



# 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<sup>th</sup> 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

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 ques-

tions: 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:

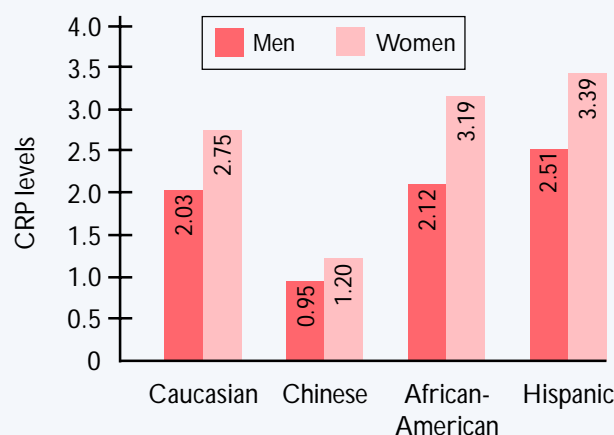
- 🕒 In all ethnic groups, women have higher levels of CRP than men
- 🕒 Women who take estrogen medications have higher CRP levels than those who do not
- 🕒 Obesity increases CRP levels tremendously
- 🕒 Chinese individuals have much lower CRP levels than other ethnic groups.

*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 WAKE FOREST 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.

**Please pass along this important information to Harriet Weiler. Her number is 336-716-9721. Thank you!**

## MESA, Harriet Weiler, and You: The Vital Connection

By Terry Tembreull, Assistant Project Manager for MESA at Wake Forest University

Perhaps you have wondered what we do with the information you provide during follow-up calls between study visits. As you may recall, during these calls we ask about your health, if you have seen a health care professional, or if you have been in the hospital since your last telephone interview.

In MESA, it is critically important for us to know your whole health picture, and the information you provide during follow-up calls is essential. This information is passed along to Harriet Weiler, our Research Events Coordinator. Based on your responses, Harriet may request medical records from hospitals, physician's offices, and nursing homes. Harriet processes the information and sends it to the MESA Coordinating Center, in Seattle. (Your privacy is protected at all times, of course!) Physicians from all MESA sites then share in reviewing the medical event information.

Harriet has been working as a Research Events Coordinator since 1993, when she joined the Cardiovascular Health Study (CHS) staff. Lucky for us, she also fulfills this very important role in MESA. Harriet appreciates the ongoing opportunities for learning that her position provides, and she thoroughly enjoys and values the

interaction she has with participants. Harriet knows how important her work is, too, and says she "appreciates the opportunity to be a member of a team of professionals dedicated to the collection of accurate and detailed data pertaining to heart disease and stroke. I believe these endeavors will benefit many generations to come."

Away from the office, Harriet enjoys concerts, dance performances, theatre, gardening, and exercising. She also tutors a kindergarten student and takes voice lessons. Harriet has a son, Christopher, who lives in Asheville, and a daughter, Shannon, who lives in Atlanta.

To each and every one of you we all wish to express our genuine gratitude for your willingness to participate in MESA. Your generosity of time and spirit is essential to the integrity of the study, and we couldn't do it without you. A very heartfelt *thank you* from all of us at the General Clinical Research Center and the Public Health Research Center at Wake Forest University! ❤️



Harriet Weiler, Research  
Events Coordinator

Blood levels of cholesterol, lipoproteins (LDL & HDL), and triglycerides provide a good gauge of your heart health.

### Tips for reducing cholesterol-raising fats in your diet

Choose foods that are baked, broiled, or steamed rather than fried ♡ Top salads with low- or no-fat salad dressing, or use dressings made with liquid oils like olive oil or canola oil ♡ Choose vegetables or broth based soups rather than cream soups ♡ Use low-fat or fat-free milk, cheese, yogurt and sour cream rather than full-fat varieties ♡ Use lean fish and meats with the skin and fat removed, and fish rich in omega-3 fatty acids, such as salmon and albacore tuna ♡ Substitute tofu, nuts, and legumes (dry beans) for high-fat meats.

### Soluble fiber & blood cholesterol

Eating the foods listed here, which contain soluble fiber, can help you lower your cholesterol ♡ Whole grain foods made from oats, barley, and rye, such as oatmeal and whole grain rye bread ♡ Fruits and vegetables, such as apples, oranges, green beans, and sweet potatoes ♡ Legumes and nuts such as chick peas, kidney beans, and almonds.

### Tips to increase soluble fiber

Make whole grain cereals that contain soluble fiber a part of every breakfast ♡ Eat fresh fruit with breakfast and for snacks ♡ Switch to whole grain bread made from rye or oats ♡ Add more vegetables to sandwiches, pizza, pasta, and other entrees ♡ Make soup, chili, and enchiladas with kidney beans, black beans, or other legumes.

## 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.

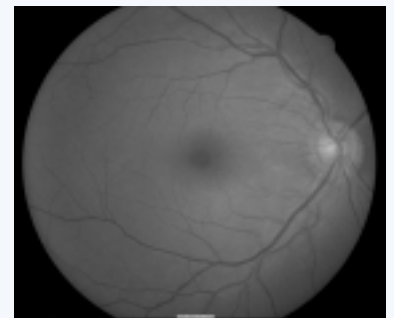
We're looking forward to talking to you about this exciting and important study. Until then, as always, thanks for your continuing dedication to MESA!

## Age-Related Macular Degeneration

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

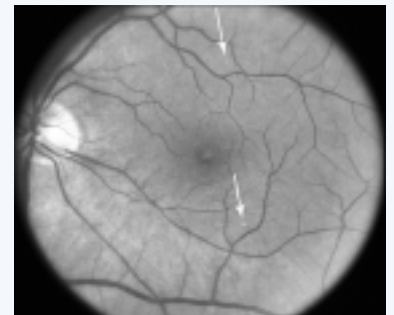
**Age-related macular degeneration (AMD)** is a disease that affects the *macula*, the central part of the retina that allows us to see fine details when we look straight at an object or person. AMD affects our ability to perform tasks, such as reading and driving, that require clear central vision. 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.

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.



A normal eye (1)

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-

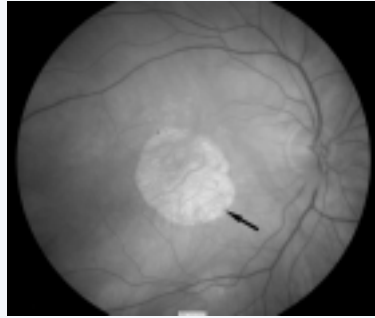


Early AMD (2a)

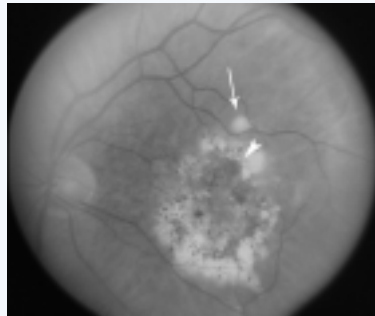


Ten years later (2b)

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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