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 seven-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, mathematics and areas of natural sciences. Their research is acknowledged worldwide and some 21 Nobel Laureates are connected with the institution.

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 £12 billion National Programme for IT (NPfIT), 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 in 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 by Prof. Mike Richards, with Health Secretary Patricia Hewitt’s full support. The NHS has successfully improved and is set to improve patient care.

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.dh.gov.uk

Healthcare says farewell to Britain’s IT Tsar

Prime Minister Tony Blair ...and goodbye to Britain’s IT Tsar

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

Productivity turn around.

Turn around your lab’s productivity with the new Advanced® Instruments Model 2020 osmometer. With an easy loading turntable and 90-second test, it’s the only instrument that automates batches of up to 20 samples. There’s storage for up to 200 test results and a new date and time stamp improve sample documentation. Extend walk-away time and enhance lab performance with the Model 2020 – simply the most Advanced multi-sample osmometer on the market today.

Breathrough in lymphatic cancer treatment

By EH Czech Republic correspondent Rostislav Kuklik

Celebrating his 71st birthday this year, Czech chemist Professor Antoon Van der Ven is also able to celebrate the launch of clinical testing of a drug to treat Hodgkin lymphoma (HLH) and chronic lymphatic leukaemia (CLL) – adding another to his 60+ patented 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 Betra Orov, from the 1st Faculty of Medicine, Charles University in Prague (I. 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 phosphorhospho-ethylguanine (PMEG) nucleotide analogue. Actually for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...gal for their workers to maintain service or the machines because it’s illegal...ga
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 numerous clauses, is aimed at encouraging more students to take up medicine. However, although the medical profession welcomes the increase, the Association Nationale des Etudiants en Medicine 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 April last year. 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 Linda Shepherd 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
software directs data from medical machine to EPR...
standard data that contains a single electronic patient record (EPR). The whiteboard solution, implemented by Orion Health, helps to streamline 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, patient 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,' Dommel added. '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 HITR 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 iisalut, 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.
Networking between hospitals: Why buy new software?

Digital data exchange between hospitals is often not possible without replacing software. However, Heidelberg University Hospital 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, presented in a report submitted to Meilahti, Toolo Hospital and Peijas Hospital.

In Meilahti hospital, the system is up and running in 12 OTs, at 13 PACU beds and 32 ICU beds including the cardiac ICU, where all Finnish heart and lung transplant patients are treated. Thomas Healthy Care in Helsinki is the largest trauma hospitals, with 17 OTs, 21 PACU beds and 35 ICU beds. In Helsinki University 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 and clinical information management system. Each bed area is integrated with numerous medical devices, allowing to automatically gather patient real-time data.

Being comprehensively parameterised and configured, the system is simple to implement and adjust (according to local experiences so far are mainly positive).

The ability to transparently integrate data and tools to improve patient care process throughout all peri-operative environment was an important factor in the hospital district's decision to select Piccas CareSuite. Ability to have a complete, real-time patient record at any time throughout the treatment process is crucial in environments where life-saving surgery, where every second patient goes from OR to ICU. Another important selection criteria was the fact that the system had been used in large scale multi department hospital environment before.

Within a Virtual Medical Record, ICW ProfessionalGate provides a consolidated view of all the medical data that are available on a patient. "This information is always retrieved directly from the HIS in which it was created. As a result, the latest diagnosis, imaging, and laboratory data are available. This 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 compiles 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 small databases, it quickly finds individual patient data. In a load test with up to 100 million patient data records, the system handled more than one second under very challenging workload, 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 hospital ready for admission. During discharge, however, the system returns 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 establish and evaluate data exchange standards. 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 integration with products from other manufacturers. "Current systems of General Electric, TietoEnator, Chill, and SAP have been integrated; others will follow."

One hurdle in hospitals is the proximity to sensitive medical equipment. "Structural conditions, as well as technical installations, or larger data centers and 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 medical equipment, such as ultrasound scanners for patient monitors within the hospital,’ says Sven Glüsing of Dimension Data 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 situation, you only need to press a button to confirm where are the whereabouts of an urgently needed piece of equipment,’ said Sven Glüsing.

