

# CAYMAN PULSE

A publication of The Heart Health Centre for health care professionals

## Coronary Artery Calcium Scanning

By Dr. Iain McGhie

### Introduction

The presence of calcification in the coronary arteries indicates the presence of coronary atherosclerosis. Detection of coronary artery calcification using multi-detector CT scanning is becoming increasingly used for early identification of coronary artery disease (CAD). This article will discuss the background, methodology, and clinical application of this technology.

### Background

It has long been known that presence of calcification in the arterial system, which is sub-intimal, is indicative of atherosclerosis. There is a strong correlation between the amount of calcification and the extent of atherosclerosis. In the last 2 decades there have been several primary prevention studies, primarily using statins, showing improved outcomes with reduction in cardiac events and all-cause mortality. Therefore, early detection of sub-clinical CAD allows for initiation of therapies targeted at attenuating the disease process at an earlier stage. The limitations of other non-invasive imaging modalities, i.e. exercise ECG, stress echocardiography and myocardial perfusion imaging, is an inability to detect non-obstructive coronary disease. Recent studies have shown that as many as 50-60% of patients with normal stress perfusion imaging have significant coronary calcification. Therefore, techniques which use stress testing to detect CAD in at-risk, asymptomatic individuals are very limited; whereas coronary artery calcium scanning (CACS) is an excellent tool for detecting disease in this patient population.

### Methodology

A set of 30-40 images are acquired during a single breath-hold using a multi-slice CT scanner with 16 detector rows or greater. The data are acquired to the ECG to arrest cardiac motion in end-diastole. No IV is required as no contrast is administered. Images are then analyzed for lesions in the coronary arteries with a density greater than 130 Hounsfield units and a coronary artery calcium score is computed. The whole procedure takes just a few minutes. The exposure to ionizing radiation is typically very low, <1 mSv (annual background exposure is around 3 mSv).

### Patient Selection

CACS is used for the evaluation of asymptomatic patients with an intermediate risk for CAD, typically 2 or more risk factors. In the US, current American Heart Association and American College guidelines state that CACS is appropriate for evaluation of asymptomatic patients with a Framingham coronary risk score of between 6% - 20% risk of a cardiac event in the next 10 years.

### Interpretation of Results

Patients with a CACS of zero, i.e. no coronary calcification, have a very low likelihood of coronary atherosclerosis and coronary angiograms in these patients are typically normal. They are at a very low risk of a cardiac event over the next 5 years. The risk of a cardiac event increases as the amount of coronary artery calcification increases. Compared to patients with no coronary calcification, patients with a CACS between 1-100, 101-300 and >300 the risk of a cardiac event is increased by X4, X 8 and X 10, respectively. Patients with a CACS score of >400 are at the same risk as a patient with clinically manifest CAD. Patients with any coronary artery calcification require intensive management of their risk factors, including aggressive reduction of their LDL to  $\leq 70$ mg/dl. In addition, patients with a CACS score between 100 and 400 with a high clinical risk and all patients with a CACS  $\geq 400$  require further risk stratification with stress myocardial perfusion imaging.

### Conclusions

CACS is an excellent technique for risk stratification in asymptomatic individuals with risk factors for CAD. The absence of coronary calcification makes the presence of CAD very unlikely and places the patient at a very low risk category of a cardiac event for the next 3-5 years. In comparison, patient's risk of cardiac events rises with increasing amounts of coronary artery calcification.



A patient with extensive calcification of the left main, left anterior descending and left circumflex coronary arteries.

## Our Physicians

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## Our Services

Consultation Services  
Diagnostic Testing and Imaging  
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## This Month

January 3<sup>rd</sup>-5<sup>th</sup> Dr. Kosiborod  
(Stress Echocardiography available)

January 16<sup>th</sup>-17<sup>th</sup> Dr. McGhie  
(Nuclear Stress testing available)

January 26<sup>th</sup>-28<sup>th</sup> Dr. Rivas-Gotz  
(Stress Echocardiography available)

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