

Through the Eyes of the Radiologist

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Professor Dr. Anders Persson, Director, of the Center for Medical Image Science Visualization (CMIV)

Through the Eyes of the Radiologist

When vascular surgeons at the University Hospital in Linköping, Sweden, wanted to see 3D images of CT acquisitions the same as radiologists, they had to sit at a workstation. Now however, the *syngo* WebSpace server technology sends the 3D/4D images where they need them – to their offices, to conference rooms, or even to a laptop while traveling.

By Katja Stöcker, Siemens Medical Solutions, Erlangen, Germany

Professor Anders Persson, MD, the Director of the Center of Medical Image Science Visualization (CMIV), is justifiably proud of his inter-disciplinary research center. Accompanying him on a tour through the

CMIV at the University Hospital in Linköping, he speaks enthusiastically of the numerous research activities of his 70 researchers and 31 doctoral candidates. All are focused on the big picture. Persson

and his team are researching imaging and reconstruction, image analysis, visualization and processing, as well as the transfer of comprehensive image data such as generated with the high-end

SOMATOM® Definition Dual Source CT system. The CMIV master plan hangs on the wall: a Nobel Prize within the next 25 years.

3D/4D Images Anytime and Everywhere

Professor Persson sees good cooperation with clinicians in the adjacent rooms of the University Hospital Linköping as an important key to the success of the CMIV's research projects. "We listen carefully to where clinical applications can be improved. In return, we receive feedback from the clinicians on our efforts," explains Persson. Previously, he discussed radiological reports, for example, with vascular surgeons at morning case meetings using 2D images from PACS. "In order to plan operations better, surgeons want to see what we see, and not simply imagine it," explains Persson. This is now possible – anytime and from anywhere. "Using *syngo*® WebSpace, we can call up 3D CT images from a standard computer or laptop – this provides us with a completely different way of working," says Persson enthusiastically.

The easy, password-protected Internet connection to a *syngo* WebSpace server enab-

les up to 20 users to work simultaneously with 3D/4D post-processing tools – without having to sit at a workstation. The images are sent directly from the CT system to the *syngo* WebSpace server. "This happens much faster than from a CT system to PACS," reports Persson. "Speed is playing an increasingly important role in modern medical care."

Enormous Storage Capacity for Thin-Slice Acquisitions

syngo WebSpace is also the optimum solution for short-term storage of thin-slice (less than 5 millimeters) CT data. The server's storage capacity is enormous, from 800 Gigabytes to 4.9 Terabytes, depending on the configuration. As a result, from 1.6 million to almost 10 million thin-slice acquisitions can be stored. The need for 3D/4D image data from volume CT images has grown enormously, but purchasing new or upgrading existing workstations is expensive. CMIV employees currently work at four workstations. "Naturally, they are always fully booked," says Persson. "*syngo* WebSpace makes detailed CT information available everywhere, is password protected and significantly improves workflow. This saves money and improves the

quality of treatment. Thoracic radiologist and senior physician Gunnar Wiklund, MD, noted an additional benefit:

"If a patient sees how advanced calcification is in his coronary vessels, he will take our advice to quit smoking and get into exercise more seriously than if we were to simply show him 2D images from PACS."