Costs can also be cut through software that accesses the databases of different IT systems and even visualises communication information. The communication dashboard supplied by Dimension Data visualises communications between patient and nursing data. If, for example, the cleaners 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 also allow them to manage to summarise and visualise capacities, shortages and overcapacities. Used in the right way this means that hospital stays reduced and capacity improved. From admission to discharge, a 360° view ensures that site teams can be fully aware of all diagnoses and beds, along with visualisation of all clinical workflows.

A big advantage in these emerging 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 product-specific projects and services.

Cologne University Hospital uses the Online Network and Facility Management Service supplied by Dimension Data, along with their support services package. The key module enables 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 and care packages not only ensures the interaction of different products but also complements the offers of three business partners whose product portfolios complement one another and add further specific packages. DDS, Cisco and Dimension Data are three business partners whose product portfolios complement one another and add further specific packages. DDS, Cisco and Dimension Data are three business partners whose product portfolios complement one another and add further specific packages.
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 to the clinic. These technologies include detection of isolated tumour cells in bone marrow and blood, individualised local therapies, systemic treatment based on molecular diagnostic 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 of upcoming technologies and concepts.*

* Congress details: www.senologe.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 1993-2004 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-yearly 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.abs.gov.au
Digital breast tomosynthesis

THE FUTURE OF MAMMOGRAPHY

By Thomas Mertelmeier, Principal Scientist at Siemens AG Medical Solutions

Full-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

A combination of ultrasound and tomosynthesis?

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 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 cranio-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® 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/iodium 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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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.
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 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 situation. He spoke with Professor Walter Heindel MD, who heads the Centre. They also discussed future diagnostic possibilities involving innovative imaging procedures. Present at the briefing, we asked Prof. Heindel about the programme’s success and particularly the research project focusing on photon-counting tomosynthesis.

In North Rhine-Westphalia the screening programme has been comprehensive and 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. The Centre has 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 be able to monitor 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 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 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 helpful, with the objective of comparing those results systematically with MR mammography. So far, MR mammography has been a problem solver for women, such as those affected by lobular carcinoma, which is hard to detect with X-ray mammography. It’s 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 read, we are trying to increase the dose to achieve brilliant images where you can see very precisely.

‘Yes, this is a well-known problem - a constant reduction in dose. So we have less noise and radiation compared with common systems that use electron beams. The photon-counting system uses 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 one 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 from 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, 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. ‘There is no consensus - 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 use electron beams. But Sectra has developed 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 use electron beams. It’s a pity - 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 use electron beams. It’s a pity - Sectra has developed.

MAMMO-UPDATE

Germany’s early detection programme and research

Professor Walter Heindel MD, with Andreas Pinkwart

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 subject relating to other clinical disciplines. The results achieved by the students in their first state examinations - held according to the new, stricter guidelines - are used as a guideline. The Faculty points out: ‘Münster students have done very well by comparison.’ A further strength in Münster is that the University of Münster with many other medical disciplines, constitutes a defined plattform at the Medical Faculty, and this will be further expanded. In this way, issues going beyond pure medicine, such as exposure to radiation, radiation measurement and safety issues can be swiftly evaluated.

TOMORROW’S IMAGING ON TODAY’S HORIZON

Professor Mats Danielsson

Europe's early detection programme and research
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 FRCP, head of the Breast Imaging Unit in the Medical Imaging Department of Sunnybrook Health Science Centre, Toronto, Canada, and José Abellan-Martínez, 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 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-Martínez said: ‘GE’s advantage is that we do 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-Martínez and Roberta Agnes Jong, with Meike Lerner of EH.

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The Innovation Powering Kodak Health Products
Combining a scientific research laboratory with a 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...

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:
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.
Hitachi Medical Systems: Confidence makes you feel good.
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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 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.

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

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 advantageous to mammography. And we have found cancers that were not seen during mammography.

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Radiofrequency ablation in breast cancer

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

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 and those who underwent lumpectomy with radiation therapy, have been observed in the treatment of kidney, lung, brain 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,
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

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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CTLM for cancer detection in dense breast

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, Rochester and the Women’s Imaging Centre, Orlando, Florida,) and México (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?

