

The Strong Heart Study: Interviews and Procedures by Examination

	Cohort Study (n=4549)			Family Study (n=3665)		
PROCEDURES	Phase 1	Phase 2	Phase 3 (including a family pilot study)	Phase 4	Phase 5	Phase 6
	1988-91	1991-96	1996-2000	2000-05	2005-10	2014-2018
INFORMED CONSENT	CVD & risk factors					CVD & risk factors + lung, liver, inflammatory diseases & cancer
	x	x	x	x	x	x
MORBIDITY AND MORTALITY SURVEILLANCE (medical chart review, CVD and mortality, ongoing continuously)	x	x	x	x	x	x
INTERVIEWS						
Demographic	x	x	x	x	x	
Socioeconomic Status	x	x	x	x	x	
Health Behavior	x	x	x	x	x	
Family History of Diseases	x					
Reproductive History (Women only)	x	x	x	x	x	
Respiratory Symptoms		x	x			
Sleep Habit			x			
Medication Survey	x	x	x	x	x	
Medical/Health History	x	x	x	x	x	
CHD Events/Procedures	x	x	x	x	x	
TIA/Stroke	x	x	x	x	x	
Denture and Eating Problems		x				
Access to Medical Care	x		x			

Dietary Intake					
24-Hour Recall	x (20% pts)	x	x		
Food Frequency				x	x
Artificial Sweeteners					x
Soft Drink					x
Physical Activity Questionnaire	x	Brief follow-up questions	Brief follow-up questions		
Physical Activity - Pedometer				x	x
Psychosocial Questionnaire					
Quality of Life					
SF-36		x	x		
SF-12				x	x
Weight Satisfaction				x	x
Stress evaluation	x	Perceived Stress		Perceived Stress	Perceived Stress
Gambling Questionnaire			x		
Risk Factor Knowledge		x	x		
Culture Factor	x	x		x	
Depression (CESD)		x		x	x
Multidimensional Health Locus of Control (MHLC, measures of health related beliefs)				x	
Social Support		x (ISEL)		x	x
Anger Expression Scale (Spielberger)		x		x	
Cook-Medley Hostility Scale		x		x	
PTSD/Anxiety/Fatalism					x
ANTHROPOMETRY					
HEIGHT					
Standing Height	x	x	x	x	x
GIRTHS					
Hip	x	x	x	x	x
Waist	x	x	x	x	x
WEIGHT	x	x	x	x	x
BLOOD PRESSURE					

SITTING	X	X	X	X	X	
ANKLE	X	X	X	X	X	
PHYSICAL EXAMINATION						
Neck	X	X		X		
Cardio/pulmonary	X	X	X	X	X	
Extremities	X	X	X	X	X	
Diabetic Foot Screen		X	X			
ELECTROCARDIOGRAMS						
12 LEAD	X	X	X	X	X	
Bioelectrical Impedance	X	X	X	X	X	
ECHOCARDIOGRAPHY						
		X		X	X	
ULTRASONOGRAPHY						
CAROTID ARTERIES			X	X	X	
POPLITEAL ARTERY					X	
Applanation Tonometry			X	X		
Gallbladder Sonogram		X				
PULMONARY FUNCTION						
FEV ₁		X				
FVC		X				
Skin Test for TB		X				
Asthma Substudy			X			
Medical Data Review - CVD and Mortality	X	X	X	X	X	
VENIPUNCTURE						
CHEMISTRIES						

Glucose	X	X	X	X	X	
Creatinine	X	X	X	X	X	
Insulin	X	X	X	X	X	
Total Protein			X	X	X	
Albumin			X	X	X	
Uric Acid			X	X	X	
Urea Nitrogen			X	X	X	
Calcium			X	X	X	
Phosphorous			X	X	X	
Magnesium			X	X	X	
Sodium			X	X	X	
Potassium			X	X	X	
Glucose Tolerance	X	X	X			
HEMATOLOGY (Complete Blood Count etc.)			X	X	X	
Hematocrit			X	X	X	
Hemoglobin			X	X	X	
White Blood Cell Count			X	X	X	
Platelet Count			X	X	X	
Neutrophil Count			X	X	X	
Neutrophil Bands			X	X	X	
Lymphocytes			X	X	X	
Monocytes			X	X	X	
Eosinophils			X	X	X	
Basophiles			X	X	X	
Glycated Hemoglobin A1C	X	X	x (only G0 > 110)	x (only G0 > 110)	x (only G0 > 110)	
HEMOSTASIS						
Fibrinogen	X	X	X	X		
LIPIDS						
Apo AI	X			X		
Apo B	X			X		
ApoE	X			X		
Total Cholesterol	X	X	X	X	X	
Total Triglyceride	X	X	X	X	X	
HDL Cholesterol	X	X	X	X	X	

LDL Cholesterol	X	X	X	X	X
LDL Size		X			
VTRIG	X	X			
VCHOL	X	X			
Lipoprotein (a)		X		X	
High-sensitivity CRP		X		X	X
PAI-1		X		X	
Urine collection					
Urinary albumin	X	X	X	X	X
Urinary creatinine	X	X	X	X	X
ANCILLARY STUDIES					
Note: Many ancillary studies are case-control study conducted at various time and do not have full data for whole cohort.					
Urinary Metal Study (arsenic species, total As, Cd, Mo, Pb, Sb, Se, U, W, Zn)	X	only ~300	only ~500	X (non-diabetes)	
Metabochip			only ~200	X (non-diabetes)	
Metabolomic Profiles (have not been generated yet)					
Androgen-Estrogen Balance Study (case-control study, measured on a subset of participants)					
Estrone		X	X		
Total Estradiol		X	X		
Free estradiol		X	X		
Bioavailable estradiol index		X	X		
Total testosterone		X	X		
Free testosterone		X	X		
Bioavailable testosterone index		X	X		

Sex hormone-binding globulin		x	x			
Dehydroepiandrosterone sulfate		x	x			
Androstenedione		x	x			
Leptin and Obesity (Case-control)						
Leptin						
Infectious Burden on CVD (case-control)						
CMV IgG						
Hepatitis A IgG						
Herpes simplex type 1 IgG						
Herpes simplex type 2 IgG						
C. pneumonia IgG, IgA						
H. pylori IgG						
Homocystine and CVD (case-control)						
Homocystine						
Brain Natriuretic Peptide (BNP) and Congestive Heart Failure						
BNP (Dakotas only)		x				
Mannose Binding Lectin and CVD (case-control)						
MBL						
Polymorphisms of inflammatory markers						
ppar_g						
Resistin						
HSD11B1						
pparg2						
IL6						
Haptoglobin and CVD (case-control)						
Haptoglobin						
Adiponectin and CVD (case-control)						
Adiponectin						

Resistin and CVD (case-control)					
Resistin genotype					
plasma resistin					
Free Iron and CVD (case-control)					
Free iron					
Vcam, IL6 and CVD (case-control)					
Vcam					
IL6					
TSH and CVD (case-control)					
TSH					
Sleep Heart Health Study (~200 each site)		x			
PSG Data					
Vision Keepers (OK only)		x			
Visual acuity					
Retinopathy					
Cataract					
Glaucoma					
Strong Heart Stroke Study (SHSS)			2010-2013: N=1033 Surviving participants from SHS Phase 1	2017-2019: N=? Surviving participants from S1/SHSS1	
Cranial 1.5T sagittal/axial T1,T2 MRI: vascular brain injury (number/size/type/location of infarct & hemorrhage; white matter hyperintensity volume; graded white matter hyperintensities)			x	x	
Cranial 1.5T sagittal/axial T1,T2 MRI: structural loss / atrophy (graded ventricle enlargement, graded sulcal widening, hippocampal volume, brain volume, intracranial volume)			x	x	
Neuropsychological / Cognitive tests					
Executive function (3MSE)			x	x	

Processing speed (WAIS-IV Coding)			X	X		
Verbal phonemic fluency (COWA FAS)			X	X		
Verbal learning and memory (CVLT-II)			X	X		
(NACC) UDS: MOCA, Craft Story, Benson Complex				X		
Figure, Number Span, Category Fluency, Trail Making, MINT, Verbal Fluency						
Functional tests						
Fine motor: finger tap			X	X		
Grip strength			X	X		
SPPB: chair stand, timed stand/balance, timed walk			X	X		
Quality of Life (SF-36)			X	X		
Depression (CESD)			X	X		
Trauma (PCL-C)			X	X		
Family medical history			X	X		
Personal medical history			X	X		
Health attitudes, beliefs, daily activity, daily pain			X	X		
Alzheimer's Disease Knowledge Scale				X		
Electrocardiogram (ECG)			X			
Lipids: LDL, HDL, Tg			X	X		
Glucose: FPG, HbA1c			X	X		
Inflammation: CRP			X	X		
Renal: serum & urine Cr, serum Cys-C, urine albumin			X	X		
Anthropometric: BP, Waist, Hip, Height, Weight			X	X		

The Strong Heart Study: Genetic data						
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Pedigree Information			x (family pilot)	x		
Microsatellite Markers				x		
Linkage Map				x		
Candidate Gene Markers		x		x	x	
Fine Mapping SNPs					x	
Telomere Length (measured in the lab of Dr. Blackburn, UCSF)	x (Dakota Only)			x		
Metabochip Markers				x (n=2500, free of Type 2 diabetes)		
Exome Sequence				x (n=94, AZ 47, OK 47)		