Newsletter of the Multi-Ethnic Study of Atherosclerosis
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# The MESA Messenger

## Studying the Arteries, Part 2: Carotid Arteries

*From the National Heart, Lung, and Blood Institute's MESA Project Office*

In the last issue of the MESA Messenger we discussed the ankle-brachial index (ABI) and peripheral arterial disease—decreased blood flow in the arteries of the legs ("Studying the Arteries, Part 1: Arteries of the Leg"). In this issue we turn to the ***carotid arteries*** and how they provide us with valuable information about cardiovascular disease.

An artery, like a pipe, has a *wall* and a *lumen,* which is the space inside the wall through which blood flows. Normally, the wall of the carotid artery is less than 1 millimeter thick (about 1/25$^{th}$ of an inch), and the lumen is clear and open. During the first MESA examination you had a ***carotid artery ultrasound*** to measure the thickness of the walls of your carotid arteries and to check for narrowing of the lumen. While something as thin as an artery is not easy to measure, state-of-the-art equipment, like the ultrasound machines we used in MESA, can do it.

Why measure carotid arteries? Research has shown that an increase in the thickness of the carotid artery wall is related to a higher risk of heart attack and stroke. If you're wondering how changes in the arteries that supply the brain can be related to heart attacks, read on.

Atherosclerosis ("hardening" of the arteries) is a *systemic* disease—a disease that affects the body's entire system of large arteries at about the same time. So, if a person has thickened carotid arteries, he or she will probably also have thickened coronary arteries (arteries that supply blood to the heart). In addition, MESA investigators have learned that the thickness of the carotid artery wall is related to other indicators of atherosclerosis that we have measured (coronary artery calcium and the ankle-brachial index, for example).

***Carotid arteries*** *carry oxygen-rich blood from your heart to your head and brain. The carotid arteries travel up each side of your neck. You can feel your pulse in either carotid artery by lightly pressing your fingers to your neck, just under the back of your jawbone.*

***Carotid artery ultrasound*** *uses high-frequency sound waves to create an image of your carotid arteries. The ultrasound probe emits sound waves and then picks up the returning waves that have "bounced off" the artery. The probe sends this information to the ultrasound machine, and the machine calculates the distance that the sound waves travelled and the time it took them to return to the probe. Using these calculations, the ultrasound machine creates a two-dimensional image of your arteries.*

MESA

Continued on page 2

In rare cases, the carotid wall is not only thickened, but the lumen of the artery, through which blood flows, is partially or completely blocked. Such blockage can put a person at a high risk for a stroke. In MESA, we found 58 participants with this level of blockage, and we recommended they see their doctors.

During Exam 3, half of you had a second carotid artery ultrasound (the other half had it during Exam 2). We are repeating this test to find out how carotid artery wall thickness changes over time. Doing this second ultrasound will help us answer some important questions: Does it progress in a similar manner as coronary artery calcium? Does it progress in all people at the same rate, or do age, ethnicity, and gender affect the rate of progression? Is progression related to other measurements, such as cholesterol level? Most important, are there other factors that protect us against progression?

These and other questions can be answered only by repeating the carotid artery ultrasound and other tests that are part of MESA—just one of the reasons we love to see you come back year after year! ♡

## Learning about C-Reactive Protein and Inflammation: Results from MESA

*By Susan G. Lakoski, MD, Internal Medicine/Cardiology, Wake Forest University School of Medicine*

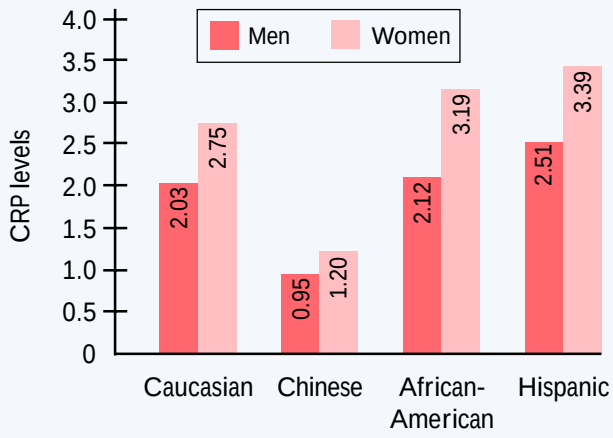
You may have heard in the news, or from your doctor, about ***high sensitivity C-reactive protein***, or hs-CRP, a blood test that measures the level of C-reactive protein (CRP) in the blood. CRP is made by the liver and is present in the blood when there is ***inflammation*** somewhere in the body. Several studies have shown that a high level of CRP in the blood can increase your risk for a future heart attack.

