

THE STRONG HEART STUDY
Cardiovascular Disease in American Indians
Manual

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1. General Description and Study Management

1.1 BACKGROUND

1.1.1 General

A review of existing data by the Subcommittee on Cardiovascular and Cerebrovascular Disease of the Secretary of Health and Human Service's Task Force on Black and Minority Health concluded that information on CVD in American Indians is inadequate and strongly recommended epidemiologic studies of this problem (1). The Strong Heart Study is designed to respond to this recommendation.

1.1.2 Scientific Background

Available data indicate that cardiovascular disease has become the leading cause of death in American Indians (2, 3, 4). Some Indian groups appear to be participating in the decline in CVD rates occurring within the overall U.S. population, but, among other Indians, rates appear to be increasing. In addition, when compared to data from other components of the U.S. population, there appears to be excessive mortality attributed to CVD in younger Indians.

Several problems have made it difficult to obtain adequate data on the prevalence and severity of CVD as a health problem among American Indians. The small size, relatively young age, cultural and anthropological diversity and the geographic dispersion of the American Indian population have made it impractical to include large numbers of subjects in research examinations and surveys of vital statistics. Excess mortality among younger Indians from noncardiovascular causes may have obscured the true risk of CVD in this population (5). Definitions of the term "Indian" are variable in published reports. The denominators from which disease rates were calculated often were based on uncertain estimates of the population at risk. Definitions of disease and methods of its ascertainment have varied in different studies. In addition, health care services available to Indians vary considerably in different geographic areas, and possibly contribute to differences in reported CVD morbidity and mortality.

States with the largest Indian populations are Arizona, Oklahoma, California, New Mexico and North Carolina. Because the major concentrations of Indian tribal groups in the U.S. are located in the Southwest, more than half of the reported studies of CVD and CVD risk factors have been conducted in these groups. Studies have been reported in the Pima, Papago, Navajo, Apache, Hopi and other tribes in the Arizona-New Mexico region (6-19). In general, these studies have concluded that CVD rates are lower in these Indian groups than in the U.S. population.

Additional reports describe small and often incomplete surveys from Minnesota, Montana, Wyoming, Oklahoma, Florida and New York (20-23) and among Alaskan Natives (24). In general, CVD rates among Indians living in the North Central states appear to be substantially higher than rates found in the Southwest (25).

Although these rates are based upon small numbers, and thus, subject to fluctuation, some reports indicate CVD rates in this area may exceed those found in the U.S. White population (3). Despite the limitations and potential sources of error, available evidence suggests that there are major differences in CVD rates among Indian tribes from different geographic areas and between the majority of Indians and the general U.S. population.

The etiology, manifestations and natural history of CVD among Indians is not well known. Current information indicates 43 per cent of heart disease deaths among Native Americans are secondary to myocardial infarction and 32 per cent are due to chronic ischemic heart disease (26). Below the age of 35 years, the heart disease rate in Native Americans exceeded reported U.S. rates. A significant portion of this excess may be due to congenital heart disease (1).

Data on temporal trends in CVD prevalence and incidence in American Indians are limited. Sievers and Fisher have suggested that CVD rates may be increasing in some Southwestern tribal groups (27). Although coronary heart disease rates are still low among the Navajos, the largest U.S. tribal group and one in which traditional lifestyles have been maintained, these rates also appear to be increasing (18).

Several possible explanations exist for differences in apparent CVD rates and for potential differences in CVD risk factor distributions among U.S. Indians. American Indians have undergone rapid cultural changes during this century with many changes taking place during the last 40 to 50 years. Prior to 1940, over 90 per cent of Indians lived on reservations set aside by the Federal Government and, in many cases, constituted a "country within a country" with customs, diets and living conditions that differed dramatically from those of the surrounding white population (28). By the 1980 census, however, almost two thirds of the 1.4 million persons identifying themselves as Indian lived off reservations, tribal trust lands or other Indian lands. Over 50 per cent lived in metropolitan areas and 10 per cent reported living on or near reservations that were in or contiguous to metropolitan areas. Poverty remains widespread and the low socioeconomic status of the majority of Indians contributes to the patterns of disease seen in this subgroup of our population. Currently, the amount of cultural and genetic admixture of American Indians with the remaining U.S. population varies substantially and corresponds generally to the geographic location of tribal groups. Far more integration has taken place in the North Central states than in the Southwest (3). These changes may account for part of the apparent tribal (and geographic) variation in reported CVD rates. Sievers and Fisher believe that the lower CVD rates found in Indians may be explained by their higher degree of Indian blood and lower levels of acculturation compared to Indians living in other geographic areas (6). Changes in lifestyle associated with this acculturation would be expected to produce increases in cholesterol levels, lower ratios of high density lipoprotein cholesterol to low density lipoprotein cholesterol, increased frequency of cigarette smoking, decreases in physical activity and an increased frequency of diabetes, hypertension, and obesity. If the preliminary data of Sievers and Fisher are correct, rates of ischemic cardiovascular disease among American Indians may increase substantially in future decades.

A frequently overlooked but potentially important distinction is the heterogeneity of the American Indian population. Tribal groups now living within U.S. borders originated from several distinct migrations from Asia into North America over a 40,000 year period. Distinct subgroups of Indians of different origin can be identified

both by linguistic analyses and by determination of genetic markers (29). Some Southwestern tribes are thought to have originated from early migrations and to have returned to the U.S. after initially migrating to Central America while other tribes now residing in the Northern United States are thought to be descendant from larger migrations which entered the U.S. from the North. The potential may still exist for comparing Indians of similar origin who have major differences in acculturation.

Limited data are available on current levels and time related changes in risk factors for ischemic cardiovascular disease among American Indians. Because of the absence of systematic surveys of defined populations and the lack of standardization of methodology employed in studies of different groups, it is difficult to interpret apparent increases in risk factors over time or to explain apparent differences in CVD rates by differences in risk factor distributions. Studies of current risk factor levels and distributions are of great importance, however, since they may provide the best estimates of the future relative risk of CVD within the Indian population.

Multiple factors may contribute to current risk factor levels in American Indians. Variations may exist among tribal groups, secondary to genetic admixture and to both the degree and duration of acculturation and in relation to attained socioeconomic status. It is important to recognize that generalizations about risk factors for CVD in American Indians are inappropriate and that available data only apply to groups with similar origins and history. Risk factor information now available is summarized below.

Rates of hypertension among Indians appear similar to rates observed in the U.S. white population (1,15,16,20,21,28,30,34,36). Rates may be increased in association with obesity and alcohol use (1).

Cholesterol levels among Indians are generally lower than those for U.S. Whites and generally lowest in Southwestern Indians (10,30,33). Limited studies of lipoprotein levels have indicated that Pima Indians have favorable HDL to LDL cholesterol ratios compared to levels observed in whites.

Excessive alcohol consumption is a well documented problem of the American Indians, particularly among males (13,34). Excessive alcohol consumption appears to increase rates of hypertension in Indians as has been shown in other populations.

Smoking prevalence rates vary greatly by tribal group and by region of county (35). In the Southwest, heavy cigarette smoking is rare although many Indians reported occasional smoking (13,36). Smoking habits of Indians in other locations were similar to those of the general population but are higher than U.S. rates in some North Central groups (25,30). These marked differences in smoking likely contribute to the differences in cardiovascular disease.

The prevalence of impaired glucose tolerance and diabetes is increased compared to both U.S. whites: and blacks among the majority of U.S. Indian tribes who have been surveyed except for those residing in Alaska (37,38). Diabetes appears to be almost exclusively of the Type II variety among full blooded Indians (39). Diabetes among Indians is highly associated with obesity and generally has an earlier age of onset than Type II diabetes seen in other populations (39). Diabetes is a risk factor for ischemic heart disease in Pima Indians, although observed rates in both diabetic and nondiabetic Pima remained lower than would be expected in comparable groups of U.S. whites (36).

In summary, studies to date indicate that rates of CVD in American Indians appear to vary up to fourfold by tribe and area of residence (3). Although studies are limited, conventional CVD risk factors appear to have expected associations with occurrence of CVD in Indians. Very limited studies suggest that rates of CVD are increasing, at least among some Indian groups.

1.2 RESEARCH OBJECTIVES

The objective of the Strong Heart Study is to employ standardized methodology to obtain estimates of CVD mortality and morbidity rates as well as to allow comparison of CVD risk factor levels among American Indian groups living in three different areas: Phoenix, Arizona, southwestern Oklahoma, and Aberdeen area, South and North Dakota.

1.3 STUDY DESIGN

The study has three components: (1) a mortality survey to estimate the CVD mortality rate, (2) a morbidity survey to estimate the incidence rates of selected CVD, and (3) a clinical examination including personal interview and physical examination to estimate the prevalence of CVD and of CVD risk factors.

The study population includes members of the following tribes:

- (1) The Pima/Maricopa Indians of central Arizona who live in the Gila River Indian Community (GRIC) and the Salt River Indian Community (SRIC).
- (2) The Seven Tribes of southwestern Oklahoma: Apache, Caddo, Comanche, Delaware, Fort Sill Apache, Kiowa and Wichita. These tribes live primarily in the southwestern Oklahoma including the following counties: Caddo, Comanche, Kiowa, Cotton, Tillman, Stephens, Washita, Jefferson, Grady, Custer, Blaine, Murray, Carter, Love, Garvin, McClain, Cleveland, Oklahoma, Canadian, Jackson, Beckham, Greer, and Harmon. The two major cities with IHS facilities in the area are Lawton and Anadarko.
- (3) The Oglala Sioux Tribe (Pine Ridge), and the Cheyenne River Sioux Tribe (Eagle Butte) of South Dakota and the Devil's Lake Sioux Tribe (Ft. Totten) of North Dakota. The following communities surrounding Pine Ridge: Wanblee (includes Hisle, Interior, Kadoka), Kyle (includes American Horse Creek), Allen (includes Batesland), Manderson (includes Grass Creek and Wounded Knee), and Porcupine (includes Rockyford) and the following five communities on the Cheyenne River Sioux Reservation: Cherry Creek (includes Bridger), Red Scaffold, White Horse (includes Moreau River and Promise), Swift Bird (includes Four Bear, Laplant and Marksville), and Eagle Butte (includes Bear Creek and Green Grass) will be included in the study. The other community included is the Ft. Totten area where the Devil's Lake Sioux Tribe of North Dakota live (see Appendix 4).

Residents who have lived in one of the study communities for at least 6 months prior to the CVD event or the physical examination will be eligible.

For the mortality surveys, resident tribal members who were 35-74 years old at the time of their death during the period from January 1, 1984 to December 31, 1988 constitute the study population for Arizona and Oklahoma. In the Dakotas, all the deaths occurring in residents of Wanblee, Porcupine, Allen, Kyle, Manderson, Swift Bird, Red Scaffold, White Horse, Cherry Creek, and the entire Devil's Lake Sioux Reservation will be included. A 50% random sample of the eligible persons from the Eagle Butte Community (living and dead) will be taken and the deaths in this random sample will be included in the mortality survey. This sampling methodology corresponds to the methodology used for the morbidity survey and for the clinical examination. For the morbidity survey, resident tribal members who were aged 45-74 years during the period from January 1, 1984 to December 31, 1988 constitute the study population. For the third component (clinical examination), tribal members who are local residents and between 45 and 74 years of age at the time of the examination will be invited to participate. Persons who are institutionalized will be excluded. Each study area is expected to recruit approximately 1500 subjects for the third component. In Arizona and Oklahoma, all persons who satisfy the above criteria will be invited. However, in the Dakotas only a representative sample will be invited due to limited resources and the large number of eligible persons. In the five communities of the Pine Ridge area, all eligible persons will be invited. Approximately 900 participants are expected. All of the eligible Cheyenne River Sioux in Cherry Creek, Red Scaffold, White Horse and Swift Bird and a 50% random sample of the eligible persons in the main community of Eagle Butte will be invited. A total of 400 persons are expected to participate in the study. Another 200 participants are expected to come from the Ft. Totten area, which will be a 100% sample. If insufficient participants are obtained, the size of the sample at Eagle Butte will be increased to provide at least 1500 participants in total.

In the calculation of the Center mortality and morbidity rates the total number of eligible persons will be estimated by using the December 31, 1988 tribal rolls taking into account the deaths occurring during 1984-1988 as confirmed by study center staff in consultation with the tribes. Every Center will compile a list of eligible persons. Steps for calculation of the denominator for mortality and morbidity rates are:

- (1) Obtain tribal rolls for 1988.
- (2) Confirm residence using IHS records and consultation with tribe.
- (3) Calculate person years for 35-74 years old (mortality survey) and 45-74 years old (morbidity survey) for each year from 1984-1988.
- (4) Include person years for all deaths.
- (5) Assume immigration equals emigration.
- (6) For denominator for morbidity incidence rates (for myocardial infarction and stroke) follow steps 1-5 for 45-74 years old and correct for prevalence of disease.
- (7) For prevalence rates, the denominator will be all those tribal members 45-74 years old who attend the clinical examination. Exclude individuals who are institutionalized for all of the examination period.

1.3.1 The Mortality Survey

For the mortality survey of the study all deaths occurring among eligible members aged 35 and 74 years in the three study areas between 1/1/84 and 12/31/88 will first be identified through tribal records and other sources. Death certificates will be obtained and coded by a central nosologist. All death certificates with any mention of CVD will be further reviewed and the cause of death confirmed independently. The confirmed CVD deaths will be used to calculate CVD mortality rates.

1.3.2 The Morbidity Survey

Possible cases of CVD will be identified in the three study areas through the review of hospital records. Persons eligible will be tribal members aged 45-74 years at any time during 1/1/84-12/31/88 who were discharged from the hospital with a diagnosis of CVD between 1/1/84-12/31/88. Relevant information from the medical record will be abstracted to allow independent confirmation of the diagnosis of an incident or recurrent case. CVD events to be ascertained include the following:

1. Acute myocardial infarction (ICD9 410)
2. Stroke (ICD9 431,432,434,436)

Incident rates, incidence density, as well as total incidence (40) will be estimated.

1.3.3 The Clinical Examination

The third component of the study consists of a personal interview, a limited physical examination, and laboratory tests for evidence of prevalent CVD, peripheral vascular disease (PVD) and risk factor assessment. Eligible persons will be tribal members aged 45-74 at the time of the examination. Those eligible to participate will be contacted by the staff at each study center.

1. Personal Interview

Information on the following risk factors will be obtained from the personal interview:

- (a) Demographic data: age, sex, quantum of Indian blood and quantum of Indian blood of subject's parents and grandparents.
- (b) Education
- (c) Family history of CVD
- (d) Tobacco use and alcohol consumption
- (e) Traditional values/culture
- (f) Socioeconomic/stress evaluation
- (g) Physical activity
- (h) Medical history, particularly CVD history
- (i) Diet - This will be done on a random sample if extra support is found.

2. Physical examination

The physical examination will include the following procedures:

- (a) Height and weight
- (b) Girth measurements: supine waist (abdominal) girth, erect hip girth, and upper arm circumference
- (c) Measurements: of body fat using impedance meter
- (d) Sitting arm blood pressure
- (e) Ankle and arm blood pressures in supine position using the doppler
- (f) A resting 12-lead ECG
- (g) Examination of heart and lungs
- (h) Palpation of posterior tibial and Pedal pulses
- (i) Auscultation of femoral and carotid bruits

3. Laboratory measurements:

- (a) Lipids: TC, TG, HDL-C, LDL-C, VLDL-C and VLDL-TG
- (b) Apolipoproteins: ApoB, ApoA-I, Lp(a), Apo E phenotype
- (c) Fasting insulin
- (d) Plasma creatinine
- (e) Fasting glucose and 2-hour glucose tolerance test (GTT)
- (f) Urinary albumin and creatinine
- (g) Fibrinogen
- (h) Glycated hemoglobin (HbA_{1c})
- (i) DNA extraction and storage

1.4 STUDY QUESTIONS

1.4.1 Mortality Survey

1. What are the CVD mortality rates (average annual rates for 1984-1988) in the three centers, and how do they compare to one another ?
 - a) Mortality rates will be estimated for acute myocardial infarction, stroke, congestive heart failure, total cardiovascular diseases, total mortality, diabetes,* cancer,* and external and other causes*.
 - b) Estimated mortality rates will include the following:
 - (1) Age-specific (four 10-year age group)
 - (2) Sex-specific
 - (3) Age and sex-specific (8 groups)
 - (4) Age-sex adjusted to U.S. population aged 35-74

* These will be collected by death certificate only. No attempt will be made to confirm cause of death.

2. How do these rates compare with reported rates for the U.S. population?
3. How do these rates compare with reported rates for Indians in these areas?
4. How do these rates compare among the tribes and among the three centers?

1.4.2 Morbidity Survey

1. Incidence Rates

- (a) What are the CVD incidence rates (average annual rates for 1984-1988) in the three centers, and how do they compare to one another?
 - (1) Incidence rates and total incidence will be estimated for hospitalized acute myocardial infarction, and stroke.
 - (2) Estimated incidence rates will include the following:
 - (i) Age-specific (three 10-year age group)
 - (ii) Sex-specific
 - (iii) Age and sex-specific (6 groups)
 - (iv) Age-sex adjusted to U.S. population
- (b) How do these rates compare to published rates of other population (e.g., Framingham, Minnesota Heart Study, etc.)?

1.4.3 Clinical Examination

1. Prevalence Rates by Examination

- (a) What are the prevalence rates of CVD and related diseases in the three centers, and how do they compare to one another?
 - (1) Prevalence rates will be estimated for angina, ischemic heart disease with a history of myocardial infarction, cerebrovascular disease with a history of stroke, congestive heart failure, diabetes, impaired glucose tolerance, ECG abnormalities, large vessel peripheral arterial disease, and hypertension.
 - (2) Estimated prevalence rates will include the following:
 - (i) Age specific (three 10 year age groups)
 - (ii) Sex specific
 - (iii) Age and sex-specific (6 groups)
 - (iv) By degree of Indian blood (e.g. $< \frac{1}{4}$, $\frac{1}{4}-\frac{1}{2}$, $\frac{1}{2}-\frac{3}{4}$, $> \frac{3}{4}$)
 - (v) Age-sex adjusted to U.S. population
- (b) How do these rates compare to those from other studies?

2. Risk Factor Analysis

- (a) What are the prevalence rates or distributions of the following risk factors in each of the three centers, and how do they compare to one another ?
- (1) Hypertension
 - (2) Tobacco use
 - (3) Lipids (TC, TG, LDL-C, VLDL-C, VLDL-TG, HDL-C)
 - (4) Obesity (% body fat)
 - (5) Diabetes, impaired glucose tolerance (IGT)
 - (6) Concentrations of insulin, HbA_{1c}, glucose
 - (7) Apoproteins ApoA-I, ApoB, Lp(a), Apo-E phenotypes
 - (8) Fibrinogen
 - (9) Alcohol consumption
 - (10) Physical Activity
 - (11) Diet
 - (12) Degree of Indian blood
 - (13) Family history of CVD
 - (14) Acculturation
 - (15) Education/Socioeconomic status
 - (16) Intake of dietary fat, cholesterol, animal protein, fiber and total calories
- (b) What individual risk factors and/or combinations of risk factors are associated with CVD prevalence? What is the degree of association ?
- (c) What are the most important risk factors associated with CVD prevalence in each of the three centers, and how do the centers differ from one another ?
- (d) Can the data for mortality, morbidity and risk factors be combined and analyzed collectively ?
- (e) What are the relationships among risk factors in each centers and how do they compare among the centers?

1.5 STUDY MANAGEMENT

1.5.1 Introduction

The Strong Heart Study is funded by the National Heart, Lung, and Blood Institute, and directed by the Clinical and Genetic Epidemiology Branch, Epidemiology and Biometry Program, Division of Epidemiology and Clinical Applications. The Principal and Co-investigators are listed in Appendix 1. The operations of the study are directed by the Strong Heart Study Steering Committee, which includes members from each center and the NHLBI Project Manager. An organizational chart of the Strong Heart Study is given in Appendix 2. In addition to being a field center, the Oklahoma Center assumes the responsibility of the Coordinating Center, the Dakotas Center is the ECG Reading Center and the Arizona Center acts as the Core Laboratory. Other key personnel at each center and consultants of the Study are listed in Appendix 3.

1.5.2 Confidentiality of Data

All personnel with access to data collected for the study at each center are required to sign a confidentiality pledge which states that they understand the sensitive and confidential nature of the data and that divulgence of any information will result in disciplinary action. The pledge will be co-signed by the principal investigator. A sample of the confidential pledge is given in Appendix 6 (b).

Completed data forms will be placed in locked file cabinets in offices assigned to the study at each study center and at the Coordinating Center. Only authorized staff members have the key to the office and access to the data forms.

Data on computers at the Coordinating Center will be safeguarded by a password which is known only to authorized personnel.

1.5.3 Communications

1. Newsletter:

The Coordinating Center prepares and distributes a quarterly newsletter to facilitate communication among Study staff. In general, each edition includes: (1) reports from the Program Office, the Coordinating Center, the Core Laboratory, the ECG Reading Center, and the Steering Committee, (2) a description of the facilities and staff of one field center or central agency, (3) general information on data management and (4) a calendar of events. The newsletter also provides reports on issues such as recruitment and participant follow-up rates, the development and use of new equipment, and preliminary study results and abstracts.

2. Electronic Mail

FAX will be the major electronic mail facility to be used by all field centers, the Coordinating Center, Core Laboratory, ECG Reading Center and the Program Office. This electronic mail network will allow rapid and efficient communication among centers for messages such as announcements, meeting agendas, abstracts for clearance and acknowledgements of receipt of data.

3. Field Center Visits

The Program Office and Staff from the Coordinating Center, ECG Reading Center and Core Laboratory conduct periodic monitoring visits to field centers as needed to: (1) maintain channels of communication with field center investigators and staff, (2) monitor participant recruitment and surveillance procedures, (3) monitor adherence to the protocol, and (4) provide technical support for activities such as data management and quality control.

1.6 DATA MANAGEMENT AND STATISTICAL ANALYSIS

In the interest of standardization of the data management process, the following guidelines are recommended:

- a. All data collected by the three Study Centers will be entered, managed and analyzed by the Coordinating Center.
- b. All file restorations will be performed on IBM personal computers or on IBM compatible computers.
- c. Removable diskette drive A: of the computer will be of the 3.5 inch hard cased 1.44 megabyte format type.
- d. The operating system for the computer will be DOS 3.3 or any operating system that reliably emulates DOS 3.3.
- e. The set of DOS programs will be located on the C: hard disk drive in the directory C:\DOS; directory C:\DOS will be included in the DOS path list.
- f. Each Study Center will license SAS software for the personal computer that minimally will include the SAS/BASE programs.
- g. SAS software will be located on the C: hard disk in directory C:\SAS and will be installed as recommended by SAS Institute.

1.6.1 Data Forms and Guidelines for Completing Forms

Uniform data entry forms for all information to be collected will be designed by the Coordinating Center for use by each Study Center. Each study subject will have a unique identification number (ID number). The ID number is a six digit number: the first digit is the center code (1 = the Dakota Study Center, 2 = the Oklahoma Study Center, and 3 = the Arizona Study Center), the second digit indicates the vital status of the subject (1 = dead and 0 = alive), and the last 4 digits are for the local identification number. For convenience, for subjects in the mortality study (deaths) the last four digits will start from 0001, and those in the morbidity study (living participants) will have numbers beginning with 2001. For example, 110001 will be the ID number of the first death identified at the Dakota Study Center and 302001 the ID number of the first living participant at the Arizona Study Center. The ID number will be stamped on every page of all forms at each center. For laboratory specimens, Computype brand labels will be used. Page 12a gives examples of how to assign ID numbers.

Standard IHS community codes will be used to identify the community where the participant resides. A list of community codes for the three centers is given in Appendix 4. Hospitals where the subject died or were treated for CVD are also coded. Standard IHS facility codes will be used to identify IHS hospitals and clinics. Codes for other non-IHS hospitals will be assigned by each center. The hospital/clinic codes are given in Appendix 5. In addition, every member of the Study is assigned a Personnel Code which will be used to identify the person who filled out a specific data form. The Personnel Codes for the three centers are listed in Appendix 6. Additional Codes will be added sequentially as new employees begin to work on the project.

All data forms must be filled out legibly and completely. Each and every form will be reviewed and checked for completeness and legibility before it is sent to the Coordinating Center. The following are a few guidelines for form completion:

1. All forms should be filled out in black pen. Print all information in block capital letters, with one letter only in each box, so that keypunch errors can be minimized. For example, one should differentiate: 7 from 1, U from V, 4 from 6, P from D, M from N, C from O, and T from J.
2. For names and addresses, start from the leftmost box and leave the unused boxes blank. Include periods for initials.

Example:

Name:

A	.	D	.	H	A	R	J	O
---	---	---	---	---	---	---	---	---

If the address is a post office box or rural route, record in the field for "street number", as

P	O		B	O	X		2	0	5	
---	---	--	---	---	---	--	---	---	---	--

or

R	O	U	T	E		5	
---	---	---	---	---	--	---	--

3. For numerical values, fill in the boxes in a right justified manner and leave the unused boxes blank.

Example:

Triglyceride:

			2	0	5
--	--	--	---	---	---

4. For dates, two digits are allowed for each of the month, day and year. If the number has only one digit, use zero in front of the number.

Example:

Date of birth:

0	5
---	---

 -

0	8
---	---

 -

2	9
---	---

mo day yr

5. When recording dates, use 99 for missing months, days or years.
6. To correct an error, draw a single line through the mistake and write the correct value above.

Example:

Age at Death:

7	8
---	--------------

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ASSIGNMENT OF ID NUMBERS FOR STRONG HEART STUDY

This is a procedure for assigning numbers to Strong Heart Study participants and for individuals who are morbid, or mortal cases but do not participate in the study. Examples given below are using Darkotas participants.

1. Participants in the physical examination will be assigned as they have been in the past with the following sequences:

102000 - 102999: Pine Ridge
103000 - 103499: Eagle Butte
103500 - 103699: Fort Totten

The same number will be used for the morbidity forms if the participant was hospitalized for cardiovascular disease. Using the same identification number, a separate morbidity form must be completed for each hospitalization with ICD-9 discharge diagnoses 402, 410-414, 427, 428, 518.4, or 430-458.

2. Deceased tribal members who died between 1984 and 1988 will be assigned the following numbers for the mortality surveillance.

110000 - 110999: Pine Ridge
111000 - 111499: Eagle Butte
111500 - 111700: Fort Totten

If a deceased person had previously been hospitalized and has discharge codes as noted above (see #1), the last four digits will remain the same but the second digit will be changed from 1 to 5 when filling out the morbidity forms. A separate morbidity form must be completed for each hospitalization using the same identification number. For example,

if 111047 had CVD event, then the ID for the morbidity for would be 151047.

3. Individuals who are alive, December 31, 1988 but who refuse to participate or who are not eligible to participate, and have morbid events will be assigned numbers as follows:

106000 - 106999: Pine Ridge
107000 - 107499: Eagle Butte
107500 - 107699: Fort Totten

Non-participant forms should also be assigned numbers according to this sequence when they are completed. If an eligible person decides to participate after being assigned a non-participant number, he/she should be assigned a number according to (#1) above and the data center should be requested to delete the data entered on the non-participant form and to change the number on any other forms. This persons non-participant number can then be reassigned to the next non-participant.

4. These individuals are assigned numbers in this sequence so that the study will be able to keep track of which category they are in. The last four (4) numbers should be unique for each individual in the study.

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7. Fractions should be rounded up to the nearest whole number if the fraction is 0.5 or more, otherwise, drop the fraction, e.g. $2.25 = 2$; $2.75 = 3$; $3.5 = 4$.
8. If an interval is given, record the midpoint of the interval if it is a whole number. If the midpoint includes the fraction 0.5, use the rounding rules previously given.

Example:

16-18 months, midpoint = 17 months, record 17.
 13-14 months, midpoint = 13.5 months, record 14.

9. Unless otherwise instructed, no item on any of the forms should ever be left blank. Codes to be used in the event of missing or incomplete data are given under the heading of each specific item. If there is not a code for the "unknown" category, draw two parallel lines horizontally through the box or boxes to indicate that the interviewer or abstractor did not ignore the question. For example, if the time of death is unknown, do the following:

Time of death:

--

 :

--

1.6.2 Monthly Mailings Of Data To The Coordinating Center

The Arizona Study Center will cease data collection at the close of operations on the first Friday of each month and prepare all recently collected data for shipment to the Coordinating Center. The Oklahoma Study Center will do the same on the second Friday of the month, as will the South Dakota Study Center on the third Friday of the month. This will allow for modular migration of data files to the Coordinating Center.

Preparation of the data for shipping will require a review of each data form for completeness (i.e. no missing responses or miscoded entries). Legible photocopies will be made of all original data forms. The photocopied forms will be separated by form type and sorted in ascending order by ID number. These forms should be packaged in a mailer made of corrugated cardboard and secured with the type of mailing tape that has fibre threads running through it. Each mailer should be labeled with large legible printing of the following address:

Dr. Elisa T. Lee
 Strong Heart Study
 Department of Biostatistics and Epidemiology
 OUHSC -CHB 301
 P.O. BOX 26901
 Oklahoma City, OK 73190

This label should be covered with clear adhesive tape to protect the label from moisture. The original data forms associated with this mailing should not be filed until the Coordinating Center acknowledges receipt of the photocopies. In the event that forms are lost in the mail, the Study Center must photocopy the originals a second time and repeat the above processing.

1.6.3 Restoration of Coordinating Center Backup Diskettes

After receipt of data forms from a Study Center, the Coordinating Center will forward monthly to that Study Center diskettes which contain backup copies of the databases. The first diskette (in case of multiple diskettes) will be labelled with the command line that must be typed at the DOS prompt in order to RESTORE the databases at the Study Center. A typical example of such a command line is given by the following:

C:\DOS\RESTORE A: C:\AZ89JUL*. * /S

In this example, the data of the Arizona (AZ) Study Center for the year 1989 (89) and the month July (JUL) is to be restored from the Coordinating Center backup. The first diskette would be placed into the A: drive and the command given on the diskette label (above) would be typed and the ENTER key pressed.

1.6.4 Statistical Analysis

(1) Mortality rate (or mortality density)

Mortality events can be grouped into three classes: (1) death due to CVD, i.e., CVD is the immediate cause of death, (2) death due to causes other than CVD in patients with CVD, i.e., CVD is the underlying or contributing cause of death, and (3) death due to causes other than CVD in patients without CVD, i.e. CVD is not mentioned on the death certificate. Classes (1) and (2) are of interest to this study. Let D represent the number of these events occurring between 1984 and 1988. To determine the CVD mortality rate, the total number of deaths will be the numerator and the total population-time (or person-year) contributed by all eligible participants (living and dead) the denominator. Thus, the estimated mortality rate due to CVD for 1984-88 is

$$MR_{(1984-88)} = D/PT$$

where $PT = \sum_{i=1}^n \Delta t_i$, n is the total number of eligible persons and Δt_i is the

follow-up period for the ith individual from the time he/she satisfies the age criteria to death (for the deceased) or to December 31, 1988 (for the living participants). Since the December 31, 1988 tribal roll will be used to estimate the total number of eligible persons and information of those who migrated out of the area is unavailable, losses-to-follow-up will be ignored. Eligible members are tribal members who were 35 to 74 years old during 1984-88 (born between January 1, 1910 and December 31, 1953). The December 31, 1988 tribal roll will be used to estimate the number. The Δt_i will be computed as follows:

<u>Birth Date</u>	<u>Δt_i(contribution to PT)</u>
1/1/10 to 12/31/10	\leq 1 year, from birthdate to death or to 12/31/84

1/1/11 to 12/31/11	≤ 2 years, from birthdate to death or to 12/31/85
1/1/12 to 12/31/12	≤ 3 years, from birthdate to death or to 12/31/86
1/1/13 to 12/31/13	≤ 4 years, from birthdate to death or to 12/31/87
1/1/14 to 12/31/49	≤ 5 years, from birthdate to death or to 12/31/88
1/1/50 to 12/31/50	≤ 4 years, from birthdate to death or to 12/31/88
1/1/51 to 12/31/51	≤ 3 years, from birthdate to death or to 12/31/88
1/1/52 to 12/31/52	≤ 2 years, from birthdate to death or to 12/31/88
1/1/53 to 12/31/53	≤ 1 year, from birthdate to death or to 12/31/88

Age and sex specific CVD mortality rates will be estimated in a similar way.

(2) Incidence rate (or incidence density) and Total incidence

Average five-year incidence rates of acute myocardial infarction and stroke will be estimated in a manner analogous to the mortality rate:

$$IR_{(1984-88)} = I/PT$$

where I is the number of new cases that occurred during the calendar period 1984-88, PT is the amount of population-time (person-year) accrued

by the eligible CVD free study population, $PT = \sum_{i=1}^n \Delta t_i$. The eligible

population consists of tribal members who reside in Study Communities and who were between 45 and 74 years old (born between January 1, 1910 and December 31, 1943). The December 31, 1988 tribal roll plus the deaths occurring during 1984-88 minus the number of prevalent cases will be used to estimate the number. In the Dakotas random sampling is used to determine the eligible population in the town of Eagle Butte and the Ft. Totten service unit as described in the mortality study design. The number of prevalent cases will be obtained from the clinical examination and medical record review. The individual contribution (Δt_i) to the calculation of PT is similar to that in the estimation of mortality rates.

Since myocardial infarction and stroke may occur more than once within an individual, the total incidence will also be estimated. Let T be the total number of new and recurrent events (MI or stroke) that occurred during the calendar period 1984-88 and TPT be the total amount of population-time (person-year) accrued by the eligible study population, the total incidence is estimated as follows:

1989 - 1991
45 - 74 45 - 47
12-31-1915 1-1-1946

1-1-1915 to 12-31-1946

$$TI_{(1984-88)} = T/TPT.$$

The calculation of TPT is slightly different from PT:

$$TPT = \sum_{i=1}^n T_i$$

where n is the total number of eligible persons and T_i is the total follow-up time of the i th person, from the time he/she is eligible for the Study to death or December 31, 1988.

(3) Prevalence rate

Cases identified in the examination from persons between 45 and 74 years of age will allow us to estimate the point prevalence rate. The point estimate is calculated by:

$$P_t = C_t/N_t$$

where C_t is the number of CVD cases found and N_t the size of the sample or study population, at time t . A function of the point prevalence, namely, the prevalence odds (probability of being a case divided by the probability of not being a case at time t) can also be calculated. In addition, age, sex and exposure-specific prevalence rates will be obtained.

Since this is a cross-sectional study, the following prevalence ratio can be used to compare CVD prevalence between centers and between subgroups (or exposure groups in a broad sense, such as smokers and nonsmokers)

$$PR_i = P_i/P_o$$

where P_i and P_o are the estimated prevalence rates, respectively, for the center (or exposure group) and the reference center (or reference exposure group) (40).

(4) Risk Factor Assessment

Risk factors for each subtype of CVD in each center will be identified and compared with those identified in other centers. Both univariate and multivariate methods will be employed to examine associations between potential risk factors and morbidity endpoints. Cardiovascular disease rates will be estimated for the "exposed" and "unexposed" groups and tested for equality by chi-square methods. Odds ratios (OR) and 95% confidence intervals will also be obtained. For continuous variables, such as cholesterol concentration, the t-test will be used to compare means between the CVD cases and non-CVD persons within each center and for all centers. If the distribution of a variable is skewed, a logarithmic transformation will be considered or a nonparametric test (e.g. the Mann-Whitney U test) may be used.

If the number of non-responders is large, we will examine the characteristics of the nonresponders obtained from chart. Nonparticipation fractions for each of the four exposure-disease cells can then be estimated and the OR corrected according to methods described by Kleinbaum et al (41). Nonresponse bias will also be estimated.

In evaluating a possible risk factor, one must consider potential confounding variables. For example, in assessing the association of blood pressure and coronary heart disease, one must consider the extraneous effect of age. One method to control for confounding factors is stratified analysis. Decisions needed to be made include the determination of the variables to be used to stratify and the selection of ways to form strata. The Mantel-Haenszel Method (42) will be used to estimate summary odds ratios and to test for significant association.

Another method to be used for control of confounding variables is multivariate mathematical modeling. This method will enable us to control for several confounding variables simultaneously, to estimate overall effect and to test for overall association. The most commonly used model is the linear logistic regression (40,43). Odds ratios and confidence intervals will be estimated from this model for the various exposure factors and each subtype of CVD.

Significant risk factors identified from the above methods for each center will then be compared. Factors which appear to act across the centers and those which appear to act only in a specific population will be identified.

1.7 PUBLICATION POLICY

Overall responsibility for manuscript and abstract generation and approval for the Strong Heart Study lies with the Steering Committee, which also serves as the Publication Committee. This committee has developed procedures for generating manuscripts and abstracts as well as the formal requirements for manuscript approval prior to submission for publication or abstract submission before presentations.

The overall aim of this process is to encourage the preparation of manuscripts and abstracts while also providing appropriate control over their quality and content.

This section discusses the procedures for both the generation phase and the approval phase. It reviews the different types of possible publications and presentations, authorship, and general strategy for preparation of manuscripts and abstracts, and describes in more detail the requirements for each type of publication or presentation.

1.7.1 Types of Publications and Presentations

There are several types of publications and presentations for which approval procedures are established. These include:

- (1) Major descriptions of the design and conduct of the study.
- (2) Descriptions of results, based on data from all field centers, addressing the objectives of the study.
- (3) Descriptions of results based on data collected from a single field center.
- (4) Descriptions of methodological developments required to meet the needs of the study.
- (5) Articles to appear in proceedings of meetings for which no abstract was required.
- (6) Invited presentations.
- (7) Press releases or discussions with the media.

The Steering Committee is responsible for resolving any uncertainties as to which category a specific presentation or publication belongs.

1.7.2 Outline of the Preparation and Approval Process

The basic steps for the generation and approval of publications and presentations are listed below:

- (1) The Steering Committee designates a topic.
- (2) The Steering Committee selects a writing group and its chairperson. A member of the Coordinating Center will be included in each writing group.
- (3) The writing group prepares specifications for the manuscript and obtains Steering Committee approval.
- (4) The writing group prepares and communicates computational specifications to the Coordinating Center.
- (5) The Coordinating Center prepares statistical computations according to priorities specified by the Steering Committee.
- (6) The writing group prepares, reviews internally, and submits the completed document to the Steering Committee for review and approval.
- (7) The manuscript is formally submitted to a journal or abstract selection process.

The overall responsibility for managing the entire process lies with the Steering Committee.

1.7.3 Authorship

The authorship policy varies according to the type of publication or presentation being considered. In all cases, the persons preparing the manuscript are listed as authors. Some abstracts and presentations can be listed as presented by someone for the study. The person assuming the primary responsibility will be listed as the first author. In addition, the phrase "Strong Heart Study" is to be included in the title and listed as a "keyword" whenever possible.

The Steering Committee is responsible for resolving any conflict or confusion that occurs with respect to appropriate recognition of authorship.

1.7.4 Manuscript and Abstract Generation

The general procedure for generating manuscripts or abstracts is for the Steering Committee to designate a writing group with the charge to develop the manuscript for publication or presentation. The impetus for this designation may come directly from the Steering Committee or may be in response to a request or suggestion from outside the committee. Once it is decided that a specific manuscript will be developed, the writing group and its chairperson will be specified.

Under normal circumstances the chairperson, who has the lead responsibility for this task, will also be listed as the first author. The chairperson also has the responsibility for listing the co-authors in the appropriate order. As indicated above, the Steering Committee serves as final arbitrator of any conflicts.

Individuals interested in preparing a manuscript or abstract on a specific topic must submit their proposal, which should include suggestions for writing group members, to the Steering Committee for approval. The proposal must include a clear statement of the nature of the publication, and should, if appropriate, also include the hypotheses to be addressed and the types of statistical computations or data summarizations likely to be required.

The Steering Committee has the responsibility for reviewing these proposals, both for appropriateness and for a priority designation. The Steering Committee also ensures that the different participating centers and groups are appropriately represented and that appropriate recognition is provided.

Once the specifications for the manuscript have been approved, the requirements for statistical computing can be formally communicated to the Coordinating Center. Requests will be processed according to the priorities specified by the Steering Committee. The Coordinating Center has representation on the writing group whenever possible and this person serves as the liaison to the writing group both for communications about computing issues and for providing or obtaining appropriate statistical input.

The Steering Committee reviews the progress that each writing group is making toward the completion of its task and makes those changes required for the timely completion of each manuscript or abstract.

1.7.5 Approval Procedures

A manuscript stemming from the Strong Heart Study is submitted to the chairperson of the Steering Committee, who sends copies of the manuscript to all Steering Committee members for their critique. Upon receiving the critiques, two courses of action are possible: (1) If the chairperson deems the reviewers suggestions to be mainly editorial in nature, she may approve the manuscript and request that the authors incorporate suggested changes to the final version, or submit in writing reasons for not doing so. No further action is needed from the Steering Committee; or (2) If, in the chairperson's judgment, critiques entail substantive changes, the revised manuscript must be further reviewed by the primary reviewers. Approval by NHLBI and IHS will next be initiated. Each center will be responsible for obtaining local IHS approval. The Dakotas Center, on behalf of the three centers, will also submit the manuscript to IHS headquarters for approval for the Study.

1.7.6 Press Releases and Media Discussions

In general, scientific findings from the Study made available to the media will involve those findings being presented at scientific meetings and being published in the scientific literature. Such presentations and publications require prior clearance as noted above. In some circumstances, media discussions and press releases may be appropriate to clarify scientific findings for the lay public, but they should not be used as forums to release new information. Investigators are requested to keep the Program Office informed of contacts with representatives of the major national media and of major national media coverage of information which they have supplied. If a situation arises in which it appears desirable to release to the media new information not otherwise cleared for presentation or publication, prior clearance from both the Steering Committee and the Program Office is required.

Release of general descriptive information about the study for local use (such as a local newspaper, university newsletter or state medical society journal) does not require prior approval. Use of centrally prepared materials for such purposes is encouraged. A copy of any resultant article should be sent to the Program Office and the participating tribes. All those communicating with the media will be sensitive of the special needs and concerns of the Indian Communities involved. Any interviews or photographs involving tribal members must have prior approval of the tribe.

1.8 Ancillary Studies Policy

1.8.1. General Policy

To enhance the value of Strong Heart Study and to ensure the continued interest of the investigators, the Steering Committee welcomes proposals from individual investigators to carry out ancillary studies. Nevertheless, to protect the integrity of the Study, such ancillary studies must be reviewed and approved by the Steering Committee before their inception. In general, ancillary studies require outside (non-Strong Heart Study) funding.

1.8.2 Definition of an Ancillary Study

An ancillary study is one based on information from the Study participants in an investigation which is not described in the Strong Heart Study protocol and involves data which are not collected as part of the routine Strong Heart Study data set. The core Strong Heart Study includes the use of blood and DNA stored for case-control studies selected by the Steering Committee; these are not considered ancillary studies.

1.8.3 Requirements for Approval of an Ancillary Study

Before an ancillary study can be approved, it must be shown that the ancillary study will have scientific merit but will not do any of the following:

- (1) Interfere with the completion of the main objectives of the Strong Heart Study.
- (2) Adversely affect participant cooperation in compliance in the Strong Heart Study.
- (3) Create a serious diversion of study resources (personnel, equipment or study samples), either locally or centrally.
- (4) Jeopardize the public image of the Strong Heart Study.

1.8.4 Preparation of Request for Approval of an Ancillary Study

A written request for approval of an ancillary study should be submitted to the Steering Committee and should contain the following information:

- (1) Description of objectives.
- (2) Scientific merit of study.
- (3) Methodology for data collection.
- (4) Proposed statistical analyses.
- (5) Names of definite or possible collaborators.
- (6) Proposed funding sources.
- (7) Discussion of impact on main Strong Heart Study.

1.8.5 Review of Ancillary Study Proposals

The Steering Committee will review and will approve, reject or request modification of ancillary study proposals in a timely manner. At least one Strong Heart Study investigator must be included as a co-investigator in each proposal. Strong Heart Study investigators other than those submitting the proposal may request to become collaborators on a proposal if they have a specific interest in the topic. The key criteria for approval of proposals are scientific merit and impact on the main Study.

1.8.6 Analysis and Publication of Results of Ancillary Studies

The investigator of the ancillary study, and if necessary the Steering Committee, will consult with the Coordinating Center during data analysis to ensure that all study data used in analysis of ancillary study results are consistent with data in the main study database. Manuscripts resulting from ancillary studies will require approval by the Steering Committee and by NHLBI prior to submission for publication or presentation. The investigator who assumes lead responsibility for the ancillary study shall be listed as senior author. The phrase "The Strong Heart Study" should be included in the title and listed as a key word whenever possible. Manuscripts will also contain an appendix listing all Strong Heart Study Principal Investigators as well as other individuals deemed appropriate.

1.8.7 Feedback of Results of Ancillary Studies to Participants

Results of ancillary studies shall be reported to participants and/or their physicians if medically useful. Such reporting should follow standard Strong Heart protocol for notification of participants. A copy of any resultant article should be sent to the Program Office and the participating tribes.

2. Mortality Survey

The most important feature of the mortality study is the identification and confirmation of the CVD deaths of interest.

2.1 ELIGIBILITY CRITERIA

Fatal events are selected according to the following eligibility criteria:

- (1) Age. Only deaths at ages 35 to 74 are included
- (2) Tribal Affiliation. The decedent must have been enrolled in one of study tribes.
- (3) Place of Residence. The decedent must have lived within the study community. The residence recorded on the death certificate determines eligibility. People institutionalized at the time of death will be included.
- (4) Time. Only deaths occurring between January 1, 1984 and December 31, 1988 are eligible.

2.2 DEFINITIONS OF CVD DEATHS

The following will be the primary events of interest:

- (1) Definite fatal myocardial infarction (MI)
- (2) Definite sudden death due to coronary heart disease (CHD)
- (3) Definite fatal CHD
- (4) Possible fatal CHD
- (5) Definite fatal Stroke
- (6) Possible fatal stroke
- (7) Definite fatal congestive heart failure (CHF)
- (8) Possible fatal CHF
- (9) Other fatal CVD

All death certificates will be recoded by the study nosologist. After recoding the following ICD codes will be utilized to identify subjects for detailed mortality review: possible cardiovascular disease 250, 390-448, 518.4, 585, 798 and 799.

Criteria used for ascertaining the primary CVD deaths are the International Diagnostic criteria for acute myocardial infarction and acute stroke (44) and criteria for fatal CHF of the Framingham study (45):

2.2.1 Definite fatal myocardial infarction (MI)

(1a) Definite MI within 4 weeks of death by criteria:

1. Evolving diagnostic ECG

AND/OR

2. Diagnostic ECG and abnormal enzymes

AND/OR

3. Prolonged cardiac pain and abnormal enzymes.

OR

(1b) Acute MI diagnosed by autopsy

AND

(2) No known nonatherosclerotic or noncardiac-atherosclerotic process that was probably lethal according to death certificate, autopsy report, hospital records, or physician records.

2.2.2 Definite sudden death due to coronary heart disease (CHD)

(1) Death witnessed as occurring within 1 hour after the onset of severe cardiac symptoms (cardiac pain - see below, shortness of breath, fainting) or within 1 hour after the subject was last seen without symptoms

AND

(2) No documentation of definite acute MI within, 4 weeks prior to death by criteria (see (1)a. in Section 2.2.1 for criteria for definite MI)

AND

(3) No known nonatherosclerotic or noncardiac-atherosclerotic process that was probably lethal according to death certificate, autopsy report, hospital records, or physician report.

2.2.3 Definite fatal CHD

(1) Death certificate with consistent underlying or immediate cause(s) (ICD-9 codes 410-414)

AND

- (2) No documentation by criteria of definite acute MI within 4 weeks prior to death

AND

- (3) Criteria for sudden death not met

AND

- (4) No known nonatherosclerotic or noncardiac-atherosclerotic process or event that was probably lethal according to death certificate, autopsy report, hospital records, or physician records

AND

- (5a) Previous history of MI according to relative, physician, or hospital records, or definite MI (see criteria above) or possible MI by criteria below:

One or more of the following categories:*

- 1) Equivocal enzymes and equivocal ECG (with or without pain)
- 2) Equivocal enzymes and diagnostic ECG (no pain)
- 3) Abnormal enzymes and other ECG (no pain)
- 4) Abnormal enzymes and equivocal ECG (no pain)
- 5) Abnormal enzymes alone (no pain, ECG absent or uncodeable)
- 6) Prolonged cardiac pain and equivocal enzymes (ECG absent or uncodeable)
- 7) Prolonged cardiac pain and equivocal ECG (enzymes incomplete)
- 8) Prolonged cardiac pain and diagnostic ECG (equivocal or incomplete enzymes)
- 9) Prolonged cardiac pain alone (ECG and enzymes incomplete)
- 10) Prolonged cardiac pain, "other" ECG, equivocal enzymes
- 11) Prolonged cardiac pain, "other" ECG, incomplete enzymes

OR

- (5b) Autopsy reporting severe atherosclerotic-coronary artery disease or old MI without acute MI (>50% proximal narrowing of two major vessels or >75% proximal narrowing of one more vessel if anatomic details given)

OR

- (5c) Rapid death:

Death occurring greater than 1 and less than or equal to 24 hours after the onset of severe cardiac symptoms or after subject was last seen without symptoms.

* Definitions are given in Section 2.3.

2.2.4 Possible fatal CHD

- (1) No documentation by criteria of definite acute MI within 4 weeks prior to death

AND

- (2) No documentation by criteria of definite sudden death

AND

- (3) No documentation by criteria of definite fatal CHD

AND

- (4) Death certificate with consistent underlying or immediate cause (ICD-9 codes 410-414)

AND

- (5) No known nonatherosclerotic or noncardiac-atherosclerotic process that was probably lethal according to death certificate, autopsy report, hospital records, or physician records.

2.2.5 Definite Fatal Stroke

- (1a) Cerebral infarction or hemorrhage diagnosed at autopsy

AND

- (1b) No other disease process or event such as brain tumor, subdural hematoma, subarachnoid hemorrhage, metabolic disorder, or peripheral lesion that could cause localizing neurologic deficit or coma - according to death certificate, autopsy, hospital records, or physician records

OR

- (2a) History of rapid onset (approximately <48 hours from onset to time of admission or maximum acute neurologic deficit) of localizing neurologic deficit and/or change in state of consciousness

AND

- (2b) Documentation of localizing neurologic deficit by unequivocal physician or laboratory finding within 6 weeks of death with >24 hours duration of objective physician findings

AND

- (2c) See list under (1b) above.

2.2.6 Possible Fatal Stroke

(1) Death certificate with consistent underlying or immediate cause (ICD-9 codes 431-437)

AND

(2) No evidence at autopsy examination of the brain, if performed, of any disease process other than cerebral infarction or hemorrhage that could cause localizing neurologic signs (see (1b) above).

2.2.7 Definite Fatal CHF

Two major or one major and 2 minor criteria must be present concurrently.

Major criteria

Paroxysmal nocturnal dyspnea or orthopnea
Neck vein distention
Rales
Cardiomegaly
Acute pulmonary edema
S₃ gallop
Increased venous pressure >16 cm water
Circulation time \geq 25 seconds
Hepatojugular reflux

Minor criteria

Ankle edema
Night cough
dyspnea on exertion
Hepatomegaly
Pleural effusion
Vital capacity reduced by one-third from predicted
Tachycardia (rate of \geq 120/min)

Major or Minor criterion

Weight loss \geq 4.5 kg in 5 days in response to treatment. No known noncardiac process leading to massive fluid overload such as renal failure.

2.2.8 Possible Fatal CHF

Death certificate with consistent underlying or immediate cause, but neither autopsy evidence nor adequate pre-terminal documentation of the event.

2.2.9 Other Fatal CVD

1. Definite other fatal CVD

(1a) Autopsy evidence consistent with other CVD as cause of death

OR

(1b) Death certificate with consistent underlying or immediate cause

AND

(2) Adequate documentation in medical records

2. Possible other fatal CVD

Death certificate with consistent underlying or immediate cause, but does not satisfy any of the above criteria.

2.3 DEFINITION OF ABNORMAL ECG, ABNORMAL ENZYMES AND PROLONGED CHEST PAIN

2.3.1 Abnormal ECG

1. Evolving Diagnostic ECG

An evolving pattern on serial ECGs of a diagnostic ECG. (An evolving pattern of changes [appearance or disappearance within lead groups: anterior (V_1 - V_5); lateral (I , aV_L , V_6); or inferior (II , III , aV_F)] establishes the infarct as acute. Two or more ECG recordings during the hospitalization are needed for this classification.)

To Qualify as a Q wave, deflection should be at least 0.1 mV (1 mm.) in amplitude. Possibilities:

a. No Q wave in one ECG record followed by a record with a diagnostic Q wave.

OR

b. An equivocal Q wave and no major ST segment depression in one ECG followed by a record with a diagnostic Q wave PLUS a major ST segment depression.

OR

- c. An equivocal Q wave and no ST segment elevation in one ECG record followed by a record with a diagnostic Q wave PLUS ST segment elevation > 1 mm.

OR

- d. An equivocal Q wave and no major T wave inversion in one ECG record followed by a record with a diagnostic Q wave PLUS a major T wave inversion.

OR

- e. No Q wave and no ST Junction depression $>$ than or $=$ to $.5$ mm. and flat or downsloping ST segment depression followed by a record with an equivocal Q wave PLUS ST Junction and flat or downsloping ST depression of $> .5$ mm.

OR

- f. No Q wave and no ST elevation > 1 mm. followed by a record with an equivocal Q wave PLUS ST elevation > 1 mm.

OR

- g. No Q wave and no T wave findings diagnostic of infarction followed by a record with an equivocal Q wave PLUS T wave findings diagnostic of infarction.

2. DIAGNOSTIC ECG WITH Q WAVE

- a. Diagnostic Q and QS patterns.

3. DIAGNOSTIC ECG WITHOUT Q WAVE

- a. ST segment elevation PLUS T wave depression indicative of infarction. (T wave depression cannot be used in the presence of ventricular conduction defects.)

4. EQUIVOCAL ECG WITH Q WAVE

- a. ECG with Q and QS pattern possibly representing infarction.

5. EQUIVOCAL ECG WITHOUT Q WAVE

- a. ST junction (J) and segment depression or T wave inversions or ST segment elevations possibly representing infarction.

6. OTHER

- a. All other findings, including normal.

7. UNCODEABLE ECG

- a. Missing Leads
- b. Baseline drift (>1 in 20) if it obscures ST-T segment.
- c. Muscle tremor giving >2 mm. peak-to-peak oscillation.
- d. Other technical errors making Q wave measurements impossible.
- e. Major abnormal QRS conduction patterns(BBB, pacemaker, etc.)

2.3.2 Abnormal Enzyme

To be able to be used to evaluate an MI, enzymes must have been measured within 1-4 days of admission or onset of acute event, whichever is later.

1. Abnormal Cardiac Enzymes

Enzymes are classed as "abnormal" if any enzyme values recorded meet any of the following criteria:

- 1a) CK-MB is "present" (if laboratory uses the criterion of "present" or "absent" without reporting a more specific value) or the CK-MB (heart fraction) is at least twice the upper limits of normal (if hospital uses quantitative criteria) or $\geq 10\%$ of the total CK value, and total CK is at least twice the upper limit of normal.

AND

- 1b) There is no known non-ischemic cause (cardiac surgery, severe muscle trauma, rhabdomyolysis) for the elevated enzyme value.

OR

- 2a) The ratio $LDH_1 : LDH_2 > 1$

AND

- 2b) There is no evidence of hemolytic disease.

OR

- 3a) Total CK and LDH are both at least twice the upper limits of normal. (These increases do not have to occur on the same day.)

AND

- 3b) There is no known non-ischemic cause (cardiac surgery, severe muscle trauma, rhabdomyolysis) for the elevated enzyme value and no evidence of hemolytic disease.

2. Equivocal Cardiac Enzyme

Enzymes are classed as "equivocal" if the criteria for abnormal enzymes are not met and if:

- 1) Either total CK or total LDH are at least twice the upper limits of normal.

OR

- 2) Both total CK and total LDH are between the upper limits of normal and twice the upper limits of normal. (These increases do not have to occur on the same day.)

OR

- 3) CK-MB= 5-9% of total CK or is "weakly present".

A summary of the enzyme diagnostic criteria, as related to total CK and LDH is given in the following algorithm:

	Twice Upper Limit of Normal	Equivocal	Equivocal	Abnormal
TOTAL LDH		Normal	Equivocal	Equivocal
	Upper Limit of Normal	Normal	Normal	Equivocal
			Upper Limit of Normal	Twice Upper Limit of Normal
				TOTAL CK

2.3.3 Prolonged Cardiac Pain

Pain having the following characteristics: Occurring anywhere in the anterior chest, left arm or jaw, which may also involve the back, shoulder, right arm, or abdomen on one or both sides and lasting for more than 20 minutes.

2.4 IDENTIFICATION AND CONFIRMATION OF CVD DEATHS

2.4.1 Procedure

The identification and confirmation of CVD deaths will involve the following steps: (1) identification of all deaths occurring in the eligible population during 1984-88, (2) obtaining all death certificates, (3) coding of all death certificates by the central nosologist, (4) identification of potential CVD deaths, (5) obtaining Coroner's/Medical Examiner's report, (6) review autopsy reports, (7) chart review, and (8) independent confirmation of CVD deaths by the Event Committee comprised of Dr. Maurice Sievers and Dr. Wm. James Howard.

STEP 1: Identification of all deaths

All deaths that satisfy the Eligibility Criteria (1) - (4) in Section 2.1 will be identified by each center from tribal records, IHS hospitals, BIA, State Department of Health and/or the National Death Index. The name, date of birth, date of death and place of death will be obtained for each eligible death. Persons who died out-of-state when visiting other states will be included.

STEP 2: Obtaining death certificates and reviewing charts

With the names of the decedents, dates of birth, dates of death, and places of death, copies of death certificates of all deaths will be obtained from the State Department of Health. The Death Certificate Form (Appendix 7) will be completed by the local data abstractor and mailed to the Coordinating Center.

STEP 3: Coding of death certificates by central nosologist

The local center will stamp the back of the death certificate, add the ID number immediately above the stamp and send only the death certificate to the central nosologist,

Mr. Karl E. Wise
36 Fox Grape Lane,
Southern Shores,
Kitty Hawk, NC 27949

for coding of the cause of death. The corresponding Death Certificate Forms will simultaneously be sent to the Coordinating Center. Mr. Wise will, in a standardized approach using ICD 9th Revision, record the codes on the back of the death certificate and return it to the Coordinating Center. The nosologist's codes will be entered into the computer. A copy of the codes will be sent to the Study Center by the Coordinating Center.

For quality assurance purposes, the Coordinating Center will send a random sample of approximately 10% of the death certificate to another nosologist, Janice Johnson of the Oklahoma State Department of Health, for independent recoding of the cause of death.

STEP 4: Identification of potential CVD deaths

Potential CVD deaths will be identified by each Study Center after receiving the codes from the Coordinating Center.

A potential CVD death is defined as having mention of any of the following anywhere on the death certificate.

Any type of cardiovascular disease
Diabetes
Acute edema of lung
Renal disease
Sudden death, cause unknown

If there is any question as to whether a death should be considered a potential CVD death, the P.I. should be consulted.

The following steps are for the potential CVD deaths only.

STEP 5: Obtaining Coroner's/Medical Examiner's Report

If it is indicated on the death certificate that an autopsy was performed, the Coroner's/Medical Examiner's Report will be obtained by each study center. Photocopy the autopsy report, complete the Mortality Medical Records Abstract Form, attach both to the death certificate, and send the entire package, including Final Decision Form II, to Dr. Sievers for confirmation.

STEP 6: Review medical chart to see if the decedent was hospitalized within 6 weeks prior to death and fill out first section (Question 1-17) of Mortality Survey Medical Records Abstract Form (Appendix 9) in order to identify possible CVD events between 1984 and 1988. The Chart Request Form in Appendix 16 will be used to record charts needed from each involved hospital.

STEP 7: Confirmation of CVD deaths

- a. If the decedent was hospitalized within 6 weeks prior to death, the Mortality Survey Medical Records Abstract Form will be completed. The Medical Records Abstract Form, the death certificate and the Coroner's/Medical Examiner's report, if available, will be sent to Dr. Sievers for confirmation.
- b. If the decedent died prior to arrival at the hospital, upon arrival, or in any other non-hospital location (e.g., home, nursing home), and if available information is not sufficient to determine whether the death

was due to a cardiovascular problem, the attending physician, and an informant will be identified from the death certificate or other sources and contacted for an interview. The Physician's Questionnaire (Appendix 10), Informant Interview Form (Appendix 11), and the Medical Records Abstract Form will be completed. These three forms as well as the death certificate and coroner's/medical examiner's report (if available) will be forwarded to Dr. Sievers. A Final Decision Form II (Appendix 12) will also be mailed to Dr. Sievers from the study center for recording his final decision. The study center will stamp the ID number and fill out the patient's name on the Final Decision Form II for Dr. Sievers. Dr. Sievers will return the completed Final Decision Form II to the Coordinating Center for data entry. The Coordinating Center will forward a copy of the Decision Forms to the Study Center. For any equivocal cases Dr. Sievers will forward all information to Dr. Wm. James Howard for independent classification. In addition, Dr. Wm. James Howard will independently reclassify a random ten percent of deaths.

A flowchart describing the procedure outlined above and a checklist which should be followed to assure that all steps are completed are given in Appendices 13 and 14, respectively.

2.4.2 Review of Medical Charts of the Decedents

Unless the Coroner's report is conclusive, medical records of the decedent will be reviewed and pertinent data abstracted using the Medical Records Abstract Form. For deaths that occurred in hospitals other than IHS hospitals, additional efforts will be made to secure medical information. If the patient was hospitalized in more than one facility without intervening discharge, all available medical records will be reviewed to complete the Medical Record Abstract Form. Discharge summaries, ECGs, X-ray reports, etc. will be photocopied and attached to the Form, when possible. If the patient died in a hospital as an in-patient, data accumulated in the period of hospitalization will be reviewed and abstracted. If the patient died out-of-hospital or died upon arrival at the hospital, available information in the medical records for relevant hospitalizations and outpatient visits prior to death will be reviewed and abstracted.

2.4.3 Informant Interview

Using name and address information from the death certificate, an attempt will first be made to contact and interview the spouse or a first-degree relative (i.e., son, daughter, or sibling) of the decedent, or someone else who witnessed the death. The following procedure will be followed:

- (1) Find the informant's telephone number and/or address.

- (2) If the telephone number is available, call him/her to request permission to interview and to set up an interview appointment. The interview may be conducted over the telephone, or if necessary, in person using the Informant Interview Form.
- (3) If phone contact is not possible, the local community health representative or public health nurse will be asked to assist in arranging the interview.
- (4) If the informant cannot be contacted by phone or in person, a form letter, a reply letter and a self-addressed and stamped envelope (Appendix 15 a and b) will be sent asking the informant for permission for an interview and convenient time for the interview. If the form letter is sent and no reply is received in three weeks, another such letter is sent by certified mail. If no reply is received within one month, no further effort to contact the individual is made.

When the death is witnessed by someone other than a member of the decedent's family, both a family member and the witness are interviewed. In such a case, the information from both interviews are recorded on separate Informant Interview Forms. Up to three (the three best) Informant Interview Forms may be completed for a given event.

2.4.4 Death Occurring Outside the Study Community

Eligible deaths outside of the study area, but within the State, will be included in the above review and confirmation procedure. For eligible out-of-state deaths, we will attempt to obtain an abstract or summary from the hospitals where they died and interview an informant. Their local medical charts will also be reviewed.

3. Morbidity Survey

3.1 ELIGIBLE POPULATION

Cases of MI and stroke will be identified in the three study areas through the review of hospital records and through interviews of individuals who participate in the clinical examination. Persons eligible will be tribal members who have resided in one of the study communities for at least 6 months prior to the event who are 45-74 years of age at any time during the five-year interval 1984-1988, and who were discharged from the hospital with a diagnosis of CVD between January 1, 1984 and December 31, 1988.

3.2 SURVEILLANCE EVENTS

Two types of frequency measures will be used, total incidence and incidence rate. All cases of MI and stroke, as well as new cases (first occurrence), occurring during the study interval will be ascertained. Data obtained from review of medical records will be used to calculate total incidence and incidence rates of acute myocardial infarction and stroke. Only information for those events with discharge diagnoses between January 1, 1984 and December 31, 1988 for individuals aged 45-74 years at the onset of their events will be abstracted. The following types of CVD will be ascertained:

1. Acute Myocardial Infarction (ICD-9 code 410)
2. Stroke (ICD-9 codes 431-432, 434, 436)

Criteria used for defining acute myocardial infarction and stroke have been derived primarily from the International Diagnostic Criteria (44). The criteria for "diagnostic" cardiac enzymes are those of ARIC (46) and the International Diagnostic Criteria.

3.3 DIAGNOSTIC CRITERIA: NON-FATAL MYOCARDIAL INFARCTION

3.3.1 Definite Non-Fatal MI

Must meet one or more of the following criteria:

1. Evolving diagnostic ECG (defined in Section 2.3.1);

OR

2. Diagnostic ECG and abnormal enzymes (defined in Sections 2.3.1 and 2.3.2);

OR

3. Prolonged cardiac pain (defined in Section 2.3.3) and abnormal enzymes.

3.3.2 Possible Non-Fatal MI

Must meet one or more of the following criteria in the absence of findings that meet the criteria for Definite Non-Fatal MI:

1. Equivocal enzymes and equivocal ECG (with or without pain)
2. Equivocal enzyme and diagnostic ECG (no pain)
3. Abnormal enzymes and other ECG (no pain)
4. Abnormal enzymes and equivocal ECG (no pain)
5. Abnormal enzymes alone (no pain, ECG absent or uncodeable)
6. Prolonged cardiac pain and equivocal enzymes (ECG absent or uncodeable)
7. Prolonged cardiac pain and equivocal ECG (enzymes incomplete)
8. Prolonged cardiac pain and diagnostic ECG (equivocal or incomplete enzymes)
9. Prolonged cardiac pain alone (ECG and enzymes incomplete)
10. Prolonged cardiac pain, "other" ECG, equivocal enzymes
11. Prolonged cardiac pain, "other" ECG, incomplete enzymes

3.3.3 ECG Tracings to be Photocopied

The following ECG tracings are to be photocopied:

1. The last ECG obtained prior to this admission.
2. The first ECG recorded after admission or the occurrence of an in-hospital event,
3. The first ECG done each day thereafter, and
4. The last ECG recorded before discharge.

The photocopies of ECGs should be dated according to the date and time the ECG was done, and they should be arranged in chronological order from earliest to latest. The ECG series for each case will be reviewed independently by three cardiologists. Discrepancies will be adjudicated among the three readers. The series of three ECGs is assigned the highest category for which criteria are met, i.e., evolving diagnostic is greater than diagnostic is greater than equivocal is greater than other.

A summary of the diagnostic criteria for hospitalized, non-fatal myocardial infarction used in the Strong Heart Study is given in Table 3.1.

Table 3.1

Summary of Diagnostic Criteria for Hospitalized, Non-Fatal Myocardial Infarction (MI) in The Strong Heart Study

Cardiac Pain	ECG Findings	Enzymes	Diagnosis
Present	Evolving Diagnostic ECG	Abnormal	Definite MI
		Equivocal	Definite MI
		Incomplete	Definite MI
		Normal	Definite MI
	Diagnostic ECG	Abnormal	Definite MI
		Equivocal	Possible MI
		Incomplete	Possible MI
		Normal	No MI
	Equivocal ECG	Abnormal	Definite MI
		Equivocal	Possible MI
		Incomplete	No MI
		Normal	No MI
	Absent, Uncodeable, or other	Abnormal	Definite MI
		Equivocal	Possible MI
		Incomplete	No MI
		Normal	No MI
Not present	Evolving Diagnostic ECG	Abnormal	Definite MI
		Equivocal	Definite MI
		Incomplete	Definite MI
		Normal	Definite MI
	Diagnostic ECG	Abnormal	Definite MI
		Equivocal	Possible MI
		Incomplete	No MI
		Normal	No MI
	Equivocal ECG	Abnormal	Possible MI
		Equivocal	Possible MI
		Incomplete	No MI
		Normal	No MI
	Absent, Uncodeable, or other	Abnormal	Possible MI
		Equivocal	No MI
		Incomplete	No MI
		Normal	No MI

3.4 DIAGNOSTIC CRITERIA: NON-FATAL STROKE

3.4.1 Definite Non-Fatal Stroke:

1. History of rapid onset (approximately <48 hours from onset to time of admission or maximum acute neurologic deficit) of localizing neurologic deficit and/or change in state of consciousness

AND

2. Documentation of localizing neurologic deficit by unequivocal physician or laboratory finding within 6 weeks of onset with > 24 hours duration of objective physician findings

AND

3. No other disease process or event such as brain tumor, subdural hematoma, subarachnoid hemorrhage, metabolic disorder, or peripheral lesion that could cause localizing neurologic deficit or coma according to hospital records.

3.4.2 Possible Non-Fatal Stroke:

- 1a. History of rapid onset (approximately <48 hours from onset to time of admission or maximum acute neurologic deficit) of localizing neurologic deficit and/or change in state of consciousness,

AND

- 1b. Documentation of localizing neurologic deficit by unequivocal physician or laboratory finding within 6 weeks of onset with >24 hours duration of objective physician findings,

OR

- 1c. Discharge diagnoses with consistent primary or secondary codes (ICD-9-CM codes 431, 432, 434, 436, 437),

AND

2. No evidence by unequivocal physician or laboratory findings of any other disease process or event causing focal brain deficit or coma other than cerebral infarction or hemorrhage according to hospital records.

3.4.3 Unequivocal Laboratory Findings:

1. A computerized axial tomography (CAT) scan showing no definite findings of any disease process or event causing focal brain deficit or coma other than cerebral infarction or hemorrhage,

AND

- 2a. Showing a focal area of decreased or normal attenuation consistent with cerebral infarct,

OR

- 2b. Showing focal increased attenuation consistent with intracerebral hemorrhage.

A summary of the diagnostic criteria for hospitalized, non-fatal stroke used in The Strong Heart Study is given in Table 3.2.

Table 3.2

Summary of Diagnostic Criteria for Hospitalized, Non-Fatal Stroke in The Strong Heart Study

Diagnostic Evidence	Onset/Duration Neuro. Deficit	Other Causes	Diagnosis
Unequivocal physician or laboratory	Rapid/ >24 hr.	Absent	Definite Stroke
Discharge Diagnoses of Stroke (431, 432, 434, 436, 437)	Rapid/ >24 hr.	Absent	Possible Stroke
All other combinations		No Stroke	

3.5 PROCEDURE FOR IDENTIFICATION OF INCIDENT AND RECURRENT CASES

The morbidity survey will involve the following steps: 1) identification of potentially eligible cases from IHS user listings, discharge records of other community hospitals and personal interview at the clinical examination. 2) review of the medical records of potential cases to determine whether the age and tribal (residence) criteria are met, 3) determine whether one of the study events has, in fact, occurred and determine whether it is the first diagnosis of the event or a recurrent event, 4) abstract relevant information from the medical record for each documented event to allow independent confirmation of the diagnosis of a case.

STEP 1: Identification of potentially eligible cases.

In order to identify persons with events that may qualify as incident cases, IHS hospital discharge diagnosis listings and outpatient lists for 1984 through

1988 will be reviewed. All screening discharge diagnoses should be reviewed (see below). If included in the discharge listings, age and tribal (residence) eligibility should also be checked before recording a chart number for subsequent review. The names of all potential cases identified from the IHS listings will be reviewed by local staff, with tribal assistance, to determine if they are members of the study cohort. Other local hospitals will also be surveyed to obtain discharges for MI or stroke that may be American Indians. These lists will be compared to eligible tribal members lists to determine which records are to be abstracted. Participants at the clinical examination will also be asked if they had an MI or stroke during 1984-88. Positive answers will be confirmed by chart review. When reviewing IHS user lists or hospital discharge listings, names, chart numbers and other relevant information for pulling charts for review should be recorded on the Chart Request Form (Appendix 16). Potential cases will be identified using the following ICD-9 codes. The list of screening codes to be used in reviewing discharge diagnoses is broader than the study event codes in order that cases not be missed.

1. MYOCARDIAL INFARCTION (ICD-9 codes 402, 410-414, 427-428, 518.4)
 - 402 Hypertensive heart disease
 - 410 Acute myocardial infarction
 - 411 Other acute and subacute forms of ischemic heart disease
 - 411.0 Postmyocardial infarction syndrome
 - 411.1 Intermediate coronary syndrome
 - 411.2 Other - includes coronary insufficiency (acute), microinfarct of heart, subendocardial ischemia
 - 412 Old myocardial infarction
 - 413 Angina pectoris
 - 414 Other chronic ischemic heart disease
 - 427 Cardiac dysrhythmia
 - 428 Heart failure
 - 428.0 Congestive heart failure
 - 428.1 Left heart failure
 - 428.9 Heart failure, unspecified
 - 518.4 Acute edema of lung, unspecified

2. CEREBROVASCULAR DISEASE (ICD-9 430-438)
 - 430 Subarachnoid hemorrhage
 - 431 Intracerebral hemorrhage
 - 432 Other and unspecified intracranial hemorrhage
 - 433 Occlusion and stenosis of precerebral arteries - includes embolism, narrowing, obstruction or thrombosis of basilar, carotid, and vertebral arteries
 - 434 Occlusion of cerebral arteries
 - 435 Transient cerebral ischemia
 - 436 Acute, but ill-defined, cerebrovascular disease - includes CVA NOS, Stroke
 - 437 Other and ill-defined cerebrovascular disease - includes cerebral atherosclerosis, chronic cerebral ischemia, hypertensive encephalopathy, cerebrovascular disease or lesion not otherwise specified.
 - 438 Late effects of cerebrovascular disease

STEP 2: Review of medical record for eligibility

Medical records from each IHS facility will be reviewed at the time each of the 4500 participants is undergoing the physical examination phase of the study. If the examination participant is on the list of eligible cases created in STEP 1 or if he reports an MI or stroke during 1984 and 1988 in the medical history portion of the interview, STEP 3 and STEP 4 will be followed. Otherwise, the chart will first be reviewed in order to determine whether the participant experienced an eligible event. If the examination participant reports a history of MI or stroke in 1984-88, they will be asked at which hospital they were cared for so that records can be obtained. Release of clinical information forms will be obtained for all non - IHS facilities, if required by local Institutional Review Board (IRB) and the standard IHS Authorization For Release of Information may be used.

Eligible individuals who refuse to participate in the examination and those aged 75-80 will be interviewed in person or by phone for possible morbid events using the Interview Form for Non-participants in Appendix 17. Permission to review their medical records will also be obtained.

For those persons identified in STEP 1 who do not participate in the examination, those aged 75-80, and those who have been hospitalized at non-IHS facilities, charts will be requested and STEP 3 and STEP 4 will be followed. IHS charts of potential CVD decedents will also be reviewed for possible morbid events during 1984-1988.

If required by the local IRB, consent for release of clinical information will be obtained from the participant or the next-of-kin before any charts are reviewed.

STEP 3: Confirmation of event occurrence and incident status.

Because discharge diagnoses may be improperly recorded and a variety of associated codes will be screened, it is important to confirm that one of the events of interest has, in fact, occurred. Information in the record pertaining to the admission by which the potential case was identified (the index admission) should be reviewed. Check the discharge diagnoses listed on the face sheet of the admission and read the discharge summary.

If one of the survey events has occurred during the study interval, information about the event will be abstracted from the record. The next step is to determine whether the event was the first time such a diagnosis had been made. Myocardial infarction and stroke are defined as "new" if there is no mention in the medical record of a previous episode. We are interested in any occurrence of one of these events if it happened during the study interval, but will consider it as a "new" event only if that first occurrence was also within the study interval, i.e., 1984-1988 in an individual aged 45-74 years at the onset of symptoms.

In order to determine whether the event is new, information from the index admission must be reviewed. This includes reading the admission history and physical examination section of the record, any interim notes, and the discharge summary for indications of a previous event. If the medical record contains admissions prior to the index admission, the face sheets and discharge summaries of

these admissions should also be reviewed to determine whether a previous hospitalization was due to myocardial infarction or stroke. If a MI or stroke occurred prior to the index event, but within 1984-1988, then the abstractor should treat that event as the index event and repeat the process of review of prior admissions. Any event subsequent to the primary event should be reviewed. The IHS user listings can also be reviewed to determine whether the case was seen previously for the event of interest. All events of interest occurring during the study interval should be abstracted.

STEP 4: Medical record abstract for incident cases.

If the index admission is for one of the study events (whether or not it is the first occurrence), an appropriate medical record abstract form for that admission should be completed (Appendix 18(a)). If evidence is present suggesting that one or more myocardial infarctions or strokes occurred, a separate chart abstract form will be completed for each event. Separate events must have a 28 day period when the patient is discharged from an acute care facility after a previous event. During the chart review, the abstractor will determine whether the event is a first event (incident case) or a recurrent event so that incidence rates and total incidence for myocardial infarctions and strokes can be determined. (If the participant is a study death, the abstract of medical records for decedents should also be completed.) If the medical record is not eligible for abstraction, the reason for exclusion (i.e., not age eligible, not tribal eligible, event occurred outside of the calendar years of the study, not a study event) should be entered on the listing of potential cases.

High resolution photocopies of ECGs taken as evidence of a myocardial infarction during the morbidity survey (see Section 3.3.3) should be arranged in chronological order from earliest to latest. ECG series for each case will be sent to the ECG Reading Center (Fitzsimons) with a completed Possible Myocardial Infarction ECG Analysis Field Sheet (Appendix 18(b)) and a blank ECG Center Sheet (Appendix 18(c)) with ID number stamped. The ECG series will be reviewed independently by three cardiologists and results recorded on the ECG Center Sheet which will then be returned to the Coordinating Center.

The Morbidity Survey Medical Records Abstract form, the ECG Analysis Field Sheet, the ECG Analysis ECG Center Sheet and the Morbidity Survey Decision form (Appendix 18(d)) will be sent to Dr. Arvo Oopik for confirmation by the Coordinating Center. Dr. Oopik will return the entire package with the completed Decision form to the Coordinating Center. For any equivocal cases Dr. Oopik will forward all information to Dr. Wm. James Howard for independent confirmation. In addition, Dr. Wm. James Howard will independently reclassify a random ten percent of cases.

3.6 RATIONALE FOR SELECTION OF EVENTS FOR THE MORBIDITY SURVEY

Myocardial infarction and stroke were selected as incidence surveillance events. Other types of CVD such as angina pectoris, rheumatic heart disease, congestive heart failure, and peripheral vascular disease are less readily identifiable from hospital records, since hospitalization may not be required. In addition, information necessary for independent classification may not be available, and it is more difficult to identify the first occurrence of these events. The physical examination phase of the study, in which prevalence of CVD will be assessed, is a more appropriate setting in which to ascertain the frequency of these events. Prevalence estimates from the physical examination will be based on a uniformly applied set of diagnostic procedures and disease definitions.

4. Procedures for Training & Quality Control of Mortality & Morbidity Surveillance

4.1 TRAINING

Interviewers will be centrally trained at the April 1989 training meeting in South Dakota. Training will include instructions in reviewing and abstracting of charts and instructions in transcribing of information on death certificates and medical examiner reports. Training will include:

1. Adherence to the standardized protocol
2. Techniques for locating information in the charts
3. Dealing with problems encountered in the charts
4. Post-abstraction responsibility for the data

The training sessions will consist of:

1. Explanation of the procedure for abstracting
2. Demonstration by the instructor of abstraction procedures
3. Performance of abstraction by the trainee with instructor observing
4. Abstraction of records by both the trainee and the instructor with verification for completeness, consistency and accuracy

4.2 QUALITY CONTROL

4.2.1 Ascertainment of Cause of Death

In the mortality study, for every tenth death, duplicated records will be sent to Dr. James Howard as well as to Dr. Sievers by each center. Dr. James Howard will independently make a judgement as to the cause of death and fill out Decision Form I or II. The Coordinating Center will then compare the results from both physicians. In addition, if Dr. Sievers feels a decision on a death is particularly equivocal, Dr. Sievers will send all information to Dr. James Howard and then they will arrive at a joint decision.

4.2.2 Data Abstraction

To assure consistency and accuracy in the chart abstractions and death certificate and medical examiner reports, a chart for morbidity, a chart for mortality, a death certificate and a medical examiner report will be circulated by the Coordinating Center to each center quarterly with personal identifiers deleted. All data abstract personnel will complete the necessary forms related to that circulated material and they will be judged at a central source for consistency and completeness.

5. Clinical Examination

5.1 INTRODUCTION

Tribal members who have resided in one of the study communities for at least 6 months and who are between 45 and 74 years of age during the examination phase will be invited to participate in the physical examination. Persons who are institutionalized will be excluded. This component of the study consists of a personal interview, a limited physical examination and laboratory tests. The objectives are to estimate the prevalence of CVD and its risk factors and to assess the degree of association between the risk factors and CVD.

The examination will be conducted at local IHS hospitals and clinics. In the Dakotas, it will be performed at the Aberdeen Area IHS hospitals and clinics on three reservations. In Phoenix, the IHS hospital at Sacaton (GRIC) and the IHS outpatient clinic at Salt River (SRIC) will be the examination sites. In Oklahoma, the IHS hospital in Lawton and the IHS clinic in Anadarko will provide space and facilities for the examination.

The objective of the Strong Heart Study and the examination procedures will be explained to the participants. A consent form will be signed by each participant. Appendix 19 gives an example of the consent form.

All examinations are performed by trained clinicians, either nurse practitioners, nurse clinicians, medical students, physician assistants or physicians. All examination items are within the scope of training that these providers have received and are usual, if not daily, parts of physical examinations. Detailed descriptions and training are aimed at achieving consistency from examination to examination, and among centers. This is the main goal of this component of the protocol.

The training of the nurse clinicians, medical students, physician assistants and physicians on the protocol occurred on April 16-19, 1989 at the Black Hills Training Center, Rapid City, S.D. and is based on the written protocol. Each Study Center has designated a primary examiner and at least one other person who is available to perform examinations in the absence of this primary person. The second examiner may be the medical director or a physician who has been trained and certified in the protocol.

Certification requires adequate performance of the components of the examination as validated during training. In case of loss of a center's staff member, a replacement may be trained locally by someone certified in the procedure(s). The same certification requirements as used in the initial training must be met. Quality control focuses on the potential for false positive examinations. Because most participants are healthy, the frequency of abnormal findings is relatively small. The presence of real abnormalities among those with normal examinations is also small (a low false negative rate), and this makes it inefficient to re-examine the many individuals with normal findings. The review of positive findings is part of the medical data review. After the initial training, continuing education includes regular review of the protocol.

5.2 COMPONENTS OF THE CLINICAL EXAMINATION, ENDPOINTS AND RISK FACTORS

5.2.1 Components of the Clinical Examination

The clinical examination has two parts: a personal interview and a physical examination.

1. Personal Interview

The following questionnaires will be administered.

- (1) Demographic information, personal habits including smoking, alcohol and beverage consumption, stress and acculturation.
- (2) Medical history, including Rose questionnaire for angina pectoris and intermittent claudication
- (3) Physical activity
- (4) Dietary survey (to be performed on a random sample of 50 men and 50 women of each decade at a separate time)

2. Physical Examination

The physical examination includes the following procedures:

- (1) Anthropometric measurements
 - (a) Weight
 - (b) Height
 - (c) Waist and hip circumferences
 - (d) Body fat measurement using an impedance meter
 - (e) Arm circumference (for blood pressure measurements)
- (2) Examination of the following
 - (a) Heart
 - (b) Lungs
 - (c) Pulses - posterior tibial and dorsalis pedal
 - (d) Bruits - Carotid and femoral
- (3) Blood Pressure Measurements:
 - (a) Sitting with conventional sphygmomanometer(3 times) -right arm
 - (b) Right brachial and both ankles using doppler in supine position
- (4) Twelve-lead ECG measurement
- (5) Glucose Tolerance Test (GTT). The GTT will be given to participants excluding the following:

- (a) Insulin requiring diabetics
 - (b) Diabetics who are on oral agents and the previous record indicated at least two values of random blood glucose above 250 mg/dl. or fasting glucose \geq 225 mg/dl. by Accucheck.
 - (c) Non-diabetics with a fasting glucose \geq 225 mg/dl. by Accucheck.
- (6) Fasting blood samples for measurements of total triglyceride and cholesterol, LDL and HDL Cholesterol, VLDL C/TG ratio, total ApoA-I and ApoB, Plasma Fibrinogen, apoE phenotype, glucose, creatinine, insulin, and HbA_{1c}. Fasting blood samples will be taken from patients who are on renal dialysis or have had a kidney transplant, if possible.
- (7) Urine collection at beginning of physical examination for measurement of albumin and creatinine

The IHS medical records will also be reviewed to determine whether the participant experienced hospitalization for stroke or myocardial infraction in 1984-88.

A checklist to be used for the physical examination and a reminder of post examination activities are given in Appendix 20 (a) and (b).

The clinical examination will last approximately two and a half hours. The participant will arrive at the clinic fasting in the morning. After registration, a study staff member will explain the study and procedures to the participant, answer questions, if any, and have the consent form signed. The participant will then be instructed to go to the laboratory for blood drawing, to drink the glucose preparation (Glutol), and to obtain the urine specimen. The nurse clinician and other staff will then conduct the personal interview, examination of the heart and lungs, obtain anthropometric measurements, blood pressure, impedance measurement for body fat composition, and ECG measurements. At exactly two hours after the ingestion of the glucose preparation, the participant will have another blood sample drawn for the glucose tolerance test. If the above procedures are not completed before the 2-hour sample is drawn, they may be continued and completed after the participant consumes a light snack. After all the procedures are completed, the participant will receive the payment or sign the payment form and be thanked for his/her participation. A flowchart that describes the process is given in Appendix 21.

If possible, all of the components, except for the dietary survey, should be completed in one visit. If an individual leaves before the examination is completed, it must be completed within two weeks or it must be entirely repeated. The exception is the examination of the heart and lungs which could be done up to six months later. The personal interview and consent may be completed up to two weeks prior to the physical examination if such arrangements are more convenient.

5.2.2 Endpoints and Risk Factors

The purpose of the physical examination as described in detail under the study questions in Section 1.4, is to determine the prevalence of several aspects of atherosclerotic vascular disease in individuals between 45 and 74 years old and quantify a number of risk factors in order to be able to determine the relationship between these risk factors and the measures of disease, both within and between centers.

The following cardiovascular endpoints will be measured during the examination:

1. Electrocardiographic abnormalities - these will be defined by Minnesota Code Criteria as described in Section 2.3.1.
 - a. Major ischemic abnormalities - these will be defined either as Major Q-wave abnormalities (Minnesota Codes 1.1.1 through 1.1.7) or using a strict criteria such as that of the Tecumseh Study (50) (Minnesota Codes 1.1-1.2, 4.1, 5.1-5.2, 6.1 and 7.1).
 - b. Minor electrocardiographic abnormalities - while the functional significance of minor ST and T-wave changes are debated, several less stringent epidemiologic criteria have been developed which include these, such as that of the Pooling Project (51) (Minnesota Codes 1.1-1.2, 4.1-4.2, 5.1-5.2, 6.1-6.2, 7.1-7.2, 7.4, 8.1, and 8.3) or Whitehall Study (52) (Minnesota Codes 1.1, 1.3, 4.1-4.4, 5.1-5.3, and 7).
2. Congestive heart failure - congestive heart failure will be diagnosed during the physical examination (after confirmation by a referring internist or cardiologist), if a minimum of two major or one major and two minor criteria are present concurrently (from the Framingham study).

Criteria for CHF

Major Criteria

Paroxysmal nocturnal dyspnea or orthopnea
Neck-vein distention
Rales
Cardiomegaly
Acute pulmonary edema
S₃ gallop
Increased venous pressure \geq 16 cm of water
Circulation time \geq 25 seconds
Hepatojugular reflux

Minor Criteria

Ankle edema
Night cough
Dyspnea on exertion
Hepatomegaly
Pleural effusion
Vital capacity decrease $\frac{1}{3}$ from maximum
Tachycardia (rate of \geq 120/min)

Major or Minor Criterion

Weight loss \geq 4.5 kg in 5 days in response to treatment

3. Peripheral vascular disease - although atherosclerosis is most often associated with definite cardiac ischemic changes, other manifestations of atherosclerosis include occlusion of large vessels in the periphery. This is expected to be of particular interest in this study because of the high prevalence of diabetics and because of data from other population surveys indicating that diabetes confers greatly increased risks for peripheral vascular disease. At present, peripheral vascular disease will be determined by the following criteria:

- a. Intermittent claudication as identified by the Rose questionnaire:

Intermittent claudication is defined as being present in subjects who answer as follows:

Q. 10:	"Yes"
Q. 11:	"No"
Q. 12:	"Includes calf"
Q. 13 or 14:	"Yes"
Q. 15:	"No"
Q. 16:	"Stop or slowdown"
Q. 17:	"Relieved"
Q. 18:	"10 minutes or less"

Intermittent claudication may be graded according to severity:

Q. 14:	"No" = Grade 1
	"Yes" = Grade 2

- b. peripheral occlusion as evidenced by absence of dorsalis pedis or posterior tibial pulses on either side.
- c. A ratio of ankle/arm systolic blood pressure of less than 0.8.
- d. The presence of femoral bruits.
4. Angina pectoris as defined by the Rose questionnaire:

Angina is defined as being present in subjects who answer as follows:

Q. 1:	"Yes"
Q. 2 or 3:	"Yes"
Q. 4:	"Stop or slow down"
Q. 5:	"Relieved"
Q. 6:	"10 minutes or less"
Q. 7:	(a) Sternum (upper or middle, or lower), or (b) left anterior chest and left arm.

If interviewing instructions are correctly observed throughout, it is sufficient to check the answer to Q. 7.)

