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Russia: New cardiology centre signals better healthcare

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One of the most painful problems of modern Russia is the high death rate, especially among able-bodied people. In 2005, the average life expectancy for men was 58.8 years. In 2006, there was a significant decrease in the population death rate. Cautious estimates show that, for the first time for last eight years, the increase of 1.5 years in life expectancy for men exceeded the pensionable age. A reduction in deaths was observed in all the basic causes, including cardiovascular diseases at 67.3 thousand (5%). Could this improvement signal the beginning of a long-term positive tendency?

About a year ago, the leaders of the Russian Federation's government emphasised that it is expedient to include in the priority national project on public health services measures to decrease the death rate from preventable causes. It is no secret that many

By Olga Ostrovskaya

Russians die young from chronic diseases that simply are not diagnosed in time and, even when a correct diagnosis is made, the patient does not receive the necessary help, because of the absence of advanced equipment, and doctors' cannot provide qualified help.

In 2007, in the national 'Health' project, top medical technologies were given a new priority.

Over 30 billion roubles of the federal budget were allocated to construct 14 hi-tech medical centres in Russian regions. Eight of these have been chosen – based on population healthcare needs, as well as the presence in these localities of variously qualified personnel.

As a result, cardiovascular surgery has been sited in Penza, Astrakhan, Khabarovsk, Krasnoy-

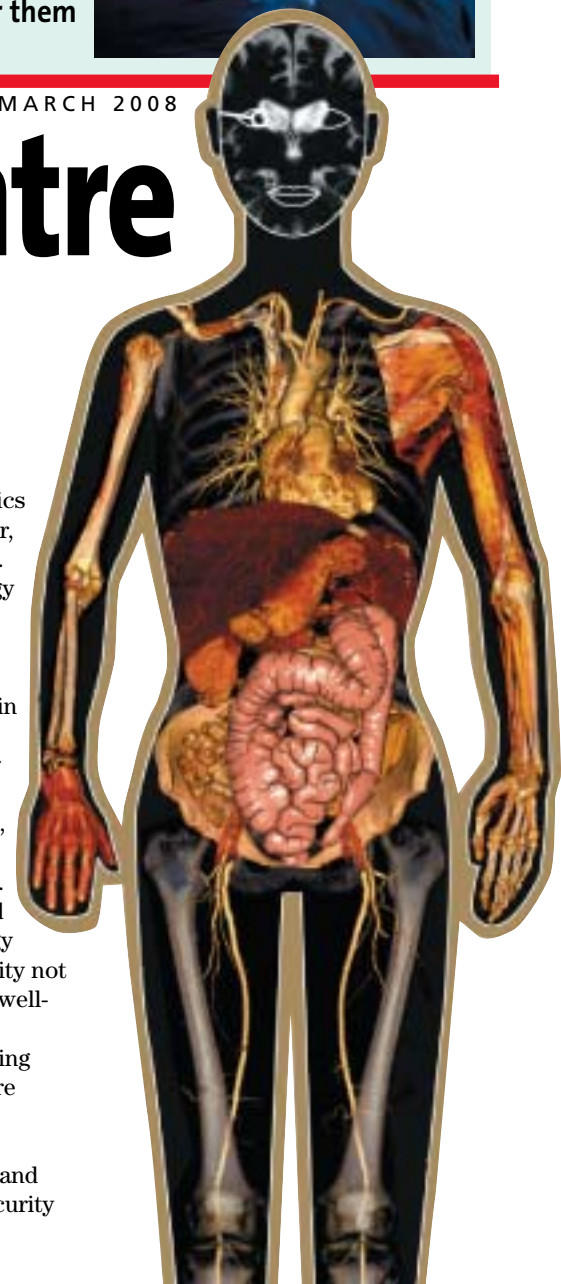
arsk and Kaliningrad; traumatology and orthopaedics in Cheboksary and Krasnodar, and neurosurgery in Tyumen.

The emphasis on cardiology is clear: cardiovascular diseases kill about a million Russians annually. 'We lag behind Europe and the USA in a number of medical technologies, particularly for cardiovascular surgery', according to **Jury Neomycin**, deputy head of the Federal agency for high technologies.

The first centre – At the end of January the first cardiology centre opened in Penza – a city not chosen accidentally, for it is well-placed geographically, with highways and railways enabling patients to travel to the centre from different corners of the region.

President Vladimir Putin and the members of the State Security

continued on page 3



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Google enters EPR pilot project

Cleveland, Ohio - Cleveland Clinic, a non-profit, multispecialty, academic medical centre, is working with Google on a pilot project to test the secure exchange of electronic patient records (EPR – or, known in the US as the electronic personal health record – PHR).

Marissa Mayer, Vice President, Search Products and User Experience, Google said: 'We chose Cleveland Clinic as one of the first partners to pilot our new health offering because, as a provider, they already empower their patients by giving them online tools that help them manage their medical records online and co-ordinate care with their doctors.'

The clinic has over 100,000 patients entered in its PHR system – the eCleveland Clinic MyChart. The pilot, an invitation-only opportunity offered to a group of Cleveland Clinic PHR users, plans to enrol

between 1,500 and 10,000 patients. The clinic reports that the pilot project will test the secure exchange of the PHR data, e.g. prescriptions, conditions and allergies, etc. between their Cleveland Clinic PHR to a secure Google profile in a live clinical delivery setting.

Patients participating in the pilot project authorise the secure importation into a Google account, via Google's AuthSub interface. To store and access the data, Google will use its GData protocol (already offered in many of the company's products) and supporting standards-based medical information formats, e.g. the Continuity of Care Record (CCR).

By integrating with the Google platform, Cleveland Clinic says that, at no cost to the user or provider, this will help to provide 'national access, consumer empowerment and 24/7 access/portability'.

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2. YOUR JOB

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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 Radiology, imaging/high tech advances

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Ambulance and rescue equipment Pharmaceutical news

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relatively modern Yes No

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

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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.

EH 1/08

COMPETITION

The EH/DNA Art competition

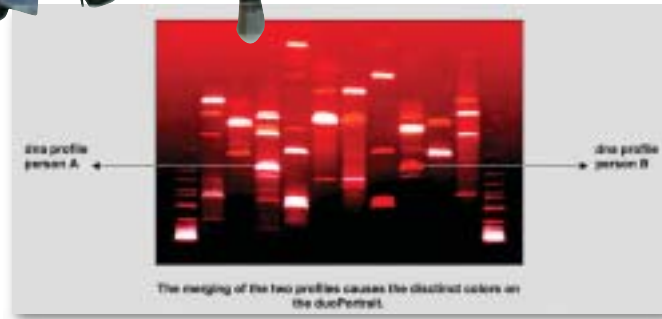


Win your own masterpiece

Everyone's DNA is different. Yours could become the subject of a unique portrait



Duo Multi



A dnaPortrait – This displays an individual's DNA bands on high quality canvas, stretched over a custom-made wooden frame. Sizes/prices: Size: 60x40cm £325; 90x60cm £460; 140x90cm £590

A dnaPhoto – After the lab process a photograph is taken when exposure to ultraviolet light colours the gel within a container. Then a high quality 60x60cm photo print is produced and supplied to the customer unframed. Price: £415.

Duo M range – the DNA of two people merged in one colour on one canvas, which creates a visually striking display of colours – an exceptional gift for marriages, anniversaries, or to celebrate a special partnership, for example. Sizes/prices: 90x60cm £595; 140x90cm £695.

Duo V range – the DNA of two people are mounted vertically in two separate colours on one canvas, which creates a visually striking display of colours – an exceptional gift for marriages, anniversaries, or to celebrate a special partnership, for example. Sizes/prices: 90x60cm £595; 140x90cm £695.

Duo Multi range – For this truly 21st Century family portrait, the DNA of four people have been arranged on one canvas in four colours. Frank Scolaro reports: 'This has put a really modern spin on traditional representation, and has had a fantastic response.' Size/price: 140x90cm £965.

The dnaCode – This sculptural crystal concept would make an exceptional commemorative award for achievements in medical research or medicine in practice. 'It's the perfect desktop gift,' Frank Scolaro points out, 'and absolutely stunning when illuminated.' Unlike the other artworks, for this the code letters of a DNA molecule, the smallest particle of DNA that still contains all its chemical traits, are used. To reveal the ATCG sequence, the gel must undergo a lengthy analysis in a second lab. Then the individual stream of letters are etched by laser into a solid, clear 12x18x8 cm crystal block, resulting in a stunning 3-D visualisation of the DNA suspended within the glass. Price: £3,000.



dnaCode crystal

DNA Art for your hospital?

Imagine hanging dnaPortraits of your hospital's leading medical experts in your reception area – certainly very apt and attractive decor and undoubtedly a talking point for patients and visitors.

Or why not consider organising one as a special prize for work excellence, or a retirement?

A SPECIAL OFFER for European Hospital readers

For anyone wishing to purchase a product from DNA Art UK the company will offer a **15% discount for a limited time only**

Please quote EH/DNA Art UK offer, to receive the discount. To discuss this or other

artworks described here, you can contact **Frank Scolaro** (and quote your introduction through *European Hospital*). Phone: +44 1932 852227 Address: DNA Art UK Ltd, 1st Floor, The Annexe, Locke King House, 2 Balfour Road, Weybridge, Surrey KT13 8HD, United Kingdom. You can view the company's products at www.dna-artuk.com or email sales@dna-artuk.com for further information.

ENTER NOW! THE PRIZE A £460 dnaPortrait of YOU

In partnership with European Hospital, DNA Art UK will supply the winner with a 90 x 60cm canvas of his or her own DNA, in a colour selected from a choice of nine (or in customised hues)

HOW will the winner's personal image be made?

Our competition winner will be sent a swab kit to swipe a sample from inside his or her cheek. This kit must then be sealed and posted back to DNA Art UK. There, the winner's identity will be protected by a barcode system and numerical identification. (The company follows the



strict European regulations that govern storage of DNA material. Frank Scolaro confirms that, after a DNA sample is processed in the lab, it is immediately destroyed).

