EH@ECR2005

EUROPEAN HOSPITAL'S SPECIAL ISSUE FOR THE EUROPEAN CONGRESS OF RADIOLOGY

# HISTORY: FROM HANDS TO MOLECULES


Some early popular concepts about the ability of X-rays to 'see through things' were not always off the mark in terms of what the future would hold. The old French postcard shown here depicts a customs officer checking out a trunk by using an X-ray device. The next images show how X-ray techniques revealed Mexican immigrants hidden in a lorry and man in a car boot. The lorry appeared in *European Hospital* in April 2004, when Professor Herman Vogel, Senior Medical Officer at the Albers-Schönberg-Institute for Radiation-Diagnostics, debated the current use of X-rays at country border controls in terms of radiation risk.

The third image demonstrates the thrill of seeing the bones of a hand. Gradually, since the X-ray was discovered, more powerful scanners developed, along with the computer, which combined to allow us to hone in on and clarify views of body parts - and far deeper. If Roentgen were able to return to life, wouldn't he have been delighted by the advancement towards 'seeing' cells and thus targeting disease at a level certainly never imagined!

At the ECR, try not to miss the exhibitions of ephemera as well as 'Violence in X-rays', which documents torture and crime in today's world. Organisers: The German X-Ray-Museum in co-operation with Professor Vogel.

# 'Moleculary' medicine: now and the future

**In an interview with Daniela Zimmermann, Executive Director of European Hospital, Dr Mohammad Naraghi, Head of the Department of Business Development at Siemens Medical Solutions, discussed developments in molecular medicine, biochips, preventive diagnostics and a comprehensive and integrated health system for the future**

The term *moleculary medicine* is increasingly heard. In diagnostics, Dr Naraghi explained that this means the knowledge of moleculary causes for the development of diseases is used to prevent, or diagnose and treat those diseases at an early stage, which can be done with the help of laboratory diagnostics as well as imaging diagnostic procedures, adding: 'Molecular imaging plays a very strategic role.'

Data mining is another increasingly used term. 'In the field of moleculary diagnostics data mining initially means the analysis of large amounts of data with the help of information technology and to look, for example, for genetic or other, clinical patterns that can signal potential disease,' he explained. 'To do this we need a highly efficient IT infrastructure. Modern medical diagnosis procedures, such as CT, MRI or, in the future, moleculary methods, produce rapidly increasing amounts of data. The challenge is to analyse these intelligently and in an integrated manner so that we can extract clinically relevant, action-oriented information from them. However, this assumes that we can overcome today's clinical data silos and establish integrated, electronic patient files, ideally across current boundaries of care.

'To recognise and visualise diseased processes through molecular interaction, molecular imaging needs molecular contrast media and radiopharmaceuticals.'

Two distinctions are made for disease diagnoses: in the first a patient already has a disease, in the other the patient is described as being predisposed to a disease, for example developing breast cancer. 'A predis-

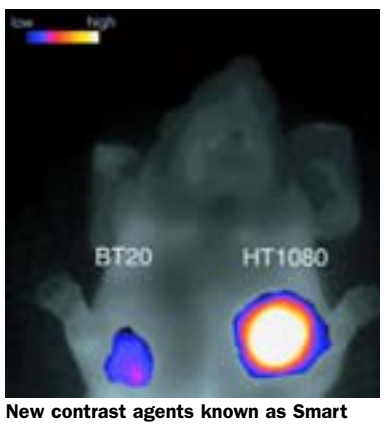
*continued on page 2*

New concept in hybrid imaging technology

*continued from page 1*

position shows the likelihood of developing a disease, which can have genetic causes. Certain combinations of genes, for example, have a very high likelihood of resulting in cancer or other diseases. If a patient has a certain combination of genes, which, in many other patients, has been confirmed as a trigger for a certain illness, he has a very high predisposition. The other subject is the diagnosis of a disease that is already established, with the help of molecular-medical methods - and to do this earlier than currently done. In addition, gene-technological methods will also be used for the recognition of predispositions. In some cases we can definitely determine that a disease has genetic causes, for example cystic fibrosis and other diseases, such as Huntington's.

In predisposition, the professor pointed out that one of the big challenges is to determine in what ways a patient is likely to develop a disease, whether or not it progresses and over what period of time. 'At the moment there are no recorded procedures for this. What we can say is that, if a predisposition exists, a disease is likely to develop over a certain period of time with a certain statistic probability. However, we must take into account that all diseases are different, and won't necessarily develop. From a purely statistic point of view we can determine the average probability of the disease developing. For instance, the probability for a woman to develop breast cancer at some stage in her life is x percent. Then we can say that if a woman has specific genes in a modified form often known to trigger cancer then the probability of her developing the disease at some point in her life is not x percent but possibly 3x or 5x percent. However, once you have established that someone has a higher probability of developing this or that disease you can screen and monitor so that, if the diseases actually develops, we can start therapy at a very early stage.'




New contrast agents known as Smart Contrast Agents are at the core of the research in the area of MI.

In the case of breast cancer, for example, although this scenario could be quite comforting for statisticians, wouldn't it scare women in terms of its predictability and then at what stage in life it would occur? Dr Naraghi concurred, but pointed out: 'Thanks to moleculary diagnostics we will have very efficient methods at our disposal in the future to recognise the occurrence and progress of diseases. Depending on their predispositions, doctors are able to recommend that patients be screened and monitored on a regular basis. If the disease then actually develops, the diagnosis can be made at a very early stage and therapy will be much more successful if commenced early. Surely this brings us one step further!'

This could also mean a significant cost-saving potential from a commercial point of view. 'The largest block of costs arising in the healthcare system today develops because many diseases are diagnosed too late, and then the system has to bear the costs of coping with the long-term consequences,' he replied. 'Let's look at oncological, neurological and degenerative diseases and, for example, the fact that a high percentage of colon cancer cases can be diagnosed and it can be removed at an early stage with the help of endoscopy and other methods. Molecular diagnosis will enable us to recognise these diseases at an even earlier stage of their development. And this will, again, save costs and dealing with the long-term effects of these illnesses. We are hoping, for instance, to diagnose Alzheimer's at an early stage before the whole range of clinical symptoms manifests itself. And if we then also have medication available, which at least slows down the process of the illness, we would enhance a patient's quality of life a lot. It would also have enormous economic effects because, for instance, we could save on costs for long-term care.

Returning to the discussion on contrast media, used in combination with different imaging diagnostic procedures such as PET, SPECT, MRI, we asked which procedure is used in which cases? 'It very much depends on the disease. PET-CT is often used in the case of oncological diseases. MRI is the preferred method for neurological problems, and we use CT and SPECT for cardiac problems. There are many differences, and we have long-term clinical experience of which methods should be used in which case.'

However, Dr Naraghi pointed out that truly molecular contrast media is as yet unavailable. 'They are at the early stage of development. So we cannot yet say what the consequences will be in every single case. But it is likely that innovations in the area of contrast media and progress in the area of molecular medicine in general will change and enhance the use of different methods of imaging diagnosis.'

Contrast media generate a new connection between medicine technology and the pharmaceuticals industry. To highlight this, we referred to the GE acquisition of Amersham, and asked about Siemens' views on potential opportunities. 'Our strategy is to offer solutions that help our customers to improve the quality of care and to lower costs - to increase efficiency through innovations and process optimisation When putting these strategies into practice we not only think about single segments of the healthcare system but about its entirety. We talk about integrated solutions, which comprise all areas - prevention, diagnosis, therapy and care. Based on this background we continually work out how these objectives can be realised. Where necessary we will enter into the appropriate co-operations and partnerships. In the area of molecular medicine, and contrast media in particular, we think that many innovations will not come from one single company but from a whole range of innovative companies, larger and smaller institutions, research facilities and hospitals. This means that we are more likely to be thinking about partnerships and co-operations in this area.

When did he think the first, truly molecular contrast medium might become available? 'This is difficult to say,' he replied. 'It will take a few years and will also depend on the readiness of the regulating bodies in the US, Europe and elsewhere to facilitate faster licensing procedures.



## RIS/PACS Innovations at the ECR 2005

Ferrania demostrates a wide range of digital and web-based solutions including LifeWeb, a web-based radiology information system and picture archiving and communication system (RIS/PACS), LifeInVision, a digital acquisition system and the new range LifeImager 6000 DICOM enabled imagers. The LifeWeb RIS 2.1 is an enterprise-level RIS system that provides a complete set of tools to manage the radiology workflow. Utilising native web technology as a framework, LifeWeb RIS provides an open and flexible architecture in which integration of a "brokerless" PACS and RIS can occur. A robust composition of patient records and images is efficiently obtained through the combination of an intuitive user interface and a DICOM structured reporting module – making possible the convergence of both reports and images within the same DICOM hierarchy.

### RIS / PACS in Italy and the UK

Also featured on the Ferrania stand will be the University La Sapienza – Policlinico Umberto 1 installation in Rome – both the Radiology and Neuroradiology departments – plus the recently commissioned innovative RIS / PACS installation at Newcastle Upon Tyne NHS Trust in Newcastle, UK. As with the Rome installation a key factor for Dr Andrew Chippindale – Clinical Director of Radiology – and Phil Wilson – Radiology Directorate Manager for the Trust – was the availability of images on-line throughout the 4 sites spread across Newcastle city centre. Quite a challenge with over 1000 examinations per day, some 5.5 million images per year being generated, and needing to be available throughout 13 departments, often simultaneously at different sites. To date there are over half of the 5000 Trust users on line. For more information please see us at booth 108 hall A.

# Contrast agents

**Generating targeting agents for diagnostics, prognostics and radiotherapy, by designing biochemically specific elements in contrast agents to be the targeting molecules attached to and carrying diagnostic or radiotherapeutic molecules to abnormal cells**

Molecular medicine is arriving as a blizzard of new genes and their proteins. (Each gene instructs a cell to produce or 'express' a protein. Abnormal cells are those whose genes are over or under-expressing a protein, or expressing an abnormal protein. The sheer number of newly discovered genes and proteins will almost guarantee an ever more detailed understanding of human biology and disease, and lead to many new drug molecules that interact with the new entities, and increasingly interact specifically with only abnormally operating cells. In most cases there will be multiple new drugs that work specifically on smaller subsets of diseased individuals.

Wherever regionally defined biochemical information is useful, there will be fertile ground for new imaging agents, for it is regionally sorted information, obtained non-invasively, that is the strength of in vivo medical imaging. Imaging pharmaceuticals of the future will yield regional protein expression - regional proteomics. Nuclear medicine (NM) already has proven ability to image regional protein expression, for example, using Positron Emission Tomography (PET) to find highly metabolic metastases in many cancers. 'Targeted biochemical imaging' will also be crucial to predicting the outcome of biochemically specific therapeutic interventions. While diagnostics - finding a disease - will be greatly assisted by highly anatomical imaging modalities like MRI and X-ray CT, characterizing the disease through protein expression imaging will require extreme sensitivity, currently available with NM. Prognostics, rather than diagnostics, is a broader term for the future role of NM.

Ultrasound (US) can possibly cope with protein expression when the targets of the US imaging agent are accessible to the contrast agents, and there is a long-term possibility even for MRI agents. Current technology in these latter imaging modality's agents restricts agents to large sizes and therefore to targets expressed inside blood vessels. NM agents can be made very small, to pass through blood vessel walls and they can then access abnormal cells other than those contacting the blood - and most abnormal cells are of that type.

Bracco Research USA Inc, focuses on generation of targeting agents for diagnostics, prognostics and radiotherapy, by designing and producing biochemically specific elements of NM, MRI and US contrast agents. These biochemical elements are the novel targeting molecules that are attached to and carry diagnostic or radiotherapeutic molecules to abnormal cells. For example, a radioactive targeting molecule 'homes in' by attaching specifically to the abnormal proteins expressed only by the abnormal cell, carrying the radioactive element with it.

Nuclear Medicine includes both diagnostics/prognostics and targeted radiotherapy. This latter technology is a new variant of the most common cancer radiotherapy - a radioactive beam directed at whole segments of the body. Targeted radiotherapy delivers the radiation more specifically to the target by combining a targeting molecule with a radioactive element that emits a killing radiation, and injecting this new molecule as a drug. The technology involved in both forms of NM, diagnosis/prognosis and radiotherapy, is intimately related.

Bracco has many years of experience in the necessary arts and sciences, numerous renowned experts and PhD level scientists, and has established critical collaborations with other companies to enhance its capabilities and opportunities in this area.

*Source: Bracco Research USA Inc*

R&D at Bracco's laboratories

# Breaking the volumetric imaging record

GE Healthcare announced at the RSNA in November that its next-generation volume computed tomography (VCT) scanner, the LightSpeed VCT, has set the record for fastest volumetric imaging in the world. 'The LightSpeed VCT with its .35-second rotation and 40-millimetre coverage allows for true volumetric scanning of the heart in only five beats.'

According to W Dennis Foley MD, chief of Digital Imaging at Froedtert Hospital in Milwaukee and professor of radiology at the Medical College of Wisconsin, the LightSpeed VCT's new 35-second rotational speed produces excellent resolution and coverage of the heart simultaneously: 'It's somewhat amazing that an accurate 3-dimensional image of the coronary arteries and sites of focal disease can be obtained from a beating heart. The LightSpeed VCT system does this using rapid high resolution imaging gated to the patient's heart cycle.'

Lightspeed VCT scanner

The first LightSpeed VCT was installed at Froedtert Hospital in June 2004 to provide insight into the best clinical practices for advanced CT systems, including information to help with the diagnosis of disease and injury. LightSpeed VCT is the only proven 64-channel detector in the world, and can cover the anatomy with the fastest speed while simultaneously providing the best resolution, GE points out.

Noting that LightSpeed VCT is 75% faster scanning than existing CTs, Popular Science Magazine chose it as 'The Best of What's New in Technology for 2004'.

'This is game changing technology that will make the LightSpeed VCT the quintessential emergency room scanner,' emphasised Peter Arduini, general manager of Functional Imaging and Computed Tomography at GE Healthcare.

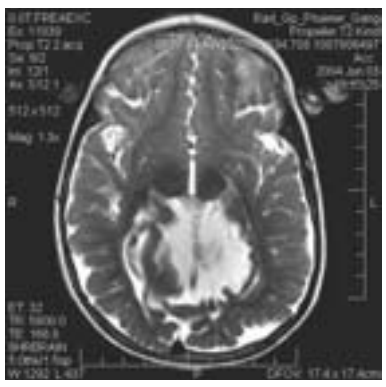
Due to its exceptional coverage speed, the LightSpeed VCT has the capability to attain 43 millisecond temporal resolution, which means doctors can effectively freeze the motion of the heart, which might lead to a more accurate diagnosis and treatment of heart disease and other life-threatening illnesses, GE added. In a single rotation, the system creates 64 submillimetre images, totalling 40 millimetre of anatomical coverage, which are combined to form a 3-D view of the patient's anatomy for the physician to analyse.