Many factors influence CRP, and one of the goals of MESA was to learn more about these factors. We made many interesting observations:

- In all ethnic groups, women have higher levels of CRP than men
- Women who take estrogen medications have higher CRP levels than those who do not
- Obesity increases CRP levels tremendously
- Chinese individuals have much lower CRP levels than other ethnic groups.

***Inflammation*** *is your body's normal response to an injury. Your immune system springs into action when you catch a cold, develop appendicitis, or step on a nail. It fights off infections and helps injuries heal.*

*Too much inflammation (perhaps caused by high blood pressure or a chronic low-level infection, for example) appears to damage the lining of artery walls and contribute to the formation and rupture of plaques.*




In MESA, Chinese men have the lowest CRP levels, and Hispanic women have the highest CRP levels (as shown in the chart below).

What does this mean? Well, women may have higher CRP levels, but that doesn't necessarily translate into more heart attacks. Therefore, it is important that doctors understand that a high CRP has different implications for men and women. This is also very true when comparing CRP levels by ethnicity: for example, a high CRP level in Chinese people is actually a low value for Hispanics.

Bottom line: each individual is different. Interpreting CRP levels requires knowledge of how CRP differs by gender and ethnicity and an understanding of each person's medical history. Because of your participation in MESA, new information is coming to light about these important issues. Thanks! ♡

# Winter Greetings from THE JOHNS HOPKINS FIELD CENTER

1 We sometimes send you forms asking that you please give MESA permission to confidentially collect your medical records from hospitals and doctors' offices. **Please quickly sign and return those forms,** so we will be able to get records MESA needs for its research.

2 **Please take part in our phone interviews.** Every 9–12 months, we call you on the phone to interview you about your health. It doesn't take long, and it's an essential part of MESA—just as important as coming into the clinic for the exams. If we don't reach you and leave a message, please call us back.

**Three things you can do to help us**

3 **Please call us if you have a major change in your health status, a new address, or a new phone number.** And if you were recently in the hospital or if you underwent a serious outpatient medical test, please give us a call. It's not required, but it helps us know that MESA is collecting the most complete information we can.

**Call the Johns Hopkins University clinic, (410) 944-6780, and ask for Rosie Zelke or Gene Graves. Thank you!**

## You, MESA, and the Step-by-Step Process of Conquering Cardiovasular Diseases

*By Moyses Szklo, MD, DrPH, Principal Investigator at the Johns Hopkins University in Baltimore, Maryland*

Cardiovascular diseases, such as strokes and heart attacks, are a significant health problem for all ethnic groups in the United States; and each year approximately 900,000 people die from these diseases. This is why it's so important for us to learn about the causes of cardiovascular diseases, and about how to best prevent them—which is precisely what MESA is all about.

We are very grateful to all of you who have agreed to return repeatedly for clinic visits. We understand that this entails sacrifice on your part, and that it's not always easy to change your work or personal schedules to help us in this important study. Without your dedication, though, we would not have been able to carry out the study.

Having participated in one or more visits, and having spent so much time undergoing the exams, some of you may wonder why you still needed to return for exams 3 and 4 (and perhaps even others in the future). The answer is simple, but it's the key to MESA's success: Factors that cause atherosclerosis ("hardening of arteries")—the process that results in cardiovascular diseases—do not stay the same as time goes by. For example, a person's dietary habits and weight may change over time, which, in turn, may cause cholesterol levels to change too. The scientific question is, do these types of changes affect our risk of cardiovascular diseases? Only by analyzing data obtained from repeated visits will we be able to answer this and other related questions. This is why it is so crucial that you return for all the clinic visits!

Just as risk factors like smoking and cholesterol can change over time, so can the condition of a person's arteries. Atherosclerosis can remain "silent" (without symptoms) for a long time, but that doesn't necessarily mean that the arteries aren't changing. In MESA, we use several methods, over the course of several years, to study silent atherosclerosis. For example, using ultrasound, we can measure the thickness of the neck arteries (the thicker they are, the greater the likelihood of atherosclerosis). With the CT scan, we can see whether, and how much, calcium is present in the arteries of the heart. These types of changes can increase with age—a sign that atherosclerosis is getting worse. At the same time, however, it's possible that increases in atheroscle-

Continued on page 4

rosis can be stopped or delayed by improvements in the risk factors that contribute to it, such as high cholesterol and smoking.

