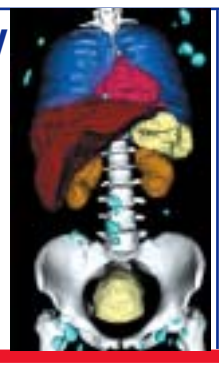
EUROPEAN HOSPITAL

THE EUROPEAN FORUM FOR THOSE IN THE BUSINESS OF MAKING HEALTHCARE WORK



VOL 17 ISSUE 5/08 OCTOBER/NOVEMBER 2008

Europe's unequal healthcare

'Achieving the level of healthcare of the older EU member states will remain a long-term project for new members'

Christian Pruszinsky reports from the 11th European Health Forum Gastein in Austria

600 participants, working in healthcare politics, science, industry, medicine, healthcare administration and non-governmental organisations in 45 countries, attended this year's European Health Forum Gastein in Austria, when a range of topics vital to all our countries were discussed. These included the stark inequality of healthcare in the expanding EU.

Europe cannot be described as 'united' in terms of healthcare – not even within the EU. The differences in quality between healthcare systems and the health of their populations, if comparing the old and new EU member states, are enormous. 'If the infant mortality rate in Romania is six times higher than in Sweden and the cancer mortality rate in the new member states is drastically higher than in the old ones, you can actually talk about an *Iron Curtain*,' said Alojz Peterle, former Slovenian Prime Minister and member of the *Members of the European Parliament against Cancer* initiative.

The EC is certainly aware of this problem, confirmed **Andrzej Rys**, Head of the Department for Public

continued on page 2

Warning for hospital cleaners: 'Don't over-dilute disinfectants!'

USA – Bacteria can survive weak solutions of some disinfectants, by ridding their systems of the cleaning chemicals and thus boosting their resistance, which causes greater hygiene problems, according to a study published in Microbiology.

At the Department of Veterans Affairs Medical Centre, Detroit, the researchers exposed Staphylococcus aureus bacteria to low concentrations of a wide range of antiseptic and antibacterial solutions, many commonly used in hospitals and homes.

They discovered that when the bacteria were not killed by the chemicals they began to mutate into new strains, which often had a higher number of 'efflux pumps' on the surface of their cells. These pumps enabled them to dispose of toxic molecules, not only removing the disinfectant molecules, but also removing certain antibiotics, e.g. ciprofloxacin.

Lead author Dr Glenn Kaatz warned that repeated exposure of biocides in hospitals could not only build up that resistance, but also contribute to hospital-acquired infections.

The 2008 European Health Forum Award

27 EU countries were represented in at least one of the eight short-listed entries for this award. The prize was won for an Eire/Northern Ireland cross border project aimed at improving the care of kidney patients in rural areas. Renal units in six hospitals in the Irish border region are working together to share expertise and information in the treatment and care of these patients. The winning project was developed with funding secured by CAWT, the cross border health services partnership, from the EU's INTERREG IIIA programme.

Dr Peter Garrett, Project Board Chair and Lead Consultant with the Renal Unit of the Western Health and Social Care Trust (Western Trust) said that, although delighted and honoured by the award, it was not an ending to this project, but a 'powerful springboard to enable us to advance our work further still.'

Dr Garrett received the award along with Dr Kieran Hannan (right) of Cavan General Hospital, Ireland.

World isotope shortage threatens scans

Due to its short 'lifespan', molybdenum 99 (used to form technetium-99m which, when injected into patients is used as a tracer to help diagnose heart disease or bone cancer) cannot be stockpiled. Moybdenum 99 is produced in nuclear reactors. Inevitably, with the growing use of nuclear medicine, scans depend heavily on regular production. This was demonstrated in December 2007, when the supply of molybdenum 99 stopped during a Canadian nuclear reactor shut down for safety reasons. The Ontario Association of Nuclear Medicine predicted that 50,000 Canadians and 160,000 US citizens would have their examinations postponed every month as along as the reactor remained shut. To tackle that emergency, the government-owned firm *Atomic Energy of Canada* re-started the reactor using an emergency pump.

In Europe, in recent months, four of the five reactors that produce molybdenum-99 shut down, three for planned maintenance, one due to an unexpected problem. Among these, a Belgian reactor released uncontrolled radioactive iodine into the atmosphere; a Dutch reactor had cooling system problems and again a Canadian reactor was closed temporarily due to a hefty electrical storm. These events reduced the supply of the isotope to such an extent that physicians were advised to delay scans, giving urgent tests priority or they were advised to use different kinds of scans according to cases.

Concern has been voiced that many of the world's reactors that produce medical isotopes are now old and therefore likely to continue with periodical shutdowns, continuing to affect radiological examinations, particularly for serious diseases such as cancer, as well as those for cardiac and bone.

** Following the recent agreement between the Bush administration and India, the latter country plans to build 18 to 20 nuclear reactors at an estimated cost of $30bn. This will place India as the world's sixth nuclear power.*

Avian 'flu research suggests vaccine should be used now, not stockpiled

UK – Governmental fear of an avian 'flu pandemic remains high, and a certain amount of vaccine has been stockpiled to meet sudden demand. In addition, Department of Health guidance for hospitals is available to provide specific recommendations, planning strategies and tools for local public health and healthcare officials who would be in the front line for managing and containing an influenza pandemic.

However, new research published in the *New England Journal of Medicine* suggests that vaccination now, with the currently available product, could help save lives in a future bird 'flu pandemic. The study, by researchers at Leicester University, indicates that, if a vaccination against one strain of avian flu is given years even years earlier, this could prime the immune system to ward off many later avian 'flu strains. They suggest that, in the event of a pandemic, a booster could be given to those pre-vaccinated people, thus protecting them far sooner than others who had not received the vaccine. 'If a bird 'flu pandemic erupted tomorrow it isn't clear that we would have six weeks to vaccinate people before it arrived in this country, even if the vaccine was stockpiled,' researcher Dr Iain Stephenson pointed out.

The researchers focused on people who were vaccinated against the H5N3 strain of bird 'flu between 1999 and 2001. That vaccine contained MF59, an additional ingredient to boost its effectiveness. Some years on, this group were given jabs against the H5N1 strain of avian flu. Their immune system response was then compared with those of a group who had not received the earlier vaccination. Seven days later, 80% of the pre-vaccinated group showed signs that their bodies were protected against H5N1, compared with just 20% of the previously non-vaccinated group.

The researchers concluded that the initial vaccine against H5N3 strain of avian 'flu had not only provided protection against that strain, but enhanced protection against

continued on page 2

contents

EUROPEAN HOSPITAL
Reader Survey

YOU may qualify for a FREE subscription to EUROPEAN HOSPITAL, the bi-monthly journal serving hospitals throughout the EU.

*If selected, you will be sent a copy of EUROPEAN HOSPITAL every two months, as well as the EH electronic newsletter

To participate, simply fill in this coupon and fax to:
+49 201 87 126 864

No fax? No problem. Simply post your coupon to:
European Hospital Publisher, Theodor-Althoff-Str. 39, 45133 Essen, Germany

Or, for even quicker entry, please visit our website: **www.european-hospital.com**

ENTRY COUPON

COMPETITION QUESTION

The iPod nano prize comes in several colours. How many?

Your answer _____ **If you win, please write here which colour you would like your iPod nano to be** _____

DO YOU WISH TO RECEIVE OR CONTINUE TO RECEIVE EUROPEAN HOSPITAL AND THE EH ONLINE NEWSLETTER? ☐ Yes ☐ No

Signature _____ Date _____

Reader Number _____

Name _____

Job title _____

Hospital/Clinic _____

Address _____

Town/City _____ Country _____

Phone number _____ Fax _____

E-mail address _____

Now, tell us more about your work, so that we can plan future publications with your needs in mind. Please put a cross ☒ in the relevant boxes.

1. SPECIFY THE TYPE OF INSTITUTION IN WHICH YOU WORK

☐ General hospital ☐ Outpatient clinic ☐ University hospital

Specialised hospital/type _____

Other institution (eg medical school) _____

2.YOUR JOB

☐ Director of administration ☐ Chief medical director ☐ Technical director

Chief of medical department/type _____

Medical practitioner/type _____

Other/department _____

3. HOW MANY BEDS DOES YOUR HOSPITAL PROVIDE

☐ Up to 150 ☐ 151-500 ☐ 501-1000 ☐ more than 1000

☐ None, (not a hospital/clinic)

4 . WHAT SUBJECTS INTEREST YOU IN YOUR WORK?

☐ Surgical innovations/surgical equipment
☐ Clinical research/treatments/equipment
☐ Ambulance and rescue equipment
☐ Physiotherapy updates/equipment
☐ Nursing: new aids/techniques
☐ Hospital furnishings: beds, lights, etc.
☐ Hygiene & sterilisation
☐ Linens & laundry
☐ Information technology & digital communications
☐ Personnel/hospital administration/management
☐ Material Management
☐ EU political updates
☐ Radiology, imaging/high tech advances
☐ Intensive Care Units/ management/equipment
☐ Pharmaceutical news
☐ Speech therapy/aids
☐ Laboratory equipment, refrigeration, etc.
☐ Hospital clothing and protective wear
☐ Nutrition and kitchen supplies
☐ Waste management
☐ Hospital planning/logistics
☐ Hospital Purchasing
☐ Medical conferences/seminars

Other information requirements – please list _____

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

What is your speciality? _____

In which department do you work? _____

Are you head of the department? ☐ Yes ☐ No

Are you in charge of your department's budget? ☐ Yes ☐ No

How much influence do you have on purchasing decisions?

I can only present an opinion ☐ Yes ☐ No

I tell the purchasing department what we need ☐ Yes ☐ No

I can purchase from manufacturers directly ☐ Yes ☐ No

Do you consider that your equipment is

out-dated ☐ Yes ☐ No

relatively modern ☐ Yes ☐ No

state-of-the-art ☐ Yes ☐ No

Do you use/buy second-hand equipment? ☐ Yes ☐ No

If so, what do you use of this kind? _____

Is your department linked to an internal computer network? ☐ Yes ☐ No

Is your department linked to an external computer network? ☐ Yes ☐ No

Is your department involved with telemedicine in the community? ☐ Yes ☐ No

Do you consider your department is under-staffed? ☐ Yes ☐ No

Are you given ample opportunities to up-date knowledge? ☐ Yes ☐ No

Do you attend congresses or similar meetings for your speciality? ☐ Yes ☐ No

This information will be used only in an analysis for European Hospital,Theodor-Althoff-Str. 39, 45133 Essen, Germany, and for the mailing out of future issues and the EH electronic newsletter. EH 5/08

READERS' COMPETITION

Your chance to WIN the new *iPod nano*!

Enter today! Simply fill in the Readers Survey (left) and send it in

The new fourth generation *iPod nano* comes in a sleek new design with a curved aluminium and glass enclosure in a fine choice of colours. This device incorporates Apple's breakthrough Genius technology, enabling the automatic creation of playlists from songs in your music library to present great combinations – with just one click.

The *iPod nano* also features a refined user interface, high resolution portrait display and a built-in accelerometer that automatically switches to *Cover Flow* when rotated and automatically goes into *Shuffle* mode when lightly shaken.

The 16 GB model holds up to 4,000 songs, 14,000 photos and 16 hours of video.

Available colours: silver, purple, blue, green, orange, yellow, pink, red and black.

COURTESY OF APPLE

Thinner than ever, yet packed with technology

HOW TO ENTER

Simply answer the questions in the Readers Survey (left), fill in your details as appropriate, then send as directed at the top of the coupon.

PLEASE NOTE:

- **The closing date for entries to the EH 5/08 competition: 30 November 2008.**
- **Coupons received after that date cannot be entered in the draw.**
- **The winning coupon will be drawn from the correct entries.**
- **Only the winner will be contacted directly.**
- **The winner's name and location will be published in a future issue of European Hospital.**
- **NB: The prize is not exchangeable for cash.**
- **The usual competition rules apply**

The winner of the European Hospital issue 4/08 competition

Dr Marian Raucina, gynaecologist/obstetrician at the Nemocnica Poprad Hospital in Poprad, Slovakia, has won the handsome seca quadra 808 weighing scale!

Europe's unequal healthcare

continued from page 1

Health in the DG Sanco (Directorate General for Health and Consumer Affairs) in Brussels, who pointed to numerous, current schemes to reduce economic (structural funds) and health-related differences (programmes for the different social groups). 'However,' he added, 'achieving the level of healthcare of the older member states will remain a long-term project. Apart from the different economic conditions … key facts, such as life expectancy or healthy years, reflect the positive and negative influences during someone's entire life.'

Patient safety

The error rate in healthcare has remained relatively constant for the last 20 years. 'Those responsible on all levels don't take the dimension of the problem seriously enough,' said **Günther Leiner**, President of the European Health Forum Gastein. However, the improvement potential does not lie primarily in the avoidance of classic 'malpractice' but in the areas of hygiene; acceleration of processes in acute cases; diagnostic safety and the reduction of waiting times (e.g. for transplants). 'Sometimes it is not even money that's required, but just a different attitude towards a problem,' he pointed out. Indeed, studies presented at the forum revealed that around 10% of all hospital patients are affected in some kind of medical error and that the number of fatalities resulting from treatment errors far exceeds that of the road accident victims. According to European Commission data, 10% of hospital admissions involve treatment errors.

Jo Groves, Managing Director of the *International Alliance of Patients' Organisation* lamented the current error rate and demanded open disclosure procedures, i.e. error analysis without legal consequences, as well as better training for doctors and other medical staff, in terms of more communication and cooperation with patients and their surroundings.

A further prickly topic: Apart from normal legal reviews of mistakes, opportunities are needed for scientific reviews, where causes and effects can be discussed without consideration of possible legal consequences.

Ethics councils gain acceptance

An ethics advisory council neither aims to impede nor prevent progress; it only wants to ensure that progress benefits society. However, those involved in medical and scientific ethics have often been viewed as potential antagonists by the healthcare industry. That scene is changing – they are increasingly accepted and even seen as 'partners' to industry in the EU.

Albert Weale, Chairman of the UK's Nuffield Council of Bioethics, said: '…the voice of the council is being heard and can influence decisions sustainably'. Even if the resistance of the council against the increase of DNA databases was unsuccessful, the weight of ethical advisory bodies on the whole is on the rise – particularly through the scientific competence of their members, he said. 'Formal regulations, which enforce the integration of ethics advisory committees into decision-making processes, are one kind of approach, but ultimately we have to convince through competence.'

Rare diseases

Ségolène Aymé, Head of the French action plan for rare diseases – with 7,000 of these currently classified – introduced this initiative, which is worth over € 100 million. He pointed out that the most important cornerstones are a network of 132 national competence centres for rare diseases; comprehensive patient information on the internet (www.orpha.net – in five languages) and ensuring that the study of rare diseases becomes part of the curriculum for medical degrees.

For cases of rare diseases are too low in number to enable all individual countries to provide the necessary facilities and experts, making international cooperation vital. However, treatment can be, and should be, organised on a national level. 'Efficiency doesn't mean that patients should fly criss-cross all over the continent,' he pointed out.

Avian 'flu research

continued from page 1

other avian 'flu strains. 'We have been able to prove in this study that you can vaccinate people six, seven, or eight years ago and still get a very rapid response with a booster shot within a week,' said Dr Stephenson.

Follow-up research has been suggested by the government-funded National Institute for Biological Standards and Control, which helps in the production and testing of vaccines for emerging influenza strains and had backed the Leicester study.

GERMANY: TACKLING CONTAMINATED WATER

Compared with private households, hospitals may only produce 10–20% of wastewater containing the residue of drugs; however, tackling the problem is very necessary. One interesting project, developed at the 400-bed district hospital KKH Waldbröl, Germany, has involved the management, Environment Ministry, research institutions, engineers, to work as a team and produce an ecological and economic sanitation and sewage system.

Johannes Pinnekamp, head of the project and Director of the Institute for Settlement Management at RWTH Aachen University, pointed out that individual drugs, such as contrast media or cytostatics, make hospitals the main culprits in environmental contamination. Due to stricter legal requirements, veterinary medicines will become far less likely to enter wastewater, which is not the case for human medications – and their use continues to rise. 'The concentration of medical agents in drinking water is between a hundred to a million times lower than any one prescribed daily dose, but we don't yet know how these minute amounts, if consumed over a period of years via drinking water, affect our health,' he added. Consumed by water organisms they can definitely have an effect. Artificial oestrogens, such as those excreted by women on the contraceptive pill, lead to a feminisation of male fish. But anticonvulsant and mood stabiliser Carbamazepine also has damageable effects on the ecosystem.

The team not only aims to produce a viable ecologically acceptable system at KKH Waldbröl, but also a 'master plan' to determine which hospitals could also economically benefit from this. Considering rising electricity and water costs, even comprehensive modifications could ultimately pay off. 'Sewage treatment costs are based on the pollution level and the amounts of waste and rain water drained at the same time and then purified by the communal sewage works,' explained **Christian Mauer** of Pöyry GKW GmbH Essen, who is responsible for the economic evaluation of the project. Purely based on sewage charge reductions, he calculated an annual saving of around €80,000.

To date, rain water from roofs and car parks at Waldbröl has been separated from the general sewage system as far as possible. This is fed into a nearby stream via a rain retention basin, which not only limits the volume of wastewater but also means that the seepage water charge, levied on land areas in Germany, is inapplicable. 'Furthermore, highly concentrated waste water is easier to purify than water diluted by rain water,' said leading engineer **Silvio Beier** at the RWTH Aachen University.

The scientists developed a *Membrane Bioreactor* (MBR) for contaminated hospital wastewater. This has a membrane of fine pores that filters the waste water. The remaining biomass consists of a multitude of bacteria and other micro-organisms, which largely break down any substances dissolved in the water. However, substances that are hard to break down, such as many drugs, cannot be eliminated.

For further treatment, the Aachen scientists are now testing three processes for the strongest effect and lowest costs. 'Active coal has a huge surface area of 900–1,200 square metres per gram. A large number of organic substances can attach to this surface and hence be removed from water,' Silvio Beier explained. This occurs due to the tiny pores in every granule of coal. The other processes are nanofiltration, or rather reverse osmosis, and ozonisation, in which oxygen radicals destroy the mostly large-molecule drug compounds.

The elimination capacity for all these processes is determined. The Aachen scientists chose various, significant active ingredients from different indication groups, such as antibiotics, anticonvulsants, beta blockers, lipid lowering agents, cytostatics, anti-rheumatics and a few others.

The Waldbröl hospital research and modification project was expensive – estimated costs (including scientific research) after completion: c. €2.5 million. 80% of this will be funded by North Rhine-Westphalia State.

Nonetheless, Christian Mauer believes this type of project would be beneficial for other hospitals, first because costs can be reduced, particularly for larger hospitals where renovations or new buildings are already planned, as well as centres with increased wastewater contamination, e.g. cancer units. At the KKH Waldbröl, the sewage disposal cost reduced from €4.20 per cubic metre of wastewater to just fewer than 50 cents per cubic metre. 'This equates to a savings potential of €81,000 per year,' Christian Mauer concludes.

THE CZECH SCENE

Water and energy management (WEM) appears to be successfully handled by the majority of local healthcare institutions, because Czech hospitals do spend, on average 2–5% of their budgets these resources.

Recent publicly available data on Czech hospital management confirm that modern management programmes were widely developed and implemented to help improve hospital water efficiency, and reduce water consumption. International standards (ISO norms) are being employed to prepare the hospital technical background to evaluate opportunities for water savings without any adverse effects on daily operations. Regardless of hospital size, water saving measures need not be overly expensive, but there is always a strong need for complexity and attention to detail, because resources saved in one place may be easily wasted elsewhere. For this reason, authors of water saving programmes always strive to cover all potential losses, starting with easy steps taken on the patient's side, e.g. room faucets, toilets, showers, laundry and gradually arriving at improvements for technical appliances, e.g. refrigerators, air-conditioning units, sanitisers, sterilisers, etc. In terms of lowering water consumption, faculty hospitals in particular adopted various measures including:

- installation of flow control fixtures on all faucets and water saving shower heads
- replacement of high consumption toilets and urinals by modern sanitary installations with low consumption valve kits
- installation of wash-water and rinse-water recycling and reclamation systems to re-use water for consequent wash cycles
- management of washing-related processes, e.g. ensuring full loads in lab equipment washers, sanitisers, sterilisers, etc.
- installation of automatic valves, wherever necessary, to cut down on water consumption, e.g. biochemical analysers, X-ray film processing units, etc.

As water distributors keep raising prices, nowadays similar measures (more or less pronounced) are fully implemented in all Czech hospitals.

Varnsdorf before and after reconstruction

Energy be praised

Importance of energy efficiency is also widely recognised in Czech hospitals. One very good example of how to deal with ever increasing energy prices and environment-friendly thinking was a project developed through a cooperation between Prague Bulovka teaching hospital and the firm EPS CR (Energy Performance Services), which has implemented an eight-year performance contract for energy efficiency services to the hospital. The contract provided long-term financing for the energy system upgrade. The 1,600-bed Bulovka hospital covers around 80.000 m². Its energy bills totalled 10–15% of its annual revenues (enormous amounts of energy were used to generate heat in the hospital's own steam plant). The hospital underwent large scale reconstruction and modification of various energy-related appliances and procedures including switching from steam heating to district heating system and implementation of new computerised energy management system; the installation of modern air handler recovery system, and high efficiency natural gas boiler and the installation of modern control and monitoring equipment and replacement of old piping.

It is more than obvious now that, despite the initial high investment, all implemented changes led to vast savings resulting in its return in just a couple of years. Again, similar changes to energy consumption and related processes were established in all healthcare settings countrywide.

The Varnsdorf case – In this town, one of the smaller hospitals was extensively reconstructed in terms of energy consumption management. Reconstruction of the heating system occurred in 2002 and the project contractor, EVC Ltd, supplied new technology and equipment using an EPC (Energy Performance Contracting) method that allows for a significant decrease of investments spent on daily hospital operation. After the hospital heating system reconstruction, operating costs reduced to about 50% of previous costs.

GERMANY

Horst Michael Arndt says rainwater use is ecologically prudent now and for the future: 'We now have important know-how'

BED PANS FRESH AS RAINWATER

Horst Michael Arndt is sometimes called a technology freak. His enthusiasm is largely the reason why rainwater flows through bedpan washers and flush toilets in hospitals in Ruppin (Brandenburg) Germany. As general manager of the Ruppiner Kliniken GmbH he commissioned the Grützmacher planning office to bring some of the technological ideas of his management team to fruition. At Grützmacher, **Jörg Hennicke** thought the rainwater concept so 'brilliant' that a system of pumps and cisterns was developed not just to water the gardens, but also to cleanse toilets and bedpans – the latter supplied by Meiko from its Offenburg plant. Each of these bedpan washers comes equipped with a booster heater to bring the rainwater temperature up to the necessary operating temperature of 50 degrees.

Since Germany's reunification, 25 of the 111-year-old Ruppin hospitals' brick pavilions have been restored by a specialist employed year-round

Two underground cisterns (capacity: 600,000 litres of rainwater each) were constructed and an overflow pond created in the hospital grounds. As required, the pumping system drives the water to wherever needed.

'The equipment works flawlessly. So far there have been no complaints,' said **Gabriele Plaasch**, the hospital's nursing director, who has seen the project evolve from its beginnings. 'Even if we don't achieve a large economic advantage I consider the use of rainwater ideal from a technical standpoint. It is especially soft and clean. A significant side-effect of using rainwater is that the equipment is not scaled.'

Jörg Hennicke remains convinced that the use of rainwater is an excellent energy alternative in an area little previously considered, but he does recommend anyone interested in its use should learn more first. In Ruppin, for example, a test system with artificially controlled bacterial exposure was built to determine the critical threshold of rainwater. He also points out that there is now a DIN for rainwater that must be considered.

France: Ministry of Health initiative ensures emissions conformity

Following the Grenelle Environmental meeting in 2007, the French Ministry of Health has a specific mission: to set an example to the public as to what can be achieved by investing in energy saving. New standards are to be applied in all public and private healthcare establishments in France – in total 60 million m² of buildings. These need to be managed in an environmentally-friendly way to reduce both consumption of resources and CO_2 emissions.

Since 1st July this year, healthcare establishments can voluntarily apply for a certification known as HQE (High Environmental Quality). The fruit of several years work, this acknowledges efforts hospitals are making to have cost-effective, energy efficient buildings that have low CO_2 emissions. The environmental quality approach of the HQE, already applicable for other sectors since 1996, requires the environment to considered at every stage of development and life of a building (planning, design, construction, demolition, etc.).

The initiative is financially supported by the *Hôpital 2012* plan, which has funds of 10 billion euros to improve the healthcare infrastructure over five years. Already operational, this ambitious programme covers new constructions and modernisation of existing hospitals. In a further effort to combat global warming, MAINH (Mission Nationale d'Appui à l'Investissement Hospitalier) and the Caisse des Dépôts have provided another financial option in the form of loans, in the region of two billion euros, to promote the environmental quality of building works by actively encouraging sustainable development. Even if an establishment already has a certificate of excellence awarded by the HAS (Health Authority) they can enter into the scheme by examining the environmental credentials of their existing buildings, energy consumption and CO_2 emissions (22 institutions have already limited their CO_2 quotas by more than 260,000 tonnes annually).

Numerous bodies have been involved in the creation of certification specifically adapted and relevant to the particular needs of hospitals. Within the HQE certification process there are 14 environmental targets to be attained. From the management of energy, water, waste, air quality and the lighting of spaces, to keeping down nuisance levels, as well as visual pollution caused by building sites, these integrated parameters make the HQE scheme a cross-disciplinary and wide-ranging approach to the hospital environment.

Among reasons that health authorities choose to follow this initiative is the opportunity to improve the thermal and operational performance of new constructions, thus reducing running costs in terms of energy prices, maintenance and water consumption. The French Government considers support of the system not expenditure but a long-term investment in the planet's future.

UK: Rosie's

In May 2006 the Rosie Hospital, in Cambridge, UK, launched a competition challenging staff to suggest ways to save energy or time. Many came up with energy saving ideas. This resulted in the creation of the Rosie Energy Awareness programme. Monitoring energy usage of various items of medical equipment within hospital, for example ultrasound machines, the energy statistics provided staff with a real reason to switch off lights and PCs and save money.

Ciara Moore, Operations Manager in Medicine at the renowned Addenbrooke's Hospital in Cambridge, reports on this highly effective programme, which has so far saved the hospital an estimated £7,000, with a further £19,000 predicted for this year. 'Most importantly,' she also points out, 'the Rosie has saved 48 tonnes of carbon annually.'

The Rosie Hospital is part of Addenbrooke's Hospital; both are part of Cambridge University Hospitals NHS Foundation Trust. The Rosie's focus is on the health and care of women, providing out-patient clinics, with a range of services that include family planning, genetic clinics, reproductive medicine, delivery, foetal medicine antenatal clinics, coloscopy, gynaecology, urodynamics, and much else.

In 2006, when working as the Service Delivery Manager in Women's Services, I launched a competition that challenged staff to come up with ways to save costs, energy, or time in their normal daily working practices. It ran for one month. The collated ideas showed that staff had really looked at their work environment and the majority of the ideas generated promoted energy saving. For example:

- Switch off lights in seminar rooms at the end of meetings
- Always turn off lights after use in toilets
- All staff should turn off computer screens, printers and lights when leaving offices at the end of the day, and not leave them on over weekends. The residual electricity saved throughout the Trust would probably run into thousands of pounds per annum.

And so on. What happened next?

The Service Delivery Manager and the Operations Manager Kate Evans realised that, if the majority of the staff had registered energy efficiency savings as ideas then perhaps the Rosie Hospital was ripe for an energy awareness campaign. Clearly assistance was required in understanding energy, the carbon footprint and where energy could possibly be saved. A project team was formed including the two mentioned managers and the newly appointed Trust Energy Manager, Ian Jackson.

Working closely together, the team

energy-saving programme saves £-thousands

felt that, to raise awareness, there needed to be a service-wide understanding of energy cost – not only financially but also to the cost of the carbon footprint. Clearly, the staff would need a tangible reason to switch off a light or printer and understand the effect of doing that. We agreed that if they could match the energy consumption to the services provided within the building they would be better placed to raise energy awareness and make some cost savings. At that time the team was not aware of the amount we would or could save.

First steps

The energy manager monitored energy usage of various items of medical machines within the Rosie, including ultrasound, foetal sonicade and a urodynamic device. PC's and general lighting were also monitored. (See table).

Switching off 12 lights for an hour saves enough energy to power an ultrasound machine for the same amount of time

We agreed that those energy statistics would be the best tool to promote energy saving ideas. In the same way that the Carbon Trust promotes energy saving ideas via what is normal day to day living, such as mapping switching off lights with cups of tea, the Trust Energy Manager set to work on mapping the statistics to similar strap lines. The key difference was that the hospital would promote a 'service specific' message.

The result included the following messages:

Did you know?
A computer left on uses more energy than a urodynamics machine

Did you know?
Switching off 12 lights for an hour saves enough energy to power an ultrasound machine for the same amount of time

Did you know?
Two lights left switched on constantly would power a foetal sonicade machine for an entire year

Remember, every £1 the Trust saves on Energy is a pound made available to treat somebody and less carbon put into the atmosphere

The team's puzzle was how to promote these ideas and make them stick! We commissioned durable light switch size plastic holders with bright backgrounds for the messages and placed them with a different key message under every light switch in the hospital. It was felt that staff when switching off would read the message, become more aware and switch off. The energy programme manager also guided the team towards changing to energy efficient light bulbs throughout the building.

Since the programme began

- 334 lights in the Rosie have been upgraded to more efficient ones saving an estimated £7,000 and 48 tonnes of carbon annually!
- Every light switch has a relevant strap line message displayed beneath it.
- The project team ran a very successful Energy Awareness day for staff and visitors to demonstrate the work and results.
- The Trust is launching a Trust-wide energy saving campaign based on the Rosie's results. Estimated annual saving: £400,000

Future schemes

- On-going light upgrades
- Installing radiator valves (TRV's) estimated to save a further £9,000 per annum!
- Ventilation plant and heating upgrade saving £10,000 per annum!

Many of the measures that can save energy are individually small and simple but if we all use them they combine to have a large impact.

The sustainability drive here is now big, and the great savings will go towards patient care, not to mention the carbon savings that will be great for us all.

Machine	Annual energy running costs/£	Number of lights left on 24 hours per day required to run this machine for 1 year	Number of lights left 1 hour per day required to run this machine for 1 year
Ultrasound machine	153.97	3.45	11.60
Hysteroscopy stack	75.02	1.68	6.28
Colposcope	18.95	0.43	1.59
Urodynamic	11.79	0.26	1.19
Fetal sonicade (OI)	23.63	0.53	2.37

Comparisons are based on lights with single lamps, the most common within the Rosie. Equipment costs are based on hours of clinical utilisation of the machine

NURSING SECTION COMPILED BY **HEIDI HEINHOLD**

Equipment safety and nursing care

The safety of medical products, which includes bedding, depends on three pillars: **identification of mistakes, updating standards and training**

Identification of mistakes
In Germany, these mostly concern faulty operation and must be reported to the Federal Institute for Drugs and Medical Devices (BfArM) according to Medical Products Safety Guidelines. They must then be rectified.

Updating standards
In terms of medical products, this should become internationally compulsory, with test criteria and procedures harmonised, which would facilitate comparisons of results and therefore products.

Staff training
Realistically, manufacturers should involve future users of their products in the development. This will later avoid problems with the introduction of products on the market.

Identifying risk factors

Jochen Iwen summarises reported incidents in Germany

First the good news: In the years from April 1998–2008, only 40 incidents were reported to the Federal Institute for Drugs and Medical Devices, for assessment. The following picture emerged from those events:

- 10 reports related to fire (including smouldering, deflagration and explosion)
- 10 reports of malfunctioning
- 6 reports related to medical presentation
- 5 related to mechanical problems
- 5 related to complaints and falls
- 3 related to electrical fields
- 1 report indicated a labelling problem

In terms of causes the distinction lies between

- product-related (14)
- non-product-related (25)

Example of a non-product-related cause: One report related to the fall, and subsequent death of a patient, because a system was used in addition to the normal mattress. The manufacturer had stated in its instructions that the product should be used in place of a mattress. In 26 of the 40 reported cases there were no effects or only a slight impact on patients and users, such as minor injuries (e.g. reddening of the skin, through bruising). In three of the 40 occurrences there were severe injuries, e.g. decubitus ulcers on the back of the head, an open wound, and in three further cases the injuries led to patient mortality (1 x fall out of bed, 2 x effects of burns, although the product did not cause the fire). The severe injury causes were:

- faulty use
- non-observance of instructions
- patient behaviour

In 17 cases, corrective measures to rectify the mistakes, based on the assessment by the German Federal Institute for Drugs and Medical Devices or the respective institutes in other countries, resulted in changes to the design and construction of products with regard to manufacturing-related defects, product information and handling.

As a precaution it is recommended that in the new or further development of products, construction and manufacturing related factors that become apparent should be taken into account, such as unit dimensions, quality control and suitable product documentation (instructions), along with user and patient requirements. Proper use by trained staff along with observance of instructions and regular inspection of the products used should be a matter of course.

** Source: MTDialog 7/2008, p. 50 ff (www.mtd.de)*

Updating standards

Peter Diesing reports on a meeting of the ISO Groups in TC 173 SC 1

During the second meeting in 2008 of the ISO Groups in TC 173 SC 1, which took place in Japan, the four working parties came together to work on existing and new ISO standards covering technology for wheelchairs and mattresses. The main focus was on ISO 7176 for wheelchairs and stair climbers and ISO 16840 for seating products. In addition, the second 2-day meeting of the mattress group focused on the testing of microclimatic and mechanical properties; accelerated aging of products; terms and definitions and the mechanical properties of mattresses.