After your DNA strings are isolated and highlighted, the image will be stretched

and wrapped on canvas. You will receive your unique work of art in about four to five weeks after your sample has been received by the lab.

*Should the winner wish to further personalise the dnaPortrait, this could be discussed with Frank Scolaro, but it would incur payment of an additional fee to be paid by the winner.

HOW TO ENTER

For quick, easy entry, visit our website: www.european-hospital.com. Or, simply fill in the Entry Coupon on this page and follow our fax or postal instructions.

PLEASE NOTE:

1. If you are already registered to receive free issues of our journal *European Hospital*, only fill in the top section of the Entry Coupon (i.e. down to your E-mail address).

2. If you do NOT receive a free subscription to European Hospital already, please fill in all requested details in the Entry Coupon.

• Closing date for entries to the EH 1/08 competition: 3 April 2008.

• Coupons received after that date cannot be entered in the draw.

• If several correct answers to the competition question are received, the winner will be drawn from these.

• Only the winner will be contacted directly.

• The winner's name will be published in a future issue of European Hospital.

• The usual competition rules apply.

What is DNA Art?



Following the development of techniques to isolate DNA and transfer it to print or canvas, DNA Art UK Limited produces the vibrant images shown on this page. 'It's a unique self portrait, a portrait of you, by you,' explained Dutch molecular geneticist Rudolf Wessels, who developed the techniques to produce these very personal portraits. This work is supported by Professor Lubbert Dijkhuizen, professor of microbiology at Groningen University, the Netherlands, and winner of the esteemed 2006 Wubbo Ockels Prize.

99.9% of our DNA is shared with all other humans. Only about 0.1% of our DNA makes us individual

DNA Art UK was established last year to supply these highly original artworks* to the public.

What makes this firm's DNA portraits unique is that they display only the 0.1% of DNA that makes someone an individual – which makes a truly personal image.

Finding that 0.1% inevitably involves a number of time-consuming procedures; these take six to eight hours per person.

For those wanting an even more individual self-portrait, the firm's laboratory can also identify several characteristics. For example, following further painstaking procedures, such a bespoke DNA canvas could show up the alcohol gene and the male/female chromosome. Frank Scolaro, director of DNA Art UK, also points out that there are some limitations as to which can be illuminated. 'Most characteristics are not located on a single gene but on multiple genes. Only the traits showing up on a single gene can make a coherent picture.' Nonetheless, work is continuing to identify over 20 other personal traits.

In effect, this company has introduced a very new kind of art form to the market, as the giclee printing technique used to produce dnaPortraits was originally developed to meet the critical demands of collectors of limited edition prints. 'Giclee productions remain colourfast for at least a century, and DNA Art UK's high resolution imaging produces a vibrancy that makes such longevity meaningful,' Frank Scolaro explains. 'DNA Art is at the cutting edge of art and science. A tiny slice of the human genome is highlighted as bands that show the presence and intensity of your DNA. This is transformed in the laboratory into a remarkable image, which is then printed as a photograph or inscribed onto a high quality canvas. Your DNA is your grand design – it's your blueprint – so you couldn't have a more real portrait of yourself or loved one.'

* Each DNA artwork is supplied with an authenticity guarantee certificate from the firm's founders.

Russia: New cardiology centre signals better healthcare *continued from page 1*

Council attended the opening. After their tour (buildings are under construction with special units using German technology) government members and many of the country's top physicians held a meeting to focus on problems in the development of high-tech medical equipment.

One problem is financing such devices; another is training doctors to use them. For the new and well-equipped centres to provide appropriate patient care, preparation is necessary, in the

short term training over 1,000 doctors and about 1,000 nurses are needed. In essence, this will demand the creation of a new system of retraining for medical personnel.

If all the envisaged premises can be executed, public health service leaders hope for a significant expansion in high-tech healthcare delivery — from 26% to 45-50%. Thus the level of medical care would rise throughout the country, not just in its capitals, Moscow and Petersburg.

Olga Ostrovskaya: Our new editorial correspondent in Russia

Formerly a medical writer with the Russian newspaper *Medical News*, and the leading newspaper *Saint-Petersburg vedomosty*, Olga is currently press representative for the Federal Almazov Heart, Blood and Endocrinology Centre, in Saint-Petersburg, and Editor-in-chief of the Russian journal *Advanced Medical Technologies*



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Computer programme aims to personalise medicine

Rostislav Kuklik reports from the Czech Republic

A computer programme under development at the National Centre for Biomolecular Research at Masaryk University, in Brno, by Jiri Damborsky MD and a team of scientists, could become the first step towards personalised medicine.

Although working for two years with a team at the Mayo Clinic in the USA, the Brno researchers have been developing their programme in a slightly different format. Currently, it can design proteins and forecast their biological behaviour in living organisms (simulated in vivo environment). The Mayo specialists concept was that the programme should be able to 'tailor' a treatment for a specific patient after the data describing a patient's own genetic sequence is entered in the programme interface. The computer then should be able to determine how that patient's unique polypeptides will react to the administration of a wide spectrum of medications used to treat the given condition, disorder, or disease.

The programme's core function is now designed to forecast the mutual interactions of proteins, which becomes a real corner-stone of the whole operation, because different sequences of nucleotides encode different genes (and different proteins) in each patient.

The software is to be re-written and tested so that it can be fully applied in clinical trials.

The Czech research team includes two informatics specialists, one molecular biologist, and (starting this year) a student from Kapitan Jaros grammar school, who has been invited to participate in the development of the final software version.

Co-operation with the US team began early last year when, following an invitation from Dr Tomas Kara, leader of the ICRC (International Clinical Research Centre) project in Brno, Professor Eric Wieben, of the Mayo Clinic visited the Brno-based research facility at Masaryk University. This co-operation is expected to produce very promising results, as American physicians possess extensive knowledge as well as the technology/laboratory equipment and the financial resources necessary to analyse patient's genetic information, and input the data into the computerised system. Czech scientists can contribute significant expertise and experience in bioinformatics, and chemistry of polypeptides.

Source: www.muni.cz, <http://loschmidt.chemi.muni.cz>



Dr Jens Meiler

Better research opportunities, defined career paths, greater job security and higher salaries: these attractions inevitably lure young, talented scientists away from their own countries to work in the USA. Among them is German biotechnologist **Jens Meiler PhD**. Four years ago he became Assistant Professor for Protein Structures in the Departments of Chemistry, Pharmacology and Biomedical Informatics at the Centre for Structural Biology, Vanderbilt University, Nashville, where opportunities for research into computer-assisted determination of protein structures have proved worlds apart from those on offer in his homeland.

'After my doctoral thesis at Johann Wolfgang Goethe-University, Frankfurt, I really wanted to go to the

Europe's brain drain

THE IRRESISTIBILITY OF US UNIVERSITIES

Biotechnologist Dr Jens Meiler explains his reasons for emigration to America

By Meike Lerner

USA, although I always intended to return home after a few years. However, during my interviews for assistant professorships, two of which took place in the US, I realised that the differences between the two countries are so enormous that, from a career point of view, it was going to be impossible to return to Germany,' he explained. Job insecurity in his homeland was one of the deciding factors: 'When you take a job there, you already know that the contract will end in five years and that you will have to start looking elsewhere. There

The team



is a danger that somewhere between the ages of 35 and 40 your career gets stuck. In particular since we are so specialised that it's becoming increasingly difficult to find the right job at the right time in your career, and when the right job becomes available you compete with applicants returning from the US - who are often better qualified because they have been able to carry out better research using their larger "start-up packages", in laboratories with better facilities and in the security of a tenure-track position.

'In the USA, assistant professor posts are designed to lead to a full professorship. Continued employment as a professor in the US is only performance-related, so to some extent you have a better control of your own destiny,' he added.

The financial situation for starting scientists is also more favourable which facilitate research at a higher level. 'When compared to Germany a larger part of the US research funds goes directly and competitively to the researchers, less goes to the University administration. This gives young scientists higher chances to receive independent funding. It also prompts

American universities to provide their assistant professors with substantial start-up finances to make them competitive. In turn American universities profit directly when their young investigators are successful, since they receive a bonus for every dollar I receive from a research foundation.' Dr Meiler pointed out. However, although US universities also pay higher salaries, he said this was not a crucial factor in his decision to remain in the US.

Aged 33 and married, with a young son, he sees his mid-term future in the US: 'If an institute in Germany was to lure me away, I would return, but these job offers are rare - there are maybe only a dozen full professorships in Germany that match my research profile. It's important that a job description fits 100%. That's why I am using all my opportunities here; after all, I have only just started my research projects and built up my staff. Our research into the computer-assisted determination of protein structures is only in an early stage, but it's very promising and carries considerable potential. This is the challenge that I'm focusing on at the moment.'

Computer-assisted protein determination

Fishing in a sea of opportunities

The field of research in which Jens Meiler and his team of 20 at Vanderbilt University in Nashville USA specialise covers the relatively new, computer-assisted determination of proteins, their structure and interactions; their aim is to determine the underlying causes of certain diseases then develop appropriate therapies.

Due to increased computer capabilities in recent years, it is now possible to carry out precise simulations of proteins and examine their structure and function. Once the functions are known, they can be manipulated through changes to their structure and proteins can be turned into therapeutics. Additionally, it is possible to determine the interactions between a drug and a protein or, vice versa, to select a drug that will bind with the protein in the best possible way, based on detailed knowledge of its structure. One of the best-known examples of this is the structure elucidation of the HIV-1 protease protein, which led to therapeutics that are part of the drug cocktail now widely used to treat patients.

Opportunities to design a protein, or find the right drug for a certain protein, are almost unlimited; currently it is difficult to determine

at exactly what stage science is at. In principle, research in this field is always as good as the programs scientists develop and the computers used to carry out the research. Further developments are therefore strongly dependent on the enhancement of computing power and the development of new algorithms. Research is now at a stage in which various possibilities to design a protein can be trialled. However, with computing power at its current level, proteins can be folded only up to a certain size; larger proteins require higher computing power.

