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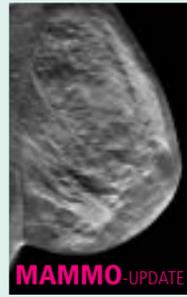
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VOL 16 ISSUE 3/07

JUNE/JULY 2007

## ETH Zurich to name its first female Rector

Switzerland – Professor Heidi Wunderli-Allenspach (below) has been nominated to succeed Prof. Konrad Osterwalder as Rector of ETH Zurich. After the Board ratifies her nomination, in September, she will become the first woman Rector in the 152-year history of this research and education institute.

The Rector of ETH Zurich is not appointed by its President, but is proposed and nominated by over 360 professors. One of the four-member ETH Zurich Executive Board, Prof. Wunderli-Allenspach is responsible for education matters.

Born in Zurich in 1947, her bio-medical academic history is impressive – and, since 1995, she has been a full Professor in Biopharmacy at the Institute of Pharmaceutical Sciences, and deputy head of the Department of Chemistry and Applied Biosciences (D-CHAB).

Around 18,000 people, from 80 nations, study, carry out research, or work at ETH Zurich, where about 350 professors in 16 departments teach mainly engineering sciences and architecture, system-oriented sciences, mathematics and areas of natural sciences. Their research is acknowledged worldwide and some 21 Nobel Laureates are connected with the institution.



# Healthcare says farewell Prime Minister Tony Blair ...and goodbye to Britain's IT Tsar

Report: Brenda Marsh

UK – Leading up to his June departure as Prime Minister, Tony Blair highlighted his government's achievements in the National Health Service (NHS), particularly in the way technology has improved and is set to improve patient care.

Indeed, since his Labour Government launched the country's massive £12 billion *National Programme for IT* (NpIT), the Department of Health (DoH) reports that 92 National Health Service Trusts and over 250 hospitals, across the country, use picture archiving and communications systems (PACS). And, in May, the DoH announced that London is the second region in England to complete 100% of its PACS installations – this means every London hospital Trust is using PACS – which is also predicted to be the case for all the country's Trusts by 2008.

The highly difficult *NHS Connecting for Health* programme has been headed



Tony Blair with Health Secretary Patricia Hewitt following a PACS inspection

by Richard Granger, who took on often seemingly impossible tasks, including the introduction of IT to achieve electronic patient records (EPR). Speaking about the achievement with digital imaging in

London, recently, he said: 'This is an important part of the bigger picture, in which hundreds of new systems have already been installed, benefiting tens of thousands of clinicians and millions of patients.' It has been estimated that about 39 million patients are now affected by the use of PACS – about 80% of England's population.

### IT Chief quits

Then came a bombshell – Richard Granger, aged 42 and said to be earning £290,000 as CEO of *NHS Connecting for Health*, handed in his resignation from this job in mid-June, just a short period before a new prime minister – Gordon Brown – takes over from Tony Blair, with expected alterations to the Cabinet.

Richard Granger had suffered many head-on collisions with IT companies to try to keep the programme within its *continued on page 2*

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## A world-class radiotherapy service

United Kingdom – An independent report that suggests better ways to use the UK's current radiotherapy resources, as well as predicting the needs of a radiotherapy service in the future, has been released by the *National Radiotherapy Advisory Group* (NRAG), led by national cancer director Professor Mike Richards, and Dr Michael Williams, vice president of the Royal College of Radiologists.

With unprecedented levels of investment in its cancer services, the National Health Service (NHS) reports it now delivers better cancer treatment to more people than ever before. Facts and figures include:

- an additional £639 million spent on cancer services in the three years up to 2003-04
- 4.3 billion spent on cancer services in 2006 – a 12% increase on 2005
- a rise in the number of therapy radiographers by 31% between 1997-2004 (from 1,407 to 1,839)
- cancer mortality among those under aged 75 years fell almost 16% between 1996-2004 (estimated lives saved: 50,000+).

Whilst the NRAG report acknowledges all these huge improvements, it also surprisingly points out that 15–20 years ago planning experts had predicted that radiotherapy would not take a key role in future cancer care and so demand would fall. As a result, explained Professor Richards, radiotherapy was not prioritised by the NHS for development and expansion, so, '...despite positive actions the Government has taken over recent years, there is a significant gap in radiotherapy capacity.'

Although radiographer trainees have doubled, and investment in equipment is considerable, more capacity is needed for staff and equipment, he said. 'This report is very helpful in setting out how this could be achieved, both in terms of using what we already have more effectively and also in planning better for the future.'

Government Ministers immediately committed £5 million of capital funding to support the novel training facilities suggested in the report. 'They have also asked that I take the broader recommendations into account as I develop the

*Cancer Reform Strategy*, the professor added. 'This strategy will map the way forward for cancer services in England.' They also urged the professor to bring the NRAG report to the attention of cancer networks.

The Cancer Reform Strategy will consider these recommendations in more detail, and publication is expected by the end of this year.

\* *The NRAG report can be accessed at the Department of Health: www.db.gov.uk*

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# Breakthrough in lymphatic cancer treatment

By EH Czech Republic correspondent *Rostislav Kuklik*

Celebrating his 71st birthday this year, Czech chemist Professor Antonin Holy will also be able to celebrate the launch of clinical testing of a drug to treat non-Hodgkins Lymphoma (NHL) and chronic lymphatic leukaemia (CLL) – adding another to his 60+ registered patents.

For these new trials, his research is again backed by the American bio-pharmaceutical firm Gilead Sciences; in the past, the professor and his team produced Viread, also commercialised by Gilead, to treat HIV/AIDS.

Three Czech research teams led by the professor and Dr Ivan Votruba, at the Institute of Organic Chemistry and Biochemistry (UOCHB), and Dr Berta Otov, from the 1st Faculty

of Medicine, Charles University in Prague (1. LFUK), co-operated on the development of the new anticancer drug. Pre-clinical tests produced unbelievable results - it took only a week and one injection of the substance, named GS9219, and malignant cervical and abdominal lymphatic tumours in animals disappeared.

The uniqueness of GS9219 lies in the fact that, unlike chemotherapy in which normal immune cells are destroyed along with the cancer cells, this drug attacks tumour cells, but not normal cells.

GS9212 is a 'double pro-drug' of phosphomethoxy-ethylguanine (PMEG) nucleotide analogue. Actually



Professor Antonin Holy

this PMEG nucleotide analogue had been synthesized in the UOCHB, where the research team discovered its extraordinary anticancer potential. However, the molecule needed to be safely transported directly in to cancer cells. This is where Gilead Sciences came on the scene.



Dr Zdenek Havlas

Gilead successfully created a formula for GS9212 so that it enters the cancerous cell, and undergoes hydrolytic conversion to an intermediary metabolic product called cPrPMEDAP, which is further de-aminated and turns into an active PMEG compound. Once inside the cell, PMEG is

phosphorylated and acquires the ability to be incorporated into nucleic acid strand in the form of a nucleotide analogue. This insertion makes the DNA molecule replication defective, and the cancer cell dies soon afterwards.

Dr Zdenek Havlas, Director of Institute of organic chemistry and biochemistry, said: 'We have no idea yet why our drug acts upon malignant cells only; once we know why it is so, we will be able to treat cancer effectively.'

Gilead Sciences was involved in this research from the beginning, and announced the scientific results during the American Association on Cancer Research (AACR) meeting earlier this year.

The clinical trial of the GS9212 compound will involve several thousand patients in the USA, at a cost of around a billion US\$. This drug could reach the market in 5-8 years.

Details: <http://www.gilead.com>  
<http://www.uochb.cas.cz/>

## MRI battle continues against EU Directive

Although the law restricting MRI use is not due for implementation until 30 April 2008, Slovakia decided to implement it in advance, and the European Commission has defended that country's decision.

However, by implementing the directive, Gabriel Krestin, professor and chairman of the Department of Radiology at Erasmus University in the Netherlands, and a member of the Alliance for MRI pointed out that, in Slovakia now, '... a worker could sue the hospital, or the companies could stop maintaining the machines because it's ille-

gal for their workers to maintain or service the machines. So practically, it's illegal to use MR in that country.'

Dr Stephen Keevil Consultant Physicist and Head of Magnetic Resonance Physics at Guy's and St Thomas' NHS Foundation Trust, as well as Honorary Senior Lecturer in Imaging Sciences at King's College London, and a leading member of the Alliance for MRI, added: 'The assumption that Slovakia is making is incorrect. The Crozier study\* demonstrates that continuing with MRI in that country is now illegal.

As reported in European

Hospital (vol 16 issue 2/07) the Alliance for MRI aims to have The Electromagnetic Fields Directive 2004/40/EC amended before its implementation date next year.

On behalf of the Alliance, Dr Keevil has presented the commission with findings of research carried out by Professor Stuart Crozier, which was commissioned by the UK Health and Safety Executive. This study shows that anyone standing within about one metre of an MRI scanner while it is acquiring images will exceed the exposure limits set out in the directive.

Following concerns about the

accuracy of information (limits) behind the directive expressed by the Alliance and leading radiologists, Vladimir Pidla, the European Commissioner for Employment, Social Affairs and Equal Opportunities, met with members of the European Society of Radiology (ESR), and he authorised the creation of a working group, to include ESR members. The results of this study are due in October or November this year.

Referred to as the 'Crozier study', this was officially presented on 13 June 2007. It has confirmed concerns that limits set in the directive would restrict the use of MRI.

This study, commissioned by the UK Health and Safety Executive and undertaken by Professor Stuart Crozier, has been published as two papers in the *Proceedings of the International Society for Magnetic Resonance in Medicine (ISMRM)*.

Details: [www.allianceformri.org](http://www.allianceformri.org) – 'background documentation' section.

## Czech president signs new laws

Under a new law amendment, signed last month by Czech president Vaclav Klaus, patient will be able to see and copy their own medical records without restrictions. They will also be able to transfer that right to relatives, and when the patient dies, the relatives automatically will be granted access to his/her record unless, prior to death, the patient banned this.

In January this year, the European Court of Justice (ECJ) had ruled that the Czech Republic is breaching EU law by not acknowledging doctors' diplomas and certificates issued by other Member States. Until now, Czech law required that foreign doctors had to become members of the Czech medical chamber, even if they only visit the country for a limited time and according to EU legislation, should need nothing more than their own country's certification documents. Now, foreign medical professionals will only have to announce their presence in the Czech Republic, and medical chambers will add them to the official list of visiting healthcare personnel.

*continued from page 1*  
massive budget – a high on impossible task. However, he can indeed count many successes, which include the 'choose and book' scheme for patients to select a hospital and appointment time online. The DoH has also pointed out that the national use of the PACS has cut diagnosis times from over six days to under three.

### Tony Blair sums up

Nearing the end of 10-year role as Prime Minister, Tony Blair visited healthcare workers and, when addressing an audience at the *King's Fund* in London reflected on a decade of progress in the National Health Service. Healthcare, he declared, is '...no longer the preserve of the lucky or well-connected'. Welcoming the Prime Minister, Secretary of State, Chairman of the British Medical Association,

CEO of the Long Term Conditions Alliance, Policy Director of the NHS Confederation and many other healthcare leaders, Niall Dickson, CEO of the Kings Fund confirmed that the country had seen 10 years of 'significant change, with unprecedented levels of funding that will leave health spending in Britain at or around the average for the EU'. He also added that the Fund believes there have been significant improvements in key areas, but also 'missed opportunities as well as serious challenges and difficult decisions ahead'.

Four reports had been published by the DoH, coinciding with PM Blair's meeting at the Fund. These covered cardiac care, cancer treatments, emergency services and mental health. Focusing on reforms and measures introduced in the early phase of the government, they

cite these improvements of include a maximum waiting time of four hours per patient in Accident and Emergency; a 40% reduction in heart disease; 99% of patients with suspected cancer are seen within two weeks; and suicides have been at their lowest since records began.

'What I think is undeniable is this,' Tony Blair pointed out. 'In terms of waiting, which was a problem in 1997, there have been real and transformative reductions and by the end of next year, if we succeed, then the concept of waiting as traditionally addressed in the Health Service will have gone.'

Nigel Edwards, Policy Director of the NHS Confederation pointed out the very bad state of the NHS, due to serious under-funding, when PM Blair's party came to office. 'A lot of work was needed to repair the infrastructure,' he pointed out.

The NHS now is in a far better position than hoped for in 1997 or even 2000, he added, '...and in England, at least, we have a policy that is now much more convergent with the rest of the developed world in particular, moving away from the very peculiar position that the UK has of having such direct state control and ownership of its hospitals and other health care providers, which we have been somewhat off the graph with.'

Peter Carter, General Secretary of the Royal College of Nursing said that he never expected such a success on waiting lists and waiting times and better funding has been achieved under this government. However, he pointed out that the average nurse earns £24,000, making this the lowest paid of the professional groups. He also pointed out the 'brutal' deficits issue of the couple of

years, and the number of healthcare workers redundancies that have been undertaken. He also made significant points about the way people were promoted beyond their then abilities, only to lose jobs later, and much else on personnel handling, as well as that of the various strategic health authorities. In his 38-year career in the NHS, he said, he had never ever seen so much money in the service, and sadly, in some areas, never seen so much wasted.

However, in conclusion, he said overall this government is to be commended, though not for the pay offer to the lowest paid people in the NHS. At the time of going to press, incoming Prime Minister Gordon Brown's selection of leaders for the country's healthcare remain unknown.

## Medical schools under pressure

An initiative launched recently by the French health ministry to boost the number of doctors entering the profession by 50% over the next three years is putting a severe strain on the country's training faculties.

France is facing a growing shortage of doctors and the move, known as the *numerus clausus*, is aimed at encouraging more students to take up medicine. However, although the medical profession welcomes the increase, the *Association Nationale des Etudiants en Médecine* is complaining about overcrowded lecture rooms and a general shortage of study courses and programmes. Officials on the student body say the government's plan is seriously under-resourced and has called for further investment.

Although France has a high doctor-patient ratio – 3.5 per 1,000 in 2006 – many physicians are approaching retirement or tend to retire early. Female colleagues who are also mothers are leaving the service to care for their families. Rural community GPs are less likely to be replaced after they hang up their stethoscopes.

MP Francis Beyrou, a centrist candidate in the recent presidential elections, has suggested that the need for new doctors should be calculated on a regional basis, to accommodate varying demographic needs. He also favours group practices, telephone consultations and extra grants for medical students who agree to work in rural communities for a minimum number of years after they qualify.

## English-speaking support networks

TWO British women whose lives have been afflicted by serious illnesses have each set up a charity association to provide help and support to other sufferers and their families throughout France.

The first, Cancer Support France (CSF) was founded in 2003 by British expatriate Linda Shepherd, a former school teacher who contracted breast cancer soon after she moved to this country with her husband, in 2000. She soon realised there was no one else she could talk with – in English – about her feelings.

With her cancer now in remission, Linda and her colleagues are working to expand the all-volunteer organisation that helps English-speaking people all over France, regardless of nationality, to cope with the trauma of cancer.

The charity operates drop-in centres and helplines and tries to provide bilingual speakers who

can also attend consultations with patients. Most importantly, it provides someone to talk to – whether face-to-face, on the phone, or by e-mail.

CSF is held in high regard by the French medical profession and is supported by the UK cancer charity Macmillan, which regularly visits France to help train CSF members. Last year, CSF hosted 'The World's Biggest Coffee Morning' – an event that raised £2,250 for itself and a further £750 for

Macmillan UK.

The second group, Friends4Life (*Amis Pour La Vie*), was started by Zofia Kawecka-Chevigny, a British-born Pole married to a Frenchman.

When aged three, Gaspar, the eldest of their two sons, was diagnosed with a brain tumour that had provoked hydrocephalus. After surgery and his return from hospital, Zofia realised just how badly the problem affected her family. When contacted by French

acquaintances and families in similar circumstances, the idea for the Association was born. It was founded in April last year.

With the help of its members, many medical professionals, it offers bilingual information, practical assistance and advice, plus the psychological support via telephone or e-mail contact with other sufferers and their families throughout France.

• *Cancer Support France*: contact Paul Martin on +33 (0)545 30 31 78 or email

*linda.shepherd@wanadoo.fr*;  
website: *www.cancersupportfrance.info*

• *Friends4Life (Amis Pour La Vie)*: contact Zofia Kawecka-Chevigny on +33 (0)553 525445 or email *friends4life@club-internet.fr*



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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.

EH 3/07

## IT & TELEMEDICINE

# Spanish university hospital

At the 50-year-old Son Dureta University Hospital, IT systems had been introduced gradually and with little planning, resulting in a conglomerate of computer applications and databases across departments to cover their individual needs but not inter-relating, Joan Marqués Faner explained. 'It was crucial to have a system that could integrate the whole information system, and include modules that had not yet been computerised.'

Whilst many existing systems worked well and users were familiar with them, a system was needed to integrate these, without replacements. 'However, neither the adult emergency department nor clinical workflow had been computerised. So we decided the emergency department should be a strategic starting point, with two basic features:

1. Our emergency services are provided by physicians assigned to the emergency department, and also, as needed, by specialists from various in-house services. This means that many doctors perform emergency services in addition to their regular duties.

2. Specialists assigned to the emergency department also work in admissions and out-patient services - usually young professionals eager to work with new technologies, which facilitates their implementation. 'We have now implemented the patient workflow management module, which integrates our triage system (electronic whiteboard), clinical notes, admission reports and orders submission management into three of our core services. The system is available in the emergency department, for adults and children, and we expect to deploy the clinical orders management system from every hospital department to every lab by the end of 2007.'

Son Dureta University Hospital, in Palma de Mallorca (Balearics), is Europe's first to use a clinical information system developed from a partnership between Oracle Corporation, Orion Health and Fujitsu Services.

Joan Marqués Faner, the hospital's Chief Information Officer, discussed the system with Eduardo de la Sota, our correspondent in Spain



### What were the most difficult tasks?

'From the beginning, we thought risk management would be important. Those with experience in project management know that problems will arise and we must solve them. However, we didn't want any surprises. We also knew that integration with third-party components (e.g. labs) could be a problem, considering the variety of providers and technologies involved, and the resistance to change that characterises end users.'

'In terms of the first issue, I could say we underestimated our concerns. Unfortunately, not all the providers of computerised solutions work with integration technology standards such as HL7, so each application has its own background and therefore

its own chronology. At the same time, in an effort to minimise the impact of users' resistance to change, we formed a medical-technological workgroup to ensure all the system functions reflected the needs of users and were not imposed by

management or the IT department.'

### What role do the three main applications play in the system?

'Through our clinical web portal, based on the Orion Health Concerto Medical Applications Portal, the physicians can retrieve and review all pertinent data. Through Orion's web-based orders module they can also electronically process their test requests to clinical, radiology, and pathology labs.'

'To avoid clinical data stored in multiple formats all information is entered into the Oracle Healthcare Transaction Base (HTB) through the Orion Health Rhapsody Integration Engine - a middleware product specifically designed for the health industry. This extracts clinical information from wherever it is located, converts it to a standard format and finally saves it in the HTB. In this way, the engine creates a central repository of

# Software directs data from medical machine to EPR

'Medical Interconnect makes it possible to feed data directly from medical equipment into an electronic patient file (EPR),' Thomas Breig explained. 'The EPR is then available digitally and accessible for all authorised staff.'

### How does the software work, given that hospitals still have so many isolated IT environments?

'Compared with standards in private industry, hospitals do appear to have many different, insular solutions, which are connected via individual programmes, or individual interfaces. Medical Interconnect is based on the respective standard products supplied by Microsoft, and results from experience that HP gathered during an integration project in Norway, which was set up for just this purpose. In this context, we have used the appropriate modules from our partner company, Cardiac, to enable us to connect equipment that previously we have not been able to integrate. It would be an exaggeration to claim that we have achieved 100% coverage instantly. However, it is fair to say that we have been able to connect quite a number of devices so far.'

### Does this mean you do not need a special network structure, but could work with almost any of them?

'Theoretically, yes. Practically, no. Once

Medical Interconnect aims to smoothly transmit data produced by medical equipment to the hospital information systems (HIS). Thomas Breig, Head of Distribution - Digital Hospital at Hewlett Packard and Jens Dommel, who is responsible for Healthcare/Communes/Non-profit Organisations at Microsoft Germany GmbH, explained the purpose of this software to Denise Hennig, of European Hospital



Thomas Breig

Jens Dommel

the volume of data exceeds a certain level you do need an appropriate network infrastructure. Many hospitals recognise the importance of a unified and future-proof infrastructure to ensure transmission of information. In this context we can see that the infrastructures for conventional telephone systems and IT systems are increasingly integrated.'

The time it takes to implement a system varies, depending on the type of equipment, and on how many devices need to be integrated, he said. 'Currently it tends to be mainly cardiocographs (CTG), laboratory systems, ECGs and endoscopy equipment that are being integrated, but the numbers and types of equipment are growing continuously.'

Asked what role Microsoft plays in

overcoming incompatibility between machines, Jens Dommel said the group has built a reference architecture for healthcare, known as the *Connected Healthcare Framework* (CHF). 'This can be used as a blueprint for the development of service-orientated architectures in healthcare,' he explained. 'CHF facilitates co-operation between the different types of equipment and different applications. Microsoft supplies standard software for this purpose.'

'Medical Connect uses mainly the BizTalk Server, which works as a data platform and ensures not only that the individual interfaces between equipment and applications work, but also that communication between different types of equipment is facilitated. As a central

# nets communications

standard data that contains a single electronic patient record (EPR).

'The whiteboard solution, implemented by Orion Health, helps to manage the workflow around patients in the emergency department. The tool displays the updated data of the patients, actually during the service, including the triage decisions, patients' locations with assigned physicians, orders submitted and, if available, lab results, plus information about time spent by a patient in each segment of the process. With these solutions, the emergency department physician can review on-screen, all the information about patients, including time of admission, waiting period and processes followed by the service, from the moment they entered hospital till a physician was assigned and took over the case. We also provide the information to the patient's family, to spare them the anguish of not knowing. Actually, the system also includes the preparation of clinical notes and hospitalisation or discharge reports, as well as the management of all orders submitted to pathology, radiology and emergency labs. Hopefully, the remaining labs (immunology, microbiology, haematology, genetics, etc.) will be included soon.'

#### Did the hospital perform a cost/benefit analysis?

'The return on investment is not the only factor to keep in mind; you must particularly consider the period required to obtain the benefits. By 2009, we will move to the hospital that is currently under construction. By then, we need to have the EPR module implemented, so we don't have to add to the traumatic move to a different building all the nuisance of a computer system change.'

module within Medical Interconnect, the BizTalk Server simplifies the integration of new equipment. It provides the intelligence to understand different "languages". Combined with products supplied by HP, the BizTalk Server can also establish connections with non-IP systems; at this point the server works like a universal interface engine that takes on the function of a universal interpreter and orchestrator.

'A further advantage is that individual interfaces can be used again,' Dommel added. 'We often have cases where individual interfaces have to be developed from scratch - which costs a lot of time and money. Through the reusability of interfaces we are saving these costs. To what extent the interfaces can be reused and exactly what the cost savings are depends on the equipment to be integrated and its connectivity. Some machines are supplied already set up for the plug & play system, which is something to be considered when new equipment is being purchased.'

Around 90% of all medical hardware and software available worldwide today is actually being used in Germany, Breig pointed out. 'The declared objective of both companies is the development of a standardised platform. Only the introduction of standards will help hospitals to work efficiently in the future.'

Here, Dommel was keen to add: 'Health does not stop at borders. We need international standards such as HL7 or DICOM standards. There is no reason why we shouldn't be able to build a networked healthcare platform across borders.'

#### Are you planning other new developments?

'The project is the embryo of our electronic health records module, which, later on, will be linked to the EPR portal for all the communities in the Balearic Islands. We have a long way to go, from the implementation of all consultations and lab orders to the computerisation and integration of nurses' treatments into the portal. We will not stop at any time in the future.'

'Without the help of our

providers - Oracle Corporation, Orion Health and Fujitsu Services - of course this project would have never been possible. We were the first site in Europe to put the Oracle HTB Database in production, a fact that caused some initial integration problems due to lack of experience with this tool. In this sense, the help provided by Fujitsu, leader of the project, especially when dealing with IBSalut, was crucial, to overcome all the difficulties.'

**How have these technologies affected the hospital and patients?** Presently, because they are only available in hardcopy, physicians must request them with two days' notice. Over a period of three years, all physicians will be able to review the EPR of any individual, at any moment when all the data stored in the health history becomes available at the clinical portal.

'In terms of the community, this project was also extremely important for the hospital, which faces intense pressure to improve its assistance to other hospitals that need quick access to the reports that we create for their

patients. Such access can only be obtained through the implementation of an electronic clinical database, which can be accessed from any hospital or healthcare centre. As a matter of fact, the project developed at the Son Dureta University Hospital has been a launching platform for the health-records database of all the communities in the Balearic Islands. Based on the success of our project, they have adopted the same technology. This means that, from any hospital on the islands, and through a single clinical portal, you can review any individual's digital EPR, including discharge reports, lab results, etc.



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# Fifteen Finnish hospitals go for EPRs



HUS Meilahti Hospital

By **Kaj Blomqvist MSc (E.E.)**, electronic engineer for the Hospital District of Helsinki and Uusimaa (HUS), and currently in charge of the 'Picis CareSuite Project', which aims to automate all HUS acute care departments

As part of a Finnish nationwide electronic patient record (EPR) initiative the Hospital District of Helsinki and Uusimaa (HUS) began to automate its acute care departments. These contain about 600 acute care beds, including operating theatres (OT) and intensive care units (ICU) in the district's 15 hospitals. Presently HUS has annual revenues of around €1.3 billion, and about 21,000 employees.

**Aims and advantages** – These are now very well-understood, universally. For example, electronic networking allows 24/7 access to patient records; they save nurses' time by speeding up data acquisition and retrieval, and they speed up diagnoses and clinical decision-making, which can be made in real time. There's also object-oriented data input, along with problem oriented data output, which helps to integrate relevant information to answer clinical questions, e.g. if a patient is hypovolemic. Recorded data also can be used to analyse current care procedures and create

reports to improve and standardise clinical protocols and processes at unit or population level.

Because data is stored in an SQL database, the system also supports academic research. In addition to research in the 'traditional' controlled trial setting, the data warehouse enables study of clinical interventions in a non-controlled setting, with minimal extra resources, since all data is collected for other purposes. This way more accurate information of different protocols without research bias (Hawthorne effect) can be achieved.

## The system

To achieve those universal aims, the *Picis CareSuite* anaesthesia and critical care system has gradually been taken into production at HUS. Currently it has been installed and is operating in Meilahti, Töölö and Peijas Hospitals.

In Meilahti hospital, the system is up and running in 12 OTs, at 13 PACU beds and 32 ICU beds

Kaj Blomqvist



including the cardiac ICU, where all Finnish heart and lung transplantation patients are treated. Töölö Hospital is one of Europe's largest trauma hospitals, with 17 OTs, 21 PACU beds and 35 ICU beds. Peijas Hospital, with 17 OTs, 33 PACU beds and 15 ICU beds will be fully operational by this autumn.

The CareSuite system is integrated with the hospital administration system (HIS) and laboratory system. Each bed area is integrated with numerous medical devices, to automatically gather patient real-time data.

Being comprehensively parameterised and configured, the system is simple to implement and adjust to clinical processes. Experiences so far are mainly positive.