The Shear Force Initiative (SFI), an international group of scientific specialists, presented results studies of the possibilities of measuring, describing and explaining shear forces and their effects on tissue and its reaction.

Intensive discussions took place on North American and European philosophical differences regarding air-filled mattresses. In the USA, mattress description mainly involves measurement of the depth of indentation and envelopment, which enables characterisation of the properties of Low Air Loss and foam mattresses and other products for continuous pressure relief. This work is supported by S3I, a subgroup of the NPUAP in the US. By contrast, Europe's gold standard is the Alternating Pressure Philosophy, which must describe the shape of the pressure over a period of time in these products.

Working party 11 focused on seating, including flammability of products and the idea of an indenter instrument to measure interface pressure.

A European subgroup on mattresses met again in Berlin (20-26 October) particularly to focus on the description of alternating pressure.

Staff training

Successful quality assurance regarding pressure ulcers requires proper training for medical staff and caregivers, says **Hartmuth Brandt**

Hartmuth Brandt, Director of Mobilissimo, an institute for supplier-independent medical aids consultation, which serves pharmacies and medical products stores as well as technology institutes. The firm provides sales and marketing training and medical education for both groups.

In medical/healthcare products shops that are commissioned in Bavaria by the statutory health insurer AOK to provide anti decubitus systems for AOK patients, medical staff receive two-day training conducted by Mobilissimo. The curriculum covers basic medical knowledge regarding pressure ulcers as well as the handling of questionnaires and documentation and, above all, the professional selection of an appropriate anti-decubitus mattress for the individual patient.

The participants (primarily rehabilitation technicians and hospital and home-care nurses) gain a first-hand impression of various available anti-decubitus systems. More than 20 systems from various manufacturers in different countries have been compared. Each participant spends a night on either an alternating air pressure mattress or an air cushion.

Another important issue is economics: What exactly is 'sufficient and appropriate' care that does not 'exceed the necessary', and where does excessive and superfluous care begin? At the end of the two-day training, the participants receive a certificate that permits them to deliver anti-decubitus systems to AOK patients.

The training course resulted from an agreement between the regional orthopaedics technicians association with AOK. Currently AOK Hesse does not offer any courses because, due to tight registration restrictions, not enough merchants were eligible for participation. Consequently, in some areas participation modalities were changed; now in Bavaria, for example, a qualified nurse who works a medical supplies store is allowed to determine a decubitus stage and select an anti-decubitus system. However, Mobilissimo will continue to provide training courses commissioned by the association of the medical supplies sellers, which received very positive feedback.

Details: H.Brandt@mobilissimo.de

Minimising the risk of falling

By **Hans Peter Hartl**, member of the Nursing Directorate at the Department of Gerontopsychiatry, Mainkofen District Hospital, Germany

Many old people tend to be restless and try to get out of bed. In one of his cases, neuro-psychologist Oliver Sacks describes a man who regularly fell out of bed because, he said, in his bed he would find a cut-off human leg that was not his own and which he wanted to throw out. While trying to do so, he continued, he must have fallen out of the bed himself, then found the leg fixed to his body. In a similar case, a cardiologist arrived at a convincing diagnosis: paralysis following an embolism induced by ventricular fibrillation. The man had simply lost all feeling in his left body half, which is particularly noticeable at night when reduced blood circulation makes the affected body parts seemingly colder and heavier. The man simply could not identify the leg as his own.

Prophylaxis for patients at risk

The 680-bed Mainkofen County Hospital, in Bavaria, specialises in psychiatry, psychosomatics, forensic psychiatry, neurology and neurological rehabilitation. Here the patients' risk of falling is a major issue, which prompted a number of measures to prevent falls and concomitant injuries. The staff is well aware that there is no 100% prevention and that

mechanical devices, such as fixation of the patient or bed rails, are ethically and legally questionable solutions.

Consequently, low beds were purchased – but still, the question remained how injuries can be prevented, or at least reduced to a minimum, if a patient falls out of the low bed. Placing a permanent pad such as MTS's Soft Landing Strip next to the bed turned out ideal – meaning a safe and ethical – solution.

- Advantages of the low-bed-and-pad combination:
- Flattened edges ensure daily nursing tasks are not impeded
- The Soft Landing Strip is designed to support shoes and even wheelchairs, so it can be permanently placed next to a bed
- Anti-slip material ensures patient/staff safety
- The pad cushions falls, even from normal-height beds and prevents injuries
- The easy-to-clean surface facilitates compliance to hygiene standards.

Due to these advantages we decided to ensure ethical and safe care of patients by fitting the departments that have patients at risk of falling (e.g. geronto-psychiatry and neurology) with low beds and Soft Landing Strips.

Product effectively relieves pressure

The DeCube system's construction enables selective pressure reduction; individual elements can be removed according to needs

During five years of practical experience, **Johanna Meyer**, Assistant Director of the Nursing Directorate at Gütersloh Municipal Hospital, Germany, has found that a pressure-relieving system made by MTS proved convenient for patients and nurses

The internationally agreed definition of decubitus is damage to the skin and/or underlying tissue due to pressure or pressure combined with shear force and/or friction, and it predominantly occurs over protuberances. However, successful prevention depends not only on professional care but also on high-quality positioning materials, as experiences have shown in Gütersloh Municipal Hospital, Germany.

Professional standards and guidelines contribute to the high quality of nursing services. Our standards are revised regularly and are based on national expert standards of the German Network for Quality Development in Nursing (DNQP).

Problem case decubitus

One type of therapy for decubitus ulcers is the positioning of patients on pressure-relieving systems, such as DeCube by MTS. This system was first used at our hospital in April 2003; it has since proved very successful. We use 30 products of this type in our hospital; not least due to their simple handling and high patient comfort, which patients substantiate, in that no other technical devices are needed that cause additional heat or noise. DeCube has been used for several hundred patients all over our hospital as an alternative to a previously favoured alternating pressure system. The length of use – depending on the clinical picture of the patient – ranges from a few days to several months.

The material

The DeCube-System consists of cube-shaped, patented pieces of polymer-foam. Removable units are embedded in a base made from particularly wear-resistant material, guaranteeing a firm hold. The foam ensures extremely low pressure levels in areas that are particularly at risk, whilst maintaining microcirculation. This in turn leads to pain reduction and promotes wound healing.

The individual layers of this high-quality foam (patented Engineered Polymer-procedure) guarantee efficient pressure reduction for many years. The additional, inbuilt fringe reinforcement facilitates safe and simple repositioning and mobilisation of a patient. Removable elements allow for a specific additional pressure reduction, particularly for high-risk and un-cooperative patients.

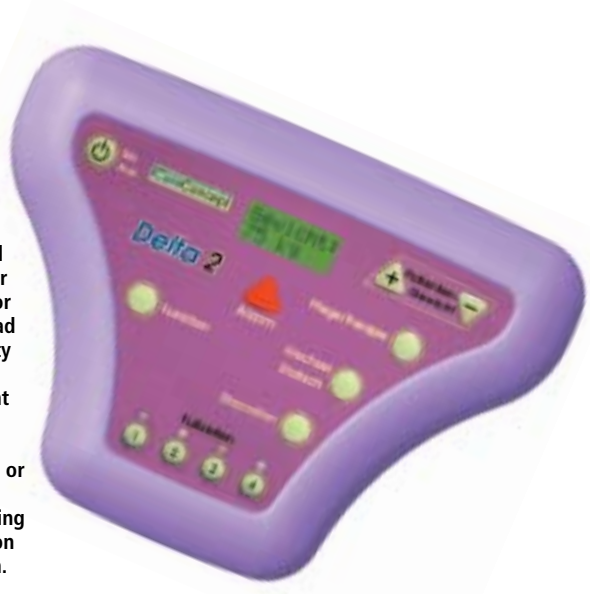
The integrated positioning option is a relief for patients and nurses. Appropriate positioning of the elements facilitates positioning of the heel without pressure, or a seating position with almost vertical back part, without the need for additional aids, e.g. cushions, for all positioning techniques, including decubitus position and inclined plane. In addition to changes of position and mobilisation, the product has proved of value both for prophylaxis and therapy of decubitus ulcers, up to and including stage IV according to Seiler.

Consequential costs, such as maintenance or repair, can be subtracted. Hygienic preparation is not complicated. Only disinfection through wiping is necessary.

What's a *dynamic* mattress?

Dynamic mattresses, also called alternating air pressure mattresses or replacement mattress systems, have air cells that alternately inflate and deflate in a cycle to relieve pressure on the body. They are used to prevent and treat decubitus ulcers. Indications, such as skin moisture, pulmonary conditions, wounds and activation of the patient, possible contra-indications and limitations such as spasticity and permanent pain must be assessed on a case by case basis for individual patients. In short: the selection process for a dynamic mattress needs to take into account a patient's overall situation.

Some patients voice subjective 'contra-indications' such as the noise of the electric components of a dynamic mattress system, mattress buoyancy or the tubes that connect the cells. Modern systems, however, are silent and the components are integrated (Fig. 1). There are also concerns that, in an emergency, e.g. during a cardiac event, the cells do not deflate quickly enough.



Delta 2, a dynamic system, is almost silent. It has no external components and tubes. The user interface of this micro-processor controlled system is easy to read and use. It also includes a safety function to detect errors. Settings: individual body weight adjustment from 20 to 150 kg; alternating air pressure, combined with soft positioning or solely soft positioning; time-controlled maximum filling during therapy measures, and finally, on request, special heel protection.

Development of systems with the nurses' cooperation

Dynamic mattress technology was developed in cooperation with caregivers – a smart move, because they will work with the system and know the patients' and staff requirements and needs.

Several details have stood the test: all control units are integrated in the mattress, air tubes and cables are hidden and can no longer be detached accidentally, which reduced false alarms and improved overall mattress performance.

An easy-to-read control unit offers settings such as *nursing* or *therapy*, which ensure maximum pressure even during nursing procedures. This function is limited to 15 minutes, which corresponds with the average duration of nursing and therapy measures, e.g. body hygiene. After those 15 minutes the system automatically returns to the original mode.

With immobile patients the heel is a particularly vulnerable part of the body. Fabry explained that gangrene (he never used the word decubitus) occurs when wounds or similar leg damages, e.g. caused by fracture, required the foot to be held upright on the heel for an extended period. This exerted pressure on the heel, which may turn into infections, pain and excessive moisture.

Therefore, modern mattresses must offer a heel area that allows cells to be emptied completely without causing fenestration oedema.

The cooperation of intended users in the design and development of new products is thus always fruitful. It can significantly reduce the number of customer complaints and operator errors – which can occur despite the best training.

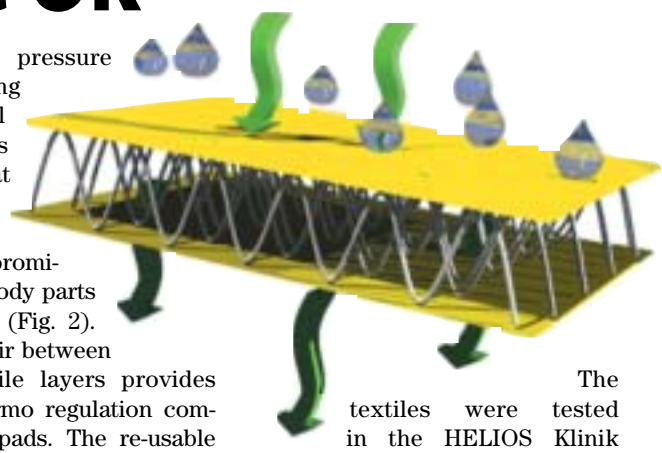
3-D textiles reduce pressure ulcer risk in the OR

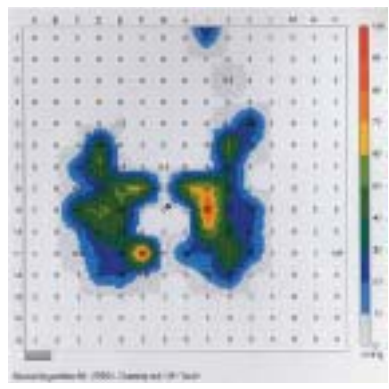
Pressure ulcers are a risk for patients undergoing long surgical procedures. Gel pads, widely used to reduce this risk, are considered to have two major disadvantages: they compromise the patient's thermo regulation by 'sucking' warmth from the body and they do not provide sufficient pressure reduction for prominent body parts.

Re-usable 3-D spacer fabrics with thermo-regulating properties are being developed to overcome this and reduce the risk of developing post-surgery pressure ulcers. Spacer fabrics combine textile sheets with distance fibres made of monofilar polyester (Fig. 1). These structures are characterised by high permeability, pressure resistance and other custom-made features.

TITV Greiz, for example, specialises in the development and production of elastic 3-D textiles for use on or close to the skin. The structures (available in thicknesses up to 9 mm) feature soft and skin-friendly surfaces.

Research on the development of innovative functional 3-D textiles to prevent pressure ulcers during long surgical interventions indicated that spacer fibres reduce the pressure on prominent patient body parts by up to 25% (Fig. 2). Additionally, air between the two textile layers provides improved thermo regulation compared to gel pads. The re-usable textiles can be disinfected, washed and sterilised, and dirt can be removed, with detergents rinsed off according to hygiene regimes.





The textiles were tested in the HELIOS Klinik Blankenhain. Ten custom-made operating theatre table pads were provided for use in traumatology/orthopaedics, general surgery and urology. The material was used primarily during long interventions (joint replacement, gastro-intestinal surgery, surgical removal of gastro-intestinal tumours and those in the urogenital tract) of up to six hours.

Overall, it was concluded that spacer fibres are well suited for the prevention of pressure ulcers during surgery, and: 'One crucial advantage in terms of hygiene is the fact that these textiles do not release any fibres.'

BED PURCHASING COSTS RISE WITH SOARING FUEL AND MATERIALS PRICES

SPECTARIS, the German Industry Association for Optical, Medical and Mechatronical Technologies, has predicted a significant increase in the cost of hospital beds since double-digit price increases for raw materials and fuel has put manufacturers under pressure. Along with energy costs, the manufacturers are particularly hit by price increases for steel, aluminium and wood – the major raw materials. With the situation being exacerbated by an innovation backlog, manufacturers have been forced to introduce rationalisation measures because the cost-saving potential has been fully exploited. 'Companies will have to react to this development and pass on the cost increase to their clients,' predicts Jan Wolter, director for medical aids at SPECTARIS.

In Germany, for example, the association estimates the turnover for hospital beds to reach about 100 million euros this year.

**** SPECTARIS represents about 150 companies in the capital goods and medical aids sectors, which focus on high tech products and are strongly export-oriented. In 2007, German medical technology manufacturers reported a combined turnover of approx. 17.4 billion euros; 1,246 companies employed over 95,000 people.***

The joint AACC/AACB conference Laboratory medicine – into the future

13-14 November Honolulu, Hawaii

The American Association for Clinical Chemistry (AACC) and the Australasian Association of Clinical Biochemists (AACB) are joining together for the second time for a conference on major changes facing laboratorians in coming years, under the banner *Laboratory Medicine – Into the Future*. The AACC has organised this biannual conference for 12 years. In 2006, the AACB co-sponsored the event, which took place in Cairns, Australia.

Leslie Burnett PhD, AACB President and Director and CEO of Pathology North in Sydney, Australia, said: 'We live in exciting times: the era of genomics, proteomics, personalised medicine and molecular diagnosis has arrived, but at a time of accelerating professional workforce shortage, environmental concerns and financial instability. We face risks of pandemic and terrorist threat from outside, and of obesity and re-emerging infectious diseases internally. While some of the challenges facing laboratory medicine are global and will affect us internationally, our different national pressures, environments and competencies have resulted in subtly different responses to these common challenges.' The meeting will explore these topics in great depth and help to gain international perspectives on ways of planning responses, he pointed out.

Above: AACB President Leslie Burnett
Left: David Hickey of Siemens

In focus will be public health, clinicians, IVD industry and the clinical laboratory. For example, **David Hickey**, Senior Vice President at Siemens Healthcare Diagnostics*, will present the IVD perspective on the evolution of clinical laboratory technology and services. 'This updated view of diagnostics will require a new perspective of the traditional roles held by diagnostic departments such as pathology and radiology,' he explained. 'It's very important for these two disciplines to recognise their shared diagnostic strengths and the collaborative power they have to advance patient care.' After covering topics such as emerging omics and molecular technologies, infectious diseases, accreditation and more, the day will end with a hot topics panel discussion on key factors affecting the labs of the future.

On the second day, complementary topics will be aired on quality, e.g. ensuring quality across the network, quality use of pathology resources, as well as patient safety and the greening of laboratories.

** The programme is supported by Siemens Healthcare Diagnostics.*

Protein cloning technology gains European patent

London and Cambridge-based biopharmaceutical research firm Domainex Ltd has received a European patent for its *Combinatorial Domain Hunting* (CDH) Technology, which enables the cloning and expression of recombinant proteins, or parts of proteins (domains), from challenging molecular targets. The proteins are then screened to select soluble, stable protein domains that are ideal reagents for use in drug discovery programmes by the pharmaceutical industry.

CDH technology is based on research conducted by Professor Paul Driscoll, Professor Laurence Pearl, Dr Chris Prodromou and Dr Renos Savva, at UCL, The Institute for Cancer Research and Birkbeck, University College London.

Domainex specialises in the development of novel drug targets reached via this technology and also provides structural biology and chemistry services to major pharmaceutical and biotechnology firms.

The company has already used its CDH protein expression platform to successfully tackle a series of difficult target proteins and has fulfilled commercial contracts with a number of major pharmaceutical companies, such as leading global firm, UCB.

Dr Eddy Littler, CEO of Domainex, said: 'The application of the CDH technology within our internal portfolio allows Domainex to access attractive therapeutic targets that are impossible to approach by other technologies. We also have a granted Australian patent for CDH and pending CDH patent applications in the USA and several other territories.'

Domainex's portfolio will have an initial focus on targets for cancer treatments; the firm has begun such discussions with pharmaceutical companies regarding future out-licensing.

Details: www.domainex.ltd.uk

NEW Urinalysis strip test

Siemens new Clinitek Micro-albumin 9 Urinalysis Strip is now available in Europe. The strips, which can be used on the firm's Clinitek Status analyser, or the Clinitek Advantus analyser, provide nine tests to detect and monitor kidney disease.

The urine strips provide the Albumin to Creatinine (A:C) and Protein to Creatinine (P:C) ratios, adjusted for varying patient urine concentrations to minimise false negative/positive results. This allows for immediate indication of normal or abnormal results, Siemens explains. A:C ratio results are used for early detection of kidney disease in patients with diabetes. Early intervention may stop or reverse the process of kidney disease. The P:C ratio is used to manage patients with kidney disease. The P:C ratio results provided by the Clinitek analysers meet the needs of clinical specialists managing patients diagnosed kidney disease who are likely to excrete high levels of protein.

Expansion for range of cardiovascular genetic tests

UK – Lab21 is to expand its portfolio of genetic tests for inherited cardiac syndromes. Through its existing UK licence with PGxHealth, a division of Clinical Data, Inc., Lab21 offers exclusive UK and Ireland access to the Familion portfolio of tests for Long QT and Brugada Syndromes and has now added two new assays for catecholaminergic polymorphic ventricular tachycardia (CPVT) and hypertrophic cardiomyopathy (HCM) to its range of tests.

'The addition of CPVT and HCM to the Familion stable substantially assists UK cardiologists in the accurate diagnosis of cardiac disease. By enabling cardiologists to quickly identify a patient's risk, the most appropriate monitoring, treatment or lifestyle options can be implemented,' explained **Berwyn Clarke**, Lab21 Chief Scientific and Development Officer at Lab21.

Non-invasive prostate cancer test may reduce biopsies

The French firm bioMérieux and ProteoSys, based in Mainz, Germany, have signed a license and development agreement for Annexin 3 to be used to develop a urine-based, confirmatory diagnostic test for prostate cancer.

After a research phase, the new test should be developed on the VIDAS platform.

Annexin 3, also known as ANXA 3, was discovered by ProteoSys, which specialises in cell biology and proteomics. Studies have shown that ANXA 3 quantification in urine is a novel, non-invasive test with high specificity for prostate cancer. Today, when the levels of prostate specific antigen (PSA) are in the uninformative 'grey zone', a biopsy is used to provide definitive diagnosis. The ANXA 3 test would be used to provide better identification of patients with a high probability of prostate cancer, thereby reducing the number of unnecessary biopsies.

After the first research phase at bioMérieux, a diagnostic test for the VIDAS platform will be developed. While the confirmatory diagnostic application on VIDAS will be the initial focus, bioMérieux is also considering the development of treatment decision and prognostic applications for ANXA 3.

UMBILICAL CORD BLOOD BANK OPENS

UK – The Anthony Nolan Trust Cord Blood Bank and combined research institute, opened in September at Nottingham Trent University, will store stem cells from the blood of newborn babies' umbilical cords as part of a multi-million pound project that aims to bank 50,000 cord bloods.

In the next few years, the charity aims to have 10 collection centres, with initial donations of umbilical cord blood by mothers delivering at London's King's College Hospital.

The country has had a National Health Cord Blood Bank for 12 years. This new centre builds on the Anthony Nolan Trust charity's highly successful Bone Marrow Register of 400,000 potential donors, by offering a new source of stem cells to match an increasingly diverse population.

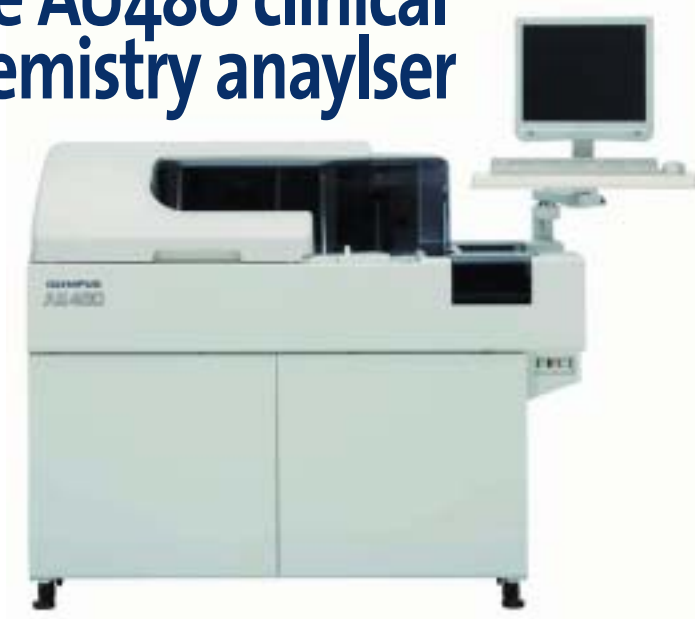
The charity first expanded into cord blood five years ago, by sourcing donations from overseas; last year it imported 70 cords for UK transplant patients. Of the 50,000 donations planned for storage by 2013, 20,000 will be suitable for transplantation, and 30,000 for research.

The Anthony Nolan Trust (http://www.anthonynolan.org.uk/) is a UK registered charity, founded in 1974, by Shirley Nolan, whose son suffered a life threatening congenital disease for which, at that time, the only known cure was a bone marrow transplant. In the absence of a compatible donor, Shirley Nolan focused on recruiting adult volunteers prepared to donate their bone marrow. Since then The Anthony Nolan Trust has given the chance of life to more than 5,000 patients in need of a transplant and today their register numbers nearly 400,000 people. The Trust's research institute focuses on research to improve the outcome of stem cell transplants and the use of immune system modulation as a form of therapy.

Report: Mary Black

NEW at MEDICA

The AU480 clinical chemistry anaylser



Olympus will present the latest member of its clinical chemistry analyser family at Medica. 'With a throughput of up to 800 tests per hour, an ISE module and on board capacity of 63 different analytes, the Olympus AU480 is the ideal main analyser for small to medium size laboratories. It can also fit as a special chemistry or STAT analyser in large laboratories,' the firm reports.

The analyser includes new Graphic User Interface software, standardised with the AU680, and master calibration established by 2-dimensional barcode. New state of the art sample and reagent volumes are also achieved by the AU480. 'Sample volumes as low as 1 µl are ideal for paediatric testing,' Olympus adds.

Also: New microscopy introductions

New microsocpy solutions on show at Medica will include the Olympus CX41 microscope with FluoLED Multi, enabling easy to handle fluorescence microscopy with up to three interchangeable LED cassettes. These are controlled at the same time via a three channel electronic driver, allowing multicolour observations. 'LEDs are safer to use and produce light more efficiently than other fluorescence light sources, which combined with their long lifetime produces a cost effective, energy saving solution,' the firm points out.

'For telepathology applications, the new dotSlide 2.0 virtual digital microscopy system offers enhanced functionality and image quality for scanning entire slides at high resolution and fidelity,' Olympus adds. 'This advanced technology makes them accessible and fully navigable from anywhere on the globe. The new Olympus dotSlide 2.0 is therefore ideal for remote review, secondary consulations and multidisciplinary team discussions, as well as for training purposes.'

See them at MEDICA. Hall 10, Booth C20

Xarelto gains EU approval

The European Commission has granted marketing approval to the Bayer Group for Xarelto (rivaroxaban), an anticoagulant taken as one tablet, once-daily, to prevent venous thrombo-embolic events (VTE) in adults undergoing elective (planned) hip or knee replacement surgery. 'As Xarelto has the potential to become a blockbuster, its launch is an important milestone for Bayer,' said Werner Wenning, CEO of Bayer AG.

The EU marketing approval followed a review of data from the extensive RECORD clinical programme that included three Phase III trials of Xarelto among around 10,000 patients undergoing elective hip or knee replacement surgery (RECORD1, 2 and 3 trials). Bayer reports that results from these three studies demonstrated the superior efficacy of Xarelto, both in head-to-head comparisons with enoxaparin (RECORD1 and 3) as well as when comparing extended-duration (5 weeks) Xarelto with short-duration (2 weeks) enoxaparin (RECORD2). 'In all three trials, Xarelto and enoxaparin had comparable safety profiles including low rates of major bleeding.'

Dr Bengt Eriksson, orthopaedic surgeon at the Sahlgrenska University Hospital/Östra, Gothenburg, Sweden, and a leading investigator in the Xarelto clinical development programme said: 'The development of Xarelto, an effective oral, once-daily anticoagulant, which does not need routine coagulation monitoring, is a huge step forward in blood clot prevention.'

Worldwide, almost 50,000 patients are expected to be enrolled into an extensive Xarelto development programme. The clinical trial programme will evaluate the product in the prevention and treatment of a broad range of acute and chronic blood-clotting disorders including VTE treatment, stroke prevention in patients with atrial fibrillation, VTE prevention in hospitalised, medically ill patients, and secondary prevention of acute coronary syndrome.

The German Society for Senology 28th Annual Conference

30 December – 1 November

In a pre-conference discussion with this year's President, **Professor Hans-Heinrich Kreipe**, Director of the Institute for Pathology at Hanover Medical School, he outlined the significance of MRI in breast cancer detection, and highlighted other topics for the event. 'For certain breast cancers – especially the aggressive ones that cannot be detected with X-rays – MRI examination is definitely better. For these, which occur particularly in younger women, it would make sense to define a risk group for hereditary breast cancer, who would benefit from MRI examinations for early diagnosis – particularly patients with radio-opaque breasts,' he added. 'However, an MRI scan often shows up things that may turn out to be harmless – but intervention has already taken place.'

After diagnosis, the vital question is: *What type of mamma carcinoma is it; passive or aggressive?* This cannot accurately be distinguished by traditional measuring instruments, he pointed out. Given the trend towards individualised therapy, the extent to which molecular biology may contribute to this problem will be discussed, and gene profiling research presented.

Professor Hans-Heinrich Kreipe

Professor Ingrid Schreer

In 2003, the German Society for Senology and the German Cancer Society e.V. began issuing the quality mark *Certified Breast Centre* to hospitals that ensure professional care. Asked about this, Prof Kreipe said the project has been running very successfully. 'However, it's a shame that certified breast centres and screening-institutions, are only superficially networked together, but run alongside one another. The German screening programmes can only be carried out in certain institutions, so this excludes all other hospitals. This is also problematic in terms of further training, because this diagnostic outsourcing means trainee doctors hardly see any mammograms – something criticised, particularly by the German Radiology Society.'

Radiologist **Professor Ingrid Schreer** heads the Breast Centre at the University's Women's Hospital in Kiel and is Vice Chair of the German Society for Senology. Asked for her views on the best imaging procedures for the early diagnosis of breast cancer, she unhesitatingly replied: 'Ultrasound scanning is definitely the ideal, complementary examination procedure to mammography. Initial results from a multi-centre elastography study are particularly promising. They show that by measuring tissue elasticity with ultrasound elastography we can better tell benign tumours and unclear tumours apart, with a very high probability. For example, a harmless increase in tissue volume can be cysts, which frequently occur in the breast and can be clearly identified via elastography without the need to penetrate it. So this imaging procedure promises a much gentler way of diagnosis. However, it doesn't help in the further differentiation of malignant tumours in BI-RADS categories four to five.

'The most helpful method to identify suspected malignant results remains biopsy. We have very gentle hollow needle procedures for this, using the ultrasound-guided punch biopsy and vacuum biopsy under ultrasound, X-ray or MRI control. MRI scanning only makes sense for high-risk groups – women already offered an annual MRI scan as standard in one of 12 centres set up for this purpose here,' she added.

'The problem with early detection via mammography is not necessarily that malignant tumours are overlooked but that highly aggressive types grow very fast. Therefore, a mammography screening programme carried out every two years is not effective enough for those tumours and for younger women. For them, in Sweden, screening programmes are carried out every 1.5 years. A large English study has shown that annual mammography screening for 40–50-year-old would make even more sense. If necessary, shorter intervals between examinations should be possible on an individual basis, to ensure early diagnosis.'

As for digital tomosynthesis versus 2-D mammography, Prof Schreer pointed out that the former shows small sections of glandular tissue without overlay, so unlike a classic X-ray exam, the result is not masked by upper layers of tissue. The uses for digital tomosynthesis are the subject of current studies. 'It is important that patients are not exposed to additional radiation through this procedure, so tomosynthesis can only be used complementary to classic mammography. However, we don't know whether this will work. Digital mammography could potentially be combined in one single piece of equipment with ultrasound, but that's speculation.'

As for using molecular imaging to differentiate and individualise tumours, this may one day become a complementary procedure '…to discover more about benign or malignant tumour functions, beyond anatomic-morphological information,' she added. However, this is currently only used in animal experiments, and no one can be sure.

The biological effects of radiation – When any ionising radiation exposes a radiation field, it does what it is supposed to do: it ionises molecules in any material or tissues that lie in its way, whereby some of its energy is absorbed. Depicting this differential absorption that occurs is the basis of the resulting diagnostic image. Consequently, the effects of such ionisations are immediate, even if their biological consequences may not become apparent until years later. Considering the effects on the radiologists of the first hour or on the survivors of the atomic bomb explosions, there can be no doubt that these effects occur. Changes in peptides are largely responsible for these ill effects and occur predominantly through indirect means when free radicals are generated by the ionisation of water, which is ubiquitous in biological tissues. While these tissues have suitable mechanisms in place to repair such damages, these take time and may become exhausted.

To understand risk assessments it is important to be aware of the standard units in which radiation doses are expressed in relation to risks: for each organ exposed, the absorbed dose may be estimated in J/kg [Gy]. Since the effectiveness of ionisation is different for the various types of ionising radiation, the absorbed dose needs to be multiplied by an appropriate weighting factor, resulting in an equivalent dose. This in turn is multiplied by a tissue-weighting factor, which takes account of the different sensitivities of various organs to the effects of ionising radiation. The values for all irradiated organs may be summed up to yield the effective dose to the whole patient. Both the equivalent and effective dose estimates are consequently given in J/kg; however, to signify their biological significance, the unit of Sievert [Sv] has been introduced. This allows comparing the relative risks of different radiological investigations or procedures that utilise ionising radiation.

Furthermore, somatic effects of ionising radiation must be distinguished from hereditary effects: the former occur in the exposed patient, the latter in her or his children. It is noteworthy that, while one would think that such genetic effects should occur, there is actually no such evidence. And yet another piece of information is crucial to understand the whole issue: The somatic effects of ionising radiation can be divided into deterministic ones, which occur once a certain threshold dose is exceeded and statistical effects that are probabilities, i.e. the dose is directly proportional to the effect. Skin reddening through ionising radiation exposure, induction of cataracts, bone marrow suppression and sterility are examples for deterministic effects that in general all require doses that should not occur in a clinical radiology setting. However, given that the lens of the eye has no blood supply, there is no possibility of a repair of damages induced and these will thus be cumulative. In contrast, the induction of leukaemias and solid tumours are considered statistical effects of ionising radiation. These effects may therefore occur at very low doses, while it is believed that they manifest clinically only after a latency of some years (leukaemias), and about 40 years (solid tumours). And whatever the incidence of cancers induced by man-made radiation may be, given that CT was introduced in the 1970s, being then widely applied in the 1980s, we are now within this time range, necessitating the current debate.

Population dose and its development – Ionising radiation is ubiquitous and includes sources of which many of us are not aware: Gamma radiation is emitted from the ground and various building materials just as particularly radon is emitted from the ground, in some locations at significant levels. Equally, our food and drink does contain natural isotopes and high altitude flying brings us nearer to cosmic radiation. Nonetheless, altogether these amount to no more than an estimated average of 4 mSv per annum. Importantly, this includes ionising radiation from medical exposures that contribute about 50% of the population dose. Specifically important is the fact that at least half of the medical exposures are from CT examinations.