As technical prerequisites and the different scientific areas go hand in hand, the interdisciplinary approach of the research team is important. Dr Meiler's team includes computer programmers, mathematicians, physicists, chemists, biologists and medics - i.e. those who know what problems need to be solved and those able to programme the computer to do so.

On the whole, the approach to protein research provides a significant opportunity for a new approach to drug development that, in turn, may solve problems such as multi-resistance to antibiotics.

IT & TELEMEDICINE

PREGNANT JESSICA

Virtual woman wins top award for innovators

Wales - Jessica Tate is pregnant. Hers is a normal pregnancy. There is, however, some concern because she wants her baby to be born at home, but is often alone there because her partner must travel for his work. Mid-term, she

Jessica has been pregnant for over three years

is tired and has mild anaemia. At one stage in her pregnancy she also falsely believes labour has started and is worried.

However, all should go well. She benefits from having many midwives. How? Jessica is a virtual woman and the fascinating computer programme in which she lives is helping student midwives to hone their diagnoses.

Monitoring the virtual pregnancy - Via graphics, video and sound, the students follow her pregnancy from its early stages to early

Brenda Marsh reports from the UK

labour. They can move the mouse over computer-enhanced photo images of her pregnant abdomen to draw up a clearer picture of the uterus and foetus and information is revealed gradually, as it would be if the student were using his or her hands to examine a pregnant patient. A click on key words will also produce vital current information.



Student midwives follow Jessica's onscreen pregnancy at Swansea University

Susanne Darra and Marian McIvor receiving their £500 Award for Excellence in midwifery education prize and glass trophy at the 6th RCM annual awards ceremony



Communication skills - In video clips the interactions between a midwife and Jessica are shown and students are asked to assess good or bad communication skills.

Used since 2004 at Swansea University in Wales, this programme has won a top award from the UK's Royal College of Midwives for '... using technology to explain the process of pregnancy very clearly and simply,' said Dame Karlene Davies, general secretary of the RCM.

Jessica was created by midwifery lecturers Susanne Darra and Marian McIvor who, inspired by virtual training programmes used by other

departments at the university, decided to create one for midwifery. They worked with the University's School of Health Science computer assisted learning department and the resulting programme has not only helped students to learn through Jessica, but also 'she' has helped them to promote deliveries with the minimum intervention. 'Winning this was a great reward for all the hard work we had put in - however we couldn't have done it without the help of many of our colleagues.'

This innovative programme is now being offered to other midwifery schools in Wales and it is hoped that it will spread to other midwifery teaching centres.

'For hundreds of years people supported their local hospitals out of philanthropy or generosity, not because they expected a reward.

Today, many people think of hospitals as an unpleasant place, a place they go to when they are sick. In fact hospitals are a place to get well and we should be proud of them. This misconception has to be broken if we want to motivate people and capitalise on their generosity,' he explained. Fundraising is no miracle, he emphasises, when training people in fundraising techniques. 'There's just a significant need to make it a professionally organised activity.'

The first and foremost step in establishing a hospital's fundraising project is to gain management commitment to support and invest in it. 'Although it's the people who donate to the hospital, fundraising is not a bottom-up concept. Fundraising has to become an attitude of the organisation, not just a department - this is only possible in a regulated top-down process.'

Additionally, fundraising needs good public relations. 'The best thing to do is to involve a specific person to co-ordinate the activities and contact people,' he points out.

Raising money is no miracle; it must be a professionally organised activity

'In a world where motivated people are sometimes difficult to find, I have a theory to always go back to basics: Everyone has a story to tell and also likes to hear a good story - we have to listen and tell good stories about our hospital as well.'

This year, Fletcher's team plan to organise monthly fundraising events for the hospital in various restaurants in and around Birmingham. 'We will inform people about our hospital, tell them how proud we are of it and thank them for their support. We will possibly ask why they are supporting us and we will appeal to the community to support the hospital's development, to become a part of it as its advocates.'

From the expert's point of view, healthcare fundraising is not meant to solve the problem of cost explosion. 'Hospital fundraising is not about raising money just to pay the bills and it will take a very long time before fundraising for healthcare has an impact on its overall finances.' It is, however, a brilliant method to show authorities that when they cut costs they not only affect a hospital, but people. 'Fundraising is more about involvement of the people in their hospital - a way for patients to influence the development of their chosen clinic according to their needs,' Fletcher says. Nevertheless, fundraising is still interesting for healthcare facilities because people donate for a special reason. 'You are not accountable to the hospital's financier why these donations were spent for that particular reason. For smaller clinics it could be even more worthwhile as they are closer to the community.'

Unlike in the UK and North America, healthcare fundraising is not well established in continental Europe. 'What it needs on the continent is just one hospital to be serious about making a difference,

Fundraising



Peter Fletcher

Health service budgets often cannot be stretched to buy a vital piece of equipment or new state-of-the-art department. However, by stimulating social consciousness money from the public can flood in - even enough to build an entire new hospital. Sounds too good to be true? Not according to **Peter Fletcher**, Director of Philanthropy at the University Hospital Birmingham (UHB) Foundation Trust. 'You will get what you ask for,' he told an intrigued audience of at the Hospital Management Forum in 2007 (see ECR supplement in this issue for this year's event). Although frequently used in the USA and UK, the hospital fundraising approaches he described are less known in Europe.

one hospital that believes in what it does, and decides to ask its community for support, and then, I believe, many others will follow. I was contacted by Dr Sven Ploem from the Universitair Medisch Centrum Groningen (UMCG), The Netherlands, who is keen to start a fundraising project for his radiology department. There is also a clinic in France that is going to have such a campaign next year and I guess there will be other hospitals watching these projects very closely.

For details and guidance e-mail: hospitalfletcher@btinternet.com

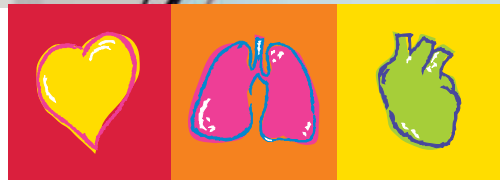
(How one hospital raised millions: page 6)

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ARCHITECTURE

High-tech 'dacha in the woods' to treat Ukrainian children



The All Ukrainian Health Protection Centre for Mothers and Children will cover 10 hectares and contain departments for general paediatrics and surgery (in five surgery blocks), oncology, oncohaematology, and a peritoneal centre. A research and training centre is also planned for paediatric doctors, to help integrate Ukraine into the world medical community

UK, France & the Ukraine – In the spring of 2006, Kateryna Yuschenko, Head of the Supervisory Board for the Ukraine 3000 International Charitable Foundation, and wife of the president of Ukraine, laid a capsule at the site of a future hospital — *The All-Ukrainian Mother and Child Healthcare Centre*. 'Today,' she said, 'we make our first step on the way to our greatest dream – building a modern hospital for Ukrainian children, the best of its kind in Europe.'

Following a competition that involved seven architectural companies – based in Germany, Netherlands, Italy, the United Kingdom, USA, and the Ukraine itself – the selected architects for the new 250-bed children's hospital are bdpgrroupe6. 'The objective is to build a children's hospital with the most modern medical equipment and to organise a clinic facility that provides specialised, high tech medical care,' explained Neil Cadenhead, Director of bdpgrroupe6. 'As architects and engineers, we have the ability to design it very sustainably. This appointment confirms that there is a demand for the very best of

European hospital design in the international arena.'

The architectural firm BDP, with Groupe6, its associate practice in France, are regularly listed in the BD World Architecture top 10 healthcare architects. 'We currently have healthcare buildings in design and construction of a value in excess US \$4,527 million in addition to a large international commercial portfolio. The firms are growing and ambitious and have 12 offices in France, the UK and overseas,' the company reports. 'Our formalised association as bdpgrroupe6 is to undertake international healthcare commissions and we are actively pursuing opportunities throughout the world, often using local collaborators.'

Construction of the 5-6 floor hospital began last year and will end in 2009. The bdpgrroupe6 are the architects and structural and environmental engineers. The group is supported by EC Harris as health planners, quantity surveyors and equipment advisors, and by Budova Centre in Kiev - architects engineers and quantity surveyors.



The winning architects designed a highly sustainable building sympathetic to the site, which is in a pretty forest on the edge of Kiev. 'The new building separates the treatment and diagnostic areas from ward areas and buries the former block beneath a 'green' roof so that it merges with the forest floor. The ward blocks were inspired by the Ukrainian tradition of the *dacha* in the woods, re-interpreted within a modernist aesthetic,' bdpgrroupe6 explained

FUNDRAISING

The power of people

When the Oxford Radcliffe Hospitals NHS Trust invested £109 million in its new Oxford Children's Hospital, funding for certain special embellishments could not be contemplated. Thus a £15 million Campaign was launched to enable the hospital to be built and equipped far beyond the NHS standard. £13.8 million of that target has so far been received. Who raised that astonishing sum? Its benefactors are ordinary people, the young, old, healthy, sick, and all kinds in between. How? Seeking answers from the Trust, **Brenda Marsh** (European Hospital) discovered inspirational as well as heart-rending tales

Children



12-year-old singer, Zoë Mace, recorded an album inspired by her four-year-old Down's Syndrome sister, who died. In just five weeks, that folk and opera CD, *'Little Ray*



of Light, sold 5,000 copies nationwide. Zoë and her family have raised over **£26,000** for CHOx.

Schoolchildren produced the opera *'Amahl and the Night Visitors'* at which a 13-year-old child, suffering Crohn's disease, sang in the choir. This event raised **£29,000** from ticket sales and donations. In addition, inspired by this effort, an anonymous donor donated **£25,000** to CHOx.

Two teenagers, Billy Henson and Leander Cadbury, climbed the summit of Mont Blanc — 4,807 metres. Their efforts raised over **£24,000** for the TORCH Appeal, a charity set



up by the family of their friend Tom Waley-Cohen, who died of cancer when aged 20. Aiming to raise **£1,000,000** to name a surgical ward at the children's hospital, Torch has already exceeded that target.