The ability to transparently integrate data from pre-operative patient assessment throughout all peri-operative environment was an important factor in the hospital district's decision to select Picis CareSuite. Ability to have a complete real-time patient record at any time throughout the treatment process is crucial in environments like cardiac surgery and neurosurgery, where almost every patient goes from OR to ICU. Another important selection criteria was the fact that the system had been used in large multi department hospital environments at several sites worldwide, making us confident about the implementation success within the numerous hospitals and various departments at the Hospital District of Helsinki and Uusimaa.

## How digitisation impacts on people

UK - Looking at the growing need to understand how digitisation of health information will impact upon patients, staff and managers across the health service, Professor Ann Blandford of the University College London, and Professor Peter Lunt, surveyed 200 patients as well as their representatives, clinicians and other healthcare professionals (librarians and IT staff) working in eight NHS trusts. The main body of research focused on experiences and perceptions of digital libraries (sources of non-personal health information). The second part looked at the introduction of new technologies in particular healthcare contexts, including patient information, patient booking and patient record systems. Findings from the project, which was funded by the Economic and Social Research Council's E-Society Programme, show how technologies can be integrated into practice in different ways to those expected by the people implementing and monitoring their use. This indicates that attention is needed to focus on areas such as:

- designing technologies to fit with established working practices at the individual and team level within the NHS
- ensuring that the values of workers are not at odds with the new technologies; ensuring that users trust the technology
- ensuring that the new technologies do not undermine health service workers' pride in their knowledge.

'Technologies can empower users and support their working practices, facilitate effective communication and improve efficiency,' Ann Blandford said. 'However if the shift toward the digitisation of health information is to result in improved performance and quality of life, then it is essential to understand the interrelationships between technology design and deployment and the roles and relationships of the users of that technology.'

A PDF on the research 'Co-Evolving Roles and Technologies in the NHS: Barrier and Forces for Change' can be obtained at the e-Society website: <http://www.york.ac.uk/res/e-society/projects/8/8briefingdoc.pdf>

This research was funded by the Economic and Social Research Council (ESRC), the UK's largest funding agency for research and postgraduate training relating to social and economic issues. The ESRC E-Society Programme is the largest-ever academic research programme to investigate the impact of digital technologies, particularly the internet, on society: <http://www.york.ac.uk/res/e-society/>

## Networking between hospitals? Why buy new software?

Digital data exchange between hospitals is often not possible without replacing software. However, Heidelberg University Clinic, and its partner hospitals, have become the first to use a solution called *ICW ProfessionalGate*, which, the maker InterComponentWare (ICW) reports, can connect existing hospital information systems (HIS) without them having to buy and adapt new software for data migration and employee training.

'Within a *Virtual Medical Record*, *ICW ProfessionalGate* provides a consolidated view of all the medical data that are available on a patient in the connected hospitals,' the firm reports. 'This information is always retrieved directly from the HIS in which it was created. As a result, the latest diagnoses, imaging, and laboratory data are available.' The virtual record also provides information in real time, it adds.

All patient data from the different HIS systems must be associated with just one single person. This task is handled by the *ICW Master Patient Index (MPI)*, which compares the master data of the various systems and, when a match is found, assigns it to a patient. 'If no unique association is possible (because of small differences in the data sets), the MPI activates a clearing unit in the hospital. Even in very large data volumes, it quickly finds individual patient data: In a load test with up to 100 million patient data records, stable response times of under one second were achieved,' ICW reports.

Later general practitioners (GPs) and patients are to be integrated in the network, enabling them to provide patients with their test results and diagnoses, in their medical records to take to hospital ready for admission. During discharge, hospital treatment data can be transferred to the medical record, so the GP can begin follow-up treatment without delay.

\* The *ICW MPI* conforms with the Integrating the Healthcare Enterprise (IHE) initiative, which aims to improve data exchange among clinical computer systems. This year, *ICW MPI* was at eHealth Week 2007, for the first time, and took part in the practical test called Connectathon. *ICW* reports that it demonstrated trouble-free interaction with products from other manufacturers: 'Currently systems of General Electric, TietoEnator, Chili, and SAP have been integrated; others will follow.'

Just as medical teams are getting used to using management and hospital information systems (HIS) the next wave of innovative IT products and solutions is ready to hit them. Wireless networks are on the way, to provide mobile data entry, trace medical equipment and even make hospital-wide radio waves available to patients.

One innovative company that develops the tools to run wireless local area networks (WLAN) within firms and hospitals is *DDS GmbH*, based in Neuried, near Munich, Germany. 'We deal exclusively with data and speech transmission in WLAN, SAN and LAN, with network documentation and mobile solutions,' explained Bernd Kahnes of *DDS*.

confirm finished tasks in patients' rooms on an input terminal, no matter whether they are centralised or decentralised the bed managers have up-to-date room plans for all wards, showing current occupancy and space for new beds.

Administration tools in the dashboard allow clinic management to summarise and visualise capacities, shortages and overcapacities. Used in the right way this means that working processes can be optimised, the length of hospital stays reduced and capacity improved.

From admission to discharge, a 360° view ensures that all doctors can be fully aware of all diagnoses and needs, along with visualisation of all clinical workflows.

# New wave IT flows towards greater mobility

By **Guido Gebhardt**



Pictures: Dimension Data

One hurdle in hospitals is proximity to sensitive medical equipment. 'Structural conditions, as well as technical installations, or large medical equipment that might create interference fields, are particular challenges,' said Christian Gauer, Head of Technology at *DDS*.

The company uses networking hardware from *CISCO* to install its mobile radio solutions. The aim is to enable mobile communications for ward rounds, and to supply patients with services at the bedside - they can make phone calls, watch TV, control room lighting, and so on, via a multimedia terminal.

'The WLAN also enables us to locate marked medical equipment, such as ultrasound scanners or patient monitors within the hospital,' says Sven Glüsing of *Dimension Data* in Hamburg. The common loss of medical equipment in hospitals can be significantly reduced through marking with *RFID* tags (radio frequency identification). 'So, in an emergency medical staff only need to press a button to confirm on-screen the whereabouts of an urgently needed patient monitor,' said Sven Glüsing.

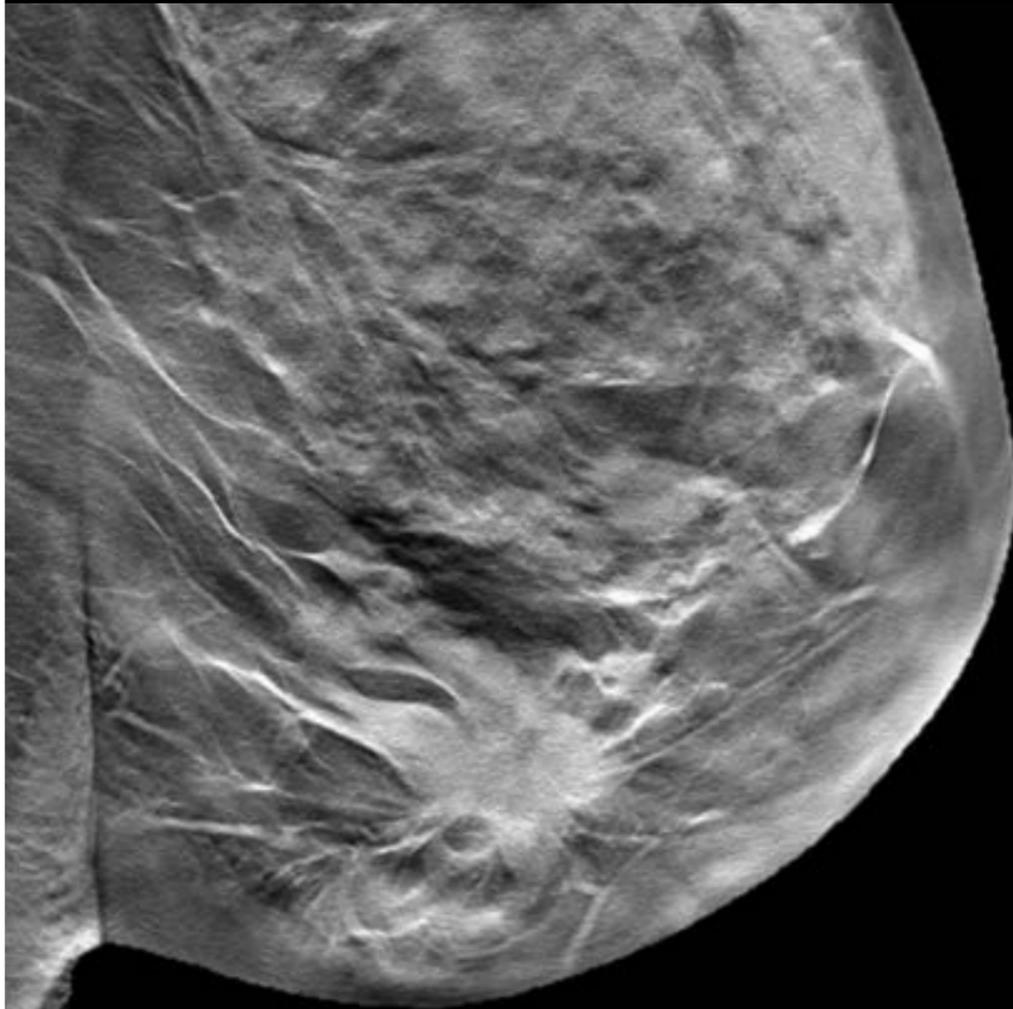
Costs can also be cut through software that accesses the databases of different IT systems and evaluates existing information. The communication dashboard supplied by *Dimension Data* visualises patient and nursing data.

If, for example, the cleaners

A big advantage in these enterprising young companies that focus on healthcare organisations, is the range of services they offer, for along with applications they deal with IT and operational safety and proactive IT monitoring and management - tasks that many manufacturers of *HIS*, *RIS* and *PACS* solutions still find difficult. Moreover, the young firms are happy to enter into strategic commercial partnerships, to improve their provision of the best project-specific products and services.

*Cologne University Hospital* uses the *Online Network and Facility Management Service* supplied by *Dimension Data*, along with their support services package. The *InSite* module ensures that the hospital management has 24/7 monitoring of network components, reporting any technical failures within five minutes of occurrence, automatically logging service requests and commencing fault clearance.

Successful integration of clinic management software packages not only ensures the interaction of different products but also co-operation between different companies. *DDS*, *Cisco* and *Dimension Data* are three business partners whose product portfolios complement one another and add value to hospital information technology with mobile solutions. All three are currently unlocking information in a so far unimagined dimension with a wave of modern services and applications.



JUNE 2007

## MAMMO-UPDATE

# Screening: Patients respond well to web-based reminders

**USA** - Web-based mail and phone reminder software significantly increased the percentage of patients who received preventive health services, according to a study led by Rajeev Chaudhry MBBS, at the Mayo Clinic, published in May in *The Archives of Internal Medicine*.

Although the US national evidence-based guidelines advise that all women over aged 40 should have an annual mammogram, Dr Chaudhry said only about 65% of women had one in the last two years. 'The study showed we can increase that percentage through a team approach. With our new electronic

tool and our related practice changes, one appointment secretary can now schedule mammography for over 10,000 women.' The tool he refers to is the *Preventive Care Reminder System (PRECARES)*, a web-based mail and phone reminder software designed by the Mayo team to help the Mayo secretaries arrange breast cancer screening appointments for eligible women at the practice.

Usually in the US, each woman is responsible for her own reminders to phone her physician's office and first obtain approval for an annual mammogram. She must then wait for an appointment. If the woman overlooks this, her test could be missed.

As Dr Chaudhry points out, the reminder notice women receive via the software programme is pre-approved, so mammography can be scheduled during her first phone call. Every month, the system produces a list of women over the age of 40 who are due for mammogram screening within the next three months, but who have not scheduled a screening. Each of these patients are sent a letter asking them to phone for an appointment. If a woman does not respond, a second letter is sent, and if this produces no response,

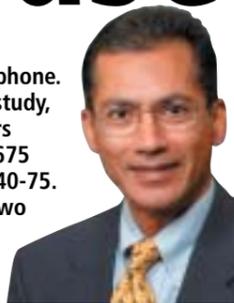
the woman is contacted by phone.

During the study, the researchers focused on 6,675 women aged 40-75. Divided into two groups, the first received the mailings and, when

necessary, were phoned to remind them to book a mammogram. The control group did not receive reminders. Among the reminded group, 64.3% had their annual mammogram, compared with 55.3% in the control group. Following the study, the programme expanded and compliance with annual mammograms grew to over 72%, with 86% of the Mayo Clinic patients have had one mammogram within the past two years.

Redesigning primary care so that appointment secretaries schedule preventive services was a key to the programme's success, Dr Chaudhry points out.

Robert Stroebel MD, chair of Primary Care Internal Medicine at Mayo Clinic, and the study's senior author, added: 'We already have expanded this reminder method to Pap smears and diabetes care, and will be adding other preventive services this year.'



Dr Rajeev Chaudhry

## The 27th Annual Convention of the German Society for Senology



21-23  
June 2007  
Lübeck

Congress President **Professor Juergen Dunst MD** praises major advances and multidisciplinary efforts, and outlines future hopes for breast cancer patients

"Breast cancer plays a key role in oncology and health policy. It is the most common malignancy in women and an important cause of death and severe illness. Over the past 30 years, some major improvements have markedly changed the face of breast cancer. Major advances have been achieved in terms of early detection and screening programmes, improved pre-operative diagnostics, breast-preserving therapies, adjuvant systemic therapy and palliative treatment. In summary, these advances have markedly improved the long-term cure rate (from under 20% in the 1950s to over 50% in 2000), prolonged life, reduced treatment morbidity and increased quality of life.

Currently, breast cancer is an exciting field of basic and clinical research. A broad spectrum of research will, hopefully in the near future, bring modern and advanced diagnostic and therapeutic concepts into the clinic. These technologies include detection of isolated tumour cells in bone marrow and blood, individualised local therapies, systemic treatment based on molecular diag-

nostic tools and a variety of new drugs. Breast cancer was one of the first diseases that could be effectively treated by molecular therapies (e.g. the Her-2-neu antibody trastuzumab).

A major challenge in the diagnosis and treatment of breast cancer is the fact that these involve a variety of medical disciplines. This has led to the formation of specialised breast centres that bring together a large number of specialists, improve the multidisciplinary approach and provide high quality standards in all fields of care. Thus the development of breast centres set an example for other fields of multidisciplinary oncology.

The Annual Meeting of the German Society for Senology, with about 2,000 national and international participants, is one of the largest multidisciplinary cancer meetings held in Germany. The scientific programme reflects the manifold aspects of research and care in breast cancer and gives an overview over upcoming technologies and concepts."

\* Congress details: [www.senologie.org](http://www.senologie.org)

## State governments unite to lower mortality

**Australia** - The Australian Institute of Health and Welfare has reported a 26% decrease in the breast cancer mortality rate among women aged 50-69 years between 1990 and 2004. The *BreastScreen Australia Monitoring Report 2003-2004* indicates that the rate is down from 68.5 per 100,000 women in 1990 to 50.9 in 2004, an average decrease of 2.1% per annum. Although the occurrence of breast cancer has risen, the report also shows that the rate of mortality has fallen due to a combination of early detection and improvements in treatment.

BreastScreen Australia provides free screening mammograms for women - and particularly aged 50-69 years - at two year-

ly intervals. Participation in the scheme in the target age group increased from 51.4% in 1996-97 to 55.6% in 2003-04. In 2004 BreastScreen Australia detected 3,851 invasive breast cancers - 2,733 of them in the target age group.

In 2003-04 the participation rate for indigenous Australian women aged 50-69 years (35.3%) was much lower than the general non-Indigenous rate (55.4%). However, the rate for Indigenous Australian women increased significantly, from 30.3% in 1998-99 to 35.3% in 2003-04.

BreastScreen Australia is a joint initiative of all Australian governments.

Details: [www.aihw.gov.au](http://www.aihw.gov.au)

### MAMMO-UPDATE

This special supplement is published by

### EUROPEAN HOSPITAL

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# Digital breast tomosynthesis

## THE FUTURE OF MAMMOGRAPHY

By **Thomas Mertelmeier**, Principal Scientist at Siemens AG Medical Solutions

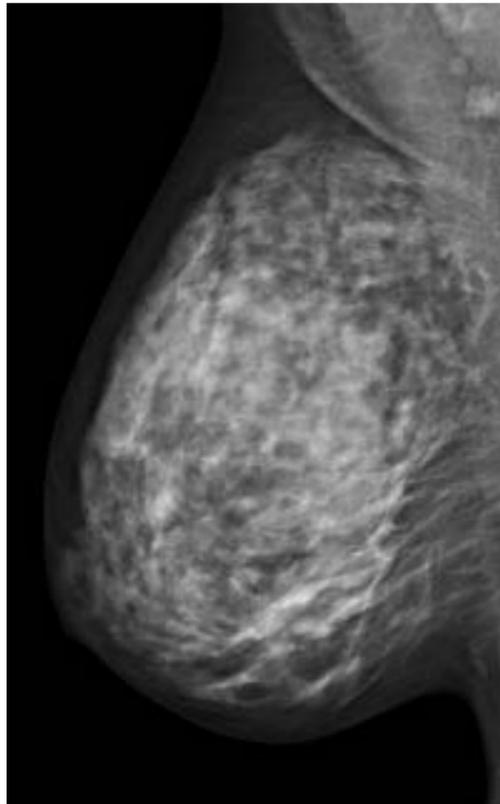
**F**ull-field digital mammography (FFDM) offers many advantages over film/screen mammography. Whereas most commercial FFDM systems have shown to have superior physical image quality over their analogue counterparts, large scale clinical trials have demonstrated that FFDM seems equivalent to screen/film mammography with statistically significant diagnostic advantages for certain populations, such as women under 50 years old, women with dense breasts, and pre- or perimenopausal women.

The main limitation of projection mammography is not quantum or

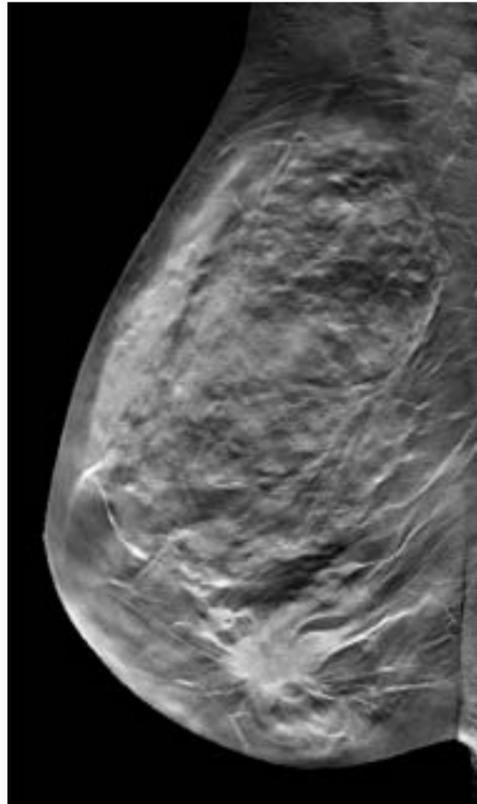
detector noise but the fact that the 3D anatomy is projected into a 2D image. Therefore, overlapping anatomical structures limit the radiologist's ability to detect certain lesions. Digital tomosynthesis promises to overcome this limitation of projection mammography by reconstructing slice images.

### The principle of breast tomosynthesis

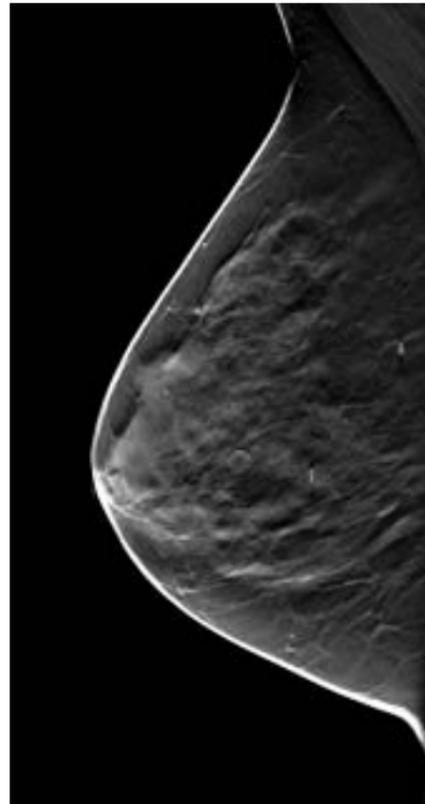
Breast tomosynthesis is a 3D imaging technology that acquires 2D projection images of a compressed breast at multiple angles during a sweep of the X-ray tube. Objects at different heights in



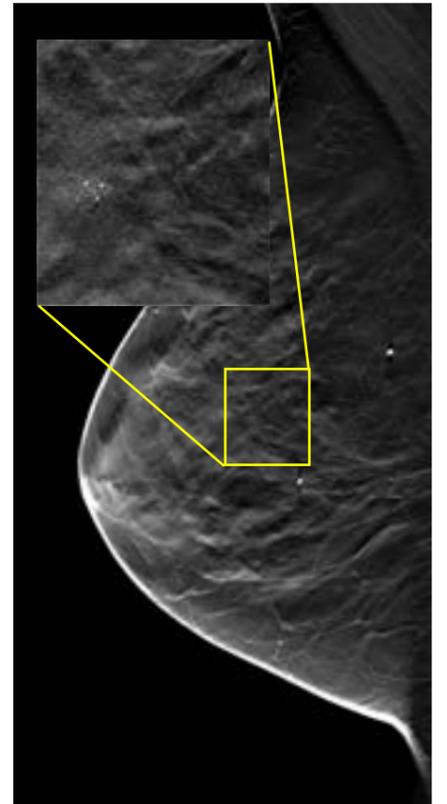
Digital mammogram of a R-MLO projection (Fig. 1a)



Reconstructed tomosynthesis slice of the same breast showing a tumour that is not visible on the mammogram (Fig. 1b)



Reconstructed tomosynthesis slice of a breast in MLO position containing a well-margined lesion (Fig. 2a) and a cluster of microcalcifications (Fig. 2b). The insert is a magnified view of the area with the calcifications.



IMAGES COURTESY OF DR. ANDERSSON, MALMÖ

## TESTING TIME FOR TOMOSYNTHESIS

A pioneer of breast screening, **Dr Ingvar Andersson**, of Malmö University Hospital, Sweden, began the first randomised screening trial in 1976. These trials have continued ever since, and have confirmed that screening with mammography can reduce breast cancer mortality by between 25-30%.

Currently, Dr Andersson is working with the Siemens tomosynthesis prototype. 'Tomosynthesis,' he believes, 'will become a successful screening modality. We have done some studies that have shown that its sensitivity is superior to that of digital mammography. So we expect to find more cancers, and probably in an earlier stage. Moreover, in my opinion, tomosynthesis will be even more relevant in screening than in clinical use because, in a clinical setting, we always use ultrasound, which is a very good additional modality. In screening, we are basically limited to

**What next?  
A combination of  
ultrasound and  
tomosynthesis?**

Dr Ingvar Andersson



mammographic techniques. My impression is, that tomosynthesis will provide us with further information and that it will be a valuable technique that will be implemented into the market in a couple of years. However, before that, more investigations need to be done. We know that the sensitivity is better than in

today's techniques but, for screening purposes, the specificity also plays a huge role. This means we have to do large trials under real screening conditions to see how tomosynthesis really works and how many women would be recalled for additional examinations. This figure must be low, because recalls cause anxiety

and cost time and money.'

Dr Andersson adds that there is another problem to be investigated. 'When we carry out screening today – digital or film – we do two projections for the breast, one cranial-caudal and one mediolateral oblique. With tomosynthesis, the question that arises is whether one view (the

mediolateral oblique) would be enough because it is a tomographic technique. However, there some data suggesting that, by adding the cranio-caudal projection, the cancer detection rate might increase.'

To know precisely how to proceed, such things need to be proven in a series of larger trials, Dr Andersson points out. Although this has not been done at Malmö Hospital, so far, he has a concept for such a project. What is being done at Malmö is research on optimisation of the radiation dose to be delivered, the optimal angular range, number of projections and other technical factors.

And what is the future of breast cancer screening? 'I would like to see a combination of tomosynthesis and ultrasound scanning in the same equipment. That would give us the best of both worlds.' But, he adds: 'Most likely it will take time before we are there.'

the breast are projected differently at different angles. The subsequent image reconstruction leads to a stack of slice images of the different depth layers parallel to the detector surface. The in-slice-resolution is predominantly determined by the detector resolution and usually much higher than the resolution between slices ('depth resolution') due to the incomplete sampling of the object within a relatively small angular scan range.

During the acquisition process the total dose is split among the single views. Because one voxel is probed by the same number of X-ray quanta as in projection mammography, a tomosynthesis scan needs approximately the same dose as a projection mammogram - under the assumption that the image detector does not excessively contribute to noise.

The objective of the Siemens tomosynthesis prototype device was to gain experience – together with our clinical partners – in how to provide a comprehensive solution for 3D mammography. The specific goals were to find the best acquisition mode for a tomosynthesis scan and to study reconstruction algorithms to optimise image quality. Another objective was to learn about the clinical performance and workflow of tomosynthesis.

The prototype is based on a Siemens MAMMOMAT *Novation*<sup>DR</sup> system modified for an X-ray tube motion over an arc of up to 50°. The detector used in this research system is a fast direct converting amorphous selenium detector, with an imaging area of 23.9 cm x 30.5 cm. The system is quantum noise limited, even for the lowest detector exposures used. A tungsten/rhodium anode/filter combination is used to keep the dose of one complete scan as low as that of one or two conventional 2D mammograms. The data of the examples presented here were acquired in a mode with 25 views and with scan time of 20 s.

**Clinical benefits**

Breast tomosynthesis has the potential to improve sensitivity in the detection of breast cancer due to reduced overlap of breast tissue, particularly in dense breasts. This may result in earlier cancer detection. Breast tomosynthesis may also lead to significant improvements in specificity as the 3D-analysis of the distribution of microcalcifications, and of shape and margin of lesions, might be easier. This could lead to a reduction in recall of patients and fewer biopsies.

Finally, digital breast tomosynthesis might eliminate the need for multiple exposures of the same breast. Thus it might lead to dose reduction, if only one tomosynthesis view, such as in the MLO orientation, is needed.

**Image examples**

At the University Hospital in Malmö, Sweden, human subjects are recruited under the direction of Dr Ingvar Andersson with informed consent in accordance with a protocol approved by the local

ethics board. All human subjects also underwent standard digital mammography on a commercial FFDM unit.

One tomosynthesis example is shown in Figure 1. The 57-year-old woman with compressed breast thickness of 6 cm underwent tomosynthesis scans on each breast in MLO position. The mammogram of the right breast (Figure 1a) did not show the 2.8 cm palpable ductal cancer which is, however, clearly visible in the tomosynthesis data set,

e.g. in the slice 2.5 cm above the patient table (Figure 1b).

A second example is shown in Figure 2. The breast of the 60-year-old human subject contains a well-marginated lesion (Fig. 2a) about 2.3 cm above the table and a microcalcification cluster in a different plane (Fig. 2b). The magnified view (insert) nicely demonstrates the detailed microcalcifications.

**Conclusion** - Currently, breast tomosynthesis is in research status,

obtaining first clinical experience. The fundamental physical problems have been solved although many details need further investigation. One of the biggest challenges is related to data handling. For a tomosynthesis solution for routine clinical use, an efficient way of displaying, reading and archiving the huge amount of image data must be found.