Over the past 20 years, the number of CT examinations performed in Western societies has increased by 10 to 20-fold. While other high-dose procedures, such as fluoroscopy-guided interventions, have contributed significantly to this figure, requests for CT of the acute abdomen in particular have risen. Mean doses from CT examinations are of the order of 10–20 mGy but rise to as high as 80 mGy for cardiac applications. Given that many patients do in fact undergo more than one examination during a visit to a CT department, and further, given that surveys have found differences as high as an order of magnitude in applied dose for certain types of examination, with current practice, considerable dose levels are now reached in a large proportion of patients.

However, there are other factors to be considered that contribute to rising dose levels:

Dosis facit venenum (Paracelsus)

- Development of multi-detector row CT machines has both inherently increased dose levels as well as increased the number of indications for CT examinations[3].
- There is documented evidence that a significant proportion of radiological examinations are being repeated unnecessarily within time-spans a short as six weeks (audit data, Regional Chamber of Physicians, Lower Saxony, Germany).
- Concerns about litigation not uncommonly give rise to requests for CT examinations, a practice referred to as defensive medicine[4].
- Pressures on staffing levels and working hours impinge on sound imaging algorithms.
- Finally, the simple ability to scan has resulted in questionable new indications, particularly in the screening of asymptomatic individuals, where the estimated disease prevalence is thought to be 2% but further investigations result from the examination in as much as a third of cases (whole body CT screening data)[4].

Risk estimation and its problems – Hall and Brenner state that 'there is now direct credible epidemiological evidence of an excess risk of cancer … for these procedures'. This evidence is derived from both the follow-up of the Japanese atomic bomb survivors and the study of Anglo-American nuclear workers published between 1995 and 2007. The mean dose at which an excess relative risk has been identified was found to be 35 mSv, equating to two or three CT scans. The risk of development of a fatal cancer in an individual undergoing such an examination may be estimated by 'measuring or calculating organ doses, and then applying … specific cancer risk estimates' (Hall and Brenner). The likeliness of either over or underestimating such a risk has been stated by the US National Council on Radiological Protection to be close to a factor of three both ways. Importantly, the desire to summarise the overall risk of any X-ray examination by using the Sievert as a single effective dose value has been questioned recently[6], and a new similarly comparative value suggested (cf. reference). It is noteworthy that the foundations of current risk estimates have been questioned by some, saying that the atomic bomb survivors were exposed to different types of radiation and doses, as are CT patients today. However, considering these estimates, as much as 0.4% of cancers in the US may be iatrogenic from CT use, rising to 2% when its increasing use is taken into account[1].

Summary of current thinking on cancer risks – Somatic effects in patients exposed to ionising radiation are a real concern, particularly those statistical effects that occur without a threshold being exceeded. Such doses may result in leukaemias or solid cancers some years or decades after the exposure. In general, this risk is inversely proportional to a patient's age, i.e. children carry the highest burden of risk. Furthermore, women are principally at higher risk than men due to breast tissue being more radiosensitive during reproductive years. Most importantly, however, the statistical risk for an individual patient remains small with the risk/benefit-ratio in a given clinical setting usually in a patient's favour.

Approaches to dose reduction – In general, protecting patients, staff and the general public from the ill-effects of ionising radiation may be considered in the context of three sub-headings: justification of any examination (don't do the test?), optimisation of the actual procedure (applying medical physics)

THE GUARDIANS
Clinical radiologists must embrace their key role in the radiation protection debate


Johannes Gossner MD


Joerg Larsen MD FRCR

Most professionals will recognise issues that call for consideration in a wider context, a context that does not merely consider strictly professional issues, i.e. issues based upon facts and figures, write **Johannes Gossner MD** and **Joerg Larsen MD FRCR**, of the Institute for Roentgendiagnostics, Braunschweig Teaching Hospitals, Germany. 'These issues have a more general dimension and the current radiation protection debate is such a case: There has been a notable increase in the attention paid to radiation protection issues in the recent past, resulting in a debate that has reached the public domain in the US, perhaps evidenced by the review article of Brenner and Hall in the New England Journal of Medicine last year[1]. In Europe, radiation protection has long been a 'on the back burner', fed by an ever-present subliminal scepticism of scientific advance, a scepticism that, on occasions, has evolved into a diffuse hostility against technical issues, particularly in Germany. The well documented dramatic increase in the number of computerised tomography (CT) scans performed worldwide and the forecasted incidence of up to 2% consequent malignancies, i.e. tumours induced through radiological diagnostic procedures, do however explain the increasing debate only to a degree: the genuinely 'American' appearing optimism in scientific advance may have rather suffered a dampening, perhaps in a phase of worldwide tensions, as described by the acclaimed commentator Parag Khanna[2], resulting in a discussion that is more focused on associated risks' Here they review the background and basic considerations in this current, vital debate.

and the limitation of the exposure of employees and the public (Farr and Allisy-Roberts, 1997).

An exposure is justified when the net benefit to the patient is greater than the associated risk. Consequently, repeat examinations when a recent, previous study is not available for review, any screening test, frequent follow-up investigations or studies where the result is inconsequential to patient management, or where a different imaging modality has a higher sensitivity or specificity, must come under particular scrutiny.

Virtually any radiological examination using ionising radiation may be optimised: this refers to the general principle, to keep exposures to a level, *as low as reasonable achievable* (ALARA) and comprises practical measures regarding both the absolute number of exposures as well as the actual dose applied with each exposure. Either approach requires a thorough understanding of radiation physics, the examination technique and the equipment used. Reference levels have been set for certain types of examinations to address these issues and appropriate quality control measures should be in place as part of a clinical governance system to monitor them.

Finally, dose limits are used to guarantee that staff and the general public are not subject to ill effects of ionising radiation. These are legal limits and staff exceeding certain dose levels may be placed under particular monitoring and certain restrictions.

Special considerations apply to the management of female patients and staff who may be or may become pregnant, as well as to breast-feeding mothers. However, these are beyond the scope of this brief review and readers are referred to previously issued guidance such as from the Royal College of Radiologists of London.

Practical measures to reduce patient dose – A detailed analysis of the dose increases outlined above is key to possible dose reductions: In CT usage, there have been suggestions that up to a third of scans are either unnecessary or may be replaced by alternative imaging as the screening of asymptomatic individuals in the context of lung or colon cancer, cardiac disease and whole body screening, where the benefits have still to be established. The screening of at-risk individuals for abdominal aortic aneurysms is a similar scenario: here ultrasound may be applied to equal effect, instead of the admittedly convenient CT. CT usage may equally be reduced by re-considering other common indications, specifically in the pre-operative assessment of presumed appendicitis, when patients are frequently young and thereby more radiosensitive.

With respect to X-ray technique, there are ample ways of reducing the applied dose per CT scan or Roentgen-examination by adjusting technical factors: It is important to note that any dose reduction (specifically in the milli-amperage) will result in an increase in image noise. A trade-off is thus necessary between acceptable, i.e. diagnostic quality images, and dose. This relation is favoured when there is high, inherent, image contrast (renal stone disease), when only localising information is required (PET-CT) or when small subjects are being scanned (children) who exhibit less secondary radiation scatter, a large factor in image noise. The issue of differences in the absorption of radiation in relation to patient size and organ scanned has been addressed by the introduction of automated i.e. machine recommended exposure control in modern CT scanners. Furthermore, reducing the body area scanned to a bare minimum, or the number of contrast medium-enhanced phases, will have a considerable impact. Shielding techniques include gonad protection and bismuth-coated eye shields. Radiographic dose reduction e.g. includes left- instead of right-sided lumbar spine radiography, beam angulation in cranial CT to exclude the lens of the eye, and copper-filtration as well as the use of pulsed beams in fluoroscopy. Clearly, the measures indicated here do not constitute a comprehensive list but are examples for specific, i.e. targeted, modifications in the examination of individual patients.

Final remarks – Considering all the above, surprisingly few certainties appear to remain. The foundations of current risk estimates have been questioned by some, just as the use of the effective dose concept has been criticised. However, within the agreed range of uncertainty of ± a factor of three, we may concur that there is a notable risk to public health with current practices in the use of CT.

CT examinations are commonly performed in the elderly and seriously ill whose life expectancy is not that of a normal population. Nonetheless, CT use in the young and for screening purposes should be questioned. In addition, we must take care when justifying repeat examinations and when alternative imaging modalities are available. These certainties are at the interface of clinical medicine and clinical radiology; specifically, we may condense them into the questions whether or not, and how, any examination utilising ionising radiation is performed: Radiological expertise and guidance are central to this decision-making process. Radiologists' unique understanding of radiation physics, examination techniques and the equipment used therein is central to dose reduction in any shape or form.

This conclusion is as important as the understanding that we need to raise awareness of the fact that population exposure is reaching a level that may constitute a public health issue.

It has been argued that further regulations may be required to ascertain standards in radiation protection. We believe that this approach would likely fail, because it could not be meaningfully enforced. In contrast, if clinical radiologists could embrace their central position and practice radiation protection as shining examples, attitudes and practices of referrers and other staff working with ionising radiation may change. Detailed referral criteria and guidelines such as issued by the European Commission (Referral Guidelines for Imaging, www.europa.eu) are prudent adjuncts to this argumentative repertoire when justifying and performing Roentgen-examinations. And, as pointedly quoted by Cohnen recently, 'in radiation protection, a gram of brain weighs more than a ton of lead' (paraphrased from Wachsmann, 1965).

References: 1. Brenner DJ and Hall EJ (2007) NEJM 357:2277-84. 2. Khanna P (2008) The Second World: Empires and Influence in the New Global Order. Random House, London. 3. Dawson P (2004) Br J Radiol 77:S10-3. 4. Hall EJ and Brenner DJ (2008) Br J Radiol 81:362-78. 5. Preston DL et al. (2007) Radiat Res 168:1-64. 6. Brenner DJ (2008) Br J Radiol 81:521-3

Although there should always be concern about radiation in a facility that uses X-ray to image patients, that concern is perhaps not as vocal as for CT or interventional radiology, according to physicist Jacqueline Gallet, Global Manager of Clinical Studies at Carestream Health. 'X-ray equipment is still very minimal in terms of patient radiation and digital equipment has improved on that by going from film screen into digital. We have better management in terms of image processing. We also have quality control tools that can help in controlling the dose in X-ray facilities. You need radiation to produce an image, the type of the detector and the means by which you acquire that data varies. Therefore, some equipment may need a bit more. It is also very subjective in terms of the radiologist looking at an image. One radiologist may say, I'm okay, but another may say I need to see more, in which case you sometimes have to irradiate the patient a bit more. Also, you may be looking at a hard copy or soft copy – if looking at soft copy images, the quality control that you'd have on your monitors is very important. Monitors can deteriorate very rapidly. The radiologist may not necessarily notice this and keep insisting that there's something wrong, or that you need more dose, but in fact it is really the equipment that has not been tracked properly, and it may not be performing the way it should be performing.'

How can tracking be controlled?

'A facility should have a medical physicist. If it doesn't, there should be a quality control technologist or imaging manager who tracks that kind of information. Carestream provides quality control tools and instruction on how to track the performance of the equipment, and we can help with any ongoing programme as it evolves in a facility. This is very important in also monitoring the correct dose to a patient. If you don't have a quality control programme within the facility, it is very easy for a radiographer to increase doses – perhaps very imperceptibly at first – in order to correct for system minor malfunctions or even for a monitor degrading.

So it depends not so much on the system, but on the skill of a radiographer or radiologist?

CARESTREAM HEALTH: 'Tracking equipment performance is vital to control radiation dose'


Jacqueline Gallet

Yes, the radiologist determines the quality of the image that he wants to read, whether or not it has a high radiation dose. The radiologist must make the final diagnosis. So the radiographer will abide by what the radiologist wants in the facility. But again, it is very subjective. One radiologist will be very happy reading a slightly noisier image compared with someone else. This can be a problem.

In equipment comparisons among radiologists someone said that Carestream equipment needs high dosage, which is not true.

'Correct. Competitors have used that exact phrase. It is not true. It depends on how a facility is tracking, and whether it is really concerned about the patient dose. The radiologist is the end viewer. So we train the radiographer. The radiologist approves or does not approve or provides comments as to the quality of the image that he or she wants to see. If you have a good radiographer who understands image processing, now we are talking about digital, and we have that aspect of the image processing that can be adjusted to provide the quality that the radiologist would like to see. The more robust your image processing is, the more you can provide a better image at a lower dose to the patient. More than just dose comes in to image quality.

Is there a difference in how, for example, European, American, Asian, African or Russian radiologists deal with the question of radiation dose?

I've been questioned about dose in other regions, but perhaps not to the extent received from Europe. You have particular groups, such as paediatricians, who are generally more concerned about the patient dose.

In Europe, this is also a political situation; there are groups that want to avoid a lot of CTs, for whatever reasons. Is that the case in the USA?

For CT? Certainly there is a push to lower the dose in paediatrics – a national push. MR is a different part of the spectrum. I've not seen anything as disconcerting as a dose in CT. I've not seen that much coming out of MR, which is a different type of electromagnetic radiation. It can do other things that are harmful.

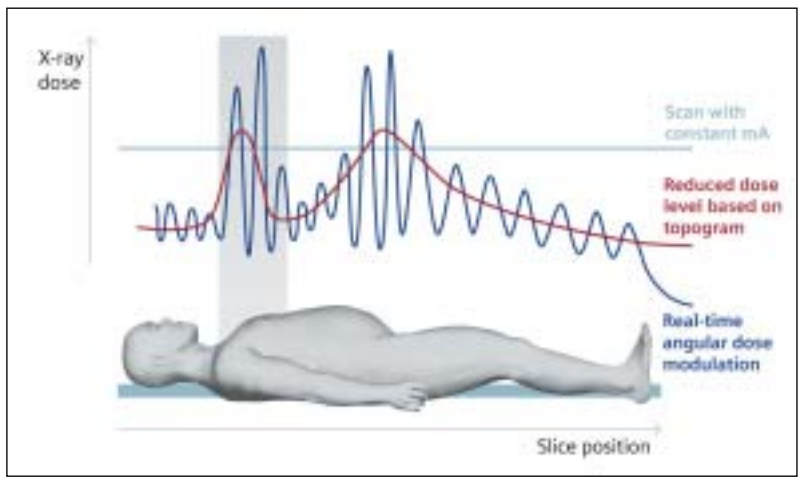
Are you trying to develop material to lead to less radiation in CT?

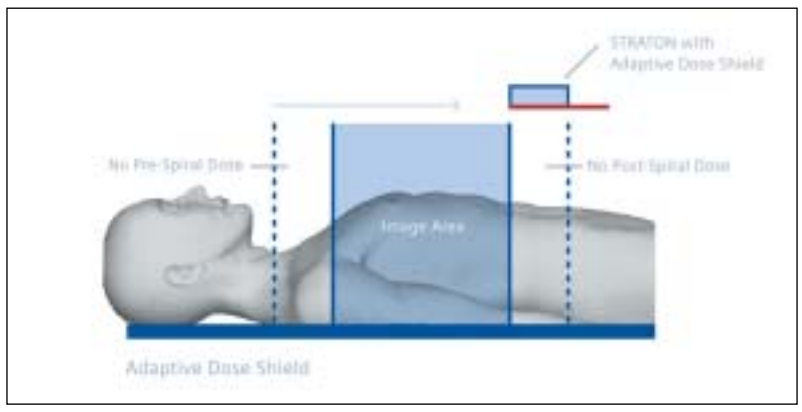
We are always on a path toward lowering the amount of radiation that we need in order to produce an image. That is part of all of these product lines that we develop. In terms of image processing, we are always developing image processing so that you can extract the most out of the acquired signal. This is one of the two biggest areas; the other is the actual detector technology. Certainly informing and teaching the user how to best use the equipment is also a big factor, and introducing quality control tools to monitor and track equipment properly. As a company, we are concerned about the patient dose. We want to provide the best image quality and the lowest possible dose to our users, and we are continuously improving our products along that mind frame.'

SIEMENS:

The word 'dose' describes the energy effect an X-ray transfers to the material. Therefore, the radiation dose is quantified in terms of the amount of energy (unit: Joule) transferred by radiation to a certain amount of material (unit: kilogram). In this context the dose is known as *absorbed dose*. The unit of absorbed dose is *Gray* – abbreviated as Gy. One Gray is equal to one joule per kilogram (1Gy = 1 J/kg).

Different tissues absorb radiation to different degrees. The amount of radiation X-rays are made up of high-energy photons. This type of radiation follows the physical laws of electromagnetic waves as well as of particles. Just like the filament in a light bulb a hot-cathode emits electrons. These are subjected to high speed acceleration toward the anode by an electric field. When the electrons penetrate into the anode disk upon impact they undergo severe deceleration. The energy thus released is emitted as X-ray radiation. The high voltage applied is a measure of the energy; the tube current – the number of electrons being accelerated toward the anode – controls the intensity. When both parameters are well-adjusted the radiation exposure of the patient is minimised.





Intelligent dose management reduces radiation exposure by up to 66% – compared with continuous constant current radiation

RADIATION: How dangerous

Radiation can't be seen or felt; it has no smell and our senses can't feel it – still it can cause great harm. Therefore, many fears are associated with radiation.

Radiation is used for diagnostic and therapeutic purposes. As with many treatments the amount of dosage is what matters. Harm from radiation can be divided into two groups, which are both present if one receives a certain amount of radiation:

1. Deterministic effect means that every exposure to a certain amount of radiation causes the same reactions. Deterministic effects are strongly dose related. Skin rash, skin burns, hair loss, bone marrow degeneration, radiation sickness and death – can be caused by a certain well-known amount of radiation. Compare deterministic effect to placing a finger on a hot plate – at a certain time and temperature you will have red skin, burn blisters and serious burns. Deterministic effects are more or less relevant for radiation therapy; here deterministic effects limit the amount of radiation that can be used to treat a patient. Cancer does not play a role in deterministic effects.

2. Stochastic effects are different. Stochastic effects of radiation cause cancer. However, it is not the case that everyone who gets exposed to radiation develops cancer – just the likelihood of cancer increases. The relation between dosage and amount of additional cancer was calculated by witnessing the survivors of atomic bombs. From the witness linear dependency we developed the theory that ever so little bit of radiation increases the risk of cancer. It might be that this view is overcautious and that the little radiation we deal with in

‘More knowledge – less dose’

is it really?

By **Soenke Bartling**

Absorbed dose	Energy dose transferred by the radiation energy to the tissue
Equivalent dose	Weighting of the absorbed dose taking into account the biological effectiveness of the different types of radiation
Effective dose	Weighted organ dose taking into account the radiosensitivity of the organs and tissues

tion absorbed by the body is also expressed as a dose. Different types of radiation, e.g., alpha radiation, neutron radiation and x-rays, trigger different relative biological effects in the tissues, which scientists account for by assigning weighting factors to them. The product of absorbed dose and the weighting factor of the radiation is known as the *equivalent dose*. Its unit is Sievert, abbreviated as Sv. X-ray radiation has a weighting factor of one and therefore the equivalent dose is equal to the absorbed dose.

Exposure to natural and medical radiation – Human organs differ in their susceptibility to radiation; the skin, for instance, is rather insensitive, while the gonads – in women, ovaries and, in men, testicles – are most susceptible. This is accounted for by the tissue weighting factor. The product of equivalent dose and the tissue weighting factor – summed over all organs irradiated – is known as the *effective dose*. The effective dose is the usual measure of the radiation exposure of the patient and is also given in Sievert (Sv or mSv for one thousandth of one Sievert).

The impact of the dose/effect of ionising radiation on the DNA in body cells is subject to scientific controversy. It has been demonstrated that ionising radiation can alter the genome. However, experts disagree on which dose affects which degree of damage.

Radiation exposure in CT scans

State-of-the-art CT scanners cause additional radiation exposure of 2–20 mSv, depending on the model and the region of the body studied. Studies confirmed damage to the body only for a dose of at least 0.5 Sv – that is about 500 times the CT radiation exposure. Epilation of the skin becomes a risk only with an absorbed dose of at least 3 Sv (about 1,000 CT studies). Therefore, deterministic radiation damage (damage that can be traced to a certain event) due to CT studies can be ruled out completely. The data on stochastic damage (probability of damage after irradiation) is founded on long-term observation of the survivors of Hiroshima and Nagasaki. Since 1950, the so called life span study, covering about 120,000 patients, has confirmed a linear relationship between dose and additional risk of cancer. To a large extent, this risk depends on the age when irradiation happened. If irradiation took place during childhood the risk is increased. ICRP 1990 (International Commission on Radiological Protections) hypothesises an additional lifetime mortality risk of cancer of about 5 % per Sv. In other words, a CT study with 10 mSv carries an additional mortality risk of 0.05 %.

Compared with other known risks this is a rather low value. Cardiovascular disorders increase the mortality risk by 34 %, heavy smoking by 40 % and alcohol abuse even by 72 %. If the general risk of cancer is 25 %, a CT study will increase this risk to just 25.05 %. Without a doubt, for medical indications the patient benefit far outweighs the additional risk of radiation exposure.

Modern CT scanners are equipped with numerous tools that allow radiologists to keep patient radiation exposure as low as possible. Decreasing patient diameter by just 4 cm will halve the tube current. For quite some time, automatic dose modulation, such as *CareDose4D* by Siemens, has been taking this into account. It ensures real time automatic dose modulation by anatomically controlled automatic exposure control, thereby reducing the dose by up to 66 %. Asymmetric collimator control preventing over-exposure of the area studied and ECG-gated dose modulation also help to reduce radiation exposure even further. Knowing how to handle the unit properly has a direct impact on patient dosage.

medicine is less harmful. However, it is better to play it safe.

In diagnostic imaging stochastic effects are the limiting factor. Every procedure that involves X-rays increases the cancer risk of an examined patient – strictly speaking. The question here is only how much the cancer risk is increased; this can vary a lot, because the exposure caused by modalities varies in order of magnitudes. A standard X-ray exposes a patient 100-500 times less to radiation than a CT examination. Furthermore, even CT scan protocols differ in orders of magnitude with respect to patient exposure.

To give some numbers – be aware that CT scans can be very different – a CT scan that is used to rule out a pulmonary embolism causes ten cancer deaths in 10,000 people – whereas 2,500 would die of cancer anyway. While at first glance this looks like a high number, it relates well with the number of people saved by the early and right diagnosis of pulmonary embolism.

Furthermore, another factor is the patient and his/her life expectancy. For young patients radiation exposure is especially critical, while old patients are less likely to witness a consequence through radiation.

Like many things in medicine, something that helps can also harm. It is as wrong not to use an imaging modality as to use it without good reason. A specialist must decide when a diagnostic method is appropriate and when not, based on best knowledge and guidelines.

In recent years, diagnostic imaging has witnessed advances to reduce radiation: diagnostic information increased, while necessary radiation decreased.

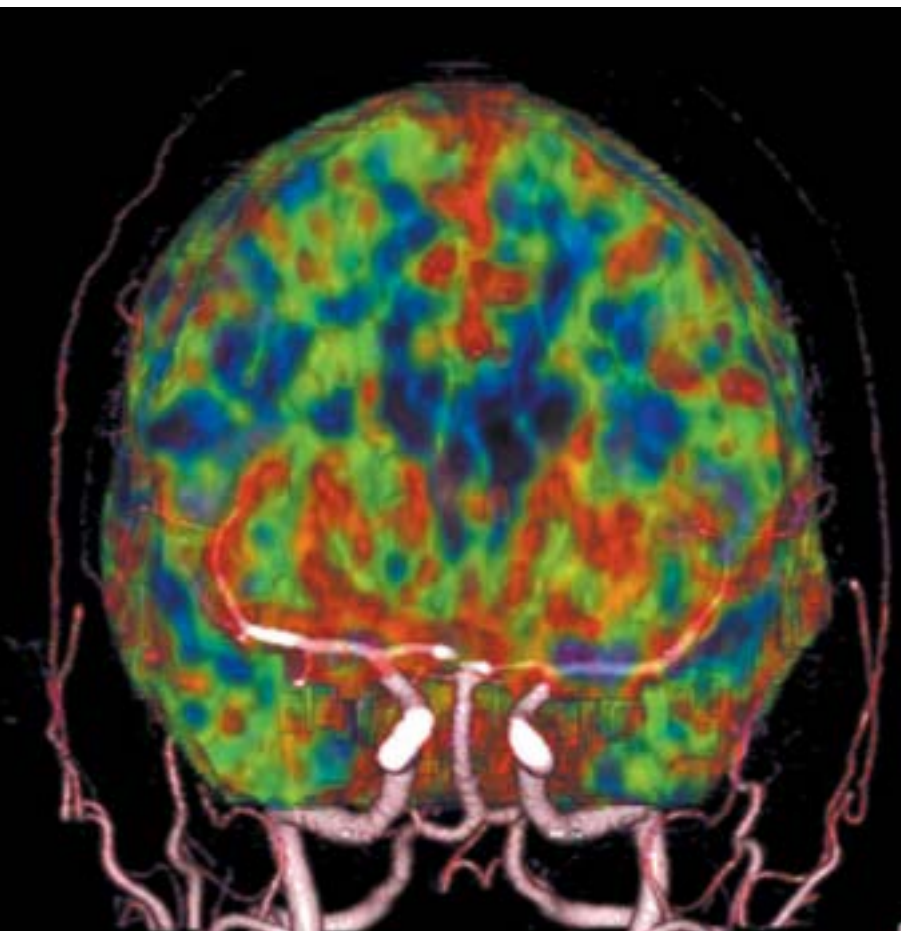


Fig 1: 3D fusion image of cerebral perfusion and angiography (4.6 mSv) (Case courtesy Charité Berlin, Germany)

CT: Optimising

Dose 'hysteria' and the 320-slice CT scanner

For the last few months, **Dr Patrik Rogalla**, Senior Consultant at the Charité, Berlin, specialist in diagnostic radiology and Head of the Computed Tomography Department at Campus Mitte, University Medicine Berlin, has been using a 320-slice CT scanner, one of four currently manufactured. During a *European Hospital* interview, we asked whether the system has provided greater detection rates, and why it has also ignited further debate on radiation dose

'Radiation dose is a topic that is sometimes discussed rather hysterically, and often by many without sufficient basic knowledge on the subject. Reason number one: if people are short on interesting and innovative topics they will talk about radiation dose. This always goes down well and scores points, because radiation is generally perceived as something very negative in our society. Once you tackle this topic you are guaranteed to remain a talking point. The second reason: Of course we must cut down on dose and are obliged by the legislators to examine using the lowest possible dose. The reason why the 320- slice is re-igniting discussions is the potentially lower dose requirement of this new type of CT scanner, and this puts us into the focus of the discussions around dose.

'There are not quite so trivial discussions around the question of how much dose is required for what kind of image quality. The dose can be measured – it is not that easy but technically it can be done in a fairly reliable way. However, image quality can only be conditionally objectively measured, because a large part of image quality is determined by subjective impression. The real measure should be: How much of a dose do I need for a sensible image quality that allows safe diagnosis? However, seeing how images tend to make very subjective impressions, this opens the floodgates to all kinds of speculation and marketing. CT scanners manufactured by all the main suppliers all require a certain degree of a radiation dose for comparable examinations. The differences between the different manufacturers are rather marginal. The parameter setting of the equipment, determined by the radiologist based on the individual requirements of a patient, and in particular the clinical question at hand, is much more important.

'It is a little regrettable that the discussion about CT tends to be reduced to a discussion around dose, although the use-risk ratio of CT scanning across medical indications is calculated at around 200:1. This is not only damaging for this technology, but also for radiology itself. This discussion then questions many radiological procedures, such as conventional angiography and fluoroscopy. How can you convince a female patient to have embolisation of a fibroid carried out using fluoroscopy when there is this constant debate over the dangers of radiation during CT scanning? We are taking away our own basis for essential methods of examination and treatment in radiology. I think this is short-sighted. The discussion around dose is necessary, but should be carried out based on the highest levels of knowledge and seriousness. One of the great difficulties with this discussion is that in today's scientific world, where you cannot refer back to publications from Medline going back more than 4–5 years, nobody can be bothered to carry out proper research into data on exposure to radiation in the way it is required. A piece of research carried out two years ago is referred to because it appeared in a "respectable" journal, and is used as proof that radiation has a "calculable" risk. However, when you take a closer look at this piece of research you then see that it, in turn, refers to another piece of research carried out a few years previously, and this in turn quotes another piece of older research, which eventually takes us back to the original source – data from those who survived Hiroshima. Apart from very few exceptions, these survivors' data are thus the only source – and of course they don't constitute a scientific study

Sometimes radiation dose is a topic discussed hysterically. Dose discussion is necessary, but should be carried out based on the highest levels of knowledge and seriousness

By **Dr Jörg Blobel**, Ph.D., Chief Clinical Science, CT Systems Division, Toshiba Medical Systems Corporation, and **Jürgen Mews**, of the CT Systems Division at Toshiba Medical Systems in Neuss, Germany

Dr Jörg Blobel

AquilionTMONE is the first CT scanner capable of imaging whole organ regions up to a width of 16 cm in one rotation and within a split second. Based on the raw volume data, rapid dynamic processes within an entire organ (e. g. heart, pancreas, kidney or brain) may be diagnosed with a time interval of 50 ms, i.e. with a rate of 20 volumes per second. With their smallest effective width of 0.5 mm the detector elements ensure best possible spatial resolution. Image reconstruction of 2 x 320 slices, coupled with special mathematical interpolation, provides a geometric resolution of 0.4 mm image voxels in all directions. Unlike in flying-focus spot technology, the signal strengths are not halved and spreadover both slice series. Consequently, this halved signal strength per slice does not have to be compensated by increasing the exposure.

Heart rate adapted temporal resolution between 50 ms and 175 ms allows scanning of the entire organ within one heart beat. For rather high heart rates the temporal resolution of 50 ms is almost half that of a

dosage

dual source CT scanner and the heart is better locked into position during motion. Compared with a Helical CT unit where the heart volume is captured by individual overlapping rotations the volume scan reduces the effective dose of the normal patient to 1.5-6 mSv – a reduction of 60-80%. Also the disadvantages of the step-and-shoot mode of multislice CT with a scanned field width of 20-40 mm, i.e. the common stepping artifacts at the volume borders and dose doubling along the volume overlap, are overcome. Data capture with Aquilion ONE requires just one heart beat. The modality is robust and offers increased potential to study arrhythmia patients. Calcified and non-calcified plaques, the latter frequently resulting in myocardial infarction, can be visualized down to a diameter of less than 1 mm.

This outstanding low-contrast resolution of the Aquilion ONE allows low radiation energy levels at 80 kV, e.g. for diagnostic organ perfusion scans. For the first time perfusion of the entire cerebral volume can be captured simultaneously. The 15-20 volume data sets generated during one minute of the study are acquired with a regular effective patient dose of just 4-6 mSv. Volumetric acquisition permits anatomically accurate fusion of the CT angiography and perfusion volumes (Fig1). The innovative range of CT studies opens up new perspectives for functional diagnostic workup, e.g. in joint movement, peristalsis, dynamic blood flow analysis and perfusion of numerous organs.

In diagnostic pediatric scans the radiation field and the number of detector element rows is collimated to the size of the organ. This rapid examination avoids the need for breathhold in infants and small children otherwise required by the longer scanning times. If an emergency thoracic CT study is needed in an infant the effective dose at a tube voltage of 80 kV is minimal at 0.16 mSv. Large areas of the body in combination with cardiac CT can be captured by individual volume scans much more rapidly than with helical CT and are subsequently "stiched" to one patient volume. Complex studies of the heart, lungs and the head may be combined with supplementary CT angiography and – based on the study plan – are optimized by automatic system selection of the scan parameters to reduce radiation exposure. Before the start of the study the expected patient radiation exposure is displayed and can be controlled.

Conventional helical CT mode with the selection of 16, 32 and 64 detector rows is also available and the volume scan mode is enhanced by numerous new dynamic function options. These innovations of the Aquilion ONE will alter the patient workflow between the diagnostic imaging modalities in radiology.

---

but consist of estimates and observations – observations of a disastrous situation following the dropping of an atomic bomb. This source – and luckily we have not had to experience a more recent, comparable event – is used to deduct a seemingly high degree of evidence, recalculated over and over again and used as hard data to calculate literally the deaths per examination rate, although the basic data hasn't changed and the linearity of radiation damage to dose remains a hypothesis. No new drug, no new examination procedure would ever become market-ready these days if the risk evaluation was carried out without such a lack of solid, scientific base as the discussion around dose in radiology.'

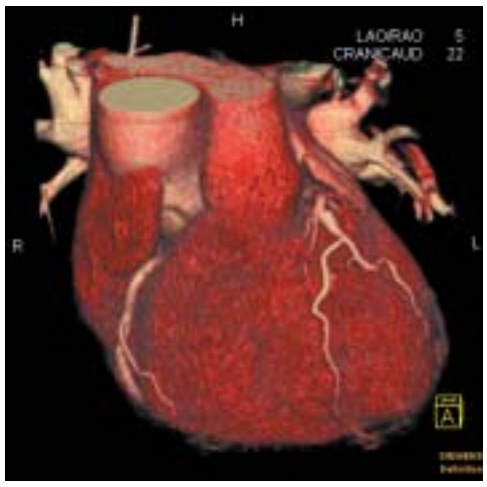
Dr Rogalla is currently using a *dynamic volume* 320-slice scanner. 'This refers to the term dynamic imaging in general,' he explained. 'Dynamics is a process that stretches over a period of time and as such can be captured. This can be movement, perfusion, blood flow or a metabolic process. Previously CT diagnostics was more or less like picture taken with flashlight; the freezing of a moment. However, dynamic imaging captures the course of a process.