Detecting the Exact Position, Extent, and Length of Stenoses

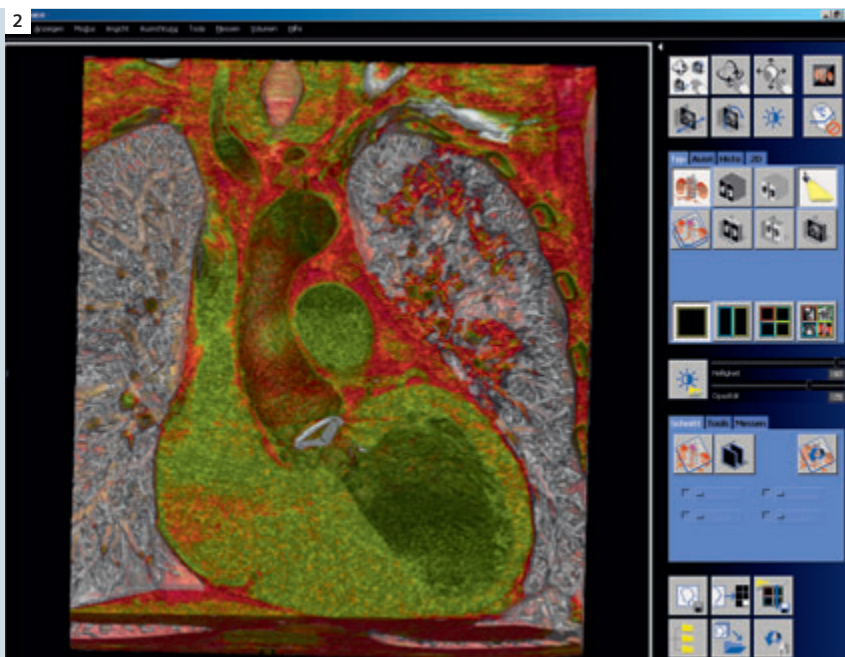
Since the *syngo* WebSpace client-server technology works with the proven *syngo* InSpace4D post-processing software, no additional training is necessary for users of the workstation based InSpace 4D. All post-processing functions can be used from a PACS workstation, as well as a PC or laptop. *syngo* WebSpace even enables for example, more precise preparation for vascular intervention. "In this 76-year-old man, we see a somewhat unusual position for the LIMA [left internal mammary artery], which runs under the thorax. In addition, the 4D view shows us how the vessel moves," says Persson, explaining the images on the screen in the CMIV training room (Fig. 2). Using this detailed information, surgeons are able to more precisely plan the opening in the thorax to reach the

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Professor Anders Persson, MD

Prof. Anders Persson, MD and Gunnar Wiklund, MD discussing a patient's diagnosis. Data can be sent directly from the CT system to the *syngo* WebSpace server which makes detailed CT information available everywhere.





1 With *syngo* WebSpace even criminal cases can be solved more easily: concerned police stations have simplified access to virtual autopsies.

2 A 76-year-old man with LIMA (left internal mammary artery), running under the thorax.

coronary vessels. Vascular surgeon Claes Forssell, MD, agrees and adds: "We need, for example, very precise details regarding the position, length, and extent of stenoses. The ability to look at 3D/4D images, even in my office or during surgery, simplifies my work and improves treatment for my patients." Enhanced vascular analytical functions such as automatic stenosis measurement and lumen to vessel evaluation are additional, critical pieces of information that Forssell and his colleagues can call up anywhere, even outside the hospital.

Another focus of the CMIV is cardiac examinations. The Dual Source SOMATOM Definition CT system provides Persson and his colleagues with high-resolution real-time images of the beating heart, using a low dose of contrast agent without beta blockers. For Professor Persson, *syngo* WebSpace also plays a critical role in training: "Here in the CMIV training room, I show my students the 3D/4D images from the computer directly on the screen." Persson also trains colleagues from throughout Sweden on working with 3D post-processing tools such as *syngo* InSpace4D, and shows them how to design more efficient workflows with *syngo* WebSpace. The next course will

take place in early 2008 (see page 59).

Virtual Autopsies Clarify Criminal Cases

Because of its modern equipment, the CMIV also works on solving criminal cases. According to Persson, since the center's founding in 2003, it has performed almost 200 virtual autopsies. "In some of the cases, with our modern imaging capabilities we came up with a cause of death different than the obvious one," reports Persson proudly. High-resolution 3D imaging provides fast, precise information on injuries and fractures. Using *syngo* WebSpace, the information is sent just as quickly to the corresponding police stations and district attorneys' offices. Professor Persson is very satisfied with the capabilities that *syngo* WebSpace and *syngo* InSpace4D offer his radiology team and the clinicians at the university hospital, especially in vascular analysis and the planning for surgery, as well as in training. "I hope that we will also be able to view 3D/4D images from other applications at our morning meetings, such as blood flow and oncology." By keeping a focus on the big picture, Persson's research and that of the CMIV do not stop with imaging.

Overview: Center of Medical Image Science Visualization (CMIV), Linköping, Sweden

- Founded in 2003 at Linköping University Hospital, Sweden
- Research and training center with 70 researchers and 31 doctoral candidates
- Four areas of research: Imaging and reconstruction, image analysis and description, image visualization and processing, as well as transfer of comprehensive image data
- Selection of projects: Studies on cardiac and vascular blood flow, vascular morphology, segmentation and transfer of CT and MR data, including volume rendering for clinical application