Q. 3: “No” =Grade 1
 “Yes” =Grade 2

The following risk factors will be measured during the study:

1. Plasma and LDL cholesterol - Although these will generally be analyzed as a continuous variable, the definition of hypercholesterolemia will be defined as concentrations of total cholesterol greater than 240 mg/dl.
2. Blood pressure - Although this will be analyzed as a continuous variable, hypertension will be diagnosed as a systolic greater than or equal to 140 mmHg or a diastolic greater than or equal to 90 mmHg; or by the use of antihypertensive medication.
3. Smoking - Although the smoking questionnaire allows estimation of quantities of cigarettes smoked per day, individuals can also be grouped into categories including non-smokers, light smokers (less than $\frac{1}{2}$ pack a day), moderate smokers (greater than $\frac{1}{2}$ pack but less than 1 pack per day) and heavy smokers (1 pack per day or greater).
4. Obesity - Although obesity will be measured as percent fat and can be analyzed as a continuous variable, in addition, obesity will be defined as men with a percent fat of greater than 25% or women with a percent greater than 30% (65). In addition, obesity will be subdivided by fat distribution with those of waist to hip ratio greater than 1.0 for men and 0.8 for women being defined as having central obesity and those less than 0.8 as peripheral obesity. In addition, the waist/hip ratio can be analyzed as a continuous variable.
5. Physical activity - The algorithm for computation of extent of physical activity has been developed by Kriska et al., (58) and is described in the section explaining the physical activity instrument.
6. Consumption of total fat, saturated fats, or cholesterol - This will be determined in a subset of individuals at all centers using 24-hour recall and food frequency surveys as described in a separate manual and will be analyzed using the nutritional analysis system at the University of Minnesota.
7. HDL cholesterol - This will be analyzed as a continuous variable.
8. Total and VLDL triglyceride - This will be analyzed as a continuous variable, but hypertriglyceridemia will be defined as individuals above the 95th percentile for sex and weight by the LRC criteria.
9. Plasma glucose - Fasting and 2-hour plasma glucose can be analyzed as continuous variables. In addition, diabetes will be defined according to WHO criteria, that is fasting greater than or equal to 140 and/or 2-hour greater than or equal to 200. Impaired glucose tolerance is defined as a fasting less than 140 and 2-hour glucose between 140 and 200.

10. Plasma insulin - Fasting plasma insulin will be analyzed as a continuous variable.
11. Other apoprotein measurements - Measurements of total plasma apoAI, apoB and glycated LDL will be analyzed as continuous variables. In addition, apoE phenotype will be determined, individuals will be classified as E4/E4, E4/E3, E3/E3, E3/E2, E2/E2, and E2/E4.
12. Hemoglobin A_{1c} - This will be analyzed as a continuous variable.
13. Plasma fibrinogen - This will be analyzed as a continuous variable.

5.3 RECRUITING

In order to facilitate publicity and recruiting efforts in the community, it has been determined that individuals between 45 and 74 years old are eligible for the clinical examination. The age limit is determined at the day the volunteer presents himself/herself for the physical examination. This means that if examinations are conducted over a two year period, some individuals who are 43 years old at the beginning of the two year period will be eligible for examination at the end, and conversely, those who are 74 at the beginning of the two year period will not be eligible after turning 75.

Eligible study participants are identified through the tribal population lists. Individuals will be contacted in an order convenient for each center. Local publicity campaigns and mailed information will alert participants before participation is requested.

When contacting an eligible examinee, the interviewer introduces the Strong Heart Study and explains its purpose and importance. A brochure and a letter explaining the purpose of the study and exam are used for recruitment. The voluntary nature of the study and the confidentiality of the collected data are stressed. If the subject is not at home at the time of the phone call or visit, call backs are made as necessary to meet the individual and schedule the clinic appointment. 100% participation is the goal.

In all areas, the recruiter should wear an identification badge. When scheduling appointments the recruiter should emphasize the following:

1. that the volunteer should not eat breakfast the morning of the visit to the exam; and should not eat or drink anything but water after 9:00 p.m. the previous evening.
2. that the volunteer should bring with him/her all medications which he/she has been prescribed and is currently taking;
3. that the volunteer should not take their morning diabetes medication until blood drawing is completed;
4. no tobacco or vigorous activity before the clinic visit;
5. volunteer should be instructed to wear loose clothing and ladies to wear a skirt and blouse or pants and shirt, rather than a dress

In case the volunteer might be retarded or otherwise mentally incapacitated, a surrogate must accompany him/her to the examination, preferably someone who is very familiar with the medical and family history.

The recruiter schedules the appointment with the clinic for each subject. Whenever possible, eligible members of a single household are scheduled on the same day. The recruiter should also verify name, address, and social security number at the time of the recruiting visit. When possible, participants should be reminded by phone or in person the day prior to the visit.

After the visit appointment is made, the clinic staff should assemble all forms and labels necessary for the exam and arrange to have the hospital chart for that participant available the morning of the clinic visit. The chart may also be reviewed to see if the participant satisfies the exclusion criteria for the glucose tolerance test.

The reason for nonparticipation should be documented. The Reasons for Nonparticipation Form in Appendix 22 should be filled out by clinic staff for all persons who do not participate. In addition, they will be interviewed in person or by phone for possible morbid events by using the form in Appendix 17. Permission to review their medical records will also be obtained.

5.4 PERSONAL INTERVIEW

5.4.1 Components of the Personal Interview

The personal interview is designed to obtain demographic information, medical history, health behavior, acculturation and stress data that are considered important in identifying risk factors for cardiovascular disease. A total of three questionnaires will be administered during the clinical examination:

1. Personal Interview Form (I and II)
2. Medical History Form
3. Physical Activity Form

Family health history, personal living habits such as cigarette smoking and alcohol consumption, and stress have been considered as important risk factors for cardiovascular disease. Data on these factors as well as demographic information and the degree of acculturation will be collected by using the Personal Interview Form (I and II) given in Appendix 23. Appendix 24 gives the Medical History Form which consists of questions on past medical conditions, medications used and the Rose Questionnaire for angina pectoris and intermittent claudication. Lastly, information on general, leisure time-exercise and occupation-related physical activities will be obtained using the Physical Activity Form in Appendix 25.

Note : The Personal Interview Form I contains personal identification information. For confidentiality purposes, it should be sent to the Coordinating Center separately.

5.4.2 Guidelines for Interviewers

1. Introduction

The personal interview is probably one of the most important procedure for data collection in epidemiologic research. The personal interview has been shown to increase response over self-administered questionnaires, and when rapport is established between the interviewer and the interviewee it has been shown to be an excellent source of high quality information for epidemiologic research purposes. However, the interviewer must be able to show tact, care, and sensitivity, to be effective. Not everyone can become a successful interviewer.

Also, the personal interview can lead to a lack of standardization in the data collected, particularly in a multicenter study such as the Strong Heart Study. Since the interviewer is known to have a large effect on the quality of the data obtained, therefore interviewer training is very important. Please read this interviewer's manual frequently, and refer to it as needed during the study. It is also recommended that each Study Coordinator hold monthly interviewer meetings, to go over common problems and clear up any questions about the interview procedures and the interview forms in the Strong Heart Study.

2. Types of Interviews

Structured versus Unstructured Interviews

In an unstructured interview the responses to questions are open-ended, and information given is to be recorded as given. In a structured interview the questions are usually closed, with a specific set of answers provided in the questionnaire.

For the Strong Heart Study we are using both structured and unstructured interviews. The use of structured interviews is the best way to maintain consistency in the data being collected. Interviewer training is important in order to maintain as much consistency in the interviews between study centers as possible.

Because we are using structured and unstructured interviews, we can achieve even more consistency if all interviewers conduct the interviews in a similar way. Therefore, ask each question as it is written. Do not reword the question. Also, ask the questions in the order they are given in the interview form. Hopefully, by following these procedures we can achieve a high degree of consistency in the way the interviews are conducted.

3. Style of the Interview

The interview style is also important and some of the components of what is generally considered to be acceptable interview style are listed below. In addition to the components of style listed below, the following interviewer characteristics are also very important: Politeness is very important since we will be asking sensitive questions to strangers, in a situation where they may

be uncomfortable. Sensitivity on the part of the interviewer is also important, in order to know how and when to be more or less assertive in asking for information. Besides these qualities, listed below are what we expect our interviewer's style to approach, so please try to develop your style in accordance with these guidelines:

- a. Non-judgmental, non-evaluative style – A large portion of the impression which the respondent has of the interviewer is based solely on the interviewer's voice and the manner with which the interviewer responds to the respondent's comments. A judgmental or evaluative response would indicate that the interviewer has made a judgement of the relative goodness, appropriateness, effectiveness, or rightness of the respondent's statement. The interviewer should not, in response to the respondent's statements, state what the respondent should or should not do in a given situation. The interviewer's task is simply to record the information provided, and to elicit the desired response.
- b. Non-interpretive style – As above, the interviewer should not use a style that might be considered teaching or preaching. An interpretive response is one which indicates that the interviewer's intent is to teach. We are interested in the respondent's impression of what was happening, not in the interviewer's impression.
- c. Allow for respondent to complete sentences – Do not try to help the respondent by answering the questions for him/her. No matter how slowly the respondent is speaking, putting words in the respondent's mouth or not allowing the respondent to finish thoughts will generally alter the information which the respondent is attempting to give. However, long hesitations may be bridged by asking appropriate questions.
- d. Supportive remarks – Remarks which indicate that the intent of the interviewer is to reassure, to pacify, or to reduce the intensity of the respondent's feelings are appropriate. However, these should be in keeping with local terms and expressions, and should be short so as not to detract from the interview itself.
- e. Probing – This is an important response style which will be discussed further. A probe is a response which indicates that the interviewer's intent is to seek further information, to provoke further discussion along a certain line, or to question the respondent. Direct probes will be specific questions about details of what the respondent said.
- f. Non-directive, or understanding – A typical non-directive response might be "I see". This is the general idea of understanding murmuring or clucking. The interviewer might also repeat what the respondent just said. This may prompt the respondent to elaborate.

4. Gain Rapport with the Interviewee before Commencing Interview

The first step in gaining the confidence of the respondent is a straightforward, believable introduction of the interview and the reason for this contact. It may help in gaining rapport with the respondent if you tell him/her a little about yourself, such as where you are from, and your background, etc. If the respondent seems to hesitate or has some questions the interviewer must be prepared with a more detailed explanation of why the information is needed. Also, if the respondent raises the issue of the confidentiality of the information collected, the interviewer must be prepared to reassure him/her of the precautions taken to respect their privacy.

5. Interviewer Error

We should try to minimize interviewer error during this study. The primary objectives of epidemiologic research are (1) to obtain measurements of exposure and disease variables relevant to the objectives of the study, and (2) to minimize error in these measurements. The presence of an interviewer may both reduce error and increase error. It may reduce error by increasing the response rate, motivating the subject to respond well and probing to obtain complete data when the responses volunteered fall short of what is desired. The presence of an interviewer may increase error if by his or her appearance, manner, method of administration of the questionnaire or method of recording of the responses he or she exerts a qualitative influence on the subject's responses. Possible sources of error in the interview for data collection include (1) conditions of administration (heat, light, ventilation, freedom from distraction, lack of time, etc.); (2) interaction of the personality (sex or race of the interviewer with that of the subject); and, (3) performance by the interviewer (questioning, prompting and recording of responses).

The following are the common interviewer errors :

- a. Asking errors - Omitting questions or changing the wording of questions.
- b. Probing errors - Failing to probe when necessary, biased probing, irrelevant probing, inadequate probing, preventing the respondent from saying all he or she wishes to say.
- c. Recording errors - Recording something not said, not recording something said, incorrectly recording response.
- d. Flagrant cheating - Not asking a question but recording a response, recording a response when the respondent does not answer the question asked. These kinds of errors do occur and this has been amply documented by various studies. Cheating has been shown to be more common when the interviewer is in an uncomfortable situation with the interviewee, i.e., he/she is difficult. We should try to be aware of these situations to avoid the interviewer errors above.

6. Circumstances for the Interview

We will not have very much control over the circumstances for the interviews. However the following should be considered in arranging for conducting interviews:

- a. Time – There will be little control over the time of the interviews, since we will have many different interviews to carry out over a short period of time. However, it is desirable not to interview until after the breakfast has been served, otherwise the interviewee may tend to be somewhat uncomfortable.
- b. Place – The place for the interview should be chosen where there are as few distractions as possible. Try to select a place where the location is quiet and comfortable. If it is possible, it is ideal to sit at a table, with the interviewer facing the interviewee, so that the interviewer can organize the papers. Privacy is also important. If the respondent will need to refer to records during the interview, be sure that the records are available before the interview begins.

7. Asking Procedures

In general the rules for asking questions in structured interviews can be summarized as follows:

- a. Questions must be asked according to the instructions for each form. Be sure to read and re-read the instructions for each questionnaire you are using, and to ask all the questions in the same way to each person interviewed.
- b. Read the questions exactly as they are worded in the questionnaire. If the question is misunderstood, then it may be repeated, interchanging local terms, if necessary for understanding.
- c. Read each question slowly.
- d. Use correct intonation and emphasis.
- e. Ask the questions in the order that they are presented in the questionnaire.
- f. Ask every question that applies to the respondent (all inapplicable questions will be identified as such by skip instructions in the questionnaire).
- g. Repeat questions IN FULL that are misheard or misunderstood.
- h. Read all linking or transitional statements exactly as they are printed.
- i. Do not add apologies or explanations for questions unless they are printed in the questionnaire.

PROBING : Probes are additional questions asked or statements made by the interviewer when the answer given by a respondent is incomplete or irrelevant. Probing has two major functions : (1) To motivate the respondent to reply more fully; (2) to help the respondent focus on the specific content of the question. It must fulfill these functions without biasing the respondent's answers. However, probes, when they are used, **MUST** be neutral. Probing can introduce bias, such as by summarizing your understanding of the response to the subject when an unclear response has been given, or by offering some alternative interpretations from which the respondent can choose, and this must be guarded against.

The following are NON-DIRECTIVE methods of probing:

- a. Repeat the question (RQ). All that may be required to clear up a vague answer may be to repeat the question. You may begin by saying "I am not sure that I understood you, let me just repeat the question so that I can be sure to get your answer right."
- b. The expectant pause. Waiting expectantly will tell the respondent that the interviewer is expecting more information than has been provided.
- c. Repeat the reply. Repeating the reply aloud while recording it may stimulate the respondent to provide more details.
- d. Neutral questions or comments. Various neutral probes may be used for purposes such as clarification, specificity, or completeness: "What do you mean exactly?", "In what way?", "Could you be more specific about that?", "Anything else?", "Can you tell me more about it?"
- e. Interpretation. Make sure that the question was understood, since that may be the reason for incomplete answers. You may need to ask the question again, perhaps substituting some local terms, if there is a problem in interpretation.

FEEDBACK : The provision of feedback by the interviewer to the respondent about his or her performance has been the subject of much research. Some studies have shown that the use of feedback in health-related surveys increased the amount of reporting of most events. Your decision about whether to provide feedback may depend upon the performance of the person you are interviewing, and your experience in the benefits of providing feedback.

8. Specific Instructions for Telephone Interviewing

While it is generally held that the principles outlined above, which have been derived solely from research into and experience of face-to-face interviewing, apply to telephone interviewing, the evidence that this is true is very limited. Telephone interviewing is probably not simply the transfer of face-to-face techniques to the telephone. Use of visual cues, such as "show cards", is impossible on the telephone and must be compensated for in questionnaire design. There is evidence that this compensation may lead to

response differences. In addition, other non-verbal communication, both from the interviewer to respondent and respondent to interviewer, is absent. The "expectant pause", for example, may be much more difficult to use as a probe for additional information on the telephone. It is also more difficult for the interviewer to establish the legitimacy of the interview on the telephone and the pace of the interview may be faster (because of the need to keep talking) leading to hurried and, perhaps, less thoughtful responses. On the positive side, the telephone should eliminate non-verbal biasing activity by the interviewer, and may encourage more honest reporting of threatening behaviors. Empirical data, however, have not shown consistent evidence of these effects.

9. Instructions for Recording Responses

In the study manual, each interview and form contains a set of question by question instructions for filling out the interview form, to clearly describe the information that is being solicited. These instructions should be read carefully and understood before attempting to fill out an interview form.

In addition, see the attached instructions for filling out forms. The following are some additional guidelines for recording responses:

- a. Make sure that you understand each response.
- b. Make sure that the response is adequate.
- c. Do not answer for the respondent (i.e., do not infer a response from an incomplete or inadequate reply).
- d. Begin writing as soon as the respondent begins talking. (The respondent's interest may be held by repeating the response aloud as you are writing).
- e. Use the respondent's own words and record the answers verbatim.
- f. Include everything that pertains to the question's objectives.
- g. Note in the questionnaire the nature and place of each probe used.
- h. Do not erase anything. If a response is wrong, strike it out and enter the correct response.
- i. Write "refused" beside any question that the respondent refused to answer.

5.4.3 Training & Quality Control of Interviewers

1. Training

Interviewers will be centrally trained in April, 1989 at the training session in South Dakota using a standardized procedure for administering

each questionnaire. Training will include instructions in research interviewing techniques and in completing each form. Interviewer skill training will include:

- (a) adherence to the standardized protocol
- (b) use of non-judgmental attitudes
- (c) degree and nature of prompting permitted
- (d) dealing with problem interviewing situations
- (e) handling participants comments and recording relevant information on the note logs
- (f) post interview responsibility for the data

2. Quality control of interviewers

To insure consistency and accuracy and to minimize inter- and intra-interviewer differences, study coordinators will monitor 5% of the interviews done by each interviewer.

5.5 RATIONALE FOR MEASUREMENTS

5.5.1 Blood Pressure

As blood pressure rises, so does risk of ischemic heart disease and its complications. The range of normal blood pressures is wide. Even within the "normal range", risk increases as the upper limits are approached. Usually, blood pressures are expressed as systolic pressure/diastolic pressure; values 140/90 mmHg or higher are considered to be hypertensive for adults. Middle-aged persons with a diastolic blood pressure of 90-104 mmHg (so-called "mild" hypertension) have a risk of heart attack that is about 70 percent higher than that of persons with a diastolic pressure under 80 mmHg (normal value). Persons with a diastolic blood pressure exceeding 104 mmHg (moderately severe to severe hypertension) have a risk more than twice that of those with a normal value. Hypertension is an especially strong risk factor for stroke and, to a lesser extent, for peripheral vascular disease. Most of the knowledge of the consequences of high blood pressure arises from studies of sitting arm blood pressure.

5.5.2 Measurement of Body Fat

Population studies have always demonstrated a univariate association between obesity and CVD. However, in many early studies, the association between obesity and the incidence of CVD did not remain significant in multivariate analysis, and thus it was thought that obesity was a risk factor solely because of its influence on other risk factors such as blood pressure, plasma lipoproteins and diabetes. More recently, especially in longer term studies, significant independent associations between obesity and the incidence of CVD have been demonstrated.

Although early records are not conclusive, all evidence indicates that obesity among American Indians was rare until the last century. Their farming and hunting life styles which were associated with high degrees of physical activity and the lack of consistently abundant food sources, probably assured the maintenance of a lean population. However, with the advent of "Westernization" and the reservation system obesity has increased steadily among all Indian tribes and is now a major health problem. It is thus essential to evaluate the extent of obesity in the individuals in this study in order to ascertain its role in cardiovascular disease as well as its relationship to risk factors such as diabetes and hypertension.

In the past, assessment of obesity in population studies was invariably accomplished either by algorithms such as ratios of weight to height, or by measurements of skin folds using calipers. This was because assessment of body composition required either very expensive equipment or time consuming procedures, such as underwater weighing. Within the past few years, instrumentation has become available to allow estimates of body composition from measurements of tetrapolar impedance. This measurement of bioelectrical impedance is quick and easy to perform and has been extensively validated against densitometry. These validations were first performed by Lukaski et. al. (53) and by Roche et. al. (54), in a wide variety of individuals. The study of Roche et. al., evaluated both Caucasians and Blacks. In addition, a large series of Pima Indians have undergone both impedance measures and underwater weighing at the NIH facility in Phoenix, so that the measurement can be directly standardized for this racial group. The conductivity increases in individuals with low percent body fat and the instrumentation calculates the percent body fat utilizing a computerized algorithm.

5.5.3 Anthropometric Measurements

It has been recently demonstrated that among obese individuals, the distribution of body fat is related to certain patterns of morbidity. Vague and co-workers (55) have observed that body fat distribution differs among obese individuals, and that obese subjects can be roughly divided into two groups depending on whether accumulation of body fat is subcutaneous and peripheral (referred to as gynecoid or female type obesity) or whether the fat accumulation is central and primarily in the omentum (referred to as central or android obesity). The latter distribution has been shown in a number of studies to be consistently associated with the triad of hypertension, insulin resistance, and cardiovascular disease. Most studies have shown that central obesity is a risk factor for coronary artery disease.

No systematic studies of body fat distribution have been made among the American Indians. However, visual observations suggest that central obesity is much more prevalent among this racial group.

The quantification of central vs. peripheral obesity is not well standardized. Original studies were done simply by photographs and visual evaluations. This was supplanted by body circumference measurements with investigators generally taking the ratio of the body circumference at the waist to the hip or the thigh as a measure of fat distribution. However, it is clear that the body fat of interest in central obesity is the non-subcutaneous, and therefore, whole body scanning devices are necessary for a precise evaluation of this depot. Nevertheless, it has been shown in a number of population studies that the comparative circumference measurements are an approximation of the body fat distribution and the only practical techniques usable in a field study.

5.5.4 Measurements of Peripheral Vascular Disease

The atherosclerotic process affects vessels in many parts of the body. While the most conspicuous morbidity and mortality arise from coronary atherosclerosis, large vessel peripheral arterial disease (PAD) often results in significant incapacitation of the lower extremities and has been also strongly associated with the incidence of coronary heart disease. Criqui and co-workers have shown that large vessel PAD is strongly and significantly predictive of all caused mortality in both sexes with a relative risk of 4 to 5, and this was independent of other cardiovascular risk factors in a multivariate analysis. Moreover, data from the Framingham study indicate that diabetes was associated with an even greater magnitude of increase of peripheral vascular disease than was coronary heart disease.

A thorough evaluation of peripheral arterial occlusive disease usually entails both a history and a physical examination including measurements of pulses and segmental blood pressures and then more complex measures such as angiography or sonography. The latter two techniques are both expensive and difficult to apply in a field setting. On the other hand, both Criqui et al (56) and Beach et al (57) have used segmental blood pressures measured by a simple doppler instrument in studies involving hundreds of patients. In addition, the correlation between quantitative velocity measurements and segmental blood pressures with occlusion as measured directly by angiography has been established.

Because of time limitations and economic consideration for purchase of equipment, the following indices of peripheral vascular disease will be made in this study.

1. Rose Questionnaire for intermittent claudication.
2. Palpation of posterior tibial and dorsalis pedis pulses.
3. Auscultation for femoral bruits.
4. Measurement of the ratio between blood pressures taken at the antecubital fossa (brachial) and ankle (posterior tibial) using a doppler listening device (Imex Mascot Model).

5.5.5 Physical Activity

Physical activity has been demonstrated in several population studies both in the United States and Europe to be directly associated with the incidence of coronary heart disease. The mechanism for the beneficial effect of physical activity is not understood, but has been proposed to involve factors such as enhancement of cardiovascular function, decrease in blood pressure, decrease in obesity, lowering LDL cholesterol, raising HDL cholesterol, and release of stress.

It is clear that the dramatic changes in lifestyle undergone by the American Indian during "Westernization" and adjustment to reservation life has been associated with changes in their habitual level of physical activity toward the direction of a greatly increased sedentary life style. During this time period, the prevalence of a number of chronic diseases, including coronary disease, diabetes and obesity has increased. It is important to evaluate the level of physical activity in the subjects of this study, because of the potential relationship to cardiovascular disease and also assess its relationship to diabetes and obesity which are prevalent in these group.

The questionnaire currently used by Kriska, et al. (58) from the University of Pittsburgh, on the Gila River Reservation will be modified and adapted for this study. This consists of an interviewer administered questionnaire to assess general, leisure and occupational activities. It is designed primarily to evaluate the past year and past week activities and a summary measure of lifetime physical activity.

5.5.6 Examination of the Heart, Lungs, Carotids and Neck Veins

1. The heart

Auscultation is done to detect signs of congestive heart failure (S_3 - diastolic gallop) and valvular heart disease (murmurs). Physical findings suggestive of previously undiagnosed disease will lead to referral for further evaluation and treatment.

2. The lungs

Auscultation is done to detect signs of congestive heart failure (rales).

3. Carotids

Carotid bruits could be due to vascular disease or aortic valvular disease.

4. Neck veins

Dilatation in the upright position indicates congestive heart failure.

5.5.7 Electrocardiograms

All participants will have a resting electrocardiogram so that evidence for ischemic changes and left ventricular hypertrophy can be determined. The prevalence of such changes will reflect the prevalence in the population studied and can be compared to other population-based studies and among the three sites.

5.5.8 Overview of Laboratory Measurements

1. Lipoprotein Profile

Lipoprotein Physiology: Lipoproteins are basically spherical particles ranging widely in size and composed of two components: the lipids (or fats) in the core of the particle and the proteins on the surface of the particle. The two types of lipids which we are interested in measuring as part of the present research are triglyceride (TG) and cholesterol (Chol). Depending on the relative amount of these two components and various associated proteins, different classes of lipoproteins can be defined (Table 5.1).

Table 5.1: Definition of Lipoproteins

Class	%Lipid	%Protein	Origin and Function
Chylomicrons	99	1	Intestine; transport of newly absorbed dietary fats; normally not detectable in plasma after a 12-hr fast; creamy layer on top of plasma tube after 12 hrs in the refrigerator.
VLDL, very low density lipoprotein	90	10	Liver; transport of newly synthesized triglycerides to peripheral tissue; approximately 80% of plasma TG is in this fraction
LDL, low density lipoproteins	75	25	Liver; derived from VLDL after the triglycerides have been metabolized; transport of cholesterol; approximately 60% of plasma cholesterol is in this fraction
HDL, high density lipoproteins	45	55	Liver and intestine; transport of cholesterol from peripheral tissues back to the liver

The evidence is overwhelming from both cross-sectional and prospective studies in a wide variety of populations that total and LDL cholesterol are significantly associated with the occurrence of atherosclerotic coronary vascular disease (ASCVD), and that HDL cholesterol has a negative or "protective" effect.

The relationship with total triglycerides or VLDL triglycerides has been more controversial. Several population studies have now demonstrated an independent positive association between elevated triglycerides and ASCVD. Triglycerides are also closely linked to obesity, hyperglycemia and low HDL, and are therefore important to measure because of their reflection of these disorders. Some of the ambiguity concerning the associations between triglycerides and coronary vascular disease stems from the possibility that all elevations in triglycerides may not be equal. That is, elevated VLDL with a high proportion of protein, or cholesterol rich VLDL such as that observed in many diabetics may be more atherogenic than large, triglyceride-rich VLDL.

If a Beta Estimate is performed, measurements are made of total plasma cholesterol and triglyceride. HDL is isolated by precipitation, and HDL cholesterol is measured. LDL is calculated by the Friedewald formula:

$$\text{LDL chol} = \text{Total Chol} - \text{HDL Chol} - (\text{Total TG}/5)$$

This estimate is based on the assumptions that VLDL cholesterol is a minor portion of the total cholesterol, that the majority of the total triglyceride is in VLDL, and that the composition of the VLDL is "normal", that is, VLDL cholesterol is approximately one fifth that of triglyceride.

This method has two advantages:

- (1) Can be performed on frozen plasma.
- (2) Requires much less technician time.

The disadvantages are:

- (1) It is inaccurate in individuals with high triglycerides (above 450).
- (2) It is inaccurate in individuals with altered VLDL composition.
- (3) It will not allow the isolation and examination of VLDL composition and relation to ASCVD.

If Beta quantitation is performed, total cholesterol and triglyceride are measured, and HDL cholesterol is measured after precipitation, as in the beta estimate. In addition, VLDL is isolated by ultracentrifugation, and the ratio of cholesterol to triglyceride is measured in VLDL. From this we can directly calculate:

$$\text{LDL-Chol} = \text{Bottom-chol} - \text{HDL-Chol}$$

$$\text{VLDL-Chol} = \text{Total chol} - \text{Bottom chol}$$

$$\text{VLDL-Triglyceride} = \text{VLDL-Chol} \times [\text{VLDL-TG}/\text{VLDL-Chol}]$$

The advantages are:

- (1) LDL cholesterol is measured directly, not estimated.
- (2) A measure of VLDL composition is obtained.
- (3) VLDL and bottom fractions are available for further apoprotein measurements or for storage.

The disadvantages are:

- (1) The ultracentrifugation is laborious, and thus time consuming and costly.

The beta quantitation procedure is selected because of the need for accuracy in the measurement of LDL and because it yields a VLDL fraction of particular interest in a population with high prevalence of diabetes.

2. Apolipoproteins

- (1) **ApoB** ApoB is the only apoprotein in LDL, and the major apoprotein in VLDL. It contains the binding site for recognition of the receptor (B/E) which controls the metabolism of both LDL and VLDL remnants. Its concentration is thus correlated with the amount of LDL and VLDL particles present in plasma. In almost all cross sectional studies comparing apoB in individuals with and without CVD, apoB concentration was higher in those with CVD, and in a few studies it appeared to be a more accurate discriminator between those with and without disease. Its relative significance in predicting CVD has not been established in prospective studies.

- (2) **ApoA-I** ApoA-I is the main apoprotein in HDL. It is the site of recognition of HDL receptor activity. It is the major protein secreted with nascent HDL by the liver and gut, and some A-I is also found in chylomicrons. It reflects the amount of HDL present, and the ratio of HDL cholesterol/A-I is a reflection of HDL composition. In many cross sectional studies it has been shown to be inversely related to CHD, and has been suggested to be a better discriminator between those with and without disease. Like apoB, its relative significance in predicting CHD has not been fully established in prospective studies.

The apoproteins will be measured using a sandwich ELISA assay. ELISA has the same sensitivity as radioimmunoassay (RIA) and does not require the use of radioisotopes. It can be performed using frozen plasma, but this must be stored at -80°C as soon as possible.

- (3) **Glycated apoB** In the presence of a high concentration of glucose, plasma apolipoproteins as well as other plasma proteins will be glycosylated or glycated. The extent of glycation is a function of the residence time of the protein in the bloodstream and the average concentration of glucose in plasma. ApoB with a large molecular weight and an average half-life of 2-3 days, is believed to be a good measure of the short-term glucose control in any individual. A solid phase radioimmunoassay is available for glycated apoB in the laboratory of Dr. Linda Curtiss at the Scripps Research Institute in La Jolla, CA.
- (4) **ApoE Isoforms:** ApoE is present in chylomicrons, VLDL and HDL. It serves as a ligand for the B/E receptor, and thus facilitates the clearance of chylomicron and VLDL remnants. In man there are 6 major phenotypes of apoE, probably resulting from 3 alleles, E2, E3, and E4. Studies to date indicate that the E3 occurs most frequently. E2/E2 occurs in approximately 1% of subjects, and a fraction of them develop type III hyperlipoproteinemia. Most interesting, however, is that plasma cholesterol is highest in individuals with E4, and lowest in those with E2. In type III hyperlipoproteinemia there is an accumulation of remnants of triglyceride-rich lipoproteins, because the E2 is not able to recognize the receptor. It is not clear why all individuals homozygous for E2 do not develop type III hyperlipidemia. It is also not clear why LDL concentrations vary with phenotype, although it can be hypothesized that in individuals with E2/E2, the lack of delivery of cholesterol to the liver via remnant clearance induces upregulation of B/E receptors, and thus increased LDL clearance. Individuals with E4 phenotype also appear to have increased cholesterol absorption, raising the possibility that apoE is involved in regulation of plasma LDL in this manner.

No information is presently available on apoE phenotype in American Indians. It will be interesting to relate phenotype both to occurrence of CVD, and also to plasma cholesterol, because of our previous reports of low plasma LDL in the Pimas.

Determination of apoE phenotype will be done from the isolated VLDL using isoelectric focusing techniques.

3. Glucose Tolerance Test (Glucose and Insulin)

Although it may be argued that a 75 gm glucose load is not a measure of glucose disposal that is analogous to carbohydrate ingested during daily meals, it is the standard measure of glucose tolerance which can be compared to other studies, and forms the basis for all the currently used criteria for diagnosis of diabetes. Because of the expected high prevalence of diabetes in all three centers, and because of the multiple previous studies reporting associations between diabetes and CVD, a glucose tolerance test is essential for the current study. The most simple to perform is one where blood samples are drawn by venipuncture at fasting, and then two hours after ingestion of the glucose. All other fasting blood samples may be obtained at the time of the fasting sample, thus limiting the venipunctures to two.

Glucose concentrations will be measured in both fasting and two hour samples. Blood for this is obtained in tubes containing fluoride to prevent glucose breakdown. Previous studies in Phoenix have shown that tubes of blood containing fluoride can be held on ice for up to four hours before isolating the plasma, and glucose values are unaffected. Glucose is measured on the Hitachi analyzer using a glucose oxidase technique.

Insulin Concentration has been reported in several recent studies to be an independent risk factor for the development of CVD. Although the mechanism of this association has not been established, there are several intriguing possibilities involving its link with insulin resistance, hypertension, hypertriglyceridemia, and thrombosis. The first three factors have been linked in several population studies in individuals with central obesity. However, some preliminary studies with the Pimas suggest that these factors are not universally associated. It will thus be of interest to measure fasting insulin concentrations in individuals at the three centers, to evaluate its relationship to vascular disease and also to blood pressure, triglycerides, waist/hip ratio and fibrinogen.

Insulin will be measured using an overnight radioimmunoassay developed as a modification of the method of Morgan and Lazarow (59). It utilizes a double antibody method; both antibodies and labeled insulin can be obtained efficiently from commercial sources. Although no absolute reference plasma pools are available for insulin, we have constructed our own control pools. The assay has proved to be stable over time with a coefficient of variation of 8-10%. One source of error in insulin measurements occurs in some individuals who have been previously treated with insulin, and thus have circulating insulin antibodies. Samples from insulin treated diabetics will be flagged at the time of drawing, so that their data can be separately evaluated.

4. Glycated Hemoglobin

The relationship between glycemia and the occurrence of CVD is an important one. Although it is well established that diabetes is associated with an increase in CVD, it is not clear whether there is a significant correlation between plasma glucose and either prevalence or incidence of CVD, and in fact several studies have failed to show a relationship between macrovascular disease and glucose tolerance, especially in diabetics.

One explanation that has been cited for this is that tests such as an GTT do not reflect long term glycemia, and also have high intra-subject variability. An alternative for the integrated assessment of glucose levels over time is the measurement of glycated proteins, since the nonenzymatic glycation of proteins is a constant process which increases with increasing concentrations of glucose. Thus the measure of extent of glycation of a protein with a relatively long half life is an assessment of the ambient levels of glucose during the life of that protein.

The most commonly employed is the measure of Hemoglobin A1c. It can provide an assessment of glucose status which reflects approximately a two month period. Although there is an excellent correlation between HbA1c and glucoses during GTT over the entire range of glucose intolerance, the correlation in the nondiabetic to IGT range is less strong. A recent measure of HbA1c in Framingham has shown a very strong positive correlation between it and CVD over the entire range.

HbA1c is much more laborious to measure than is glucose. Although several electrophoretic and chromatographic techniques have been employed in the past, currently an HPLC assay appears to be the method of choice. HbA1c will be measured by HPLC in the laboratory.

5. Fibrinogen

Disorders of the coagulation system could play a major role in ASCVD. There has been special interest in the role that abnormalities in the clotting system might play in the increased risk for atherosclerosis observed in diabetics. Abnormalities in several factors have been reported to be associated with atherosclerosis. One of the most commonly and easily studied is fibrinogen, and it has been shown to be an independent risk factor for CVD in both nondiabetics and diabetics in the Framingham study.

Fibrinogen has been most commonly measured using a chromometric technique. For this thrombin is added to plasma to induce clotting, and the clot is quantitated on a fibrometer or automated coagulometer. Since the lab at the MRF does not possess this equipment, measurements will be made by Dr. Russel Tracy at the University of Vermont.

6. DNA

Because CVD is a clinically heterogeneous disorder and involves a complex interaction between genetic and environmental factors, it will probably be explained by a complex polygenic transmission. Recent developments in recombinant DNA technology, including using restriction enzymes to identify polymorphisms, are now frequently being used in study of genetic disorders and may be very helpful in sorting out the genetics of complex diseases such as atherosclerosis. Methods are now available for detecting altered nucleotide sequence in the human genome, which may be used as genetic markers of CVD or risk factors. Certain alterations in DNA sequence may be demonstrated by cleaving genomic DNA with restriction enzymes, hybridizing with cloned DNA probes and by detecting changes in the length of gene fragments by autoradiography. These techniques have allowed the chromosomal mapping of the genes for diseases such as muscular dystrophy and Huntington's chorea.

Although we do not yet have evidence in Indians that CVD shows familial aggregation, there is certainly ample indication in other populations that CVD and several of its risk factors are familial and thus would lend themselves to genetic studies. Although genes for cardiovascular disease have been localized in animals, attention in human studies has been focused on identifying alleles that may be associated or linked with other diseases. Since diabetes, hypertension and altered lipoprotein concentrations are strong risk factors for the development of CVD, attention has been focused on the possibility that abnormalities in apoprotein or insulin gene loci might be associated with susceptibility to CVD. Mandrup-Poulsen et al. (60) have suggested that a polymorphic region of DNA close to the human insulin gene is a genetic marker for atherosclerosis. Karathanasis et al. (61) have shown that the genes for apoA-I and apoC-III are physically linked, and that polymorphism of the apoA-I gene is inherited as a trait linked to premature atherosclerosis in one affected family. Ordovas et al. (62) have also shown that the apolipoprotein A-I gene polymorphism was associated with CAD in a study of 88 patients, and was also found in 8 out of 12 kindreds with familial hypoalphalipoproteinemia. Finally, the possible association between NIDDM and arteriosclerosis is further suggested by a recent report of an association between an apoA-I gene polymorphism and susceptibility to NIDDM.

Because of the distinct possibility that the next several years will lead to greatly increased availability of genetic markers and likely specific gene loci with documented association with CVD, it is of interest to study these in the Indian groups to be examined in the current survey. The present study will undoubtedly include many related people and gives the opportunity to identify families for linkage studies. Isolated populations such as the Indians lend themselves easily to family studies. For this reason it is proposed in the present protocol to isolate and store DNA from lymphocytes of blood sample. This can be easily accomplished in an efficient and economical way and would, therefore, serve as a store for future genetic studies.

5.6 PROCEDURE FOR GLUCOSE TOLERANCE TEST (GTT)

For all subjects, a fasting glucose value will first be obtained by using Accucheck (see Section 6.1.1 for procedure). Query subjects as to whether they are a known diabetic. If they are, ask if they take insulin or oral agents.

Note that all diabetic participants taking insulin will be exempted from the glucose tolerance test (GTT). Those diabetics who take oral agents and who have two random glucose values ≥ 250 mg/dl. or any participant with a fasting glucose ≥ 225 mg/dl. by Accucheck will also be EXEMPTED from the GTT. For individuals on renal dialysis or who have had a kidney transplant, blood will be drawn at the time of the examination, if possible.

1. Have the bottle of glucose (Glutol 75g.) and blood drawing equipment ready. Although the Glutol has proved to be very dependable and consistent when its concentration per ml has been measured in numerous samples, the volume supplied per bottle is not consistent. Thus it is necessary to measure both the Glutol and the water into which it will be diluted for each patient. The easiest way to accomplish this is to have a plastic graduated container such as that used for urine collections. The person administering the glucose tolerance test can thus pour 135 ml of Glutol into the measuring container, pour that into the cup supplied to the patient and then measure out 135 mls of water using the same measuring container. The cup containing the diluted Glutol is then ready for the patient. This measuring container can be used for all patients visiting on that day, but it should be discarded at the end of the day and a fresh measuring container used for the next clinic.
2. Ask subject if he/she has been fasting for 12 hours and whether he/she has refrained from smoking and beverages other than water, and record the response on the GTT check list given in Appendix 26.
3. Draw fasting blood samples as described in Procedure for Blood Drawing. Record the time of blood collection.
4. Describe the purpose of the GTT to the subject.
5. Ask the subject to drink the glucose solution quickly, within 3 minutes - Record the time the process started on form.
6. Instruct the subject that he/she should not eat, drink or smoke anything until the second blood sample is obtained two hours later.
7. Instruct the subject to take the specimen container to the bathroom for the urine sample - Record the time of urine collection.
8. Place urine sample in the refrigerator.
9. Obtain second blood sample at exactly 2 hours post load - Effort should be made so that the second blood sample is obtained at exactly 2 hrs \pm 3 min. Record the time of collection.

5.7 PHYSICAL EXAMINATION

During the examination, participants wear a surgical scrub suit, gown, or loose fitting clothes that do not impair accurate body measurements and the examination. It is helpful to have them wear large scrub pants to enable the pant legs to be rolled up for the ECG examinations. Shoes and socks are removed for the supine examination and weight and height measurements. The form to be used is given in Appendix 28.

5.7.1 Anthropometry

Anthropometry is performed before the clinic snack with the participant's bladder empty. The subject may wear a scrub suit or clothing into the station. Measurements may be taken over the scrubsuit or light clothing only. Make sure that the pockets are empty and the belt is removed. Height and weight measurements are not to be taken with the participant wearing shoes.

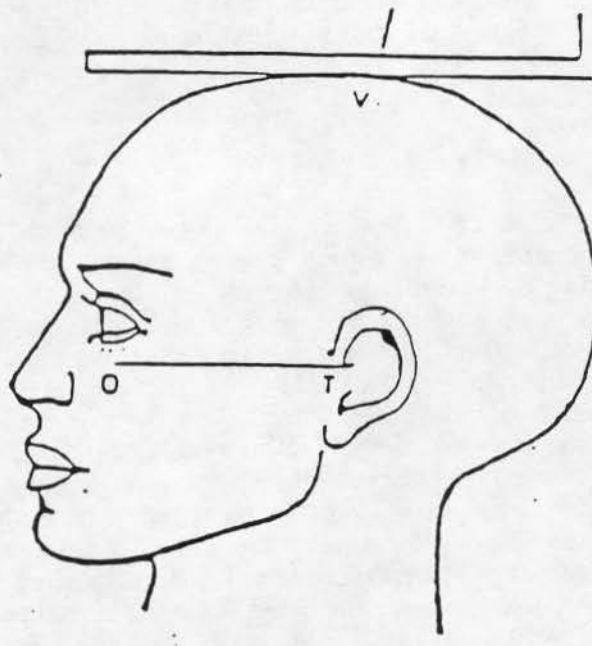
Measurements if possible are taken by a team of two persons (one acting as observer, the other as recorder). If two are available, the first observer takes the measurements, calling out the value of the measurement. The first observer keeps the measuring instrument in place until the recorder repeats the number. The recorder also checks the examinee's position during the procedure. If a single observer performs the measurements, each should be recorded immediately after they are taken. Values taken are rounded to the nearest unit indicated for each measure. Fractions less than 0.5 will be omitted and fractions greater than or equal to 0.5 will be rounded up to the next higher unit.

1. Height and Weight

a) Standing Body Height

The participant stands erect on the floor or the horizontal platform with his/her back against the vertical mounted ruler, heels together and against the vertical ruler, looking straight ahead with his/her head in the Frankfort horizontal plane (the horizontal plane which includes the lower margin of the bony orbit—the bony socket containing the eye—the most forward point in the supratragal notch—the notch just above the anterior cartilaginous projections of the external ear) (Figure 5.1). The right angle is brought down snugly but not tightly on the top of the head. A foot stool is used if the examiner is shorter than the participant so that the examiner's view is level with the point of measurement on the head of the participant. The participant's height is recorded to the nearest centimeter using the rounding method described above. The participant is instructed to stand as straight as possible but with feet flat on the floor. (A check is made to be sure the floor is level, the wall is at a 90 degree angle to the floor, the wall is straight and the metal ruler is mounted perpendicular to the floor). A chart converting centimeters to inches is on the wall or available for use in informing the participant of his/her height in inches.

Figure 5.1 Frankfort Plane for Measuring Body Height



b) Body Weight

Before a participant is weighed, the scale is balanced so that the indicator is at zero when no weight is on the scale. The scale must be level and on a firm surface (not a carpet). The participant is instructed to stand in the middle of the platform of the balance scale (Detecto, model 683-p) with head erect and eyes looking straight ahead. Record the results to the nearest kilograms using the rounding method described above. To maintain accuracy, the scale is zeroed daily and must be calibrated with a known weight (50 lbs.) every month or whenever the scale is moved. To calibrate the scale, check that the 50 lb. weight weighs 50 lbs. after zeroing the scale. Furthermore, the operator should make sure that an adult must weigh 50 lbs. more when standing on the scale holding the weight.

2. Supine Waist (Abdominal) Girth

An anthropometric tape is applied at the level of the umbilicus (naval) with the patient supine (Figure 5.2) and the participant is instructed to "breathe quietly". The measurement is made and recorded to the nearest centimeter using the rounding method described above.

3. Erect Hip Girth

Instruct the participant to stand erect yet relaxed with weight distributed equally over both feet. The hip girth is measured at the level of maximal protrusion of the gluteal muscles (hips) (Figure 5.3). Keep the anthropometric tape horizontal at this level and record the measurement to the nearest centimeter using the above rounding method. Only one measurement is made. The greatest source of error for this measurement is due to not having the tape horizontal. Technician(s) should check the position of the tape to assure its correct position from both the front and back.

4. Upper Arm Circumference

The participant sits on a table or stool so that the right arm hangs freely with the right hand resting on the right knee. The observer applies the tape measure horizontally at the midpoint between the acromium and olecranon (Figure 5.3). Record the measurement to the nearest centimeter using the rounding method described above. This measurement is used to select the proper size blood pressure cuff.

A Novel Products tension tape is used to measure both abdominal and hip girth and the upper arm circumference.

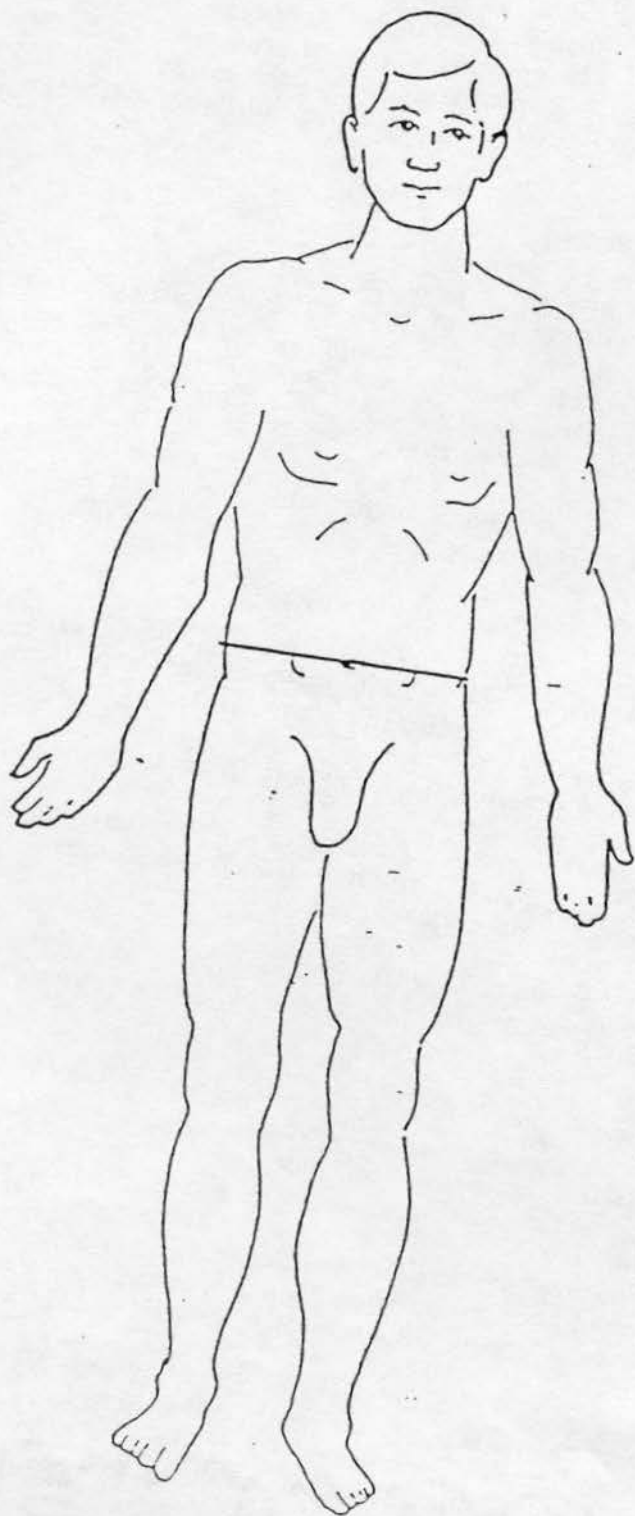
5.7.2 Training and Certification for Anthropometry

Each technician must undergo training and certification by an anthropometry expert. The training program for taking body size measurements consists of the following components.

1. Training is conducted centrally by an expert in anthropometry.
2. Each field center trains one or two individuals before the baseline examination. One individual from each center is designated the center's anthropometry supervisor.
3. If additional personnel are needed by a center to perform anthropometry, training is provided by the center's anthropometry supervisor.
4. Training includes:
 - a. Introduction - rationale for body size measurements, overview of technique, expected limits of reproducibility, and pitfalls related to anthropometry.
 - b. Demonstration of technique - an expert demonstrates the proper technique of each measurement on a volunteer subject. This includes a description of proper and improper techniques, as well as recording of data.
 - c. Practice - technicians divide into groups of three, and two techs perform measurements on the third in a round-robin fashion. This is done under the observation of a trained anthropometrist. Differences in technique and clarification of problem areas are discussed.

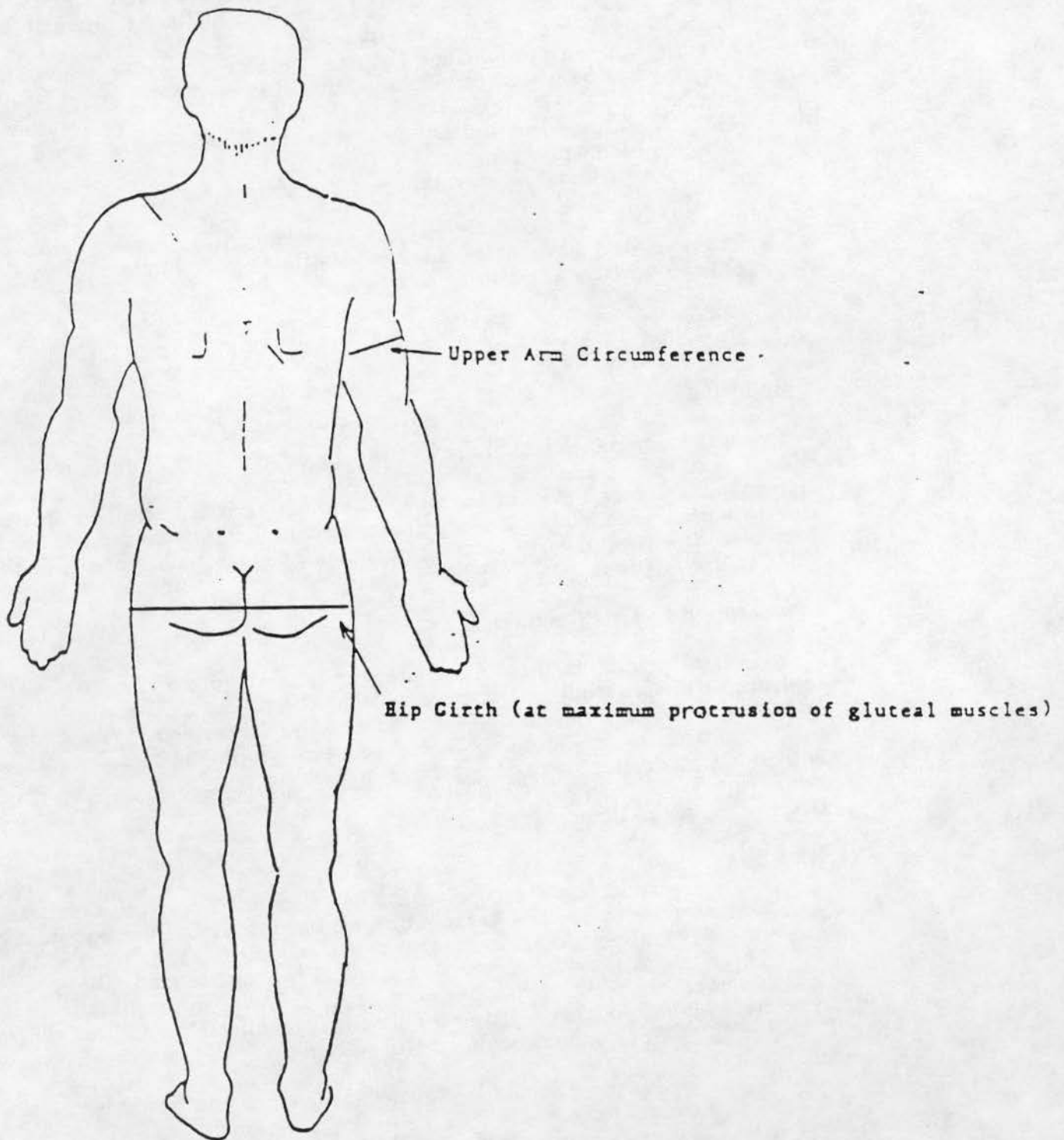
Figure 5.2

Location of Waist Girth Measurement



Supine Waist Girth
at level of umbilicus

Figure 5.3 Location of Upper Arm, Hip, and Calf Circumferences



- d. Testing - several subjects are assessed independently and blindly by each technician. Each technician's measurements are compared with the expert's measurements and the results discussed in class. The four subjects examined have four distinctly different body types: lean, obese, athletic, and aged.
- e. Certification - technicians must measure one or more test subjects and be within certain standards of error:
 - 1) The arm, waist and hip measurements must agree within ± 1 cm on each subject.
 - 2) Weight must agree within ± 1 kg. Height within 1 cm.

If these are met, the subject receives certification for field work. Trainees who have problems are identified, and they are allowed to practice and try again to be certified.

5.7.3 Sitting Blood Pressure

1. Introduction

In the Strong Heart Study, sitting blood pressure is measured in a resting state, using 3 measurements with a Baum mercury sphygmomanometer. Within any one individual, variation in blood pressure is substantial, even within a few minutes and particularly under conditions perceived as stressful. Use of three replicate readings tends to reduce this short-term variation.

2. Standardized Clinic Procedure

Correct measurement of blood pressure is of the utmost importance to the success of this study. It is essential that the procedure described below for measuring blood pressure be followed exactly. Precision is essential for valid comparisons of blood pressure between groups of people and in individuals on different occasions.

3. Description of the Equipment

a) Stethoscope

A standard stethoscope with a bell is used. Korotkoff sounds are best heard with the bell because of their low pitch. Stethoscope tubing should be about 10-12 inches from the bell piece to "Y" branching. This length provides optimal acoustical properties and allows the observer to read the sphygmomanometer at eye level and in a comfortable position. Earpieces should fit comfortably and snugly in the ears. Four points should be observed in using the stethoscope.

- i) The ear piece should be directed downwards and forwards into the external ear canal.
- ii) The ear pieces should be tight enough to exclude outside sound but not so tight that they cause discomfort.

- iii) The valve between the bell and the diaphragm should be turned in the correct direction.
- iv) The bell of the stethoscope should be placed lightly on the skin overlying the brachial artery - immediately below the cuff and medial to the cubital fossa above the medial epicondyle of the radius and posterior to the biceps muscle. Light pressure accentuates the low-pitched sound and avoids compression murmurs. When pressing too heavily with the bell on the artery a murmur can be heard which may prolong the apparent duration of phase 4 and give inaccurate readings.

b) Sphygmomanometers

Standardized Baum mercury instruments are used for all clinic visits. The mercury manometer consists of a screw cap, a face with numbers, a lined glass column, a reservoir containing mercury, rubber tubing, and a metal case. The rubber tubing from the mercury manometer connects to the rubber tubing from the inflatable rubber bladder of the cuff. As the inflatable rubber bladder is filled with air, the air pressure in the bladder travels through the connecting rubber tubing. The pressure pushes the mercury out of the reservoir and into the lined glass column. The number for each line is read when the rounded top of the mercury, the meniscus, is level with it. If the meniscus is exactly between the lines, the reading is made from the line immediately above, i.e., rounded up the nearest even number.

c) Cuffs and Bulbs

Proper size of the cuff is essential for accurate blood pressure measurement. Study Centers have three standardized Baum cuffs available - adult, large adult, and thigh cuff.

The range markings on commercial cuffs overlap from size to size and do not offer a precise guideline. In the Strong Heart Study arm size is measured and the cuff size is selected as follow:

Table 5.2 Determination of cuff size based on arm circumference (Mid humeral)

Cuff Size	Arm Circumference
Adult	24 to 32 cm
Large Adult	33 to 41 cm
Thigh	> 41 cm

4. Blood Pressure Measurement Instructions

Some of the many extraneous factors influencing blood pressure are controlled by standardizing the measurement technique and the environment in which the measurement is made. Uncontrolled factors, such as time of day, arm circumference, recent use of caffeine, and identity of the observer are recorded, so that they can be taken into account during analysis.

The Strong Heart Study participants are asked to avoid caffeine (tea, coffee, chocolate, and soft drinks), eating, heavy physical activity, smoking and alcohol intake for twelve hours and to refrain from smoking for at least one-half hour prior to the clinic visit. Current drug intake, including medications affecting blood pressure, and non-prescription drugs is recorded on the day of the examination. A detailed history of alcohol intake history and recent physical activity at work and leisure are also recorded.

5. Staff Preparation for Participant Visit

In relating to the Strong Heart participants, remember that participation in the study is voluntary. Participants are given full explanation and instructions about the preparation for the blood pressure examination and an opportunity for questions. The setting in which blood pressure measurements are made is standardized.

6. Measurement Procedures

The sitting arm blood pressure is measured three times at each clinic visit. It takes approximately 10 minutes to make three blood pressure measurements including the initial five minute rest. The blood pressure measurements are made early in the clinic visit sequence immediately following the reception and informed consent, and more than 15 minutes after phlebotomy.

Once the participant is given instructions and explanations, and the equipment has been checked, blood pressure measurement begins. The following steps must be followed precisely.

- a) If the participant indicates that there is a medical or postsurgical reason for not having the blood pressure measured on the right arm (or if the right arm is missing), reverse chairs and proceed with the left arm. Indicate on the data collection form that the left arm is used. If in doubt, or if the participant prefers not to have a blood pressure taken on either arm, consult with the supervisor.
- b) Seat the participant with the right arm on table. The bend at the elbow (ante-cubital fossa) should be at heart level. Legs should be uncrossed and head support comfortable. The participant should be able to relax the neck and shoulder muscles as much as possible.

- c) Connect the cuff to a standard manometer and establish the pulse obliteration pressure by slowly inflating while palpating the radial artery until pulse is no longer felt. Deflate and record the pulse obliteration pressure.
- d) Palpate the brachial artery (just medial to and above the ante-cubital fossa), and mark this location for stethoscope placement. Choose the correct cuff size and wrap the cuff on the arm with the center of the bladder over the artery. If the participant seems particularly apprehensive, delay wrapping the cuff until after the five minute wait.
- e) Record the time. Allow a five minute wait before taking the blood pressure. Conversation should be limited. However, a brief explanation of the procedure can be repeated at this time if necessary.
- f) Measurement 1: Connect the cuff to the manometer. Inflate rapidly to the pulse obliteration level + 30 mm. Holding the pressure constant with the bulb, wait 5 seconds. Place the bell of the stethoscope on the brachial artery and slowly deflate the cuff (2 mm per second) while listening. Record the 1st and 5th phases, reading the pressure in mmHg to the nearest even number. The first sound heard in a series of at least two sounds is recorded for systolic blood pressure (phase 1). The first silence in a series of at least two silences is recorded for diastolic blood pressure (phase 5), not the last sound heard. If the sounds do not cease completely, the fourth Korotkoff sound will be used.
- g) Measurements 2 and 3: Have the participant raise measurement arm for five seconds. After waiting another 25 seconds with the participant's arm on the table, repeat the measurement in step f above and disconnect cuff.

Average blood pressure readings are calculated for the second and third readings. Because of the importance of the blood pressure averages, to inform the participant and for the purposes of referral, all arithmetic is done with a calculator.

If for any reason the observer is unable to complete, or has forgotten to complete any portion of the examination (and the participant is gone), draw two horizontal lines through the space(s) on the form. This is the correct way to indicate missed information. If an entire reading is missed and the participant is still sitting at the blood pressure work station, completely deflate the cuff and start over with a replacement reading.

7. Reporting the Blood Pressure Results to the Participant

Using a calculator, average the second and third readings and mention the results to the participant. State clearly the systolic and diastolic pressure.

8. Procedure for changing the peak inflation level

Occasionally the Korotkoff sounds may be heard as soon as one places the stethoscope over the brachial pulse. If this happens, the peak inflation level used was too low. The observer immediately deflates the cuff by releasing the thumbscrew and disconnecting the cuff tube. Then have the participant hold the cuff-wrapped arm vertically for five seconds. Proceed with blood pressure measurement, starting at a new peak inflation level, 10 mm Hg above the previous level.

9. Sitting Blood Pressure Training and Certification

At each field center a minimum of two clinic staff persons are trained for measuring sitting blood pressure. They need not be health professionals, but they must be trained and certified in the blood pressure measurement technique. Observers should also have experience in relating to people.

The first training session begins with a description and demonstration of the correct blood pressure measurement procedure. Trainees watch the American Heart Association blood pressure instruction video tape. Checklist is used for certifying all persons taking BPs (Appendix 29). Simultaneous BPs will be recoded using a Y stethoscope as described in Appendix 30.

It is the responsibility of each field center to conduct these procedures and report to the Coordinating Center when the procedures are completed.

Y Tube stethoscope observations are made in conjunction with the blood pressure training video during initial training and for quarterly quality control. The trainer has the observer-trainee go through the entire blood pressure measurement procedure using a quality control checklist. The observer and trainer listen with the Y Tube and record the values on separate sheets. Two measurements on one subject are obtained. Measurements by the trainer and the trainee should agree within 4 mmHg on any one reading (systolic or diastolic) and averages should agree within 3 mmHg.

10. Quality Control

To ensure the accuracy of the blood pressure measurements throughout the study, quality control measures are developed centrally and applied at all field centers. These measures include:

- a) recruitment of the most qualified personnel
- b) standardized training and certification
- c) retraining as necessary
- d) observation of data collection by supervisors, using the checklist given in Appendix 29. One checklist is used for each technician and mailed to the Coordinating Center each month
- e) frequent staff meetings to provide feedback
- f) editing of data, both manual and by computer
- g) a quality assurance program administered by the Coordinating Center
- h) simultaneous Y Tube observation of each technician by the blood pressure supervisor
- i) equipment and maintenance program

11. Technician Training and Quality Control

Blood pressure technicians are trained centrally prior to participant recruitment. New technicians hired after the start of the study are trained locally by the Study Coordinator or a designated "Blood Pressure Supervisor".

The Coordinating Center directs a blood pressure quality assurance program to review six-monthly data. This includes quality analysis and review of blood pressure data every 3 months, comparing means for each technician with the values for all technicians, by center. These statistics are adjusted for weight, age and sex of the participants by the use of Z-scores. Arbitrary levels of Z-scores, (which can be modified according to performance) are used to detect possible systemic deviations in blood pressure measurement by individual technicians. Digit preference is also monitored for each technician. The Form for Recording Simultaneous Blood Pressure Observations in Appendix 30 will be used.

12. Equipment Maintenance

Each study center is responsible for the proper operation and maintenance of its equipment. Maintenance responsibility is assumed by the nurse clinician, and all staff are instructed to report any real or suspected equipment problems to that person promptly.

All checks, inspections, cleanings and problems indicated are documented and recorded by date in a permanent log. Problems and solutions are also recorded. The local nurse clinician sends a copy of this log monthly to the Coordinating Center. A copy of this log is given in Appendix 31.

The standard sphygmomanometer is inspected once a month. These inspections include a check of:

- i) the zero level
- ii) mercury leakage
- iii) manometer column for dirt or mercury oxide deposit
- iv) condition of all tubing and fittings

The equipment is cleaned if inspection indicates it is needed, or at least once a year. Specific maintenance instructions for the standard sphygmomanometer are provided in Appendix 32.

5.7.4 Ankle Systolic Blood Pressure

1. Move the Participant to the Supine Position

Assist the participant in moving to the supine position on the examination table.

2. Applying the Blood Pressure Cuff

The appropriate ankle blood pressure cuff is applied on the right calf. The same size cuff should be used on the ankle as the one used on the arm. In special instances, different cuff size may be used.

At this point, a blood pressure cuff is applied above the ankle of the right leg, as shown in Figure 5.4. Place the cuff flat on the table (the surface marked "side to the patient" face up) with the appropriate ankle centered on the cuff. At this time disregard the "over the artery" marker. The lower edge of the cuff (from which the hoses extend) should be approximately 2-2 ½ inches above the medial malleolus. Following the contour of the lower leg, wrap the end of the cuff with the velcro "fabric" over the ankle, as shown in Figure 5.5. Note that depending on the degree of tapering in this area, the cuff corner will be offset from parallel toward the knee. Holding the cuff from sliding, wrap the other end over the ankle (step III in Figure 5.5), again following the contour of the ankle, and secure the velcro. Check to be sure that the corners of the cuff extending above the upper edge of the cuff are about equal: if one end extends more than the other, loosen the velcro and adjust the wrap. Next, locate the "over the artery" marker of the cuff, and rotate the cuff so that this line is directly over the posterior tibial artery. The cuff may be rotated more easily by sliding it toward the malleolus, and after alignment, the cuff can be made snug by pulling it up toward the calf. The cuff should conform closely to the shape of the ankle, with the lower edge 2-2 ½ inches above the malleolus.

The posterior tibial artery is usually palpated as it courses posteriorly to the medial malleolus. Even if the posterior tibial pulse is not palpable, the posterior tibial artery is used as the location for the marker line on the cuff for the "over the artery position". Any kinks in the tubing are removed, and any "tugging" of the tubing on the participant's leg is relieved.

3. Procedure for Measuring Ankle Blood Pressure

- a) Palpate posterior tibial pulse and mark these locations. Apply ultrasound gel to the posterior tibial area over the pulse or in the area shown on Figure 5.4.
- b) Listen for the pulse using the Imex Mascot Doppler. If no pulse is audible or palpable, record zero for ankle blood pressure after the absence of pulse is verified by a second observer. Then try to use the dorsalis pedal pulse for the determination of blood pressure.
- c) Inflate cuff to a pressure reading 20 mm higher than the "Peak Pressure" used for the sitting arm pressure (ie. obliteration +50 mmHg) and utilize identical deflation techniques while listening with the Doppler.
- d) Take a second blood pressure, and record both blood pressure in the Physical Examination Form. This procedure also applies to the doppler arm blood pressure.

- e) Record the first sound as described above.

The blood pressure cuff is applied over the brachial artery according to the instructions found in the Sitting Blood Pressure section of this manual. By consulting the participant's Data Form, the observer verifies that the same arm and the same cuff size are used as for the sitting blood pressure readings.

If the participant had his/her sitting blood pressure taken on the right arm earlier in the clinic examination, the cuff is applied on the right arm at this time. The observer then uses the Doppler to record the brachial pressure. The pressure recorded in the right arm is used to calculate the brachial/ankle systolic pressure ratio for both lower extremities.

If it is impossible to obliterate the sounds after increasing the pressure to above 250 mmHg, no systolic measurement should be made in that ankle.

- f) Repeat the procedure for the left leg and record the pressure as soon as the cuff is in the proper position.

The observer now removes all conduction jelly. Socks and a robe or other garments are now replaced and the participant is escorted to the next work station.

5.7.5 Electrocardiogram

1. Basic description

- a) A Marquette Mac-PC (or Mac-12) based system will be used.
- b) All ECGs will be transmitted centrally to Fitzsimons Army Medical Center in Denver electronically by modem.
- c) All ECGs will be read in a standard manner at the ECG Reading Center by Board Certified or Board Eligible Staff Cardiologists and transmitted or mailed back to the site of origin for clinical correlation or other action, if required. In any case, all ECGs will be overread and promptly returned.
- d) All ECGs with abnormal readings by the Marquette SL-12 analysis system will be forwarded to the University of Minnesota ECG center for application of Minnesota codes.
- e) The Strong Heart Study will itself maintain a permanent copy of all cardiograms in its possession to assure "perpetual" availability of the study data for study members.

Figure 5.4 Placement of the Blood Pressure Cuff on the Ankle
Step I. Positioning the Lower Leg on the Cuff

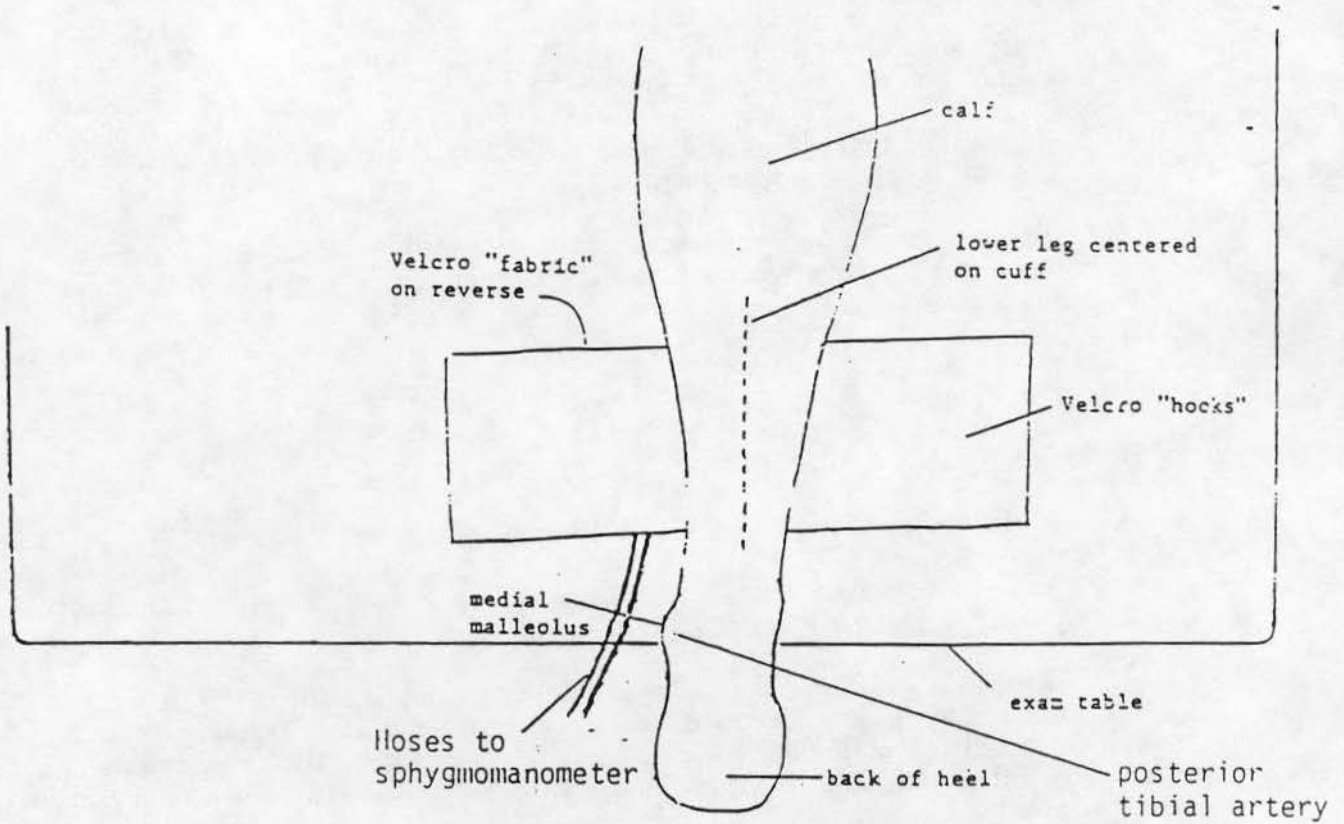
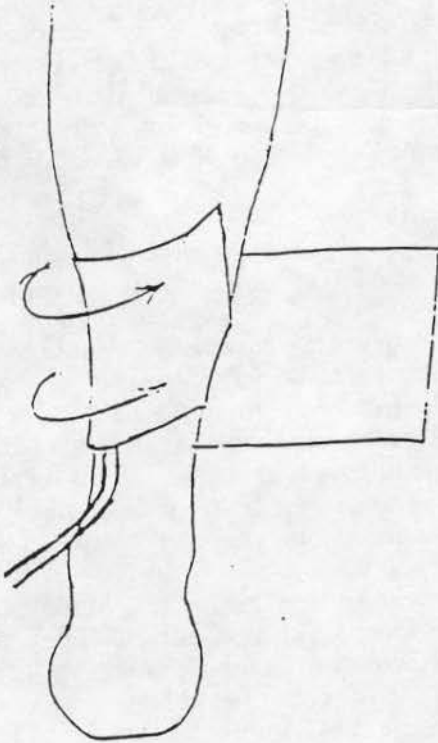


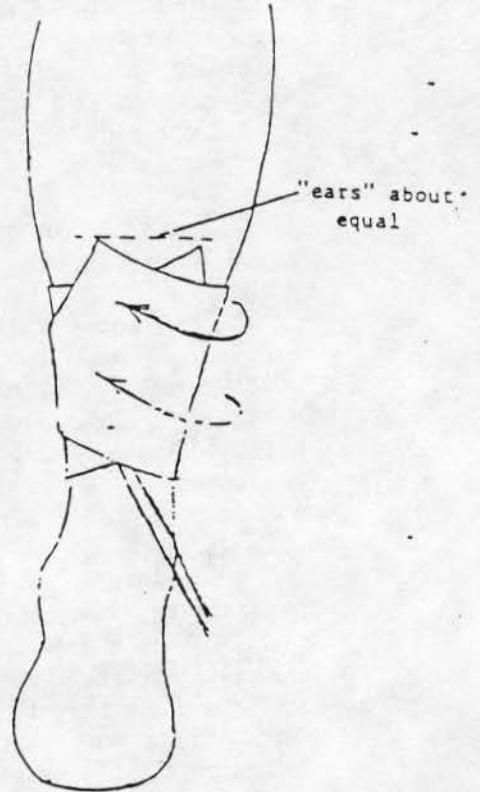
Figure 5.5

Placement of the Blood Cuff on the Ankle.
Steps II and III: Wrapping and Securing the Cuff

II. Wrap Fabric End of Cuff Following Contour of Ankle



III. Wrap and Secure Cuff



- f) A standard level of competence must be demanded of our personnel performing ECGs at each site. A "competency exam" would be conducted of all persons recording ECGs at individual sites by a physician (or other designated person) who would judge the ability of the person being examined to adhere to standard protocol.

2. Minimal Equipment Requirements

- a) A new Mac-PC with modem will be used at each clinic. Mac-12 machines may be used if they are available.
- b) Fitzsimons Army Medical Center will provide free use of their mainframe CAPOC (Computer Associated Practice of Cardiology software) system (except for study hook-up costs and paper costs) for the duration of the study. This system can be accessed 24hrs/day by modem and stores all study cardiograms together or by center. Also, floppy disc downloading can be accomplished to a Mac-12 compatible format.

Transmission instructions on Mac-PC, Standardized ECG, instructions and Minnesota Codes are given in Appendices 33, 34, and 35, respectively.

Procedures will differ at each center concerning how ECG readings are supplied to local physicians and IHS health records. A copy of the ECG obtained at the time of performance, if marked "unconfirmed" can be included in the patients chart that day. As soon as three cardiologists have overread, they will be transmitted by modem to each center. This version can be added to the patients chart at that time or can be used to replace the one placed in the chart on the day of the examination.

For data analyses, a copy of the ECG tracing containing the MAC SL12 program will be sent by each center to the Coordinating Center. They will create a data set containing 10 numbers for the machine reading using CAPOC MUSE library statement numbers (Appendix 33(f). New codes will be created for readings that are not in the statement library.) Three cardiologists will read the ECG in Denver, and a summary reading will be compiled by Dr. Oopik, using an adjudicator if there is disagreement. This will be sent to the Coordinating Center and added as a second reading to the data set. All ECGs considered abnormal by the MAC SL12 program, readings will be sent to the University of Minnesota to be coded. The Minnesota codes will then be added to the ECG data set by the Coordinating Center.

5.7.6 Impedance Measure

The measurement of body fat is accomplished using the Impedance Meter, Model # B1A101, made by RJL Equipment Company. This involves a small low frequency current which travels across the body through the extracellular fluids. The measurement of bioelectrical impedance is related to the volume of the conductor and when expressed as impedance or conductance, it is proportional to fat free mass.

1. Procedure

- a) Before beginning explain why you are making the measurement to the subject and check to see that the subject has not exercised vigorously for the past 12-hours and has not consumed alcohol in the past 24-hours. Make sure that the subject is not dehydrated. Record past vigorous exercise or alcohol consumption and evidence of dehydration on the data form.
- b) Before beginning the test, be sure that the subject cable is securely attached to the RJL spectrum, have the subject remove the right shoe and sock and lie down with the right side nearest to the analyzer;
- c) If the examination table is metallic, it must have a foam pad - all of the body must be on the pad.
- d) For best results:
 - i) Use electrodes only once.
 - ii) Legs should be far enough apart so that thighs do not touch each other. A towel may be used to prevent the legs and thighs being touching.
 - iii) Hands and arms should be far enough apart so that the arms and hands do not touch the torso. A towel can be used to prevent the arms from touching the body.
 - iv) No body parts should be in contact with any external metal (jewelry and pins in bones will not effect the results).
 - v) Subject's skin should be clean, dry and warm to the touch. If the skin is oily, clean it with an alcohol swab before attaching the electrodes.

Prior to the attachment, cut the electrodes in half bisecting the foil tab. The cut edge of the electrode placed on the ankle and wrist should face toward the shoulder and thigh respectively. The cut edge of the other two may face in either direction.

- e) Electrode Placement:
 - i) Attach the black wires to the foot with the red clip connected to electrode at ankle (F1). Attach the red wires to the hand with the red clip connected to electrode at the wrist (H1).
 - ii) Put H1 on an imaginary line from the protruding bone of the wrist to bisect the ulnar head; make sure that the cut edge of the electrode is toward the shoulder.

- iii) Put H2 just above the knuckles of the right hand or on any finger; there should be at least 5 cm difference between H1 and H2.
- iv) Put F1 on an imaginary line between the protruding ankle bones to bisect the medial malleolus; make sure that the cut edge of the electrode is toward the thigh.
- v) Put F2 just above the toes of the right foot or on the great toe (there should be 5 cm difference between F1 and F2)

Once the electrodes have been properly attached to the subject, the values for resistance and reactance will appear on the screen. Record these on the results sheet. Make sure that the toggle switch is set on x1.

2. Instructions for Impedance Meter

Battery Charging

Unit has rechargeable batteries that must be charged before use. They are charged by plugging instrument in with power switch in off position. Manufacturer suggests charging for 8 hours prior to use. Instrument should not be plugged in longer than 8 hours; damage to batteries may occur.

For our use they suggest the following: Plug unit in first thing in the morning before clinic and at least 15 minutes before the first test. Leave unit plugged in for the duration of each clinic, but have the power on only when testing a patient. At the end of clinic, the meter should indicate high charge (green area).

Checking Instrument

Before testing the first patient, be sure that the cables are not crimped or damaged. Check battery charge using the following procedure. Disconnect power cord. Place the Resistance/Reactance switch in the resistance position. Place the switch labeled x1/x10 in the x1 position. Attach the 2 clips from one patient cable to one side of 500 ohm resistor provided.

Attach the two clips from the other cable to the other side of the resistor. Turn power on. Resistance displayed should be between 490 and 510 ohms. If resistance is in this range, proceed with patient testing.

If resistance is not within this range, the batteries may not be fully charged, or another problem may be present. If charge appears to be low, charge batteries for 8 hours, then retest. If unit is fully charged and resistance is still not acceptable, see manual, page 9, for trouble shooting.

Note: Patient cables are made of silver. Take care not to bend or abuse cables. They should be left plugged into instrument to minimize handling, except when relocating instrument.

3. Quality Control for Impedance Measure

Training for the measurement of body fat using the bioelectric impedance meter was accomplished by a representative from the RJL Equipment Company who attended the training followed the following steps:

1. Instructions concerning the use and verification of the machine.
2. Demonstration by instructor of the procedure.
3. Practice by the individual operators.
4. Certification of operators if instructor and operator achieve an impedance measure where resistance and reactance were each within 3%.

For ongoing quality control in each center, one individual will be designated as supervisor of the impedance measures. This individual will assure that each of the other operators of the instruments is recertified quarterly by having him/her perform an impedance measure on the same individual as the instructor. These should agree within 3%.

In addition, the instructor is responsible for the monitoring of the impedance meter. This includes checking the battery charge daily before the instrument is used, following the instructions in the manual. Further, the instructor should observe individual operators performing impedance measures at least quarterly to verify consistent and proper technique.

5.7.7 Examination of the Heart, Lungs, Bruits and Pulse

1. Sitting Examination

Neck - Presence or absence of venous column in 90° upright position is recorded.

2. Sitting or Supine Examination

Neck, Carotid Bruits - The participant is asked to stop breathing momentarily. With the stethoscope bell, the examiner listens first above the clavicle for the common carotid artery and second, at the angle of the jaw for carotid bifurcation. In each position, the stethoscope is placed for three cardiac cycles, alternating sides of the neck.

3. Auscultation

Auscultation can be performed while patient is sitting quietly waiting (five minutes) for blood pressure measurements.

(1) Lungs

Lungs - Rhonchi, Rales- The participant is in the sitting position. It may be best for men to remove the scrub top or shirt entirely and for women to lift it. The stethoscope diaphragm (which should be warmed in the palm of the hand) is used. The participant is instructed to take deep breaths through the mouth. After the first five or six breaths and as needed thereafter, the participant is asked about symptoms of lightheadedness. Auscultate posteriorly beginning at the apices with at least one full breath in each location. Three locations on each side are examined: apex, mid-lung field (approximately at the 6th intercostal space) and the base, which may need to be determined by percussion. Rhonchi are described as coarse breathing noises.

Rales are fine moist noises. Basilar rales are reported as those within two stethoscope diameters of the base of the lung. "Lower lung" means from above the base to mid-lung, at the 6th space posteriorly.

(2) Heart

The diaphragm of the stethoscope is placed consecutively at the apex, the left sternal border at the 5th intercostal space, the left sternal border at the 2nd intercostal space and the right sternal border at the 2nd intercostal space. The bell of the stethoscope is then placed at the apex (the PMI) for low frequency auscultation (S₃ and diastolic rumbles).

The location of a systolic or diastolic murmurs are reported in the area in which they appear loudest. More than one location of equal intensity is acceptable. Grading of murmurs is as follows:

Grade 1 - Barely audible

Grade 2 - Just easily audible with careful listening.

Grade 3 - Readily Heard with even casual listening.

Grade 4 - Intermediate with palpable thrill.

Grade 5 - Louder, but requires light stethoscope contact.

Grade 6 - Loudest, can even be heard with stethoscope off chest.

Other findings include the radiation and character of the murmur.

4. Supine Examination

a) Femoral Bruits

The femoral artery should be auscultated by stethoscope using the diaphragm at the inguinal crease bilaterally for the evidence of bruits. (This is a large artery readily palpable in all but the most obese individuals).

b) Ankle Edema

The socks or other foot covering are removed. The participant is examined in the supine position. Gentle but firm pressure is applied along the mid-tibia, anteriorly down to the ankle in each leg. Pitting or indentation remaining after pressure is removed constitutes definite edema. The examiner identifies the mid-point between the prominence of the medial malleolus and the inferior border of the patella. Pitting at or above that mid-point is recorded as "marked" edema. Pitting only below that point is recorded as "mild" edema. The degree of edema is based on the extent.

c) Posterior Tibial Pulse

The examiner palpates inferior to the medial malleolus of each foot. The presence or absence of arterial pulsation is recorded. If in doubt, the examiner compares with the radial pulsation.

d) Dorsalis Pedis Pulse

The superior aspect of each foot is palpated for the presence or absence of this pulse.

5.7.8 Physical Findings to be Confirmed by a Physician to Assure for Presence of CHF

The participants should be referred for evaluation by a physician if these findings were noted so they can be confirmed and evaluated for the presence of congestive heart failure.

1. Lung Examination

Rales in at least three of four lower lung field in the sitting position.

2. Other findings

Bilateral ankle edema, orthopnea or paroxysmal nocturnal dyspnea.

The standard IHS referral form should be used to refer patients with newly observed physical findings described above to an internist or cardiologist so that the diagnosis can be confirmed and the prevalence of congestive heart failure can be determined. In such cases, use the Physician Referral Form for Diagnosis of CHF in Appendix 36.

5.7.9 Referral Guidelines

It is the intention of the Strong Heart Study that individuals who participate in the physical examination will be provided both with education and encouragement concerning a healthy life style aimed at preventing cardiovascular disease and, also that the participants receive assistance in securing medical care for any significant medical conditions uncovered during the course of the study exam.

The following procedures will be followed to assure these goals:

- (1) All participants reporting for the medical exam will receive appropriate educational materials concerning a heart health lifestyle. In addition, the examining personnel, when possible, will endeavor to educate the participants during the exam concerning the importance of risk factor reduction and modifications that the individual might make to improve his/her risk for cardiovascular disease.
- (2) After all laboratory results are completed from the physical examination, a follow-up letter will be mailed to each participant thanking him or her for participation and supplying him/her with basic medical information obtained during the exam. (See example of letter in Appendix 37(a) and suggested interpretation in Appendix 37(b)).
- (3) After all results from the medical examination are complete, a form (Appendix 37(c)) will be generated by the Coordinating Center which will be available to the Indian Health Service for insertion into the patients medical record. This will contain results of the electrocardiogram, measurements of body fat, glucose tolerance test, and blood measurements, which might be of benefit for their future medical care.
- (4) In order to insure that the patient receives appropriate referral and treatment for significant medical conditions uncovered during the course of the study, consistent referral levels have been established as described below which will be applied at each center.

1. Referral Levels at Medical Data Review

The Strong Heart Study refers participants using established guidelines for referral. Uniform criteria for referral of participants are implemented at all centers. Emergency, immediate, urgent, and routine referrals are made. Methods for referring participants who have no physician are established with the participant. All referrals are documented on a separate log and copies of the referrals are kept in the Strong Heart Study folders. The following are the levels of referral established for the Medical Data Review.

- (1) Emergency Referral: The patient is immediately escorted to a physician or an emergency squad is summoned. In such situations study personnel will provide emergency care to the best of their ability and training as appropriate to the emergencies that arise.
- (2) Immediate Referral: The participant is urged to see his/her physician within one day.

The physician assistant/nurse clinician notifies the participant's physician or nearest IHS facility and the Strong Heart Study physician, if applicable. The participant is provided with an IHS referral form to take to his/her physician.

- (3) Urgent Referral: The participant is urged to see his/her physician within one week.

The physician assistant/nurse clinician confirms the decision with the Strong Heart physician, if applicable, of the referral. An IHS referral form is filled out and an appointment is made with the assistance of the clinic staff and/or CHRs.

- (4) Routine Referral: The participant is asked to see his/her physician within one month, or at first convenient appointment.

The physician assistant/nurse clinician advises a visit to the participant's physician. Appointments for the patients are made by the CHRs or clinic staff.

- (5) No Referral: The study results are summarized for participant and held for routine results letters.

2. Referral and Review Guidelines for Independent Patient Follow-up

Guidelines for referral at medical data review are provided in the table below. The reviewer determines the acuteness of the findings, as well as whether or not the condition is being followed by a physician. If the participant is aware of and being followed medically for a condition, judgement is exercised about whether to refer. The standard IHS referral form is used to provide appropriate clinical information to the health care professional who will evaluate the patient. A copy of this referral will be retained with the research forms to document the referral that was made.

Referral at the time of examination

Emergency Referral

Statement to Participant ("Consult M.D. immediately")

SBP \geq 260 mm Hg
 DBP \geq 130 mm Hg
 Pulmonary edema or any finding or symptom suggestive of a life-threatening illness, including evidence of acute MI.
 Use Referral form (Appendix 36)

Your BP is very high
 Your BP is very high
 Describe rationale for referral to participant.

Immediate Referral

Statement to Participant ("Consult M.D. today")

Fasting Accucheck glucose $>$ 400
 SBP 240-259 mm Hg
 DBP 115-129 mm Hg
 Diabetic foot ulcer
 Unstable angina
 Neurologic symptoms in past week
 Other severe symptoms or findings

Your blood sugar is very high
 Your BP is very high
 Your BP is very high
 Your foot must be seen by a physician
 Your chest pains may be important
 Your symptoms may be important
 Your symptoms may be important

<u>Urgent Referral</u>	("Consult M.D. within a week")
SBP 200-239 mm Hg DBP 105-114 mm Hg	Your BP is high Your BP is high
Angina, stable but untreated/ not being followed	Your chest pains may be important
Neurologic symptoms, untreated, one week to six months ago	Your symptoms may be important
Suspected congestive heart failure (Use Referral Form in Appendix 36)	Your symptoms may be important
Other acute, but less severe symptoms Inappropriate Medication usage	Your symptoms may be important Taking medication incorrectly may be dangerous
Non-diabetic with a fasting AccucheK glucose \geq 200	Your blood sugar is high
<u>Routine Referral</u>	("Consult M.D. within one month or at first convenient appointment")
SBP 140-199 mm Hg	Your BP is elevated into borderline range. Recommend that participant confirm blood pressure reading within 2 months
DBP 90-104 mm Hg	Your BP is elevated into borderline range. Recommend that participant confirm blood pressure reading within 2 months
Old MI (Rose Questionnaire), previously unrecognized	Your chest pain may be important
Neurologic problem (stroke, TIA findings) > 6 months ago, unrecognized	Your symptoms may be important
Claudication, previously unrecognized	Your leg pain may be important
Absence of pedal pulse or doppler < 0.8 of arm	You may have a problem in your foot. You should check with your doctor
Carotid Bruit : previously undiagnosed heart murmur and carotid murmur	You have a heart murmur and should be checked
Grade 3 Murmur is one that is "moderately" loud	
Grade 4 Murmur is "loud"	
Grade 5 Murmur is very loud but requires placement of the stethoscope on the chest.	
Grade 6 Murmur can be heard even without placing the stethoscope on the chest.	