LightSpeed VCT is able to no invasively capture the heart in five beats and scan the whole body in 10 seconds.

### Identifying advanced procedure possibilities

**5-Beat Cardiac** - Heart motion has historically made CT cardiovascular scans challenging and prone to motion artifacts. Due to its speed, the LightSpeed VCT is enabling physicians to secure extremely high-quality images of coronary arteries at submillimetre resolution in only five beats of the heart. This enables a fast and less invasive diagnostic evaluation of arterial stenosis.

**Triple RuleOut** - In the A&E, patients exhibiting acute chest pain could be diagnostically scanned quickly and non-invasively, using



the LightSpeed VCT, for evidence of heart attack, pulmonary embolism or aortic dissection, the three most life-threatening causes of chest pain, in a single scan.

**Stroke Work-Up** - Once a stroke occurs, it is commonly believed that treatment must be delivered within an hour, or less, to ensure the best outcome. Current diagnostic imaging procedures are complex. GE pointed out that LightSpeed VCT offers the speed and resolution required for rapid examination of blood vessels in the brain (perfusion studies), enabling doctors to make a quick diagnosis of stroke and determine the extent of damage, and can help make this complex procedure easier and more routine.

**LightSpeed VCT and PET** - The LightSpeed VCT can be easily integrated with its positron emission tomography (PET) technology, which will marry the high-speed, high-resolution capabilities of GE's volumetric CT with the metabolic and physiologic capabilities of GE's PET.

## PLUS - the first high definition MR system

At the RSNA, GE Healthcare also launched '...the world's first high definition magnetic resonance (HDMR) system'. The firm reported that HDMR will, for the first time, provide physicians with unprecedented image clarity in cases where patients are difficult to image due to movement, including Parkinson's patients who suffer from uncontrollable patient motion and including children who do not respond to sedation.

Dr Lawrence N Tanenbaum, Section Chief MRI, CT and Neuroradiology, New Jersey Neuroscience Institute, said: 'Dedicated high density coils facilitate throughput and enable high definition scanning, resulting in dramatic images reminiscent of those provided by high definition television.' This provides a 'can't miss' quality in challenging circumstances, he added.

'The technology dramatically improves MR imaging speed and quality, allowing clinicians to obtain vast amounts of data in a short time and to perform MR studies that otherwise would be compromised,' said Dennis Cooke, GE Healthcare's Vice President, Global MR business

According to studies, 25-30% of all head MR studies are compromised by some amount of patient movement, which can impact on patient diagnosis. However, the HDMR technology, *Propeller* provides uncompromised images of the brain despite patient motion, the firm pointed out. 'HMDR will make a real difference in patient diagnoses by providing GE exclusive applications that enable physicians to consistently perform the highly targeted studies they've been wanting to do, but couldn't because of patient motion or the challenge of diabetic patients with lower blood flow to the lower legs,' Denis Cooke added.

Also, because HDMR has extremely fast image processing technology, it enables a greater range of targeted MR studies in critical areas such as the heart, liver and lower legs.

This new technology, available on GE Signa 1.5T and 3.0T MR systems, enables massively simultaneous imaging in multiple channels in increments of 16. HDMR features unique, balanced acquisition architecture, with individual receiver channels connected to dedicated reconstruction engines.

As channels are added (in units of 16, 32, 48, 64 and more), image-processing power increases in proportion, the firm explained. 'The coil elements that detect the signal, the receivers that digitise it and the array processors that perform calculations are scaled together so that massively simultaneous imaging can be performed without image processing delays. This technology sets a new standard for acquisition, gradients and the human interface.'

GE's *Excite* technology has enabled three targeted MR applications with meaningful clinical benefits: *Vibrant* for bilateral breast imaging in a single exam; *Tricks* for MR angiography of the legs; and *Propeller* for high-quality brain imaging that is extremely resistant to motion artifacts.

### New targeted studies:

- Extremely high-resolution images of the liver with shorter breath holds and better organ coverage
- MR Echo real-time cardiac imaging with the resolution of MR at the speed of ultrasound, without the need for breath holding or ECG gating
- A new 32-element peripheral vascular coil, providing images of the lower leg and foot vessels that show unprecedented definition

## Don't miss this!

**At the ECR, Gary Larson, of the Eastman Kodak Company, will deliver a presentation on the UK National Programme for IT: delivering Diagnostic Imaging for the North West and West Midlands in England**

Gary Larson, of the Eastman Kodak Company, Programme Director for the National Programme for IT

**In May 2004, Kodak participated in a CSC-led alliance that was awarded a 10-year contract with the UK National Health Service (NHS) for delivering diagnostic imaging services for a substantial portion of England. Under the contract, the alliance is designing, building delivering and operating new Picture Archiving and Communications System (PACS) across the North West and West Midlands cluster.**

**The system is being established as part of the Department of Health's £6 billion National Program for IT (NPfIT) aimed at helping millions of patients to receive treatment more quickly and efficiently. The programme has four primary goals: an electronic appointment booking system, an electronic care records system, electronic transmission of prescriptions, and a fast, reliable underlying IT infrastructure.**

**Gary Larson's presentation will concentrate on some of the unique aspects of this programme that differentiate it from the delivery of a more traditional PACS. 'Together with other participants in the alliance,' he says, 'we are delivering a managed service for diagnostic imaging that is tightly coupled with the overall core services in the NPfIT. Using KODAK Directview Versatile Intelligent Patient Archive (VIParchive) technology, we are delivering a single, data centre-based archive for a population of approximately 12 million patients. Finally, in addition to KODAK Directview and Dryview printing solutions, KODAK RIS 2010 is being used to electronically integrate the radiology workflow across hospitals in the cluster to optimise the utility of their assets in the delivery.'**

## Acquisitions expand healthcare offerings

**When GE acquired Amersham, the world's biggest Medical Imaging Company, it connected the fields of pharmaceutical with imaging technology production. In an interview with Steve Bolze, President of GE Healthcare International, we asked how this will influence GE's strategy and research and development**

"The most inspiring and exciting thing about GE's business is what the customer can now see under one roof: we can deliver practically everything in imaging and services for the core radiologist because, with the acquisition of Instrumentarium, our information technology became much bigger in terms of PACS, and through our acquisition of Amersham, the inclusion of chemistry and biology completes our healthcare services. It's all in one family. GE is now a company that represents about 14 billion dollars in healthcare. We have around 402,000 employees - 12,000 based in Europe. This is up by over 50% since 2003.

As people walked through our stand at the RSNA in November, they could see lots of innovations: the Volume CT, high definition MR and PET CT, which is still tremendous - particularly for oncology. Additionally we have women's healthcare - digital mammography as well as some new technologies, such as newly developed ultrasound technology for bone density diagnoses.

As we advance, one of the most exciting things about GE Healthcare is its vision for the next twenty years, which we see as personalised healthcare. If you look at that vision it covers everything from predicting or stating the disposition of disease, to much earlier diagnoses, then to sharing information across geographically spread users, then, lastly, more targeted therapies.

Let's return to women's healthcare - one of the vigorous examples is oncology and breast cancer. Breast cancer is obviously one of the predominant cancers for women and looking at that today, most women go through standard mammograms. But we now know that if someone over-expresses a specific genotype the chances of having cancer are much higher and it could be diagnosed at a much earlier age. So as GE Healthcare advances - which, again, is to do with the conjunction between chemistry, biology and imaging - couldn't we start to look at new technologies that could help to tackle the whole disease area of breast cancer? With our customers, we don't just talk about the modalities or the specific technologies, but about disease management, such as oncology. So, those are the key messages right now - only GE has these capabilities, across that span. This is the new age of medicine.

As we brought the companies together, and went from being a diagnostic imaging company with IT to a company that provides personalised healthcare, the reactions we had in America, Europe, the Middle East and Asia were very positive. Certain areas of the world are responding more to IT, or biology, or chemistry areas, which is how certain markets develop, but, overall and particularly during the first 3-4 months, we had a tremendously positive response. What we have liked most in discussions with customers is that we've moved from being diagnostic imaging and modality specific to prediction and personalised healthcare.

Due to acquiring pharmaceuticals, we now also have a greater relationship with general practitioners, and we also need, in terms of personalised healthcare, to support various insurance activities - a productivity vision, which is a much broader concept. Insurance companies want to save money, it is a key interest - particularly in Europe right now. We have a business area with services called performing solutions, in which we are working with customers on improvements. For example, say they have a new diagnostic imaging project. They ask: How can we scan more patients and improve the hospital's productivity? How can we plan therapies and the hospitals workflow? In Europe, a lot of attention is given to these questions. "

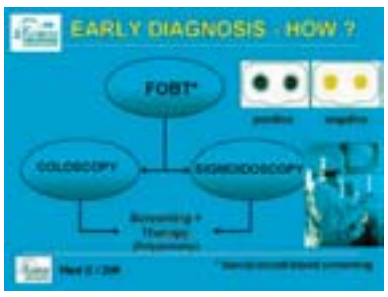
# Pushing for prevention

**At the *11th International MR Symposium* radiologists were urged to co-ordinate a campaign to detect disease earlier, and a new 'tandem' concept for diagnosis and therapy was revealed. *Anja Behringer* reports**

From left: Prof J F Riemann and Dr G Layer

Calling for radiologists to coordinate a comprehensive prevention campaign, Hans-Ulrich Kauczor, professor of oncology diagnostics and therapy at Heidelberg University and head of radiology at the city's Cancer Research Centre, described the potential for this presented by advances in magnetic resonance imaging (MRI) systems.

Professor J F Riemann, director of Medical Clinic C, in Ludwigshafen, concurred, adding that, although colorectal carcinoma causes the second largest number of cancer deaths after bronchial carcinoma, the German public's interest in primary prevention is low. This, he said, makes preventive measures, i.e. early detection of polyps and carcinoma, even more important. 'Due to the low sensitivity of the occult blood test and high incidence of undetected lesions during sigmoidoscopy, coloscopy is now the preferred screening procedure, medically and financially.' An American national study on polyps clearly showed that consistent polypectomy for the early stages of cancer prevented the development of colorectal cancer in up to 90% of cases, he said. Thus, from October 2002, coloscopy has been included in the German medical insurers' early cancer screening programme.




The professor went on to present a concept in which radiology could be used for secondary prevention. In this, a new 'preventive' radiologist would head an interdisciplinary medical team to care for a patient. However, he conceded that the economic benefits of such a system must still be considered.

Secondary prevention is about identifying the early stages of a disease, for which risk factors are present but there are either no symptoms or non-specific symptoms. This presents the radiologist with much to examine, and for that the method of choice is virtual coloscopy of the large intestine, to detect polyps or tumours. Other possible indications: cardiovascular and neurodegenerative diseases and their differential diagnosis, plus various metabolic risk factors.


Dr G Layer explained that, since 2001, an interdisciplinary working group at Medical Clinic C and the Central Institute for Diagnostic and Interventional Radiology, had been working on an intensive diagnosis of gastroenterological diseases, and that this rare German example of 'cooperation not confrontation' has resulted in the establishment of MRI in routine gastroenterological diagnosis.

In view of the low public interest in colorectal cancer screening, specialists now wonder whether the additional offer of modern imaging procedures would generate more interest in this preventive care. Previously, a complete depiction of the colon was only possible via computed tomography (CT). Depending on the method used, this screening system offered a sensitivity of over 90% for polyps larger than 1cm, but it exposes a patient to a certain amount of radiation - and early screening programmes also include those who are clinically healthy.

Due to further developments in MRI, colonography is now possible without radiation exposure. 'However, this type of screening is still in its early stages compared with CT-colonography,' said Dr Layer. 'It needs further evaluation in prospective studies.' The underlying formula seems to be what's been said in the USA: 'MRI is good for healthy people, CT is good for those who are sick'.

The latest project at the Ludwigshafen Clinic is virtual imaging of the large intestine, as well as examination of the biliopancreatic system and small intestine. In this the patient is cared for by radiologists experienced in interface imaging diagnostics who share their endoscopic expertise with experts in gastroenterological diagnostics and therapy. 'If existing methods are to be improved and new procedures developed, the potential of MRI in diagnoses in this area can only be effectively utilised through cooperation,' said Dr Layer, who has developed, with Prof. Riemann, what they call the 'tandem' concept - which works due to their close cooperation in their fields of expertise.

**In tandem** - coloscopy is combined with diagnostic procedures such as MRI colonography, thus bringing the number of unpleasant examinations for a patient to a minimum and saving time for all involved. Those who come for colon cancer screening and are found to have no gastrointestinal symptoms are offered an MR colonography, after receiving initial consultation and advice. If polyps or any other pathological problems are detected, a therapeutic coloscopy follows.

Prof. Alexander Tschammler credits the full field digital mammography system and stereotactic breast biopsy table with helping the institute to optimise efficacy and efficiency

# Streamlining mammography

## All in a day: screening, results and a biopsy booking

**Germany** - At the Institute of Radiology, University of Wurzburg, patients can undergo mammography, receive results and schedule a biopsy - all on the same day. The Institute, which annually carries out 6,000 mammograms and 350 biopsies, began streamlining its process in 2003, with the installation of a Hologic MultiCare Platinum breast biopsy system. This was chosen for two key reasons, explained Professor Alexander Tschammler, chief physician in the Institute's breast imaging department: the patient is prone which minimizes movement, and the system facilitates biopsy from above, below or either side, enabling the breast to be reached from any angle. 'I try to enter the breast from below,' he added. 'That way, if there's a scar, no one will see it.'

Because Germany does not yet allow digital screening - a situation expected to change in 2005 - a few months later the Institute also purchased a conventional Hologic M-IV system to replace the analogue mammography system used there for many years. The professor explained that the change in manufacturers was made because Hologic's analogue and digital systems are very similar, making it easy for technologists to switch between either, and servicing by just one company proved more attractive - a Hologic support technician was within easy distance, ensuring speed if any changes to the system should be needed.

Last year the university also opted to install a Hologic Selenia full-field digital mammography system, a choice made not only for consistency, but also because, among the full-field products available, in slot scanning technology the scan times were too long, and among the flat-panel equipment on offer, either the field of view was far smaller than Selenia's 24 x 29 cm FOV, or they did not have a mature system solution worth evaluating, Prof. Tschammler said, adding: 'The larger field of view is absolutely necessary. A third of our patients don't fit on an 18 x 24 device.' In addition to accommodating larger breasts and providing overall great images, the Selenia is also compatible with the hospital's new PACS system - the entire state-of-the-art imaging/biopsy/image transmission capability will go online early this year.

In terms of digital vs. analogue image quality, contrast in the former is better for visualisation of calcifications and architectural distortion also is more easily visualized, he pointed out, adding that the radiation dose has been reduced by about 10% with the digital system, largely because the improved ability to manipulate digital images has reduced the need for magnification and other additional views. Another advantage is that digital images are produced far more quickly than film images and, if they request it, patients can be given their images on a CD.