'If you handle dynamic CT imaging wrongly then dose can really become a problem. But we have enough ways around this to avoid that problem. You can distribute the dose across a period of time, literally fraction it. We line up several images one after the other, each of which obviously only requires a fraction of the whole dose, so that the entire dose during an examination of several seconds or minutes remains the same. We compensate for the resulting image loss with mathematical solutions – by averaging over time using new filters. This works. It involves one of the concepts of post-processing; admittedly, this is still under development. I am convinced that we will see very interesting new approaches to solutions during the next scientific congresses.

TRENDS IN IMAGE-GUIDED THERAPY

In the fifth in his series for European Hospital, **Professor Stefan Schönberg** (left) of the Institute of Clinical Radiology and Nuclear Medicine (IKRN), University Hospital Mannheim, Medical Faculty of Mannheim, University of Heidelberg, invited colleagues from Mannheim and the Federal Office for Radiation Protection (BFS) in Neuherberg for a round-table discussion on:

New concepts for dose reduction in the diagnosis of coronary heart disease with CT



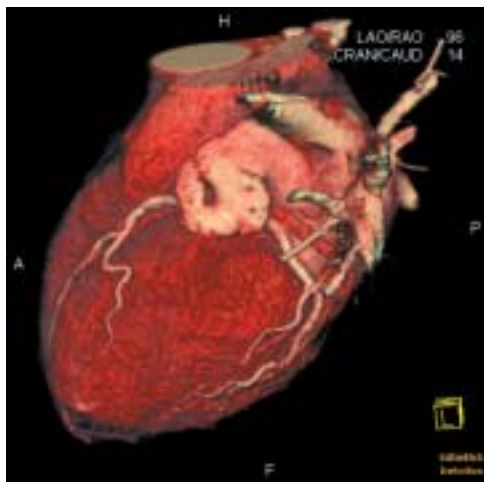


Figure 2a and 2b: Coronary CTA of a 63-year-old male (BMI 22) with recurrent chest pain and medium CAD risk score acquired by a dual-source-CT with 100 kV tube potential, automatic tube-current modulation and ECG-controlled tube-current modulation, shows excellent diagnostic image quality

Non-invasive multidetector coronary CT angiography (CTA) has become an established imaging tool for the diagnosis of coronary artery disease. Several studies have shown that – particularly with new scanner generations (i.e. 64-slice and higher) – the presence of hemodynamically relevant coronary artery stenoses in previously untreated patients can be ruled out by CT with a high negative predictive value of almost 100%. With the latest 4th generation CT systems, which use broader detector arrays with up to 320 rows or dual source technology, an isotropic spatial resolution of 0.5 mm and a minimal temporal resolution of 83 ms can be realised, which approaches the spatial resolution of catheter-based coronary angiography (~0.3 mm).

However, with CT the patient is exposed to considerably higher amounts of ionising radiation than with standard catheter-based coronary angiography. In recent clinical CTA studies using a 64-slice scanner, the effective dose ranged between 10 and 21 mSv, in comparison to 5 to 6 mSv for a diagnostic catheter-based coronary angiography. Recent radio-epidemiological estimates have shown that standard cardiac scans are associated with a considerable risk for patients to develop a radiation-induced cancer. As expected, the so-called *lifetime attributable risk* (LAR) for cancer incidence depends markedly on the age at exposure and the gender of the patient: It is markedly higher for women and younger patients as compared to men and older patients (LAR for standard cardiac scans varied from 1 in 143 for a 20-year-old woman to 1 in 3261 for an 80-year-old man).

To maintain low levels of image noise and thus high image quality in CTA, the current-time product and tube potential must be increased with increasing patient body size or decreasing slice thickness.

Several techniques have been developed to the reduce radiation exposure related to a CT examination of the coronary arteries. The radiation dose decreases considerably by applying a lower tube potential. Recent studies have shown that reducing the tube potential in CTA from 120 kV to 100 kV in patients of normal weight results not only in a marked reduction of the radiation dose but also improves the contrast between vessels filled with an iodinated contrast agent and their surroundings. One of the most promising techniques to reduce patient exposure in MSCT is that of automatic tube-current modulation, which allows substantial radiation dose reduction without sacrificing image quality. The principal idea of this approach is to adapt the tube current according to the changing anatomy of the patient, both, in the transverse as well as axial direction. Coronary arteries typically show the least motion in the diastole. Therefore, images required to diagnose patients with low heart rates should be reconstructed from diastolic data. By contrast, systolic data does not necessarily need to be reconstructed. This can be realised by the 'ECG-controlled tube-current modulation', which decreases or switches off X-ray tube current during systole.

Quantification of the calcium content in coronary arteries by electron beam CT and MDCT was traditionally used with prospective ECG triggering with sequential slice-by-slice acquisition, and is typically related with a radiation exposure of about 2 mSv. To achieve a high reproducibility of coronary CTA, it is essential to use short acquisition times and overlapping slice reconstruction (to reduce partial-volume effects). With previous MDCT scanner generations this could only be realised by *retrospectively* ECG triggered helical acquisition of the coronary artery tree. With the current MDCT technology, however, much shorter acquisition times can be realised, which makes *prospective* ECG triggering possible. By using the so-called 'step and shoot (SAS)' mode, the X-ray tube is turned on only during predefined phases of the cardiac cycle, while the table is moved in the remaining phases not utilised for data acquisition. This approach considerably reduced radiation exposure of patients. When the axial range covered by the detector rows in MDCT is increased, the dataset can be acquired within only few heartbeats (or only one with most recent technology), which can result in dose reduction.

Most of these technological approaches can be combined to optimise CT examinations of the coronary arteries from a radiation hygienic viewpoint. Initial studies revealed that the effective dose can be reduced to less than 5 mSv, which is comparable or lower than the dose related to diagnostic X-ray coronary angiography.

Nevertheless, restricting the indication to a well-defined patient population is still the best method for reducing radiation dose of patients. In patients with a high pre-test probability of coronary stenoses there is a high likelihood that interventional treatment will be necessary anyway and there would be no clinical benefit of CTA. Considering the radiation dose, there is also no evidence for screening of low risk patients or asymptomatic individuals. The benefit of CTA is likely to be greatest and is reasonable for symptomatic patients who are at intermediate risk for coronary artery disease (CAD) after initial risk stratification, including patients with equivocal stress-test results. In consideration of recent scientific statements and study results, a clinical algorithm for the diagnosis of CAD with the use of CT was established at our institution (Figure 1). A symptomatic patient with suspected CAD has to undergo a risk stratification including physical exam, ischemia diagnostics and medical history first. CTA is a central tool for patients with a medium risk value (10–90%).

With its high negative predictive value one can be confident to adhere to conservative therapy after negative CTA (no or low grade stenosis only). Even in these patients, findings such as extended noncalcified or calcified coronary plaques warrant intensification of conservative therapy, so there is an additional benefit for the patients. Patients with positive findings (high grade stenosis) are referred to cardiac catheterisation with potential percutaneous coronary artery intervention. The pre-interventional CT also helps to plan the procedure and is a valuable means of image-guided therapy. Patients with chronic coronary artery occlusion confirmed at catheter angiography are referred to MRI for the assessment of viability, in order to evaluate if the patient benefits from a revascularisation procedure.

The algorithm is currently evaluated as part of a research project performed in collaboration with the Federal Office for Radiation Protection in Germany. To its end, a comprehensive benefit-risk evaluation of various non-invasive imaging tools available for the diagnosis of CAD (MDCT, MRI, PET/CT, coronary angiography) will be performed, taking into account risks from the imaging technique, the administration of contrast agents, and the invasiveness of the procedure.

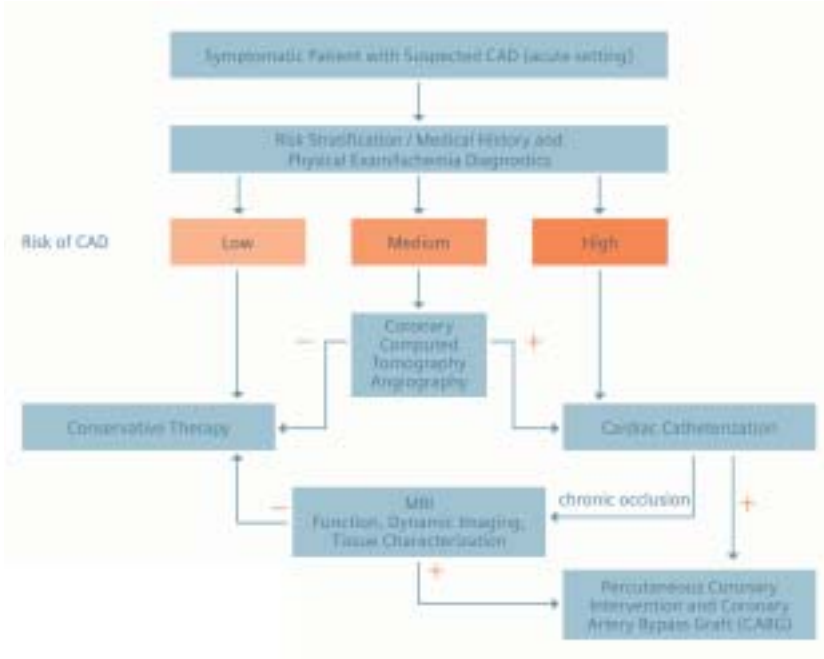


Figure 1: Diagnostic algorithm for workup of patients with suspected CAD including coronary CTA, which is a central tool for patients with a medium risk value (Courtesy of Siemens Healthcare)


Radko Krissak


Tim Süselbeck


Thomas Henzler


Gunnar Brix


Martin Borggrefe


Christian Fink

Meet the experts

Radko Krissak[1], Tim Süselbeck[2], Thomas Henzler[1], Gunnar Brix[3], Martin Borggrefe[2], Stefan Schoenberg[1], Christian Fink[1]

[1]Department of Radiology and Nuclear Medicine

[2]Department of Medicine-Cardiology, University Medical Centre Mannheim, University of Heidelberg, Germany

[3] Federal Office for Radiation Protection (BFS), Neuherberg, Germany

HOLOGIC: Radiation dose and digital mammography

By Kerry Heacox of i.t. Communications

The use of mammography to maintain breast health comes with a caveat: exposure of the breast to radiation, which can increase the susceptibility risk of breast cancer. Thus, using the lowest possible radiation dose for mammograms is of utmost importance.

A standard mammography examination with four exposures, two to each breast, is approximately equivalent to a whole-body dose from background radiation over the course of a year. Radiation dose from a mammogram is a direct consequence of the amount of X-rays that are absorbed in the breast tissue. With a well calibrated mammography unit, no other tissues of the body are exposed to X-rays. Radiation dose is affected by the energy of the X-ray beam, the thickness and composition of the breast, amount of compression, and type of imaging equipment used.

The introduction of digital imaging systems for mammography provides a lower dose alternative option for mammographers and patients. One of the advantages of digital mammography

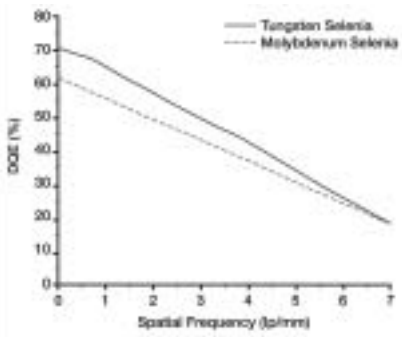


Fig 1. DQE curves for systems using tungsten and molybdenum X-ray tubes at dose levels typical for a 4.5 cm breast. The DQE for tungsten is superior to that for molybdenum

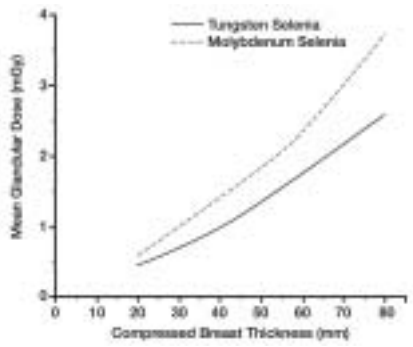


Fig 2. Typical mean glandular dose as a function of breast thickness for tungsten and molybdenum Selenia systems. Tungsten x-ray tube systems have lower dose than molybdenum x-ray systems. In addition to the dose levels shown here, other lower dose modes are available

systems over traditional analogue screen-film ones is that dose can be reduced by at least 30%. New technological innovations are providing even greater levels of dose reduction.

Mammography is a very technically demanding radiographic procedure because it simultaneously requires high spatial resolution and good dose performance. High resolution is needed, because some objects that must be depicted are very small microcalcifications, which need to be visualised when they are as small as 200 microns.

Years of engineering development and clinical experience proved that molybdenum was the optimal X-ray tube anode material for breast imaging with traditional screen-film systems. Analogue mammography has a very limited dynamic range determined by the screen-film combination. The introduction of digital mammography systems using molybdenum X-ray tubes have already demonstrated a 30% reduction in dose compared to analogue mammography systems.

Recent clinical trials and scientific investigations have determined that a tungsten X-ray tube with rhodium and silver filters will allow for an additional dose reduction of up to 30%. The use of a tungsten anode in the X-ray tube also offers superior performance for new technologies currently in advanced stages of development and clinical testing, such as digital breast tomosynthesis, iodinated contrast, and dual energy breast imaging.

Hologic Inc. has replaced molybdenum X-ray tubes with tungsten X-ray tubes in its Selenia digital mammography system. In laboratory testing, using identical Selenia systems, with the exception of the type of tube used, with radiation dose of 1.0 mGy imaging a breast phantom, superior imaging was achieved with a better Detection Quantum Efficiency (DQE) curve. This produced better digital images (fig. 1.)

The addition of a silver filter enables large breasts to be imaged better. Silver filters, which replace molybdenum ones, produce superior imaging performance at lower dose. They also reduce the X-ray exposure time that is needed for women with large and/or dense breasts, and that reduces the potential problems associated with patient motion. The use of silver filters with Selenia systems ensure that superior image quality is not compromised by breast size or density (fig 2).

Hologic also has eliminated the need for dual track anode X-ray tubes. In the golden age of screen-film mammography, X-ray tubes with dual track configurations were used on some analogue mammography X-ray systems to enable dose optimisation for large breasts. But dual track configuration X-ray tubes are less reliable and more expensive than single-track configurations. A Selenia system with a single track tube can deliver the highest current exposure needed for the largest breasts at an acceptable exposure time reducing motion artifacts. This ensures against underpenetrated images, long exposure motion blur and poor quality. The use of a single track configuration with a tungsten X-ray tube in digital mammography systems minimises the need for retakes – and repeated radiation exposure – and ensures that women of all breast sizes and densities will have mammogram images of superior quality.

The mammogram radiation dose is a minimal risk for women compared to the benefit of early breast cancer diagnosis. Digital mammography reduces the risk further by substantially reducing dosage needed to produce superior image quality that reveal much more breast detail when displayed on a diagnostic workstation equipped with mammography specific image processing tools. Digital mammography benefits mammographers, and in terms of lower radiation dose for a lifetime of mammograms, the patients who receive them.

Clinical applications of advancing high frequency ultrasound techniques

By **Dr Adrian Lim** and **Professor David Cosgrove**, Department of Imaging, Imperial College London, United Kingdom

High frequency ultrasound (US) techniques continue to improve with better resolution and exquisite B-Mode imaging, particularly with improved compounding techniques seen with the Aplipure product. However, particular focus has been on improving techniques for breast imaging and one distinctly novel idea is to highlight microcalcifications within tissues.

Micropure – This highlights those microcalcific foci as a 'twinkling' focus on a dark blue background (the latter can be altered to personal taste). This is the first time that an ultrasound device has been developed to help the operator confidently visualise microcalcifications, which previously would have been deemed too difficult with just conventional US. This could be particularly helpful with biopsy, where traditional methods would necessitate stereotactic sampling. The latter would require 10–20 core biopsies whereas, with the help of US guidance, this could be reduced, although its efficacy remains to be proven. Fig. 1 illustrates how the microcalcific foci in the 12 o'clock position of the right breast, seen mammographically, is more clearly seen with the MicroPure application.

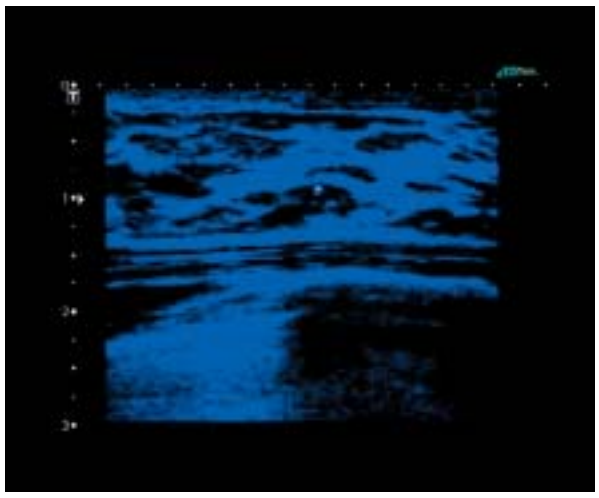


Fig. 1: Microcalcification 'twinkles' with Micropure The dark blue background makes the foci stand out. A second focus is also more easily appreciable

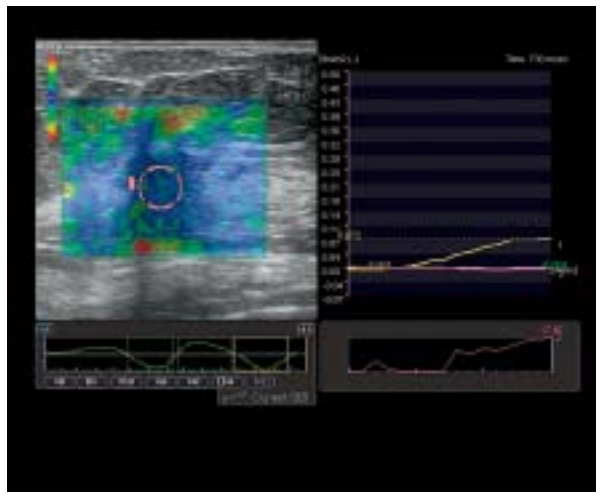


Fig. 2: Elastography shows marked stiffness in a cancer with a high fat to lesion ratio of more than 10

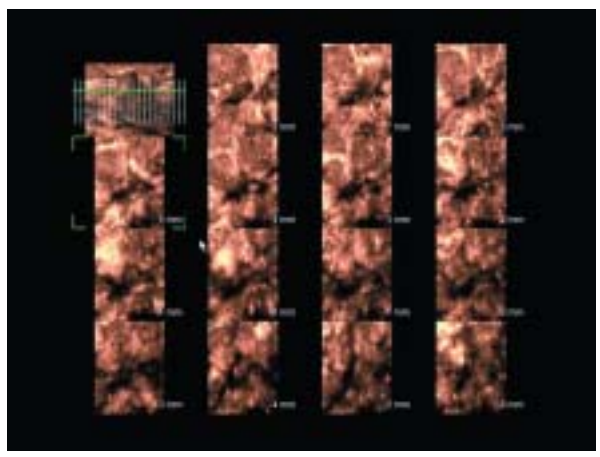


Fig. 3: 3-D coronal view depicts a cancer as well as the finger-like projections radiating from this lesion and its true extent

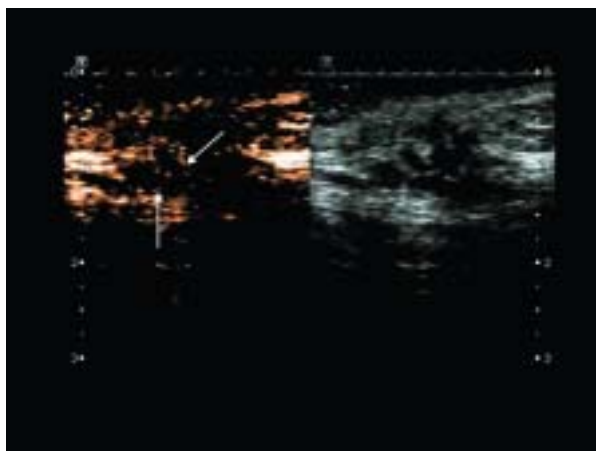


Fig. 4: Twin view contrast image shows low mechanical index contrast specific mode on the left with the grey scale image on the right. The gold colour depicts the microbubbles; note the tracks of angiogenic vessels (arrows)

Elastography – The technique has been shown to distinguish benign from malignant breast lesions successfully. It is a method to quantify 'manual palpation' ultrasonically: the stiffer a lesion, the more likely it is malignant. Much of the published work has concentrated on providing colour maps of the area of stiffness of a lesion and surrounding tissues. Toshiba has added this capability to the Aplio, but provides an extra dimension by allowing time elasticity graphs to be plotted over a region of interest in the compression or relaxation cycles. By quantifying elasticity it removes the subjectivity of colour maps and some recent pilot studies (as yet unpublished) have suggested that the ratio of the adjacent normal fatty breast tissue to the lesion can be an indicator of malignancy when the ratio is at least 10. However, there are exceptions to the rule, particularly if a malignant lesion is necrotic or in cysts, which can also show stiffness. Fig. 2 displays the elastograph map and graph of a breast carcinoma.

Volume imaging – Another area of US development has been the ability to generate 3-D volumetric images with high frequency probes. Particularly successful in obstetrics, this has yet to find its clinical application in general imaging. However, it has become apparent that the coronal plane reformatted images of breast cancers provides an appreciation of the retraction of a lesion and perhaps gives a better estimation of the true size and extent of the mass. Further trials are needed to assess whether this really does provide a better representation of tumour size. Fig. 3 shows the extent of a carcinoma with the 'finger like' projections closely resembling those seen on the MRI images. 3-D elastography techniques have also been suggested to be helpful in assessing breast mass lesions.

Contrast enhanced ultrasound – Although US contrast agents have an established use in abdominal studies, particularly for characterising focal liver lesions, they have yet to find their niche with superficial lesions and high frequency scanning, particularly for breast lesions. Fig. 4 shows how the enhancement pattern and angiogenic vessels of a malignant tumour can be depicted with microbubble enhancement. It remains controversial as to how much this adds for distinguishing benign from malignant lesions, since breast biopsies are easily performed with few complications or significant morbidity. The role of contrast enhancement may therefore not be major; however, it may find a role in assessing response to treatment.

Conclusion – There is immense potential for the latest developments in breast ultrasonography, in particular Micropure and elastography time/stiffness curves, which provides quantification and does not rely solely on subjective visualisation. Together with the 4-D and small parts contrast capabilities, the new version 3 Aplio XG provides the radiologist with a great armamentarium for evaluating complex breast lesions.

It is not envisaged that Micropure would replace mammography in screening for microcalcifications, but the ability to biopsy microcalcifications under US guidance, and thus obviating the need for stereotactic biopsies, would be of notable value. The ability to depict the true extent of malignant breast tumours more accurately with elastography, 4-D imaging and the use of microbubbles would not only help surgical management but also has potential in assessing response to chemotherapeutic treatment, thereby aiding the oncologist.

The potential of these techniques to detect problematic breast tumours such as lobular or multifocal breast carcinomas, as well as in screening, should be fully investigated. Ultimately, these latest developments require multicentre studies to evaluate their true value and potential.

Elastosonography and the detection of breast carcinomas

Professor Friedrich Degenhardt (right), Head of the Gynaecology Clinic at Franziskus Hospital, Bielefeld and the Cooperative Breast Centre Bielefeld-Herford, Germany, is using elastosonography to examine breast carcinomas. We asked him to outline present finding as to its value, future potential, and the current value of ultrasound in breast cancer detection

'We are currently carrying out elastosonography examinations to achieve a differentiation between benign and malignant growths, to find out a cut-off which gives us the chance to find out more about the nature of a tumour, an assessment of malignancy i.e. the histological result of a breast tumour,' Professor Friedrich Degenhardt explained. 'We have just finished a doctorate on more than 200 cases and were able to draw good conclusions. As this doctorate is not yet fully evaluated, I can't give more details. However, it will be interesting to see whether we will actually achieve a closer prediction of tumours with this additional gray-scale imaging.

'Using the new *Hitachi Elastosonography System*, first we are able to show differentiated images of these tumours. Then the small boxes are superimposed on the tumour tissue. We then superimpose the same boxes on tissue that does not appear to have any pathological characteristics based on the ultrasound image. The density value for what we believe to be normal breast tissue is then compared with the density value of the tissue which appears pathological. Based on this density ratio we are able to achieve better conclusions about the tumour tissue.'

'Ultrasound is under-represented in breast cancer diagnostics'

Asked whether elastosonography become an established procedure in the future, Prof Degenhardt said this is primarily a health-political question. 'It is definitely of great help in the differentiation between benign and malignant tumours. So, if we say that we only want to operate on those patients with a malignant result, then elastosonography is a good basis for such a decision.' However, he added: 'Healthcare politics is currently leaning towards mammography screening. But there are an increasing number of examinations that show that ultrasound could be equally, or in some cases even more effective than mammography. There are now special procedures in ultrasound scanning technology that allow us to depict a tumour slice by slice, almost as with MRI technology. I imagine that we could more or less match MRI quality and possibly limit the use of MRI for very specific areas.'

Although there are currently three procedures – mammography, MRI and ultrasound – healthcare politics currently only favours mammography, he pointed out. 'For the first time, the new S-3 guidelines recommend ultrasound for women, up to the age of 40, who have a lump in their breast. For women between 50 and 69, mammography is the recommended procedure. However, for women with a high breast tissue density mammography does not always deliver good results. This means that breasts in categories ACR3 and ACR4 (ACR = American College of Radiology) ultrasound has to be carried out additionally to confirm results.

'The S-3 guidelines contain directives about the detection of tumours, whether they are benign or malignant and how to treat them. As I said, younger women, around the age of 50, or women who take hormones, often have very dense glandular breast tissue. It has transpired in recent years that a proportion of carcinoma within this group has not been detected. This is why ultrasound should be used here. If necessary, elastosonography or gray-scale imaging can also be used, which depends on what type of equipment doctors are using. If the appropriate equipment is available elastosonography can be carried out. The procedure of gray-scale imaging is currently not very wide-spread, it is still a field of investigation.

'The outlook is definitely very promising. I should add that ultrasound is currently still a little under-represented in breast diagnostics, and something has to change. Maybe this is because, with mammography, imaging can be carried out by radiographers, whilst, in Germany, ultrasound has to be carried out by doctors, which means we cannot offer ultrasound on a large scale because we do not currently have the required number of doctors trained in this area.'

Mammography: What really counts?

'In the next decade 80 % of detectors used in medical X-ray imaging will be photon counting'

The fact that the female breast is one of the most radiation sensitive organs in the human body is a major driver for all those searching for low radiation alternatives – one of these routes lies in *photon counting*.

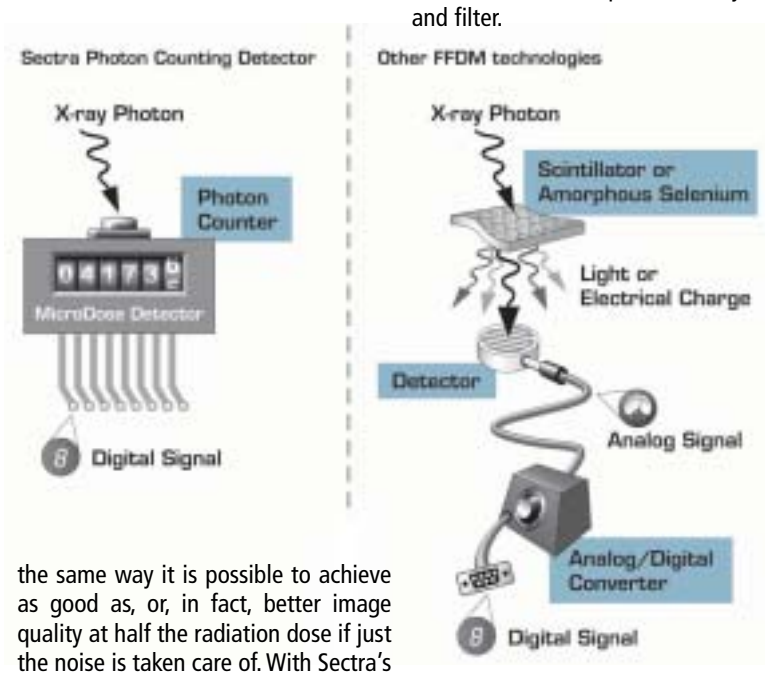
At this year's meeting of the *Radiological Society of North America* (See box), 'Photon Counting: Is it the future of X-ray Imaging from Mammography to CT?' will be an important panel discussion initiated by **Professor Mats Danielsson** of the Royal Institute of Technology, Stockholm, and **Robert Nishikawa**, Associate Professor of Radiology at the University of Chicago Medical Centre and Director of the Carl J Vyborny Translational Laboratory for Breast Imaging Research.

Is dose the only factor that determines image quality? The Swedish firm Sectra certainly does not think so. It claims that the Sectra MicroDose, currently in use in more than 10 countries, produces more brilliant images at half the radiation dose used by competing systems. We asked, *Is this possible?*

Prof Mats Danielsson explained: 'The limitation of current imaging systems is that they have too much noise – comparable to a hearing difficulty in a noisy environment. Basically you have two options: either reduce the background noise or speak louder. To speak louder is equivalent to increasing a radiation dose; the only problem is that it puts women at increased risk for radiation-induced cancers. The other solution is to reduce the background noise, in a silent environment you can clearly hear a whisper, while even shouting may not help if surrounding noise is too high. In exactly the same way it is possible to achieve as good as, or, in fact, better image quality at half the radiation dose if just the noise is taken care of. With Sectra's solution the main noise sources in terms of electronic noise and scattered radiation are reduced more or less to zero and this is really the answer. It's not black magic.

Mats Danielsson

Left:Sectra MicroDose Mammography L30



'This is achieved by photon counting technology. With the advent of applications such as tomosynthesis and dual energy mammography, it will become even more important to control noise because the signal in tomosynthesis will be much smaller compared to the noise – if nothing is done to reduce it. To count the X-ray photons down to the quantum level is the ultimate solution. Today, it is a significant advantage; it will be even more important in the future. Getting rid of the noise is the way to go.'

Apart from eliminating noise, it is also important to optimise the X-ray source in terms of target and filtering and this can be applied to all systems – photon counting or not. For example, some manufacturers still use X-ray tube anodes and filters similar to what was used for film (Molybdenum), which is obviously not wanted. However, since there is really nothing new in this area in the last decades, the potential for improvement is limited. The obvious choice is a detector without any noise combined with its optimum X-ray tube and filter.

A reduction in radiation dose may even be worth a slight increase in cost; in this case it is better to count the X-ray photons than just dollars and cents.

Photon counting

Since X-rays are digital and Sectra's detector counts them one by one, a direct capture of individual X-rays occurs. This means no electronic noise in the image and no information loss in conversion steps, which is the case in other digital detectors. With Photon counting, there are no phantom images to interfere with interpretation, since the detector is fast enough to be ready when the next photon arrives. The image is acquired by a multi-slice scanning technology that eliminates the scattered radiation and significantly reduces the noise level in the image. The multi-slice scanning technology ensures that images are totally reliable, with no dead pixels that could obscure microcalcifications.

Photon Counting: Is this the future of X-ray imaging?

Monday 24 November 4:30–6:00 pm

Don't miss this special focus session at the Radiological Society of North America (RSNA) meeting

Professor Mats Danielsson says that 10 years from now all X-ray detectors for medical imaging will be photon counting.

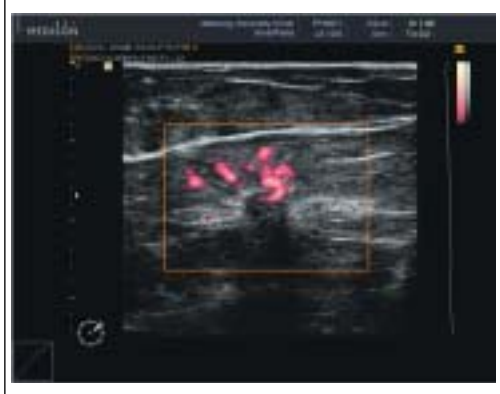
Conversely, **Professor Rüdiger Schulz-Wendtland**, who heads the local mammography centre in Erlangen, Germany, questions: 'Is photon counting really required? The radiation dose and image quality with traditional digital technologies are good enough for mammography'.

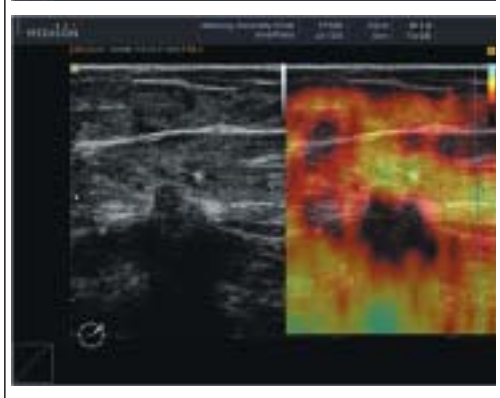
Photon counting detectors need to demonstrate benefits over other detectors prior to widespread acceptance, adds Lorens Niklason of Hologic Inc.