Full field digital mammography (FFDM) and computed radiography (CR) based mammography systems may bring hospitals and breast imaging services closer to gaining digital mammography, but, according to a leading systems vendor, simply buying imaging equipment does not automatically lead to a more efficient workforce. To reap the biggest harvest from a digital system, every aspect of digital image capture, from viewing, distribution, storage and management, must be assessed before any purchase is made.

Depending on the mammography equipment, the average file size of one screening procedure with a high resolution CR system could be as high as 200 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 a third of their original size, but the file sizes will remain very large,’ advises Christopher Varian, Director of Worldwide Business Development, Carestream Mammography Solutions, at Carestream Health Inc. ‘A digital review of prior mammographic 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 under-stood 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.

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 radiograph examination.

- 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 screen- ings 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 medi- um and files,’ says Christopher Varian. ‘A plan must be in place to migrate data on to current plat- forms or a major cost issue will be encountered in five to seven years after the first images enter the sys- tem.’ 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 mammog- raphy systems might prompt cen- tres to expand storage devices earlier than planned. However, he suggests that a decision to outsource image management to an external vendor, retrieval on demand, makes that third party responsible for main- taining, backing-up and retrieving the stored examinations - beneficially freeing up radiographers’ time.

As said, legally examinations must be stored for at least 25 years. Off-site storage and back-up in case of disasters must also be planned. Providers with an 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 manage- ment 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, digital mammography viewer, or another means of printing the images. A plan to ensure that every patient and referring physician has a copy of the mammography report is also needed.

One of the most useful developments in digital mammography is the PACS viewing tools can be customised for screening and diagnosis.

The PACS viewing tools can be customised for screening and diagnosis.

An emerging technology, CTLM, using computed tomographic laser mammography (CTLM) to detect cancers occult to mammography in dense breasts, and their comparison with CTLM with MRI to follow results of neo-adjunctive chemotherapy.

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

Christopher Varian

The integrated RIS/PACS Carestream Mammography Workstation offers many reporting and image management options.
When DCIS was classified as malignant

<table>
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<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>NPV</th>
<th>PPV</th>
</tr>
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<tbody>
<tr>
<td>Mammography alone</td>
<td>50.0%</td>
<td>75.5%</td>
<td>90.9%</td>
<td>23.5%</td>
</tr>
<tr>
<td>Mammography + CTLM</td>
<td>58.3%</td>
<td>86.8%</td>
<td>93.2%</td>
<td>40.0%</td>
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</tbody>
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If DCIS was classified as ‘pre-malignant’ the results changed slightly, as follows:

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>NPV</th>
<th>PPV</th>
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</thead>
<tbody>
<tr>
<td>Mammography alone</td>
<td>43.8%</td>
<td>73.6%</td>
<td>93.2%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Mammography + CTLM</td>
<td>56.2%</td>
<td>84.4%</td>
<td>95.3%</td>
<td>25.7%</td>
</tr>
</tbody>
</table>

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, Stamenz P, Kopans DB, Rafferty E et al., ‘Prospective Comparison of Mammography, Sonography and MRI in Patients Undergoing Neo-adjuvant Chemotherapy for Poly-Abreast 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 lobules, and abnormal vascular structures, particularly angiogenesis. CTLM, therefore, provides both morphologic and functional information (Helbich T. ‘Computed Tomography Laser Mammography’. European Hospital Vol. 13. issue 3/2004; 4-5).

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 1d). 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.
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

When European Hospital asked Prof. Kuhl why the University of Bonn cited by Lancet as a pioneering centre 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 — 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 procedures 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 easy-to-use examination procedure that many areas of modern medicine can no longer do without. Think of orthopaedics or neurosurgery, for instance. MRI was used only infrequently, 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 MRI 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 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 others, 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 the tumour. This use of breast MRI — staging — is not yet covered by medical insurers in Germany as standard, which I consider scandalous. The current situation looks like a paradox: the indicator for surgery for breast cancer would have a significant impact on the treatment management for around 25% of patients. Breast cancer is a type of oncology in which 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!”