Referral after test results are available

Consult M.D. immediately

Fasting blood glucose \geq 140 or
2 hr-glucose \geq 200, and non-diabetic

You may have diabetes

Fasting blood glucose \geq 200 and diabetic

Your diabetes is not under control

2-hr blood glucose 140-199

Your blood sugar is high. You may develop diabetes

Chol $>$ 200

Your blood cholesterol must be rechecked

TG $>$ 1000

Your TG is very high

TG $>$ 250

Your blood triglycerides (fats) must be rechecked

Plasma Creatinine $>$ 2 and no previous history of kidney problems

Your kidneys are not functioning well

Urine Albumin $>$ 1000 mg/day or
Plasma creatinine 1.5-2.0

Your urine test shows you should be checked

=====

ECG

ECG Findings Requiring Review by M.D.
Before Participant leaves the
Field Center

Would like to review with M.D.

- * Acute pattern abnormalities
(MI, ischemia...)
- * Rhythm disturbances (2nd or 3rd
degree block, ventricular tachycardia,
any type of ectopic beat > 6/minute,
couplets bigeminy, R on T, multifocal
premature ventricular contractions,
atrial fib/flutter with
ventricular rate < 60 or > 110,
sinus bradycardia < 40,
sinus tachycardia > 110,
PR interval \geq 0.26 sec.
- * Any other ECG findings, alone or in
conjunction with symptoms, causing
concern

Call should be made to ECG
Reading Center by field staff.
(303) 361-8133

Other ECG Findings to be reviewed
the same day; if possible

QT Prolongation (confirm medications)

ECGs where
Routine Referral is usually appropriate

New left bundle branch block
New right bundle branch block
Wolff Parkinson White
Left Ventricular Hypertrophy

=====

Examples of
Usually Benign ECGs (always obtain old comparison ECG when available)

Left Axis Deviation/Left Anterior Hemi (Fascicular) Block
Atrial Abnormalities
Intraventricular Conduction Delay
Unusual P Wave Axis
Wandering Atrial Pacemaker
S₁S₂S₃ Pattern
Old Right Bundle Branch Block
Incomplete Right Bundle Branch Block
ST Elevation compared with Early Repolarization
First Degree AV Block

Copies of each ECG obtained as part of the Strong Heart Study will be forwarded
to either the local clinical director or other identified local clinical personnel.

6. Laboratory Procedure

6.1 PROCEDURE FOR BLOOD DRAWING

Have the following tubes labelled and ready in ice bucket

Fasting Sample

- * Three 10-ml Lavender-top tubes
- * One 3-ml Gray-top tube

2-hr Sample

- * One 5-ml Lavender-top tube
- * One 3-ml Gray-top tube

Other Supplies

- * tourniquet
- * alcohol pads
- * 2x2 gauze pads
- * bandaids
- * vacutainer sleeve
- * vacutainer needle [21G]
- (multiple sample)
- * urine collection cups

Note :

Participant exempted from the GTT will also have 5-ml Lavender top tube drawn at fasting.

6.1.1 Accucheck Procedure

- 1) Obtain an Accucheck reading from a drop of blood obtained by finger prick. (Using the blood from the venipuncture procedure below will not provide comparable results since there is a difference between capillary blood (fingerstick) and venous blood values.)
- 2) See Accucheck procedure for calibrating the meter and steps to follow in obtaining a glucose reading. (Consult with the operations manual which can be obtained from Boehringer Mannheim. 1-800-858-8072)

6.1.2 Venipuncture Procedure

- 1) Position subject in comfortable chair in an environment free from distraction.
- 2) Query subject about fasting state. Record time since last food or beverage on GTT check list (appendix 26). If subject is not fasting, record time and note in comment section what foods or beverage were consumed that morning. Be sure to include any additives like cream, sugar, or artificial sweeteners if a beverage was consumed. Regardless of fasting state, precede with drawing procedure.

- 3) Inform subject about procedure. Use left arm if possible.
- 4) Assemble all materials; have extra tubes within reach.
- 5) Apply tourniquet; have subject close fist and palpate for vein. (A vein feels like an elastic tube and bounces when pressure is applied). If the presence of vein is questionable, remove or loosen tourniquet. If the structure remains, it probably was not a vein; if it disappears assume it was a vein. Another technique to assist in locating a vein is to moisten the skin with alcohol as it will decrease the friction and may aid in the palpation of a vein. If the tourniquet has been on for 2 minutes, loosen and reapply before performing venipuncture.
- 6) Cleanse skin over vein thoroughly using a circular motion from center to periphery. Dry with sterile gauze.

DO NOT TOUCH SKIN AFTER CLEANSING

- 7) Put gloves on; fit needle into Vaccutainer sleeve and place lavender top tube into sleeve.
- 8) Pull skin taut 2 inches below site to keep vein from rolling. With bevel in upright position, enter vein and then push the tube forward as far as it will go. Hold needle in the same direction as vein and at a 15 degree angle to vein.
- 9) After blood begins to flow, loosen tourniquet.

If blood does not begin to flow try the following:

- a) Move needle slightly in or out.
- b) Rotate needle slightly or lift needle to move bevel away from wall of vein.
- c) Try another tube.
- d) Loosen tourniquet; blood flow may be impeded if tourniquet is too tight.

* Be sure to watch for signs of hematoma from a vein. If there is any indication of hematoma, immediately remove tourniquet and needle. Place pressure and/or ice pack on site for 10 minutes. If the first attempt to obtain blood is unsuccessful with the subjects permission try again on the opposite arm. The same technician should not attempt a venipuncture more than twice.

- 10) When first tube is filled, remove tube and replace with the next tube. Invert filled tubes 3x and place on ice.
- 11) Proceed with additional tubes in this order:

Fasting:	3(10ml) lavender 1 (3 ml) gray	If GTT not done add 5ml lavender top tube at fasting.
2 Hr:	1 (3ml) gray 1 (5ml) lavender	

- 12) After drawing the last tube, remove tourniquet. Place gauze on site of needle entry and quickly withdraw needle. Apply pressure to site. Ask subject to bend arm and hold gauze pad with pressure until told to relax.
- 13) Record the time the fasting draw is completed on the GTT check list.
- 14) Serve glucose beverage; instruct subject to consume it within 3 minutes. Record time on GTT check list.
- 15) Confirm that bleeding has stopped and apply pressure bandage at venipuncture site. If bleeding has not stopped, elevate arm and continue to apply pressure until it stops.
- 16) Affix preprinted labels to tubes, making sure that ID# and tube designation are correct.
- 17) Give subject labeled urine specimen cup and instruct him to void into container. Inform him where to leave the container.
- 18) Remove gloves, wash hands, and precede to next patient.

6.2 SAMPLE PREPARATION, STORAGE AND SHIPPING

The laboratory procedures described in this manual are being implemented in the PENN MED LABORATORIES of the Medlantic Research Foundation.

6.2.1 General Rules for Handling Sample for Lipid and Other Measurements

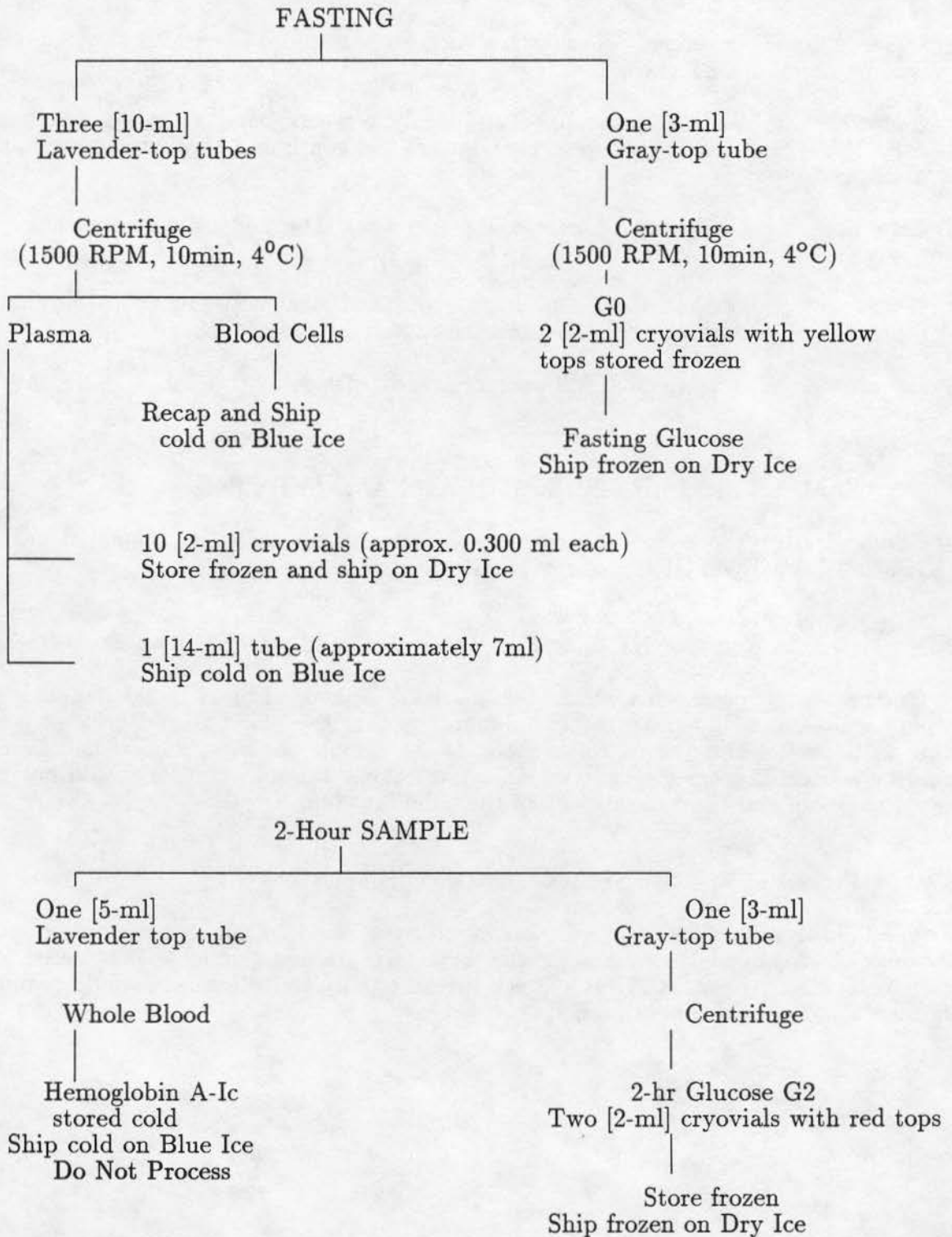
One important precaution which should always be kept in mind in the handling of sample for lipids and lipoprotein measurements is that the blood should be kept cold (either in the refrigerator or on ice) as soon as the sample has been collected. Plasma should be separated from the cells within a few hours. Plasma samples should not be allowed to freeze and thaw during any of the handling steps.

6.2.2 Processing of Blood Samples and Urine Sample

The following flow diagram indicates exactly the blood collection procedure of the protocol. A check list is available in the Appendix 27a and should be completed for each participant. Appendix 27b is a check list for quality controls which would require a number of additional tubes of blood.

Figure 6.1 Processing of Blood Samples and Urine Sample

Precautions: Gloves should be worn at all times when blood and urine samples are being handled.



6.2.3 Blood Processing

1. Label vials and tubes for each patient as follows (this should be done before beginning the blood processing)

<u>Container</u>	<u>Label</u>	<u>Shipment</u>
------------------	--------------	-----------------

Fasting Samples

From the 3 x [10ml] Lavender Tubes

14-ml tube	ID	cold
2-ml Cryovials	ID	frozen (x10)

From the [3-ml] Gray Top Tube

2-ml cryovial with yellow top	ID	frozen (x2)
-------------------------------	----	-------------

From Urine Sample

14-ml Tube	ID	frozen
------------	----	--------

2-Hour Samples

From the [5-ml] Lavender Tube

Send entire tube refrigerated every week without any processing

From the [3-ml] Gray Top Tube

2-ml Cryovial with red top	ID	frozen
----------------------------	----	--------

2. Place vials and tubes in order each on ice
3. Centrifuge all blood tubes except the [5-ml] Lavender top tube taken at the 2-hr, at 4°C 10 minutes, 1500 RPM spin (500xg)
4. Remove from centrifuge and place on rack on ice
5. Remove caps from 3 [10-ml] lavender top tube
6. With a disposable transfer pipet, place approximately 6-7 ml into the 14ml tube to be shipped refrigerated every week. With the same pipet transfer all the remaining plasma into the 10 (2ml) cryovials remaining (approx. 0.3 ml each). Be very careful not to disturb the cell pellet in the bottom of the Lavender top tubes.
7. Do not freeze the [14-ml] test tube, place in refrigerator for shipment once a week. Make sure that the cap has been snapped tightly and not just closed to prevent leakage.

8. Recap 3 lavender tubes. Do not freeze. Place in refrigerator and ship on blue ice weekly.
9. Discard transfer pipet #1,
10. Remove cap from fasting [3-ml] gray top tube.
11. With a fresh transfer pipet #2, transfer plasma to the two cryovials for fasting glucose and creatinine with Yellow-colored caps.
12. Discard tube with red cells and transfer pipet #2.
13. Remove top from [3-ml] gray top tube.
14. With a third fresh pipet transfer plasma to two cryovials for the 2-hr glucose. These tubes will be indicated by Red-colored caps.
15. Discard tube and transfer pipet #3.
16. The [5-ml] Lavender top tube taken at the 2-hr sample should be sent refrigerated every week to the Core Lab UNPROCESSED.
17. Take patient's urine sample, pour approximately 8 ml into tube labeled "URINE" and discard the rest
18. Two zip-lock bags will be needed for each participant.

Bag A will be used for cold shipment and should contain

- * 1 [14-ml] plasma tube
- * 1 [5-ml] Lavender top tube unprocessed
- * 3 recapped Lavender top tubes

Bag B will be used for frozen shipment and should contain

- * 10 [2-ml] cryovials for plasma
- * 2 [2-ml] cryovials with yellow-colored caps
- * 2 [2-ml] cryovials with red-colored caps
- * 1 [14-ml] urine sample

The two lab checklists in Appendix 27 a and b will be used by the staff who process the blood and urine sample. Appendix 27c illustrates the recommended flow of samples for two participants using the Workstation.

One [10-ml] QA Lavender top tube should be processed and fresh plasma transferred to 5 [2-ml] cryovials with the proper ID label. The second [10-ml] QA lavender top tube should be processed and fresh plasma transferred to a plastic screw cap test tube. The QA Gray top tube should be also processed as any regular Gray top tube and the plasma placed into two [2-ml] cryovials with red top. These 7 [2-ml] cryovials and the [14-ml] urine tube will be kept frozen in a separate zip-lock bag and sent in the next Dry-Ice shipment. The [5-ml] QA Lavender top tube taken at 2-hour and the screw cap plastic test tube containing the plasma from the second lavender top tube should be placed in a separate zip-lock bag and sent directly to the Core Laboratory with the next shipment on Blue-Ice.

6.2.4 Equipment and Supplies

1. Equipment: A refrigerated clinical centrifuge pre-cooled at 4°C will be required for the separation of plasma from the cells. The centrifuge rotor should have adapters for 13x100 tubes.

Alternatives would include the placement of a non-refrigerated centrifuge in a standard refrigerator via an extension cord.

2. Supplies:

A description of the various tubes and supplies that would be needed in the study is presented. Except for the Cryovials for frozen samples, all other items can be substituted with equivalent items from the local distributor.

Items	Size	Packaging	Material
Plasma Tubes w/push-on cap	14-ml	1000/case	polypropylene
Cryovials w/screw cap	2-ml	500/case	Nalgene cryoware
Transfer Pipets	7-ml	500/box	polyethylene
Vacutainer, EDTA	10-ml	1000/case	15% solution BD6457
Vacutainer, EDTA	5-ml	1000/case	15% solution BD6507
Vacutainer, fluoride	3-ml	1000/case	
Vac. Multiple Sample Needles	21G	1000/case	BD7212
Vac. Reusable Holder	(10 free with each case of tube)		
[2x2] Sterile Gauze			
Alcohol Wipes			
Latex gloves			
Tourniquet			
Needle disposal device			

6.2.5 Shipping

1. Shipment Schedule

All refrigerated samples should be shipped in frozen dry ice within 5 days of draw.

Frozen samples should be shipped on dry ice once every 2 weeks. When packing, place at least 8 - 9 lbs. dry ice in the box. Pack tightly and do not add any other packing material.

For either fresh or frozen samples, put the shipping slip in a plastic bag.

2. Shipping Slip

A pre-printed form will be available to each clinic for inclusion with each shipped container. Information required for each participant would include the ID code, the number of plasma tubes, the number of special blood tubes, and the number of blood cell tubes. Place check mark next to the ID number in the Frozen Shipment Form of diabetics receiving insulin. Extra labels should be mailed along with the bag containing the unfrozen plasma and the whole blood (5 ml PTT) drawn on each patient. These labels will be used for dispensing the whole blood into freezer containers for hemoglobin A_{1c} assays. A copy of the shipping slip should be retained by the originating clinic (Appendix 27d).

Upon receipt of the samples, a status check list will be sent back to the central office of PI's (or any pre-designated individual), presumably by FAX. Key information to watch for is the condition of the samples. If the temperature is inadequate, it would be important to increase the number of cold packs for subsequent shipment. The results for the laboratory measurements of each participant will be returned within 7 working days in the shipping package along with the cold packs to be re-used. The final results including all laboratory measurements will be available only every two months.

3. Shipment Address

Refrigerated samples (Wet Ice) for analyses should be sent via airfreight, overnight delivery, to the following address for receipt between 9:00 AM to 5:00 PM EST, Monday through Friday:

Penn Med Labs, Suite 150
650 Pennsylvania Ave, S.E.
Washington D.C. 20003
Telephone: (202) 675-4760
Fax: (202) 675-6042
Attn: EDNA ROSS

Arrangements can be made for the samples to be picked on Saturdays or holidays at the Federal Express office

Federal Express
201 Pennsylvania Ave S.E.
Washington D.C. 20003

Frozen samples (Dry Ice) to be shipped every 2-4 weeks should be sent to:

Dr. Michael Paidi
George Hyman Research Building
Medlantic Research Foundation
108 Irving Street NW
Washington DC 20010
Phone (202) 877-6530
FAX (202) 877-3209

Mrs. Edna Ross is the laboratory supervisor and will be able to answer any question regarding the status of the shipment. Special shipment for weeks involving a legal holiday should be coordinated with Mrs. Ross.

6.3 LABORATORY PROCEDURES

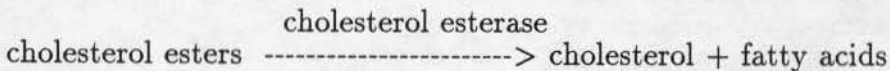
6.3.1 Plasma Lipids

All lipid determinations will be carried using the Hitachi 705 Clinical Chemistry Analyzer using enzymatic kits obtained from Boeringer Mannheim Diagnostics.

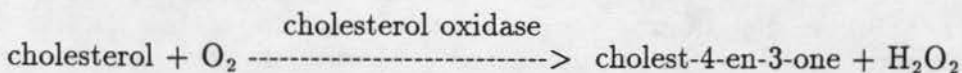
1. CHOLESTEROL ASSAY

PRINCIPLE:

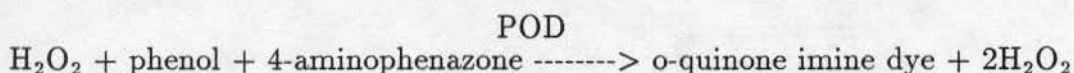
All cholesterol esters present in serum or plasma are split quantitatively (100%) into free cholesterol and fatty acids by cholesterol esterase:



In the presence of oxygen, free cholesterol will be oxidized by cholesterol oxidase to cholest-4-en-3-one:



The hydrogen peroxide reacts in the presence of peroxidase (POD) with phenol and 4-aminophenazone to form an o-quinone imine dye:



The intensity of the color formed is proportional to the cholesterol concentration and can be measured photometrically.

SPECIMEN COLLECTION:

Serum: Lipemic samples do not interfere with cholesterol recovery. Hemolysis up to 200 mg/100 mL has no effect on the assay. Bilirubin up to 12 mg/100 mL shows no interference.

Plasma: EDTA is the recommended anticoagulant. Do not use citrate, oxalate or fluoride. Cholesterol is stable in specimens for up to six days at 2-8°C or at room temperature(20-25°C).

REAGENTS:

The Cholesterol Reagent is intended for in vitro diagnostic use. The components of Cholesterol System Pack for HITACHI 705 include:

Cholesterol Reagent

Reactive Ingredients:

- 0.18 mmoles 4-Aminophenazone
- 0.73 mmoles 3,4-Dichlorophenol
- 1.09 mmoles Phenol
- ≥45 U Cholesterol oxidase (*Nocardia erythropolis*) (25°C)
- ≥72 U Cholesterol esterase(microorganism) (25°C)
- ≥36 U POD (horseradish) (25°C)

Nonreactive Ingredients: Buffer, stabilizers

Precautions: DANGER - TOXIC. NEVER PIPETTE BY MOUTH. In case of contact flush affected areas with copious amounts of water. Get immediate medical attention for eyes, or if ingested.

Storage: Store unopened at 2-8°C.

Preparation of Working Reagent:

1. For R1 Working Solution, reconstitute the contents of one Bottle of Cholesterol Reagent to the shoulder (180 mL) with distilled or deionized water. R1 Working Solution is stable for four weeks at 2-12°C or 7 days at (20-25°C)
2. R2 Working Solution is not required

INSTRUMENT SETTINGS:

CHANNEL SETTING: (see page 7 of Operators' Manual)

CHANNEL NO: 1

TEST CODE: 11

CHEMISTRY PARAMETERS: (see page 6 of Operators' Manual)

TEST CODE: 11 (CHOL)
ASSAY CODE: 1 (ENDPOINT)
SAMPLE VOLUME: 5 μ L
R1 VOLUME: 500 μ L - -----
R2 VOLUME: 1-1-N
R3 VOLUME: ---
WAVELENGTH 1: 600 nm
WAVELENGTH 2: 505 nm
RGT. BLK. ABS: 0
RGT. BLK. CONC: 0
STD. CONC.: * - * - <blk>
FACTOR: 0
STD. ABS. ALLOWANCE: 10%
NORMAL RANGE L: 140 mg/dL
NORMAL RANGE H: 240 mg/dL
ABS. LIMIT (RATE): 0
CONTROL ID NO.: 1 - 2 - <blk>

* Values will be based on PreciCal Normal and Abnormal as used during the daily calibration. Might be expected to change every 6 months.

CONTROLS:

On each tray position one and two will be the high and low QC pools and in the middle three more QC pools will be run.

CONTROL POOLS:

1 vial reconstituted every three days.
Add 10 ml DW using calibrated pipet.
Mix well on mixer 30 minutes.

AFTER RUN:

Transfer lab sequence numbers to tape.
Tape and list go to data entry.
Data are double entered.

2. TRIGLYCERIDE

PRINCIPLE:

Esterase hydrolyzes triglycerides to glycerol and fatty acids. The glycerol is then oxidized to dihydroxyacetone phosphate and hydrogen peroxide. In the presence of peroxidase, the peroxide reacts with 4-aminophenazone and 4-chlorophenol in a Trinder reaction to a colorimetric endpoint.

- 1) triglycerides + 3H₂O $\xrightarrow{\text{esterase}}$ glycerol + fatty acids
- 2) glycerol + ATP $\xrightarrow{\text{GK}}$ glycerol-3-phosphate + ADP
- 3) glycerol-3-phosphate + O₂ $\xrightarrow{\text{GPO}}$ dihydroxyacetone phosphate + H₂O₂
- 4) H₂O₂ + 4-aminophenazone + 4-chlorophenol $\xrightarrow{\text{peroxidase}}$ 4-(p-benzoquinone-monoimino) phenazone + 2H₂O + HCl

SPECIMEN COLLECTION:

Plasma: EDTA will be used as anticoagulant.
 Triglycerides are stable in plasma for 3 days at 2-8°C or frozen at -20°C.

REAGENTS:

The Triglycerides (GPO) Reagents are intended for in vitro diagnostic use.

The components of the Triglycerides (GPO) System Pack for HITACHI-705 include:

1. Buffer/Enzymes (enzymes added on reconstitution)

Reactive Ingredient:

0.35 mmol 4-chlorophenol

Nonreactive Ingredients:

Buffer, preservative, detergent

Precautions:

WARNING - TOXIC. AVOID INHALATION AND CONTACT WITH SKIN OR MUCOUS MEMBRANES. In case of contact, flush affected areas immediately with copious amounts of water. Contains sodium azide; if drain becomes clogged, clean with 10% sodium hydroxide.

Storage: Store tightly closed at 2-8°C.

1a GPO

Reactive Ingredients:

≥0.05mmol	ATP
0.035 mmol	4-Aminophenazone
≥300 U	Esterase (E.C. 3.1.1.13; microorganism)
≥250 U	Glycerol phosphate oxidase
≥20 U	Glycerokinase (EC 2.7.1.30; microorganism)
≥15 U	Peroxidase (E.C. 1.11.1.7; horseradish)

Precautions: Exercise the normal precautions required for the handling of all laboratory reagents.

Storage: Store tightly closed at 2-8°C.

Preparation of Working Reagents:

1. For R1 Working Solution, connect one Bottle 1 (Buffer/Enzymes) to one bottle 1a (GPO) using one of the enclosed adapters. Mix by gentle inversion. Completely dissolve the lyophilizate in the buffer. R1 Working Solution is stable for 2 weeks at 1-12°C or 2 days at room temperature (20-25°C).
2. R2 reagent is not required.

INSTRUMENT SETTINGS:

CHANNEL SETTING (see page 7 of Operators' Manual)

CHANNEL NO: 2
TEST CODE: 33
TEMPERATURE: 37°C

CHEMISTRY PARAMETERS (see page 6 of Operators' Manual)

TEST CODE: 33 (TRIG)
ASSAY CODE: 1 (ENDPOINT)
SAMPLE VOLUME: 5
R1 VOLUME: 500 -N
R2 VOLUME: 1-1-N
R3 VOLUME: ---
WAVELENGTH 1: 700
WAVELENGTH 2: 505
RGT. BLK. ABS: ---
RGT. BLK. CONC: 0
STD. CONC.: * - * - <blk>
FACTOR: ---
STD. ABS. ALLOWANCE: 10%
NORMAL RANGE L: 40 mg/dL
NORMAL RANGE H: 150 mg/dL
ABS. LIMIT (RATE): 0
CONTROL ID NO.: 1 - 2 - <blk>

* Values will be based on PreciCal Normal and Abnormal as used during the daily calibration. Might be expected to change every 6 months.

<blk> blank, no entry

If specimen exceeds 500, dilute sample with physiological saline, and re-run.

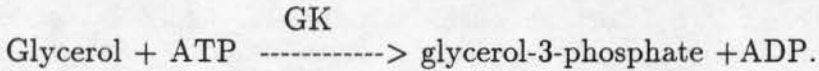
CONTROLS Low, medium and high. Standardized controls are run with each assay.

NUMBERING & DATA: Same as for Cholesterol, page 9.

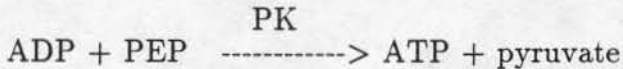
3. FREE GLYCEROL

PRINCIPLE:

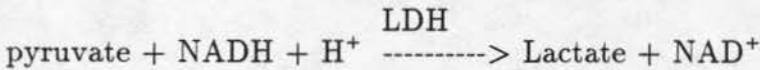
This procedure will measure only the free glycerol. By subtracting the free glycerol from total, triglyceride glycerol is computed. During the assay glycerol is reacted with ATP in the presence of GK to form glycerol-3-phosphate plus ADP.



The ADP reacts with phosphoenolpyruvate (PEP) in the presence of pyruvate kinase (PK) to form ATP and pyruvate.



Pyruvate reacts with nicotinamide-adenine-dinucleotide=reduced (NADH) in the presence of lactate dehydrogenase (LDH). The amount of NADH oxidized during the reaction is equivalent to the amount of glycerol in the specimen.



The wavelengths used are 340 nm and 660 nm.

SPECIMEN

A duplicate aliquot is taken of all specimens used for total triglyceride assay.

Reagents

1. Free Glycerol (Triglyceride Blank) - Use BMD Autoflo Triglyceride Kit, Catalog #166448. Triglyceride Kit stored at 2-8°C when not in use. Refer to kit for expiration date.
2. Extran MA 03 BMD, Catalog #7550 (Reaction cell Bath Detergent) - Use Extran MA 03 as is, no preparation required.
3. Dilute Extran - Using 0.5 ml of Extran Diluted with 200 ml distilled deionized H₂O. Solution stable for 2 months at room temperature.
4. 0.1 M NaOH - Dissolve 4.0 grams of NaOH in 90 ml of distilled, deionized water. Adjust final volume to 100 ml. Store in plastic container at room temperature. Stable for 1 year.

Evaluation Parameters for Free Glycerol on Hitachi 705:

Kit Utilized:

Autoflo Triglyceride, Catalog #166448.

Reagent Preparation:

R1 Reconstitute Bottle 2 (Coenzyme Reagent) as directed in the Autoflo package insert. (15 ml distilled H₂O).

Combine 20 ml from Bottle 1 (Buffer) with 7.5 ml of Bottle 2 (15 ml Coenzyme Reagent). Use calibrated pipette. Dilute to 175 ml with distilled or deionized H₂O. Stable for 2 days at 2-8°C.

R2 Dilute 3.0 ml of Bottle 4 (Glycerolkinase Reagent) to 75 ml with distilled H₂O. Store in refrigerated reagent compartment of Hitachi 705 or refrigerator at 2-8°C.
Stable: 1 day at 2-8°C.
Filter Before Use!!

Hitachi 705 Parameters:

ASSAY CODE:	END POINT
SAMPLE VOLUME:	10 μ l
R1 VOLUME:	350 μ l
R2 VOLUME:	150 μ l
WAVELENGTH 1:	660 nm
WAVELENGTH 2:	340 nm

CRT PAGE 7

CHANNEL NUMBER:6
TEST CODE: 36 - 36

Calibrator:

Precimat Glycerol, Catalog #166588, Set Point 21.0 mG glycerol/dl.
TRIG Set Point = 200.0 mg TG/dl.

Controls and procedures are identical to cholesterol assay.

4. ROUTINE START UP PROCEDURE FOR CHOLESTEROL/TRIGLYCERIDE ANALYZER

OPERATING INSTRUCTIONS:

Check water supply, reagents and temperature. Record temperature in temperature log book.

Turn power on for Hitachi, making sure that the cassette tape is in place.

Check reagents and make up all that are not sufficient for the day's plans mix for 15-20 minutes, record lot # and expiration date in log book.

Calibration and controls must be done before performing patient samples.
(see page 16)

Perform daily maintenance as listed on the log sheet. Date and sign name of person performing task, using the special cassette tape for routing maintenance. When preparing reagents, record Lot # and expiration date in reagent log book.

STANDARD WET CHEMISTRY:

1. Call up CRT Page 2, "TEST SELECTION". The cursor appears next to "Sample NO."
2. Depress (-) 1, then Enter.
3. The line now displays "Blank".
4. Depress TEST SELECTION KEYS for chemistry tests for which blanks are to be performed, then ENTER.
5. The line now displays "STD". (See page 7-27 of Operators' Manual for more details).
6. Select test for standard.
7. The line displays 1-001, depress the down arrow (↓) key to move the cursor to the clear "LINE".
8. Depress YES, then depress ENTER.

NOTE: This insures that any patient test request from the previous run are deleted from memory.

9. Call up CRT, Page 1, "START AND MONITOR".
10. Type DATE, then ENTER.
11. Ensure that the number 1 is displayed next to the "SAMPLE NO." line. If the number 1 is not there, depress number 1.
12. Using down arrow (↓) key - cursor displays "CALIBRATION LINE".
13. Depress YES, then ENTER. This instructs the system to perform the calibration sequence on the selected tests.
14. "MULTI-STD" line, depress YES, then ENTER.
15. "SERUM INDEXES", depress NO.
16. Use down arrow (↓) key to "CONTROL INTERVAL", depress numeric key corresponding to the desired interval for processing patient samples between control samples, the depress ENTER.

17. Verify that INCUBATION temperature is 37°C.
18. Fill a sample cup with physiological saline and place it in position B in the inner ring of the sample tray.
19. Fill a sample cup with multi-constituent standard (calibrator) and place it in the designated position (S1, S2 or S3) in the inner ring of the sample tray.
20. Place controls in position C1, C2 or 3.
21. Depress the START key.
22. After about three (3) minutes, the first result will be printed. After completion of run, record in Q.C. book.

Calibration of Hitachi:

Use Precical (BMD) for C & TG.

For HDL-C use 50 mg/dl standard (BMD).

For glycerol use 200 mg lab standard (BMD).

Saline blank.

Run level 1 and 2 controls, plus precical level I normal and abnormal for each analyte.

Request calibration procedure.

Record in log.

Recalibrate every 4-6 hours.

5. HDL-Cholesterol

PRINCIPLE:

In the presence of $MnCl_2$ and heparin, Chylomicron, VLDL and LDL are selectively precipitated, leaving only HDL in solution. The precipitated lipoprotein are sedimented by centrifugation and the clear, HDL-containing supernatant is recovered for measurements of cholesterol.

HDL-CHOLESTEROL STANDARDS:

Preciset Cholesterol standards containing 50 and 150 mg/dl are obtained from Boehringer Mannheim Diagnostics. Using the 150 mg/dl standard, two new standard solutions are obtained to reflect the lower range required for the determination of plasma HDL.

Final conc.	Stand.	Final volume
25 mg/dl	4.16ml	25ml
75 mg/dl	12.5ml	25ml

The standard solutions should be kept at 4°C.

Three extra pools with known HDL values are placed at the beginning, middle and end of each HDL rack.

PRECIPITATION PROTOCOL:

- a) Heparin-Manganese precipitation should be performed as soon as possible after sample collection, preferably on the day the samples are drawn. If necessary, however, plasma may be stored at 4°C for no longer than 7 days before the HDL-fraction is prepared. In most cases, storage related changes are detectable, but small during this time.
- b) Manganese Chloride ($MnCl_2 \cdot 4H_2O$, Sigma M-3624) should be stored in a vacuum desiccator to minimize water uptake. Dissolve 10.0127 gm of manganese chloride in 50 ml with fresh deionized water.
- c) Working reagent should be made fresh (every 2 days) using 0.6 ml of Sodium Heparin (20,000 usp units/ml LyphoMed Cat.No. 9155-01) and 5 ml of the $MnCl_2$ solution.
- d) HDL Blank is obtained by adding 200 mg of EDTA to 100ml of normal saline solution which is subsequently titrated to pH 7.0 with 1N NaOH.
- e) Transfer 500ml of HDL blank or unknown to individually labeled microfuge tube (1.5ml capacity). Add 50ul of heparin/manganese reagent (see above). Vortex vigorously and allow samples to stand at 4°C for overnight. Sediment the precipitate by centrifugation at 7,500 x g for 30 minutes (4°C). The supernate can be decanted into another properly labeled tube. The HDL supernate is ready for HDL-cholesterol determination or can be stored at 4°C.

Calibration:

- a) Reconstitute A-GENT Cholesterol using the volume of distilled water given on the vial. Add 210ul of EDTA (150mg/ml). Mix gently to avoid bubbles or foaming. Pure cholesterol standards (25, 50 and 75 mg/dl) are needed to establish the standard curve.
 - b) Place 500ul of HDL blank into the 01 cup and 500ul standards, control sera and unknowns into subsequent cups. DO NOT USE SERA-SEAL ON STANDARDS AS IT WILL DILUTE THE CONCENTRATION.
 - c) Determine the CF as for Cholesterol determination in the previous section.
 - d) Proceed exactly as for Cholesterol determination.
6. LDL-Cholesterol

PRINCIPLE:

The VLDL fraction is isolated by ultracentrifugation at density ($d < 1.006$ gm/ml). The cholesterol in the bottom fraction is measured and the calculation of LDL-CHOL is:

$$\text{LDL-CHOL} = \text{CHOL}(d > 1.006) - (\text{HDL-CHOL})$$

ULTRACENTRIFUGAL ISOLATION OF PLASMA VLDL

Specimen: The specimen should be freshly drawn plasma (or serum) which has not been frozen. If specimens must be shipped to the laboratory, they should be packed unfrozen on water ice. Ultracentrifugation should be carried out as soon as possible, but samples may be stored at 4°C for up to 7 days if necessary.

Set-up for VLDL Spin: Use the Beckman 40.3 or 50.3Ti rotor with pollyallomer tubes (2.5" x 0.5", capacity 6ml).

- * Pre-cool the rotor to 10°C
- * Label ultracentrifuge tubes and place them in a test tube rack in an ice bath.
- * Pipet 5ml of plasma into the appropriately labeled ultracentrifuge tube (A smaller volume of plasma may be used if insufficient sample is available - the actual volume used must be recorded and any dilution factor taken into account in the final calculation).
- * Carefully layer sodium chloride solution (NaCl, 0.15mol/l) over the specimen to the top of the ultracentrifuge tube.
- * Seal the tube tightly. Gently squeeze the sealed tube to check for leaks.
- * Place the tubes in the rotor sockets in such a way that the rotor is evenly balanced.
- * Place the rotor in the ultracentrifuge and centrifuge for 18 hours at 15°C at 105,000 x g (40,000 rpm)

Recovery of the Lipoprotein Fractions:

The centrifuge must be stopped without the use of brake in order to minimize re-mixing of the fractions. The samples must be removed as soon as possible after the rotor has come to a complete stop.

- * Label the 3-ml and 5-ml volumetric flasks with the corresponding sample ID number.
- * Gently remove the rotor and transfer it to the area where the tubes are sliced. The rotor should be maintained in a horizontal position at all times.
- * Using the extraction tool, remove each tube slowly avoiding any abrupt movement which would disturb the lipoprotein layers.

- * Insert the tube into the tube slicer until the bottom edge of the tube is approximately 2.2 cm from the bottom of the tube slicer and the small dent in the tube faces away from the point of the slicer blade. Slice the tube with a quick, smooth thrust of the sharp blade. Clip off the top of the quick seal tube.
- * Withdraw the top fraction through the fill-hole using a disposable pipet. Remove the top portion of the tube including the cap from the tube slicer. Transfer the remainder of the top fraction to a 3ml volumetric flask. Rinse the slicer and cap with NaCl solution. Aliquot of this fraction is used to determine CHOL and TG by the usual method allowing for the calculation of the ration VLDL-CHOL/VLDL-TG. Quantitative recovery of lipoprotein in the top fractions is difficult.
- * To recover the bottom fraction, withdraw the blade slightly and remove the bottom fraction, using disposable pipet. Transfer it to an appropriately labeled 5-ml volumetric flask.
- * Remove the blade completely and remove the bottom portion of the tube from the slicer. Loosen all material from the wall of the tube with the pipet tip and transfer the remainder of the bottom fraction to the 5-ml volumetric flask.
- * Rinse the bottom portion of the tube with a small amount of the NaCl solution and add the washing to the 5-ml volumetric flask. Bring the contents of the flask to 5-ml with the NaCl solution. Total cholesterol in the bottom fraction is determined and used with the independently determined value for HDL-CHOL to calculate the LDL-CHOL.

7. Quality Controls

A. OVERVIEW

Penn Med Labs which is serving as the Core Laboratory for the CARDIA Study is presently standardized by the CDC for lipid measurements which include total cholesterol and triglyceride, and HDL-cholesterol. Quality Control plasma pools have been prepared and standardized and are measured. A precision check (i.e., same sample in each tray 20 times) is run each day.

Cholesterol and HDL Cholesterol

Daily standardization is accomplished using levels of reconstituted plasma, PreciCal and PreciNorm from BMD. Frozen plasma pools at three ranges of cholesterol are also used. Accuracy and precision of the cholesterol measurements are ensured by participation in several programs including the Lipid Standardization Program administered by the Centers of Disease Control in Atlanta, GA and the College of American Pathologists.

Triglycerides

The same daily standardization procedure is used for triglyceride and for cholesterol.

We follow Westgard's rules for the evaluation of runs. In addition, we have instituted a more stringent procedure. If either level for level 2 are $>SD$, the tray should be rejected and repeated. If one of the three additional controls is $2SD$, repeat five samples. If not with 3% , repeat whole tray. If two or more are $>2SD$, check pickup, do a precision check (i.e., same samples 20 times) and then repeat the tray. Before repeat, try to identify the problem with the supervisor if both runs are outside the acceptable range.

B. ACTION PLAN FOR OUT OF LIMIT CONTROLS

All analytical procedures should be reviewed for out of limit controls. Review Westgard's Rules for acceptance or rejection. These limits are posted in the QC logs for easy reference. If an out of limit control requiring immediate action is observed, the following plan is to be employed before reporting any patient result.

1. Check all reagents for expiration, improper storage, etc. Check all instrumentation for obvious problems like insufficient gas pressure, incorrect operating temperatures, defective pipetting, lamp out, etc. Take any corrective measures necessary. Record all steps taken in the maintenance logs or QC log.
2. Repeat the assay
 - a. If the QC is within limits, report the patient results.
 - b. If the QC is still unacceptable, notify the laboratory supervisor. No patient results may be reported in this situation. The supervisor should make sure the assay is performing correctly before any additional patients are analyzed.
3. It is essential that any remedial action taken be documented. Out of limit controls should be circled and initialed in the QC log book. The specific steps taken should be recorded either below or on the reverse page. For example, if a single control is between 2 and 3 SD observe the next run, that should be noted in the logbook. If an assay is repeated, write it down. It must be documented that patient results were not reported for any out of control assay.
4. Note: For cholesterol and triglyceride assays, tray should be rejected if control pools are not within $\pm 1\%$ of the reference value.

C. WESTGARD'S MULTI RULES FOR QUALITY CONTROL

- 1:3s Reject when one observation exceeds the mean by \pm three or more standard deviations (SD).

- 2:2s Reject when 2 consecutive observations exceed the mean by plus or minus two or more standard deviations.
- R:4s Reject when one control observation in the run exceeds its mean by 2 SD and the next control exceeds its mean by minus 2 SD. (A difference of 4 SD).
- 10:mean Reject when ten consecutive control observations fall on one side of the mean.

Means and standard deviations for each control pool are determined after at least 10-15 separate days of assay. For each control pool for each assay, a graph is constructed showing the mean and the two standard deviation +/- limits. Values for each days' control pool are plotted on this graph as a visual means of inspecting for trends within each assay. When the supply of any one control pool is reduced to approximately 3-months' supply, another control pool is constructed and the man and standard deviation computed so that there can be a replacement without a gap.

Please follow these guidelines for accepting control values. If control fall out of this range do not accept run and bring to the attention of the supervisor on duty.

D. RECORDING OF ACTIONS TAKEN ON OUT OF LIMIT CONTROLS

1. Refer to VI.B. on "Action plan for out of limit controls".
2. Record all QC results, even if it is obviously out of limit.
3. DECISION MAKING TIME:
 - A. If 2 out of 3 controls are within limits (+2 SD) and the third was within limits in the previous run and it is within 3 SD, accept the run. Write "2 out of 3 in, accept run" on the QC sheet. This applies especially to Lipid assays.
 - B. If a single control pool is employed, and the control is out, repeat the control. If the control is still out, assay the other two controls. If the other two are in the acceptable range, follow A above, recording this decision in the QC log.
 - C. If all controls are out, refer to our action plan for out of limit controls. Document which corrective actions were taken; i.e., recalibration, faulty probe, etc. on the QC sheet. Repeat your QC and also record these acceptable results in the QC log.
 - D. If an assay is rejected and no results are reported because the assay will be repeated on another day, write "assay rejected, no results reported".

6.3.2 Apolipoproteins

1. Sandwich ELISA for apoB

Pooled plasma was used to isolate LDL by ultracentrifugation and will be coupled to CNBr-activated Sepharose 4B for the isolation of specific IgG against apoB. The best fraction is conjugated with alkaline phosphatase and the IgG fraction of weaker specificity is used to coat the plates.

Step 1 (Friday) Coat the Plates

Take out frozen vial containing specific IgG against apoB from the -80°C freezer. Allow to thaw at room temperature. DO NOT RE-FREEZE IgG. Prepare a 1:500 dilution of the IgG using coating buffer. You will need 10 ml of dilute IgG per plate or 50 ul of IgG. Add 100 uL of anti-apoB IgG (1:500 in coating buffer) into 96 wells Immunolon II flat bottom plate. Cover and store it in a humidifier at 4°C.

Step 2 (Monday) Block the Plates

Wash the plate 3 to 4 times with wash buffer with alternate drying in between wash by placing it upside down on a couple layers of paper towel. Add 200 uL of Blocking Solution and cover and store it in a humidifier as in step 1. Set up a 1/100 dilution of standards, control plasma samples, and unknown samples in Wash Buffer and store them at 4°C. Dilute sample. Recommended dilution of plasma for apoB is 1:30 K.

Step 3 (Tuesday) Sample Application

Wash the plate 3 to 4 times and dry it as in step 2. Add 100 uL of standard, plasma or unknown to the appropriate wells. Cover and store it as in the previous step.

Step 4 (Wednesday) Application of Enzyme-linked Antibody

Wash the plate 3 to 4 times and dry it. Prepare a 1:500 dilution of the enzyme-linked IgG (stored in the refrigerator). You will need 10 ml of the diluted preparation for each plate. Add 100 uL of the diluted enzyme-linked IgG preparation to each well.

Step 5 (Thursday) Application of Substrate

Wash the plate 3 to 4 times and dry it. Prepare substrate buffer at a concentration of 1 mg/ml. You will need 10 ml of substrate buffer for each plate. Substrate (Sigma P104-105) is available as 5 mg per pellet and should be kept in dark bottle in the desiccator. Once the substrate is added put the plate in the humidifier at room temperature and let the plate develop. The development process should be carried out away from light.

Step 6 (Thursday or Friday)

Reading the Plates

Once the highest concentration of the standards reaches an O.D. of 1.0, the plate should be read. It should take approximately 3 hrs for the color to develop. Slow color development might occur if the room temperature becomes too low, in which instance the plate can be placed in the refrigerator and read the next morning. If this becomes a consistent problem it would indicate that one of the IgG preparations might have been denatured. A new batch should be used.

Step 7 (Friday) Data Analysis

Plot OD[405nm] vs the concentrations of the apolipoprotein standards (in ng/mL). Extrapolate the concentration of the apolipoprotein in the unknown sample from the standard curve. STATGRAPHICS will be used as a PC-based package for data analysis.

2. Sandwich ELISA for apoA-I

The same 7 steps will be used for the apoA-I ELISA with the appropriate antibody. Pooled human HDL isolated by ultracentrifugation was coupled to CNBr-activated Sepharose 4B for the isolation of specific IgG against apoA-I. Dilution of plasma samples is: 1 : 31 K.

3. Buffer Preparation

The following buffers will be shared by the ELISA systems. The reagents and supplies required for the immunoassay are listed in B.2.5

- a) Coating Buffer (Tween or milk powder) 50 mM $\text{PO}_4^{=}$ /0.1M NaCl/0.01% NaN_3 /0.001 M EDTA pH 7.4

To prepare 6L:

Mix 498 ml 0.5 M Stock Phosphate Dibasic
101.4 ml 0.5 M Stock Phosphate Monobasic
35.04 grams of NaCl

Bring up to 5900 ml with distilled water. The pH should be around 7.2- 7.4.

Add 0.6 g NaN_3 and 2.22 g EDTA.
Raise total volume to 6 liters
Mix well and store in the cold room.

b) Stock Blocking Buffer

Milk Powder Concentrate: (30 mg/mL stock)
Add 3 g milk powder/100 ml Coating Buffer, stir overnight and store it at 4°C.

- c) Stock Detergent Buffer (10% Tween-20)
Add 10 ml Tween-20 concentrate to 90 ml Coating Buffer, mix it and store at 4°C.
- d) Block Buffer
(1 mg/ml milk powder and 0.05% Tween)
Add 100 ml milk powder concentrate into 2800 ml Coating Buffer followed by 15 ml of the 10% Tween solution and bring up to 3 liters. Stir overnight and store it in the cold room.
- e) Wash Buffer Solution:(0.1 mg/mL milk powder and 0.05% Tween)

To Make 6 liters:
Add 600 ml Block Buffer to 5300 ml Coating Buffer
Add 30 ml of the 10% TWEEN solution.
Bring up to 6 liters.
Stir and store it in the cold room.
- f) Substrate Buffer Solution:

Add 242.5 ml Diethanolamine to, 2 liters of distilled water followed by 0.5 g of NaN_3 and 250 mg of MgCl_2 . Adjust pH to 9.8 with 1 N HCl and bring up to 2500 ml. Store in a dark bottle and keep it in the dark.

4. ApoE isoform from plasma

Plasma sample is stored at -70°C

1. Dialysis

Sample (20 μl) is dialyzed at room temperature overnight
dialysis buffer

20.9g monobasic sodium phosphate
16.55g dibasic sodium phosphate
6.25g EDTA, tetrasodium salt, pH 6.8

↓

q.s. to 4l with deionized water
dialyzed samples diluted in dialysis buffer containing 3 Murea

2. Preparation of Gel

29.1% monomer solution

29.1g polyacrylamide → q.s. to 100 ml

0.9% dimer solution

0.9g bis acrylamide → q.s. to 100 ml

5 ml of 29.1% monomer solution--

5 ml of 0.9% dimer solution

5.4g Urea

0.45 ml Pharmalyte pH 4.5-5.4

0.9 ml Pharmalyte pH 5-8 --

-- q.s. to 30 ml

add 175 μ l 10% Ammonium Persulfate
21 μ l TEMED

3. Electrofocusing

Plasma samples are applied 0.5cm from the cathode

catholyte → 1M NaOH

anolyte → 1M H₃PO₄

catholyte and anolyte wicks are saturated with each solution.

LKB Ultrophor electrofocusing unit is connected with a cooling circulation and power supply at 101V constant power

↓

after 1 hr's running, sample application pieces are removed and the cathode electrode wick is blotted.

* total isoelectric focusing time is 3 hrs

4. Transfer

Transfer buffer = TBS buffer

gel is covered with prewretted nitrocellulose sheet and left at room temperature overnight

5. Immunoblotting

Nitrocellulose is removed and rinsed in TBS Buffer

TBS Buffer: 0.25M Nacl
 0.03M Tris-Hcl
 pH 8.0

↓

60 min incubation in 5% nonfat dry milk

↓

90 min exposure in anti-apoE antiserum diluted 1:750 in TBS Buffer

↓

10 min × 3 times in TBS Buffer

↓

90 min incubation in anti-IgG conjugated with enzyme alkaline phosphatase diluted 1:5000 in TBS Buffer

↓

washed in TBS Buffer three times

↓

stained in 25mg β -naphthyl phosphate
 25mg Fast Blue BB salt
 60mg magnesium sulfate in 50 μ l stock buffer
 (1.8g NaOH, 3.7g boric acid/l)

Notes:

Stocking Buffer → should be stored at 4°C until use

↓

q.s. to 4l before use (not reusable)

Dialysis is carried out overnight at room temperature

↓

samples are diluted to 150 μ l of dialyzing buffer containing 3 Murea

* When samples have precipitate → spin down and use supernatant

Apply 25 μ l of samples (maximal numbers of samples → 30 ~ 40 lanes)

↓

rest can be stored and frozen. Prefocusing is necessary for 15 min.

5. Quality Controls for ELISA

For the apolipoprotein assays, four replicates at one dilution are used for each plasma sample. A distribution of fractional standard deviations (FSD) is routinely obtained for every 200 samples. The 90th percentile of FSD is determined and any sample which is found to have a FSD greater than the 90th percentile will be re-measured in the next assay. Unacceptable FSD for both control samples in each plate requires all of the samples on the plate to be re-measured. All of the samples on the plates are also repeated in the next assay if the mean value of the control is outside the acceptable range (mean \pm 1.60 SD).

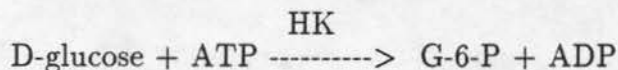
No standardization program for plasma apolipoprotein is available at this time. The Core Laboratory is participating in a program recently initiated by the IFCC Apolipoprotein Committee and CDC Apolipoprotein Working Group. Final decision on the standardization program is not expected for several months.

In the interim, controls in the form of lyophilized plasma are obtained from the Northwest Lipid Research Center to serve as standards for the immunoassays. Controls with known concentration of apoA-I and apoB are also available from BioRad Chemicals. Frozen plasma controls are also available in the Laboratory of Lipoprotein Physiology of the Medlantic Research Foundation.

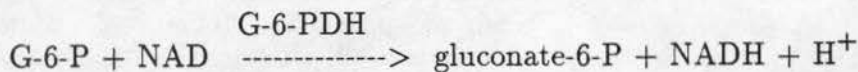
6.3.3 Glucose

PRINCIPLE:

Hexokinase catalyzes the phosphorylation of glucose by ATP:



G-6-P is oxidized to 6-phosphogluconate in the presence of NAD by the enzyme glucose-6-phosphate dehydrogenase. No other carbohydrate is oxidized:



The amount of NADH formed during the reaction is equivalent to the amount of D-glucose in the specimen and can be measured photometrically by the increase in absorbance.

SPECIMEN COLLECTION:

Plasma: Blood must be drawn in tubes containing fluoride to inhibit degradation of glucose

Glucose in plasma with fluoride is stable up to 3 days at 4°C or for up to 8 hours at 25°C.

REAGENTS:

The GLUCOSE-HK Reagents are intended for in vitro diagnostic use.

The components of the Glucose-HK System Pack for HITACHI 705 includes:

Non reactive ingredients:

27.7 mmoles Sodium chloride

Reactive Ingredients:

1.2	mmoles	Magnesium
433.9	umoles	NAD
365.8	umoles	ATP
>1130	U	Hexokinase (yeast) (E.C.2.7.1.1)
>951	U	G-6-PDH (leuconos.) (E.C.1.1.1.49)

CALCULATION:

The HITACHI 705 microcomputer uses absorbance measurements to calculate glucose concentration as follows:

$$C_x = K (A_x - A_b) + C_b$$

Where:

- C_x = Concentration of sample
- K = Concentration factor
- A_x = Mean of absorbance of Sample + both reagents read at positions 30 and 31 minus mean of absorbance of Sample + the first reagent only read at positions 14 and 15**

Ab = Mean of absorbance of Blank + both reagents
read at positions 30 and 31 minus mean of
absorbance of Blank + First Reagents read at
positions 14 and 15**
Cb = Concentration of Reagent Blank

** Corrected for reagent/sample volume by $K = (\text{sample volume} + R1) / (\text{sample volume} + R1 + R2)$.

Linearity: Higher glucose concentrations should be reassayed after dilution with physiological saline.

Quality Control: Precitrol - N; Precitrol - Abn;
Precical - (calibrator)

Procedure for the quality control are the same as these used for cholesterol and triglyceride.

6.3.4 Insulin

PRINCIPLE:

Insulin in serum or plasma is measured by radioimmunoassay. ¹²⁵I insulin and non labeled insulin from either standards or unknown sera compete for sites on the antibody during incubation. The bound antibody-antigen complex is then precipitated through the use of a carrier (normal guinea pig serum in PEG buffer) and an antibody to the carrier (goat anti-guinea pig serum). After centrifugation, the resulting pellet is counted in a gamma counter. Quantitation is achieved by interpolation from a standard curve.

METHODOLOGY:

Total insulin in serum or plasma is measured by radioimmunoassay.

SAMPLE REQUIREMENTS:

500 ul of serum or heparinized or EDTA plasma is required. Care must be taken when using heparin as an anticoagulant since an excess will provide falsely high values (Thorell, J.I., Scand. J. Clin. Lab. Invest. 31:187, 1973). Use no more than 10 IU heparin per ml of blood collected.

CONTROLS:

Ten insulin reference controls are used, three each from Bio-Rad and Diagnostics Products Corp. (DPC) and 4 plasma pools. Insulin concentrations should be in the low, medium and high range, i.e., approximately at the calculated ED₈₀, ED₅₀, and ED₂₀ levels of the standard curve. These reference plasmas must be run in triplicate with each assay.

Each month the mean and standard deviation (SD) for QCs are calculated for the last 10 assays or for the month, whichever provides the greater number of assays for evaluation. The %CV and Range (± 2 SDs) are calculated and used to evaluate all new assays for the coming month. If three of the QCs fall outside of ± 2 SD, data can not be reported. If any QCs remain outside of limits on repeat testing, hydrate new vial and see supervisor. Upon reconstitution with distilled water, the QC should be stored at -20°C in small aliquots.

QC 1, 2, 3: BioRad, (714) 630-6400100
Alfred Nobel Dr.
Hercules, CA 94547
Cat.# C370-5, \$139.00/3 vials
Reconstitute the reagents with 5 ml of water

QC 4, 5, 6: Diagnostics Products Co. (DPC)
1-800-654-3707
5700 West 96th St.,
Los Angeles, CA 90045
Cat.# CON6, \$40.00/6 vials
Reconstitute the reagents with 6 ml of water.

REAGENTS:

A. Buffer 0.05M Phosphate buffered saline, pH 7.4

- a. NaCl - 9g/liter
- b. Na₂HPO₄ - 7H₂O - 12.35g/liter or Na₂HPO₄ (anhydrous) 6.54 g
- c. KH₂PO₄ - 0.65g/liter Sigma P0662 Potassium Phosphate
Monobasic \$16.00/500g
- d. EDTA - 9.3 g/liter
- e. EMSTA - 0.1g/liter Kodak 135 8456 \$59.00/25g, Ethyl
Mercurithiosalicylic Acid, Sodium Salt

EDTA is not dissolved easily. When pH is adjusted to 7.4 with 5N or 10N NaOH, EDTA can be dissolved quickly.

- a1. Assay Buffer, 0.05M Phosphosaline, pH 7.4, 1% BSA. Use only Sigma RIA grade BSA:

Sigma A7888, Albumin, Bovine, RIA grade, Fraction V Powder \$84.15/50g, \$140.45/100 g. Stable 1 month. Store refrigerated.

- a2. Buffer for the second antibody and the carrier (NGPS), 0.05M Phosphosaline, pH 7.4, 3% PEG 8,000
PEG 8,000: Sigma P2139, Polyethylene Glycol 8,000, \$10.35/500g Store at 4°C.
 - a3. Wash Buffer to wash the precipitate, 0.05M Phosphate buffered saline, pH 7.4, without BSA, without PEG.
- B. First Antibody - Guinea Pig Anti Porcine Insulin Serum. Dilute to obtain a 34-45% B₀. Binding of total label insulin. Store at -20°C. Obtained from:

Linco Research, Inc. (314) 527-2188
P.O. Box 641, Eureka, Missouri 63025
\$60.00/1000 tubes.

For lot 122-845-P, reconstitute the content of the vial with 1 ml of assay buffer. Aliquot to small vials and store at -20° C. For use in assay, further dilute to 1:100 with assay buffer and add 100ul per tube.

C. Human Insulin Standards -

- a. Obtained from Dr. Ronald E. Chance of Eli Lilly and Co. (317) 276-4233. See the Appendix for details. This is provided as 0.57 U per vial with 1 mg of Human Serum Albumin as a carrier. Add 5.7 ml of 0.01 N HCl to produce a 100 mU/ml stock solution. Store at 4°C., **DO NOT FREEZE**. Insulin for treatment of human diabetes cannot be used. It may not be accurately quantitated.

b. Preparation of Working Standards.

Stock A: Add 100 ul of Stock Insulin (100 mU/ml) to 39.9 ml of assay buffer to obtain the working stock at a concentration of 250 uU/ml.

Dilution Table

Sample	Concentration uU/ml	Stock A ml	Buffer ml
01	200	8	2
02	100	4	6
03	50	2	8
04	25	1	9
05	12.5	0.5	9.5
06	6.3	0.2	9.8
07	3.2	0.1	9.9
08	0.0	0.0	10.0

Use 100 ul per assay tube.

Aliquot 500 ul of each in 12 x 75 glass tubes sufficient for 20 separate standard sets. Freeze at -20°C . Each standard set is stable for three months.

D. ^{125}I -insulin. Obtained from:

NEN, 1-800-551-2121

Insulin (Porcine), Tyr^A₁₄, (^{125}I), Receptor Grade (220 uCi/mmol),
Cat.# NEX-196, \$348.00/10ul

Use the radioactive material only in Room 105-111 in the limited area. Fill the record every time when tracer is used. Use 30,000 CPM/100 ul per tube. Dilute sufficient label for one month use. Aliquot and freeze at -20°C .

E. Normal Guinea Pig Serum Carrier (NGPS). Obtain from:

Pel Freez 1-800-643-3426

Box 68, Rogers, Ark. 72757

Cat.# 38119-3, \$24.00/30 ml.

Aliquot and store at -20°C . Stable until expiration date. Dilute 1-70 with assay buffer containing 3% PEG. Use 100ul per tube

F. Second Antibody (Goat Anti Guinea Pig IgG Serum). Obtain from:

Linco Research

\$60.00/1,000 tubes.

For lot GP2012, dilute the content of the vial with 10 ml of assay buffer. Aliquot and store at -20°C . For use, dilute to 1:10 with buffer containing 3% PEG and add 100 ul per tube.

EQUIPMENT:

Beckman J-6 Refrigerated Centrifuge

Day 1.

1. Pipet 100 ul of standards, quality controls and samples. Totals, blanks, standards, and quality controls are run in triplicate; patient samples are run in duplicate (see summary table at end of procedure.)
2. Pipet 300 ul of insulin buffer to the blank tubes (4-6) and 100 ul of insulin buffer to standards, quality controls and patients.
3. Pipet 100 ul of 1st antibody to tubes standards, controls and patient samples.

4. Pipet 100ul of Tracer to all tubes.
5. Vortex, except for totals, cover and incubate overnight at 4°C.

Day 2.

6. Add 100 ul of 2nd antibody to all tubes (except totals).
7. Add 100 ul of NGPS (Normal Guinea Pig Serum Carrier) to all tubes (except totals).
8. Vortex, cover and incubate 2 hours at 4°C.
9. Add 1 ml of wash buffer (0.05 M phosphosaline, pH 7.5, no BSA, no PEG) to all tubes, except totals.
10. Vortex, centrifuge for 30 minutes at 3,500 RPM (2,500 X g).
11. Pour off supernatant and count pellet.

CALCULATION:

1. Average triplicate counts for blanks (tubes 1-3), total counts (tubes 4-6) and total binding (tubes 7-9), and average duplicates of remaining samples.
2. Subtract the average non-specific binding (NSB) counts (Blank tubes) from each average count (except for total counts). These are the counts used in the following calculations.
3. Calculate the percentage of tracer bound ($((\text{Total Binding Counts}/\text{Total Counts}) \times 100)$). This should be 34-40%.
4. Calculate the percentage of maximum binding ($\% B/B_0$) for each standard and sample ($\%B/B_0 = (\text{Sample or Standard}/\text{Total Binding}) \times 100$).
5. Plot the $\% B/B_0$ for each standard of the y-axis and known concentration of the standard on the x-axis. The use of log-log graph paper or the use of the Stats Graphics Linear Regression Program will result in a nearly linear curve.
6. Determine the insulin of the unknown samples (patients and controls) by interpolation of the reference curve.

LIMITS OF PROCEDURE:

1. Assay should be rejected if any 2 of the 6 reference controls falls outside of 2 SDS. See supervisor.

2. If the difference between duplicate results of a sample is $> 10\%$ CV, repeat the sample.
3. The limit of sensitivity for the insulin assay is 3.2 uU/ml.
4. The limit of linearity for the human insulin assay is 200 uU/ml. Any result greater than 200 uU/ml should be repeated on dilution using zero standard as a diluent.

INTERPRETATIONS:

INSULIN STANDARDS

To obtain human insulin standards from Eli Lilly and Company, write to:

Mr. Thomas Jeatran
Registered Pharmacist
Lilly Research Laboratory
Lilly Corporate Center
Indianapolis, IN 46285.

In the letter you have to write that insulin will be used only for research, not for humans. Mr. Jeatran will send you a form. It should be filled out and sent back to him. After the form is reviewed, he will send you the Reagent.

When insulin standards from other sources are used make sure that the conversion of uU of insulin to ng by the factor 25 uU/ng is performed.

6.3.5 Urinary Albumin

This assay is performed by the laboratory of Dr. Peter Bennett at the NIDDK Research Center in Phoenix, AZ, using an automated nephelometric immunochemical procedure. Light scattering units are measured during a reaction of albumin with a monospecific antibody to human albumin, using a Behring Nephelometer. Albumin concentrations are calculated by the instrument using a multipoint calibration curve constructed from a commercial calibrator which corresponds to WHO standards. Two normal and two abnormal controls are included in each run. At least 3 of the 4 controls must be within 10% of the established mean value for that control. Samples are run in duplicate or triplicate; coefficient of variation for replicates must be less than 7.07. The mean of two values or median of 3 values is reported.

6.3.6 Urine Creatinine

Urine creatinine is measured in the Phoenix NIDDK Laboratory using an automated alkaline picrate methodology run on an Alpkem Rapid Flow Analyzer. It is based on a procedure described by Chasson, Grady, and Stanley in 1961. Two aliquots of a normal and abnormal control are included at the beginning and end of each run. An assay is acceptable if at least 5 of the 8 controls are within 5% of the established mean and at least two of the within range values are for the low control and 2 are for the high control. Samples are run in duplicate or triplicate. Coefficient of variation for replicates must be less than 3.54. Mean of duplicates or median of triplicates is reported.

6.3.7 Fibrinogen: Functional Method (BBL Fibrometer)

This assay is contracted to the laboratory of Dr. Russ Tracy at the University of Vermont.

Purpose: The Dade method for determining fibrinogen concentration is based on the clotting time of citrated plasma using 100 NIH units/ml of thrombin (excess thrombin),

Principle: Fibrinogen, a soluble plasma protein, is converted to fibrin, an insoluble polymer of fibrinogen, in the presence of thrombin. Fibrinogen concentration determines the reaction rate using high concentrations of thrombin and relatively low concentrations of fibrinogen. The thrombin clotting time versus fibrinogen concentration is linear when plotted on log-log paper. Therefore, the longer the clotting time, the less the concentration of fibrinogen.

Equipment:

1. BBL Fibrometer
2. 0.9 ml fibrometer probe
3. 12 x 75 mm plastic tubes
4. 50 μ l, 100 μ l, 200 μ l MLA pipettes, fibropipet
5. fibrometer reaction cups
6. disposable MLA and fibrotip pipette tips

Reagents: Stock Chemicals

1. Bovine thrombin, topical Parke-Davis 10,000 NIH Units
2. Sodium Diethylbarbiturate (Na Barbitol) $\text{NaC}_8\text{H}_{11}\text{N}_2\text{O}_3$ F.W. 206.18
Fisher Scientific B-22 500 gms
3. Sodium chloride (NaCl F.W. 58.44) Sigma
4. Concentrated Hydrochloric acid (HCl)
5. 85% Phosphoric Acid

Stock Reagents

1. 0.1 N HCL

Slowly add 4.2 mls concentrated HCL to 250 mls Milli-Q water in a 500 ml volumetric flask. Fill to the 500 ml mark with Milli-Q water. Make fresh and use immediately.

2. Veronal Buffer

Mix together:

11.456 gm Na Barbital

14.610 gm NaCl

430 mls 0.1 N HCL (freshly made)

Add these reagents to approximately 1000 mls Milli-Q water in a 2000 ml volumetric flask. When dissolved in about 1800 mls of distilled water, adjust pH to 7.35, fill to 2000 ml mark and recheck pH. Store at 4°C. Stability is 6 months.

3. Veronal Buffer with 5mM CaCl₂. (for use with EDTA plasma). Made same as #2 although 0.734 g/L CaCl₂ is also added to the solution.

4. 1% Phosphoric Acid

Slowly add 11.7 mls of 85% phosphoric acid to approximately 500 mls distilled water in a 1 liter volumetric flask. Fill to 1000 ml mark with distilled water. Store at RT. Stable for one year.

5a. Standard Curve (citrate plasma)

Dade Fibrinogen Calibration Reference is used by diluting 1 vial with 1.0 Milli-Q water then making dilutions as follows:

1:5 0.1 ml standard and 0.4 ml Veronal buffer.

1:15 0.1 ml standard and 1.4 ml Veronal buffer.

1:40 0.1 ml standard and 3.9 ml Veronal buffer.

The dilutions are assayed on the fibrometer, in duplicate, and mean values (seconds) are recorded. This procedure is repeated twice more, preferably on two other work days, in order to have three different groups of values (seconds) for the three standard dilutions. Record in fibrinogen standard book. An average for each standard dilution is obtained (in seconds). There is an assay value on each vial of Dade Calibration Reference which may vary with each lot of standard. Each dilution has an assay value of fibrinogen concentration determined by the following:

1:5 Assay value x 2

1:15 Assay value from 1:5 dilution divided by 3

1:40 Assay value divided by 4

For each standard having a specific fibrinogen concentration there is a corresponding thrombin clotting time. Linear regression is used on TI-55III to establish a standard curve using the values obtained from assaying three different vials of Dade Calibration Reference: See TI 55III guidebook, pages 1-30.

5b. Standard Curve (EDTA plasma) (revised 9/15/89)

For samples drawn into EDTA tubes, a standard curve using plasma treated with EDTA is made. A sample of citrated plasma obtained from lab tech, MK, was determined to have a fibrinogen level of 222 mg/dl in a

1:10 dilution as assayed on the fibrometer. Plasma obtained from an EDTA tube drawn on lab tech, MK, was also used. This plasma was run in 1:5, 1:10, 1:15, and 1:40 dilutions. Dilutions were made in Veronal Buffer with 5 mM CaCl₂. The dilutions were assayed on the fibrometer in duplicate, and mean values (seconds) were recorded. This procedure was repeated twice, one time each by individual lab techs, MK and DG. Values agreed among the different runs and a standard curve was made according to the above instructions (5a).

6. Working Reagents

Thrombin (100 NIH U/ml) PREPARE USING PLASTIC BEAKERS, TUBES, AND PIPETTES.

Bovine Thrombin Topical, Parke-Davis, 100,000 NIH Units - Dissolve each vial of 10,000 NIH Unit thrombin in 100 mls of Veronal Buffer. Make 500 mls, aliquot 4 mls into labelled 5 ml 12 x 75 mm plastic tubes, cap with blue plastic caps, and place into plastic containers with lids. Store at -70°C.

7. Controls

Normal Plasma (N-10 pooled plasma from the Medical Center Hospital of Vermont) Ci-Trol Level I

8. Specimen

Recover sample to be assayed from freezer, thaw at 37°C, and place on ice.

Procedure: Turn on fibrometer(s) and heating block(s) to allow for at least a 20-minute warm-up time period. Lift the fibrometer probe into position and clean with 1% phosphoric acid. Rinse the electrodes well (x4) with distilled water.

Thaw the necessary number of working thrombin aliquots required for the number of plasma samples being assayed. [i.e., with one 4 ml aliquot approximately 40 cups or 20 samples can be assayed.] After removing aliquots from the freezer, leave at RT for 5 - 10 minutes, then place into 37°C waterbath until completely thawed. Leave tubes at RT during assays.

Reconstitute 1 vial of Ci-Trol Level I with 1.0 ml Milli-Q water, swirl gently, and allow to equilibrate for 10-15 minutes. Place vial in ice bath with aliquots of thawed pooled plasma and patient's plasmas.

Dilute pooled plasma, Ci-Trol Level I 1:10 using 0.1 ml sample add 0.9 ml Veronal Buffer. Also, make 1:90 dilutions of controls using 0.1 ml control and 2.9 mls Veronal Buffer. On EDTA plasma, patient samples are diluted 1:20 by pipetting 0.05 ml patient plasma in .95 ml Veronal buffer with 5 mM CaCl₂. This dilution was made no earlier than 5 minutes before addition of thrombin in the fibrinogen assay.

Each dilution is assayed in duplicate. Note: 50 µl of sample and 450 µl buffer may be used for 1:10 dilutions, if necessary.

Pipette 0.2 ml of control and patients' plasma dilutions into Fibrocups at timed intervals and incubate in the fibrometer heating block for at least 2 minutes but less than 5 minutes. Transfer fibrocups, one at a time, to the reaction well.

Pipette 0.1 ml Thrombin (100 NIH U/ml) into the first fibrocup being assayed, at the same time activating the fibrometer's timer.

Record the number of seconds registered on the fibrometer for each cup, averaging the duplicated and using a mean value from which to convert seconds to mg/dl fibrinogen concentration.

If the clotting time is shorter than the lowest value from the standard curve, dilute the EDTA plasma sample 1:30 using 0.1 ml sample and 2.9 ml Veronal Buffer with 5 mM CaCl_2 (or dilute the citrate plasma sample 1:20 using 50 μl sample and 950 μl Veronal Buffer). Assay in duplicate. Multiply the calculated fibrinogen concentration by 2 to correct for the 1:20 dilution. Plasma samples having low fibrinogen concentrations, such that no clot forms by the time given for the 1:40 standard (usually 35-40 seconds), are diluted 1:5 using 0.1 ml sample and 0.4 ml Veronal Buffer, assayed in duplicate. Calculated fibrinogen concentration is divided by 2. (For EDTA samples, dilute 1:10 using 0.1 ml sample and 0.9 ml Veronal Buffer with 5mM CaCl_2). A dilution less than 1:5 is not usually performed since there is often insufficient volume of plasma sample.

Results: Average the duplicate times for each dilution and calculate the corresponding fibrinogen concentrations from the calculator programmed with the standard regression curve (or use conversion table when available). Report all values in mg/dl, including control values. Make sure all dilutions not 1:10 are corrected (i.e. multiply by 2 for 1:20, divide by 2 for 1:50).

Discussion

1. Fibrinogens are run at 37°C.
2. The thawed working thrombin is used at RT but placed on ice or refrigerated when not being used.
3. Controls are assayed at the beginning of each run, after every 12 dilutions, and at the end of each run. All control values must be plotted on Levy-Jennings graph and all 'out-of-control' values accounted for (i.e. whether a new dilution was made and assayed, whether original dilution was re-assayed, etc) and reported to the supervisor.

Quality control of Fibrinogen Assay

Control pools have been prepared by the laboratory and are assayed at the beginning for each run after 12 dilutions and at the end of each run. All control values are plotted on Levi-Jennings Graph. The assays are controlled using Westgard rules.

Graphs and all "out of control" values are accounted for and reported to the supervisor. Dr. Tracy's laboratory at the University of Vermont subscribes to the College of American Pathologists external quality control program and has consistently met their requirements. In addition, the laboratory at the University of Vermont has recently developed a standard, in collaboration with the ACP, for use in the standardization of fibrinogen assays.

6.3.8 Glycated Hemoglobin

HBA_{1c} is measured in the Phoenix NIDDK laboratory by a variation of the cation exchange method which is adapted to the HPLC. Specially prepared hemolysate is injected into a small glass column fitted with cation exchange resin. A two buffer step gradient system is used. The first buffer having a higher pH and lower sodium ion concentration is pumped under moderate pressure to elute the fast fraction. The second buffer is pumped through the column to elute the main hemoglobin fraction. A spectrophotometer detection is used to continuously monitor the absorbance of the elute from 410 to 415 nm. Quantitation is accomplished by computing with an electronic integrator the area under the absorbance curve. For about 10% of the samples, where evidence of decomposition is seen, an affinity chromatographic method will be used as a backup.

Quality control is maintained using three levels of standards which are assayed at least once during each day's run. For the Strong Heart Study, in addition, quality control will be maintained by assaying blinded duplicates of 10% of the samples.

6.3.9 Glycated apoB

The percent of plasma apoB which is glycated is determined by solid-phase radioimmunoassay in the laboratory of Dr. Linda Curtiss of the Scripps Research Institute, La Jolla, CA.

THE TANDEM BEAD ASSAY FOR DETECTING GLUCOSYLATED LDL IN SERUM OR PLASMA

I. PREPARATION OF REAGENTS

A. Antibody Purification by Mono-Q Column Chromatography

1. Sample Preparation:

Clarify mouse monoclonal ascites fluid at 2,800 rpm in Beckman J6B centrifuge at 4°C for 10 min. Dialyze supernatant in 50,000 MWCO Spectra/Por 6 (Baxter) dialysis tubing against 10 mM Tris, 0.01% Na Azide, pH 8.0 at 4°C. Clarify the dialyzed ascites in 1.5 ml Eppendorf tubes at 13,250 rpm (11,600 xg) in a Beckman Microfuge 11 for 10 min. Filter the ascites with a prefilter, then a 0.45 μ filter and finally a 0.2 μ filter.

2. Antibody Isolation:

Mono-Q HR 16/10 column and FPLC system from Pharmacia.

Start Buffer: 10 mM Tris, 0.01% Na azide, pH 8.0.

Final Buffer: 0.5 M NaCl, 10 mM Tris, 0.01% Na azide, pH 8.0.

Flow Rate: 6 ml/min.

Chart Speed: 1 cm/min.

Absorbance: A280; 0.2 AUFS

Volume Injected: 1 ml of dialyzed and clarified ascites fluid.

Peak Threshold: 2% of full-scale.

Fraction Size: 1 min (6 ml) no delay.

Gradient: Time 0 min -- inject sample.

0-2 min -- start buffer.

2-30 min -- 20% of final buffer to 60% of final buffer.

30-34 min -- 100% of final buffer.

34-38 min -- start buffer.

10 mM Tris, 0.01% Na azide, pH 8.0.

24.22 g Tris base, MW 121.1.

2.0 g Na azide.

pH to 8.0 with more than 7 ml concentrated HCl.

Bring volume up to 20 liters with nanopure water.

0.5 M NaCl, 10 mM Tris, 0.1% Na azide, pH 8.0.

58.44 g NaCl mw 58.44

Bring volume up to 2 liters with 10 mM Tris, 0.01% Na azide, pH 8.0.

3. Antibody Detection and Concentration:

The antibody is detected with a solid-phase immunoassay where the antigen is coated onto a microtiter plate, an aliquot of each column fraction is added and allowed to incubate 1 hr at 37°C. After washing the mouse antibody is detected with a radiolabeled antimouse Ig antibody. Fractions containing antibody are pooled and concentrated in an ultrafiltration cell (Amicon) with a 30,000 MWCO membrane. The concentrate is dialyzed in 50,000 MWCO Spectra/Por 6 dialysis tubing against PBS at 4°C and clarified. Protein concentration is determined by the Modified Lowry Protein Assay. Antibody purity is determined on a Pharmacia PhastGel.

B. Coupling of the APO B-Specific Antibody, MB47, to Sepharose 4B

150 mg of purified MB47 antibody in PBS is bound to 15 g of CNBr-activated Sepharose 4B (Pharmacia 17-0430-01) as per manufacturer's instructions. All of the antibody is coupled to the Sepharose under these conditions.

C. Radioiodination of the Other APO B-Specific Antibody, MB24, and the Glucitolysine-Specific Antibody, 8C11

200 µg of purified antibody is radiolabeled with 1 mCi of ¹²⁵I using six Iodobeads (Pierce 28666) as per manufacturer's instructions. The iodide is removed by overnight dialysis at 4°C against PBS. The antibodies are iodinated to specific activities of between 7,000 and 9,000 dpm/ng.

II. SAMPLE PREPARATION

A. NaBH_4 Reduction of the Plasma Sample

Measure plasma volume. To reduce the proteins add a volume of 1 M NaBH_4 in PBS to make the plasma 20 mM in NaBH_4 . Incubate for 1 hr at room temperature, then 3 hr at 37°C . Dialyze in 12,000-14,000 MWCO Spectra/Por 2 (Baxter) dialysis tubing against 10 mM EDTA in PBS at 4°C . Determine the protein concentration with a Modified Lowry Protein Assay and store the sample at -70°C .

1 M NaBH_4 in PBS (1 M NaBH_4 , 0.0005 N NaOH in PBS).

37.85 mg NaBH_4 , MW 37.85.

Mix and add: 5 μl 1 N NaOH and 945 μl PBS, pH 7.2.

B. Protein Determination -- Modified Lowry

Standards: Duplicates of BSA containing 0-70 μg BSA.

Volume: 100 μl of standard or sample. Use water to bring sample volume to 100 μl , if necessary.

Procedure: Mix 1 part Reagent B with 100 parts Reagent A.

Add 2 ml to standards and samples.

Add 200 μl of Folin Reagent diluted 1:2 in water.

Vortex immediately.

Let stand at room temperature for at least 45 min.

Read absorbance at 660 nm wavelength on plate reader.

Reagent A: 2% Na_2CO_3 , 0.4% NaOH, 0.16% Na tartrate, 1% SDS.

Dissolve in the following order:

8 g NaOH mw 40.00

40 g Na_2CO_3 MW 105.99 (or 46.8 g $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ MW 124.00)

3.8 g Na tartrate MW 230.08 ($\text{Na}_2\text{C}_4\text{H}_4\text{O}_6 \cdot 2\text{H}_2\text{O}$)

20 g SDS (Sodium dodecyl sulfate)

Bring volume up to 2 L with nanopure water.

Reagent B: 4% $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

4 g $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Bring volume up to 100 ml with nanopure water.

Folin and Ciocalteu Reagent: SIGMA F9252.

III. THE TANDEM BEAD ASSAY FOR GLYCOSYLATED LDL

Wash the MB47 Sepharose 4B beads (MB47 antibody coupled to Sepharose 4B) twice with PBS/EDTA/BSA (1 mM EDTA, 3% BSA in PBS). Prepare a 10X volume/volume (buffer/beads) suspension in PBS/EDTA/BSA. Aliquot 200 μl of the suspension to a siliconized 12X75 glass tube. Clarify the stored NaBH_4 -reduced plasma at 9,500 rpm (7,000 xg) for 5 min in a Beckman Microfuge 11 and add 10 μl of plasma or control to each of six tubes containing the bead suspension. Incubate overnight at 4°C on a rotating platform. Wash the beads twice with 3 ml of PBS/EDTA/BSA at 4°C by pelleting the beads at 700 rpm for 5 min in a Beckman J6B centrifuge at 4°C . Aspirate off the supernatant. Add 100 μl of ^{125}I -8C11 antibody at 5 $\mu\text{g}/\text{ml}$ to three tubes per plasma sample. Add 100 μl

of ^{125}I -MB24 antibody at $0.1 \mu\text{g}/\text{ml}$ to the remaining three tubes per plasma sample. Incubate 4 hr at 4°C on a rotating platform. Wash twice with 3 ml of PBS/EDTA/BSA at 4°C . Pellet and aspirate as above. Count tubes in a gamma counter.

Calculate the trichloroacetic acid (TCA)-precipitable dpm per ng of ^{125}I -radiolabeled antibody. To do this, subtract the PBS/EDTA/BSA buffer control mean cpm (assay zero control) from the plasma mean cpm. Divide this by the TCA-precipitable cpm per ng for each antibody. The result is the ng ^{125}I -antibody bound by the immobilized plasma LDL. To obtain the ratio of glycosylated LDL to total LDL, divide the ng of ^{125}I -8C11 bound by the ng of ^{125}I -MB24 bound.

The antibody coupled beads can be regenerated by washing them with 3M KI until the ^{125}I -cpm are removed. Regenerated beads can be reused in the assay.

6.3.10 LEUCOCYTE DNA ISOLATIONS

REAGENT PREPARATION

Stock Solution:

1. Autoclave DI- H_2O (10 x 500 ml) \rightarrow for Reagent preparation
2. Buffer B: 3.85 g NH_4Cl in 500 ml DI- H_2O (from #1)
3. Buffer C: 0.198 g NH_4HCO_3 in 500 ml DI- H_2O (from #1)
4. Proteinase K comes in 100 mg lyophilized powder.
 - Add 10 ml DI- H_2O (from #1) into the vial to make 10 mg/ml Proteinase K working reagent.
 - Filter this 10 mg/ml Proteinase K
 - It is recommended to prepare a 30-40 ml batch of Proteinase K (10 mg/ml) and filter this batch.
 - Aliquot this Proteinase-K (10 mg/ml) into 5 ml portion \rightarrow and freeze at -20°C .
5. Ethanol
6. 8-Hydroxyquinoline (Sigma MW = 145.2)
7. 2M Tris pH 7.51 (MW = 121.1); 60.55 g Tris/500 ml DI- H_2O \rightarrow Adjust pH to 7.51
8. 0.2M Tris pH 7.51 \rightarrow 1/10 dilution of #7
9. 0.5M EDTA pH 7.98 (MW = 372.2); 93.05 g/500 ml \rightarrow Adjust pH to 7.98
10. 3M NaAc pH 5.21 (MW = 82.03); 123.05 g/500 ml \rightarrow Adjust pH to 5.21
11. TE Buffer: 500 λ 2M Tris pH 7.51 + 200 λ 0.5 m EDTA pH 7.98 in 100 ml H_2O
12. TES Buffer: 2.5 ml 2M Tris pH 7.51)
 - 1 ml 0.5 m EDTA pH 7.98) in 500 ml DI- H_2O
 - 2.5 g SDS)
13. Phenol (solid): Wear gloves and lab coat; fume hood
 - Step I: 500 g Phenol + 0.5 g Hydroxyquinoline in 500 ml of DI- H_2O \rightarrow 60°C until phenol gets into solution. Stir O/N at 4°C to get a saturated Phenol in H_2O .

Step II: Pour #1 to 1000 ml separate funnel. There will be 2 layers:

→ DI-H₂O

→ Phenol saturated with H₂O

PREFERRED METHOD: Take reagent bottle, heat to 60°C → 500 ml liquid prepare as in #1.

This prevents from weighing 500 g Phenol → It stinks!

Always save the yellow bottom layer. Collect this Phenol saturated H₂O in a 1000 ml beaker.

Step III: Add 500 ml of 0.2 M Tris pH 7.51 into Phenol saturated with H₂O → Stir at 4°C O/N.

Step IV: Pour reagent from Step III into a 1000 ml separate funnel. Again let it separate into 2 layers

→ 0.2 M Tris

→ Phenol saturated w/0.2 M Tris

Step V: Collect Phenol saturated with 0.2 M Tris in a 1000 ml beaker. Add 500 ml TES buffer into the beaker. Stir at RT O/N. Next a.m., pour this reagent into 1000 ml separate funnel. Collect the bottom yellow again (Phenol saturated with TES) into a 1000 ml reagent dispenser. Add another 500 ml TES into this Phenol saturated with TES. This is your final working Phenol solution. Store at 4°C.

→ TES

→ Phenol saturated w/TES

Excess Phenol saturated with TES → store at 4°C. It will remain 2 layers of liquid if things are done correctly.

14. Working Buffer B & C: 500 ml buffer + 50 ml Buffer C
Prepare at least 2 liters.

WORKING PROTOCOL FOR LEUCOCYTE DNA PREPARATION

DAY 1 (wear gloves and lab coat)

1. RBC in purple tubes arrives at 650 Penn Medical Lab. Arrange it to be transferred to the Hyman Building with blue ice pack. Keep this at 4°C until processing time. Save SHS labels.
2. Log in samples in SHS log book. There will be a lab number and an SHS number. Save SHS labels.
3. Label 50 ml/conicals with lab number. Label both the tube and cap.
4. Squirt buffer B & C into each purple tube. Cap it and invert 2 to 3 times and pour it into its corresponding conical tube. Each SHS patient usually has 3 purple tubes.

5. Q.S. each conical to 45 ml w/ B & C.
6. Cap tubes and shake vigorously.
7. Centrifuge these tubes at 3000 rpm @10'; 4°C (1st wash).
8. Discard upper liquid leaving compacted cells at the bottom. Be careful not to discard these cells at the bottom.
9. Q.S. Conical to 20 ml w/ B & C.
10. Centrifuge again at 3000 rpm @10'; 4°C (2nd wash).
11. Again discard the upper liquid. Pellet to be processed for DNA extraction should be observed by now at the bottom of the conical. Log-in those that have small amount of pellet.
12. Add 5 ml TES into each conical and also add 100 λ Proteinase K (10 mg/ml) \rightarrow vortex \rightarrow incubate at 60°C O/N.

DAY 2:

13. Label a new set of conicals again.
14. Remove tubes from incubator and add 5 ml of working Phenol from a reagent dispenser
15. Vortex these conicals and centrifuge 3000 rpm @10'; 4°C.
16. Harvest the upper phase into the new set of conicals. Add 500 λ 3m NaAc and 10 ml ETOH into each conical. Vortex. Sometimes insoluble DNA can be seen a this stage.

\rightarrow save

\rightarrow discard

17. Precipitate the DNA at -20°C O/N or longer.

DAY 3 (final stage)

18. Centrifuge conicals 3000 rpm @10'; 4°C.
19. Discard supernatant \rightarrow DNA pellet at bottom (difficult to observe).
20. Invert these conicals to dry the tubes for at least 1 hour. It does not have to be totally dry.
21. While the tubes are drying, label 3x1.5 ml Eppendorf screw-capped vial per SHS patient w/SHS labels. These triplicate vials will be used to store the final DNA.
22. Add 300 λ TE to each dry conical in order to resuspend the DNA pellet.
23. Add 20 λ 3M NaAc to each Eppendorf vials. Add 100 λ of resuspended DNA pellet into each vial.
24. Add 250 λ ETOH into each vial. Insoluble DNA must be visible by now.
25. Cap these Eppendorf and sort the triplicates into 3 storage boxes.
26. Store these vials at -70°C.
27. Ship list with storage box # goes to office for data entry.

QUALITY CONTROL: (for every 10 tubes)

Pipet 2 λ of DNA suspended in TE into 498 λ of TE. Measure A260. Record the value in the log book.

For every 50 tubes assay DNA by agarose gel electrophoresis.

AGAROSE GEL ELECTROPHORESIS FOR THE EVALUATION OF DNA

The following protocol describes a horizontal electrophoresis of DNA on a low melting Agarose.

Stock Solutions

1. 70% ethanol and 100% ethanol
2. Proteinase K (10 mg/ml)
3. Phenol saturated with TES
4. Chloroform Isoamyl Alcohol (24:1)
5. 3M Sodium Acetate pH 5.21
6. Glycerol
7. 10% Bromophenol Blue (tracking dye)
8. 10% Xylene cyanol FF (tracking dye)
9. Tris Base
10. Boric acid
11. EDTA (mw: 372.2)
12. TE (Resuspending buffer)
13. Stock Buffers:

I. 10X TBE (Tris-Borate - EDTA Buffer)

Prep: Tris-Base 432g
 Boric Acid 220g
 0.5M EDTA pH 7.98 160ml
 → Q.S. to 4L with DI-H₂O

II. Gel Loading Buffer:

Prep: (6 Fold; Store at 4°C)
 Glycerol 15 ml (Final concentration: 30%)
 10X TBE 5 ml
 Bromophenol Blue .25ml of a 10.00% Bromophenol Blue
 Xylene Cyanol FF .25ml of a 10.00% Xylene Cyanol FF
 (Final concentration of each dye is 0.25%)
 → Q.S. to 50ml with DI-H₂O

III. Electrophoresis Running Buffer:

1X TBE + Ethidium Bromide (final concentration is 0.5 γ /ml)

14. 0.7% Agarose Gel in 500 ml 1X TBE → microwave 20 minutes at low temperature. This stock solution can be stored at RT and is reusable over and over again, provided there is no bacterial growth. Pour 100 mL of this 0.7% Agarose into a 100 ml storage bottle and use this as a working stock. Ethidium Bromide (Mutagen and Carcinogen! Be Careful. Wear Gloves and Lab Coat!)
15. HIND III - digested λDNA (from VWR/IBI) → molecular weight DNA marker.