Your willingness to return again and again for exams gives MESA investigators fantastic opportunities to measure, compare, and correlate so many aspects of cardiovascular health and disease. So far, close to 90% of you have been able to make it back for Exam 3, and each return visit means just that much more information about how and why atherosclerosis begins and progresses. For that, we owe you hearty thanks! ♡

## Cabbage Salsa

Try out this healthy, delicious, and easy-to-make salsa at your next party—it'll be a hit!

1 small head green cabbage, chopped into small pieces
1 bunch radishes, diced
3–4 firm, medium tomatoes, seeded and chopped
½ package dried Italian dressing seasoning mix
1 can (approximately 8 ounces) Embassa brand jalapeños with carrots and onions
½ cup (more or less, to taste) chopped fresh cilantro

Throw it all into a big bowl and mix. Serve with tortilla chips. Simple!

## MESA Air Pollution Study Coming to Your Neighborhood Soon!

*By Joel Kaufman, MD, Director of Occupational & Environmental Medicine at the University of Washington*

Soot, smoke, smog, and haze in the air—what we consider air pollution—contain all sorts of gases and very tiny particles (one-thirtieth of the width of a human hair). Sources of pollution include, for example, emissions from automobiles and coal-burning power plants, wood burning stoves, and forest fires. Even Mt. St. Helens added to the mix, by spewing over 500 million tons of ash into the air when it erupted in 1980. These gases and particles are all around us, and we inhale them into our lungs every day. Do they affect our health?

This year, the results of a medical study of air pollution in the Los Angeles area were published in the journal *Environmental Health Perspectives* (Volume 113, No. 2, February 2005). The findings showed that air pollution levels where people live seem to be related to cardiovascular disease (measured by carotid artery wall thickness—one of the tests you've had in MESA already!).

In the last *MESA Messenger,* I wrote about the new **MESA Air Pollution** study that will look at how exposure to air pollution can affect cardiovascular health. Recruitment for "MESA Air" started this spring and will continue through Exam 4. We will be inviting *all* MESA participants to join this important new study. I'll briefly summarize how the study will work, but you'll get full details from the MESA staff when you come in to the clinic for Exam 4.

If you decide to participate in MESA Air, we will ask you to fill out a questionnaire about your residence(s), where you work, and your activities. The questionnaire will focus on building characteristics for your residence and workplace, like heating, air conditioning, appliances, and windows. All these things influence the air pollution levels you might breathe.

*Outdoor air monitor*

Once we have gathered information from everyone's questionnaires, we will ask about 900 of you to let us place an air monitor outside your home. We'll do the monitoring twice, for two weeks each time, during an 18 month period.

Continued on page 5

About 330 of the people who have outdoor air monitoring will also be asked to let us do indoor air monitoring. Indoor monitoring will also be done twice, for two weeks, over 18 months. We'll also be collecting air samples in your community. So, even if your home isn't being monitored, don't be surprised to see one of these devices mounted on a telephone pole near you, quietly "sniffing" the air.

*Indoor air monitor*

Finally, just to make sure we're keeping tabs on every little air particle out there, we will ask about 80 of you to participate in *personal* monitoring! This will involve carrying monitoring equipment with you for two weeks, everywhere you go. I won't go into all the details of personal monitoring in this newsletter, but I will say this: If you decide to do it, you're going to get the VIP treatment from the MESA Air staff!

In addition to all of the air monitoring, we will also invite some of the MESA Air participants to return to the clinic in about five years and undergo some additional health testing. The tests will be very similar to those we are doing in MESA currently.

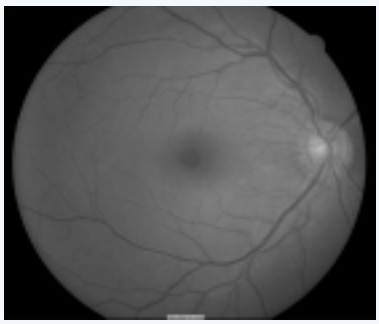
All of this air sampling, combined with the health tests and information collected in MESA, will make MESA Air the most advanced study of air pollution health effects ever conducted. MESA Air is being funded by the US Environmental Protection Agency (EPA) with the largest research grant that agency has ever made! In giving us this grant, the EPA recognized the importance of MESA and the tremendous contribution that you have made – and continue to make – to the advancement of scientific knowledge. The valuable information we gather from MESA Air will be used for years to come in the effort to understand, and protect people from, the effects of air pollution.

We're looking forward to talking to you about this exciting and important study. Until then, as always, thanks for your continuing dedication to MESA!

