

Insights into the Brain

In a joint venture, researchers at the Wolfson Brain Imaging Centre (WBIC) at the University of Cambridge, UK, and the Cognition and Brain Sciences Unit (CBU) at the Medical Research Council (MRC) detected signs of awareness in patients whose behaviors meet the criteria that defines the vegetative state. With a MAGNETOM® Trio 3 Tesla (3T) magnetic resonance imaging (MRI) system, Adrian M. Owen, PhD, and his colleagues used functional MRI (fMRI) to investigate a 23-year-old patient who suffered from severe traumatic brain injury and met all of the diagnostic criteria for a diagnosis of vegetative state. Clinically, she demonstrated no evidence of awareness or purposeful response to command when she was asked to move or speak. However, when asked to perform several mental imagery tasks during fMRI, the responses were indistinguishable from healthy volunteers performing the same tasks. Hence, despite negative behavioral markers, it was possible to detect awareness without requiring the patient to move or speak. Though false negative findings in functional neuroimaging are common even in healthy volunteers, these reproducible, task-dependent responses represent a method that could help some noncommunicative patients use their residual cognitive capabilities to

communicate their thoughts by modulating their neural activities. The WBIC is at the forefront of research for brain injury. It has been incorporated into the environment of a Neurosciences Critical Care Unit. Recently, the WBIC added another 3T MRI system, MAGNETOM Verio, to undertake magnetic resonance spectroscopy (MRS) in a range of metabolic disorders.



Its proximity to the Neurosciences Critical Care Unit of Addenbrooke's Hospital allows the Wolfson Brain Imaging Centre to conduct crucial research in neurotrauma.

Bringing the User into Focus



Clinical staff members can experience an improvement in their daily workflows when using Siemens' picture archiving and communication systems (PACS) and radiology information systems (RIS). The software's well-developed, role-based portals apply to the individual requirements of each user and therefore, supply him or her with exactly the functions needed in the respective situation. This concept employs the new 'User-Centered Design' model. In the process of creating these user-friendly portals, first the diagnostic

process is defined: Who is part of the workflow? What are the stakeholders' tasks? Step two, the "Overview Use Case," follows, concentrating on the typical user in order to supply the developers, designers, and testers with accurate impressions of the user. In the last step, the 'User Goal Use Case,' the interactions of the staff members with the system are portrayed and early prototypes of the system are sketched out by designers. During this three-step phase, product management, analysts, and designers work closely with selected end-users using different methods, such as onsite observation in the user's real working environment, interviews, and evaluation of early prototypes. All this leads to a software that promises easier, faster operations: only relevant information is monitored and clicks as well as mouse paths are reduced. Additionally, the software has a strong focus on enabling both the organization

and the users to meet their goals. The portals *syngo*® Portal Referring Physician¹, *syngo* Portal Radiologist, *syngo* Portal Transcriptionist¹, and *syngo* Portal Executive² can already be found on the market. With *syngo* Portal Referring Physician, the referring physician is, for instance, able to directly schedule an examination for his or her patient in a clinic or practice, which avoids time-consuming calls between the referrer, the patient, and the imaging provider. *syngo* Portal Radiologist supports the radiologist all the way from viewing images and creating reports to holding clinical conferences. *syngo* Portal Transcriptionist contains the functions necessary for transcription or correction of radiology reports. *syngo* Portal Executive² is a business intelligence tool that points out trends, problems, and opportunities within an organization.

¹ Not available for sale in the U.S.

² Available with *syngo* Workflow SLR only



Dr. Eva Scheurer and Professor Kathrin Yen analyze imaging results to draw up a forensic report.

High-tech Testimony

High-tech imaging procedures such as magnetic resonance imaging (MRI) and computer tomography (CT) can increase legal certainty in the juridical process – however, they are not routinely used in forensic medicine for many jurisdictions. The Ludwig Boltzmann Institute for Clinical Forensic Imaging in Graz, Austria, aims to overcome technical challenges in order to increase the acceptance of these methods in clinical forensic medicine. It is likely that Austria will become the first country to perform forensic radiological practices regularly in forensic medicine.