However, for now, Germany offers insufficient reimbursement to cover the additional costs involved in a full-field digital screening system. 'When digital screening is reimbursed, and when the cost of systems comes down, its impact will really begin to be felt,' the professor predicted. That is, conventional mammography systems will not be needed. 'Image characteristics of digital mammography and biopsy systems are similar, so it's easy to go from digital mammography to digital biopsy. The future is digital.'

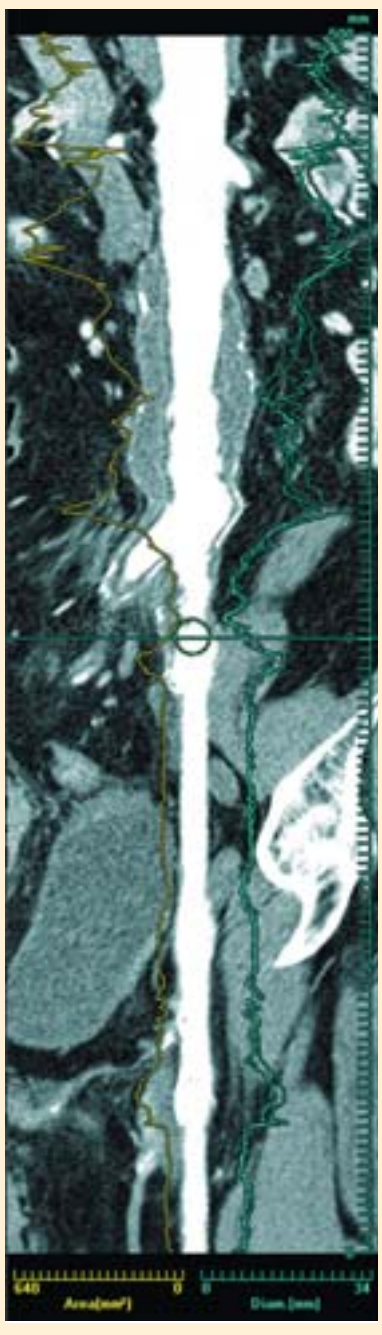
# ANGIOGRAPHY

## FDA clears CTA and MRA vessel analysis package

**Belgium** - Barco has received 510(k) pre-market clearance from the USA's Food and Drug Administration (FDA) for its Voxar 3D VesselMetrix module, which offers radiologists a vessel analysis package to evaluate contrast-enhanced Computed Tomography Angiography (CTA) and Magnetic Resonance Angiography (MRA) studies in the assessment of stenosis, stent and stent graft planning, and stent graft surveillance.

The FDA 510(k) clearance, in February, arrived soon after the company first previewed the software at the Radiological Society of North America (RSNA) conference in November, when Craig Anderson, General Manager of the Voxar product group, observed its good reception: 'Our customers and PACS partners need 3D-enabled clinical software applications that are user-friendly and optimised to increase productivity. VesselMetrix delivers this for angiographic studies and is fundamental to our goal of providing radiologists with the tools they need to effectively read large volumetric data studies.'

Barco designs and develops solutions for large screen visualisation, display solutions for life-critical applications, and systems for visual inspection. Headquartered in Kortrijk, Belgium, Barco has facilities in Europe, North America and Asia Pacific, for R&D and manufacturing, plus sales & marketing, customer support.
Details: www.barco.com



Above: 3-D colour volume image showing an endovascular repair of an AAA (Brigham and Women's Hospital, MA)
Right: MPR localiser view of a straightened vessel of an AAA displaying the centreline through the lumen

# READINGS FROM HOME

**Belgium** - Radiologists at the Department of Medical Imaging at AZ Sint-Maarten general hospital, Belgium, will be able to report from home during weekends or night duty periods, when a new PACS system is installed at the hospital. Currently the ten radiologists perform around 80,000 radiology examinations annually.

To integrate radiology services at its two sites - Duffel and Mechelen - the hospital has ordered Agfa's picture archiving and communications system Impax. MR examinations are performed in one site. By using the WEB1000(tm) web server interface, the new system will enable diagnosis in both, speeding up reports and liaison with physicians.

The Impax at AZ Sint-Maarten will be integrated with Agfa's RIS and speech technology solutions and connect with the medical patient record. The IMPAX solution will be installed at one site and connected to the other via a 100 Mbps line. Reports will be made from nine Impax DS3000 diagnostic display stations, spread over both sites. An outpatient CD-ROM-burning solution will be available at each site.

The hospital's Medical Imaging departments will also be equipped with Agfa's CR 75.0 and CR 25.0 digitisers. Apart from mammography, all imaging activities will then be fully digital, with data flowing through the relevant departments as well as any authorised home-based radiologist.

# Mobile radiology diagnoses

## The new radiologist: 'Always online'

Gregor Wedekind MD (right) offers radiological services to the local hospital and outpatients in Kempen, a city in the West Ruhr Area of Germany. Having searched for a mobile radiology system for some time, he has opted for a new teleradiology system called MORITS. This utilises high-resolution laptops to receive transmitted images obtained during a medical emergency, so that radiologists situated virtually anywhere can supply a diagnosis.

During a recent interview with our journal, Dr Wedekind presented a scenario to explain its use: 'A private radiology practice works with a hospital that has no facilities for interface diagnostics. However, when the practice is closed for the night, or over weekends, no one is using its costly and very useful equipment, which amounts to about 75% of the time. To provide the hospital with emergency cover someone has to be at the practice to make a diagnosis. However, with only three available radiologists, this would boil down to 10 nights of cover for each radiologist per month - and more during holiday periods. Hence we had to find a solution and began to focus on teleradiology - available for quite some time over a fixed network. In this, data has been transferred from a CT scanner via a fixed network line to a PC installed at home - but again, the radiologist must be stationed at home. So, we looked for a solution that facilitates total mobility - and eventually we found it.

'Major providers, whether film suppliers or firms specialising in medical technology, had no solution to match this concept. On the contrary, they even disputed that something like this could be developed. Anyhow, we have done it and it works. The licensing procedure, with the Health and Safety Office in North-Rhine Westphalia, was another story... but approval for its use was received after radiology experts examined the equipment and deemed it serviceable - a great relief. Knowing that I can access my images from any location is very reassuring.

'You can work from absolutely everywhere because transmission is via UMTS and, if there is no UMTS reception, it automatically switches back into the GSM network, where several channels are bundled. It basically works everywhere a normal mobile telephone works. This complies with the new regulations on teleradiology use in emergencies: a radiologist does not physically have to be where the examination takes place, but someone who specialises in radiation protection does - a doctor who can supervise examinations using contrast media, for example, and who can help if there are problems, such as allergic reactions, etc.'

After receiving images on the laptop, a diagnosis is made and the patient's name and results are entered under the radiologist's letterhead. Within minutes, that report is then automatically transmitted to the hospital/referring doctor, again via the laptop.

Laptop criteria - Arpad Bischof, who developed Morits at the UK-based company Image Information Systems Ltd, explained: 'You need a two mega-pixel display with high contrast, homogenous light field and high light density. We have a diagnosis module based on a high-end industry notebook equipped with special software - which we supply. We calibrate the high-end display. The notebook can only be customised for medical use by these additional steps. In theory,' he added, 'data are transferable into all radiography modalities, but the system's use is optimised for CT and MRI; that is, the software interface and the notebook display are optimised for use in interface diagnostics,' he added. 'We comply with DIN-Norm 6868-57 for medical diagnostic imaging with CT and MRI, but not with the regulations on image diagnostics for conventional diagnostics. You can use the system for a second opinion in conventional diagnosis or for ultrasound scans as well. However, we do not recommend using it for a primary diagnosis.

'Data protection is another important issue,' he pointed out. 'We offer two procedures. All data leaving the hospital is encoded, and the hospital's system is protected via a firewall against potential intrusion from the internet, using the most modern technology available. This is vital. Additionally, we have developed an optional pseudonym procedure, so that images are not transmitted with actual names, but with identification codes. It's very similar to the way laboratories encode blood samples.'

Although the system may sound complex and expensive, Arpad Bischof pointed out that it costs less than 20,000 euros and transmission costs are under 50 cents per examination, and added this assurance: 'There's a big savings potential for all specialist clinics and hospitals that offer night cover and emergency medical cover.'

*Details: bischof@image-systems.biz*
*Gemeinschaftspraxis für Diagnostische Radiologie, 47906 Kempen, Mülhauser Str. 32, Germany.*
*Image Information System Ltd, 483 Green Lanes, London, N13 4BS, UK*

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**3. HOW MANY BEDS DOES YOUR HOSPITAL PROVIDE**

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Please complete the above questions and we would like you to answer the following additional questions by ticking yes or no or filling in the lines as appropriate.

What is your speciality?

In which department do you work?
Are you head of the department? ☐ Yes ☐ No
Are you in charge of your department's budget? ☐ Yes ☐ No

How much influence do you have on purchasing decisions?
I can only present an opinion ☐ Yes ☐ No
I tell the purchasing department what we need ☐ Yes ☐ No
I can purchase from manufacturers directly ☐ Yes ☐ No

Do you consider that your equipment is
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relatively modern ☐ Yes ☐ No
state-of-the-art ☐ Yes ☐ No

Do you use/buy second-hand equipment? ☐ Yes ☐ No
If so, what do you use of this kind?

Is your department linked to an internal computer network? ☐ Yes ☐ No
Is your department linked to an external computer network? ☐ Yes ☐ No
Is your department involved with telemedicine in the community? ☐ Yes ☐ No
Do you consider your department is under-staffed? ☐ Yes ☐ No
Are you given ample opportunities to up-date knowledge? ☐ Yes ☐ No
Do you attend congresses or similar meetings for your speciality? ☐ Yes ☐ No

This information will be used only in an analysis for European Hospital, Höherweg 287, 40231 Düsseldorf, Germany, and for the mailing out of future issues.

Signature Date ECR/EH 1/05

# Procurement

## Growing trades: buying and selling used imaging equipment

**Denmark - The Epoka Medic Mission A/S (EMM), based in Pandrup, re-utilises existing medical technology resources by offering pre-owned equipment at competitive prices to customers in over 80 countries. 'One of the main reasons for our success is our ability to make quick buying decisions and take immediate action,' explained the firm's CEO Lars Braun Nielsen (right). 'Many of our most important suppliers are important decision makers in the hospital world. When our partners wish to sell their old equipment they've already ordered the installation of a newer generation, which means we must be flexible and be able to deliver the right timing and technical expertise for de-installation and pick-up from the customer site.'**

**He co-founded EMM, in 2003, with the owners of the Epoka Group A/S, which has been an international reseller of pre-owned, refurbished, high-performance IT equipment since 1991, and could pass on considerable experience and knowledge to the new firm. Today, EMM employs 10 people for purchasing, sales, technical support for de-installation and installation, shipping and logistics. Additionally, within the last six months the sales force has expanded by four people.**

**The firm's strong financial position (with a 2004 turnover of 40 million euros, Epoka Group A/S has a triple A rating from Dun & Bradstreet) means it can buy high-end equipment for inventory and speculation purposes, such as devices made by leaders in CT, MRI, X-ray, Ultrasound Scanners, Angio & Cath Labs, Mammography and PET/Nuclear Systems, buying and selling all brands and generations between 1992 and 2005. For storage the firm has one of Europe's biggest warehouses: 3,000 square metres.**

**EMM handles all aspects of the purchasing process, from testing and de-installation to a safe and professional removal from a hospital site anywhere in the world. 'All the hospital has to do is make the purchasing agreement, decide a de-installation date - and make sure the system is not scheduled to operate on the day of the pick up!' said Lars Nielson. 'Our main partners and suppliers are located in Western Europe and America, whilst our customers and end-users come from developing countries as well as many European and other developed countries. Many hospitals maintain a strong focus on costs and find in financially wise to purchase high-end second user equipment from us, because we can offer almost new scanners with very little usage and some of the newest application options. In developing countries it is more important simply to get access to equipment. Even older equipment often means that many lives can be saved.'**
**Details: www.epokamedic.com**

**As electronic patient's records (EPR) - complete with irreplaceable radiological and surgical images - increase in size, numbers and importance, why are some managers lackadaisical about their protection?**

# A room with a view to SECURITY

IT managers inevitably invest in security, such as firewalls, but many ignore aspects of physical security by leaving data unprotected from its immediate environment: servers, network components and other hardware systems may be located next to copiers, or even kept in rooms where easily combustible materials are stored. Apart from fire itself, corrosive combustion gases can constitute a primary risk, as can unauthorised access, dust and electromagnetic radiation.

At a Zurich hospital, Lampertz GmbH, which custom-builds IT protection units, has installed a modular IT security room to physically protect data and systems. This 'room within a room' (recently ECB•S certified) contains '...individual fireproof construction elements linked together in a water and gas proof way,' the firm explains. 'The security cell can thus be flexibly set up, taken apart, extended or moved, and imposes practically no requirements on the structure of the building itself. If space requirements change, the room can be easily adapted or moved. Apart from flexibility, this solution meets all security requirements for systems locations, through Euronorm EN 1047-2 for data security containers and rooms.'

Lampertz emphasises that it makes sense to divide up a central IT area into different sections, for which different security requirements might apply. 'Finally, there are other security requirements for mission critical data and systems, for example components designed for redundancy, such as a parallel IT system. It is therefore more cost effective if the IT room solution can also incorporate a corresponding *layered* approach when it comes to security.' The firm's *DataCenter* is a modular security system. 'This scaleable and thus individually selectable, made-to-measure IT security solution offers three further advantages over and above extensive protection: as a system it can be certified, and is therefore of interest to insurers,' the firm points out, adding that the modular construction method also provides more advantageous depreciation treatment. Finally, the complete room system can be financed. 'This allows lines of credit to be used more sparingly,' Lampertz says. 'So the work does not impact the balance sheet.'
Details: www.lampertz.de or: info@lampertz.de

# Cost cutting via IT

**Germany** - The healthcare sector is looking to cut costs through increased investments in information and communication technology and its stringent use. According to a recent poll by Steria-Mummert Consulting, in Hamburg, in 2003, German hospitals spent around 12% of their total budgets in this area, and in 2004 that figure rose to 18%. Spending by compulsory medical insurers rose from 13% to 20%, private insurers increased their spending in IT from 14% to 35%. To achieve even more efficiency, 60% of hospitals are looking at investments in treatment processes, which are to be tightened through the DRGs, and into electronic purchasing (e-procurement). 72% of all insurers foresee a big savings potential in automating the processing of claims, and 79% of the compulsory insurers are planning to invest in e-health by 2006, with 55% of the private insurers also looking at this kind of investment.

