Cardiovascular Imaging at OHSU

The Cardiovascular Division, Department of Medicine and the Department of Radiology have developed a combined program in Cardiovascular Imaging for CT, MRI, and Nuclear Cardiology. The four physicians in this group (see below) have joint appointments in both the Departments of Medicine and Radiology.

We have described cardiovascular MRI in a previous issue of The Pulse (issue 1, volume 2, 2007) and will describe nuclear cardiology in a subsequent issue. In pages 2 and 3 of this issue we describe cardiovascular CT at OHSU.

Sanjiv Kaul, MD: Is the Distinguished Professor of Cardiology, and Professor of Medicine & Radiology. He completed his residency in Internal Medicine at the University of Vermont and his fellowship in Cardiovascular Medicine at UCLA followed by a 2-year cardiovascular imaging fellowship at the Massachusetts General Hospital before starting a faculty appointment at the University of Virginia. He moved to OHSU two years ago as the Head of the Cardiovascular Division. His imaging interests include echocardiography and nuclear cardiology, particularly in coronary artery disease.

Dianna Bardo, MD: Is Associate Professor of Radiology and Medicine. She completed a four-year residency in Diagnostic Radiology at The Cleveland Clinic, a one-year fellowship in Pediatric Radiology at Northwestern University and a one-year fellowship in Neuroradiology at the University of Chicago. She was an Assistant Professor of Radiology and Medicine (Section of Cardiology) at the University of Chicago before coming to OHSU.

Craig Broberg, MD: Is Assistant Professor of Medicine and Radiology. He completed his residency at the University of Washington and his Cardiovascular Medicine fellowship at OHSU. He then trained in advanced cardiovascular imaging and adult congenital heart disease at the Brompton Hospital in London, UK, for two years, before returning to OHSU as faculty two years ago. His imaging interests include cardiovascular MRI, CT, and echocardiography, particularly as they relate to adult congenital heart disease.

Michael Shapiro, MD: Is Assistant Professor of Medicine and Radiology. He did his residency and cardiovascular medicine fellowship at the Beth Israel Hospital in New York. He then trained in advanced cardiovascular imaging at the Massachusetts General Hospital for two years before joining the faculty at OHSU in the fall of 2007. His imaging interests are cardiovascular CT and MRI, particularly as they relate to coronary artery disease.
Currently OHSU has a 64-slice cardiovascular CT system on the Markham Hill campus. This month it is installing a similar system in the outpatient cardiology clinic at the Center for Health and Healing (South Waterfront Campus). This system will be replaced within a year by a 256-slice system, which will be the only such system in a cardiology clinic in the country.

From July 1, 2008, Drs. Bardo, Shapiro, and Broberg will provide round-the-clock coverage for interpretation of cardiovascular CT studies, be it in the emergency department for a patient presenting with chest pain, or in the outpatient clinic for the detection of coronary artery disease.

Currently, the main focus of cardiac CT is visualization of the coronary arteries. Numerous studies have compared the accuracy of coronary artery stenosis detection by CT to coronary angiography (Figure 1). The negative predictive value was found to be high, ranging from 92% to 100%, indicating CT’s ability to reliably rule out the presence of coronary artery stenoses (Figure 2). Currently the best indications for CT are: low pretest probability of disease, equivocal stress test to rule out important coronary disease in new onset heart failure, and to assess bypass graft patency (Figure 3). Additionally, CT is extremely reliable for known or suspected congenital coronary artery anomalies.

**Figure 1:** A) CT angiography in a patient with right coronary stenosis (arrow), that closely matches a stenosis seen on coronary angiography (arrow) in B).
An added benefit of cardiac CT is that one can derive the calcium score. Coronary calcium is a surrogate marker for coronary atherosclerosis. With the exception of patients with renal failure, calcifications occur exclusively in the context of atherosclerotic lesions (Figure 4). In patients over 50 years of age the absence of coronary calcium thus rules out the presence of significant coronary artery stenoses with high predictive value. Furthermore, the calcium score is a very powerful predictor of future cardiac events independent of the Framingham risk score. Another future potential of cardiac CT is to evaluate the non-calcified plaque (Figure 5), but the clinical and prognostic value of this has yet to be defined. CT also has major potential for assessment of myocardial perfusion, thus making it a one-stop-shop for CAD assessment. Further refinements, including lowering the degree of radiation exposure as well as quantitative algorithms for stenosis assessment will make CT a very powerful imaging tool of the future.
Recent Publications


500th Heart Transplanted at OHSU!

The OHSU End-Stage Heart Failure and Cardiac Transplantation Program has reached an important milestone by completing its 500th heart transplantation. Since its commencement in 1985, this program has provided outstanding service to end-stage heart failure patients in the Pacific Northwest and has become the premier center of such service in the area.