## Age-Related Macular Degeneration

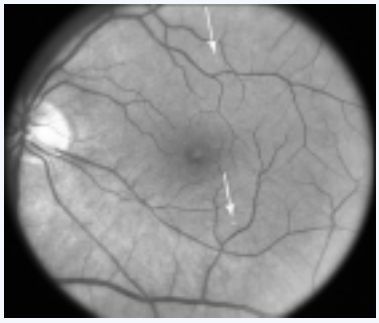
*By Ronald Klein, MD, MPH, Director of Ophthalmology & Visual Sciences at the University of Wisconsin*

***Age-related macular degeneration (AMD)*** is a disease that affects the ***macula,*** the central part of the retina that allows us to see fine details when we look straight at an object or person. AMD affects our ability to perform tasks, such as reading and driving, that require clear central vision. It does not affect side (peripheral) vision. In the United States AMD is the leading cause of vision loss in people over 60. Scientists do not completely understand what causes AMD.



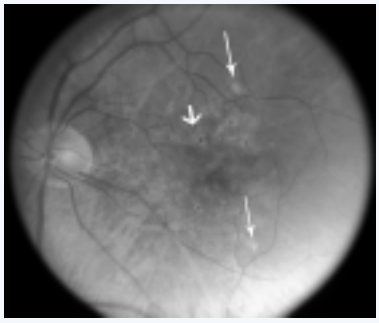
*A normal eye (1)*

To give you an idea of what AMD looks like, we've included some photographs (these are *not* from MESA participants). Photo 1 shows the central part of the retina—the macula—in a normal eye of a person without AMD.



*Early AMD (2a)*

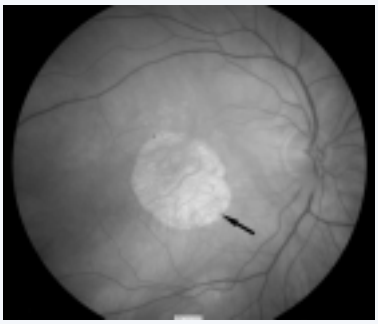
Photos of the left eye of another person show AMD developing over the course of 15 years. In photo 2a, arrows point to tiny yellowish abnormalities, called ***retinal drusen.*** Photo 2b, taken ten years later, shows that the drusen have grown in number and size. Abnormal blood vessels devel-



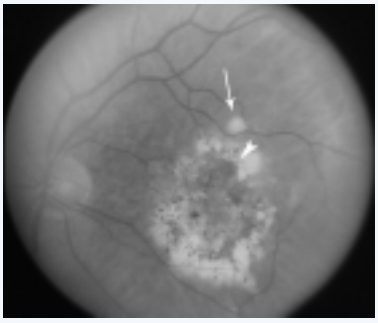
*Ten years later (2b)*

Continued on page 6

oped in the retina and, eventually, bled into the macula (photo 2c). This bleeding, which is called "wet" AMD, caused a significant decrease in the central vision in that eye. Photo 3 shows the "dry" form of AMD. In dry AMD, bleeding does not occur; but the drusen gradually enlarge and merge together, and blood vessels and other tissues in the central area of the eye shrink.



*Wet AMD (2c)*



*Dry AMD (3)*

Most of what we know about how often and why AMD occurs has come from previous studies whose participants were white. In these studies, AMD occurred more often in families, which suggests genetics play a role; and people who smoked were two to three times more likely to develop AMD than those who didn't. However, very little information is available in large populations on the frequency of this disease in African-Americans or Hispanics, and no information is available about AMD in Chinese or Asian-Americans. So we have had a unique opportunity to study AMD in the four racial/ethnic groups participating in MESA. Here's a little of what we've learned, so far:

Among participants of all ages, we found AMD in 2.4% of African-Americans, 4.2% of Hispanics, 4.6% of Chinese, and 5.4% of whites. In participants ages 75 to 84, the lowest incidence of AMD was in African Americans (5.9%), the highest in whites (13.3%).

In the future, we plan to study whether smoking, blood pressure, cardiovascular disease, medications, and other factors measured in MESA are associated with AMD. In addition, the MESA Family Study will provide us with information about the genetics of this disease in African-Americans and Hispanics. We hope that these studies will give us more and better information about AMD in different racial and ethnic groups, and that we'll be able to use this information to help prevent and treat AMD. ♡

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Multi-Ethnic Study of Atherosclerosis
Coordinating Center
University of Washington, Box 354922
6200 NE 74th St., Building 29, Suite 310
Seattle, WA 98115

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