The Federal Association for Information Management, Telecommunication and New Media (BITKOM) estimates savings of up to €1.3 billion through the introduction of the electronic health card. An exhibition of solutions for those cost-saving objectives will be held at the ITK trade fair, CeBIT. 10-16 March, in Hanover.

# And finally ... PACS protects against disease

**Hong Kong** - A PACS network became a useful 'barrier' to protect medical staff during the recent outbreak of the highly infectious severe acute respiratory syndrome (SARS).

When treating 70 SARS patients at the Tseung Kwan O Hospital (TKOH), Hong Kong (where a PACS was installed in 1999) no film was printed, except when any patient had to be transferred to another hospital. Imaging equipment was set up in the ICU and a SARS clinic. Only 1% of the SARS patients needed an X-ray follow-up - and X-ray image viewing, via the electronic network, was sufficient for radiological diagnosis.

The hospital's PACS has a storage capacity of about 5 TB (inc. 2.3-TB storage-area network set-up). Performed on the SAN, the DICOM compression rate is 2.5. The network has a cluster of automatic fail-over switches. Using a cluster of three Web servers for image distribution, image-viewing systems are set up in wards using embedded LCDs, wall-mounted computers, barcode scanners, and smart-cards. A mobile image-viewing trolley is also available during procedures.

Reporting at the RSNA in November, Dr Carrison Tong, of the hospital's medical physics department, said that this system had contributed to the continuous monitoring of patients' responses to drugs, and that none of the radiology department staff had been infected during the outbreak. 'Filmless radiology services provided an important tool for the care of SARS patients - and the protection of healthcare workers,' he concluded.

**EH@ECR 2005 was produced by EUROPEAN HOSPITAL, the leading bi-monthly pan-European healthcare journal. Other publications include the @MEDICA series, in tandem with the international medical trade fair, and DESIGN in EH, which focuses on hospital architecture/interiors as well as advanced designs in medical equipment. Contact details: www.europeanhospital.com or ECR supplement p 19**

## Professor Antonio Chiesa, ECR Congress President, welcomes visitors to the Hospital Administrators Symposium

*"It is my great pleasure to welcome you to this meeting today - I did not say 'annual' meeting because it is too early to promote it as such. For the time being, this is simply an occasion to gather together administrators who are participating in ECR 2005, so that you can exchange ideas and opinions. However, the broader idea is that this meeting will mark the beginning of an annual tradition that will include discussions on high-technology and its financing.*

*The time has already arrived when hospitals no longer rely solely on doctors - an opinion doctors also share, for they understand that a modern hospital is defined not only by its highly professional medical teams, but also by leading-edge equipment, informatics applications and innovative programmes. Administrators play a key role in this changing world, where progressively reduced resources are met with rising costs. With an increasingly aged and abundant population, such obstacles present a hefty challenge.*

*Evidently, these problems, just like healthcare systems themselves, vary from one European country to the next, so that hospital management in London is different from that of Munich, Prague, or Moscow. In all cases, patient-oriented hospital management remains of utmost importance, and marketing and sales strategies play new roles for promoting financial support for hospitals.*

*Application Services Providers (ASP), project financing and benchmarking, are some of the words that administrators increasingly use. This meeting is the ideal place where these ideas can be shared by administrators of different origins and who work in different environments, so that they can work towards a more uniform European standard of healthcare.*

*Looking into the future, I would like the 2006 administrators meeting to be hosted in the main building at the Austria Centre, and that it will not end next year, but establish itself as an annual meeting."*


# Hospital Administrator Symposium

## Successful Hospital Management - Facing the Challenges of Hi-tech and Financability

ARES TOWER Vienna - Austria

**March 5th, 2005 / 4pm – 6pm**

Organised by:

ECR 2005 March 4-8, Vienna Austria
European Congress of Radiology

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### Programme

Welcome by Professor Antonio Chiesa, ECR 2005 President

4.00 pm - 4.20 pm — Cost-efficient and patient-oriented hospital management in a major German hospital - a model for future success? Volker Hüsgen, MD, Chief Information Officer, University Hospital, Cologne, Germany

4.20 pm - 4.40 pm — Radiological innovations between hi-tech and financability, Maximilian F. Reiser, MD, Professor and Chairman, University of Munich, Department of Clinical Radiology Großhadern, Germany

4.40 pm - 5.00 pm — Marketing and sales strategies for hospitals, Jörg F. Debatin, MD, MBA, Professor, Medical Director and CEO, University Medical Center, Hamburg Eppendorf, Germany

5.00 pm - 5.20 pm — Regional Cooperation between imaging facilities to enhance patient care in South-western Hungary, Peter Bogner, MD, PHD, Professor, Deputy Director, University of Kaposvár, Hungary

5.20 pm - 5.40 pm — The impact of IT solutions (PACS) on organisation and workflow in hospitals, Helmut Ringl, MD, Department of Diagnostic Radiology, University of Vienna General Hospital (AKH), Austria

5.40 pm - 6.00 pm — Facilitating hospital innovation programmes - an example of a succesful cooperation between a medical systems manufacturer and a financial solutions provider, Kim Egger, Sales Director Healthcare, De Lage Landen, the Netherlands and Henio Sobiszewski, Regional Manager Central Europe, Toshiba Medical Systems Europe (OD)

Discussion and Refreshments

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# Innovations: between hi-tech and economic viability

In European countries the in-patient length of stay has decreased considerably. Consequently, from 1990 to 2001 the number of hospital beds shrank by 19% although 20% more patients were treated. This efficiency increase could be realised - not entirely but to a great extent - due to modern imaging diagnostics and minimally invasive radiological procedures. Fast and precise diagnostics, which puts little stress on a patient, enables us to start an effective and targeted therapy briefly after the patient has been admitted to hospital. In these diagnostic procedures radiological equipment such as CT and MRI play a crucial role.

Often, medical technology is held responsible for the explosion of costs in healthcare. However, the facts tell a different story: In Germany (for example) major medical technology equipment accounts for only 1% of annual health expenditures and only 0.2% is spent on investments.

These facts notwithstanding, re-investment and modernisation have become ever more difficult. In Germany, over 50% of the radiological equipment in use is more than 10 years old, which means it is outdated, requires high-maintenance and thus, in the end, it is no longer economical. Even health politicians understand that 10 to 12.5 billion euros need to be earmarked for investments in healthcare annually, but only five billion euros are available. As a result, during the last years, an investment backlog of 25-35 billion euros has accumulated.

This development is, at least in Germany, a direct consequence of the structure of the public healthcare system. Public budgets are

**By Professor Maximilian F Reiser, director of the Institute of Clinical Radiology at the University Clinic, Munich, Germany**

in dire straits, which makes urgently needed re-investments impossible - notwithstanding the fact that, as has been proved, innovative medical technology contributes significantly to cost reductions and quality improvement.

It has to be taken into consideration that we are currently witnessing a change of paradigm within radiology which may well lead to a further efficiency boost - for example via whole-body imaging with state-of-the-art MRI systems, PET/CT and multislice CT. Instead of a sequence of diagnostic steps, the entire body is scanned in one go, which further avoids delays. Moreover, interventional radiological procedures, such as radio frequency ablation and vertebroplasty, are highly effective and help reduce treatment costs.

But how can we realize these cost-efficient and doubtlessly useful innovations in a situation characterised by scarce resources? It is not enough for the radiologists to make demands and then complain if those demands are not met. Rather, we must make every effort to reduce operating costs by improving organisation and workflow. New financing models must be developed by partnerships between hospital administration and industry - however, such public-private partnerships require mutual trust. Particularly promising seems to be a 'Pay per use' model, which allows a hospital to avoid high initial investments but at the same time guarantees long-term budgeting, and is integrated into a strategic investment plan. Hospital and industry partners share risks, as well as profit, and both partners have a vested interest in the economic success of the project.

Radiologists and hospital managers should make every effort to convince financial decision makers that investment in medical technology and in IT infrastructure can improve the quality of healthcare and at the same time reduce costs. The one-sided orientation and support for pharmaceutical research and development has long been proven as an expensive error.

# A model for future success?

## Dr Volker Hüsken describes cost-efficient and patient-oriented hospital management in a major German clinical complex

**Volker Hüsken PhD**: Following his PhD studies in information technology and economics, in the department of electrical engineering at the RWTH Aachen, Dr Hüsken became a systems engineer at Siemens AG, where he directed the development of the Super Computer Reference Centre.
After several years as IT Director with Klöckner Datentechnik and EDS, he became Senior Consultant for strategic acquisitions with EDS, and was then asked, by the German Armed Forces, to design its intranet.
Later, Dr Hüsken, as Managing Director of international Sema Group, he was responsible for its 'Civilian IT' and 'Consulting' divisions, which focused on business development in commerce, banking and utilities.
Dr Hüsken became IT Director and CIO of the University Hospital of Cologne in 2003 and, in 2004, Managing Director of MedUniServ GmbH, a service provider owned by the university hospital

If the new requirements for major changes in the billing and documentation of hospital services are to be fulfilled, whilst still reaching priority objectives (cost-efficiency and patient-orientation) the future IT infrastructure must be developed in a far more strategic way. The traditional approach, with its multitude of department-based systems and applications, is no longer viable. The IT department has to support the new financial and organisational freedom accorded to the hospital by the new legal framework efficiently and quickly - particularly organisational changes by sustaining 'make or buy' decisions.

Today, a hospital no longer defines itself by its traditional hospital activities but as a healthcare company, i.e. a service provider in the health market. Consequently, medical leadership must define, as clearly as possible, the main medical foci, including all peripheral parameters. That strategy serves as a guideline for the development of the IT infrastructure. Keeping the broadest possible range of services and equipment in stock and striving for utmost flexibility is neither cost-efficient nor patient-oriented.

For IT, the development of a healthcare company means that workflows must be established independently of the organisational framework, so that internal or external resources can provide services. This particularly concerns medical service providers in the areas of laboratory, radiology, nuclear medicine and radiation therapy. Concepts for a hospital electronic patient's record (EPR) not only have to take into account the entire patient record documentation, but also, and above all they have to cover the complete process behind a medical service, from requests for diagnostics to therapy. If the IT infrastructure causes interruptions or gaps in the implementation of such a concept or workflow, the medical and management information value of stored data becomes distorted. Only a unified and integrated system will allow a meaningful assessment of the real quality and performance of health services.

An IT strategy must first determine which system will be responsible for all transactions involving accounts and which one will deal with the patient's medical data. Then, specific services, such as communication, archiving and the management information system, must be considered. All these services have to be accessible from all applications, and must allow for external communication.

The final strategic decision concerns the choice of a laboratory system, where the focus is on efficient automation of all laboratory procedures, rather than on patient-oriented services.

The question of how pathology services are to be integrated into a system is still under discussion. The cross-sectional approach to communication, co-operation and information processing and display is the last of the cornerstones of a hospital to be built on internet technology. It is particularly important that all systems follow a common standard, which means not only communication standards for data exchange but also standards with regard to user interfaces, the integration into an operating system and a database environment and user administration. These standards notwithstanding, any integrated system must provide a certain degree of freedom to accommodate individual needs.

In this context, the role of the applications vendor needs to be re-evaluated. The software-vending firm must be included in a hospital's strategic business planning, so it can understand future requirements and prepare itself accordingly. Obviously, the traditional department-based vendor policy is obsolete. The hospital as a whole enters into a long-term co-operation with a vendor - a fact that both parties should be aware of, because that is the precondition for the speedy implementation of software decisions and requests - a crucial capability in today's fast-changing market. For example, the KIS vendor has to explore today how, in the future, individual contracts with patients can be reflected by the application. Consequently, price can no longer be the exclusive determining factor for software purchase. Professional trust and confidence and co-operation are the basis of business dealings - and obviously that is something that can be developed with five but not 50 providers.

The transition from a decentralised to a centralised IT department also always has profound implications for the users. The user is interested - understandably so - in having a quick response and all conceivable support from the IT department, whenever it is needed, and he rarely understands the demands of a superordinated process. For the user, centralisation means that he no longer has direct access to 'his' IT support person next door, but that this colleague is part of a larger structure and that, most likely, he has no power to set priorities. One approach to avoid frustrations is the implementation of a system of service levels and, for the user, this has to be transparent and make the activities of the IT department predictable. A system of service levels according to ITIL is quite common today. It is crucial that management, and the board, support such a concept - otherwise every attempt to implement standards, be it for applications, hardware or services by the IT department, is doomed to fail. This certainly also holds true for medical technology used in a hospital.

Very often, the IT staff must 'take the rap' for many of the daily decisions regarding organisation and workflow necessitated by IT projects, and IT staff must be aware of this fact of life and realise that it is quite useless to fight that. Instead, IT management has to make sure its IT staff has the qualities and qualifications of consultants, because that is what they are: they act as consultants to the hospital because they have the knowledge of almost all activities within the hospital. Today, in most organisations, only very few staff members could fit that bill - not surprising considering the history of IT and IT hospital departments.

The questions of who is responsible for the fulfilment of the various documentation requirements is a major issue today - and it is an issue which increasingly impedes the implementation of IT projects since there are ever more parameters that have to be included to be able to evaluate services and quality. We know from other disciplines that documentation assistants are a very good solution to free medical staff to concentrate on their core task of providing medical services.
In short, cost-efficiency and patient-orientation mean:

- general systematics to implement electronic patient records are available
- limitation to a few strategic applications
- integration beats specialisation
- central standards for hardware/software
- paper-based processes are discontinued
- fast fulfilment of all documentation requirements
- flexible applications with room for individual needs
- intuitive and standardised user interface
- meaningful data analysis that does not allow for individual interpretations
- implementation of service levels
- professional trust in and co-operation with vendors
- location-independent services.

# How to *sell* your hospital

## Jörg F Debatin MD MBA, Medical Director and CEO of the University Medical Centre, Hamburg Eppendorf, outlines strategies for administrators taking on a relatively new role - in marketing

To date, healthcare throughout Europe has remained largely insulated from normal market mechanisms. Rather, healthcare providers are operating in a jungle of rules and regulations created by bureaucrats and enacted by politicians. Obviously, there are many reasons why healthcare cannot be considered a 'normal' market. First and foremost, health is a very special commodity, which should be affordable for all members of a society regardless of their income levels. Acceptance of this paradigm remains the basis for all European healthcare systems. Despite the introduction of patient co-payments for physician visits, as well as medication, thankfully there appears to be consensus that healthcare needs to remain available for all in need.

Insulation from market mechanisms has resulted in highly inefficient healthcare service structures. Ever increasing healthcare costs have now resulted in a growing trend towards the introduction of market mechanisms based on supply and demand. In some regions, particularly large metropolitan areas, healthcare providers are therefore confronted with increasing competition mandating the development of marketing and sales strategies for individual healthcare providers.

**Points to take onboard:**

- Current health systems based on state-governed regulations have failed to provide affordable and efficient healthcare.
- The introduction of market mechanisms based on supply and demand to healthcare is rapidly gaining acceptance.

