

# 2006 Image of the Year: Focus on Cardiac SPECT/CT

**A** SPECT/CT image showing both the coronary arteries and blood flow to the heart was selected by Henry N. Wagner, Jr., MD, as the 2006 Image of the Year at the SNM 53rd Annual Meeting in San Diego, CA. Wagner, SNM past president and historian, announced his choice for Image of the Year at a press conference on June 5.

This year's image, chosen from thousands of oral and poster presentations, illustrates what Wagner called the "complementary nature" of 2 imaging modalities. The image was a part of the scientific presentation "Comparison of 64-Slice Spiral CT Angiography and Myocardial Perfusion Imaging in Noninvasive Evaluation of Functionally Relevant Coronary Stenoses," by researchers from University Hospital Zurich (Switzerland). "Our study shows that purely anatomical imaging of the heart is often insufficient to identify coronary lesions, underlining the need for a combined assessment that may be made possible—and effortless—with future hybrid SPECT/CT or PET/CT scanners," said Philipp Kaufmann, MD, lead researcher of the study and professor of nuclear cardiology at the University Hospital Zurich. "Our fused images accurately pinpoint blood flow defect to its corresponding artery—and are eye-catching and easy to understand." Wagner called the image "a beautiful fusion image of a 64-slice CT with SPECT."

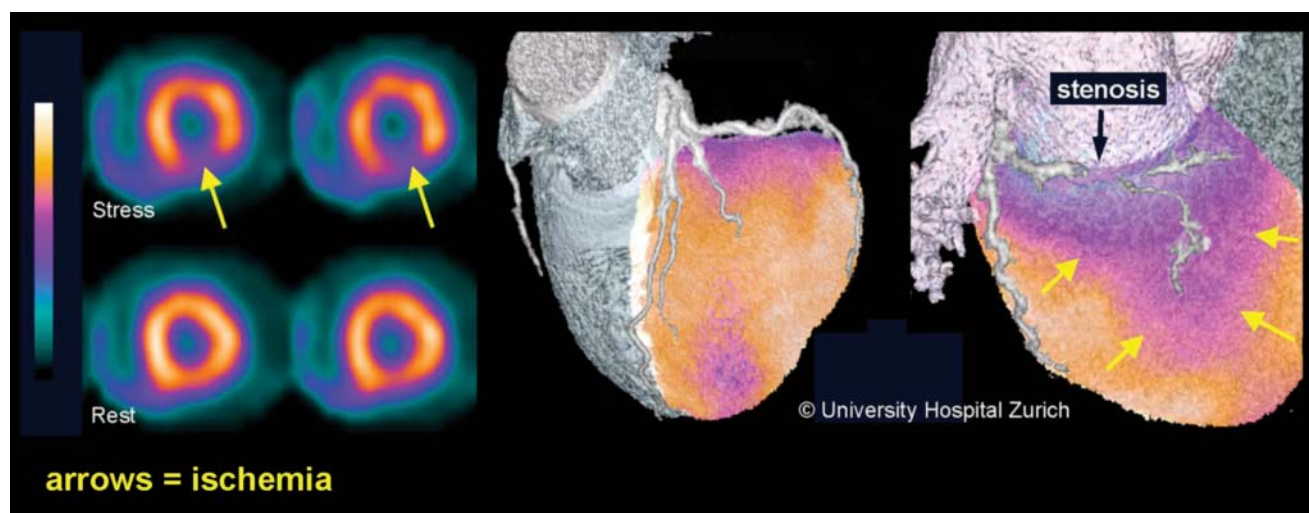
The researchers analyzed 399 coronary arteries and 1,386 coronary segments (including 12 bypass grafts) in 100 patients with coronary artery disease. "The technique behind the new generation of CT scanners is pretty

exciting," said Kaufmann, "as it offers high resolution close to that found in conventional angiographies—without the risks inherent in such invasive procedures." Additional studies must be done to confirm the researchers' work with high- and low-risk patients, he added.

The image is divided into 3 panels. The first panel shows conventional cardiac SPECT with  $^{99m}\text{Tc}$ -tetrofosmin as a radiotracer. The upper row shows 2 short-axis slices after pharmacologic stress, and the lower row shows the same slices at rest. Arrows indicate a small perfusion defect on the back of the heart—visible only on the stress images—showing ischemia in the heart wall.

The middle and right panels represent SPECT/CT fusion of the heart and its coronary arteries obtained by 64-slice CT angiography (VCT Lightspeed, GE Healthcare scanner), with functional information about corresponding perfusion from cardiac SPECT (orange and yellow) superimposed. The 2 datasets were acquired on different scanners, then digitally fused in a second step using the CardIQ Fusion software package (GE Healthcare).

The middle panel shows a front view of the heart and its coronary arteries. On the right the heart can be seen from the posterior view, revealing the perfusion defect from the SPECT images (blue color, arrows) and stenosis in the corresponding artery. Posterior defects may be caused by the narrowing of arteries other than the one responsible in this case. "Therefore, the information obtained from either SPECT or CT alone can be insufficient to identify the vessel that is responsible for causing ischemia (culprit lesion)," said Oliver Gaemperli, MD, first author of the study. "CT



The 2006 Image of the Year shows the "complementary nature" of SPECT and CT in demonstrating coronary anatomy and blood flow to the heart. The image is provided by Oliver Gaemperli and Philipp Kaufmann, University Hospital Zurich, Switzerland.

angiography using a 64-slice CT scanner is an excellent tool to rule out relevant coronary artery disease and may be used as an alternative to myocardial perfusion (blood flow) imaging with SPECT,” noted Gaemperli. “However, not every plaque or lesion in the coronary arteries causes significant reduction of blood flow to the heart muscle. The results of our study underline the importance of a combined assessment with CT angiography and SPECT to identify those lesions that may need urgent revascularization and those that may be treated conservatively.”

Wagner noted that this year’s choice for Image of the Year is unusual. For the past few years, the spotlight has been on PET/CT and advances in oncologic diagnosis and therapy. The 2006 Image of the Year points to the “significant advances being made in nuclear medicine in

optimizing combined functional and anatomic diagnostic information in cardiac applications,” said Wagner.

As this issue of Newsline went to press, Wagner notified Newsline that shortly before his Highlights Lecture, he became aware of work being performed on coronary SPECT/CT by the group working with Ora Israel, MD, at Rambam Hospital in Haifa, Israel. During his Highlights Lecture, Wagner named a scan from this group as “Co-Image of the Year.” He said, “This is further proof of the dynamic nature and vitality of our annual meetings. Groups around the world are working on these and other cutting-edge issues, and there is always something new and fascinating to find in the many oral and poster presentations offered.” The Co-Image of the Year will appear in the complete Highlights Lecture in the August issue of Newsline. ✧