

MESA Messenger

MESA: Past, Present...Future?

By MESA Project Office, NHLBI

You probably know that MESA researchers continue to study the wealth of information you have provided to the study over five in-person visits and follow-up contacts in between. (Read about some examples of our findings in this edition of the MESA Messenger.) In the past year alone, we published more than 150 scientific articles using MESA data! In the process, MESA has helped many young scientists from around the country become involved in research. Also, findings from MESA have contributed to new guidelines to help doctors care for patients at risk for heart disease. Yet many questions remain about why and how heart diseases and other related conditions develop.

You may also know that the National Heart, Lung, and Blood Institute (NHLBI) is the primary Federal agency that supports MESA. NHLBI is one of 27 Institutes and Centers at the National Institutes of Health (NIH). NIH is our nation's foremost biomedical research agency. Each year, NIH provides roughly \$30 billion to conduct and support biomedical research. The United States Congress provides these taxpayer-derived funds directly to NIH for supporting scientific studies to improve health and save lives.

What you probably didn't know is that NHLBI has decided to continue MESA for another five years - into 2020 - and to support another clinic exam! NHLBI recognizes the value of the science from MESA as well as

Moving? Please notify your Field Center, so you can continue receiving these newsletters and other important MESA materials!



the dedication of its participants who make it all possible. Plans are not final yet, but we expect Exam 6 will begin in the Fall of 2016. The exam period may continue for up to 18 months, into the Spring of 2018.

Exam 6 will include blood pressure readings, height and weight measurements, a blood draw, and a few questionnaires; in addition, we expect some new and interesting components we'll tell you more about as the time approaches. Of course, you'll also continue to be contacted by MESA staff periodically to confirm your contact information and check on your health status. We're excited to see MESA continue, and we hope you are too! ❤️

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The Role of Air Pollution in the Development of Atherosclerosis

By Anjum Hajat, PhD, MPH, BA, University of Washington

As you know, MESA researchers are trying to better understand **atherosclerosis**, or the thickening of artery walls that can limit the amount of blood flow through the artery. The development of atherosclerosis is a complex process, but medical scientists know that **inflammation** of the blood vessels plays a key role. What sorts of things cause this inflammation? In the MESA Air project, we are looking specifically at how air pollution might stimulate the inflammatory response. We wondered if people who have been exposed to higher levels of air pollutants over time would show more signs of inflammation.

It's hard to tell just by looking at a person how much inflammation they have in their blood vessels. Fortunately, we can measure certain components in the blood, and these "**blood markers**" are excellent clues about what is going on inside the body. For example, there is a protein in the blood called "**interleukin-6**" that we know the body produces in greater quantities when there is an inflammatory response going on. We measured the levels of interleukin-6 and other blood markers in the blood samples provided by MESA participants.

We were also able to measure and model the concentrations of certain air pollutants outside MESA participants' homes. We measured what is called "**fine particulate matter**," particles in the air like dust, soot, and smoke that are small enough for humans to inhale deep into our lungs. Using data from the US Environmental Protection Agency's air monitors and our own MESA Air monitors, we estimated the amount of fine particulate matter MESA participants were exposed to from 2000 to 2012.



Air quality in Minneapolis



Air quality in Los Angeles on a smoggy day

Then, we compared the levels of fine particulate matter in the air around participants' homes to the levels of interleukin-6 measured in their blood over time. Since things like age, gender, race and smoking status (to name a few) can also impact interleukin-6, we used statistics to hold these other factors constant. When all else was equal, we found that for every 5-unit increase in fine particulate matter, participants had about a 6% higher level of interleukin-6 in their blood. In case you were wondering, a 5-unit increase in fine particulate matter is approximately the difference in air quality between Los Angeles (which has more air pollution) and Minneapolis (which has less air pollution).

This tells us that long-term air pollution exposure may have an impact on our inflammatory response, and therefore, possibly an impact on the development of atherosclerosis and cardiovascular disease. So how big of an impact is air pollution having? To put the result in context, consider this: when we look at smoking as the risk factor, instead of fine particulate matter, we see that current smokers have 22% higher levels of interleukin-6 than people who have never smoked—a much bigger effect on the interleukin-6 levels than the fine particulate matter.