Preparation of a 50/ml marker:

Example: The Hind-III marker (500λ) comes in with a concentration of 207λ/ml.

Procedure:

- a. Centrifuge the whole 500λ Hind-III marker, 11000 rpm for 5 minutes
- b. Mix the Hind-III marker by re-pipetting back and forth
- c. Pipet 145λ of Hind-III and mix it with 355λ of TE and 100λ of Gel Loading Buffer
- d. Final concentration is 50λ/ml

PROCEDURE FOR AGAROSE GEL ELECTROPHORESIS

DAY 1: Preparation of Samples to be Loaded on Agarose Gel

- a. Thaw frozen vials containing DNA tuft. Transfer the DNA tuft into pre-labelled Eppendorf vials. For invisible DNA, centrifuge the vials (11000 rpm for 5 minutes) and discard the supernatant. The DNA pellet will be at the bottom of the vials.
- b. To remove inorganic salt and rinse the DNA tuft, add 500λ of 70% Ethanol. Centrifuge 11000 rpm for 5 minutes → discard supernatant, invert the vials and air dry for 20 minutes.
- c. Add 400 of TES to each vials and 50λ of Proteinase K (10 mg/mL) → vortex → centrifuge 11000 for 1 minutes.
- d. Resuspend the DNA by repeat pipetting and incubate the vials at 55°C for 1-hour.
- e. After 1-hour, add 400λ of Phenol saturated with TES → vortex → Centrifuge 11000 rpm for 2 minutes.
- f. Transfer the upper phase only to a new set of Eppendorf vials. Do not contaminate this DNA containing upper phase with proteins from the intermediate phase.
- g. Add 400λ CHCl₃ Isoamyl alcohol (24:1) into the vials → vortex → centrifuge for 2 minutes.
- h. Again, transfer the upper phase into a new set of Eppendorf vials. Do not transfer the lower phase CHCl₃.
- i. Add 40λ 3M NaOAc and 880λ 100% Ethanol into each vial.
- j. Store the vials at -70°C.

DAY 2:

- k. Thaw the frozen vials (j) for 10 minutes centrifuge 11000 rpm for 5 minutes.
- l. Wash the DNA by adding 500 λ of 70% Ethanol \rightarrow centrifuge 11000 rpm for 5 minutes \rightarrow DNA pellet will be visible at the bottom of the vials. If DNA pellet is invisible (for small concentration of DNA) \rightarrow re-centrifuge for another 5 minutes and proceed to the next step.
- m. Discard supernatant and invert the vials. Air dry the vials for 20 minutes.
- n. Resuspend the DNA pellet in 100 λ of sterile water.
- o. To determine the concentration of DNA, pipet 2 λ of suspended DNA (from n) into 498 λ of sterile H₂O. Measure A₂₆₀. Calculation of DNA concentration:

$$(\gamma/\lambda) = \frac{OD_{260} \times 250}{20}$$

DAY 2: Preparation of Agarose Gel Beds for Horizontal Electrophoresis

1. Have the Bio-Rad mini-gel electrophoresis apparatus set clean and ready.
2. Tape the plastic template all around with autoclave tape and fold the other half of the tape underneath the plate to form a mold into which the 0.7% Agarose Gel can be decanted into.
3. Insert the serrated plastic comb into its corresponding grooves (located close to the cathode). Normally, 14 sample wells are formed with the plastic comb.
4. Proceed to pour the melted 0.7% Agarose Gel (microwave the 100 mL stock 3 minutes at high temperature) into the above plastic mold.
5. Once the Agarose has solidified, proceed to remove tape gently as to not tear the agarose off its template. Remove the serrated plastic comb.
6. Insert the plastic tray into the gel cassette.
7. Pour Running Buffer (with Ethidium Bromide in it) into the gel cassette so as to immerse the solidified Agarose.
8. Form an array of 2 λ Gel Loading Buffer on a clean surface of parafilm (use the inside section). Be sure that the amount of 2 λ gel loading buffer dispensed on the parafilm correspond to the amount of samples prepared.
9. Pipet 1 λ of the prepared DNA samples (n. above) and mix it with the 2 λ loading buffer (from #8 above) on the parafilm surface and load the samples into its sample wells. Do this slowly and steadily to prevent puncturing of the gel bed. Also, try to avoid releasing the samples outside of the sample wells.
10. The extreme left sample well is usually allotted for the Hind-III DNA markers. Add 4 λ of the Hind-III marker straight into its slot (without mixing with loading buffer).
11. Be sure that the electrophoretic apparatus is connected properly to the power supply. Turn on the power and the running voltage is usually 50V for 20 minutes.

Photography of DNA

Ethidium Bromide is an intercalating agent between stacked bases and fluoresces on UV illumination.

Procedure:

Once the electrophoresis is over, remove the whole plastic tray (#6 above) and put it on top of the transilluminator (Model UVT 750-M/IBI).

Reminder: Put on anti UV goggles while viewing the illuminated gel. **THIS IS A MUST.**

Undergraded DNA will show only a single band. Proceed to take a Polaroid (#667) picture of the gel. Label the picture and put it in the record book.

NB: For QC purposes:

- a. A_{260} measurement is performed on every 10th sample.
- b. Agarose gel electrophoresis is done on every 25th sample.

6.4 QUALITY ASSURANCE PROGRAM

In addition to the use of quality controls with each run, there is a need to assure that all the steps from blood drawing to sample receiving and laboratory measurement are correct, replication of unknown samples will be necessary.

At the discretion of the individual PI, one participant the first clinic day every week will serve as the replicate control - the recommended scheme is that should be the first participant who has a GTT for blood drawing that clinic day. If there is more than one clinic site, they should be rotated so that QA samples are sent from all clinic sites with the same frequency. A check list for blood drawing for quality control sample is available (Appendix 20b). A total of one urine tube and four extra blood tubes will have to be drawn, including:

Fasting: 2 [10-ml] Lavender top tube
 1 [14-ml] urine tube

2-Hour : 1 [5-ml] Lavender top tube
 1 [3-ml] Gray top tube

These are indicated on the Check List. One [10-ml] QA Lavender top tube should be processed and fresh plasma transferred to 5 [2-ml] cryovials with the proper ID label. Plasma from the second [10-ml] QA Lavender top tube should be placed in a screw top tube (do not freeze). The QA Gray top tube should be also processed as any regular Gray top tube and the plasma placed into two [2-ml] cryovials with red top. These 7 [2-ml] cryovials and the [14-ml] urine tube will be kept frozen in a separate zip-lock bag and sent in the next Dry-Ice shipment. The [5-ml] QA Lavender top tube taken at 2-hour and the screw top tube containing plasma should be placed in a separate zip-lock bag and sent directly to the Core Laboratory with the next shipment on Blue-Ice.

The numbering system for these quality control samples is similar to the Study ID and consists of 6 digits with the first digit corresponding to the center (1-SD, 2-OK, 3-AZ), the second digit will be a "3" to indicate that the sample is a QA and a 4-digit sequence number. A complete set of tubes should not be expected for QA samples. The Coordinating Center should receive at monthly intervals the list matching Study ID to QA for analysis (Appendix 27b). This list should never be made available to the Core Laboratory. (Appendix 27b).

6.5 SAMPLE HANDLING AND STORAGE AT THE CORE LABORATORY.

6.5.1 Sample Handling for Refrigerated Shipment

The following procedure will be instituted for shipment sent on Blue Ice from the various clinics.

1. Shipping Box is received
2. Check off the enclosed Shipping List making sure that ID's on the tubes matched with the ID's on the Shipping List.

There should be a separate zip-lock bag for each subject containing the following tubes:

- * 1 [14-ml] plasma tube
- * 1 [5-ml] Lavender top tube
- * 3 [10-ml] Lavender top tubes containing red cells and buffy coat

In addition a set of extra self-sticking pre-printed ID# corresponding to the samples sent should also be included in the box.

3. Gently mix the Lavender top tube by inversion and divide the content into 2 [2-ml] Cryovials pre-labeled with the ID#.
4. Place one of the cryovials into the Freezer Box labeled "HbA1c" which will be assayed when two boxes are filled - approximately 180-200 samples. Enter the ID of the sample on the HbA1c Log List.
5. Place the remaining cryovials into the storage freezer box labeled "Hb" making sure that the Seq Number of the storage box is recorded on the Shipping List received from the clinics.
6. Set up the plasma samples for lipid measurements and ultracentrifugation.
7. Send the 3 [10 ml] Lavender top tubes (red cells and buffy coat) to Molecular Genetics Laboratory at Medlantic for DNA isolation.

6.5.2 Procedure for Sorting and Logging Frozen Specimens

1. Frozen samples will arrive in containers (#1) with dry ice in it. Please observe the condition of the samples; is it frozen or thawed? If it is thawed, it should be reported to the Center of origin and a comment should be entered on the shipping list.
2. Have on hand a second insulated container large enough to hold two (2) cardboard freezer boxes (labelled Glucose and SHS ###), a third container large enough to hold one cardboard freezer box (labelled Urine) and a fourth container large enough to hold four (4) freezer boxes (labelled Insulin #, Fibrinogen #, Glycated LDL #, and Apo's #).
3. Transfer some dry ice to all 3 insulated containers.
4. Have on hand the accompanying shipping list from the sender and SHS Log Book.
5. This process will require two (2) people, one to sort samples and the other to record SHS numbers and appropriate information on the logging slips.
6. Open the shipping container. Samples from each individual patient are stored in separate plastic bags. Each bag should contain 10 x 2 ml, 2 G-O, 2 G-2 and 1 urine vials. Except for QC samples (w/#3 on the second digit) which normally contain 5 x 2 ml plasma, 2 G-2 and 1 Urine vials.
7. Remove one plastic bag at a time from the shipping container and count the number of tubes including urine tubes. These should be checked off by patient number on the shipping list by the second person. After being checked off, the sorting process will begin. Any discrepancies should be recorded on the shipping list.
8. Sorting Process: Remove the vials one by one from each bag. Place the urine vial in the urine box, one set of G-O (yellow caps) and G-2 (red caps) into the Glucose box, four plasma vials into the four separate boxes in the fourth container. Place the remaining 6 x 2 ml plasma and one set G-O and G-2 into the Storing box. This storing box should have the prefix of the Center and the box numbers written on it. (SHS ###)

PHX = Phoenix
OK = Oklahoma
SD = South Dakota
9. Repeat this process for each of the bags and be sure to record any missing vials on the Glucose list and the accompanying shipping list. QC samples (w/#3 as the second digit of the SHS numbers) should be placed in the fourth container (w/the four boxes) for later sorting.
10. After all the bags are processed and contents transferred to the appropriate cardboard freezer boxes, the QC samples can be processed.

11. Protocol for Sorting QC-samples:
 - a. Urine tube - this is to be added to the urine box to be shipped with the regular samples to Phoenix.
 - b. Two (2) vials (G-2 with red tops) - one of these is to be added to Edna's regular glucose box; one of these is to be added to a box labelled "QC Samples XXX".
 - c. Five vials of plasma - one is to be added to the box for fibrinogen samples to be shipped with the regular samples to Vermont; one is to be added to the box for the glycated LDL samples to be sent with the regular samples to California; one is to be added to the box of insulin samples to be assayed by Kazumi; two (2) are to be added to the box labelled "QC Samples XXX".

Therefore, the QC box will contain for each subject: three (3) vials - one (1) red top G-2 and two (2) regular plasma vials.

12. When the sorting is complete, store the cardboard boxes on their appropriate shelf in a -70°C freezer.
13. Glucose box, apo's box and QC box should be placed on the bottom shelf while awaiting transfer to 650 Penn for assays.
14. Fibrinogen, glycated LDL and urine should also be placed on the bottom shelf while waiting to be shipped out for assays. The insulin box will be processed by Kazumi.
15. At this point, sample processing complete.
16. Final paperwork: Log in the sample #'s from the glucose list into an empty SHS list. Once this is done, xerox five (5) copies of the new SHS list and label it for urine, insulin, fibrinogen, glycated LDL and apo's. Enter QC numbers on the QC list. File these lists in the SHS log book.
17. Be sure to send back the original shipping container to the appropriate center.
18. Sample logs go to office for entry onto dataset.

6.5.3 Procedure for Shipping Frozen Samples for Analysis

1. Shipping out of samples will be done only on Tuesday (especially for Urine samples to Phoenix, AZ) of the week.
2. When 2 to 3 boxes for each type of analyte are available, then those boxes can be shipped for analyses.
3. Place the 2 to 3 boxes of urine, etc. into each separate insulated container with dry ice.

4. Inside each insulated container, there will be a list of samples to be analyzed, two(2) address labels of the receiving center (with telephone numbers of MRF and the receiving center on it, THIS IS A MUST!).
5. Seal the container tightly with strong sealing tape.
6. Fill out the appropriate Federal express form, insert it inside the mailing pouch and attach it to the top of the container.
7. Place another address label (with phone number) on the side of the container.
8. Use a marker and write the following instructions on the box:

MEDICAL SUPPLY ORMA
 DRY-ICE _____ lbs. UN 1845

9. Once this is done, store these boxes in a -20°C freezer (2nd floor) or -70°C if it's available.
10. Call Federal Express (953-3333) and tell them you have a package pick up. Fedex will require an account number, weight of boxes to be picked up and zip code of receiving center. The destination of receiving centers are as follows:

Urine: Ms. Linda Phillips
 NIH, STRONG HEART STUDY
 1550 E. Indian School Road
 Phoenix, AZ 85014
 602-263-1615

Gylc LDL: Dr. Linda Curtiss
 Dept. of Immunology
 Research Institute of Scripps Clinic
 10666 N. Torrey Pines Road
 La Jolla, CA 92037
 609-551-8248

Fibrinogen: Russell Tracy, Ph.D.
 Department of Pathology
 University of Vermont
 104 Southwick Street
 Burlington, VT 05405
 802-656-0396

11. Fedex will give you a confirmation number. Usually, ADWA xxxx. Write this number on the box.
12. Fedex will come and pick up the boxes before 5 pm of the same day.
13. Call the appropriate receiving center and notify them of the impending shipment.

14. Glucose, Apo's and QC boxes are also packed in dry ice and transported to 650 PML for analysis by anyone who is going down there.

6.6 INFECTION CONTROL POLICY

The Strong Heart Study recognizes that some study subjects might possibly be infected with Hepatitis virus, HIV virus or other infectious disease which might potentially be transmittable to either clinical personnel or laboratory personnel handling blood specimens. However, it is not feasible in a field study to pretest individuals before the examination, nor should they properly be excluded if a random sample of the population is desired. Since contact with individuals with infectious diseases can pose risk to study personnel, a policy has been developed for both clinical personnel during patient contact and also laboratory personnel handling blood specimens. These policies are attached to appendix 38.

APPENDIX 1

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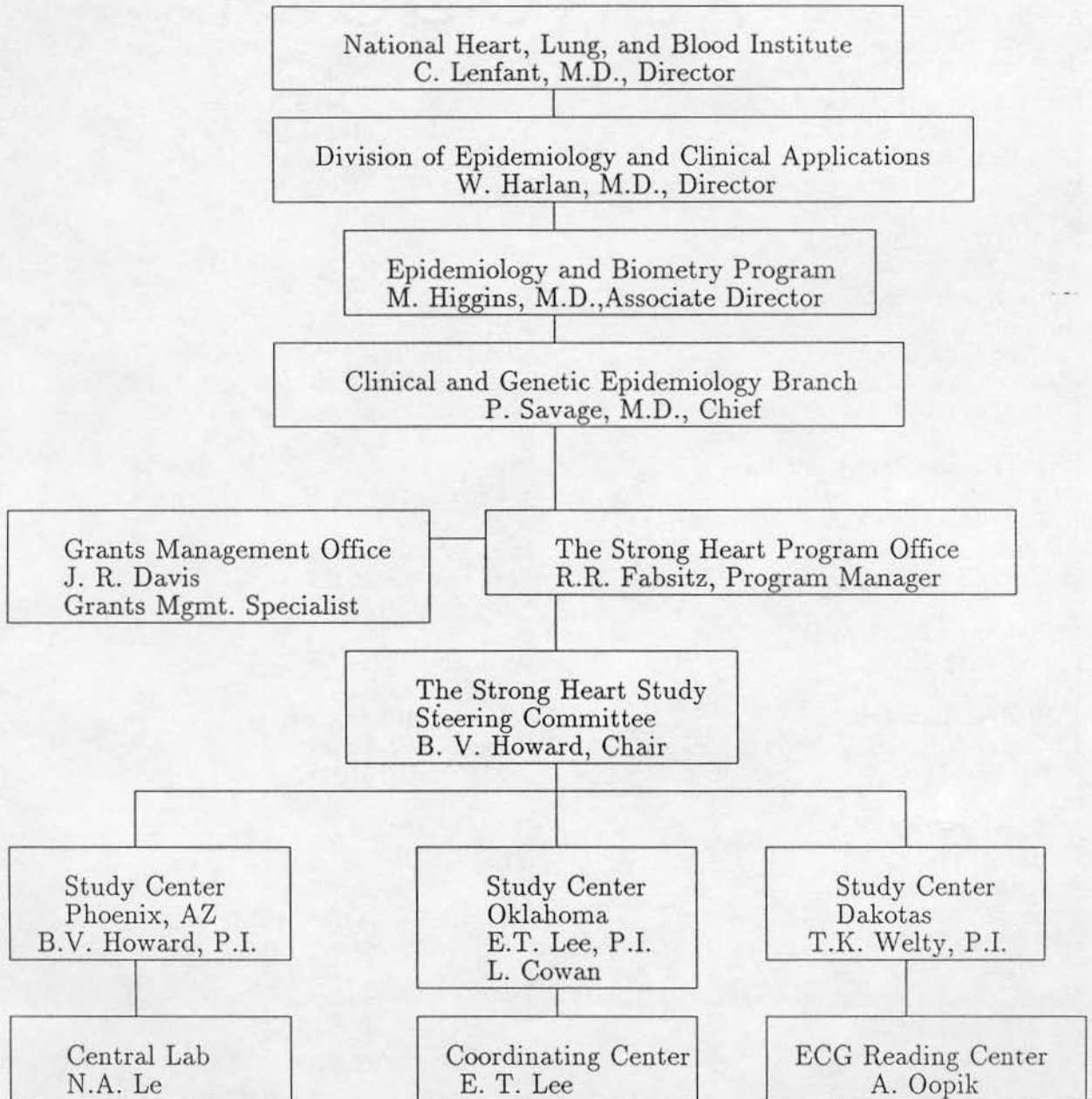
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APPENDIX 2

Organizational Chart of the Strong Heart Study



THE STRONG HEART STUDY

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APPENDIX 4

Study Communities and Codes

Arizona Community Codes

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
Maricopa	Co-Op Colony	116
	Gila Crossing	119
	Komatke	124
	Laveen	125
	Lone Butte	127
	Komatke Hts.	799
	Maricope Colony	128
	Lehi	126
	Salt River	132
Pinal	Santa Cruz	231
	Blackwater	213
	Sacaton Flats	230
	Sacaton	229
	San Tan, Lower	232
	San Tan, Upper	233
	Stotonic	237
	Goodyear (South)	235
	Bapchule	212
	Casa Blanca	214
	Casa Blanca S	215
	Casa Blanca W	216
Sacate	228	
Sweetwater	240	

Dakotas Community Codes

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
Benson (Fort Totten)	Crow Hill	356
	Flora	357
	Fort Totten	358
	Knox	359
	Mission	360
	Oberon	361
	St. Michael D	362
	Tokio	363
	Warwick	364
	Woodlake Dis	365
	Eddy	Hamar
Sheyenne		397
Nelson	Lakota	456
	Michigan	457
Ramsey	Tolna	458
	Crary	476
	Devils Lake	477
	Doyon	478
	Lake Wood	479
Bennett (Pine Ridge) **	Allen	526
	Harrington	527
	Martin	528
	Patricia	529
	Swett	530
	Tuthill	531
	Vetal	532
Dewey (Eagle Butte)	Agency Dist	605
	* Bear Creek/Eagle Butte	606
	* Eagle Butte	607
	Firesteel	608
	* Four Bear/Swiftbird	609
	Glencross	610
	* Green Grass/Eagle Butte	611
	Isabel	612
	Lantry	613
	* Laplant/Swiftbird	614
	* Marksville/Swiftbird	615
	* Moreau River/Whitehorse	616
	* Promise/Whitehorse	617
	Ridgeview	618
	* Swiftbird	619
	* Swiftbird JC	620
	Timber Lake	621
Trail City	622	
* White Horse	623	
Jackson (Pine Ridge)	Blackfoot	624
	Belvidere	661

Ft. Totten

Pine

Dakotas Community Codes (con't.)

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
	** Interior/Wanblee	662
	** Kadoka/Wanblee	663
	Stamford	664
Jackson (Pine Ridge)	** Hisle/Wanblee	846
	Longvalley	847
	Potato Creek	848
	** Wanblee	849
Shannon (Pine Ridge)	** Am Horse Cr/Kyle	771
	** Batesland/Allen	772
	Calico	773
	Crazy Horse	774
	Cuny Table	775
	Denby	776
	** Grass Creek/Manderson	777
	** Kyle	778
	Lake	779
	Lakeside	780
	** Manderson	781
	Oglala	782
	Pine Ridge	783
	** Porcupine	784
	Red Shirt TA	785
	** Rockyford/Porcupine	786
	Slim Butte	787
	White River	788
	Wolf Creek	789
	** Wounded Knee/Manderson	790
	Wakfamni Lk	791
Ziebach (Eagle Butte)	* Bridger/Cherry Creek	866
	* Cherry Creek	867
	Dupree	868
	Glad Valley	869
	Iron Lightin	870
	Red Elm	871
	* Red Scaffold	872
	Thunder Butt	873

Pine Ridge

Eagle Butte

- * Denotes communities that are included in the Cheyenne River Sioux Study
 100% sample
 Cherry Creek
 Red Scaffold
 Whitehorse
 Swiftbird
 50% sample
 Eagle Butte
- ** Denotes communities that are included in the Oglala Lakota Sioux Study - All
 100% samples

Oklahoma Community Codes

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
Beckham	Carter	095
	Delhi	096
	Elk City	097
	Erick	098
	Mayfield	099
	Sayre	100
	Texola	101
	Blaine	Canton
Eagle City		105
Geary		106
Greenfield		107
Hitchcock		108
Homestead		109
Longdale		110
Okeene		111
Southard		112
Watonga		113
Caddo	Albert	138
	Alfalfa	139
	Anadarko	140
	Apache	141
	Binger	142
	Bridgeport	143
	Carnegie	144
	Cement	145
	Cyril	146
	Eakly	147
	Fort Cobb	148
	Gracemont	149
	Hinton	150
	Hydro	151
	Lookeba	152
	Riverside Bi	153
	Washita	154
Canadian	Concho	158
	Concho Bia S	159
	Calumet	160
	El Reno	161
	Mustang	162
	Piedmont	163
	Union	164
	Yukon	165
Carter	Ardmore	169
	Carter Semin	170
	Clemscot	171
	Fox	172
	Gene Autry	173

Oklahoma Community Codes (cont'd.)

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
	Graham	174
	Healdton	175
	Lone Grove	176
	Mcman	177
	Milo	178
	Newport	179
	Pooleville	180
	Ratliff City	181
	Springer	182
	Tatums	183
	Tussy	184
	Wilson	185
	Wirt	186
	Woodford	187
Cleveland	Lexington	232
	Moore	233
	Noble	234
	Norman	235
Comanche	Cache	245
	Chattanooga	246
	Elgin	247
	Faxon	248
	Fletcher	249
	Ft. Sill BIA	250
	Geronimo	251
	Indiahoma	252
	Lawton	253
	Medicine Prk	254
	Meers	255
	Sterling	256
Cotton	Devol	260
	Randlett	261
	Temple	262
	Walters	263
Custer	Arapaho	291
	Butler	292
	Clinton	293
	Custer	294
	Moorewood	295
	Thomas	296
	Weatherford	297
Garvin	Foster	350
	Elmore City	351
	Hennepin	352
	Lindsay	353
	Maysville	354
	Paoli	355

Oklahoma Community Codes (cont'd.)

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
Grady	Pauls Valley	356
	Pernell	357
	Stratford	358
	Wynnewood	359
	Alex	363
	Amber	364
	Bradley	365
	Chickasha	366
	Cox City	367
	Minco	368
	Nennekah	369
	Pocassett	370
	Rush Springs	371
	Tuttle	372
Greer	Verden	373
	Brinkman	390
	Granite	391
	Mangum	392
	Reed	393
Harmon	Willow	394
	Vinson	395
	Gould	397
Jackson	Hollis	398
	Altus	435
	Blair	436
	Duke	437
	Eldorado	438
	Elmer	439
	Headrick	440
	Martha	441
	Olustee	442
	Jefferson	Addington
Fleetwood		447
Grady		448
Hastings		449
Oscar		450
Ringling		451
Ryan		452
Terral		453
Waurika		454
Kiowa		Cooperton
	Gotebo	496
	Hobart	497
	Lone Wolf	498
	Mountain Prk	499
	Mountain View	500
	Roosevelt	501
	Snyder	502

Oklahoma Community Codes (cont'd.)

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>	
Love	Burneyville	565	
	Leon	566	
	Marietta	567	
	Orr	568	
	Overbrook	569	
	Rubottom	570	
	Thackerville	571	
	Blanchard	574	
Mcclain	Byars	575	
	Dibble	576	
	Newcastle	577	
	Purcell	578	
	Rosedale	579	
	Washington	580	
	Wayne	581	
	Big Canyon	664	
Murray	Davis	665	
	Dougherty	666	
	Hickory	667	
	Sulphur	668	
	Okla City, Rur	717	
	Arcadia	718	
	Bethany	719	
	Choctaw	720	
Oklahoma	Edmond	721	
	Harrah	722	
	Jones	723	
	Luther	724	
	Newalla	725	
	Nicoma Park	726	
	Okla City, Urb	727	
	Spencer	728	
	Wheatland	729	
	Del City	730	
	Midwest City	731	
	Stephens	Alma	905
		Bray	906
		Comanche	907
County Line		908	
Duncan		909	
Loco		910	
Marlow		911	
Velma		912	
Tillman	Davidson	927	
	Frederick	928	
	Grandville	929	

Oklahoma Community Codes (cont'd.)

<u>County</u>	<u>Community Name</u>	<u>Community Code</u>
	Hollister	930
	Loveland	931
	Manitou	932
	Tipton	933
Washita	Bessie	965
	Burns Flat	966
	Canute	967
	Cloud Chief	968
	Colony	969
	Cordell	970
	Corn	971
	Dill City	972
	Foss	973
	Rocky	974
	Sentinel	975

APPENDIX 5

a. Codes for IHS Facilities by Area and Service Unit

Area Code	Service Unit Code	Location Code	Facility Name
Area: Aberdeen			
Service	Unit:	Non SVC Unit	
10	00	00	Aberdeen
Service	Unit:	Rapid City	
10	09	01	Rapid Ct Gms
10	09	88	R Shirt T Hs
Service	Unit:	Cheyenne Riv	
10	10	01	Eagle Butte
10	10	31	Cherry Cr Hs
10	10	33	Red Scaff Hs
10	10	34	Swiftbird Hs
10	10	35	Whitehors Hs
10	10	51	Cherry Cr Hs
10	10	82	Faith
10	10	88	Isabel
Service	Unit:	Ft. Berthold	
10	12	00	Newtown Fo
10	12	10	Minni - Tohe
10	12	30	Mandaree Hs
10	12	31	Twin Bute Hs
10	12	32	Wh Shield Hs
Service	Unit:	Ft. Totten	
10	13	10	Ft. Totten Hc
10	13	51	St. Michaels
Service	Unit:	Pierre	
10	14	00	Chamberln Fo
10	14	21	Pierre S - Hc
10	14	30	Ft. Thomps Hs
10	14	31	Low Brule Hs
Service	Unit:	Pine Ridge	
10	15	01	Pine R'g Ho
10	15	10	Wanblee Hc
10	15	30	Allen Hs
10	15	31	Kyle Hs
10	15	32	Manderson Hs
10	15	62	Porcupine Sc
10	15	63	Porcupine Ch
Service	Unit:	Rosebud	
10	16	01	Rosebud Hosp
10	16	55	Norris Sc
10	16	59	St. Francis
10	16	61	White River
10	16	90	Parmelee

Area Code	Service Unit Code	Location Code	Facility Name
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Area: Aberdeen (con't.)

Service	Unit:	Sisset - Wahpt	
10	17	01	Sisseton Hos
10	17	22	Wahpeton Hc
Service	Unit:	Standing Rock	
10	18	01	Ft. Yates Hos
10	18	10	Mclaughln Hc
10	18	30	Bullhead Hs
10	18	31	Cannonbal Hs
10	18	33	Wakpala Hs
Service	Unit:	Turtle Mount	
10	19	01	Belcourt Hos
Service	Unit:	Omaha - Winneb	
10	20	01	Winnebago Ho
Service	Unit:	Yankton	
10	21	01	Wagner Hosp

Area: Oklahoma

Service	Unit:	Claremore	
50	52	01	Claremore Ho
50	52	14	Miami Hl Cen
Service	Unit:	Clinton	
50	53	01	Clinton Hosp
50	53	10	Watonga H. Ct
50	53	11	Concho Hc
Service	Unit:	Kansas	
50	54	10	Holton Hc
50	54	20	Haskell Hc
50	54	30	White Cloud
Service	Unit:	Lawton	
50	55	01	Lawton Hosp
50	55	10	Anadarko Hc
50	55	30	Carnegie Hc
50	55	31	Riverside Hs
Service	Unit:	Pawnee	
50	56	10	Pawhuska Hc
50	56	11	White Eag Hc
50	56	12	Pawnee Hc
50	56	13	Pawnee Benefit Package
Service	Unit:	Shawnee	
50	58	10	Shawnee H Ct
Service	Unit:	Tahlequah	
50	59	01	W.W. Hastings
Service	Unit:	Ada	
50	62	01	Carl Albrt H
50	62	11	Wewoka Hl Ct

Area Code	Service Unit Code	Location Code	Facility Name
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Area: Oklahoma Tribe/638

Service	Unit:	Claremore	
55	52	02	Creek Nation
55	52	11	Delaware Dhc
55	52	12	Okemah H Ct
55	52	15	Indian Hlth. Res. (Tulsa)
55	52	16	Salina Hlth. Center
55	52	31	Sapulpa Hc
Service	Unit:	Shawnee	
55	58	11	Oklahoma City Clinic
55	58	12	Black Hawk Clinic
Service	Unit:	Tahlequah	
55	59	10	Eufaula Hc
55	59	11	Sallisaw Hc
55	59	12	Dkmartin Hc
Service	Unit:	Talihina	
55	60	01	Talihina Hos
55	60	11	J. Andrsn Hc
55	60	12	Hugo Hl Ct
55	60	13	Mcalester Hc
Service	Unit:	Ada	
55	62	10	Tishomingo
55	62	12	Ardmore Hc
Service	Unit:	Eagle Pass	
55	63	00	Eagle Pass

Area: Phoenix

Service	Unit:	Keams Canyon	
60	62	01	Keams Canyon
Service	Unit:	Owyhee	
60	63	01	Owyhee Hosp
Service	Unit:	Colorado Riv	
60	64	01	Parker Hosp
Service	Unit:	Phoenix	
60	66	01	Phoenix Ho
60	66	20	Phoenix H S
60	66	30	West End H C
60	66	31	Salt River
60	66	63	Ft. McDowell Hs
60	66	99	Undesig Locs
Service	Unit:	Sacaton	
60	67	01	Asacaton Hos <Hu - Hu - Kam>

Area Code	Service Unit Code	Location Code	Facility Name
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area: Phoenix (con't.)

Service 60	Unit: 68	San Carlos 01	San Carlos
Service 60	Unit: 69	Schurz 01	Schurz Hosp
Service 60	Unit: 71	Whiteriver 01	Whiteriver H
Service 60	Unit: 72	Ft. Yuma 01	Ft. Yuma

b. Non-IHS Hospitals and Codes

1. Dakota

<u>Pine Ridge</u>	
Martin Hospital	10-15-55
Kadoka Hospital	10-15-56
Philip Hospital	10-15-57
Hot Spring VA Hospital	10-15-58
Ft. Meade VA Hospital	10-15-59
Rapid City Regional Hospital	10-15-60
Gordon, Nebraska Hospital	10-15-61
Porcupine Community Clinic	10-15-62
University of Minnesota Hospital	10-15-63
Hot Spring Community Hospital	10-15-64
Fitzsimons Hospital, Denver	10-15-65
Sioux Valley Hospital, Sioux Falls	10-15-66
McKenna Hospital	10-15-67
Ellsworth AFB	10-15-68
Wall Clinic	10-15-69
Rapid City Eye Institute	10-15-70
Minneapolis VA Medical Center	10-15-71
St. Anthony Hospital, Denver	10-15-72
Porter Memorial Hospital	10-15-73
<u>Eagle Butte</u>	
Faith Clinic	10-10-82
Isabel Clinic	10-10-83
St. Mary's Hospital, Pierre	10-10-84
Sacred Heart, Yankton	10-10-85
Mid Dakota, Chamberlain	10-10-86
Med Center Orfe, Bismarck, ND	10-10-87
St. Alexius, Bismarck, ND	10-10-88
Mobridge Hospital	10-10-89
Gettysburg Hospital	10-10-90
<u>Ft. Totten</u>	
Mercy Hosital, Devil's Lake	10-10-60
New Rockford Hospital	10-10-61
United Hospital, Grand Forks	10-10-62
St. Lukes Hospital, Fargo	10-10-63
Fargo VA Hospital	10-10-64

2. Phoenix

Desert Samaritan Hospital	60-66-70
Good Samaritan Hospital	60-66-71
Humana Hospital	60-66-72
Jesse Owens Med. Ctr.	60-66-73
John C. Lincoln Hospital	60-66-74
Maricopa Med. Ctr.	60-66-75
Maryvale Samaritan Hospital	60-66-76
Mesa Lutheran Hospital	60-66-77
Phoenix Baptist Hospital	60-66-78
Phoenix Memorial Hospital	60-66-79
St. Luke's Medical Center	60-66-80
Scottsdale Memorial Hospital	60-66-81
St. Joseph's Hospital	60-66-82
Valley Lutheran Hospital	60-66-83
Chandler Community Hospital	60-66-84
NIH	60-66-85
Family Care Clinic in Chandler	60-66-86

3. Oklahoma

Anadarko Municipal Hospital	08-01-14
Carnegie Tri-County Municipal Hospital	08-02-14
Comanche County Memorial Hospital	16-01-05
Southwestern Medical Center	16-03-05
Reynolds Army Hospital	16-05-05
Grady Memorial Hospital	26-01-14
Veterans Administration Hospital	55-18-01
State of Oklahoma Teaching Hospitals	55-20-01
Oklahoma Memorial Hospital	55-20-01
Oklahoma Childrens Memorial	55-20-01
Duncan Regional Hospital	69-28-76
Mercy Hospital	55-63-76
South Community	55-63-87
Norman Regional Hospital	14-60-24
St. Anthony Hospital	55-63-78
Baptist Medical Center	55-63-89
Deaconess Hospital	55-63-24
Presbyterian Hospital	55-63-84
Midwest City Memorial Hospital	55-53-29

APPENDIX 6 (a)

PERSONNEL CODES

ARIZONA CENTER

301	Barbara Howard
302	Anh Le
303	Jim Howard
304	Betty Jarvis
305	Paula Harper
306	Mohammed Saad
307	Linda Phillips
308	Edna Ross
309	Michael Paidi
310	Shinkuro Kataoka
311	Wayne Santo
312	Joy Jones
313	Matilda Johns
314	Helen Johns
315	Rowena Guan
316	Oreen Johns
317	Angeline Barley
318	Wendolyn Johnson
319	Allison Drasch
320	Sonja Antone
321	Carmelita Estenson
322	Maurice Sievers
323	Rosinna Stewart
324	Roberta Seepie
325	Suzette Mikula
326	Kathleen Addie
327	Daryl Allis
328	Greg Wood
329	Don Warne
330	Veronica Williams
331	Stanley Miles
332	Susan Moussa
333	Andrea Kriska
334	Inez Heath
334	Patricia Nolin

DAKOTAS CENTER

101	Thomas K. Welty
102	Beverly Blake
103	Monique Brave
104	Dianne Rand
105	Cecilia Fire Thunder
106	Eileen Iron Cloud
107	Pauletta Red Willow
108	Sharon Eagle
109	Arliss Keckler
110	Jackie Hallevoet
111	Mary Clark-Lee
112	Shirley Butts
113	Veronica Williams
114	Vincent Whipple
115	Linda Comini
116	Gregory Cost
117	Christine Nichols
118	Georgia McIntosh
119	Corbin LeBeaux
120	Pauline Livermont
121	Lakota Kruse
122	Gregory Shuford
123	Gayle Moran
124	Geoffrey Fitzgerald
125	Arvo Oopik
126	Mary Clown
127	Geri Shangreaux
128	Joanne Berry
129	Victoria Standing Elk
130	Lydia Alvarez
131	Amy Livermont
132	Debra Bruguier
133	Betty Cook
134	Kurt Schweigman
135	Rose White Face
136	Billy Beets
137	Hanky Poafpybitty
138	Linad Otero
139	Evelyn Chaske
140	Juanita Young
141	Betty Johnson
142	Linda Gibbons
143	Annabelle Weston
144	Claudia Roeber
145	Jeri Archer

DAKOTAS CENTER (cont'd)

146 Jennifer Gireaux
 147 Mary Lou Jetty
 148 Norman Blue Arm
 149 Pearl Rodriguez
 150 Charles White
 151 Kim Smith
 152 Patty Moran
 153 Bonita Claymore
 154 Will Knight
 155 Amy Koplovsky
 156 Kristone Griffith
 157 Kevin McNeill
 158 Jane Runzheimer
 159 Geneva Lone Hill
 160 Marcia O'Leary
 161 Susan Baker
 162 Jamie Giroux
 163 Andrew Swietlik
 164 Andre Winter
 165 Alicia Rosen
 166 Kathlenn Jenkins
 167 Robert Stern
 168 Gillian Schweitzer
 169 Deanne Miner
 170 Marge Grant

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OKLAHOMA CENTER

Elisa Lee
 Linda Cowan
 Andy Cucchiara.
 Jeunliang Yeh
 David R. Risser
 Carol Mote
 Gail Tackett
 Linda Poolaw
 Jary Mayes
 Lela Brown
 Rachel Fiedler
 Deborah Rodgers
 Yvonne Kobus
 Lois Swift
 Juanita Cortez
 Sherry Jackson
 Faith Jacob
 LaRose Thompson
 Ron Tso
 Martha Stoddart
 Nick Nichols
 Tae Young Heo
 Karen Langilotti
 Judy Aaron
 Gloria Caudillo.
 Margie Deer
 Tauqeer Ali
 Brenda Mateler
 Karen Kimbley

250
 251
 270

Dick Deuserman
 Cheryl Rojas
 Paul Enright

THE STRONG HEART STUDY
Cardiovascular Disease in American Indians

Confidentiality Pledge

I, _____ understand that data obtained for subjects of research projects are confidential.

I will not reveal to unauthorized persons any patient's name or any identifying information or any other information obtained from subjects of the project entitled, "Cardiovascular Disease in American Indians (The Strong Heart Study)".

I will not allow any persons who are not authorized members of the Strong Heart Study staff to have access to any information collected from or about the subjects.

I will properly store the data forms, computer printouts and other documents in locked file cabinets or drawers to protect confidentiality.

I understand that breach of this confidentiality pledge is grounds for dismissal from employment on the Strong Heart Study.

I will return all data to the Principal Investigator when my employment terminates.

Staff Member

Principal Investigator

Date

INSTRUCTIONS OF DEATH CERTIFICATE FORM

I. GENERAL INSTRUCTIONS

The Death Certificate Form is completed for each eligible death. The purpose of this form is to obtain information on the decedent and information on the informant, coroner/medical examiner, or certifying physician. The ID number has 6 digits: the first digit identifies center (1=SD, 2=OK, 3=AZ), the second digit identifies vital status (1=dead, 0=alive), and the last four digits identifies the individual. For this form, the second digit is 1 for all subject. The community code has 3 digits, it is the standard IHS community code.

II. DETAILED INSTRUCTIONS FOR EACH QUESTION

Item	Instructions
1.	Decedent's name. Enter the first, middle, and last name of the decedent. Begin each name in the left-most box using <u>CAPITAL</u> letters.
2.	Death certificate number. This number will be found stamped or typed on the death certificate. If a computer printout is used, it must include this information. Record the number starting in the right-most box. <u>DO NOT</u> add zero to the right of the number.
3.	Sex. Record the decedent's sex.
4.	Race. Record as is stated.
5.	Marital status. Record as listed. If the death certificate just says "not married" or "S", record as "Single".
6.	Date of birth. Record as listed on the death certificate.
7.	Date of death. Record as listed on the death certificate.
8.	Age at death. If the age at death is recorded on the death certificate, check it by using the following algorithm. Also if age is not recorded, then use this algorithm to compute it. <ol style="list-style-type: none">If the month and day of birth fall <u>BEFORE</u> the month and day of death, subtract the year of birth from the year of death.If the month and day of birth fall <u>AFTER</u> the month and day of death, subtract (year of birth + 1) from the year of death.

Record the correct age on the form. If the age at death cannot be computed then enter "=" in each field.

9. Time of death. Convert all time to 24 hour clock and record. Enter unknown as “=” in each field.
10. Location of death. Choose an appropriate answer. Other includes nursing home, another residence, or a non-hospital institution.
11. Name of hospital/clinic/nursing home/non-hospital institution/another residence where death occurred. Enter the name and location of the location where the decedent died. Include the city and state.
12. Coroner/medical examiner's case. Record as indicated on the death certificate.
13. Name and location of coroner/medical examiner. Record the name and address of the coroner/medical examiner who signed the death certificate. Provide as much detail as is recorded on the death certificate.
14. Autopsy. Record as indicated on the death certificate.
15. Interval of onset of symptoms and death. Record the shortest possible category for the immediate cause of death as indicated on the death certificate. If this is missing, DO NOT substitute the interval for another cause. Instantaneous should be recorded as “5 minutes or less”.
16. Informant. Most death certificates have a line for the informant. Often this is the spouse, but it may be a co-worker, etc. Record the name and address. Provide as much detail as is recorded on the death certificate.
17. Relationship of informant. Recorded as listed on the death certificate. If no information is provided then record as “unknown”.
18. Certifying physician. Record the name and address of the certifying physician who signed the death certificate, if not the coroner or medical examiner.
19. Date abstract completed. Record the date the Death Certificate Form is completed.
20. Code number of abstractor. The field center staff member who has completed this form must enter his/her valid Strong Heart Study code number in this question.

Final Decision Form I Instruction

1. Fill out study identification number, community code and decedent's name following instructions given for Death Certificate Form.
2. Cause of death. Record the cause of death according to autopsy report.

APPENDIX 9

The Strong Heart Study
Cardiovascular Disease In American Indians
Mortality Survey
Medical Records Abstract

Medical charts (IHS and/or other community hospitals) of all potential CVD decedents will be reviewed. Section A is to determine whether the decedent had any possible morbid events of interest between 1984 and 1988. Sections B through F will be filled out if the decedent had the following ICD-9 codes listed as the underlying cause of death or contributing cause of death and had been hospitalized within 6 weeks prior to the death : 250, 390-448, 518.4, 585, 798, 799. Use all available medical records to complete this form.

FORMID:SHMORT

=====
ID Number:

Community code: (see instruction):

Social Security Number:

=====
A. MEDICAL HISTORY

This section needs to be filled for every eligible decedent.

1. Degree of Indian Blood, if know the fraction, record it.

 /

If not, record the code appear on the face sheet of the chart (Item 7-Optional)

What is decedent's tribe of enrollment ? (Using IHS tribal code)

2. Has the decedent been hospitalized within six weeks prior to his/her death ?

1=yes, 2=no.

3. What was the date of the latest outpatient or ER visit?

 - -

(Do not include Death on Arrival (DOA)).

mo day yr

4. a. Hospital code number - last facility before death
(see instruction)

b. Hospital location - Town/City

c. Hospital location - State

d. Medical record number

5. Usual IHS facility code and chart number
if different from Question 3

 -

6. a. Date of ADMISSION to this hospitalization:

mo day yr

b. Date of DISCHARGE(for nonfatal case) or death:

mo day yr

7. Is there a history of a prior myocardial infarction ?
(Not including the event precipitating the death).

1=yes, 2=no, 8=uncertain, 9=not mentioned

8. If yes, date of most recent event (month/day/year):

mo day yr

Facility where hospitalized: _____

If between 1984-1988, fill out Morbidity Medical Review Form for each event.

9. Is there any history of angina pectoris or coronary insufficiency ?

1=yes, 2=no, 8=uncertain, 9=not mentioned

10. Is there a history of valvular disease or cardiomyopathy ?

1=yes, 2=no, 8=uncertain, 9=not mentioned

11. Is there a history of coronary bypass surgery ?

1=yes, 2=no, 8=uncertain, 9=not mentioned

12. Is there a history of coronary angioplasty ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)
13. Is there a history of hypertension (high blood pressure) ?
1=yes, 2=no, 8=uncertain, 9=not mentioned
14. Is there a history of stroke ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)
If between 1984-1988, fill out Morbidity Medical Review Form for each event.
15. Is there a history of congestive heart failure ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)
16. Is there a history of diabetes ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)
Record "8" for borderline diabetes if treated or on medication.
17. Is there an EKG (ECG) on file in the chart within the last 10 years ? (1=yes, 2=no)

***** If YES, attach a copy of the latest tracing and interpretation and also one *****
***** other example of any tracing and interpretation showing myocardial infarction *****

If any of the following tests or procedures were done to diagnose a condition mentioned in Questions 9-16, attach a photocopy of the report of results : chest X-ray, echocardiogram, angiogram, cardiac catheterization, CT/MRI scan, bypass/angioplasty report, ultrasound.

For decedent who had NOT been hospitalized WITHIN SIX WEEKS
prior to their death, STOP HERE !!!

For DOAs attach a photocopy of all clinical notes recorded in the chart at the time
the decedent arrived at the hospital

If decedent had been hospitalized within six weeks prior to his/her death, CONTINUE to finish this form.

Abstractor Number

Date abstract completed:

<input type="text"/>	<input type="text"/>	<input type="text"/>
mo	day	yr

The Strong Heart Study
Cardiovascular Disease In American Indians

Mortality Survey
Medical Records Abstract

FORMID:SHMORT

=====
ID Number:

Social Security Number:

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=====
B. OTHER MEDICAL PROBLEMS

18. Has the decedent been diagnosed or treated for the following:

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

a. Atrial fibrillation ?

b. Other arrhythmias ?

c. Claudication in the lower limbs ?

d. Brain tumor ?

e. Subdural hematoma or subarachnoid hemorrhage ?

f. Metabolic disorder ?

If yes, specify:-----

g. Other neurological disorder(s) ?

If yes, specify:-----

21. Enter the ICD-9 code numbers for the hospital discharge diagnoses and procedure codes exactly as they appear on the front sheet of the medical records and/or on the discharge summaries. Be sure these are ICD-9 codes. Record diagnosis if no codes are available.

1. .

7. .

2. .

8. .

3. .

9. .

4. .

10. .

5. .

11. .

6. .

12. .

22. Were any of the following events diagnosed within 6 weeks prior to patient's death ?

a. Myocardial infarction ? (1=yes, 2=no)

b. Stroke ? (1=yes, 2=no)

If yes, what was the primary diagnosis ?

0. Thrombotic infarction

1. Subarachnoid hemorrhage

2. Intraparenchymal hemorrhage

3. Lacunar infarction

4. Embolic infarction

5. Atherosclerotic infarction

6. Other, unknown infarction

7. Unknown type stroke

c. Congestive heart failure ? (1=yes, 2=no)

d. Any other cardiovascular diseases ? (1=yes, 2=no)

If yes, specify -----

23. What was the disposition of the patient on discharge ? (1=deceased, 2=discharged alive)
24. If deceased, was an autopsy performed ? (1 yes, 2=no)
 If yes, it was done by
 1. Hospital
 2. Medical Examiner/Coroner
25. If deceased, was the patient either dead on arrival or did he/she die in the emergency room ?
 (1=yes, 2=no)
26. Approximately how long was it from the onset of acute cardiac symptoms to arrival at this hospital?
 0 = symptoms did not begin prior to arrival,
 1 = less than 20 minutes,
 2 = longer than 20 minutes, but shorter than an hour,
 3 = longer than one hour, but shorter than 2 hours,
 4 = longer than 2 hours, but shorter than 4 hours,
 5 = longer than 4 hours, but shorter than 6 hours,
 6 = longer than 6 hours, but shorter than 12 hours,
 7 = longer than 12 hours, but shorter than 24 hours,
 8 = longer than one day,
 9 = not reported
 If not applicable, draw two lines across the box (eg. DOA).

D. SYMPTOMS.

Taking into account all of the available information, is there evidence of:

27. An acute episode(s) of pain or discomfort anywhere in the chest, left arm or shoulder or jaw recorded in patient's chart ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)
28. If yes, approximately how long did this pain or discomfort last ?
 1= less than 1 hour,
 2= longer than 1 hour but less than 24 hours,
 3= longer than 24 hours,
 4= not applicable (discharged alive)
 5= uncertain
 6= not mentioned.

29. If death occurred, was it under any of the following situations ?

a. Death occurred within one hour after the onset of severe cardiac symptoms (prolonged cardiac pain, shortness of breath, or fainting).

1=yes, 2=no, 7=not applicable, 8=uncertain, 9=not mentioned

OR

b. Death occurred within one hour after the decedent was last seen and without any symptoms.

1=yes, 2=no, 7=not applicable, 8=uncertain, 9=not mentioned

OR

c. Death occurred after the onset of neurologic symptoms.

1=yes, 2=no, 7=not applicable, 8=uncertain, 9=not mentioned

Skip Question 30 if Question 28 describes an episode immediately prior to death.

30. Approximately how long was it from the onset of symptoms to death?

1= less than 1 hour,

2= equal to or greater than 1 hour and less than 24 hours,

3= 24 hours or more,

4= not applicable (discharged alive)

5= uncertain

6= not mentioned

31. Was there evidence of a focal (localized) neurological deficit ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

If yes,

1 = less than 1 hour

2 = equal to 1 hour and less than 24 hours

3 = greater than or equal to 24 hours

32. Was there evidence of a change in state of consciousness that lasted more than 24 hours?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

33. Was there evidence of TIA (Transient Ischemic Attack) ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

34. Was there evidence of a rapid (sudden) onset of neurological symptoms (approximately less than 48 hours from onset to time of admission or maximum acute neurologic deficits) ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

35. Time from onset of neurological symptoms to admission or maximum neurologic deficit and/or change in state of consciousness.

Choose shortest time, in hours. 98=no neurologic symptoms, 99=not mentioned.

36. Which (if any) of the following physical findings were present?

1=yes, 2=no, 8=uncertain, 9=not mentioned

a. Abnormal gait

b. Romberg

c. Weakness or drift

d. Asymmetry of reflexes

e. Babinski (positive)

f. Loss of visual fields

g. Aphasia or apraxia

h. Change in mental status

i. Headache

j. Loss of consciousness

k. Other:-----

37. Lumbar puncture with cerebral spinal fluid evidence of hemorrhage ?

1=yes, 2=no, 7=not done, 8=uncertain, 9=not mentioned

38. Which (if any) of the following physical findings were present ?

1=yes, 2=no, 8=uncertain, 9=not mentioned

a. Edema

b. Jugular venous (neck-vein) distension

c. Hepatomegaly

d. Hepatojugular reflex

e. Displaced point of maximum impulse (PMI)

f. Pulmonary congestion or rales

g. S₃ gallop

h. Pulmonary edema

i. Cardiomegaly

39. Is the patient reported to have paroxysmal nocturnal dyspnea or orthopnea ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

40. Is there a report of dyspnea on exertion ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

41. Is there any report of increased venous pressure > 16 cm water ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

42. Is there any report of night cough ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

43. Is there any report of pleural effusion ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

44. Is there any report of tachycardia (rate of > 120/min)?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

45. Is there any report of a reduction in vital capacity by one-third from maximum ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

46. Is there evidence of fluid overload secondary to renal failure or other non cardiac disease ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

E. TESTS

47. Were any cardiac enzymes test done within DAYS 1-4 after arrival at the hospital or after in-hospital coronary heart disease event ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

48. If yes,

a. Is there mention of the patient having either trauma, a cardiac surgical procedure, or rhabdomyolysis within one week prior to measurement of enzymes ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

b. If yes, specify the date and reason.

mo		day		yr					

c. Reason : -----

d. Is there any evidence of hemolytic disease during the hospitalization ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

 ***** RECORD THE ENZYME TEST RESULTS ON THE FOLLOWING PAGE *****

49. Were any 12 lead ECG's taken during this admission? (1=yes, 2=no)
 *** If ECGs were taken, attach copies of required ECGs and interpretations. ***
 ***** (see instructions) *****

50. Which (if any) of the following diagnostic tests were performed ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)
 (If yes, please attach copies of interpretation)

a. Computerized Axial Tomography (CAT) of the head

CARDIAC ENZYME TEST RECORDS

	DAY ONE			DAY TWO			DAY THREE			DAY FOUR		
	(DATE:)			(DATE:)			(DATE:)			(DATE:)		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
Total CK (CPK)												
Upper limit of Total CK (CPK)												
CK-MB												
Upper limit of CK-MB												
Total LDH												
Upper limit of normal LDH												
LDH1												
LDH2												
LDH1/LDH2												
SGOT												
Upper limit of normal SGOT												

- b. Magnetic Resonance Image (MRI) of the head
- c. Carotid ultrasound
- d. Chest X-ray
- e. Exercise tolerance test
- If yes, was test done with thallium ?
- f. Echocardiography
- g. Angiogram
- h. Other
- Specify:-----

F. PROCEDURES

51. Were any of the following procedures performed during this hospital stay :

If yes, attach a copy of the report-if available. (1=yes, 2=no, 8=uncertain, 9=not mentioned)

- a. Cardiac catheterization ?
- b. Coronary angioplasty ?
- c. Swan-Ganz catheterization ?
- d. Coronary bypass surgery ?

52. Narrative: (Attach photocopies of face sheet (including discharge diagnoses and procedures).

Discharge Summary and Admitting history and Physical examination).

53. Abstractor Number

--	--	--

54. Date abstract completed:

mo		day		yr	

INSTRUCTIONS FOR MORTALITY SURVEY:
MEDICAL RECORDS ABSTRACT

I. GENERAL INSTRUCTIONS

The Medical Records Abstract for the Mortality Survey is completed, either partially or in toto, for each death with a mention of any type of cardiovascular disease on the death certificate. The purpose of the abstract is to provide sufficient information to allow the underlying cause of death to be classified by the Event Committee. Because some deaths will occur outside the hospital, Questions 8-16 on the abstract form are intended to collect information on the decedent's medical history when there was no hospitalization within 6 weeks prior to death. The remainder of the form collects information from hospitalizations that occurred within 6 weeks of death, including the terminal hospitalization. Review all available medical records to complete this form.

The ID number has 6 digits: the first digit identifies the study center (1=SD, 2=OK, 3=AZ), the second digit identifies vital status (1=dead, 0=alive), and the last four digits identify the individual. For this form, the second digit is 1 for all subjects. The community code has 3 digits and is the standard IHS community code.

If you have a question at any time during the abstracting process, consult with the study coordinator. In most cases, it will be possible to answer your questions by telephone. However, if an abstract is especially troublesome, note the difficulty, put the chart aside, and the study coordinator will assist you in person.

II. DETAILED INSTRUCTIONS FOR EACH QUESTION

Item	Instructions
------	--------------

Enter the study ID number, community code, patient's social security number and degree of Indian blood recorded in chart. If the patient did not have a social security number, draw double lines through the boxes.

1. Find out decedent's Indian blood from face sheet of the IHS Hospital/Clinic chart.
2. If the decedent was hospitalized within 6 weeks of death, including the terminal hospitalization, this should be coded as 1 (yes). If the hospitalization you are abstracting occurred more than 6 weeks prior to death, code as 2 (no).
3. Record the date (month, day, last two digits of year) of the last outpatient or emergency room visit prior to death. Choose the one closest to the date of death, i.e., the most recent, but do not count the ER admission at which a person was DOA.
4. Enter the code number, name, and location of the hospital from which the record is being abstracted.

5. Enter the primary IHS number of the decedent.
6. Record the date of the last admission (the one you are abstracting) and discharge.
7. This item is intended to identify those decedents who had a history of myocardial infarction prior to the terminal or last admission. If the admission you are abstracting was for a MI, do not count it when answering this question. In this and other questions, "yes" means that a positive history or occurrence is specifically mentioned in the record, "no" means that the absence of the event or occurrence is specifically stated in the record (e.g. "there is no previous history of heart disease in this patient"), "uncertain" means that the medical record includes some qualifying adjectives or statements, such as "possible" or "there is some suggestive of a prior history, but this is unclear" and so on, "not mentioned" means that nothing regarding the event or occurrence is mentioned in the medical record.
8. If the decedent had a definite or uncertain history of prior MI (codes 1 and 8 in Question 7), enter the date of the most recent MI and print the name of the facility where he/she was hospitalized.
- 9-16. Questions 9-16 ask about the decedent's history of selected diseases and medical procedures. This information may be given in the admitting history and physical examination of the index admission, but it may also be necessary to check these sections and the discharge sheet for all prior admissions included in the record. After review of the record for each of these items, record the appropriate response, again using the definitions of yes, no, uncertain and not mentioned given above.

These should be answered as "yes" (code 1) only if they have been specifically diagnosed by a physician. Exceptions are questions 13 (history of hypertension) and 16 (history of diabetes). For these two questions, if there is no specific diagnosis given by a physician, they should still be coded as "yes" (code 1) if either of the following is noted in the chart:

1) the patient is on treatment (i.e., antihypertensive medication or hypoglycemic agents) or

2) for hypertension, there are two or more occasions when blood pressure reading of systolic ≥ 140 mmHg or diastolic ≥ 90 mmHg were recorded; for diabetes, there are two or more occasions when the fasting glucose was ≥ 140 mg/ml or the 2 hour post glucose load value was ≥ 200 mg/dl.

Photocopies of reports of relevant diagnostic tests should be made and attached to the abstract. If more than one report of a given type is in the chart, copy the report from the admission in which the diagnosis was made and the most recent test result if done after the date of diagnostic test. Be sure that personal identifiers are removed during the photocopying, that the date of the test is included, and that the ID number is printed on each report copy. The types of studies for which reports should be copied include: echocardiogram, angiography, chest X-ray, coronary bypass or angioplasty, MRI, cardiac catheterization, CT scan, ultrasound, exercise (treadmill) tolerance test.

17. If there was an ECG done within the past 10 years and filed in the chart, enter a 1 in the code box and attach a photocopy of the tracing and interpretation to the completed abstract. Be sure that the tracing is dated and that personal identifiers have been removed during the photocopying process. Be sure that the ID number is printed on the photocopy.

IF THERE ARE NO HOSPITALIZATIONS FOR THE DECEDENT WITHIN 6 WEEKS OF DEATH, THIS FORM IS FINISHED, AND YOU MAY STOP ABSTRACTING.

18. Review the patient's medical history and other admissions in the chart to determine whether he/she had a history of any of the conditions listed in Question 18. "Metabolic disorder" includes thyroid disorders (e.g., goiter, hypothyroidism), and Cushing's syndrome.
19. If the patient was transferred to or from another acute care hospital, record a 1 in the code box. This question asks only about acute care facilities, and does not include convalescent care, long-term custodial care, or outpatient clinics or physicians' offices.
20. If one or more transfers occurred, record the hospital name and location, the dates of admission and discharge, and the chart number of the medical record for the subject at the transfer hospital, if available. This section can also be used to record the relevant information for hospitalizations at other facilities within the six weeks prior to death, even if these are not strictly "transfers".

The remaining portions of the abstract deal with information from medical records generated during hospitalizations within the six weeks prior to death (including the terminal hospitalization).

21. Print the ICD-9 codes of the discharge diagnoses and procedures as listed on the front sheet of the admission you are abstracting. Record them in the order they are listed in the record. Be sure these are ICD codes and not another coding system such as APS. If the codes are not ICD-9, leave the box blank and print the diagnoses next to each box. The ICD-9 codes will be done at the Coordinating Center.
22. Based on review of the medical record, determine whether any of the events listed were diagnosed within 6 weeks prior to death. It does not have to be the first time such a diagnosis was made. If the patient had a stroke within 6 weeks prior to death (including the terminal event), record the number that corresponds to the type of stroke diagnosed. If the record says only "cerebral infarction" use code 6. If the record says only "stroke" or "CVA", use code 7. "Any other cardiovascular diseases" includes valvular heart disease, rheumatic heart disease, hypertensive heart disease, heart disease not otherwise specified, angina pectoris, arteriosclerotic heart disease (ASHD), atherosclerotic heart disease, pulmonary heart disease, cardiomyopathy, conduction disorders, cardiomegaly, and arteriosclerotic cardiovascular disease (ASCVD). IF IT WAS A THROMBOTIC INFARCTION, USE CODE '0'.
23. If the patient died in the hospital during this admission, code as 1 (deceased). If you are abstracting an admission that occurred prior to death and the patient was discharged alive, code as 2 (discharged alive).

24. If the patient died in the hospital and an autopsy report is included in the chart, code as 1 (yes) and attach a photocopy of the autopsy report. Again, be sure to omit personal identifiers from the photocopy, but print the ID number on the copy.
25. If the patient was dead on arrival at the hospital or if he/she died in the emergency room (i.e., was not admitted to the hospital) code as 1 (yes).
26. Acute cardiac symptoms are defined as pain in the chest, left arm or shoulder, or jaw, and may be accompanied by sweating, faintness, nausea or dizziness. If the time is not specifically stated in the medical record, but it is possible to accurately calculate the time based on information given regarding onset of symptoms and arrival at the hospital, calculate the time yourself and enter the appropriate code. If there is any doubt about the timing of symptoms and arrival at the hospital, code as 9. If symptoms began after admission to the hospital, code as 0 (did not begin prior to arrival). If there were NO cardiac symptoms, put a double lines through the box.
Note : Questions about symptoms refer to the last hospitalization.
27. If either the manner of onset of pain (i.e., whether it was of acute (sudden) onset) or the location of pain is unclear, code as 8 (uncertain). If there is no mention of chest pain, code as 9 (not mentioned). If the record says there was no indication of pain in the chest, left arm or shoulder or in the jaw then code as 2 (no). A "yes" code requires both acute onset and location of pain.
28. If the answer to Question 27 is not "yes", skip to Question 29. Code according to the reported time from onset of acute symptoms to death. If the time is not specifically stated in the medical record, but it is possible to calculate the time from information given about the time of onset of symptoms and the time of death, calculate the time yourself and enter the appropriate code. If there is any doubt about the timing of symptoms and death, code as 5 (uncertain). If the patient was discharged alive, code as 4 (NA=not applicable). If no information is given, code as 6 (not mentioned).
29. This question asks about the timing of death, either in respect to the onset of cardiac symptoms, neurological symptoms, or the time the patient was last seen without any symptoms. If the patient died after the onset of severe cardiac symptoms, defined as prolonged cardiac pain, shortness of breath, or fainting, code a. as 1 (yes). If the death occurred after the patient was last seen and without symptoms, code b. as 1 (yes). If the patient died after the onset of neurologic symptoms, code c. as 1 (yes). If the patient was discharged alive, code a., b. and c. as 7 (NA). If the occurrence of cardiac symptoms, neurologic symptoms, or any type of symptoms is unclear, code as 8 (uncertain). If there is no mention in the record of the circumstances of death, code a., b. and c. as 9 (not mentioned).
30. Code the time from either the onset of symptoms or when the patient was last seen and without symptoms until death. Follow the same guidelines and coding rules as given in Question 28.
31. Review the record for the last admission to determine whether the patient had a focal (localized) neurological deficit. This would include hemiplegia, sensory impairment in part of the face, arm and leg, aphasia, motor speech

disorder, distortion of visual coordinates, paralysis of conjugate gaze, paresis (weakness) on one side of the body, and other neurological abnormalities which can be localized to a particular structure or area in the brain. If a focal neurological deficit was noted, determine whether it lasted more than 24 hours or until death, and code the appropriate answer. If the length of time the deficit lasted is unclear, code as 8 (uncertain).

32. Change in state of consciousness includes altered awareness or ability to concentrate, stupor, and coma. If a change in consciousness occurred and lasted more than 24 hours, code as 1 (yes). If the length of time that consciousness was altered is unclear from the information in the record, code as 8 (uncertain). This question does not include changes in consciousness that may occur immediately prior to death.
33. Determine if there was evidence of TIA.
34. Determine whether the patient experienced a rapid onset (approximately less than 48 hours from onset to time of admission or maximum acute neurologic defects) of neurological symptoms. If the patient did not have any neurologic symptoms, code as 2 (no). If the timing is unclear, code as 8 (uncertain). If there is no mention of neurologic symptoms or no mention of whether the onset was rapid, code as 9 (not mentioned).
35. Determine as in Question 28 the length of time from the onset of neurological symptoms to admission or maximum neurologic deficit and/or change in state of consciousness. Choose the shortest time if more than one interval can be determined. If it is not possible to determine an interval of time, code as 99. All time intervals are coded in hours (round parts of an hour according to rounding rules for intervals). If the patient did not have neurologic symptoms, code as 98 (no neurologic symptoms).
36. This question includes a list of neurologic signs and symptoms. After review of the medical record, determine whether each of these was present. Codes for yes, no, uncertain, and not mentioned should be used as described in Question 7. Consult the list of keywords if you are uncertain about the definition of any of these terms. "Weakness or drift" refers to unilateral paresis or loss of strength in one side of the body. It does not include malaise or a generalized feeling of weakness.
37. If a lumbar puncture (LP) was done, was there evidence of blood in the cerebral spinal fluid? If an LP was not done, code as 7 (not done).
38. This question asks whether specific physical findings were present at any time during the admission. The use of codes is explained in Question 7. Most of this information should be found in the admitting physical exam or in subsequent examinations. Consult the list of key words if you are uncertain about the definition of any of these terms.
- 39.-46. These questions ask about the presence of certain symptoms. Review the admitting history and physical exam and subsequent examinations and tests for this information. For Question 41., if venous pressure was tested, was it > 16 cm of water? Question 44 asks about tachycardia (heart rate > 120 beats/min.). This may be reported on ECGs or in the portion of the nurses notes that record vital signs. If a test of lung function was done, answer Question 45 as yes, no or uncertain. If no lung function tests were done, code Question 45 as 9 (not mentioned).

47. Determine whether any cardiac enzyme studies were done within 1-4 days after arrival at the hospital or after an in-hospital cardiac event. Cardiac enzymes include CPK (CK), LDH, and SGOT.
48. If cardiac enzyme studies were done within the appropriate time frame after the event, determine whether there is any mention of trauma, a cardiac surgical procedure, or rhabdomyolysis within one week before the measurement of enzymes. If one of these conditions was present in the appropriate time frame, complete parts b. and c. of Question 48. If the exact date of the event is unknown, but it was clearly within the specified time frame, draw double lines through the boxes for the date. Determine whether there is evidence of hemolytic disease during the hospitalization.
- If cardiac enzymes were done during the appropriate time frame after the event, and the answers to Question 48 are "no", "uncertain" or "not mentioned", complete the Enzyme Test Form.
- In some cases, information about cardiac enzymes may only be available from discharge summaries. i.e., no lab slips are available. In this circumstance, record the information available from the discharge summary on the enzyme form, and indicate at the top of the enzyme form that these data come from the discharge summary only.
49. Code as instructed. If yes, attach copies of required ECGs and interpretations. These include the last ECG obtained prior to the last admission, the first ECG done after admission, the first ECG done each day thereafter, and the last ECG obtained prior to death or discharge. Be sure that personal identifiers are removed, but also that the ID number is recorded on each ECG attached. Be sure that ECGs are dated so that it is possible to determine the order in which they were done.
50. For each of the diagnostic tests listed, code whether or not the test was done. Only codes 1 (yes) and 2 (no) should be used. If a procedure is not mentioned in the chart, code as 2 (no). Ignore codes 8 and 9. For those tests done, attach copies of the interpretation, again following the same procedures regarding identifiers and ID numbers.
51. The instructions for this question are the same as those for Question 50.
52. Attach a photocopy of the Discharge Summary and Admitting History and Physical Examination pages from the chart. Again, follow the same instructions with respect to personal identifiers and ID numbers.
53. Enter your code number.
54. Enter the date the abstract was completed.

- d. Coronary angioplasty ? (1=yes, 2=no, 9=uncertain)
- e. Angina pectoris or coronary insufficiency ? (1=yes, 2=no, 9=uncertain)
- f. Other chronic ischemic heart disease ?
 1=yes, specify: _____
 2=no
 9=uncertain
- g. Rheumatic or valvular heart disease ? (1=yes, 2=no, 9=uncertain)
- h. Cardiomyopathy ? (1=yes, 2=no, 9=uncertain)
- i. Congestive heart failure ? (1=yes, 2=no, 9=uncertain)
- j. Stroke ? (1=yes, 2=no, 9=uncertain)
- k. If yes, date of most recent event (month/year)
- l. Hypertension ? (1=yes, 2=no, 9=uncertain)
- m. Diabetes mellitus ? (1=yes, 2=no, 9=uncertain)
- n. Kidney failure ? (1=yes, 2=no, 9=uncertain)
- o. Any non-cardiac condition that might have contributed to this death ?
 1=yes, specify: _____
 2=no
 9=uncertain
5. Was the decedent taking any of the following medications within six weeks prior to death ?
- a. Nitrates ? (1=yes, 2=no, 9=uncertain)
- b. Calcium channel blockers ? (1=yes, 2=no, 9=uncertain)

c. Digitalis ? (1=yes, 2=no, 9=uncertain)

d. Beta-blockers ? (1=yes, 2=no, 9=uncertain)

e. Other cardiovascular drugs ?

1=yes, specify: _____

2=no

3=uncertain

B. DETAILS OF DEATH

6. Are you familiar with the events surrounding the decedent's death ? (1=yes, 2=no)

7. Did you witness the death ? (1=yes, 2=no)

If NO to both Question 6 and 7, go section C, Question 14.

8. a. Was there any pain in the chest, left arm or shoulder or jaw within 72 hours of death ?
(1= yes, 2= no, 9= uncertain)

If NO or Uncertain, go to Question 9.

b. Did the pain include the chest ? (1=yes, 2=no, 9=uncertain)

c. Did you think this pain was of a cardiac origin ?

1= yes

2= no, specify: _____

9= uncertain

9. Did the decedent take (or was he/she given) nitrates at the time of the acute episode ?
(1=yes, 2=no, 9=uncertain)

10. Was coronary reperfusion (intravenous or intracoronary streptokinase or TPA, angioplasty, etc.)
attempted during the acute episode ? (1=yes, 2=no, 9=uncertain)

11. Was CPR and/or cardioversion performed within 24 hours of death ?
(1=yes, 2=no, 9=uncertain)

12. Please give time between onset of acute symptoms to death.

(We are defining death as the point where spontaneous breathing ceased and the patient never recovered)

1= Death instantaneous, no symptoms

2= Less than 1 hour

3= At least 1 hour, but less than 4 hours

4= At least 4 hours, but less than 12 hours

5= At least 12 hours, but less than 24 hours

6= One day

7= Two to three days

8= More than three days

9= Unknown

13. Would you classify the decedent's cause of death due to cardiovascular disease (CVD) ?

(1= yes, 2= no, 3= uncertain)

If NO, what do you believe to be the cause of death ?

a. Pulmonary embolism ? (1=yes, 2=no, 9=uncertain)

b. Acute pulmonary edema ? (1=yes, 2=no, 9=uncertain)

c. Stroke ? (1=yes, 2=no, 9=uncertain)

d. Pneumonia ? (1=yes, 2=no, 9=uncertain)

e. Other ?

1= yes, specify: _____

2= no

3= uncertain

C. SIGNATURE

14. Form completed by: _____

Signature

15. Date:

mo		day		yr	

PHYSICIAN QUESTIONNAIRE INSTRUCTIONS
(Include IHS and Non-IHS Physicians)

I. INTRODUCTION

The DOCTOR form is targeted for completion for each out-of-hospital death (including DOA or ER death with no vital signs). Up to two DOCTOR forms may be needed.

1. One form should be completed by the certifying physician listed on the death certificate.
2. A second form is to be completed if there is another knowledgeable physician who cared for the decedent within four weeks of death. The names of such physicians could be obtained from one of several sources: informant interview, hospital or nursing home record, another DOCTOR questionnaire, or coroner's report. (Permission from next-of-kin may be required to contact this physician.)

The DOCTOR questionnaire is used in nursing homes. In particular, if the patient was in a nursing home, completion by nursing home personnel should substitute for the second Physician Questionnaire.

II. DETAILED INSTRUCTIONS FOR SPECIFIC ITEMS(PHONE ADMINISTRATION)

ITEM DESCRIPTIONS

1. Decedent's name. Record the first, middle, and last name of the decedent.
2. When interviewing by telephone, try to obtain an informant who is familiar with the decedent's medical history, preferably a doctor. A nurse or receptionist using the chart is less desirable. If no one is available who is familiar, i.e., if this was not a doctor's patient, follow the indicated skip pattern.
3. Time last saw decedent. This refers to when the doctor last saw the decedent. If the doctor is not the respondent, be sure to point this out to whoever is answering.
4. Read the medical conditions as listed and record the appropriate response. If the respondent is reading the medical chart, conditions that are not listed should be indicated as "NO". If there is an uncertainty, record "Uncertain". If yes to items f or o, specify as indicated.
5. Medications. We are specifically interested in medications during the past six weeks only. Medications prescribed prior to that period that should have run out would be counted as "No".
6. Familiarity with death. This refers to the specific informant (physician), and should be read as such. If no, follow the indicated skip pattern.
7. Witnessed death. This refers to the specific informant (physician) and should be read as such. If no, follow the indicated skip pattern.

8. Pain. Question 8a should be marked "Yes" for any pain in the chest, left arm, left shoulder, or jaw within 72 hours of death. Prior pain, including a history of angina, should be checked as "No" if there was no pain in the final three days. If the doctor did not witness the event, then this may be uncertain.
9. Nitrate use. The time frame for this question is, again, 72 hours prior to death.
10. Coronary reperfusion. The parenthetical words in the question should be read. Intravenous or intracoronary streptokinase or tissue plasminogen activator, angioplasty, laser angioplasty, and so forth should be considered "Yes".
11. CPR/cardioversion. Note that the time frame is the 24 hours prior to death.
12. Timing of death. Be certain to use the SHS definition of death, i.e., the point where spontaneous breathing ceased and the patient never recovered. Record the time between the onset of acute symptoms and death in the most appropriate category.
13. Death due to CVD. If death is not due to CVD, ask the following question. Wait for an answer and check the appropriate response. Then, if A-D were not mentioned, ask each of them individually. Check "Yes" or "No" or "Uncertain" as indicated. If "other", please specify.
14. If completed by phone interview, put the respondent's name in this position and date the interview.
15. Record and date the interview.

C. RECORD OF CALLS or HOME VISIT

DATE	TIME (24 hour clock)	Method of contact	Contact successful	Interview Completed
		1 = Phone 2 = Home Visit	1 = Yes 2 = No	1 = Yes 2 = No
1) -----	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) -----	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) -----	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) -----	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) -----	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Before we get started, could you please tell me what was your relationship to the deceased ?

- 1= spouse,
- 2= parent,
- 3= daughter/son,
- 4= other relative,
- 5= friend,
- 6= work-mate,
- other, -----

5. Do you know the degree of Indian blood of ----- ? /

Write down the fraction of Indian blood. If unknown record 99/99.

6. First, think back to about one month before (-----) died.
At that time, was he/she sick or ill, with his/her activities limited,
or was he/she normally active for the most part ?

- 1= sick/ill/limited activities, 2= normally active, 3= unknown.

7. Was (-----) being cared for at a nursing home, or at another place at the time of death ?

1= yes, nursing home,

2= yes, at home,

3= yes, other, specify: -----

4= no,

9= unknown

8. (If the decedent was cared by nursing home prior to the death), please tell me the name and location of the nursing home:

a. Name:

b. Address:

City/town:

State-Zip:

9. Was (-----) hospitalized within the six weeks prior to death?

1= yes, 2= no, go to Question 14, 9= unknown, go to Question 14.

10. Was the hospitalization for heart attack or chest pain? (1=yes, 2=no, 9=unknown)

11. Was the hospitalization for heart surgery? (1=yes, 2=no, 9=unknown)

12. What was the date of hospital admission?
mo day yr

13. Could you tell me the name and location of the hospital?

a. Name:

b. Address:

City/town:

State-Zip:

14. Was (-----) seen by a physician anytime in the last six weeks prior to death? (1=yes, 2=no, 9=unknown)

15. Could you tell me the name and address of this physician?

a. Last Name:

b. First Name:

c. Street address:

City/town:

State-Zip:

16. Could you tell me the name and address of (-----)'s usual physician.
(If same as Q15 record as "same").

a. Last Name:

b. First Name:

c. Street address:

City/town:

State-Zip:

17. Before (-----)'s final illness, had he/she ever had pains in the chest from heart disease, for example, angina pectoris? (1=yes, 2=no, 9=unknown)
If no, go to Question 18.

18. Did (-----) ever take nitroglycerin for this pain? (1=yes, 2=no, 9=unknown)

19. Did a doctor ever say that (-----) had a heart attack prior to his/her final illness? (1=yes, 2=no, 9=unknown)

20. Was (-----) hospitalized for a heart attack ?
(1=yes, 2=no, 9=unknown)
21. Did (-----) ever have a coronary bypass operation, balloon angioplasty, or some other operation or procedure to improve circulation of blood to the heart ?
(1=yes, 2=no, 9=unknown)
22. For the following questions, (1=yes, 2=no, 9=unknown).
- a. Did (-----) ever have heart failure ?
- b. Did (-----) ever have rheumatic heart disease?
- c. Did (-----) ever have any other heart disease or heart condition before his/her final illness ?
If yes, what was the heart disease or heart condition ? -----
23. Did (-----) ever have a stroke ?
1= yes, 2= no, if no, go to Question 24
24. Did he/she have a stroke within four weeks of his/her final illness ? (1=yes, 2=no)
25. Were you present when (-----) died ? (1=yes, 2=no)
26. If no, did anyone see or hear (-----) when he/she died ?
(1=yes, 2=no, 9=unknown)
27. How long after (-----) was last known to be alive was he/she found dead?
(Enter the shortest interval known to be true)
- 1= 5 minutes or less,
2= 1 hour or less,
3= 24 hours or less,
4= more than 24 hours,
9= unknown

28. Did (_____) experience pain or discomfort in his/her chest, left arm or shoulder or jaw either just before death or within 3 days (72 hours) of death ?
- 1=yes, 2=no, 9=unknown

If answer is "NO" or "Unknown", skip to Question 32.

The next set of questions deal specifically with the last episode (that led to the death) of (_____)’s pain or discomfort. The last episode is defined as starting at the time (_____) noticed discomfort that caused him/her to stop or change what he/she was doing.

29. Did (_____)’s last episode of pain or discomfort specifically involve the chest ? (1=yes, 2=no, 9=unknown)

30. Did he/she take nitroglycerine because of this last episode of pain or discomfort ? (1=yes, 2=no, 9=unknown)

31. How long was it from the beginning of (_____)’s last episode of pain or discomfort to the time he/she stopped breathing on his/her own? (use the shortest interval known to be true)
- 1= 5 minutes or less,
2= 10 minutes or less,
3= 1 hour or less,
4= 24 hours or less,
5= more than 24 hours,
9= unknown

32. Within 3 days of death, or just before (_____) died, did any of the following symptoms begin for the first time : (1=yes, 2=no, 9=unknown)
- a. Shortness of breath ?
- b. Dizziness ?
- c. Palpitations (pounding in the chest) ?
- d. Marked or increased fatigue, tiredness, or weakness ?

- e. Headache ?
 - f. Sweating ?
 - g. Paralysis ?
 - h. Loss of speech ?
 - i. Attack of indigestion or nausea or vomiting ?
 - j. Other ?
- specify:-----

The next few questions are concerned with emergency medical care (-----) may have received prior to or at the time of death. You may have already given this information in an answer to an earlier question. Since it is important to obtain information specifically on emergency medical care, I hope you don't mind if these questions seem repetitive.

33. Was (-----) taken to a hospital ? (1=yes, 2=no)

34. If yes, could you tell me the name and location of this hospital:

a. Name:

b. Street address:

City/town:

State-Zip:

35. Is there someone else whom we could contact, who might know more about the circumstances surrounding (-----)'s death or his/her usual state of health ?

(1=yes, 2=no, 9=unknown)

36. If yes, could you tell me the name, address, and telephone number of this person?

a. Last Name:

b. First Name:

c. Street address:

City/town:

State-Zip:

Telephone:

37. How was he/she related to the deceased ?

1= spouse,

2= parent,

3= daughter/son,

4= other relative,

5= friend,

6= work-mate,

7= other, -----

38. Finally, I want to ask you if you can tell me anything else about the circumstances surrounding (-----)'s death, specifically, could you please tell me what you know of (-----)'s general health, health on the day he/she died, and of the death itself ? (1=yes, 2=no, 9=unknown)

39. If yes, specify:

Interview is over. go to Question 40. To be completed immediately after the interview.

INFORMANT INTERVIEW FORM INSTRUCTIONS

I. GENERAL INSTRUCTIONS

The purpose of the informant interview is to obtain information about possible cardiovascular events in order to classify the cause of death. The interview with next-of-kin is potentially difficult because of the sensitive nature of a relative's death and the difficulty recalling or understanding the events related to the death. Even if the informant initially claims no knowledge, begin the form to see if the questions can be answered.

The interviewer should enter the information required on the first page before the contact is made with the informant, though some of the informant data may need to be filled after contact, such as relationship to the decedent. In some cases the informant may change after calling, as in the case where a spouse is to be contacted but the actual informant is a son or daughter. A record of calls should be maintained for the attempts at contacting the informant. The interviewer should put the date and time of each call, any explanatory notes, a result code for each call, and the interviewer's assigned code number. Eight attempts to contact an informant should be made over a two-week period. If no contact is made, repeat in a month.

The questionnaire is divided into sections. The first is concerned with the decedent's medical history, including previous hospitalizations. Then the questions address the events immediately surrounding the fatal event, and Section C is concerned with the symptoms the deceased experienced prior to the event. Then emergency medical care is ascertained, and the information about other potential informants is requested. Finally the interviewer is asked questions about the reliability of the information obtained during the interview.

Almost all questions have multiple choices for answers; however, if necessary the interviewer can write any additional information or comments that may be important to understanding the response in the margins next to the question. A few questions require the interviewer to write out descriptions of the death or the decedent's state of health as related by the informant. For these questions, the interviewer should write word-for-word (in short phrases, abbreviating) the response of the informant. For questions asking the informant to specify names, if more than one answer is given, write all responses.

When reading questions to the informant, the interviewer should fill in the blanks with the name of the decedent. For example, "I'd like to start by asking about _____'s medical history" should be read "I'd like to start by asking about Mr. Smith's medical history. "

The interviewer needs to know thoroughly the SHS definition of death to complete the interview accurately. "Death" is defined as the point at which the decedent stops breathing on his/her own and never recovers. Thus, the onset of death for someone who is resuscitated or ventilated is the point at which he/she last breathes spontaneously. He/she may recover several times after resuscitation, but the last cessation of breathing is considered "death". Death is not the time "pronounced dead".

If someone is "found dead", timing of death may be estimable if the time since last seen alive was short. However, if long, timing of death may be unknown.

The interviewer should be familiar with skip patterns and nature of each question. Several questions are similar, with only subtle differences. The interviewer must make the distinction clear to the informant. Such questions may sound repetitive and are easier if clarified.

If informant contradicts a previous answer, probe to clarify and correct if obviously wrong.

If informant says at the start of the interview that he/she does not know anything about the death, coax the informant to start the interview and try to complete. If the informant is obviously not helpful, gracefully end the interview.

Ask for next-of-kin record during the interview if appropriate but get written permission only if needed. Written release need to be witnessed.

Finally, the interviewer is responsible for reviewing and editing the Informant Interview Form thoroughly following the interview. Review every question and the skip patterns carefully. Every question must be answered unless skip patterns indicate otherwise. The description of the events preceding the death is extremely important for diagnostic purposes. Make sure that the description includes the timing of events and the symptoms experienced.

II. DETAILED INSTRUCTIONS FOR VARIOUS QUESTIONS

ITEM	DESCRIPTIONS
1.-3.	Information on the decedent's name, date of death, and informant should be filled out from the death certificate prior to the informant interview.
4.	This question asks for the relationship of the informant to the decedent. Make sure not to reverse this: for example, "She was my mother" should be answered "daughter/son". "Other relative" includes aunt, uncle, cousin, in-law, and grandparent.
5.	Ask the informant about the decedent's degree of Indian blood.
6.	This question refers to any restriction from the decedent's usually day-to-day activities. It excludes the events at death.
7.	"Being cared for" refers to attendant medical care because of disability or sickness.
8.	Fill in as much information as is known by informant. If the informant asks why this is needed, explain that it may be important to get additional information from the nursing home, with permission, to understand the cause of death.

9. Any hospitalization for any reason is "yes".
10. Mark the appropriate answer.
11. Mark the appropriate answer.
- 12.-13. If decedent was hospitalized more than once or stayed in more than 1 hospital, record the most recent on the form, then list all dates, names, cities and states of other hospitalizations on a separate piece of paper. If exact dates are unknown, fill in month and year. Missing values are indicated by "=" (equal sign) in the appropriate field.
14. Refer to any encounter with a physician for any reason in the month preceding death, including final symptoms.
15. This should be the most recent. If more than one physician seen, provide names and addresses of most knowledgeable two.
16. Record the name and address of decedent's "usual" physician. If same as most recently seen, record "same".
17. This question refers to chest pain from heart disease at any time before death. Angina or angina pectoris or a heart attack would be considered "yes" responses. Pain in the left arm or shoulder, jaw, or upper abdomen is considered equivalent to chest pain.
18. Refer to the list of names for nitroglycerin if informant hesitates. Nitroglycerin is usually administered as a small tablet placed under the tongue but may be taken as a pill, an ointment, or as "skin patch".
19. Be aware that this refers to past history and does not include the fatal event under consideration (emphasize ever) and clarify to the interviewee, if required.
20. Synonyms for heart attack are "myocardial infarction", "MI", coronary occlusion.
21. Coronary bypass involves surgery bypassing the blocked coronary arteries with vessels removed from the arm or leg. "Balloon dilation" or "PCTA" are other terms for angioplasty. A cardiac catheterization, coronary angiography, or angiogram for diagnostic purposes without angioplasty should be answered "no".
22. This question simply asks whether the decedent had ever had any of these cardiac events previously. Mark the appropriate response.
23. A stroke is a brain hemorrhage or ischemia (blockage of blood flow) also known as a cerebrovascular attack, cerebral hemorrhage, or blood clot on brain.
24. This includes the final, fatal event under consideration.

25. "Present" is defined as being within sight or sound of the deceased at the time of death; for example, Present: lying next to in bed, in next room and could be heard, left decedent alone momentarily. Not present: in another room out of sign and sound, outside out of sight and sound, left decedent alive and returned after 5 minutes, talked to on phone sometime right before.
26. This question asks whether anyone was present at the time of the decedent's death (defined above). If the decedent died in his/her sleep with someone nearby, Question 26 should be answered "yes".
27. Mark the shortest interval known to be reliable. If the informant hesitates, read the intervals in order starting with the shortest.
28. We are primarily interested in acute symptoms, not chronic. Thus, if a person had been generally fatigued for a month and then had chest pain one hour before death, it is the chest pain that was the last episode. Similarly, if someone had a long history of angina but, not having acute pain, suddenly collapsed and stopped breathing, the onset of the final episode was the time of collapse. If the death occurred while sleeping or while someone was within hearing range of decedent, the interval between onset and death is considered to be instantaneous. If the decedent was found dead (no one close enough to see or hear him/her), the onset may be unknown.

Onset of last episode is defined as being at that point in time when new symptoms cause a change in activity. If the symptom is chronic (e.g. , longstanding exertional chest pain), there must be a change in severity or frequency. Symptoms might be stepwise (e.g. , one chest pain, then a more severe one an hour later). In this case it is the first pain, if it was new and caused a change, that is the onset of the final episode. The final episode for someone who collapses, is revived, and collapses again began at the first collapse. Interviewers will have to probe and define onset specifically for each informant.

The difference between Q17 and Q28 is the time period referred to. In Q28 the time is specific: within 3 days of death. In Q17, the decedent could have experienced pain at any time prior to death. If Q28 is answered "no", skip to Q32, as Q29-Q31 refer to an episode of pain within 3 days of death.

The location of the pain or discomfort referred to in Q17 and Q28 is specific. If the pain was experienced at sites other than the chest, left arm or shoulder or jaw, the answer should be "no". If the informant is unsure, but is leaning toward a "yes", then proceed as with a "yes".

If the decedent was found dead, Q28 must be answered either "yes" or "unknown". If the decedent was found dead, most of the answers will be "unknown". In this case, skip quickly through, verifying that the answers are unknown.