One teenager's personal campaign — 'Sophie's Campaign for the Children's Ward for Interesting Things to Do' (SCCWID) was set up in 1997 by 14-year-old Sophie Watson, a cancer patient in the John Radcliffe Hospital. After Sophie died, in 2000, the charity pledged **£250,000** (which they exceeded) to the new Children's Hospital. Their fundraising continues, largely through successful sales of SCCWID clothes, which are sold by youngsters across Britain.

Teenager Andrew Baker, a former patient who survived major brain surgery and, by way of thanks, for his treatment, began fundraising, with a target of **£20,000**. He has enlisted the help of his school and a nearby girls' school, and recently organised a football tournament.

The new Oxford Children's Hospital has taken the majority of children's services from the Radcliffe Infirmary (now closed), Churchill Hospital and John Radcliffe Hospital in Oxford under one roof, creating a centre of excellence for sick children.



Treating about 65,000 children annually, this hospital is certainly child-friendly: everything has been designed specifically for tots to teenagers, as well as their families. A major feature, for example, is the parent bed and storage area that has been included beside most of the children's beds. In addition, there are classrooms, play terraces, sensory rooms, colourful sporting animal direction signs, adolescent facilities and parent/patient kitchen and lounge facilities, all designed to help minimise distress, provide distraction and make life as normal as possible for children and their families during the stressful times.



The way in which dedicated child, adult and business fundraisers have raised and continue to raise cash for the Campaign for the Children's Hospital, Oxford (CHOx) is

inspiring. In addition, their ideas have provided considerable fun for those taking part. Here are but a few examples of what they did, and achieved.

Clearly so much can be gained to raise the standards of hospital facilities simply by asking the public to help – for it is to them that a hospital also gives.

Parents and individuals

The parents of a 4-year-old who died in 2004, set up a charity to raise £1 million by 2007, to provide vital equipment and name an oncology ward after their son. By December 2006, they had raised **£560,000**. In 2007, a dinner dance and special lottery, which

offered spectacular prizes, raised around **£250,000**.

A young mother and friends organised a Memorial Fun Day, in memory of her 30-year-old husband, who had died in an accident. They raised **£1,200**.

Local newspapers

Newsquest, Oxfordshire backed the Children's Hospital Campaign with publicity over a five-year period. This included two pages weekly in the *Oxford Mail* during its fifth year as a supporter. The coverage in the *Oxford Mail* and *Oxford Times*, together with activities organised and supported by the company, e.g. the OX5RUN (an annual five-mile sponsored run in the grounds of Blenheim Palace), was a major factor in helping to raise **£3 million**.



CHOx makes front page news

Actor Jason Donovan joins the fun run



Organisations and commerce

Renault F1 Team gave a **£150,000** gift to the Children's Hospital Campaign in 2005 to name the Renault F1 Team Play Terrace, between Tom's Ward and Robin's Ward. They continue their support with gifts of auction items, toys for the children and pedal and electric



in a huge number of events, e.g. a 55-kilometre walk, golf days, a car raffle, sponsored runs, T-shirt sales and counter collections.

Other charities

A £14,000 mobile cardiac monitor was purchased for the Children's Hospital thanks to funding from ECHO, a leisure industry charity.

The Baronets Trust donated **£12,000** for a specially designed bath and ceiling-mounted hoist for the hospital. (In Britain, the title baronet is an ancient hereditary honour; its standing lies between a baron and knight).

And so donations have arrived, raised by everyone, from the poor to nobility, the young and old, the week and the strong.



** With special thanks for help and co-operation to Claire Hooper, Communications & Stewardship Manager, Oxford Radcliffe Hospitals NHS Trust.*



Baronets and bath



Formula 1 cars, and recently driver Lucas di Grassi (pictured) visited the patients. All their involvement has resulted in positive media coverage and the gift has resulted in a long-term relationship that benefits not only child patients, but also the Renault F1 community profile.

Shops: The Midcounties Co-operative Society made a commitment to raise **£150,000** to name the Children's Radiology Waiting Area. In addition to a creative array of events, activities as well as its team participation in the OX5RUN, the Co-op asked every customer that



went through their 130 stores in August 2006 to add 50p to their bill for the Children's Hospital. Over 120,000 customers said 'Yes'.

Siemens Magnet Technology has taken part in many events to raise funds for the children's hospital. For example, eight of its engineers cycled 100km off-road, which



raised **£17,100**. This Siemens division makes magnets for hospital MRI scanners.

A computer company aims to raise another **£45,000** for CHOx, to help develop a Resource Room on the surgical floor. This firm, CSW, specialises in products for electronic health records management, and integration with web-based knowledge resources.

Builders - The management team at Oxford builders merchant Johnsons Buildbase unanimously pledged **£55,000** for the CHOx appeal — and their staff happily joined in. As a result, they have beaten their target, by participation

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*Ram FSF et al, The Cochrane Library 2005, Issue 4

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Transcending

Top technology and design coalesce in the ultimate operating theatre

from view, so that, during difficult phases, the surgeon can work in peace without guests having to leave the operating theatre. Trainees can also rotate this way – some in the theatre, then swapping with a group in the bistro.’

The system also can be set up to provide live links to other hospitals, practices or to national and international congresses. As **Heinz Jacqui**, Managing Director of Olympus Winter & Ibe GmbH pointed out that video and audio links to other departments in the hospital can be created in the future ‘for example to the gastroenterology and radiology departments’.

Dr Langwieler added: ‘Our aim is to further enhance the competencies and quality of our work. This not only means the treatment of patients across borders, or the close co-operation with Ronald Marvik at Trondheim (Norway) and Antonio Lacy in Barcelona; it also means finding new ways forward in research and development. Real innovations come from smaller hospitals. We are much more versatile than larger hospitals – when it comes to co-operation with Olympus in the development of a new instrument, or in modifications for a surgical

procedure, we can test this method in a relatively short space of time.’

Thomas Lütke-Kappenberg, head of systems integration at Olympus Germany, agreed: ‘It’s what makes smaller hospitals interesting for the industry – including Olympus. They are better placed to come up with new ideas more quickly and to put them into practice. Interestingly, we then get ideas such as the use of podcasts and videos in medicine. We are not at all ruling out this very interesting technology; we intend to discuss with Apple how we can use it in medicine.’

The podcasts of operations would not only be used for training purposes, but also to record certain aspects of a procedure as information for patients, Dr Langwieler pointed out.

‘All of this should then also be available for downloading from the Sieveking Hospital website or from the Olympus website,’ Thomas Lütke-Kappenberg continued. ‘It will be the next step in our co-operation. After that, we will try to develop similar concepts to those put into practice in surgery for the gastroenterology department, which is currently being completely redeveloped at the Amalie Sieveking Hospital. Dr. Langwieler

and Prof. Koop (Gastroenterology) are the points of contact for the development of this new concept for gastroenterology. The future in this area of integration is not only in the theatre but also in gastroenterology and the networking of both technologies.’

‘Despite being a small hospital, with this project we are continuing our strategy of becoming a technological leader’, said **Ralf Pinnau**, Managing Director of the Ev. Amalie Sieveking-Krankenhaus.

‘Following the successful implementation of cardiac infarction care with one of North Germany’s most modern catheter laboratories, with Olympus we are now committed to further developing a centre for MIS and MIS gynaecology. Without a doubt, the hospital has become one of the most interesting places to work in the field of minimally invasive surgery which, in the long term, makes us even more attractive to potential employees and consultants.’

Funding, planning, construction and realisation

‘The idea for the reconstruction was conceived at a congress,’ Dr Langwieler explained. ‘For reference, we chose the operating theatre in Barcelona. We flew to Barcelona in

The theatre is spectacular. Its immaculate cornflower blue glass walls surround space age technology – the EndoALPHA system. Even that name suggests something that surpasses what existed before; it’s ‘the be all and end all’.

Mounted like futuristic works of art, HDTV monitors display digitised X-ray images of endoscopy procedures transmitted by the surgeon from cameras that explore the body’s depths. The clarity achieved is significant. ‘The use of high-resolution HDTV camera systems together with NBI (Narrow Band Imaging) allows even the smallest of changes in the stomach or breast to be detected when performing tumour operations,’ explained **Thomas E Langwieler MD**, head of surgery at the Ev. Amalie Sieveking-Krankenhaus.

The beneficial effect of the surroundings is palpable. Patients enter the theatre visibly more relaxed, he said: ‘Patient comfort definitely increased, and the positive impact on the subjective feeling of well-being among the surgeons and theatre staff. There’s a positive impact on workflow.’ Maximum freedom of movement is

ranging to the adjustment of the operating table, so we don’t need an assistant to do these jobs for us. The same applies when we wait for instantaneous sections and inform the pathologist. Using the video systems we can confer with one another and make real-time decisions. It also applies to imaging: we can upload images directly into the PACS, losing no time during surgery. Our hospital departments have always worked very closely together. With this technology it’s no longer a problem for another surgeon to join an operation with little time and effort.

The new theatre systems also aid training and research. ‘We are a teaching hospital for minimally invasive surgery (MIS), which means guests are always observing our surgical procedures. Eight to ten times a year we carry out MIS training courses. Through the video technology we can send images directly to monitors in the conference and training rooms and a “bistro” that is separated from the theatre by frosted glass. At the touch of a button, our guests can follow operations live, with all the images in HDTV quality on a separate TFT screen. They can also talk to the operating surgeon via a



Left to right: Denise Hennig (European Hospital representative), Thomas Langwieler and Thomas Lütke-Kappenberg

achieved due to the lack of cabling lying around, as well as the easy, quick movement of devices, as needed.

‘At the moment the theatre is mainly used for laparoscopic interventions; obviously we could also use it for conventional surgery,’ Dr Langwieler continued. ‘Through the outstanding functionality we have achieved shorter preparation times and can start operations quicker. The touch screen allows us to adjust all the required settings on-site, starting with the correct lighting and

microphone. They also see instruments and camera systems in use, so directly experience what they have learned in practice. Everyone has a good view and can observe an operation in the best possible way.