### Healthcare: a special product

In an abstract sense healthcare is a product rather different from most other commodities. From a customer perspective it is of unsurpassed value, as it represents the virtual bases for a productive life. Despite its importance to the individual patient, it is difficult for the customer, i.e. the patient, to define its monetary value or the required product quality. Healthcare providers expect their patients to trust that their product is of high quality and priced correctly. In view of the multitude of regulations governing the way healthcare is provided, patients only too willingly place this trust into healthcare providers and their professionals including physicians, nurses and technologists.

Unfortunately, the reliance on rules and regulations to assure sufficient quality of healthcare is not really warranted. In contrast to all other products, regulations governing the health sector only affect the process of administrating healthcare regardless of outcome. If the same principles were applied to the production of cars,

the assembly of brakes in a car would be regulated, whereas performance of the same brakes would not be subject to any checks at all. Increasingly patients are becoming aware of this central shortcoming of European healthcare systems. Pressure has grown to a point where even governments are reacting. New rules and regulations are being implemented. Most again fall short of what is needed: transparency of quality and pricing for healthcare products to the customer, i.e. the patient. Hence, efforts to provide reliable quality data can be considered one of the most important contributions to any health marketing strategy.

The process of pricing healthcare products has remained as elusive to the average patient as the assessment of product quality. For many healthcare services patients do not even receive a bill. Rather, payments are provided by anonymous insurance or health service agencies, in accordance with rules lacking in transparency - and frequently sense. For the healthcare market to gain in efficiency, it is of utmost importance that pricing becomes transparent to the patient. Clearly this does not mean that invoices also should be paid directly by the patient. Rather, the underlying insurance system with acceptable co-payments should be maintained.

**Points to take onboard:**

- For market mechanisms to unfold their desirable effects, healthcare products must become far more transparent to the customer, i.e. patient, regarding pricing and quality. The latter should be based on outcome and should represent a central theme in all marketing strategies.
- While transparency in pricing requires patients to be billed, it does not require the patient to pay those bills themselves. Rather, the underlying risk sharing systems should be maintained as payers.

## Hospital marketing strategy

Most healthcare professionals would probably associate marketing with advertisement strategies. First and foremost, such strategies should focus on information to the patient. Transparency should be provided regarding the quality of the medical products offered. The creation of an attractive and content-rich internet platform clearly represents a corner stone in this undertaking. Furthermore, occasional press releases that document the success of medical treatments should be prepared and distributed into all available channels. Finally, advertisement strategies can also include direct marketing measures, such as letters to treated patients outlining progress in diagnosis and therapy regarding their disease. The healthcare provider should be careful however to respect all laws and regulations governing advertisement in the healthcare sector in most European countries.

Marketing however covers far more ground than mere 'advertisement'. In a sense marketing represents the very core of any company by first and foremost defining a product portfolio.
Hence we can summarise as follows:
The central aspect of any marketing concept relates to the definition of products
Advertisement strategies only represent the tail end of a marketing concept.

## Product portfolio

In our current hospital world product portfolios, by and large, have developed in a historic sense. While there are variations in the number and type of healthcare products offered by different hospitals, few providers have consciously decided upon what is offered as part of the existent product portfolio. Rather, portfolios appear to be the results of historic processes based on individual physicians interests and abilities as well as perceived patient needs, expressed by insurance carriers. Frequently, a hospital offers various healthcare products for no identifiable reason at all.

As a first step in the process of developing any marketing strategy, the currently offered products should be listed. Using portfolio analysis tools, each of these products should be analysed in terms of quality, profitability, and future relevance. The assessment of quality and profitability should be based on comparative benchmarking data. Both factors generally relate to volume. Thus, there is ample data to illustrate a direct relationship between outcome quality of a particular procedure, or operation, and the number of times that the procedure is performed within the same hospital in a given time frame. Case volume has also emerged as a direct predictor for cost. Similar to most other products, economy-of-scale effects also contribute towards reduced cost of medical procedures. Put differently: the same procedure becomes less expensive if it is performed more often within the same hospital.

**Points to take onboard:**

- Product Portfolios should be consciously defined based on different criteria including quality, cost and 'future relevance'.

## Unique selling Proposals (USPs)

Future relevance of products relates to existent Unique Selling Proposals (USPs) of the hospital offering the product. Each hospital should define these USPs, which set it apart from its most direct competitors. USPs can relate directly to the type of patient group served by the hospital (community hospital vs. specialised referral centre), medical services on offer (cardiac surgery, organ transplants), or the quality of care provided. In addition to this, USPs can also relate to aspects of process affecting all products, such as a special means of nursing, the implementation of a quality assurance programme or a particularly innovative means of electronically archiving medical patient data.

*continued on page 12*

*continued from page 11*

USPs should be designed to be as defensible as possible. Thus, USPs that can be easily copied by a competitor are of considerably less value than those that will remain truly unique - preferably over a very long period of time. Put differently: Unique Selling Proposals should be associated with 'high barriers of entry' for any potential competitor.

For a University Medical Centre, the following USPs seem relevant:

***All products requiring an interdisciplinary approach***

Because university hospitals will generally be home to more sub-specialists than other hospitals, diseases that require a multi-disciplinary approach will be treated in a more efficient manner.

***Complex diseases requiring intensive care***

Because university hospitals are generally equipped with vast intensive care resources, they should be used to treat the most complex disease *entities that require such services.*

***Ability to adapt to new therapies***

Because university hospitals encompass research, as well as medical care, it should be far easier to implement new medical advances in healthcare products.

Once defined, USPs should be checked against those products that have been determined as being of high quality as well as high profitability. In the end, only those products that combine defensible USPs with high medical quality and profitability should be further developed and entered into a future product portfolio.

**Points to take onboard:**

- USPs can relate to various aspects defining the character, infrastructure or medical abilities of a hospital
- Defensible USPs are those associated with high barriers of entry for any direct competitor.

## Sales strategies

Once a product portfolio has been defined, the hospital infrastructure has to be developed in a manner to strengthen the ability to deliver these products at maximal quality in minimal cost. These efforts should be made transparent to the customer by publishing them on the web. Furthermore, these efforts must provide the bases for any direct sales strategy that, in common with all other industries, can only be based on quality and pricing. In this regard it will be most important to provide transparency regarding the definition of quality. Clearly, these aspects will need to be regulated in a homogeneous, hopefully European manner.

**Points to take onboard:**

- Any sales strategy must be based on transparency regarding the quality and pricing of the medical products offered.
- Attention must be paid to existing laws and regulations governing the healthcare sector.

## Summary

Healthcare is rapidly evolving from a totally non-transparent and heavily process-regulated system to a competitive market. To survive in such a market, hospitals will require the conscious development of marketing and sales strategies. These should be based on a product portfolio defined by quality, profitability and Unique Selling Proposals. The basis of marketing and sales strategies must however lie in providing transparency to the customer, i.e. patient, regarding outcome quality and pricing of healthcare products.

# COLLABORATION BETWEEN IMAGING FACILITIES

## Peter Bogner MD PhD describes current projects aimed at enhancing patient care in South-West Hungary

Diagnostic imaging information plays an increasingly significant role in healthcare, primarily due to advanced imaging techniques. In addition, recent developments in information technology add major advantages that can improve the use of diagnostic imaging information as well as the medical and financial efficiency of imaging procedures. In fact, recent IT solutions offer a safe and flexible access to digital images in a wide area network that is currently developed and/or used globally.

Along with becoming a member of EU, in Hungary the reorganisation of public administration has begun. This means that the former three counties of South-West Hungary will join to form one region among the five that will represent Hungary in the future. This process seems to evolve somewhat slowly, but EU financing helps to establish different organisations that will function according to this concept in the near future. One such example is the development of a medical IT system in South-West Hungary that will be shared by nine institutes of different size and competence. There is, of course, a hierarchical organisation of healthcare in the region, where the clinical departments of a medical school would represent the highest professional level followed by three county hospitals and several outpatient services. The principle aim of the regional medical network to be developed is the sharing and easy communication of medical information, gained through the diagnostic and therapeutic procedures in which a patient has been involved at certain institutions. No doubt that imaging information is the most demanding, especially in terms of its size and proper visualisation.

There have been two main trends for storing and sharing diagnostic images in a wide area network:

- to maintain large central (in our case possibly regional) archiving facilities that can be accessed by each institute
- local archiving that is maintained by each institute and shared data through some kind of data broker.

Large central image archiving facilities appeared to have several advantages, like bulk storage rates; operation by a dedicated professional staff for data management and for hardware support and high level of physical security. This concept involved easier technological migration, which is a major issue for any local IT staff. Since healthcare financing is nationalised in our country, the national health insurance company would have much easier financial and professional control. Surprisingly, this was not chosen by the participants, but decided so as to develop local archiving and share data on request. Why? The main reasons could be defined as:

- concerns about legal issues
- data ownership
- responsibility for lost data (short term)
- authorisation
- concerns about archive security - as in many countries, in Hungary decades of medical image and data archiving is mandatory by law
- psychological reservations, because system administrators and hospital managers prefer to hug their own data.

So how could the image data sharing problem be solved without large central archives?

Current industry standards, like DICOM and HL-7 are inadequate for this purpose. These standards don't address issues like proper authorisation, access rights, and on-demand features for wide area network. The solution for the problems has to be some kind of data broker, and that must comply with the standards as well as extend them to meet the needs of this distributed environment. Institution policies for data identification may be different regarding study and patient identification that can be solved with a custom mapping for data identification. Similarly, authorisation should be custom-made for the different institutes and/or users. Possibly a patient index will be collected on the central server of the medical network that will efficiently help the functions mentioned above.

Another issue is professionally demanding visualisation of images that complies with the workflow and organisation of current needs. Sending the full data set is also prohibitive and time consuming, burdening network load. However, today, IT technology and solutions make it possible to transfer studies as big as 100 Mbytes within a few seconds. Visualisation of images might be done on some DICOM workstations, but their local accessibility to multiple users is questionable. Teleradiology would provide another solution, nevertheless features currently available are limited compared to the dedicated DICOM workstations. So, our purpose is to overcome the limitations of either solutions and to demand features (comparison studies, link feature, collaboration, dictation support, a remote transcription service, communication with local RIS, high resolution monitor, multiple monitor capability, MPR, MIP, basic 3D features) that give possibly the best versatility.

The same project is simultaneously running in two other regions in Hungary and it is planned to extend for the entire country within the next few years.

**Professor Peter Bogner MD PhD med. Habil. Is vice-director of the Institute of Diagnostic Imaging and Radiation Oncology, University of Kaposvár, Hungary and he also works in the Dept. of Radiology, at the Health Science Faculty, University of Pécs. In his early career he was a post-doctoral fellow at Hungary's National Academy of Sciences, and at the Dept. of Clinical Chemistry, University Medical School of Pécs, as well as in the dept. of Biochemistry and Molecular Biology, Medical School of Ohio, Toledo, USA. Later he was Fogarty fellow at the Laboratory of Biological Chemistry, National Institutes of Health, National Cancer Institute, Bethesda, USA (1989-91). On returning to Hungary he worked in an institute that became the Institute of Diagnostic Imaging and Radiation Oncology. Research continued at the Department of Clinical Chemistry, University Medical School of Pécs. In the years 1997/98 and 2000 he was also a visiting research radiology fellow at the Brigham and Women's Hospital, Harvard Medical School, Boston, MA. Current research interest: cell volume regulation, diffusion MR imaging**
**The Professor's scientific publications and honours are too numerous to list**

The advent of a digital network for picture archiving and communication systems (PACS) reduces all the steps in retrieval and archiving of images and previous diagnoses to minutes - or even seconds - and links the relevant diagnostic and other departments. PACS connects all modalities (CT, US, MRI, plain film, etc) to a central computer, which for security reasons stores the image data redundantly.

To leverage such a system's many advantages, a PACS of appropriate size and scope must be chosen. Experience has shown that state-of-the-art equipment, such as a multi-slice CT scanner, can overtax a PACS that was not designed to accommodate it. Consequently, the workflow slows considerably, if not unacceptably. Therefore, before choosing a PACS, long-term planning, which includes the identification of all current and future devices to be integrated with the system, as well as the data

volumes to be expected, is an absolute must. In addition, a PACS must allow for problem-free upgrades, to accommodate unforeseeable increases in data volumes.

As with pre-PACS solutions, digital archiving also offers fast access to expensive local storage devices, which hold images from the last 3-6 months, and a cheaper, bigger, long-term storage device with longer access times. 'Pre-fetching' avoids extended waiting periods: scheduled examinations are entered into the system hours, or days, before they take place which means the computer automatically loads the patient's data from previous examinations into the short-term storage.

The most important impact of a PACS is that it reduces the time span between an examination and final diagnosis. In the past, a delay of several days between examination and final diagnosis was not unusual because previously generated images had been forwarded temporarily to the patient or a physician. Today, with an adequately sized PACS and well-functioned pre-fetching, all images are available within minutes at all diagnostic workstations. The 'down time' of a radiologist and time to final diagnosis are reduced significantly.

# Buying a PACS? Think first!

## Considerable analysis must influence your choice of system, advises Helmut Ringl MD, of the Department of Diagnostic Radiology at the University of Vienna General Hospital, where life without a PACS is now 'unimaginable'

Helmut Ringl

Ideally, after the implementation of a PACS the entire workflow runs in the background - a radiologist no longer sees it. All images of the current examination and all relevant previously generated images can be retrieved with a few mouse clicks. This means that a final diagnosis is available much faster and thus the length of stay for our patients is potentially shorter.

Very often a comparison between several previous examinations is necessary to arrive at the best possible diagnosis, particularly when there are images of a previous surgical intervention. Since a PACS facilitates such a comparison - images are at your fingertips - this option is now being exercised more frequently, which without a doubt improves diagnostic quality. Furthermore, a PACS allows a quick and precise assessment of pathological changes by the comparison of current and previous examinations - a particularly important issue for hospitals with an oncology department.

With a PACS it is practically impossible to lose x-rays. Consequently, there are considerably less repeat images that put an additional radiation burden on a patient and are costly. As soon as all modalities are integrated into a PACS it is possible to re-organise staff capacities. On the other hand, additional technicians are required to control and maintain the system. Obviously, a PACS has to interface with the hospital information system (HIS) and, if available, the radiology information system (RIS). Patient data in the HIS are transferred to the RIS for scheduling purposes and then forwarded to the individual modalities. Thus, potential patient mix-ups become less likely. Fully compatible interfaces between the systems are essential to ensure error-free exchange of patient and diagnostic data. Experience has shown that the organisation and administration of such a system is easiest when as many programmes as possible are produced and upgraded by one single company. If there are interface problems it is often impossible to determine which programme or company is the source of the problem - a fact that inevitably leads to conflicts and accusations between the different vendors involved.

