



CALCIUM ASSESSMENT and HEART CARE

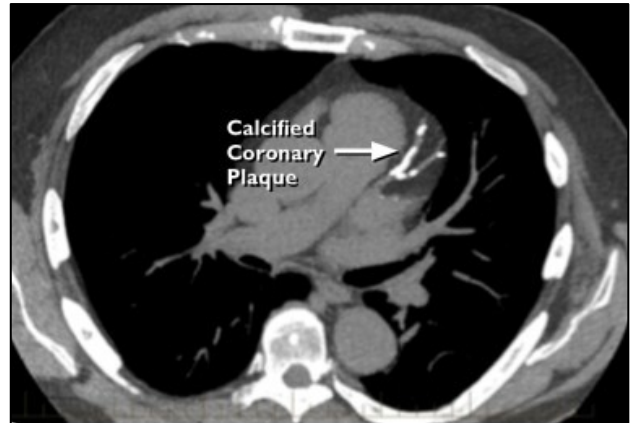
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The information below was originally published in 2018 in the Millhouse Integrative Newsletter, a monthly publication, primarily designed for clinic patients, highlighting useful strategies which may help prevent disease and improve health.

Calcium CT Score

When Computerised Tomography (CT) scanning was introduced in the 1970's, it radically improved the diagnosis of disease. When I first commenced general practice, I well remember a middle-aged lady who had been treated for years, with severe headaches and depression, who was found on CT scanning to have a large brain meningioma. When the tumour was removed, her symptoms vanished.

CT is performed by placing a patient on a moveable table which enters the machine where a rotating X-ray generator scans the body. The detected images are processed through a computer to produce 3mm cross sectional pictures (tomograms) of the area being studied. From the earliest days of scanning, calcium deposits were pictured in the heart arteries. Their significance remained unclear, until CT technology improved over the next decade, allowing evaluation of the coronary artery calcium.



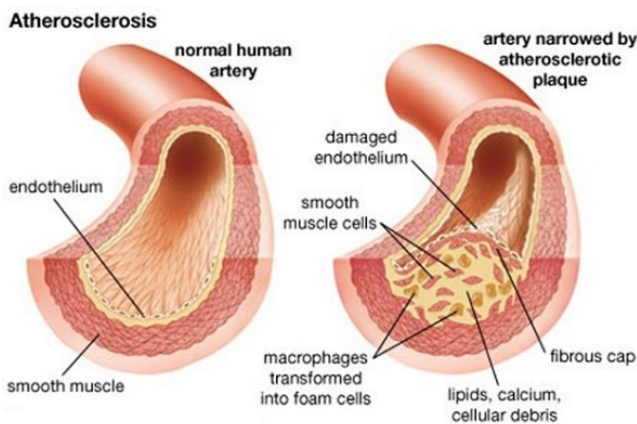
In 1990 Dr Arthur Agatston, a pioneer in non-invasive heart imaging, with his colleague Dr Warren Janowitz developed a method for quantifying the artery calcium which they designated as the Agatston Score or [Calcium CT Score](#). (Agatston is probably best known as the author of [The South Beach Diet](#) which advocates positive lifestyle changes to reduce obesity and maintain a healthy heart.) A score of zero means no calcium deposits have been detected in the heart arteries; greater than 400 indicates significant arterial disease.

Increasing prevalence of Artery Disease

Prior to 1900, heart disease was an uncommon event in Western countries, but with the increased consumption of sugar and processed food (which also leads to diabetes & obesity), smoking and greater sedentary living, heart disease dramatically rose, reaching a peak in the 1980's. We also know that a strong family history of artery disease, having a high cholesterol and raised blood pressure, acquiring a chronic inflammatory condition like rheumatoid arthritis or inflammatory bowel disease, and suffering from depression and hostility all increase heart risk. Ageing too plays its part, tripling the rate of heart disease for every decade of life we live.

What happens in the artery?

Coronary disease begins in childhood and by the late teenage years there is evidence of streaky fat deposits on the inner artery wall lining.



When the smooth artery lining is damaged, low-grade inflammation occurs, attracting white blood cells. These cells engulf the waxy low-density lipoprotein (LDL) cholesterol molecules floating in the blood, and other debris, and become embedded, like a plasticised Band-Aid (arterial plaque) at the site of injury on the blood vessel wall. If nothing is done to reverse the arterial plaque process, it slowly increases, obstructing blood flow, creating greater flow turbulence and leading to more arterial damage. In time, the saturated white cells, now called foam cells, die, releasing calcium which crystallises in the older plaque adjacent to the arterial wall. CT images the calcium deposition and the extent of coronary artery disease.

A number of studies since 2000 have demonstrated that the CT Calcium Score (CCS) is the best predictive test for heart disease.