‘This is very attractive for training medical students, nurses and other operating theatre staff. They don’t have to spend the entire time in the theatre; they can take a break, sit down, and have coffee. However, the glass is not always see-through – if necessary it can be iced up, completely shielding the operation

Ev. Amalie Sieveking Hospital

With its focus on acute heart attacks and cardiac care, minimally invasive visceral surgery, orthopaedic and trauma surgery, gynaecology and obstetrics, gastroenterology, and treatment of acute, complex geriatric cases, and, as the teaching hospital for Hamburg University and a member of the Northern German Heart Network and Northern German Orthopaedic Network, this smallish hospital treats over 20,000 patients annually.

Measured against the number of beds, the hospital also operates one of the biggest accident and emergency departments in Hamburg, and also works with doctors and therapists at the Therapy Centre in Walddorf.

The **Albertinen Group** treats over 35,000 in-patients and about 40,000 out-patients annually, at its many establishments: the Albertinen Hospital, Albertinen-House; Centre for Geriatrics and Gerontology; Evangelisches Amalie Sieveking Hospital (including Richard-Remé-House) and Residence Wohnpark am Wiesenkamp.

ASPECTS OF THE ADVANCED ENDOALPHA SYSTEM

Operation: Medical devices (e.g. camera and insufflator) and non-medical peripheral systems (e.g. lighting) are operated and controlled via two identical touch screens in the sterile and non-sterile areas. The intuitive user interface and optional voice control provide safe and speedy central operation of all theatre equipment. Pre-set device configurations and lamp settings expedite set-up and changing procedures.

Communication: The user-friendly interface and modern, integrated video and audio technology ensure communication both inside and outside the operating theatre. Inside the theatre every individual video source can be displayed on all screens. Images of findings, e.g. from the radiology department, can be displayed, for example, on the 40" TFT wall monitor. The video conference module also enables telemedicine with internal and external partners. Live connections for teaching and demonstration purposes, as well as consultations during surgery, open up new communication possibilities.

Integration: As well as traditional integrated systems, e.g. operating theatre lamps, surgical light camera, operating table and room camera, a full documentation and video management system are integrated with the Advanced EndoALPHA system. Standardised interfaces connect to the HIS and PACS to acquire digital image data from, for example, the radiology department.

Video management: The digitisation of image and video data from all video sources in the theatre and its connection to the hospital



Touch screen in the non-sterile area

IT network enables access to images and videos throughout the hospital. Four additional operating theatres and the gastroenterology department are included in the system, so that images from any video source can be displayed in all operating theatres, examination and senior consultants’ rooms. The simultaneous processing of audio data facilitates bidirectional communication between the interdisciplinary departments. The flow of information to and from the operating theatres also can be extended to the international scientific community.

Documentation of findings: The interdis-

ciplinary and modular system ENDOBASE documents findings before, during and after the intervention. Users can, for example, create and maintain patient data and digital files, record images and video sequences, and write and archive findings and reports. In addition, diagnosis and accounting codes can be created and statistics evaluated. Standardised HL7 and DICOM interfaces enable data exchange with the HIS and PACS.

Ergonomics: Ceiling mounted medical devices can be easily and quickly manoeuvred into the optimal position for each procedure.

There is also no risk of tripping over cables on the floor.

All important device settings are shown on a central display.

Large windows provide sufficient daylight and, with the fully-glazed walls, present a pleasant working environment.

Lighting: The theatre’s two lamp rings can be independently controlled (white and blue light) for ambient lighting and an LED colour concept (developed for this new theatre). These ensure ideal lighting conditions during surgery, as well as a pleasant atmosphere for patient and personnel before, during and after an intervention.

Teaching and research: Integrated audio and video (AV) technology assists in employee training, academic teaching and research. Live connections to the hospital’s lecture halls and lecture rooms can be set up as quickly as links-ups to other reference centres.

A frosted glass panel can become transparent at the touch of a button to connect the operating room to its neighbouring bistro.

Using bidirectional technology, a wall monitor in the bistro can receive any video signal transmitted from the operating theatre.

Hygiene: The wall design is groundbreaking; instead of tiles or Trespa panels, the operating theatre is completely glazed. These individual glass panels can be removed to enable conversions and integration of new technologies. The glass walls and ceiling supported medical devices enable quicker and more thorough cleaning and also reduce set-up and changeover times.

tradition

2006 to get a better picture and we realised that our operating theatre should be designed differently. Some design ideas developed during the planning phase, but we needed funding for their implementation, which we requested from the city council for the entire operating theatre refurbishment. Within the Albertinen Group, we also had funds of €2.7 million. As soon as the finance was in place there was a lively exchange between everyone involved in the project, including the architects, because not every idea could actually be implemented as planned. The blue walls, for example, were only developed during refurbishment.'

The project, which involved

relocating a central sterilisation unit, new construction, and the refurbishment of four existing operating theatres, took 16 months to accomplish from planning to the official opening. During the five critical months there were times when the operating theatre could not actually be used, Dr Langwieler pointed out. 'The modifications did have an impact, but it was not as extensive as we had assumed. We also did a good job in terms of logistics. We extended our working hours during the week, then didn't operate some weekends. A further limitation of our work was that we had to relocate the recovery room and changing rooms to the third floor. We operated on the second floor, which meant that we could

only reach the operating theatre via sealed off stairways. Hygienists took daily swabs to ensure that we adhered to the hygiene guidelines. Transportation across two floors, along with those daily checks, were quite complex, but at least we did not have a total outage.'

Thomas Lütke-Kappenberg believes past experience helped during the Hamburg project. 'We could fall back on experiences gathered in Barcelona over three years ago. However, other aspects, developments and new functionalities were added in Hamburg, such as digital video screens, the architecture of the operating theatre, ergonomics and the extension of functionalities by a few PACS systems. Luckily, we didn't have to develop a new IT infrastructure: the existing network was completely sufficient, but we did need to programme the interfaces, which is not always easy. However, the Albertinen Group's IT department was most co-operative.'

And so to the future...

Since the successful hand-over of the first integrated Olympus operating room in the Hospital Clinic Barcelona in 2004, the company has completed over 70 reference projects in Europe, and reports that the number will increase at an even greater pace in future.

Today, the European Olympus Medical Organisation employs about 2,000 members of staff, who work on the development and sales of endoscopic systems in over 30 national companies.

'For Olympus this highly modern operating theatre (in Hamburg) serves as a global reference centre for customers from all over the world, and the opening of a new global Olympus Training Centre with an operating theatre showroom in Jenfeld will complement this overall concept,' Thomas Lütke-Kappenberg explained. 'The training centre offers an exclusive training

programme and through the link with the reference centre online training can be carried out at any time. The geographical proximity of the hospital to Olympus also promotes this form of co-operation. Moreover, the rebuilding of the operating theatre was certified by the Technical Inspection Authority for the first time, i.e. we are the first organisation which supplies and fits operating theatres certified by the Technical Inspection Authority.

For such advanced operating theatre, Olympus works closely with Europe's leading surgeons and endoscopists and, according to **Frank Drewalowski**, General Manager of Olympus Medical Systems, Europa, the company is investing in specialist teams of project engineers and service experts right across Europe – all who are, he said, 'committed to turning all the visions of operating room users into reality'.

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OLYMPUS

Your Vision, Our Future

J McD: With the acquisition of DPC, Bayer Diagnostics and Dade Behring, Siemens can now offer a more comprehensive portfolio of technology that enables us to look at a disease along the continuum of care and engage from a screening and predictive perspective. Having integrated in vivo and in vitro technologies, we can provide customers with an integrated delivery model, which allows them to do business with one company, rather than multiple companies.

This sounds like hard work for laboratories and radiology departments, which may see one another as a kind of competitor.

J McD: Well, on the one hand, while pathologists are different from radiologists, we are seeing impressive examples, around the world, where both work together to provide integrated diagnostics that create advances in healthcare never seen before. I think, in many ways, radiology is not so different

DIAGNOSTICS

Uniting the lab and radiology

Healthcare is in a dynamic state of change — and so is the healthcare industry, in which there is an increasing trend towards integrating scientific disciplines.

The Siemens Healthcare acquisition of DPC, Bayer Diagnostics and Dade Behring is a good example of this.

Meike Lerner (EH) asked **Jackie McDowell (J McD)**, Head of Integrated Diagnostics and Market Development at Siemens, why the company chose this route, and how following such practice could also benefit hospitals



This concept translates into greater efficiency for our customers. With Siemens' capability for full integration, we can look beyond disciplines and focus on disease states and organisational challenges. We can view the entire picture and as a result develop tools and products that will help our laboratory customers to work along the continuum within their own hospitals.

Whether it is research and development, the development of technology or biomarkers strategies, we believe we can help customers to expand diagnostics beyond the laboratory and incorporate more than one discipline. We can also be proactive in terms of helping the laboratory, imaging departments and hospital management to realise improvement potential in the workflow of diagnostic medicine. There is a lot of value and power in looking at it this way — many of today's thought leaders believe it will become increasingly valuable for laboratories to come out of their silos and collaborate closely with imaging to provide outstanding patient care.

Additionally, one of our goals is to support laboratory professionals in creating more awareness and visibility for themselves within the healthcare environment through the positioning of integrated diagnostics. Of course that requires a mutual understanding between laboratories and their imaging counterpart — the radiologists. Today there is often a sense of the unknown across the two departments. And our opportunity as a company is to help our customers take down those walls through education and knowledge and broadcast the message that integrated diagnostic data, both imaging and laboratory, is the most powerful information in the hospital.

from the lab. The biggest difference is that in radiology you move the patient, whereas in the lab you move a specimen from the patient.