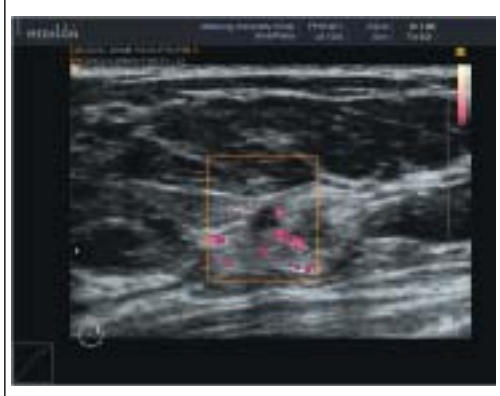
Their arguments and reasoning, along with those of **Hans Ringertz** (Stanford), **Matthew Wallis** (Cambridge), **Robert Nishikawa** (Chicago), **Andrew Maidment** (Philadelphia) and **John Rowlands** (Toronto), promise to make this debate lively indeed.

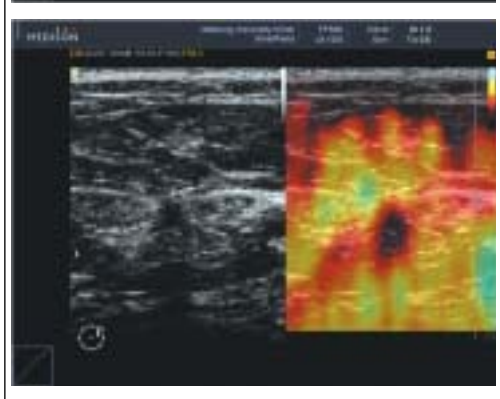
Elastoscan

By **Volker Duda**, of the Senological Diagnostics Department, Giessen and Marburg University Hospital, Germany









Clinical images made by Medison's ACCUVIX V10. All show an invasive ductal mammacarcinoma of 4mm

THE WHOLE DIVERSITY OF BREAST CANCER

'Diagnostics is not diagnostics, not even when it relates to a specific indication such as breast cancer,' says Professor Walter Heindel MD (right), who heads the Munster Mammography and Breast Centre Reference Centre at Munster University Hospital, focusing on the dissimilarities among patient groups and their peculiarities

Leading breast centres in Germany work in a standardised and structured manner with interdisciplinary teams. Modern senologic imaging comprises different radiological procedures and image-guided examination/clarification of the female breast. The three important imaging procedures are: X-ray mammography, increasingly carried out as digital mammography; ultrasound of the breast and all its different, enhanced forms, and finally contrast media enhanced MR mammography.

This basic spectrum, brought together at these centres, facilitates the following services: many hospitals now offer a special breast advisory surgery for women who want a second opinion. This is different from *symptom-oriented* diagnostics, the clinical or curative imaging of the female breast.

The third area that has developed is image-guided breast biopsy. The trend across Europe is to confirm an image-based diagnosis histologically, even if the image fairly clearly indicates a tumour. These days – and this is something that we heavily emphasise at our centre – results, whether image-based and histological or pathological, must be correlated and have interdisciplinary evaluation to work out the best possible surgical and treatment plan.

Another important topic is *risk-adapted* early detection, which particularly concerns women with an individually increased risk of breast cancer – about 25 % of all cases. This includes genetically-based risks, for example based on the BRCA1 and BRC2, which, for the affected female constitutes a significantly increased lifetime breast cancer risk of up to 80 %. Certain breast centres offer special imaging protocols and programmes for these women. As this group tends to develop the disease at a younger age, from age 25 they are entitled to regular mammography, ultrasound and MR mammography for early detection. This is different from the mammography screening programme for all women without symptoms from 50–69 years old.

Finally, we must care for women who have already been treated for breast cancer and for

in mammary sonography

ACCUVIX V10

If, in the early days of mammary sonography, it was revealed to be helpful to render tactual findings in a visible manner (sonic palpation), then now is the time to palpate clinically occult findings in a new manner (Elastoscan*). The use of the 'strain effect', i.e. checking to what extent reflectors can be separated from one another under compression, provides important additional information on tissue conditions in a region of interest not to be further differentiated by the B-mode image.

The complementing of conventional B-mode sonography by elastography represents, by contrast to Doppler sonography and 3-D sonography, a much less time-consuming new approach that is available without any additional preparations.

For more enhanced requirements made of sonography in early detection of breast cancer it is increasingly important to also unerringly address such focal points as would scarcely have been remarked upon without mammographic detection with ultrasonics. In addition, these focal points are, in part, only rudimentarily to be differentiated from the small intra-mammary haematomas frequently occurring in pre-operative interventions. Similar indications for elastography arise during 'second look' sonography during the search for correlates of mamma-MRT findings and in improved targeting for the execution of interventional measures (punch biopsy) on small or difficult to delineate focal findings.

Additionally, still under scientific evaluation are questions of detail definition of therapy monitorings, whether in the case of pre-operative chemotherapy, pre-operative predictions on size and the supplemental sonography of mammary excidates.

Gathered previous clinical experience shows that elastography does not, in fact, actually replace mammary sonography in histological clarification but, particularly in the case of small or more deeply situated findings, delivers unambiguous and clearly reproducible images. Hence, clearly targeted work becomes a possibility and a further, promising facet provides an enhancement to sonography, a facet the deployment possibilities of which have scarcely even been embarked upon.

** Elastoscan is a trademark of Medison*

Siemens opens Cologne research centre

Germany – Siemens Healthcare has opened a new research centre in Cologne, where around 40 employees are developing new diagnostic tests to describe the molecular characteristics of breast cancer cells, to help physicians to select individual therapy.

Siemens has also been researching innovative biochips for breast cancer tests. 'Biochips can perform hundreds and, in extreme cases, hundreds of thousands of diagnostic tests simultaneously. Many different tumour characteristics must be investigated in order to identify the possibility of various therapies,' the firm points out. 'Biochips are therefore especially suitable for performing a high number of required tests both fast and efficiently.'

The Siemens 'Breast Care Solutions' package combines various imaging techniques including ultrasound, mammography and magnetic resonance imaging, and these are now supplemented by laboratory diagnostic tests and DP based evaluation systems.

DIAGNOSTICS

whom imaging plays an important part in aftercare.

In terms of imaging methods, it has transpired that, not least due to the screening, Germany is currently among the leading nations in digital mammography on a European level. Private surgeries and hospitals have invested a lot in modern equipment.

The development of different digital procedures is changing and, currently, significant progress can be seen. Industry and scientists are looking into subjects such as required radiation dose, spatial solution, as well as the usability of equipment for screening. We have seen that screening, due to the high number or cycles involved, puts a lot of pressure on equipment. Some storage plates soon reach their capacity and have to be changed for quality reasons. This was a new issue for manufacturers, as well as the doctors. Currently, there is definitely a lot of technological progress and development that should be observed.

itm Rhenium-PTA/PTCA®

'An effective, safe treatment for prophylaxis of restenosis in periphery and cardiology' – *new generation of Endovascular Brachytherapy gains full CE-certification*

Constricted blood vessels (stenosis and restenosis) can now sustainably be treated and kept open through the local treatment with beta radiation. itm FlowMedical GmbH reports that its *itm Rhenium-PTA/PTCA®* now provides a proven and effective solution for the treatment of stenosis and re-stenosis, especially in peripheral blood vessels, where other treatment alternatives have no real significance. This advantage could, among other factors, be established through the significantly improved performance of the beta emitter Rhenium-188 and the ASK-Application System.'

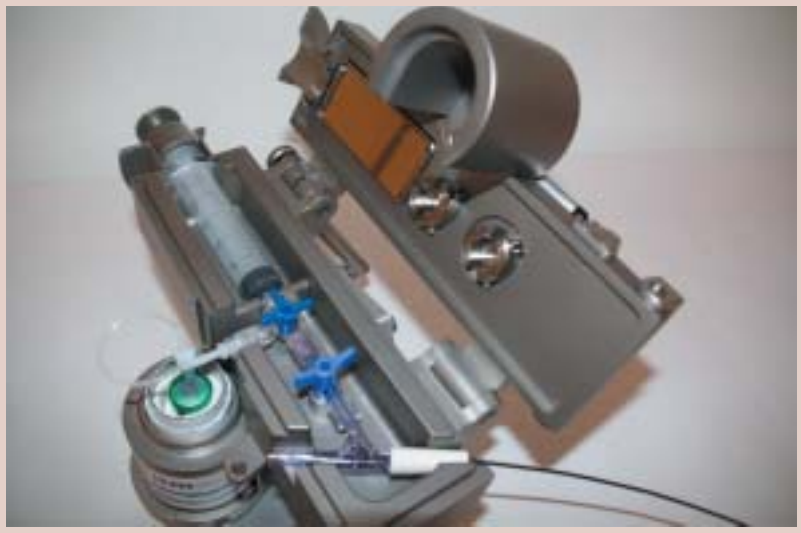
Although bare-metal and drug-eluting stents are commonly used in coronary treatments (PTCA), the occurrence of in-stent-restenosis still poses a severe and prevalent problem, the manufacturer points out. 'In the periphery, where medical tools like stents still have little or no relevance, restenosis is an even more common complication of PTA treatments. Peripheral arterial disease mainly affects patients suffering from diabetes. Main consequences are myocardial infarctions in cardiology as well as organ failures or amputations in periphery.'

For many years Endovascular Brachytherapy (EVBT) has been considered an effective treatment for the prophylaxis and treatment of stenosis and restenosis. 'However, many of the traditional EVBT treatments, primarily applied in cardiology, shared some fundamental common shortcomings. With the itm Rhenium-PTA/PTCA® a new generation of brachytherapy is now available that systematically resolves issues experienced in the past – and is applicable and approved not only for cardiology but also for the treatment of peripheral arterial diseases.'

Due to its highly efficient treatment characteristics and outstanding safety standards, the firm adds, the itm Rhenium-PTA/PTCA® offers the solution to the shortcomings of conventional EVBT treatments. Its advantages include:

- Simple application in the angio suite – no relocation of the patients required
- Flexible treatment of vessels geometries, also with large diameters and long lesions
- Efficient process through high activity concentration and short treatment time
- Safe and homogeneous irradiation through the systems self-centring characteristics
- Optimised radiation protection through a specially developed application system (ASK)
- Just-in-time delivery and availability of Rhenium-188 at short notice
- Simple and economical waste management due to short half-life (17h) of the Rhenium-188

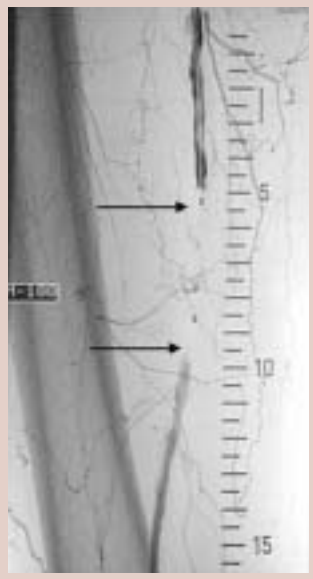
itm Flow Medical GmbH also reports that – with the help of a specially developed generator – it is delivering the liquid Rhenium-188 ready-to-use in the required activity concentration and volume – without any necessity for additional concentration or preparation. 'Therefore, the ideal dose can be applied in a short overall treatment time of 3 to 7 minutes. Being a beta-emitter Rhenium-188 has a very short path length and shows fast dose reduction in tissue which guarantees that the radiation penetrates only a few millimeters into surrounding tissue. Therefore, only the immediate vessel wall is irradiated with practically no radiation of surrounding tissue. Furthermore, the catheter's self-centering characteristics ensure that the vessel walls are irradiated homogenously, making the treatment more medically efficient.



When the treatment is complete, the short half life of Rhenium-188 of only 17 hours ensures that residual radiation levels in used materials drop very quickly which significantly simplifies otherwise complicated waste management.

The method also provides an optimum standard in radiation protection. 'Due to the specially developed application system (ASK), interventions can be performed at extremely low levels of radiation exposure to personnel and patients. Independent measurements of the German Federal Agency for Radiation Protection (BfS) have proven the ASK's excellent protective features making it appropriate for widespread use in routine clinical application.'

This September, the itm Rhenium-PTA/PTCA®, which is distributed by itm FlowMedical GmbH, received full CE-certification for application in cardiology and the periphery. The device comprises the specially developed Application System (ASK), liquid beta emitter Rhenium-188, specially certified PTA and PTCA-catheters as well as several accessories, and is currently being introduced for routine applications in cardiology and periphery. The treatment can be reimbursed by public and private insurers in Germany, the manufacturer points out.



From 2004, Augsburg Central Hospital has successfully used the treatment and achieved excellent clinical results, the company adds. '16 months after treatment the restenosis rate is at only 13.6% – even when treating multi-morbid patients. (Conventional treatments, such as the drug eluting stent or drug-coated balloons, show a restenosis rate of 20% or higher within six months after an intervention).

itm FlowMedical GmbH

The itm Rhenium-PTA/PTCA® was first developed by ITM Isotopen Technologien München AG (ITM AG) in collaboration with Augsburg Hospital.

itm FlowMedical GmbH became a spin off of ITM AG in 2007, created to focus on the CE-certification, sales and marketing of the system. The company profits from the broad scientific and technical expertise of ITM AG and its collaborators in fields including medical engineering, radio chemistry, radiation protection, physics and radio pharmacy.

Production and development facilities are established and embedded in the industrial user centre (IAZ) in the direct vicinity of the new neutron-source FRM-II Heinz Maier-Leibnitzin Garching, near Munich.

The investments into the neutron source and, therefore, access to the scientific and industrial nuclear infrastructure on the campus generate a unique environment, which is of central importance to the development and commercial production of medical radioisotopes such as the Rhenium-188.

New devices that significantly improve radiation protection for example during the injection of radiopharmaceuticals in nuclear medicine are currently in development.

Contact details: itm FlowMedical GmbH, Lichtenbergstr. 1, 85748 Garching near Munich/ Germany. Telephone: +49-89-28913940, Email: info@flowmedical.com www.flowmedical.com

Unveiled:

This September, Carestream Health revealed the first wireless cassette-size DR Detector. The Carestream DRX-1 system, which incorporates a console and wireless 14x17 inch cassette-size digital radiography (DR) detector, provides a rapid, affordable conversion for users of radiographic film or computed radiography systems, Carestream explains. The equipment can be used with an existing wall stand or table-based Bucky, and no modifications to existing analogue equipment are needed, so installation costs are low. In addition, a healthcare facility can use one detector for almost all types of examination in which a traditional cassette would be used. 'The Carestream DRX-1 system delivers high-quality preview images in less than five seconds, which significantly improves productivity, even for users of computed radiography (CR) systems,' Carestream explains.

When we spoke with **Todd Minnigh**, Marketing Director, Carestream Health Inc, about the development of this new device, he explained that the detector used for the DRX-1 is a combination of Carestream's research and that of a few 'undisclosed partners'. It has a very highly active fill factor, he pointed out. 'When you look at the individual picture, a pixel, for example, say from Canon, a certain percentage of the pixel is the active area, in other words, it can receive an image, and a certain percentage of the pixel is simple circuitry, like transistors. They manage the movement of the image information. What we have is a pixel where the entire surface of the pixel is sensitive to light, so this allows us to capture more of the light and not waste any. Then the electronics are behind the pixel. In other words, instead of having it all on one plane, or on one simple circuit, we actually have a multi-layered circuit. By doing it that way we have very, very good DQE for this type of DR technology.

'We are able to use Gadolinium Oxysulphide (GdOS) and still get a good DQE because of the greater surface area for each pixel. The reason we use GdOS is really because of its durability. Cesium iodide (CsI) is a crystal and somewhat brittle, and to make this cassette size detector – the cassette was really a very

Test this clever motorised table at MEDICA and the RSNA

Provotec GmbH & Co KG reports that its Prognost XPE table series is now on sale globally. 'The mobile patient positioning table with motorised, elevating and floating tabletop allows variable patient positioning as well as optimal use of modern X-ray tube/image receptor combinations. If using a fixed working height, but needing the advantage of a mobile table with the floating table top, then the Prognost XP is the right choice. Neither line cable nor electricity is necessary,' the firm explains.

'All versions can be equipped with a Bucky, cassette holder with fixed grid or detector holder for transportable digital panels, and are moveable longitudinally under the table top.'

Provotec also extended its product range with PEDS – complete, fully digital X-ray systems with ceiling or floor tube stand, generator, DR detector, digital radiographic control console and Prognost XPE table. 'Due to special detector housings, the systems can be configured with different types of detectors. The digital radiographic control console provides complete control of all image capture functions within the examination room, as it controls the detector and X-ray exposure equipment while providing upstream connectivity to the hospital HIS/RIS and downstream connectivity to DICOM workstations, archives and printers. In addition, the equipment provides excellent post-processing tools for image quality assurance.'

Basic functions:

- DICOM Print features, DICOM Storage SCU, -SCP DICOM Storage Commitment SCU, -SCP
- DICOM Query/Retrieve SCU, -SCP.

A selection of further software packages includes DICOM worklist, MPPS, a barcode reader, advanced image processing software, and stitching software.

The equipment will be on show at RSNA 2008 (Hall D, booth 1800-E) and MEDICA 2008 (Hall 16, booth 16B65)

Ultrasound imaging and vital signs monitoring products from China

Edan Instruments Inc., based in Shenzhen, China, is one of the leading medical equipment manufacturers involved in R&D, manufacturing and marketing. Products include:

The EDAN M3 (below): This vital signs monitor has made its mark in out-patient department and doctors' office for its accuracy, durability and cost-effectiveness by SpO2 and NIBP

The Carestream DRX-1


Todd Minnigh

important part of the design – we needed to start out with a fundamentally durable detector material – scintillator and detector material. These two things were important for the first attempt at making such a thing.

'The development of such a neat concept began with core research labs' investigation over seven years ago', Todd reflected. 'Commercialisation of the product goes back about three years. A long time, but this is very advanced technology. As far as we know no one else has a cassette size, wireless DR. It really is a technological breakthrough. If you look at the market, about 93% of X-ray rooms are currently cassette-based. We say, well of course, they were built around a standard and that standard was the film cassette which later became the computed radiography (CR) cassette, using the same standard. So if you could make a DR cassette at that standard, you would have a really nice solution because you could simply put it in and it would fit, and then the room would be converted to a DR room and a great deal of the workflow would improve because the movement of cassettes would be almost eliminated. Essentially, it takes away the obstacles to converting to DR.'

The current wireless design, he pointed out, is for use in an X-ray room. 'The console is associated with this X-ray room and can work anywhere in it. This 802.11n wireless technology with the WPA2-PSK security software ensures that information is communicated peer to peer, and only between the cassette and console. So, if you were to use this technology in a typical application, it works for many metres. In our clinical tests we have had no issues with it communicating from anywhere in the X-ray room.'

There is yet another special feature of the DRX-1. Todd Minnigh explained that the lithium ion battery has a certain polymer layer and is '… a bit like a very large cell phone battery. The technology that keeps my cell phone working all week will keep my X-ray detector working all day. It can run for 70 to 90 exposures. We assume this will be in a typical busy setting, but even if not, the battery will stay charged for several days. Most examinations have 2–3 views. In an extremely busy X-ray room, 50 or 60 examinations may take place daily, meaning very close scheduling and only 2–3 battery changes through the day. It only takes about 30 seconds to swap to another battery. The first is then recharged in about three hours. The charger holds up to three batteries so you can use the detector constantly, all day long. It is almost impossible to shoot enough pictures to use up all of the batteries in the time it takes to recharge them. There are some wireless detectors, which are not cassette size and their batteries don't come out. So you have to take the whole detector and put it in a charger stand to recharge; I don't know how long their batteries take to charge.'

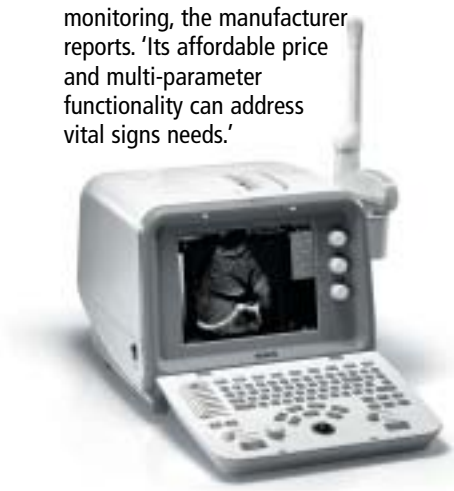
The detector, case and components are rugged, yet the detector weighs just 8.5 pounds – up to 30% lighter and some 50% smaller than other portable detectors.

Carestream points out that it is suitable for general radiology, trauma, orthopaedics and almost all other X-ray examinations, adding that the system's console assists with image capture, preparation of preview images, image processing and full-resolution display. Images can be transmitted as DICOM files to a PACS or storage device.

All in all, a very neat package, so how has it been received? Todd Minnigh said that the Carestream DRX-1 has already been on show privately to customers at a few trade shows. 'The response has been really wonderful. The general customer reaction has been: *This is the solution I've been looking for.* So it's wonderful to have something that your competition doesn't have, and that the market is hungry for. We are solving a real problem in healthcare, at least in the small area of X-ray, a core modality for us.'

The future market for this wireless, lightweight X-ray equipment is indeed large. 'Globally there are over 200,000 X-ray rooms. If you count veterinary applications and others you can go over 300,000, but core hospital X-ray rooms alone are over 200,000, and 93% are cassette based,' he pointed out. 'Over the next 15 years as the baby boomers retire, most developed countries, as well as others, will have approximately twice as many patients, yet proportionally fewer workers. Then, it's not just about who will pay for healthcare, but who will shoot the X-ray?'

monitoring, the manufacturer reports. 'Its affordable price and multi-parameter functionality can address vital signs needs.'



The DUS 6 (above)**:** A digital ultrasonic diagnostic imaging system. With advanced digital beam-forming (DBF) technology, DUS 6 focuses on ultrasound applications that will create new clinical value for physicians and their patients. Furthermore, the maximum 128 frames built-in image storage and standard configuration of two-transducer-connector bring along with more options and flexibility. *Details: www.edan.com.cn*

Innovative technology for automated lymph node analysis

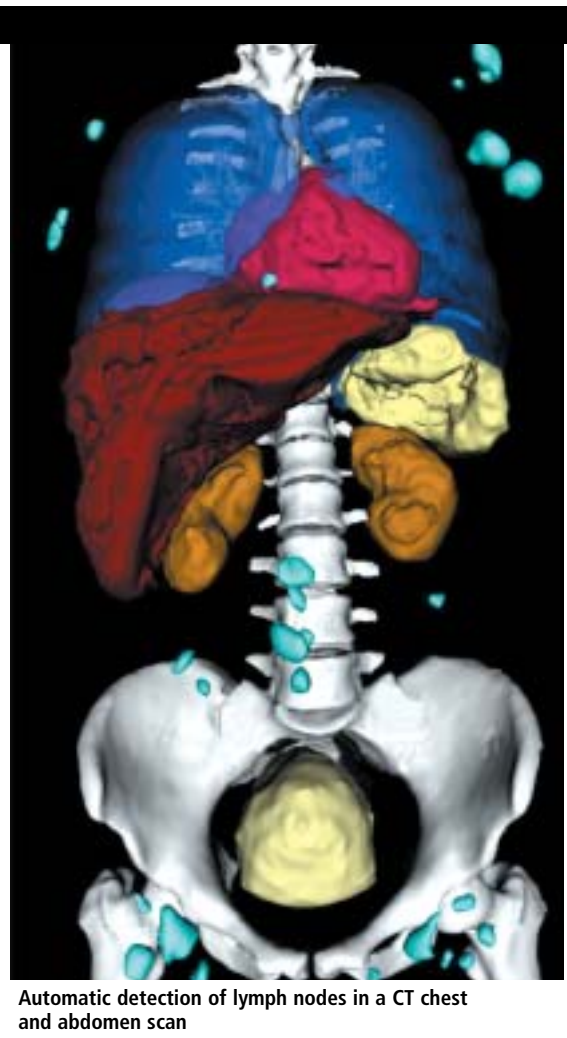
Definiens will introduce a new image analysis application at RSNA 2008

At this year's RSNA meeting, Definiens, the number one Enterprise Image Intelligence company, will introduce a new image analysis application that will allow radiologists to analyse lymph nodes volumetrically and compare them over time. Definiens' technology addresses formerly unmet needs by enabling radiologists to rapidly and accurately identify, analyse and track lymph nodes of interest, facilitating earlier detection of the metastatic spread of cancer.

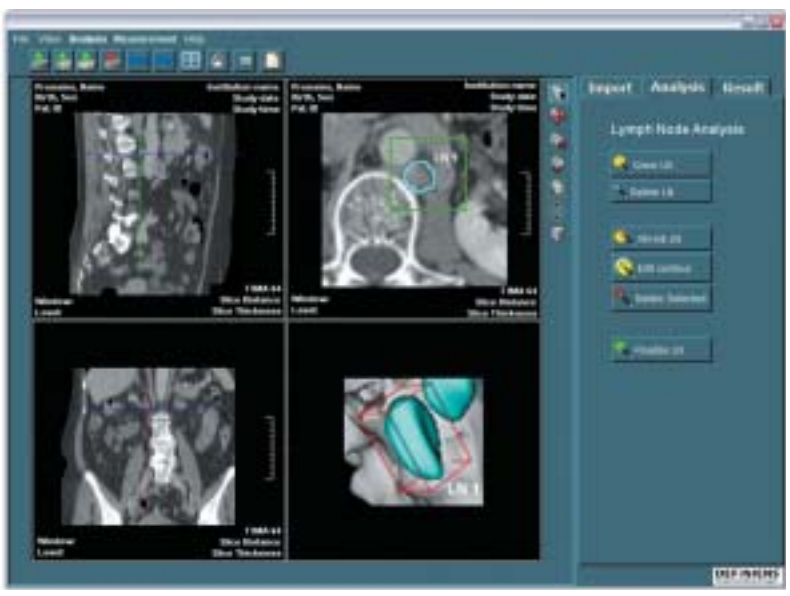
Peter Herzog MD, who tested another Definiens-developed software for the detection and quantification of lymph nodes on Multi Detector-Row CT Data at the Clinical Radiology Department, Munich University Hospital, said: 'The aim of this technology is to automate documentation and analysis of volumetric changes of the lymph nodes to obtain standardised information that is reader-independent. The volume of small lesions is difficult to determine in digital or – even worse – analogue images. We are talking about sizes where just two millimetres can mean doubling the volume, which has severe diagnostic impact. Based on the specific criteria established by the World Health Organisation, the new technology can now measure changes in lesions even of such a small size.'

CAD products, which assess diameter as well as volume of a lesion by a mouseclick, are already in clinical use for the staging of lung carcinomas. The assessment of lymph nodes, however, is much more complex due to differentiation from the multitude of organs in direct proximity throughout the whole body.

Peter Herzog MD



Automatic detection of lymph nodes in a CT chest and abdomen scan



Screenshot of Definiens LymphExpert™ (alpha version)

In CT a matrix size of 512 x 512 pixel results in submillimeter resolution which allows precise delineation of lymph nodes and organs. The innovative Definiens' technology uses an algorithm which calculates the size on the basis of these pixels, explains Herzog. 'During a former study where we evaluated the detection performance of the software mentioned above, we collected the parameters necessary to measure the volume as well. The current technology is the convincing result of that research, enabling physicians to measure changes in size automatically for the first time – a milestone in cancer diagnostics.'

Definiens technology can deliver more accurate results than manual image analysis in a fraction of the time. Thousands of images can be analysed with precision, easing the image analysis bottleneck. The technology is able to perform complex 3D volumetric analysis over time (4D analysis). Applications built on this technology will allow clinicians to monitor patient response or disease progression far more accurately than ever before.

By launching its first medical application, Definiens intends to help its customers take the necessary steps toward realising personalised treatment. Developing highly effective treatments requires an understanding of the entire healthcare landscape, from life sciences research and disease pathology to clinical diagnostics and treatment of individual patients. The company aims to provide intelligent image analysis solutions for cell and tissue-based assays and medical imaging, such as X-rays, CT and MRI scans.

Frank-P. Klein, Vice-President of Medical Imaging at Definiens added: 'Our vision is information-driven healthcare that links patient information at the point of care with information gathered from imaging devices and medical knowledge databases. Such an approach enables the most efficient use of all available information in order to find the most effective treatment for the patient. Our innovative technology will be instrumental in realising this vision.'

Unlike most competing technologies that are mainly pixel-based, *Definiens Cognition Network Technology*® also considers context and examines objects in relationship to each other. The technology emulates human cognitive processes to extract intelligence from images, Klein explained, adding that *Definiens LymphExpert*™, the company's new application for semi-automated lymph node analysis, builds on this technology. 'It will support radiologists to identify, analyse and visualise lymph nodes over time. The application will allow the automatic measurement of lymph nodes according to RECIST and WHO guidelines in a consistent, fast and reproducible manner – building a 3-D volumetric picture of the node. Radiologists will be able to detect metastasising cancer early, avoid costly and unnecessary treatment and provide better outcomes for patients.'

Following the introduction of *Definiens LymphExpert*™ at the RSNA in Chicago, the application will become commercially available in Europe early next year.

Molecular imaging platform planned in Alsace

France – Alsace BioValley Competitivity Pole is partnering GE Healthcare in a feasibility study of the creation of a technology platform in various fields of molecular imaging to focus on research and translational medicine. This would become accessible to the Alsace region's scientists as well as to industry partnerships.

GE Healthcare will share its knowledge of the various imaging solutions and the types of platform currently in operation in academia and industry. Alsace BioValley will ensure the project will be tightly integrated with the area's leading scientists, to help develop the Alsace region. 'Setting up this type of platform, which can model human and animal cells in different ways, will be yet another facility to attract talent and investment to our region,' explained Nicolas Carboni, managing director of Alsace BioValley.

Dominique Blanc, General Manager France of GE Healthcare, also underlined the benefit to the region: 'Research in Alsace, both basic and applied, from biology to clinical, from chemistry to genetics has earned a worldwide reputation and is an excellent fit for the level of excellence that GE Healthcare looks for in its projects.'

Situated in the heart of Europe, and hosting 200 companies, 60 laboratories and 15,000 employees, Alsace Biovalley believes it is a real catalyst and one of the largest European clusters for life science and healthcare.

C-Arm technology in daily use

*Last year, orthopaedics and sports medicine specialist **Dr Rainer Burgkart** (left), who is also a musculoskeletal researcher, selected a new C-Arm for use at the Technical University of Munich (Klinikum rechts der Isar). Recently, we asked him for the reasons behind this choice and his subsequent experience with this device.*

Dr Burgkart: We had shortlisted other providers. The Ziehm Vision Vario 3-D convinced us through its excellent image quality and the enormous flexibility of the system. Initially, we had a space problem – our operating theatres are comparatively small, but we obviously didn't want to compromise on the technology; we wanted to be state-of-the-art. This system was the only one that fulfilled this requirement, which is actually not as banal as it sounds. Its flexibility becomes most apparent during use: to capture the entire three-dimensional volume the C-Arm swings on an elliptic curve with a variable iso-centre. For example, this procedure allows us to generate 3-D images of the hip and shoulder, which play a decisive role in tumour surgery. Orthopaedic tumours are often found in almost inaccessible places that are hard to capture, making precise, safe biopsy very difficult.

Apart from biopsies the system is particularly suitable for spinal intervention, such as for stabilisation. The placement of pedicle screws has become a technically a lot easier due to 3-D images and the precise navigation system.

So, generally speaking, 3-D imaging guarantees more safety and accuracy during an intervention: the surgeon can assess whether he is using his tools correctly or whether a screw is in the right position during the actual surgery and, if need be, can adjust it. The number of cases where items such as screws are wrongly positioned should reduce greatly in the future. Previously, to make such an assessment we had to generate numerous C-Arm images and, if necessary, correct things during a second procedure. This not only took up a lot of time, but also the patient was additionally exposed to an increased radiation dose. So, since we've been using the Ziehm Vision Vario 3-D, we've saved time and cut down on radiation doses – with an even safer result than we had before.

To determine precisely the changes between bone and soft tissues for tumour surgery, outstanding contrast performance is needed. Is the system convincing in this area?

In the first cases in which we could test the flat-panel technology, the contrast performance was excellent in the soft tissues as well as bones. The same applied to depth of contrast. A further advantage of this technology is that there is no distortion. A straight K-wire is shown without the usual distortion, which obviously adds additional safety to the assessment. In my view FD technology has considerable advantages in terms of mobile imaging.

On the whole, this system has made our work a lot easier on a daily basis, not least because of the great ease of use despite the sophistication of the technology. The handling of the user console is similar to that of a CT – there was almost no need for any adjustment and we were able to start using the system without any significant problems.

EVINCI

The European multi-centre, multi-modality cardiac imaging project that could lead to a more intelligent and less costly use of today's technology in cardiac care

Danilo Neglia MD PhD

An advanced phase of negotiation has been reached with the European Commission (EC) for a proposed three-year, multi-centre project, with multi-modality imaging as the major focus. If the EC contract is agreed this November, the EVINCI (EValuation of INtegrated Cardiac Imaging) study will become one of the two projects dealing with cardiac imaging among the almost 200 projects approved in the FPVII Health of the EC. All being well, the study will begin in January 2009.

17 partners in nine European countries will be involved: 14 clinical centres (three in Spain, four in Italy, and one each in Paris, Zurich, Munich, London, Leiden, Turku and Warsaw). The European Society for Cardiology (ESC) will disseminate results; CFC Consulting in Milan will provide project management, and InforSense in London will provide the informatic background for integrated analysis of multi-parametric data and for development of advanced softwares dedicated to innovative multi-modality imaging clinical reporting systems.

