Dr Edmund Lee MBBS (WA) FRACP

CARDIOLOGIST

St John of God Murdoch Medical Clinic

Suite 34/100 Murdoch Drive

Murdoch WA 6150

Tel: (08) 6169 2060

Fax: (08) 6169 2065

THE PROS AND CONS OF CALCIUM SCORING

THE PROS:

1. **Risk scores can be imprecise:** There are a number of risk scores available online to determine future risk of vascular events. In North America, the ASCVD risk score is used. The ACC/AHA 2013 guidelines and 2016 US Preventive Service Task Force guidelines recommend starting statins if the score is above 7.5% over 10 years. In Australia, the Absolute CVD risk calculator is used as part of the National Vascular Disease Prevention Alliance. A score above 15% over 5 years is used to recommend starting statins. The Framingham risk calculator is also another commonly used risk calculator. Numerous studies have shown that these calculators overestimate risk. Overestimating risk on this scale implies that worldwide, more than a billion humans are unnecessarily taking statins.

2. **CAC is more precise than risk scores:** Many studies have shown than CAC outperforms risk scores or other risk markers for predicting future cardiac events. When added to traditional risk factors, it significantly improves risk prediction from a c-statistic of 0.75 to 0.8 (0.5 is a roll of the dice). Also, CAC scores form a stepwise gradient of risk from low to high CAC.

3. **Zero CAC:** Knowing that you have a zero calcium score is very useful as it predicts an extremely low event rate. A study of 4,800 participants, of which half were eligible for statins based on a 10 year ASCVD risk of greater than 7.5%, showed that the incidence of observed ASCVD was 4.2 per 1000 per-years. Another cohort study showed that the risk of vascular events over 15 years in non-smokers with a calcium score of 0 was 0.1%.

4. **Motivates lifestyle changes:** There is no doubt that an abnormal calcium score will motivate people to make healthy lifestyle changes. A meta-analysis of 11,000 patients found a 2-3x increase in the initiation of statins, lipid lowering drugs, blood pressure lowering drugs and lifestyle changes in those with an abnormal calcium score vs those with a 0 score.

5. **Improves shared decision:** More accurate risk prediction helps shared decision between patients and care providers. One can potentially discuss more accurately the relative risk reduction, absolute risk reduction and numbers needed to treat. CAC proponents state that we can use this test to determine who benefits more (or less) from treatment.

CONS:

1. **Lack of RCT evidence:** This is the strongest argument against CAC screening. The only single-centre trial of about 1,000 patients showed that those who had a calcium score above the 80th percentile, randomised to atorvastatin 20mg, followed up for a mean duration of 4.3 years showed a reduced rate of cardiac events (6.9% vs 9.9%) but this was not statistically significant. The largest RCT (EISNER trial) of 2137 patients showed that CAC screening results in a 2mmHg drop in SBP and 6mg/dl drop in LDL. A hardly meaningful effect. There was no change in body weight, waist circumference or smoking cessation.

Low cardiac events in intermediate-risk people also remain a major barrier to studying the effects of CAC screening. A very large trial would be costly especially given that we already have strong evidence in the treatment of intermediate risk patients from trials such as HOPE-3 and JUPITER.

2. **Incidental findings:** In a study of 1,000 patients undergoing cardiac CT, the incidence of non-cardiac findings was 41%. Most were not clinically significant but 1 in 4 was deemed notable enough to necessitate further testing. In an era where the threshold to investigate any aberration, however benign, is low, the burden of increased anxiety, potential harm and higher costs of incidental findings cannot be ignored.

3. **Downstream testing:** The finding of arterial disease in the heart instils fear … and fear means more testing. Whether these tests change long-term outcome is yet to be determined.

In summary, the notion of making a personalised diagnosis and treatment is attractive; however, to conclude that a scan will lead to a better outcome requires a lot more evidence.

Dr Edmund Lee
May 2018