29. The option "yes" is checked if the pain occurred anywhere in the chest within 3 days of death.

30. A list of names of "nitroglycerin" preparations is provided in the medication list and should be consulted if informant isn't sure or offers a brand name.
31. This is a crucial question for the timing of death. Use the definition provided above for death and onset of the final episode in order to clarify timing. Read the question, wait for response, and mark the shortest interval known to be true. If the informant may have given a time interval when answering Question 27. If so, the interviewer may want to preface the question stating the time interval and asking for confirmation (e.g. "You mentioned that _____ had chest pains two days before he died. Is that when the chest pain began?").
32. This question asks about any symptoms other than pain or discomfort in the chest. The timing of onset of these "other" symptoms is crucial. After each "yes" answer, probe to make sure the onset was within 3 days, and that the condition was not longstanding or "usual". Read the list slowly and fill in the appropriate answers.
33. Fill in the appropriate response.
34. Fill in as much of the information as is known.
35. This question asks if there is any person who may be able to provide additional information about the events leading up to the death or the death itself. For example, a spouse may know most about the three days prior to death while a co-worker actually witnessed the death. (Note: If the answer is "yes", an interview will need to be carried out with this individual.)
36. Fill in as much of the information as is known.
37. Write down as stated.
38. Narrative: Write out as close to word-for-word as possible, using short phrases. Probe neutrally for symptoms, order and timing of events, medical care, etc. Record these important items verbatim; try to limit the narrative to the space provided. When describing the events surrounding the death itself, be sure to differentiate between the onset of the last symptoms, the death (recalling definition of death), and being "pronounced dead".
39. Close the interview by thanking the informant and repeating how much the quality of our research depends on the cooperation of people like themselves. After closing the interview, fill in the questions about reliability and administrative information.
40. If informant is decedent's next of kin and agree to provide consent for further information, ask him/her to sign the consent form.
- 41-44 Interviewer evaluate the quality of information provided by the informant.

APPENDIX 12

THE STRONG HEART STUDY

Mortality Survey

FINAL DECISION FORM II

=====
ID number:

Decedent's name: -----

Last

First

Middle

=====

Disposition: 1. Regular 2. QC case 3. Equivocal case

A. Cause of death, choose appropriate one.

1. Definite fatal myocardial infarction
2. Definite sudden death due to coronary heart disease
3. Definite fatal coronary heart disease
4. Possible fatal coronary heart disease
5. Definite fatal stroke
6. Possible fatal stroke
7. Definite fatal congestive heart failure
8. Possible fatal congestive heart failure
9. Other fatal cardiovascular diseases
10. Other, specify : -----

B. Criteria used: (Please check the appropriate boxes)

1. Definite fatal myocardial infarction

[] a. Definite MI within 4 weeks of death by criteria: (1=yes, 2=no)

1. Evolving diagnostic ECG
 2. Diagnostic ECG and abnormal cardiac enzymes
 3. Prolonged cardiac pain and abnormal cardiac enzymes
-

[] b. Acute MI diagnosed by autopsy

[] c. No known non-atherosclerotic or noncardiac-atherosclerotic that was probably lethal according to death certificate, autopsy report, hospital records, or physician records.

2. Definite sudden death due to CHD

- a. Death witnessed as occurring within 1 hour after the onset of severe cardiac symptoms (prolonged cardiac pain, shortness of breath, fainting) or within 1 hour after the subject was last seen without symptoms.
- b. No documentation of acute MI within 4 weeks prior to death.
- c. No known non-atherosclerotic or noncardiac-atherosclerotic process that was probably lethal according to death certificate, autopsy report, hospital records, or physician report.

3. Definite fatal CHD

- a. Death certificate with consistent underlying or immediate causes.
- b. No documentation of definite acute MI within 4 weeks prior to death.
- c. Criteria for sudden death not met (above).
- d. No known non-atherosclerotic or noncardiac-atherosclerotic process or event that was probably lethal according to death certificate, autopsy report, hospital records, or physician records.
- e(i). Previous history of MI according to relative, physician, or hospital records, or definite or possible MI by criteria.
- e(ii). Autopsy reporting severe atherosclerotic-coronary artery disease or old MI without acute MI (> 50% proximal narrowing of two major vessels or > 75% proximal narrowing of one more vessel, if anatomic details give.)
- e(iii). Death occurring greater than 1 and less than or equal to 24 hours after the onset of severe cardiac symptoms or after subject was last seen without symptoms.

4. Possible fatal CHD

- a. No documentation by criteria of definite acute MI within 4 weeks prior to death.
- b. No documentation by criteria of definite sudden death.
- c. No documentation by criteria of definite fatal CHD.
- d. Death certificate with consistent underlying or immediate cause.
- e. No known non-atherosclerotic or noncardiac-atherosclerotic process that was probably lethal according to death certificate, autopsy report, hospital records, or physician records.

5. Definite fatal stroke

- a. Cerebral infarction or hemorrhage diagnosed at autopsy.
- b. No other known disease process or event such as brain tumor, subdural hematoma, subarachnoid hemorrhage, metabolic disorder, or peripheral lesion that could cause localizing neurologic deficit or coma according to death certificate, autopsy, hospital records, or physician records.
- c. History of rapid onset (approximately < 48 hours from onset to time of admission or maximum acute neurologic deficit) of localizing neurologic deficit and/or change in state of consciousness.
- d. Localized neurologic deficit within 6 weeks of death documented by unequivocal physician or laboratory findings with > 24 hours duration of objective physician findings.

6. Possible fatal stroke

- a. Death certificate with consistent underlying or immediate cause (ICD-9, code 431-437),but neither autopsy evidence nor adequate pre-terminal documentation of the event.
- b. No evidence at autopsy examination of the brain, if performed, of any disease process that could cause localizing neurologic signs that would not be connected with cerebral infarction or hemorrhage.

7. Definite fatal congestive heart failure.

Two major criteria or one major and two minor criteria:

a. Major criteria

- i. Paroxysmal nocturnal dyspnea or Orthopnea
- ii. Neck vein distention
- iii. Rales
- iv. Cardiomegaly
- v. Acute pulmonary edema
- vi. S_3 gallop
- vii. Increased venous pressure > 16 cm water
- viii. Circulation time ≥ 25 seconds
- ix. Hepatojugular reflux

b. Minor criteria

- [] i. Ankle edema
- [] ii. Night cough
- [] iii. Dyspnea on exertion
- [] iv. Hepatomegaly
- [] v. Vital capacity reduced by one third from maximum
- [] vi. Tachycardia (rate of ≥ 120 /min.)

c. Major or minor criteria

- [] i. Weight loss > 4.5 kg in 5 days in response to treatment

d. [] No known non cardiac process leading to fluid overload such as renal failure

8. Possible fatal congestive heart failure

- [] Death certificate with consistent underlying or immediate cause, but neither autopsy evidence nor adequate pre-terminal documentation of the event.

9. Other fatal cardiovascular diseases

- [] i. Death certificate with consistent underlying or immediate cause.

Comment:

C. TYPE OF STROKE:

- | | |
|--------------------------------|-------------------------------|
| 1. Thrombotic infarction | 5. Embolic infarction |
| 2. Subarachnoid hemorrhage | 6. Atherosclerotic infarction |
| 3. Intraparenchymal hemorrhage | 7. Other, unknown infarction |
| 3. Lacunar infarction | 8. Unknown type stroke |

D. Does the diagnosis in Section A (Cause of death) agree with your clinical impression?

- 1. Yes 2. No

If "No", what is your diagnosis? _____

Why? _____

Coder

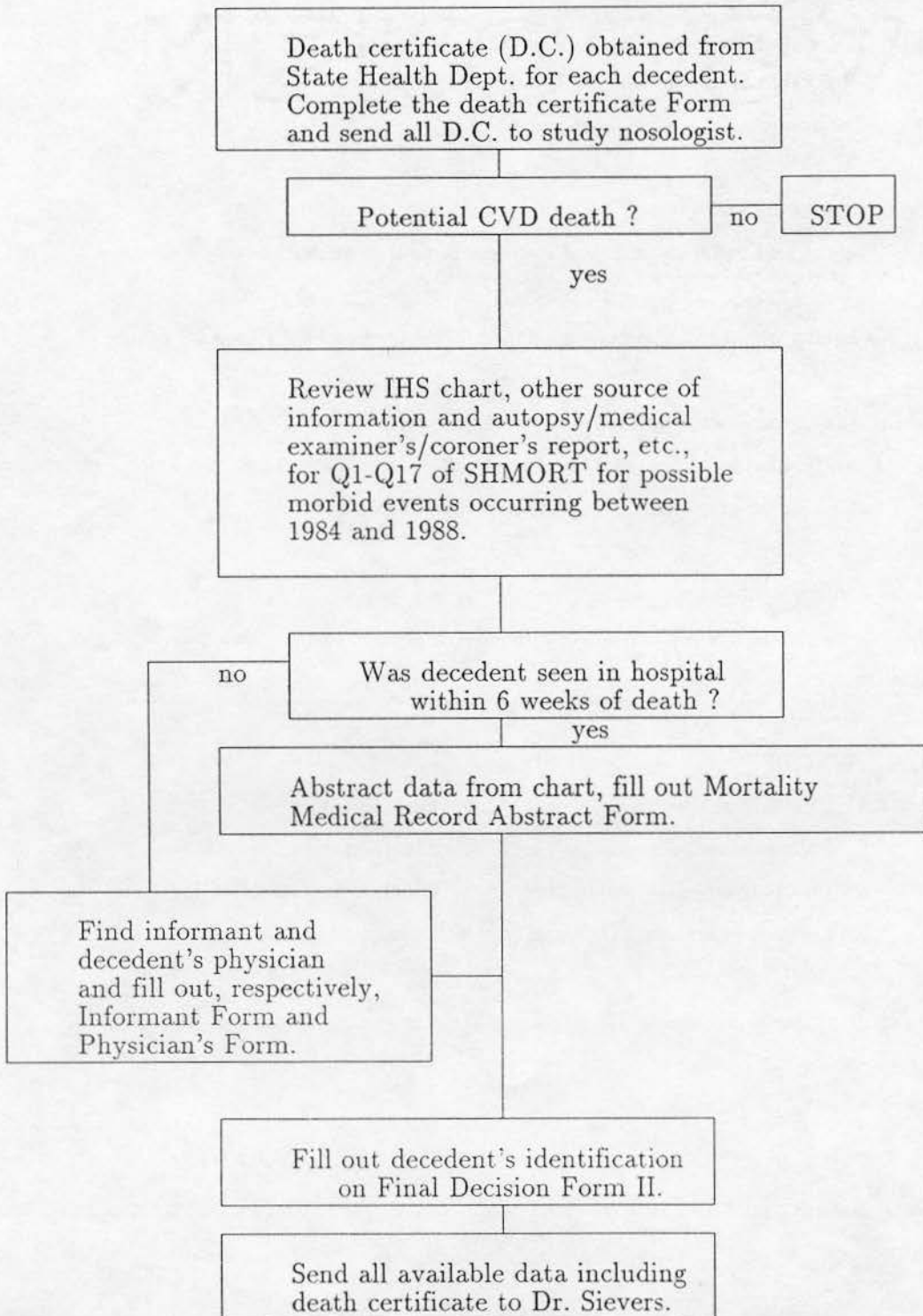
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Date completed

--	--	--	--	--	--	--	--

APPENDIX 13

FLOWCHART FOR MORTALITY SURVEY



APPENDIX 14

Checklist for Mortality Survey

1. Death Certificate Form -----
2. ICD coded cause of death -----
3. Autopsy report available -----
unavailable -----
4. If autopsy report is available,
Final Decision Form I -----
5. Final Decision Form I and autopsy report
to Dr. Sievers -----
Date: -----
6. Medical Records Abstract Form -----
7. Copy reports as specified -----
8. Check if the decedent is eligible for the
morbidity survey and proceed as required
by the morbidity survey protocol. -----
9. Non-IHS Physician's Form -----
10. Informant Interview Form
How many? -----
11. Medical Records Abstract Form, Non-IHS Physician's Form
and Informant Interview Form and Final Decision Form II
to Dr. Sievers. -----
Date: -----

SAMPLE LETTER TO INFORMANT: UNKNOWN TELEPHONE NUMBER

Dear: _____:

I am writing on behalf of the National Heart, Lung, and Blood Institute's Strong Heart Study, a project of (name of institution) designed to measure the rates of heart disease in (name of state or area), to ask for your help. Your name is listed on the death certificate of (name of _____) who passed away on (date of the decedent). We would like to call you to talk to you about the project and to ask a few medical questions, but have been unable to find your telephone number.

Please take a few moments to fill out and mail the enclosed postcard. The information we will be calling about will be used for statistical purposes only, and will remain strictly confidential. It will contribute to our efforts to better understand heart disease and prevent its occurrence in the future. Of course, your assistance in our research is entirely voluntary. Thank you very much in advance for your help in the important study.

Sincerely,

Principal Investigator

(ENCLOSE POSTCARD, RETURN ADDRESSED AND STAMPED)

APPENDIX 15 (b)

REPLY POSTCARD FROM INFORMANT WITH TELEPHONE NUMBER
FORMS SHOULD BE RETURN-ADDRESSED TO LOCAL SURVEILLANCE
CENTER AND STAMPED.

Dear (Name of Surveillance Supervisor):

I will be able to help with your Strong Heart Study. I do have a telephone number which is () . The best times to reach me are or .
An alternative telephone number is: () . The best times to reach me at this number are or .

I do not have a telephone number, but I agree to be interviewed in person, and will be calling your staff at (collect) to set up a time and a place for the interview.

Sincerely,

Print Name of Informant

APPENDIX 16

THE STRONG HEART STUDY

Mortality/Morbidity Survey - Chart Request Form

HOSPITAL: _____

Date: _____

Chart Number	Patient Name	Date	ICD Code	Disposition

What is your sex?

Female

Male

Which IHS Hospital/Clinic do you usually go for health care? _____

What is your IHS Hospital/Clinic chart number? _____

The STRONG HEART STUDY will help us learn more about heart disease in Indians. Please answer a few questions that will help us a great deal.

1. How tall are you? _____ Feet _____ Inches.

2. How much do you weigh? _____ Pounds.

3. Have you ever been hospitalized for heart attack, stroke or other problems in the last ten years ?

Yes

No

4. If yes, list which hospital(s), when and what the reason was ?

	Hospital/Clinic	Town/State	Date	Reason
i.	_____	_____	_____	_____
ii.	_____	_____	_____	_____
iii.	_____	_____	_____	_____

The Strong Heart Study would like to review your medical records to better understand heart disease and stroke in Indian people. We request your consent to release your medical records to the Strong Heart Study. Please sign the enclosed form and return it in the enclosed envelope. Thank you.

5. Do you smoke cigarettes now ? (1=yes 2=no)

Yes

No

MEDICAL CONDITIONS: I'd like you to answer some questions about medical problems.

Has a medical person EVER told you that you had any of the following conditions ?

(Please check the correct answer)

6. High blood pressure?

Yes No I don't know

If yes, are you taking any medication for your blood pressure?

Yes No I don't know

7. Diabetes ?

Yes No I don't know

If you have diabetes, please answer the next two questions.

How old were you when you were first told by a medical person that you had diabetes?

Indicate the actual age.

--	--

years

What treatment do you take for your diabetes?

None Insulin Pills Diet only I don't Know

8. Kidney failure?

Yes No I don't know

9. Are you on dialysis (a kidney machine)?

Yes No I don't know

10. Have you ever received a kidney transplant?

Yes No I don't know

11. What is your birth date? _____ / _____ / _____
month day year

12. What is your Social Security Number?

--	--	--	--	--	--	--	--	--	--

Thank you for answering these questions. Please sign and return this form in the attached envelope.

Signature

Date

Appendix 17 (b)

Procedure for Completing Non-Participant Form

The objective of the Strong Heart Study is to determine morbidity and mortality rates from myocardial infarctions and strokes and also to determine cardiovascular disease risk factor prevalence in American Indians. In order to accomplish this, it is important to learn as much as possible about eligible tribal members who do not participate in the physical examination portion of the Study. The Strong Heart Study Steering Committee has developed this form to be completed for non-participants.

The non-participant form can be mailed to participants with a cover letter (copy attached) and returned in a postage-paid envelope to the local Strong Heart Study office. Alternatively, the Strong Heart Study staff can contact the eligible tribal member by telephone and complete the non-participant form in that manner. If contact by mail and telephone is not successful, local community members should be queried with regard to residence of the non-participant and the forms should be completed by personal interview if possible.

If none of the above procedures is successful in completing the form, the IHS medical record should be reviewed and the form completed if the patient has been seen within the last two years. If a tribal member cannot be contacted by telephone, mail, or personal interview, and if no entry has been made in the medical record for the past two years, no form can be completed. It will be assumed that the tribal member has moved off the reservation or outside Indian country and is not eligible for the Study unless there is evidence that she/he still has residence. In this case the individual can be removed from the denominator and no attempt will be made to include this individual in the morbidity and mortality surveillance.

APPENDIX 18 (a)
The Strong Heart Study
Cardiovascular Disease In American Indians

Morbidity Survey
Medical Records Abstract

FORMID:SHMORB

Medical charts (IHS and/or other community hospitals) of all patients with the following ICD-9 codes listed as in the IHS utilization tape or hospital discharge codes will be reviewed.

These ICD-9 codes include: 402, 410 to 414, 427,428,430-438, 518.4 .

=====

ID number:

Community code: (see instruction)

Social Security Number:

=====

Degree of Indian blood, record in fractions. /

If the fraction is not known, record the code from face of the chart (Item 7)

1. Were either of the following events diagnosed between January 1, 1984 and December 31, 1988 ?

a. Possible Myocardial Infarction (events with codes 402, 410 to 414, 427,428, 518.4)?

1=yes, fill out the NEWMI form for each event
2=no.

b. Possible Stroke (events with codes 430-438) ?

1=yes, fill out the NEWSTROKE form for each event
2=no.

If the answers of 1 a, and b are both "NO", STOP HERE

Abstractor code

Date abstract completed - -
mo day yr

The Strong Heart Study
Cardiovascular Disease In American Indians

Morbidity Survey
Medical Records Abstract for Myocardial Infarction

FORMID:NEWMI

=====
ID number:
=====

If the event occurred in a Non-IHS facility, review the IHS chart for Questions 8-18.

1. a. Last Hospital code number

--	--	--	--	--	--	--	--	--	--

b. Hospital name -----

c. Hospital location -----

d. Medical record number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

2. Date of ADMISSION to this hospital:

mo		day		yr							

3. Date of discharge:

mo		day		yr							

4. Was the patient transferred to or from another acute care hospital? (1=yes, 2=no)

If no, go to Question 6.

5. Hospitalizations.

a. Hospital _____ Town _____ Code

--	--	--	--	--	--

Record number

--	--	--	--	--	--	--	--	--	--	--	--

 Admission Date

--	--	--	--	--	--

 mo day yr Discharge Date

--	--	--	--	--	--

 mo day yr

b. Hospital _____ Town _____ Code

--	--	--	--	--	--

Record number

--	--	--	--	--	--	--	--	--	--	--	--

 Admission Date

--	--	--	--	--	--

 mo day yr Discharge Date

--	--	--	--	--	--

 mo day yr

c. Hospital _____ Town _____ Code

--	--	--	--	--	--

Record number

--	--	--	--	--	--	--	--	--	--	--	--

 Admission Date

--	--	--	--	--	--

 mo day yr Discharge Date

--	--	--	--	--	--

 mo day yr

d. Hospital _____ Town _____ Code

--	--	--	--	--	--

Record number

--	--	--	--	--	--	--	--	--	--	--	--

 Admission Date

--	--	--	--	--	--

 mo day yr Discharge Date

--	--	--	--	--	--

 mo day yr

6. Enter the ICD-9 code numbers for the hospital discharge diagnoses recorded in all medical records and procedure codes exactly as they appear on the front sheet of the medical record and/or on the discharge summaries. Be sure they are ICD-9 codes. Record diagnoses if no codes are available.

1. .

7. .

2. .

8. .

3. .

9. .

4. .

10. .

5. .

11. .

6. .

12. .

7. Photocopy the discharge diagnoses as they appear on face sheet of medical records and/or discharge summaries for this ADMISSION. Attach copies.

If there is mention in the chart that the patient subsequently died prior to 1989,

DON'T forget to fill out the MORTALITY survey form

8. Is there a history of a previous myocardial infarction? (1=yes, 2=no)

9. If yes,

a. Date of most recent previous event:

| |
mo day yr

b. Facility where hospitalized: -----

10. Is there any history of angina pectoris or coronary insufficiency ?
(1=yes, 2=no, 8=uncertain, 9=not mentioned)

11. Is there any history of any other chronic ischemic heart disease ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

12. Is there any history of valvular disease ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

13. Is there any history of coronary bypass surgery? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

14. Is there any history of coronary angioplasty? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

15. Is there any history of hypertension (high blood pressure) ?
 (1=yes, 2=no, 8=uncertain, 9=not mentioned)

16. Is there any history of stroke? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

If yes, date of most recent event :

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
mo		day		yr			

17. Is there a history of congestive heart failure ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

18. Is there a history of diabetes ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

19. Approximately how long was it from the onset of acute cardiac symptoms (pain in chest, left arm or shoulder or jaw) to arrival at the initial hospital?

0= symptoms did not begin prior to arrival

1= less than 20 minutes,

2= at least 20 minutes, but shorter than an hour,

3= at least one hour, but shorter than 2 hours,

4= at least 2 hours, but shorter than 4 hours,

5= at least 4 hours, but shorter than 6 hours,

6= at least 6 hours, but shorter than 12 hours,

7= at least 12 hours, but shorter than 24 hours,

8= one day or longer

9= not reported

20. Was there mention of an acute coronary heart disease (CHD) event with onset after arrival at the initial hospital? (1=yes, 2=no)

21. If yes, date of in-hospital CHD event:
mo day yr

22. a. Was there an acute episode(s) of pain or discomfort anywhere in the chest, left arm or shoulder or jaw, either within 72 hours prior to arrival to the initial hospital or in conjunction with the in-hospital CHD event in Question 20 ? (1=yes, 2=no, 9=unknown)

b. Date of onset of pain:
mo day yr

c. Did this pain or discomfort specifically involve the chest ? (1=yes, 2=no, 9=unknown)

d. Did it last more than 20 minutes ? (1=yes, 2=no, 9=unknown)

e. Was the pain or discomfort diagnosed as having a non-cardiac origin ? (1=yes, 2=no, 9=unknown)

f. If yes, specify: -----

g. Was coronary reperfusion (coronary angioplasty, bypass, intravenous or intracoronary thrombolysis) attempted in the first 24 hours after onset of the event ? (1=yes, 2=no)

h. If yes, approximately how long was it between event onset and attempt at reperfusion ?

1= less than one hour,

2= at least 1 hour, but shorter than 2 hours.

3= at least 2 hours, but shorter than 4 hours.

4= at least 4 hours, but shorter than 6 hours.

5= at least 6 hours, but shorter than 8 hours.

6= 8 hours or longer.

9= unknown.

23. For each of the following procedures, if performed during this hospital stay, please enter the appropriate code number and attach a copy of the report, if available.

1= yes, 2=no or not mentioned

- a. Cardiac catheterization
- b. Coronary angiography
- c. Coronary angioplasty
- d. Swan-Ganz catheterization
- e. Echocardiography
- f. Coronary bypass surgery
- g. Intracoronary streptokinase, urokinase, or TPA reperfusion.
- h. Intravenous streptokinase, urokinase, or TPA reperfusion.
- i. Aortic balloon pump
- j. Radionuclide scan
- k. MRI scan
- l. Other: -----

24. Were any cardiac enzymes reported within DAYS 1-4 after arrival at the hospital or after in-hospital CHD event ? (1=yes, 2=no)

25. If yes,

a. Is there mention of the patient having either trauma, a cardiac surgical procedure, or rhabdomyolysis within one week prior to measurement of enzymes ? (1=yes, 2=no)

b. If yes, specify the date and reason.

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
mo		day		yr	

c. Reason : _____

*** Ignore the enzyme report corresponding to this trauma or cardiac surgical procedure. ***

d. Is there any evidence of hemolytic disease during the hospitalization ? (1=yes, 2=no)

***** FILL THE ENZYME TEST RESULTS IN THE FOLLOWING PAGE *****

26. Were any 12 lead ECG's taken during this admission? (1=yes, 2=no)

*** If ECGs were taken, attach copies of required ECGs and interpretations, at least one per day. ***

***** (see instructions) *****

27. Narrative: (Attach photo-copy of discharge summary, and admitting history and Physical examination.)

28. Abstractor Number

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

29. Date abstract completed

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
mo		day		yr	

CARDIAC ENZYME TEST RECORDS

	DAY ONE			DAY TWO			DAY THREE			DAY FOUR		
	(DATE:)			(DATE:)			(DATE:)			(DATE:)		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
Total CK (CPK)												
Upper limit of Total CK (CPK)												
CK-MB												
Upper limit of CK-MB												
Total LDH												
Upper limit of normal LDH												
LDH1												
LDH2												
LDH1/LDH2												
SGOT												
Upper limit of normal SGOT												

Medical Records Abstract

Stroke

FORMID:NEWSTROKE

=====
ID number:
=====

If the event occurred in a non-IHS facility, review the IHS chart for Questions 15-25.

1. A. Hospital code number

B. Hospital name

C. Hospital location

D. Medical record number

2. Date of ADMISSION to this hospital:

mo
day
yr

3. Date of discharge:

mo
day
yr

4. Was the patient transferred to or from another acute care hospital? (1=yes, 2=no)

If no, go to Question 6.

5. Hospitalizations.

	Hospital		Town		Code
a.	_____		_____		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Record number		Admission Date		Discharge Date or Date of Death
	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
			mo day yr		mo day yr
	Hospital		Town		Code
b.	_____		_____		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Record number		Admission Date		Discharge Date or Date of Death
	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
			mo day yr		mo day yr
	Hospital		Town		Code
c.	_____		_____		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Record number		Admission Date		Discharge Date or Date of Death
	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
			mo day yr		mo day yr
	Hospital		Town		Code
d.	_____		_____		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	Record number		Admission Date		Discharge Date or Date of Death
	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
			mo day yr		mo day yr

6. Enter the ICD-9 code numbers for hospital discharge diagnoses and procedure codes exactly as they appear on the front sheet of the medical record and/or on the discharge summaries. Be sure they are ICD-9 codes. Record diagnoses if no codes are available.

1. .

7. .

2. .

8. .

3. .

9. .

4. .

10. .

5. .

11. .

6. .

12. .

7. Photocopy the discharge diagnoses as they appear on face sheet of medical records and/or discharge summaries for this admission. Attach copies.

***** If there is mention in the chart that the patient subsequently died prior to 1989, *****
 ***** DON'T forget to FILL OUT the mortality survey form *****

8. Was the primary diagnosis:
- 0. Thrombotic infarction
 - 1. Subarachnoid hemorrhage
 - 2. Intraparenchymal hemorrhage
 - 3. Lacunar infarction
 - 4. Embolic infarction
 - 5. Atherosclerotic infarction
 - 6. Other, unknown infarction
 - 7. Unknown type stroke
 - 8. Transient Ischemic Attack (TIA)

Taking into account all of the available information, is there evidence of:

9. A focal (localized) neurological deficit that lasted more than 24 hours? (1=yes, 2=no)

10. Change in state of consciousness that lasted more than 24 hours. (1=yes, 2=no)
11. Rapid (sudden) onset of localizing neurological deficit and/or change in state of consciousness (approximately less than 48 hours from onset to time of admission or maximum acute neurologic deficit) (1=yes, 2=no)
12. Time from onset of symptoms to admission or maximum neurologic deficit and/or change in state of consciousness. Choose shortest time, in hours. 1=less than or equal to one hour, 99=unknown.
13. Which (if any) of the following physical findings were present? (1=yes, 2=no, 9=not mentioned)
- a. Abnormal gait
 - b. Romberg
 - c. Weakness or drift
 - d. Asymmetry of reflexes
 - e. Babinski (positive)
 - f. Loss of visual fields
 - g. Aphasia or apraxia
 - h. Change in mental status
 - i. Headache
 - j. Loss of consciousness
 - k. Other: -----
14. Lumbar puncture (LP) evidence of hemorrhage ? (1=yes, 2=no, 3=not done, 9=unknown)

15. Is there a history of a prior myocardial infarction? (1=yes, 2=no)

If yes, date of most recent event:

mo		day		yr	

16. Is there any history of angina pectoris or coronary insufficiency ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

17. Is there any history of any other chronic ischemic heart disease?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

18. Is there a history of valvular disease or cardiomyopathy?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

19. Is there a history of coronary bypass surgery?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

20. Is there a history of coronary angioplasty?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

21. Is there a history of hypertension (high blood pressure) ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

22. Is there a history of prior stroke?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

If yes, DATE of most recent previous event :

mo		day		yr	

23. Is there a history of transient ischemic attack (TIA) ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

24. Is there a history of congestive heart failure ?

(1=yes, 2=no, 8=uncertain, 9=not mentioned)

25. Is there a history of diabetes ? (1=yes, 2=no, 8=uncertain, 9=not mentioned)

26. Which (if any) of the following diagnostic tests were performed?

(1=yes, 2=no, 9=not mentioned)

(If yes, please attach copies of interpretation)

a. Computerized Axial Tomography (CAT) of the head

b. Magnetic Resonance Image (MRI) of the head

c. Carotid ultrasound/doppler

d. Electrocardiogram

e. Angiography

f. Other

Specify: -----

27. Was there evidence from computerized axial tomography (CAT) scan of either cerebral infarction or hemorrhage without evidence of other disease process or event ?

(1=yes, 2=no, 3=not done, 9=unknown)

If yes,

a. did scan show a focal area of decreased or normal attenuation consistent with cerebral infarct ?

(1=yes, 2=no, 3=not done, 9=unknown)

b. did scan show focal increased attenuation consistent with intracerebral hemorrhage ?

(1=yes, 2=no, 3=not done, 9=unknown)

28. Has the patient been diagnosed or treated for : (1=yes, 2=no, 9=unknown)

a. Atrial fibrillation

b. Other arrhythmias

c. Claudication in the lower limbs

d. Brain tumor

e. Subdural hematoma

f. Metabolic disorder

Specify : -----

g. Other neurological disorder(s)

Specify : -----

29. Narrative (Attach photocopies of Discharge summary, Admitting History, and Physical examination.)

30. Abstractor Code

31. Date abstract completed

mo day yr

APPENDIX 18 (b)
 THE STRONG HEART STUDY
 Cardiovascular Disease in American Indians
 Morbidity Survey
 Possible Myocardial Infarction
 ECG Analysis
 Field Sheet

High resolution photocopies of ECGs taken as evidence of a myocardial infarction during the morbidity survey should be arranged in chronological order from earliest to latest. ECG series for each case will be reviewed independently by three cardiologists at the ECG Reading Center (Fitzsimons). When possible, a baseline ECG obtained most recently, but prior to the event in question, should be labeled and included as the top tracing.

ID number:

Community code:

Social Security Number:

-

-

1) Baseline ECG

Available : Date

mo day yr

Time (24 hr. clock)

:

hr min

Not Available :

2) First Prolonged ($> \frac{1}{2}$ hour) symptom onset

Available : Date

mo day yr

Time (24 hr. clock)

:

hr min

Not Available :

3) Record Patient ID number, Date, and Time on each ECG submitted in the above format.

4) Attach this cover sheet to the front of each group of ECGs submitted for analysis.

THE STRONG HEART STUDY
Cardiovascular Disease in American Indians

Morbidity Survey
Possible Myocardial Infarction
ECG Analysis

ECG CENTER SHEET

High Resolution photocopies of ECGs taken as evidence of a myocardial infarction during the morbidity survey should be arranged in chronological order from earliest to latest. ECG series for each case will be reviewed independently by three cardiologists at the ECG Reading Center (Fitzsimons). When possible, a baseline ECG obtained most recently, but prior to the event in question, should be labeled "BASELINE" and included as the top tracing.

=====
ID number:

=====
1) ECG READER ID number:

***** The series of ECGs will be assigned the highest category for which *****
**** criteria are met, i.e., evolving diagnostic > diagnostic > equivocal > other. ****

EVOLVING DIAGNOSTIC

Definition: An evolving pattern on serial ECGs of a diagnostic ECG. (An evolving pattern of changes [appearance or disappearance within lead groups: anterior (V_1 - V_5); lateral (I, aV_L , V_6); or inferior (II, III, aV_F)] establishes the infarct as acute. Two or more ECG recordings during the hospitalization are needed for this classification.)

To Qualify as a Q wave, deflection should be at least 0.1 mV (1 mm.) in amplitude.

Possibilities:

- No Q wave in one ECG record followed by a record with a diagnostic Q wave.
OR
- An equivocal Q wave and no major ST segment depression in one ECG followed by a record with a diagnostic Q wave PLUS a major ST segment depression.
OR
- An equivocal Q wave and no ST segment elevation in one ECG record followed by a record with a diagnostic Q wave PLUS ST segment elevation $>$ than or $=$ to 1 mm.
OR
- An equivocal Q wave and no major T wave inversion in one ECG record followed by a record with a diagnostic Q wave PLUS a major T wave inversion.
OR
- No Q wave and no ST Junction depression $>$ than or $=$ to 0.5 mm and flat or downsloping ST segment depression followed by a record with an equivocal Q wave PLUS ST Junction and flat or downsloping ST depression of $>$ than or $=$ to 0.5 mm.
OR
- No Q wave and no ST elevation $>$ than or $=$ to 1 mm. followed by a record with an equivocal Q wave PLUS ST elevation $>$ or $=$ to 1 mm.
OR
- No Q wave and no T wave findings diagnostic of infarction followed by a record with an equivocal Q wave PLUS T wave findings diagnostic of infarction.

DIAGNOSTIC ECG WITH Q WAVE

Diagnostic Q and QS patterns.

DIAGNOSTIC ECG WITHOUT Q WAVE

ST segment elevation PLUS T wave depression indicative of infarction. (T wave depression cannot be used in the presence of ventricular conduction defects.)

EQUIVOCAL ECG WITH Q WAVE

ECG with Q and QS pattern possibly representing infarction.

EQUIVOCAL ECG WITHOUT Q WAVE

ST junction (J) and segment depression or T wave inversions or ST segment elevations possibly representing infarction.

OTHER

All other findings, including normal.

UNCODEABLE ECG

-
- 1) Missing Leads
 - 2) Baseline drift (> 1 in 20) if it obscures ST-T segment.
 - 3) Muscle tremor giving > 2 mm peak-to-peak oscillation.
 - 4) Other technical errors making Q wave measurements impossible
 - 5) Major abnormal QRS conduction patterns (BBB, pacemaker, etc.)

APPENDIX 18 (d)
 THE STRONG HEART STUDY
 Morbidity Survey
 DECISION FORM

=====
 ID number:

Participant's name: _____
Last First Middle

=====
 Disposition: 1. Regular 2. QC case 3. Equivocal case

A. DIAGNOSIS (enter appropriate code number):

1. Definite non-fatal myocardial infarction
2. Possible non-fatal myocardial infarction
3. Definite non-fatal stroke
4. Possible non-fatal stroke
5. Other, specify : _____

B. Criteria used: (Please check one box in each field)

1. MYOCARDIAL INFARCTION

a. PROLONGED CARDIAC PAIN Present
 Absent

b. ECG FINDINGS Evolving diagnostic ECG
 Diagnostic ECG
 Equivocal ECG
 Absent, uncodable, or other

c. CARDIAC ENZYMES Abnormal
 Equivocal
 Incomplete
 Normal

COMMENTS: _____

2. STROKE

a. DIAGNOSTIC EVIDENCE

Unequivocal physician or laboratory

Discharge diagnoses of stroke (431,432,434.436,437)

Neither of above

b. ONSET/DURATION OF NEUROLOGICAL DEFICIT

Rapid/ > 24 hours

Rapid/ ≤ 24 hours

Protracted/ > 24 hours

Protracted/ ≤ 24 hours

c. OTHER CAUSES

Present

Absent

d. TYPE OF STROKE:

1. Thrombotic infarction

5. Embolic infarction

2. Subarachnoid hemorrhage

6. Atherosclerotic infarction

3. Intraparenchymal hemorrhage

7. Other, unknown infarction

3. Lacunar infarction

8. Unknown type stroke

COMMENTS:

C. Does the diagnosis in Section A (DIAGNOSIS) agree with your clinical impression?

1. Yes 2. No

If "No", what is your diagnosis?

Why?

Coder

Date completed

mo

day

yr

INSTRUCTIONS FOR MORBIDITY SURVEY: MEDICAL RECORDS ABSTRACT

I. GENERAL INSTRUCTIONS

The Medical Records Abstract for the Morbidity Survey is completed for each hospitalized MI and stroke that occurred in an eligible tribal member between 1984 and 1988. The purpose of the abstract is to provide sufficient information to determine whether the event meets the study's criteria for MI or stroke. Data to be abstracted for each event, regardless of type, is included on the face sheet of the abstract form (SHMORB). Separate abstract forms, designated NEWMI and NEWSTROKE, are used for MI and stroke respectively.

NEWMI and NEWSTROKE forms are to be completed for each event of interest. Each event should be thought of as a separate occurrence. Sometimes, a patient may have been hospitalized at more than one facility for the diagnosis and treatment of a single event. For example, a patient may come to an IHS hospital with severe chest pain and be transferred to another hospital for acute care. Since you will usually be first abstracting an IHS chart, in this example you may have information from the initial IHS admission as well as copies of data from the acute care hospital detailing the patient's hospital course. Both sets of information should be used to complete the abstract, since they both apply to the same single event.

The ID number has 6 digits: the first digit identifies the study center (1=SD, 2=OK, 3=AZ), the second digit identifies vital status (1=dead, 0=alive), and the last four digits identify the individual. For this form, the second digit is 0 (alive) for all subjects. The community code has 3 digits and is the standard IHS community code.

II. DETAILED INSTRUCTIONS FOR EACH QUESTION - FACE SHEET

Ques	Instructions
------	--------------

Find out from chart the degree of Indian blood of the patients.

1. Determine whether the patient was discharged with a diagnosis of possible MI (ICD-9 codes of 402, 410-414, 427, 428, 518.4) or possible stroke (ICD-9 codes 430-438) between January 1, 1984 and December 31, 1988. It is possible that both of these events might have occurred separately but within the time interval of interest. If this is the case, record a 1 (yes) for each item and complete both a MI and stroke form. Separate abstracts should be completed for each event when more than one MI or more than one stroke occurred during the study interval. Begin with the first occurrence of the event in the medical record that was within the study interval. For example, if a patient had a discharge diagnosis of MI in 1984 and another in 1987, abstract the 1984 admission first. If none of the discharge diagnoses correspond to these ICD-9 codes or to the conditions covered by these codes, do not continue with the abstract. If you have any questions as to whether a chart should be abstracted, contact the study coordinator.

DETAILED INSTRUCTIONS FOR EACH QUESTION - NEWMI ABSTRACT

Ques Instructions

Enter the ID number.

1. Enter the hospital code number, name, city and state and the medical record number of the chart in the appropriate boxes.

Question 1 should be answered as the last hospital to which the patient was admitted for this event, and question 5 should be the next-to-last. That is, if the patient was hospitalized at more than one facility for a single event, information about the hospitals should be entered in reverse chronological order. The statement at the bottom of the first page of the NEWMI form ("This section can also be used") is not relevant to the morbidity survey and should be ignored. Likewise, for both the NEWMI and NEWSTROKE forms, the date fields given in question 5 should read only "Discharge Date" not "Discharge Date or Date of Death", since by definition, these are non-fatal events.

2. Enter the date of admission for the event you are abstracting.
3. Enter the date of discharge from the hospital for the event you are abstracting.
4. If the patient was transferred to or from another acute care hospital, record a 1 in the code box. This question asks only about acute care facilities, and does not include convalescent care, long-term custodial care, or outpatient clinics or physicians' offices.
- 5.a.-d. If one or more transfers occurred, record the hospital name and location, the date of admission, date of discharge and the chart number of the medical record for the subject at the transfer hospital, if available.
6. Print the ICD-9 codes of the discharge diagnoses and procedure codes as listed on the front sheet of the discharge summary. Record them in the order they are listed in the chart. Be sure these are ICD codes and not another coding system such as APC. If the codes are not ICD-9 or if there are no codes in the chart, leave the box blank and print the diagnoses given. The ICD-9 codes will be done at the Coordinating Center.
7. Photocopy the front sheet of the discharge summary, being sure to include the discharge diagnoses. Be sure that personal identifiers are omitted in the photocopying process and that the ID number is printed on the photocopy.
8. This question is intended to determine whether the patient had a MI prior to the current admission you are abstracting. To determine this, review the admission history and physical exam for the current admission. It may also be necessary to review previous admissions in the chart to be sure that there is no prior history. It is very important that you make a thorough search through the chart to determine whether the patient has had a previous MI.

9. If a previous MI occurred, enter the date of the MI that occurred closest in time (i.e., most recently) to the event you are currently abstracting. Print the name and location of the facility where the patient was hospitalized for the MI.
- 10.-18. These questions, like Question 8, are intended to identify specific conditions or procedures which the patient may have had prior to the admission you are abstracting. Review the admitting history and physical examination and the face sheets (and records, if necessary) of previous admissions to determine whether any of these are present.

Questions 10-18 ask about a history of specific medical conditions prior to the event you are abstracting. These should be answered s "yes" (code 1) only if they have been specifically diagnosed by a physician. Exceptions are questions 15 (history of hypertension) and 18 (history of diabetes). For these two questions, if there is no specific diagnosis given by a physician, they should still be coded as "yes" (code 1) if either of the following is noted in the chart:

- a) the patient is on treatment (i.e., antihypertensive medication or hypoglycemic agents) or
- b) for hypertension, there are two or more occasions when blood pressure readings of systolic ≥ 140 mmHg or diastolic ≥ 90 mmHg were recorded; for diabetes, there are two or more occasions when the fasting glucose was ≥ 140 mg/dl or 2 hour post-glucose load value was ≥ 200 mg/dl.

Question 11 asks about a history of "any other chronic ischemic heart disease". This includes ischemic heart disease other than that defined by a prior MI or history of angina, such as non-specific diagnoses of "ischemic heart disease", "coronary heart disease", etc. In the absence of a prior MI or history of angina, such diagnoses may have been made by a physician on the basis of test results, such as positive tread mill test.

19. The NEWMI form is intended to collect all available information regarding each possible MI, so it is important to think about each event, even if the patient was hospitalized at more than one facility for that single event. Question 19 asks about the timing between the onset of acute cardiac symptoms and first contact with a hospital. Thus, "this hospital" means the first one to which the patient went after the onset of acute cardiac symptoms.

Acute cardiac symptoms are defined as pain in the chest, left arm or shoulder, or jaw, and may be accompanied by sweating, faintness, nausea or dizziness. If the time is not specifically stated in the medical record, but it is possible to accurately calculate the time based on information given regarding onset of symptoms and arrival at the hospital, calculate the time yourself and enter the appropriate code. If there is any doubt about the timing of symptoms and arrival at the hospital, code as 9. If symptoms began after admission to the hospital, code as 0 (did not begin prior to arrival). This is trying to determine how long it requires to receive medical care.

20. In some instances, the event of interest will have occurred in the hospital (the patient being originally hospitalized for something else). If this is the case, code as 1 (yes). If the acute event occurred prior to admission (this would include events in the emergency room), code as 2 (no).
21. If the answer to Question 20 is "yes", record the date of the in-hospital MI.
22. This series of questions deals with the timing and nature of the cardiac pain and medical procedures that may have been used within the first 24 hours of the onset of the acute event. Review the admitting history and physical exam or the notes in regard to an in-hospital event to determine whether an acute (sudden) episode of pain or discomfort occurred as described in Question 22.a. Record the date of onset of pain. If there was no pain, draw double lines through the boxes for the date. 22.c. code as instructed. Question 22.d. asks whether the pain or discomfort was diagnosed as having non-cardiac origin. This would include gastrointestinal problems, pulmonary disease, or skeletal muscle as the source of the pain. If a non-cardiac origin was diagnosed as the source of the pain, specify the diagnosis. Because early intervention may prevent the full-blown clinical presentation of MI from developing, it is important to note whether coronary reperfusion (coronary angioplasty, bypass, intravenous or intracoronary thrombolysis) was attempted within the first 24 hours after the onset of acute symptoms. If so, code 22.f. as 1 (yes), otherwise code as 2 (no). If 22.f. is coded as 1, code 22.g. according to the approximate time between the onset of symptoms and the attempt at reperfusion.

Question 22a. should read "..... either within 72 hours prior to arrival to this hospital (meaning the first one) or in conjunction with the in-hospital CHD event defined in Question 20". It should be Question 20, not Question 23.

Question 22h. should read, "If yes, approximately how long was it". That is, if the answer to Question 22g. "Was coronary reperfusion attempted in the first 24 hours after onset of the event?" is "no", then you should not answer 22h. and should draw double lines through the box.

23. For each of the tests and procedures listed, code whether or not it was done during this admission. If the procedure was performed, attach a photocopy of the results and interpretation to the abstract. Be sure that personal identifiers are removed from the report, but that the ID number is printed on each page that is photocopied.

Only codes 1 (yes) and 2 (no) should be used. If a procedure is not mentioned in the chart, code as 2 (no). Codes 8 (uncertain) and 9 (not mentioned) don't make much sense in these instances. However, codes 8 & 9 should still be used, when necessary, for other questions, such as those related to the presence or absence of specific physical findings.

24. Determine whether any cardiac enzyme studies were done within 1-4 days after arrival at this hospital or after an in-hospital event. Cardiac enzymes include CPK (CK), SGOT and LDH.
25. If cardiac enzyme studies were done within the appropriate time frame after the event, determine whether there is any mention of trauma, a cardiac surgical procedure, or rhabdomyolysis within one week before the measurement of enzymes. If one of these conditions was present in the

appropriate time frame, complete parts b. and c. of Question 25. If the exact date in part b. is unknown, but it was clearly within the specified time frame, draw double lines through the boxes for the date. For part d., determine whether there is evidence of hemolytic disease during this hospitalization.

If cardiac enzymes were done during the appropriate time frame after the event, and the answers to Question 25 are "no", complete the Enzyme Test Form. In some cases, information about cardiac enzymes may only be available from discharge summaries. i.e., no lab slips are available. In this circumstance, record the information available from the discharge summary on the enzyme form, and indicate at the top of the enzyme form that these data come from the discharge summary only.

26. Code as instructed. If yes, attach copies of required ECGs and interpretations. These include: the most recent ECG prior to this admission, the first ECG recorded after admission or the occurrence of an in-hospital event, the first ECG done each day thereafter, and the last ECG recorded before discharge. Be sure that personal identifiers are removed, but also that the ID number is recorded on each ECG attached. ECGs should also be dated so that it is possible to determine the order in which they were done.
27. Attach a photocopy of the Discharge Summary and of the Admitting History and Physical Examination pages from the chart. Again, follow the same instructions with respect to personal identifiers and ID number.
28. Enter your code number.
29. Enter the date the abstract was completed.

DETAILED INSTRUCTIONS FOR EACH QUESTION - NEWSTROKE

Ques	Instructions
------	--------------

Enter the ID number, community code and patient's social security number. If the patient does not have a social security number, draw double lines through the boxes.

- | | |
|-------|--|
| 1.-7. | Complete using the same instructions as given above for Questions 1.-7. NEWMI. |
| 8. | Record in the box the number which corresponds to the primary diagnosis of type of stroke. If the record says only "cerebral infarction" use code 6. If the chart says only "stroke" or CVA, use code 7. <u>IF IT WAS A THROMBOTIC INFARCTION, USE CODE '0'.</u> |

Recent experience with the quality-control abstracting suggests the need to add another code option to question 8. A patient admitted to the hospital and discharged with a diagnosis of CVA was transferred to another hospital for neurological work-up. The final diagnosis based on this work-up was "Bell's palsy". If the final diagnosis turns out to be a neurological condition other than stroke, code Question 8 with a "9" and print the diagnosis below the list of codes. Since the forms have already been printed, you will have to remember to use this code when needed.

9. Review the information for the current admission to determine whether the patient had a focal (localized) neurologic deficit, and if so, whether the deficit lasted more than 24 hours. Focal neurologic deficit would include hemiplegia, sensory impairment in part of the face, arm and leg, aphasia, motor speech disorder, distortion of visual coordinates, paralysis of conjugate gaze, paresis (weakness) on one side of the body, and other neurological abnormalities which can be localized to a particular structure or area in the brain.
10. Change in state of consciousness includes altered awareness or ability to concentrate, stupor, and coma. Determine from review of the admission whether the patient had a change in state of consciousness that lasted more than 24 hours.
11. Determine whether the patient had a rapid onset of localizing neurologic symptoms. Rapid onset is defined as approximately within 48 hours from onset of symptoms to time of admission or the maximum expression of the acute neurologic deficits.
12. Determine the time from the onset of neurological symptoms to admission or maximum neurologic deficit and/or change in state of consciousness. Enter the shortest time in hours reported in the chart. If the time is not specifically stated in the chart, but it is possible to accurately calculate the time from information given about the time of onset of symptoms and the time of admission, calculate the time yourself and enter the time in hours. Choose the shortest time if more than one interval can be determined. If it is not possible to determine an interval of time, code as 99. Time intervals are coded in hours (round parts of an hour according to rounding rules for intervals).
13. This question includes a list of neurologic signs and symptoms. After review of the chart for this admission, determine whether each of these was present. Codes for "yes" (finding was mentioned as present), "no" (finding was mentioned as not present or negative), and "not mentioned" should be used for each item. Consult the list of key words if you are uncertain about the definition of any of these terms. "Weakness or drift" refers to unilateral paresis or loss of strength in one side of the body. It does not include malaise or a generalized feeling of weakness.
14. If a lumbar puncture (LP) was done, was there evidence of blood in the cerebral spinal fluid? If an LP was not done, code as 3.
15. This question is intended to determine whether the patient had a MI prior to the current admission you are abstracting. To determine this, review the admission history and physical exam for the current admission. It may also be necessary to review previous admissions in the chart to be sure that there is no prior history.

If a previous MI occurred, enter the date of the MI that occurred closest in time to the admission you are currently abstracting.
- 16.-25. These questions are intended to identify specific conditions or procedures which the patient may have had prior to the event you are abstracting. This information may be given in the admitting history and physical examination of the current admission, but it may also be necessary to check

these sections and the discharge sheet for all prior admissions included in the record. After review of the record for each of these items, record the appropriate response. These questions should be answered as "yes" (code 1) only if they have been specifically diagnosed by a physician. Exceptions are questions 13 (history of hypertension) and 16 (history of diabetes). For these two questions, if there is no specific diagnosis given by a physician, they should still be coded as "yes" (code 1) if either of the following is noted in the chart:

1) the patient is on treatment (i.e., antihypertensive medication or hypoglycemic agents) or

2) for hypertension, there are two or more occasions when blood pressure readings of systolic ≥ 140 mmHg or diastolic ≥ 90 mmHg were recorded; for diabetes, there are two or more occasions when the fasting glucose was ≥ 140 mg/ml or the 2 hour post glucose load value was ≥ 200 mg/dl.

Question 17 asks about a history of "any other chronic ischemic heart disease". This includes ischemic heart disease other than that defined by a prior MI or history of angina, such as non-specific diagnoses of "ischemic heart disease", "coronary heart disease", etc. In the absence of a prior MI or history of angina, such diagnoses may have been made by a physician on the basis of test results, such as positive tread mill test.

26. For each of the diagnostic tests listed, code whether or not the test was done. Only codes 1 (yes) and 2 (no) should be used. If a procedure is not mentioned in the chart, code as 2 (no). Ignore codes 8 and 9. For those tests done, attach copies of the results and interpretation, again following the same procedures regarding identifiers and ID number.
27. If a CAT scan was done, review the report of the results to determine whether there was evidence of either cerebral infarction or hemorrhage, but no evidence of other types of disease processes or events. Using the results reported, answer parts a. and b. If you have any questions about how to interpret the CAT scan results, consult the study coordinator.
28. Review the patient's medical history in this admission (and others prior to it, if necessary) to determine whether he/she had a history of any of the conditions listed prior to the current admission. "Metabolic disorder" includes conditions other than diabetes, such as thyroid disorders (e.g., goiter, hypothyroidism), and Cushing's syndrome. Specify the metabolic disorder or other neurological disorder, if present.
29. Attach a photocopy of the Discharge Summary and of the Admitting History and Physical Examination pages from the chart. Again, follow the same instructions with respect to personal identifiers and ID numbers.

In addition to the other items which are to be photocopied and attached to the NEWSTROKE abstract, PHOTOCOPY AND ATTACH THE NEUROLOGICAL CONSULTATION REPORT, if a consult was done.

30. Enter your code number.
31. Enter the date the abstract was completed.

SAMPLE CONSENT FORM FOR PARTICIPATION
IN A RESEARCH PROJECT

Introduction

We are inviting you to participate in a research study designed to evaluate the amount of heart disease that is present in individuals 45-74 years old in your community. It is important that you read and understand the following general principles which apply to all participants in our studies.

1. Participation is entirely voluntary.
2. Personal benefit may not result from your participation in this study, although knowledge may be gained that will benefit others.
3. Withdrawal from the study may be accomplished at any time without jeopardy or prejudice. Please feel free to ask any questions you may have of those discussing the project with you.

The examination to identify cardiovascular disease and its correlates will include:

1. Oral Glucose Tolerance Test - You will be asked to drink a cola-flavored beverage containing 75 grams of carbohydrate. Blood samples will be taken before the drink, and two hours afterward for the determination of glucose and other substances in the blood. A total of up to four ounces of blood may be taken from your arm. Sometimes the glucose beverage might cause mild diarrhea.
2. Electrocardiogram (heart tracing)
3. Physical Examination - This will include measurement of blood pressure, height and weight, thickness of fat tissue, and body fat.
4. Health Interview - This will include questions concerning many aspects of your general health, questions related to chest pain and pains in your legs, questions about your dietary habits, and physical activity.

All of the tests are standard medical examinations and carry a very low risk of any side-effects. Withdrawal of blood from the arm occasionally results in some bruising and minor discomfort for a day or two.

If the doctor finds problems which require immediate attention, you will be referred to the Indian Health Service for appropriate tests and emergency treatment and we will help arrange for any necessary follow-up treatment.

I understand the above explanation and have been given the opportunity to ask any questions that I may have. If I wish, I may have a copy of this consent form. I agree to allow the results of the examination and any information in my medical record to be used for statistical purposes to further medical knowledge. I understand that any medically important information will be included in my Indian Health Service medical record, and I may request and authorize, by signature, its release to other agencies or persons as I feel appropriate.

I have been assured there is little likelihood that harm will result from my participation as a subject in this study and that I may withdraw from any part of the examination and that this action will not in any way prejudice my right to receive proper medical treatment at the present time or in the future. I understand that in the unlikely event of injury established as a result of my participation in the research, appropriate short-term medical care including hospitalization will be provided by the Indian Health Service. Neither the Indian Health Service, the Federal Government, nor _____ Foundation has provisions for financial compensation in the event of such injury. I understand that Drs. _____ who are in charge of these investigations, should be contacted if any injuries occur. Their telephone number is _____

Investigator's signature/date

Volunteer's signature/date

Witness' Signature

APPENDIX 20 (a)

THE STRONG HEART STUDY

Clinical Examination -- Checklist

Last name and initial of first name: _____

Study ID: _____

Date: _____

Items	If done, check and initial	
1. Consent Form	-----	-----
2. Accucheck blood test	-----	-----
3. Fasting blood sample	-----	-----
4. Urine sample	-----	-----
5. Two-hour blood sample	-----	-----
6. ECG	-----	-----
7. Impedance measurement	-----	-----
8. Height and Weight	-----	-----
9. Abdominal, hip and arm circumference	-----	-----
10. Sitting blood pressure	-----	-----
11. Doppler blood pressure	-----	-----
12. Examination of heart, lungs and vessels	-----	-----
13. Personal interview form	-----	-----
14. Medical history form	-----	-----
15. Physical activity form	-----	-----
16. Medical Chart Review to identify morbidity cases	-----	-----
17. Payment or payment form	-----	-----

APPENDIX 20 (b)
STRONG HEART STUDY
POST EXAM ACTIVITIES

Same Day:

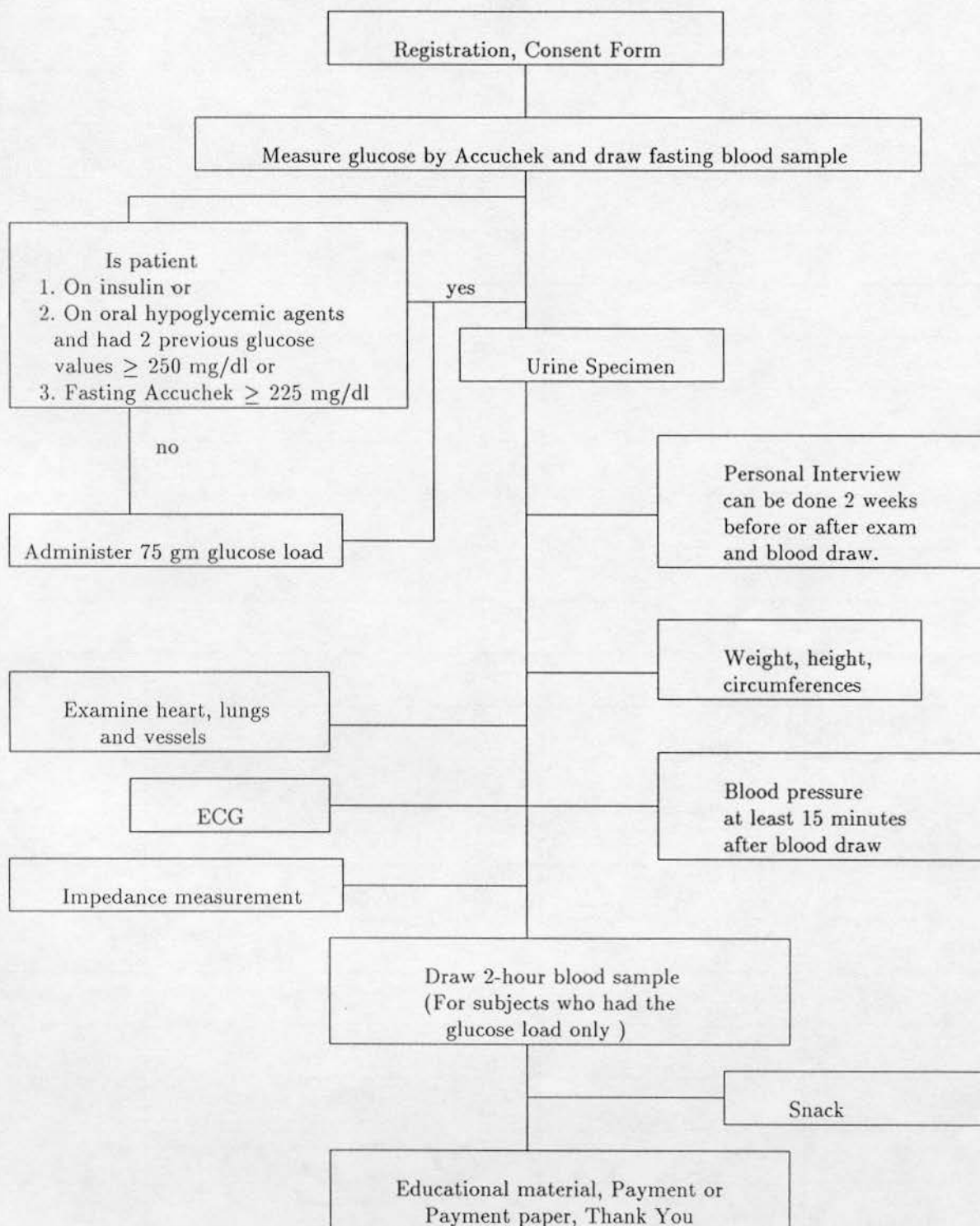
- Process blood specimens
- Review morbidity (chart review at clinic site)
- Stamp patient's clinic chart with SHS exam information
- Add codes: community, tribe, clinic/hospital, medicines
- Abstract physical activity questionnaire (Sacaton)
- Edit for missing data
- Transmit ECG's to Denver
- Make all but routine referrals

Later:

- Make routine referrals
- File confirm ECG's at Salt River
- Mail letters to patients
- File laboratory findings in patients medical records
- Xerox questionnaires for data center
- Mail data to Oklahoma
- Mail laboratory specimens

APPENDIX 21

Flowchart for Physical Examination



APPENDIX 23 (a)
 THE STRONG HEART STUDY
 CARDIOVASCULAR DISEASE IN AMERICAN INDIANS

MORBIDITY STUDY
 PERSONAL INTERVIEW FORM I

FORMID:INTERVIEW1

ID number:

--

Community Code:

--	--	--	--

Social Security Number:

--	--	--	--	--	--	--	--	--	--

A. DEMOGRAPHIC INFORMATION :

1. What is your full name? (Last, middle, first)

Last:

--

Middle:

--

First:

--

2. To which IHS Hospital/Clinic do you usually go ? List the one they go most often first. Give names and codes.

Hospital

Chart number

Hospital Code

a.

--

b.

--

c.

--

d.

--

3. To which non-IHS Hospital/Clinic do you usually go ?

--

4. What is the name by which you are known to your friends?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

5. If ever married, what was your maiden name?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Since we may need to obtain information from various sources about your medical history, are there any other names which you have used previously that might help us find this information ?

6. Name 1:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

7. Name 2:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

8. What is your current mailing address ?

a. Street/PO Box

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

b. City/town

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

c. County

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

d. State and zip code

--	--	--	--	--	--	--	--	--	--

9. What is your residential address ? (Optional)

a. Street Number

b. City/town

c. State and zip code

10. What is your home or evening telephone number and area code ?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

11. What is your work or day time telephone number and area code ?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

THE STRONG HEART STUDY
CARDIOVASCULAR DISEASE IN AMERICAN INDIANS

MORBIDITY STUDY
PERSONAL INTERVIEW FORM II

FORMID:INTERVIEW2

=====

ID number:

Social Security Number:

--	--	--	--	--	--	--	--	--

=====

12. Gender (1=male/2=female):

13. What is your marital status? (Enter up to 3 options)

1= never married

2= currently married

3= divorced

4= separated

5= widowed

6= POSSLQ

(Person of Opposite Sex Sharing Living Quarters)

14. What is your date of birth ?

mo		day		yr	

15. Since we know that years of education may be a risk factor for some diseases, and that completing education may be more difficult for persons living in rural areas, we need to ask about the years of education you have completed.

How many years of education have you completed ?

0-12= Vo-tech or years of school (GED = 12)

14= Junior college

16= Bachelors

18= Masters

19= Law degree

20= Doctorate

Since we are investigating heart disease in the American Indian population, we need to ask about your degree of Indian blood.

16. What do you estimate to be your degree of Indian blood ?

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

17. Blood contents

Write the name of each tribe in the spaces below.

Tribal Code

Blood content

Tribe 1: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

Tribe 2: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

Tribe 3: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

Tribe 4: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

Tribe 5: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

White – non-Hispanic: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

White – Hispanic: -----

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

Other: specify -----

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

18. What is your tribe of enrollment? (Enter name and IHS tribal code)

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

B. FAMILY HISTORY :

This section is about the medical history of your family members. Complete the following table for natural mother, natural father, natural siblings, and natural sons and natural daughters.

19. How many natural sons do you have ?

<input type="text"/>	<input type="text"/>
----------------------	----------------------

20. How many natural daughters do you have ?

<input type="text"/>	<input type="text"/>
----------------------	----------------------

Complete parents first, then siblings and children, first born to last born

NAME	RELATIONSHIP CODE ^a	YEAR OF BIRTH	VITAL STATUS ^b	DEATH		HISTORY OF								
				AGE	CAUSE Use codes in Appendix 23 c	MI ^c	HD ^c	HBP ^c	DM ^c	KF ^c	CVA ^c	AT ^c	CANCER ^d	
	1													
	2													

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Responses for

- relationship :
 - a 1 = Mother
 - 2 = Father
 - 3 = Sister
 - 4 = Half-sister
 - 5 = Brother
 - 6 = Half-brother
 - 7 = Daughter
 - 8 = Son
- vital status :
 - b 0 = alive
 - 1 = dead
 - 9 = unknown
- heart attack(MI), heart diseases(HD), high blood pressure(HBP), diabetes mellitus(DM), kidney failure(KF), stroke(CVA), athritis(AT):
 - c 1 = Yes
 - 2 = No
 - 9 = Unknown/not sure
- cancer :
 - d For each family member with a history of cancer, list type if known. Use codes in Appendix 23 (c).

NOTE : If YEAR OF BIRTH or AGE AT DEATH is not known, draw two lines across the box.

INTERVIEW#2

C. SMOKING CIGARETTES :

21. When you were growing up, did your father or male guardian ever smoke cigarettes regularly ?

1= yes

2= no

3= no father or male guardian

9= Unknown

22. When you were growing up, did your mother or female guardian ever smoke cigarettes regularly ?

1= yes

2= no

3= no mother or female guardian

9= Unknown

23. Whether or not you smoke, on the average, how many hours a day are you exposed to the smoke of others ? (If none, fill in zero)

24. Have you smoked at least 100 cigarettes in your entire life ?

1= yes

2= no (skip to Section D)

9= unknown

25. How old were you when you first started smoking cigarettes fairly regularly ?

Indicate age started smoking.

00= Never smoked regularly (skip to Section D),

99= Unknown

26. Do you smoke cigarettes now ?

1= yes (skip to Question 28)

2= no

27. How old were you when you stopped smoking cigarettes ?

Indicate the age stopped smoking.

99= Unknown

28. On the average, how many cigarettes (did/do) you usually smoke a day ?

--	--	--

Indicate the number of cigarettes smoked daily

00= Less than one cigarettes per day

99= Unknown

29. For how many years (have you been/were you) a regular smoker, do not include the times you may have stayed off cigarettes ?

--	--

Indicate number of years of regular smoking

00= Less than one year

99= Unknown

D. SMOKING - PIPES, CIGARS, AND SMOKELESS TOBACCO :

"Now I would like to ask you some questions about use of regular pipes, cigars, or smokeless tobacco."

30. Do you smoke a pipe NOW ? (1 =yes, 2= no)

31. Do you smoke cigars NOW ? (1 =yes, 2= no)

32. Do you use chewing tobacco/snuff NOW ? (1 =yes, 2= no)

E. CAFFEINE :

33. How many cups/glasses of caffeinated beverages (i.e., hot or iced coffee, tea, cocoa or chocolate milk) do you drink per day ? Specify how many cups/glasses per day.

--	--

34. How many soft drinks with caffeine do you drink per day ?

--	--

(Coke, Pepsi, Mountain Dew, TAB, etc.) Specify how many 12oz. cans per day.

F. TRADITIONAL VALUES/CULTURE :

35. Can you speak your native language, _____ (interviewer should specify the language) ?

1=yes, fluently

2=yes, but not fluently

3=no

If no, skip to Question 37.

36. How often do you speak your native language ? (Read options)
- 1= Always
2= Almost always
3= Often
4= Seldom
5= Never
9= Not applicable
37. How often do you use traditional medicine or herbs for any reason ? (Read options)
- 1= Always
2= Almost always
3= Often
4= Seldom
5= Never
9= Not applicable
38. How often do you or your family participate in traditional tribal ceremonies (i.e., the Pipe Ceremony, Naming Ceremony, Prayer Ceremony). (Read options)
- 1= Always
2= Almost always
3= Often
4= Seldom
5= Never
9= Not applicable
39. How long have you lived in Indian Country or the reservation ?
- Enter actual years. (If " All their lives " then put respondent's age)
40. Have you ever lived outside Indian Country or the reservation ? (1= yes, 2=no)
41. a) If so how long ? Enter appropriate years.
- b) Have you lived on the reservation or in Indian country for 6 or more months in the last year ?
- (1=yes, 2=no)

G. STRESS EVALUATION :

42. How much sleep have you lost because of worry recently ? (Read responses)

1= None

2= Occasionally

3= Frequently

43. How much strain or stress are you under ? (Read responses)

1= None

2= Minimal

3= A lot

44. How many open arguments have you had with your relatives in the last 2 weeks ? (Read responses)

1= None

2= Only minor arguments

3= More than one argument

4= Many arguments

5= Constantly arguing

45. Does any member of your household currently have a problem with alcohol ?

1=yes, 2=no, 9=don't know/not sure.

46. How many people live in your household ? Enter number in household.

H. ALCOHOL :

"The next few questions are about the use of wine, beer, or liquor, including all kinds of alcoholic beverages".

READ THE FOLLOWING TO THE PARTICIPANT:

"We are asking these questions about alcohol, because we think alcohol consumption may be related to heart disease. We want to assure you that this information is strictly confidential and that we are not trying to judge your drinking habits and do not intend to report them to anyone."

47. In YOUR ENTIRE LIFE have you had at least 12 drinks of any kind of alcoholic beverage?

1= yes

2= no (skip to Section I)

48. How long ago did you last drink any kind of alcoholic beverage ?

Indicate number of days, months, or years of their last drink.

Number of days

(if they drank today, fill in zero in days)

OR

Number of months

(if they drank this month, fill in zero in months)

OR

Number of years

(if they drank this year, fill in zero in years)

If one or more years, skip to Question 54.

49. How many drinks of alcoholic beverages do you have in a typical week ?

Enter 1 for occasional drinkers.

1 qt. of beer = 2.5 drinks

1 pt. of beer = 1.5 drinks

1 pt. of wine = 4 drinks

1 qt. of wine = 8 drinks

0.5 gal. of wine = 16 drinks

1 pt. of hard liquor = 12 drinks

One-fifth of hard liquor = 19 drinks

1 case of beer (12 oz. cans) = 24 drinks

6 pack of beer (12 oz. cans) = 6 drinks

Add up the total number of drinks in a typical week and fill them in the box in Question 49.

Round up to nearest whole number if fraction is greater than or equal to 0.5 .

50. On how many days in a typical month do you have at least one drink ?

Indicate number of days per month.

51. On the days when you drank any liquor, beer or wine, about how many drinks do you have on the average ? Indicate number of drinks per day.

52. How many times during the past month did you have 5 or more drinks on an occasion ?

Indicate times per month. (Enter zero if subject has quit drinking more than one month ago.)

53. How many times during the past year did you have 5 or more drinks on an occasion ?
 Indicate times per year. (Enter zero if subject has quit drinking more than one year ago.)

54. Did you drink a lot in the past ? (1=yes, 2=no)

I. FAMILY INCOME :

55. Do you have enough family income to pay the bills ? (1=yes, 2=no)

56. Of those people who regularly live in your home, how many of them regularly receive food stamps or are on the WIC program ?

57. Of those people who regularly live in your home, how many of them regularly receive commodity food ?

58. Which of the following categories best describes your annual household income from all sources ?
 Please show a list .

- | | |
|---------------------|------------------------|
| 1= less than 5,000 | 6= 25,000 to 35,000 |
| 2= 5,000 to 10,000 | 7= 35,000 to 50,000 |
| 3= 10,000 to 15,000 | 8= over 50,000 |
| 4= 15,000 to 20,000 | 9= don't know/not sure |
| 5= 20,000 to 25,000 | 0= refused |

J. ADMINISTRATIVE INFORMATION :

59. How reliable was the participant in completing the questionnaire ?
 1= very reliable
 2= reliable
 3= unreliable
 4= very unreliable
 5= uncertain

60. Interviewer

61. Date
 mo day yr

Instructions for the Personal Interview Forms I and II

Subject should be seated comfortably and made to feel welcome during this interview because it is the first form collected and will set the scene for later data collection.

ITEM # DESCRIPTIONS

=====

Personal Interview Form I

Study Identification Number should be completely filled in with the number assigned at the time the consent form is completed and subject is registered.

1st digit represents the center number (1=SD, 2=OK, 3=AZ).

2nd digit should be "0" for all interviewees.

3-6 digits will be the consecutive number of the subject interviewed within the center.

Write in community code from list.

Write in social security number.

A. Demographic Information

- 1 Enter first name, left justified.
Enter middle name, left justified. If no middle name, leave blank.
Enter last name, left justified.
- 2 LOCAL IHS HOSPITAL OR CLINIC CODES: IHS facility where most recent record is maintained. Write in facility with which number is associated.
- 3 Write down the name of the non-IHS hospital which subject usually goes.
- 4 Enter name known by friends. If double name, leave blank between first and last. If two different names, separate with slash.
- 5 If ever married, enter maiden name left justified.
- 6-7 If ever used other names, enter name left justified. If more than last name, enter complete name with blanks between first and last names. Before asking about additional names, read introduction (see form) to subject emphasizing names related to medical care.
- 8 a Enter left justified with blank separating number from street name and street name from unit number. If post office box, enter after street address.
b Enter left justified, city/town or reservation of residence.
c Enter left justified, county of residence.
d Enter state of residence as two digit postal abbreviation.
AZ= Arizona SD= South Dakota
OK= Oklahoma ND= North Dakota
- 9 If residential address is different from the mailing address, write in the residential address following the rules given in item 8.

- 10 Enter complete telephone number of home phone or phone at which subject can be reached during the evenings.
- 11 Enter complete telephone number of work phone or phone at which subject can be reached during the day.

Note : All Personal Interview Forms I should be sent to the Coordinating Center separately for confidentiality.

Personal Interview Form II

- 12 Enter gender of subject (1=male, 2=female).
- 13 Subject should be asked if he/she has ever been married. If yes, are you currently married? If not, are you divorced, separated or widowed?
Enter marital status codes as indicated.
- 14 Enter month, day and year of birth in numbers. If subject does not know month enter 06. If subject does not know day enter 15.
- 15 Before asking number of years of education completed, read the introductory paragraph (see form). Years completed means progress within school system. Repeating a grade counts as one year, not two. Interviewer should expect to help the subject by dividing education up as number of years in each school and adding those years for the subject. Interviewer should be sensitive to subject and non-judgmental to response. If participant had taken some courses beyond high school or college, count every 30 undergraduate hours or 24 graduate hours as one year's education.
- 16 What do you estimate your degree of Indian blood.
- 17 Record each tribe for which subject has at least $\frac{1}{8}$ Indian blood. Also record eighths of white, hispanic and other blood. Total should add to one. Add code for each tribe from attached tribal code list. If tribe has no code, enter 999. Leave unused boxes blank.
- 18 What is your tribe of enrollment? Record name in writing and three digit IHS code from attached list of codes.

B. FAMILY HISTORY

- 19 Record the number of natural sons the subject has.
- 20 Record the number of natural daughters the subject has.

FAMILY HISTORY: Precede questions with statement "Now I want to ask you about your relatives. Let us begin with your natural mother." Ask year of birth. If uncertain, ask current age and help subject with calculation. Record current age in margin and enter calculated year of birth in boxes. Enter alive=0 or dead=1 for vital status. If unknown, enter 9. If vital status=1, enter age at death and cause of death.

For each question on morbidity, record yes=1, no=2, unknown/not sure=9. Precede questions with statement "Now I want to ask you about your natural father. Can you provide information on your natural father?" If no, skip questions for subject and record answers as 9's. If yes, ask year of birth and proceed as above.

After natural father's data is completed proceed in chronological order with all natural sisters, half sisters, natural brothers, half brothers, and then with natural daughters, and natural sons. Name should include first and last names. Specify maiden or married name if readily available. Interviewer should complete these forms from first born to last born for each subgroup. Subject should be informed that "several diseases of interest to this study run in families and it is important to know about your family members." Record only individuals living to at least one year of age. Be sure to enter the code for type of relation as coded at the bottom of form.

C. **SMOKING CIGARETTES** – These questions are very important to assess accurately because smoking is a major risk factor for cardiovascular disease.

Questions 21 & 22 will assess the prevalence of smoking in the previous generation and will give us an idea of when Indian people in the Northern Plains began to smoke cigarettes regularly. Currently smoking prevalence in adult Indians of the Northern Plains is between 55%-60% compared to rates of 10%-20% for southwestern Indians.

Question 23 assesses exposure to passive smoking which has been shown to be a risk factor for cardiovascular disease in some studies.

Question 24 assesses lifetime exposure to cigarettes. Persons who smoke less than 100 cigarettes are considered to be never smokers and they can skip the rest of the cigarette smoking questions.

Question 25 determines the age when smoking began and Question 26 determines the current smoking status. Individuals who are still smoking can skip Question 27 which asks when individuals stopped smoking cigarettes.

Question 28 assesses the average number of cigarettes currently smoked or previously smoked or ex-smoked. Ex-smokers should report the average number smoked per day during the year prior to quitting.

Question 29 assesses the total number of years the respondent has been a regular smoker for both current smokers and ex-smokers. Multiplying answers to Question 28 & 29 and dividing by 20 gives the pack years smoking history, a calculation that can be done by the computer.

D. **SMOKING PIPES, CIGARS AND SMOKELESS TOBACCO** – These questions are straight forward and assess current smoking status for pipes and cigars and current usage of chewing tobacco or snuff.

E. **CAFFEINE**

CAFFEINE – Caffeine is a risk factor for cardiovascular disease and a rough quantitation of consumption will be attempted in Questions 33 and 34. Note in Question 33, this includes chocolate milk and in Question 34, the following soft drinks contain caffeine. Coke-a-cola (unless specified as decaffeinated), Pepsi, Mt. Dew, Tab, Dr. Pepper.

F. TRADITIONAL VALUES/CULTURE

Question 35 assesses the knowledge of the native language in its current use. Traditional people are more likely to speak the language than people who are acculturated. Question 36 assesses the frequency whereby the native language is spoken.

Question 37 assesses the frequency of use of traditional sources of medicine or healing again to assess whether the participants are acculturated or traditional. The interviewer should read the responses to the participant.

Question 38 also assesses the level of participation of individuals in traditional ceremonies. The responses should be read to the participants.

Question 39 assesses total duration of residence in Indian country as a measure of traditionality. Exclude time in military services.

Question 40 assesses whether individuals have ever resided off the reservation and 41 asks how long. This time includes time they are out of Indian country or off reservation.

G. STRESS EVALUATION – Stress is difficult to assess. The following questions are designed to assess stress in our participants.

Question 42 assesses the amount of sleep loss due to worry. Responses should be read to the participants.

Question 43 asks the patient their level of stress. Responses should be read to the participant.

Question 44 assesses frequency of arguments. Responses should be read to the participant.

Question 45 asks about household members with alcohol problems.

Question 46 asks the number of people living in the household as a measure of crowding.

H. ALCOHOL – Questions related to alcohol consumption are frequently not answered accurately in surveys. Questions included in this questionnaire have been widely used and validated in several national studies.

Question 47 assesses the never drinkers from drinkers. Those who answer no to the question of having at least 12 drinks of any kind can skip the rest of the questions.

Question 48 determines when the individual last had any alcoholic beverage. If the last drink has less than 30 days fill in the box labeled number of days. If the last drink was within the last year, but more than 30 days fill in the number of months. If the last drink was over one year ago fill in the number of years. If the last drink was one or more years ago, skip to Q54.

Question 49 assesses the average number of drinks consumed in a typical week. Frequently individuals with severe drinking problems especially binge drinkers do not consume alcoholic beverages by the can, glass or shot, but rather drink wine or hard liquor out of a bottle. In these situations the interviewer must skillfully inquire as to the volume of each type of liquor consumed and then convert these according to the following table.

1 qt. of beer = 2.5 drinks
1 pt. of beer = 1.5 drinks
1 pt. of wine = 4 drinks
1 qt. of wine = 8 drinks
0.5 gal. of wine = 16 drinks
1 pt. of hard liquor = 12 drinks
One-fifth of hard liquor = 19 drinks
1 case of beer (12 oz. cans) = 24 drinks
6 pack of beer (12 oz. cans) = 6 drinks

Add up the total number of drinks in a typical week and fill them in the box in Question 49.

Question 50 will tell you the frequency of alcoholic consumption. Many individuals with severe alcohol problems will only drink on the weekends (i.e., 8 days per month).

Question 51-53 are utilized to quantitate binge drinking. Use the information described above to assist in calculating number of drinks for individuals who drink bottles of liquor or wine, rather than drinks. The alcohol consumption history can be validated by calculating the average drinks per month utilizing two different calculations as follows:

Question 49 drinks per week X 4 = drinks per month

Question 50 days per month drinking X Question 51 drinks per day also should give you drinks per month.

Question 53 quantitates binge drinking that occurs less frequently than once a month. For heavy binge drinkers, estimate annual number of binges for 1 month and multiply by 12.

Question 54 assesses whether the subject has drunk a lot in the past. If respondent asks for the definition of "a lot", the answer is "enough to cause problems in your life."

Question 55 to 58 assess the family income so that the subject's socioeconomic status can be determined. Ask the questions as stated in the questionnaire. Prepare a sheet of income levels to show the participant.

Question 59 assesses the reliability of the answers responded by the subject. Write down your personnel code number and the date of completion of interview.