***Danilo Neglia MD PhD**, Head of the PET and PET-CT Unit at the Institute of Clinical Physiology, National Research Council, in Pisa, Italy, spoke with European Hospital representative Gabriela Eriksen at this year's ESC Meeting, to describe the impressive potential of EVINCI .*

Why this study? We think that advanced imaging technology has progressed in the last few years somewhat further than scientific evidence in the field of cardiovascular applications. On one side, this is a good thing, since technology is giving us new, unexpected, powerful tools for the non-invasive and widespread assessment of vessels anatomy and function. On the other side, the cardiological community is still not able to define clearly which will be the additional value of each of these technologies and of their combination in the clinical arena. EVINCI promises to be a relevant study, because its major objective is to provide objective evidence of the clinical role of multimodality imaging for the early diagnosis, complete characterisation and targeting of treatment in patients with suspected Coronary Artery Disease (CAD). CAD is the major cause of morbidity and mortality in developed countries and one of the major sources of sanitary costs.

We'll select a wide population of patients in Europe with an intermediate probability of CAD based on individual risk factors, clinical observation, biohumoral profile and a preliminary stress ECG test. In this subset of patients non-invasive imaging is expected to be most cost-effective. Every patient, fulfilling inclusion and exclusion criteria and providing an informed consent, will be submitted to a complete non-invasive imaging evaluation. Multislice CT will be used to define coronary anatomy. Radionuclide imaging (either SPECT or PET) will be performed to measure myocardial perfusion at rest and during stress. In each patient the possible effects of myocardial ischemia on ventricular function will also be assessed by either Magnetic Resonance (MR) or Echocardiography (Echo). Patients will then undergo heart catheterisation as a reference method to define the presence and the extent of coronary disease and its effects in limiting blood flow to the myocardium. Finally, the patients will be followed up for a maximum of three years and events will be recorded. The major end point of EVINCI will be to assess the ability of non-invasive multimodality imaging to recognise in the single patient not only if coronary disease is present but if it mainly involves the major coronary arteries or the microvessels and, most importantly, if it causes ischemia and hence should be aggressively treated – all these without submitting the patient to a costly and potentially risky invasive catheterisation.

We expect that multimodality cardiac imaging will allow the recognition of four different populations among patients presenting with suspected CAD; first, patients with evidence of anatomical CAD (as documented by CT abnormalities of the major coronary vessels) able to cause myocardial ischemia (as documented by stress induced perfusion defects at radionuclide imaging and/or contractile dysfunction at MR or Echo). Available data demonstrate that these patients will greatly benefit from coronary revascularisation.

A second group of subjects will have anatomical CAD, but with absent or negligible functional relevance, i.e. without evidence of myocardial ischemia. Currently, in most European countries, these patients are hospitalised, and submitted to coronary revascularisation mainly because the functional information is not available or disregarded. There is some recent evidence that their prognosis could not be improved or even worsened by revascularisation, not to take into account the induced sanitary costs of this approach. It is evident that if we will be able clearly to recognise, non-invasively, these two classes of patients we will spare non-useful, potentially harmful and costly procedures.

A third group of patients will show minor coronary anatomic lesions but severe myocardial perfusion abnormalities. At present, this category is underestimated. These subjects have disabling anginal symptoms, they may have myocardial ischemia and hence a poor prognosis not different from that of patients with 'classical' CAD. Nevertheless, they are undertreated because their disease is not recognised. Very recent data have been collected on these types of patients, demonstrating that the cause of their symptoms is still a coronary disease but diffusely involving the vascular endothelium and/or the microvessels. If this condition is recognised it could precede full blown CAD and should be aggressively treated by reducing risk factors and by drugs able to improve coronary vascular function.

In the fourth group of patients every test will be negative. These subjects can be completely reassured without performing other invasive procedures.

Patients participating to the EVINCI Study will be followed and treated by their referring clinicians according to current good clinical practice and European guidelines. Possibly the clinicians will be advantaged in their decision-making by the additional information that will be available in each patient. Moreover, one of the important goals of the project is to reduce to minimum the procedural risks and the radiation exposure. Procedural risks and costs will be strictly monitored during the protocol and a cost-benefit analysis will be one of the major expected outputs of the study.

What are the expected benefits from the EVINCI results? Early diagnosis and accurate characterisation of coronary disease by multimodality imaging in anginal patients could avoid non-useful invasive procedures in about three in four 4 subjects. If this approach will demonstrate accuracy, we could think that, in the future, heart catheterisation will be no more needed for diagnostic purposes in CAD but could be mainly reserved for interventions, i.e. to revascularise coronary stenosis causing myocardial ischemia. Multimodality imaging approach could be apparently more costly in the beginning but definitively cheaper in the end. In the cost/risk-benefit work-package of the study, we will evaluate this hypothesis. Moreover, we should also be able to define the most cost-effective diagnostic work-up for the recognition of 'significant' CAD among the different imaging modalities or combination of modalities. The other point worth mentioning is that, with this approach, we could recognise patients who don't have full blown CAD (a stenosis to be revascularised) but are at high risk of future events due to functional abnormalities of the coronary system. We know that these patients, if unrecognised and left untreated, are at increased risk of developing myocardial infarction or heart failure. Again, resources used to recognise this population will save lives and spare future health costs. Finally, in the future, results coming from the EVINCI Study could help to tailor specific imaging modalities or combination of techniques to specific patients. Choosing the most cost-effective approach for the specific clinical question will avoid redundancy in using technology in medicine. A particular advantage of the experimental design of the EVINCI Study lies in the presence of independent core-labs for each different imaging modality. They will receive anonymised raw-data and would provide their analysis that will be compared with results from other modalities and clinical outcome only at the end. This approach could ensure a fair comparison of different modalities even if this is not the major goal of the study.

In terms of collaboration, there were no real difficulties in involving different countries in the project. I must say that it could be possibly more complicated to make different specialists to cooperate in the same Institution (radiologists with cardiologists and nuclear medicine specialists) than convincing countries from northern, middle, Mediterranean and east Europe to work together. The Working Group Five of the ESC on Nuclear Cardiology and Cardiac CT made an incredible effort to design and support the EVINCI project from its beginning. We believed that this could be a landmark study in cardiology, potentially able to change the approach to coronary artery disease in the near future. The process began almost two years ago; now we are crossing our fingers as we wait for the final signature of the contract with the EC. I don't expect major problems, but simply cannot say at present.

One of the problems is that the budgeting from the EC is underestimated for the actual costs of this study. Apart from enrolling 700 patients, our study will probably involve about 100 people, because every centre should provide specialists for different modalities. It's a very big study. However, since many relevant clinical centres and universities are involved throughout Europe, we expect a substantial local economical support.

Of course we don't know what the final results will be, but I guess we'll end up saying that if proper technology is selected for the right patient the information that we can get will be exceptionally useful for the appropriate management of that patient. We could reduce his risks, effectively treat his disease and optimise health costs. Everyone will learn from this information. I think the study will not demonstrate that we must use all techniques for every patient, but that every one of these techniques will be helpful in specific questions. In one sentence no 'intelligent' technique can replace our intelligence. "

20 years of contrast enhanced MRI at Bayer Schering Pharma

Since the mid 1900s MRI has enriched clinical practice

Professor Hans Maier

Dr Hanns-Joachim Weinmann

'At the beginning of the 1980s when Bayer Schering Pharma developed the first ever MRI contrast medium – *Magnevist* – some radiologists were of the opinion that conventional imaging procedures were more than enough to cover diagnostic needs. Others doubted whether contrast media were going to enhance the diagnostic significance of this new technology,' recalls **Dr Hanns-Joachim Weinmann**, former head of MRI and X-ray research at Bayer Schering Pharma and a co-developer of Magnevist.

A current stock-taking appraisal belies the former scepticism: Today, in 2008, more than 20,000 MRI scanners have been installed worldwide and an annual 20 million examinations are performed – a number estimated to double over the next decade. 'This MRI success story was only possible due to simultaneous development in three areas: scanning and coil technology, IT and contrast media,' **Professor Hans Maier**, Head of the Business Unit Diagnostic Imaging, pointed out.

What was initially viewed with scepticism developed into an integral and indispensable part of modern imaging diagnostics

The development did not arrive from nowhere; it involved considerable work: 'At the beginning of 1980, our first experiments were not very promising, so many colleagues ended up concentrating on the development of new contrast media for conventional X-ray procedures. It took a good year until I found a gadolinium-compound that was not toxic but still gave a clear contrast. When we could successfully diagnose a tumour in an animal brain for the first time we realised we had found the desired combination between MRI and a new type of contrast medium with optimum characteristics,' Dr Weinmann added.

This was also the breakthrough for gadolinium-based contrast media, with the first phase of clinical trials beginning in 1983 and the initial registration granted in 1988.

The current range of products services the whole spectrum of MRI indications. It comprises the all-round Gadovist, Primovist, the first liver-specific T1 contrast medium and Vasovist, the first blood-pool marker worldwide for the visualisation of blood vessels in a dynamic and steady state.

Competition in the contrast media market today is significantly more difficult than 20 years ago, but the company also benefits from a strong therapeutic expertise alongside its diagnostics units. This is an advantageous combination, which not only facilitates modern disease management but also actively promotes it – and forms the basis for the innovations of the next 20 years.

What is MRI?

Water – the most common molecule in the human body – is the key to magnetic resonance imaging (MRI): Hydrogen atoms in the body are exposed to a strong magnetic field so that individual protons in the atomic nuclei align themselves just like the tiniest compass needles along the magnetic field. Then the protons are disturbed by radio waves. Once they return to their initial positions they send out electromagnetic signals. As these signals have specific characteristics, MRI technology can not only exactly attribute each signal to a certain position in the body, but also draw conclusions from them as to the state of the tissue.

The effect of MRI contrast media is based on paramagnetic compounds – such as the gadolinium-complex Magnevist. These produce the smallest local magnetic fields and thus change the strength of signals transmitted. In this way they enhance the contrast between the different types of body tissues, for instance between a tumour and healthy tissue.

Autologous cartilage transplantation

Advances in the treatment of cartilage injuries to the knee are very noteworthy. The decisive breakthrough must have been the development of the self-resorbing, bilayer collagen membrane *(Chondro-Gide)* by *Geistlich* in Switzerland. This allows the damaged area and replacement material to be covered long enough for the new tissue to integrate and heal.

Sports-related knee injuries often lead to concomitant injuries of the articular cartilage. However, in adults, articular cartilage damage has literally no tendency at all to self-heal. Left untreated, over the years they lead to an increasing destruction of the joint (arthrosis), and there are always efforts to find new means to avoid this. During a discussion with *European Hospital*, **Professor Matthias Steinwachs MD** (above) at the Schulthess Hospital in Zurich, a leader in the latest developments, outlined some of those techniques.

Operative treatment procedures

With arthroscopic drilling (Pridie procedure) and the procedure of microfracture drill holes are inserted into the bony base of the cartilage damage, leading to bone marrow leaking out and then clotting within the damaged area and settling as a fibrin clot containing stem cells. After 6-8 weeks rest for the joint, a fibrous replacement cartilage develops that, unfortunately, has limited biomechanical characteristics.

Autologous matrix-induced chondroneogenesis (AMIC) is a procedure developed for the treatment of awkwardly situated, large cartilage defects. The bone marrow leaking from the drill holes is retained within the damaged area by covering it with periost or a self-resorbing collagen membrane (Chondro-Gide). However, this also leads only to the development of rather ineffectual fibrous cartilage.

Autologous chondrocyte transplantation (ACI), a biological procedure developed for clinical use a few years ago, involves the removal and subsequent analysis of a small cartilage sample from a non weight-bearing part of the joint during arthroscopy. The cartilage cells are removed from the tissue under sterile conditions and germinated in a Petri dish. Enough cells are cultivated to cover the defect. After 3-4 weeks germination the cells are inserted into the damaged area during an open operation and covered with the collagen membrane. Under these conditions the cells develop a much higher grade regenerated cartilage that has almost 90% of the biomechanical characteristics of healthy articular cartilage. It also means the joint can be used much earlier, significantly shortening rehabilitation.

Chondro-Gide bilayer collagen membrane

Swiss company Geistlich has made a significant contribution to advances in the treatment of cartilage injuries through the development of the new type of collagen membrane Chondro-Gide. This membrane covers the defect and the replacement material used to fill it and holds it in place. In Europe, the previously used periost is now hardly used because all too often the tissue becomes overgrown (hypertrophy) and patients experienced consistent pain requiring further operations. The new collagen membrane decreased these undesired late effects.

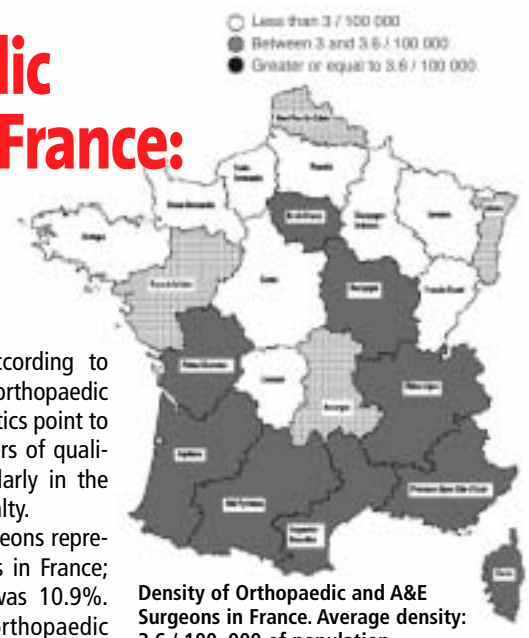
Chondro-Gide consists of collagen of porcine origin. The membrane's compact, smooth outer layer prevents permeation by foreign cells. The porous inner layer consists of collagen fibres that promote cell adhesion and stimulate cell growth. The configuration of the fibers ensures high tensile strength. The membrane can be fixed with fibrin glue, sutures or pins, which prevents it from sliding or displacement resulting from mechanical strain. Spontaneous disintegration of the membrane through resorption takes about 3-6 months.

As Prof Steinwachs explained, in 99% of cases these methods have been used on the knee joint; it is also possible to use them to operate behind the kneecap. ACI has been used since 1988 although, unfortunately, it turned out that the fibrous cartilage that developed lasted only on average for three years. With AMIC plus Chondro-Gide it should be possible to achieve much better results, he said. However, as this procedure has only been used for 3.5 years no conclusive statistics are available yet.

One major problem with this procedure is cost. Surgical costs of ACI and AMIC are about the same and covered by medical insurers. However, with AMIC there is an additional cost to cultivate the cells – around 7,000 Swiss Francs. So far, medical insurers do not cover this. Perhaps, given sufficient data from follow-up studies, this will change.

Literature: MR Steinwachs: The treatment of articular cartilage damage. The Medical Journal (TMJ) 2008; 3: 7-12

Orthopaedic surgery in France: cause for concern?



Density of Orthopaedic and A&E Surgeons in France. Average density: 3.6 / 100 000 of population

While consensus varies according to source as to the number of orthopaedic surgeons in France, all statistics point to a steady decline the numbers of qualified specialists and particularly in the numbers entering the specialty.

In 1999, orthopaedic surgeons represented 21% of all surgeons in France; by 2002 this percentage was 10.9%. However, demand for orthopaedic surgery has not followed a similar downward path. Information from National Statistics (CNAM) shows a progression of 4.95% in surgical consultations and operations since 1998. In 2003, SOFCOT (National College and Union of Orthopaedics) conducted a survey of French adults. The results suggested that about 12% of adults seek some form of orthopaedic consultation annually – roughly 2.3 million people. If we include the paediatric population, according to another survey 1.6 million children required orthopaedic treatment in the year preceding the survey and 163,000 of these underwent surgery.

Closer inspection shows that not all these operations were performed by specialists. Figures from CNOM (Conseil National de l'Ordre de Médecins) suggest that 27.56% of orthopaedic and emergency surgical interventions are carried out by surgeons with no real specialist qualification.

Modelling by various different epidemiological methods has indicated a need to train 201 more orthopaedic surgeons to satisfy legal requirements from 2003 onward.

The average age of qualified orthopaedic surgeons is 46±8 years; this is higher than the national average (44.6), and 78 of them retired between 1998 and 2007. Amongst paediatric specialists, 66 retired over a 10-year period and only about half the number of young surgeons qualified to replace them. If we consider it takes six years to train, spread over five years, this equates to a deficit of 40 orthopaedic surgeons per year. Extrapolation of these figures gives a deficit of 192 this year, 212 in 2009 and 219 in 2010.

To overcome the problem 192 surgeons should have qualified this year. Why is this not happening? One major reason is the increase in insurance premiums up to 20,000 euros annually, coupled with poor recompense in salary, social security reimbursement for surgical interventions has remained unchanged for 20 years, e.g. hip replacement is valued at 489.69 euros; taking into account inflation its real value would be 900 euros. Also, the increasing feminisation of the medical profession is affecting this specialty; only 2.6% of orthopaedic surgeons are female!

The college of orthopaedic surgeons has been warning of this problem since 2004 and instead of the situation improving the general malaise described in this article seems to be spreading to other branches of surgery. For France to maintain her position as one of the world's foremost surgical nations, change is needed, quickly.

Reference: Caton and Duburcq in e-mémoires de L'Académie Nationale de Chirugie, 2007;6:103-111

WHO's FRAX incorporated into Hologic's bone densitometers

Led by **Professor John Kanis**, the World Health Organisation Collaborating Centre for Metabolic Bone Diseases, at Sheffield University Medical School, UK, developed FRAX. This algorithm is based on individual patient models that integrate the risks associated with clinical risk factors as well as bone mineral density (BMD) at the femoral neck to calculate a patient's 10-year fracture risk.

This September, the US Food and Drug Administration (FDA) granted clearance to Hologic to incorporate FRAX into its bone densitometer systems, and the firm has incorporated the technology into its Discovery and Explorer bone densitometer systems.

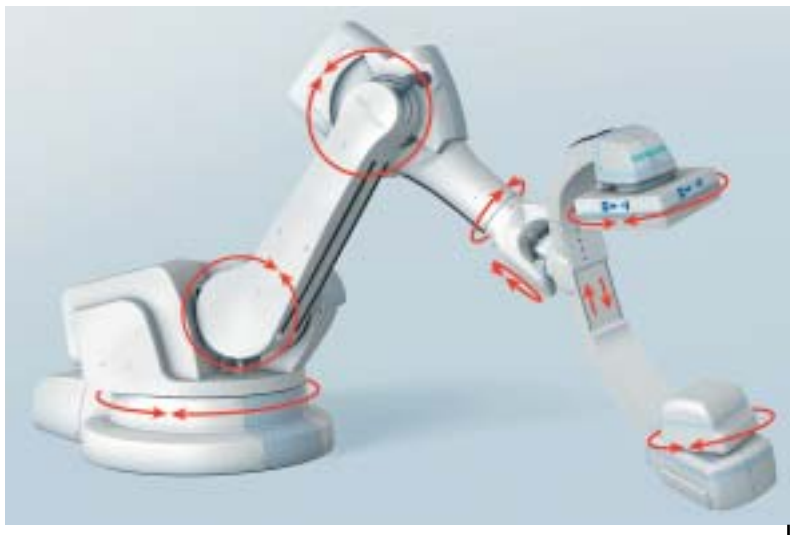
While the T-score remains the standard for diagnosing osteoporosis, FRAX combines eleven of the highest risk factors, including age, personal history of factures, and family history of fractures, plus country-specific life expectancy and country-specific fracture data, identifying patients at high risk of fracture, but who would not be candidates for preventive therapy using the T-score. 'By incorporating the FRAX calculator into our bone densitometer systems, we dramatically alter and improve the way patients are evaluated and treated for potential bone fractures,' explained **Kevin Wilson PhD**, Scientific Director at Hologic. 'In the United States, the National Osteoporosis Foundation, in collaboration with many other physician groups, has issued guidelines recommending that a patient's 10-year fracture risk calculated with FRAX be used by physicians to determine whether pharmacological treatment is indicated for prevention of bone fractures.'

**Hologic points out that upgrades to incorporate FRAX will be available for existing users of Discovery and Explorer bone densitometers.*

Targeting market needs

The hybrid OT meets the needs of modern surgery

Recent developments in surgical techniques, e.g. trans-catheter valve replacement, now promise far better therapeutic possibilities by combining surgery and interventional procedures. The ideal environment for these treatments is the 'hybrid operating theatre' (OT), an integrated operating theatre with high-end imaging capabilities for interventions. As a vendor of the highly sophisticated angiography system *Artis Zeego*, Siemens Healthcare has established a new business unit to focus exclusively on the implementation of Hybrid OTs. The Artis Zeego angiography system is based on robot technology and systems from partner companies, depending on customer needs.



Meike Lerner, of European Hospital, asked **Professor Axel Haverich MD**, President of the German Society for Thoracic and Cardiovascular Surgery and Director at the Clinic for Heart, Thorax, Transplant and Vascular Surgery at the Medizinische Hochschule Hannover, in Germany (MHH), and **Professor Georg Nollert**, Director of the new Siemens unit in Erlangen, about this development and its potential.

The technological challenge in hybrid operating theatres lies in setting up a workable imaging system in the theatre that also results in a practical environment for surgeons. 'Of course, imaging takes up a lot of space and impacts on hygiene requirements for the theatre, so the challenges lie particularly in planning,' Prof Haverich pointed out.

To tackle planning needs, equipment and applications to meet surgical needs are being developed and tested at the new Siemens unit. 'Next to Siemens Healthcare with the Artis Zeego we have other manufacturers involved in our hybrid operating theatre business, for example, those that produce operating theatre equipment that we cannot offer,' Prof Nollert explained. These, he added, are not competitors but partners, who contribute their experience to develop the best solution for customers. Prof Haverich, for example, has been working with a new hybrid solution for four months. 'We are talking about an outstanding set-up, particularly for the patient, because he benefits from receiving a surgical result that has been constantly controlled during the intervention,' he said. 'Thanks to integrated imaging, the patient is often spared a further intervention. For example, with aortic aneurysms we had to carry out surgery but were only able to check results afterwards. Today, this is a minimally invasive intervention and the stent is directly navigated, so that the result is optimal.'

Professor Haverich

In October, the office of the Federal President announced that Professor Haverich, with his Hanover research team, has been nominated for the 'German Future Prize' for the development and successful use of adaptable biological heart valves

Hybrid operating theatres will also play a significant part in aortic valve insertion, with valves fitted via a small chest incision. 'We are due to start the procedure in Hanover in a few months – we think it is very promising,' Prof Haverich prophesised.

On the subject of radiation exposure, he explained that examination times have been considerably minimised by up-to-date technology and that radiation intensity would be no more than for angiography in a cath lab. 'The point is, we can now combine the surgery with the respective imaging procedure.'

As for future product developments, Prof Nollert mentioned even more specific applications for cardiac surgery that will make procedures such as valve replacements even easier. Other future options include implant 'libraries', each to be custom-fitted in the aorta. Another objective for imaging is the conversion to 3-D imaging, which, said Prof Haverich '…is very important for us; it would lead to more safety. After all, we operate in a three-dimensional space.'

The costs of a complete solution such as this can be offset against the number of operations saved, shorter aftercare and therefore shorter hospital stays and, above all, lower risks for patients. All of which makes hybrid solutions – currently much in demand in Europe, the USA and Asia — successful. On this, the professors agreed: 'Imaging is moving into the operating theatre; it is definitely the trend for the future.'

Maquet has launched *Cardiohelp*, the world's smallest, lightest heart-lung machine, that can not only provide a total therapy solution for heart surgery, cardiology, intensive and emergency care, but also, due to its suitcase size and 10 kg weigh, the device can be carried by just one person onto a helicopter or ambulance for mobile use. 'Cardiohelp,' explained **Christian Keller** (right), Chairman of Maquet Cardiopulmonary AG, 'represents the essence of our competencies as leading providers of therapeutic concepts and as market leader worldwide in artificial respiration for intensive care. Our vision was to transfer our know-how from heart surgery, and therefore the principles of extracorporeal oxygenation and mechanical cardiac support, into other areas. In combination with first-class mechanical respirator systems, Maquet is the only manufacturer worldwide offering a complete therapy concept for patients with the most severe types of lung disease.'

Cardiohelp

The core of Cardiohelp is an integrated drive and control unit. Different types of disposable products can be docked to this compact (50 cm long, 26 cm wide and 30 cm high) and functionally designed box.

Cardiohelp is ready for use almost immediately and is easy to handle, Maquet points out. 'Trained staff can operate the equipment with a single turn-press button and a touch screen.'

Maquet also offers modular training programmes for the different uses of the equipment.

The required operating mode is configured depending on the type of use. Cardiohelp is designed for data exchange via a USB and Ethernet connection. The equipment can be connected to the mains supply or to an airborne supply system inside a plane or helicopter. Integrated lithium-ion batteries guarantee 90 minutes worth of performance without connection to mains power. This is particularly important for inter and intra-hospital transport. A universal mounting bracket means that Cardiohelp can be securely fixed to all current carrier systems. 'This mobility allows very novel areas of use for the system. It is easy to transport and can support cardiologists in high-risk intervention,' said

EurAsia Heart

By **Olga Ostrovskaya**, EH correspondent in Russia

The Swiss charity EurAsia Heart, founded in 2006 by cardiac surgeon **Professor Paul Vogt MD**, at Zurich University Hospital, emerged from numerous contacts being made with Asian heart surgeons at the beginning of 2000, and consequent invitations to perform surgery and lecture tours in China. At that time Prof Vogt realized there was little benefit for surgeons from other countries to visit Switzerland, to listen, see how Swiss surgeons worked, but not do anything themselves. As a result he formed EurAsia Heart to enable European surgeons to operate in other countries.

Paul Vogt

Evgeny Shlyakhto

The organization now has a medical network in Eastern Europe and Asia and a team of surgeons are committed to working for the foundation. Their aims are to provide poorer patients with appropriate treatments and to lower mortality from cardiovascular diseases worldwide. Today, the charity has international partners in countries such as China, Vietnam, Malaysia, Thailand and India, where many clinics want further educational cooperation and training while working on their own patients and with their own materials.

In Russia, many patients cannot receive the good treatment needed; the mortality rate for cardiovascular diseases is 25,300:100,000. Anxious about education for young surgeons in Russia (many modern medical centres were built, but the country had very few great surgeons), in 2005, **Professor Evgeny Shlyakhto MD**, Director of the Almazov Heart Centre in Saint-Petersburg and Corresponding Member of Russian Academy of Medical Science, founded the Russian charity, the Almazov Foundation. The Foundation's programme for fellowships and educational exchanges for cardiologists, surgeons and anaesthetists, is titled 'A precious experience'.

The main mission of Almazov Foundation is to unite scientists, officials, businessmen and so on, who have an interest in the development of scientific cardiology and cardiac surgery in this country. It supports young Russian physicians to improve their techniques and knowledge via broad international cooperation.

This summer Prof Vogt and Prof Evgeny Shlyakhto met in Saint-Petersburg, where he signed a letter of intent for education and the exchange of cardiovascular knowledge as a common goal between EurAsia Heart and the Almazov Foundation. In Novosibirsk, Prof Vogt also saw academician E N Meshalkin, of the State Research Institute of Circulation Pathology, where EurAsia Heart surgeons operated and lectured daily.

Part of the letter of intent read: 'We look forward to working together on a basis of mutual respect, recognition and enthusiasm, which will surely end up in a fruitful partnership following our common goal – to provide everyone with the appropriate medical and surgical treatment they need.' Great words, which it is hoped will result in very real activities.

Doctors on an emergency mission

Maquet: Cardiohelp makes proven technology universally useable

With Cardiohelp and the oxygenator pump unit developed especially for cardiac surgery Maquet has further advanced the integration of components, which began with the QUADROX-i. Apart from the arterial filter, available as an option, a new feature of the new unit (QUADROX-iR) is a fully integrated centrifugal pump. Further development of the proven and tested QUADROX system now allows a minimal filling volume thanks to the integration and compact design. The oxygenator pump unit guarantees constant blood flow, low pressure drop and, in conjunction with a low surface contact, minimal damage to blood. This has further optimised the principle of extracorporeal circulatory support (MECC) for cardiac surgery.

Apart from the use in cardiac surgery, Maquet has developed a product for long-term use in intensive care. In addition to an oxygenator, specially designed for long-term use, the machine also includes a cardiac support system. The so-called VAD system, in the shape of a novel centrifugal pump, and the integrated oxygenator is referred to as the HLS module. This heart-lung support module also contains the sensors for venous, internal and arterial blood pressure and the arterial temperature.

The premium line of products, known as HLS Module Advanced, takes the concept of integration even further. In addition to the pressure and temperature sensors, worldwide this is the first time that a system offers the determination of the essential parameters of venous saturation (SvO2), haematokrit (Hct) and haemoglobin level (Hb) as well as venous temperature (Tv) with the help of a high-tech sensor. Up to now it has only been possible to measure these parameters with an external blood analysis unit.

The product has a license to be used for transport and a license to be used in emergency medicine for a minimum of 14 days.

Cardiohelp

The world's smallest heart-lung machine saves lives

Professor Christof Schmid MD, Director of the Clinic and Polyclinic for Cardiothoracic and Vascular Surgery at the University Hospital Regensburg, Germany.

The mobile heart-lung machine also ensures sufficient oxygen supply and stabilises circulation during inter and intra-hospital transportation.

The connection of disposable products is also easy. The connection for the HLS module (heart-lung support module) is located directly on the back and can be connected to the machine within seconds via a simple plug & play principle. The Cardiohelp system can be adapted to specific requirements in the operating theatre, intensive care ward and for transportation in three operating modes and with three disposable products.

Virtual coloscopy

A new generation of CO_2 Insufflators

ulrich medical has announced the extension of its product portfolio by a CO_2 Insufflator for virtual coloscopy by the end of this year. These devices automatically insufflate carbon dioxide into the colon for virtual coloscopy examinations in CT. 'Due to the regulated and constant insufflation the distension of the colon is significantly improved compared to common room air insufflation performed by handheld pump systems,' ulrich explains. 'Unwanted side-effects such as a too high and aching pressure are avoided. The patient's comfort is increased as the setting and monitoring of gas volume and pressure are adequate to the patient's requirements. In comparison to room air insufflation the insufflation of CO_2 offers the additional advantage in terms of patient's comfort of being re-absorbed faster.'

The CO_2 Insufflator is operated with a patient application set. There's also an optional caddy, with storage capacity for a CO_2 bottle and a tray.

The new CO_2 Insufflator will be on show at:

MEDICA (19-22 Nov. Dusseldorf)
Hall 12 #F04

RSNA (30 Nov-5 Dec. Chicago)
Hall D #620

Re-organising an operating theatre

The hospital administrators' viewpoint

In September 2006, **Dr Albrecht Bornscheuer** (right) changed roles within the Hannover Medical School (MHH): the anaesthetist became a manager responsible for the coordination and capacity utilisation of the school's 41 operating theatres. 'Re-organisation is not an embarrassment,' he reflects, 'but a necessity brought about by changing times – and the same applies to hospital administrators. Thus, over the last two years, the MHH has managed to achieve an increase of up to 30% in the capacity utilisation of its operating theatres.

What the administrator wants

'The most important issue for me in the daily work of an operating theatre co-ordinator is to promote dialogue between the theatres and other hospital departments.' To recognise and utilise potentials within a theatre you need to "open the doors of the operating theatre". For the hospital administrator one particular communication is the loss of information moving between management, administration and wards. Performing those tasks oneself provides an understanding of the atmosphere in the operating theatre and the importance of seemingly insignificant tasks. 'The experiences of those who carry out these tasks every day must be acknowledged,' Dr Bornscheuer points out. 'However, the biggest impact on theatre performance always comes from the surgeons, and this means that they carry special responsibility beyond the purely medical issues.'

Changes for theatre staff

Initially, it should be understood that the staff must not be viewed as 'main cost factors', but that they actually facilitate hospital services. If a staff member is to perform well and shoulder a lot of personal responsibility they should be given attractive working conditions. However, a surgeon's individual competence is just as important, yet often underestimated. 'We have to prepare for the fact that, in future, we will probably have a kind of transfer market between the best staff members and hospitals. It is a fact that shorter operating times, with constant quality, account for the highest increase in the number of cases treated, and that not all colleagues can deliver this in the same way,' Dr Bornscheuer explains.

The use of functional services across the theatres is another important aspect that has enabled the MHH to perform 40-45 more operations monthly during core working hours. Over-qualification is a hindrance to processes in the theatre: 'If more than half the staff in certain groups have managerial qualities, then at some point you will be short of those who are actually happy to touch a patient,' he points out. 'I also think it's necessary not to turn down overtime in general. An extra hour is often the one utilised in the best way.'

Tips for a theatre manager

Albrecht Bornscheuer recommends careful analysis of the causes of target and performance discrepancies. The re-organisation process should take place in small, concrete steps to make it truly feasible. Objectives should be achieved without stress, because stress is the main cause of mistakes. He warns against losing the grasp of the basics, i.e. the basic relationship between doctor, patient and care, by obscuring it with secondary processes, such as accounting, purchasing and personnel management. Optimising patient care in the theatre, on a qualitative, ethical and financial level, is the main objective – in precisely that order, he concludes.

'You can set an example for colleagues by taking the initiative and actually carrying out necessary changes. This particularly applies to the adjustment and synchronisation of work schedules. This tangible implementation of changes then makes it easier to tackle further necessary adjustments because the reorganisation process has begun.'