Breast tomosynthesis has the potential to revolutionise mammography by significantly

reducing the tissue overlap problem, inherent in projection mammography. This might lead to improved sensitivity and specificity, fewer recalls, fewer biopsies, less dose and less painful compressions. It can be expected that breast tomosynthesis will be used as a diagnostic tool in the beginning. However, after a learning curve and the diagnostic benefit have been proven, breast tomosynthesis would most likely be applied in the screening setting.

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Left to right: Professors Walter Heindel, Ursula Nelles, President University Münster, Andreas Pinkwart, Minister for Innovation, Science and Technologies, NRW, and Volker Arolt, Dean of the Medical Faculty

In 2002, Germany implemented an early detection programme for breast cancer. The digital Reference Centre for Mammography at the University Hospital Münster is one of five such centres in the country - and it's one of the most modern, providing digital systems for imaging and results evaluation as well as a mammo-PACS.

During a recent visit to Münster, Professor Andreas Pinkwart, Minister for Innovation, Science, Research and Technology of North Rhine-Westphalia, was updated on the screening programme by Professor Walter Heindel MD, who heads the Centre. They also discussed future diagnostic possibilities involving innovative

programme at all times along with providing regular training to keep them up-to-date with the latest technological developments.

**Currently you are also looking at new mammography technology - photon-counting tomosynthesis. Is this an inferior form of CT diagnosis?**

'Individual manufacturers are experimenting with a breast-CT. In terms of tomosynthesis, what we don't need and want is for women to be examined by yet another machine. In fact, the idea is to use tomosynthesis only to further investigate suspicious results. We are currently co-operating with the Radiology Department at the Charité in Berlin in an EU-funded project looking at the kind of medical questions where tomosynthesis will be

# Germany's early detection programme and research

imaging procedures. Present at the briefing, we asked Prof. Heindel about the programme's success and particularly the research project focused on tomosynthesis

In North Rhine-Westphalia the screening programme has been comprehensively implemented according to European guidelines, Prof. Heindel told us: 'New digital systems have been installed in many surgeries and hospitals, which shows how seriously radiologists take this subject. The feedback is also positive among women entitled to be screened. In the first year more than 50% of women that the programme targeted (aged between 50-69 years) took up the offer of being screened. This great response initially surprised us, and now we can present first scientific data showing that we have been able to detect small, and therefore curable, breast cancer with the help of early screening. Our objective is to lower mortality from breast cancer through early diagnosis.'

'Being responsible for the mammography screening programme for North Rhine-Westphalia - Germany's biggest federal state - the Centre is responsible for technical and medical quality assurance, training of screening teams. Our scientific focus is the evaluation of digital mammography technologies and of the programme. We work in multidisciplinary teams comprising radiologists, medical physicists, medical documentation assistants and radiology technicians, so that we assist the doctors participating in the

helpful, with the objective of comparing those results systematically with MR mammography. So far, MR mammography has been a problem solver for many women, such as those affected by lobular carcinoma, which is hard to detect with X-ray mammography. Its spread is hard to determine, because it often does not differ from the density of the normal glandular tissue. MR mammography is the gold standard here, prior to resorting to surgery. The question is whether we will be able to better detect this lobular carcinoma with the help of tomosynthesis. This is where the photon-counting system supplied by Sectra\*, which significantly lowers the levels of scattered radiation, comes into the equation (see box). We have already confirmed this with our own measurements. However, the most important question - as always in imaging - is to what levels we can lower doses whilst maintaining the quality of diagnosis. That's the decisive issue.'

**Particularly because radiologists must resist the impulse to increase the dose to achieve brilliant images where a lot can be seen very precisely?**

'Yes, this is a well-known problem - a problem with digital technology such as this type of technology "evens out", unlike conventional X-ray technology. Here you get over-exposed images when the dose is too high. This is the danger with digital mammography or generally with digital technologies. Theoretically the manufacturer or user can say: I want images of particularly



Walter Heindel (left) with Andreas Pinkwart

brilliance and quality, i.e. I will increase the dose a little. But even if you still stay below the legal exposure limits when doing so, the interest of the women patients must be at the centre of things. The objective is to make that important diagnosis whilst adhering to the principle of protection from radiation, which is accepted the world over: *as low as reasonably achievable* (ALARA). This is a fundamental issue, which our working group is also looking into.

**How do you know whether you just can't see anything or whether you cannot see anything because the dose was too low?**

'This is a problem, which is why we currently work with so-called reference values, i.e. you state what dose should be used for an average examination. However, in digital mammography we have maximum limits that have been specified across Europe. I am convinced that, with the

help of these new technologies, we can lower the doses and that's why I have lobbied for this technology for our reference centre. Between brilliant images achieved with doses that are too high, and a situation where the doses are lowered to the extent that there is no diagnostic value left in the images taken, is where we need to define the right maximum and minimum values.

'This includes the comparison of different digital technologies by collating relevant data. This is also the background for a request from the State Ministry to our reference centre to collate data on the doses administered, and to correlate them with the diagnoses, which will help to make realisable and scientifically well-founded conclusions. This is also of high interest from a political point of view, for instance in dealing with self-help groups for women.'

\* Sectra manufactures diagnostic imaging equipment, including digital

mammography systems. The firm reports that MicroDose Mammography is the only system that guarantees very low radiation doses for patients, and that the development of photon-counting tomosynthesis, with even lower radiation doses, is therefore a logical further development for the firm. Sectra adds that the system is currently only used for research purposes. The company is currently undertaking research in co-operation with, among others, Prof. Heindel within the EU research project 'High Resolution X-Ray Imaging for Improved Detection and Diagnosis of Breast Cancer'.

## The University of Münster

In Germany, Münster's Medical Faculty is one of the top faculties of its kind for teaching and research. The secret of this success lies in the organ-centred and interdisciplinary orientation of the study courses. During any one semester students are lectured on a certain topic in all relevant medical fields, for example radiology, pathology, laboratory medicine or surgery, so they learn their subjects relating to certain indications. The results achieved by the students in their first state examinations - held according to the new, stricter guidelines - appear to justify our methods, the Faculty points out. 'Münster students have done very well by comparison.'

A further strength in Münster is that innovative imaging, together with medical physics, constitute a defined platform at the Medical Faculty, and this will be further expanded. In this way, issues going beyond pure medicine, such as exposure to radiation, radiation measurements and safety issues can be swiftly evaluated.

# TOMORROW'S IMAGING ON TODAY'S HORIZON

**Professor Mats Danielsson, at the Royal Institute of Technology and Sectra, in Sweden, explains what tomosynthesis means to his company today, and soon, to mammography for the future**

'Tomosynthesis is a hot topic in all the companies involved in mammography', Professor Danielsson pointed out. 'But whereas they are developing more or less the same thing, Sectra has a totally different concept - photon-counting - a unique technology that, for the first time, processes X-rays one by one. So we have less noise and radiation compared with common systems that unselectively merge many and different kinds of photons with noise. Along with the electronic noise reduction we also receive more information from each X-ray. This data is acquired with a slit-imaging

detector (it has only thin slits to let the radiation through), which moves from left to right to collect the data. So we are talking about a very sophisticated system, which only Sectra is developing.

'Photon-counting tomosynthesis is a result of research in high-end physics. When researchers at Fermilab found the long missing sixth quark, the so-called top quark and a fundamental constituent of matter, that was only possible because of a new, very sensitive detector. This sensor uses similar technology to the sensor we now use for photon-counting mammography. So, I have

shifted my experience from CERN into mammography development. Obviously, my advantage is that I work part-time, and independently for Sectra, and part-time at the Royal Institute of Technology in Stockholm, so I can match my experiences from both sides - as is the case for the tomosynthesis project.

'There are currently prototypes of the photon-counting tomosynthesis system for research purposes. Our focus is for example on the comparison of MR and tomosynthesis. At this stage, we are convinced that tomosynthesis can definitely compete with MR, because MR is expensive,

and the resolution of tomosynthesis is far better. Even considering the radiation, which you don't have with MR, tomosynthesis has advantages, because the radiation is low and the images excellent. It's the same with CT - I think it cannot keep up with the resolution of tomosynthesis.'

Professor Mats Danielsson



# REVEALING THE BREAST'S ARCHITECTURE

2D imaging - whether analogue or digital - is thought to miss detection of 20-30% of breast cancers. Early clinical results from studies using the new technology *tomosynthesis* indicate its potential to lower those percentages.

During a tomosynthesis examination, an X-ray tube moves in an arc around the breast, producing image slices that are virtually free of overlapping parenchyma, so manufacturers say this system can provide more accurate 3D views of the breast than the 2D views currently produced by mammograms. Tomosynthesis also delivers a lower radiation dose.

During the recent German Radiology Congress in Berlin, **Roberta Agnes Jong MD FRCPC**, head of the Breast Imaging Unit in the Medical Imaging Department of Sunnybrook Health Science Centre, Toronto, Canada, and **José Abellan-Martinez**, Marketing Manager for mammography in the Global Diagnostic Imaging division of GE Healthcare, discussed this firm's tomosynthesis technology with *Meike Lerner* of European Hospital

'Compared with today's mammography, which provides us with a summation of images, where subtle abnormalities often

have huge experience in the reconstruction of organs via CT, MR or RAD and we profit from our own technologies now regarding tomosynthesis. The technology we designed had all the features necessary for tomosynthesis, whereas other companies have to change their current technology used for digital mammography. So GE is one step ahead. A second point is, that our system is very

efficient in terms of the radiation dose and image quality. But actually, we do not bother that much about other companies doing similar things; we have the right system and tomosynthesis is just another step to GE's aim of early health. What is important in the end is that our work will result in a good, proven instrument that will support us in the fight against cancer.

'Currently we are doing extended clinical trials that hopefully will prove our hopes. The first results will be available in the near future. Afterwards we need FDA approval. So, from my point of view, the first tomosynthesis systems will not be implemented before 2009 or 2010. But, as far as we know from other new innovations, it will be a long way before tomosynthesis

will be the common method for breast cancer examinations. Just look at digital mammography: GE Healthcare started with its digital system in 1999. In 2006, only around 20% of all US hospitals were equipped with a digital mammography system. So today we cannot predict when women will benefit from this new technology. Hopefully it will be as soon as possible.'

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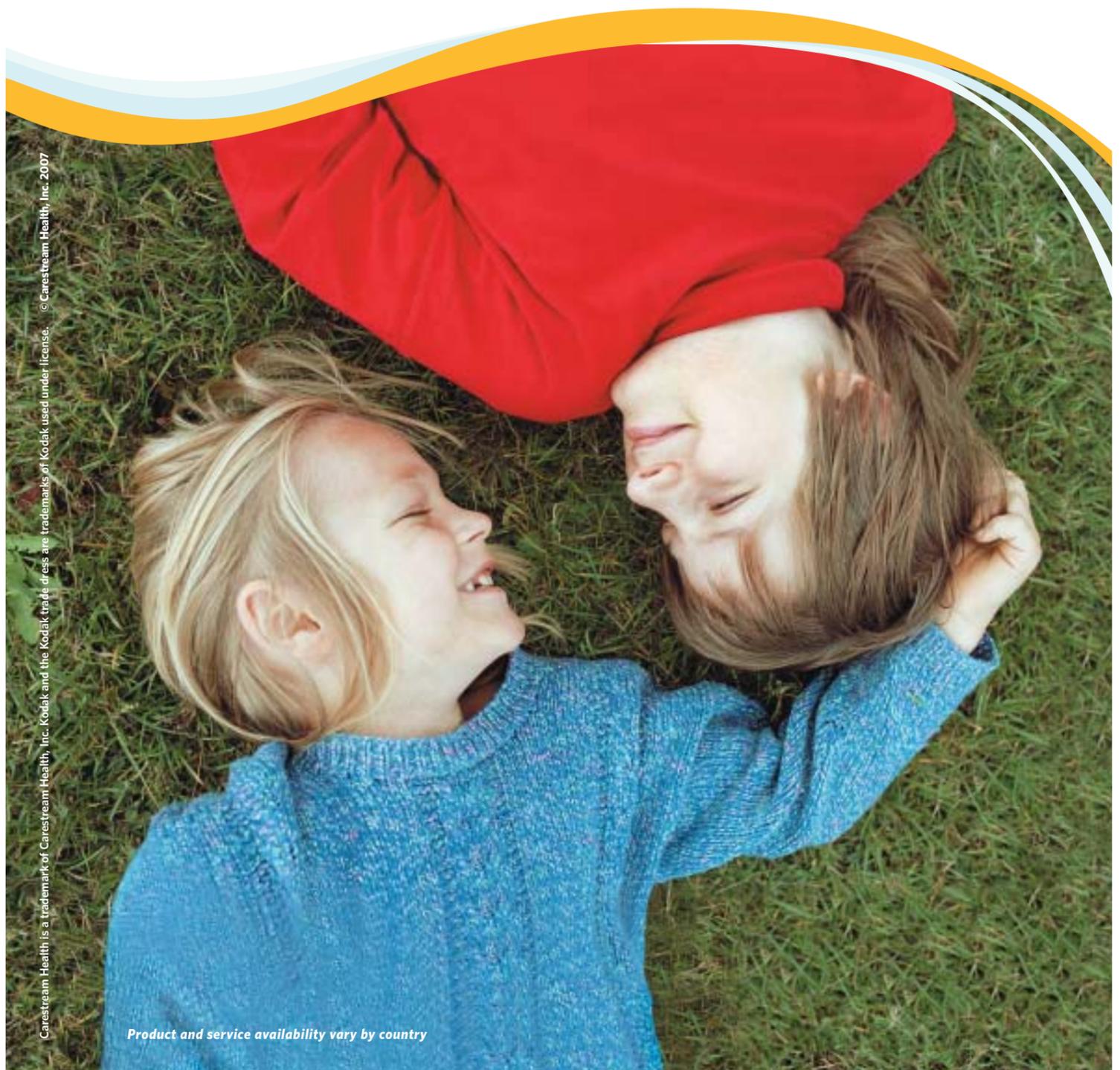


José Abellan-Martinez and Roberta Agnes Jong, with Meike Lerner of EH

get obscured by the images of other tissue, tomosynthesis will show us thin slices of the tissue of the whole breast,' explained Dr Jong. 'This will make it easier for the radiologist to look at the margins of masses, at architectural distortions and other signs of malignancy. So we hope that tomosynthesis will improve the early detection rate of breast cancer and will provide us with more accurate images that will reduce recall rates and the number of biopsies. This is a very important advantage for women, because a recall is always connected with fears and means great physiological and psychological stress. Furthermore, with the new method the breast must only be compressed one time and maybe with slightly less compression, but this is not proven at the moment. As a study has shown, the radiation dose during a tomosynthesis-examination is less or equal to that of a two-view mammogram.

'For the radiologist, tomosynthesis will be a great help, for the analysis of the images will be much easier, because of their accuracy, and the danger of missing a detail will be minimised.'

Asked what advantages GE's tomosynthesis equipment might have, compared with other similar technology in the works at other companies, José Abellan-Martinez said: 'GE's advantage is that we do



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ROB WINKELS, THE NETHERLANDS

Combining a scientific research laboratory with specialised clinic, the Netherlands Cancer Institute, in the Antoni van Leeuwenhoek Hospital (NKI-AVL), in Amsterdam, aims for a unique interaction of scientific research and clinical application. Along with this, the organisation disseminates knowledge and education for physicians to collaborate with academic teaching hospitals, universities and scientific research institutes in the Netherlands and abroad.

Patients are referred to the Institute either after breast screening through a local screening site or by the recommendation of their general practitioners (GP). Others come for a second opinion, because NKI-AVL is a dedicated cancer hospital.

Radiologist **H J Teertstra** and a team at the NKI-AVL are presently studying the clinical use of a new 3D method of imaging that can reduce or eliminate the tissue overlap effect called breast tomosynthesis. The system being tested was developed by Hologic, a leading developer of premium diagnostic and medical imaging systems for women. 'We've been working on breast tomosynthesis for a year,' Dr.

Teertstra said, during a recent *European Hospital* interview. 'We asked 1,200 patients who came to our out-patient breast clinic to participate in the study, about 500 agreed to participate. Analysing the results from 500 cases is a lot of research.'

At present, breast cancer detection is done from mammography, ultrasound, MRI, and CT, Dr Teertstra said. 'Breast cancer screening programmes use conventional analogue or digital mammography, a two-dimensional imaging modality. In conventional mammography, pathologies of interest are sometimes difficult to visualise because of the clutter of signals from objects above and below. This is because the signal detected at a location on the film cassette or digital detector is dependent upon the total attenuation of all the tissues above the location.'

'Our research involved looking at the 3D or tomosynthesis patient's image in addition to her conventional 2D mammogram. To date we've read about 300 of the 500 cases that we have gathered. In the first 300 cases we found two cancers that were not seen on conventional mammography. In a lot of the other cases tomosynthesis didn't real help by giving us new or better information. Sometimes you can see a cancer easily, so you don't need it. You already know it's there. It's there on

# Evaluating breast tomosynthesis for the Netherlands



H J Teertstra

'We've completed 300 cases to date using breast tomosynthesis. In two of the 300 cases, tomosynthesis was clearly better. In one case the patient had mammography, ultrasound and a biopsy in another hospital, but came here for a second opinion. We did not see the cancer on her conventional mammogram. But with tomosynthesis it's very easy to see the spiculated and ill-defined lesion.'

In the second case, we found a tumour with breast tomosynthesis that wasn't seen in her conventional mammogram. We had sent the patient back to her GP, but after reading the study we called her back for a biopsy. So we saved her with tomosynthesis. We don't yet know if we'll recommend doing tomosynthesis on all screening patients. We do know that it's definitely beneficial in certain cases.'

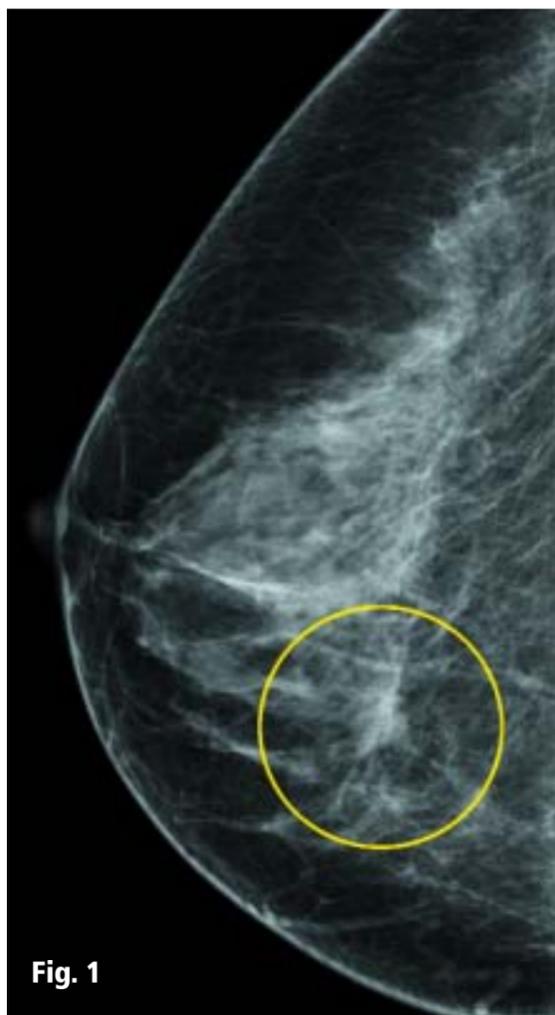


Fig. 1



Fig. 2

Fig. 1: Digital mammogram of left breast with mass circled. Mass is an invasive ductal carcinoma.

Fig. 2: Tomosynthesis image from the level of the mass with the mass circled. The mass and the spiculated margins of the mass are much better appreciated on the tomosynthesis image.



Demonstrating aspects of imaging for Daniela Zimmermann of EH (right)

**Hologic's selenium-based breast tomosynthesis system**

Although the principles of tomosynthesis technologies are the same, the prototypes of the several companies developing tomosynthesis machines have differences. Hologic, for example, is the only one to use a detector that moves with the tube. The advantage of a moving detector is that it can manage to keep the entire breast tissue imaged at all angles compared to a fixed detector that will have a smaller field of view, **Andy Smith PhD**, a physicist with Hologic pointed out. In addition, he added, the company's tomosynthesis system uses a selenium based, direct capture detector: 'Because images are acquired rapidly with

tomosynthesis, a fast imaging technique is needed. Selenium-based image receptors with their high Detective Quantum Efficiency (DQE), greater than 95 % x-ray absorption at mammographic energies, and rapid readout capabilities are ideal for that purpose.

'Tomosynthesis offers the possibility of revolutionising mammography. Clinical sites like AVL in the Netherlands are helping to determine if tomosynthesis can eliminate the problem of overlapping tissues. Other areas under investigation include whether the dose can be lower with breast tomosynthesis and if compression can be made less painful.'



Jack Cumming, Hologic's CEO: 'We expect tomosynthesis to be a major new advance in breast care, with the potential to improve cancer detection rates and reduce patient recall. This summer we expect to finish our clinical trials and file for necessary approvals to sell breast tomosynthesis systems in Europe, the U.S. and other major women's imaging markets.'

mammography, and on ultrasound; it's there when you put a needle in it, so the diagnosis is clear.'

Hologic has five sites in America that are looking at the use of breast tomosynthesis with patients from a screening population. In the first phase of the AVL research, Dr Teertstra and his colleagues are investigating another population – patients already known to have cancer. 'We wanted to examine a lot of cancers. We want to see whether tomosynthesis can cut down on unnecessary patient recalls and breast biopsies. The problem with mammography is that you sometimes see things that are not there. Is it the composition and superposition of the tissue? Is it really a lesion? So patients must return for analysis of that with compression mammography or ultrasound. We think that tomosynthesis will help to reduce the recall rate. We hope that we can see more during screening.'



'At AVL,' he continued, 'we are investigating the lesions that are recalls in our own population. In a year, we do about 10,000 mammographies and the recall rate is about 300-400. Using tomosynthesis, we want to examine them all to investigate, by a process of elimination, whether if we had done it initially, they would not have been recalled.'

'In a later study we hope to look at contrast-enhanced tomosynthesis. 'We want to find out if it's as good as MRI, for instance. Our ethical committee has not yet decided if it's ok for us to proceed with this study.' **Does he think the system will be used for screening in the Netherlands?**

'Yes, that will be the way to go. In America a lot of research has been done on screening the population. But the problem with that kind of research is that, to evaluate it, you need so many patients. We're simply trying to find out if it's also suitable for our population. As yet, we don't know if it can really help us. You certainly can see the lineation of a tumour better. So it's adjunctive to mammography. And we have found cancers that were not seen during mammography.'

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# Radiofrequency ablation in

By **Beate M Stoeckelhuber MD**, Associate Professor and Radiology (Interim) Director at the Department of Radiology, Luebeck University, Germany, with Smaragda Kapsimalakou MD, also at Luebeck



Figs 1 & 2. RFA probes deployed

The past 20 years have seen marked changes in the surgical management of breast malignancies. Mastectomy has been largely replaced by breast conservation surgery. The latter has become more widely accepted by both patients and physicians because similar survival rates between patients who underwent mastectomy alone, and those who underwent lumpectomy with radiation therapy,

have been documented in large randomised studies. There is a major trend towards less invasive local treatment of breast cancer, which has the potential to destroy malignant tissue with little effect on the surrounding environment. These encouraging results have led researchers to investigate the next step towards minimally invasive procedures for the treatment of breast

tumours under visual control. One possible method for local tumour treatment is the local application of heat.

**Radiofrequency ablation: the technique**

Radiofrequency (RF) ablation has been demonstrated to be effective in the treatment of non-resectable hepatic malignancies, and promising results

have been observed in the treatment of kidney, lung, brain, prostate and bone tumours. The experience of RF ablation in patients with breast cancer is far more limited. A few pilot studies have been published to date.

During RF ablation, high frequency 100–500 kHz alternating current emitted from the non-insulated tip of the needle electrode (Figs 1, 2) propagates into the adjacent tissues,

where it causes ionic vibration as the ions attempt to follow the rapidly changing direction of the alternating current. The tissue heats resistively in the area that is in contact with the needle electrode tip, and the heat then transfers conductively to more distant tissue.

The objective of RF ablation is to generate local temperatures that will result in tissue destruction. In general,

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## Greater bonding of radiation oncologists and diagnostic radiologists sought by RSNA

Radiation oncologists and diagnostic radiologists will be encouraged to forge partnerships at the Radiological Society of North America (RSNA) congress in Chicago this November helped by a new programme, called *Bolstering Oncoradiologic and Oncoradio-therapeutic Skills for Tomorrow (BOOST)*

'Radiation oncologists today have to work closely with diagnostic radiologists because if we know where the cancer is located, we know better where to treat. This new synergy of precision imaging for use in precision therapy has just unfolded. It's a wonderful way to get both disciplines working hand in hand,' explains Professor Sarah S Donaldson MD, RSNA Board Liaison for Publications and Communications and board representative to the RSNA Oncologic Imaging and Therapies Task Force, which devised the four-day programme. This will be unique in such meetings, she points out.

Co-chairs on the task force - Steven Leibel MD, medical director of the Stanford Cancer Centre and professor of radiation oncology at Stanford University, and David Panicek MD, vice-chair for clinical affairs and director of educational programmes in radiology at Memorial Sloan-Kettering Cancer Centre, and professor of radiology at Cornell University Medical College in New York worked on the programme with Prof. Donaldson.

The courses will be run from 8.30 a.m. to 6 p.m. between 26-29 November inclusive, and one type of cancer will be the focus each day (head and neck, prostate, lung or gastrointestinal) and feature experts from radiation oncology, diagnostic radiology, biology and physics. The first part of the day is akin to a refresher course, focusing on the oncologic principles of the disease site, the biology and pathophysiology and the anatomy using

Sarah Donaldson MD is associate chair of the Department of Radiation Oncology, deputy clinic chief and residency programme director for radiation oncology at Stanford University Medical Centre, California.



She is also the Catharine and Howard Avery Professor of Radiation Oncology at Stanford University School of Medicine

state-of-the-art imaging. Practical aspects will follow on radiation oncology or contouring, i.e. identifying the area to be treated as defined by the radiation oncology and diagnostic imaging experts.

'We're looking at radiation target volumes, the proper volume to treat, and the best imaging modality to identify what to treat,' explains Dr Leibel. 'We really want to focus on a disease site and emphasise all the issues around its imaging and treatment, but also present papers and special lectures on radiation biology and the role of interventional radiology and offer some panel discussions,' he adds. The latest developments will also be discussed: '...what the different imaging approaches are and what's on the horizon for radiation oncologists and diagnostic radiologists to use in a specific disease site to improve diagnosis and treatment.'

The design of BOOST has developed in response to what RSNA attendees have asked for, he points out. 'The real impact is to have diagnostic radiology onsite, with multimodality presentations. For example, the radiologists are going to tell us, "Here's how it spreads, this is how we image it, this is the role of PET imaging." It's a unique way to allow the two disciplines to play off each other.'

\* Registration for all RSNA 2007 courses begins on 18 June. Details: RSNA2007.RSNA.org

# breast cancer

the higher the target temperature, the less exposure time is needed for cellular destruction. It has been shown that, in the treatment of liver tumours, thermal coagulation begins at 70° C and tissue desiccation begins at 100° C, with resulting coagulation necrosis of the tumour tissue and surrounding hepatic parenchyma.