‘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 recent data has 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
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 we lack 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-cancerous 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 is currently used 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.
Hospital group streamlines screening

Project integration with other hospital systems and hospitals is also important. The AgfaHealthCare 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.

The CR Mammography system was developed so that radiologists can use CR systems in mixed environments, for general radiology and mammography applications. According to Dr. Pacini, 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 mammography 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.

"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 Gb. Reconstructing this image from the measured data would take an average PC about a month. That’s where we were dependant 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 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 detect growths and tissue changes in the 3D image as well.

Therefore, 3D ultrasound CT offers possibilities to show all abnormalities together in one image – and this means we’ll 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 shed 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.
In 2005, 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 work force’s commitment to 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 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 environments in which a number of the new systems will be used,’ Niall Phelan said.

Following all the processing necessary in procurement, Niall Phelan foresees ‘…we’ll be one of the most advanced screening services’. ‘Wouldn’t it have been easier and perhaps quicker, I wanted to obtain equipment from just one company?’ he suggested, ‘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.

Tissue elasticity reveals tumours

When equally compressed, the tissue and structure of tumours 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 SonoeLactography for the Hitachi EUB-8500, the company adds - to evaluate the shifts between the individual images in consecutive ultrasound views. Hitachi concludes that the alterations in expansion and determine the site. This enables differentiation of tumour tissue from healthy tissue, and of malignant tumour tissue from benign tumour tissue. Hitachi adds. ‘Unlike conventional ultrasound procedures, sono-elastography measures larger scale shifts only and doesn’t require any compression phase without pseudo artifacts.’

This additional information about the visco-elasticity of breast tissue significantly increases the rate of breast cancer diagnosis, the company says. ‘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

Recalled patients - After examining medical records of 1,600 patients over a previous 18-month period, 198 women were 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.’
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.

Esi Touch Elasticity Imaging, a new software from Siemens Medical Solutions, has become available with the firm’s 5.0 release of the Acuson S2000 Solutions, has become available with software from Siemens Medical Solutions. 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.
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 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 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 - who was 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 of 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 diagnosticians. 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. It already have a considerable number of scenarios where in-vivo and in-vitro diagnostic procedures are combined. For example, 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 €44 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 paradigm in medical technology away from product-specific solutions to disease-oriented solutions. This means that, in the future, it will no longer 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 system. 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. For instance, a blood test can indicate malignant tumours at a very early stage, which can then be localised with Soarian, a Siemens IT 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 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.

Soarian is 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-vivo 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 diagnostic concept 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.
What’s your prediction for MR? ‘Expect the unexpected’

‘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 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 we won’t see today. But I’m sure MR will have a great future in medical diagnostics.’

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.
Lithuania

Endoscopy in

By our correspondent Andrius Vagoras

The well-known Whipple procedure, or pancreaticoduodenectomy, recently underwent a transformation due to the skills of Nenius Kaselis MD, Head of Abdominal and Endoscopic Surgery, University Hospital. For him, 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 preserving the stomach, part of which would have been 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 can be treated 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 is important several years ago isn’t today. Modern anaesthesia now has no 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 colonoectomy 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 has 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 bariatric 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.

SEALING VEINS, ARTERIES AND BUNCHED TISSUE

Using the different shaped tips of ARC 350L and TissueSeal or Ligator instruments, made by Bowa, surgeons can permanently seal large veins, arteries or bunched tissue. All of these special tools gained a red dot award for ergonomics and practicality.

Along with ligation and standard programmes, the ARC 350L also provides numerous individually programmable memory locations,' Bowa reports. ‘The ARC range of generators is particularly versatile and is based on the proven ARC Control System with an argon plasma coagulation speed of 10 microseconds and an argon plasma coagulation with ARC PLUS as an option.’

Accessories from other companies can be connected without any problems.

The ARC range of generators includes: ARC 350, ARC 350L, ARC 300, ARC 300L, ARC 300e, ARC 200, ARC 200G. In addition, all units provide argon plasma coagulation with ARC PLUS as an option.