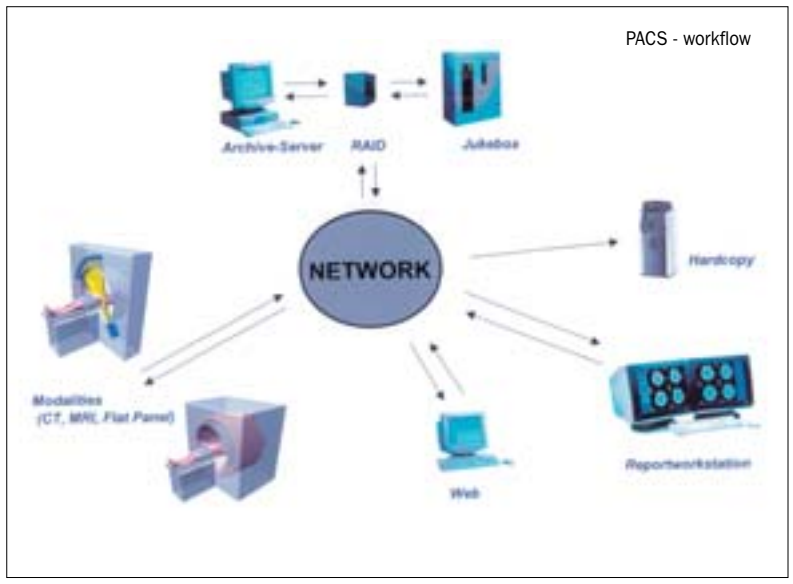
Additionally, modern PACS are web-enabled, which means images can be retrieved from every hospital-PC with an internet or intranet connection and the appropriate access rights. This improves communication between the referring and radiology departments. Most PACS already provide telemedicine modules, to be easily integrated on demand.

In a research environment the advantages of a digital archiving system are obvious. Comparisons between different examinations are easily achieved and no longer require additional costly prints. Moreover, measurements and quantification can be generated digitally and images can be transferred easily without loss of quality to presentations. In addition, pathologies can be searched for key words.

The overwhelming number of workflow and organisational advantages notwithstanding, a PACS has one crucial disadvantage. When such a system is completely down, the entire workflow comes to a standstill, and diagnosis is virtually impossible. Therefore, it is crucial that not only the system provides appropriate redundancy, but also that there are effective service and maintenance contracts and/or competent technicians who can react promptly to a problem.

In point of fact, a PACS significantly speeds up workflow and simplifies the organisation of a radiology department. It has become standard in all medium-sized and large hospitals, and also in my hospital, the Vienna General Hospital, where it is now hard to imagine our daily radiological routine without a PACS.

PACS - workflow




For all readers interested in getting information about the Hospital Administrator Forum at the ECR 2006, please put a cross ☒ in the reader survey, page 8 in the ECR supplement!

# Financing a turnkey project in Poland

The Kopernik Angio Centre, which opened last November in Lodz, Poland, is a five million euro turnkey project. In 1998, the radiology department at the Kopernik hospital needed modernisation, but the hospital's owner - the province of Lodz - could not afford such a large investment and, as a public institution, the hospital itself could not seek a financial loan.

A way around the problem was found 1999, by Dr Jozef Tazbir, the hospital's director: a limited liability company would be founded, which could raise the capital. As a result, the im Kopernika PPP (PFI) turnkey project was realised by TMSE-OD, in cooperation with the finance company De Lage Landen International B.V. headquartered in Eindhoven, The Netherlands and TMS Sp. Z o.o. representing Toshiba Medical Systems Europe.

The project included construction, two complete angio systems (Infinix CS-I with FPD and VC-I with FPD), an ultrasound unit (Aplio 80CV incl. Nice), 16 complete CCU beds and a fully computerised department (including a Cardiac PACS). EH spoke with **Dr Jozef Tazbir** and **Henio Sobiscewksi** of Toshiba Medical Systems Europe (OD), about the project.

In Poland, loans must be requested from a hospital's owner, which is often the provincial government. For this project, Henio Sobiscewski explained, the bank required a guarantee from the province. 'The government, however, avoids issuing such a guarantee because it has a negative impact on the public budget.' The way around this was to found a limited company to outsource the radiology services. 'The entire radiology department with the exception of oncological radiology, was closed down and the staff was laid off, then immediately hired by the company,' he explained.

'One advantage in this is that we can schedule the staff differently and more flexibly,' Dr Tazbir pointed out. 'In Poland, there is a law limiting working hours for radiology staff to a maximum of five hours daily. Initially, that was intended to protect staff from radiation. The law applies to all staff - physicians, technical personnel or MTAs - and severely limits work that can be done in a radiology department. The company took the entire personnel on board - but on a freelance basis. So, today, our radiology staff is not permanently employed but provides radiological services as freelancers. This construct allows us to schedule working hours flexibly and according to demand.

The hospital agreed to this arrangement, because that was the only way to raise funds for the radiology department. Due to this concept we can now offer the entire range of imaging procedures. We installed a new CT and an MRI and the ultrasound and endoscopy equipment was upgraded. This first project, which also encompassed a PACS, was completed in 1999.'

Asked whether the negotiations were only possible because Dr Tazbir was administrative director of the Kopernik hospital as well as managing director of the company, he replied: ' That is not entirely correct. In my function as administrative director of the hospital I represent the interests of the owners, meaning the province. The hospital holds 86% of the shares of the company, which has its own managing director. The other 14% is mainly in the hands of private owners. That simply happened when the company was founded 16 years ago.'

In terms of financing the project, Henio Sobiscewksi said funds could be raised for two reasons: 'First, because we had founded the limited company, as explained, then because the hospital has a lot of potential - it has 900 beds, all medical disciplines are represented and it is obvious that the hospital needs a decent diagnostics department. On the basis of the outsourcing and service concept, we could develop a business plan that laid down how much money was needed for what, how many services and what equipment had to be purchased, etc. This business plan was presented to DVI, an American financial services company, because the Polish banks didn't want to finance such a project. Dr Tazbir and his colleagues rushed from pillar to post to get the banks to provide the money. DVI was specialised in the healthcare area and it finally took over the financial aspect. The firm looked at the strategic position of the hospital, for example size, specialisations, cooperation with the university, potential for expansion, and location, i.e. Lodz, a city with 1.5 million people and a big catchment area. Those were all factors that influenced DVI's decision.'

However, a considerable setback occurred when DVI failed and a new investor had to be found. 'We spoke to many banks in and beyond Poland, but none were interested,' said Henio Sobiscewksi. De Lage Landen, which was about to position itself in the healthcare market, saw the project as a challenge and took over its next phase.' Although new in the Polish healthcare market, De Lage Landen quickly analysed the hospital and, within a couple of weeks, a positive decision could be taken on financing the project. 'The first step was the purchase of a CT,' he continued. 'A second project concerned mammography; the third created the technological framework for interventional radiology: two angios and a cardiological ultrasound were installed and an intensive care unit with 16 beds was built.'

This changed the department's structure: whereas before, patients were returned to a ward with no patient monitoring system, now, after an intervention a patient can remain in the 16-bed ICU overnight to be monitored.

The business plan included the option to admit private patients. 'Public hospitals in Poland try to admit all patients, including private ones,' Henio Sobiscewksi explained. 'Unfortunately, that is only possible when the patient has a contract with a public insurer in addition to this private insurance plan, but even then, he'll be put on a waiting list. In the Polish healthcare system you cannot just open your wallet and buy any service you want. However, with a company that's possible.' In theory, he added, just as a limited company can issue an invoice, so can a public hospital, but that would violate the Polish constitution, which requires that all patients be treated equally.

So, is there a trend towards privatisation in Poland? 'That's what the government says it wants. But the future will show what measures politicians will in fact adopt in that respect,' he replied.

The angiograph room

Ultrasound

The ICU

**Celebrating the opening in Lodz were Dr Jozef Tazbir; Johannes Eenhoorn, director of TMSE; Piet Grootenboer, a member of the European Management Board of De Lage Landen, and representatives from Toshiba, the university and hospital and local government**

**DE LAGE LANDEN INTERNATIONAL B.V.**

**Operating in over 20 countries throughout Europe, the Americas, and Asia Pacific, De Lage Landen specialises in asset financing and vendor finance programmes and offers an array of commercial finance solutions. The firm's particular focus is on food & agriculture, healthcare, office equipment, IT and telecommunications and materials handling & construction equipment.**

**In 2004, the company expanded its European healthcare leasing capabilities, aiming to focus on establishing partnerships with suppliers of various categories of medical equipment, e.g. diagnostic (X-ray, MRI, CT, PET and Ultrasound), as well as equipment for radiation therapy, patient monitoring, the operating theatre, laboratory, homecare (wheelchairs, beds, etc.), plus medical filing systems (PACS), and dentistry.**

**For the 2004 period, De Lage Landen predicted profit growth to €140 million and a balance sheet total to €15 billion.**
**Details: www.delagelanden.com**

# PARTNERSHIP IS IMPERATIVE

## Clinicians+management+vendors: links in the chain must be strong to successfully integrate PACS, says Mark Simon

Partnerships between clinicians, administrators and those who supply IT systems are central to the success of harnessing sophisticated Information Technology (IT) to improve healthcare delivery - and the focus of a change in diagnostic services has to be on its benefits to patients and clinicians.

PACS is particularly relevant because the system is an overwhelmingly important tool for specialists - e.g. diagnostic clinicians, including chest surgeons, radiologists and oncologists - since it will replace existing tools such as light boxes, film and traditional reading.

Any vendor that does not understand the importance of working together, as a team, to support the change in processes due to a major PACS installation, becomes history. In such a partnership, certain issues must be addressed for each stakeholder:

### The patients

Patients are often not the first audience to be involved in healthcare IT projects. However, the will and needs of patients in European healthcare systems are central to the direction of the current IT healthcare project in England - the Government's National Programme for Information Technology (NPfIT) - which is also true wherever politicians are responsible for funding and guaranteeing healthcare delivery.

For patients, it is essential that they can choose the time and place of their specialist appointments, including those for diagnostic imaging. Also fundamental to the ongoing political will, plus huge investment for the NPfIT, are 'benefits' for patients. The patients come first!

### Clinicians

Equally important are the clinicians (radiologists/ radiographers, doctors/nurses) who understand that technology provides a positive way forward and improves their ability to make expert decisions more cost-effectively and quickly.

Clinicians need to be involved in the suppliers' plans - however, in practice this cannot mean that they can wholly redesign a vendor's system in each case. This, unfortunately, this is an expensive legacy behaviour, which is proving difficult to 'unlearn'.

### Vendors

In turn, vendors must recognise that their systems must be sufficiently flexible and universal in delivery, to address a wide range location and interpretation of clinicians' needs. This may require them to adapt proven technology and to explain that technology to clinicians who are not inherently, as has sometimes been alleged, 'anti-progress' or 'reactionary'.

### Financial staff and administrators

This group has to recognise that for every euro they spend on IT - both software and hardware - three euros has to be spent on education and training, and it should be done enthusiastically while improving the quality of patient care. To ensure a system is adopted, this not only involves a partnership, but even a 'selling role'.

At ComMedica, the UK-based healthcare IT specialist firm where I am Chief Executive Officer, we are playing an important role within the National Health Service's NPfIT. As a PACS provider to an alliance led by the Computer Sciences Corporation, where we work alongside Kodak, we have seen the elements for this co-operation from the first stage of contractual negotiations.

**The success of the project to date results from:**

- Enthusiastic Government backing and central funding for what is the world's largest IT project. There is a positive commitment to transform patient care
- The clinicians are organised and educated in what is a far-reaching technical change project, and are beginning to work closely with vendors
- Vendors being organised and ensuring that systems link-up with the integration companies, such as BT, CSC and Accenture, which are committed to long-term associations with their hospital customers
- Chief executive and finance directors of healthcare organisations, such as the UK's NHS Trusts, being ready to set aside funding, both to implement the technology and underwrite the necessary infrastructure change programmes, particularly education and training.

In England, there has been a promising start, although there still will be many bumps on the road ahead. However, the only way forward is in partnership between these constituencies week-by-week, month-by-month and year-by-year.

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# Integration for comprehensive solutions

**Marcus Ostländer, Radiology Solutions Business Manager, Europe, outlines the innovations and strategies of the AGFA HealthCare Division in an EH interview at the RSNA**

The Agfa HealthCare Division's motto in 2004 became I*nspire, Transform, Achieve*, and the visual presentation at the RSNA, emphasised that IT and high-tech are at the centre of the firm's healthcare business, Marcus Ostländer pointed out: 'You won't find any films at this exhibition stand. Our strategic orientation is towards the Solution Business, and our hospital-wide IT solutions cover not only radiology but also many other medical fields, such as mammography, cardiology and orthopaedics. We are not looking at individual products but at integrations into comprehensive solutions.

'In Computed Radiography we have two new systems, the CR 25, a single-plate-CR system, and the CR 75, a multi-plate system, and both can also be used for mammography images. This is important for radiologists, because CR in mammography is currently a very hot topic in Europe. We also have the brand new CR50, a computed radiography system with the kind of picture quality previously only achievable with DR. So, we have combined the flexibility of the CR system with the image quality of DR equipment.

'The next most important topics in radiology are PACS and RIS,' he continued. 'The flagship of the market, our IMPAX ES - Enterprise Suite - comprises integrated PACS/RIS diagnosis solutions for radiology in general, but also for mammography in particular, including CAD. We also offer IMPAX solutions for cardiology and orthopaedics, which can be integrated into the entire hospital concept. This includes appointment planning across a hospital and, of course, the integration of images with electronic patient records (EPR).

'Our next generation IMPAX is being shown as a work in progress. One highlight of this further development is the so-called persona-based design. Our teams of experts have analysed how many users work in different situations in a hospital and established different user types, so-called personas, from that analysis. These personas can be radiologists, clinicians, X-ray technicians or systems administrators, and they all have different requirements regarding specifications for visualisation and context of images, patient, department and systems information. We are not talking about special work stations for certain applications - every IMPAX user is given a customised desktop, depending on their personal profile, which makes the system very flexible and efficient. This can be within the hospital or also for access from remote locations, with transmission via intra or extranet. Our user-management is flexible in terms of system maintenance, the creation of user groups, user profiles and the distribution of access rights for users, particularly in academia, where many students also work. We combine utmost compliance with the requirements for security and access to patient data with simple, flexible administration. For instance, system administrators can check it over from any location in the hospital, and set up users and adapt profiles.'


Asked about new developments innovations in fields other than radiology, Marcus Ostländer mentioned orthopaedics. 'We have taken components from the IMPAX environment for support in the choice of implants in a filmless environment. For example, the procedure to replace a hip joint with implants used to be carried out by taking an X-ray and then trying out as many different templates on the X-ray as it took to find the right prosthesis. In a world without film we now have elegant digital solutions for this problem. X-ray films are no longer being used here - the image is called up at a special IMPAX orthopaedics workstation where the surgeon can choose from over 12,000 implants for different uses, including screws and nails. Digital superimposition facilitates finding the ideal implant and planning the operation, with the plan made available through web-based image distribution in the operating theatre. This has been in use since the beginning of 2004, and we have now extended that solution with a so-called trauma package - particularly suitable for treating multi-trauma patients. For example, the system provides a choice of screws for fixing fractures and suggests how they can best be used.'