## Literature review

The use of RF ablation to treat breast tumours was initially demonstrated by Jeffrey et al., who treated five women with locally advanced invasive breast cancer (range, 4 to 7 cm in size). By

their study design, only portions of the tumours were treated, so that the zone of ablation and margin separating the ablated and non-ablated tissue could be assessed. All patients underwent either mastectomy or lumpectomy after the RF ablation procedure. On the basis of these initial results, the authors conclude that RF ablation was effective in causing invasive breast cancer cell death, but

would be more useful for treatment of tumours smaller than 3 cm in diameter.

Izzo et al. performed US-guided RF ablation followed by immediate resection in 26 patients with T1 and T2 breast cancers (range, 0.7 – 3.0 cm in size). They observed complete coagulation necrosis of the tumour in 25-96% of the patients. One patient had a microscopic focus of viable tissue adjacent to the needle shaft site.

Noguchi et al. studied 10 patients with breast cancer less than 2 cm in diameter. After RF ablation, wide

excision was performed in seven cases and total mastectomy in three cases. The surgical margin of the tumour was negative in all of the seven patients who underwent wide excision.

Fornage et al. had treated 20 patients with 21 malignant breast tumours  $\leq$  2 cm. All underwent primary RF ablation. In all cases histology showed complete loss of cell viability.

In another study, Klimberg et al. reported 41 patients who underwent mastectomy (group I 22 patients) or lumpectomy (group II 19 patients) followed by RF ablation of the

operation cavity as a means to achieve negative margins at the first operation (Fig 3). The cavity, with surrounding tissue, was resected and underwent histopathologic examination. No in site local recurrences have occurred during a median follow up of 24 months.

## Conclusion

RFA in breast tissue is feasible. There is potential that thermal ablation might replace lumpectomy in small breast cancer in the future; however, this has to be confirmed in further studies.

For references contact:

stoeckel.@medinf.mu-luebeck.de



Fig 3. Excision followed by radiofrequency ablation (from Klimberg VS, et al. Ann Surg Onc 2006), 13 (11): 1422-1433

## Steep drop in breast cancer rates

### Less hormone therapy plus less screening

**USA** – A steep drop in breast cancer rates between 2002 and 2003 correlates with the decline in hormone therapy use, according to research from the American Cancer Society (ACS). However, the researchers also point out that the decline might indicate that fewer instances were detected because mammogram screenings had levelled off. (Between 1980-98, when mammograms became more common, breast cancer rates rose fast and by almost 40%).

The greatest decline in rates was among women 50-69 years old – those most likely to receive hormone therapy. However, the researchers say that stopping hormone therapy cannot explain their other major finding: breast cancer rates started to drop in 1999, for all women 45 and above, well before the link between hormone therapy and health problems was discovered. They reason that the most likely explanation for this earlier decline is, after almost 12 years of increase, mammography use levelled off during those years.

The ACS also believes that part of the decline in breast cancer cases might be temporary, which would mean there has been a delay in detection, rather than an actual decrease in incidence.

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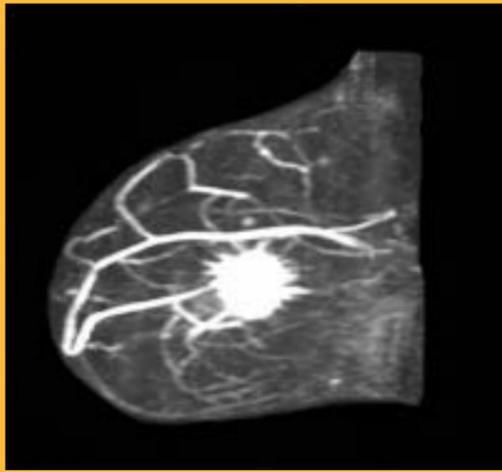
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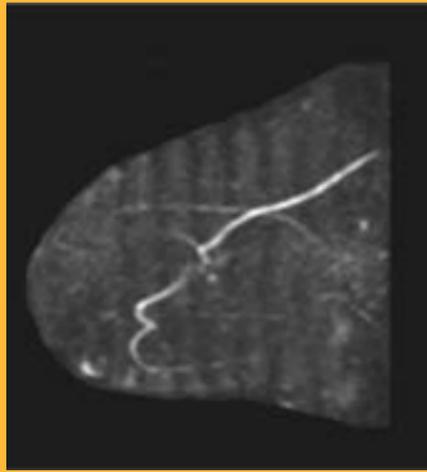
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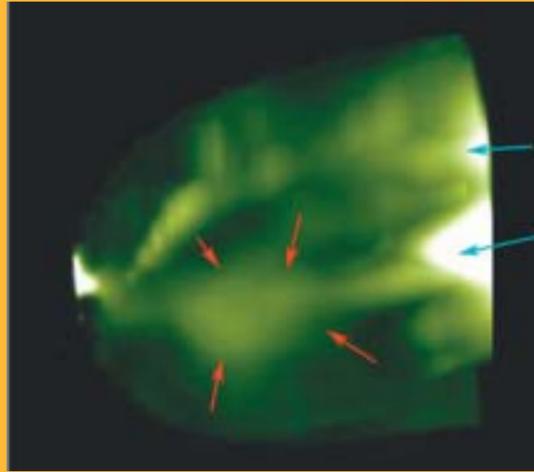
# CTLM for cancer detection in dense



1a: MRI prior to neo-adjuvant chemotherapy in a 52-year-old patient with locally advanced breast cancer. A large volume of angiogenesis is present



1b: Post-treatment MRI shows no evidence of angiogenesis, suggesting treatment has been successful



1c: Post-treatment CTLM continues to show angiogenesis (red arrows). Biopsy confirmed the presence of residual tumour. Blue arrows indicate normal venous drainage

Paolo Belli MD, Carmen Malaspina MD and Professor Lorenzo Bonomo, of the Department of Radiology, UCSC, Policlinico A. Gemelli, Rome, discuss results from using *computed tomographic laser mammography* (CTLM) to detect cancers occult to mammography in dense breasts, and their comparison of CTLM with MRI to follow results of neo-adjuvant chemotherapy

**Dense Breasts** – In an earlier article in European Hospital (Milne ENC. 'CTLM, seeing through the dense breast'. EH Vol. 15 issue 2/06) Milne described the methodology of CTLM and the rationale for using it in the dense breast - the low sensitivity of mammography - but did not at that time quote the measured sensitivity and specificity of CTLM in clinical practice.

**Methodology** - In a study involving four different investigational sites in the USA (University of Virginia,

Elizabeth Wende Breast Clinic, Rochester and the Women's Imaging Centre, Orlando, Florida,) and Mexico (National Cancer Institute, Mexico City) CTLM was used as an adjunct to mammography in 705 breasts of 515 subjects. Biopsy results were available in 451 cases. 40% of these patients were characterised as having breasts of mammographic density 3, ACR category 'heterogeneously dense', and 43% as ACR category 4, extremely dense. 34% of the patients had a family history of

breast cancer. 115 patients had nodules alone, 108 had calcifications alone, and 15 patients had both.

**Results** – In these dense breast cases, sensitivity, specificity, NPV, and PPV were as shown in the table on page 11.

We believe the difference between the two sets of results is due to the fact that the pathologically 'benign' form of DCIS shows angiogenesis in only 30% of cases, whereas comedocarcinoma shows angiogenesis in 75% of cases, an observation that might prove useful

for stratifying DCIS for treatment purposes.

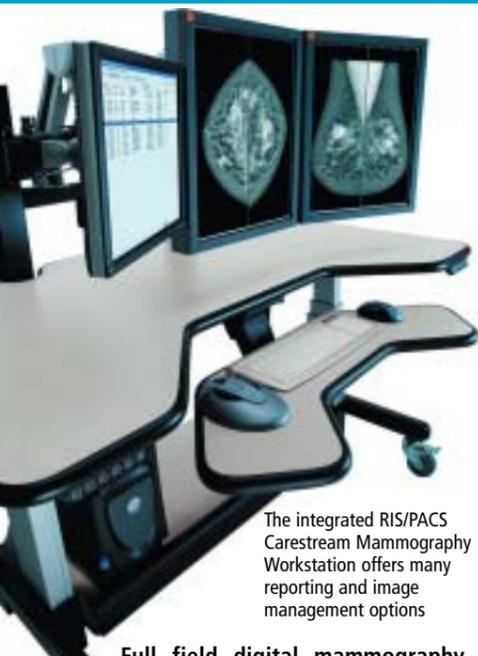
One of the more remarkable results of using CTLM as an adjunct was that specificity also improved along with sensitivity, reducing the negative biopsy rate. Using mammography alone, specificity invariably drops as sensitivity increases.

**Using imaging to follow the success of neo-adjuvant therapy for breast cancer. Is CTLM more sensitive than MRI?**

## Buzz words: digital mammography Great! But is your hospital ready and able?



Christopher Varian



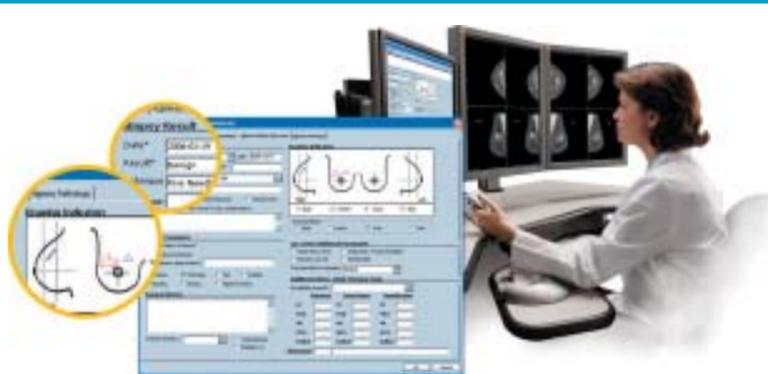
The integrated RIS/PACS Carestream Mammography Workstation offers many reporting and image management options

megabytes. Therefore, the manager of a breast screening centre that runs only 20 screenings a day needs to plan for the management of up to 4,000 megabytes (4 gigabytes) of *new* images daily. 'It may be possible to use lossless compression to reduce these file sizes to half or a third of their original size, but the file sizes still remain very large,' advises Christopher Varian, Director of Worldwide Business Development Mammography Solutions, at Carestream Health Inc. 'A digital review of prior screening examinations doubles the volume of data that will need to be handled on a daily basis.'

There are, he says, some key factors hospitals should consider before they adopt a new digital system:

**Patient and image data management and storage** - For this, it is essential to fully integrate the radiology information system (RIS) and picture archive computer system (PACS). Along with the patient's identification (ID) and examination data, it is now generally understood that a RIS can automate mammography-specific activities, such as blind double reading, sending reminder letters for annual screening, producing customised patient letters for screening and diagnostic examinations and other functions.

RIS and PACS should be installed before installation of digital mammography or it should be part of a digital conversion. This is a far more complex task than installing the capture device, he points out.



The PACS viewing tools can be customised for screening and diagnosis

**Viewing images** – Five megapixel monitors are needed for mammography, but most general radiology PACS do not have them. For this reason, screening units should consider buying new or updated workstations to display the large file sizes of mammograms at full resolution. However, even that flat panel size does not show some image matrix sizes at full resolution – an automatic zoom and pan tool is essential if large volumes of mammograms are to be read.

Rather than install dedicated workstations, centres for screening as well as diagnosis should opt for multi-modality breast imaging workstations, which enable reviews of all digital mammograms, as well as MR, ultrasound and other general radiography examinations.

**The bandwidth** – Computer networks must be able to transmit the very large size of digital mammograms. Internal IT staff, or a network specialist supplied by a contracted vendor, can evaluate

an existing network infrastructure and environment and work out what might be needed to produce acceptable image distribution speeds. 'This is an often-neglected part of an implementation,' Christopher Varian emphasises. 'In a screening facility the ability to display a full study, with priors, in a couple of seconds, will test the fastest network. If not addressed up front this aspect alone will greatly reduce the acceptance of the entire system.'

**Archiving** – Depending on its capture device, in a year a small clinical centre, which carries out 20 screenings daily, generates around one terabyte of mammography images. Even with no increase in screenings, that means 25 terabytes of the legally stipulated 25-year image storage. 'An obvious issue here is the obsolescence of storage medium and files,' says Christopher Varian. 'A plan must be in place to migrate data on to current platforms or a major cost issue will be encountered in five to seven years

after the first images enter the system.' He points to the real advantage of using off-line data centres to manage this type of back-up and migration service. 'Most centre managers will want to factor in an appropriate percentage of growth when coming up with their anticipated storage needs for the immediate future,' he adds, advising that facilities conducting diagnostic breast examinations should also organise storage for these files.

Implementing digital mammography systems might prompt centres to expand storage devices earlier than planned. However, he suggests that a decision to outsource image storage to an image management vendor, with retrieval on demand, makes that third party responsible for maintaining, backing-up and retrieving archived examinations - beneficially freeing up radiographers' time.

As said, legally examinations must be stored for years, and off-site storage and back-up in case of disasters must also be planned. Providers with existing business continuity/disaster recovery plans simply add mammographic images, but, without a plan, a mammography unit must develop and implement one, and might work with a hosted data management vendor to help develop and implement a business continuity strategy.

**Printing** – To share images with referring physicians, surgeons or patients, mammography units would need a high-resolution,

# breasts

MRI is being used increasingly to determine whether a particular treatment for breast cancer is succeeding and, for this purpose, has been considered the 'imaging gold standard'. However, false negatives occur and residual tumour may be present, even when the MRI study has reverted to apparent normality (Yeh E, Slanetz P, Kopans DB, Rafferty E et al. 'Prospective Comparison of Mammography, Sonography and MRI in Patients Undergoing Neo-adjuvant Chemotherapy for Palpable Breast Cancer'. Am. J Roentgenol. 2005; 184:868-8773).

Like MRI, CTLM images tumour angiogenesis in the intact breast, but it does not require ionising radiation or contrast medium. CTLM performs computed tomography with the same engineering approach, gantry and rotate/translate, as conventional X-ray CT, but replaces the X-ray tube with a laser diode tuned to 808nm, at which frequency the laser beam is selectively absorbed by both oxyhaemoglobin and deoxyhaemoglobin. CTLM utilises the body's own haemoglobin as a natural contrast medium and therefore visualises both normal blood-containing structures in the breast, veins and lobes, and abnormal vascular structures, particularly angiogenesis. CTLM, therefore, provides both morphologic and functional information. (Helbich T. 'Computed Tomography Laser

mammography-capable laser printer. They should check whether existing printers can be upgraded to that level.

**Designing a system** – 'Implementing a digital mammography workflow is a demanding task that can exceed the IT resources of even large facilities,' he points out. In this case, managers might decide to work on the design and implementation of an infrastructure with a vendor, or independent mammography consultant. The latter often recommends appointing a project manager with expertise in purchasing and/or integration of all necessary networking, data and management systems. To prevent outdated tasks and routines hampering the new digital system, and to optimise processes, the consultant might suggest a complete revision of scheduling, examinations and reporting. These advisors, he says, can not only help to maximise digital workflow but also help to evaluate the implementation of digital mammography technology, and to decide on either CR or DR.

**Your own system** – Whilst many mammography providers are evaluating digital mammography systems technical specifications and calculating a return on this investment, the managers equally should work to develop an environment and infrastructure that can support these systems.

Christopher Varian adds: 'As with general radiography, installing a CR-to-print or FFDM-to-print solution offers very limited benefits, since it does not address the need to integrate these images into a digital workflow that includes automated input of patient and examination information, as well as fully featured soft copy viewing, and efficient image storage, distribution and back-up.'

When DCIS was classified as malignant

|                    | Sensitivity | Specificity | NPV   | PPV   |
|--------------------|-------------|-------------|-------|-------|
| Mammography alone  | 50.0%       | 75.5%       | 90.9% | 23.5% |
| Mammography + CTLM | 58.3%       | 86.8%       | 93.2% | 40.0% |

If DCIS was classified as 'pre-malignant' the results changed slightly, as follows:

|                    | Sensitivity | Specificity | NPV   | PPV   |
|--------------------|-------------|-------------|-------|-------|
| Mammography alone  | 43.8%       | 73.6%       | 93.2% | 13.7% |
| Mammography + CTLM | 56.2%       | 84.4%       | 95.3% | 25.7% |

Mammography'. European Hospital Vol. 13, issue 3/2004; 4-5.4)

Because of its ability to visualise angiogenesis, CTLM is being tested as an imaging method for following the success, or otherwise, of neo-adjuvant chemotherapy for breast cancer.

### Comparison between CTLM and MRI

Figure 1a and b demonstrate, using MRI, what appears to be complete resolution of a cancer of the breast following neo-adjuvant treatment. However, a CTLM study made at the same time after treatment reveals definite residual angiogenesis (Fig 1c). Biopsy confirmed that

residual tumour was present. These studies are in their initial phase but, from the preliminary data, it appears that CTLM may be better able to detect residual tumour following treatment than MRI. This might be because gadolinium preferentially images areas supplied by abnormally permeable vessels, whereas CTLM, by its mode of action, images every vessel supplying the tumour, whether normally or abnormally permeable.

Other advantages of using CTLM to follow changes in angiogenesis include the speed, comfort, and low cost of an examination, the ease and speed of interpretation, and the fact that CTLM is non-interventional.



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### [ FACT ]

According to a recent mammography screening study, detection rates of invasive cancer of 1.0 cm or less increased 164% and the mean age of patients was 5.3 years younger at time of detection when radiologists used R2 CAD to assist in reading mammograms.\*

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\*T. Cupples, J. Cunningham and J. Reynolds, "Impact of Computer Aided Detection in a Regional Screening Mammography Program," AJR: October 2005; 185:944-950

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During the recent American Society of Clinical Oncology (ASCO) congress, the paper of **Professor Christiane K Kuhl** and her colleagues has been selected as 'Best of ASCO', for they had discovered that, to detect pre-invasive breast cancer (DCIS), the addition of high-resolution MRI and state-of-the-art mammography offered a significantly higher sensitivity compared with state-of-the-art mammography. **Dr Kuhl** is Professor of Radiology and Vice Chair at the Department of Radiology, and Director of the Division of Oncologic Imaging and Interventional Therapy at the University of Bonn.

# Why MRI should not be a health-political decision

**W**hen *European Hospital* asked Prof. Kuhl why the University of Bonn was cited by her Discussant at ASCO to carry out the most breast MRI examinations in, perhaps, the entire world, she said it was possibly true, explaining: 'We have a very good team here and we have reserved one MR system more or less for breast examinations. Bonn also has a large, supra-regional catchment area. Many women - some who might have a known risk of breast cancer in the family - come to us of their own accord - for example, if they have had MRI examinations elsewhere and the results are not clear.'

'I'm often asked what radiologists should do to achieve results on a par with those we have in Bonn. The answer is quite simple: Radiologists should carry out more breast MRIs. Unfortunately this procedure is not utilised enough as the medical insurers quite often refuse to cover it, because they say it's too expensive! Magnetic resonance tomography did not arrive yesterday. It is an examination procedure that many areas of modern medicine can no longer do without. Think about orthopaedics or neurosurgery, for instance. MRI is of great importance in those fields. It has also been known for some time that MRI is the most sensitive examination procedure for the diagnosis of invasive breast cancer.'

'With MRI you play in an entirely different league compared with conventional mammography or ultrasound. This has been known for years. However, as the procedure is expensive, so far MRI has mainly been used in a "targeted" way, i.e. when a patient has already suffered breast cancer and then later receives results from an X-ray mammography or ultrasound scan that are not quite clear. Then, and only, then, is the breast MRI covered by Germany's statutory medical insurers - apart from a few other, still rare indications.'

'However, the medically meaningful, or possibly even more important, potential areas of use, such as pre-operative staging or early detection are not covered. Staging means that if a type of breast cancer is detected by mammography or ultrasound, which is to be treated by breast conserving surgery (bearing in mind that over 80% of women are treated with breast-preserving procedures) then an MRI should be carried out prior to the operation to map the actual spread of

Professor Christiane Kuhl is no stranger at Bonn University, for it was there that she studied medicine and became a doctor. (In 1991, her thesis 'Magnetic Resonance spectroscopy in mitochondrial encephalomyopathies' was judged *summa cum laude*.) Indeed, her radiology residency was in the same department where she is now professor.

Before becoming Full Professor of Radiology and Vice Chairman of the Department, Prof. Kuhl also worked in the Neurosurgery Department, and she undertook neuro-interventional training in the Department of Neuroradiology in Duisburg, for certification as a neuroradiologist, and a Fellowship in Neuroradiology.

Her numerous awards include one for technical innovation from the German Federal Ministry of Science and Education; others from the Radiological Society of Germany and, beyond there, the American College of Radiology Imaging Network (ACRIN) award for 'Outstanding Contributions', and the European Magnetic Resonance Award 2006. In the United Kingdom, the Royal College of Radiologists Breast Group made her an Honorary Member.



the tumour. This use of breast MRI - staging - is not yet covered by medical insurers in Germany as standard, which I consider scandalous.

'The consistent use of MRI prior to surgery for breast cancer would have a significant impact on the treatment management for around 25% of patients. Breast cancer is a type of oncological disease where the surgical approach is curative, which is quite rare in oncology. And, of all things, it is just this situation where MRI cannot be used. However, it is used regularly in almost all other areas of oncology, such as, for instance, in patients with pancreatic carcinoma, which are rarely approached in a curative manner. This is a contradiction!'

Why? 'Cost is one factor. Breast cancer occurs much more often than pancreatic cancer. Secondly, the breast MRI only helps us in this situation when we can verify the MR diagnoses histologically for the surgeon and mark the area for surgery. Radiologists have quickly internalised and started to use the biopsy procedure for X-ray mammography, or ultrasound, and also the vacuum biopsy. But people still seem to shy from MRI-controlled biopsies - although they are no more complex than mamotome biopsies (particularly with the modern VAB systems, such as the Suros system). The problem again is that MRI can be used only infrequently, which essentially makes systems for MR guided procedures less profitable. The chronic under-usage of this examination procedure is therefore both the result and the cause of the current situation. Medical insurers

don't pay for it because the procedure allegedly produces too many wrong, positive results, therefore radiologists cannot use it - and then, if the procedure is actually used once in a while, results are insufficient and nobody is able to confirm these additional results adequately and in a minimally-invasive manner, which, quite rightly, leads to irritation and uncertainty among surgeons. In turn, this damages the reputation of this procedure and strengthens the insurers' perception that it is expensive and unsuitable - which is why it is not covered. That's how the cycle closes - and has done for years.'

'There is a further issue: Radiologists specialising in breast examinations use mammography and ultrasound almost exclusively and therefore have great expertise in this area - they specialised in this at a very early stage. They have few or no points of contact with MRI. To them, MRI is like an "exotic animal". This unsettles them. Whenever I say: "MRI should be carried out as standard as part of any breast-preserving therapy," all I hear from the mammographers is "But who is going to pay for this?" And this is despite the fact that we are looking at one of the - if not the most extensively researched area of application for MRI in terms of clinical relevance. If these mammographers were to spend just one day in an MRI department they would be amazed at what is being examined with MRI these days, without "costs" being raised - for example, MRI of the spinal lumbar region, for which we know there is

little clinical relevance and which has little impact on therapy management for these patients.'

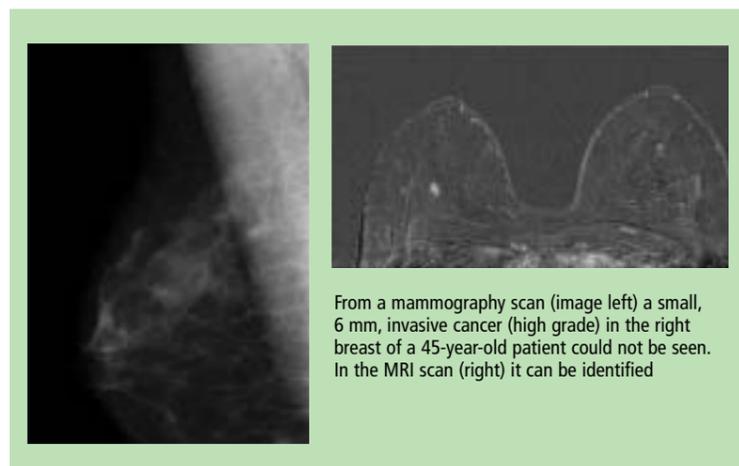
This is changing increasingly in the USA, she pointed out, there breast MRI is seeing enormous growth rates. Guidelines from the American Cancer Society stipulate that all women with a lifetime-risk of only 20% are to receive a breast MRI for early detection. 'This goes even further than the data currently available would call for,' said Prof. Kuhl. 'These data, a not insignificant proportion of which was collected in Bonn, state that women who are at higher risk due to the disease having familial history, should receive an annual MRI for early detection. And a risk of 20% is reached quite quickly.'

'In future, all those women in the US will be examined with MRI for early detection. But, in Germany, MRI for early detection is not being

considered, even though this procedure is more or less a German product, and despite the fact that the data on which the recommendations are based originated mainly here and Europe. At the same time we know from new data from the DMIST study, carried out by Etta D Pisano, that the medium sensitivity of mammography is between 40-50%, i.e. out of 10 women suffering from breast cancer only 4 or 5 are actually detected, the rest are sent home as healthy, because mammography cannot visualise these cancers.'

'For women who are at average risk, we don't know what the comparative sensitivity rate with screening MRI is, as yet. But the sensitivity of MRI for screening women at increased familial risk has been twice as high or, in some cases, more, up to three times as high as mammography, in all published studies. Breast MRI has a sensitivity of over 90%, mammography of 33-40%, combined with ultrasound this increases to 45-50%. By the way, this corresponds with data from the DMIST study - the only mammography study that has actually validated its data. Since our first publication in 2000, over 10,000 women have been examined, and more studies have been published in high-quality journals (NEJM, JAMA, The Lancet etc.). The results are surprisingly concordant: MRI is far more efficient than mammography and ultrasound - also for women who are only at moderate risk of developing breast cancer.'

Asked whether these convictions could mean the end for an entire industry, Prof. Kuhl replied: 'I wouldn't put it quite that way! Mammography definitely has its place, and we should also not say we want to carry out only MRI. But what we want to be able to do is to also carry out MRI. It cannot



From a mammography scan (image left) a small, 6 mm, invasive cancer (high grade) in the right breast of a 45-year-old patient could not be seen. In the MRI scan (right) it can be identified

be right that, in 2007, a mammography screening project in Germany - for many millions - is based on technology delivering this level of sensitivity – using technology with well-known limitations. About 40 years ago, when screening projects began in Scandinavia, there was no other technology available. Today, we know all the mammography figures, they are on the table. Mammography cannot visualise many carcinomas - due to limitations inherent in this procedure, not bad technology or because a radiologist lacks training. Even with the best technology and highest radiological expertise, certain carcinomas cannot be detected for purely physical reasons, because they are embedded in dense glandular tissue. We have known for some time that ultrasound can counterbalance some of mammography's shortcomings, but we should assume that MRI can do this even better. Therefore we must invest in this procedure – in order to make it ready for use in screening.

'We have known for quite a while that MRI, compared with mammography and ultrasound, is better for diagnosis of invasive breast cancer. However, people have said for years that MRI cannot visualise pre-breast cancer stages - intraductal carcinoma or ductal carcinoma in-situ (DCIS). It was thought this was the sole domain of mammography. To explain this in more detail: Most breast cancers – 80-90% - develop in cells that build the inner lining of the milk ducts. There is a phase in almost all cancers where real tumour cells are already present, but where they remain in the milk ducts for a certain period of time. Therefore the term ductal carcinoma in-situ is used.