To harness the potential of integrated diagnostics, organisations will have to empower and encourage people to work with other disciplines. When leadership encourages people to look at the disease state, people recognise that there are many synergies. It's not about relinquishing control of a department; it's about exponentially increasing the power of diagnostics — laboratory and imaging combined.

At a recent symposium that focused on integrated diagnostics, a radiologist noted that he had learned more about pathology in the last two days than on his own in the last five years. Today, he believes that the powerful combination of pathology and radiology places both disciplines in a stronger position with hospital administration, by demonstrating the value of diagnostic medicine as a whole.

At Siemens we have torn down our silos by integrating in vivo and in vitro diagnostics and focusing on the care continuum and patient pathways, and we believe we can provide value by travelling a parallel path with our customers because, in many ways, we are experiencing exactly the same things. When we work with our lab and imaging partners, we find both are very excited about what Siemens is doing. It's an opportunity for us to work together, not just from a technology perspective, but from an overall workflow and solutions perspective. This is our vision of how quality in healthcare can be improved. We are convinced that laboratories and radiology departments will come together to build diagnostic services that take medicine to a whole new level. We're excited to be part of it.

The Amsterdam Clinical Automation Conference



13-14
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Automating a clinical laboratory is complicated and expensive. The Amsterdam Clinical Automation Conference aims to provide access to major clinical laboratory automation manufacturers and provide tools to help laboratory managers to select and implement those technologies.

Presiding over the programme will be AACC* president, Larry Broussard PhD (Louisiana Health Science Centre, New Orleans, La). Moderators are Robin Felder PhD (University of Virginia, Charlottesville, VA) and Henk Goldschmidt MD (Regional Diagnostics Services, Tilburg, The Netherlands).

The keynote presentation by Ed Bos of KLM Airlines, will demonstrate how KLM Airlines and Schiphol Airport successfully used RFID technology to improve luggage management. Jan Dols PhD will then describe how his hospital laboratory has used RFID technologies to improve tracking.

Other key topics: autovalidation, Lean management principles, automated Q.C., and calculating ROI using procurement models.

As a finale, Jackie McDowell of

Siemens Medical Solutions (see article on this page) will present a new diagnostic paradigm — merging digital, imaging and laboratory data.

During the conference, clinical automation companies will present products and be available for individual discussions.

Also in 2008

10-11 September, Cambridge, UK. Evidence-based medicine and patient focused testing, jointly sponsored by the AACC and ACB.

13-14 November, Honolulu, HI. 'Laboratory Medicine: Into the Future', co-sponsored by AACC and the Australian Association for Clinical Biochemistry.

* Jointly sponsored for the fourth time by the American Association for Clinical Chemistry (AACC), the Association of Clinical Biochemistry (ACB — UK based) and the Netherlands Society for Clinical Chemistry and Laboratory Medicine (NVKC).

Conference supporters: Beckman Coulter, Ortho-Clinical Diagnostics, Radiometer and Siemens Healthcare Diagnostics.

Details: www.aacc.org. E-mail: jrhame@aacc.org

What does the future hold for hospital laboratories?

By **Marika Mayer**, Consultant with Master's degree in business Administration, IK-die-Krankenhausberater

The complete takeover of hospital laboratories through private laboratory service providers is rapidly changing the nature of German laboratories. Taking a closer look at these developments, it becomes apparent that several trends are developing.

On the one hand there are massive efforts towards outsourcing, i.e. privatisation of laboratory diagnostic services in hospitals. This can be on a legal and spatial basis, i.e. in the shape of a complete closure of the in-house laboratory. An external laboratory then supplies the hospital entirely with the necessary laboratory diagnostic services; however, at the same time this necessitates the installation of POCT (point of care testing) on site to ensure that emergency laboratory testing facilities are always available in the hospital.

However, laboratory outsourcing does not necessarily require spatial outsourcing of the production of laboratory results, as the 24hr availability of a laboratory is a must-criterion for continued high quality patient care in medium-size and large hospitals. The external laboratory services provider takes on legal, organisational and

Is Lean right for your organisation?

By **Maria Foster**, Managing Director, Whitebridge Associates, Pittstown, NJ

I have been involved in bringing Lean (and Six Sigma) methodologies to over 70 hospitals.

In the early years, I was confident that Lean, with its proven results in industry, would drive significant improvements in healthcare delivery worldwide. However, I have found that while Lean is conceptually an amazing approach, it does not work in all hospitals. Not because some hospitals do not need Lean, but because some hospitals do not successfully implement and sustain a Lean culture.

What does it take to implement Lean?

The two most important components for a successful Lean implementation are strong leadership and breaking down the boundaries between departments.

The leadership of the hospital must be ready for the resource and time commitment needed to support a Lean implementation. Lean is

not about tools or methods; it is a management philosophy and about creating a culture of continuous improvement. Organisations that are effective in implementing and sustaining Lean have leaders that:

- Create a vision
- Have an implementation plan
- Invest in in-house resources
- Embrace change management
- Commit to staff education and coaching
- Monitor, quantify, and post results
- Motivate and reward employees for their contributions

Within each hospital there are a number of departments with different technologies, staff, and information flow. Often, these departments operate without knowledge of their impact on the rest of the organisation. Establishing a cross-functional team assists with viewing the movement of the patient as a continuous flow versus a series of individual steps.

It is often said that people change when they see the light or feel the fire. Hospitals that have successfully implemented Lean throughout their facility have started with a Lean implementation in a high risk area (e.g., medication delivery and management) or an area that incurs high costs or patient dissatisfaction (e.g.,

patient flow in an Emergency Department). These are areas where most employees agree improvements are necessary and where small changes can generate results quickly. Success in one area generates enthusiasm and becomes contagious throughout the facility.

What does it take to sustain Lean?

While a successful Lean implementation generates a lot of excitement, many facilities have found that the gains made start to dissipate over time, or remain isolated to a small area of the hospital system. Why does this happen? Again, it takes strong leadership and cross-functional teams committed to Lean to keep the momentum going. Without vigilance, people will go back to what they have always done.

Lean is a cultural and continuous improvement journey that never ends. Are you ready to start that journey? I recommend the use of an outside consultant to begin and then build your own competency. Be sure that the outside firm can communicate with your organisation. Work with someone who has taken the time to translate the Japanese concepts of Lean so that they are meaningful to your staff.

And, most of all, be committed for the long term to ensure an effective implementation and sustainable gains.



Maria Foster

Outsourcing, co-operation or centralisation

financial responsibility and acts as the operator of the in-house laboratory. The existing staff can be taken over or supplied by the hospital. At the same time the strategic laboratory partner is guaranteed the exclusiveness of outsourcing - laboratory tests that the hospital did not process for economic or technical reasons and that were sent on to other, specialised laboratories, are now exclusively processed by the new laboratory partner.

Along with outsourcing there are also increasing efforts towards co-operation and centralisation of laboratory diagnostics in hospitals, especially against the backdrop of the recent waves of mergers among public hospitals. We often see the formation of one main laboratory and one or more basic laboratories, whereby the range of services offered by the basic laboratories is limited to easily mechanised, routine parameters, and service hours are often limited. The main laboratory, on the other hand, not only offers routine diagnostics but also specialised services in hormone diagnostics or microbiology.

In the course of centralisation it is also possible that smaller laboratory units are closed and one central laboratory takes on the round-the-clock care for several hospitals.

As a result of the 2004 Law on the Modernisation of Healthcare, hospitals are increasingly making use of a further type of laboratory care. So-called medical centres, run jointly by hospitals and/or private laboratories, concentrate laboratory diagnostics of at least two specialised areas (such as laboratory medicine, microbiology) and additionally act as providers for out-patient clinics and other users. This structure is particularly common for large hospitals or university hospitals where the range of services offered exceeds the capacities of conventional, medium-size hospital laboratories. These types of solutions are also similar to the outsourcing principle.

For private providers (laboratory specialists in private practice) who have to survive in a strongly competitive market characterised by crowding out, loss of profits and stagnation resulting from health politics, the wave of outsourcings of laboratory diagnostic hospital services offers an enormous growth potential.

Hospital laboratories are currently much sought-after objects, with the competition offering them opportunities to obtain laboratory provision at around 20-30% cheaper compared with own-run laboratories. The winners of this development are often large laboratory services providers with supra-regional structures. They are able to use (and pass on the benefits of) their advantageous conditions of purchase and know-how within the industry to the hospital laboratories. Laboratory doctors in private practice have already had to learn to deliver economical, rational but nonetheless high quality work, often associated with painful losses.

The changing structures only very rarely lead to losses in quality, because the laboratories have

comprehensive quality management in the shape of special accreditations and certifications. The developments explained above account for the increasingly growing proportion of privatised hospital laboratories.

At the same time, the trend in the private laboratory sector is towards concentration of the labour market, not only on a German but also on a European level. International chains of laboratory services

providers are rushing on to the German market as the local laboratory companies are sought-after objects for potential take-overs or stakes, because they are mostly tightly organised and work efficiently. *Sonic Healthcare*



Marika Mayer

made the headlines in 2007 when they took out a stake in Labor Schottdorf in Augsburg, and so did the takeover of Bioscientia GmbH. *Futurelab*, a laboratory services provider predominantly operating hospital laboratories and currently expanding across Austria, Switzerland and Eastern Europe, has acquired a major stake in the Münchener Labor Dr. Tiller. It seems that none of the large German laboratory companies is currently safe from rumours of

takeover, but then, there is a little truth in every rumour.

It would not be speculative to say that the European labour market will increasingly be characterised by convergence and internationalisation. It remains to be seen to what extent further, internationally represented companies – from other industries as well – will break into this market, which is still attractive, with returns of up to 20%.

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Labs are vital

Labs are Vital is a global initiative managed in the United Kingdom by a steering group that includes the Royal College of Pathologists, Association of Clinical Pathologists, Association for Clinical Biochemistry, Institute of Biomedical Science, British In Vitro Diagnostics Association and Abbott Diagnostics. 'Laboratory medicine is at the heart of patient care. It is important that we raise the profile of laboratories and highlight the quality, safe and cost effective service they deliver,' explained **Dr Graham Beastall**, Labs are Vital executive member and Consultant Clinical Scientist at the Glasgow Royal Infirmary.