BOWA-electronic also offers a range of reusable accessories for electro-surgical applications, which can be adapted to suit all units.
Several years ago, gastroenterologist Professor Horst Neuhaus introduced a system to use a high-definition TV (HDTV) system as an aid in the endoscopic procedures carried out at Düsseldorf’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 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) – without or with HDTV – is that there is a much better view of the operating field via the monitor,’ said Prof. Karl-Hermann Fuchs, Head of the Clinic told us. Explaining the HDTV system to Denise Henning of European Hospital, Prof. Neuhaus said that an HDTV system (with the 690 lines of a television set) was used for endoscopy; however, with 1080 lines, HDTV technology increases image resolution fourfold. This improved resolution can be

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 the 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.

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. This NOTES can be an advance as much as laparoscopy was in 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 abdominal incision in the stomach, bladder, vagina, or colon, so that external incisions and scars are avoided.

Advantages could include reduction in anaesthesia, avoidance of transverse incisions, less need for analgesia, better post operative pulmonary and diaphragmatic function, quicker recovery, 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 transrectal access, reasoning these are more to access upper abdominal structures, which are often more difficult to work with if using a transgastric approach.

One possible description 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 (Dr. G.V Rao and Dr. 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, three methods were successfully fulfilled in a new procedure in New York. In April, Dr. Marescaux, of the ETS-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. ‘The possibility of detecting subtle changes, which we wouldn’t have been able to see on high-definition systems, is an advantage to get much closer to where we need to be and can, if necessary, intervene much more quickly. NOTES also has the advantage of being resource intensive, and could greatly reduce trauma for the patient, MIS can also be less damage possible. Resulting in far less operating times, generally causing a patient less pain and scarring. It might also reduce the need for immunosuppression. It is important to note that MIS is not commonly used in MIS and complex operations, such as heart surgery, Eucomed adds.

Other examples of procedures available: simple bowel surgery, treatment of kidney stones and tumours, brain surgery, cardiac angioplasty, stenting, and knee replacements. Medical technology industry researchers were working to improve and develop the MIS techniques.
Taking a dive into the 21st Computer Assisted Radiology and Surgery Congress

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). The first tutorial - From Diagnostic to Therapeutic Workstations – will be followed by sessions on: Mammally Incise Spinal Therapy, Image Guidance, 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 therapy: a look at 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 need 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 physiologival 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 Oder (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 Horrow
Professor confirms there are few or no solutions to most problems

Nutrition-induced obesity is a physical and budgetary problem. Fat and sugar consumption from fast-food joints and takeout restaurants, the consumption of select fat-free and low-fat products, and the use of sugar substitutes have all contributed to the obesity epidemic.

According to a recent US study, among 1,373 post-surgical morbidly obese patients, 33.1% 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 Arbeitsgemeinschaft Intensiv- und Notfallmedizin in Liebeck. ‘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. Although medical professionals try to find solutions, they usually lack the time and resources to accomplish this.

Weighing up to 360 kg patients

Seca GmbH & Co. manufactures a non-calibrated electronic ceiling crane 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, 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 perform 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 the 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 weight of a chair – 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 transported. 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, can be slung over the back of a wheelchair. In addition, the machine stands safely in an upright position, seca confirms.

Measures to contain obesity

By Karen Dente MD

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 tract,’ according to the review by Dr Eric J DeMaria, of the Duke Weight Loss Surgery Centre at Duke University Medical Centre. Gastrintestinal surgery is recommended in the US for those with a BMI of 40 or above, or 35 with associated medical co-morbidities, such as 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:
- lift and articulate 450 kg throughout its entire motion range
- go lower than any other surgical table on the market, at 563 mm
- rise to a maximum table-top height of 1179 mm.

The table’s 420 mm longitudinal slide, carbon fibre table top and integrated X-ray cassette channel provide a platform for all types of imaging, and the removable head, back and leg sections enable customisation for all surgical procedures, Berchtold points out. Special castors and the optional autodrive also ease movement between rooms.

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 involving movement between rooms.

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.’

Adipose specialists

The German Adiposity Centre, Red Cross Clinic, treats adiposity patients interdisciplinarily. 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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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 base.

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 using 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 BfN), features an integrated function that retracts the leg rest by 7 cm. Moving the backrest to the upright position eases pressure on two counts – for the cardiac chair position.

Shock positioning, re-animation and emergency 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.