'At this point we are formally talking about cancer cells. Biologically though, for the patient the situation is still benign, because the cells are surrounded by the walls of the milk ducts and have no connection to blood or lymph vessels. At this stage breast cancer is therefore always curable.

'If you find breast cancer at this in-situ stage this can be considered the "Holy Grail" of early detection. Prior to mammography, DCIS was not diagnosed prospectively, but was virtually always an incidental finding made at pathology. Since the introduction of mammography, around a fifth, i.e. 20% of carcinomas at the in-situ stage have been diagnosed, which is a reason why early detection with mammography works. As microcalcifications cannot be visualised via ultrasound or MRI, it was assumed that the diagnosis of in-situ carcinoma is possible only with mammography. In fact, in-situ carcinoma can be visualised very well with MRI, they just look different to invasive carcinoma.

'We know that in-situ carcinoma can be divided into two categories: High-grade and non-high-grade. Non-high-grade means that carcinomas are dormant for years and possibly never turn invasive. Of the high-grade ones we know essentially that they always become invasive and that the intraductal phase is very short. The high-grade, i.e. G3 invasive carcinoma are very dangerous indeed. Therefore, it's essential to detect them at the in-situ stage – once they grow invasively, the race is on.

'The interesting feature of our data is that, very unexpectedly, MRI has proved not only on a level with mammography in the detection of in-situ carcinomas but, in fact, significantly superior – particularly in the diagnosis of high-grade in-situ carcinoma. In the detection of 167 in-situ carcinomas the sensitivity of

mammography was 51%, MRI was 92% - figures that are clearly in favour of MRI. Mammography was particularly insufficient to diagnose high-grade in-situ carcinomas: it could not detect over half of the high-grade DCIS – because they had not developed any calcifications!

'It appears that a relevantly high proportion of the in-situ carcinoma does not calcify, so mammography cannot detect it. I said earlier that 20% of all diagnosed carcinoma are in-situ carcinomas. But we know that almost all carcinomas go through this stage – so what happens with the rest? We must assume that MRI will

enable us to detect more carcinomas at this early stage, particularly the high-grade carcinoma.

'Basically, unlike what was previously believed, MRI is superior to mammography also for the pre-invasive stages, the in-situ carcinoma. For the non high-grade in-situ carcinoma both procedures are complementary. For the high-grade in-situ carcinoma they are not complementary – MRI is clearly superior.

'One of my favourite assumptions (but which cannot be proved) is that the perhaps 10% of DCIS that cannot be detected by MRI are not

biologically relevant – because they are not preparing to invade and might never become invasive. For invasive growth, the DCIS requires vessels that deliver nutrients and oxygen. When those vessels are present MRI can detect the DCIS, so quite possibly we can see all those carcinomas that are preparing to invade. If we want to detect breast cancer at an early stage then, quite clearly, we want to detect it at the in-situ and early invasive stages. And we certainly want to find the high-grade carcinomas. If we know that the examination we currently use for early detection - mammography - can only find half of

the invasive and intra-ductal carcinomas, then the logical consequence is obvious.

'Logically, the next question would be whether we will use MRI for screening. Currently we cannot do this, because we still have to gather more data, because we must define exam standards and must establish a quality assurance analogue like that used in mammography, along with training radiologists etc. And even if all this will be settled - using MRI for screening will be expensive. Whether or not we, as a society, want to make this investment is a political, not a medical question.



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Italy – One of the biggest RIS/PACS implementations in Europe is being co-ordinated the Area Vasta Centro (AVC) group, which runs 12 hospitals in central Tuscany. Among these, CPA Pistoia hospital (one of three in the ASL 3 Pistoia group, a sub-division of AVC) is streamlining its mammography workflow with a CR Mammography system supplied by Agfa HealthCare. 'We needed a mammography solution that provided superior image quality, was easy to learn and use, and due to the Tuscan Medical Technology (TMT)



## Hospital group streamlines screening

project, integration with other hospital systems and hospitals is also important. The Agfa HealthCare system met all of these criteria with ease. At the end of this year, we will integrate with other screening centres in our region,' said Dr Patrizio Pacini, Head of Senology at Pistoia hospital.

CPA Pistoia conducts about 10,000 breast screenings annually. An additional 5,000 exams are performed at the Ospedale del Ceppo - also within the ASL 3 Pistoia hospital group. The mammography team at CPA Pistoia includes two doctors and three technologists.

The CR Mammography system was developed so that radiologists can use CR systems in mixed environments, for general radiology and mammography applications. According to Agfa, the solution, comprised of the CR 85-X digitiser, the NX 2.0 Workstation for Mammography and the Drystar 4500M, has proved itself '...a perfect fit for this busy mammo-screening unit'. The NX 2.0 Workstation for Mammography includes image identification and quality control software tools, and has a touch screen. 'The intuitive interface of the NX workstation simplifies the standard tasks of our technologists,' Dr Pacini pointed out. 'It streamlines both the exam and image processing procedures.'



# 3D USCT nears reality

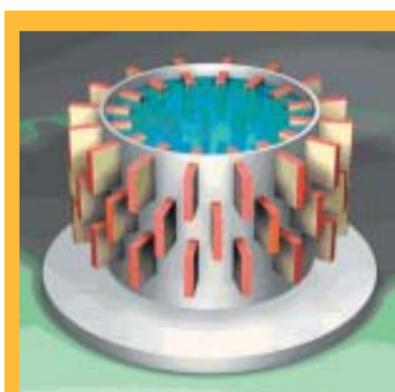


Hartmut Gemmeke

Back in the 70s, when scientists first speculated on the development of 3-D ultrasound computed tomography (3-D USCT) the available technology could not equal their dreams. Now, before the end of 2007, a prototype at Germany's Karlsruhe Research Centre will be used for the first in-vivo tests. EH reporter *Meike Lerner* asked **Professor Hartmut Gemmeke**, Head of the Institute for Data Processing and Electronics, at the Centre, and one of the developers of 3-D USCT, why such a prototype has taken so long to create, and what it might achieve

"Our prototype currently works with 1,600 ultrasound sensors – implementation with that many sensors, using conventional sensor technology, would have been too expensive. So, first we had to develop effective but cheap sensor technology. Then again, the amount of data generated by a 3D ultrasound CT image is a problem. In mammography, the amount of data we receive, per image per breast, if left uncompressed would fill 32 CDs. Reconstructing this image from the measured data would take an average PC about a month. That's where we were dependent on the development of appropriate algorithms and hardware. Around five years ago we finally realised that technology had advanced to a stage where it was feasible to contemplate the idea of 3D USCT again.

Now we are at the stage where we have carried out the first tests with nylon threads of



During a 3-D USCT scan, the patient lies face down on a couch. The breasts hang through a cutout space in the couch. The USCT cylinder, filled with body-temperature water is directly below, so the breast can be comfortably positioned inside it. Thus the painful squashing experienced in traditional breast scanners is eliminated. Another advantage to USCT: no radiation exposure.

The surface of the cylinder has sensors (currently 1,600 in the prototype, but the hope is to increase this to 1,900). Each sensor in turn sends a signal, which the other sensors receive, so a view is obtained from every direction and then assembled into a 3D image.

0.15mm, which were very successful. By the end of the year we will be able to test the sensitivity of this method for mammography in the first in-vivo tests.

The conditions are promising: On the one hand we'll be able to screen the breast from all sides, so therefore avoid shadowing effects. On the other hand the breast is not squashed, so that we will be able to locate growths and tissue changes in the 3D image as well. We expect to be able to detect tumours of less than 5mm. Moreover, this method will deliver reproducible images, which will also facilitate functional diagnostics. Compared with conventional ultrasound, 3D USCT not only measures reflections and reductions but also the speed of sound and frequency shifts. Because of the many sensors that are directed towards one picture element, the speckle noise typically produced with ultrasound scanning is extremely reduced, which is a further advantage.

Therefore, 3D ultrasound CT offers possibilities to show all modalities together in one image – and this means we'll probably be able to obtain information about the disease pattern of breast cancer at a molecular level. We've carried out first examinations with tracers, which can then be seen in 3D via ultrasound; however, this method is still in its infancy and we cannot yet say much about the sensitivity. However, if our expectations are confirmed, this would mean we'll be able to detect and quantify breast cancer in its very early stages.

Therapeutic use via hyperthermia is a further vision we have for 3D USCT. The conditions for this are given due to the large number of ultrasound sensors that focus as actors and can shell the tumour using hyperthermia.

However, these are dreams of the future. Initially we'd like to prove, with clinical tests, that 3D USCT does indeed have the effects in mammography for which we hope.

Therefore we plan to find a partner in the medical industry who will help us to implement this technology - we expect this will take two to three years. Then it will probably take another two years before the first equipment reaches hospitals. By the way, the price for this type of equipment is likely to be similar to what we currently pay for digital mammography equipment.

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**Ireland** Pulling into Europe's fast lane for digital screening

**Scotland** Under-funding, and clinical standards in breast cancer services are 'under review' *By Brenda Marsh*

In 2004, Ireland's health service recognised the need to serve the entire country through the Irish government-funded National Breast Screening Programme, BreastCheck. To provide a breast screening service at the highest possible level the usual procedures were necessary - funds had to be gained; equipment analysed; requests for tenders issued; evaluations made and finally contracts would be awarded then confirmed. Six companies tendered quotes. And now, 29 state-of-the-art mammography machines - manufactured by GE, Hologic and Sectra - are about to make Ireland one of the first European countries to provide a fully digital, state-of-the-art breast screening service.

**GE Healthcare** is to supply thirteen *Senographe Essential* full-field digital mammography (FFDM) machines, six of them for mobile units. (Within the total, two of the mobile units are from a previously awarded contract).

Ireland's rural roads are certainly a consideration for mobile units. Machine robustness is essential. Following 8,000 km vibration impact tests across the country, '... radiographers concluded positively on the digital equipment and workflow in the new mobile environment,' commented Niall Phelan, Chief Physicist of BreastCheck.

**In Ireland, breast cancer is particularly virulent: 18.5% of all cancer related deaths among the women are due to breast cancer**

**Hologic** has been contracted to supply nine of the 29 FFDM systems ordered by BreastCheck. Six will be the firm's *Selenia FFDM* mobile system, one a *Selenia* base system, and the order includes two *MultiCare Platinum* breast biopsy tables. 'We expect more new orders to follow,' says Hologic.

Outside of the new award from BreastCheck, Hologic already has at least one *Selenia* system installed and running within the Irish service, the company reports.

**Sectra** has been contracted to supply seven units to BreastCheck. In 2005, this screening programme began to evaluate the firm's *MicroDose Mammography* system, '...which is based on a unique photon-counting technology - a technique that an increasing number of experts point to as the radiology technology of the future,' Sectra reports, adding that they system also delivers the lowest radiation dose on the market.

Along with other manufacturers' equipment, it will be linked to the existing PACS, and the comprehensive digital infrastructure is expected to go into operation by the end of 2007. 'We've been pleased with the reliability and image quality of the Sectra systems and expect them to perform just as well in the more demanding environment of mobile screening trailers in which a number of the new systems will be used,' Niall Phelan said.

Following all the processing necessary in procurement, Niall Phelan confirmed that BreastCheck will be 'one of the most advanced screening services'. Wouldn't it have been easier and perhaps quicker, I wondered, to obtain equipment from just one company? Would this be like putting all one's eggs in one basket? 'All systems have their advantages and disadvantages,' Niall Phelan explained. There is also the question of ensuring that if one machine goes down for any reason, and must await servicing, the rest keep operating; after service will be critical to keep such a large and comprehensive service out and about on Ireland's roads.

**BreastCheck** - Working with a multi-disciplinary team of specialist clinicians, radiographers and breast care nurses, and including mammography, diagnosis and primary treatment, BreastCheck provides a free breast screening service to eligible women by personal invitation every two years. The programme screens systematically on an area-by-area basis - each service area reflecting electoral divisions.

Currently the service provides screening to women in the northeast, east, midlands and parts of the south east of the country through two static units (the Eccles Screening Unit, near Mater Misericordiae University Hospital and Merrion Screening Unit near St.Vincent's University Hospital) and a fleet of mobile units. In 2005, BreastCheck invited 78,945 women for screening; 59,443 women attended appointments, the service reports. Now, BreastCheck is expanding nationally to cover women in Ireland's south and west. The screening programme will be extended nationwide and the target date for commencement of expansion programme is by the end of autumn, this year.

A Southern screening unit is being built in Cork, on the campus of South Infirmary Victoria Hospital and a Western screening unit will be located at University College Hospital, Galway. These units, plus a fleet of mobile units, will provide screening to the rest of the country.

Following this national expansion of the screening programme the upper age limit will be extended to women aged 69, in accordance with the European Council's recommendation.

**Scottish woes**

Last September news broke that, despite advice from its Breast and Cervical Screening National Advisory Group, Scotland's National Health Service (NHS) would not fund a £20 breast-screening test, which, according to oncologists, could have detected around 430 more tumours annually and saved dozens of lives. The result for other women was mastectomies that would have been avoidable if the breast cancer had been detected earlier.

By imaging women from just one angle, rather than two, the Service saved £20 per patient. The Advisory Group had recommended the introduction of a 'two-view' mammography programme, and even advised it would be cost-effective.

In 2004, the amount spent on the country's breast screening programme was £10 million. A further £2 million would have been needed to provide dual X-rays to the 121,000 women, aged 50-70 years, invited for screening each year.

It was said that although the NHS recognised the benefits of two-view mammograms, funds were being stretched to introduce colorectal cancer screening. The result was that, during a first screening, X-rays were taken of the woman's breast from above and the side; but in subsequent screenings the image was taken only from the side.

Many oncologists expressed concern that Scotland did not do what is being done just south of the border in England.

In Scotland breast cancer kills over 1,000 women annually. Although 2003 figures indicate that around 1,800 breast cancers were detected there during screening, more recent figures show that only 78.5% of cancer patients were treated within two months of an urgent referral by their general practitioner (GP) - well below a 95% target.

**Scotland upgrades to two-view**

In February this year, the Scottish Executive announced that the breast screening programme would be upgraded, to use two-view mammography.

**Recalled patients** - After examining medical records of 1,600 patients over a previous 18-month period, 198 women being treated for suspected breast cancer at Inverclyde Royal Hospital, in Greenock, are being recalled by the health board to be re-examined because they had not received the required mammography or ultrasound and biopsy in addition to the standard clinical breast examination.

A full review of breast services at the hospital has been ordered by the NHS Greater Glasgow and Clyde, whose CEO, Tom Divers, said the differences in standards between Inverclyde and other breast clinics in the area first emerged during an audit of breast cancer care. 'This highlighted that, when compared to other centres, a lower percentage of patients seen at Inverclyde had diagnosis confirmed before surgical intervention. Further interrogation of these results has now identified that some patients did not receive the full range of appropriate tests when being assessed for suspected breast cancer. This has prompted us to launch a full review of practices at those clinics.'

No other clinics within the Greater Glasgow and Clyde area are affected.

Health Secretary Nicola Sturgeon said she would carefully monitor the board's actions. 'All the lessons learned will be shared with NHS boards across Scotland,' she added. 'I am also asking NHS Quality Improvement Scotland to accelerate completion of the current review of clinical standards for breast cancer services, which are already in process of being updated in the light of advances in clinical knowledge and techniques.'



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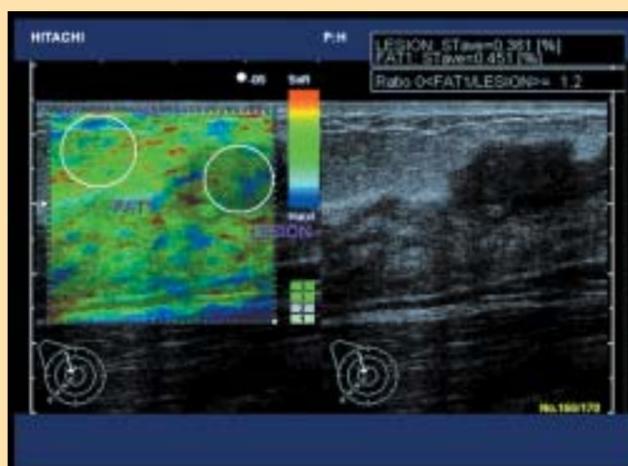
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**Tissue elasticity reveals tumours**

When equally compressed, the tissue and structure of tumours and inflammations are harder than normal tissue. Hitachi explains that, taking advantage of these alterations, the sono-elastography technique conducts real-time measurements of elasticity ratios during minor pressure to the breast, using conventional ultrasound transducers. The results are colour-coded and overlaid on the conventional breast image for evaluation through various logarithms. No additional equipment or particular transducers are necessary; only a software add-on module - Hitachi SonoElastography for the Hitachi EUB-8500, the company adds - to evaluate the shifts between the individual images in consecutive ultrasound recordings and indicate, via colour-coding, the alterations in expansion and determine the site. 'This enables differentiation of tumour tissue from healthy tissue, and of malign tumour tissue from benign tumour tissue,' Hitachi adds. 'Unlike conventional ultrasound procedures, sono-elastography measures larger scale shifts only in one compression phase without pseudo artifacts.'



This additional information about the visco-elasticity of breast tissue significantly increases the rate of breast cancer detection, Hitachi continues. 'Clinical studies conducted so far have shown that, with sono-elastography, lesions can be visualised safer and faster than with conventional 2D procedures; visualisation is even possible with the lesions that are undetectable with conventional breast image sonography.'

Full details: <http://www.hitachi-eu.com>

# New technology to reduce biopsies

Although about 75% of biopsies are negative, the side effects of that invasive procedure, plus the length of time to results, disturbs patients. Now, however, a new technology might be able to differentiate benign and malignant tissue due to an adjunct of a normal breast ultrasound examination.

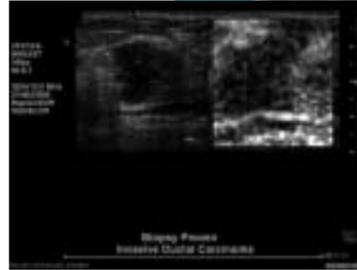
*eSie Touch Elasticity Imaging*, a new software from Siemens Medical Solutions, has become available with the firm's 5.0 release of the Acuson Antares ultrasound system. Using this

application, physicians can generate an 'elastogram' to obtain additional information about mechanical properties, such as the stiffness of breast lesions. (Generally, just a patient's heartbeat and respiration provide sufficient movement to generate an elastogram).

Several studies involving this method are showing 'promising success', Siemens reports. 'In a recently published American study, 80 patients with a total of 123 suspicious lesions were examined using the elasticity

measurement. 18 lesions were classified as malignant, which was confirmed in 17 cases by a biopsy. Of the 105 lesions predicted as benign, all were also proven so by biopsy. Results are now being validated in comprehensive studies in Europe.'

Of course, the ability to visualise tissue elasticity could not replace biopsies in general, Siemens agrees. However, the firm adds, there is reason for hope that this method might reduce the number of unnecessary breast biopsies.



Elasticity imaging illustrates relative stiffness of tissue compared with its surroundings. As tissue undergoes pathologic changes, its relative stiffness changes. Tissue stiffness, as well as its size compared with the B-mode image, provides further insight into potential pathology

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GE imagination at work

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### World's largest gathering of cancer specialists told: Mammography is still key to survival

Rapid diagnosis and treatment are the keys to breast cancer survival – and an elastogram mammography continues to play a central role in breast cancer detection according to research presented recently in Chicago, at the *43rd Annual Meeting of the American Society of Clinical Oncology (ASCO)*, writes **Ian Mason**.

In abstract number 6589, chillingly titled *'Killing time: Treatment delay and breast cancer survival'* Dr Sheinfeld Gorin and Colleagues (Columbia University, New York) tracked 43,359 females, aged 65 and older, who had been diagnosed with breast cancer between 1992 and 1999. Women who had over a three-month delay in receiving treatment had a 34% increased risk of breast cancer death, compared with women with delays under three months.

The continuing importance of mammography was underscored by data from a study of over 1,000 women [abstract 17033] showing that those diagnosed via mammography/ultrasound had higher survival rates compared with women diagnosed via breast self-examination and clinical breast examination, irrespective of disease stage at diagnosis.

Dr C. Kuhl, and colleagues, University of Bonn, Germany [abstract 1504] found that the addition of high-resolution MRI and of state-of-the-art mammography offered a significantly higher sensitivity (compared with state-of-the-art mammography) for detecting high risk pre-invasive breast cancer (ductal carcinoma in situ [DCIS]).

Another large study of more than 15,000 older women, aged 80 and older, who had been diagnosed with breast cancer between 1996-2002 [abstract 9039] found that even in this age group, regular mammography was associated with earlier stage at presentation and smaller tumour size compared with mammography non-users. 'Health care providers should consider discussing potential benefits of screening mammography with their older patients,' the authors concluded.

Other presentations showed that mammography can be used successfully to target groups who fall through the screening net, such as ethnic minority women [abstract 17020] via the targeted use of bilingual community breast liaison nurses.

Whilst Siemens AG in Germany is going through turbulent times, the medical branch of the business remains on steady ground. Thanks to a number of acquisitions (the latest, Bayer Diagnostics) Siemens Medical Solutions holds a strong position in *in-vitro* diagnostics, which not only complements its successful diagnostics portfolio but also represents an important step for future medical approaches, i.e. molecular medicine. Integrated diagnostics and workflow optimised IT solutions are key words, which Siemens Medical Solutions hopes will help to achieve successful synergies for its *in-vivo* and *in-vitro* business. Even though molecular medicine is still in its infancy these hopes appear justified.

During a *European Hospital* visit to the Siemens Medical Solutions diagnostics site in Tarrytown, New York, and the Molecular Imaging Division in Chicago, **Professor Erich R Reinhardt**, President and CEO of Siemens Medical Solutions, **Tony Bihl**, CEO of Siemens Medical Solutions Diagnostics and **Dr Wilfried Löffler**, Vice President R&D Clinical Systems, met with *Meike Lerner* to discuss their company's successes, further strategies and future potential in the interaction of the *in-vivo* and *in-vitro* business.

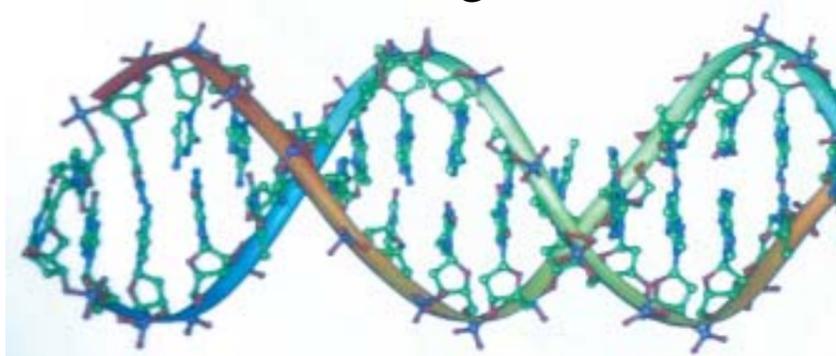
# Molecular imaging and biomarkers

## Discovering the trail to future diagnostics

Just two days after the appointment of Peter Löscher as new CEO of Siemens AG, in Germany - which caused a big stir - the mood at Siemens Medical Solutions in New York State is relaxed. 'Here in the US we don't feel current concerns as much as they do in Germany; employees are not as sensitised to this subject. However, of course we are happy that the position of CEO at Siemens AG has been filled with a good guy, and hope this will pour oil on troubled water. It goes without saying that Peter Löscher can count on our full support,' Prof. Reinhardt emphasised.

The appointment of Löscher, who has a sound reputation in the medical manufacturing world following his background at GE Healthcare Bio-Science and Merck, is not likely to have an impact on the strategic orientation of Siemens' medical business, Reinhardt believes. 'The subject of health has had a high profile within the company for some time. After the acquisitions of DPC, and Bayer Diagnostics, we are now at a stage where we are consolidating our business. As the new CEO of Siemens AG, Peter Löscher will help us to implement our strategies.'

It is clear where this will lead, he added: '... to optimised and integrated workflow processes in hospitals and to our ability to offer complete solutions in prevention, diagnostics, therapy and care. The first decisive hurdle along the way has already been overcome through successful expansion in imaging diagnostics (*in-vivo*) with *in-vitro* diagnostics. The combination of *in-vivo* and *in-vitro* is our diagnostic future. Even today, *in-vitro* diagnostics plays an important role in the clinical decision process, in *in-vitro* screening for prevention, diagnosis and in-patient monitoring during and after therapy. Around 70% of all diagnostic decisions are based on laboratory results. We already have a considerable number of scenarios where *in-vivo* and *in-vitro* diagnostic procedures are combined. For instance, a blood test can indicate malignant tumours at a very early stage, which can then be localised



via imaging procedures such as PET/CT. In view of the developments in molecular medicine, *in-vitro* diagnostics is set to become ever more important. Whereas the market volume for *in-vitro* diagnostics in 2005 was around €24 billion, it is anticipated that this figure will be around €34 billion in 2010,' Tony Bihl explained.

Through the acquisition of Bayer Diagnostics, in particular, Siemens is currently the only provider of integrated diagnostic procedures including molecular medicine. The range of products in the *in-vitro* area includes ultrasound, CT, MRI and X-ray systems, along with molecular-medical solutions such as SPECT,

SPECT-CT, PET and PET-CT. The latest development is a PET-MR machine that will be taken from its point of development in Knoxville, USA to Erlangen, Germany. In the *in-vitro* field, laboratory solutions for immune diagnostics, nucleic acid determination, clinical chemistry, urine analysis and point of care (POC) diagnostics are available.

Laboratory Automation Systems play a particularly important role in terms of workflow improvement in hospitals, and Siemens Medical Solutions Diagnostics is a market leader in this area. 'With this new range of products we are perfectly positioned for further developments in molecular medicine and can, for instance, control and optimise the development of biomarkers, based on findings in imaging procedures. Moreover, we are facing a change of paradigms in medical technology away from product-specific solutions to disease-oriented solutions. This means that, in the future, it will not be individual products, such as CTs, that will be in demand, but complete solutions for cardiology, which, for example, will then comprise CT or MR in combination with a specific laboratory solution. We are prepared for this change,' said Prof. Reinhardt.

In terms of molecular medicine and an optimised workflow, *in-vivo* and *in-vitro* diagnostics are only two important pillars. The third - and most important - are efficient IT solutions that network the processes of prevention, diagnosis, therapy and care and that adapt and optimise the results of laboratory tests and imaging procedures individually for each patient.

### Soarian

'The greatest synergies for molecular medicine, and its workflow, lie in the consolidation of existing information. In view of the highly complex matter of molecular medicine, this might sound simple, but its implementation is proving very challenging. Being able to access the right information, at the right time, for the right patient is a

great challenge,' said Dr Löffler, who is currently overseeing PET development at Knoxville, and understands the difficulties in handling data from the development of PET hybrid systems.

With Soarian, a Siemens IT solution under development at Malvern, Pennsylvania, the firm believes it is on the right track to tackle that challenge. Soarian, which had its beginnings in HIS and RIS, is an integrated solution that can be expanded step by step. The next step has been the integration of an accounting systems and finally the integration of a laboratory module and a PACS. 'These are all areas that are very stringent, but the combination of these individual elements is difficult to implement because of the sheer amount of non-compatible data. After all, the objective is to combine the information in a meaningful manner, not just to collect it. This means developing schemes that automate clinical workflows,' Dr Löffler explained.