In terms of networks and projects, Marcus Ostländer said the firm is looking at the healthcare services, and particularly those that support the successful implementation of PACS/RIS projects. 'This begins with project analysis, which determines how the workflow functions, what the configurations look like and what changes are to be expected for the workflows,' he pointed out.

But what does the term health services mean in this context: where do they begin, end, or overlap?

'A good question,' he replied, 'seeing how radiology is obviously integrated into all processes in the hospital. Initially we are talking about services that are required for the digitisation of a hospital. At this stage, we also act as consultants, asking how a hospital works, how the radiology department works, where are the interfaces with the clinicians, what is the workflow like and what should it be like, and what are the objectives that we are trying to achieve through digitisation. However, these services do certainly also comprise technical solutions.

'Our Solutions Monitoring and Management Services (SMMS) can constantly monitor the activities of the entire digital network and its connected components. This can then provide us with statistics on the volume of data, systems capacity and utilisation - information usually required by senior radiologists, who need to know what's happening in the department, how workstations are being used and what capacities are like. Hospital administrators also require that information, to know what the workloads and utilisation of equipment are like and what trends can be seen with the data volume. The system can provide short-term analyses or determine long-term trends.

Another important feature is pro-active remote diagnosis and maintenance, which practically prevents system down times, because corrective or error-preventing measures can be taken before the user even notices an error. In other words, you have extremely high stability with this system.'

Where would this control unit be based? 'Think of it less as a physical component but more as an intelligent software solution that can be used, for instance, by a systems administrator with appropriate access, who is then provided with all the information and statistics and who can carry out remote diagnosis and maintenance through communication with the AGFA service network via secure gateways.

Moving on to the subject of cardiology, Marcus Ostländer said the firm has entered into a co-development with Heartlab '... a very renowned and successful provider of cardiology information management systems in North America. They develop planning, diagnosis- and structured reporting systems. Just like radiology, cardiology uses data from different imaging modalities, and this data from different systems, e.g. MRI, ultrasound and ECG, must come together. Our new system, which is integrated into the design of the Impax environment, facilitates this.'

Mammography was the last topic to be discussed, and we asked about the firm's current competitive role in this field, to which he replied: 'We have a digital diagnostics station, the MA3000, which is part of the Impax range and developed especially for women's care, i.e. the workstation was developed for mammography images diagnoses. It automatically supports the special requirements for imaging formatting and positioning, as well as the indication of results for possible CAD processing. Apart from CR systems used in mammography we also offer digital direct-mammography - a particularly exciting area because, although there has been a lot of digitisation, mammography is the last area that, in most cases, is still done in the analogue format.

'The high image quality of digital mammography - both CR and DR- has been documented. But the real point is that the digitisation of mammography will allow complete digitisation of radiology as a whole. Conventional X-rays will be replaced by CR systems. The end result will be a digital image. However, mammography currently still works with films. So if you have to keep the film processing side going exclusively for mammography, switching to a digital system is a very attractive prospect. Screening programmes, which are currently the subject of much discussion, require high capacity and fast availability of images. We have a digital mammography solution that is complemented by the appropriate diagnostics station, which, in turn, is integrated into the Impax environment.'

## AGFA ACQUISITIONS

In November Agfa-Gevaert announced that it would acquire the private Bonn-based firm GWI AG, a leader in healthcare IT. Prior to this it had acquired the French healthcare IT firm Symphonie on Line.

Founded in 1990 by Dr Jörg Haas and Dr Rüdiger Wilbert, co-owners with General Atlantic Partners, a global private equity company, GWI develops and markets administrative and clinical IT solutions for hospitals, in the German speaking region, through its fully integrated and scalable IT system ORBIS, which encompasses a fully integrated range of general administration, workflow and documentation systems, as well as highly specific clinical departmental systems. GWI's customer base comprises over 2,000 medical sites in Germany, Austria, Switzerland and France.

By combining solid organic growth with a series of acquisitions, GWI, with around 890 employees, expects to realise revenues of around 100 million euros in 2004. Taking account of the expected revenues of GWI's recent acquisitions, the German company BOSS and the French company europMedica, the group's 2004 revenues are estimated at 118 million euros, with an operating result of 20 million Euros. Dr Jörg Haas and Dr Rüdiger will be in charge of the further development of this business within Agfa's HealthCare division. 'Due to our homogeneous product portfolio we can now drive forward the complete IT engine, including the complex range of applications for the hospital, with a superior cost-benefit ratio,' Dr Wilbert said.

NEW

# Prosound Alpha 10 to be launched at ECR 2005

A new ultrasound system, made by Aloka and named Alpha 10, has been developed for clinical applications that include general Imaging, radiology including contrast ultrasound, OB/GYN including 4-D technology, and all other clinically relevant niches, the firm reports.

Aloka, which has carried out R&D in ultrasound for over 50 years, reports that, with its ProSound Alpha 10, it will introduce new *Ultimate Compound Technology*, which has four elements.

### The Compound Pulse Wave Generator

This is the full digital beamformer's 'heart', says Aloka. It enables the beamformer to actually design the transmitted waveform as an exceptionally precise beam, providing enhancements in focus accuracy, spatial and contrast resolution. 'Since all components are fully under digital control, Aloka's Alpha 10 is ready for further and new application of ultrasound,' the firm points out. 'In addition, the accuracy of the transmission/ reception delay is up to eight times higher than conventional digital beamforming. With the aid of the Compound Pulse Wave Generator, radiation of unnecessary sounds is suppressed, both in frequency and space. The results are highly precise waveforms with excellent suppression of artefacts.'

The Compound Pulse Wave Generator, said to be unique in the industry, is the best technology approach to get best results from the new Compound Array Probes, the firm adds, explaining: 'New Compound Array Probes enhance focus precision in the elevation direction and enable beams to be focused homogeneously. This new technology is available in various probes. Also new are Aloka's 3-D probes, supporting the inbuilt compound 4-D engine. This combination provides highest performance level in the industry dedicated for sophisticated 4-D examinations in obstetrics and also other applications.'

The firm describes the system as a compact, mobile unit with the smallest footprint size in this segment and the most modern user interface - to ensure comfort, safety and speed.

Various scan methods, image formats, store media and interfaces are supported. New and additional probes expand the wide range of applications including 4-D probes, Compound Array probes, as well as acknowledged HST series probes.

Data storage meets the current standard. Apart from fully PC and DICOM standard support, data can be stored on a wide range of media, e.g. DV tales, DVDs and digital prints.

**Upgrades** - The system's flexible, scalable architecture allows for hardware and software upgrades. Raw Echo data can be stored intact through digital signal processing, Aloka points out. 'Analysis utilising raw data by using RF signals can benefit from these further developments and will be available for later, on developed new tools to analyse the raw data.'


# What PACS integration will mean to our services

**Working in conjunction with Sicily's biggest public hospital, the radiology department at The University Hospital of Palermo carries out around 100,000 examinations annually and employs 35 physicians and biologists and has over 50 students**

Prof. Robert Lagalla

In an interview with EH, **Professor Robert Lagalla**, head of the department, discussed the current installation of a PACS that will serve the central radiology department, linking with all the hospital's departments and services - a few kilometres away

At present, Professor Lagalla pointed out, there is no hospital information system (HIS), but it is under development: 'The problem is that not all departments are connected to one system. Administration uses a different one than we do,' he explained. 'Basically, they use it to carry information. Ours is faster because we need to transmit images. Also, a PACS is being installed, and we will integrate all the different radiological modalities into it. (A device called PAXPORT will link single non-DICOM output modality into a DICOM network for PACS image management and archiving, for the modalities that do not have network interfaces).

'As it is still being installed, it's too soon to evaluate the effects of the PACS on our efficiency. However, we believe that, in a few months, the new system will improve patient care by enhancing the entire department's workflow. Additionally, archived images will help to streamline the department's educational and scientific activities.

*Who will run the PACS, and will the staff adapt readily to the new system?*

'A team of three or four people, probably IT personnel and radiology technologists, will run the PACS in shifts. Agfa will train them and also provide support when they need help. It's too soon to evaluate the effects of the new system on the staff, but based on the experience of other centres, we foresee that it will take 3-4 months to use the RIS and PACS systems properly. Our goal it to be high on the plateau of the learning curve within six months. Then I think the PACS will make it possible to improve the work between the biggest hospitals in Sicily, because we will be able to exchange examination results very easily - for research and study based on the same information, and probably for telemedicine.'

Prof. Werner Schlake

# ADVANCEMENTS IN TELEPATHOLOGY

remote areas. Therefore, it is crucial to establish a network of pathology expert knowledge. One of the most fascinating tasks of the German Professional Association of Pathologists is to promote and foster such a network.

This is an ongoing process, because we have to adjust permanently to rapid technological developments. Until recently, telepathology was a rather limited application - we simply did not have the required computer storage capacities. The data volumes generated and processed during the digitisation of a single microscopic slide are many times larger than those of an X-ray image, which is basically due to colour and detail. In a pilot study in our institute we found that the average data volume of one microscopic slide is 800Mb - one microscopic slide! For certain diagnostic procedures such as breast cancer we need ten or twelve microscopic slides. However, today storage capacities have grown manifold, and at the same time prices have dropped significantly. Consequently, storage capacity is no longer the limiting factor it was a couple of years ago. The second important aspect is the scanner. The microscopic slide has to be scanned as a whole, or we have to take individual photographs at the microscope.

To help our members to begin telepathology the association installed a server, which, for personnel and financial reasons, is located at the Charité in Berlin. Currently, it is used primarily for the pilot project on mammography screening (see box). Every member of the association has access to this server, to ask for or render a second opinion. That means, at his microscope the pathologist creates a digital image of the specimen in question in different magnifications, and stores them on his hard drive. From there he downloads the images onto the server. Within a predefined time span, a competent colleague will render a second opinion. For us, this is the only way to explore the possibilities as well as the possible limitations of telediagnostics. How far can we go? Is the diagnosis based purely on digital material as good as the immediate microscope diagnosis? We don't know for sure yet, but I assume it will be very close. Current technological development has shown that digitisation is the way of the future.

***How is it guaranteed that, when downloaded to the server, the image quality is acceptable and comparable?***

We provide guidelines concerning the technical minimum requirements, so the images will all be of decent and comparable quality.

***Can all pathologists afford those technical requirements?***

Definitely. There is just one issue that might pose a bit of a problem: the telephone lines. Universities usually have 100 megabit lines, but that is the exception. We try to achieve adequate results with 10 megabit lines. Even 2,5 megabit and DSL works - but then the data transfer does take a while.

***Will the virtual microscope, a new development, play a significant role in the future?***

Indeed, this is a fascinating development, which is still in its pilot stage. I worked with such a virtual microscope for three months. The exciting innovation is the scanning technology. This was developed by a working group in Budapest, and then Zeiss came on board and launched it under the name Miraxscan (see box). The microscopic slide that we usually see under the microscope is scanned. The brilliant innovation is the fact that one does not have to generate, store and transfer images of several microscopic slides but only one. And then I can enlarge this image on my computer, in the same way that I usually do under the microscope. That works wonderfully. This solves a problem that, until now, was considered insoluble. Moreover, this scanning technology works at an acceptable speed. Previously we needed about an hour to scan one microscopic slide. Now we need one to three minutes. You can prepare a whole set; it will be documented and marked with all the necessary data prior to the actual scan. In short: this will enable us to work on screen just as we do now under the microscope.

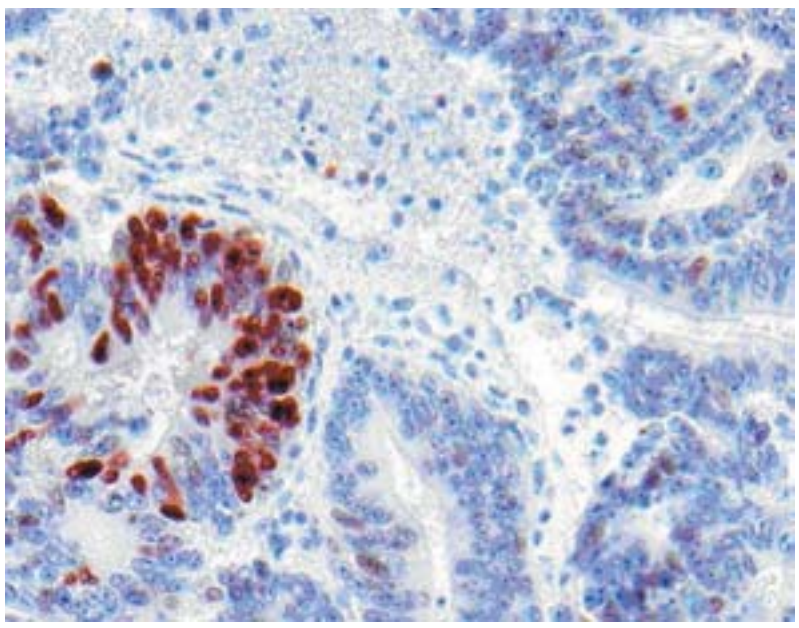
***What is needed to be able to analyse digitised images with the virtual microscope?***

Just like with any other teleconsultation project there are certain prerequisites needed: separate from the regular IT equipment a consultation server is required to up and download images. To download images you need a so-called image streaming software to enlarge the images. It works amazingly well. We tested it between the Charité and our institute in Gelsenkirchen. This scanning equipment is presently expensive, carrying a price tag of about 150,000 euros plus the storage devices.

