Recent Advances: Carotid Intima-media Thickness

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Cardiovascular disease is a major cause of morbidity and mortality worldwide. The pathophysiology of atherosclerosis is complex and not fully understood. Conventional cardiovascular risk factors such as diabetes, hypertension, hyperlipidaemia, family history of premature coronary heart disease and cigarette smoking do not fully explain the high prevalence of coronary heart disease and stroke. New markers for vascular disease (highly sensitive C-reactive protein, endothelial markers) continue to emerge which simply reflects the complex pathological process. Direct assessment of vascular health in conjunction with conventional risk factor may give greater predictive value in future development of acute cardiovascular events.

Over recent years, there is accumulating evidence to suggest that direct measurement of the intima-media thickness (IMT) of the common carotid artery by B-mode ultrasound is a useful method in cardiovascular medicine\(^1,2\). Common carotid IMT has been shown to correlate with traditional vascular risk factors and may predict the likelihood of acute coronary events and stroke\(^3,4\). Measurement of carotid IMT is convenient, non-invasive, painless, accurate and reproducible. For these reasons, carotid IMT has been used as a surrogate endpoint measure in numerous clinical trials.

Early detection of atherosclerosis in high risk individuals is unquestionably beneficial. First, it gives a visual warning signal to the high risk individuals and this may aid certain behavioural changes such as quitting smoking and weight reduction. Second, it alerts both the patient and the physician the need to vigorously control traditional vascular risk factors (such as LDL-cholesterol). Third, there is emerging evidence that early pharmacological intervention may ameliorate this pathological process and several drugs may even decrease IMT in high risk populations. For example, in the Atorvastatin versus Simvastatin on Atherosclerosis Progression (ASAP) study, high dose atorvastatin (80 mg) has been shown to be more efficacious in retarding progression of atherosclerosis in the femoral artery compared with moderate dose simvastatin (40 mg) in patients with familial hyperlipidaemia\(^5\). In a randomized-controlled study of type 2 diabetic patients, cilostazol (a type 2 phosphodiesterase inhibitor) significantly decreases carotid IMT compared to placebo control after one year\(^6\). Furthermore, thiazolidinediones (a group of peroxisome proliferators-activated receptor-gamma agonists) have been shown to have direct inhibitory effects on carotid arterial wall thickness in both diabetic\(^7,8\). This effect appears to be not mediated through plasma glucose reduction since rosiglitazone has been shown to decrease IMT progression in non-diabetic subjects\(^7\). In another recent prospective clinical trial, metformin therapy has been shown to attenuate IMT progression in Japanese type 2 diabetic patients over a period of 2 years\(^9\). Similarly, acarbose slows the progression of IMT over 3 years in subjects with impaired glucose tolerance\(^10\). In addition, in the long-term follow up of the Diabetes Control and Complication Trial, it has been shown that intensive diabetic control resulted in a decrease in carotid IMT progression in patients with type 1 diabetes\(^11\).

While we await definitive evidence to confirm reducing carotid IMT could lead to significant improvement in cardiovascular outcome, the clinical use of this non-invasive radiological marker would clearly help behavioural modification and risk stratification in high risk individuals.

![Figure 1](image) Arrow demonstrating intima-media thickness (IMT) of the common carotid artery using B mode ultrasound.
References