Precise weighing can save lives!
Специальный сервис
для читателей
European Hospital

Для наших русско-
говорящих читателей с этого момен-
та мы предлагаем особый сервис в каждом изда-
нии EUROPEAN HOSPITAL: от двух до четырех стра-
ниц в будущем будут компоноваться
пой темам и переводиться на русский язык. Полное содержание статьи Вы сможете прочитать на английском языке соответствующего изда-
ния EUROPEAN HOSPITAL. Кроме этого, мы предлага-
ем Вам специально подобранные темы, как например, в данном издании, - портрет Университетской клиники Гамбург Эппендорф или Клиники Красного Креста во Франкфурте-на-Майне. Мы ждем Ваше удовольствия от чтения и будем очень рады, если Вы выскажете свое мне-
ние и свои замечания в отношении прочитанного в чита-
tельском формате, а также подскажете нам темы, которые Вас наилучший интерес.
Мы учтём все Ваши пожелания в следующем издании.

МЕДИЦИНА & ОЖИРЕНИЕ
Эпидемия ожирения распространяется в мире.

Автор: Карен Денте, доктор медицины

Мировая организация здраво-
оохранения цитирует данные по ожирению из Мировой организации здраво-
охранения по всему миру. По срав-
нению с 1980 годом наблюдает-
ся троекратное увеличение веса среди жителей Северной Америки, а также Социального Королевства, Восточной Европы, Ближнего Востока, ост-
ровов Тихого океана, Австралии и Китая. Вопреки популярному мнению, увеличение количест-
ва тучных людей является бичем не только для стран с высокой степенью индустриализации. Развивающихся стран демонст-
рируют еще более высокие темпы ожирения среди населе-
ния. Наиболее тревожные явления тенденции ожирения заметны в сферах деталей, наблюдаемых во всех спектрах социоэкономи-
ческих групп. (см. страницы: 28)

ЭНДОСКОПИЧЕСКАЯ ХИРУРГИЯ
Камера высоко-
кого разреше-
ния — револю-
ция в медицине

Преписктор Хорст Нойхайс, терапевт и гастроэнтеролог, специализирующийся в областях диагностической и терапевтич-
ческой эндоскопии, главный врач Ван-Эвангелической клиники, директор центра эндоско-
пиической и лёгочной хирургии, в Дессауортельфе, Германия, сообщил, что благодаря своей работе с новой теле-
визионной камерой высокого разрешения, он может точно и безопасно определить, где у пациента есть повреждение. Он добавил, что новый инструмент позволяет ему увидеть даже самые незначительные изменения в тканях. (см. страницы: 16)

МАММОГРАФИЯ
Мамма - МРТ лучше чем маммогра-
фия

На международном конгрессе оонологов о том же недавно-
ем событии преписктор Кристоф Куль продемонстрировал свое новое оборудование. На примере одного из пациентов, он показал, что Магнитно-
резонансная маммография (МРТ) значительно лучше, чем простой маммограф позволяет диагностировать предвари-
тельную стадию рака груди в очень раннем возрасте. И хотя она была увидена звучанием—лучшей в мире. Поскольку данное предвари-
тельная стадия заболевания, по сравнению с «настоящим раком» груди, получает дополнительный интерес. Это значит, что для лечения его не может быть использована только маммография. Для больных с высоким риском развития ракового заболевания, требуется более тщательное наблюдение. (см. страницы: 18)

Готовность инфра-
структуры к диги-
тальной маммогра-
фии?

Автор — Кристиоф Воркен, директор департамента исследова-
тельного центра по использованию метода маммографии в мире.