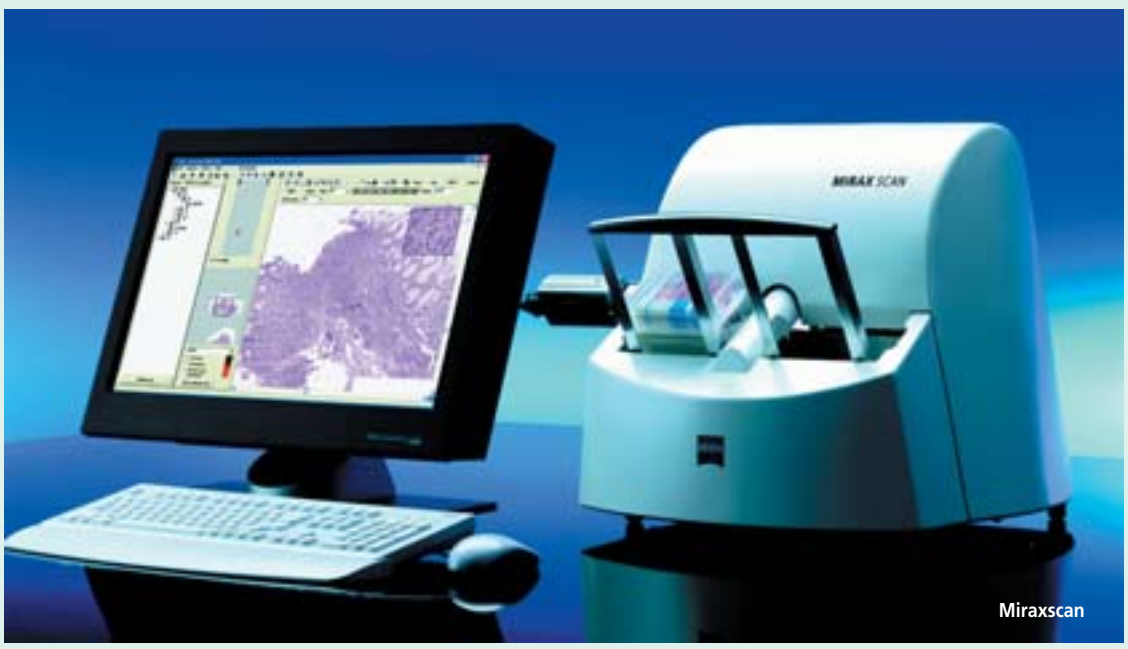
One of the other great advantages of the virtual microscope is archiving. We are asked to archive every single microscopic slide for 10 years. These are glass objects, so we have to store tons of material. And we have to be able to retrieve every single slide quickly. Digital archives would make life much easier.

***Could a digital archive really replace a physical one?***

We are not really sure about that yet, but I have a hunch that, in the end, the digital archive will replace the physical one. Consider this: in an intricate procedure water is extracted from the specimen and replaced by paraffin. In the next step this solidified specimen is embedded in a larger paraffin block. Then very thin sections are cut off that block and stained. These slices are used for diagnosis. We are increasingly asked to also archive the 'leftovers' of the paraffin blocks from which we cut the sections. With a digital archive and a physical archive all possible questions that might turn up later can be answered. With a digitised archive



**6 µm thick paraffin section. Organ specimen: (human) colon tumour, Dye: P53. Application: tumour research. Nuclear P53 labelling in a cell cluster of a colon tumour. Authors: L. Andries and M. Kockx HistoGeneX, Belgium**




**MIRAX SCAN is a fully automated system platform for digital histology that considerably facilitates the assessment of pathological specimens in clinical laboratories. Instead of using a microscope to examine histological sections, an automated scanner produces a high-resolution, digitised data set (digital slide) of the specimen, providing pathologists with new methods: diagnoses and reports can be performed at the computer, several samples can be viewed and compared simultaneously. Network connections permit access to data from several users in different locations, thus enabling a second opinion to be obtained quickly. In hospital environments, data can be integrated into existing information systems and archived.**

**The system allows processing of 300 slides in one batch without user intervention, with digitisation requiring 5-20 minutes, depending on the size of the section. The high-resolution system monitor provides the user with the same field of view as the microscope, but offers better ergonomic convenience than viewing through an eyepiece. The software permits fast screening of specimens on the monitor, marking of regions, compilation of reports, and teleconsultation via the Internet. This makes histological evaluation of specimens and preparation of the diagnostic report independent of place and time.**

**MIRAX SCAN is a joint development of Carl Zeiss AG, IBM HealthCare Solutions and Hungary-based 3DHISTECH, who developed the system with clinical users.**

alone that might not be possible. For example, many large institutes archive the paraffin block when cancer has been diagnosed. Recently, a new treatment for a certain kind of breast cancer was developed: if the tumour cells carry a certain amount of HER2/neu-proteins, an antibody therapy can be initiated. For the women concerned this is an interesting alternative, since with this antibody therapy a surgical intervention is no longer required. If a woman who has been diagnosed with breast cancer a few years back considers such a treatment, the physician first has to analyse the cells. To do so, he can examine the original paraffin block - if he archived it. If not, the woman has to undergo another biopsy. Therefore, we are asked to archive all blocks for 15 years. Digital archives - that would be the ideal solution.

***Does digital archiving also open up new perspectives on quantitative evaluation of specimens?***

Yes, with virtual microscopy we can, for example, quickly determine percentage distributions. A software-based system can tell me that, for example, 20% of the tumour cells are oestrogen positive, and 80% are negative. Today, we use more or less vague approaches for quantification. We can also perform analyses using a proliferation marker, which tells us what percentage of cells are in growth stage. We can find out whether a tumour grows fast or slow. Here, digitisation offers many possibilities.

***So, is this the end of the traditional microscope as we know it?***

I think that the digital procedure will replace the microscope for certain routine diagnostics. When we did the pilot study in our institute we found that digitisation offers a number of possibilities that the traditional microscope can't provide. For example, I can display on screen an entire overview of several specimens on one screen - extremely important in some cases. Or if one has differently stained tumour sections, you can view and compare all of them on one computer screen. I can't do that with the microscope. Therefore I believe that digital microscopy will replace certain core tasks of the microscope. But first we must prove that the digital procedure provides the same level of quality as the manual one.

***Is frozen section an issue in telepathology?***

Yes, this has a number of basic problems: first, it is performed by non-pathologists. Tactile sensitivity is very important in a pathologist's work, so it's an integral part of his training. The eye must be trained as well. Consequently, the tactile sensitivity and eye of a pathologist are quite different from that of a surgeon. Second: the staining procedure of a frozen section is limited. The frozen section does not allow the sophisticated technical procedures a paraffin block can undergo. Third: the number of intra-operative frozen sections, e.g. in mammography, is declining rapidly because breast cancer prevention and diagnostics start at a much earlier age. Consequently, malignant tissue changes are also detected earlier. If a physician suspects a tumour that he can neither see nor feel, he can perform a frozen section - but only of one or two tiny areas. The selection of these areas is random. Maybe these frozen sections do not contain any important findings, but when later the tissue is examined more closely, the pathologist does find suspicious foci, then you have to tell the patient, sorry, we made a mistake in our initial diagnosis. That is very frustrating. Therefore, frozen sections are today no longer an option with tiny lesions. Consequently, frozen section is currently no issue for telepathology. We'd rather focus on the really innovative potential of telepathology: teleconsultation. It is cheaper than the traditional method of sending out a specimen by mail or courier, and therefore an attractive option in terms of costs. Not to mention the fact that it is much faster and easier to handle. However, most importantly, teleconsultation offers the pathologist - wherever he is - access to specialist knowledge, and this means that the patient, physician and local pathologist can benefit from state-of-the-art diagnostics.

**Professor Werner Schlake, President of the Berufsverband Deutscher Pathologen (German professional association of pathologists), in Gelsenkirchen, has described teleconsultation as the most significant application of telepathology. In an EH interview we asked how this works and what the future holds**

## TELECONSULTATION IN MAMMOGRAPHY - THE PILOT PROJECT

**Mammography screening is currently being introduced in Germany. Whenever an abnormality is detected during the mammography, a tissue sample is taken for examination by a pathologist. When the legal framework for the mammography screening programme was developed it was pathologists themselves who suggested making a second opinion mandatory - to enhance diagnostic security. Therefore, the German professional association of pathologists installed a teleconsultation server at the Charité in Berlin.**

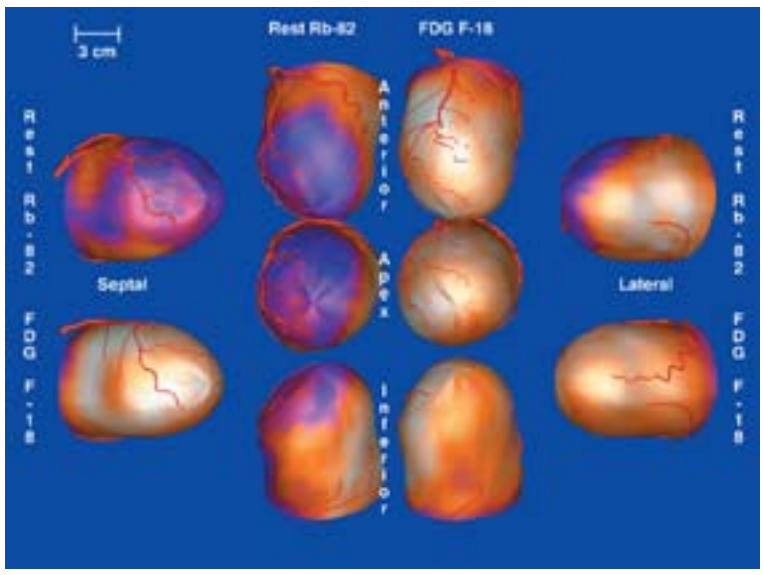
**The current pilot project aims at determining the possible fields of application, as well as the reliability of teleconsultation. Direct comparison of the conventional method of mailing the specimen to a colleague for a second opinion with a telepathology procedure rendering a second opinion on the basis of exclusively digital material will enable assessment of whether quality differs between the two methods.**

**All pathologists who have internet access, a current browser version and the necessary equipment to generate digital images of the specimens, can participate in the project. Over a period of about six months, all mammography cases submitted will be diagnosed conventionally and digitally. The sending pathologist downloads the images and the usual information to the teleconsultation server. For the second opinion, a reference pathologist is randomly selected among the participating pathologists. The following data will be collected:**

- **Diagnoses: first diagnosis, second opinion, conventional and digital, anonymous case data**
- **Evaluation of the handling procedure through a user survey.**

**This study is pan-European, the first large-scale project on the quality of teleconsultation. An interim report is scheduled for presentation at the annual pathologists' congress, and the association expects final results by the end of 2005.**

# HYBRID TECHNOLOGY




## The open PET/CT scanner

**Gemini** - the first and only open PET/CT scanner - has helped to pioneer medical hybrid technology. Developed by Philips, the firm reports that demand for this technology has been substantial: 'Clinicians commend the scanner's image quality as well as its ability to perform true full body scans while also enabling them to more accurately pinpoint the location of tumours.'

Now, at the ECR, Philips is showcasing its latest addition to the Gemini line - the Gemini GXL PET/CT system. 'This leverages breakthrough advances in PET technology, to consistently provide superior image quality across a wide range of patients and applications, with entirely new levels of throughput performance,' Philips explains..

The GXL also features the OpenView gantry, an innovation that provides an open airspace between the CT and PET acquisition components. This not only allows imaging flexibility and clinical access to patients, but has also proved more reassuring for people being scanned: the design has reduced patient rejection rates.

Deepak Malhotra, PET marketing director for Philips Medical Systems, points out: 'The leading-edge technologies in Philips Gemini GXL enhance throughput while providing high image quality at low dose levels today, and prepare physicians to leverage the benefits of new radiopharmaceuticals tomorrow. Furthermore, the system is offered in three CT slice configurations - 6, 10 and 16 slice - allowing customers to choose the right solution for their site today and upgrade to a higher CT slice configuration later, as their clinical needs grow.'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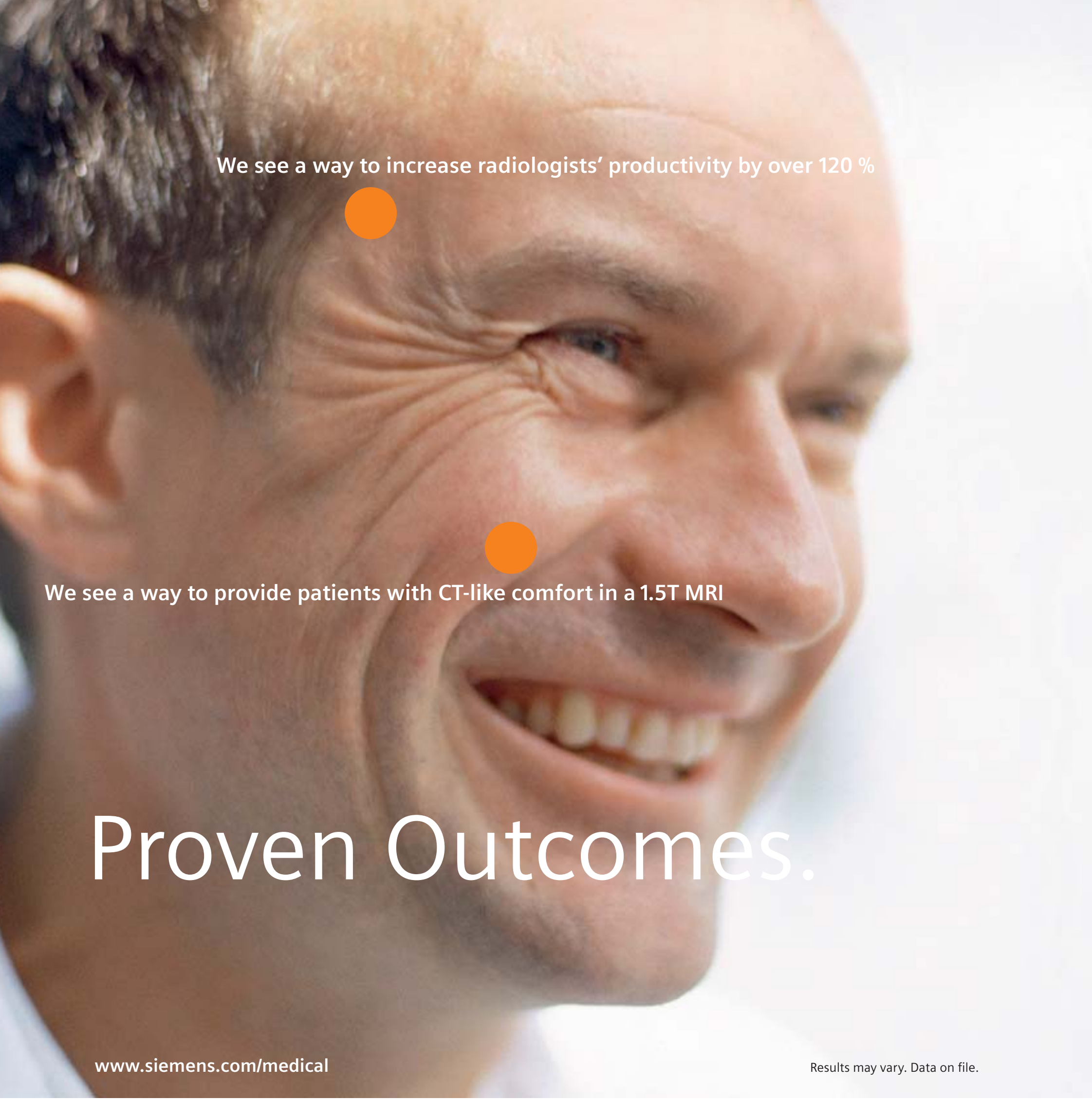


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