



The Role of Ultrasound in Vascular Age

syngo Arterial Health Package

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With the *syngo*® Arterial Health Package (AHP), Siemens is offering a new tool to help physicians measure carotid intima-media thickness (CIMT), and to communicate results regarding subclinical vascular disease and cardiovascular disease risk to their patients. *syngo* AHP combines the semi-automated ultrasound measurement of CIMT and the Atherosclerosis Risk in Communities (ARIC) database to estimate vascular age. It also includes a Framingham Risk Calculator to help physicians evaluate their patients' risk of cardiovascular disease. This may help to optimize proactive treatment and preventative care, as well as provide meaningful early intervention for patients.

Cardiovascular disease causes an estimated 16.7 million deaths globally each year, taking its toll not only on a personal, but also on an economic level. In an effort to help reverse this trend, Siemens is continually developing new products for prediction and prevention. Prevention will always be more cost-effective – and more effective – than after-the-fact treatments.

It's a common question, and one that physicians wish to answer with ever more precision: "What are my chances of cardiovascular disease?" Accurate answers could not be more vital: About 29 percent of global deaths each year are due to cardiovascular disease. Medicine and lifestyle changes could prevent a significant number of heart attacks and strokes if the at-risk population could be identified. Despite decades of prediction research based on risk factors such as blood pressure, smoking, and blood cholesterol, two-thirds of people who have cardiovascular disease do not know it until they have had a heart attack or a stroke. "For many of these patients, prevention comes too late, because they have died or had a major injury to

their hearts or brains," says James Stein, MD, Professor of Medicine and cardiologist at the University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin USA. "These cases are not detected, let alone treated, before the tragedy."

The calculation of vascular age uses an approach called carotid intima-media thickness measurement, or CIMT. The carotid arteries, Stein says, provide a "window" into the health of the coronary arteries. "We know from pathological studies that the atherosclerotic burden is quite similar in the carotid and coronary arteries." Because the carotid arteries are far more accessible to ultrasound examinations, imaging and measuring, the thickness of the intima and media provides valuable data on cardiovascular risk. To detect atherosclerotic thickening in the carotid arteries, Stein says, "You don't have to use radiation or medicines to slow the heart; you can do this in 15 to 20 minutes, and get the results quickly."

Identify the Risk

As multiple views and numerous measurements are required to calculate CIMT, the *syngo* Arterial Health Package offers the advantage of automatically computing the intima-media thickness, which replaces tedious, manual measurements. Most predictions of cardiovascular risk are based on age, smoking status, blood pressure, and blood cholesterol levels. The predictions reflect risk algorithms derived from the Framingham Heart Study or other large studies. However, the prediction algorithms are not perfect – they may exaggerate the role of chronological age, but discount family history of disease. CIMT and the calculation of vascular age supplement Framingham, not replace it, Stein says. "Its predictive ability adds to our existing assessments – it can improve our ability to identify patients at risk and to prevent heart attacks and strokes." According to the American Heart Association's Prevention Conference



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V, CIMT "can now be considered for further clarification of coronary heart disease (CHD) risk assessment."

Tool for Patient Education

Because an intima-media thickness measurement would mean nothing to a patient, Stein prefers to express CIMT results in terms of vascular age as an enhanced opportunity for patient education. "The idea came from the observation that an abnormal value for one age would be normal for another age," he explains. A 45-year-old man with an intima media thickness of 0.8 millimeters would be in the 90th percentile for risk, but that measurement is average for a 62-year-old. For this patient, "We would say he has the arteries of a 62-year-old." Vascular age can be used as an educational tool to help patients understand their vascular health.

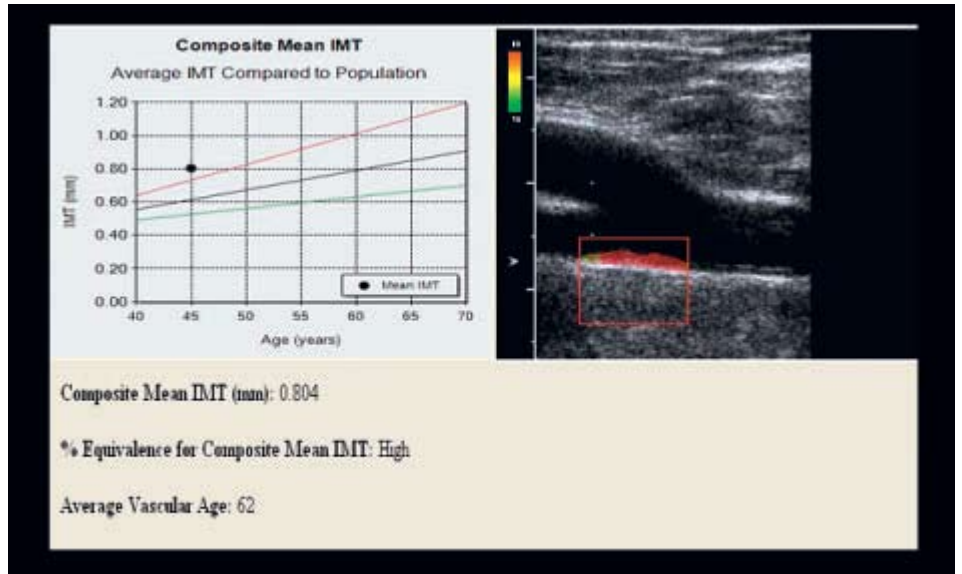
Because conventional means can already identify high- and low-risk individuals, CIMT seems especially valuable for the troublesome intermediate risk category, which includes

at least 15 to 20 percent of patients in the United States. "Typically, they are in the age range from 40 to 70, and have one or two risk factors for heart disease," Stein says. "After a standard risk assessment, we want to know which of these patients should be advised to exercise, lose weight, and take medications to control blood pressure and cholesterol. More than half the time, CIMT can be definitive for this intermediate group."

Provide Immediate Feedback

A second group that can benefit from CIMT analysis includes the many patients who worry about a genetic burden of cardiovascular disease. "You might see a 45-year-old man whose father smoked and died of a heart attack at 40," Stein says. "His cholesterol is raised, and his family doctor suggests he take a cholesterol-lowering medication. He asks, 'Do I have to take that for the rest of my life?'"

Conversely, seeing deteriorated arteries can be a powerful motivator, affirms Stein. "I've had a lot of pa-



This 45-year-old patient's calculated vascular age is well outside the normal range for his chronological age. His mean CIMT was measured at 0.8 millimeters, which is average for a 62-year-old patient of his gender and race. Vascular age can be used as an educational tool to help patients understand their vascular health.

tients for whom this has been a life-altering experience. When they see that their arteries are thick, they get religion, take their medicines, exercise, and lose weight." Although

CIMT measurements are not yet common practice, Stein says the methodology rests on "a rich evidence base, from more than two decades of research on 30,000 people, that has associated CIMT with the risk of heart attack or stroke in the next seven years. It's a very mature technology, but it's not been translated to the clinical setting – yet."

With its automatic measurement and calculation of vascular age, physicians have the opportunity to provide immediate feedback to the patient, Stein says. "This lets the patient walk out with the result, and we can build counseling right into the session. You can determine the vascular age in 15 to 20 minutes, and come back and discuss the results. The patient is fresh in your mind. It's personalized medicine, and it's much more efficient."



Based on an ultrasound examination of the carotid artery, the *syngo* Arterial Health Package can calculate a parameter called vascular age.

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