Clinical radiology focuses on diagnosis to assess therapeutic options for patients. Forensic medicine, in contrast, is concerned with the reconstruction of events after acts of violence and helps estimate the severity of injuries or the intensity of the contact. Especially when examining victims of violence who have fortunately survived an attack, modern diagnostic procedures may play a significant role and support the results of forensic examinations. Radiological exams noninvasively reveal injuries inside the body. For instance, although small blood specks in

the victim's eyes are often an indicator of strangulation, MRI could document injuries of the soft tissues of the neck that are otherwise not visible.

The advantages of integrating high-tech imaging into forensic medicine are undeniable and Professor Kathrin Yen, MD, Director of the Ludwig Boltzmann Institute, believes that the modern way of conserving evidence can also lead to shorter trials. The stress of interrogation would be reduced for the surviving victims while, regarding faked acts of violence, imaging would help improve legal certainty: "Such cases have been discovered with greater frequency lately. Specialized forensic medical knowledge is required for an objective analysis," says Yen.

People suffering from violent acts can turn to the clinical forensic ambulance of the Ludwig Boltzmann Institute, which is open 24 hours a day. "Due to the results of the examinations, legal measures and measures for the victim's protection can be taken," says Professor Josef Smolle, MD, President of the Medical University of Graz. With the examination report, physicians and victims also hold the evidence of abuse in their hands – docu-

mented forever while the visible evidence on their bodies will fade in time.

With the help of Siemens, the Institute wants to overcome technical challenges: "The results of the research must be made comprehensible to medical laypersons in court through visualization techniques, and it must be possible to represent them in a verifiable way," explains Yen. In order to read the diagnostic findings in the necessary forensic way, the radiologist will also have to attend special training courses. To enforce the standardization of the deployment of modern diagnostic procedures, the institute will publish the results of its research so they can be of use worldwide, explains Yen. The university professor also states that the new situation of radiology and forensics working so closely together is essential for forensic radiological methods.

Due to the development of medical imaging in recent years, Eva Scheurer, MD, Acting Director of the Institute, thinks it is logical that MRI and CT be used in forensic medicine. And this could happen very quickly when the standards for clinical forensic radiology are defined for Austria.



Trendsetting Mammography Design

MAMMOMAT® Inspiration¹, the digital mammography platform designed by Siemens and designaffairs, has received the iF Product Design Award 2009 and the red dot award: product design 2009. Both awards celebrate products that excel in a unique combination of functionalities, user friendliness, aesthetics, and meet all the criteria of an innovation.

With more than 11,000 submissions from 61 countries, the red dot design award is one of the largest and most renowned design awards worldwide. For the iF Product Design Award, MAMMOMAT Inspiration was one of the winning products selected from 2,808 applicants from 39 countries.

MAMMOMAT Inspiration is the first mammography system to incorporate the MoodLight™ function. MoodLight is an LED glass panel that can be illuminated with freely selectable colors. They can be adjusted to the patient's mood and preferences, thereby producing a comfortable, relaxing effect on the patient. *Read more about this feature in the article "Color Palette for the Radiology Suite" on page 30 of this issue.*

¹ Not available for sale in the U.S.

Retaining the Proven While Embracing the New

The latest version of the Siemens cardiology picture archiving and communication system (PACS), *syngo*® Dynamics, is designed to offer even greater efficiency, accuracy, and increased capabilities for clinical procedures in the fields of cardiovascular imaging, vascular ultrasound, general imaging, and OB/GYN.

