

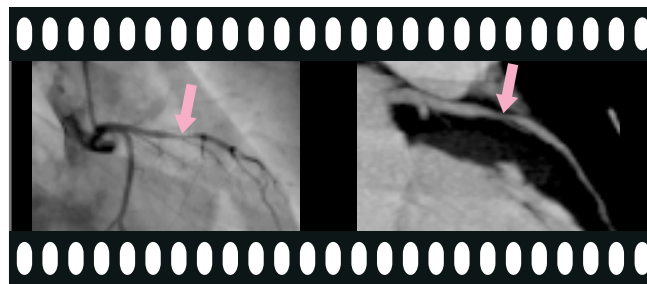
64-slice computed tomography (CT) coronary angiography service at

Associate Professor Lim Yean Teng, Dr Mark Chan
& Dr Eric Hong, THI @ NUH

It is with great pride that we announced the introduction of the Non-invasive Coronary Angiography service on the 1st of April this year. This is a collaborative project between Department of Diagnostic Imaging and the Cardiac Department with Associate Professor Lim Yean Teng manning the helm as director of the service. It took a while for CT angiography to be rolled-out in NUH as we wanted to ensure comprehensive staff training and proper equipment setup so that we would have a fully functional service from the word go.

NEW TECHNOLOGY

CT imaging of the heart started coming into mainstream imaging in the 1990s where the focus was primarily on coronary calcium scoring. At that point in time, the technology was not mature enough to acquire accurate images of the coronary arteries due to the limited imaging capabilities of the earlier 4 and 16-slice CT scanners. This limitation has been largely overcome with the advent of the newest 64-slice imaging machines that allow clear images of the coronary tree to be obtained despite the rapid motion of the heart during each cardiac cycle. Proponents of



this technology tout it as being a replacement for conventional coronary angiography, which until now, has been the only method available for obtaining precise delineation of coronary artery anatomy. This fact that CT angiography is non-invasive makes it a very attractive alternative to conventional angiography, which is in essence an invasive procedure with small but significant risks involved.

CT ANGIOGRAPHY GUIDELINES

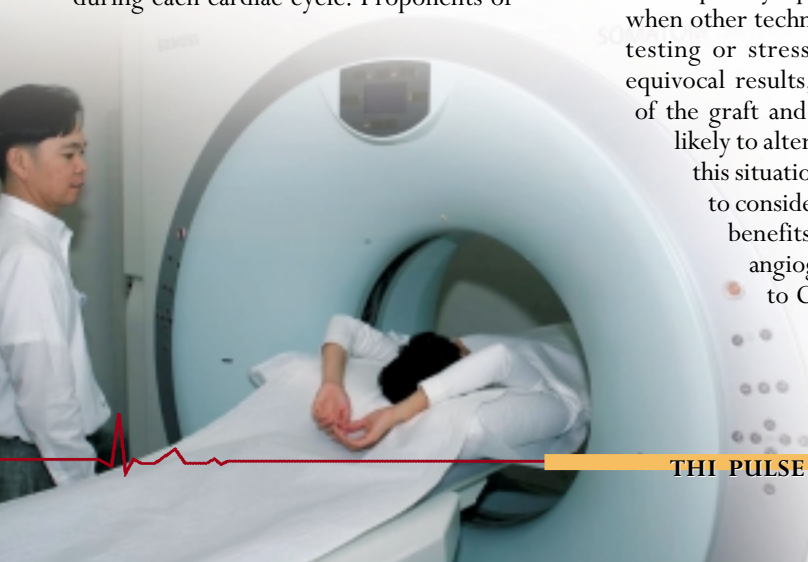
The recently launched CT angiography guidelines by the Ministry of Health recommended the following for consideration for CT angiography:

1. Assessment of graft and stent patency in patients with previous coronary artery bypass grafting or stenting and have subsequently developed symptoms especially when other techniques (e.g. stress testing or stress imaging) yield equivocal results, and knowledge of the graft and stent patency is likely to alter management. In this situation, it is important to consider the risks versus benefits of conventional angiography compared to CT angiography.

2. Diagnosis of coronary artery disease when other modalities (e.g. stress testing or stress imaging) provide equivocal results.
3. Diagnosis of coronary artery disease when other modalities (e.g. stress testing or stress imaging) yield negative results but the patient has persistent symptoms or other clinical findings that result in a continued suspicion of coronary artery disease. Before ordering the test, the physician should consider whether the results are likely to alter clinical management.
4. Patients with unusual symptoms for coronary artery disease (e.g. chest pain unrelated to physical exertion), but low to intermediate risk profiles for coronary artery disease.
5. Patients with a low risk profiles for coronary artery disease but have positive stress-test results.
6. Patient in whom there is a suspicion of congenital anomalies of the coronary arteries.

LIMITATION OF CT ANGIOGRAPHY

However, as with all new technologies, CT angiography is not for everyone. CT angiography is of limited value, of no use,



new state-of-the-art biplane flat panel imaging system

Dr Adrian Low, THI @ NUH

in the following clinical scenarios where technical factors may render the images non-interpretable:

- Patients with very high heart rates where the use of beta blockers is contraindicated. The heart rate can be lowered with other medications e.g. calcium channel blockers administered by a clinician with the use of adequate monitoring.
- Patients with severe coronary artery calcification where blooming artifacts interfere with accurate lumen assessment.
- Patients with arrhythmias, in particular ventricular ectopic beats, resulting in image discontinuity.
- Patients who are unable to hold their breath for the time needed to acquire the images.
- Situations where the patient cannot fit through the gantry or lie comfortably on the examination couch.

As such we would advice consultation with a cardiologist with relevant background training in CT angiography before subjecting yourself to such a test.

Overall, we are very pleased to be able to offer this exciting new service to our patients. Used appropriately, this is a imaging modality with great potential for both clinical and research applications.

For those interested in our CT angio services, please feel free to contact Ms Yeo Hong Lan at 9299 1997. If you would like to make an appointment with one of our cardiologists, please contact our appointment line at 6772 2222.



Our cardiac catheterisation laboratory recently acquired a new state-of-the-art biplane flat panel imaging system for use in diagnostic and interventional cardiovascular procedures.

Using two 25 cm diagonal digital flat panel detectors made of amorphous silicon that converts X-ray information into digital images, the system delivers excellent contrast resolution and allows clinicians to visualise the finest vascular structures in detail even in dense areas such as the diaphragm or spine. The images are also virtually free of artifacts or distortions seen in conventional X-ray technology.

The advantage of a biplane system is that twice the number of images can be obtained using the same quantity of contrast and without increase in procedure time. This is particularly important in patients with kidney dysfunction or heart failure where an increase in contrast volume might worsen the clinical situation.

Our new imaging system also incorporates features that minimise radiation exposure to both the patient and operator. These include a specially developed copper prefiltration system that automatically adjusts the filter to patient anatomy during the examination. Hence, optimal contrast is obtained with minimal skin dose. Additionally, the ability to adjust the collimators and filters without active fluoroscopy further minimises the radiation exposure.

With the availability of an additional monitor for auxillary input, this enables the hookup of additional systems providing incremental information to guide therapy. This additional information include intravascular ultrasound, as well as images from our 64-slice CT-angiogram scanner. This integration of patient information will facilitate patient care.