UK initiative supports lab professionals

'Many lab professionals believe – not unjustifiably – that their contribution is not recognized.' The initiative also addresses issues that laboratory teams face today: rising costs, regulatory requirements and the trend to automation. The organisation criticises developments that relegate diagnostic medicine and supports new information strategies, such as 'Safe, Accurate & Effective: An Action Plan for Healthcare Science in NHS Scotland', which was recently launched by the Scottish Government. 'Healthcare scientists deliver a superb service throughout the UK and beyond, ensuring quality and patient safety,' Dr Beastall added. 'We are involved to see similar commitments in England, Wales and Northern Ireland.' Another key objective is to stimulate communications between laboratory professionals. To this end, Labs are Vital is also using the internet to present information and interesting online activities for its registered members (<http://www.labsarevital.co.uk>).



LOOK TO TOMORROW

MESSE MÜNCHEN INTERNATIONAL

HIV Preventing mother-to-child transmission during pregnancy

By **Tamar Jehuda-Cohen PhD**, Biomedical Engineering Department, Technion Institute of Technology, Haifa, Israel

HIV infection is transmitted from mother to foetus, and 28-30% of babies, born to (untreated) HIV positive mothers, are infected with HIV. Since the risk of transmission to the foetus is directly proportional to the viral levels in the mother's blood, any reduction in viral load could improve the chance of the baby to start life without that deadly infection. This reduction can be achieved by antiretroviral drugs (ARV). However, these could have adverse effects on the foetus, especially during the first trimester.

Due to the very high exposure to the mother's blood during labour and birth, these are the most critical stages to reduce the risk of exposure.

mother and baby can halve the risk. The fact that the ARV regime is a short one and its effect in saving lives is so dramatic, lead to broad implementation of ARV-pregnancy-protocols globally, including the poorest and most afflicted areas, because the treatment is manageable, cost effective, and of limited duration, and, most importantly, because we are responsible for the well-being of newborns.

The key to implementing any ARV protocol is detecting HIV infected mothers. In some countries and states all pregnant women are

technology, Stimmunology, has been developed, which enables detection of antibodies even during the WP (Fig 1). This is achieved by pre-incubation of the blood sample, in a SMARTube for stimulation of antibody production. In a study in Kenya, 20 pregnant women were tested for HIV with and without the SMARTube step. Eight were seropositive, yet, among the seronegative women, there were an additional five who were in the WP, and their HIV infection was detected only after pretreatment of sample with SMARTube. These

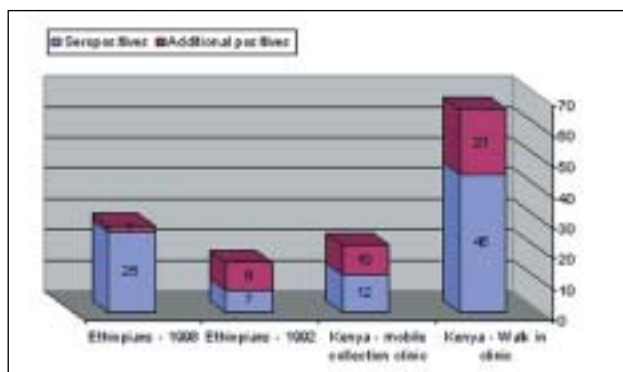


Fig 1: Clinical trials summary

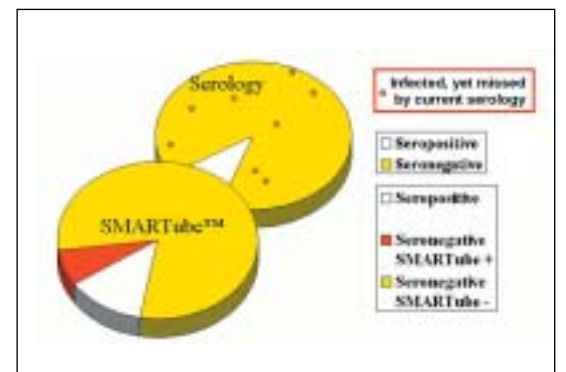


Fig 2: Detecting HIV infected pregnant women missed by current serology due to the window period

Based on all the above, antiretroviral (ARV) treatment protocols for HIV infected pregnant women (who are not on ARV treatment prior to pregnancy) have been developed. When possible, ARV (usually AZT) is taken from weeks 14-34, as well as during labour. Since the exposure of the foetus is the greatest during labour and delivery, a preventive/prophylactic ARV treatment is given to the baby for the first 1-6 weeks of life. The combined mother and child ARV regime can reduce mother-to-child transmission of HIV to as low as 1-2%. Even where resources are limited, a single dose of medicine given to

tested for HIV (unless they opt not to). However, due to the 'window period' (WP = the time between infection and possible diagnosis) women who were infected recently might test negative, in spite of the infection that is risking their foetuses, and thus not be offered any ARV. This WP, which usually lasts up to three months, could be even longer in pregnant women, because the pregnancy itself is somewhat immuno-suppressive (to protect the foetus).

Overcoming the WP problem has been a major diagnostic concern. It has been found that specific immune suppression causes the window period. A

women sero-converted within 3-6 months (4/5), too late for ARV to protect the babies from HIV infection. Today, the SMARTube has the CE Mark and can be used to detect HIV infected pregnant women even during the WP.

Misdiagnosis of HIV infection due to the WP contributes daily to the spread of the epidemic in the adult population. A missed infection in a pregnant mother is a missed chance to save a baby. Bridging the gap of the HIV WP in this population should be of top priority. Early and complete detection of HIV infections among future mothers is a critical key to curtailing the epidemic and saving future lives.

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THE EUROPEAN HOSPITAL SPECIAL ISSUE FOR THE EUROPEAN CONGRESS OF RADIOLOGY

The 2008 ECR promises to be international, controversial, inspiring, as well as a meeting in which new insights for inter-professional relationships and working practices are sought. The programme is impressive indeed. We asked **Professor Maximilian F Reiser**, this year's Congress President, about the highlights, newly introduced themes and other pressing issues that impact on radiologists throughout Europe and beyond

HITACHI
Inspire the Next

Please see
page 15
ECR-Supplement

The high profile agenda of Europe's biggest radiology congress

'RADIOLOGISTS MUST STEP OUT OF THE SHADOW OF THEIR MACHINES'

This year the guest countries at ECR are Germany, Israel and India. Why were they chosen?

Maximilian Reiser: ECR's primary task is to present advances in radiology, and the selected guest countries are interesting for several reasons: Israel is an important location that generates many exciting drives and developments. India has established itself at an international level and we would like to draw attention to the country's medical and radiological developments. We will focus on India's diagnostics and therapy for tuberculosis, a disease of global significance that increasingly re-appears in the West. The German contributions highlight the potential of computer-aided diagnosis (CAD) in clinical applications. CAD will play an increasingly important role in radiology and we look forward to many interesting presentations that will show not only its advantages but also the drawbacks.

The ECR Meets Partner Disciplines is a new event on the agenda. What is this?

MR: It's an entirely new and exciting format that aims to strengthen interdisciplinary co-operation. We invited colleagues from different countries, this year general practitioners (GPs) with whom we will discuss coronary heart diseases and peripheral arterial obstructive diseases in the context of atherosclerosis, for example: Where do these two areas converge? What does the GP have to know about diagnosis and treatment? How can radiology help?

We want to overcome communication barriers in order to improve exchange and cooperation. After all, as a radiologist, you have two types of customers: patients and referring physicians.

This issue also has a certain professional-political dimension because, in my opinion, in many countries the profession 'radiologist' is misunderstood. They are perceived as people who sit

somewhere behind huge machines, whereas, in reality, radiologists are clinical physicians. Therefore, no matter how different European healthcare systems may be, radiologists have to step out of the shadow of their machines and present themselves as clinical physicians who play a crucial role in patient care.

We do not want to start a discussion on international healthcare systems, but ECR prides itself in being a particularly innovative congress – our programme bears testimony to that. **Which criteria do you apply when selecting a paper for the congress?** The ECR offers a wide range of scientific sessions and professional seminars that deal with issues central to our work: How can we ensure that a diagnosis is as precise as possible? How do we most effectively control the success of the therapy? Here we not only choose presentations that provide the most knowledge, but we also aim at optimising the learning process by using interactive elements. A case in point: our 'audience response system', which is becoming increasingly important in events targeted at radiologists in training. This system allows the speaker to integrate the audience in his or her presentation, for example by soliciting opinions on radiation exposure. On a pad, the participant can choose between several alternative answers. This kind of interaction significantly increases motivation. The system can also be applied to check whether participants understood and retained the material under discussion. This is something particularly appreciated by our younger colleagues.

Unfortunately, we must decline many submitted abstracts — this year almost two third of all entries. However, this is by no means negative, because it shows that we have high scientific expectations and that we follow through on those expectations. A 'no' may be frustrating for the researcher, but

we strive for utmost objectivity in our selection.

What are this year's ECR highlights?

There are many highly differentiated presentations on radiation exposure. Frequently this issue is being dealt with in quite a biased manner, that is, the focus lies on the risks and how to minimise them. But when we talk about radiation exposure we must always talk about the risks and benefits of a radiological examination. That's what we want to emphasise in our events.

Professor
Maximilian
F Reiser



In the context of one of our Special Focus Sessions we will also address the issue of the ageing society – the 'demographical tsunami'. We must find answers to questions such as 'What does a sustainable healthcare system look like and how will this impact radiology?' There are some highly interesting cross-disciplinary approaches, such as the use of telemedicine for stroke diagnostics. A further example is mobile diagnostic systems, because they are already used in Norway, where

continued on page 2

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more justified cases).

Regarding radiation exposure, the 2007 report of the National Council on Radiation Protection & Measurements (NCRP) revealed that the collective annual population medical radiation dose increased between 1980 and 2006 by 7.5-fold. The number of CT scans performed in the USA has grown from 18.3 million in 1993 to 62 million scans in 2006.

