Background and Aim

- Mortality from ischemic cardiovascular disease (CVD) is epidemic in the US, with a million cardiovascular deaths and 770,000 first coronary attacks every year. First coronary attacks have a 38% mortality within the first year (American Heart Association Heart and Stroke Facts, 2008).
- Yet among patients with fatal and non-fatal MI, 90% have a remediable risk factor (Greenland P et al. JAMA 2003, 290: 891-7).
- Atherosclerosis is commonly found in more than one vascular bed (Allison MA et al., ATVB 2004).
- CAFES-CAVE Study showed that even very low risk populations had significant cardiovascular disease and that carotid (CP) and femoral plaque (FP) predict cardiovascular events (Belcaro G et al. Atherosclerosis 2001, 156:379-387).
- Current CVD prediction algorithms utilize traditional risk factors in populations but have failed to identify those at highest risk due to underlying disease. We compared a newer algorithm, “Lifetime Risk” (LR), with 10-yr and 30-yr Framingham Risk Score (FRS) algorithms as to their ability to identify those subjects at highest risk because of initial CVD event, based on having carotid or femoral artery plaque.

Methods

- From 1246 patients self-referred for screening vascular ultrasound at their annual preventive physical examinations, we studied the 809 adults between the ages of 20 and 60, 36 % women. Exclusions: No evidence of previous angina, myocardial infarction, stroke or claudication.
- Framingham Risk Score (FRS) determined by age, gender, smoking history, diabetes, blood pressure, total and HDL cholesterol.
- Thirty year FRS CVD risk scores were assessed as determined utilizing the Excel calculator in Pencina MJ et al. Circulation 2009, 119: 3076-3084.
- Ten year FRS CVD risk scores were assessed as determined from D’Agostino RB et al. Circulation 2008, 117:743-753.
- Lifetime Risk (LR) assessed on basis of total cholesterol, blood pressure, diabetes and smoking as determined from Berry JD et al. Lifetime Risks of Cardiovascular Disease. NEJM 2012; 366:321-9.
- Plaque was defined as any endothelial abnormality greater than 1.5 mm intima media thickness at either carotid or femoral artery bifurcation. Carotid and Femoral arteries were interrogated in both longitudinal and transverse planes. All ultrasound examinations were made using a 7.5 MHz linear array transducer with a Sonosite (Bothell, WA) MicroMaxx ultrasound machine utilizing SonoCalc software for measurement of plaque and automated Carotid IMT.

Results Summary

- LR placed ≥50% of all subjects with plaques in the high-risk group. For women 20 to 60 (Graph A) and men ≥50 (Graph B), this allocation was significantly better than 10 yr FRS (p<0.001, p=0.001) and 30 yr FRS (p=0.01, p=0.05).

Limitations

This clinic-based population of “worried well” may not represent a general population. The sample was almost entirely Caucasian and affluent so it may not be applicable to other segments of the population. This was not an outcome based study but used atherosclerotic plaque as a surrogate measure for CVD events. None of the risk algorithms used (10-year, 30-year, or Lifetime) adequately account for impaired fasting glucose which if included may have shifted more subjects to intermediate- or high-risk groups.

Conclusions

The Lifetime Risk algorithm is superior to both 10 and 30 year and 30 year FRS algorithms in assigning subjects with plaques to the high-risk category for women aged 20 to 60 years and for men aged 60 years or for 30 yr FRS, as well as LR, were calculated and subjects categorized into low-, intermediate- and high-risk groups. This examination of both carotid and femoral arteries was performed in the transverse and longitudinal planes. Waveform index gingame test was used to assess agreement between the algorithms for classifying those with plaque across risk groups. For men 20 to 60 yr and for men ≥50, both 10 and 30 yr FRS algorithms showed the greatest prevalence of plaque in the intermediate group, while the LR algorithm demonstrated 50% of plaques in the high-risk group. Among women, the 10 yr FRS algorithm assigned 58% of subjects with plaque to the low-risk group and none to the high-risk group (Table). Conclusions: Our study showed LR was superior to both 10 yr and 30 yr FRS in assigning subjects with plaques to the high-risk category in women 20 to 60 yr and to men in the ≥50 yr groups.

The authors declare that they have no conflict of interest with respect to this work.