Even though air pollutants like fine particulate matter may not have the largest impact on the inflammatory response, they still appear to play an important role in inflammation, and possibly in the development of atherosclerosis. More research is needed to better understand these results and help us figure out how air quality impacts our heart health! ❤️

Sleep Problems may Lead to Irregular Heartbeat

By Susan Heckbert, MD, PhD, MPH, Cardiovascular Health Research Unit

Our hearts are muscular pumps that move blood through the body. They have four chambers—two small upper chambers called the **atria** and two lower chambers called the **ventricles**. Normally, the heartbeat starts in the right atrium, where a special group of cells starts an electrical signal. This signal is carried through the rest of the heart to make the heart pump properly.

Sometimes, the atria quiver instead of beating effectively. Doctors call that **atrial fibrillation**. In this situation, the heartbeat may not manage to pump all of the blood out of the atria, allowing the blood to form clots. Clots can cause health problems, so we would like to prevent atrial fibrillation, if possible.

Atrial fibrillation is the most common irregular heart rhythm, affecting about 1% of the population and nearly 9% of those over 80 years of age. Doctors know that older age, high blood pressure, diabetes, obesity, and heart disease are all risk factors. We want to learn about other health conditions that may contribute to atrial fibrillation.

Sleep apnea is a fairly common sleep problem where the person's breathing stops and starts over and over again during sleep. A test called a sleep study, or **polysomnography**, is used to diagnose sleep apnea. It involves wearing monitoring equipment while you sleep that measures your breathing and the quality of your sleep. When sleep apnea is severe, the body may not get



enough oxygen during sleep, possibly leading to heart rhythm problems, like atrial fibrillation. We wondered whether people diagnosed with sleep apnea are more likely to develop atrial fibrillation over time.

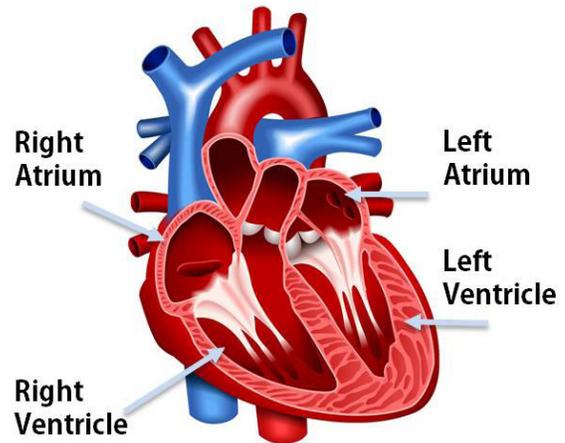


Diagram of the human heart

At the 2002-2004 clinic visit, about 4% of MESA participants reported having a diagnosis of sleep apnea. During the first 8 years after the 2002-2004 visit, 212 participants were diagnosed with atrial fibrillation. We found that people whose doctor had diagnosed sleep apnea were 76% more likely to develop atrial fibrillation than people who had no sleep apnea. The results were similar across the race and ethnic groups in MESA. These results suggest that sleep apnea contributes to the development of atrial fibrillation. It will be important to study whether treatment for sleep apnea can prevent atrial fibrillation from developing.

As the US population ages, atrial fibrillation is an increasingly relevant public health issue. Information from MESA will allow us to continue to study the health habits and conditions that cause atrial fibrillation, and hopefully find ways to prevent it!



Striving for health through **Active** living

This exercise tip is from the National Institute on Aging's Go4Life program. Want more ideas? Visit: www.nia.nih.gov/Go4Life

Whether you think of yourself as 'fit' already or not, there's always room to improve! The National Institutes of Health encourages all adults to do all four basic categories of exercise: endurance, strength, balance, & flexibility. Here's an exercise to work on STRENGTH.

Overhead Arm Raise



This exercise strengthens your shoulders and arms. All you need are weights--try soup cans!

- 1 You can do this exercise while standing or sitting in a sturdy, armless chair.
- 2 Keep your feet flat on the floor, shoulder-width apart.
- 3 Hold weights at your sides at shoulder height with palms facing forward. Breathe in slowly.
- 4 Slowly breathe out as you raise both arms up over your head keeping your elbows slightly bent.
- 5 Hold the position for 1 second.
- 6 Breathe in as you slowly lower your arms.
- 7 Repeat 10-15 times.
- 8 Rest 1 minute, then repeat Step 7 one more time. When you can do that easily, gradually try slightly heavier weights to build your strength.

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