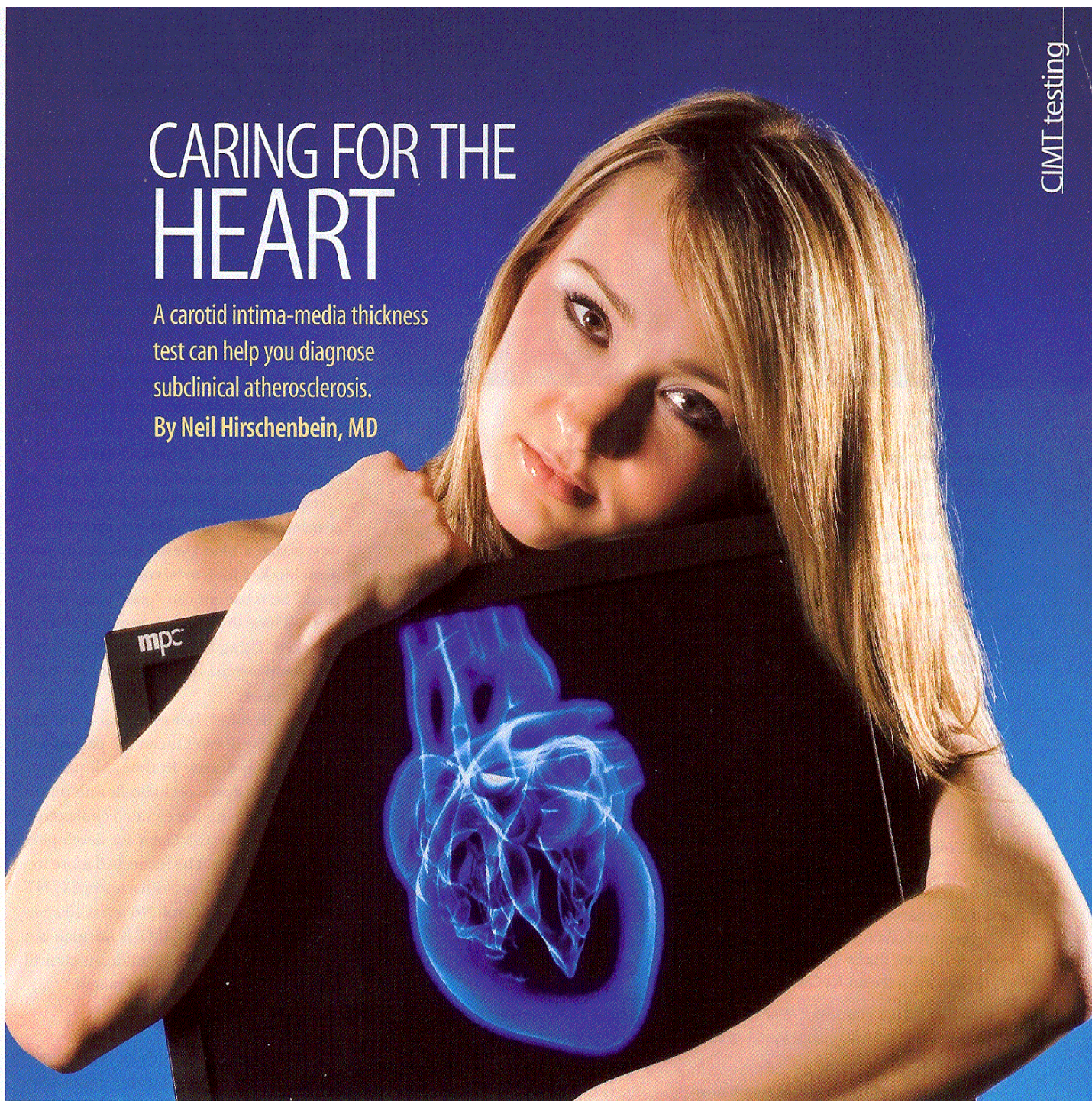


CARING FOR THE HEART

A carotid intima-media thickness test can help you diagnose subclinical atherosclerosis.

By Neil Hirschenbein, MD

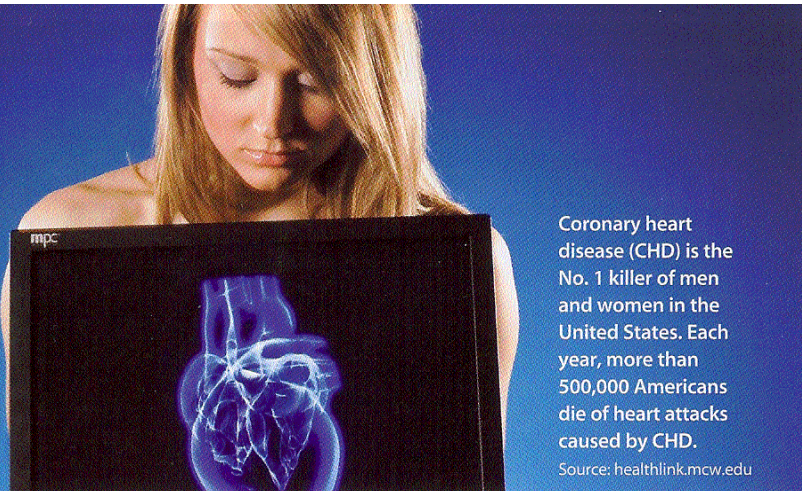


JANE HAD A TOTAL CHOLESTEROL RANGING FROM 300 TO 400. Previously, several physicians had suggested Atorvastatin. She tried it, but couldn't tolerate the drug.