With Soarian, this is already a reality. The next step will be to match diagnostic information provided by *in-vivo* and *in-vitro* procedures and so create a joint diagnostic picture - as it were, to develop an intelligent system that automatically delivers a consolidated image for the physician.

These are currently dreams for the future, but the solution is comparable to finding the Holy Grail - and Siemens is not alone in seeking this.

### In-vivo and in-vitro diagnostics in molecular medicine

In molecular medicine - and particularly in oncology - Siemens Medical Solutions is concentrating on further development of the FDG (fluorodeoxyglucose) biomarker to improve identification of certain tumours. Thanks to the combination of *in-vivo* and *in-vitro* diagnostic procedures, the relatively unspecific image currently delivered by the FDG marker can be combined with additional information from laboratory diagnostics and interpreted accordingly. In turn, the results deliver clues to further development of specific markers.

It is also conceivable that there will be more fine-tuning in the development of *in-vivo* and *in-vitro* biomarkers, so that disease patterns that are localised *in-vitro* can be specified with the appropriate *in-vivo* biomarkers. Both areas are still so innovative that, as yet, there are no tangible synergies. However, the potential for an integrated diagnostics company is great, seeing how the trend points towards a combination of early, localised detection with radioactive biomarkers in *in-vivo* diagnostics with fluorescent markers matched in detailed *in-vitro* diagnostics.



Summing up Siemens' successes and the potential of *in-vivo* and *in-vitro* diagnostics: Erich Reinhardt (left) and Tony Bihl

Wilfried Löffler, who heads PET development at the Siemens' Knoxville site in Knoxville, foresees great potential for synergies between the *in-vitro* field and molecular medicine

# What's your prediction for MR? 'Expect the unexpected'

Since April, there's been a new man at GE Healthcare's global MRI division; its new Vice President and General Manager is **James E Davis**. *Meike Lerner* caught up with him during the *International Society for Magnetic Resonance in Medicine Congress*, held recently in Berlin

*'Mr. Davis, what do you expect from the magnetic resonance (MR) technology in the near future and what are you aiming for?'*

James Davis, newly appointed VP and General Manager of GE Healthcare's global MRI division, responded with little hesitation: 'Some of the most promising uses of MR will centre around breast imaging, the prostate and liver

imaging. Going another step forward, the use of MR for whole body imaging - for cancer and metastasis detection - will offer us unique possibilities considering our early health philosophy. I think, today, we've only tapped 30% of MR potential, and it will keep going with breakthroughs that we can only dream of today. Look at

the amazing possibilities molecular imaging offers us: MR is at its heart a modality that enables us to use it for functional imaging studies, to analyse the metabolism of tumours and cancer.

'One example is the so-called hyperpolarised carbon 13 technology, which has been in development with GE for two

years. With this unusual technology we can boost the signal from magnetic resonance maybe 10,000 or 100,000 times, and therefore see things in the body that have been invisible so far. This offers the potential to watch metabolic reactions in certain locations of the body and turn MR into a modality for probing the body's metabolism in

ways that were previously impossible beyond the test tube. For us, this is the greatest potential for MR in molecular imaging.

'Another important use of MR is and will be in cardiology. Here, MR is one of the most efficient diagnostic systems. There are several studies, particularly in Europe, in which we are trying to characterise coronary plaque, which means looking at the signals returning from the plaque. They would tell us if it is a harder calcified plaque or a softer vulnerable one, which is very important information in terms of treatment options.'

Beyond those promising perspectives, there are problems such as MR-regulation discussions in Europe, and the negative effects of the gadolinium-based contrast agents. Asked how GE Healthcare is dealing with these, James Davis replied:

In relation to the condition known as Nephrogenic Systemic Fibrosis (NSF) GE Healthcare is



James Davis with EH reporter Meike Lerner

working with global health authorities and engaged in a variety of clinical and pre-clinical activities to better understand this serious condition. In consultation with the EMEA CHMP, FDA and other authorities, GE Healthcare has made modifications to the prescribing information for gadolinium containing contrast agent related to NSF and is committed to keeping our customers fully informed about using our products in the safest and most effective manner.

'Looking at the planned EU regulation that deals with the protection of those working in a surrounding of magnetic fields, we are very concerned. Primarily because we have not seen any scientific evidence that indicates that the kind of exposure the medical community get to magnetic signals and EMF signals cause any problems. But for us, as a provider of medical equipment, it is important to ensure that our technologies are as safe as possible. So, of course we are open to working with the medical community on studies and tests to really see if there are any clinical evidences that exposures to EMF signals generated by MR equipment could be a problem. So far, we have not seen it, but we seriously care about this.

In summary: All these things we talked about today are still just a small piece of possibilities and challenges we will face in the future. Talking about MR means to expect the unexpected. There will be great medical advances that today we don't expect. There will also be problems that we cannot foresee today. But I'm sure MR will have a great future in medical diagnostics.'



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# Endoscopy in Lithuania

By our correspondent **Andrius Vagoras**

The well-known Whipple procedure, or pancreaticoduodenectomy, recently underwent a transformation due to the skills of **Nerijus Kaselis MD**, Head of Abdominal and Endoscopic Surgery at Klaipeda District Hospital. For he performed, for the first time in Eastern Europe, a laparoscopic procedure on a female patient with cancer of the major duodenal papilla. During this, part of her pancreas, duodenum, the small loop of the intestine, gallbladder and ducts were removed, and anastomoses carried out via small openings in abdominal wall. The advantages of the procedure include conserving the stomach, part of which must be removed in the Whipple procedure. Even if performed in the traditional way, the procedure is one of the trickiest.

## The 12-hour time span

'I felt normal after only two days,' said Dr Kaselis, speaking of the muscle discomfort in his shoulders and neck due to working for hours with both hands raised and head bent over his patient. Most of the time spent was on the anastomoses. On average, the entire operation takes 12 hours, which is why it is unlikely to become a daily procedure – unless there were several surgeons working – one to remove diseased tissue, the other to carry out anastomoses.

'Of course,' Dr Kaselis added, 'the procedure also couldn't be daily because only stage I and II tumours can be treated with laparoscopic surgery. For the bigger tumour the only option is classical surgery, through the abdominal wall.'

He is very confident that laparoscopy could be used for early stage tumours. He points out to those who doubt whether a tumour could be removed radically that, when performing a laparoscopic procedure, the surgeon can see an enlarged image of the lymph nodes, so can select and remove more of them than when observing only with the naked eye. This is of great importance when dealing with cancer, he emphasises.

After this surgery, the woman patient was comfortable and could drink within the first day and eat after day two. Peristalsis was quickly restored and there was no gastric arrest. Results from the histological evaluation of the lymph nodes showed the patient would not need chemotherapy. The only advantage of the classical operation is the time-span – usually eight hours, compared with 12 for laparoscopic surgery. But, Dr Kaselis argues, what was important several years ago isn't today. Modern anaesthesia now has so few time-related complications that the additional four hours are worth it, and benefit the patient after only a day.

'This procedure was not extraordinary to me,' he reflected.

'It is just the next logical step from earlier experience.' Laparoscopic connections of the abdominal cavity organs are not so difficult, he said, after 14 years in daily practice. In 1993, Dr Kaselis performed his first laparoscopic removal of a gall bladder, just a month after the first was carried out at Vilnius University Hospital. In Lithuania he also pioneered the laparoscopic removal of a gangrenous appendix, intestinal obstruction and laparoscopic closure of a perforated duodenal ulcer. In 1995, the removal of a common biliary duct was the first, not only in his country, but also in East Europe, and a right side colonectomy was among the first couple of dozen – globally.

To his mind, to be successful needs experience as well as

innovation, and hospital decisions makers can influence the overall progress. 'Maybe,' he said, with a smile, 'if I was not working in a third-world country hospital, there would be less ambition to one day become the first.'

## The secret ingredient: ambidexterity

Dr Kaselis intimates that he has an inborn asset to perform endoscopy. Unlike most people, he is fully ambidextrous. His parents noticed his skills with both hands, but at school his right hand had to be put to use. However, in this type of surgery he is happy to be able to use both hands with equal ability. After introducing the manipulation

tubes some movements must be performed with the right hand, some with the left. This naturally strains those with one dominating hand, but he experiences no discomfort, loss of control or slow-down in the work.

## Bariatric surgery – the future

Although bariatric surgery in Lithuania and neighbouring countries is only on its infancy, Dr Kaselis has performed over 70 of these procedures in the last two years, and he recalls, with professional joy, that those obese patients always remember the person who helped them.

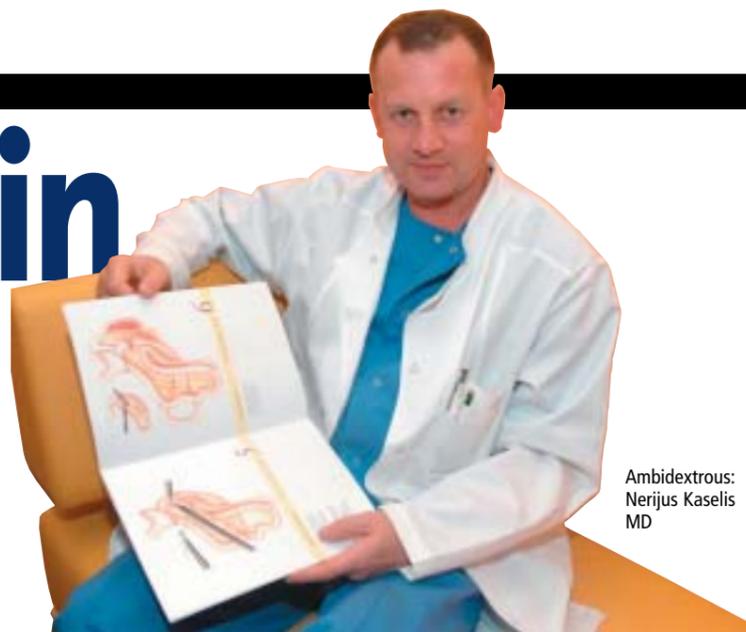
He is also increasingly

convinced that patients should be offered bypass surgery instead of adjustable gastric lap-band surgery. Bypass surgery is trickier for a surgeon, but far more effective and with lower rates of complications for the patient, he says, and only three surgeons in Lithuania can perform this type of surgery.

Dr Kaselis expressed surprise at the short-sightedness of politicians and the poor public understanding of how much bariatric surgery could help the obese. Whilst politicians in other countries discuss which type of surgery for the obese should be reimbursed from state insurance, Lithuania sees obesity not as a medical concern, but as a consequence of life style, so there is no reimbursement. Yet, studies indicate that 62 thousand obese people in Lithuania are candidates for bariatrics surgery!

He would recommend bariatric surgery to treat anyone with a body mass index over 40 and, of course, with a history of unsuccessful previous treatment by dietician and endocrinologist.

The average weight reduction after bypass bariatric surgery is over 70%, he pointed out – enough to cure more than 80% of obesity-related diabetes, hypertension, hyperlipidemia, impotence, snoring, and dramatically reduce the intake of medications.



Ambidextrous:  
Nerijus Kaselis  
MD

## SEALING VEINS, ARTERIES AND BUNCHED TISSUE



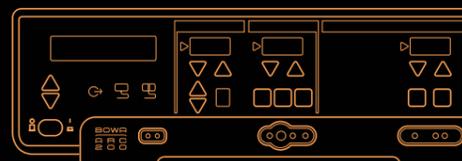
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About a year ago, gastroenterologist Professor Horst Neuhaus began to use a high definition TV (HDTV) system as an aid in the endoscopic procedures carried out at Dusseldorf's Evangelisches Krankenhaus, in the Medical Clinic and Reference Centre for Endoscopy, of which he is head.

An HDTV system has also been used for about the same period at the Visceral, Vascular and Thoracic Surgery department in the Markus Hospital, Frankfurt. 'One of the main advantages of minimally invasive surgery (MIS) – with or without HDTV – is that there is a much better view of the operating field via the monitor,' Prof. Karl-Hermann Fuchs, Head of the Clinic told us.

Explaining the HDTV system to Denise Hennig of European Hospital, Prof. Neuhaus said that, up to now, PAL technology (with the 690 lines of a television set) was used for endoscopy. However, with 1,080 lines, HDTV technology increases image resolution fourfold. 'This improved resolution can be

Haemoglobin, for example, also absorbs within the short wave range at around 460 nanometers. NBI technology helps to blank out the red colour range completely, as if we were using a filter. This colour-changed imaging allows us to characterise the mucous membrane structures in much more detail and also to detect subtle tissue changes. When we detect a change in the mucous membranes using conventional, white light endoscopy, which comprises the entire colour spectrum, we need to use chromo-endoscopy (endoscopy involving the topical application, i.e. spraying on, of chemical agents (colour stains) to improve tissue characterisation) to establish a differentiated diagnosis between infected and neoplastic tissue. However, in reality, this wasn't often done. These days we can just press a button to switch on the NBI system and can immediately differentiate changes in mucous membranes, differentiate any lesions from their surroundings and detect tissue changes much better.'

In this case, he foresees the end

improvements he would like to see? 'HDTV and NBI should be at the disposal of all endoscopists. First, we have the primary problem that we cannot find enough cases with early changes. On the one hand it's because people might not even go to their doctors or, on the other,

#### Visceral, vascular and thoracic surgery

'In MIS we get an enlarged view of the operating field via the monitor,' said Prof. Karl-Hermann Fuchs, at the Markus Hospital. 'This gives us a far more precise view than we sometimes get with open surgery

system, the professor said he did not have sufficient technical knowledge to come up with suggestions. 'That's a job for engineers,' he pointed out, and reiterated: 'All I can say is that we get a better image, which is great as it makes our work a lot easier. This not only applies to tumour removal, or organ resections, but also any other surgical procedures; it makes preparation easier because the improved image achieved via the monitor is often more precise than what we can see with our bare eyes in open surgery.'

'Improved imaging also opens up new perspectives in flexible endoscopy. We are currently developing a new operating procedure called NOTES (Natural Orifice Transluminal Endoscopic Surgery), which is groundbreaking in MIS. The method utilises natural body orifices as entry channels. Once access has been gained in this way only a small incision is then required to access the



Professor Horst Neuhaus explains HDTV to Denise Hennig of EH

## Notes on NOTES

Natural orifice transluminal endoscopic surgery (NOTES - a technique that could revolutionize minimally invasive surgery (MIS) by eliminating abdominal incisions - is slowly shifting from research on animal models to human patients. Thus NOTES could be an advance much as laparoscopy was between the 1980s-90s.

During the procedure an endoscope is passed through a natural orifice, e.g. mouth, urethra, anus, depending on the target area, and on through an internal incision in the stomach, bladder, vagina, or colon, so that external incisions and scarring are avoided.

Advantages could include reduction in anaesthesia, avoidance of trans-abdominal wound infections; less need of immunosuppression; better post operative pulmonary and diaphragmatic function, quicker recovery, so shorter hospitalisation, and finally no visible scarring.

However, critics challenge the safety and advantage of this technique in the face of effective MIS options, e.g. laparoscopy.

As said, NOTES has been mostly practised on animals, for diagnosis and treatments, including transgastric (through the stomach) organ removal. Some researchers now advocate transvesical and trans-colonic approaches, reasoning these are more suited to access upper abdominal structures, which are often more difficult to work with if using a transgastric approach.

Originally described by researchers working with animals at Johns Hopkins University (Anthony Kalloo MD, et al.), NOTES was recently used for transgastric appendectomy in humans in India (Drs. G V Rao and N Reddy).

Transvaginal access appears to be the safest and most feasible for clinical applications. In March this year, the NOTES Research Group, led by Dr Ricardo Zorron at the Federal University Rio de Janeiro, Brazil, performed the first series of transvaginal NOTES cholecystectomy on four patients, based on previous experimental studies. Later in March, Dr Marc Bessler successfully performed the same procedure in New York. In April, Dr Marescaux, of EITS-IRCAD Strasbourg, France, carried out this surgery on a patient. Although having potentially less complications, the disadvantage is that the procedure is obviously only possible for women.

subjectively seen on the flat screen monitors,' he said. 'Mucous structures and possible changes can be differentiated much better. We are more sensitive to the detection of the slightest changes, which we wouldn't have been able to notice before. We are able to get much closer to where we need to be and can, if necessary, intervene with minimally invasive procedures (MIS) straight away. A further advantage of the new camera system is narrow band imaging (NBI), which was introduced by Olympus around the time that HDTV technology was introduced.'

NBI, Prof. Neuhaus explained, is a procedure that emphasises the colours blue and green within the colour spectrum. 'These have short wave lengths that penetrate tissue to a lesser extent.

of the use of chemical agents. 'There's a range of studies, on Barrett's oesophagus, for example, which show that NBI is just as good as chromo-endoscopy. As far as I know there are no comparable studies for the colon, but from the clinical point of view the situation here seems similar. As we no longer have to use chromo-endoscopy, the differentiation between harmless benign and infected, suspicious tissue can be achieved much quicker. However, in a way there is a chance that this gain in time might be cancelled out by HDTV technology, because this allows us to see far more detail, which means that we may spend more time characterising the area we are examining and also possibly taking tissue samples.'

Are there technical

# HDTV ADVANCES INTO GERMANY

because conventional technology has not enabled us to detect these early changes, or we have overlooked them. However, if in doubt, the doctor should consult a reference centre for endoscopy.

'In terms of early stage cancer treatment, I imagine there will be further, technical improvements. Currently, it is still very complex to remove larger areas with endoscopic mucosal resection, or with the submucosal dissection introduced by the Japanese,' he pointed out. 'We are working on systems that will allow us to significantly speed up the cutting procedures, or which will allow us to carry out whole wall resections endoscopically. We don't yet have sufficiently evaluated surgical staplers, or suture procedures, used for flexible endoscopy. However, we are confident that - particularly in view of the new MIS procedure NOTES (Natural Orifice Transluminal Endoscopic Surgery) - these instruments will be significantly improved. It's now up to the medical industry.'

- particularly in areas that are difficult to access, such as the oesophagus or deep rectum.

'HDTV technology adds an extra advantage to this, because even more precise images are created. It allows us to see nerve structures, small vessels and the entire anatomy in much more detail. A further technical advantage within this system is narrow-band imaging, which allows us to define the borders of tumours far more precisely.'

Another advantage is that the system appears to remove some of the strain and fatigue for surgeons, who must concentrate for hours in front of a monitor in the operating theatre. 'This is just a purely subjective experience,' he added. 'It has not yet been scientifically proven. However, I'm sure this technology will establish itself over the next few years, and then we will get studies that record and document these advantages in figures.'

Asked what improvements he would value most in such a

operating field. In April, the gallbladder of a patient in Strasbourg was successfully removed transvaginally. This kind of surgery is in its infancy, but will definitely become important as a further means of access for MIS.

#### Working together

'Flexible endoscopists and surgeons are slowly beginning to work together,' pointed out Professor Fuchs. 'I had the advantage of having learned flexible endoscopy and also the other, open and laparoscopic surgical procedures from the beginning, and I've been practising them for 25 years. That's why I can judge that these medical fields belong together. The fact that endoscopists, gastroenterologists and visceral surgeons work closer together is a positive development. We can all learn and benefit from one another.'

## 3rd educational publication on MIS

The European Medical Technology Industry Association, Eucomed, has launched the third in a series of educational publications on medical technology innovation, focusing on minimally invasive surgery (MIS).

In recent years there has been a tremendous development in MIS, Eucomed points out. 'Few areas of surgery do not currently benefit from advances in MIS. An MIS procedure is defined as one that is carried by entering the body through a small incision in the skin or, through a body cavity or anatomical opening, with the minimum damage possible. Resulting in far less trauma for the patient, MIS can also be less resource intensive, and could greatly reduce

the patient's time in hospital and speed up recovery times, generally causing a patient less pain and scarring. It might also reduce the incidence of post-surgical complications. It is important to note that MIS is not synonymous with minor surgery as it is now commonly used in serious and complex operations, such as heart surgery, Eucomed adds.

Other examples of procedural use: small bowel surgery, removal of kidney stones and tumours, brain surgery, carotid angioplasty, stenting, and knee replacements.

Medical technology industry researchers are working to improve and refine MIS techniques.

# Taking a dive into the 21st Computer Assisted Radiology and Surgery Congress

BERLIN  
27-30  
JUNE

Emphasis on advances in the use of computer assisted radiology and surgery (CARS) technologies in clinical diagnoses and therapies, will herald the opening of CARS this year (Details: [www.cars-int.org](http://www.cars-int.org)). The first tutorial - *From Diagnostic to Therapeutic Workstations - will be followed by sessions on: Minimally Invasive Spinal Therapy, Image Guided Diagnosis and Therapy of the Prostate, Interventional Radiology and Tumour Ablation Therapies.*

Three presentations will highlight substantial and transformational innovations in current surgical and minimally invasive interventions and those prophesied for the future: *Innovation, interdisciplinary and internationality in surgery*, *'Surgery and interventions of the liver: A role model for interdisciplinary and international co-operation and Tumour ablation therapies: a look to the future.*

'By diving straight into practice we'd like to target clinicians, engineers, computer scientists and physicists all in the same way,' explained **Heinz Lemke PhD**, of Berlin Technical University, and Research Professor of Radiology, University of Southern California, Los Angeles, who is also Visiting-Professor for Computer-Assisted Surgery at Leipzig University. 'From the start, it's important for us to involve all participants in the processes and developments of the different diagnosis and therapy systems, because we'll all benefit from interdisciplinary co-operation. This year we received abstracts for presentations and posters from 44 different countries. All in all, we received 573 submissions, an absolute record number!'

Special sessions that follow include scientific papers, and tutorials on surgical subspecialties, PACS, imaging technologies, CAD and CMI will continue. About 250 paper and 200 poster presentations will demonstrate the advances of CARS in an increasing number of clinical fields. The CARS Industrial Exhibition will show the increasing impact of CARS technology in clinical practice.

Surgical PACS is another CARS highlight. Unlike radiological PACS, surgical PACS requires all data to be visible in real-time, which means the reactions of the computer system to a surgeon's actions must be visible at sub-second levels. This needs an IT infrastructure oriented around real-time. 'Transmitting the data in real-time calls for high specifications for the system,' Heinz Lemke points out. 'With the classic radiological PACS systems it doesn't matter so much if an image sometimes arrives with around 1-3 seconds delay, maybe because the network is overloaded. That situation would be absolutely unthinkable during surgery.'

To examine and develop standards for surgical PACS, a working party was set up during CARS 2005. Initially this group

had around 70 members; today there are 130 worldwide, as well as representatives from firms such as Philips, Zimmer, Brainlab, GE, Siemens, Sony and Agfa.

'We work very closely with universities, research institutions and surgeons, who are dealing

with the issue of what standards are required in the operating theatre to facilitate real-time. The difficulty lies in trying to integrate the different types of data - images and other information, such as physiological movements, respiration, heart movement - into a patient-specific model,' Dr Lemke points out. 'Patient specific modelling is destined to

become an overarching theme, embracing many of the methods and technologies presented in the ISCAS, CAD, CMI, CAR and EuroPACS congress events. Considering the needs of therapy specifically, the workflow for diagnosis and therapy need to be linked via the patient-specific model (PSM). In addition to demographic data, the PSM comprises the core information data set of the electronic patient record (EPR). The building of this data set, i.e. the PSM, commences in the diagnostic workflow, making use of, for example, computer-aided diagnosis and associated technologies. Subsequently, the

construction of the PSM proceeds in all phases of the therapeutic workflow including after-care.'

The individuality of each patient poses a great challenge to research projects of the future, Dr Lemke emphasises: 'Each human is an individual and the surgical PACS should be able to react to individual circumstances. As Sir William Osler (Canadian physician, 1849-1919) said: *Variability is the law of life, and as no two faces are the same, so no two bodies are alike, and no two individuals react alike and behave alike under the abnormal conditions which we know of as disease.*'

Based on an EH interview by Denise Hennig

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Your Vision, Our Future

Professor confirms there are few or no solutions to most problems

# Fat compromises surgical and intensive care patients

**N**utrition-induced obesity is a physical and budgetary problem. For example, in Germany alone, an estimated €20 billion has been spent on obesity related health problems.

According to a recent US-study, among 1,373 post-surgical intensive care patients, 33.3% with a BMI above 40, died, whereas mortality among average-weight patients was just 12.3%. Published in 2004, a French study showed similar results.

‘After major surgical interventions obese patients often experience complications,’ confirmed Professor Elke Muhl MD, chair of the CAIN – working group on intensive and emergency medicine (Chirurgische Arbeitsgemeinschaft Intensiv- und Notfallmedizin) in Lübeck. ‘They range from pressure sores and wound healing problems to thrombosis and pneumonia, down to organ failure.’

● Many scanners, beds, operating tables etc. are too small to accommodate obese patients



PHOTOS COURTESY OF PROFESSOR DR MEDIEKE MUHL, CHIRURGISCHE KLINIK LÜBECK, GERMANY

Obviously in this case longer needles are required for vascular access

Moving obese patients is hard work for nurses

## Weighing up to 360 kg patients



seca GmH & co. manufactures a non-calibrated platform scales that can take a maximum capacity of 360 kg. On the seca 676, weight is clearly shown in steps of 100 grams on the swivel-mounted display at hip level, the firm reports. ‘The weighing platform is only 51 mm high and is easy to mount by people who have difficulty walking. Even very adipose people have a safe footing on the large platform measuring 95 x 96.5 cm. And the stable railing firmly attached to the scales provides a secure hold.’

The ‘hold’ function stores the weight value for a few minutes after the patient has left the scales, so the patient can be helped first, then his/her weight noted. The patient’s condition is quickly determined using the BMI (Body Mass Index) function, seca points out adding that this weighing machine is equipped with a damping system, to guarantee precise weighing of even restless patients.

Wheelchair users have sufficient space on the generously sized platform. And, thanks to the TARE function, the weight of a

wheelchair is deducted to provide only the weight of the patient. With the pre-TARE function, an already stored value can be deducted from the total measured weight – a chair’s weight, for example.

The railing can be quickly folded down and the scales, now reduced to a compact size, can be easily stowed away. For transportation, the seca 676 can be placed on its narrow side, which is fitted with castors and, with the rail safely locked in position it serves as a handle, so the scales can be pushed along. In addition, the machine stands safely in an upright position, seca confirms.



Respiratory tubes used for tracheotomy. Tubes must be extra long and the bend in a different position for obese patients



Deep skin creases and thick layers of fat present a challenge for placing vascular catheters in veins and arteries



On this motor-driven bed patients can be rotated left, right and back

- Surgical procedures are technically more demanding, needing more staff
- Special instruments and devices, operating tables and positioning aids must be adapted
- In traditional surgery larger incisions need to be made to gain a clear overview of the surgical site.
- In some cases, minimally invasive surgery (MIS) is out of the question.
- Postoperative care is more complex; for example, every second obese patient suffers hypertension (three times more

- than the average-weight population).
- 80% of all diabetes patients are obese. Disorders of the lipometabolism are also more prevalent in obese people, as are arterial stenoses. Diabetes and hypertension often lead to increased arteriosclerosis, which means the circulation, in particular the microcirculation in tissue is poor, which in turn impedes wound healing.
- Obese patients require longer injection needles and specially designed cannulas.
- To ensure their own health and

safety, nurses need motor-driven beds and chairs for these patients. (‘Back-friendly’ methods, such as kinesthetics, can help with lifting approaches).

