

Carotid Intima-Media Thickness: Too Soon to Tell?

Lorenz MW, Markus HS, Bots ML, et al. Prediction of clinical cardiovascular events with carotid intima-media thickness: a systematic review and meta-analysis. *Circulation* 2007;115:459–67.

Study Overview

Objective. To determine the predictive value of carotid intima-media thickness (IMT) for the cardiovascular endpoints of stroke and myocardial infarction (MI).

Design. Systematic review of the literature and meta-analysis of available data.

Data sources. A MEDLINE search was performed using the keywords “carotid intimal media thickening” or “carotid intimal media thickness” and “myocardial infarction” or “stroke” or “death.” Studies were considered relevant if the patient sample was representative of the general population, carotid IMT was recorded, and subjects were followed for vascular clinical endpoints.

Main outcome measures. Hazard ratio for future MI or stroke per IMT increase of 0.1 mm.

Main results. 8 observational studies were identified that met inclusion criteria, representing 37,197 patients who were followed for a mean duration of 5.5 years. Analysis yielded hazard ratios per 0.1-mm difference in IMT of 1.10 to 1.15 for MI and 1.13 to 1.18 for stroke. Younger individuals with increased IMT were shown to be at a lower absolute risk but higher relative risk of vascular events compared with older populations with similar increases in IMT.

Conclusion. IMT is a valid predictor of future vascular events, making it a useful tool in clinical decision making. Additional data are needed in younger patients to understand the relative risk of vascular events with increases in IMT.

Commentary

Increased carotid IMT has been linked to vascular disease risk factors, as well as advanced atherosclerosis and resulting

coronary artery disease. IMT is attractive as a potential predictor for vascular disease because it can be measured noninvasively and, if standard criteria are applied, results are reproducible. Other benefits of using IMT as a surrogate outcome measure include low cost and shorter follow-up time. Additionally, IMT allows for the early identification of at-risk patients.

The authors performed a thorough review of available studies. All of the studies showed a positive relationship between IMT and risk of vascular disease; however, there are several study limitations that should be considered. Each of the 8 studies in the meta-analysis used slightly different protocols and definitions when measuring primary outcomes. Additionally, the studies varied with respect to age of the study population, selection criteria, and study length. This heterogeneity in study design may weaken the association between increased IMT and vascular endpoints. Other potential limitations of the meta-analysis include publication bias, the nonlinear relationship between IMT and risk, and the assumption of linearity in the graphical methods used.

Applications for Clinical Practice

Currently, more data are needed to show that IMT translates into clinical outcomes of importance. Surrogates such as IMT can often pose challenges when used for risk stratification purposes. Multicomponent diseases may not be adequately described, markers may only work well in part of their predictive range, and markers may be selectively responsive to different treatments. It is still early enough in our experience with IMT that many of these issues remain unresolved. This meta-analysis sets the stage for future research, rather than conclusively defining the clinical role of IMT.

—Review by Eric Goldberg, MD

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