Jim had a total cholesterol of 160 with an HDL of 80 and seemed in good health. In most offices, we can play out the expected scenarios. Jane's physician would have tried to find a statin she could tolerate. And Jim's doctor would have congratulated him for having such good lipids.

At our office, however, we did one additional test, a carotid intima-media thickness (CIMT) test, a low-cost, noninvasive method to assess atherosclerosis in the general population.¹

The results were surprising. Jane had no evidence of plaque and actually had an arterial age 10 years younger than her chronological age. In contrast, Jim had evidence of significant plaque. We did additional tests to determine why this was the case and found that Jim had a significantly elevated Lp(a), which we treated with a high dose of niacin.



AT RISK

Many factors raise the risk of developing coronary artery disease (CAD). The following risk factors put patients at increased risk:

- **UNHEALTHY BLOOD CHOLESTEROL LEVELS.** Ideally, total cholesterol levels should be below 200 mg/dL and LDL cholesterol levels should be below 100 mg/dL. (The new guidelines designate that certain high-risk individuals should have this number at or lower than 70 mg/dL.) HDL should be above 40 mg/dL. Having high levels of HDL is a good thing because it can exert a cardioprotective effect.
- **HIGH BLOOD PRESSURE.** Blood pressure is considered high if it stays at or above 140/90 mmHg over a period of time.
- **SMOKING.** This can damage and tighten blood vessels, as well as raise cholesterol levels and blood pressure. Smoking also doesn't allow enough oxygen to reach the body's tissues.
- **INSULIN RESISTANCE.**
- **DIABETES.**
- **OVERWEIGHT OR OBESITY.**
- **METABOLIC SYNDROME.**
- **LACK OF PHYSICAL ACTIVITY.**
- **AGE.** As patients get older, their risk for CAD increases. Genetic or lifestyle factors cause plaque to build in arteries.
 - In men, the risk for CAD increases after age 45.
 - In women, the risk for CAD increases after age 55.
- **FAMILY HISTORY OF EARLY HEART DISEASE.** Risk increases if a father or a brother was diagnosed with CAD before age 55, or if a mother or a sister were diagnosed with CAD before age 65.

Excerpted from www.nhlbi.nih.gov/health and about.com.

I have always believed that we should use tests that measure the disease we're interested in, rather than measure risk factors for that disease. I see many patients who take statins to reduce cholesterol, but who haven't been tested for atherosclerosis. Elevated cholesterol is not a disease, just a risk factor for atherosclerosis. From the cases I've described, you can see that elevated cholesterol doesn't always mean a patient has atherosclerosis, nor should normal cholesterol exclude it.

Atherosclerosis starts in the blood vessel walls. As we deposit fat, cholesterol and inflammatory cells, the blood vessel walls initially get thicker. The lumen, however, remains the same size. Later, the plaque in the walls begins to intrude into the lumen. With time, the plaque can grow larger, interfering with blood flow and producing symptoms, such as angina. The plaque also can rupture, leading to a heart attack or stroke.

Ideally, a test to measure atherosclerosis should find evidence of disease at the earliest possible time.

By finding subclinical disease early, we can initiate therapy to prevent clinical events, such as heart attacks, strokes and sudden death. By catching the disease early, we also have the luxury of time and could start lifestyle modifications and other modalities that have little risk. If we catch the disease late, however, we need to start

with the "big guns": pharmaceuticals, angioplasty and stent, or coronary artery bypass surgery.

To evaluate for atherosclerosis, many physicians use some form of stress test (regular, pharmaceutical, stress echo or nuclear stress). The problem with a stress test is that a blood vessel must be 70 percent blocked for it to be considered "abnormal." So a patient can "pass" a stress test, yet still have three blood vessels 60 percent blocked. Using the stress test "standard," we would assume this patient doesn't have heart disease.

Keep in mind, however, that a normal CIMT today doesn't mean the patient will not develop disease in time. All patients should be checked periodically with repeat CIMTs. Jane, with her elevated cholesterol, has a significant risk factor for developing disease and should be rechecked more frequently than a patient with a normal CIMT and normal cholesterol. No test is 100 percent reliable. If the CIMT is normal, but the physician suspects significant clinical disease, further testing is warranted.

How CIMT Works

CIMT looks at the carotid artery as a representative blood vessel. It makes the assumption that the "plumbing" in the carotid artery is

similar to the "plumbing" in other similar-sized arteries. The common carotid artery bifurcates into the internal and the external carotid arteries. The CIMT can measure and give information about the common carotid, the bifurcation (or bulb) and the internal carotid artery.