● Because many pharmaceutical companies lack data on dosage for the obese patient, determining medication dosage for obese patients could present a further problem. ‘Severe overweight is an increasing problem in surgery and intensive medicine,’ Professor Muhl agreed. ‘And we’ve not yet found satisfactory solutions for each problem.’

The World Health Organisation (WHO) quotes figures that indicate there are over one billion overweight adults spread across the world, as of 2007, with at least 300 million of these defined as clinically obese (as defined by a BMI (body mass index) of 30). This epidemic of global proportion poses a considerable burden not only on obese individuals, who inevitably share a greater risk for chronic diseases, but also for society, which must cope with the associated healthcare costs. In the US healthcare expenditures related to obesity have been estimated as \$100 billion per year.

The main contributors to the epidemic - energy-rich foods high in saturated fats and sugars, combined with a reduction in physical activity – are well known.

America is often viewed as being the frontrunner in obesity; however, since 1980 a three-fold increase in girth has been recorded in people in North America, the UK, Eastern Europe, the

## Measures to contain obesity

By Karen Dente MD

that in this century the rise in obesity will result in a reduction in the overall life expectancy in affected nations.

A recent article in the *New England Journal of Medicine* discusses the treatment options available. ‘Bariatric surgical procedures reduce caloric intake by modifying the anatomy of the gastrointestinal tracts,’ according to the review by Dr Eric J DeMaria, of the Duke Weight Loss Surgery Centre at Duke University Medical Centre. Gastrointestinal surgery is recommended in the US for those with a BMI of 40 or above, or 35 with associated medical co-morbidities, such as severe diabetes mellitus, sleep apnoea or heart disease, according to the guidelines developed by the NIH Consensus Development Conference in 1991. The

benefit for those with a BMI between 30 and 35 remains unclear.

Surgical operations can be divided into procedures that are either restrictive (gastric stapling or banding) or malabsorptive (Roux-en-Y gastric bypass). The former consists of creation of a smaller stomach with a narrow opening to prolong the emptying of digested food into the intestines, whereas the latter is created with bypassing of sections of the gut where the absorption of food takes place.

‘The ideal procedure has not been definitively established,’ writes DeMaria in the *Journal*, citing that in the United States, the Roux-en-Y gastric bypass is the most common operation (open or laparoscopic), while in Europe laparoscopic adjustable gastric banding is more frequently performed. Gastric banding involves wrapping a synthetic band around the stomach

that limits its capacity to expand and delays emptying. The role of surgery for those under 18, or above 60 years, has not been established. There have been no randomised clinical trials that compare surgery to medical management of obesity. A 2005 Cochrane review of five studies, including three cohort studies, showed bariatric procedures led to a weight loss of 20-50 kg, compared with a modest weight gain in medically treated patients. A large Swedish prospective trial showed that surgically treated patients followed over two years had significantly greater weight loss than those in the control group.

Defining optimal candidates for surgery remains a challenging. Some morbidly obese individuals may be at risk for complications with surgical intervention. All patients should undergo a comprehensive surgical, medical, psychological and nutritional assessment prior to surgery, according to the journal report.

# Designed for bariatrics



Berchtold markets a multi-specialty surgical table that can articulate heavyweight patients yet maintain necessary height. The manufacturer reports that its Operon D 850 will:

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**seca**  
Precision for health

## NUTRITION AND HEALTH

### Precise weighing can save lives!

For diagnostic and treatment purposes it is often crucial to obtain a clear picture of a patient's nutritional status. Once the body mass index (BMI) has been determined, further steps for a successful therapy can be initiated and the medication dose can be adjusted to underweight, overweight or normal-weight patients. Additionally, based on the weight and BMI data, a physician can decide whether the patient needs a special diet to either lose or gain weight during his/her hospital stay.

- Some diseases require strict monitoring of current body weight - when fluid loss or a certain fluid level play a role, for example.
- A nephrologist always determines exact body weight before and after dialysis.
- In an intensive care unit, the fluid management of burns patients is performed according to body weight.
- For neonates with low birth weight physical development is a matter of grams.

In short: precise monitoring of the body weight saves lives in many medical contexts.

Precise scales, which deliver exact results, are therefore indispensable in every-day hospital routine, seca points out. 'Particularly with such a ubiquitous and high-use instrument, patients, physicians and nurses need state-of-the-art technology to ensure results are 100% reliable. Additional features, such as user-friendliness and functionality - which all seca instruments offer - weigh heavily in favour of patient safety.'

## Elegant and extremely adaptable

The *eleganza XC*, launched at MEDICA 2006, is the most recent addition to the 'eleganza' range produced by Wissner-Bosserhoff. The manufacturer reports that a sturdy system of lifting columns allows this model to be adjusted to a height of 80 cm, and that the columns leave enough space under the bed for a C-arm; thus patients can be examined from head to pelvis without repositioning. Images can also be taken by standard X-ray equipment, and an optional X-ray cassette holder can be integrated in the backrest, the firm adds.

An optional integrated weighing system can measure a patient's absolute weight as well as monitor

weight changes. 'Freezing weight measurement for neutralising external influences and saving readings can both be done with ease,' the firm says, also adding that an integrated bed-leaving alarm emits an acoustic signal if and when a patient leaves the bed.

A 'double retraction' mechanism, which, in addition to retracting the backrest by 11 cm (as recommended by the German nurses' association DBfK), features an integrated function that retracts the leg rest by 7 cm. Moving the backrest to the upright position eases pressure on two counts and reduces the frictional and shearing forces acting on the particularly bed-sore-prone pelvic region, the maker

points out.

In addition to the integrated foot control for height adjustment, as well as the predefined examination position, a Supervisor panel is available, and can be stored at the foot of the bed. Saved in its memory are three semi-automatic settings for shock positioning, re-animation and for the cardiac chair position. Adjusting on both sides, an improved backrest-CPR (cardiac pulmonary resuscitation) ensures better access and easier handling. The bed can be moved into the Trendelenburg position, and a sitting position up to 16° for heart and lung patients.



The *eleganza XC* intensive-care option permits examination with C-arm or with standard X-ray equipment without changing a patient's position. The integration of a weighing system means it also can be used for therapies

## Adipose specialists

The German Adiposity Centre, Red Cross Clinic, treats adiposity patients interdisciplinary. Directed by surgeon and private lecturer Ralf Matkowitz MD, specialists in internal medicine, cardiologists, orthopaedic specialists, as well as physiotherapists and nutritionists, are developing optimised treatment strategies. As required, they carry out procedures such as gastric banding surgery, stomach pacemaker fittings, or gastric bypass surgery.

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**НОВОЕ**

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Сергей Безруков



Даниела Циммерманн

### МЕДИЦИНА & ОЖИРЕНИЕ

#### Эпидемия ожирения распространяется в мире.

**Автор: Карен Денте, доктор медицины**

Мировая организация здравоохранения цитирует данные по 2007 году, согласно которым число взрослых людей с повышенным весом по всему миру превышает 1 миллиард и по меньшей мере 300 миллионов из них являются клинически тучными в соответствии с принятым индексом массы тела (BMI). Эта глобальная эпидемия несет с собой серьезные последствия не только для самих тучных людей, которые подвержены большему риску таких заболеваний, как диабет второго типа, некоторые виды рака, инсульт, сердечные заболевания, высокое кровяное давление, но и для всего общества. Связанный с этим чрезмерный рост расходов на здравоохранение представляет собой серьезную проблему для общества в целом.

Америка часто числится в первых рядах по числу жертв этой эпидемии, распространяющейся по всему миру. По сравнению с 1980 годом наблюдается трехкратное увеличение веса среди жителей Северной Америки, а также Соединенного Королевства, Восточной Европы, Ближнего Востока, островов Тихого океана, Австралии и Китая. Вопреки популярному мнению, увеличение количества тучных людей является бичем не только для стран с высокой степенью индустриализации. Развивающиеся страны демонстрируют еще более высокие темпы ожирения среди населения. Наиболее тревожными являются тенденции ожирения среди детей, наблюдающиеся во всех спектрах социально-экономических групп.

(см. страницы: 28)

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## МАММОГРАФИЯ

### Мамма - МРТ лучше чем маммография

На международном конгрессе онкологов в этом году немецкий радиолог, профессор Кристиана Куль продемонстрировала своим американским коллегам, клиническим онкологам в Чикаго, на примере своего исследования, что магнитно-резонансная маммография (МРТ) значительно лучше, чем простая маммография позволяет диагностировать предварительную стадию рака груди в области молочных путей. За это она была удостоена звания «лучшего участника конгресса». Поскольку данная предварительная стадия заболевания, по сравнению с «настоящим раком груди» всегда имеет доброкачественный характер – так называемая Ductales Carcinoma In-Situ или сокращённо DCIS и всегда излечима, то награжденная профессор выступила за применение Мамма-МРТ в качестве инструмента предупреждения заболевания. Использование Мамма-МРТ позволяет повысить процент выявления новообразований до 90 процентов, в то

время, как маммография в комбинации с ультразвуком имеют 45-50 процентов. Применение только маммографии позволяет получить результат менее 50 процентов.

(см. страницы: 18)

### Готовность инфраструктуры к цифровой маммографии?

Автор – Кристофер Вэриан, директор делового исследовательского центра по использованию метода маммографии в мире

Для того, чтобы реализовать весь потенциал в использовании цифровой маммографии, требуется большая тщательность по всей цепочке получения визуального изображения – начиная с получения цифрового снимка, его анализа, распределения, хранения и управления всей системой.

Полная интеграция с системой RIS (Радиологическая информационная система) является существенной частью эффективного процесса цифровой работы. Для большей эффективности предусматривается

(см. страницы: 16)

### ЭНДОСКОПИЧЕСКАЯ ХИРУРГИЯ

#### Камера высокого разрешения – революция в медицине

Профессор Хорст Нойхаус, терапевт и гастроэнтеролог, специализирующийся в области диагностической и терапевтической эндоскопии, главный врач Эвангелической клиники, руководитель центра эндоскопии в Дюссельдорфе, Германия и профессор Карл-Герман Фукс главный врач клиники Маркуса - сосудистой, висцеральной и лёгочной хирургии во Франкфурте-на-Майне, Германия, сообщают об их опыте работы с новой телевизионной камерой высокого разрешения. Оба единогласно заявляют, что улучшенная система получения изображения представляет собой большой плюс в работе. Повышенная резкость изображения позволяет обоим хирургам вовремя заметить какие-либо изменения на слизистой оболочке при проведении эндоскопии, или же в области проведения операции при малоинвазивных вмешательствах. Другим положительным качеством новой системы, по замечанию профессора Нойхауса, является Narrow Band Imaging (NBI) фильтр. При помощи указанного фильтра изменения в Mucosa могут быть дифференцированы значительно точнее и быстрее. При этом можно полностью отказаться от хромоэндоскопии (эндоскопирование с окрашиванием). В будущем NBI – фильтр полностью вытеснит хромоэндоскопию. Развитие гибкой хирургии позволяет применять и расширять новые операционные методики, что по мнению профессора Фука наглядно видно на примере естественной межлечной эндоскопической хирургии (NOTES).

(см. страницы: 26)

### ИТ & ТЕЛЕМЕДИЦИНА

#### Волна информационных технологий Гидо Гебхард

Едва врачи клиник успели освоиться с больничными информационными системами и информационными системами и микродиагностики отделений клиник, как на больницы надвигается следующая волна современных инновационных информационно-технологических продуктов. Современные медицинские предприятия ставят себе

целью оснастить больницы до самого последнего угла беспроводными сетями с тем, чтобы эффективно использовать, по возможности наибольший объём информации, имеющейся в различных информационных системах. С одной стороны, это позволяет быстро получать и оценивать данные. С другой стороны, современные научные решения позволяют ослабевать при помощи радиосигналов помеченные медицинские системы и даже пациентов на всей территории клиники.

(см. страницы: 6)

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# Добро пожаловать в Университетский медицинский центр «Гамбург-Эппендорф» (УКЕ)

**Университетский медицинский центр «Гамбург-Эппендорф» (УКЕ) – самый крупный медицинский центр в северной части Германии. Центр пользуется известностью благодаря высокому качеству предоставляемого лечения. Он известен также тем, что своей исследовательской деятельностью прокладывает новые пути в медицине. Мы в Центре можем сразу обеспечить использование новейших апробированных результатов медицинских исследований в лечении пациентов в наших специализированных отделениях. В 2006 году медицинский центр «Гамбург-Эппендорф» занял первое место в Германии по количеству новых апробированных лечебных методик, что подтверждено Немецким институтом качества и экономической эффективности в здравоохранении.**

Университетский медицинский центр «Гамбург-Эппендорф» (УКЕ) является одной из самых крупных клиник Гамбурга и включает в себя 15 центров с 80 отделениями, всего на 1495 мест. Ежегодно 52.000 пациентов лечатся в клинике, кроме этого, 200.000 больных проходят амбулаторный курс лечения, а также насчитывается 50.000 случаев оказания неотложной помощи, всего по 160 специализациям.

Одной из основополагающих миссий УКЕ является постоянная деятельность по разработке новых и улучшенных методов диагностики и лечения заболеваний, при этом особый упор делается на решение сложных, а также редких медицинских проблем. К числу сложных или редких заболеваний и связанных с ними медицинских задач относятся: рак, трансплантации, болезни сердца, системные детские заболевания, специальная урология, редкие болезни кишечника, диабет, специальные офтальмология и отоларингология. Центр располагает ведущим в мире клиническим отделением по лечению рака простаты, это отделение носит название «Больница Мартини», в честь профессора Мартини.

Вышеизложенные факторы делают УКЕ привлекательным для пациентов из всех стран мира; больные желают получить здесь первоклассное обслуживание в части диагностики, лечения и последующей реабилитации. Таким образом, Медицинский Центр стал микрокосмом в глобальном высоко-специализированном и разностороннем мире медицины.

Центр УКЕ в полной мере отвечает высоким требованиям, которые предъявляют ему задачи лечения пациентов из разных стран. Пациенты, а также их родные и друзья получают медицинскую помощь, которая включает в себя диагностику и терапию; помимо этого, предоставляется организационно-административное обслуживание, как, например, услуги переводчиков и персональных тренеров-инструкторов из числа носителей родного для пациента языка, а также многие другие услуги. Университетский медицинский

центр «Гамбург-Эппендорф» объединяет многие религии и культуры, все они пользуются глубоким уважением, и обусловленные им и особенности внимательно учитываются.

Суммируя вкратце вышеизложенное, следует подчеркнуть, что одним из краеугольных камней в деятельности Университетского медицинского центра «Гамбург-Эппендорф» является непрерывная разработка ранее неизвестных и совершенствование методов лечения бо

лезней, особый упор при этом делается на исследовательскую работу в области лечения сложных и редких заболеваний. Центр пользуется известностью благодаря высокому и качественному уровню лечения, а также благодаря своей первопроходческой исследовательской деятельности. Мы можем обеспечивать немедленное внедрение апробированных результатов наших исследований в области лечения болезней в практику лечебной деятельности в наших специализированных отделениях. В 2006

году Центр находился на первом месте в Германии по количеству новых апробированных методик лечения, что подтверждено Немецким институтом качества и экономической эффективности здравоохранения.

На протяжении нескольких десятилетий Университетский медицинский центр «Гамбург-Эппендорф» считается в Германии пионером в области исследований, образования и медицинской подготовки; он, в то же время, является надежным источником

альтернативных медицинских заключений, сохраняя свою признанную репутацию как внутри страны, так и на международном уровне. Центром УКЕ представлено самое большое в Германии количество исторически важных и драматичных для медицины инноваций в области хирургии, терапии и диагностики, которые привели к улучшению уровня лечения, а также послужили основанием для многочисленных прорывов в области медицинских знаний не только в Германии, но и во всем мире.



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# UK, Vietnam and Nigeria teams take top infection control awards

## Big focus on a tiny organism

With entries from infection control teams from all over the world, with each hospital facing different challenges and with widely differing resources at their disposal, judges working on the 2006/2007 Oxoid Infection Control Team of the Year Awards focused on teams that had demonstrated that they really made a difference to standards of infection control within their own hospitals and have set examples for others to follow.

### 1st Prize - £5,000

The judges unanimously decided to award to the team at the Royal Wolverhampton Hospitals NHS Trust, UK.

By establishing its Infection Prevention Board as a new sub-group of the Trust Board, the Wolverhampton team had gained involvement from the top down, the judges found. They identified sensible performance indicators and targets, and recognised that the Link Nurse Group was not communicating as efficiently as it could be. They identified leads and champions to provide more effective routes of communication and share best practice in infection control. As one Oxoid judge said: 'These actions ensure that people are answerable at board level on infection control matters and that there are now no loose ends.'

Key initiatives had also achieved success. MRSA bacteraemia rates fell, multi-faceted initiatives to reduce Clostridium difficile associated diarrhoea (CDAD) were put in place (including a root-cause analysis of every case of CDAD) and practice improvements throughout the Trust have reduced to zero cases of Acinetobacter baumannii



1st prize winners: the Royal Wolverhampton Hospitals NHS Trust team

colonisation/infection since August 2006.

This infection control team, said another judge, is doing what we should all be doing.

### 2nd prize £1,000

The small infection control team at the 1,705-bed, Cho Ray Hospital, in Vietnam, impressed the judges with the volume of work they undertook and successes they achieved. During 2006, the team produced educational aids and trained over 4,000 people in basic infection control practice, at their own and surrounding hospitals. Their intervention programmes, modified procedures and new reporting systems showed that hospital-acquired infections had fallen significantly and, despite an increasing incidence of patients with blood-

borne infections, exposure to these infections amongst staff had greatly reduced.

### 3rd prize £500

This had to be awarded jointly to the Southampton University Hospitals NHS Trust, UK and Aminu Kano Teaching Hospital, Nigeria, because the judges found it an impossible task to finally choose between them.

The judges were impressed by the Southampton team's '...solid, hot-spot strategy and target indicators', working across four hospital sites, and with many infection control challenges.

The team at the Aminu Kano Teaching Hospital in Nigeria '...had a holistic approach to infection control and had done a wonderful job with limited resources,' said the judges. Their reduction of hospital-acquired infection rates and procedures for dealing with hospital waste were cited as particular areas of success.

The microbiology firm Oxoid provides products for hospital laboratories to aid in the diagnosis and prevention of MRSA, Clostridium difficile and other pathogens. Oxoid is part of Thermo Fisher Scientific Inc. With



Winning 2nd prize: Although small, this team at Cho Ray Hospital, trained over 4,000 people in basic infection control

an annual revenue of over \$9 billion, and c. 30,000 employees, the company has two premier brands: Thermo Scientific and Fisher Scientific. The former produces a high-end analytical instruments, laboratory equipment, software, services, consumables and reagents. Fisher Scientific produces laboratory equipment, chemicals, supplies and services used in healthcare, scientific research, safety and education. Details: [www.thermofisher.com](http://www.thermofisher.com)



Sharing 3rd prize: The team at Southampton University Hospitals NHS Trust and Nigerian winner from the Aminu Kano Teaching Hospital

The first of its kind in Europe, the €12 million BaSysBio (Bacillus Systems Biology) project, initiated in December, is headquartered in France, but involves 15 top European research organisations, as well as an Australian university.

The aim of the project, is 'to understand how bacteria react to stresses and then to transfer this knowledge to pathogens', explained Professor Uwe Sauer, of the Molecular Systems Biology department of the Swiss Federal Institute of Technology Zurich (ETH Zurich). Prof. Sauer is heading the technological areas of the project. Professor Jörg Stelling, ETH Zurich Computational Science, who heads the computational areas of the project, said the project enables ETH Zurich to integrate its expertise in both those fields into the rest of European knowledge in these two areas.'

The project is using the model bacterium *Bacillus subtilis* to research the overall structure of the regulatory networks that control bacterial metabolism. To do this, the research groups will adapt high-throughput technologies to gain quantitative measurements. Alterations with mathematical models will make it possible to interpret the experimental data obtained.

### New Biomarkers

Developed methods are to be applied to two bacteria: *Bacillus anthracis*, responsible for anthrax, and *Staphylococcus aureus*, which causes nosocomial infections.

BaSysBio will contribute to the development of new biomarkers, enabling advanced tests for the detection of virulent bacteria and insight into the increasing phenomena of bacteria resistant antibiotics. *Bacillus subtilis* bacteria have considerable economic potential as producers of enzymes and metabolites that are already used by a wide range of industries (pharmaceutical, chemical, agricultural).

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## Disinfection at the workstation



Made in Germany, the Induproof-Series includes keyboards and mouse (InduMouse) that are completely sealed to IP68 standards. They can be cleaned with disinfecting wipes and, impressively, submerged up to three metres in liquid or cleaned with high-pressure water jets, the manufacturer reports.

'The keyboards have a wear and tear resistant silicone top-part with special Dura-coating for excellent mechanical and chemical resistance. A study by the Philipps University and Institute for Medical Microbiology and Hospital Hygiene, in Marburg, Germany, showed that disinfectants used in medical environments can be used on the InduProof keyboard and mouse without any harm to the equipment.'

InduKey offers flexible input option with either a separate IP68 keyboard and mouse, or the InduProof, which comes with an integrated mouse button.

Details: [www.induproof.com](http://www.induproof.com). E-Mail: [info@induke.com](mailto:info@induke.com), Phone: +49 (0) 3 74 68 / 650-0

## Modernising? You must meet hygiene regulations

During modernisation, the law governing machines already installed in contaminated hospital sluice rooms in exactly the same way as new machines, i.e. they must comply with the same Medical Devices Act requirements as new machines. Specifically: a complete 'master device file' with workshop drawings, a risk and hazard analysis, as well as complete technical documentation, must be compiled. The hygiene performance must also comply with the latest medical knowledge.

The Offenburg firm Meiko reports that its TopLine rapid modernisation system meets all those requirements, and itemises advantages: TopLine 40 E can be



Installation and connection of the Meiko TopLine 40 E to the building's supply and waste disposal systems

accommodated in all available recesses and alcoves. The TopLine 40 E appliances have an optional plinth, and they can be extended to include a slop sink with rim flushing if needed. 'Operation of a slop sink with rim-flushing, which is already installed in the building, is easily combined with the TopLine 40 E bedpan washer,' the company points out, adding that the appliances also can be supplied with work surfaces in any length and with a variety of hygiene radii.

Meiko's new cleaning and disinfection machine can also be connected to an existing central steam supply pipe in the building.



Modernised, with new TopLine 40 E installed

## THE NETHERLANDS

# Success in MRSA control

By **Professor Jan Kluytmans MD**, of the Microbiology and Infection Control Laboratory, Amphia Hospital, Breda

*Staphylococcus aureus* is the most common cause of nosocomial infections and the consequences of *S. aureus* infections are significant. A recent study in the USA, including over 7 million hospital admissions, estimated that 0.8% of all patients suffered *S. aureus* infection, corresponding to a total of nearly 300,000 patients in all US hospitals. After controlling for confounders, the annual impact in the US was estimated to be 2.7 million additional days in the hospital, \$ 9.5 billion excess costs and 12,000 in-patient deaths.

A major problem is the emergence of methicillin-resistant strains of *S. aureus* (MRSA). First reported in 1961, MRSA has become increasingly prevalent in hospitals since the 1980s and is now endemic in many hospitals globally, with resistance being present in up to 60% of all *S. aureus* infections. These resistant micro-organisms are difficult to treat and several studies have found that there is increased morbidity and mortality associated with MRSA infections. In a systematic review on patients with bacteremia, Cosgrove et al estimated that MRSA was associated with nearly twice higher mortality than MSSA. In addition to this increased severity of disease, there is also an increase in the absolute number of affected patients. A study in England and Wales showed that, after the introduction of MRSA, the absolute number of patients suffering from *S. aureus* bacteremia increased with the number of patients suffering from MRSA.

Because of the serious consequences associated with the spread of MRSA control is of utmost importance. Clonal dissemination is the mechanism for the spread of MRSA, therefore control of MRSA largely depends on the prevention of transmission from known carriers. Antibiotic usage will probably play a role by applying selective pressure that gives resistant strains an advantage over their susceptible ancestors, but control of antibiotic usage alone will not control the spread of MRSA. An active policy to find carriers of MRSA and prevent further transmission from these carriers is the core measure for the control MRSA.

## Search and destroy

For many years The Netherlands has maintained a very low incidence (<1%), despite a high incidence in the surrounding countries, by using a 'Search and Destroy' (S&D) strategy to control MRSA.

The key elements of the S&D strategy are (1) the early recognition of carriers of MRSA, (2) isolation of (suspected) carriers of MRSA, (3) eradication of carriage and



**Professor Jan Kluytmans MD PhD** works at the Amphia Hospital, and, since 1996, has been Professor of Medical Microbiology and Infection Control at the VUmc medical university, Amsterdam. In 1996, Prof. Kluytmans' thesis for his PhD in clinical microbiology on *Nasal carriage of Staphylococcus aureus: the key to preventing staphylococcal disease*. And, today, his scientific interest is mainly in the epidemiology and control of nosocomial infections, with a special emphasis on *Staphylococcus aureus*. He is involved in many guidelines on infection control, especially those dealing with MRSA control, and has had over 100 papers published in peer-reviewed journals

(4) a 'zero tolerance' approach. These elements will be described in more detail below.

The first outbreaks of MRSA occurred in the 1980's and were traced to patients who had been hospitalised abroad. The outbreaks were controlled by applying S&D. After these initial observations a national strategy was developed to isolate and screen patients who had been hospitalised abroad upon transfer to the Netherlands. Isolation measures were abandoned when the results of screening showed that no MRSA was present. In this way most cases of MRSA were detected and controlled in an early stage, although sporadically outbreaks occurred due to patients who were not identified at increased risk of carriage before.

In 1988 the Dutch Working Party on Infection Control (WIP) issued a guideline on the control of MRSA in hospitals. This guideline has been updated several times and still is the core element of the Dutch S&D strategy. It is available in Dutch and English at [www.wip.nl](http://www.wip.nl). Along with the evolution of MRSA from the hospitals into nursing homes, and recently into the community, additional guidelines were developed for these settings as well. It should be noted that besides patients, also healthcare workers are included in contact tracing and, if they harbour MRSA, they are temporarily suspended from work.

Another aspect of the S&D policy that is critical to its success is the quality of the screening for MRSA. This includes not only that the right people should be screened, but also that the screening methods are reliable. For example, if only the nose is sampled a significant part of the carriers is left undetected. The guideline of the WIP recommends additional screening of the throat, the perineum and clinical sites if present. Also the laboratory methods used are essential and these have been incorporated in a specific guideline as well.

The implementation of the guidelines is the most important factor for the effectiveness. Compliance with guidelines on infection control in hospitals is generally low, and not easy to improve. The guidelines on MRSA in The Netherlands are very strict and therefore often debated. However, compliance with the guidelines is amazingly high. This is mainly due to a very active support and control by the Dutch infection control practitioners. When patients are in isolation for MRSA, the wards are visited frequently to answer questions regarding the procedures and to audit if the appropriate control measures are taken. In addition, adherence to the guidelines is monitored by the Government (the Healthcare Inspectorate).

To monitor the effectiveness of the policy a national surveillance has been performed for over 20 years. This includes that a representative isolate of all newly identified carriers of MRSA is sent to the National Institute of Public Health and Environmental Protection (RIVM) where further typing is performed ([www.rivm.nl/mrsa](http://www.rivm.nl/mrsa)).