Для того, чтобы реализовать высокотехнологичное использование маммографии, требуется большое число обслуживания. Для больших эффективно-
ности предсказания требуется больше времени и большие затраты. (см. страницы: 6)

ИТ & ТЕЛЕМИЦИЯ
Волна информаци-
онных технологий
Гиб Гебхард

Европейский союз. Европейская комиссия

Для того чтобы реализовать высокотехнологичное использование маммографии, требуется больше времени и большие затраты. (см. страницы: 6)
Университетский медицинский центр «Гамбург-Эппендорф» (UKE) — самый крупный медицинский центр в северо-западной Германии. Центр пользуется известностью благодаря высокому качеству предоставляемого лечения. Он известен также тем, что своей исследовательской и образовательной деятельностью преодолевает новые пути в медицине. Мы в Центре можем сразу обеспечить использование новейших апробированных результатов медицинских исследований в лечении пациентов в наших специализированных отделениях. Университетский медицинский центр «Гамбург-Эппендорф» (UKE) 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 того, 200.000 больных проходят амбулаторный курс лечения, а также насчитывается 50.000 случаев оказания неотложной помощи, всего по 160 специализациям.

Одной из основополагающих миссий UKE является постоянная деятельность по разработке новых и улучшенных методов диагностики и лечения заболеваний, 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 хирургия, редкие болезни кишечного тракта, диабет, специфические офтальмологические и отоларингологические проблемы. Центр располагает ведущим в области клиническим отделением по лечению рака простаты, это отделение носит название «Больница Мартини», в честь профессора Мартини. Выделенное в этой области медицины, лечение и последующая реабилитация. Таким образом, Медицинский Центр стал мировым лидером в глобальном высоко-специализированном и разностороннем мире медицины.

Центре UKE в полной мере отвечает высоким требованиям, которые предъявляют ему задачи лечения пациентов из разных стран. Пациенты, а также их родные и друзья нередко сталкиваются с необходимостью иноязычной помощи, которая включает в себя диагностику и терапию, психологическую поддержку, предусматривающую организационно-административное обслуживание, как непосредственно услуги терапевтов и персональных тренеров-инструкторов из числа носителей родного языка для пациента, а также многие другие услуги. Университетский медицинский центр «Гамбург-Эппендорф» объединяет многие религии и культуры, все они пользуются глубоким уважением, и обусловленные ими и особенностями внимательно учитывается.

Суммируя вышеизложенное, следует подчеркнуть, что одним из краеугольных камней в деятельнос- ти Университетского медицинского центра «Гамбург-Эппендорф» является непре- рывная разработка ранее неизвестных и совершенствование методов лечения во линей, особой упор при этом делает на исследовательскую рабо- ту в области лечения сложных и редких заболеваний. Центр пользуется известностью благода- ря высокому и качественному уровню лечения, а также благодаря своей первоочередной исследовательской деятель- ности. Мы можем обеспечивать немедленное внедрение апробированных результатов наших исследований в области лечения заболеваний в практику лечебной деятельности в наших специализирован- ных отделениях. В 2006 году Центр находился на первом месте в Германии по количеству новых апробированных методов лечения, что подтверждено Немецким институтом качества и экономической эффективнос- ти здравоохранения.

На протяжении нескольких десятилетий Университетский медицинский центр «Гамбург-Эппендорф» считается в Германии пионе- ром в области исследований, образования и медицинской подготовки; он, в то же время, является надежным источником альтернативных медицинских заключений, сохраняя свою при- знанную репутацию как внутри страны, так и на международном уровне. Центром UKE представлено самое большое в Германии количество исторически важных и драматических медицинских 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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The UKE is considered in Germany as being a pioneering facility in research, education and medical training, as well as a reliable source for a second opinion.

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UK, Vietnam and Nigeria teams take top infection control awards

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 Control of Hospital Infections 2006/2007 Competition have chosen to award top infection control awards to the team at 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 performing 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 bacteremia 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 had reduced to zero cases of Acinetobacter baumannii 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 success 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 bloodstream 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 hospitals, 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 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.thermoscientific.com
Staphylococcus aureus is the most common cause of nosocomial infections and the emergence of MRSA infections is significant. A recent study in the USA, involving 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 microorganisms 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, Cougher et al. estimated that MRSA was associated with nearly twice the mortality compared to MSSA. In addition to this increased mortality, 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 admission 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 to give 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 of MRSA.