The most reproducible is the average common carotid artery mean IMT. This measures the common carotid artery directly below the bifurcation, which is easily identified and, therefore, reliably reproducible. Multiple views of this area are obtained and then averaged. The data is sent then through a computer that determines the intima-media thickness or the thickness of the arterial wall. This information then gets compared to a large database that determines the arterial age of the patient, which is compared to the patient's chronological age.

All CIMT companies allow you to measure wall thickness and plaque, but not all of them allow you to reliably use this data to track the results. Tracking the data is key because it allows us to see if our therapeutic program is successful.

We would anticipate that the carotid arteries are about the same age as the patient's age. Frequently, this is true. However, I have found patients whose arterial age is five, 10, 20 and even 30 years older than their chronological age. I also have found patients whose arterial age is 30 years younger than their chronological age.

When patients see that their arteries are similar to those of someone 20 years older than their chronological age, they often become significantly motivated to follow recommendations they previously ignored. These recommendations can include smoking cessation, weight reduction, healthy eating, exercising, stress reduction and complying with a supplement or medication regime.

Reducing Risk

If a patient has an elevated arterial age or plaque, we need to determine the reason(s), and then institute a comprehensive approach for treatment. Numerous studies have demonstrated that lowering LDL cholesterol can reduce the risk for a coronary event by approximately 30 percent. A few studies have shown that by combining the approach of lowering LDL and raising HDL cholesterol, we can reduce the risk of a cardiac event by 80 percent to 90 percent.

In previously published articles, I've outlined a four-step program to reduce the risk for coronary disease. First, we must detect and measure coronary disease. Second, we must identify the causes of coronary disease. Third, we need to effectively treat the causes. And fourth, we need to retest to see if we have arrested or reduced the amount of coronary disease.

CIMT guides us in this four-step program. It not only helps us detect disease, but it also allows us determine the effectiveness of treatment.

As an example, BC is a man in his mid-50s with a family and personal history of significantly elevated triglycerides. Without medications, his triglycerides were usually above 1200. His LDL cholesterol level also was elevated. He had tried statins, fibrates and Niaspan, but had problems tolerating all of these medications.

In 2006, his CIMT showed an arterial age corresponding to his chronological age and a small amount of soft plaque in the left bifurcation. We treated him with high-dose fish oils and limited-flush niacin. One year later, his arterial age was 11 years younger than his chronological age, and his plaque was no longer present.

What the Literature Shows

I've used CIMT successfully in my practice, and the medical literature also shows it's a valuable tool. Studies show that CIMT measurements correlate with clinical events and expected risk factors. Furthermore, treatment designed to modify the risk factors changes IMT results and clinical events.

In fact, several large prospective studies have evaluated IMT and demonstrated its role in predicting future cardiovascular events.² IMT increases with advancing coronary artery disease.³ Quantitative assessment of carotid IMT is safe, validated, portable, inexpensive and can be used in multicenter studies.⁴ Data from multiple studies demonstrate a high degree of reproducibility in measurements of IMT thickness.^{2,5} Evidence also suggests that early detection of atherosclerotic disease processes and subsequent therapeutic interventions significantly alters the natural course of the disease.²

In studies, increased baseline CIMT was related to increased age, male gender, smoking, hypertension and lipid levels.⁶ Other risk factors are diabetes mellitus, systolic blood pressure, high total cholesterol, presence of plaque in the carotid arteries, metabolic syndrome,³ LDL particle size,⁷ menopause⁸ and low vitamin D levels.⁹ Emerging risk factors, such as lipoproteins, psychological status, plasma viscosity and hyperhomocysteinemia, also can increase baseline CIMT. Thus IMT gives a comprehensive picture of the alterations caused by multiple risk factors on the arterial walls over time.¹⁰

Increases in the IMT thickness are directly associated with an increased risk of myocardial infarction and stroke in older adults

without a history of cardiovascular disease.¹¹ Carotid IMT also independently predicts future vascular events.

Statins, ACE inhibitors and insulin sensitizers reduce carotid IMT and cardiovascular events, such as MI and stroke.^{5,10} Early improvements in CIMT, a surrogate for clinical benefit, suggest that marked LDL reduction with statins may reduce clinical coronary event rates.¹² In studies, researchers have seen improvements in CIMT in patients with clinical¹² and subclinical disease.¹³ They've also seen improvements in patients with high cholesterol, moderately high¹⁴ and normal cholesterol.¹⁵

In addition to pharmaceutical agents, dietary and lifestyle modifications can slow the progression of early pre-intrusive atherosclerosis.¹⁶ Supplements also can help. Supplementary vitamin E intake may effectively reduce the progression of atherosclerosis in subjects not treated with lipid-lowering drugs when the process is still confined to the arterial wall.¹⁷

As you can see, **significant scientific data support using CIMT to assess atherosclerosis**. With this tool, we can monitor the effectiveness of our therapeutic interventions and treat subclinical disease early. This is far better than waiting until clinical disease manifests itself.

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