APPENDIX 23 (b)

TRIBAL CODES

Tribe	Old code	New code
Absentee-Shawnee tribe of Indians of Oklahoma	141	141
Agua-Caliente Band of Cahuilla Indians of the Agua-Caliente Indian Reservaton, Palm Springs, CA	035	263
Ak Chin Indian Comm. of Papago Indians of Maricopa, Ak Chin Reservation, Arizona	096	360
Alabama and Coushatta Tribes of Texas		223
Alabama-Quassarte Tribal Town of the Creek Nation of Ind. of Oklahoma	043	266
Alturas Indian Rancheria of Pit River Indians of California	099	385
Apache Tribe of Oklahoma	004	231
Arapahoe Tribe of the Wind River Reservation, Wyoming	011	011
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana - Assiniboine	013	235
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana - Sioux	045	276 ✓
Augustine Band of Cahuilla Mission Indians of the Augustine Reservation, California	035	255
Bad River Band of the Lake Superior Tribe of Chippewa Indian of the Bad River Res, WI	030	243
Barona Capitan Grande Band of Diegueno Mission Indians, Barona Reservation, California	047	330
Barona Group of Capitan Grande Band of Mission Indians of the Barona Reservation, CA	218	412
Bay Mills Indian Comm of the Sault Ste. Marie Band of Chippewa Indian, Bay Mills Reservation, MI	030	244
Berry Creek Rancheria of Maidu Indians of California	070	312
Big Bend Rancheria of Pit River Indians of California	099	380
Big Lagoon Rancheria of Smith River Indians of California		415

Big Pine Band of Owens Valley Paiute Shoshone Indian of the Big Pine Reservation, CA		363
Big Sandy Rancheria of Mono Indians of California		417
Big Valley Rancheria of Pomo & Pit River Indians of California		420
Blackfeet Tribe of the Blackfeet Indian Reservation Montana	015	015
Blue Lake Rancheria of California		421
Bridgeport Paiute Indian Colony of California	095	345
Buena Vista Rancheria of MeWuk Indians of California	075	320
Burns Paiute Indian Colony, Oregon	095	351
Cabazon Band of Cahuilla Mission Indians of the Cabazon Reservation, California	035	256
Cachil De He Band of Wintun Indian of the Colusa Indian Community of the Colusa Rancheria, CA	172	406
Caddo Tribe Indian of Oklahoma	016	016
Cahto Indian Tribe of the Laytonville Rancheria, California		433
Cahuilla Band of Mission Indians of the Cahuilla Reservation, California	035	257
Campo Band of Diegueno Mission Indians of the Campo Indian Reservation, California	047	331
Capitan Grande Band of Diegueno Mission Indians of California	047	332
Cayuga Nation of New York	018	018
Cedarville Rancheria of Northern Paiute Indians of California	095	346
Chemehuevi Tribe of the Chemehuevi Reservation, California	021	021
CherAe Heights Indian Community of the Trinidad Rancheria of California		422
Cherokee Nation of Oklahoma	022	022
Cheyene-Arapaho Tribes of Oklahoma	012	012
Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota	045	277 ✓
Chickasaw Nation of Oklahoma	027	027
Chicken Ranch Rancheria of MeWuk Indians of California	075	321

Chippewa-Cree Indians of the Rocky Boy Reservation, Montana	042	042
Chitimacha Tribe of Louisiana	180	180
Choctaw Nation of Oklahoma	031	031
Citizen Band of Potawatomi Indian Tribe of Oklahoma	104	104
Cloverdale Rancheria of Pomo Indians of California	101	390
Coast Indian Community of Yurok Indians of the Resighini Rancheria, California	178	408
Cocopah Tribe of Arizona	036	036
Coeur D'Alene Tribe of the Coeur D'Alene Reservation, Idaho	037	037
Cold Springs Rancheria of Mono Indians of California		418
CO River Indian Tribes of the CO River Indian Reservation, AZ and CA		269
Comanche Indian Tribe of Oklahoma	039	039
Confederated Salish & Kootenai Tribes of the Flathead Reservation, Montana	049	049
Confederated Tribes of the Chehalis Reservation, Washington	020	020
Confederated Tribes of the Colville Reservation, Washington	038	038
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians of Oregon	212	212
Confederated Tribes of the Goshute Reservation, Nevada and Utah	200	200
Confederated Tribes of the Grand Ronde Community of Oregon	208	208
Confederated Tribes of the Siletz Reservation, Oregon	183	183
Confederated Tribes of the Umatilla Reservation, Oregon	164	164
Confederated Tribes of the Warm Springs Reservation, Oregon	168	168
Confederated Tribes and Bands of the Yakima Indian Nation of the Yakima Reservation, WA	174	174
Cortina Rancheria of Wintun Indians of California	172	407
Coushatta Tribe of Louisiana	181	181
Covelo Indian Community of the Round Valley Reservation, California		423
Cow Creek Band of Umpqua Indians of Oregon	198	198

Coyote Valley Band of Pomo Indians Valley Reservation, California	101	391
Creek Nation of Oklahoma	043	043
Crow Tribe of Montana	044	044
Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota	045	278
Cuyapaipe Community Diegueno Mission Indians of the Cuyapaipe Reservation, CA	047	333
Death Valley Timbe-Sha Shoshone Band of California	143	370
Delaware Tribe of Western Oklahoma	046	046
Devils Lake Sioux Tribe of the Devils Lake Sioux Reservation, North Dakota	045	272 ✓
Dry Creek Rancheria of Pomo Indians of California	101	392
Duckwater Shoshone Tribe of the Duckwater Reservation, Nevada	143	369
Eastern Band of Cherokee Indians of North Carolina	023	023
Eastern Shawnee Tribe of Oklahoma	142	142
Elm. Indian Colony of Pomo Indians of the Sulphur Bank Rancheria, California	101	393
Ely Indian Colony of Nevada	143	374
Enterprise Rancheria of Maidu Indians of California	070	313
Flandreau Santee Sioux Tribe of South Dakota	045	279 ✓
Forest County Potawatomi Community of Wisconsin Potawatomi Indians, Wisconsin	103	378
Fort Belknap Indian Community of the Fort Belknap Reservation of Montana - Assiniboine	013	236
Fort Belknap Indian Community of the Fort Belknap Reservation of Montana - Gros Ventre	050	290
Fort Bidwell Indian Community of Paiute Indians of the Fort Bidwell Reservation, CA	095	347
Fort Independence Indian Community of Paiute Indian of the Fort Independence Res, CA	095	348
Fort McDermitt Paiute and Shoshone Tribes, Fort McDermitt Indian Reservation, NV		364

Ft. McDowell Mohave-Apache Indian Community, Ft McDowell Band of Mohave Apache Indian of the Ft. McDowell Indian Reservation, Arizona	081	234
Fort Mojave Indian Tribe of Arizona	081	081
Fort Sill Apache Tribe-of-Oklahoma	005	005
Gay Head Wampanoag Indians of Massachusetts	202	202
Gila River Pima Maricopa Indian Community of the Gila River Indian Reservation of Arizona		293
Grand Traverse Band of Ottawa and Chippewa Indians of Michigan	196	196
Greenville Rancheria of Maidu Indians of California	070	314
Grindstone Indian Rancheria of Wintun-Waitaki Indians of California		435
Hannahville Indian Community Wisconsin Potawatomie Indians of Michigan	103	379
Havasupai Tribe of the Havasupai Reservation, Arizona	051	051
Hoh Indian Tribe of the Hoh Indian Reservation, Washington	052	052
Hoopa Valley Tribe of the Hoopa Valley Reservation, California	053	053
Hopi Tribe of Arizona	054	054
Hopland Band of Pomo Indians of the Hopland Rancheria, California	101	404
Houlton Band of Maliseet Indians of Maine	204	204
Hualapai Tribe of the Hualapai Indian Reservation, Arizona	055	055
Inaja Band of Cosmit Mission Indians of the Inaja and Cosmit Reservation, CA		434
Iowa Tribe of Kansas and Nebraska	057	057
Iowa Tribe of Oklahoma	056	056
Isleta-del-Sur Pueblo Indians of Texas	222	222
Jackson Rancheria of MeWuk Indians of California	075	322
Jamestown Klallam Tribe of Washington	034	034
Jamul Indian Village of California		424
Jicarilla Apache Tribe of the Jicarilla Apache Indian Reservation, New Mexico	006	006

Kaibab Band of Paiute Indians, Kaibab Indian Reservation, Arizona	095	352
Kalispel Indian Community of the Kalispel Indian Reservation, Washington	179	179
Karuk Tribe of California	216	216
Kashia Band of Pomo Indians of the Stewarts Points Rancheria, California	101	394
Kaw Indian Tribe of Oklahoma	058	058
Keeweenaw Bay Indian Community of the L'Anse, Lac Vieux Desert and Ontonagon Bands of Chippewa Indian of the L'Anse Reservation, Michigan	030	240
Kialegee Tribal Town of the Creek Indian Nation of Oklahoma	043	267
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	060	060
Kickapoo Tribe of OK (includes TX Band of Kickapoo Indian)-Oklahoma	059	059
Kickapoo Tribe of OK (includes TX Band of Kickapoo Indian)-Texas	199	199
Kiowa Indian Tribe of Oklahoma	062	062
Klamath Indian Tribe of Oregon	221	221
Kootenai Tribe of Idaho	063	063
La Jolla Band of Luiseno Mission Indians of the La Jolla Reservation, California	068	303
La Posta Band of Diegueno Mission Indians of the La Posta Indian Reservation, California	047	334
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of the Lac Courte Oreilles Reservation of Michigan	030	241
Lac du Flambeau Band of Lake Superior Chippewa Indian of the Lac du Flambeau Reservation of WI	030	246
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada	095	353
Lookout Rancheria of Pit River Indians, California	099	381
Los Coyotes Band of Cahuilla Mission Indians of the Los Coyotes Reservation, CA	035	258
Lovelock Paiute Tribe of the Lovelock Indian Colony, Nevada	095	354
Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota	045	280

Lower Elwha Tribal Community of the Lower Elwha Reservation, Washington	213	213
Lower Sioux Indian Community of the MA Mdewakanton Sioux Indian of the Lower Sioux Reservation in MN	045	281 ✓
Lummi Tribe of the Lummi Reservation, Washington	069	069
Makah Indian Tribe of the Makah Indian Reservation, Washington	071	071
Manchester Band of Pomo Indians of the Manchester, Pt Arena Rancheria, California	101	395
Manzanita Band of Diegueno Mission Indians of the Manzanita Reservation, California	047	335
Maricopa		888
Mashantucket Peguot Tribe of Connecticut	206	206
Menominee Indian Tribe of Wisconsin Menominee Indian Reservation, Wisconsin	074	074
Mesa Grande Band of Diegueno Mission Indians of the Mesa Grande Reservation, California	047	336
Mescalero Apache Tribe of the Mescalero Reservation, New Mexico	008	008
Miami Tribe of Oklahoma	076	076
Miccosukee Tribe of Indians of Florida	077	077
Middletown Rancheria of Pomo Indians of California	101	396
MN Chippewa Tribe, MN (six Component Res: Boise Ft Band Nett Lake, Fond du Lac Band, Grand Portage Band, Leech Lake Band, Mille Lac Band, White Earth Band)	030	242
Mississippi Band of Choctaw Indians, Mississippi	032	032
Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada	095	355
Modoc Tribe of Oklahoma	080	080
Montgomery Creek Rancheria of Pit River Indians of California	099	382
Mooretown Rancheria of Maidu Indians of California	070	315
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation, California	035	259
Muckleshoot Indian Tribe of the Muckleshoot Reservation, Washington	082	082

Narragansett Indian Tribe of Rhode Island	191	191
Navajo Tribe of Arizona, New Mexico and Utah	084	084
Nez Perce Tribe of Idaho, Nez Perce Reservation, Idaho	085	085
Nisqually Indian Community of the Nisqually Reservation, Washington	086	086
Nooksack Indian Tribe of Washington	088	088
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana	026	026
Northfork Rancheria of Mono Indians of California		419
Northwestern Band of Shoshone Indians of Utah (Washakie)	220	220
Oglala Sioux Tribe of the Pine Ridge Reservation, South Dakota	045	282 ✓
Omaha Tribe of Nebraska	089	089
Oneida Nation of New York	090	090
Oneida Tribe of Indians of WI, Oneida Reservation, Wisconsin	090	294
Onondaga Nation of New York	217	217
Osage Tribe of Oklahoma	091	091
Otoe-Missouria Tribe of Oklahoma	079	079
Ottawa Tribe of Oklahoma	093	093
Paiute Indian Tribe of Utah	194	194
Paiute-Shoshone Indians of the Bishop Comm. of the Bishop Colony, California		365
Paiute-Shoshone Indians of the Fallon Reservation and Colony, Nevada		366
Paiute-Shoshone Indians of the Lone Pine Community of the Lone Pine Reservation, California		367
Pala Band of Luiseno Mission Indians of the Pala Reservation, California	068	304
Pascua Yaqui Tribe of Arizona	187	187
Passamaquoddy Tribe of Maine - Pleasant Point	188	188
Passamaquoddy Tribe of Maine - Indian Township	189	189

Pauma Band of Luiseno Mission Indians of the Pauma and Tuima Reservation, CA	068	305
Pawnee Indian Tribe of Oklahoma	097	097
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, California	068	306
Penobscot Tribe of Maine	190	190
Peoria Tribe of Oklahoma	184	184
Picayune Rancheria of Chukchansi Indians of California		425
Pinoleville Rancheria of Pomo Indians of California	101	397
Pit River Indian Tribe, X-L Ranch Reservation, California	099	383
Poarch Band of Creek Indians of Alabama	207	207
Ponca Tribe of Indians Oklahoma	102	102
Port Gamble Indian Community of the Port Gamble Reservation, Washington	214	214
Potter Valley Rancheria of Pomo Indians of California	101	403
Prairie Band of Potawatomi Indians of Kansas	105	105
Prairie Island Indian Community of MN Mdewakanton Sioux Indian of the Prairie Island Reservation, MN	045	273
Pueblo of Acoma, New Mexico	107	107
Pueblo of Cochiti, New Mexico	108	108
Pueblo of Jemez, New Mexico	110	110
Pueblo of Isleta, New Mexico	109	109
Pueblo of Laguna, New Mexico	111	111
Pueblo of Nambe, New Mexico	112	112
Pueblo of Picuris, New Mexico	113	113
Pueblo of Pojoaque, New Mexico	100	100
Pueblo of San Felipe, New Mexico	115	115
Pueblo of San Juan, New Mexico	117	117
Pueblo of San Ildefonso, New Mexico	116	116

Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota	045	283 ✓
Rumsey Indian Rancheria of Wintun Indians of California	172	172
Sac and Fox Tribe of the Mississippi in Iowa	129	129
Sac and Fox Tribe of Missouri in Kansas and Nebraska	131	131
Sac and Fox Tribe of Indians of Oklahoma	130	130
Saginaw Chippewa Indian Tribe of Missouri, Isabella Reservation, Missouri	030	245
Salt River Pima-Maricopa Indian Community, of the Salt River Reservation, Arizona		377
San Carlos Apache Tribe of the San Carlos Reservation of Arizona	004	232
San Manuel Band of Serrano Mission Indians of the San Manuel Reservation, CA	139	139
San Pasqual Band of Diegueno Indians, San Pasqual Reservation, California	047	337
Santa Rosa Indian Community of the Santa Rosa Rancheria of California	035	261
Santa Rosa Band of Cahuilla Mission Indians of the Santa Rosa Reservation, CA		427
Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation, CA	033	033
Santa Ysabel Band of Diegueno Mission Indians of the Santa Ysabel Reservation, CA	047	338
Santee Sioux Tribe of the Santee Reservation of Nebraska	045	284 ✓
Sauk-Suiattle Indian Tribe	134	134
Sault Ste. Marie Chippewa Tribe of Chippewa Indians of Michigan	030	249
Seminole Nation of Oklahoma	137	137
Seminole Tribe of Florida, Dania, Big Cypress and Brighton Reservation Florida	136	136
Seneca Nation of New York	138	138
Seneca-Cayuga Tribe of Oklahoma	019	019
Shahakopee Mdewakanton Sioux Community of Minnesota (Prior Lake)	045	274 ✓
Sheep Ranch Rancheria of MeWuk Indians of California	075	323

Sherwood Valley Rancheria of Pomo Indians of California	101	401
Shingle Springs Band of Miwok Indians Shingle Springs Rancheria (Verona Tract), CA		428
Shoalwater Bay Tribe of the Shoalwater Bay Indian Reservation, Washington	185	185
Shoshone Tribe of the Wind River Reservation, Wyoming	143	372
Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho	209	209
Shoshone-Paiute Tribe of the Duck Valley Reservation, Nevada		368
Sisseton-Wahpeton Sioux Tribe of the Lake Traverse Reservation, South Dakota	045	285 ✓
Skokomish Indian Tribe of the Skokomish Reservation, Washington	146	146
Skull Valley Band of Goshute Indians of Utah	200	376
Smith River Rancheria of California		429
Soboba Band of Luiseno Mission Indians of the Soboba Reservation, California	068	308
Sokoagon Chippewa Comm. of the Mole Lake Band of Chippewa Indians, Wisconsin	030	250
Southern Ute Tribe of the Southern Ute Reservation, Colorado	151	151
Spokane Tribe of the Spokane Reservation, Washington	152	152
Squaxin Island Tribe of the Squaxin Island Reservation, Washington	153	153
St. Croix Chippewa Indians of Wisconsin, St. Croix Reservation, Wisconsin	030	251
St. Regis Band of Mohawk Indians of New York	182	182
Standing Rock Sioux Tribe of the Standing Rock Reservations, North and South Dakota	045	286 ✓
Stillaguamish Tribe of Washington	155	155
Stockbridge-Munsee Community of Mohican Indians of Wisconsin	156	156
Summit Lake Paiute Tribe of the Summit Lake Reservation, Nevada	095	357
Suquamish Indian Tribe of Port Madison Reservation, Washington	157	157
Susanville Indian Rancheria of Paiute, Maidu, Pit River and Washoe Indians of CA		430

Swinomish Indian of the Swinomish Reservation, Washington	158	158
Sycuan Band of Diegueno Mission Indians of the Sycuan Reservation, California	047	339
Table Bluff Rancheria of Wiyot Indians of California		431
Table Mountain Rancheria of California		432
Te-Moak Bands of Western Shoshone Indians of Nevada	160	160
Thlopthlocco Tribal Town of the Creek Indian Nation of Oklahoma	043	268
Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota - Arikara	010	010
Three Affiliated Tribes of the Fort Berthold Reservation, ND - Gros Ventre	050	291
Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota - Mandan	072	072
Tohono O'odham Nation of Arizona (formerly known as the Papago Tribe of the Sells, Gila Bend and San Xavier Reservation, Arizona)	096	096
Tonawanda Band of Seneca Indians of New York	192	192
Tonkawa Tribe of Indians of Oklahoma	161	161
Tonto Apache Tribe of Arizona	004	230
Tores-Martinez Band of Cahuilla Mission Indians, Torres-Martinez Reservation, CA	035	262
Tule River Indian Tribe of the Tule River Indian Reservation, California	162	162
Tlalip Tribes of the Tulalip Reservation, Washington	163	163
Tunica-Biloxi Indian Tribe of Louisiana	203	203
Tuolumne Band of Me-Wuk Indians of the Tuolumne Rancheria of California	075	324
Turtle Mountain Band of Chippewa Indians, Turtle Mountain Indian Reservation, ND	030	252
Tuscarora Nation of New York	195	195
Twenty-Nine Palms Band of Luiseno Mission Indians of the Twenty-Nine Palms Res, CA	068	309
United Keetoowah Band of Cherokee Indians, Oklahoma	022	238
Upper Lake Band of Pomo Indians of Upper Lake Rancheria of California	101	402

Upper Sioux Indian Community of the Upper Sioux Reservation, Minnesota	045	287 ✓
Upper Skagit Indian Tribe of Washington	145	145
Ute Indian Tribe of the Uintah and Ouray Reservation, Utah	165	165
Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico and Utah	166	166
Utu Utu Gwaiti Paiute Tribe of the Benton Paiute Reservation, California	095	350
Viejas Baron Long Captain Grande Band of Diegueno Mission Indians, Viejas Reservation.	047	340
Viejas Group of Capitan Grande Band of Mission Indians of the Viejas Res, CA	218	413
Walker River Paiute Tribe of the Walker River Reservation, Nevada	095	358
Washoe Tribe of NV and CA (Carson Colony, Dresslerville and Washoe Ranches)	169	169
White Mountain Apache Tribe of the Fort Apache Indian Reservation, Arizona	004	233
Wichita Indian Tribe of Oklahoma	170	170
Winnebago Tribe of the Winnebago Reservation of Nebraska	171	171
Winnemucca Indian Colony of Nevada	143	375
Wisconsin Winnebago Indian Tribe of Wisconsin	171	295
Wyandotte Tribe of Oklahoma	173	173
Yankton Sioux Tribe of South Dakota	045	275 ✓
Yavapai-Apache Indian Community of the Camp Verde Reservation, Arizona	009	009
Yavapai-Prescott Tribe of the Yavapai Reservation, Arizona	175	175
Yerington Paiute Tribe of the Yerington Colony and Campbell Ranch, Nevada	095	359
Yomba Shoshone Tribe of the Yomba Reservation, Nevada	143	373
Yurok Tribe of the Hoopa Valley Reservation, California	178	410
Zuni Tribe of the Zuni Reservation, New Mexico	124	124

Alaska Villages

Ahtna, Inc.	500
Akhiok, Native Village of Akhiok	501
Akiachak, Native Village of Akiachak	502
Akiak Native Community	503
Akutan, Native Village of Akutan	504
Alakanuk, Village of Alakanuk	505
Alatna Village	506
Alegnagik, Village of Alegnagik	507
Aleut Corporation	508
Allakaket Village	509

Codes for Cause of Death in Family History

Blank= Unknown

- 1 = Heart disease
 - 2 = Cancer
 - 3 = Stroke
 - 4 = All accidents (including suicide, homicide, and injuries)
 - 5 = Influenza and pneumonia
 - 6 = Diabetes
 - 7 = Liver disease (including cirrhosis)
 - 8 = Kidney disease (including kidney failure, kidney dialysis)
 - 9 = All others.
-

Codes for Cancer:

Blank= Unknown

- 0 = No cancer
- 1 = Lung cancer
- 2 = Colon/rectum cancer
- 3 = Breast cancer
- 4 = Prostatic cancer
- 5 = Cancer of female organs (Uterus, ovary, cervical, vagina, vulva)
- 6 = Cancer of digestive system (esophagus, stomach, liver/pancreas, small intestine)
- 7 = Leukemias or lymphomas
- 8 = Gallbladder cancer
- 9 = All others and unknow primary.

THE STRONG HEART STUDY

MEDICAL HISTORY FORM

FORMID:MEDHX

=====
 ID number:

--

Social Security Number:

--	--	--	--	--	--	--	--	--	--

=====
A. CURRENT PRESCRIBED MEDICATION HISTORY :

1. Chart review and patient interview - current medications. Bring medications to exams and record from them. Use Medical Record to verify that the participant brought all her/his medications.

Medicine	Is he/she currently taking it regularly ? 1=yes, 2=no	Medication Code						
a) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
b) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
c) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
d) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
e) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
f) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
g) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						
h) -----	<input type="checkbox"/>	<table border="1" style="display: inline-table;"><tr><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td><td style="width: 20px; height: 25px;"></td></tr></table>						

2. a) How many aspirin tabs or aspirin-containing products have you taken in the last week ?

--	--	--

b) How many teaspoons of aspirin-containing products have you taken in the last week ?

--	--	--

B. MEDICAL CONDITIONS :

"And now I'd like to ask you some questions about medical problems".

3. Has a medical person EVER told you that you had any of the following conditions ?

a. High blood pressure ? (1=yes, 2=no, 9=unknown)

How old were you when you were first told by a medical person that you had high blood pressure ? Indicate the actual age. Don't know=99

b. Rheumatic heart disease ? (1= yes, 2= no, 9=unknown)

c. Gallstones ? (1=yes, 2=no, 9=unknown)

d. Arthritis ? (1=yes, 2=no, 9=unknown)

e. Cancer, including leukemia and lymphoma ? (1=yes, 2=no, 9=unknown)

If yes, specify type of cancer : -----

f. Diabetes ? (1=yes, 2=no, 3="borderline", 9=unknown)

If yes or "borderline", do you still have it now ? (1=yes, 2=no, 3="borderline", 9=unknown)

How old were you when you were first told by a medical person that you had diabetes ?

Indicate the actual age. Don't know=99

g. Kidney failure ? (1=yes, 2=no, 9=unknown)

If yes, do you still have it now ? (1=yes, 2=no, 9=unknown)

How old were you when you were first told by a medical person that you had kidney failure ?

Indicate the actual age. Don't know=99

h. Emphysema ? (1=yes, 2=no, 9=unknown)

i. Cirrhosis of the liver ? (1=yes, 2=no, 9=unknown)

j. Have you ever had heart surgery ? (1=yes, 2=no)

k. Heart failure ? (1= yes, 2=no)

If yes, do you still have it now ? (1=yes, 2=no, 9=unknown)

How old were you when you had your first heart failure ?

Indicate the actual age. Don't know=99

l. Heart attack ? (1=yes, 2=no, 9=unknown)

If yes, how old were you when you had your first heart attack ?

Indicate the actual age. Don't know=99

m. Any other heart trouble ? (1=yes, 2=no, 9=unknown)

If yes, specify -----

n. Stroke ? (1=yes, 2=no, 9=unknown)

How old were you when you had your first stroke ?

Indicate the actual years. Don't know=99

o. Care received for heart attack and/or stroke or other problems. List all facilities where patient was hospitalized in the last TEN years. If subject has never been hospitalized for heart attack and/or stroke or other problems, skip to Question 4.

Reason : 1=Heart attack 2=Stroke 3=Other

	Hospital/Clinic	Town/State	Date	Reason
i.	_____	_____	_____	<input type="checkbox"/>
ii.	_____	_____	_____	<input type="checkbox"/>
iii.	_____	_____	_____	<input type="checkbox"/>
iv.	_____	_____	_____	<input type="checkbox"/>

- v. _____
- vi. _____
- vii. _____
- viii. _____

***** Ask patient to sign release form for care received at non-IHS facilities. *****

4a. Are you on renal dialysis ? (1=yes, 2=no, 9=unknown)

b. Have you ever received a kidney transplant ? (1=yes, 2=no, 9=unknown)

C. ACCESS TO MEDICAL CARE :

5. How many miles do you live from the nearest clinic ?
 Indicate how many miles. If less than one mile, record 1.

6. How many miles do you live from the nearest hospital ?
 Indicate how many miles. If less than one mile, record 1.

***** IF THE PARTICIPANT IS MALE, STOP HERE !!! *****

***** IF THE PARTICIPANT IS FEMALE, GO TO NEXT SECTION . *****

D. REPRODUCTION AND HORMONE USE (WOMEN ONLY) :

"The following questions are related to your reproductive system".

7. How many times have you been pregnant ?

Times pregnant (Gravidity)

Number of live births (Parity)

Number of lost pregnancies

Number of living children

8. Have your menstrual cycles stopped permanently ? (1= yes, 2= no, go to Question 11)

9. How old were you when they stopped completely ? Indicate the age in years.

10. Was your menopause natural or surgical ? (1= Natural, 2= Surgical)

If surgical, was only your uterus removed ? (1=yes, 2=no, 9=unknown)

11. Have you ever used birth control pills ? (1= yes, 2= no, go to Question 14)

12. How old were you when you started ? Indicate the age in years.

13. How many years altogether did you use them ? Specify the duration in years.

"ESTROGEN is a female hormone that may be taken after a hysterectomy or menopause."

14. Have you ever taken estrogen pills, except birth control pills, for any reason ?

1= yes,

2= no, go to next section.

15. How old were you when you started using them ? Indicate the age in years.

16. How many years altogether did you take them ? Specify the duration in years.

ROSE QUESTIONNAIRE FOR ANGINA AND INTERMITTENT CLAUDICATION

ID number:

Section A: Chest Pain on Effort

1. Have you ever had any pain or discomfort in your chest ?
- Yes
- If "No", go to Section C. No

If "Yes", ask next question.
 (If during the remainder of Section A an answer is recorded in a box marked *, go to Section B)

2. Do you get it when you walk uphill, upstairs or hurry ?
- Yes
- No *
- Never hurries or walks uphill or upstairs

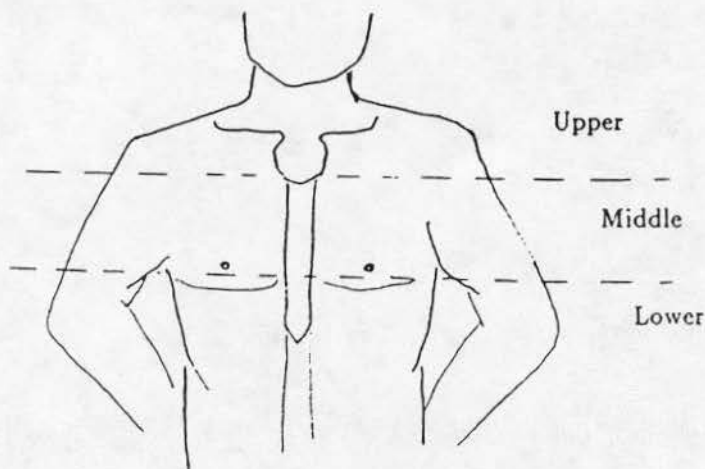
3. Do you get it when you walk at an ordinary pace on the level ?
- Yes
- No

4. What do you do if you get it while you are walking ?
- Stop or slow down
- Carry on *
- (Record "Stop or slow down" if subject carries on after taking nitroglycerine.)

5. If you stand still, what happens to it ?
- Relieved
- Not relieved *

6. How soon ?
- 10 minutes or less
- More than 10 minutes *

7. Will you show me where it was ? (Record all areas mentioned. Use the diagram below to show the location if participant can not tell exactly.)



Sternum (upper or middle)

Sternum (lower)

Left anterior chest

Left arm

Other -----

8. Do you feel it anywhere else ?

Yes

No

(If "Yes", record additional information below)

=====

Section B: Possible Infarction

9. Have you ever had a severe pain across the front of your chest lasting for half an hour or more ?

Yes

No

=====

Section C: Intermittent Claudication

If an answer is recorded in a box marked *, no further question in this section need be asked.

10. Do you get pain in either leg on walking ?

Yes

No

11. Does this pain ever begin when you are standing still or sitting ?

Yes *

No

12. In what part of your leg did you feel it ?

Pain includes calf/calves

Pain does not includes calf/calves *

If calves not mentioned, ask: Anywhere else and specify.

13. Do you get it if you walk uphill or hurry ?

Yes

No *

Never hurries or walks uphill

14. Do you get it if you walk at an ordinary pace on the level ?

Yes

No

15. Does the pain ever disappear while you are walking ?

Yes *

No

16. What do you do if you get it when you are walking ?

Stop or slow down

Carry on *

17. What happens to it if you stand still ?

Relieved

Not Relieved

18. How soon ?

10 minutes or less

More than 10 minutes

=====
 *** END OF ROSE QUESTIONNAIRE ***

Code number of person completing this form

Date of data collection

mo day yr

Instructions for Medical History Interview

Before beginning, make certain that the correct study identification number or the subject is entered at the top of the form. Explain to the subject some questions need to be asked about his or her medical history so that we can better evaluate whether or not he/she has heart disease or a tendency for heart disease. Stress that the information will be confidential and that their name will never be used in any data analysis.

A. Current Medications

1. "It is important that we are able to identify all of the pills and medicines that you are now taking. We will talk about each one of the medicines that you brought with you. For each one, we would like to know whether you take it regularly. Don't worry if you forgot to take it when you were supposed to; just tell us as accurately as you can how often you have taken." The interviewer then proceeds to ask about each medicine that the patient brought with him/her, and records for each, the name on the bottle. If the bottle is unlabeled, record the color and shape of the pill and save one of them so that it can be identified in the PDR later. After you have gone through all of the medicines that the patient brought with him/her, then ask "Are there any medicines that you are taking that you forgot to bring", if the answer is yes, record them also in Section A. After the clinic is over, it will be necessary to review Section A, first to identify medicines which were not named, then, to enter a medication code for each of those medicines.
2. The interviewer should inquire about the number of Aspirin taken in the last week. Be sure to remind the participant that products such as Bufferin and Anacin also contain Aspirin. (Show the participants the list of aspirin containing products given at the end of Instructions for Medical History Interview).

B. We would appreciate it if you can give us information about your past medical history.

3. I am going to ask about a number of medical conditions. Did you ever see a doctor or other health care professional for any of the problems that I am going to mention. (Note to Interviewer: When inquiring about how many years ago, if the patient has trouble remembering, try to ask in what year or how old they were when they had the condition; we can then calculate from their current age or from the current year, the number of years ago and enter it in the appropriate box).
 - a. High Blood Pressure. For high blood pressure, the interviewer should be alert for those individuals who answer no, who might in fact have been prescribed or taking medication for hypertension. If the patient does not know when the hypertension first began, ask when they first began taking medication for high blood pressure and record that date.

- b. Rheumatic Heart Disease. For rheumatic heart disease, it might be helpful to explain that this is a condition that develops in people who have had rheumatic fever when they were a child.
- c. Gallstones. The interviewer should also inquire about gallbladder disease. Inquire whether the gallstones were diagnosed because of symptoms such as pain, or whether they were detected during an ultrasound study.
- d. Arthritis. The interviewer should also inquire about arthritis.
- e. Cancer. The interviewer, when inquiring about cancer should ask about cancer and diseases such as leukemia, lymphoma and tumors of the skin. If they answer yes, record the type of cancer.
- f. Diabetes. The interviewer should be alert to individuals who reply no, who are in fact taking oral hypoglycemic agents or insulin.
- g. Kidney Failure. The interviewer should describe this as kidney failure or if he/she has been told that their kidneys are not working.
- h. Emphysema. When inquiring about emphysema, the interviewer should also ask about difficulty in breathing.
- i. Cirrhosis of the Liver or Yellow Jaundice. The interviewer should stress that this can occur both because of alcohol and for other reasons as well.
- j. Heart surgery. Ask if patient had any kind of heart surgery in the past.
- k. Heart failure. "That is, did the doctor or health care provider ever tell you that your heart was not working properly?" The necessity to sleep with several pillows (orthopnea) suggests heart failure.
- l. Heart Attack. When inquiring about heart attack, this would usually have involved hospitalization, but in some instances, the patient could have been told they had a heart attack in the past on the basis of an electrocardiogram. If the patient indicates that he/she had a heart attack, ask if there were more than one. Obtain information about each hospitalization and record in (o) below so that medical records can be reviewed for morbid event. Be sure to have participants sign the release forms for non-IHS hospitals, if hospitalizations occurred in the last ten years.
- m. If the patient indicates that he/she has had other heart trouble, the interviewer should ask about the symptoms, because of the possibility that it may in fact fit in a, b or c above.
- n. Stroke. Ask if the patient indicates that he/she has not had a stroke, ask also whether he/she has had any episode where he/she suddenly could not move a part of his/her body for a prolonged period of time. Obtain information about each hospitalization and record in (o) below so that medical records can be reviewed for morbid event. Be sure to have participants sign the release forms for non-IHS hospitals, if hospitalizations occurred in the last ten years.

- o. Ask the participant whether he/she had been hospitalized for heart attack and/or stroke or other cardiovascular problems in the past ten years. Record the hospital names, town and state where the hospital is located, date of hospitalization and the reason of the hospitalization.

4. When inquiring about renal dialysis, the interviewer should also ask if the patient must go two or three times a week to have a machine cleanse their blood.

C. Access to medical care. When inquiring about how many miles to the nearest clinic and/or hospital, if the patient is not able to identify the number of miles, ask how long it takes by automobile to reach the clinic/hospital and then compute the miles assuming approximately 40 mph. If it is less than one mile, record 1.

D. REPRODUCTION AND HORMONE USE – WOMEN ONLY

If the patient is a female, explain that we know that in many cases, women appear to be protected from heart disease. Therefore it is necessary for us to ask some questions about their reproductive history, because we are trying to better understand why women appear to have less heart disease.

7. After inquiring about the number of times pregnant and the number of live births and abortions, the number of live births plus the number of abortions should equal the number of times pregnant. (Unless one or more births of twins, etc. occurred).

8. When inquiring about menstrual cycles stopping permanently, this means for more than one year.

9. If the patient does not know how old she was when they stopped, ask if she remembers what year was the last year that she had a menstrual period. By referring to the patients' age and the year in which the periods stopped, then the interviewer can compute the age when they stopped completely.

10. The interviewer should answer whether the menopause or the cessation of periods occurred naturally or whether it occurred after an operation to remove the womb or uterus.

11.-16. Use questionnaire as written. If patients are currently taking estrogen pills or birth control pills, be sure they are recorded on the medication history.

INSTRUCTIONS FOR USE OF THE ROSE QUESTIONNAIRE FOR ANGINA AND INTERMITTENT CLAUDICATION

This questionnaire, originally developed by Rose & Blackburn, has been the mainstay of cardiovascular disease surveys for a number of years. The primary feature of this questionnaire is to have a standardized assessment for the pain associated with angina and intermittent claudication. Since it is well recognized that there can be many other causes for both chest and leg pain, the main objective of the questionnaire is to ask a series of questions so that certain patterns of pain will be assigned positively and others will not be assigned. For this reason, it is important that the questions be asked in the order stated. In addition, during several points of the questionnaire, there is an asterisk if a certain answer is received. The purpose of this asterisk is to assure that the questioner then proceeds to the next section. If an answer is received that has an asterisk, it has been determined that this answer indicates that the pain is not characteristic of either angina or intermittent claudication and thus, it is not necessary to proceed with that section.

The questions are essentially self-explanatory. It is permissible, and in fact advisable, when referring to pain or discomfort in the chest to elaborate to describe this pain as a tightening or crushing feeling that may or may not radiate onto the left arm.

In addition, since this is a standardized questionnaire developed in Britain, phrases such as "carry-on" can also be described as "keep on going" or "continue to walk or climb".

APPENDIX 24 (b)

DRUG CODES

400	Antihistamine
812	Antibiotics
1000	Antineoplastic drugs (chemotherapy)
1216	✓ Beta-blockers
2000	Anticoagulants
2404	Cardiac drugs - i.e., nitroglycerine, digitalis
2406	Hypolipidemic - (lipid lowering)
2408	✓ Hypotensive other than beta-blockers and diuretics
2808	Analgesic and anti-inflammatory, other than aspirins or steroids (i.e., for arthritis) <i>pain killer</i>
280892	Aspirin or aspirin containing compound
2812	Anticonvulsants
2816	Psychotherapeutic drugs - i.e., antidepressants, tranquilizers
6804	Adrenals - Steroids
6812	Oral contraceptives
4028	✓ Diuretics
5600	Gastrointestinal drugs - i.e., antacids
6816	Post menopausal estrogen
682008	Insulin
682020	Sulfonylureas
6836	Thyroid Agents
8400	Ointments and other topical products
8800	Vitamins
9200	Unclassified

APPENDIX 24 (c)

ASPIRIN CONTAINING PRODUCTS

BRAND NAME	FORM	QUANTITY OF ASPIRIN	MANUFACTURER
4-WAY COLD TABLETS	TAB	324 MG	BRISTOL-MYERS
8-HR TIME-REL.BAYER	TAB	650 MG	GLENBROOK
A.S.A	TAB	325 MG	LILLY
A.S.A ENSEALS	CAP	650 MG	LILLY
A.S.A ENSEALS	CAP	325 MG	LILLY
A.S.A PULVULES	CAP	325 MG	LILLY
A.S.A. ENSEALS	CAP	650 MG	LILLY
A.S.A. ENSEALS	CAP	325 MG	LILLY
ALKA-SELTZER EFF.P/R & AN	TAB	324 MG	MILES
ALKA-SELTZER EFF.PN/ANT R	TAB	324 MG	MILES
ALKA-SELTZER PLUS	TAB	324 MG	MILES
ANACIN	TAB	500 MG	WHITEHALL
ANACIN	TAB	400 MG	WHITEHALL
ANACIN MAX STRENGTH	CAP	500 MG	WHITEHALL
ANACIN MAXIMUM STRENGTH	TAB	500 MG	WHITEHALL
ARTHRITIS BAYER	TAB	650 MG	GLENBROOK
ARTHRITIS PAIN FORMULA	TAB	486 MG	WHITEHALL
ARTHRITIS STRENGTH BUFFLR	TAB	486 MG	BRISTOL-MYERS
ASCRIPTIN	TAB	325 MG	RORER
ASCRIPTIN A/D	TAB	325 MG	RORER
ASPERBUF	TAB	325 MG	BOWMAN
ASPERCIN	TAB	325 MG	OTIS CLAPP
ASPERGUM CHEWING GUM	TAB	228 MG	PLOUGH
ASPERMIN	TAB	325 MG	BUPPINGTON
ASPERMIN	TAB	500 MG(EXT	BUFFINGTON
ASPIRIN	TAB	325 MG	GENEVA GENERICS
ASPIRIN SUPP	SUP	300 MG	G&W LABS.
ASPIRIN SUPP.	SUP	125 MG	G&W LABS.
ASPIRIN SUPP.	SUP	600 MG	G&W LABS.
ASPIRIN W/CODEINE	TAB	325 MG	BARR
ASPIRIN W/CODEINE #2	TAB	325 MG	BARR
ASPIRIN W/CODEINE #3	TAB	325 MG	WARNER CHILCOTT
ASPIRIN W/COOEINE #4	TAB	325 MG	WARNER CHILCOTT
ASPIRTAB	TAB	500 MG(max	DOVER
ASPIRTAB	TAB	325 MG	DOVER
AXOTAL	TAB	650 MG	ADRIA
AZDONE	TAB	500 MG	CENTRAL PHARM.
BAYER ASPIRIN	TAB	325 MG	GLENBROOK
BAYER ASPIRIN FOR CHILDREN	TAB	81 MG	GLENBROOK
BAYER CHILDREN'S COLO	TAB	81 MG	GLENBROOK
BAYER TIMED-RELEASE	CAP	650 MG	GLENBROOK
BC	POW	650 MG	BLOCK
BC	TAB	325 MG	BLOCK
BUF-TABS	TAB	325 MG	BLUE CROSS

BUFASAL	TAB	500 MG(max)	DOVER
BUFF-A	TAB	325 MG	MAYRAND
BUFFAPRIN	TAB	500 MG(ext)	BUFFINGTON
BUFFAPRIN	TAB	325 MG	BUFFINGTON
BUFFASAL	TAB	500 MG	DOVLR
BUFFASAL	TAB	325 MG	DOVER
BUFFERIN	TAB	324 MG	BRISTOL-MYERS
BUFFERIN ARTHRITIS STR.	TAB	486 MG	BRISTOL MYERS
BUFFERIN EXTRA STR.	TAB	324 MG	BRISTOL-MYERS
BUFFERIN EXTRA STR.	CAP	500 MG	BRISTOL-MYERS
BUFFINOL	TAB	500 MG(ext)	OTIS CLAPP
BUFFINOL	TAB	325 MG	OTIS CLAPP
CAMA	TAB	600 MG	DORSEY (IN-LAY T
CAMA IN-LAY TABS	TAB	600 MG	DORSEY
CAPRON	CAP	227 MG	VITARINE
CHILD CHEW.BAYER ASPIRIN	TAB	81 MG	GLENBROOK
CONGESPIRIN CHEWABLE	TAB	26 MG/ML	BRISTOL-MYERS
CORICIDIN	TAD	325 MG	SCHERING
CORICIDIN MEDILETS(CHEW)	TAB	80 MG	SCHERING
COSPIRIN	TAB	325 MG	GLENBROOK
COSPIRIN	TAB	650 MG	GLENBROOK
DOLCIN	TAB	240.5 MG	DOLCIN CORP.
DOLPRN #3	TAB	250 MG	BOCK PHARMACAL
DURADYNE	TAB	230 MG	ONEAL, JONE&FELD
EASPRIN	TAB	975 MG	PARKE-DAVIS
ECOTRIN	TAB	325 MG	MENLEY&JAMES
ECOTRIN CAPLETS	TAB	325 MG	SMITHKLINE CON.
ECOTRIN EXTRA STRENGTH	TAB	500 MG	MENLEY&JAMES
EMPIRIN	TAB	325 MG	BURROUGHS WELLC
EQUAGESIC	TAB	325 MG	WYETH-AYERST
EXCEDRIN EXTRA STRENGTH	CAP	250 MG	BRISTOL-MYERS
EXTRA STRENGTH BEFFERIN	CAP	500 MG	BRISTOL-MYERS
FIOGESIC	TAB	325 MG	SANDOZ
FIORINAL	CAP	325 MG	SANDOZ
FIORINAL	TAB	325 MG	SANDOZ
FIORINAL W/CODEINE	CAP	325 MG	SANDOZ
GELPIRIN	TAB	240 MG	ALRA LABS.
GEN. BAYER ASPIRIN CAPLETS	TAB	325 MG	GLENBROOK
GENUINE BAYER ASPIRIN	TAB	325 MG	GLENBROOK
GOODY'S HEADACHE POWDER	POW	520 MG	GOODY'S
GOODY'S EXTRA STRENGTG	TAB	260 MG	GOODY'S
LORTAB ASA	TAB	500 MG	RUSS PHARM.
MAX. BAYER CAPLETS	TAB	500 MG	GLENBROOK
MAXIMUM BAYER ASPIRIN	TAB	500 MG	GLENBROOK
MEASURIN(TIME RELEASE)	CAP	650 MG	WINTHROP-BREON
MEPROBAMATE AND ASPIRIN	TAB	325 MG	PAR
METHOCARBAMOL AND ASPIRIN	TAB	325 MG	PAR
MIDOL	TAB	454 MG	GLENBROOK
MIDOL MAX STR. CAPLETS	TAB	500 MG	GLENBROOK
MOMENTUM	TAB	500 MG	WHITEHALL
MOMENTUM	TAB	500 MG	WHITEHALL
NILAIN	TAB	325 MG	A.V.P.
NORGESIC	TAB	385 MG	RIKER

NORGESIC FORTE	TAB	770 MG	RIKER
NORWICH ASPIRIN	TAB	325 MG	PROCTOR&GAMBLE
NORWICH ASPIRIN EXTRA STR	TAB	500 MG	PROCTOR&GAMBLE
ORPHENGESIC	TAB	385 MG	MARTEC
ORPHENGESIC FORTE	TAB	770 MG	MARTEC
PAC	TAB	400 MG	UPJOHN
PANODYNES ANALFESIC	TAB	260 MG	KEYSTONE
PERCODAN	TAB	325 MG	DU PONT
PERCODAN-DEMI	TAB	325 MG	DU PONT
PERSISTIN	TAB	160 MG	FISONS
ROBAXISAL	TAB	325 MG	ROBINS
ROXIPRIN	TAB	325 MG	ROXANE
SINE-OFF	TAB	325 MG	MENLEY & JAMES
SOMA COMPOUND	TAB	325 MG	WALLACE
SOMA CPD. W/CODEINE	TAB	325 MG	WALLACE
ST. JOSEPH ASA (CHEW)PED.	TAB	81 MG	PLOUGH
ST. JOSEPH ASPIRIN	TAB	325 MG	PLOUGH
ST. JOSEPH ASPIRIN(CHILD.)	TAB	81 MG	PLOUGH
ST. JOSEPH COLD TAB(PED)	TAB	81 MG	PLOUGH
STANBACK MAX POWDER	POW	850 MG/POW	STANBACK
STANBACK POWDER	POW	650 MG/POW	STANBACK
SYNALGOS-DC	CAP	364.4 MG	WYETH-AYERST
TALWIN CPD.	TAB	325 MG	WINTHROP
TRIAMINICIN	TAB	325 MG	DORSEY
TRIAMINICIN	TAB	450 MG	DORSEY
TRIGESIC	TAB	230 MG	SQUIBB
URSINUS(CAL.CARBASPIRIN)	TAB	300 MG	DORSEY
VANQUISH CAPLET	TAB	227 MG	GLENBROOK
VIRO-MEO	TAB	325 MG	WHITEHALL
VIRO-MED	LIQ		WHITEHALL
ZORPRIN	TAB	800 MG	BOOTS

APPENDIX 25
PHYSICAL ACTIVITY

A. ACTIVITY QUESTIONNAIRE - LEISURE PHYSICAL ACTIVITIES

ID number :

1) In general, about how many HOURS per WEEK did you regularly participate in sports and other strenuous LEISURE physical activities (excluding time spent walking)?

a) during the past year hrs/wk

b) during the past week hrs/wk

2) a) Identify all activities done more than 10 times in your lifetime, not including time spent in school physical education classes: Circle all the activities you have participated.

ACTIVITY CODES:

Running for exercise . .02	Racquetball/Handball . . .11	Hiking through Mts . . .20
Swimming (laps)03	Horseback riding12	Rodeo21
Bicycling04	Hunting13	Other22
Softball/Baseball . . .05	Fishing14	Other23
Volleyball06	Non-Indian Dancing . . .15	Tennis24
Bowling07	Gardening or Yardwork . .16	Golf25
Basketball08	Weight lifting17	Canoeing26
Skating (roller or ice) .09	Calisthenics18	Indian Dancing27
Football/Soccer10	Walking for exercise . . .19	

b) List all activities done over the PAST YEAR along with the AVERAGE amount of time spent in each activity:

ACTIVITY CODE	PAST YEAR				PAST WEEK
	#mos	#times/wk	#wk/mos	#hrs/time	# hours

B. ACTIVITY QUESTIONNAIRE - OCCUPATIONAL ACTIVITY

3) In general, about how many HOURS per WEEK did you regularly participate in sports and other strenuous physical activities (excluding walking and time spent in school physical education classes)?

age 12-18	<input type="text"/> <input type="text"/> <input type="text"/>	hrs/wk	age 19-34	<input type="text"/> <input type="text"/> <input type="text"/>	hrs/wk
age 35-49	<input type="text"/> <input type="text"/> <input type="text"/>	hrs/wk	age 50-64	<input type="text"/> <input type="text"/> <input type="text"/>	hrs/wk
age 65-74	<input type="text"/> <input type="text"/> <input type="text"/>	hrs/wk			

4) Over the past year, have you had a job that required physically demanding work? (1=yes, 2=no)

5) List all jobs held over the past year for more than one month. Account for all 12 months:

Job Title*	Job Code#	Walk or bike to work? min/day	JOB SCHEDULE: (average of past yr)			JOB ACTIVITIES		
			mos/yr	da/wk	hr/day	Was most of this time spent in light activities such as sitting? If yes, enter total # in light activity category. If no, determine how it was spent.	Light	Mod

*if unemployed/retired/housewife during all or part of the past year, list as such and probe for job activities of a normal 8 hour day.

LIGHT ACTIVITIES
(includes all sitting activities)

- Sitting
- Standing still w/o heavy lifting
- Light cleaning-ironing,cooking, washing,dusting
- Driving a tractor,harvester
- Slow,leisure walking

MODERATE ACTIVITIES
(includes most indoor activity)

- Carrying light loads
- Continuous walking
- Heavy cleaning-mopping,sweeping, scrubbing,scraping
- Gardening-planting,weeding
- Painting/Plastering
- Plumbing/Welding
- Electrical Work

HARD ACTIVITIES
(heavy industrial work outdoor construction, heavy farming)

- Carrying moderate to heavy loads
- Heavy construction
- Farming-hoeing,digging, mowing
- Digging ditches
- Chopping (ax)
- Sawing
- Shoveling

- 6) Have you EVER had a job for longer than one year that required physically demanding work? (1=yes, 2=no). If no, skip to Question 7.

If yes, how many physically active jobs have you ever held?

What is the TOTAL number of YEARS that you have worked in these physically demanding jobs? (Sum of years)

JOB CODES

Not Employed:

Employed (or volunteer):

- | | | |
|---------------|---------------------------------------|--|
| 1. Student | 6. Professional and technical workers | 12. Non-farm laborers |
| 2. Homemaker | 7. Managers, officials, & proprietors | 13. Private household workers |
| 3. Retired | 8. Clerical workers | 14. Service workers except private household |
| 4. Disabled | 9. Sales-worker | 15. Farmers and farm managers |
| 5. Unemployed | 10. Craftsman and foreman | 16. Farm laborers and foreman |
| | 11. Machine/equipment operator | 17. Armed Services |

C. ACTIVITY QUESTIONNAIRE - GENERAL QUESTIONS

- 7) Did you ever compete in an individual or team sport (not including any time spent in sports performed during school physical education classes)? (1=yes, 2=no)

If yes, how many total YEARS did you participate in sport teams?

- 8) Have you ever spent any time confined to a bed or chair for greater than one month as a result of an injury or an illness? (1=yes, 2=no)

If yes, how old were you when you first became confined to bed/chair?

How many MONTHS did confinement to a bed or chair last?

- 9) In general, about how many HOURS per DAY did you spend watching television? During this past year

past week

- 10) Do you have difficulty doing any of the following activities: (1=yes, 2=no)

a) getting in or out of a bed or chair?

b) walking across a small room without resting?

c) walking for 10 minutes without resting?

- 11) Approximately how many HOURS per WEEK do you spend doing moderately vigorous or vigorous housework such as sweeping, vacuuming, scrubbing, chopping wood, etc. (Do NOT include cooking or dusting)

12) During a typical day (including time spent both at work and at home), how many HOURS do you usually spend,

(a) sleeping at night?

--	--	--

(b) napping during the day?

--	--	--

(c) walking?

--	--	--

(d) carry/lifting moderate or heavy loads (including children)?

--	--	--

Interviewer code number

--	--	--

Reliable Test? (1=yes, 0=no)

--

Physical Activity Questionnaire
Interview's Instructions for Administration

I. GENERAL COMMENTS:

The purpose of this questionnaire is to obtain an estimate of the general physical activity patterns of an individual. This questionnaire was designed to assess recent (both past year and past week) leisure and occupational physical activity. For each of these time periods, a kcal estimate of activity is calculated. Although these estimates can not be regarded as true energy expenditure in the ABSOLUTE sense of the word, they do provide a way to rank order individuals from least to most active providing a RELATIVE distribution of individuals that can then be examined in relation to disease outcome.

The individuals that are being interviewed are not expected to remember the exact number of years or the exact number of hours per week that they had participated in a specific activity. However, most individuals should be able to identify the majority of activities that they participated in during the time period in question, along with a crude estimate of the "average" time spent in each activity. This is the key to properly administering the questionnaire. Do NOT get bogged down in the specific numbers. If the individual gets stuck on a frequency or duration response, the interviewer should provide them with a wide range of possible responses to consider.

As an example, consider the case of the 55 year old male who has identified baseball as a sport that he had participated in for three months out of the past year. When asked to estimate the average number of times per week he played baseball during those three months, he responds that he does not know or does not remember. In this case, provide him with a range of choices such as "from what you remember, did you play baseball once a day (7 times per week), twice a day (14 times per week), or more like once or twice a week?"

As to the occupational activity, the first step is to list all jobs held over the past year for greater than one month (homemaker or unemployed or retired can only be listed during a time period that the individual is otherwise not working). For each specific job entry listed, interviewers obtain the average job schedule (mos/yr; day/wk; hr/day) along with the time (min/day) that they walked or pedaled their bike to and from work. Finally, the number of hr/day that they work at this job needs to be separated out into the various job activity categories (light activity and moderate/heavy activity).

Begin by asking "was MOST of this time (___ hr/day) on the job spent sitting or engaged in other light activities" (such as those listed in the light activities column)???

.....If they respond with "YES", place the total number (___ hr/day) in the light activity column. You are then done with that job entry.

.....If they respond with "NO", then you need to determine "HOW MUCH of the total work time was spent sitting or engaged in other light activities" and place this number in the light activity category. Then place the remaining number of hours in EITHER the moderate OR the heavy activity category based upon a brief description of the job. [Hr/day = # hrs of light activity + # hrs moderate or heavy activity.]

As an example, you are interviewing a woman with no outside employment, i.e., a housewife (automatically an 8 hr/day job)..... . When asked if MOST of her normal 8 hour day as a housewife was spent sitting or engaged in other light activities, she replies, "Yes", you would enter an 8 in the light activity column. That is it!!!

As another example, you are interviewing a janitor who works an average of 4 hr/day When asked if MOST of his normal 4 hour day as a janitor was spent sitting or engaged in other light activities, he replies "NO". You then ask him HOW MUCH time he would estimate that he spent sitting or engaged in other light activities while working as a janitor. He replies "half of that time, or about 2 hours". When asked what he does the other half of the time on his job, he replies "walking, pushing brooms, cleaning" (moderate activities, see lists). You would enter a 2 in the light activity column and a 2 in the moderate column. There should NOT be anything written in the hard activity column since his occupational activities other than sitting are mainly moderate level physical activity.

Note: (1) as an interviewer, you are interested in obtaining the average frequency or duration of the activity, not the maximum.

(2) All the value of time should be rounded up to the nearest half an hour.

e.g., 0 to 14 minutes would be recorded as 0 hour.
15 to 30 minutes would be rounded to 1/2 hour.
30 to 44 minutes would still be 1/2 hour.
45 to 60 minutes would be rounded up to one hour.

LEISURE PHYSICAL ACTIVITY INSTRUCTIONS:

- # 1. "In general, about how many hours per week did you regularly participate in sports and other vigorous physical activities (excluding time spent walking)"
-during the past year ? -----
....during the past week ? -----

The purpose of the first question is to provide the interviewer with a general idea of the leisure activity levels of the subject.

IF THE INDIVIDUAL HAS PROBLEMS ANSWERING THIS QUESTION, OFFER A WIDE RANGE OF RESPONSES (0 hrs per week, 1 hr per week, 10-20 hrs per week??). MAKE SURE THAT THEY MEAN HOURS PER WEEK AND NOT HOURS PER DAY

- # 2. "Identify all activities done more than 10 times in your lifetime, not including time spent in school physical education classes."
- first read slowly through the activity list out loud, requesting that the individual identifies all activities that they had ever participated in regularly, on at least 10 different occasions during their lifetime (excluding any time spent in activities performed in school physical education classes). For each activity that they identify, circle the respective code number for that activity.
 - after you have gone through the entire list once, read the list a second time to make sure that all applicable activities have been identified.
 - ask if there were any additional activities they had performed often during their lifetime that had not been mentioned. If yes, write the new activity on the "other" line and code as such.

"List all activities done over the PAST YEAR along with the AVERAGE amount of time spent in each activity:"

- read through the list of activities that the individual reported having participated in more than 10 times in their lifetime (all activity codes circled) and identify any of these activities that the individual has also done this past YEAR.
- for each activity that the individual performed over the past year, enter its appropriate code number in the 'ACTIVITY CODE' column - and then move from left to right on the questionnaire, estimating the amount of time spent in that activity for each time period (first past year and then past week).

PAST YEAR – first determine the average # of months that they did the activity over the past year. [Over the past twelve months, from last _____ to this _____, how many months would you say that you participated in *****].

– next determine the average # of times each week they performed the activity. [When you did this activity, how many times during the week do you usually perform this activity?]

– then determine the average # of weeks each month. [On the average, did you do this activity every week (4), every other week (2), or about one week a month (1).]

– lastly, estimate the average length of time the activity lasted when they performed the activity (estimated to the nearest 1/2 hour).

AS AN EXAMPLE, IF AN ACTIVITY SUCH AS HUNTING WAS ONLY DONE ONCE (FOR 6.5 HOURS) OVER THE PAST YEAR, THE FOLLOWING INFORMATION WOULD BE RECORDED:

ACTIVITY CODE="13";
MOS="1"; # TIMES/WK="1"; # WK/MOS="1"; #
HRS/TIME="6.5".

PAST WEEK – ask if they had performed the activity in question over the past week [the past seven days from last _____ to this _____]. If yes, have them determine the total # of hours that they performed the activity over the past week (estimated to the nearest half an hour).

NOTE: The responses given in #2 should resemble the responses given for Question #1. If not, inquire about the discrepancy. As an example, if someone reports 10 hours/week activity over the past year in Question #1 and then does not report performing any activities over the past year in the leisure activity section of the questionnaire, try to find out why these responses differ (could you be missing a significant activity)?

- # 3. Similar to #1 above. Obtain hours/week estimates of leisure physical activity for all appropriate time periods from the teenage years (12-18) and the 20's-early 30's (19-34) and the late 30's-40's (35-49) and the 50's-early 60's (50-64) to the late 60's-present (65-74).

OCCUPATIONAL PHYSICAL ACTIVITY INSTRUCTIONS

- # 4. Over the past year, have you had a job that required physically demanding work? yes _____ no _____

Again, the purpose of this question is to provide the interviewer with a general idea about the occupational activity of the individual.

- # 5. List all jobs held over the past year for more than one month. Account for the full 12 months.

When administering the occupational physical activity section of the questionnaire:

- a) first ask the individual to identify all jobs held during the past year for greater than one month. If they were unemployed/retired or a housewife during all or part of the year, enter either unemployed/retired or housewife as the job title. All 12 months must be accounted for!! As an example, if someone had a job for 3 months (out of the past year) and was unemployed for 9 months, list both as separate job title entries and probe separately for the job activities of each entry.

Note: "Homemaker" can only be listed as a job title during the time when the women/man is not otherwise employed.

- b) for each job title entry, the average job schedule (which includes the number of months out of the past year that they worked in that job, the average number of days/week, and the average number of hours/day) will be obtained. Also probe for the number of minutes spent walking or pedaling a bike "round trip" to and from work each day.
[For both the unemployed and the housewife job entry, consider the job schedule to be five days per week and 8 hours per day.]

- c) once the average number of hours per day is determined for a specific job title, a breakdown of this total time is done, separating it into the number of hours spent performing job activities representing various intensity categories.

*** First, the individual is asked if MOST ($\frac{3}{4}$) of their normal workday was spent sitting or engaged in other light activities such as standing still without heavy lifting?

>>> If they say yes enter the entire # of hours/workday in the light activity column.

>>> If they say no then ask them how many hours while working at this job did they usually spend doing light activities such as sitting, standing still without lifting, etc., and enter this number in the light activity category. The interviewer should then determine which of the other two job activity categories are most relevant based upon a brief description of the normal activities required on the job and place the remaining number of hours in that specific job activity category.

[Moderate activities are those that require an effort similar to that of continuous walking and include activities such as those listed. The hard activity category requires efforts similar to that of running or heavy lifting.]

REMEMBER: The sum of all of the hours from the job activities section should equal the value given for the number of hours/day listed in the job schedule section.

NOTE: The responses given in the Question #5 should resemble the response given for the Question #4. If the individual responds yes to having a physically demanding job but does not report any occupational activity in Question #5, inquire about the discrepancy.

d) the Job Code should be filled out by the interviewer after the interview is completed. Determine the job code (listed at the bottom of the page) that corresponds with the job title and enter it in the column provided for it.

- # 6. Have you EVER had a job for longer than one year that required physically demanding work? ... # of physically active jobs _____
... total # of years that you worked these jobs _____

This question summarizes a lifetime of occupational activity and should include any past year occupational activity. Total # of years should be the sum of all of the years that the individual had a physically demanding job.

GENERAL ACTIVITY QUESTIONS INSTRUCTIONS:

- # 7. If the answer is no, record 0 years.
- # 8. Have you ever spent any time confined to a bed or a chair for greater than one month as a result of an injury or an illness? If yes,
..... how old were you?
..... how many months did this last?

IF THERE IS MORE THAN ONE EPISODE.....

- for the first part of this question, record the age at the first episode.
- for the second part of the question, the # of months of confinement should reflect the sum of all episodes of confinement.

If the answer is no, record 0 months.

- # 9. In general, about how many hours per day did you spend watching television?
.....during the past year? _____
past week? _____

Probe for the number of hours per day spent watching TV in a manner similar to that used previously. If the individual did not have access to a TV set, enter a zero for that response.

- # 10. Self-explanatory.
- # 11. EVERYONE should be asked this question, regardless of sex or occupation!
- # 12. Self-explanatory.

Reliable test? (1=yes; 0=no)

IF, DURING ANY PART OF THIS PHYSICAL ACTIVITY INTERVIEW, YOU (THE INTERVIEWER) FEEL THAT THE PARTICIPANT IS NOT CURRENTLY CAPABLE OF ANSWERING THE QUESTIONS ON THIS ACTIVITY SURVEY, PLEASE DISCONTINUE THE INTERVIEW AND ENTER A "0" FOR THIS QUESTION.

APPENDIX 26
GTT CHECKLIST

Center _____ ID number _____
Today's Date _____

When was the last time you ate _____ AM PM
Time of collection of fasting samples _____
Time the 75 gram glucose beverage was consumed _____
Time of collection of urine sample _____
Time of 2-hr blood sample _____

The participant did not have GTT because of

1. diabetes, on insulin treatment _____
2. diabetes, on oral agent with two previous
fasting glucose > 250 mg/dl _____
3. Accucheck > 225 mg/dl _____
4. renal dialysis _____
5. a kidney transplant _____
6. refusal to have GTT done _____

Comments :

APPENDIX 27 (a)

STRONG HEART STUDY

Routine Blood and Urine Sample Collection Checklist

Participant's Name						
Today's Date (mm/dd/yy)	Study ID					
<table border="1"> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>						

Fasting Samples *

<input type="checkbox"/>	2 [10-ml] Lavender	Lipids/Fibrinogen
<input type="checkbox"/>	1 [3-ml] Gray	Glucose/Creatinine
<input type="checkbox"/>	1 [10-ml] Lavender	Apolipoproteins

Urine

<input type="checkbox"/>	1 [14-ml] tube	Albumin/Creatinine
--------------------------	----------------	--------------------

2 - Hour Samples

<input type="checkbox"/>	1 [5-ml] Lavender *	Glycated HbA1
<input type="checkbox"/>	1 [3-ml] Gray	Glucose

*

IF THE PARTICIPANT IS EXEMPTED FROM THE GTT PROCEDURE, THE [5-ml] LAVENDER TUBE FOR GLYCATED HbA1 SHOULD BE DRAWN WITH THE FASTING SAMPLES.

APPENDIX 27 (b)

STRONG HEART STUDY Quality Control Blood Collection Checklist

(For the first participant of one Clinic day every week ~~4~~ extra blood tubes and 1 urine tube will have to be obtained and sent to the lab as quality controls)

Participant's Name	
Today's Date (mm/dd/yy)	Study ID
	Quality Control ID*

Fasting Samples

<input type="checkbox"/>	2 [10-ml] Lavender	Lipids/Fibrinogen
<input type="checkbox"/>	1 [3-ml] Gray	Glucose/Creatinine
<input type="checkbox"/>	1 [10-ml] Lavender	Apolipoproteins
<input type="checkbox"/>	2 [10-ml] Lavender	Quality Controls

Urine

<input type="checkbox"/>	1 [14-ml] tube	Albumin/Creatinine
<input type="checkbox"/>	1 [14-ml] tube	Quality Control

2 - Hour Samples



<input type="checkbox"/>	1 [5-ml] Lavender	Glycated HbA1
<input type="checkbox"/>	1 [3-ml] Gray	Glucose
<input type="checkbox"/>	1 [5-ml] Lavender	Quality Control
<input type="checkbox"/>	1 [3-ml] Gray	Quality Control

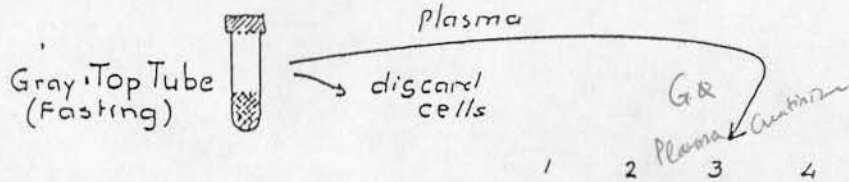
*

ALL QC CHECK LISTS SHOULD BE MAILED DIRECTLY TO THE OKLAHOMA DATA COORDINATING CENTER ON A MONTHLY BASIS.

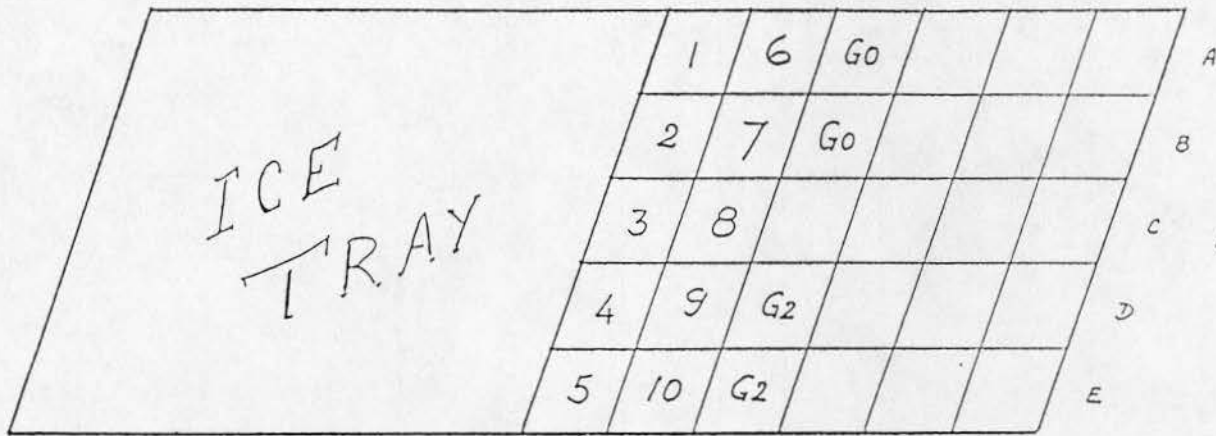
THESE CHECK LISTS SHOULD NOT BE MADE AVAILABLE TO THE CENTRAL LABORATORY.

STRONG HEART STUDY

 Ship Cold - Blue Ice
 Ship Frozen - Dry Ice



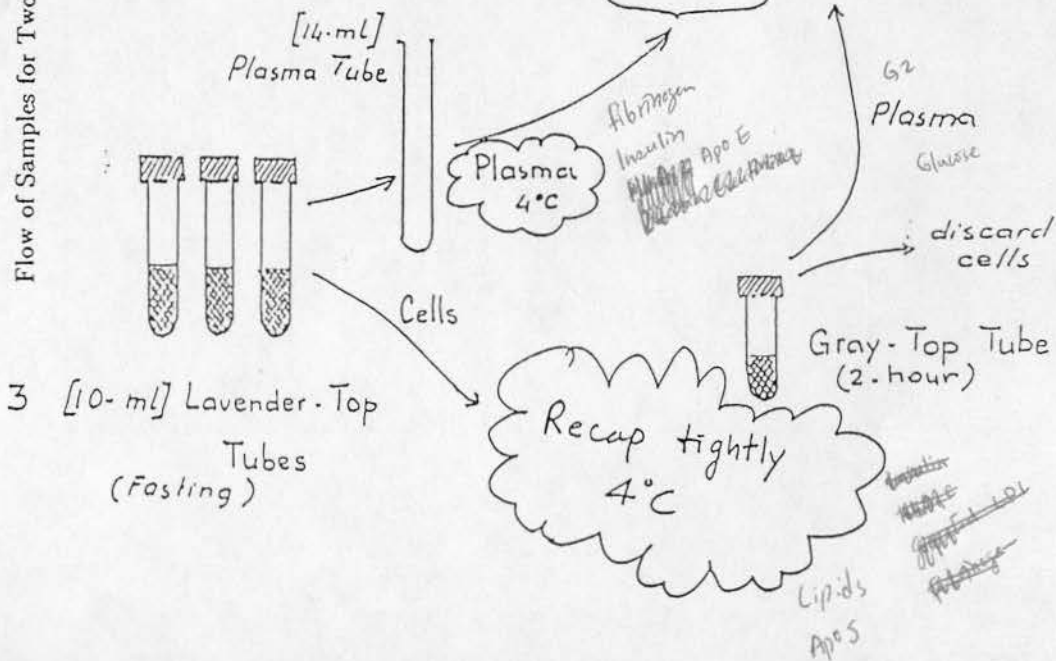
Flow of Samples for Two Participants Using the Workstation



14 [2-ml] Cryovials
 -70°C
rapid

Urine
 -70°C

APPENDIX 27 (c)
STRONG HEART STUDY



[5-ml] Lavender Top-Tube (2-hour) 4°C
 DNA
 HbA_{1c}
 Frozen: G-0, G-2, P-CREAT, INSULIN, FIBRINOGEN, GLYCATED LDL, APO E
 URINARY ALBUMIN/CREATININE
 FRESH: Lipids, ApoA₁, ApoB, HbA_{1c}.

APPENDIX 27 (d)

STRONG HEART STUDY

Cold Sample Shipment Slip

Center ID : _____

Contact Person : _____

Today's date : _____

Technician ID : _____

Seq	ID	Drawn	14 ml Pl	5 ml Lav	Cells	Rec'd	Comments	STG Box#
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Frozen Shipment

Center ID : _____

Contact Person : _____

Today's Date : _____

Technician ID : _____

[Indicate number of tubes for each category]

Seq	ID	Date Drawn	2-ml Plasma	G0	G2	Urine	Date Rec'd	Comments	Storage Box#
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Date Sent :

Technician :

Seq	ID	Rec'd	Comments	Seq	ID	Rec'd	Comments	Seq	ID	Rec'd	Comments
1				21				41			
2				22				42			
3				23				43			
4				24				44			
5				25				45			
6				26				46			
7				27				47			
8				28				48			
9				29				49			
10				30				50			
11				31				51			
12				32				52			
13				33				53			
14				34				54			
15				35				55			
16				36				56			
17				37				57			
18				38				58			
19				39				59			
20				40				60			

Date Sent :

Technician :

Seq	ID	Rec'd	Ass'd	Comments	Seq	ID	Rec'd	Ass'd	Comments	Seq	ID	Rec'd	Ass'd	Comments
1					21					41				
2					22					42				
3					23					43				
4					24					44				
5					25					45				
6					26					46				
7					27					47				
8					28					48				
9					29					49				
10					30					50				
11					31					51				
12					32					52				
13					33					53				
14					34					54				
15					35					55				
16					36					56				
17					37					57				
18					38					58				
19					39					59				
20					40					60				

Date Sent :

Technician :

Seq	ID	Rec'd	Proc'd	Box #	Seq	ID	Rec'd	Proc'd	Box #	Seq	ID	Rec'd	Proc'd	Box #
1					21					41				
2					22					42				
3					23					43				
4					24					44				
5					25					45				
6					26					46				
7					27					47				
8					28					48				
9					29					49				
10					30					50				
11					31					51				
12					32					52				
13					33					53				
14					34					54				
15					35					55				
16					36					56				
17					37					57				
18					38					58				
19					39					59				
20					40					60				

Date Sent :

Technician :

Seq	ID	Rec'd	Comments	Seq	ID	Rec'd	Comments	Seq	ID	Rec'd	Comments
1				21				41			
2				22				42			
3				23				43			
4				24				44			
5				25				45			
6				26				46			
7				27				47			
8				28				48			
9				29				49			
10				30				50			
11				31				51			
12				32				52			
13				33				53			
14				34				54			
15				35				55			
16				36				56			
17				37				57			
18				38				58			
19				39				59			
20				40				60			

APPENDIX 28
STRONG HEART STUDY
PHYSICAL EXAMINATION

FORMID:PHYSICAL EXAM

=====
ID number:

Social Security Number:

=====
Fasting Accucheck, glucose, if done. If not done, draw two lines across the boxes.

Is blood sample taken?

- 1 = yes,
- 2 = yes, participant has not been fasting,
- 3 = no, participant is on renal dialysis,
- 4 = no, participant has had a kidney transplant,
- 5 = no, participant has not been fasting,
- 6 = participant refused,
- 7 = other, specify: _____

I. BASIC MEASUREMENT: With shoes removed and heavy articles from pockets removed.

Fractions less than 0.5 will be omitted and fractions greater than or equal to 0.5 will be rounded up to the next higher unit.

1. Height in CENTIMETERS

2. Weight in KILOGRAMS

II. SITTING MEASUREMENT

A. TOBACCO AND CAFFEINE USE

"Tobacco use and caffeine can change the results of the exams and laboratory tests we will do today. Because of this we will ask you a few questions."

3. Have you smoked or used chewing tobacco or snuff within the last 4 hours ?

1= yes,

2= no, go to Question 5.

4. How long ago did you last smoke or last use chewing tobacco or snuff?

Specify the lag by hours

If less than an hour, specify the minutes

- ** "We are going to ask you not to smoke or use chewing tobacco until you have completed your
 ** visit with us today. We do this so that your test results are not affected by tobacco use.
 ** If you must use tobacco, please tell us that you did before you leave."

5. Have you had any coffee, tea, caffeinated soft drink or chocolate within the last 4 hours ?

1=yes, 2=no

If no, go to Question 7.

6. How long ago did you last have any coffee, tea, caffeinated soft drink or chocolate ?

Specify the lag by hours

If less than an hour, specify the minutes

B. PRELIMINARY MEASUREMENTS: With participant standing, measurements should not be made over gown or scub suit.

7. Right arm circumference, measured in centimeters (cm)

(Midway between acromium and olecranon)

8. Cuff size (arm circumference in brackets)

1= Pediatric (under 24cm)

2= Regular arm (24-32cm)

3= Large arm (33-41cm)

4= Thigh (>41cm)

9. Hip circumference, measured in centimeters (cm)

--	--	--

C. EXAMINATION OF THE CHEST

In this section use the following codes to answer the questions.

1=clear, 2=rales, 3=rhonchi, 4=both

10. a. Right posterior lung

Apex

Mid

Lower

b. Left posterior lung

Apex

Mid

Lower

D. EXAMINATION OF NECK VEINS (sitting position)

11. a. Left (1=Distended, 2=Flat)

b. Right (1=Distended, 2=Flat)

E. SITTING BLOOD PRESSURE

12. Recorder ID:

--	--	--

13. Time of day (Please use military time, hour:minute)

		:		
--	--	---	--	--

14. Pulse obliteration pressure

--	--	--

F. FIRST BLOOD PRESSURE MEASUREMENT

(After 5 minutes in sitting position - Right arm)

15. Systolic, Phase I - first sound

--	--	--

16. Diastolic, Phase V - first silence in a series of at least two silences.

(If Phase V did not appear, record Phase IV)

--	--	--

G. SECOND BLOOD PRESSURE MEASUREMENT (after raising the arm for 5 seconds and resting it on the table for another 25 seconds)

17. Systolic, Phase I - first sound

--	--	--

18. Diastolic, Phase V - first silence in a series of at least two silences.

(If Phase V did not appear, record Phase IV)

--	--	--

H. THIRD BLOOD PRESSURE MEASUREMENT (after raising the arm for 5 seconds and resting it on the table for another 25 seconds)

19. Systolic, Phase I - first sound

--	--	--

20. Diastolic, Phase V - first silence in a series of at least two silences.

(If Phase V did not appear, record Phase IV)

--	--	--

21. Were the above blood pressures taken from LEFT arm because of missing right arm or some other reason ? (1=yes, 2=no)

If yes, specify -----

I. EXAMINATION OF EXTREMITIES

Ask participant to remove shoes and socks, then examine for AMPUTATIONS.

22. Are any extremities missing ?

1=yes, fill out the following questions (Q23 - Q32).

2=no, skip to Supine measurements in Section III.

If "yes" to amputation in item 18. Codes for the cause of amputation :

1 = Diabetes

2 = Trauma

3 = Congenital

4 = Other, please specify

9 = Unknown

23. Right arm. (1=yes, 2=no)

If yes, cause : -----

24. Right hand. (1=yes, 2=no)

If yes, cause : -----

25. Left arm. (1=yes, 2=no)

If yes, cause : -----

26. Left hand. (1=yes, 2=no)

If yes, cause : -----

27. Right leg above knee. (1=yes, 2=no)

If yes, cause : -----

28. Left leg above knee. (1=yes, 2=no)

If yes, cause : -----

29. Right leg below knee. (1=yes, 2=no)

If yes, cause : -----

30. Left leg below knee. (1=yes, 2=no)

If yes, cause : -----

31. Number of fingers missing -----

--	--

32. Number of toes missing -----

--	--

III. SUPINE MEASUREMENTS

A. GIRTH MEASUREMENT, ECG AND IMPEDANCE

33. Waist measurement at umbilicus, in centimeters (cm)

--	--	--

34. Electrocardiogram Reading (Preliminary reading)

1= Normal,

2= Abnormal

3= Borderline

4= Unclassified

--

35. Impedance measurement

a. Resistance

--	--	--

b. Reactance

--	--

c. Activity Levels (supplemental for impedance measurement)

--

1 = Inactive : no regular physical activity with a sit-down job (eg. hospital patients).

2 = Light : no organized physical activity during leisure time with three to four hours of walking or standing per day.

3 = Moderate : sporadically involved in recreational activities such as weekend golf or tennis, occasional jogging, swimming or cycling.

4 = Heavy : consistent job activities of lifting or stair climbing or participating regularly in recreational/fitness activities such as jogging, swimming or cycling at least three times a week for 30 to 60 minutes per session.

5 = Vigorous : participation in extensive physical activity for 60 or more minutes at least four days per week.

d. Taken on left side because of amputation (1=yes, 2=no)

e. Not taken because of amputation (1=yes, 2=no)

B. PULSE AND BRUIT

For the following items (36 to 43), use the following codes for findings :

1 = present, 2 = absent, 3 = missing limbs.

36. Right posterior tibial pulse

7

58

37. Right dorsalis pedis pulse

59

38. Left posterior tibial pulse

60

39. Left dorsalis pedis pulse

61

↓

40. Right femoral bruit

41. Left femoral bruit

42. Right carotid bruit (can be examined in sitting position)

43. Left carotid bruit (can be examined in sitting position)

C. DOPPLER BLOOD PRESSURE AND EDEMA

44. Right ankle Doppler blood pressure - measure in posterior tibial artery. If not audible, use dorsalis pedis. If neither is audible, record zero. Record 999 if participant refuses or if blood pressure is not taken for a medical reason or amputation. Record 888 if you cannot obliterate.

a) First systolic B.P. measurement :

--	--	--

b) Second systolic B.P. measurement (no waiting time needed) :

--	--	--

1 = posterior tibial

2 = dorsalis pedis

45. Left ankle Doppler blood pressure - measure in posterior tibial artery. If not audible, use dorsalis pedis. If neither is audible, record zero. Record 999 if participant refuses or if blood pressure is not taken for a medical reason or amputation. Record 888 if you cannot obliterate.

a) First systolic B.P. measurement :

--	--	--

b) Second systolic B.P. measurement (no waiting time needed) :

--	--	--

1 = posterior tibial

2 = dorsalis pedis

For item 46, use left arm if left arm is used for standard blood pressure reading.

46. Right arm Doppler blood pressure - brachial artery.

a) First systolic B.P. measurement :

--	--	--

b) Second systolic B.P. measurement (no waiting time needed) :

--	--	--

47. Pedal edema (1= Absent, 2= Mild, 3= Marked, above midpoint between malleolus and patella)

D. HEART EXAM - With the diaphragm, listen to 5 or more beats at the apex (PMI), left sternal border at the 5th intercostal space, left sternal border at the 2nd intercostal space and right sternal border at the 2nd intercostal space. Then turn the stethoscope to the bell and listen at the apex for five additional beats. (The patient may be turned partially on their left side to bring the heart closer to the chest wall and facilitate auscultation at the apex).

48. Presence of S₃ gallop : (1=yes, 2=no)

49. Is there a murmur present ? if no, skip to Question 54. (1=yes, 2=no)

50. Is ejection murmur present ? (1=yes, 2=no)

If no, skip to Question 52.

51. If yes in item 50, describe murmur

0= No murmur

1= Barely audible

2= Easily audible

3= Intermediate

4= Intermediate-palpable thrill

5= Louder but requires stethoscope to hear

6= Heard with stethoscope off chest

52. Other type of murmur (Check all that apply)

1. holosystolic (1=yes, 2=no)

2. diastolic rumble (1=yes, 2=no)

3. diastolic regurgitation (1=yes, 2=no)

53. Location (Check all that apply)

a. Apex

1. holosystolic (1=yes, 2=no)

2. diastolic rumble (1=yes, 2=no)

3. diastolic regurgitation (1=yes, 2=no)

b. Left sternum 5th ICS

1. holosystolic (1=yes, 2=no)

2. diastolic rumble (1=yes, 2=no)

3. diastolic regurgitation (1=yes, 2=no)

c. Left sternum 2nd ICS

1. holosystolic (1=yes, 2=no)

2. diastolic rumble (1=yes, 2=no)

3. diastolic regurgitation (1=yes, 2=no)

d. Right sternum 2nd ICS

1. holosystolic (1=yes, 2=no)

2. diastolic rumble (1=yes, 2=no)

3. diastolic regurgitation (1=yes, 2=no)

54. Evidence of chest surgery or chest deformity (1=yes, 2=no)

If yes, specify -----

IV. ADMINISTRATIVE INFORMATION

55. Code number of person completing this form

56. Date of data collection

<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
mo	day	yr

APPENDIX 29

Checklist for Quarterly Observation of BP Technicians and New Employees
by BP Supervisor
(To be sent quarterly to the Coordinating Center)

BP Technician Code # _____ Observer Code # _____

Date Observed / / (Month/Day/Year)

=====

Instructions: For each item, check "yes" or "no" in the space provided to indicate if the procedure is carried out correctly. Record any comments in the blank line between that item and the next. For certain items specific parts of the procedure which are important are listed separately.

- | | | |
|---|---------|--------|
| Measures arm for correct cuff size | () Yes | () No |
| Palpates brachial artery | () Yes | () No |
| Marks pulse point | () Yes | () No |
| Wraps cuff center of bladder over brachial pulse | () Yes | () No |
| Leaves subject for five minutes rest | () Yes | () No |
| Instructs on Posture | () Yes | () No |
| Full five minutes for rest allowed | () Yes | () No |
| Work station free of excessive noise | () Yes | () No |
| Finds Pulse obliteration point using standard manometer | () Yes | () No |
| Calculates peak inflation, standard manometer | () Yes | () No |
| Places stethoscope in ears | () Yes | () No |
| Inflates rapidly to peak | () Yes | () No |
| Counts full 5 seconds with pressure steady | () Yes | () No |
| Places bell on brachial pulse | () Yes | () No |
| Deflates cuff 2 mmHg per second | () Yes | () No |
| Deflates cuff after 2 absent sounds | () Yes | () No |
| Records readings | () Yes | () No |
| Disconnects tubes | () Yes | () No |
| Instructs to hold arm vertical for full 5 seconds | () Yes | () No |
| Waits at least 30 seconds before proceeding | () Yes | () No |
| Informs participant of average readings of 2nd and 3rd blood pressure | () Yes | () No |

Special Comments:

Form for Recording Simultaneous Blood Pressure Observations On A Volunteer
by Two Technicians

Instructions: Approximately every 4 months, each technician should be part of a pair of

technicians who simultaneously measure blood pressure using a Y-tube on a volunteer (not a Strong Heart participant). Each technician should separately record his/her measurements on a standard paper Strong Heart SBP form. The blood pressure supervisor should then transfer the results to this form and calculate the differences between the two sets of measurements. If the difference on any individual measurement is greater than 4 mmHg, or if the averages of the three readings for each technician differ by more than 3 mmHg, the supervisor should indicate the corrective action taken on this form. Any further sets of simultaneous measurements for a given pair should appear on a new form. A copy of each form should be sent to the Coordinating Center.

Technician IDs:	1st ID: 1st Technician	2nd ID: 2nd Technician	Date: Difference
a. Initial Arm Circumference (cm)	-----	-----	-----
b. Initial Cuff Size Selected	-----	-----	-----
c. Pulse Obliteration Pressure	-----	-----	-----
d. First SBP	-----	-----	-----
e. First DBP	-----	-----	-----
f. Second SBP	-----	-----	-----
g. Second DBP	-----	-----	-----
h. Third SBP	-----	-----	-----
i. Third DBP	-----	-----	-----
j. Average SBP	-----	-----	-----
k. Average DBP	-----	-----	-----

Action taken if differences between technicians exceed limits specified:

Monthly Log for Sitting Blood Pressure Station

Field Center: Arizona _____ Oklahoma _____
 Pine Ridge _____ Eagle Butte _____ Ft. Totten _____
 Month _____ Year _____

Monthly Check Procedures:

	Month				
	1	2	3	4	5
1. Sphygmomanometer:	=====				
Date of Check	_____	_____	_____	_____	_____
A. Check Tube for Oxide Dust	_____	_____	_____	_____	_____
B. Check Cap for Tightness	_____	_____	_____	_____	_____
C. Check that mercury is at zero with no pressure	_____				

List any problems found and corrective action taken:

Procedures performed only if there appear to be problems:

- D. If mercury bounces even though the cap appears tight, remove cap, clean of any mercury beads, and check opening at top of tube for dust

Check Needed and Performed during weeks 1 2 3 4 5
 (Circle number of weeks applicable)

- E. If tube appears "dirty" (oxidized mercury) remove cap, tip manometer to retract mercury, run pipe cleaner down, replace cap

Needed and Performed during weeks 1 2 3 4 5

F. For any other problems contact control center for instructions before proceeding. List the problem encountered, the date, and the actions taken below:

2. Measuring tape for arm circumference worn or stretched Check by holding the zero mark of the tape against the ruler used to measure standing height at the 150 cm mark. If the 30 cm mark on the tape used for arm circumference falls outside the range 119.5 to 120.5 on the standing height ruler it should be replaced.

Month: 1 2 3 4 5
=====

Date of check: _____

Point on height ruler where 30 cm on tape falls _____

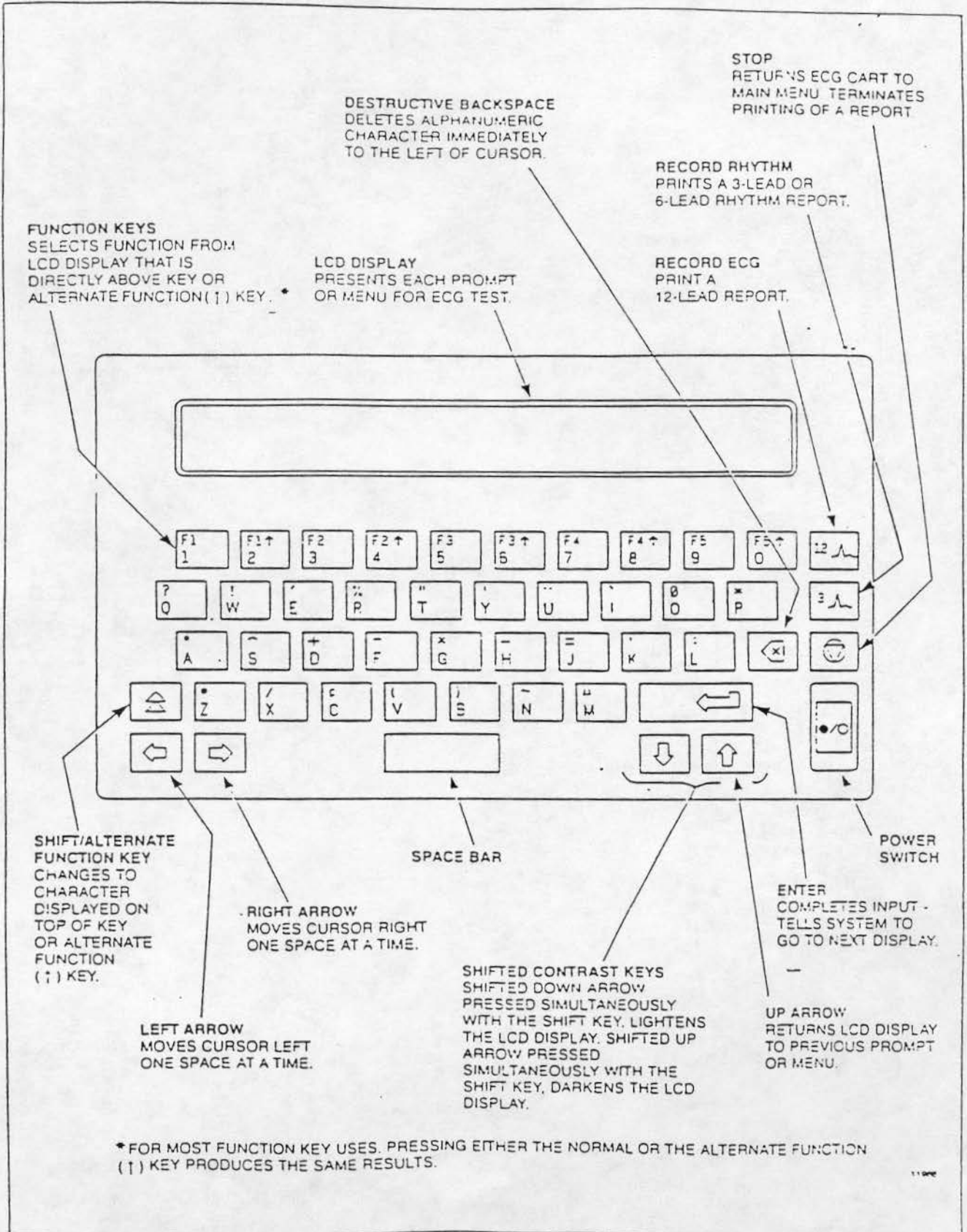
Maintenance Procedures for Standard Sphygmomanometer

The following checks should be conducted at least every month, and a log kept of the dates and the people carrying out the troubleshooting (see Appendix IV).

1. With the instrument placed flat on the table, and the inflation system disconnected, the level of mercury should read zero in the standard instrument. If the reading is either above or below the zero mark, mercury should be added or withdrawn until it does read zero. The top of the meniscus is on the zero line when the eyes are level with this line and the mercury is correctly adjusted.
2. The inflation system should then be reconnected, and the cuff rolled around a bottle and secured. The valve should be closed on the Air Flo system, and the instrument inflated until the mercury rises to 240 mmHg. The Air Flo valve should then be slowly opened and the mercury allowed to fall to 200 mmHg. The valve should then be closed, at which time the mercury column should remain stable. If the column continues to fall, there is an air leak, and the following steps should be taken:
3. The system should be reinflated until the column rises to 200 mmHg. The tubing should be pinched at various locations to localize the area of the leak. Appropriate replacement of the tubing, cuff, or valve should be performed.
4. With the instrument inflated above full calibration, the screw cap should be examined for mercury leaks. If this happens, the screw cap should be tightened. If the leak persists or the mercury is seen at the bottom of the tube, the silicone rubber which provides a seat for both ends of the glass tube should be replaced.
5. With time, the mercury will become dirty and an oxide layer will be deposited on the inside of the glass tube. The instrument should be laid nearly on its side (on a tray) so that the mercury will return to the reservoir and none can be seen in the glass tube. The tube should be removed carefully and cleaned out using the long pipe cleaner supplied with this instrument. The tube should then be replaced and the zero level rechecked.

Since mercury is a toxic substance, all maintenance procedures must be performed carefully and with attention to safety. Mercury should not be allowed to get in contact with rings and other jewelry.

APPENDIX 33 – MAC-PC Setup




Cardiograph Setup

Although your MAC PC will operate perfectly when you first receive it from the factory, you'll want to "set up" a lot of the details such as date and time, the name of your institution, types of reports you want printed, etc. Once these details are set, the cardiograph will retain them until you change the details again.



To turn on Power press



To begin cardiograph setup, press  to display the *Main Menu*:

```



↑Task      V1+II+V5
PatInfo    Rhythm  25mm/s   10mm/mV 100Hz
    
```

Next, press  and  at the same time to display the System Functions menu:

```

                System Functions
Storage  Setup  Diag  RevXmit Monitor
    
```

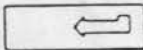


Select Setup (F2) by pressing either  or . The following display will appear if a Level 1 password has been entered:

```

Password:  _
    
```

Press Keys "L" and "1" (numeric one, not lowercase "L"), then press



Cart Setup

Dat/Tim Phone LdGrps Reports More

f1 1 f1 2 f2 3 f2 4 f3 5 f3 6 f4 7 f4 8 f5 9 f5 0

Step Step Step Step

A B C D



Cart Setup

Modem Passwds Misc Defaults More

f1 1 f1 2 f2 3 f2 4 f3 5 f3 6 f4 7 f4 8 f5 9 f5 0

Step Step Step Step

E F G H



Cart Setup

Timeout RS232 Monitor More

f1 1 f1 2 f2 3 f2 4 f3 5 f3 6

Step Step Step

I J K

<u>Step</u>	<u>Contents</u>
A.	Date/time
B.	Phone
C.	Lead Groups
D.	Report Formats
E.	Auto Dial
F.	Passwords
G.	Miscellaneous
H.	Defaults
I.	Timeout

Each of the above steps is explained in the following pages.

Step A: Date and Time Setup

Date and Time Setup
Date Time

Press Backspace-delete to erase.

1 2



Today's Date (DD-MMM-YY):
DD=Day, MMM=Month Name, YY=Year

Type day + dash
+ month + dash
+ year and press



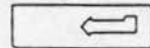
Date and Time Setup
Date Time

3 4




Time (HH-MM):
HH=Hour, MM=Minute (24 Hr Clock)

Type hour +
dash + minute
and press



Date and Time Setup
Date Time

Press  to
return to the
Main Menu.

Step B: Phone Setup

Cart Setup
Dat/Tim Phone LdGrps Reports More

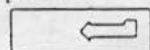
3 4




Phone Number
0-9 # * = , 9=18005314784

Some Universities need 8 to get off campus, you might need 9 or nothing. "=" gives a pause for off-campus dial tone. "1" is for long distance. The rest is the Fitzsimons EKG Center toll free access number.

*Type phone number. Then press



Cart Setup
Modem Passwds Misc Defaults More

Press  to
return to the
Main Menu.

Step C: Lead Groups-Rhythm Leads Setup

Lead Groups

Rhythm Standrd RMR 4x2.5



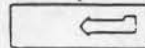
These should NEVER need to be changed.

Group:

AutoRhm Group1 Group2 Group3 Group4



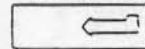
Select a group.
The previously
chosen leads
will appear.
Then press




Number of Rhythm Leads: 3

3 6

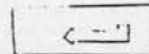
Select the
number of
rhythm leads
you want on
writer reports.
Then press



Select 1 of 12 available leads for each of the 3 or 6 rhythm channels; pressing  after each selection. In the example below, the displays for the 12 available leads are shown for channel 1:

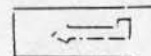
Ch 1: V1

I II III More



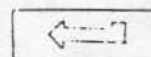
Ch 2: II

I II III More



Ch 3: V5


I II III More



Rhythm Leads Setup (Cont)

After selecting a lead for each of the channels, the following will appear:

Lead Groups			
Rhythm	Standrd	RMR	4x2.5

Press  to return to the *Main Menu*.

Step D: Report Formats Setup

Report Formats for:	
Confmd	Unconf


Do not configure confirmed.

Press F2 for Unconfirmed.

F1	F1	F2	F2
1	2	3	4



For each of the following LCDs press either F1 keys for "YES", F2 keys for "NO";

and  to store the report information.

Suppress Orig Rpt Interpretation:		NO
Yes	No	

Clinic choice here.
Marquette interpretation may be printed on ECG.

F1	F1	F2	F2
1	2	3	4



Suppress Copy Interpretation:		NO
Yes	No	

F1	F1	F2	F2
1	2	3	4

(Phoenix enters F1 or F2 for "YES")



Report Formats Setup (Cont)

Suppress Text Page: NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



Rhythm and Morphology Report (RMR): NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



(1) 1 Complex / Lead: NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



(2) Automatic Rhythm (1x10): NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



(3) 12 Lead (4x2.5): YES
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------

This is the ONLY format to be printed.



(4) Separate Text Page for 4x2.5: NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



(5) 1 Page 4x2.5 with Rhythm: NO
Yes No

r1 1	r1 2	r2 3	r2 4
---------	---------	---------	---------



Report Formats Setup (Cont)

12 Lead (2x5):	NO
Yes No	

r1	r1	r2	r2
1	2	3	4

12 Lead (2x10):	NO
Yes No	

r1	r1	r2	r2
1	2	3	4

12 Lead (4x10):	NO
Yes No	


r1	r1	r2	r2
1	2	3	4

12 Lead (2x5 at 50mm/s):	NO
Yes No	

r1	r1	r2	r2
1	2	3	4

Report Formats for:
Confirmd Unconf

From here, press "RETURN" key

When you return to the start, press  to return to the Main Menu.