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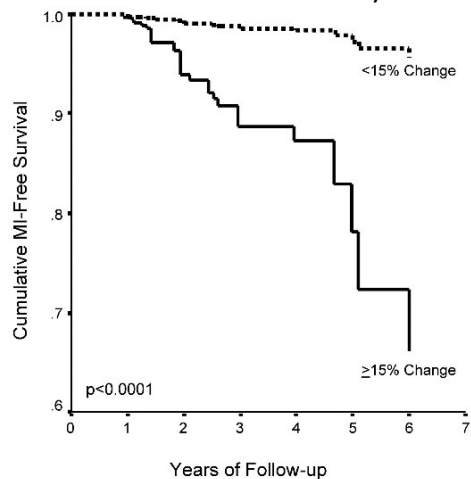
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The Best Predictive Test for Heart Disease.

Currently general practitioners perform a Cardio Vascular Disease (CVD) risk assessment on all adults, using the individual's health information to determine the probability of them having a heart attack or stroke within the next five years:

- family risk of heart disease,
- past vascular events,
- current weight and blood pressure,
- blood sugar and cholesterol levels



The CVD risk assessment tool is however a poor predictor for a heart event compared with the CT calcium score which indicates specifically the changes that have occurred in the coronary arteries by the time of scanning.

In 2004 Professor Paoli Raggi and his colleagues published [their findings](#) on 495 asymptomatic patients followed for up to seven years. All had been assessed for the CVD risk factors above and undertook 3 yearly CT calcium scans. The graph summarises their research. Patients who had less than 15% annual build up in arterial calcium (top dotted line) had good outcomes compared with those who had greater than 15% annual increase in calcium (bottom sloping zigzag line) who

suffered heart attacks. They also found that there was no difference in LDL cholesterol levels between the high and low risk groups but the diabetic patients had a greater calcium artery deposition than the non-diabetic patients. Doctors, including heart specialists, have been slow to adopt this technology, even though studies since 2000 have demonstrated that the CT Calcium Score (CCS) is the best predictive test for heart disease. A score = 0 demonstrates that there is no evidence of artery calcification and that it is highly unlikely a person will have a heart event in the next five years. Between 1-10 indicates minimal change, 11-100 mild change, 101-400 moderate change and over 400 extensive evidence of artery disease. The soft fatty plaque is laid down before calcification, well before age 50, so having no calcification does not eliminate the possibility of having artery disease.

My limited experience with symptomless patients shows that ALL who had CCS greater than 1300 have required artery stent insertion and in one case a heart bypass operation, to improve their coronary artery blood flow.

CT Scanning procedure

CCS is a simple non-invasive procedure taking only a few minutes, as I described earlier. There may be a longer wait before scanning if the heart rate is too high, in which case a medication is given to slow the heart, allowing a better scanning image to be achieved. CCS produces between 1-2 *milli-Sieverts* of ionising radiation, which is equivalent to having 50 chest X-rays and is about half the background radiation we receive each year from the environment. It may be useful to repeat the CSC in 3-4 years to evaluate whether lifestyle changes and medication have been effective. CCS costs \$330 at Ascot Radiology and is not reimbursed by medical insurance.

Reference - Raggi, Paolo et al. "Progression of coronary artery calcium and risk of first myocardial infarction in patients receiving cholesterol-lowering therapy." *Arteriosclerosis, Thrombosis, and Vascular Biology* 24.7 (2004): 1272-1277.

A TRUE STORY

Earlier this year I asked a lady in her sixties to consider having a Calcium CT Score (CCS). I had known Sue* for many years; she always had a high cholesterol (total cholesterol 8.6, LDL 5.9 ratio 5), suffered ongoing fatigue, allergies, drug sensitivities and reacted to statin cholesterol lowering medication. She had no family history of heart disease.

Sue was happy to undergo CCS investigation but she asked if her husband could undertake the test too. John* had no known heart trouble but my records indicated, when I had seen him some years earlier, that both his father and brother had heart bypass operations and another brother had diabetes. As a precaution, he had taken statin medication for a number of years to lower his cholesterol, which I understood was now at an acceptable level.

They both visited Ascot Radiology where they had the CT artery calcium scan.

Sue's score was 'zero' but John's '1396'.

I informed Sue, even though she had a known high cholesterol, it was highly unlikely she had significant artery disease.

I told John, as I am not his GP now, that he should see his own doctor and ask for a referral to a cardiologist for further heart assessment. This he did but was informed that as he had no symptoms, a referral was not necessary.

However I remained concerned and arranged for him to see a heart specialist who found on angiogram investigation that John had extensive heart disease. Two dilating stents were inserted into the coronary artery blockages.

* Names have been changed