syngo Dynamics is a comprehensive multimodality diagnostic image review and evidence-based reporting system incorporating decades of Siemens experience in both clinical and administrative workflows. The solution focuses on dynamic image clip review and reporting for ultrasound and cardiovascular imaging modalities. Version 7.0 of *syngo* Dynamics already offered immediate data transfer between Siemens AXIOM® Sensis XP hemodynamics monitoring systems and the *syngo* Dynamics reporting and image management solution, as well as the ability to incorporate data from the GE Mac Lab® v6.5 hemodynamic system to support a multivendor environment. The upcoming new version 8.0¹ will include features to enhance the cardiology department workflow and address market demands. For example, a tool designed for administrative reporting of key performance indicators, such as resource utilization and physician productivity, will allow for greater transparency and support proactive department management. In addition, a new scheduling option allows users to better manage resources in cath and echo labs. In this version, the remote viewing application² was redesigned to provide a look and feel similar to the workplace. The application offers a high level of performance – even in low-bandwidth settings – making it possible for physicians to conveniently access images from nearly any location.



One of the key functions of *syngo* Dynamics is to support accurate reporting in cardiovascular imaging.

¹ The information about this product is being provided for planning purposes. The product is not yet commercially available.

² Reference viewing only.

Dedicated Ultrasound Solution for OB/GYN

The new ACUSON X300™ Premium Edition (PE) – *Women's Imaging* ultrasound system features unique workflow tools as well as exceptional clinical performance across all modes, including 3D/4D imaging. Compact, highly portable, and easy to use, the system accommodates the needs of any clinical environment – from private practices to busy hospital settings. The system features *syngo*® AutoOB measurements, a unique workflow tool that automates routine biometry measurements of the fetus. This knowledge-based workflow application eliminates the time-consuming manual process of biometry measurements by saving up to 75 percent of the keystrokes. Not only does this help accelerate workflow, but this may also help reduce repetitive stress injury [RSI] among users.

Furthermore, the system offers Advanced fourSight™ volume imaging technology providing a complete 3D/4D solution, and *syngo* Velocity Vector Imaging™ (VVI) for fetal echocardiography, a sophisticated 2D tracking algorithm that provides insight into fetal myocardial mechanics. To complete the solution, the

syngo fourSight™ ViewTool technology provides easy offline analysis, remote review, manipulation, and storage of 3D/4D volumes, freeing the ultrasound system for additional patient exams.



MRI Shows the Limits of Endurance

A course that covers 4,500 kilometers (ca. 2,796 miles) in 64 days on foot, without a single day's rest: an impossible distance for the average jogger. The experienced runners participating in the Transeurope-Footrace 2009, who ran from Bari, Italy, to Nordkapp, Norway, could make it – at least some of them. But how do their musculoskeletal systems and hearts change under such extreme conditions, and what processes do their brains undergo? These are the questions that Uwe Schütz, MD, of the University Hospital Ulm in Germany, wants to answer. To do so, he started a unique research project in which he followed along on the entire course of the run with a trailer housing a MAGNETOM® Avanto magnetic resonance imaging (MRI) system. Each day, up to 11 participants were examined in this trailer.

"This run represented a unique study setting," says Schütz, who specializes in sports medicine and radiology. "Because we were able to do progressive checks

via MRI for the first time, and not just before and after examinations, we hope that we can better understand and trace the processes that take place in the body."

Schütz and his team examined a group of 44 test subjects from among the event's total of 67 participants. They were split at random into three examination groups. In the first group, injuries to the lower part of the musculoskeletal system were monitored. In the other two examination groups, volumetric measurements taken via MRI were used to measure both how the heart adapts to long-term strain and the activity that takes place in specific regions of the brain, which are responsible for motivation and perceptions of pain. "We believe that those runners who can endure through to the end of the ultramarathon have especially good abilities to exert their will and suppress pain. Using functional MRI testing, we might be able to discover exactly that." Schütz had the chance to prove

these abilities in the remaining 30 test subjects who crossed the finish line in Nordkapp on June 21. The collected data will be analyzed and published in 2010 in collaboration with the Department for Sports Medicine at the University Basel, Switzerland.



Project leader Dr. Uwe Schütz and radiologist Dr. Christian Billich prepare their "ultramarathon MRI."

(Photo courtesy of University Hospital Ulm)