Step E
Modem Setup — Auto Dial

Cart Setup
Modem Passwds Misc Defaults More

F1 1 F1+ 2

Speaker On: Dialing Only
Dial Always

F1 1 or F2 3

Dialing: Auto Dial
Manual Auto

F2 3 F2+ 4

Dialing Format: Touch Tone
Pulse T Tone

or "PULSE"
(may vary by site)

F1 1 or F2 2

Dial Tone Required: YES
Yes No

F1 1 or F2+ 4

Dial Tone Time: 1s
1s .2s

F1 1 or F2+ 4

Modem Transmit Power Level: -9dBm
-6dBm -7dBm -8dBm -9dBm More

F1 1 F1+ 2 F2 3 F2+ 4 F3 5 F3+ 6 F4 7 F4+ 8 F5 9 F5+ 0

Transmit Synch Time: 148.3ms
800ms 220ms 148.3ms 90ms More

F1 1 F1+ 2 F2 3 F2+ 4 F3 5 F3+ 6 F4 7 F4+ 8 F5 9 F5+ 0

Answer Tone Frequency: 2025 Hz
2025Hz 2100Hz

F1 1 F1+ 2 F2 3 F2+ 4

Answer Tone Wait (in sec.s): 180
5-600

Step F: Password Setup

Cart Setup
 Modem Passwds Misc Defaults More

f2 1
 3 4



System Passwords
 Level 1 Level 2

f1 1 f1 2 f2 3 f2 4

Password are preset as L1 for Level 1 as all aspects of programability.

Step G: Miscellaneous Setup

Cart Setup
 Modem Passwds Misc Defaults More

f3 5 f3 6



For each of the following prompts, type in an appropriate response or press a function (F) key. Then press to store that information.

Line Frequency: 60Hz 50Hz 60 Hz

f1 1 f1 2 f2 3 f2 4

The Cart ID is site specific.

Cart ID: 0-255

Phoenix MAC PC = 43
 Phoenix MAC 12 = 44

Site ID: 1-255 3

Okalhoma MAC PC 1 = 48 *< Lawton*
 Oklahoma MAC PC 2 = 49 *< Andarko*
 50 *(OKC / Carnegie)*
 Rapid City
 Eagle Butte = 59
 Pine Ridge = 60
 Fort Totten = 61

Institution Name: Strong Heart Study
 Up to 40 Characters

Number of Patient ID Digits: 1-12 11

Miscellaneous Setup (Cont)

Height/Weight: cm/kg
 in/lb cm/kg

This may be omitted in the SHS.

1 2 3 4

Input Patient Age As: DOB
 DCB Years

DOB = Date of Birth

1 2 3 4

Ask Blood Pressure Questions: NO
 Yes No

NO

1 2 3 4

Ask Options Question: NO
 Yes No

NO

1 2 3 4

Supress Normal Statement:
 Yes No NO NO

ECGs to Store/Transmit: All ECGs
 All Abnormal

ALL

1 2 3 4

Supress Border & ABN Starts
 Yes No NO NO

Delete ECGs after Transmission: SAVE
 Save Delete

SAVE. It is very important to change this to SAVE. By default the machine deletes ECGs as soon as they are transmitted, without waiting for confirmation from Halifax.

1 2 3 4

Store/Transmit Control: Store
 Store Transmit

Store

1 2 3 4

Power Up Speed: 25 mm/s
 25mm/s 50mm/s

25 mm/s

1 2 3 4

Power Up Filter: 100 Hz
 40Hz 100Hz

100 Hz

1 2 3 4

Miscellaneous Setup (Cont)

Screening Criteria: NO

Yes No

NO

^{r1} 1 ^{r1} 2 ^{r2} 3 ^{r2} 4

Baseline Roll Filter: .16 Hz

.01Hz .02Hz .16Hz .32Hz

.16 Hz

^{r1} 1 ^{r1} 2 ^{r2} 3 ^{r2} 4 ^{r3} 5 ^{r3} 6 ^{r4} 7 ^{r4} 8

QC Baseline Drift: NO

Yes No

NO


^{r1} 1 ^{r1} 2 ^{r2} 3 ^{r2} 4

QC Muscle Tremor: NO

Yes No

NO

^{r1} 1 ^{r1} 2 ^{r2} 3 ^{r2} 4

Press  to return to the Main Menu.

Step H: Defaults Setup

Cart Setup

Modem Passwds Misc Defaults More

^{r4} 7 ^{r4} 8



Are You Sure???

Yes No

NEVER say yes to return original factory setup defaults, because that will set the machine to delete ECGs after transmission.

^{r1} 1 ^{r1} 2 ^{r2} 3 ^{r2} 4



Returns LCD to the following display.



Returns the MAC PC to its original factory setup defaults. *Any setup changes that you made will be lost.*

Step I: Timeout Setup

Cart Setup				
Modem	Passwds	Misc	Defaults	More

F3 9 F5 0



Cart Setup			
Timeout	RS232	Monitor	More

F1 1 F2 2



Automatic Timeout (minutes):					10
1	5	10	30	none (ac)	

This saves the battery.


F1 1 F2 2 F3 3 F4 4 F5 5 F6 6 F7 7 F8 8 F9 9 F0 0

Select F1 to set a 1-minute timeout, F2 to set a 5-minute timeout, F3 to set a 10-minute timeout, F4 to set a 30-minute timeout, or F5 to set an indefinite timeout length.


“Timeout” is the amount of time it takes for the LCD to go blank when the MAC PC is not being used.

If the none (ac) is selected, the timeout length will be indefinite only if a power module is attached to the MAC PC and the battery status (section 12) message indicates “OK” or “FULL”. Otherwise, if a power module is NOT attached, then the timeout length will be set to 10 minutes.


Cart Setup			
Timeout	RS232	Monitor	More

Press  to return to the Main Menu.

Entering Patient Information

NOTE: It is NOT necessary to enter any patient information in order to take a resting ECG. You can record an ECG at any time—if the *Main Menu* is displayed—by just pressing . If you do not enter the patient's name and identification number, the patient will be identified by the date and time when the ECG was taken.



NOTE: When a patient's age is entered and the patient is 15 years old or less, then a pediatric 12SL analysis is performed on the ECG data. However, if NO age is entered, then the MAC PC will always perform an adult analysis.

If the *Main Menu* is not already displayed, then press  to return to it:

↑Task V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV 100Hz

Hit either F1 or F1

Next, press either  or  to select PatInfo (F1). One of the following two prompts will appear:

Patient Last Name:
A to Z, Space,

Enter names

OR

New Patient:
Yes No

-This won't show up if the machine was just turned on.
-Hit either F1 button if it is a new person
-Hit either F2 button if you want to correct an entry and/or take another ECG on the same person.

Patient First Name:
A to Z, 0 to 9, space, ,

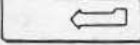
Patient ID:
Digits 0 to 9

This is actually an 11 digit ID
Enter five (5) 0 followed by
6 (six) digits Strong Heart Study ID.

Referred By:
(Physician Name)

Skip over 



Location Number:
0 to 99

Skip over 

Room Number:
Any 5 Characters

This is the Interviewer #
Enter your SHS Code here.

Date of Birth (DD-MM-YY):
DD=Day, MM=Month Name, YY=Year

To type dash press  and 
at the same time.
MM= Letters of Month
(JAN, FEB, MAR, ... , etc.)
YY= Year (89, 90, etc.)

Height: (in cm)

Skip over 

Weight: (in Kg)

Skip over 

Sex:
Male Female

Indicate sex,
Hit either F1 or F2.

Race:
Cauc Black Oriental Hisp More

Choose "More".
Hit either F5.

Race:
Unknown Indian

Choose "Indian"
Hit either F3


 

Medication:
None Unknown Add Scroll

If on CARDIAC medication,
enter either F4. Find
medication and enter.
(This is NOT part of Strong
Heart Study essential information)

The MAC PC is now ready to take a 12-lead ECG.

Press  to start.

Fault Detection Procedures

Should problems with noise or drift be encountered, electrodes are replaced. The following is a guide for determining which electrodes may be faulty. The underlined electrodes are the predominant determinants of the appropriate lead and therefore are most likely to be the faulty electrodes for a given lead. After adjustment or replacement of suspect electrodes, the electrocardiograph should be able to record 10 seconds of good data.

Lead Affected	Possible Faulty Electrode
I	RL, RA, LA
II	RL, RA, LL
III	RL, LA, LL
aV _R	RL, RA, LL, LA
aV _L	RL, LL, RA, LA
aV _F	RL, LL, RA, LA
V ₁	RL, LL, RA, LA, V ₁
V ₂	RL, LL, RA, LA, V ₂
V ₃	RL, LL, RA, LA, V ₃
V ₄	RL, LL, RA, LA, V ₄
V ₅	RL, LL, RA, LA, V ₅
V ₆	RL, LL, RA, LA, V ₆

Self-Evaluation of Technical Performance

This section allows technicians to monitor their own ECG technique. It is intended to help technicians who are having difficulty meeting the quality standards set by the ECG Reading Center. These data are not intended to be collected by the study.

The technician examines the ECG tracing to estimate the noise level and baseline drift. Based on the requirements of the Minnesota Code, acceptable and unacceptable levels of noise and baseline drift have been established. These levels are scored using the following table:

Noise Grade	Overall (mm)	Beat-to-beat Drift (mm)	Quality Drift (mm)
1	< .25	< 1	< 1
2	< .50	< 2	< 1.5
3	< 1	< 3	< 2
4	< 2	< 4	< 3
5	> 2	> 4	> 3

The grade levels given in this table are related to the ability of the analysis program to achieve the required accuracy. Quality Grade 5 is unacceptable. ECGs of Quality Grade 5 must be deleted from the machine's memory and retaken immediately.

1. First, the tracing is examined for obvious errors such as right arm/left arm and other common lead misplacement (see Figure 4, negative p-waves in I indicate lead switch). These ECGs must be deleted from the machine's memory and retaken immediately.

2. The Quality Grade for noise is obtained by measuring the noise level as vertical peak-to-peak values in terms of number of small paper divisions (smallest grid squares). Note that recording sensitivity is 1 mV per centimeter, (one small paper division = 1 mm = 0.1 mV). A noise level of more than 2 small paper divisions (> 0.2 mV peak to peak) is unacceptable (Figure 5).
3. The Quality Grade for overall drift is obtained by searching each of the 12-leads for the maximum and minimum baseline levels within that lead (as determined by the PR and/or TP segments) over the 10 second recording and measuring the vertical distance between them. A distance of more than 4 small paper divisions is unacceptable (Figure 6).
4. The Quality Grade for beat-to-beat drift is determined by searching for the pair of successive QRS complexes having the largest amplitude difference (vertical distance) between successive PR segments. A difference of more than 3 small paper divisions (> 0.3 mV) indicates an unacceptable record (Figure 7).

Improvement in technical quality will indeed result if the prescribed procedure for electrode position marking, electrode and skin preparation, electrode replacement and equipment use are carefully followed. Baseline drift problems, which are essentially caused by poor electrode-skin contact are particularly easy to remedy, as is 60-cycle interference.

Sixty-cycle interference is characterized by perfectly regular fine oscillations occurring at the rate of sixty per second (Figure 8).

Electrical equipment of any kind may be the source of AC interference on an ECG in all leads or only certain ones. Check quality of skin preparation and electrode contact. Check leadwires and resecure attachment of the alligator clip to the electrode. Make sure participant does not touch any metal part of the bed or other equipment. Proximity to a wall with hidden wiring or a partially broken cable may also cause this problem.

Muscle Tremor causes irregular oscillations of low amplitude and varying rapidity superimposed upon the ECG waveform (Figure 9). Muscle tremor is the involuntary muscle activity of a participant whose state is tense, apprehensive, or uncomfortable. This is why a clear explanation of the electrocardiogram test and reassurance are necessary for the participant. The participant is asked if the temperature of the room is too low for her/him and is covered with a blanket if so.

Original Hard Copy Record

The original 12-lead ECG record is filed at the field center. If the clinic needs a second "original" ECG, it can be printed from the machine's memory anytime before deletion of the ECG. The first hard copy ECGs are read locally by clinic physicians for notification and referral if needed. The records are then placed in participants' local data files. Double-check that this participant is correctly identified.

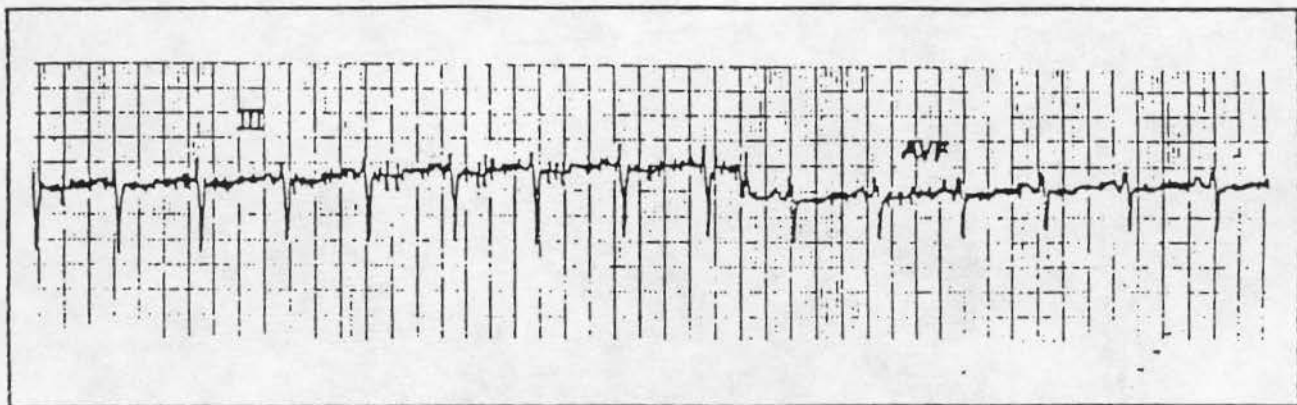


Figure 5. Unacceptable Noise Level

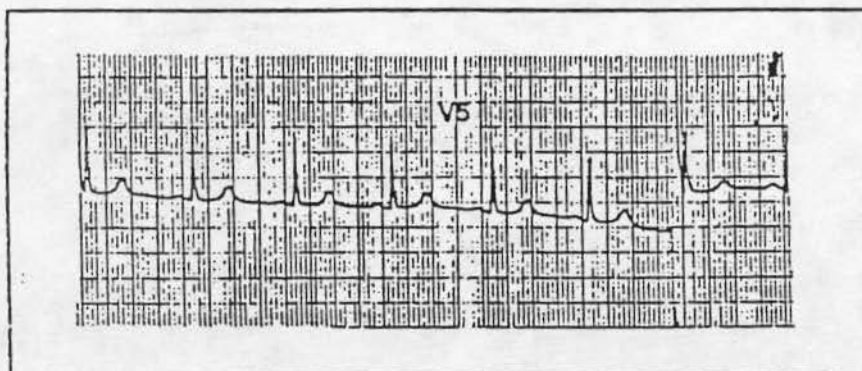


Figure 6. Unacceptable Overall Baseline Drift

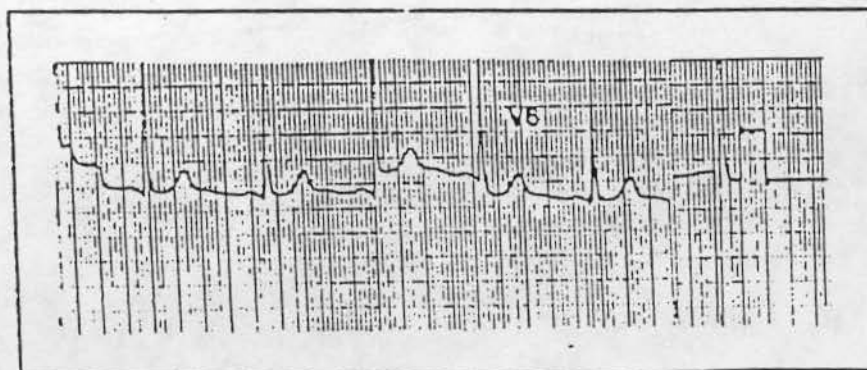


Figure 7. Unacceptable Beat-to-Beat Baseline Drift

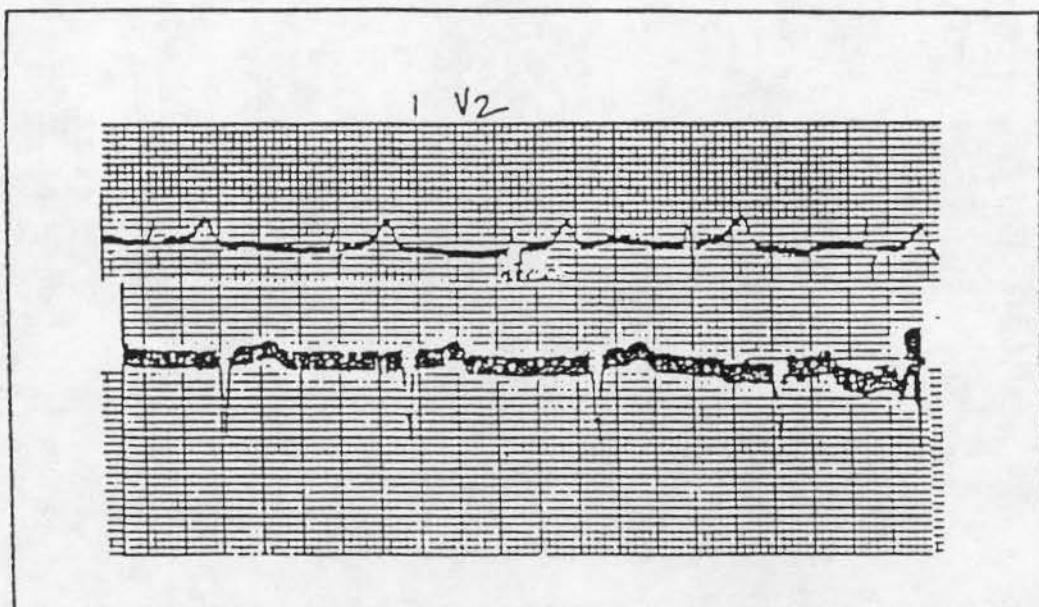


Figure 8. Sixty-Cycle Interference

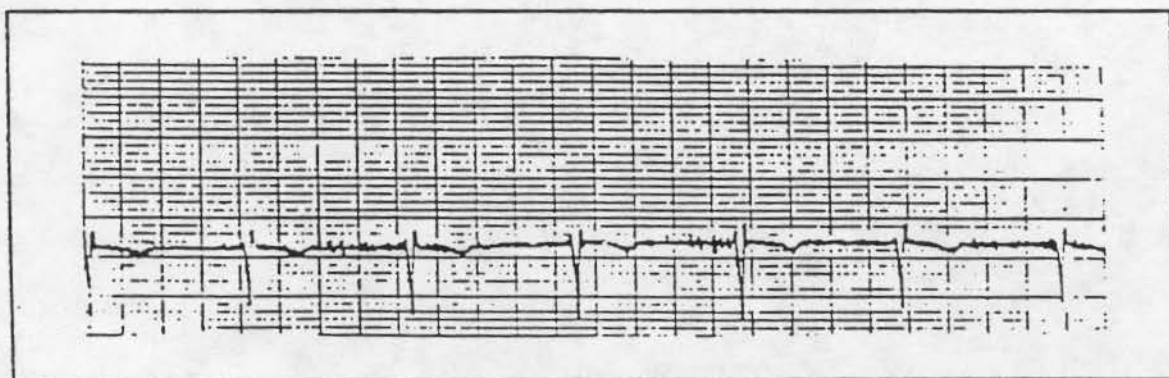
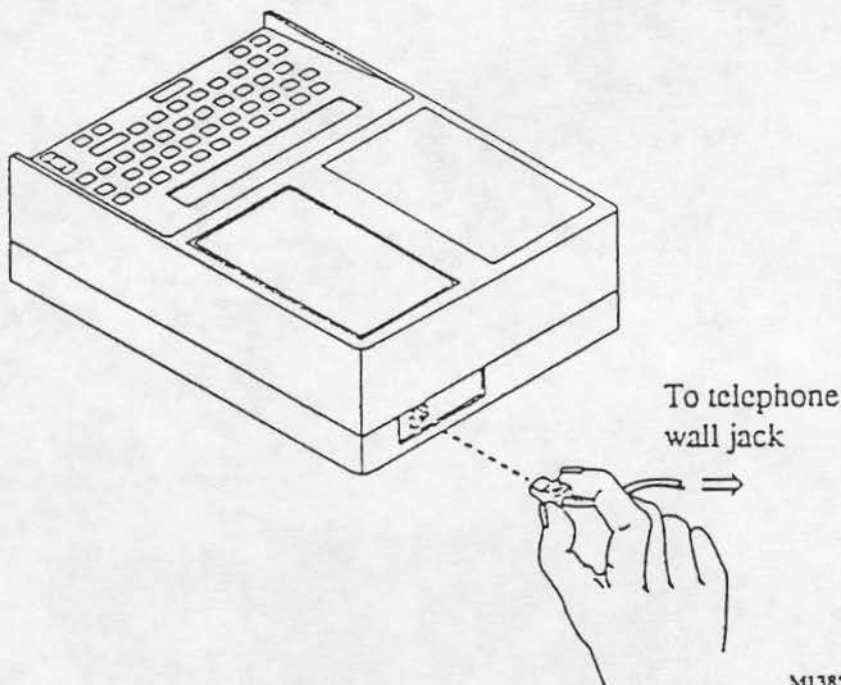



Figure 9. Artifact Caused by Muscle Tremor

NOTE: Only a MAC PC equipped with a modem can transmit ECG reports by telephone.



1. Prepare the MAC PC as described in section 1.
2. Connect a telephone cord from a telephone wall jack to the back-panel jack on the MAC PC:



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3. If the *Main Menu* is not already displayed, press  :

↑Task	V1+II+V5		
PatInfo	Rhythm	25mm/s	10mm/mV 100Hz

4. Press  and  to display the System Functions menu. Then press one of the two keys listed under each of the following displays:

System Functions
Storage Setup Diag RevXmit Monitor





Storage Functions
Plot Dirctry Summary Delete More




Storage Functions
Transmit Edit Format More



Transmission type
Phone Local RS232

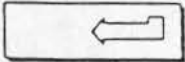
 



** No Data in Storage **

OR

Phone Number:
0-9 # * = ,

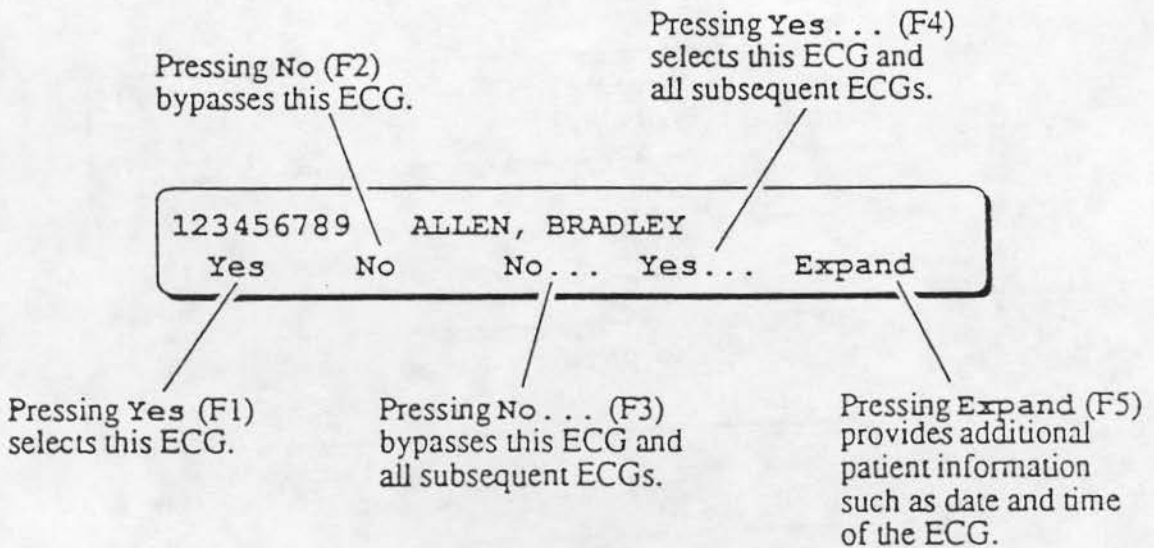
5. If the second display appears, type in the phone number of the location where you will be transmitting and press 

The # and * are touch-tone symbols.

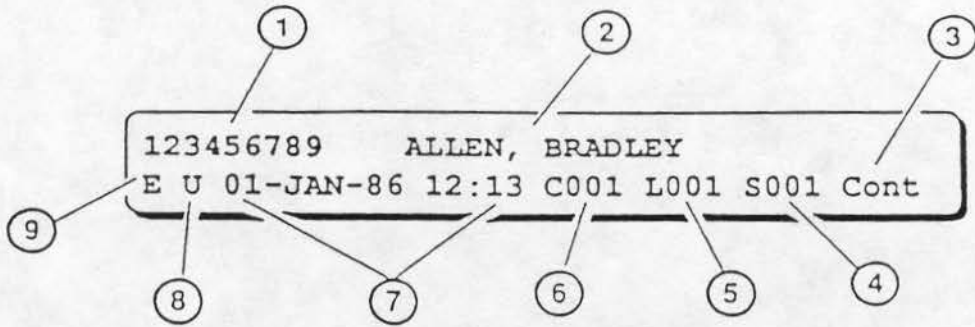
The , sign provides a 2-second pause and may be used repeatedly for longer pauses. (For example, in the phone number 1,,,8081112345 there will be a 6-second pause between the numbers "1" and "8" when dialing.)

The = sign is used to wait for a dial tone. (For example, in order to dial an outside number, your phone system may require you to dial "9" first. A sample number would look like this: 9=1234567.)

6. Next, patient data on each stored ECG will be displayed similar to the following:



7. To display additional patient information, press **Expand (F5)** and a message similar to the one below will be displayed:



- | | |
|--|---|
| ① Patient identification number. | ⑥ Cart number of the unit where ECG was recorded. |
| ② Last name, first name of patient or the date and time when ECG was recorded. | ⑦ Date and time of ECG acquisition. |
| ③ Select to return to former display. | ⑧ A U means that the ECG is unconfirmed. An C means that the ECG is confirmed. (Use the Edit function described in section 6 to change an unconfirmed ECG to a confirmed ECG.) |
| ④ MUSE site number where ECG was recorded. | ⑨ Type of data. E stands for ECG. |
| ⑤ Location number where ECG was recorded. | |

8. Depending on which ECGs you want to transmit or bypass, press the appropriate function (F) key.

9. After selecting the ECGs you want to transmit, displays similar to the following will appear:

```
    ** Batch Transmission **  
Waiting for Dial Tone
```

THEN

```
    ** Batch Transmission **  
Dialing 1112345
```

THEN

```
    ** Batch Transmission **  
Waiting for an Answer Tone
```

THEN


```
    ** Batch Transmission **  
123456789  JONES, JACK
```

10. After the last ECG has been transmitted, a message indicating the number of ECGs that were transmitted vs the number you selected to transmit will be displayed similar to the following:

```
  5 of 5 Transmitted  
Type Any Key to Continue
```

11. Pressing any key displays the following:

```
    Transmission type  
Phone  Local  RS232
```

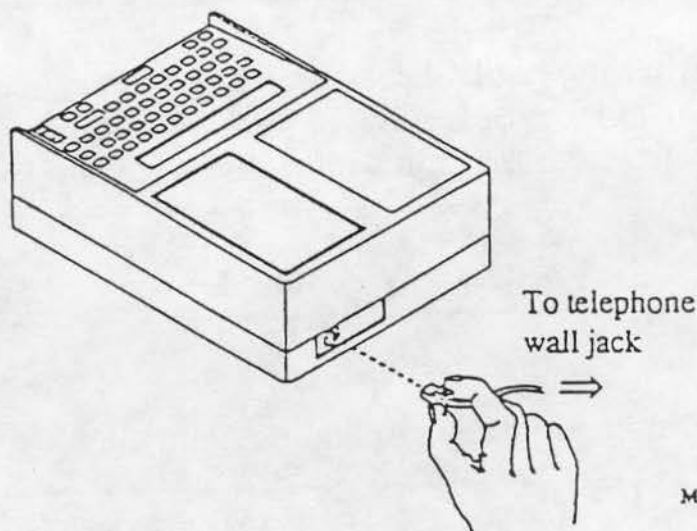
Press  to return to the *Main Menu*.

Receiving by Telephone


NOTE: Only a MAC PC equipped with a modem can receive ECG reports by telephone.

NOTE: If 75% or more of the MAC PC's memory is used, then the message "Plotter Output Only" will appear. This means that incoming data will be printed but NOT stored. In this case, if you want to store incoming data, then delete some ECGs from the MAC PC *before* you begin receiving data (refer to section 9).



1. Prepare the MAC PC as described in section 1.
2. Connect a telephone cord from a telephone wall jack to the back panel jack on the MAC PC:





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3. If the *Main Menu* is not already displayed, press  :

```
↑Task  V1+II+V5
PatInfo Rhythm 25mm/s  10mm/mV 100Hz
```




4. Press  and  to display the System Functions menu:

System Functions
Storage Setup Diag RevXmit Monitor

 
7 8

5. Select RevXmit (Reverse Transmission) to display:

Transmission type
Phone Local RS232



 
1 2

6. Select Phone (F1) and one of the following two messages will appear:

No Data Storage - Plotter Output Only
Type Any Key to Continue

OR

Select Option:
Store Plot

   
1 2 3 4

7. If the second display appears, select Store (F1) to store and print out the ECG(s) you receive, or select Plot (F2) to just print out the ECG(s) without storing them. Then a display similar to the following will appear:

NOTE: When receiving MUSE transmissions, only the Plot (F2) function can be selected.

** Reverse Transmission **
Check the Phone Line

8. If the following message appears, then the telephone line is not attached:

 ** Reverse Transmission **
Phone Line Not Attached

9. Otherwise, the following series of messages will be displayed for each ECG that is received:

 ** Reverse Transmission **
Ready to Receive

THEN

 ** Reverse Transmission **
Answering the Phone

THEN

 ** Reverse Transmission **
Receiving Data

THEN

 ** Reverse Transmission **
End of Data Packet

THEN


 ** Printing Reports **
Page XX of XX

10. After all ECGs have been received, the following will appear:

 ** Reverse Transmission **
End of Transmission

THEN

 ** Reverse Transmission **
Ready to Receive


11. If no other ECGs will be received, then press  to return to the *Main Menu*.

NOTE: Use the `Dirctry` function (section 8) to check that all ECGs have been received.

Since most ECG storage is only temporary, there will probably be times when you want to delete recordings from the MAC PC's memory. Also, there may be times when the memory is almost full, and the MAC PC itself suggests that you delete ECGs. (Refer to the section on "Forced Deletion".) ECGs taken in the Strong Heart Study should be kept in memory until confirmed copy is returned. The machine will not automatically delete ECGs except that procedures are carried out as described in "Forced Deletion".



Routine Deletion

ECGs are usually deleted after you print a paper copy of the ECG or when the ECG is transmitted to another location. To delete one or more ECGs, follow these steps:

1. Prepare the MAC PC as previously described.
2. If the *Main Menu* is not already displayed, press  :

```

Task V1+II+V5
PatInfo Rhythm 25mm/s 10mm/mV 100Hz
  
```

Press  and  at the same time to display the System Functions menu. Then press one of the two keys listed under each of the following displays:

```

System Functions
Storage Setup Diag RevXmit Monitor
  
```

```

F1  F1
1   2
  
```



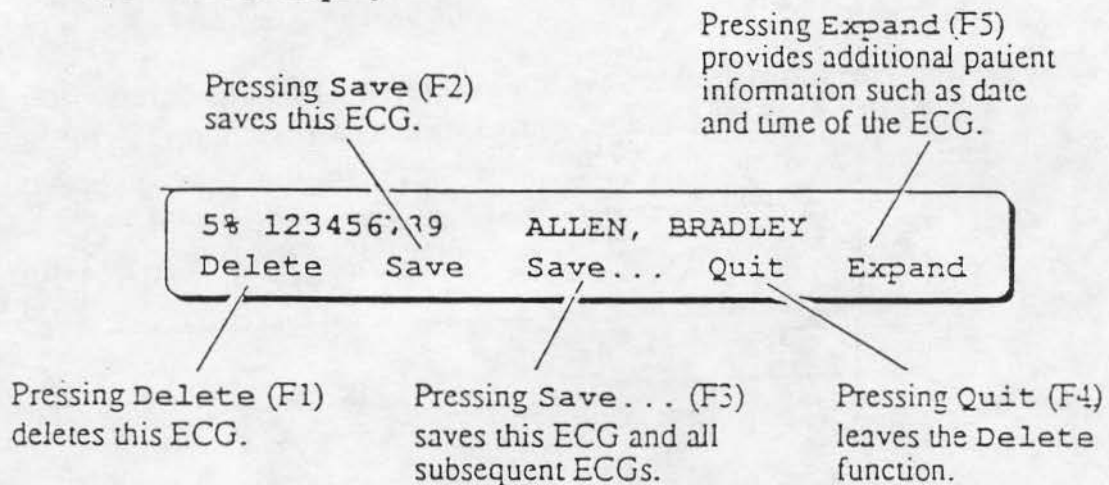
```

Storage Functions
Plot Directory Summary Delete More
  
```

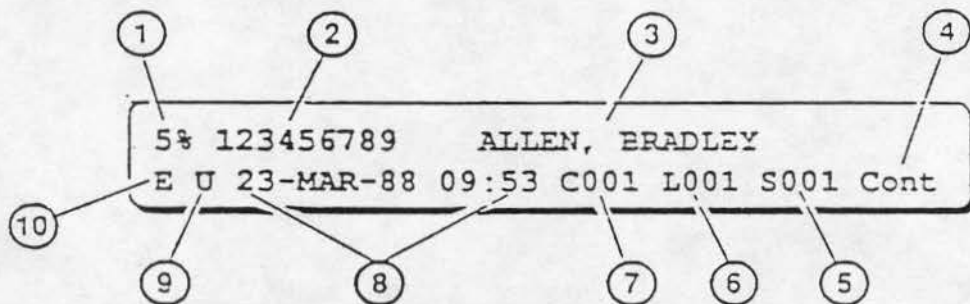
```

F4  F4
7   8
  
```


4. After selecting **Delete** (F4) a message similar to the following one will be displayed:



5. To display additional patient information, press **Expand** (F5) and a message similar to the one below will be displayed:



- | | |
|--|---|
| ① Percentage of memory used by this ECG. | ⑦ Cart number of the unit where ECG was recorded. |
| ② Patient identification number. | ⑧ Date and time of ECG acquisition. |
| ③ Last name, first name of patient or the date and time when ECG was recorded. | ⑨ A U means that the ECG is unconfirmed. An C means that the ECG is confirmed. (Use the Edit function described in section 6 to change an unconfirmed ECG to a confirmed ECG.) |
| ④ Select to return to former display. | ⑩ Type of data. E stands for ECG. |
| ⑤ MUSE site number where ECG was recorded. | |
| ⑥ Location number where ECG was recorded. | |

6. Depending on what you want to delete, save, or bypass, press the appropriate function (F) key.
7. After you have decided which ECGs you want to delete, you have another chance to change your mind. For instance, if you have decided to delete two ECGs, this message would be displayed:

Delete 2 ECG(s)?:
Yes No

F1 1 F1 2 F2 3 F2 4



Cancels the delete.



Deletes the selected ECG(s).

If the ECG you are recording requires more memory than the MAC PC is able to spare, a prompt will appear after the Processing ECG for Storage display:

```
Ecg storage:Insufficient Space Available
Type Any Key to Continue
```

1. Pressing any key to continue causes this message to be displayed:

```
Select Option:
Delete      Quit      Xmit
```

F1	F1	F2	F2	F3	F3
1	2	3	4	5	6

- Select **Delete** (F1) to display one of the ECGs stored in the MAC PC's memory. A small explanation of how each function key affects ECGs stored in the MAC PC follows.
- Select **Quit** (F2) to return to the "Ecg storage: Insufficient Space Available" display.
- Select **Xmit** (F3) if you want the MAC PC to transmit the ECG you just acquired instead of storing it. (Xmit will only appear if your MAC PC is equipped with a modem.)

2. If you select **Delete**, a display similar to the following will appear:

Pressing Expand (F5) provides additional patient information such as date and time of the ECG.

```
( 5%) 24% 123456789 ALLEN, BRADLEY
Delete Save Quit Expand
```

Pressing Delete (F1) deletes this ECG.

Pressing Save (F2) saves this ECG.

Pressing Quit (F4) returns to the "Insufficient Storage" display.

3. To display additional patient information, press Expand (F5) and a message similar to the one below will be displayed:

```

  ①      ②      ③      ④      ⑤
( 5%) 24% 123456789 ALLEN, BRADLEY
⑪ E U 23-MAR-88 09:53 C001 L001 S001 Cont
  ⑩      ⑨      ⑧      ⑦      ⑥

```

- | | |
|--|---|
| <p>① Percentage of storage that must be deleted to provide room for the ECG just acquired. This number decreases as ECGs are selected for deletion.</p> <p>② Percentage of memory used by the ECG on the display.</p> <p>③ Patient identification number.</p> <p>④ Last name, first name of patient or the date and time when ECG was recorded.</p> <p>⑤ Select to return to former display.</p> <p>⑥ MUSE site number where ECG was recorded.</p> | <p>⑦ Location number where ECG was recorded.</p> <p>⑧ Cart number of the unit where ECG was recorded.</p> <p>⑨ Date and time of ECG acquisition.</p> <p>⑩ A U means that the ECG is unconfirmed. An C means that the ECG is confirmed. (Use the Edit function described in section 6 to change an unconfirmed ECG to a confirmed ECG.)</p> <p>⑪ Type of data. E stands for ECG.</p> |
|--|---|

4. After you have either Saved or Deleted all stored ECGs, one of the following two displays will appear:

Not enough ECG(s) selected for deletion
Type Any Key to Continue

OR

Delete 2 ECG(s)?:
Yes No

F1 1	F1 2	F2 3	F2 4
---------	---------	---------	---------

If the first display appears, then you will return to the "Ecg storage: Insufficient Space Available" display. In this case, you will have to start the deletion process all over.

If the second display appears, or one like it, then select Yes (F1) to delete the selected ECGs or No (F2) to return to the "Ecg storage: Insufficient Space Available" display.

5. If you selected Yes (F1), the ECG you just recorded will be stored. Then this message will be displayed:

** ECG Storage Complete **
Type Any Key to Continue

Pressing any key will return you to the *Main Menu*.

APPENDIX 33 (f)
CAPOC MUSE Library Statement

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
IRB-RVE		446	.
SMI-LAE		701	.
AU	, AGE UNDETERMINED	831	.
CSEC	, AND CONSECUTIVE	233	A
SNDQA	, MAYBE SECONDARY TO QRS ABNORMALITY	1139	.
NEW	, NEW	833	.
OLD	, OLD	832	.
RVE+	, PLUS RIGHT VENTRICULAR HYPERTROPHY	441	A
AC	, POSSIBLE ACUTE	830	.
PDIG	, PROBABLY DIGITALIS EFFECT	1670	.
PXT	, WITH POSTERIOR EXTENSION	800	A
AB	ABNORMAL ECG	1699	.
ALAD	ABNORMAL LEFT AXIS DEVIATION	371	A
QRST	ABNORMAL QRS-T ANGLE, CONSIDER PRIMARILY T WAVE ABNORMALITY	1142	A
ARAD	ABNORMAL RIGHT AXIS DEVIATION	381	A
RSAD	ABNORMAL RIGHT SUPERIOR AXIS DEVIATION	382	A
ACCEL	ACCELERATED	33	.
AHE	ACQUISITION FAULT, NO RELIABLE ANALYS, CK ECG BEFORE INTERPRE	1674	.
ACUT	ACUTE	1423	.
PCARD	ACUTE PERICARDITIS	901	A
RAT-DEC	ALTHOUGH RATE HAS DECREASED	1252	.
RAT-INC	ALTHOUGH RATE HAS INCREASED	1253	.
AND	AND	1400	.
AMI	ANTERIOR INFARCT	740	A
AINJ	ANTERIOR INJURY PATTERN	930	A
ANT	ANTERIOR LEADS	1451	.
ALMI	ANTEROLATERAL INFARCT	820	A
ALINJ	ANTEROLATERAL INJURY PATTERN	961	A
ANTLAT	ANTEROLATERAL LEADS	1456	.
ASMI	ANTEROSEPTAL INFARCT	810	A
ASINJ	ANTEROSEPTAL INJURY PATTERN	960	A
ANTSEP	ANTEROSEPTAL LEADS	1455	.
ARE-NOL	ARE NO LONGER	1418	.
ARE-NOW	ARE NOW	1409	.
AFIB	ATRIAL FIBRILLATION	161	A
FLUT	ATRIAL FLUTTER	162	A
AFL	ATRIAL FLUTTER	273	A
AFL-BL	ATRIAL FLUTTER WITH 2 TO 1 BLOCK	288	A
ART	ATRIAL RATE	20	.
ATAC	ATRIAL TRACHYCARDIA	164	A
AVPCK	AV SEQUENTIAL OR DUAL CHAMBER ELECTRONIC PACEMAKER	293	.
BASIC	BASIC RHYTHM	327	.
BAE	BIATRIAL ENLARGEMENT	369	A
BIFB	BIFASCICULAR BLOCK	480	A
BIVH	BIVENTRICULAR HYPERTROPHY	570	A
BLKED	BLOCKED	32	.

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
BO	BORDERLINE	1694	.
BORDCRIT	BORDERLINE CRITERIA FOR	846	.
BORDE	BORDERLINE ECG	1693	.
CRO	CANNOT RULE OUT	1682	.
CITED	CITED ON OR BEFORE	844	.
CWRT	CLOCKWISE ROTAT. OF HEART, INVALIDATE VENTRIC. HYPERTROPHY	305	.
CRS	COARSE	163	.
COMP-HB	COMPLETE HEART BLOCK	281	A
CONSEC	CONSECUTIVE	325	.
CCWRT	COUNTER CLOCK ROTAT OF HEART, INVALIDATE VENTRIC. HYPERTROPHY	306	.
CRIFOR	CRITERIA FOR	843	.
CUR-UND	CURRENT UNDETERMINED RHYTHM, CANNOT COMPARISON, NEEDS REVIEW	320	.
DTOFF	DATA IS OFF LINE AND ON VOLUME	1427	.
QV6	DEEP Q-WAVE IN LEAD V6,	572	.
DPCCK	DEMAND PACEMAKER; INTERPRETATION IS BASED ON INTRINSIC RHYTHM	291	.
DXTRO	DEXTROCARDIA	307	A
REPOL	EARLY REPOLARIZATION	1000	N
QESPMI	EARLY TRANSITION INCREASED R/S RATIO IN V1, POSTERIOR INFARCT	803	A
SEARO	ECTOPIC ATRIAL RHYTHM	64	A
APCK	ELECTRONIC ATRIAL PACEMAKER	292	.
EDP	ELECTRONIC DEMAND PACING	294	.
PCK	ELECTRONIC VENTRICULAR PACEMAKER	290	.
LESSFLT	FEWER LEADS EXHIBIT FLAT T WAVES IN	1211	.
LOWTINVT	FLAT T WAVES HAVE REPLACED INVERTED T WAVES IN	1207	.
LOWT-NOL	FLAT T WAVES NO LONGER EVIDENT IN	1210	.
LOWT-NOW	FLAT T WAVES NOW EVIDENT IN	1212	.
HAS-CHG	HAS CHANGED	1407	.
HAS-DEC	HAS DECREASED	1417	.
HAS-INC	HAS INCREASED	1416	.
HASNOTCH	HAS NOT CHANGED	1408	.
HAS-REP	HAS REPLACED	1415	.
HAV-CHG	HAVE CHANGED	1412	.
HAVNOTCH	HAVE NOT CHANGED	1411	.
HOWEVER	HOWEVER	1401	.
HWVIT	HOWEVER IT	1402	.
IDIO-R	IDIOVENTRICULAR RHYTHM WITH AV BLOCK	268	A
BIGEM	IN A PATTERN OF BIGEMINY	234	O
ILBBB	INCOMPLETE LEFT BUNDLE BRANCH BLOCK	465	B
IRBBB	INCOMPLETE RIGHT BUNDLE BRANCH BLOCK	445	B
INC-MI	INCREASES EVIDENCE OF INFARCTION IN	840	.
INDAX	INDETERMINATE AXIS	390	B
IMI	INFERIOR INFARCT	780	A
IINJ	INFERIOR INJURY PATTERN	950	A
INF	INFERIOR LEADS	1453	.
IPMI	INFERIOR-POSTERIOR INFARCT	801	A
ILINJ	INFEROLATERAL INJURY PATTERN	962	A
IFLAT	INFEROLATERAL LEADS	1458	.

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
INFPOS	INFEROPOSTERIOR LEADS	1457	.
INVTLOWT	INVERTED T WAVES HAVE REPLACED FLAT T WAVES IN	1222	.
NSTNF	INVERTED T WAVES, REPLACED NONSPECIFIC T WAVE ABNORMALITY IN	1219	.
IRR	IRREGULAR	176	.
NOLONG	IS NO LONGER	1405	.
NOW	IS NOW	1406	.
JUNBRAD	JUNCTIONAL BRADYCARDIA	34	A
JUNCT-R	JUNCTIONAL RHYTHM	267	A
JST	JUNCTIONAL ST DEPRESSION, PROBABLE ABNORMAL	1002	A
JSTN	JUNCTIONAL ST DEPRESSION, PROBABLE NORMAL	1001	B
J-TACH	JUNCTIONAL TACHYCARDIA	270	A
LARG	LARGE	884	.
LMI	LATERAL INFARCT	760	A
LINJ	LATERAL INJURY PATTERN	940	A
LAT	LATERAL LEADS	1452	.
AFB	LEFT ANTERIOR FASCICULAR BLOCK	470	A
LABRAD	LEFT ATRIAL BRADYCARDIA	27	A
LAE	LEFT ATRIAL ENLARGEMENT	360	B
LAR	LEFT ATRIAL RHYTHM	30	A
LATACH	LEFT ATRIAL TRACHYCARDIA	28	A
LAD3	LEFT AXIS DEVIATION	372	A
LBBB	LEFT BUNDLE BRANCH BLOCK	460	A
PFB	LEFT POSTERIOR FASCICULAR BLOCK	471	A
LVH2	LEFT VENTRICULAR HYPERTROPHY	541	A
LAD	LEFTWARD AXIS	370	B
LFREQ	LESS FREQUENT	1403	.
LHR	LOW HEART RATE, VERIFY A-V CONDUCTION	287	.
RABRAD	LOW RIGHT ATRIAL BRADYCARDIA	25	A
RAR	LOW RIGHT ATRIAL RHYTHM	29	A
RATACH	LOW RIGHT ATRIAL TRACHYCARDIA	26	A
LOWV	LOW VOLTAGE QRS	410	B
ANACP	MANUAL COMPARISON REQUIRED FOR ANALOG TRACING	1428	.
MRR	MANUAL READING REQUIRED DUE TO INCONSISTENT MORPHOLOGY	1675	.
MSBRAD	MARKED SINUS BRADYCARDIA	24	A
MSTDAL	MARKED ST ABNORMALITY, ANTEROLATERAL SUBENDOCARDIAL INJURY	1081	A
MSTDAS	MARKED ST ABNORMALITY, ANTEROSEPTAL SUBENDOCARDIAL INJURY	1080	A
MSTDIL	MARKED ST ABNORMALITY, INFEROLATERAL SUBENDOCARDIAL INJURY	1071	A
ASBINJ	MARKED ST ABNORMALITY, POSS. ANTERIOR SUBENDOCARDIAL INJURY	1050	A
ISBINJ	MARKED ST ABNORMALITY, POSS. INFERIOR SUBENDOCARDIAL INJURY	1070	A
LSBINJ	MARKED ST ABNORMALITY, POSS. LATERAL SUBENDOCARDIAL INJURY	1060	A
SSBINJ	MARKED ST ABNORMALITY, POSSIBLE SEPTAL SUBENDOCARDIAL INJURY	1040	A

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
MAT	MARKED T WAVE ABNORMALITY, CONSIDER ANTERIOR ISCHEMIA	1151	A
MALT	MARKED T WAVE ABNORMALITY, CONSIDER ANTEROLATERAL ISCHEMIA	1181	A
MIT	MARKED T WAVE ABNORMALITY, CONSIDER INFERIOR ISCHEMIA	1171	A
MILT	MARKED T WAVE ABNORMALITY, CONSIDER INFEROLATERAL ISCHEMIA	1172	A
MLT	MARKED T WAVE ABNORMALITY, CONSIDER LATERAL ISCHEMIA	1161	A
MAFB	MASKED BY FASCICULAR BLOCK	782	.
MINICRIT	MINIMAL CRITERIA FOR	845	.
QRSV	MINIMAL VOLTAGE CRITERIA FOR LVH, MAY BE NORMAL VARIANT	542	B
MOD	MODERATE	883	.
LVH3	MODERATE VOLTAGE CRITERIA FOR LVH, MAY BE NORMAL VARIANT	548	B
MFREQ	MORE FREQUENT	1404	.
MOREFLTT	MORE LEADS EXHIBIT FLAT T WAVES IN	1213	.
MULT-AT	MULTIFOCAL ATRIAL TRACHYCARDIA	280	A
NQTACH	NARROW QRS TACHYCARDIA	236	O
NOPF	NO P-WAVE FOUND	31	A
NOSERIAL	NO PREVIOUS ECGS AVAILABLE	1300	.
NO-CHG	NO SIGNIFICANT CHANGE WAS FOUND	1305	.
ST(INC)	NON-SPECIFIC CHANGE IN ST SEGMENT IN	1116	.
ST(DEC)	NON-SPECIFIC CHANGE IN ST SEGMENT IN	1117	.
IVCB	NON-SPECIFIC INTRA-VENTRICULAR CONDUCTION BLOCK	482	A
IVCD	NON-SPECIFIC INTRA-VENTRICULAR CONDUCTION DELAY	487	B
NST2	NONSPECIFIC ABNORMALITY	1021	.
NST	NONSPECIFIC ST ABNORMALITY	900	A
NSTT	NONSPECIFIC ST AND T WAVE ABNORMALITY	1141	A
NT	NONSPECIFIC T WAVE ABNORMALITY	1140	A
NSTNL	NONSPECIFIC T WAVE ABNORMALITY NO LONGER EVIDENT IN	1214	.
NSTNW	NONSPECIFIC T WAVE ABNORMALITY NOW EVIDENT IN	1215	.
NSTLS	NONSPECIFIC T WAVE ABNORMALITY, IMPROVED IN	1216	.
NSTFT	NONSPECIFIC T WAVE ABNORMALITY, REPLACED INVERTED T WAVES IN	1218	.
NSTM	NONSPECIFIC T WAVE ABNORMALITY, WORSE IN	1217	.
NML	NORMAL ECG	1684	.
NSR	NORMAL SINUS RHYTHM	22	N
NWA	NORTHWEST AXIS	391	A
ODIG	OR DIGITALIS EFFECT	1671	.
ABR	OTHERWISE NORMAL ECG	1687	.
PEDANL	PEDIATRIC ECG ANALYSIS	2	.
POOR-DAT	POOR DATA QUALITY IN CURRENT ECG PRECLUDES SERIAL COMPARISON	1302	.
QCERR	POOR DATA QUALITY, INTERPRETATION MAY BE ADVERSELY AFFECTED	1673	.

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
PO	POSSIBLE	1680	.
PO-ATP	POSSIBLE WANDERING ATRIAL PACEMAKER	279	.
POSTMI	POSTERIOR INFARCT	802	A
POS	POSTERIOR LEADS	1454	.
PRINT	PR INTERVAL	100	.
PAC	PREMATURE ATRIAL COMPLEXES	222	O
PEC	PREMATURE ECTOPIC COMPLEXES	241	O
PJC	PREMATURE JUNCTIONAL COMPLEXES	223	O
PSVC	PREMATURE SUPRAVENTRICULAR COMPLEXES	221	O
PVCF	PREMATURE VENTRICULAR AND FUSION COMPLEXES	232	O
PVC	PREMATURE VENTRICULAR COMPLEXES	231	O
PRESENT	PRESENT	1410	.
PRV-UND	PREVIOUS ECG HAS UNDETERMINED RHYTHM, NEEDS REVIEW	321	.
PR-SBRAD	PROBABLE SINUS BRADYCARDIA, VERIFY A-V CONDUCTION	265	.
LNGQT	PROLONGED QT	1143	A
PLV	PROMINENT LATERAL VOLTAGE,	574	.
PMDPV	PROMINENT MID-PRECORDIAL VOLTAGE,	571	.
PPV	PROMINENT POSTERIOR VOLTAGE,	573	.
PULD	PULMONARY DISEASE PATTERN	411	A
QRS	QRS	1419	.
AXIS	QRS AXIS	395	.
MISIZ	QRS CONTOUR SUGGESTS INFARCT SIZE IS PROBABLY	880	.
QRS-DUR	QRS DURATION	1420	.
QRS-VOL	QRS VOLTAGE	1421	.
QT-LONG	QT HAS LENGTHENED	1250	.
QT-SHRT	QT HAS SHORTENED	1251	.
QUE-CHG	QUESTIONABLE CHANGE IN	1422	.
DEC-MI	QUESTIONABLE CHANGE IN INITIAL FORCE OF	841	.
QUEHCHG	QUESTIONABLE CHANGE IN INITIAL FORCE OF	842	.
QUESTCHG	QUESTIONABLE CHANGE IN ST SEGMENT	1115	.
QUE-TCHG	QUESTIONABLE CHANGE IN T WAVES	1208	.
BIFB1	RBBB AND LT ANTERIOR FASCICULAR BLOCK	478	A
BIFB2	RBBB AND LT POSTERIOR FASCICULAR BLOCK	479	A
RHY	RHYTHM	323	.
RAE	RIGHT ATRIAL ENLARGEMENT	350	B
RAD4	RIGHT AXIS DEVIATION	383	A
RBBB	RIGHT BUNDLE BRANCH BLOCK	440	A
RBBRVH	RIGHT BUNDLE BRANCH BLOCK OR RIGHT VENTRICULAR HYPERTROPHY	442	A
RAD5	RIGHT SUPERIOR AXIS DEVIATION	384	A
RVH	RIGHT VENTRICULAR HYPERTROPHY	520	A
RVH-2ST	RIGHT VENTRICULAR HYPERTROPHY WITH REPOLARIZATION ABNORMALITY	521	A
RAD	RIGHTWARD AXIS	380	B
RSR	RSR' OR QR IN V1 SUGGESTS RT VENTRICULAR CONDUCTION DELAY	450	B
SRSRO	RSR' PATTERN IN V1	451	.

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
S1S2S3	S1-S2-S3 PATTERN, PULMONARY DISEASE, RVH, OR NORMAL VARIANT	412	A
SMI	SEPTAL INFARCT	700	A
SINJ	SEPTAL INJURY PATTERN	920	A
SEP	SEPTAL LEADS	1450	.
SERCHG	SERIAL CHANGES OF	1425	.
EVO	SERIAL CHANGES OF EVOLVING	1424	.
NOSERCOMP	SERIAL COMPARISON NOT PERFORMED, PREVIOUS TRACINGS ARE POOR	1303	.
SHFT-LFT	SHIFTED LEFT	396	.
SHFT-RGT	SHIFTED RIGHT	397	.
SNGCH	SIGNIFICANT CHANGES HAVE OCCURRED	1426	.
SBRAD	SINUS BRADYCARDIA	21	O
SRTH	SINUS RHYTHM	19	N
STACH	SINUS TACHYCARDIA	23	O
MA	SMALL	882	.
ST&	ST &	1100	A
STABAND	ST ABNORMALITY AND	1138	A
STDIG	ST ABNORMALTY, POSSIBLE DIGITALIS EFFECT	1020	A
STDEPREP	ST DEPRESSION HAS REPLACED ST ELEVATION IN	1108	.
STDPIN	ST DEPRESSION IN	1082	A
STDEP	ST DEPRESSION, SUBENDOCARDIAL INJURY OR DIGITALIS EFFECT	1022	A
AIOHAI	ST ELEVATION CONSIDER ANTERIOR INJURY OR ACUTE INFARCT	964	A
ALIHAI	ST ELEVATION CONSIDER ANTEROLATERAL INJURY OR ACUTE INFARCT	966	A
IIOHAI	ST ELEVATION CONSIDER INFERIOR INJURY OR ACUTE INFARCT	963	A
ILIHAI	ST ELEVATION CONSIDER INFEROLATERAL INJURY OR ACUTE INFARCT	967	A
LIOHAI	ST ELEVATION CONSIDER LATERAL INJURY OR ACUTE INFARCT	965	A
STELVREP	ST ELEVATION HAS REPLACED ST DEPRESSION IN	1124	.
STELIN	ST ELEVATION IN	1083	A
STELVPRS	ST ELEVATION NOW PRESENT IN	1122	.
SERYR2	ST ELEVATION, CONSIDER EARLY REPOLARIZATION	903	B
INJONV	ST ELEVATION, CONSIDER INJURY OR VARIANT ASSOCIATED WITH LVH	968	A
SERYR1	ST ELEVATION, EARLY REPOLARIZATION, PERICARDITIS, OR INJURY	902	A
STLESDEP	ST LESS DEPRESSION IN	1105	.
STLESELV	ST LESS ELEVATED IN	1121	.
STMORDEP	ST MORE DEPRESSION IN	1106	.
STMORELV	ST MORE ELEVATED IN	1120	.
STNOLDEP	ST NO LONGER DEPRESSION IN	1104	.
STNOLELV	ST NO LONGER ELEVATED IN	1123	.
STNOWDEP	ST NOW DEPRESSION IN	1107	.
SNF	STATEMENT NOT FOUND	1	.

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
SUP-TACH	SUPRAVENTRICULAR TACHYCARDIA	266	O
SVT	SUPRAVENTRICULAR TACHYCARDIA	271	O
AV-COND	SUSPECT A-V CONDUCTION DEFECT	282	.
ARM	SUSPECT ARM LEAD REVERSAL, INTERPRETATION ASSUMES NO REVERSAL	1672	.
AT	T WAVE ABNORMALITY, CONSIDER ANTERIOR ISCHEMIA	1150	A
ALT	T WAVE ABNORMALITY, CONSIDER ANTEROLATERAL ISCHEMIA	1180	A
IT	T WAVE ABNORMALITY, CONSIDER INFERIOR ISCHEMIA	1170	A
ILT	T WAVE ABNORMALITY, CONSIDER INFEROLATERAL ISCHEMIA	1145	A
LT	T WAVE ABNORMALITY, CONSIDER LATERAL ISCHEMIA	1160	A
T-WAVE	T WAVES	1200	.
T-DEC	T WAVES AMPLITUDE HAS DECREASED IN	1203	.
T-INC	T WAVES AMPLITUDE HAS INCREASED IN	1201	.
TINVIN	T-WAVE INVERSION IN	1182	A
T-LESINV	T-WAVE INVERSION LESS EVIDENT IN	1223	.
T-INVMOR	T-WAVE INVERSION MORE EVIDENT IN	1221	.
T-INVNOL	T-WAVE INVERSION NO LONGER EVIDENT IN	1224	.
T-INVNOW	T-WAVE INVERSION NOW EVIDENT IN	1220	.
PRM-CON	THE PREMATURE CONTRACTIONS	324	.
TRIFB	TRIFASCICULAR BLOCK	481	A
UR	UNDETERMINED RHYTHM	299	O
JBRAD	UNUSAL P AXIS & SHORTER PR, PROB. JUNCTIONAL BRADYCARDIA	41	A
JR	UNUSAL P AXIS & SHORTER PR, PROB. JUNCTIONAL RHYTHM	42	A
JTACH	UNUSAL P AXIS & SHORTER PR, PROB. JUNCTIONAL TACHYCARDIA	43	A
EABRAD	UNUSAL P AXIS, POSSIBLE ECTOPIC ATRIAL BRADYCARDIA	61	A
EAR	UNUSAL P AXIS, POSSIBLE ECTOPIC ATRIAL RHYTHM	62	A
EATACH	UNUSAL P AXIS, POSSIBLE ECTOPIC ATRIAL TRACHYCARDIA	63	A
VENT-RAT	VENT. RATE	322	.
WPWA	VENTRICULAR PRE-EXCITATION, WPW PATTERN TYPE A	300	A
WPWB	VENTRICULAR PRE-EXCITATION, WPW PATTERN TYPE B	302	A
VENT-RTH	VENTRICULAR RHYTHM	269	A
VTACH	VENTRICULAR TACHYCARDIA(VENTR. OR SUPRAVENTR WITH ABERRATION)	272	A
VLAR	VERY LARGE	885	.
VSMA	VERY SMALL	881	.
LVH	VOLTAGE CRITERIA FOR LEFT VENTRICULAR HYPERTROPHY	540	A
DEMOGR	WARNING:DEMOGRAPHIC DATA DIFFERENT	1304	.
COMPAR	WHEN COMPARED WITH ECG OF	1301	.
WQTACH	WIDE QRS TACHYCARDIA	235	A

<u>ACRONYM</u>	<u>STATEMENT</u>	<u>CODE</u>	<u>DX</u>
FAV	WITH 1ST DEGREE A-V BLOCK	101	A
W2T1	WITH 2:1 A-V CONDUCTION	141	.
SAV	WITH 2ND DEGREE A-V BLOCK	105	A
MBZI	WITH 2ND DEGREE A-V BLOCK (MOBITZ I)	103	A
MBZII	WITH 2ND DEGREE A-V BLOCK (MOBITZ II)	104	A
SABI	WITH 2ND DEGREE SA BLOCK (MOBITZ I)	112	A
SABII	WITH 2ND DEGREE SA BLOCK (MOBITZ II)	111	A
W3T1	WITH 3:1 A-V CONDUCTION	142	.
W4T1	WITH 4:1 A-V CONDUCTION	143	.
W5T1	WITH 5:1 A-V CONDUCTION	144	.
CJP	WITH A COMPETING JUNCTIONAL PACEMAKER	174	A
WITH-DEM	WITH A DEMAND PACEMAKER	326	.
AVDIS	WITH A-V DISSOCIATION	108	A
CHB	WITH COMPLETE HEART BLOCK	106	A
ESCBT	WITH ESCAPE BEAT	276	.
FREQ	WITH FREQUENT	212	.
ALTWPW	WITH FUSION OR INTERMITTENT VENTRICULAR PRE-EXCITATION (WPW)	303	A
AB-VENT	WITH INTERMITTENT ABERRANT VENTRICULAR CONDUCTION	283	.
J-ESC	WITH JUNCTIONAL ESCAPE	275	.
JESC	WITH JUNCTIONAL ESCAPE COMPLEXES	242	O
MSAR	WITH MARKED SINUS ARRHYTHMIA	252	O
WEKH	WITH MOBITZ (WENCKEBACH) BLOCK	278	.
OCC	WITH OCCASIONAL	211	.
ABER2	WITH PREMATURE VENTRICULAR OR ABERRANTLY CONDUCTED COMPLEXES	173	A
ABER	WITH PREMATURE VENTRICULAR OR ABERRANTLY CONDUCTED COMPLEXES	181	O
QRSW	WITH QRS WIDENING	543	A
QRSW-2ST	WITH QRS WIDENING AND REPOLARIZATION ABNORMALITY	545	A
RVR	WITH RAPID VENTRICULAR RESPONSE	171	.
WHRATDEC	WITH RATE DECREASE	1255	.
WHRATINC	WITH RATE INCREASE	1254	.
2ST	WITH REPOLARIZATION ABNORMALITY	544	A
SA-BLK	WITH S-A BLOCK OR TRANSIENT A-V BLOCK	284	.
SPR	WITH SHORTER PR	102	A
SAB	WITH SINUS ARREST OR TRANSIENT A-V BLOCK	285	A
SAR	WITH SINUS ARRHYTHMIA	251	.
PAUSE	WITH SINUS PAUSE	113	A
SVR	WITH SLOW VENTRICULAR RESPONSE	172	.
WSTR	WITH STRAIN PATTERN	1084	A
TVT	WITH TRANSIENT VENTRICULAR TACHYCARDIA	277	.
IRREG	WITH UNDETERMINED RHYTHM IRREGULARITY	175	O
VAVB	WITH VARIABLE A-V BLOCK	107	A
VESC	WITH VENTRICULAR ESCAPE COMPLEXES	243	O
VENT-FUS	WITH VENTRICULAR FUSION	274	.
WPW	WOLFF-PARKINSON-WHITE	304	A

APPENDIX 34 STANDARD ECG INSTRUCTIONS

1. BASELINE ECGs

1.1 Introduction

During the baseline examination, a standard supine 12-lead resting ECG is recorded at least one half hour after ingestion of glucose.

1.2 Procedure for Recording Baseline ECG

The standard electrocardiograph for the Strong Heart Study is the MAC PC Personal Cardiography by Marquette Electronics, Inc. The standard configuration for the MAC PC is shown in Appendix A. A 12-lead resting ECG tracing is obtained consisting of 2.5 seconds of each of the leads simultaneously (I, II, III, aV_R, aV_L, aV_F, V₁-V₆) with a 10 second lead Rhythm Strip.

Procedures for charging the battery of the MAC PC: The MAC PC runs only from its battery. The battery can be charged by plugging the unit into a wall outlet. The MAC PC will record and print about 50 ECGs on one charge. The amount of charge left is displayed for one-half second when the machine is turned on. It takes about 10 hours to charge the battery.

Plug in the unit each evening after transmitting data to Fitzsimmons. Unplug the unit in the morning. It is not good for the machine to spend several days in either the fully charged or completely drained state. For weekends and holidays the machine may be left plugged in, or, if the brief charge display shows at least 25 ECGs remaining, it may be left unplugged.

1.3 Electrode Position Measuring and Marking

Because it is essential for the study to be able to compare baseline ECG data with subsequent records, a uniform procedure for electrode placement and skin preparation is required. The method and procedure for standardizing electrode locations are outlined below.

The participant, stripped to the waist, is instructed to lie on the recording bed with arms relaxed at the sides. The individual is asked to avoid movements which may cause errors in marking the electrode locations, but encouraged to converse with the technician. Prior experience with electrocardiograms is discussed, as is the purpose of the ECG recording. The participant should be told this is a research ECG to be used for statistical analysis later in the study. However, it can also be used by the clinic physician for general diagnostic purposes, and a copy can be sent to the individual's private physician.

For best electrode/skin interface, place the electrodes on the skin at least 2-3 minutes before taking the ECG. Patient information can be entered on the MAC PC during this time. This waiting time is not so critical with the suction electrodes, if it is anticipated that data entry will take > 3 minutes, you may want to enter data first when using these electrodes. It is recommended that the stick-on electrodes be applied 2-3 minutes prior to acquiring the ECG.

A good felt tip pen is used to mark the six chest electrode positions. Wipe the general area of the following 10 electrode sites with a sterile alcohol prep to remove skin oil and perspiration. It is extremely important that care be taken to locate these positions accurately. Therefore, the procedure given below must be meticulously followed. Electrode positions in women with large, pendulous breasts must be determined in relation to the anatomic points described below - as for all participants. The electrodes must then be placed on top of the breast (in the correct position).

1.3.1 Chest Leads (Figure 1)

1. Electrode V_2

Locate the sternal angle and second left rib between the index and middle fingers of your right hand. Count down to the fourth rib and identify the fourth intercostal space below it. Locate V_2 in the fourth intercostal space immediately to the left of the sternal border.

2. Electrode V_1

Locate electrode V_1 in the fourth intercostal space at the right sternal border. This should be at the same level as V_2 and immediately to the right of the sternum.

3. Anterior 5th Interspace Marker (E Point)

Identify the fifth rib and fifth intercostal space below V_2 by counting down ribs as described for V_2 . Follow this space horizontally to the midsternal line and mark this point. This is the "E" point.

4. Electrode V_6

Locate the V_6 electrode at the same level as the E point in the midaxillary line (straight down from the center of the armpit). If breast tissue is over the V_6 area, mark the V_6 location on the breast.

Do not attempt to move the breast in order to mark V_6 on the chest wall, unless doing so is absolutely necessary to achieve better anatomic position.

5. Electrode V_4

Electrode V_4 is located using the E- V_6 Halfpoint Method. Using the medical tape measure employed in anthropometry, measure the distance between the E point and the V_6 marking. The tape should be resting lightly on the skin, not pressing into the flesh. The E and V_6 marks should be clearly seen. Place electrode V_4 midway between E and V_6 .

6. Electrode V_3

Using the medical tape measure employed in anthropometry, mark the location of electrode V_3 midway between the locations of V_2 and V_4 .

7. Electrode V_5

Using the medical tape measure employed in anthropometry, mark the location of electrode V_5 midway between the locations of V_4 and V_6 .

ELECTRODES AND LEADS

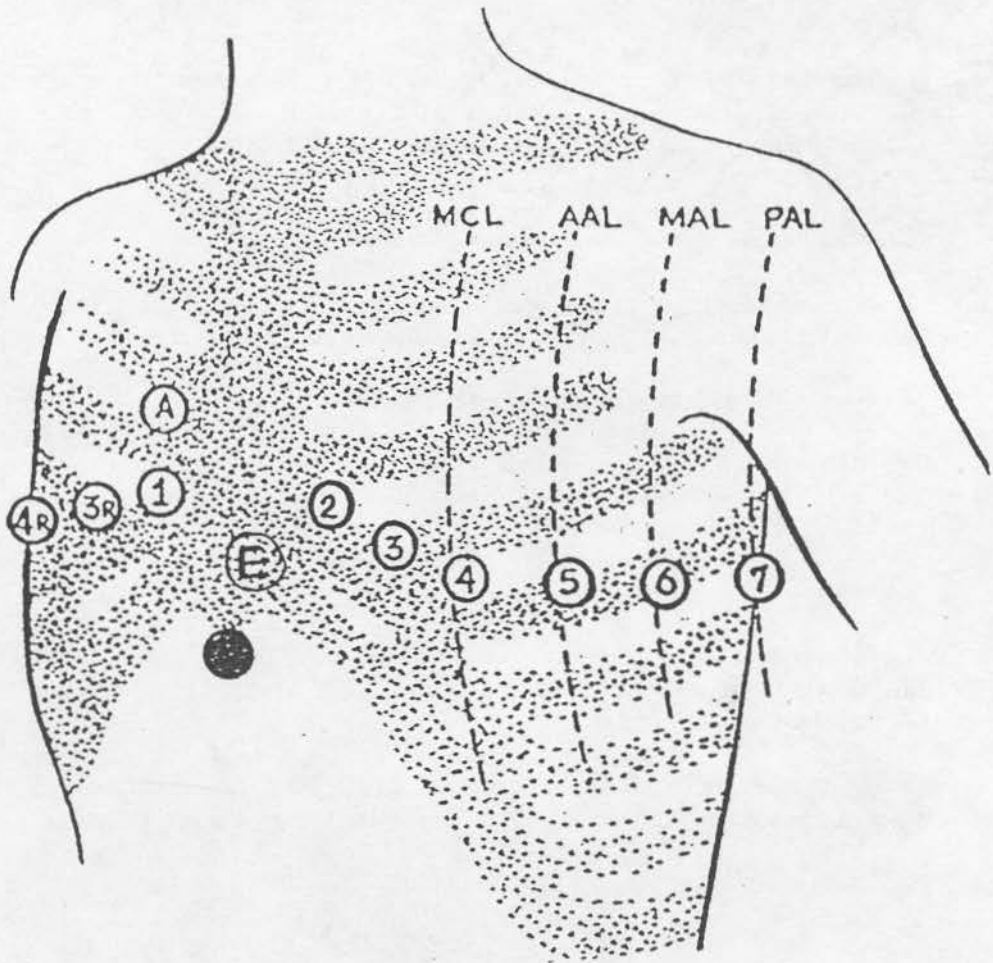


Figure 1. Precordial points from which chest leads are derived.

1.3.2 Limb Leads (Figure 2)

Locate electrode LL on the left ankle (inside).
Locate electrode RL on the right ankle (inside).
Locate electrode LA on the left wrist (inside).
Locate electrode RA on the right wrist (inside).

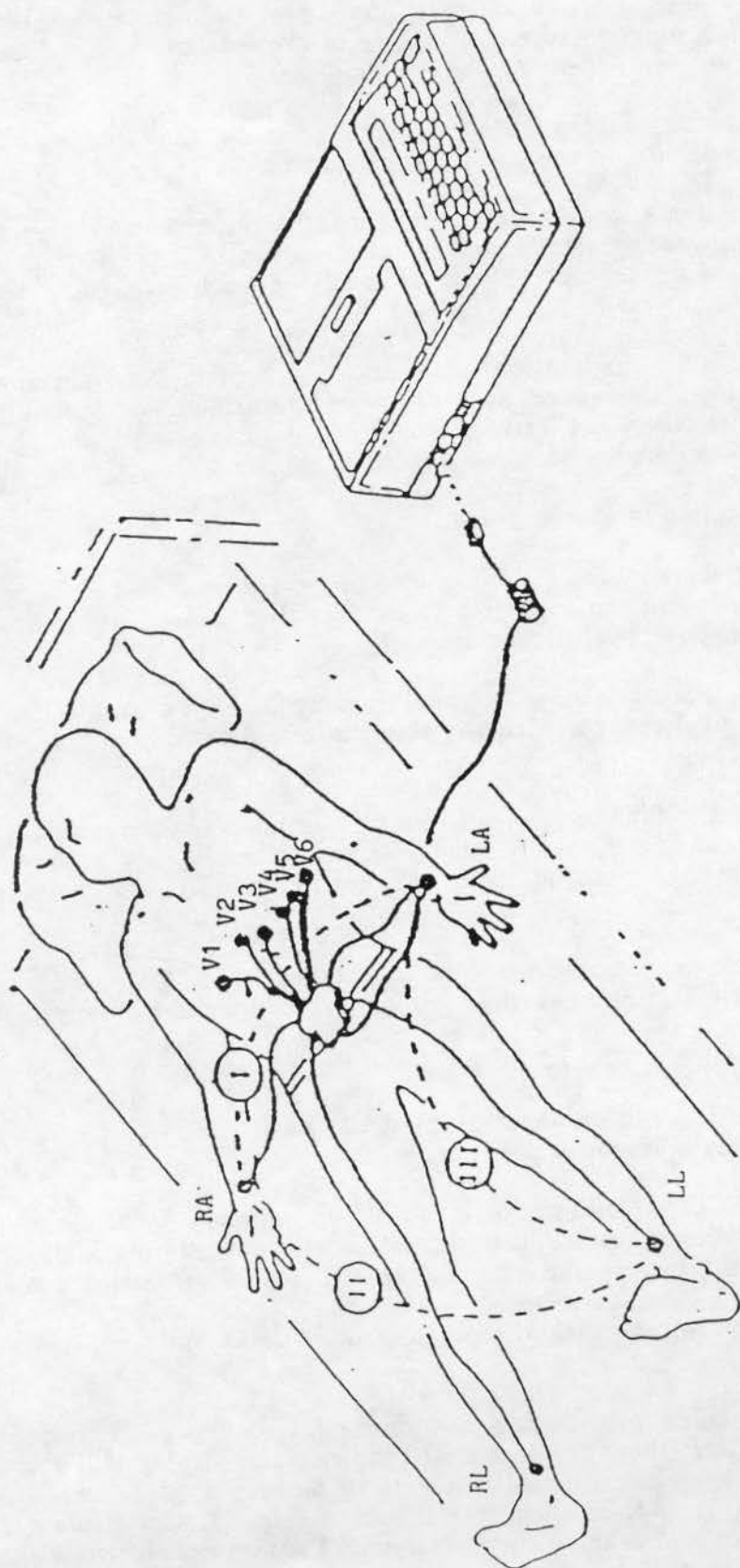


Figure 2 Electrode and Leadwire Placement

1.4 Skin Preparation

Skin preparation is undertaken only in the presence of observed technical problems due to poor electrode contact. As a first step it may be sufficient to rub the skin lightly with a tongue depressor or piece of gauze to produce reddening. If this does not resolve the problem, then:

1. With the participant's consent, remove any excess hair from each electrode site on the chest using a shaver.
2. At each electrode location in turn the outer horny layer of the epidermis is removed by gentle dermal abrasion with a piece of gauze. Only three passes (in the form of an asterisk) at each site using light pressure are required.

If the skin preparation has removed the felt pen marking at any of the electrode sites, these are accurately re-established by carefully repeating the procedure described in Electrode Position Measuring and Marking. It is important that the electrode sites be marked using the exact technique described.

1.5 Application of Electrodes

Either disposable or suction electrodes are used in the Strong Heart Study. Adaptors are used with the leadwires to connect the "banana" plug from the MAC PC leadwire to the disposable electrode via a clip.

When placing each electrode, massage it in a small circular motion to maximize the pre-gel contact with the skin but avoid overlap of gel from one electrode to the next.

Center the four limb electrodes on the inside of the wrist or ankle with the tab for the clip pointing toward the head. Center the six chest electrodes on the chest markings with the tabs pointing down. Do not let the electrodes overlap or touch each other if possible.

Clip the appropriate leadwire to each electrode (Figure 1). Do not pull or jerk tangled wires. To untangle wires, disconnect lead wires from electrodes.

1.6 Recording the 12-lead ECG

Change the roll of paper as needed. Each roll is 75 feet long; each patient takes approximately one foot of paper.

Each ECG is automatically stored in memory until it is deleted. After placing the electrodes on the skin, enter the participant information into the MAC PC (Figure 3) according to Appendix B. Disposable electrodes particularly must be on the skin for at least 2-3 minutes before taking the ECG. Make a final check of the electrodes and lead wires. Ask the participant to relax and keep still, then press the RECORD key.

The machine will display "Acquiring Data" and the left side of the display will show a count. If there are technical problems the display will show which lead is involved and will keep counting until it gets 10 seconds of good data. Check electrode contacts and leadwires, then check the display again. If the display counts past 75, push the STOP key and remove the electrodes. Prepare the electrode sites as discussed in Skin Preparation and follow the above protocol for exact relocation of electrodes.

Press RECORD ECG. The machine will tell you to "enter a new patient or press RECORD." Press RECORD ECG a second time to start the ECG. The machine will automatically print the ECG after it has acquired 10 seconds of good data (Appendix C).

Tear the ECG off the machine and file it in your records.

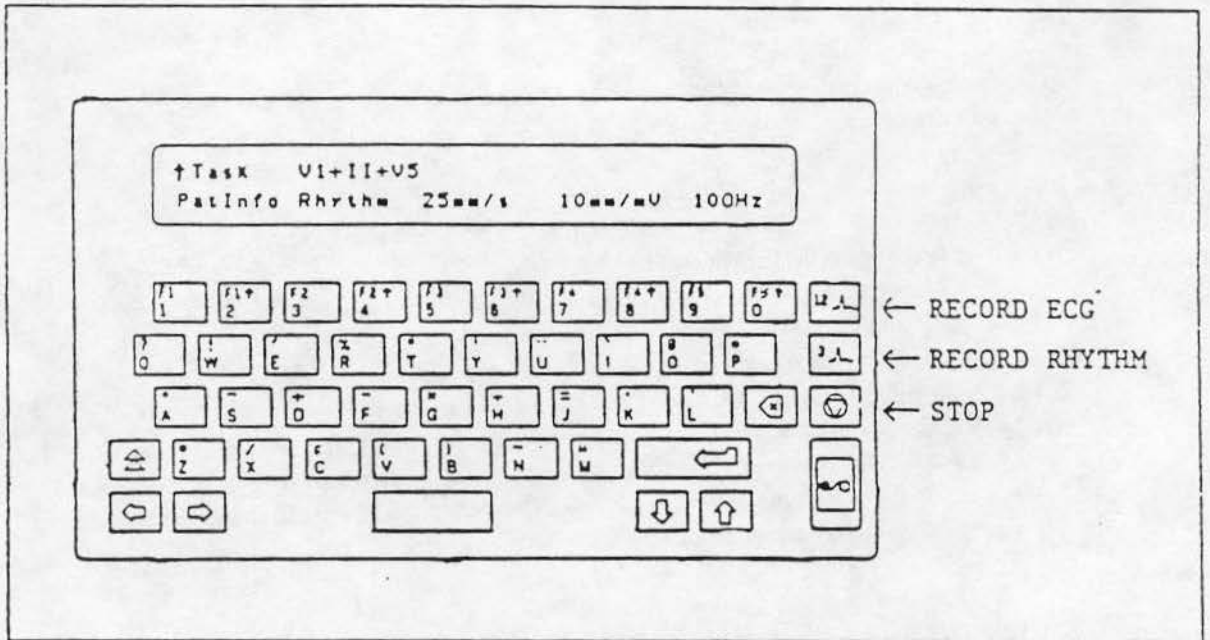


Figure 3. The MAC PC Keyboard and LCD Display by Marquette Electronics Inc.

MINNESOTA CODE 1982

Q and QS Patterns

(Do not code in the presence of WPW code 6-4-1.) To qualify as a Q-wave, the deflection should be at least 0.1 mV (1 mm in amplitude).

Anterolateral site (leads I, aVL, V₆)

- 1-1-1 Q/R amplitude ratio $\geq \frac{1}{2}$, plus Q duration ≥ 0.03 sec in lead I or V₆.
- 1-1-2 Q duration ≥ 0.04 sec in lead I or V₆.
- 1-1-3 Q duration ≥ 0.04 sec, plus R amplitude ≥ 3 mm in lead aVL.
- 1-2-1 Q/R amplitude ratio $\geq \frac{1}{2}$, plus Q duration ≥ 0.02 sec and < 0.03 sec in lead I or V₆.
- 1-2-2 Q duration ≥ 0.03 sec and < 0.04 sec in lead I or V₆.
- 1-2-3 QS pattern in lead I. Do not code in the presence of 7-1-1.
- 1-2-8 Initial R amplitude decreasing to 2 mm or less in every beat (and absence of codes 3-2, 7-1-1, 7-2-1, or 7-3) between V₃ and V₆. (All beats in lead V₃ must have an initial R > 2 mm.)
- 1-3-1 Q/R amplitude ratio $\geq \frac{1}{2}$ and $< \frac{1}{2}$, plus Q duration ≥ 0.02 sec and < 0.03 sec in lead I or V₆.
- 1-3-3 Q duration ≥ 0.03 sec and < 0.04 sec, plus R amplitude ≥ 3 mm in lead aVL.

Posterior (inferior) site (leads II, III, aVF)

- 1-1-1 Q/R amplitude ratio $\geq \frac{1}{2}$, plus Q duration ≥ 0.03 sec in lead II.
- 1-1-2 Q duration ≥ 0.04 sec in lead II.
- 1-1-4 Q duration ≥ 0.05 sec in lead III, plus a Q-wave amplitude ≥ 1.0 mm in the majority of beats in lead aVF.
- 1-1-5 Q duration ≥ 0.05 sec in lead aVF.
- 1-2-1 Q/R amplitude ratio $\geq \frac{1}{2}$, plus Q duration ≥ 0.02 sec and < 0.03 sec in lead II.
- 1-2-2 Q duration ≥ 0.03 sec and < 0.04 sec in lead II.
- 1-2-3 QS pattern in lead II. Do not code in the presence of 7-1-1.
- 1-2-4 Q duration ≥ 0.04 sec and < 0.05 sec in lead III, plus a Q-wave ≥ 1.0 mm amplitude in the majority of beats in aVF.
- 1-2-5 Q duration ≥ 0.04 sec and < 0.05 sec in lead aVF.
- 1-2-6 Q amplitude ≥ 5.0 mm in leads III or aVF.
- 1-3-1 Q/R amplitude ratio $\geq \frac{1}{2}$ and $< \frac{1}{2}$, plus Q duration ≥ 0.02 sec and < 0.03 sec in lead II.
- 1-3-4 Q duration ≥ 0.03 sec and < 0.04 sec in lead III, plus a Q-wave ≥ 1.0 mm amplitude in the majority of beats in lead aVF.
- 1-3-5 Q duration ≥ 0.03 sec and < 0.04 sec in lead aVF.
- 1-3-6 QS pattern in each of leads III and aVF. (Do not code in the presence of 7-1-1.)

Anterior site (leads V₁, V₂, V₃, V₄, V₅)

- 1-1-1 Q/R amplitude ratio $\geq \frac{1}{2}$ plus Q duration ≥ 0.03 sec in any of leads V₂, V₃, V₄, V₅.
- 1-1-2 Q duration ≥ 0.04 sec in any of leads V₁, V₂, V₃, V₄, V₅.
- 1-1-6 QS pattern when initial R-wave is present in adjacent lead to the right on the chest, in any of leads V₂, V₃, V₄, V₅, V₆.
- 1-1-7 QS pattern in all of leads V₁-V₄ or V₁-V₅.

- 1-2-1 Q/R amplitude ratio $\geq \frac{1}{2}$, plus Q duration ≥ 0.02 sec and < 0.03 sec, in any of leads V_2 , V_3 , V_4 , V_5 .
- 1-2-2 Q duration ≥ 0.03 sec and < 0.04 sec in any of leads V_2 , V_3 , V_4 , V_5 .
- 1-2-7 QS pattern in all of leads V_1 , V_2 , and V_3 . (Do not code in the presence of 7-1-1.)
- 1-2-8 Initial R amplitude decreasing to 2.0 mm or less in every beat (and absence of codes 3-2, 7-1-1, 7-2-1, or 7-3) between any of leads V_2 and V_3 , V_3 and V_4 , or V_4 and V_5 . (All beats in the lead immediately to the right on the chest must have an initial R > 2 mm.)
- 1-3-1 Q/R amplitude ratio $\geq \frac{1}{2}$ and $< \frac{1}{2}$ plus Q duration ≥ 0.02 sec and < 0.03 sec in any of leads V_2 , V_3 , V_4 , V_5 .
- 1-3-2 QS pattern in lead V_1 and V_2 . (Do not code in the presence of 3-1 or 7-1-1.)

QRS Axis Deviation

(Do not code in presence of low-voltage QRS, code 9-1, WPW 6-4-1, ventricular conduction defects, or 7-1-1, 7-2-1, and 7-4.)

- 2-1 Left. QRS axis from -30° through -90° in leads I, II, III. (The algebraic sum of major positive and major negative QRS waves must be zero or positive in I, negative in III, and zero or negative in II.)
- 2-2 Right. QRS axis from $+120^\circ$ through -150° in leads I, II, III. (The algebraic sum of major positive and major negative QRS waves must be negative in I, and zero or positive in III, and in I must be one-half or more of that in III.)
- 2-3 Right (optional code when 2-2 is not present). QRS axis from $+90^\circ$ through $+119^\circ$ in leads I, II, III. (The algebraic sum of major positive and major negative QRS waves must be zero or negative in I and positive in II and III.)
- 2-4 Extreme axis deviation (usually S1, S2, S3 pattern). QRS axis from -90° through -149° in leads I, II, and III. (The algebraic sum of major positive and major negative QRS waves must be negative in each of leads I, II, and III.)
- 2-5 Indeterminate axis. QRS axis approximately 90° from the frontal plane. (The algebraic sum of major positive and major negative QRS waves is zero in each of leads I, II and III, or the information from these three leads is incongruous.)

High Amplitude R Waves

- 3-1 Left: R amplitude > 26 mm in either V_5 or V_6 , or R amplitude > 20.0 mm in any of leads I, II, III, aVF, or R amplitude > 12.0 mm in lead aVL measured only on second to last complete normal beat.
- 3-2 Right: R amplitude ≥ 5.0 mm and R amplitude \geq S amplitude in the majority of beats in lead V_1 , when S amplitude is $>$ R amplitude somewhere to the left on the chest of V_1 (codes 7-3 and 3-2, if criteria for both are present).
- 3-3 Left (optional code when 3-1 is not present): R amplitude > 15.0 mm but ≤ 20.0 mm in lead I, or R amplitude in V_5 or V_6 , plus S amplitude in $V_1 > 35.0$ mm.
- 3-4 Criteria for 3-1 and 3-2 both present.

ST Junction (J) and Segment Depression

(Do not code in the presence of codes 6-4-1, 7-1-1, 7-2-1 or 7-4. When 4-1, 4-2, or 4-3 is coded, then a 5-code must also be assigned except in lead V₁.)

Anterolateral site (leads I, aVL, V₆)

- 4-1-1 STJ depression ≥ 2.0 mm and ST segment horizontal or downward sloping in any of leads I, aVL, or V₆.
- 4-1-2 STJ depression ≥ 1.0 mm but < 2.0 mm, and ST segment horizontal or downward sloping in any of leads I, aVL, or V₆.
- 4-2 STJ depression ≥ 0.5 mm and < 1.0 mm and ST segment horizontal or downward sloping in any of leads I, aVL, or V₆.
- 4-3 No STJ depression as much as 0.5 mm but ST segment downward sloping and segment or T-wave nadir ≥ 0.5 mm below P-R baseline, in any of leads I, aVL, or V₆.
- 4-4 STJ depression ≥ 1.0 mm and ST segment upward sloping or U-shaped, in any of leads I, aVL, or V₆.

Posterior (inferior) site (leads II, III, aVF)

- 4-1-1 STJ depression ≥ 2.0 mm and ST segment horizontal or downward sloping in lead II or aVF.
- 4-1-2 STJ depression ≥ 1.0 mm but < 2.0 mm and ST segment horizontal or downward sloping in lead II or aVF.
- 4-2 STJ depression ≥ 0.5 mm and < 1.0 mm and ST segment horizontal or downward sloping in lead II or aVF.
- 4-3 No STJ depression as much as 0.5 mm, but ST segment downward sloping and segment or T-wave nadir ≥ 0.5 mm below P-R baseline in lead II.
- 4-4 STJ depression ≥ 1.0 mm and ST segment upward sloping, or U-shaped, in lead II.

Anterior site (leads V₁, V₂, V₃, V₄, V₅)

- 4-1-1 STJ depression ≥ 2.0 and ST segment horizontal or downward sloping in any of leads V₁, V₂, V₃, V₄, V₅.
- 4-1-2 STJ depression ≥ 1.0 mm but < 2.0 mm and ST segment horizontal or downward sloping in any of leads V₁, V₂, V₃, V₄, V₅.
- 4-2 STJ depression ≥ 0.5 mm and < 1.0 mm and ST segment horizontal or downward sloping in any of leads V₁, V₂, V₃, V₄, V₅.
- 4-3 No STJ depression as much as 0.5 mm, but ST segment downward sloping and segment or T-wave nadir ≥ 0.5 mm below P-R baseline in any of leads V₂, V₃, V₄, V₅.
- 4-4 STJ depression ≥ 1.0 mm and ST segment upward sloping or U-shaped in any of leads V₁, V₂, V₃, V₄, V₅.

T-Wave Items

(Do not code in the presence of codes 6-4-1, 7-1-1, 7-2-1 or 7-4.)

Anterolateral site (leads I, aVL, V₆)

- 5-1 T amplitude negative 5.0 mm or more in either of leads I, V₆, or in lead aVL when R amplitude is ≥ 5.0 mm.