EUROPEAN HOSPITAL

EUROPEAN HOSPITAL Publisher,
Theodor-Althoff-Str. 39, 45133 Essen, Germany
Phone: +49 (0)201 87 126 850
Fax: +49 (0)201 87 126 864
e-mail: info@european-hospital.com

www.european-hospital.com

Editor-in-Chief Brenda Marsh
Art Director Mary Pargeter
Executive Directors Daniela Zimmermann, Reiner Hoffmann
International Media/ Editor Gabriela Eriksen/ Denise Hennig
Managing Editor Meike Lerner
Medical Writer Edda Grabar
Editorial Assistant Karoline Laarmann
Production & Distribution: Janka Hoppe
Russian Supplement Sergey Bezrukov, Fibrotex GmbH, Fischerstr. 1, 40477 Düsseldorf, Tel: +49 211 550 49 70, e-mail: fibrotex@gmx.net
Founded by Heinz-Jürgen Witzke

Correspondents
Austria: Christian Pruszinsky. ***Baltic***: Andrius Vagoras. ***Czech Republic***: Rostislav Kuklik. ***France***: Jane McDougall, Keith Halson. ***Germany***: Anja Behringer, Annette Bus, Karl Eberius, Guido Gebhardt, Heidi Heinhold. ***Great Britain***: Brenda Marsh, Ian Mason. ***Poland***: Pjotr Szoblik. ***Russia***: Olga Ostrovskaya. ***Spain***: Eduardo de la Sota. ***Switzerland***: Dr André Weissen. ***USA***: Karen M Dente, Kerry Heacox, i.t. Communications, Ivan Oransky, Craig Webb.

UK editorial address
55 Wey Meadows,Weybridge, Surrey KT13 8XY

Subscriptions
Janka Hoppe, European Hospital, Theodor-Althoff-Str. 39, 45133 Essen, Germany

Subscription rate
6 issues: 42 Euro, single copy: 7 Euro. *Send order and cheque to:* European Hospital Subscription Dept

Finishing media technique jöhri, Weilerswist, Germany
Printed by VVA GmbH, Düsseldorf, Germany
Publication frequency bi-monthly
European Hospital ISSN 0942-9085

Representatives
Germany, South Europe, AUS, BR
Andreas Conze, Head Office, Tel: +49 201 87 126 950, e-mail: ac@european-hospital.com

China & Hongkong
Gavin Hua, Sun China Media Co., Ltd, Room 802, 15th Building, BinJiang Residential Quarter, Dongyuan Road, Futian District, Shenzhen, Guangdong, China, Code: 518031
Tel: +86-0755-81 324 036
e-mail: gh@european-hospital.com

GB, Scandinavia, BeNeLux, France
Simon Kramer, Willem Alexander Plantsoen 25, 2991 NA Barendrecht
Tel:/Fax +31 180 6200 20
e-mail: sk@european-hospital.com

Israel
Hannah Wizer, International Media, Dep. of El-Ron Adv. & PR Co., Ltd., 7, Leteris street, Tel-Aviv 64166, Israel
Tel: +972-3-6 955 367
email: hw@european-hospital.com

Japan
Tetsuzo Asoshina, Echo Japan Corporation, Grande Maison Room 303, 2-2 Kudan Kita, 1 Chome Chiyoda-Ku, Tokyo 102, Japan
Tel: + 81 3 3263 5065
e-mail: ta@european-hospital.com

South Korea
CH Park, Far East Marketing Inc, Room 103-1011, Brown Stone, 1330, Baekseok-dong, Ilsan-ku, Goyang-si, Gyunggi-do, Korea 410-360
Tel: +82 2 730 1234
e-mail: ch@european-hospital.com

Taiwan
Ben Chen, Jurassic Communications Corp., 10th Floor-4, No 235, Chang Chuen Road, Taipei 10479, Taiwan R.O.C.,
Tel: +886 2 2503 8028
e-mail: bc@european-hospital.com

USA & Canada
Hanna Politis, Media International, 8508 Plum Creek Drive, Gaitherburg, MD 20882, USA
Tel: +1 301 8696 610
email: hp@european-hospital.com

Cross-enterprise electronic healthcare records (eEPA) in Europe

By **Jens-Uwe Thieme**, Business Line Manager HIS & ERP Systems, iSoft Health GmbH

Formerly service manager for the IT operation of Charité Berlin, as part of an outsourcing project for Dräger Krankenhaus-Informationssysteme GmbH, Jens-Uwe Thieme became manager of iSoft's ASP & Consulting Department in 2005. He is now portfolio manager for the product management and development of ERP systems.

The creation of standardised cross-enterprise healthcare records in Germany will be increasingly promoted in numerous national initiatives and projects spanning several manufacturers, e.g. by the eFA initiative for the electronic case file headed by the Fraunhofer Institut ISST. However, how can these projects be assessed in an international comparison? What experiences and successes are available in neighbouring European countries? Looking across the border is worthwhile, especially regarding cost-benefit reasons and also an ever closer harmonisation across Europe in the health sector.

Cross-enterprise records usually means *electronic case files* focused on the patient and/or the treatment. Depending on their purpose, these files have a permanent or time-limited validity and are always subject to patient approval, which, of course, they can partially or completely withdraw at any time. Users of these files are predominantly physicians involved in the treatment – unlike the *medical files* maintained by a patient.

In the future, case files will be able to include any type of medical information. Their purpose and challenge are not only the accumulation of information, but also the structured storage of information and the possibility of its use in different recipient systems – in other words, neutrality with regard to manufacturers. For this reason the future consistent support of international standards is a necessary condition. An example worth mentioning here is the IHE XDS standard (Integrating the Healthcare Enterprise Cross-Enterprise Document Sharing), which facilitates the registration and distribution of, and access to, electronic healthcare records across several health sector enterprises. At the same time it provides an interoperable approach based on standards for the joint utilisation of documents between enterprises in the healthcare sector, from the general practitioner (GP) via the clinic to aftercare. The XDS standard has already been successfully used in a multitude of national initiatives, e.g. in Canada, France and Austria.

When comparing the different approaches and projects in European countries, the NPfIT (National Health Program for IT) at the UK's NHS (National Health System) is certainly an exception due to its dimensions and implementation status. The target set by the government is the centralisation of information in healthcare record systems for 30,000 general practitioners and 300 hospitals and health centres. However, in countries such as Holland and Austria interesting projects have also begun and can already show first results in some cases. In Austria, since 2006 the project ELGA (electronic healthcare record) represents a very promising initiative, although not too publicly well known. However, the preproduction costs, with an estimated €30 million during the design stage, are quite considerable. Nonetheless, nationwide implementation is planned for 2009. On the other hand, in the Netherlands efforts are still relatively new. The recently started NICTIZ (Nationaal Instituut voor ICT in de Zorg) initiative, with the working title MMS (Multimedia Sharing), is still in the early planning stages and implementation phase.

Although national projects now exist in many European countries, given a Europe without borders, how can those national initiatives be integrated into a common European context? An example is the use of internationally active IT providers who consistently use international standards in their solutions. iSOFT, for example, is currently working on a cross-enterprise electronic healthcare record system as part of the *Lorenzo Integrated Care Initiative*, combining the requirements from Germany (eFA) and the Netherlands (MMS) into a single product. This will allow patients presenting for treatment in border areas, e.g. in the Aachen/Maastricht region, to make their clinically relevant data available to physicians in both states in future.

Help for harmonisation across Europe could also arrive from Brussels. With the European eHealth Action Plan (2004), the development of which currently involves 12 EU member states and about 30 industry partners. Its objective is the creation of an EU standard for interoperable healthcare records (EHRs) and a bundling of the requirements for records, as well as a political adjustment of the necessary legislation in the countries (EU guidelines). The abovementioned stringent utilisation of international standards also makes integration of the nationally created record systems ever more probable.

epSOS

Members of the EC Information Society and Media Directorate-General, **Ilias Iakovidis**, Deputy Head of Unit, and Project Officers **Flora Giorgio** and **Michael Palmer**, outline the potential of a project set to bring cross-border healthcare into reality

In September 2008, twelve EU member states signed a new initiative aiming to revolutionise the way Europeans, no matter where in the EU, can access their health records electronically. The European Patient Smart Open Services (epSOS*), known as the *Large Scale Pilot*, is a bold attempt to break down barriers that block the way to offering seamless healthcare to EU citizens who fall ill in a country other than their own.

These barriers exist because European states all developed their own ways of storing medical data with no attempt to make those systems 'talk' to each other. Consequently, European lives have frequently been at risk when medical authorities could not access their health records.

With a mandate to run for three years, health authorities in Austria, the Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Slovakia, Spain, Sweden and the UK will attempt to prove that interoperability can work despite the different medical heritage of each participating state.

Three years may not seem a long period in which to make a step change in how healthcare can be delivered, but it is important to remember that the project aims to work with whatever infrastructure already exists. Initially, this will involve countries in deciding how much of their health systems can be shared with their partners and then producing best practice models to achieve this.

To attain their objectives by 2011, the 12 member states have an ambitious timetable. Structured to cover several phases, the project starts with a full audit of member states' current capabilities; examination of any legal considerations the project may throw up; development of technical considerations to ensure secure use of personal data and ending with a near-real life beta test.

The project's chances of success have been considerably boosted by the level of political buy-in received. Progress among the twelve EU member states should provide a good working model of how well any interoperability system will work after the model rolls out to all 27 EU countries. Furthermore, the project will work closely with the CALLIOPE network (Call for Interoperable eHealth services in Europe) to ensure benefits can be shared with non-participant countries. During the project, the network will be consulted on specific topics and contribute to raising awareness and create consensus around the overall issue of interoperability of eHealth services.

The EC's recommendation in July to work towards cross–border interoperability of eHealth architectures is also a good indicator of how this pilot is tapping into the zeitgeist for universal access to electronic health records across the EU.

The goodwill among all stakeholders for the pilot's success is also tremendous. Along with the EC's backing (funding 50% of the project), and that of the 12 participating member states, European industry, which was previously hesitant to play a part in jeopardising research and investment in proprietary legacy systems, is now lending support. Among major vendors, the feeling is that, far from destroying value, a role in helping to harmonise Europe's healthcare system offers an opportunity to gain worldwide leadership positions in electronic healthcare – a real step away from the past.

The Large Scale Pilot offers social and economic benefits to all stakeholders and will be keenly watched by the other EU member states, which could benefit from the pathfinder's efforts. It will also be keenly debated at the World of Health IT conference (Copenhagen. 4-6 November) where several of the scheme's architects will offer feedback on current progress and share views on how the project will evolve up to 2011. It is in all Europeans' interests that this project, which only a few years ago would have been considered impossible, becomes a success: let us hope that we use this opportunity wisely.

Links:
www.epsos.eu
www.worldofhealthit.org

REAL TIME EPRS GO MOBILE

Torrevieja, Spain October 08

Medical professionals have immediate access to patients' clinical records. They are able to check results and to ask for internal consultations

The *Florence Mobile* (right), which was presented at the Microsoft Iberia Meeting in Budapest. This new device fulfils Forbes' predictions of 'mobile technology' being the 'future of medical care', says Luis Barcia.

Spain – An article in the leading US business publication Forbes magazine recently predicted: 'mobile technology will be the future of medical care'. The use of mobile phones to access electronic patients records (EPR) for patients in Torrevieja Hospital gives credence to this prediction. Developed jointly by Microsoft and Torrevieja Salud, the *Florence Mobile* makes this the first hospital to provide its physicians with real-time internet mobile access to EPRs.

'Beyond the inherent advantages of the Florence Mobile as innovative IT, the new tool proves us with the capacity and infrastructure to develop such a technology. And this is so because we apply state-of-the-art features developed by Microsoft,' said, Manager of Torrevieja Health Services.

The Florence Mobile

Using this new technology, Torrevieja's healthcare professionals can access the EPRs anytime, anywhere via their own mobile phones, giving them the medical data of any hospitalised patient: name, number, status, clinical results, etc. Moreover, Florence Mobile goes further into an interactive technology, allowing a physician to manage consultations through his/her own cell phone.

Access to medical records is implemented via a highly secure connection that guarantees data privacy. If the system registers no activity during a 10 minute period, it automatically logs off. For example, if one patient in an emergency room (ER) needs an internal consultation with a nose and throat specialist, that physician will be able to check the patient's status and to give advice to the ER physician through an internet mobile connection.

Luis Barcia adds that Torrevieja Salud is holding a leading position in IT developments in healthcare. The company has invested over € 4 million in the development and implementation of innovative IT systems that have turned Torrevieja's into a real online hospital.

Specifically, Torrevieja Salud has jointly developed with Microsoft (systems), Servicom (infrastructures) and Hewlett-Packard (hardware), the healthcare system Florence, which centralise all clinical and administrative information, controlling parameters such as medical appointments, waiting rations or patient's flow.'

Recently, the Spanish company set in motion an SMS alert system addressed to healthcare professionals, to alert them regarding any changes in a patient's status or to inform them about the availability of medical results. 'Doctors were therefore immediately and permanently informed of any news concerning their patients and they needed nothing else but to get to the nearest PC in order to visualise the new information. Now, and thanks to Florence Mobile, the physician will be able to visualise all the information received via SMS from his/her cell phone – no more need of a PC- and will be able to act accordingly immediately. X-rays results can be consulted or extra tests requested just through the doctors' pda or cell phone.'

Web 2.0 makes the electronic health file look old

Web 2.0 is a 'buzz' phrase used to describe users' involvement with the Internet. This form of electronic exertion of influence is still fairly rare. 'This reluctance regarding new developments is typical in medicine,' remarked Professor Frank Ückert, Junior Professor at the Institute for Medical Informatics and Biomathematics at the University Hospital Muenster, Germany, who discuss this theme at the IT forum MEDICA MEDIA at MEDICA (19-22 November). 'I'm not saying that this development is necessarily good. But we mustn't ignore the Internet as a medium. We have to prepare for what is going to happen,' he added. 'After all, at one time there was even scepticism about the introduction of the telephone into medicine – for many doctors the only thing that counted was direct contact between patient and doctor.'

This perhaps explains why *GoogleHealth*, an internet-based health information source for the general public, is flippantly referred to by many German doctors as 'StudiVZ for the Sick' (Explanation: StudiVZ is a highly popular, Berlin-based *social* networking platform mainly for college and university students in the German-speaking countries). However, condemnation of such services may be hasty. Microsoft, and partners, has commenced a similar project. Named *HealthVault*, this aims to set international standards, and if that happens it will probably be irrelevant what patients, doctors, medical insurers and those involved in data protection want from an electronic health file – it may be outdated before it could even be introduced.

Professor Ückert is among the initiators of the electronic health file *akteonline.de*, on which patients can store, organise and transfer their medical data via the Internet. He believes that, in countries such as the USA, medical products in the sense of Web 2.0 are further advanced because those who hold medical insurance have more personal responsibility. However, this also applies in Germany, where pressure is increasing for people to develop more personal responsibility – including the organisation and monitoring of their own data.

Further details: http://www.medicamedia.de.

8th Swiss eHealthcare Congress

Heidi Hanselmann: 'In the St Gallen canton we now have an administrative council for new hospitals. IT ensures synergies and helps us to utilise joint resources in a better way'

Willy Oggier: 'eHealth is not just technology but an attitude towards life'

Right: The Notwil exhibition

This two-day event, held in Notwil, Switzerland, in September, hosted over 1,600 participants and 80 exhibitors, and attracted about 100 more visitors than in 2007. Many, from Germany and Austria, wanted to ascertain the value Swiss eHealth developments could be to their own systems.

Willy Oggier, health economist and President of the Congress Board, said: 'Switzerland is not especially ahead in this area. We actually need further events of this kind, which emphasise that eHealth should be given top-priority, as this is a strategic task for the entire healthcare system. These findings shaped the 8th eHealth congress with regards to its entire programme development. The issue is not to generate quantity but to steer the decision-making players in healthcare towards action and quality, because Switzerland, as a country lacking in commodities, is in particular need of this innovation.'

Heidi Hanselmann, Administrative President, District President and Principal of the healthcare department in the St. Gallen canton, also underlined the importance of the working group (federation/cantons), which will decide on Swiss standards as a next step. This canton has recognised the importance of eHealth and, in line with solutions developed by other cantons, as well as by European neighbours, will further actively optimise, as well as dispel fears and promote its qualitative advantages.

Report: Guido Gebhardt

37 French hospitals opt for Orbis

Agfa HealthCare has won a contract to install the *Orbis* Clinical Information System (CIS) in 37 hospitals in the Assistance Publique – Hôpitaux de Paris (AP-HP) group. The order is worth €95 million. 'It is the biggest contract ever in Europe for a hospital information solution and paves the way for our position as a leading company in France,' said Christian Reinaudo, President of Agfa HealthCare.

The AP-HP is a public health organisation comprised of 37 hospitals with about 23,000 beds, serving a million in-patients annually in the Ile de France region.

Agfa HealthCare has put together a multidisciplinary team to ensure the progressive implementation of this project. 'The programme is divided into three phases,' Christian Reinaudo explained. 'The first runs for 18 months, during which we will adapt our software platform to the hospitals' needs, since the modular design of Orbis allows for specific customisation. Then, we will team up with the AP-HP team and have six months to deploy our IT solutions to the first three pilot facilities. During the following three years, up to the end of 2013, the AP-HP trained teams will deploy Orbis into all other hospitals.'

To bring the project to a successful conclusion, the company will manage a consortium with Cap Gemini, HP and Oracle.

Jo Cornu

Christian Reinaudo

ORBIS is Agfa HealthCare's leading Hospital Information System (HIS) integrated with a Clinical Information System (CIS). It manages and monitors all patient-oriented processes: medical data, including images, nursing, administrative and business documentation, thus providing fast and complete availability of patients' histories to authorised staff. Agfa points out that a core strength of this HIS-/CIS-software is its simplicity.

Jo Cornu, CEO of Agfa-Gevaert NV, is convinced that IT implementation in healthcare sector is a key element to more efficient, streamlined and cost-effective care; he is also sure that healthcare will continue to grow within the global economic market. As a 2006 study run by Agfa HealthCare revealed, the participating German hospitals could achieve an average reduction of process costs of 32% after the implementation of Orbis. In other words, an average 600-bed hospital could save about €100,000 annually by changing to electronic order entry and results reporting.

Report: Gabriela Eriksen, European Hospital.

COOPERATIONS

French firms meet Germa

From left: Bertrand Le Tallec, with Stéphane Perchenet, Head of the Investment Goods Department, and Martin Winder, Head of the Communication and Services Department.

From left to right: Eric Barrey, Alain Jampi, (European Hospital)

As neighbours of Germany, France and its manufacturers have the advantage of quick accessibility, similar traditions and a European presence. This October, to further trade relations, the Department for Economy and Trade at the French Consulate in Dusseldorf, invited German hospital buyers to meet French companies. 'We see ourselves as mediators between companies and purchasers,' Bertrand Le Tallec, head of Economics and Trade Department, told Denise Hennig of European Hospital 'We represent small and medium-size French companies -- those with around 50 employees -- young, innovative companies that want to do business in Germany. We support the companies and their customers, to match the right supplier with the right purchaser. During this event both sides have the chance to get to know one another, swap ideas and – if the product-range permits – do future business.'Apart from the organisation of such events, the Department for Economy and Trade has a comprehensive network in France, comprised of 24 regional foreign trade representations, 175 Chambers of Industry and Commerce, Ubi France, the most important trade associations and close contacts in French industry.

Since the introduction of the DRG system in Germany in 2006 purchasers' expenditure inevitably tightened. Merging with purchasing associations means that better prices can be negotiated with industry. 'You can't really change much about the prices of products,' said Ulrich Schiedeck, a Managing Director at AGKAMED. 'However, you can optimise processes to save costs.' AGKAMED, one of Germany's biggest purchasing associations, serves 128 hospitals, 65 residential homes for the elderly and runs 18 centres of competence with 50 doctors and purchasers.

Thomas Klein, a managing director at UNICO and head of the Department for Material Science at the Düsseldorf University Hospital, added: 'UNICO is a purchasing association for 13 well known university hospitals in Germany and has 13 managing directors dealing with the various areas within the association. One important aspect is communication between all those involved, because purchasers don't automatically know which products are particularly in demand with nurses and doctors and which are not. The cost factor obviously cannot be ignored. However, if an initially more expensive product turns out cheaper in the end, because it lasts longer, its handling is easier for doctors, or the patient benefits from it for longer, then price is not decisive.'In hospitals, purchasing departments were often found in

NEW

The Hitachi HealthXchange Module and Mawell M7 solution

Increasing populations and the additional storage requirements for a spiralling volume of their medical data cause acknowledged concerns among healthcare organisations. A straightforward CT scan, for example, produces 250 MB of data, while an in-depth colonoscopy study can generate files up to 2 GB. In addition to such hefty storage needs, other patient information also needs be quickly accessible to hospital staff.

To address this issue, Hitachi Data Systems, provider of Services Oriented Storage Solutions (SOSS), teamed up with Mawell, the European healthcare software company, on a year-long project to bring highly scalable data management solutions to a wider European healthcare audience. The result is the Hitachi HealthXchange Module and Mawell M7 solution.

Mark Clark, Hitachi Data Systems Director for e-health solutions EMEA, explained: 'By partnering with Mawell, we've combined the company's sophisticated medical software with our advanced storage technology. The result is a data management solution tailored to the exact needs of healthcare organisations across Europe. Medical staff can now enjoy a new level of simplicity and fast access to patient records and images. Virtualisation will soon be an integral part of healthcare IT systems, and by using Hitachi storage, hospitals and clinics can benefit from our unrivalled expertise in this area.'

The Mawell M7 medical imaging solution manages multimedia clinical content and electronic health records across multiple sources, Hitachi reports. 'It creates a virtual network within the healthcare organisation, and can be extended to include other healthcare providers in different locations. Through virtualised patient informatics, it consolidates this data and presents a single view of patient information tailored to the needs of the healthcare professional.'

The Hitachi HealthXchange Module provides a scalable platform to archive digital medical images, electronic health records and associated data from the various healthcare systems such as PACS, Radiology Information System (RIS) and Healthcare Information Systems (HIS). Through the Mawell interface, users can quickly search, locate and retrieve patient data from the Hitachi archive, as needed. The archive also features automated policy management that allows healthcare organisations to comply with government regulations to ensure content authenticity, retention and integrity.

Hitachi HealthXchange Module is a fully integrated component of Hitachi's Content Archive Platform (HCAP) and supports Hitachi Data Systems' Services Oriented Storage Solutions (SOSS) approach to storage management.

Petri Morko, PR and marketing manager for Mawell, pointed out: 'Electronic patient data is continuing to evolve and new storage-intensive formats, such as video and bio-signals, will ensure storage requirements grow exponentially. At the same time Hitachi's leadership in storage and storage virtualisation perfectly complements our expertise in virtualised patient informatics.'

an buyers

Sandrine Grange and Denise Hennig

basements, simply ordering whatever hospital department heads wanted. Today's purchasing manager handles the department's own budget and must closely monitor market developments. Events such as the French gathering, add to that knowledge, and also help businesses. 'Without this event,' agreed Sandrine Grange, Sales Director of Deltalyo Valmy, Eric Barrey, Managing Director and Alain Jampi, Sales Manager of Locometrix, 'we would have only remote chances of presenting our products to the managing directors of different purchasing associations.'

Europe has abolished many barriers and streamlined terms and conditions of business. European Contract Law stipulates that master contracts must largely be issued via official tenders, and at such meetings lie opportunities for international cooperation.

Advanced laser technology

Mediclase manufactures and distributes sophisticated medical laser technology. The firm's DermaXel CO2 laser emits continuous or pulsed infrared radiation that is highly absorbed in water. 'Since any soft tissue is composed mainly of water, tissue at the focal point of the laser beam is instantaneously vaporised, leaving behind a thin necrotic layer of tissue that assures haemostasis, and stimulates creation of collagen in skin resurfacing procedures,' Mediclase explains. 'Laser surgery is widely applied in a variety of human surgical specialties such as otolaryngology, gynaecology, neurosurgery, plastic surgery, dermatology and oral and maxillofacial surgery. Out of several available laser types, the CO2 laser is considered the *workhorse* of laser surgery due to its unique capabilities in performing precise, haemostatic incisions, excisions and ablations of tissue.'

CO2 laser surgery is implemented in a freehand mode, in microsurgery and in rigid endoscopy, enabling surgical precision to a fraction of a millimetre, the company adds. 'CO2 surgical lasers for human surgery are installed in thousands of hospitals and clinics around the world. These systems have so far been too large and too expensive for small to mid-size clinics. The DermaXel CO2 surgical laser now offers medical professionals the advantages of CO2 laser surgery in a compact and affordable system.'

The DermaXel laser provides fractional skin resurfacing technology combined with the CO2 mode for advanced ablative and non-ablative procedures

Mediclase
healing by light

'It's a life

says **David Furst**, Director Life

Israeli physicians, scientists, researchers and engineers have propelled the country's medical device industry to the leading edge of innovation and creativity, spanning all fields of medicine.

QUICK FACTS:

- **Israel is considered to be the second largest supplier of medical device solutions worldwide.**
- **Israel ranks number one for medical device patents per capita (number 4 in absolute figures).**
- **The country is home to over 900 life science companies; 55% of these produce medical devices.**

Israel's medical device industry receives strong support from the country's highly sophisticated and internationally renowned electronics industry. Many of this industry's advanced technologies, especially those related to electro-optics and lasers, find vital applications in medical devices. Furthermore, as a small country, Israel's tight network of universities, research institutions and medical centres, and the creative fusion with industry, foster cooperation and the flow of ideas. This enables novel and innovative technologies to reach physicians, and their patients, faster than anywhere else in the world.

Several global medical corporations have found Israeli companies to be attractive business partners. Israeli companies have proven excellence in R&D, and in implementing breakthrough

Non-invasive diagnostic devices for sleep and endothelial function assessment

Bio-medical technology firm Itamar Medical Ltd develops and markets diagnostic medical equipment based on its proprietary Peripheral Arterial Tone (PAT) Technology.

PAT Technology provides a non-invasive window to the cardiovascular and autonomic nervous systems, Itamar explains. 'The PAT Signal is acquired by measuring pulsatile arterial volume changes in the fingertip by specialized non-invasive biosensors. This innovative approach provides office-based access to medical data previously reserved for high-tech labs by Itamar's FDA cleared & CE marked PAT-based products.'

ODI, calculated on sleep time rather than examination time), as well as sleep architecture (REM/Deep Sleep/Light Sleep/Wake stages) and snoring and body position channels. It is validated by over 100 publications and abstracts, providing a perfect combination of natural sleep with sophisticated data.'

Watch-PAT: a 'wearable' sleep lab

Breathing-related sleep disorders affect overall health. Sleep apnoea sufferers are at increased risk of death, disease and disability. Yet, although the problem is as common as asthma, most sufferers go undiagnosed because they avoid medical advice and sleep labs.

Itamar explains that the wrist-mounted Watch-PAT200 can be used by patients in their own beds. 'The device provides a comprehensive, automatically generated sleep report, covering multiple parameters about sleep-related breathing disorders (RDI, AHI,

Endo-PAT: assessing cardiovascular risk

Dubbed 'the ultimate risk among risk factors' for over a decade, endothelial function has been recognised by physicians as the critical junction between risk factors and clinical disease. Today, many clinicians see atherosclerosis as the clinical manifestation of endothelial dysfunction.

The Endo-PAT2000 is a non-invasive, easy-to-use, user-independent medical device that assesses endothelial function, the manufacturer explains. 'The 15-minute, office-based test provides immediate, reliable and reproducible results. It has been validated by nearly 100 publications and abstracts, and is used in eminent clinical institutions, research centres and pharmaceutical studies. The Endo-PAT2000 is becoming widely recognised as the standard methodology for endothelial function assessment and is part of the universal efforts to arrest progression of the CVD pandemic.'

Company seeks strategic partners

Early diagnosis device assesses at-risk pregnant women

Safepregnancy Ltd* which produces Pregnochrone, reports that this non-invasive device helps in the early diagnosis of at-risk asymptomatic women, thus helping to prevent miscarriage or premature births. 'It's easy to handle, fully automatic and non-invasive, and it displays results discreetly,' the company adds.

Safepregnancy Ltd is expanding and seeking strategic partners.

Address: 51 Chen Avenue, Rehovot 76469, Israel. Telephone: +972-8-946-5193,www.safepregnancy.com

ISRAEL

science powerhouse'

Science Industry, Israel Export and International Cooperation Institute

technologies in the medical device industry. Some of the leading multinationals holding equity positions in Israel include GE Medical, Philips, Siemens, Boston Scientific, Johnson & Johnson and Medtronic.

Key segments in the medical device industry include disposable and implantable devices, diagnostics, imaging, drug delivery, monitoring and telemedicine.

MEDICA 2008

The Israel Export and International Cooperation Institute (IEICI) is the major organiser of our country's participation at Medica.

To find out more about business opportunities in Israel's life science industry, please visit the IEICI at **Hall 16, Booth E27**.

Further information: http://www.export.gov.il/Eng/

Refurbished systems

ElsMed Ltd takes pride in providing fully-refurbished diagnostics equipment, servicing/training, application/clinical user training, parts and technical support, all reportedly at affordable prices. The firm's services range from initial consultation and evaluation to complete turnkey projects, installation and ongoing maintenance of advanced diagnostic imaging systems.

Refurbished equipment – Currently, the firm specialises in the refurbishment of all Philips Mx8000 CT Systems (2, 4, 16, and 64-slice) and The Elscint MxTwin (Flash) CT System, as well as GE's Elscint Nuclear Medicine Gamma Camera, single and dual head: SPX4, SPX6, VG Millennium (Hawkeye).

'The equipment performs and looks and works like new', ElsMed points out. 'The refurbishment process brings a system to its original specifications and functionality in a dedicated refurbishment centre.'

Philips CT

An ElsMed technician brings CT scanner back to original specifications

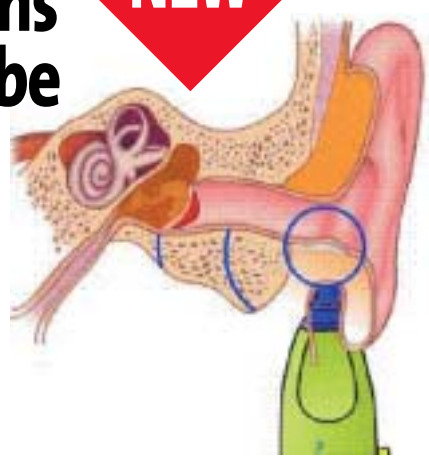
Turnkey projects – ElsMed reports that it has successfully installed over 150 systems worldwide, and it services over 70 of these directly. These countries include Israel, the USA, France, Italy, Holland, the UK, Germany, Norway, Greece, Cyprus, Portugal, Ukraine, Moldova, Russia, Ethiopia, Puerto Rico, Chile, India, Mexico, Colombia and Iraq.

Ongoing parts & technical support – Experienced field engineers and factory trained support specialists are available 24/7, the firm points out. So are remote diagnoses and unlimited phone support. Its inventory (at reduced prices) is also large, and delivery quick.

ElsMed adds that it operates and maintains a quality management system applying ISO 9001:2000 standards

Ear device opens Eusthichian tube

NEW



Middle ear inflammation often involves treatment with steroids and pseudo-epinephrine to reduce oedema, and antibiotics to combat primary bacterial infection or a secondary complication. If all this fails and inflammation recurs, perforation of the tympanic membrane is carried out and drainage tubes inserted to keep it open and allow fluid in the middle ear cavity to drain out. In this way pressure is equalised and hearing improves; additionally a topical medicinal treatment can be introduced to the area.

However, *Eardoc* – a new non-invasive device that naturally opens the Eusthichian tube and heals the ear – may prevent such measures all together. According to the manufacturer, a study performed by the Medical University of Hungary showed that Eardoc generates and transmits vibration waves that travel through the bone to the middle ear, thus opening the Eustachian tube. The waves then drain trapped fluids and ease the pressure, subsequently relieving pain.

Device details: www.eardoc.info/

Первая Европейская объединенная университетская больница – это вполне реально

Аахен / Маастрихт – Организация первой Европейской университетской больницы, которая будет являться совместным проектом Университетской больницы г. Аахен (UKA) и Университетского медицинского центра г. Маастрихт (Maastricht UMC+), является, как в правовом, так и в финансовом отношениях, вполне реальным начинанием. Следует отметить, что дальнейшее развитие существующего партнерства в указанном направлении послужит улучшению качества работы этих медицинских учреждений и повышению их конкурентоспособности на международном уровне .

Это было подчеркнуто в ходе экспертизы, которая проводилась в течение нескольких месяцев фирмой-консультантом «KPMG» по поручению университетских клиник. По результатам экспертизы рекомендуется создание совместного фонда ресурсов с упором на развитие сильных сторон каждого партнера. В условиях нарастания финансового прессинга это является необходимой мерой для того, чтобы иметь возможность проводить лечебную и научно-исследовательскую работу на самом высоком уровне.

«Мы работаем в направлении достижения решающего в стратегическом отношении подхода в целях совершенствования медицинской работы, научных исследований, а также выработки общей корпоративной ответственности. Это означает в перспективе формирование совместного руководства на уровне правления и совместной платформы по информатике, комплексному систематическому контролю, а также фактурированию и учету», сообщил профессор Хеннинг Засс, руководитель клиники в Аахене.

С точки зрения интересов пациента, важно, чтобы медицинское обслуживание на местах, в Аахене и Маастрихте, не претерпело ухудшений. Пациенты только выиграют от партнерства, например, благодаря возможности привлечения для медицинского консультирования и экспертизы врачей той и другой стороны.