Threats to the strategy are mainly the emergence of MRSA in the community and more recently in pig farmers. The good news is the availability of rapid tests to detect MRSA. A reliable culture method takes on average four days before it can be considered negative. Molecular tests that can detect the presence of MRSA within two hours are now available and these will greatly improve the effectiveness of the control policy, although backup cultures remain necessary.

In conclusion, control of MRSA is successfully maintained using the S&D strategy. Although the principles of S&D are relatively simple, it involves complex interactions in the modern healthcare setting. Besides active tracing of carriers of MRSA and subsequent isolation of proven carriers it is essential to have reliable laboratory methods to remain in control of MRSA.

Further details and references: [jklytmans@amphia.nl](mailto:jklytmans@amphia.nl)

## GERMANY Significant increase in MRSA infections

### COULD A COMPUTER PROGRAMME HELP?

Figures for MRSA infections have placed German hospitals among the highest in Europe. According to current recommendations by the Robert-Koch-Institute ([www.rki.de](http://www.rki.de)) the following groups of patients should be routinely tested for MRSA:

- patients with known MRSA anamnesis
- patients transferred from regions or units with known high MRSA prevalence
- MRSA patients' contacts
- patients with chronic care requirements
- bedridden patients with catheters

- patients undergoing dialysis
- patients with skin ulcers
- those with chronic wounds and burns.

Other patient groups, such as those admitted to intensive care wards, might also need to be included in screening programmes. Screenings has already proved cost effective for the above mentioned patient groups. However, the future availability of reliable, fast tests, along with a computer programme that identifies former MRSA patients on readmission could solve this problem.

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Phone: +49 (0)201 87 126 850  
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**Subscription rate**  
6 issues: 42 Euro, single copy: 7 Euro. Send order and cheque to: European Hospital Subscription Dept

**Finishing** media technique johri, Weilerswist, Germany

**Printed by** Frotzcher Druck, Darmstadt, Germany

**Publication frequency** bi-monthly

**European Hospital** ISSN 0942-9085

**A member of VVA HealthCare Group**

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TCM is based on Chinese philosophy. Disruptions or imbalances of yin, yang, qi and blood can be influenced and treated in several ways, classically including herbal remedies, acupuncture and moxibustion, tuina (a special massage), breathing and movement therapies, such as tai chi and qi gong and the Chinese concept of nutrition.

Pulse diagnosis and observation of the condition of the tongue are two important diagnostic methods. Medication consists primarily of herbs and roots, as well as minerals and some, but very few, animal substances. In acupuncture, disposable steel needles are used to stimulate the meridian system and complementing organs.

Medication and/or acupuncture are selected according to the nature of the disease.

For the first time in 33 years, wound healing was the focus of a dedicated session at the 33rd annual VEITHsymposium for vascular surgeons in New York (11/06). This underscores the fact that wound healing is heading increasingly towards a speciality that warrants the special attention of dedicated people willing to embrace an interdisciplinary approach to non-healing or complex wounds.

*Wounds at VEITHsymposium*, organised and co-chaired by myself, with Gary W Gibbons, of Boston, MA, and David L Steed, of Pennsylvania, was subdivided into 6 sections. (1) New Concepts in Wound Care. (2) Classic versus Modern Wound Care. (3) Wound Healing Societies. (4) Silver in Wound Care – The Magic Bullet? (5) Economy in Wound Care. (6)

# New insights, algorithms and debates

By Dieter O Mayer MD, of Zurich University Hospital, Switzerland



European Board certified vascular surgeon (EBSQ-VASC) Dieter O Mayer is Head of Wound Care in the Cardiovascular Surgery Clinic at Zurich University Hospital, Switzerland. He is also a board member of the Swiss Association for Wound Care and faculty member of the European Wound Institute. Special interests: the scientific basis of wound healing and how to attain further evidence for modern treatment modalities

The Diabetic Foot.

In Section 1, R Gary Sibbald (Toronto, Canada and Gregory Schultz, Gainesville, FL, USA pointed out the importance of having a conceptual rather than a straightforward local approach to all types of wounds: physicians should always search for an accurate diagnosis and treat the cause (see diagram 1) as well as take into account the patient-centred concerns, such as experience, ability to co-operate and preferences; only then should physicians and nurses start to focus on local wound care. The TIME concept

(diagram 2 and 3) illustrates the systematic (modern) approach to local wound care. E Sebastian Debus (Hamburg, Germany) and Dieter O. Mayer focused on two further topics, quality of life (QoL) and 3-dimensional (3D) measurement of wound healing; QoL was significantly reduced in ulcer patients and 3D measurement of wounds was the only accurate parameter of wound healing over time. Anneke Andriessen (Malden, The Netherlands) presented the approach of German speaking countries on wound antisepsis (consensus paper).

# Chinese traditional medicine – a complement, not an alternative

*Christian Pruszinsky: Dr Kraus, you are a traveller between two worlds.*

**Ingrid Kraus:** I don't travel between the worlds, I'm fortunate to be able to travel within two worlds. To be more precise: I can make use of the results of two very different schools of thought, which allows me to recognize the best possible approach for an individual patient in his or her specific situation.

In general, there is no 'either/or'. That's why, today, we don't talk about TCM as an alternative, but as a complementary medical approach. That was an important step forward. Conventional - that is Western medicine - is also used in China. Obviously, a heart patient in a Chinese hospital has access to beta-blockers, ACE blockers, stents, by-passes, pacemakers or whatever is considered the European standard. Cancer tumours are also treated with chemotherapy, surgery or radiotherapy, just like here.

In addition the patient also receives herbal medicine, based on thousands of years of ancient knowledge, to mitigate side effects, to regulate blood pressure or reduce complications. Complementing herbal therapies are intended to strengthen the patient so he reacts better to chemotherapy, to improve his appetite, digestion, overall physical state. Because the better the overall state the better the patient will react to conventional therapies.

**Does this mean there are no cancer therapies based exclusively on TCM? The media often report on such 'magical cures'.**

Obviously there are hospitals in China where cancer therapies are based exclusively on TCM, because the patient chooses that approach, and also due to the structure of that huge country, in which therapy options are not unified but diverse.

**Would TCM departments in European hospitals create synergies?**

In my experience Western conventional medicine and TCM would complement one another very well. But we shouldn't forget that they are two completely different systems and even the diagnostic approach to a disease is based on different criteria. Let's look at gastritis: Western cause-oriented diagnostics focuses on criteria such as helicobacter pylori positive/negative, ulcer present/not present, etc. After diagnosis comes a medication-based therapy. In Chinese diagnostics helicobacter pylori is completely irrelevant. The Chinese physician looks for symptoms, for example, the liver attacks the stomach, or he



The interest in using traditional Chinese medicine (TCM) alongside conventional Western medical care has steadily increased among European physicians; it is no longer unusual, for example, for acupuncture to be suggested by a doctor to help fight tobacco addiction, or to ease a persistent musculoskeletal problem. Dr Ingrid Kraus, a cardiologist who also runs a private clinic to exclusively provide patients with TCM and acupuncture, spoke with Christian Pruszinsky, European Hospital Correspondent in Austria, about the benefits of marrying these two medical approaches

finds a lack of Yin. Each identified symptom requires very specific herbal formulas. So, to say one approach is more comprehensive than the other doesn't make sense. Both systems are valuable in their own right.

**Since TCM does not require expensive equipment, could a dedicated TCM diagnostic department give an economically competitive advantage to a hospital?**

TCM does not come cheap, either. Chinese herbs are expensive and currently health insurers usually don't reimburse those costs. However, wherever there's a dedicated department - at the university hospital in Vienna, for example - the inter-system approach does offer benefits. More and more hospitals hire Chinese physicians trained in both conventional European medicine and TCM. This is important, because it can be interpreted as a signal to the insurers to include TCM therapies in their range of reimbursable services. Acupuncture, for example, is now an established therapy to 'cure' smokers, or to treat conditions of the musculoskeletal system, and some insurers are paying for this.

Obviously, in China acupuncture is used more than here. There, stroke patients can receive acupuncture treatment several times a week for two or three years. For Western hospitals, I again would favour a combination of both systems: acupuncture can be used to reduce spasticity, for example, which in turn would provide a better point of departure for physical therapy.

I support both systems, and both systems are successful in certain areas. Fortunately, there are signs of closer cooperation of both systems in terms of 'climate': mutual respect and recognition of therapy successes. In terms of statistics, these show a growing number of physicians complete both conventional as well as TCM training. This is linked to official recognition by professional associations, which, in turn, is a precondition for insurers to cover cer-

tain TCM therapies. In terms of future orientation: the work of the European TCM Society and the founding of the first private European TCM university, Li Shi Zen, in Vienna in 2003. In Germany there are a few TCM hospitals - the TCM-Klinken Am Steigerwald, in Kötztink and in Munich.

**Can you personally use your rather rare 'double knowledge'?**

At the Zentrum für Ambulante Rehabilitation (see box) I can apply acupuncture, but Austria's leading medical body has not approved Chinese herbal therapies, so they can't be used in a rehab centre. When I believe certain patients would benefit from additional TCM therapies, but I can't use them, that's obviously sad. This is one area where I would like to see TCM officially recognised. On the other hand, in my private TCM practice I use all conventional diagnostic findings and medication instructions. That works pretty well. No doubt the patients would prefer the insurers to cover the costs of the often quite time-consuming diagnostic procedures and the herbal therapy.

Moreover, there is certainly some potential there, particularly regarding the patient's constitution as seen from a TCM point of view, for example using tongue and pulse diagnoses. In addition, Chinese nutrition principles could be incorporated in preventive care.

**\* The Zentrum für Ambulante Rehabilitation (an in-patient rehabilitation centre run by the Pensionsversicherungsanstalt, Austria's biggest health insurers), with its holistic approach to medicine, is currently unique in Europe. Forming a link between hospitals, in-patient rehabilitation centres and office-based physicians, it provides free out-patient care for up to a year following rehabilitation. The therapy team includes physicians, psychologists, physiotherapists, nurses and masseurs. Services are available to all the policyholders, and costs are reimbursed without deductions.**



Ingrid Kraus qualified in medicine in 1980. After working for several years as a hospital doctor, in 1996 she joined the Zentrum für Ambulante Rehabilitation\*, and from that year until 2002 she studied traditional Chinese medicine (TCM) first in Austria, then the University of Chengdu/Sichuan. In Vienna she was a student of one of the pioneers of acupuncture in Europe - Professor Johannes Bischof MD, whose polyclinic treatments provide both modern western medicine and TCM.

## Acupuncture What others say...

The WHO

During the last ten years or so, there has been a convergence of modern international science with traditional Chinese medicine, with research carried out in physiology, biochemistry and pharmacology.

In terms of acupuncture, according to a report from the World Health Organisation (WHO), in over 600 cases of coronary heart disease the effectiveness of acupuncture in relieving the symptoms was over 80%. In 645 cases of acute bacillary dysentery, 90% of the patients were cured within ten days, as judged by clinical symptoms and signs and results from stool culture. The technique is also comparatively effective in controlling fever, inflammation and pain, the WHO adds.

From the viewpoint of modern medicine, the principle action of acupuncture (and of moxibustion) is to regulate the function of the human body and to increase its resistance by enhancing the immune system and the antiphlogistic, analgesic, antispastic, antishock and antiparalytic abilities of the body.

The World Health Organisation Interregional Seminar drew up a provisional list of diseases that lend themselves to acupuncture treatment. However, it points out that the list is based on clinical experience, not necessarily on controlled clinical research, and that the inclusion of specific diseases are not meant to indicate the extent of acupuncture's efficacy in treating them.

**Upper Respiratory Tract**

- Acute sinusitis
- Acute rhinitis
- Common Cold
- Acute tonsillitis
- Respiratory System**
- Acute bronchitis
- Bronchial asthma (most effective in children and in patience without complicating diseases)
- Disorders of the Eye**
- Acute conjunctivitis
- Central retinitis
- Myopia (in children)
- Cataract (without complications)

Section 2 covered discussion about classic versus modern wound care. Martin C Robson, (Tampa, Florida), Michael G. Franz (Ann Arbor, Missouri) and David L Steed, made it clear that, although modern wound care has made huge progresses over the last years, clear evidence for superiority is still lacking for most of the modern wound therapies.

In section 3, R Gary Sibbald presented the World Union of Wound Healing Societies (WUWHS) and the 2008 meeting in Toronto, Canada, where about 6,000 participants are expected. The meeting is highly recommended for all who are co-involved in wound healing.

Section 4 focused on silver (Ag) in wound healing. Liza G Ovington (Sommerville, New Jersey) and Robert E Burrell (Edmonton, Alberta) fought out

the battle for whether the different forms of silver (nanocrystalline (NC) versus non-NC) might have a different impact on wound healing. Again, it was shown that all forms of Ag are effective, with little evidence on which type of treatment is better. In any case, Ag dressings were shown to be effective even in the topical treatment of MRSA and in the presence of biofilms by J Barry Wright, (Collegeville, Pennsylvania) and Robert Strohal (Feldkirch, Austria). Steven Percival (Deeside, UK) demonstrated that the prevalence of resistance of micro-organisms to Ag is very low and clinically

irrelevant, probably due to its multiple site of action.

In Section 5, Michael S Weingarten (Philadelphia, PA) and Robert E Burrell showed that modern wound dressings probably will be cost effective compared with classic wound care, although evidence-based data for this topic are also unavailable. Christopher E Attinger (Washington, DC) showed how best to invoice for wound care after vascular surgery.

Section 6, on the diabetic foot, debated whether osteomyelitis would need a radical resection or not, Thomas Boeni (Zurich,

Switzerland) showed that, in special circumstances, a conservative approach might be a valuable alternative compared with radical resection. Nevertheless, radical resection (as little as possible) is still the mainstay to treat diabetic foot infection with bone involvement, as pointed out by Gary W Gibbons. Tools, such as the vacuum assisted closure (VAC) system and hyperbaric oxygen therapy, presented by Dieter O Mayer and Palma M. Shaw (Boston, MA) have been shown to have great potential, although evidence exists only for the VAC system.

*The WOUNDS at VEITHsymposium 2006* was conceived as a unique, physician-centred top quality focus meeting about wound healing and indicated the future direction of an evolving speciality. Dedicated people willing to share their knowledge and to participate in an interdisciplinary, as well as inter-professional, approach to patients with wound healing problems, will be able to further strengthen the evidence of modern wound care and therapeutics.

*Additional details:*  
[www.veithsymposium.org](http://www.veithsymposium.org)

#### Disorders of the Mouth

Toothache, post-extraction pain  
Gingivitis

Acute and chronic pharyngitis

#### Gastro-intestinal Disorders

Spasms of esophagus and cardia  
Hiccough

Gastroptosis

Acute and chronic gastritis

Gastric hyperacidity

Chronic duodenal ulcer (pain relief)

Acute duodenal ulcer (without complications)

Acute and chronic colitis

Acute bacillary dysentery

Constipation

Diarrhea

Paralytic ileus

#### Neurological and Musculo-skeletal Disorders

Headache and migraine

Trigeminal neuralgia

Facial palsy (early stage, i.e., within three to six months)

Pareses following a stroke

Peripheral neuropathies

Sequelae of poliomyelitis (early stage, i.e., within six months)

Meniere's disease

Neurogenic bladder dysfunction

Nocturnal enuresis

Intercostal neuralgia

Cervicobrachial syndrome

'Frozen shoulder', 'tennis elbow'

Sciatica

Low back pain

Osteoarthritis

#### The NHS, United Kingdom

In the UK, demand for alternative therapy has grown, and an increasing number of National Health Service (NHS) practices now offer many forms of alternative therapy as part of their primary care health improvement programmes HIMPS.

The NHS says: In Western medicine, acupuncture is generally used to treat the symptoms of a condition rather than the condition or disease itself. It can be helpful in relieving pain, and as a result, is the most common used complementary therapy on the NHS. Studies show that acupuncture is effective for treating post-operative nausea and vomiting, chemotherapy related nausea and vomiting, sickness and nausea in pregnancy, and post-operative dental pain.

'As yet, research into the effectiveness of acupuncture treatment for chronic pain has not produced consistent results – partly due to the small scale of the studies undertaken. Although research shows that acupuncture is not harmful, several studies suggest it is no more effective than a placebo. Therefore, acupuncture is generally used as a second or third treatment option on the NHS for patients with chronic pain, such as migraine, arthritis or back pain. It is not normally recommended unless conventional treatment has failed.

The NHS also points out that symptoms such as pain or sickness can indicate a more serious problem within the body, and that the general practitioner (GP) will try to investigate any underlying problem before recommending acupuncture.

The NHS Directory provides GPs with listings of acupuncturists who have '...put themselves forward to work either directly in NHS practices or from their own practice on a referral basis'.

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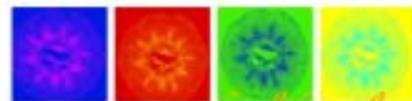
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2007

GLOBAL



EVENTS

JUNE

24-27 Lisbon, Portugal  
**Europace 2007** The European Heart Rhythm Association (EHRA), a registered branch of the European Society of Cardiology. Focus: arrhythmias and cardiac pacing in Europe. [Europace@escardio.org](mailto:Europace@escardio.org)

27-30 Berlin, Germany  
**CAD 2007** Computer Assisted Radiology and Surgery. [www.cars-int.org](http://www.cars-int.org)

27-1 July Glasgow, Scotland  
**World Congress on Design and Health** Organiser: International Academy for Design and Health. [www.designandhealth.com](http://www.designandhealth.com)  
E-mail: [academy@designandhealth.com](mailto:academy@designandhealth.com)

JULY

2-5 York, United Kingdom  
**Society of Occupational Medicine Annual Scientific Meeting** [www.som-asm.org.uk](http://www.som-asm.org.uk)

4-7 Athens, Greece  
**EAES 2007** 15th International Congress of the European Association for Endoscopic Surgery. [www.eaes-eur.org](http://www.eaes-eur.org)

5-7 Samos Island, Greece  
**5th ICICTH** International Conference on Information Communication Technologies in Health. [www.ineag.gr/ICICTH](http://www.ineag.gr/ICICTH)

5-8 Lugano, Switzerland  
**ESMO 2007** Conference of the European Society for Medical Oncology. [www.esmo.org](http://www.esmo.org)

15-19 San Diego, USA  
**AACC Annual Meeting & Clinical Lab Expo** [www.aacc.org](http://www.aacc.org)

28-31 Vancouver, Canada  
**13th World Congress on Heart Disease** [www.cardiologyonline.com](http://www.cardiologyonline.com)

AUGUST

16-20 Hong Kong, China  
**Hong Kong International Medical & Health Care Fair** <http://hkmedicalhealthcarefair.tdctrade.com/>

23-26 Lyon, France  
**EMBC 2007** 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society in conjunction with the biennial Conference of the French Society of Biological and Medical Engineering (SFGBM). [www.embc07.ulster.ac.uk](http://www.embc07.ulster.ac.uk)

25-28 Brussels, Belgium  
**11th Congress of the European Federation of Neurological Societies (EFNS)** [www.kenes.com](http://www.kenes.com)

30-2 September Berlin, Germany  
**5th European Congress of Reproductive Immunology** [www.uroweb.org](http://www.uroweb.org)

31-4 September Budapest, Hungary  
**4th Congress of the International Paediatric Nephrology Association** [www.ipna2007.com](http://www.ipna2007.com)

SEPTEMBER

1-3 Istanbul, Turkey  
**NESA Days** 2nd Annual Scientific Meeting of the New European Surgical Academy. The opportunity for surgeons to update their knowledge in basic sciences as well as in their own professions and to be exposed to new ideas and techniques in other disciplines. [www.nesacademy.org](http://www.nesacademy.org)

2-7 Glasgow, United Kingdom  
**EANS 2007** European Congress of Neurosurgery. [www.eans2007.com](http://www.eans2007.com)

7-8 San Francisco, USA  
**The 2007 Breast Cancer Symposium** Integrating emerging science into clinical practice. [www.asco.org](http://www.asco.org)

8-12 Athens, Greece  
**CIRSE 2007** Meeting of the Cardiovascular and Interventional Radiological Society of Europe. [www.cirse.org](http://www.cirse.org)

9-13 Florence, Italy  
**8th World Congress of Perinatal Medicine** [www.wcpm8.org](http://www.wcpm8.org)

11-14 Chisinau, Republic of Moldova  
**MoldMedizin & MoldDent** International specialised exhibition of medical technique and diagnosis devices, pharmaceuticals, stomatology equipment, instruments and consumables. <http://en.moldmedizin.moldexpo.md/>

26-29 Paris, France  
**Sepsis 2007** International Symposium. [www.sepsisforum.org](http://www.sepsisforum.org)

27-29 Dublin, Ireland  
**7th World Basic Urological Congress 2007** [www.wcur-dublin2007.com](http://www.wcur-dublin2007.com)

27-30 Dusseldorf, Germany  
**EXPOPHARM 2007** branch meeting. [www.expopfarm.de](http://www.expopfarm.de)

OCTOBER

2-5 Faenza, Italy  
**11th Annual Seminar & Meeting on Ceramic, Cells and Tissues** Nanotechnology for functional repair and regenerative medicine. [www.istec.cnr.it](http://www.istec.cnr.it)

7-10 Berlin, Germany  
**ESICM 2007** Annual Congress of the European Society of Intensive Care Medicine - '25 years of progress and innovation'. [www.esicm.org](http://www.esicm.org)

7-10 Venice, Italy  
**7th International Congress on Coronary Artery Disease - from Prevention to Intervention** <http://www.kenes.com/CAD/>

9-11 Moscow, Russian Federation  
**National Cardiology Congress of the Society of Cardiology of the Russian Federation** [www.cardiosite.ru](http://www.cardiosite.ru)

10-13 Paris, France  
**7th Congress of the European Society of Gynaecology** [www.segparis2007.com](http://www.segparis2007.com)

11-13 Sibiu, Romania  
**6th National Congress on Laboratory Medicine** 2nd Symposium on Immunopathology; 2nd National Congress of Clinical Laboratory Assistants; Biomarkers of disease/Quality Assurance in Laboratory Medicine

12-14 New Delhi, India  
**Medifest '07** International Medical, Healthcare Pharmaceutical and Hospital Equipment Trade Fair. [www.vantagemedifest.com](http://www.vantagemedifest.com)

13-17 Copenhagen, Denmark  
**EANM 07** Annual Congress of the European Association of Nuclear Medicine. [www.eanm.org](http://www.eanm.org)

16-19 Brno, Czech Republic  
**HOSPIMedica** International medical technology, rehab and healthcare fair. [www.bvv.cz](http://www.bvv.cz)

18-20 Leipzig, Germany  
**3rd World Congress on Regenerative Medicine** [www.regmed.org](http://www.regmed.org)

18-20 Vilnius, Lithuania  
**3rd International Baltic Congress of Anaesthesiology and Intensive Care** [www.anestez2007.com](http://www.anestez2007.com)

18-21 TianJin, China  
**4th World Congress of the Society for Breast Health** [www.2007wsbh.org](http://www.2007wsbh.org)

19-20 Toronto, Canada  
**4th Annual Paediatric Emergency Medicine Conference** [www.pemconference.com](http://www.pemconference.com)

20-24 Paris, France  
**JFR 2007 - Annual Meeting of the French Society of Radiology** [www.sfrnet.org](http://www.sfrnet.org)

24-27 Berlin, Germany  
**German Congress of Orthopaedics and Casualty Surgery** [www.orthopaedie-unfallchirurgie.de](http://www.orthopaedie-unfallchirurgie.de)

24-27 Leipzig, Germany  
**EUROSON Congress and 31st Tri-Country Meeting on Ultrasound** [www.euroson2007.de](http://www.euroson2007.de)



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**ESC 2007** Congress of the European Society of Cardiology. Presentations of new scientific developments and novel research. [www.escardio.org](http://www.escardio.org)

5-8 Prague, Czech Republic  
**9th Congress of European Association of Clinical Anatomy** <http://eaca2007prague.cz/>

6-9, Berlin Germany  
**The 1st World Congress on Controversies in Neurology (CONY)** [www.comtecmed.com](http://www.comtecmed.com)

12-14 Bangkok, Thailand  
**HOSPIMedica Thailand** International hospital, pharma, medical & rehab equipment & supplies exhibition. [www.hospimedica-thailand.com](http://www.hospimedica-thailand.com)

12-15 Valencia Spain  
**Annual Congress of the European Society of Regional Anaesthesia & Pain Therapy (ESRA)** [www.kenes.com](http://www.kenes.com)

15-19 Stockholm, Sweden  
**ERS 2007** Annual Congress of the European Respiratory Society. [www.ersnet.org](http://www.ersnet.org)

17-21 Amsterdam, Netherlands  
**Annual Meeting of the European Association for the Study of Diabetes (EASD)** <http://www.eurocongres.com/easd>

23-27 Barcelona, Spain  
**ECCO 14 - European Cancer Conference** 'Cancer in Europe - sharing the responsibilities' - The biggest multidisciplinary forum to discuss the full spectrum of cancer research and management. [www.fecs.be](http://www.fecs.be)

24-26 Vienna, Austria  
**health connex '07** Congress of the Austrian Health. [www.health-connex.com](http://www.health-connex.com)

23-27 Barcelona, Spain  
**ESTRO 26** Congress of the European Society for Therapeutic Radiology and Oncology. [www.estro.be](http://www.estro.be)

25-28 Budapest, Hungary  
**1st World Congress World Institute of Pain** <http://www.kenes.com/wipl/>

26-28 Lille, France  
**EuroBio 2007** Gathering of key European bioscience and bio-industry experts. [www.eurobio-event.com](http://www.eurobio-event.com)

26-29 Berlin, Germany  
**DGU** Congress of the German Society for Urology. [www.dgu.de](http://www.dgu.de)

**The 6th National Congress on Laboratory Medicine, the 2nd Symposium on Immunopathology, and the 2nd National Congress of Clinical Laboratory Assistants will be held in Sibiu, Romania in October**

Manole Cojocaru MD PhD, Chairperson of the 6th RSLM Congress, points out that the event is of 'outstanding importance in laboratory medicine'. The prestigious laboratory scientists and other specialists include many from abroad, such as Marilene Melo, Brazil; Bernard Gouget, France; Enrico Granieri, Italy; Zoran Mijuskovic, Serbia; Tomislav Stojanovic, Serbia; Claus Muss, Austria; Mihaly Boros, Hungary; Eleonora Luka Pilla, Switzerland; Elmer Koneman, USA; Svetoslav Handjiev, Bulgaria, and Daniela Zimmerman (European Hospital journal, Germany).



Young scientists, eager to improve their professional knowledge and practical skills, Dr Cojocaru adds. 'The main aim of the Romanian Society of Laboratory Medicine is to enhance the understanding and prestige of laboratory medicine, in all its aspects.' Another goal, he says, is to '...create a warm scientific environment where young scientists can interact directly with well-known experts.' And indeed, many young scientists, eager to improve professional knowledge as well as practical skills, will be attending.

One young researcher will receive the Constantin Voiculescu Award, launched in 2006 to honour the best laboratory medicine research. Extending the 'warmest welcome', Dr Cojocaru adds that the organising committee has not only arranged an attractive scientific programme, trade show and various academic activities, but also that the chosen venue, Sibiu, is the 2007 European Cultural Capital.

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