Search and destroy

For many years The Netherlands has maintained a low incidence of MRSA. This includes not only the fact 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 with 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/ismra). 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: jkluytmans@amphia.nl

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Professor Jan Kluytmans MD PhD works at the Amphia Hospital, and, since 1996, has been Professor of Medical Microbiology and Infection Control at AMC medical university, Amsterdam. In 1996 Prof. Kluytmans obtained his PhD, in clinical microbiology on Nosocomial carriage of Staphylococcus aureus: the key to preventing staphylococcal disease. And, today, his scientific interest is mainly one 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.
For the first time in 33 years, wound healing was the focus of a dedicated session at the 33rd annual UTH Symposium for vascular surgeons in New York (11/06). This underscores the fact that wound healing is becoming an increasingly important diagnostic system that warrants the special attention of dedicated people willing to embrace an interdisciplinary approach to non-healing and complex wounds.


In Section 1, R. Gary Sibbald (Toronto, Canada and Gregory Schulte, Seattle, WA, USA) pointed out the importance of having a conceptual rather than a straightforward approach to all types of wounds: physicians should always search for an alternative treatment, define the treat the cause (see diagram 1) as well as take into account the patient’s medical history, wall stress, suture, since as experience, ability to co-operate and predetermine, only then should physicians and nurses start to focus on local wound care. The TIME concept (diagram 2 and 3) illustrates the systematic (modem) approach to local wound care. E. Sebastian Debux (Hamburg, Germany) and Dr. Dieter O. Mayer focused on two further topics, quality of life (QoL) and three dimensional (3D) measurement of wound healing. QoL was significantly reduced in untreated patients. Furthermore, measurement of wounds was the only accurate parameter of non-healing wounds (R: 0.056).

Anneke Andriessen (Malden, The Netherlands): the approach of German speaking countries on wound antiseptics (consensus paper).

Chinese traditional medicine – a complement, not an alternative

The interest in using traditional Chinese medicine (TCM) alongside conventional Western medical care has steadily increased over the past three years. For Western hospitals, I can’t use them, it’s obviously bad. 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 medical 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 more professional dermatologists, particularly regarding the patient’s condition as seen from a TCM point of view, to assess the condition of the tongue and pulse diagnoses. In addition, Chinese nutrition principles could be incorporated into an interdisciplinary care.

* The Centrum für Ambulante Rehabilitation (an in-patient rehabilitation centre run by the Pensionsversicherungsanstalt, Austria’s state pensioner’s insurance), with its holistic approach to medicine, is currently unique in Europe. Forming a link between various centers, it integrates rehabilitation centres and office-based physicians. It provides free out-patient therapy.

**The therapy team includes doctors, nurses, physiotherapists, and masseurs. Services are available to all the policy holders, regardless of diagnosis.**
Section 2 covered discussion about classic versus modern wound care. Martin C Robson, (Tampa, Florida), Michael C. Franz (Ann Arbor, Missouri) and David L. Steed, made it clear that, although modern wound care has made huge progress 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. Lisa G Ovington (Somerville, New Jersey) and Robert E Burrell (Edmonton, Alberta) fought out the battle for whether the different forms of silver (nano-crystalline (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 (Dessies, UK) demonstrated that the prevalence of resistance of micro-organisms to Ag is very low and clinically irrelevant, probably due to its special site of action.

In Section 5, Michael S. Weinberger (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 mainstream 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 specialty. 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
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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 Cipcianu MD PhD, Chairperson of the 6th ELSA-congress, says that the event is "outstanding importance in laboratory medicine". The prestigious laboratory scientists and other specialists include many from abroad, such as Marlene Melo Brazil; Bernard Grognard, France; Enrico Granieri, Italy; Zoran Mijuskovic, Serbia; Eleonora Luka Pilla, Switzerland; Elmer Koneman, USA; Stefanos Haidjev, Bulgaria, and Daniela Zimmerman European Hospital journalist, Germany.

Young scientists eager to improve their professional knowledge and practical skills, Dr Cipcianu adds. "The main aim of the Romanian Society of Laboratory Medicine is to enhance the understanding and prestige of laboratory medicine, in all 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 Viriculescu Award, launched in 2006 to honour the best laboratory medicine research. Extending the "warmest welcome", Dr Cipcianu adds that the organising committee has not only arranged an attractive scientific programme, trade shows and various academic activities, but also that the chosen venues, Sibiu, is the 2007 European Cultural Capital.