Целью проекта является организация Европейского центра медицины отличного качества с фокусированием на особо важных, требующих высокой специализации сферах, в которых обе клиники, как UMC, так и UKA, уже имеют выдающийся опыт.

Для ключевых медицинских учреждений совместного проекта планируется новое местоположение, на границе между Германией и

Хеннинг Засс (справа) и Гай Пеетерс (слева) за изучением совместного проекта (июнь 2008 г.)

Нидерландами, примерно в 5 км от Аахена и 25 км от Маастрихта. Это как раз там, где находится Европейский научный и деловой парк «Авантис». Здесь предполагается организовать центр по лечению сердечно-сосудистых заболеваний, а также центр по лечению онкологических больных с использованием новейших методов радиотерапии пучком заряженных частиц.

«Путем создания совместного центра по лечению сердечно-сосудистых заболеваний, отвечающего самым высоким стандартам, обе наши клиники смогут объединить свой потенциал и утвердить высокую репутацию в сфере медицинских услуг как на национальном, так и на международном уровне», подчеркнул Гай Пеетерс, руководитель Университетского медицинского центра Маастрихта.

Наблюдательный совет дал инструкции исполнительным комитетам двух университетских клиник по дальнейшему развитию партнёрства в 2009 году на основе рекомендаций, высказанных в заключении экспертизы по созданию совместного проекта.

В больницах Чехии экономят воду

По недавно опубликованным данным, в больницах Чехии получили широкое развитие и внедрение современные программы по более эффективному менеджменту. Цель указанных программ – более эффективно использовать воду, уменьшить ее потребление; тем самым достигается экономия средств.

Работа проводится в соответствии с международными стандартами (ISO). Необходимо определить возможности экономии воды, подготовить больницы в техническом отношении, избежав при этом неблагоприятных последствий для нормального функционирования лечебных учреждений. Вне зависимости от размера лечебного учреждения, мероприятия по экономии воды не должны быть чрезмерно дорогими; вместе с тем, необходимо комплексно решать эту проблему, учитывая все детали, чтобы в результате не получилось так, чтобы в одном месте осуществлялась экономия, а в другом допускалась «утечка».

Исходя из этих соображений, разработчики стремятся предусмотреть в программе все места, где может иметь место потенциальный перерасход. Работа начинается с первых, более легких ступеней, касающихся обслуживания пациентов – водопроводные краны в комнатах, туалеты, душ, прачечная. Затем, постепенно, приступают к решению вопросов, касающихся улучшения функционирования в контексте экономии более сложного и технологичного оборудования – холодильников, кондиционеров, стерилизаторов, дезинфекторов, машин для мытья лабораторной посуды, оборудования в операционных.

В целях уменьшения потребления воды больницами, и, в первую очередь, базовыми университетскими клиниками, предприняты следующие меры:

- установка на все водопроводные краны приспособлений для контроля потока воды, а также установка водосберегающих душевых насадок;
- замена всех санитарных приборов с большим потреблением воды в туалетах на современные, с водосберегающими клапанами;
- установка систем для вторичного использования воды в прачечных в последующих циклах стирки и полоскания;
- организация экономии в процессах, так или иначе связанных с использованием воды для очистки. Это включает, например, обеспечение полной загрузки машин для мытья лабораторной посуды, дезинфекторов, стерилизаторов и т.п.;
- установка там, где это необходимо, автоматических клапанов для уменьшения потребления воды в биохимических анализаторах, оборудовании для обработки рентгеновских снимков и т.п.

Подобные меры, в большей или меньшей степени, сейчас полностью внедрены в практику работы всех чешских больниц. Они явились ответным шагом на непрекращающуюся политику повышения цен на воду со стороны компаний, обеспечивающих водоснабжение.

Панель периоперационного мониторинга в режиме реального времени

Организация периоперационной работы является одним из ключевых факторов в деятельности больницы. Фирма «Пайсис» (Picis) предлагает свою помощь. Недавно она выпустила на рынок панель периоперационного мониторинга «Пайсис». Данная разработка является хорошим информационно-аналитическим решением для организации периоперационной работы в больницах Европы.

Улучшение ухода за больными экономит средства

Исследователи Центра по совершенствованию паллиативного ухода за больными, а также Национального исследовательского центра по организации паллиативного ухода (Нью-Йорк), выяснили, что больницы в США могут экономить более 300 долларов на пациента в день, организуя паллиативный уход, при одновременном улучшении качества ухода. Программы по паллиативному уходу дают больницам возможность удовлетворять потребности пациентов без ущерба для своей экономической стабильности.

Причины ошибок в медикаментации

Американские исследователи установили, что в период пребывания в больнице на каждого пациента приходится, согласно записям в медицинских картах, в среднем 1,5 случаев ошибочного и потенциально вредного применения медикаментов. Приступив к изучению причин, они выявили, что наиболее критические в этом отношении ситуации возникают при приеме и при выписке пациента.

Всю статью полностью читайте на интернет-странице www.european-hospital.com

Европейский форум по вопросам здравоохранения в Гаштайне

В работе одиннадцатого Европейского форума по вопросам здравоохранения в Гаштайне приняли участие более 600 представителей политики, науки, промышленности, медицины, управления, а также многочисленных неправительственных организаций.

В специализированных рабочих группах, а также в ходе параллельных заседаний был обсужден целый комплекс актуальных проблем. Целью организаторов было, в соответствии с генеральным девизом форума: «Здоровье и система ценностей – от теории к реальности», способствовать тому, чтобы его участники из 45 стран вынесли из работы на форуме как можно больше практической информации, необходимой в повседневной деятельности, в противовес общей теории.

Обсуждались следующие темы:

- сотрудничество на международном уровне в борьбе с «редкими заболеваниями»;
- проблемы безопасности пациента – необходимость больше учиться на ошибках ;
- Европа – «больная» и «здоровая»;
- растущее признание роли специальных органов по медицинской этике.

«Медицина поверх границ» – данная концепция является одной из ключевых в политике по вопросам здравоохранения в 21 веке.

В поощрение этой тенденции ежегодная награда форума была присуждена на этот раз совместному проекту Ирландии и Северной Ирландии. Работа в рамках этого сотрудничества по лечению пациентов с заболеваниями почек была оценена как образцовый пример осуществления медицинской помощи «через границы».

Полностью статью по данному вопросу вы сможете прочитать по-английски на стр. 1

Частная клиника «Майн-Таунус» – тело, душа и настроение в руках лучших врачей.

Частная клиника международного уровня «Майн-Таунус» расположена в одной из наиболее успешных в экономическом отношении областей Германии – регионе Рейн – Майн, центром которого является финансовая метрополия Франкфурт-на-Майне. Клиника предлагает своим пациентам самые последние достижения медицины в сочетании с комфортом и великолепную местность.

Частная клиника «Майн-Таунус» входит в группу медицинских учреждений, которая ежегодно обеспечивает медицинское обслуживание, как стационарное, так и амбулаторное, более чем 55.000 пациентов. Она расположена всего в 20 километрах от международного франкфуртского аэропорта – центра путешествий, где приземляются и взлетают в воздух самолеты, практически по всем авиалиниям мира. В то же время, клиника находится всего лишь в 15 километрах от центра Франкфурта-на-Майне.

Клиника предлагает медицинское обслуживание наивысшего уровня, так как её медицинский персонал располагает большим опытом и обширными междисциплинарными знаниями. Врачи работают в постоянном профессиональном контакте с коллегами из других отделений в рамках клиники, а также с коллегами из других клиник. Клиника специализируется на определенном круге медицинских проблем, компетентность и опытность врачей и всего медицинского персонала отвечают высшим профессиональным стандартам. Процесс лечения, также как и его результаты, постоянно отслеживаются и оцениваются в соответствии со всесторонними требованиями системы менеджмента качества.

Медицинская концепция клиники подкрепляется принципами холистики, т.е. многокомпонентности в подходе к лечению пациентов. Организм и духовная составляющая человека рассматриваются в их единстве, при лечении принимается во внимание этот аспект целостности, а не просто лечение каких-то нарушений, больных органов или систем.

Данной цели также подчинено и оформление интерьера больницы; здесь все направлено на то, чтобы в высшей степени благоприятствовать созданию положительно действующей атмосферы. Это очень хорошо влияет на результаты лечения. Оказываются диагностические услуги, проводится лечение и реабилитация; обеспечивается комплексное лечение путем создания междисциплинарных коллективов врачей в таких ключевых сферах, как, например, лечение онкологических заболеваний. Благодаря самым прогрессивным хирургическим технологиям: минимально инвазивной хирургии, хирургии по быстрым программам (фаст трэк), микрохирургии пациенты клиники быстрее, чем обычно, могут благополучно покинуть стационар.

Пациентам предоставляются просторные комнаты, где есть красивые уютные кресла, письменный стол, телевизор, проигрыватель DVD, стереоустановка. Комнаты оборудованы скоростным беспроводным интернетом. Все это создает ощущение того, что Вы находитесь в отеле высокого класса.

Main-Taunus-Privatklinik,
Germany
Kronberger Str. 36 A
D-65812 Bad Soden
Тел.: 0049/6196/657300
Факс: 0049/6196/657301

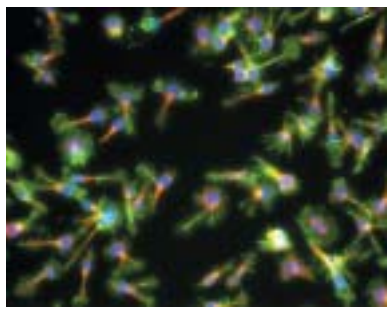
Молекулярная медицина открывает новые горизонты

Д-р Росс Мак-Манус

Рассчитанный на 13 лет проект изучения генома человека был завершен в 2003 году, он с очень большим интересом был воспринят во всем мире. Молекулярная медицина делает все более глубокие изыскания в мире клеток человека и преобразует наши концепции диагностики и лечения заболеваний. Одним из лидирующих европейских центров – партнером со стороны Ирландии в этих инновационных исследованиях, является Институт молекулярной медицины, который осуществляет свою деятельность в рамках Университета «Тринити Колледж» в г. Дублин, http://www.tcd.ie/IMM .

Институт молекулярной медицины расположен в городке больницы Св. Джеймса, на площади в 4.500 кв.м. Это научное учреждение оборудовано по последнему слову техники и занимается исследованиями человеческих заболеваний на молекулярном уровне. Основные сферы работы – это биология клетки, иммунология и генетическая природа системных заболеваний.

В изучении биологии клетки большую роль играет методика скрининга и анализа высокого информационного содержания. Данная методика предусматривает использование микроскопа высокой степени разрешения, который позволяет автоматически



Т-лимфоциты «ощупывают» окружающую среду (фотография любезно предоставлена д-ром Майклом Фрили)

отслеживать индивидуальные лунки в планшетах, состоящих из 96 лунок. Это дает возможность анализировать большое количество материала. Клетки в лунках остаются живыми, а при помощи новейшего программного обеспечения камера микроскопа демонстрирует изображения передвижения клетки в лунках в режиме реального времени. Если вы, например, захотите увидеть, каким образом цитокин способен активировать Т-лимфоцит, исследователи могут пометить в клетке те белки, которые представляют интерес, а затем сфотографировать весь процесс, наблюдая, перемещаются ли белки внутри клетки, что с ними происходит. Можно отслеживать каждую клетку в ее лунке, каталогизируя при этом движения, изменения формы, а также события, происходящие с клетками.

Новые технологии позволяют ученым исследовать отдельно информационную РНК, идентифицированную как индивидуальную для данного гена. Этот метод получил название «нокдаун», его сущность заключается в том, что информационную РНК извлекают из клетки, и затем наблюдают, какой результат это оказывает на саму клетку. В настоящее время проводятся международные исследования с целью изучения комплекса эффектов, которые оказывает извлечение информационных РНК на все гены генома. Эти исследования не были бы возможны без применения метода скрининга высокого информационного содержания. Результаты дадут нам возможность получить гораздо лучшее представление о специфической роли каждого гена в развитии того или иного заболевания, а также о его роли в функционировании клетки. Мы сможем понять, почему две клетки, имеющие один и тот же генетический компонент, например, Т-лимфоцит и клетка печени так различны, и каким образом можно регулировать поведение клеток.

Доктор Росс Мак-Манус из Института молекулярной медицины объясняет далее: «Если нам удастся заблокировать Т-лимфоцит, воспрепятствовать тому, чтобы он двигался или мигрировал из клетки, это даст нам ключ к пониманию природы воспалительных процессов. Если мы, например, сможем блокировать выделение интерлейкина - 2 Т-лимфоцитом, то сможем получить основу для создания очень действенного антивоспалительного препарата». Центр также собирается вскоре запатентовать работу по биомаркерам сепсиса, которые помогут точнее определять состояние больных. Уровень цитокина является в данном случае ключевым критерием. Пациенты, у которых иммунные (воспалительные) реакции проявляются сильнее, на что указывает повышенный уровень цитокина, имеют лучшие шансы на выздоровление. Станет возможным в 40% случаев выделить пациентов с заражением крови, которые будут нуждаться в более интенсивной терапии, и это в скором времени приведет к пересмотру подхода к организации лечения сепсиса в больницах.

Институт молекулярной медицины, Университет «Тринити Колледж», Дублин

Carestream DRX-1 – беспроводной цифровой радиографический детектор.

Фирма «Carestream Health», сообщила в сентябре этого года, что она произвела первый беспроводной цифровой плоский радиографический детектор. Описываемая система включает в себя консоль и беспроводной цифровой плоский радиографический детектор размером примерно 36см x 43 см. Детектор позволяет обеспечивать очень быстрое конвертирование данных при радиографической визуализации или визуализации с помощью компьютизированных радиографических систем. Детектор совместим со столами для рентгеновского обследования Буки и со стойкой Буки для обследования пациента в вертикальном положении. Не требуется никакого модифицирования уже имеющегося в распоряжении аналогового оборудования; таким образом, затраты на установку очень невелики. При визуализации один детектор может быть использован вместо традиционных кассет почти для всех видов обследований.

«Система **DRX-1**» позволяет получать высококачественные предварительные изображения менее чем за 5 секунд, это существенно увеличивает эффективность работы, даже при использовании компьютизированной радиографии», разъясняет далее производитель.

Центр по лечению заболеваний молочной железы при Университетской клинике Гамбург-Эппендорф (UKE).

Центр по лечению заболеваний молочной железы является составной частью Университетской клиники Гамбург-Эппендорф и возглавляется доктором медицины г-ном Бьёрном Лисбоа. В целях соблюдения интересов своих пациенток Центр строго ориентируется в своей деятельности на требования по медицинскому обслуживанию, соответствующие как национальным, так и международным стандартам. Проведение научных исследований и разработка клинических методик позволяют внедрять в практику новые и передовые терапевтические концепции и, тем самым, достигать самого высокого уровня в лечении больных.

В Центре уже в течение многих лет сложилось тесное сотрудничество высококлассных профессионалов различных медицинских направлений. Здесь, под одной крышей для блага пациентов, собраны все современные средства диагностики и терапии, отвечающие уровню новейших достижений науки и техники.

Центр сертифицирован в соответствии со строгими критериями «Немецкого общества по борьбе с раком» (DKG) и «Немецкого общества сенологии» (DGS). Опытные хирурги Центра по лечению заболеваний молочной железы осуществляют более 500 операций в год. В результате в 70 – 80% проведённых операций хирургам удаётся сохранить пациенткам грудь.

«Д-р Бьёрн Лисбоа, руководитель Центра по лечению заболеваний молочной железы при UKE»

В том случае, если удаление груди всё-же неизбежно, то в распоряжении врачей имеются все современные способы по её восстановлению, в том числе с использованием собственных тканей организма пациентки.

Центром предлагаются также все виды пластических операций по увеличению, уменьшению или подтяжке груди.

В целях сохранения подмышечных лимфатических узлов, которые, как правило, удаляются у пациенток, страдающих раком молочной железы, Центром предлагается метод удаления так называемого сторожевого лимфатического узла (SLN). Это первый лимфатический узел на пути лимфооттока от первичной опухоли, который выявляется с помощью нуклеарной медицины и удаляется.

Уход за больными осуществляется коллективом опытных и ответственных врачей и медсестёр, имеющих специальную подготовку. Физиотерапевтические процедуры, которые начинают проводить пациенткам уже на следующий день после операции, способствуют быстрому улучшению их состояния здоровья. Наряду с лечебной гимнастикой и врачебными рекомендациями о правильном поведении после перенесённой операции, Центр предлагает также проведение процедуры по послеоперационному дренажу лимфы.

Пациенты Центра, говорящие по-русски, могут в любое время обратится со своими проблемами к сотруднице Международного отдела Ирме Агрикола (тел.: 0049177 4001903). Любые вопросы, в том числе и на русском языке, могут быть направлены по следующему адресу электронной почты *patients@uke.uni-hamburg.de.*

Насколько в действительности опасна радиация?

Взгляд на ее опасные последствия

Автор Soenke Bartling

Радиацию нельзя зафиксировать визуально, ее нельзя почувствовать, у нее нет запаха, и, тем не менее, она может нанести огромный вред. Это является причиной того, что с использованием радиации в диагностике и лечении связано много страхов.

Как и во многих других случаях, решающее значение имеет доза получаемой радиации. В принципе, вредные последствия радиационного облучения можно подразделить на две группы.

В первую группу входят детерминированные эффекты. Это означает, что любое облучение определенным количеством радиации вызывает определенные же реакции. Детерминированные эффекты в очень значительной степени зависят от полученной дозы облучения. Сыпь на коже, кожные ожоги, потеря волос, дегенерация костного мозга, лучевая болезнь, а также смерть могут быть вызваны конкретными и хорошо известными дозами облучения.

Детерминированные эффекты могут быть более или менее релевантными в радиационной терапии, они, в данном случае, ставят ограничения по дозе радиационнго облучения, которая может быть применена в лечении пациента.

Рак не относят к числу детерминированных эффектов. Возникновение рака относят к стохастическим эффектам радиации. Это не означает, что у любого человека, подвергшегося радиационному облучению, развивается рак. Можно полагать, однако, что риск этого заболевания увеличивается.

В диагностической визуализации стохастические эффекты являются ограничивающим фактором. Любая процедура, связанная с применением рентгеновских лучей, строго говоря, увеличивает риск возникновения рака у обследуемого пациента. Вопрос состоит лишь в том, насколько повышается этот риск.

Приведем в пример несколько чисел, имея при этом в виду, что процедуры компьютерного сканирования очень различны. Компьютерное сканирование, используемое для определения отсутствия или наличия эмболии сосудов легких вызывает смерть от рака в 10 случаях из 10.000, но при этом 2500 из этого количества умерли бы, так или иначе, от этой болезни. Если приведенная отрицательная статистика и кажется, на первый взгляд, высокой, она релятивируется за счет количества пациентов, которых удается спасти при помощи своевременно поставленного правильного диагноза.

Более того, важным фактором является состояние самого пациента, ожидаемая продолжительность его жизни. Для молодых пациентов радиационное облучение является более рискованным, в то время как пожилые пациенты вряд ли ощутят на себе его последствия.

В сущности, такое положение вещей часто встречается в медицине – то, что помогает, может также принести и вред. Дело специалиста – решить, какой метод диагностики оптимален, при этом он должен основываться на информации и методических рекомендациях наилучшего качества. За последние годы диагностическая визуализация претерпела огромные усовершенствования, направленные на уменьшение необходимой дозы облучения. Получаемая диагностическая информация, таким образом, стала обширней, а необходимые дозы облучения уменьшились.

Новая система визуализации?

Маммография является обычным методом выявления рака груди. Он не является, тем не менее, совершенным. Цель маммографии – попытаться выявить уплотнения в гландулярных тканях на ранней стадии развития опухоли. Магнитно-резонансная визуализация является более чувствительным, но и более дорогим методом, при этом она недостаточно специфична. В настоящее время исследователи предлагают еще один метод – сканер, интегрирующий термоакустическую и фотоакустическую томографию; таким образом, достигается дуально-контрастная визуализация.

Новое программное обеспечение CAD помогает усовершенствовать диагностику рака.

Результаты исследования, которые были недавно опубликованы в интернет-версии «Американского журнала по вопросам рентгенологии», дают оценку использования в клинической практике системы компьютерного распознавания образов для интерпретации маммограмм (CAD).

Процент необходимости повторных исследований, эффективность в плане выявления заболевания, уровень позитивности прогнозов, процент выявления рака – по этим критериям оценивались результаты. Данные, полученные по итогам однократной интерпретации с помощью CAD, были сопоставлены в ходе исследования с данными, полученными в результате двукратного прочтения без применения этой новой системы.

Всю статью полностью читайте на интернет-странице www.european-hospital.com

ВОЗ вводит новую систему для измерения плотности костей производства фирмы «Холоджик»

«Hologic» является первой фирмой по производству медицинской техники, получившей лицензию от Администрации США по контролю за продовольствием и медикаментами на интегрирование в системы для измерения плотности костей алгоритма, который дает возможность оценивать степень риска возникновения переломов на период до 10 лет.

Сотрудничающий с ВОЗ Центр по изучению метаболических заболеваний костей при медицинском факультете Шеффилдского университета (Великобритания), под руководством профессора Джона Каниса разработал алгоритм ФРАКС. С помощью этой разработки врачи могут выявлять и более эффективно лечить пациентов с высоким риском переломов в связи с разреженной плотностью костной массы, а также вследствие других факторов. Фирма «Холоджик» является ведущим производителем в области самых современных диагностических систем с дигитальной визуализацией; она использовала этот принципиально новый подход в своих системах для измерения плотности костей Discovery™ и Explorer™.

В то время как T-score остается основной стандартной методикой в диагностике остеопороза, ФРАКС открывает врачам принципиально новые возможности для выявления пациентов с высоким риском переломов в перспективе до 10 лет. ФРАКС выделяет 11 главных факторов риска, включающих: возраст, анамнез в отношении этого вида травм, а также специфические для конкретной страны данные о средней продолжительности жизни и статистике переломов. Это позволяет эффективно выявлять пациентов с высоким риском переломов, в то время как при использовании традиционной Т-шкалы такие пациенты не вошли бы в группу риска и не стали бы кандидатами на превентивную терапию.

«ФРАКС позволяет врачам идентифицировать пациентов, которые иначе остались бы без лечения до возникновения перелома», – сообщил Кевин Уилсон, доктор мед. наук, директор по научным разработкам фирмы «Холоджик». По имеющимся данным, предположительно 200 миллионов женщин в мире страдают остеопорозом. Еще большую тревогу внушает то, что 10 – 20 % женщин, которые перенесли перелом бедра, умирают в первый же год, а до 25 % пациентов с переломом бедра нуждаются в долговременном специальном домашнем уходе. Оперативность в интегрировании системы ФРАКС в наши денсометрические приборы демонстрирует то, что наша деятельность последовательно нацелена на укрепление здоровья женщин с помощью своевременной и более совершенной диагностики».

Современная хирургия опухолей

Главный компонент междисциплинарной концепции терапии опухоли костной и мягкой ткани

В саркомном центре клиники «Charite» в рамках междисциплинарной терапевтической концепции и с применением современных техник производится лечение как взрослых, так и детей с опухолевыми или опухолеподобными заболеваниями костей и мягких частей, включая метастатические изменения вне зависимости от места их расположения.

При этом спектр хирургических методов распространяется от эксцизионной биопсии до гистологического сохранения и мультивисцеральных резекций. В частности сюда можно включить все методы резекций для определенных отделов:

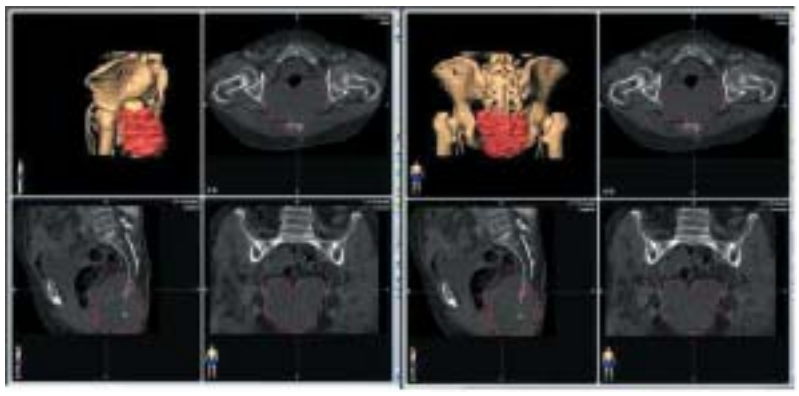
- опухоли костей и мягких тканей конечностей,
- таз,
- плечевой пояс,
- туловище и
- позвоночник.

В особенности следует упомянуть

- периацетабулярные резекции,
- резекции крестца,
- кифопластику и вертебропластику,
- дорсовентральную стабилизацию позвоночника вплоть до
- комплексной спондилектомии нескольких сегментов (рис.1),
- ротационную пластику,
- сдвиг бедра и, разумеется,
- установку модульных опухолевых эндопротезов для практически всех суставов конечностей (рис. 2), включая применение так называемых протезов роста для детей.

Для восстановления возникших в рамках резекции опухоли дефектов в костных и мягких тканях в вашем распоряжении наряду с уже упомянутыми опухолевыми эндопротезами находятся методы пластической хирургии, а также микрохирургии и сосудистой хирургии. Как формы биологического восстановления, которые приобретают все большее значение, применяются аутологичное / гомологичное замещение сосуда, локальные и свободные перемещения лоскута вплоть до трансплантации костей методом стебельчатого лоскута (рис.3).

Неотъемлемой составляющей опухолевой хирургии при сложной с анатомической точки зрения локализации опухолей в области таза и позвоночника является интраоперационный контроль с помощью компьютерного томографа, а также компьютерная навигация. Таким образом, достигается превосходное ориентирование в реальном времени, которое гарантирует точное отображение определенных на дооперационном этапе границ резекции (рис.4). Это позволяет, с одной стороны, сделать безопаснее полную онкологическую резекцию опухоли, а с другой стороны, еще эффективнее предотвратить излишнюю потерю здоровой ткани, а также повреждение таких важных структур, как корешки нервов и сосуды.



Предоперационное планирование: получение цветного изображения опухоли на мониторе, фиксирование уровней резекции.

Поскольку пациентов, страдающих опухолевыми заболеваниями, не всегда можно вылечить с помощью операционного вмешательства, лечение пациентов с опухолями костной и мягкой ткани всегда представляет собой сложную междисциплинарную задачу, в которой наряду с опухолевой хирургией важную роль играет онкология, в том числе радиационная. Учитывая это обстоятельство, лечение всех пациентов с подобными заболеваниями совместно обсуждается в рамках консилиума, где также в соответствии с современными онкологическими стандартами разрабатывается индивидуальный эффективный план лечения. При этом для лечения определенных опухолей применяются стандартизированные международные терапевтические протоколы. С точки зрения медицинской онкологии здесь доступны все системные методы терапии вплоть до высокодозовой терапии и трансплантации костного мозга. С точки зрения радиационной онкологии для лечения пациентов с опухолями на пред- и послеоперационном этапе предлагаются все обычные современные методы облучения вплоть до интраоперационного облучения и гипертермии.

С операционной терапией опухолей неразрывно связана, разумеется, и физиотерапия, призванная восстановить функции суставов и конечностей, а также мобильность.

Все это служит только для того, чтобы обеспечить пациенту наилучшие шансы для лечения опухолевого заболевания и, кроме того, восстановить или сохранить функциональную и полноценную работу конечностей.

Более подробную информацию вы можете найти на сайте скелетно-мышечной опухолевой хирургии:
www.musculoskeletal-tumor-surgery.com
e-mail:
ingo.melcher@charite.de;
klaus-dieter.schaser@charite.de

Онкологическая клиника СанаФонтис приглашает Вас посетить наш стенд С25 на Международном Форуме Медицины и Красоты с 17 по 19 ноября 2008 года по адресу: Россия, Москва, ул. Ильинка, 4, КДЦ «Гостиный Двор», ст.м. Площадь Революции. Подробная информация: www.sanafontis.com

Новая система визуализации рака

Точный диагностический анализ и определение стадии раковой опухоли желчных протоков все еще остается проблемой. Исследовательская разработка из Германии – новая система визуализации «Целлвизио» (*Cellvizio*) – дает врачу возможность исследовать ткани на клеточном уровне внутри организма. Таким образом, система позволяет выявлять вид рака, который считается одним из наиболее трудных в плане диагностики.

PET-сканирование спасает жизнь больным с колоректальным раком

Колоректальный рак – это вид рака, который часто приводит к смерти больного.

По данным последних изысканий австралийских ученых, позитронно-эмиссионная томография способствует улучшению прогноза, а также совершенствованию лечения рецидивов колоректального рака более чем у половины пациентов с этим диагнозом.

На основании этих результатов рекомендуется чаще осуществлять нуклеарную визуализацию при лечении рака у больных.

Существует вероятность того, что лекарство может помочь в предотвращении рецидива опухоли.

Раковые клетки способны к миграции, иногда в ходе самой операции по удалению опухоли.
Американские ученые недавно установили вероятность того, что периоперационное лечение препаратом, известным под названием «колхицин», может предотвратить рецидивы в области хирургической раны.

Всю статью полностью читайте на интернет-странице www.european-hospital.com

Самый маленький сердечно-лёгочный аппарат в мире

Фото аппарата Кардиохелп (Cardiohelp)

Сердечно-лёгочный аппарат размером с небольшой чемодан, весящий около 10 кг., который можно использовать не только в операционной, в катетерной лаборатории, в палате интенсивной терапии, но и в автомобилях скорой помощи и медицинских вертолётах: этот всесторонний аппарат под названием «Кардиохелп» (Cardiohelp) представила специалистам медицинского мира совсем недавно фирма «Маке». Система впечатляет не только своими миниатюрными размерами, являясь самым маленьким сердечно-лёгочным аппаратом в мире, но и предоставляет возможности решать общетерапевтические задачи в области сердечной хирургии, кардиологии, интенсивной терапии и в медицине несчастных случаев.

«Кардиохелп является наглядным выражением нашей компетентнтности в качестве ведущего создателя обобщённых концепций и в качестве ведущего производителя механических систем принудительного дыхания на рынке интенсивной терапии. В своей работе мы исходили из того, что мы можем наши знания и опыт в области хирургии сердца, а также принцип экстракорпорального оксегинирования и принцип механической поддержки работы сердца перенести в другие области медицины» - заявил Кристиан Келлер, председатель правления фирмы Maquet Cardiopulmonary AG.

На основе этой концепции была создана комплексная система. Её главным элементом является интегрированный привод с системой управления. К этому компактно и функционально изготовленному блоку монтируются различные варианты техники, требуемые для конечного продукта. Кардиохелп отличается возможностью моментального применения и простотой управления. Аппарат может облуживаться обученным медицинским персоналом при помощи только одной поворотной кнопки и экрана, выполняющего роль клавиатуры. Необходимый режим работы конфигурируется заранее, в соответствии в целями применения аппарата. При помощи стандартного компьютерного разъёма и этернетразъёма аппарат имеет возможность производить обмен данными. Он может быть подключен к локальной сети, а также к бортовой сети самолёта или вертолёта. При помощи встроенных литиево-ионных батарей аппарат может работать в течение 90 минут без подключения к электрической сети. Особенно большое значение это имеет при траспортировке больных внутри клиники или между клиниками. При наличии у Кардиохелпа универсальных креплений, он может быть легко зафиксирован на любой системе транспортировки больного.

Проф. д-р Кристоф Шмид, директор клиники и поликлиники сердечно-сосудистой и лёгочной хирургии университетской клиники в Регенсбурге говорит: »Благодаря мобильности аппарата появляются совершенно новые области его применения. Его можно легко транспортировать или применять для поддержки кардиологов в ходе операционных вмешательствах с высоким риском».

Этот сердечно-лёгочный аппарат обеспечивает пациента во время его транспортировки внутри клиники, или из клиники в клинику, необходимым количеством кислорода и стабилизирует его сердечно-сосудистую систему. При весе около 10 кг. аппарат достаточно лёгок, для того чтобы его мог переносить один человек и достаточно компактен (50 см. длина, 26 см. ширина и 30 см высота) чтобы его можно было взять на борт вертолёта или использовать в автомобиле.

Также легко осуществляется подключение дополнительных технических компонентов. Предусмотренный для подключения HLS модулей (модули поддержки седца и лёгкого) разъём находится на задней стороне аппарата и позволяет подключать эти модули к аппарату в течении секунд. Кардиохелп может спользоваться с 3 режимами работы и с 3 дополнительными конечными продуктами, которые позволяют приспособить его для работы в операционной, в палате интенсивной терапии или к работе на траспорте

Фото Кристиана Келлера

Поправка к тексту ПЭТ/КТ: предельно точная диагностика рака
В нашем сентябрьском номере на странице 25 была допущена следующая ошибка:

Доктор Ганс Кристиан Ришке

является заведующим ПЭТ/КТ-центра города Фрайбурга, а не доктор Кристина Даннекер, радиолог онкологической клиники СанаФонтис, чья фотография по ошибке заменила фотографию доктора Ришке.

40

years MEDICA
1969 – 2009

World Forum
for Medicine

www.medica.de

Düsseldorf, Germany
Nov. 19 – 22, 2008

MEDICA®

Messe Düsseldorf GmbH
Postfach 10 10 06
40001 Düsseldorf
Germany
Tel. +49 (0) 2 11/45 60-01
Fax +49 (0) 2 11/45 60-6 68
www.messe-duesseldorf.de

Messe Düsseldorf®