- 5-2 T amplitude negative or diphasic (positive-negative or negative-positive type) with negative phase at least 1.0 mm but not as deep as 5.0 mm in lead I or V₆, or in lead aVL when R amplitude is ≥ 5.0 mm.
- 5-3 T amplitude zero (flat), or negative, or diphasic (negative-positive type only) with less than 1.0 mm negative phase in lead I or V₆, or in lead aVL when R amplitude is ≥ 5.0 mm.
- 5-4 T amplitude positive and T/R amplitude ratio $< 1/20$ in any of leads I, aVL, V₆; R wave amplitude must be ≥ 10.0 mm.

Posterior (inferior) site (leads II, III, aVF)

- 5-1 T amplitude negative 5.0 mm or more in lead II, or in lead aVF when QRS is mainly upright.
- 5-2 T amplitude negative or diphasic with negative phase (negative-positive or positive-negative type) at least 1.0 mm but not as deep as 5.0 mm in lead II, or in lead aVF when QRS is mainly upright.
- 5-3 T amplitude zero (flat), or negative, or diphasic (negative-positive type only) with less than 1.0 mm negative phase in lead II; not coded in lead aVF.
- 5-4 T amplitude positive and T/R amplitude ratio $< 1/20$ in lead II; R wave amplitude must be ≥ 10.0 mm.

Anterior site (leads V₂, V₃, V₄, V₅)

- 5-1 T amplitude negative 5.0 mm or more in any of leads V₂, V₃, V₄, V₅.
- 5-2 T amplitude negative (flat), or diphasic (negative-positive or positive-negative type) with negative phase at least 1.0 mm but not as deep as 5.0 mm, in any of leads V₂, V₃, V₄, V₅.
- 5-3 T amplitude zero (flat), or negative, or diphasic (negative-positive type only) with less than 1.0 mm negative phase, in any of leads V₃, V₄, V₅.
- 5-4 T amplitude positive and T/R amplitude ratio $< 1/20$ in any of leads V₃, V₄, V₅; R wave amplitude must be ≥ 10.0 mm.

A-V Conduction Defect

- 6-1 Complete (third degree) A-V block (permanent or intermittent) in any lead. Atrial and ventricular complexes independent, and atrial rate faster than ventricular rate, with ventricular rate < 60 .
- 6-2-1 Mobitz Type II (occurrence of P-wave on time with dropped QRS and T).
- 6-2-2 Partial (second degree) A-V block in any lead (2:1 or 3:1 block).
- 6-2-3 Wenckebach's Phenomenon (P-R interval increasing from beat to beat until QRS and T dropped).
 - 6-3 P-R (P-Q) interval ≥ 0.22 sec in the majority of beats in any of leads I, II, III, aVL, aVF.
- 6-4-1 Wolff-Parkinson-White Pattern (WPW), persistent. Sinus P-wave. P-R interval < 0.12 sec, plus QRS duration ≥ 0.12 sec, plus R peak duration ≥ 0.06 sec, coexisting in the same beat and present in the majority of beats in any of leads I, II, aVL, V₄, V₅, V₆. (6-4-1 suppresses 1-2-3, 1-2-7, 1-2-8, 1-3-2, 1-3-6, all 3, 4, 5, 9-2, 9-4, 9-5 codes.)
- 6-4-2 WPW Pattern, intermittent. WPW pattern in $\leq 50\%$ of beats in appropriate leads.
 - 6-5 Short P-R interval. P-R interval < 0.12 sec in all beats of any two of leads I, II, III, aVL, aVF.
 - 6-6 Intermittent aberrant atrioventricular conduction. P-R > 0.12 sec (except in presence of 6-5 or heart rate greater than 100); wide QRS complex > 0.12 sec; normal P-wave when most beats are sinus rhythm. (Do not code in the presence of 6-4-2.)
- 6-8 Artificial pacemaker.

Ventricular Conduction Defect

- 7-1-1 Complete left bundle branch block (LBBB). (Do not code in presence of 6-1, 6-4-1, 6-8, 8-2-1 or 8-2-2.) QRS duration ≥ 0.12 sec in a majority of beats (of the same QRS pattern) in any of leads I, II, III, aVL, aVF, plus R peak duration ≥ 0.06 sec in a majority of beats (of the same QRS pattern) in any of leads I, II, aVL, V₃, V₆. (7-1-1 suppresses 1-2-3, 1-2-7, 1-2-8, 1-3-2, 1-3-6, all 2, 3, 4, 5, 9-2, 9-4, 9-5 codes. If any other codable Q-wave coexists with the LBBB pattern, code the Q and diminish the 7-1-1 code to a 7-4 code.)
- 7-1-2 Intermittent left bundle branch block. Same as 7-1-1 but with presence of normally conducted QRS complexes of different shape than the LBBB pattern.
- 7-2-1 Complete right bundle branch block (RBBB). (Do not code in the presence of 6-1, 6-4-1, 6-8, 8-2-1 or 8-2-2.) QRS duration ≥ 0.12 sec in a majority of beats (of the same QRS pattern) in any of leads I, II, III, aVL, aVF, plus: R' > R in V₁ or QRS mainly upright, plus R peak duration ≥ 0.06 sec in V₁ or V₂; or V₂; or S duration > R duration in all beats in lead I or II. (Suppresses 1-2-8, all 2-, 3-, 4- and 5-codes, 9-2, 9-4, 9-5.)
- 7-2-2 Intermittent right bundle branch block. Same as 7-2-1 but with presence of normally conducted QRS complexes of different shape than the RBBB pattern.
- 7-3 Incomplete right bundle branch block. QRS duration < 0.12 sec in each of leads I, II, III, aVL, aVF, and R' > R in either of leads V₁, V₂ (Code as 3-2 in addition if those criteria are met. 7-3 suppresses code 1-2-8.)
- 7-4 Intraventricular block. QRS duration ≥ 0.12 sec in a majority of beats in any of leads I, II, III, aVL, aVF. (7-4 suppresses all 2, 3, 4, 5, 9-2, 9-4, 9-5 codes.)
- 7-5 R-R' pattern in either of leads V₁, V₂ with R' amplitude $\leq R$.
- 7-6 Incomplete left bundle branch block. (Do not code in the presence of any codable Q- or QS-wave.) QRS duration ≥ 0.10 sec and < 0.12 sec in the majority of beats of each of leads I, aVL, and V₃ or V₆.
- 7-7 Left anterior hemiblock (LAH). QRS duration < 0.12 sec in the majority of beats in leads I, II, III, aVL, aVF, plus Q-wave amplitude ≥ 0.25 mm and < 0.03 sec duration in lead I, plus left axis deviation of -45° or more negative. (In presence of 7-2, code 7-8 if axis is $< -45^\circ$ and the Q-wave in lead I meets the above criteria.)
- 7-8 Combination of 7-7 and 7-2.

Arrhythmias

- 8-1-1 Presence of frequent atrial or junctional premature beats (10% or more of recorded complexes).
- 8-1-2 Presence of frequent ventricular premature beats (10% or more of record complexes).
- 8-1-3 Presence of both atrial and/or junctional premature beats and ventricular premature beats (so that individual frequencies are < 10% but combined premature beats are $\geq 10\%$ of complexes).
- 8-1-4 Wandering atrial pacemaker.
- 8-1-5 Presence of 8-1-2 and 8-1-4.
- 8-2-1 Ventricular fibrillation or ventricular asystole.
- 8-2-2 Persistent ventricular (idioventricular) rhythm.
- 8-2-3 Intermittent ventricular tachycardia. Three or more consecutive ventricular premature beats occurring at a rate ≥ 100 . This includes more persistent ventricular tachycardia.
- 8-2-4 Ventricular parasystole (should not be coded in presence of 8-3-1).
- 8-3-1 Atrial fibrillation (persistent).
- 8-3-2 Atrial flutter (persistent).

- 8-3-3 Intermittent atrial fibrillation (code if 3 or more clear-cut, consecutive sinus beats are present in any lead).
- 8-3-4 Intermittent atrial flutter (code if 3 or more clear-cut, consecutive sinus beats are present in any lead).
- 8-4-1 Supraventricular rhythm persistent. QRS duration < 0.12 sec; and absent P-waves or presence of abnormal P-waves (inverted or flat in aVF); and regular rhythm.
- 8-4-2 Supraventricular tachycardia intermittent. Three consecutive atrial or junctional premature beats occurring at a rate ≥ 100 .
- 8-5-1 Sinoatrial arrest. Unexpected absence of P, QRS and T, plus a R-R interval at a fixed multiple of the normal interval, $\pm 10\%$.
- 8-5-2 Sinoatrial block. Unexpected absence of P, QRS and T, preceded by progressive shortening of P-P intervals. (R-R interval at a fixed multiple of the normal interval, $\pm 10\%$).
- 8-6-1 A-V dissociation with ventricular pacemaker (without capture). Requires: P-P and R-R occur at variable rates with ventricular rate as fast as or faster than the atrial rate, plus variable P-R intervals, plus no capture beats.
- 8-6-2 A-V dissociation with ventricular pacemaker (with capture).
- 8-6-3 A-V dissociation with atrial pacemaker (without capture).
- 8-6-4 A-V dissociation with atrial pacemaker (with capture).
- 8-7 Sinus tachycardia (over 100/min).
- 8-8 Sinus bradycardia (under 50/min).
- 8-9 Other arrhythmias. Heart rate may be recorded as a continuous variable.

ST Segment Elevation

- Anterolateral site (leads I, aVL, V₆)
- 9-2 ST segment elevation ≥ 1.0 mm in any of leads I, aVL, V₆.
- Posterior (inferior) site (leads II, III, aVF)
- 9-2 ST segment elevation ≥ 1.0 mm in any of leads II, III, aVF.
- Anterior site (leads V₁, V₂, V₃, V₄, V₅)
- 9-2 ST segment elevation ≥ 1.0 mm in lead V₃ or ST segment elevation ≥ 2.0 mm in any of leads V₁, V₂, V₃, V₄.
- STV6
? STV
STV5
- M92X-1
M92X-2
M92X-3
-

Miscellaneous Items

- 9-1 Low QRS amplitude. QRS peak-to-peak amplitude < 5 mm in all beats in each of leads I, II, III, or < 10 mm in all beats in each of leads V₁, V₂, V₃, V₄, V₅, V₆. (Check calibration before coding.)
 - 9-3 P-wave amplitude ≥ 2.5 mm in any of leads II, III, aVF, in a majority of beats.
 - 9-4-1 QRS transition zone at V₃ or to the right of V₃ on the chest. (Do not code in the presence of 6-4-1, 7-1-1, 7-2-1 or 7-4.)
 - 9-4-2 QRS transition zone at V₄ or to the left of V₄ on the chest. (Do not code in the presence of 6-4-1, 7-1-1, 7-2-1 or 7-4.)
 - 9-5 T-wave amplitude > 12 mm in any of leads I, II, III, aVL, aVF, V₁, V₂, V₃, V₄, V₅, V₆. (Do not code in the presence of 6-4-1, 7-1-1, 7-2-1 or 7-4.)
 - 9-8-1 Technical problems which interfere with coding.
 - 9-8-2 Technical problems which do not interfere with coding.
- M98X TP?

Incompatible Codes

The codes in the left column suppress codes in the right column.

Code	Suppresses this code(s)
All Q-, QS-codes	7-6
Q > 0.03 in lead I	7-7
3-1	1-3-2
3-2	1-2-8, 7-3
6-1	All other codes except 8-2
6-4-1	All other codes
6-8	All other codes
7-1-1	1-2-3, 1-2-7, 1-2-8, 1-3-2, 1-3-6, all 2-, 3-, 4-, and 5-codes, 7-7, 9-2, 9-4, 9-5
7-2-1	1-2-8, all 2-, 3-, 4-, and 5-codes, 9-2, 9-4, 9-5
7-3	1-2-8
7-4	All 2-, 3-, 4-, and 5-codes, 9-2, 9-4, 9-5
8-1-2	8-2-4
8-1-4	8-1-1, 9-3
8-2-1	All other codes
8-2-2	All other codes
8-2-3	8-1-2
8-3-1	8-1-1, 8-1-2
8-3-2	6-2-2, 8-1-1, 8-1-2
8-3-3	8-1-1, 8-1-2
8-3-4	6-2-2
8-4-1	6-5
8-4-1 + heart rate \geq 140	All other codes except 7-4 or 6-2
Heart rate > 100	6-5
8-4-2	8-1-1
9-1	All 2-codes

PHYSICIAN REFERRAL FORM FOR DIAGNOSIS OF CONGESTIVE HEART FAILURE

ID Number: _____

While Mr./Ms. _____ was participating in our examination, it appeared to us that he/she might have congestive heart failure. He/She thus has been referred to you for care. Listed below are the criteria that we are using for the identification of congestive heart failure in our study. We would very much appreciate it if you could complete the form below and send it to us, so that it may assist us in making the diagnosis. Record all that are present when you evaluate the patient.

I. Major Criteria	Present	Absent	Not evaluated
Paroxysmal nocturnal dyspnea or orthopnea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neck-vein distention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cardiomegaly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Acute pulmonary edema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
S ₃ gallop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased venous pressure >16 cm of water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circulation time \geq 25 seconds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hepatojugular reflux	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
II. Minor Criteria	Present	Absent	Not evaluated
Ankle edema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Night cough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dyspnea on exertion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Present	Absent	Not evaluated
Hepatomegaly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pleural effusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vital capacity decrease $\frac{1}{3}$ from maximum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tachycardia (rate of ≥ 120 /min)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Major/Minor Criteria	Present	Absent	Not evaluated
Weight loss ≥ 4.5 kg in 5 days in response to treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IV. Tests that were performed on this patient. (1=yes, 2=no)

Echocardiogram	<input type="checkbox"/>
Chest x-ray	<input type="checkbox"/>
Measurements of vital capacity	<input type="checkbox"/>
Measurements of venous pressure	<input type="checkbox"/>

In your opinion, does Mr./Ms. _____ have congestive heart failure?

If yes, what is the underlying cause ?

(Please check the appropriate cause described below)

- Valvular heart disease
- Atherosclerotic heart disease
- Cardiomyopathy
- Other, please specify.

What is your specialty/subspecialty of medical practice?

We thank you very much for your assistance.

Signature Date

APPENDIX 37 (a)

Sample Letter to Participant after Physical Examination

Dear _____

Thank you very much for taking part in the Strong Heart Study on _____
(date). The final results of your blood tests are available and this letter summarizes the
important findings of your evaluation.

(See attached list)

If you were told at your examination that you should see a doctor, please follow the
instructions given to you at that time.

The results of your tests will be sent to the IHS Hospital/Clinic as part of your hospital
record. This will help the doctors take care of you if you get sick and go to the
Hospital/Clinic. If your doctor does not work at the IHS Hospital/Clinic, please let us
know so we can send your test results to him/her.

We thank you again for having your participating in the Strong Heart Study. If you

have any questions, please talk to _____ at the IHS

Hospital/Clinic. You can also reach me at _____.

Sincerely,

Strong Heart Study

APPENDIX 37 (b)
Interpretation of Examination Results and Suggestions

Blood Pressure: If your blood pressure was above 140/90, you should go to clinic to see your health care provider for advice on how to lower it.

Percent Body Fat: If your percent body fat is above the desirable range, you should lose weight. The desirable range is shown on the results.

Body Mass Index is also a measure of obesity. If you are more than 120% of body mass index, you should lose weight.

Physical Exam: The findings listed are those found by the exam done by the nurse practitioner. They will be available in your IHS medical record in case you need further evaluation.

Cigarette use: If you smoke, it is advised that you cut down or preferably quit. Smoking causes heart problems and cancer and you can improve your health by quitting.

Lipids: These are the fats measured in your blood.

Total cholesterol measures both good and bad cholesterol.

Triglycerides are another kind of fat in the blood. Sometimes they are high in diabetic patients who have high blood sugars. If your triglycerides are high, eat less food and drink less alcohol (if you drink) and have your triglycerides checked in 3 months.

HDL cholesterol is the good cholesterol. The higher your HDL cholesterol, the less chance of heart disease.

LDL cholesterol is the bad cholesterol which may cause heart disease if it is high: 130-159 is moderately high, over 160 is very high.

All persons with high LDL should go on a low fat, low cholesterol diet and have a follow-up check-up in several months.

Creatinine measures kidney function. If it is high, you should go to clinic to see a health care provider.

Glucose is blood sugar. Patients with diabetes have high blood sugars.

Fasting glucose 140 or higher = Diabetes
Fasting glucose less than 140 = Normal

Two hour post 75gm glucose load

Some persons were given sugar water to see if they have diabetes. The reading two hours after drinking the sugar means:

Blood glucose 200 or higher = Diabetes
Blood glucose 140-199 = Impaired glucose tolerance
Blood glucose less than 140 = Normal

People with impaired glucose tolerance are more likely to get diabetes than people with normal levels. Healthy diet, losing weight if you are overweight, and exercise are an important way to prevent or control diabetes.

Urinary albumin-creatinine ratio measures kidney function. If above 30, it indicates there may be some kidney damage.

Glycated hemoglobin reflects the blood sugar over the past 6 weeks.

The levels of glycated hemoglobin are interpreted in diabetic patients as follows:

- Poor control - 9.6% and above
- Fair control - 7.6% - 9.5%
- Good control - 6.0% - 7.5%
- Normal Value - 5.9% and below

APPENDIX 37 (c)
STRONG HEART STUDY
Summary Report of Clinical Examination

Name _____ Date of Examination ____/____/____

IHS chart number _____ Community Code _____

Ht.: _____ ft. _____ ins. or _____ cm. Wt.: _____ lbs. or _____ kg.

B.P.: _____ / _____ (Normal: below 140/90)

Percent Body Fat by impedance _____ (Desirable range: M 14%-21%, F 22%-31%)

Body Mass Index _____ ; Percent of ideal body weight _____ (Desirable: 90%-120%)

PHYSICAL EXAM:

HEART: Gallop - present/not present
Murmur - present/not present

LUNG: clear/rales or rhonchi

BRUITS: Carotid - Right: heard/not heard
Left: heard/not heard

Femoral - Right: heard/not heard
Left: heard/not heard

Pulses: Posterior Tibial - Right: present/not present
Left: present/not present

Dorsalis Pedis - Right: present/not present
Left: present/not present

ECG reading: Tracing can be found in chart

Current cigarette consumption: yes/no.

Lipids:

Total cholesterol: _____ (normal range: 100-199 mg/dl)

Triglycerides: _____ (normal range: 75-249 mg/dl)

HDL cholesterol: _____ (normal range: 35-74 mg/dl)

LDL cholesterol: _____ (normal range: 75-129 mg/dl)

Serum Creatinine: _____ (normal range: 0.5-1.10 mg/dl)

Fasting glucose: _____ (normal: less than 140 mg/dl)

Two hour post 75 gm. glucose load: _____ (normal: less than 140 mg/dl)

Glycated hemoglobin (Hb A1c): _____ (normal: less than 5.9%)

Urinary albumin-creatinine ratio: _____ (normal: less than 30)

INFECTION CONTROL POLICY

Human Immunodeficiency Virus (HIV) and Hepatitis B

INTRODUCTION:

The virus that causes AIDS is a human retrovirus that has been named HIV (human immuno deficiency virus). The virus primarily infects cells of the T-lymphocyte system, but is also able to infect other cells such as macrophages and those of the central nervous system. The virus destroys the cellular immunity of infected people, leaving them susceptible to a variety of opportunistic diseases.

It has been established that the virus can be transmitted: (1) through sexual contact; (2) through parenteral exposure, including sharing needles and syringes when injecting illicit drugs, transfusion of blood or its components, and infusion of clotting factors concentrates; and (3) through perinatal exposure, probably both transplacental and intrapartum transmission and postpartum transmission.

To date, there is no evidence that the HIV virus can be transmitted by casual social contact, not even among people living in the same house-hold. Recent reports by the CDC suggest that exposure of skin or mucous membranes to contaminated blood may rarely result in transmission of HIV. The magnitude of the risk is not known.

Hepatitis B virus (HBV) is transmitted in ways similar to HIV.

PURPOSE:

To stress the importance of following recommended precautions to prevent exposure to the AIDS and HBV virus.

PREVENTION:

1. Before initiating work, all bench areas should be cleaned and sanitized daily with a appropriate disinfectant.
2. All laboratory specimens should be treated as if they were contaminated with either HIV or HBV. Any specimens specifically taken from known AIDS or hepatitis patients should clearly marked as isolation and transported in a leak proof container.
3. Specimens leaking from their containers should be discarded after requesting a replacement. In those cases in which the specimen is not replaceable, the outside of the soiled container should be disinfected with either a 1:10 sodium hypochlorite solution (household bleach) or lysol spray and left standing for at least ten minutes before performing any laboratory procedure(s).
4. Every laboratorian should wear gloves and be dressed in a laboratory gown or uniform when handling and processing specimens. This will minimize the risk of contamination to exposed body parts or street clothing. Gloves should be worn and disposed of in accordance with the "Gloves (Proper Use and Disposal)" policy. Hands and other skin surfaces should be washed thoroughly and immediately after coming into contact with blood or body fluids.

5. Wear masks, gowns (of aprons), and goggles (or glasses when there is a possibility that blood or body fluids may splash or splatter on you.
6. All initial microbiology specimens should be cultured under a biohazard or laminar flow hood. Aerosol dispersion of body fluids are thereby controlled and the risk of accidental exposure to mucous membranes, eyes, skin, etc, is greatly minimized. All other types of laboratory specimens that must be manipulated before processing (i.e., body fluids to be diluted, caps on tubes of blood to be opened, specimens to be split or transferred, etc.) should be handled cautiously.
7. Microbiology specimens needing centrifugation should first be placed into capped tubes that in turn should be placed into a centrifuge carriage with a sealed dome. These anti-aerosol devices provide an almost absolute containment of any infectious material. Centrifuge carriages should be sanitized daily (or after each use if possible HBVs or AIDS specimen is being centrifuged) with a germicide. After weekly use, centrifuge interiors should be sprayed with an appropriate disinfectant.
8. To prevent needle stick injuries, needles should never be recapped separated from syringes or otherwise manipulated. Instead, used needles should be placed intact into puncture-resistant containers. The same criteria should be applied to used scalpel blades and any other sharp device that may be contaminated by a patient.
9. To prevent transmission of HIV or HBV the platform on the finger prick device (Autoclik, etc.) should be changed between patients.
10. Reusable devices, such as tissue grinders, pipettes, etc, should be placed into vesicles containing an appropriate germicide prior to being autoclaved and cleaned.
11. Mouth Pipetting of blood or serum or plasma is forbidden for any clinical laboratory procedure. Mechanical pipetting devices are available and must be routinely used.
12. All laboratory specimens and disposables should be discarded in biohazard bags ten autoclaved prior to final disposition by either incineration or sanitary carting.
13. Accidental spillage of a specimen should be promptly cleaned up with any of the previously mentioned disinfectants. This solution should be freshly prepared and kept in its diluted form no longer than one week.
14. If accidental contamination occurs to an exposed area of the skin, wash first with a good liquid antimicrobial detergent soap (i.e., hibiclens, chlorhexidine gluconate, etc.). Rinse well with water, then apply a 1:10 dilution of household bleach or 50% isopropyl or ethyl alcohol. Leave preparation on skin surface for at least one minute before final washing with the liquid soap and water.
15. All work bench areas should be cleaned and sanitized with an appropriate germicidal agent at the end of each work shift.

16. Before workers leave the laboratory, all protective clothing should be removed. In addition, all laboratory personnel should wash their hands and arms with an appropriate germicidal detergent soap (i.e., chlorhexidine gluconate with alcohol).

First Aid After Contamination or Likely Contamination

SKIN

Wash the skin with soap and water.

EYES

Flush eyes with water by using the safety eye wash.

NEEDLE STICK

Squeeze the affected part gently to somewhat cleanse the wound by bleeding. Cleanse with soap and water.

MOUTH

Immediately rinse out the mouth with large amounts of clean water. Do not swallow the water. (mouth pipetting is strictly forbidden)

1. Notify the supervisor and report to the Employee Health Unit or in the event Employee Health is closed, go to the Emergency Room.
2. As incident report form must be filed.
3. The decision to administer hepatitis immune globulin is made by the Employee Health Unit.
4. the hepatitis B surface antigen (HBsag) vaccine HAS BEEN AND IS AVAILABLE to high risk personnel (laboratory, ICU, etc.)

Reference:

Tierno, PM: Preventing Acquisition of Human Immunodeficiency Virus in the Laboratory: Safe Handling of AIDS Specimens. Laboratory Medicine 1986; 11: 696-698.

Standard Procedure for the Collection of Diagnostic Blood Specimens by Venipuncture, National Committee for Clinical Laboratory Standards March 1980.

So You're Going to Collect a Blood Specimen, College of American Pathologist, 1980.

Rose SL: Clinical Laboratory Safety Philadelphia, J.B. Lippincott Company, 1984

KEY WORDS (AND SYNONYMS)

ANGINA PECTORIS (Angina, chest pain, cardiac pain):

Discomfort in the chest, often radiating from the precordium (epigastrium and anterior surface of the lower part of the thorax) to the left shoulder and down the arm, due to ischemia of the heart muscle, usually caused by coronary disease

ANGIOPLASTY (Percutaneous Transluminal Coronary Angioplasty, PTCA):

Catheter procedure for enlarging a narrowed coronary arterial lumen by peripheral introduction of a balloon-tip catheter and dilating the lumen

AORTIC BALLOON PUMP (See Intra-aortic balloon pump):

APHASIA:

impaired or absent communication by speech, writing, or signs, due to dysfunction of brain centers in the dominant hemisphere

APRAXIA:

a disorder of voluntary movement, consisting in partial or complete incapacity to execute purposeful movements, even though muscular power and coordination are still present

ARRHYTHMIA:

irregularity of the heart beat

ATAXIA:

incoordination; an inability to coordinate the muscles in the execution of voluntary movement

ATHEROSCLEROTIC INFARCTION:

sudden insufficiency of arterial blood supply due to atherosclerosis that produces a macroscopic area of necrosis

ATRIAL FIBRILLATION:

normal rhythmical contractions of the atria are replaced by rapid irregular twitchings of the muscular wall. Often seen in conjunction with mitral valvular heart disease or heart failure, but may be seen as an isolated finding

BABINSKI (toe reflex):

"positive" Babinski=extension of the great toe and abduction of the other toes instead of the normal flexion reflex to plantar stimulation

CABG(coronary artery bypass grafting):

surgical revascularization of blocked or partially blocked coronary arteries using either veins from the leg or with arteries from inside the chest

CARDIAC CATHETERIZATION:

procedure in which a catheter is passed into the heart via a vein or artery, to withdraw samples of blood, measure pressures within the heart's chambers or great vessels. and inject contrast media; used mainly in the diagnosis and evaluation of congenital, rheumatic, and coronary artery lesions

CARDIOMYOPATHY:

disease of the myocardium; affects mainly the heart muscle, sparing other cardiac structures and usually resulting in fibrosis or hypertrophy

CARDIOVERSION:

restoration of the heart's rhythm to normal by electrical countershock

CLAUDICATION (intermittent claudication):

a condition caused by ischemia of the muscles due to sclerosis with narrowing of the arteries; it is characterized by attacks of lameness and pain, brought on by walking, chiefly in the calf muscles, although the condition may occur in other muscle groups

CONGESTIVE HEART FAILURE (Heart failure, acute coronary insufficiency, congestive failure):

mechanical inadequacy of the heart so that as a pump it fails to maintain the circulation of blood, with the result that congestion and edema develop in the tissues; the resulting clinical syndrome consists of some or all of the following: shortness of breath, pitting edema, enlarged tender liver, engorged neck veins and pulmonary rales

CORONARY ANGIOGRAPHY:

radiography of coronary vessels after the injection of a radiopaque material

CORONARY INSUFFICIENCY: See Angina Pectoris

CT SCAN (Computerized Axial Tomography Scan, CAT Scan):

a test to gather anatomical information from a cross-sectional plane of the body. Presented as an image generated by a computer synthesis of x-ray transmission data obtained in many different directions through the given plane

DTR,s (Deep Tendon Reflexes):

an involuntary muscular contraction following Percussion of a tendon of a muscle

DYSPNEA:

shortness of breath, a subjective difficulty or distress in breathing. Can occur with exertion, when recumbant, or at other times as well. Its timing hints at its cause (ischemia, CHF, etc.)

ECHOCARDIOGRAPHY (Ultrasound cardiography, DOPPLER, DUPLEX SCAN):

use of ultrasound in the diagnosis of cardiovascular lesions especially mitral disease, pericardial effusion, and abdominal aortic aneurysm; the ultrasound can record the size, motion, and composition of various cardiac structures

EDEMA:

accumulation of an excessive amount of watery fluid in cells, tissues, or serous cavities

EJECTION FRACTION (EF):

the fraction of blood expelled during each contraction of the heart. The ejection fraction decreases with the onset of congestive heart failure. Normal ejection fraction is above 50 or 55% depending on method of measurement

EMBOLIC INFARCTION:

sudden insufficiency of arterial or venous blood supply due to obstruction of the vessel by an embolus (a plug, composed of a detached clot, mass of bacteria, or other foreign body) that produces a macroscopic area of necrosis

FOCAL NEUROLOGIC DEFICIT:

neurologic shortcomings explainable by localized abnormal brain function such as produced by an embolus or stroke involving a particular region of the brain

GAIT:

manner of walking

GATED BLOOD POOL SCAN (or MUGA SCAN):

A nuclear medicine procedure which involves the radioactive "labelling" of the blood. Useful for determining ejection fraction and overall cardiac function relatively noninvasively.

GXT (Graded Exercise Test):

Usually a walking test on a treadmill to determine if there is any inducible ischemia by ECG, symptoms or radionuclide determination

HEMOLYTIC DISEASES:

A group of disorders of varying causality all eventually resulting in the lysis of red blood cells

HEPATOJUGULAR REFLUX (Abdominojugular reflux):

a persistent elevation of venous pressure visible in the jugular veins produced in active or impending congestive heart failure by firm pressure with the flat hand over the abdomen

HEPATOMEGALY:

enlargement of the liver

INFARCTION:

sudden insufficiency of arterial or venous blood supply due to emboli, thrombi, vascular torsion, or pressure that produces a macroscopic area of necrosis

INTRA-AORTIC BALLOON PUMP (IABP)

A machine attached to a large (usually > 50 cc.) balloon placed surgically or percutaneously in the descending aorta used during times of coronary insufficiency or congestive heart failure to augment diastolic pressure and decrease early systolic afterload

INTRAPARENCHYMAL HEMORRHAGE:

bleeding into the brain

INTRAVENOUS/INTRACORONARY THROMBOLYSIS:

The chemical dissolution of acute coronary thrombosis, usually with streptokinase, mokinase, t-PA or a combination of these agents. The ultimate goal is myocardial salvage from the effects of prolonged ischemia

LACUNAR INFARCTION:

infarctions in the deep portions of the cerebral hemispheres and brainstem resulting from occlusion of small perforating branches of the circle of willis and adjacent arteries. Strong association with hypertension, representing ~ 10 % of all stratus

MRI (Magnetic Resonance Imaging):

MUGA SCAN (see gated blood pool scan):

MYOCARDIAL INFARCTION (MI, Heart attack):

sudden insufficiency of blood supply to an area of the heart muscle, usually as a result of occlusion of a coronary artery

ORTHOPNEA:

shortness of breath which occurs while recumbant

OHS:

open heart surgery either of valves, coronary arteries or other cardiac structures. See also CABG

PAROXYSMAL NOCTURNAL DYSPNEA (PND):

acute shortness of breath or difficulty breathing appearing suddenly at night, usually waking the Patient after an hour or two of sleep and relieved with more upright posture. Usual cardiac cause is CHF

PLEURAL EFFUSION:

escape of fluid from the blood vessels or lymphatics into the tissues of the lung. Due to infecton, congestive heart failure or other process

PMI (Point of Maximal Intensity):

the area on the chest where the apical heart beat is best felt

PTCA: See Angioplasty

PULMONARY EDEMA:

accumulation of an excessive amount of watery fluid in the tissues of the lungs, usually resulting from increased leftsided pressures, due to valvular heart disease, or congestive heart failure of other causes

RADIONUCLEIDE SCAN:

any scan employing radioactive isotopes to explore particular aspects of anatomy or function

RHABDOMYOLYSIS:

an acute disease of skeletal muscle which entails destruction of skeletal muscle as evidenced by myoglobinemia (myoglobin in the blood) and myoglobinuria (myoglobin in the urine)

RHOMBERG:

Rhomberg or station test; a positive test is when a standing patient becomes increasingly unsteady with the eyes closed indicating a loss of proprioceptive control

RNA (Radionucleide angiography):

display, by means of a stationary scintillation camera device, of the passage of a bolus of a rapidly injected radiopharmaceutical. Can be gated - see also muga and gated blood pool study

STENOSIS:

stricture or narrowing of any canal. Can be applied to coronary vessels and valves

STREPTOKINASE (STK) / UROKINASE/ TISSUE PLASMINOGEN ACTIVATOR (t-PA):

isolatic or genetically engineered substances used to dissolve clots

STROKE (Cerebrovasoular accident (CVA)):

sudden neurological affliction usually related to the cerebral blood supply; appropriate terms indicate the nature of the disturbance, e.g., thrombosis, hemorrhage, or embolism

SUBARACHNOID HEMORRHAGE:

bleeding into the subarachnoid space, usually due to aneurysm and usually spreading throughout the cerebrospinal fluid pathways

SUBDURAL HEMATOMA (Subdural Hemorrhage):

a mass of blood, usually clotted, or bleeding into the area below the dura mater (outer covering of the brain and spinal cord)

SWAN-GANZ CATHETERIZATION (SG Catheter, Right heart catheterization):

procedure that uses a thin, very flexible, flow-directed catheter using a balloon to carry it through the heart to a pulmonary artery; when it is positioned in a small arterial branch, Pulmonary wedge Pressure is measured in front of the temporarily inflated and wedged balloon giving a reflection of left atrial pressure

VALVULAR HEART DISEASE:

any acquired or congenital lesion involving one or more valves of the heart. An example of acquired valvular heart disease is Rheumatic mitral stenosis or calcific aortic stenosis . Of note, many people with valvular heart disease should receive antibiotics prophylactically during dental work and other procedures where bacteria may be introduced into the blood stream

TIA (Transient Ischemic Attack):

a focal neurologic deficit whose total duration is less than one hour

REFERENCES

1. Report of the Secretary's Task Force on Black and Minority Health. Vol IV: Cardiovascular and Cerebrovascular Diseases Part 2. U.S. Department of Health and Human Services (Washington, D.C., U.S. Government Printing Office, January, 1988).
2. Rhodes ER, Hammond J, Welty TK, Handler AD, Amler RW. The Indian - Burden of Illness and Future Health Interventions. Public Health Reports 1987; 102: 261-368.
3. U.S. Congress. Office of Technology Assessment. Indian Health Care. OTA-H-290 (Washington, D.C., U.S. Government Printing Office, April, 1986.)
4. Coulehan JL. Cardiovascular Disease. In: Indian Health Conditions, An IHS Report. In Press 1989.
5. DHHS. Indian Health Service. Indian Health Service Chart Book Series. June 1984.
6. Sievers ML, Fisher JR. Disease of North American Indians. IN Rothschild HR, ed., Biocultural Aspects of Disease. New York: Academic Press, 1981, Chapter 8, pp. 191-252.
7. Sievers ML. Disease patterns among Southwestern Indians. Public Health Reports 1966;81:1075-1083.
8. Kunitz SJ. Disease Change and the Role of Medicine. The Navajo Experience. University of California Press. Berkeley, CA. 1983.
9. Strotz CR, Shorr GI. Hypertension in the Papago Indians. Circulation 1973;18:1299-1303.
10. Howard BV, Davis MP, Pettitt DJ, Knowler WC, Bennett PH. Plasma and lipoprotein cholesterol and triglyceride concentrations in the Pima Indians. Distributions differing from those of Caucasians. Circulation 1983;68:714-724.
11. Savage PJ, Hamman RF, Bartha G, Dippe SE, Miller M, Bennett PH. Serum cholesterol levels in American (Pima) Indians children and adolescents. Pediatrics 1978;58:274-282.
12. Pettitt DJ, Lisse JR, Knowler WC, Bennett PH. Mortality as a function of obesity and diabetes mellitus. Am J Epidemiol 1982;115:359-366.
13. Sievers ML. Cigarette and alcohol usage by Southwestern American Indians. Am J Pub Health 1968;58:77-82.
14. Sievers ML. Myocardial infarction among Southwestern American Indians. Ann Int Med 1967;67:800-807.

15. Clifford NJ, Kelly JJ, Leo TF, Eder HA. Coronary heart disease and hypertension in the White Mountain Apache tribe. *Circulation* 1983;28:926-931.
16. DeStefano F, Coulehan JL, Wiant MK. Blood pressure survey on the Navajo Indian reservation. *Am J Epidemiol* 1979;109:335-345.
17. Fulmer HS, Roberts RW. Coronary heart disease among the Navajo Indians. *Ann Int Med* 1963;59:740-764.
18. Coulehan JL, Lerner G, Helzlsouer K, Welty TK, McLaughlin J. Acute myocardial infarction among Navajo Indians, 1976-83. *Am J Public Health* 1986;76(4):412-4.
19. Klain M, Coulehan JL, Arena VC, Janett R. More Frequent Diagnosis of Acute Myocardial Infarction among Navajo Indians. *AJPH* 1988;78:1351-1352.
20. Howard BV, Lisse JR, Knowler WC, Davis MP, Pettitt DJ, Bennett PH. Diabetes and atherosclerosis in the Pima Indians. *Mount Sinai J Med (NY)* 1982;49:169-175.
21. Gillum RF, Prineas RJ, Palta M., Horibe H. Blood pressures of urban Native American school children. *Hypertension* 1980;2:744-749.
22. Pinkerton RE, Badke FR. Coronary heart disease. An epidemiologic study of Crow and Northern Cheyenne Indians. *Rocky Mount Med J* 1974;71:577-583.
23. Mayberry RH, Lindeman RD. A survey of chronic disease and diet in Seminole Indians in Oklahoma. *Am J Clin Nutr* 1963;13:127-134.
24. Scott Em, Griffith IV, Hoskins DD, Whaley RD. Serum cholesterol levels and blood pressures of Alaskan Eskimo men. *Lancet* 1958;2:887-888.
25. Hrabovsky SL, Welty TK, Coulehan JL. Acute Myocardial Infarction and Sudden Death in Sioux Indians. *W. Med. J.*, April 1989.
26. U.S. Department of Health, Education, and Welfare. *The Indian Health Trends and Services*. U.S. Government Printing Office. Washington, D.C. 1978. HSA 78-12009.
27. Seivers ML, Fisher JR. Increasing rate of acute myocardial infarction in Southwestern American Indians. *Ariz Med* 1979; 36:607-610.
28. DHHS. *Proceedings of the National Conference of High Blood Pressure Control in Native American Communities*. NIH Publication No. 79-19BO. April 1977.
29. Williams RC, Steinberg AG, Gershowitz H, Bennett PH, Knowler WC, Pettitt DJ, Butler W, Baird H, Dowda-Rea L, Burch TA. GM allotypes in Native Americans: evidence for three distinct migrations across the Bering land bridge. *Am J Phys Anthropol* 1985 Jan;66(1):1-19.
30. Gillum RF, Gillum BS, Smith N. Cardiovascular risk factors among urban American Indians. Blood pressure, serum lipids, smoking, diabetes, health knowledge, and behavior. *Am Heart J* 1984;107:758-778.

31. Sievers ML. Historical overview of hypertension among American Indians and Alaskan American Indians. *Ariz Med* 1979;36:739-742.
32. Welty TK, Freni-Titulaer L, Zack MM, et al. Effect of Exposure to Salty Drinking Water in an Arizona Community. Cardiovascular Mortality, Hypertension Prevalence and Relationships Between Blood Pressure and Sodium Intake. *JAMA* 1986;255:622-626.
33. Sievers ML. Serum cholesterol levels in Southwestern American Indians. *J Chron Dis* 1968;21:107-115.
34. Thomas RK. The history of North American Indian alcohol use as a community based phenomenon. *J Studies Alcohol* 1981; (suppl*), 9:29-39.
35. Welty TK, Tanaka ES, Leonard B, Hurlburt W, Rhodes E. Indian Health Service Facilities Become Smoke-Free. *MMWR* 1987;36:348-350.
36. Ingelfinger JA, Bennett PH, Liebow IM, Miller M. Coronary heart disease in Pima Indians. Electrocardiographic findings and postmortem evidence of myocardial infarction in a population with a high prevalence of diabetes mellitus. *Diabetes* 1978;25:581-585.
37. West KM. Diabetes in American Indians and other Native Populations of the New World. *Diabetes* 1974; 23:841-855.
38. Gohdes, DM. Diabetes in American Indians: A Growing Problem. *Diabetes Care* 1986;9:609-613.
39. Savage PJ, Bennett PH, Senter HG, Miller M. High prevalence of diabetes in young Pima Indians. Evidence of phenotypic variation in a genetically isolated population. *Diabetes* 1979;28:937-942.
40. Kleinbaum DG, Kupper LL and Morgenstern H. *Epidemiologic Research*, Lifetime Learning Publications, Belmont, Calif, 1982.
41. Kleinbaum DG, Morgenstern H and Kupper LL. Selection bias in epidemiologic studies. *A.J. Epid.* 1981; 113: 452-463.
42. Mantel N and Haenszel W. Statistical aspects of the analysis of data from retrospective studies of disease. *J. Nat'l Cancer Inst.* 1959; 22: 719-748.
43. Lee, ET. *Statistical Methods for Survival Data Analysis*. Lifetime Learning Publications, Belmont, CA, 1980.
44. Gillum RF, Fortman SP, Prineas RJ and Kottke TE. International diagnostic criteria for acute myocardial infarction and acute stroke. *Am. Heart J.* 1984; 108: 150-158.
45. McKee PA, Castelli WP, McNamara PM and Kannel WB. The natural history of congestive heart failure: The Framingham Study. *The New England J. of Med.*, 1971; 285: 1441-1445.

46. The National Heart, Lung and Blood Institute, ARIC (Atherosclerosis Risk in Communities Study) Manual, 1987.
47. The Minnesota Code Manual of Electrocardiographic Findings; Prineas RJ, Crow RS, Blackburn H. John Wright PSC, Inc., Littleton, MA 1982.
48. Rautaharju PM, Warren J, Jain U, Wolf HK and Nielsen CI. Cardiac Infarction Injury Score: An Electrocardiographic Coding Scheme for Ischemic Heart Disease. *Circulation* 1981; 64(1): 249-256.
49. Rautaharju PM, Wolf HK, Eifler WJ, and Blackburn H. A Simple Procedure for Positioning Precordial ECG and VCG Electrodes Using an Electrode Locator. *Journal of Electrocardiology* 1979; 9(1): 35-40.
50. Ostrander LD. Serial Electrocardiographic Findings in a Prospective Epidemiological Study. *Circulation*, 34:1069-1080, 1966.
51. Pooling Project Research Group. The Relationship of Blood Pressure, Serum Cholesterol, Smoking Habit, Relative Weight and ECG Abnormalities to Incidence of Major Coronary Events: Final Report of the Pooling Project. *J Chron Dis.*, 31:201-306, 1978.
52. Rose G, Hamilton PJS, Keen H, Reid DD, McCartney P and Jarrett RJ. Myocardial Ischaemia, Risk Factors and Deaths from Coronary Heart Disease. *Lancet*, I:105-109, 1977.
53. Lukaski HC, Johnson PE, Bolonchuk WW, and Lykken GI. Assessment of Fat-Free Mass Using Bioelectrical Impedance Measurements of the Human Body. *Am J Clin Nutr.*, 41:810-817, 1985.
54. Roche AF, Chumlea WC and Guo S. Identification and Validation of New Anthropometric Techniques for Quantifying Body Composition. U.S. Army Report #NATICK/TR-86/058, 1986.
55. Vague J. The Degree of Masculine Differentiation of Obesities, A Factor Determining Predisposition to Diabetes, Atherosclerosis, Gout and Uric Calculous Disease. *AM J Clin Nutr.*, 4:20-34, 1956.
56. Criqui MH, Fronek A, Klauber MR, Barrett-Connor E and Gabriel S. The Sensitivity, Specificity, and Predictive Value of Traditional Clinical Evaluation of Peripheral Arterial Disease: Results from Non-invasive Testing in a Defined Population. *Circulation* 71(3):516-522, 1985.
57. Beach KW, Bedford GR, Bergelin RO, Martin DC, Vandenberghe N, Zaccardi M and Stradness Jr., DE. Progression of Lower-Extremity Arterial Occlusive Disease in Type II Diabetes Mellitus. *Diabetes Care*, 11(6), 1988.
58. Kriska AM, Sandler RB, Cauley JA, LaPorte RE, Hom DL and Pambianco G. The Assessment of Historical Physical Activity and Its Relation to Adult Bone Parameters. *Am J Epidemiol.*, 127:1053-1063, 1988.
59. Morgan CR, Lazarow A. Immunoassay of Insulin: Two Antibody System. Plasma Insulin Levels in Normal, Subdiabetic and Diabetic Rats. *Diabetes*, 12:115, 1963.

60. Mandrup-Poulsen T, Owerbach D, Nerup J, Johansen K, Ingerslev J and Hansen AT. Insulin-Gene Flanking Sequences, Diabetes Mellitus and Atherosclerosis: A Review. *Diabetologia*, 28:556-564, 1985.
61. Karathanasis SK, McPherson J, Zannis VI and Breslow JL. *Nature*, 304:371, 1983.
62. Ordovas JM, Schaeffer EJ, Salem D, Ward RH, Gleuck CJ, Vergani C, Wilson PF and Karathanasis SK. *New Engl J Med.*, 314:671, 1986.
63. Armstrong BK. *Exposure Measurement in Epidemiology*. (Manuscript) Chapter 5. The Personal Interview (26 pp), 1986.
64. Kelsey JL, Thompson LW, and Evans AS. *Methods in Observational Epidemiology*. (366 pp) Oxford University Press. New York, 1986.
65. *Bioelectrical Impedance User's Manual*. RJL System, Inc. Detroit, 1987.

ADDENDUM I

MODIFICATION TO PHASE I MORBIDITY SURVEY PROTOCOL (1/13/92)

At the January 9, 1992 Steering Committee meeting, it was determined that the protocol for the Phase I Morbidity Survey should be modified. The "Eligible Population", as currently described on page 35 of the SHS Manual, has been modified so that the morbidity survey is restricted to events between 1984 and 1988 in those persons who participated in the Phase I physical examination. Their medical records will be reviewed to identify and confirm the occurrence of hospitalized myocardial infarction or stroke. There are no changes in the types of events included or the criteria used to define an event for the purposes of this study. Because the events are referable only to those examined, age is no longer included in defining the eligible population, other than those limits used to define eligibles for the Phase I examination. That is, information on any prior, potentially eligible event will be abstracted and reviewed.

This change in the Morbidity Survey protocol is effective as of 1/13/92 and takes precedence over any prior descriptions in the Phase I SHS manual regarding case identification and selection. For example, the portions of Section 3.5 "Procedure for Identification of Incident and Recurrent Cases" on pages 39-40 are no longer applicable.

The rationale for this modification is that there will now be a follow-up component (Phase II) of the Strong Heart Study, which was not originally part of the study. This follow-up component will allow for more accurate identification of incident myocardial infarction and stroke cases than was possible from record review alone. In addition, risk factor data will be available, which would not have been the case under the previous morbidity survey protocol. Given the extensive resources required to carry out a total population morbidity survey and the uncertain quality of the resultant data compared to that which will be obtained for a group of carefully study, well-characterized participants (i.e., the Phase I examinees), this modification to the Phase I protocol was unanimously accepted by the Steering Committee.

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ADDENDUM II

STRONG HEART STUDY

CHART REVIEW FORM FOR ELEVATED PLASMA CREATININE PATIENTS

SHS ID: _____

IHS CHART NO: _____

STRONG HEART STUDY EXAMINATION DATE: _____

PATIENT'S NAME: _____

1. Was the patient referred for follow up? (1=YES, 2=NO)

If yes, by whom? _____

2. Referred to: 1=IHS Clinic/Hospital
2=Nephrologist
3=Other, _____

3. Was the patient seen for the elevated creatinine? (1=YES, 2=NO)

4. Was creatinine clearance done? (1=YES, 2=NO)

If yes, most recent results? _____ DATE: _____

5. Was 24 hour urine creatinine done? (1=YES, 2=NO)

If yes, most recent results? _____ DATE: _____

6. Was a PPD done? (1=YES, 2=NO)

If yes, most recent results? _____ DATE: _____

7. Was INH preventive therapy administered if PPD is positive? (1=YES, 2=NO)

8. Is blood pressure less than 140/90 at the most recent clinic visit?
(1=YES, 2=NO)

9. Record last three blood pressures.

_____/_____/_____

_____/_____/_____

_____/_____/_____

DATE

DATE

DATE

10. Was dietary consultation obtained and documented in the chart? (1=YES, 2=NO)
- If yes, most recent consultation? DATE: _____
11. Does the patient have diabetes? (1=YES, 2=NO)
12. If yes, record last three blood sugars.
Indicate "F" for fasting test or "R" for random test.
- | | | |
|-------------|-------------|-------------|
| _____ mg/dl | _____ mg/dl | _____ mg/dl |
| _____ | _____ | _____ |
| DATE | DATE | DATE |
13. Most recent plasma creatinine: _____ mg/dl
DATE _____
14. Strong Heart Study plasma creatinine: _____ mg/dl
DATE _____
15. Is the patient on dialysis? (1=YES, 2=NO)
- If yes, date started: _____
DATE _____
16. Did the patient receive a kidney transplant? (1=YES, 2=NO)
- If yes, date received: _____
DATE _____
17. Form completed by: _____
DATE _____

ADDENDUM III

DEFINITION OF STUDY VARIABLES

DEFINITION OF AGE, INDIAN BLOOD QUANTUM, AND INELIGIBILITY

1. SEX: PERSONAL INTERVIEW FORM II, Q12
0 (FEMALE) INT2_1='2'
1 (MALE) INT2_1='1'
2. AGE (IN YEARS), Q14 AND DOC IN PERSONAL INTERVIEW FORM II
AGE = (DATE OF EXAM/INTERVIEW) - (DATE OF BIRTH)
= (DOC - INT2_3) / 365.25
3. INDIAN BLOOD QUANTUM (BLOOD), Q16 AND Q17 IN PERSONAL INTERVIEW II
BLOOD = INT2_5 / INT2_6
= (INT2_8/INT2_9) + (INT2_11/INT2_12) + (INT2_14/INT2_15) +
(INT2_17/INT2_18) + (INT2_20/INT2_21)
4. TRIBE OF ENROLLMENT, Q18 IN PERSONAL INTERVIEW II, INT2_28
5. RESIDENCE, PERSONAL INTERVIEW FORM II
Q39, YEARS LIVING IN INDIAN COUNTRY/RESERVATION: INT2_49
Q41a, YEARS LIVING OUTSIDE INDIAN COUNTRY/RESERVATION:
INT2_51 = AGE - INT2_49

6. INELIGIBILITY:

AGE: < 44.5 YEARS OR > 75.5 YEARS

TRIBE: IF TRIBE OF ENROLLMENT (INT2_28) IS NOT ONE OF THE FOLLOWING

OKLAHOMA: 231 - APACHE

016 - CADDO

039 - COMANCHE

046 - DELAWARE

005 - FT SILL APACHE

062 - KIOWA

170 - WICHITA

DAKOTAS: 282 - OGLALA SIOUX

277 - CHEYENNE RIVER SIOUX

272 - DEVIL'S LAKE SIOUX

Add 045, 278

OR ANY OTHER SIOUX (276, 279, 280, 281, 283, 284, 274, 285, 286, 287, OR 275) LIVED IN PINE RIDGE, EAGLE BUTTE, AND FT. TOTTEN AREA.

ARIZONA: 293 - PIMA/MARICOPA IN GILA RIVER INDIAN COMMUNITY

317

379 - PIMA/MARICOPA IN SALT RIVER INDIAN COMMUNITY

888 - MARICOPA

360 - PAPAGO INDIAN OF MARICOPA IN AK CHIN (OLD CODE = '096')

RESIDENCE:

Steering Committee decided not to use this criteria (1-10-92).

IF LIVED LESS THAN 6 MONTHS IN INDIAN COUNTRY/RESERVATION IN THE PAST YEAR, Q40 AND Q41b

DEFINITION OF DIABETIC STATUS:

I. DIABETES STATUS:

A. KNOWN DIABETES:

1. IF THE PARTICIPANT WAS NOT GIVEN GTT, GTT CHECKLIST:
 - a. ON INSULIN TREATMENT;
 - b. ON HYPOGLYCEMIC AGENT AND HAD TWO OCCASIONS OF ELEVATED BLOOD SUGAR (≥ 250) IN THE PAST;
 - c. ON RENAL DIALYSIS OR HAD KIDNEY TRANSPLANTATION AND MENTIONED HISTORY OF DIABETES IN MEDICAL HISTORY QUESTIONNAIRE (Q3f, MED25='1');
- OR
2. EITHER FASTING BLOOD SUGAR (GLUC_0) ≥ 140 OR TWO-HOUR BLOOD SUGAR (GLUC_2) ≥ 200 AND WITH MENTIONING ANY HISTORY OF DIABETES IN MEDICAL HISTORY (Q3f, MED25='1' OR '3').

B. NEW DIABETES:

1. ACCUCHEK VALUE ≥ 225 AND FASTING BLOOD SUGAR (GLUC_0) ≥ 140 , AND WITHOUT MENTIONING ANY HISTORY OF DIABETES IN MEDICAL HISTORY (Q3f, MED25='2' OR '9'); OR
2. EITHER FASTING BLOOD SUGAR (GLUC_0) ≥ 140 OR TWO-HOUR BLOOD SUGAR (GLUC_2) ≥ 200 AND WITHOUT MENTIONING ANY HISTORY OF DIABETES IN MEDICAL HISTORY (Q3f, MED25='2' OR '9').

C. IMPAIRED GLUCOSE TOLERANCE (IGT):

GLUC_0 < 140 AND GLUC_2 BETWEEN 140 AND 199.

D. NORMAL GLUCOSE TOLERANCE (NGT):

1. NGT WITH HISTORY OF DM: NOT IN (I) AND (II), GLUC_0 < 140 AND GLUC_2 < 140 AND WITH A HISTORY OF DIABETES (MED25='1').
2. TRUE NGT: GLUC_0 < 140 AND GLUC_2 < 140 AND WITHOUT A HISTORY OF DIABETES (MED25='2').

E. DIABETIC STATUS UNDETERMINED:

1. ON RENAL DIALYSIS OR HAD KIDNEY TRANSPLANT WITHOUT MENTIONING OF DIABETES IN THE MEDICAL HISTORY (MED25='2')
2. RESULTS OF GTT WAS NOT RECEIVED, OR
3. PARTICIPANT REFUSED GTT AND GLUC_0 WAS NOT SUFFICIENT TO DECIDE THE DIABETIC STATUS.

DEFINITION OF DIABETIC STATUS -- CONT'D

II. DURATION OF DIABETES, FOR DIABETIC PATIENTS ONLY:

IF AGE OF DIABETES WAS DIAGNOSED (Q3f, MED27) WAS KNOWN,
DURATION OF DM = AGE AT EXAM - MED27

III. DIABETES CONTROL, FOR DIABETIC PATIENTS ONLY:

POOR CONTROL --- HbA1c \geq 9.6% FAIR CONTROL --- HbA1c: 7.6-9.5%
GOOD CONTROL --- HbA1c: 6.0-7.5% POOR CONTROL --- HbA1c \leq 9.6%

IV. DIABETES TREATMENT, FOR DIABETIC PATIENTS ONLY, MEDICAL HISTORY:

A. BOTH INSULIN AND ORAL AGENT:

TAKING BOTH INSULIN (ANY OF THE MEDICATION CODE, MED2, MED4
MED6, MED8, MED10, MED12, MED14, OR MED16, IS '682008') AND
HYPOGLYCEMIC AGENT (ANY OF THE MEDICATION CODE, MED2, MED4
MED6, MED8, MED10, MED12, MED14, OR MED16, IS '682020') AT THE SAME
TIME.

B. INSULIN TREATMENT:

TAKING INSULIN CURRENTLY (ANY OF THE MEDICATION CODE, MED2,
MED4 MED6, MED8, MED10, MED12, MED14, OR MED16, IS '682008')

C. ORAL AGENT:

TAKING HYPOGLYCEMIC AGENT CURRENTLY (ANY OF THE MEDICATION
CODE, MED2, MED4 MED6, MED8, MED10, MED12, MED14, OR MED16, IS
'682020')

DEFINITION OF CORONARY HEART DISEASE:

I. ANGINA PECTORIS - DEFINED BY THE ROSE QUESTIONNAIRE:

ROSEAP=1 (YES): ROSE1='1' AND (ROSE2='1' OR ROSE2='3') AND ROSE4='1' AND ROSE5='1' AND ROSE6='1' AND (ROSE7A='1' OR ROSE7B='1' OR (ROSE7C='1' AND ROSE7D='1')), ELSE

ROSEAP=0 (NO)

II. MYOCARDIAL INFARCTION

A. MEDICAL HISTORY

1. HISTORY OF MI: Q31 IN MEDICAL HISTORY QUESTIONNAIRE
MED37='1';
2. POSSIBLE MI FROM ROSE QUESTIONNAIRE: Q9
ROSE9='1'.

B. CLINICAL ABNORMAL ECG: (DR. OOPK)

1. CLINICAL EVIDENCE OF ECG MI --- PANEL DECISION.
2. UNCODEABLE ECG
 - a. MISSING LEADS
 - b. BASELINE DRIFT (1 IN 20) IF IT OBSCURES ST-T SEGMENT.
 - c. MUSCLE TREMOR GIVING 2 MM. PEAK-TO-PEAK OSCILLATION.
 - d. OTHER TECHNICAL ERRORS MAKING Q WAVE MEASUREMENTS IMPOSSIBLE.
 - e. MAJOR ABNORMAL QRS CONDUCTION PATTERNS(BBB, PACER, ETC.)

C. ECG CRITERIA BY MINNESOTA CODE

1. MAJOR ISCHEMIC ABNORMALITIES -
 - a. MAJOR Q-WAVE ABNORMALITIES: 1.1.1 THROUGH 1.1.7, OR
 - b. STRICT CRITERIA (e.g., THE TECUMSEH STUDY): 1.1.X-1.2.X, 4.1.X, 5.1-5.2, 6.1 AND 7.1.X.
2. MINOR ECG ABNORMALITIES - MINOR ST AND T-WAVE CHANGES.
 - a. POOLING PROJECT: 1.1.X-1.2.X, 4.1-4.2, 5.1-5.2, 6.1-6.2, 7.1.X-7.2.X, 7.4, 8.1.X, AND 8.3.X, OR
 - b. WHITEHALL STUDY: 1.1.X, 1.3.X, 4.1.X-4.4, 5.1-5.3, AND 7.X.

MN CODES	ANTERO-LATERAL	POSTERIOR (INFERIOR)	ANTERIOR	PATTERN
1-1-X	1, 2, 3	1, 2, 4, 5	1, 2, 6, 7	Q AND QS
1-2-X	1, 2, 3, 8	1, 2, 3, 4, 5, 6	1, 2, 7, 8	Q AND QS
1-3-X	1, 3	1, 4, 5, 6	1, 2	Q AND QS
2-X	1, 2, 3, 4, 5			QRS AXIS
3-X	1, 2, 3, 4			HIGH R
4-1-X	1, 2	1, 2	1, 2	ST JUNCTION (J)
4-X	2, 3, 4	2, 3, 4	2, 3, 4	STJ
5-X	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	T-WAVE
6-X-X	1, 2-1, 2-2, 2-3, 3, 4-1, 4-2, 5, 6, 8			A-V CONDUCTION
7-X-X	1-1, 1-2, 2-1, 2-2, 3, 4, 5, 6, 7, 8			VENTRICULAR CONDUCTION DEF
8-X-X	1-1, 1-2, 1-3, 1-4, 1-5, 2-1, 2-2, 2-3, 2-4, 3-1, 3-2, 3-3, 3-4, 4-1, 4-2, 5-1, 5-2, 6-1, 6-2, 6-3, 6-4, 7, 8, 9			ARRHYTHMIAS
9-X	2	2	2	ST ELEVATION

D. COMPOSITE POSSIBLE CHD: (DR. OOPIK)

<u>CHD</u>	<u>MN ECG</u>	<u>CLINICAL ECG</u>	<u>MI HX</u>	<u>ROSE MI</u>	<u>ROSE ANGINA</u>
1	+	+	+	+	+

DEFINITION OF CONGESTIVE HEART FAILURE:

- A. FROM MEDICAL HISTORY QUESTIONNAIRE, QB3k.
MED34='1'

DEFINITION OF STROKE:

- A. MEDICAL HISTORY QUESTIONNAIRE, Q3n, MED41='1'

DEFINITION OF OTHER HEART DISEASE

- A. LEFT VENTRICULAR HYPERTROPHY (LVH):
1. CLINICAL ECG EVIDENCE: (DR. OOPIK)
 2. ECG EVIDENCE, MINNESOTA CODE -
 - a. CARDIA: 3.1 OR 3.2
 - b. DR. CROW: (3.1 OR 3.2) AND (5.1 OR 5.2)
- B. RHEUMATIC HEART DISEASE:
- A. MEDICAL HISTORY QUESTIONNAIRE, Q3b='1'

DEFINITION OF HYPERTENSION

- I. BLOOD PRESSURE: AVERAGE OF THE LAST TWO SITTING BLOOD PRESSURE FROM PHYSICAL EXAM, Q17, Q18, Q19, AND Q20
 SYSTOLIC BLOOD PRESSURE - $SBP = (EXAM27 + EXAM29) / 2$
 DIASTOLIC BLOOD PRESSURE - $DBP = (EXAM28 + EXAM30) / 2$
 MEAN BLOOD PRESSURE - $MBP = (2/3 SBP) + (1/3 DBP)$

- II. HYPERTENSION:
 1. TAKING ANTIHYPERTENSIVE DRUG(MEDICATION CODE='2408')
OR
 2. TAKING (DIURETICS ('4028'), OR BETA-BLOCKERS ('1216')) AND HISTORY OF HYPERTENSION (MED19='1')
OR
 3. SYSTOLIC BLOOD PRESSURE ≥ 140 mmHg
OR
 4. DIASTOLIC BLOOD PRESSURE ≥ 90 mmHg

(BORDERLINE HYPERTENSION ???)

- III. NORMOLTENSIVE:
SBP < 140 AND DBP < 90 AND NO ANTIHYPERTENSIVE TREATMENT.

DEFINITION OF ISOLATED HYPERTENSION:

- 1. HYPERTENSION: $DBP \geq 90$ AND $SBP \geq 140$
- 2. DIASTOLIC HYPERTENSION: $DBP \geq 90$ AND $SBP < 140$
- 3. ISOLATED SYSTOLIC HYPERTENSION: $SBP \geq 140$ AND $DBP < 90$
- 4. NORMALTENSIVE $SBP < 140$ AND $DBP < 90$

HYPERTENSION CONTROL, FOR HYPERTENSIVE PARTICIPANTS ONLY:

- 1. UNCONTROLLED HYPERTENSION: $DBP \geq 90$ OR $SBP \geq 140$ *See uncontrolled*

OR Use WHO:

HTN RX or 160/95

Borderline : 140-159/90-94

Normotensive No RX, < 140/90

DEFINITION OF RENAL DISEASE:

I. RENAL FUNCTION, PLASMA CREATININE:

A. CATEGORICAL VARIABLE:

1 (RENAL INSUFFICIENCY) PLASMA CREATININE \geq 2.0 mg/dl
0 (NORMAL) PLASMA CREATININE < 2.0 mg/dl

B. CONTINUOUS VARIABLE, ADJUSTED FOR BMI

II. ALBUMINURIA (ACRATIO):

ESTIMATED BY URINARY ALBUMIN - URINARY CREATININE RATIO

2 (MACROALBUMINURIA) ACRATIO \geq 300 mg/g

1 (MICROALBUMINURIA) ACRATIO 30 - 299 mg/g

0 (NORMAL) ACRATIO < 30 mg/g

III. END STAGE RENAL DISEASE (ESRD)

1 (YES)= ON RENAL DIALYSIS, MEDICAL HISTORY FORM, Q4a, MED42='1', OR
HAD KIDNEY TRANSPLANT, MEDICAL HISTORY, Q4b, MED43='1', OR
KIDNEY FAILURE, MEDICAL HISTORY, Q3g, MED29='1'

0 (NO)= NONE OF ABOVE

DEFINITION OF PERIPHERAL VASCULAR DISEASE (PVD)

- I. ANKLE-BRACHIAL RATIO (PVD_ABR), PHYSICAL EXAM, Q44, Q45, AND Q46
RIGHT ANKLE BP: MEAN OF FIRST AND SECOND DOPPLER SBP OF RT ANKLE.
RANKBP=(EXAM66 + EXAM68) / 2
LEFT ANKLE BP: MEAN OF FIRST AND SECOND DOPPLER SBP OF LT ANKLE.
LANKBP=(EXAM70 + EXAM72) / 2
RIGHT ARMBP: MEAN OF FIRST AND SECOND DOPPLER SBP OF RT ARM.
RARMBP=(EXAM74 + EXAM75) / 2
RPVD_ABR = RANKBP / RARMBP
LPVD_ABR = LANKBP / RARMBP

PVD_ABR:

- 1 (YES): IF (RPVD_ABR < 0.8) OR (LPVD_ABR < 0.8) OR THE ANKLE DOPPLER BPs WERE NOT AUDIBLE (EXAM70, EXAM72, EXAM74, OR EXAM75 WAS '0')
- 0 (NO): IF PVD_ABR ≥ 0.8.

- II. PERIPHERAL OCCLUSION (PERIOCC):
ABSENCE OF DORSALIS PEDIS PULSE AND POSTERIOR TIBIAL PULSE ON EITHER FOOT.
(PHYSICAL EXAM Q36-Q39),
PERIOCC=1 (YES): (EXAM58='2' AND EXAM60='2') OR (EXAM59='2' AND EXAM61='2')
- PERIOCC=0 (NO): EXAM58='1' AND EXAM59='1' AND EXAM60='1' AND EXAM61='1'

- III. PRESENCE OF FEMORAL BRUITS (BRUIT)
(PHYSICAL EXAM Q40-Q41)
BRUIT=1 (YES): EXAM62='1' OR EXAM63='1'
- BRUIT=0 (NO): EXAM62='2' AND EXAM63='2'

- IV. INTERMITTENT CLAUDICATION (MEDICAL HISTORY - ROSE QUESTIONNAIRE)
ROSEIC=1 (YES): ROSE10='1' AND ROSE11='1' AND ROSE12='1' AND (ROSE13='1' OR ROSE13='3') AND ROSE15='2' AND ROSE16='1' AND ROSE17='1' AND ROSE18='1', ELSE
- ROSEIC=0 (NO):

- V. COMPOSITE PVD (PVD_COMP)
PVD_COMP 1 (YES): PVD_ABR=1 OR PERIOCC=1 OR BRUIT=1 OR ROSEIC=1
PVD_COMP 0 (NO): PVD_ABR=0 AND PERIOCC=0 AND BRUIT=0 AND ROSEIC=0

DEFINITION OF OBESITY INDICES, PHYSICAL EXAM:

- A. BODY MASS INDEX, Q1 AND Q2, (WEIGHT IN KILOGRAM) / (HEIGHT IN METER)²

$$\text{BMI} = (\text{EXAM94}) / (\text{EXAM03}/100)^2$$

- B. WAIST-HIP RATIO, Q33 AND Q9:

$$\text{WHR} = \text{EXAM51} / \text{EXAM13}$$

- C. PERCENT BODY FAT (PCTFAT):

PCTFAT is calculated by using Rising's equation as following:

fat-free mass:

$$\text{FFT} = 13.74 + 0.25 * (\text{height}^2 / \text{resistance}) + 0.30 * (\text{weight}) - 0.14 * (\text{age}) + 6.18 * (\text{sex})$$

where: height in cm, weight in kg, age in years, sex (0=female, 1=male)

$$\text{fat mass (FM)} = \text{weight} - \text{FFT}$$

$$\text{PCTFAT} = (\text{FM} / \text{weight}) * 100\%$$

RESISTANCE: Q35a IN PHYSICAL EXAM

ADDENDUM IV

DEFINITION OF RISK FACTORS

1. CIGARETTE SMOKING (PERSONAL INTERVIEW II, Q24-Q29):

A. SMOKING (NEVER, EX-SMOKER, CURRENT)

- 0 (NEVER) IF INT2_34='2' OR INT2_35=0
1 (EX-) IF (INT2_34 = '1' AND INT2_35 NE 0) AND INT2_36='2'
2 (CURRENT) IF (INT2_34 = '1' AND INT2_35 NE 0) AND INT2_36='1'
9 (UNKNOWN) NONE OF ABOVE

IF GROUP INTO SMOKER VS NONSMOKER,
(SMOKING=0 OR SMOKING=1) CAN BE COMBINED AS NON-CURRENT
SMOKER;

OR

(SMOKING=1 OR SMOKING=2) CAN BE COMBINED AS EVER SMOKED.

B. SMOKING AMOUNT (FOR SMOKER ONLY):

1. DURATION OF SMOKING: Q29 (INT2_39)
2. AGE STARTED SMOKING:
CURRENT SMOKER: AGE AT EXAM - DURATION OF SMOKING
EX-SMOKER: AGE STOPPED SMOKING (Q27) - DURATION OF SMOKING
3. DAILY SMOKING AMOUNT (Q28): INT2_38
4. TOTAL SMOKING AMOUNT (PER PACK YEAR):
PPY = (DAILY SMOKING AMOUNT * DURATION OF SMOKING) / 20
= (INT2_38 * INT2_39) / 20

C. OTHER TYPE OF SMOKING: INTERVIEW II, Q30-Q32

- 0 (NO) IF (INT2_40='2' AND INT2_41='2' AND INT2_42='2')
1 (YES) IF (INT2_40='1' OR INT2_41='1' OR INT2_42='1')

D. PASSIVE SMOKING

- 0 (NO) IF INT2_33=0
1 (YES) IF INT2_33 > 0
DAILY EXPOSURE TIME (IN HOURS): INT2_33.

E. PARENTAL SMOKING:

- 0 (NONE) (INT2_31=2 OR INT2_31=3) AND (INT2_32=2 OR INT2_32=3)
1 (ONE) INT2_31=1 OR INT2_32=1
2 (BOTH) INT2_31=1 AND INT2_32=1

2. EDUCATION: PERSONAL INTERVIEW FORM II, Q15 - INT2_4
- A. CONTINUOUS: INT2_4 (YEARS)
- B. CATEGORICAL:
- i. THREE CATEGORIES (EDUCAT1):
- | | |
|--|-------------------------------|
| 1 (LESS THAN HIGH SCHOOL) | $0 \leq \text{INT2_4} < 12$ |
| 2 (HIGH SCHOOL GRADUATE AND/OR SOME COLLEGE) | $12 \leq \text{INT2_4} < 16$ |
| 3 (COLLEGE GRADUATE) | $\text{INT2_4} \geq 16$ |
- ii. FOUR CATEGORIES (EDUCAT2):
- | | |
|--------------------------|----------------------------------|
| 1 (LESS THAN NINE YEARS) | $0 \leq \text{INT2_4} \leq 9$ |
| 2 (SOME HIGH SCHOOL) | $10 \leq \text{INT2_4} \leq 12$ |
| 3 (SOME COLLEGE) | $13 \leq \text{INT2_4} \leq 16$ |
| 4 (COLLEGE GRADUATE) | $\text{INT2_4} \geq 16$ |
3. TOTAL DEGREE OF INDIAN BLOOD: INTERVIEW II, Q16
- A. CONTINUOUS: INDIAN = $(\text{INT2_5} / \text{INT2_6}) * 100\%$
- B. CATEGORICAL:
- | | |
|-------------------|---------------------------------|
| 0 (LESS THAN 25%) | $0 < \text{INDIAN} < 25\%$ |
| 1 (LESS THAN 50%) | $25 \leq \text{INDIAN} < 50\%$ |
| 2 (50-74.9%) | $50 \leq \text{INDIAN} < 75\%$ |
| 3 (75-99.9%) | $75 \leq \text{INDIAN} < 100\%$ |
| 4 (FULL BLOODED) | $\text{INDIAN} = 100\%$ |
4. INDIAN TRADITION: INTERVIEW II, Q35-Q38
- A. SPEAK NATIVE LANGUAGE, INDYLANG
- | | |
|---------|---|
| 0 (NO) | $\text{INT2_45} = '3'$ OR $\text{INT2_46} = '5'$ |
| 1 (YES) | $\text{INT2_45} = '1'$ OR $'2'$ AND $(\text{INT2_46} = '1'$ OR $'2'$ OR $'3'$ OR $'4')$ |
- B. USE TRADITIONAL MEDICINE/HERBS, INDYMED
- | | |
|---------|--|
| 0 (NO) | $\text{INT2_47} = '5'$ OR $'9'$ |
| 1 (YES) | $\text{INT2_47} = '1'$ OR $'2'$ OR $'3'$ OR $'4'$ |
- C. TRADITIONAL CEREMONIES, INDYCERE
- | | |
|---------|--|
| 0 (NO) | $\text{INT2_48} = '5'$ OR $'9'$ |
| 1 (YES) | $\text{INT2_48} = '1'$ OR $'2'$ OR $'3'$ OR $'4'$ |
5. STRESS: INTERVIEW II, Q42-Q46
- A. SLEEP LOSS, Q42, SLEPLOSS
- | | |
|---------|----------------------------------|
| 0 (NO) | $\text{INT2_52} = '1'$ |
| 1 (YES) | $\text{INT2_52} = '2'$ OR $'3'$ |
- B. STRAIN OR STRESS, Q43, STRAIN
- | | |
|---------|----------------------------------|
| 0 (NO) | $\text{INT2_53} = '1'$ |
| 1 (YES) | $\text{INT2_53} = '2'$ OR $'3'$ |

C. OPEN ARGUMENTS, Q44, QUARRELL
0 (NO) INT2_54='1' OR '2'
1 (YES) INT2_54='3' OR '4' OR '5'

D. ALCOHOL PROBLEM OF HOUSEHOLD, Q45, HOUSETOH
0 (NO) INT2_53='1'
1 (YES) INT2_53='2'

E. SIZE OF HOUSEHOLD, Q46, HOUSIZE
1 (SMALL) INT2_54 ≤ 4
2 (MEDIAN) 4 < INT2_54 < 10
3 (LARGE) INT2_54 ≥ 10

6. ALCOHOL USE

A. ALCOHOL DRINKING STATUS, ETOHUSE, Q47-Q48
0 (NEVER) INT2_57='2'
1 (EX-DRINKER) INT2_57='1' AND (INT2_59 ≥ 12 OR INT2_60 ≥ 1)
2 (CURRENT) INT2_57='1' AND INT2_60 = 0

B. BINGE DRINK

1. DURING THE PAST MONTH, Q52
0 (NO) 0 ≤ INT2_64 < 5
1 (YES) INT2_64 ≥ 5

2. DURING THE PAST YEAR, Q53
0 (NO) 0 ≤ INT2_65 < 5
1 (YES) INT2_65 ≥ 5

C. AMOUNT OF ALCOHOL INTAKE

7. SOCIOECONOMIC STATUS (SES)
 - A. RECEIVING FEDERAL ASSISTANCE:
 1. FOOD STAMPS / WIC, Q56

0 (NO)	INT2_68 = 0
1 (YES)	INT2_68 > 0
 2. COMMODITY FOOD, Q57

0 (NO)	INT2_69 = 0
1 (YES)	INT2_69 > 0
 3. FEDERAL ASSISTANCE, FEDHELP

0 (NO)	INT2_68 = 0 AND INT2_69 = 0
1 (YES)	INT2_68 > 0 OR INT2_69 > 0
 - B. SES (EDUCATION, FAMILY INCOME, ...)
 1. HOUSEHOLD INCOME, Q58: USE THE CATEGORIES LISTED IN THE QUESTIONNAIRE.
8. FAMILY HISTORY OF DISEASES - PERSONAL INTERVIEW II, FAMILY HISTORY
 - A. CLASSIFICATION:
 1. PARENTAL, FOR RELATIONSHIP CODE 1 AND 2 (FH1 AND FH14)
 2. FIRST DEGREE FULL-BLOOD RELATIVES:
RELATIONSHIP CODE: 1 (MOTHER), 2 (FATHER), 3 (SISTER), 5 (BROTHER), 7 (DAUGHTER), AND 8 (SON).
 3. ALL FIRST DEGREE RELATIVES, ALL CODES.
 - B. DISEASE HISTORY
 1. HEART DISEASE: MI AND HD
 2. CARDIOVASCULAR DISEASE: MI, HD, HBP, CVA
 3. DIABETES: DM
 4. KIDNEY FAILURE: KF
 5. ATHRITIS: AT
 6. CANCER

9. MEDICAL HISTORY, MEDICAL HISTORY FORM

A. PRESCRIBED MEDICATIONS: USE CATEGORIES IN THE MANUAL (p. 282)

- | | |
|--------------------------------|-------------------------------|
| 1- ANTIHISTAMINE (400) | 2- ANTIBIOTICS (812) |
| 3- ANTINEOPLASTIC RX (1000) | 4- BETA-BLOCKERS (1216) |
| 5- ANTICOAGULANTS (2000) | 6- CARDIAC DRUGS (2404) |
| 7- HYPOLIPIDEMIC (2406) | 8- HYPOTENSIVE (2408) |
| 9- ANALEGISTIC (2808) | 10- ASPIRIN (280892) |
| 11- ANTICONVULSANTS (2812) | 12- PSYCHOTHERAPY (2816) |
| 13- ADRENALS (6804) | 14- ORAL CONTRACEPTIVE (6812) |
| 15- DIURETICS (4028) | 16- GI DRUGS (5600) |
| 17- MENOPAUSAL ESTROGEN (6816) | 18- INSULIN (682008) |
| 19- SULFONYUREAS (682020) | 20- THYROID AGENTS (6836) |
| 21- OINTMENTS (8400) | 22- VITAMINS (8800) |
| 23- UNCLASSIFIED (9200) | |

B. HISTORY OF:

- GALLSTONE, Q3c
0 (NO) MED22='2'
1 (YES) MED22='1'
- ARTHRITIS, Q3d
0 (NO) MED23='2'
1 (YES) MED23='1'
- CANCER, Q3e
0 (NO) MED24='2'
1 (YES) MED24='1'
- KIDNEY FAILURE, Q3g
0 (NO) MED28='2'
1 (YES) MED28='1'
- EMPHYSEMA, Q3h
0 (NO) MED31='2'
1 (YES) MED31='1'
- LIVER CIRRHOSIS, Q3i
0 (NO) MED32='2'
1 (YES) MED32='1'
- RENAL DIALYSIS, Q4a
0 (NO) MED42='2'
1 (YES) MED42='1'
- KIDNEY TRANSPLANT, Q4b
0 (NO) MED43='2'
1 (YES) MED43='1'

10. REPRODUCTION AND HORMONE USE (FEMALE ONLY), MEDICAL HISTORY

A. REPRODUCTION:

1. TIMES PREGNANT, Q7-1, REPRO1
2. NUMBER OF LIVE BIRTH, Q7-2, REPRO2
3. NUMBER OF LOST PREGNANCIES, Q7-3, REPRO3
4. NUMBER OF LIVING CHILDREN, Q7-4, REPRO4
5. MENOPAUSAL, Q8
0 (NO) REPRO5='2'
1 (YES) REPRO5='1'
6. AGE AT MENOPAUSE, Q9, REPRO6

B. HORMONE USE

1. ORAL CONTRACEPTIVE, Q11
0 (NO) REPRO9='2'
1 (YES) REPRO9='1'
2. AGE STARTED TO USE OC PILLS, Q12, REPRO10
3. TOTAL DURATION OF USING OC PILLS, Q13, REPRO11
4. EVER USE OF ESTROGEN OTHER THAN OC PILLS, Q14
0 (NO) REPRO12='2'
1 (YES) REPRO12='1' OR MEDICATION CODE (Q1a-Q1h)
CONTAINS '6816' (POST MENOPAUSAL ESTROGEN)
5. AGE STARTED TO USE ESTROGEN, Q15, REPRO13
6. TOTAL DURATION OF USING ESTROGEN, Q16, REPRO14

=====

11. PHYSICAL ACTIVITY

WILL CONSULT WITH DR. ANDRIA KRISKA

12. LAB DATA

- A. LIPID - CONTINUOUS VARIABLE
 - 1. TOTAL TRIGLYCERIDE, $\ln(\text{TRIG})$
 - 2. TOTAL CHOLESTEROL, CHOLEST
 - 3. HDL CHOLESTEROL, HDL_CHOL
 - 4. LDL CHOLESTEROL, LDL_CHOL
 - 5. VLDL TRIGLYCERIDE, VTRIG
 - 6. VLDL CHOLESTEROL, VCHOL
 - 7. RATIOS:
 - i. VCHOL/VTRIG
 - ii. HDL_CHOL/CHOLEST
 - iii. HDL_CHOL/LDL_CHOL
 - iv. APOB/(CHOLEST-HDL_CHOL)
 - v. APOA1/HDL_CHOL
 - vi. APOB/LDL_CHOL
- B. APOLIPOPROTEINS: APOA1, APOB
- C. GLUCOSE:
 - 1. FASTING BLOOD GLUCOSE, GLUC_0
 - 2. 2-HR BLOOD GLUCOSE, GLUC_2
- D. FIBRINOGEN
- E. PLASMA INSULIN
- F. FIBRINOGEN
- G. APO E PHENOTYPE
- H. PLASMA CREATININE
- I. URINARY ALBUMIN AND CREATININE
- J. GLYCATED LDL

CUT POINTS FOR CONTINUOUS VARIABLES:

VARIABLES	LOW (0) NO	MEDIUM (1)	HIGH (2) YES
AGEGP	45-54	55-64	65-74
OBES_SHS	FEMALE: BMI < 31 MALE: BMI < 29		BMI ≥ 31 BMI ≥ 29
OBES_HAN (95%)	FEMALE: BMI < 32.3 MALE: BMI < 31.1		BMI ≥ 32.3 BMI ≥ 31.1
OBES_FAT	FEMALE: PCTFAT < 41% MALE: PCTFAT < 29%		PCTFAT ≥ 41% PCTFAT ≥ 29%
OBES_WHR	FEMALE: WHR ≤ 0.8 MALE: WHR ≤ 1.0		WHR > 0.8 WHR > 0.8 (1.8)
TOTAL CHOLESTEROL (NCEP GUIDELINE)	CHOLEST < 200 (mg/dl)	CHOLEST 200-239	CHOLEST ≥ 240
TOTAL TRIGLYCERIDES	TRIG < 250 (mg/dl)		TRIG ≥ 250
HDL CHOLESTEROL (NCEP GUIDELINE)	HDL_CHOL < 35 (mg/dl)		HDL_CHOL ≥ 35
LDL CHOLESTEROL (NCEP GUIDELINE)	LDL_CHOL < 130 (mg/dl)	LDL_CHOL 130-159	LDL_CHOL ≥ 160

THE VARIABLES MAY ALSO BE ANALYZED BY QUATILES.

	BMI	
	M	F
over WT	27.3	27.8
Obese	31.1	32.3

ADDENDUM V
STRONG HEART STUDY
REQUEST FOR DATA ANALYSIS

Title of project: _____

Major hypotheses: 1) _____
2) _____
3) _____
4) _____
5) _____

Purpose: _____ Paper
_____ Abstract for professional conference
_____ Invited talk
_____ Pilot data for grant or contract submission
_____ Quality contro or local monitoring
_____ Other

Investigators: _____

Expected date of completion _____ / _____ / _____
mm dd yy

Variables to used: (List all the variables)

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Statistical methods to be used (check all that apply):

- _____ Summary statistics and frequencies
- _____ Simple correlation and partial correlation
- _____ Regression analyses
- _____ t-test, ANOVA, and multiple comparison
- _____ Logistic regression
- _____ Other _____

(Specify)

Comments:

COORDINATING CENTER USE ONLY:

STRONG HEART STUDY PAPER NUMBER: _____

ANALYSIS NUMBER: _____

DATA ANALYST: _____

DATE RECEIVED: _____

ADDENDUM VI

Paper # _____

Received by Coordinating Center: _____

First author: _____

=====

STRONG HEART STUDY

SCHEDULE OF DEADLINES FOR REQUESTED DATA ANALYSIS

<u>Item</u>	<u>Date Due</u>	<u>Date Received</u>
Proposal	_____	_____
Outline \$ Analytic plan	_____	_____
First draft	_____	_____
Second draft	_____	_____
Third draft	_____	_____
Final draft	_____	_____
Date published	_____	

NOTE TO FIRST AUTHOR: Please sign, date, make a copy for your files and return original to the Coordinating Center.

Signature

Date

ADDENDUM VII

PUBLICATION APPROVAL FORM
STRONG HEART STUDY

The Strong Heart Study Steering Committee is anxious to share the results of the study with the participating tribes and with the scientific community. Prior to publication of these results the committee would like to have input from participating tribes on how the reports describe the tribal communities and the interpretation of the results. This study has always been partnership of scientist and of tribal members committed to better understanding and prevention of heart disease in American Indians. The committee welcomes your input on ways to best accomplish that goal.

Please complete this form and return it in the enclosed envelop by _____. If we do not receive a response by this date, we will assume that your tribe approves.

Thank you.

TITLE OF REPORT: _____

FIRST AUTHOR: _____

NAME OF TRIBE: _____

FIRST EFFORT FOR PUBLICATION _____

Based on my review of this report

___ I approve of publication of the report.

___ I approve of publication with the following suggestions:

___ I disapprove of publication because:

SIGNED: _____

TITLE: _____ DATE: _____

PROCEDURES FOR MORTALITY AND MORBIDITY FOLLOW-UP IN PHASE II (3/23/92)

I. Mortality Follow-up

Fatal events will continue to be identified and investigated during Phase II using the same protocol as was used in Phase I. Procedures for abstracting and coding death certificates and for the mortality review are described in detail on pages 22-34 and 149-203 in the Strong Heart Study (SHS) Phase I manual. In Phase II, all deaths occurring in the population during the calendar years 1989 through 1995 will be identified. Additional information will be obtained for those death certificates with any mention of cardiovascular disease. These data will be reviewed by the Mortality Classification Panel for assignment of the underlying cause of death.

The examination cohort will be monitored in an on-going fashion to identify deaths. The six-month contact of Phase I participants (described below in the morbidity section) will identify some deaths in the study cohort. In addition, the following sources will be monitored on a regular basis to identify additional deaths in the cohort as they occur: local newspapers and community notices, community and tribal members, IHS, tribal and BIA records. Near the end of 1995, the final year of data acquisition in Phase II, the State Health Departments will be contacted to identify death certificates in the study communities for those deaths that may have been missed using other sources.

II. Morbidity Follow-up

Only those persons who participated in the Phase I physical examination will be followed for incident events of cardiovascular disease in Phase II. Because the interval between the Phase I and Phase II examinations is relatively short (maximum, 6 years; minimum 1.5 years; mean 4 years), the major point at which the occurrence of new events will be ascertained will be at the Phase II examination. Determining the incidence of events at this time will allow for more thorough collection of data and for obtaining signed consent for review of medical records pertaining to the events of interest. In Phase II, the following incident events will be identified: myocardial infarction, stroke, congestive heart failure, angina and peripheral vascular disease. The occurrence of coronary bypass surgery, angioplasty or similar procedures will also be determined. Prevalence of the following conditions/indicators will also be ascertained at the Phase II exam: valvular heart disease, positive cardiac catheterization, positive treadmill test, left ventricular hypertrophy, other left ventricular dysfunction, cardiac wall motion abnormalities, and obstructive lung disease (see table 7 of the Phase II application for a listing of endpoints of interest). The same definitions and criteria for these events used in Phase I will be used in Phase II.

Procedures for Collecting Data:

The Phase II examination will include both clinical evaluations and questions that will be used in determining the occurrence of the events listed above. When necessary, additional data will be obtained from medical records to confirm the diagnoses. Those persons who are examined in Phase II prior to October, 1994 will be contacted during the interval 10/94 - 9/95 to determine whether any new events have occurred since the Phase II examination. A contact form to be used for this purpose follows this section. This form is designed to be used by mail, person-to-person interview, or by telephone.

As part of the Phase II follow-up procedures, Phase I participants will receive a SHS newsletter every six months. This contact will be used to keep in touch with participants, up-date addresses, identify any deaths that may have occurred and to inform participants of up-coming SHS activities. Part of each newsletter will include a reminder to notify study personnel if any hospitalizations or specific health problems have occurred. A one- page, abbreviated contact form (also following this section) will be used to keep track of new events that are identified and require medical record validation. Participants who have medical charts at IHS facilities will also have a page inserted prominently in their chart that includes a tear-off, pre-paid postcard notice to the SHS to be used when the patient is seen for any of the endpoints of interest. Study personnel, if feasible, may also monitor IHS hospital admissions for SHS participants.

STRONG HEART STUDY PHASE II FOLLOW-UP

Because you are an important part of the Strong Heart Study, we would like to know if you have had any heart problems or any test of your heart since the last time we contacted you.

PLEASE ANSWER THE FOLLOWING QUESTIONS ABOUT HOW YOU HAVE BEEN SINCE WE LAST SAW YOU.

Since _____ have you had:

1. a heart attack? _____ NO _____ YES
2. a Stroke? _____ NO _____ YES
3. heart failure? _____ NO _____ YES
4. Have you been hospitalized or seen a doctor because of your heart or any other reason? If the answer is YES, please give the name of the doctor and hospital and the reason.

HOSPITAL: _____

DOCTOR: _____ REASON: _____

5. Have you had any of the following tests or procedure done? If the answer is YES, please give the name of the hospital or clinic where the procedure was done.

	No	Yes	Hospital/Clinic
a. ECG (electrocardiogram)	_____	_____	_____
b. Heart cath (heart catherization)	_____	_____	_____
c. Treadmill (exercise tolerance) test	_____	_____	_____
d. Any other kind of heart test	_____	_____	_____
e. Bypass (open heart) surgery, angioplasty, or balloon treatment.	_____	_____	_____
f. Other kind of heart surgery, (For example, valve replacement, pacemaker)	_____	_____	_____

If your address has changed since your exam date with the Strong Heart Study, print your new address below so we can stay in touch.

THANK YOU FOR COMPLETING THIS FORM. PLEASE RETURN TO: