Strong Heart Study Newsletter

Investigating Cardiovascular Disease in American Indians

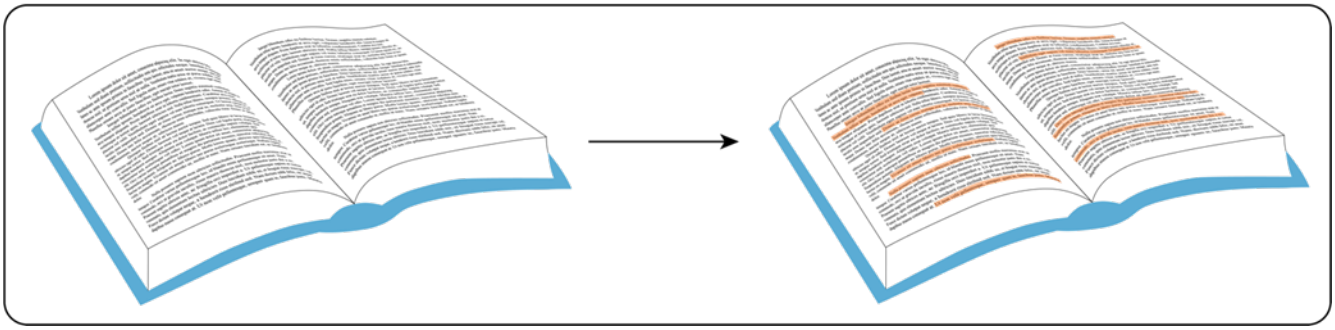
Updates for Community Members and Strong Heart Study Participants

Volume 29, Issue 1 Winter 2019

WHAT IS EPIGENETICS?

DNA is made up of a sequence of bases (called A, T, G, and C). All cells in your body contain the same, unique DNA sequence. Epigenetics is the study of changes to a person's DNA that are not due to changes in the DNA sequence. So, what does that mean? The DNA sequence provides instructions for cells. The instructions are communicated through gene expression. However, not all cells follow the same set of instructions. For example, some cells become muscle cells and some cells become brain cells. Epigenetic markers provide instructions to turn some genes on and to turn some genes off so they become what they were meant to be. It is similar to highlighting in a book showing which parts are important to read.

Like highlighting, epigenetic markers tell a cell which parts of DNA are important.



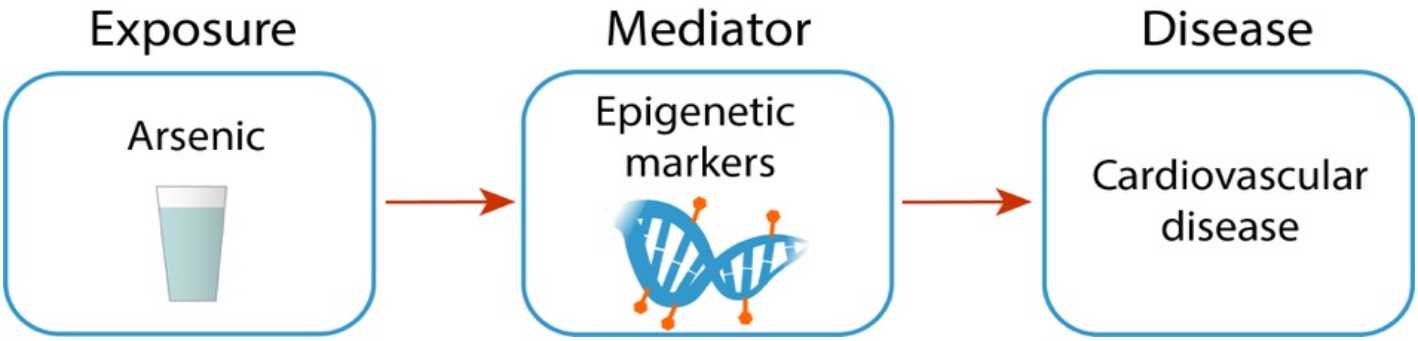
Epigenetic markers include DNA methylation. – *Anne Bozack, Doctoral Student, and Ana Navas-Acien, MD, MPH, PhD, Professor, Columbia University*

EPIGENETICS AND THE ENVIRONMENT

The environment around us and our experiences can cause changes to epigenetic markers. These changes can help our bodies adjust to stress. For example, they allow muscles to grow when you exercise. However, these changes can also lead to problems and to disease. Environmental exposures such as diet, tobacco, and arsenic can change epigenetic markers. – *Anne Bozack, Doctoral Student, and Ana Navas-Acien, MD, MPH, PhD, Professor, Columbia University*

WHAT CAN WE LEARN ABOUT EPIGENETICS FROM THE STRONG HEART STUDY?

Exposure to arsenic through water and food may increase the risk of cardiovascular disease. We have measured epigenetic markers in the form of DNA methylation in blood samples from participants in the Strong Heart Study. We are using these data to investigate if epigenetics is a factor that acts between arsenic exposure and CVD. We are asking the following questions: (1) does arsenic change epigenetic markers? (2) Do these epigenetic changes affect heart disease? We hope the answers to these questions will lead to new ways to prevent heart disease. – *Anne Bozack, Doctoral Student, and Ana Navas-Acien, MD, MPH, PhD, Professor, Columbia University*



DO BEHAVIORS CHANGE GENE FUNCTION? SMOKING AND GENE FUNCTION

Early data from the Strong Heart Study (SHS) confirms the effects of smoking on our genes. The SHS has collected data on changes that smoking can make to genes in the DNA collected from SHS participants. These are chemical changes that can occur to any of our many genes. These changes cause the DNA to be "methylated", and can turn genes on and off. This is called epigenetic modification. There are a number of studies that have reported that two genes in particular get this modification, or change, in smokers. Using early data from the SHS we were able to identify these same changes in the DNA of current cigarette smokers. One gene has been known to be associated with increased risk of heart disease (F2RL3), Another gene is associated with processes that get rid of toxins from cigarette smoke (AHRR). Confirming these results in the SHS data means that our SHS data are of high quality. We are analyzing the data for additional, unique findings regarding the impact of our behavior on our genes. – *Shelley Cole, PhD, Associate Professor and Program Co-lead Population Health, Texas Biomedical Research Institute*

THREE SISTERS STEW

According to legend, corn, beans, and squash are three inseparable sisters who only grow and thrive together. This tradition of interplanting corn, beans and squash in the same mounds, widespread among Native American farming societies, is a sophisticated, sustainable system that provided long-term soil fertility and a healthy diet to generations.

Serves: 8 to 10

Ingredients

- 1 large butternut squash (about 2 pounds – can be purchased already peeled & precut)
- 2 tablespoons olive oil
- 1 medium onion, chopped
- 2 to 4 cloves garlic, minced
- 1 medium green or red bell pepper, cut into short narrow strips
- 14- to 16-ounce can fire-roasted diced tomatoes, with liquid
- 2 to 3 cups cooked or canned (drained and rinsed) pink or pinto beans
- 2 cups corn kernels (from 2 large or 3 medium ears, or frozen)
- 1 cup homemade or canned vegetable stock, or water
- 1 or 2 small fresh hot chilies, seeded and minced, or one 4-ounce can chopped mild green chilies
- 2 teaspoons ground cumin
- 2 teaspoons chili powder or mesquite seasoning, or more, to taste
- 1 teaspoon dried oregano
- Salt and freshly ground black pepper
- ¼ cup minced fresh cilantro or parsley

Instructions

Preheat oven to 375 degrees F**.**

1. Cut squash in half lengthwise and remove seeds. Cover with foil and place the halves, cut side up, in a foil-lined shallow baking pan. If you don't have sharp enough knives, just wrap the squash in foil and bake it whole. Bake for 40-50 minutes until you can pierce through with a knife with little resistance.

2. When cool enough to handle scrape out the seeds and fibers if you haven't already. Slide and peel into large dice.

3. Heat the oil in a soup pot. Add the onion and sauté over medium-low heat until translucent. Add the garlic and continue to sauté until the onion is golden.

4. Add the squash and all remaining ingredients except the last 2 and bring to a simmer. Simmer gently, covered, until all the vegetables are tender, about 20-25 minutes. Season to taste with salt and pepper.

5. If time allows, let the stew stand for 1-2 hours before serving, then heat through as needed. Just before serving, stir in the cilantro or parsley. The stew should be thick and very moist but not soupy; add additional stock or water if needed. Adjust seasonings to your liking.

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PROTECTING STRONG HEART STUDY DATA
The iDASH Project

The Strong Heart Study (SHS) Coordinating Center at the University of Oklahoma Health Sciences Center and the SHS Genetics Center at Texas Biomedical Research Institute are working with investigators at the University of California, San Diego to develop a new data computing model. This model will allow approved investigators who are interested in using SHS data for research projects to analyze the data on a computer at the SHS Coordinating Center or the SHS Genetics Center without receiving the raw data. In other words, this model does not allow data to be sent out of the SHS Coordinating Center or the Genetics Center, but still allows analysis of the data while protecting participant privacy. ***SHS processes for tribal review of paper and project proposals will remain the same and will be followed***. The project will also include a study of the data sharing preferences of SHS participants. This information will be used to build the computing models. This aim will be carried out through interviews, group discussions, and surveys of SHS participants and community members. Investigators met with community members and tribal leaders on July 12, 2018 at the Delaware Nation facilities in Oklahoma. Dr. Lucila Ohno-Machado from the University of California, San Diego presented an overview of the project to the Southwest Oklahoma Intertribal Health Board and to community members.

Photo: iDASH investigators at the Hudson College of Public Health at the University of Oklahoma Health Sciences Center, July 12, 2018