

A REVIEW OF NONINVASIVE METHODS USED IN THE ASSESSMENT OF
ATHEROSCLEROSIS (PART 1)
CAROTID INTIMA-MEDIA THICKNESS

Cardiovascular disease remains the number one killer of both men and women. Does knowing this fact make it incumbent on health care providers to provide some type of warning system to possibly prevent a cardiovascular event or death? We will discuss various techniques that are currently in use to possibly identify early atherosclerosis and then permit early aggressive treatment. I do understand that many people who read my blog have different levels of understanding of these difficult medical issues. While I will try to keep it simple, I believe it is important to do it in such a way as to not trivialize such an important topic.

Invasive coronary angiography still remains the gold standard to identify clinically significant coronary artery disease. Like all invasive procedures, there are inherent risks associated with the procedure that include heart attack, stroke, death, damage to the artery in the arm or groin used as the puncture site, and kidney failure to name a few. It is my belief that many cardiologists indiscriminately perform angiograms of the heart arteries for reasons that are clearly not supported by the literature. With this said, my preference is to perform noninvasive testing in order to identify patients at risk. If after following a treatment algorithm, it is felt that coronary angiogram becomes necessary; it then can be done in accordance with well-accepted indications.

We will first talk about Carotid Intima-Media Thickness, also known as CIMT. This involves measuring the thickness of two concentric (circular) layers of the neck arteries using duplex ultrasound. To be more precise, it measures the thickness of the first two layers of the mid-portion of the common carotid artery. CIMT was first reported as a surrogate (substitute) marker for atherosclerosis in 1986. This was a comparison between autopsy studies and what was found in B-mode ultrasound studies. There was a measurement error of less than 20% in 77% of the subjects studied. In a follow up study, they found that patients with high cholesterol had increased CIMT augmented by including traditional risk factors. Fourteen years later, the American Heart Association deemed CIMT the only acceptable noninvasive method for assessment of cardiovascular risk. It is thought that any increase in CIMT is thought to be a reactive process secondary to shear stress and pressure within the artery from hypertension and plaque formation.

The ARIC trial is the largest CIMT observational cardiac endpoint trial to date. In 13,870 middle-aged adults, CIMT measurements were increased in those patients with coronary artery disease. Quantification studies showed that a .2mm increase in CIMT yielded a 33% relative risk increase in heart attack and 28% for stroke. Similarly, in both the CHS study and Rotterdam study, increased CIMT correlated with subclinical atherosclerosis. Since CIMT is a recognized marker of cardiovascular risk, it is used as a primary endpoint in clinical trials. The beneficial

effects of cholesterol lowering on CIMT progression have been demonstrated in ARBITER, ASAP, and ACAPS. In the ENHANCE study, the results were not accurately portrayed by the media and I have previously written about the actual results on my blog. Additional studies using different blood pressure medicines are ongoing in order to see their effect on CIMT.

The main problem with measuring CIMT is that there has been significant interobserver variability. Technical advancements in B-mode ultrasonography have reduced this problem.