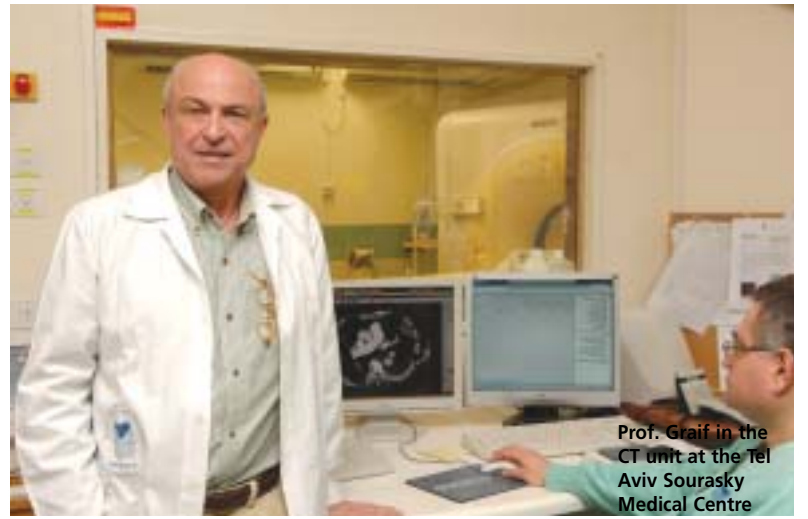
As for the cost, a recent study has shown, for example, that cervical spine CT use shot up by more than 400% and the number of admissions rose by only 13%, while severity of injury and illness changed little. A cost analysis yielded an expenditure of US\$ 8,509 for each positive study.

It has also impacted on radiology teams. Over half of Emergency CT studies are performed during the shift hours,

first. From a radiological point of view it usually requires the use of abdominal ultrasound and chest X-rays. The definitive phase occurs when casualties are no longer arriving. At this point, the main

simultaneous evaluation of a complex injury by several specialist teams.

The velocity of execution and accuracy make CT an ideal tool for emergency use, and is



Prof. Graif in the CT unit at the Tel Aviv Sourasky Medical Centre

CT: Overuse in emergencies, but top value for trauma cases

The high profile agenda of Europe's biggest radiology congress continued from page 1

a patient does not go to a radiologist for X-rays, but the X-ray equipment goes to the patient. This is particularly beneficial for older patients because they no longer have to leave their familiar environment.

A further interdisciplinary session will deal with myomae, focusing on myoma embolisation with presentations by a gynaecologist, radiologist and a patient. This is very exciting, because the patient will describe her hospital experience in detail. She will present her records and show, very impressively, how her quality of life was impeded by the myoma and how much it improved after embolisation. The patient had learnt about this organ-saving therapy only after long research - and after four gynaecologists had recommended hysterectomy. Myoma embolisation is an acute problem, since this radiological intervention is not widely accepted, particularly in Germany. Moreover, myomae can be treated with focused ultrasound - another option that will be discussed.

Why has the Women in Radiology theme been introduced?

Women are still discriminated against in radiology. It is unacceptable that the females earn less and in general have worse working conditions. It is unacceptable that the careers of women suffer because they have children. Nevertheless, that's the reality and it's a reality that women will discuss at this event. The presentations emphasise the social responsibility of radiology and they suggest solutions to these problems. We will also address possible political steps - for example the fact that we need more day-care for children. In some countries, such as France, childcare outside the family is well organised. In other countries this is still a huge problem.

However, there are solutions to all these problems and ECR, as the biggest European radiology congress, will contribute its share. I'm confident that all participants will welcome this year's high-profile agenda and that, once again, ECR will be a huge success

Over the last three decades CT has become a premier diagnostic tool for the evaluation of the acute patient.

Over the past ten years in Israel, we have seen an overwhelming increase in the volume of CT examinations in the emergency department (ED). Data from the USA and Germany appear to yield similar results. A comparison of the number of CT studies performed per 1000 ED visits showed a five-fold increase over one decade! Particularly dramatic was the increased use of CT studies during the night shift. A particular increase in body CT studies in the ED (Renal Colic, appendicitis, acute abdomen, bowel obstruction) over neurological CT was also noted.

Surprisingly, the massive CT utilisation patterns had no significant impact on the consumption of other imaging services (such as X-rays). Expectations that examinations - such as acute abdominal series (AAS) which have limited clinical value in patients in whom CT or ultrasound is considered - will decrease, were not met. The five views skull radiographs so far appear to be the only example of an 'extinct species'.

The 'Golden Hour' (Dg & treatment within 60 minutes) rule, which nowadays dictates the management of the trauma patient, favours CT, as a 'one stop shop', over the combination of several modalities. It also appears that clinicians may still feel more comfortable with CT images than with ultrasound. Emergency doctors prefer to use CT as the gold standard for imaging abdominal trauma and to reserve FAST (focused abdominal sonography for trauma) for unstable patients.

These trends boost healthcare costs. They also affect patients due to increased radiation exposure and more incidental findings that lead to further investigation (not always justified). They create queues of patients waiting for a CT examination (prolonging the average investigation time for each patient, particularly the clinically

By Professor Moshe Graif MD

involving smaller and less experienced teams. Those teams are also subjected to the effect of prolonged, continuous working hours and accumulated fatigue. While the technical time per CT examination has decreased (Spiral CT exam time is shorter by 2.3-10 factor) which induces increased throughput, the radiologist reading time is prolonged because there are more images to read (69% more images per MDCT study on average), more reconstructions to perform, and change in procedure mix (more complicated studies such as CTA, abdominal studies, CT guided interventions).

A particular aspect of Emergency CT is related to its role in mass casualties events (MCE).

It appears that hospitals

objective is to provide optimal care, which involves more skeletal X-Rays, CT work up and angiographies.

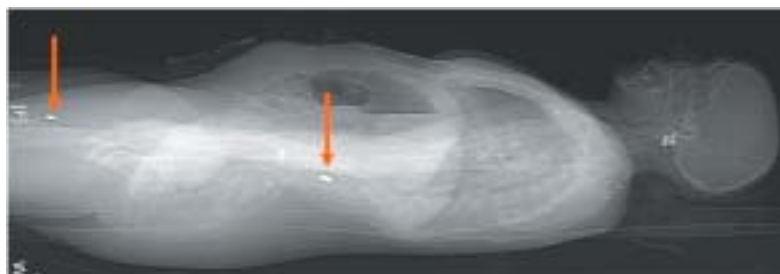
The clinical nature of the cases that involve blast and/or shrapnel injuries requires special CT protocols. This includes whole body scans to identify foreign

replacing traditional radiological studies. Utilisation is likely to increase. The development of techniques designed to reduce radiation are constantly under intensive consideration.

Careful use of the guidelines may help to reduce the unnecessary studies. In the future,



Multi-disciplinary team with patient in the CT suite during MCE



CT surviwe image showing 2 metallic ballistic objects distant from each other (arrows)

situated near to such events play a major role in trauma patient care. More than 50% of patients are evacuated to the nearest hospital within 5-20 minutes. This creates an immediately overwhelming overload on all hospital medical resources, including CT; it is therefore mandatory to have a hospital preparedness plan to be able to deal effectively with the situation. Generally two phases can be observed. The Initial Phase - when casualties are flowing in and chaos is at maximum. In this phase, the main objective is to identify the critically injured patients, who need to be treated

bodies missed on a radiography and triple contrast regime (via naso-gastric tube, intravenous injection and rectal contrast administration). There is also a routine use of CT angiography and 3-D reconstructions in every case of a penetrating object and/or suspicion of vascular involvement.

In those situations, CT now offers a quick mode to evaluate the extent of injury, shrapnel localisation and the detection of unsuspected injuries. The rapidity of the modality makes patient co-operation less necessary. The availability of PACS, and heavy duty workstations, enables



Coronal CT image of one of the metallic objects located in the spine (arrow)

more radiologists and technicians will be needed, and residency programme planning measures should be taken at national level to ensure the proper future availability of a professional workforce.

* I would like to thank Dr. Ahuva Engel, Dr. Dorith Shaham, Dr. Ofer Benyaminov, Dr. Jacob Sosna, Dr. Osnat Luxenburg, Dr. Arie Blachar, Dr. Eli Konen, Dr. Arnon Makori, Prof. Pinhas Halpern, Ms. Sharona Vaknin and Mabel Zelikovitz Msc for their help in providing scientific data for this report.

Radiation dose reduction

By Cynthia E Keen

4,000,000 paediatric CT scans were performed in 2006 in the USA, a number that has tripled since 2001. Concerns about the adverse effects of cumulative radiation dose in a generation of children where CT imaging and other radiation intensive procedures will be the norm has led to the launch of a national campaign to establish low dose radiation protocols designed specifically for variously aged children.

The 'Image Gently' campaign was launched in January 2008 by the founding members of the Alliance for Radiation Safety in Paediatric Imaging (ARSPI). The Society of Paediatric Imaging proposed this campaign in 2006, and formed the Alliance in 2007 with the American College of Radiology, the American Society of Radiologic Technologists and the American Association of Physicists in Medicine. An additional six major professional organisations

with electronic patient records is technologically achievable.

The fourth bi-annual ALARA (as low as reasonably achievable) Concept in Paediatric Imaging conference was held in February in Orlando, Florida, and was attended by paediatric radiologists, emergency physicians, medical physicists and hospital administrators. Its theme was *Building bridges between radiologists and emergency medical providers* and focused on improving imaging safety and quality for children presenting in an emergency

department. The conference objectives were to discuss the challenges that emergency physicians and radiologists face in overcrowded hospital emergency departments and to identify methods of improving communication, as well as establish better protocols for procedure ordering and imaging of children with the least amount of radiation.

The combination of the threat of litigation with malpractice law-

suits and the fact that many uninsured families use emergency departments as sources for primary care has created an environment in many US hospitals in which an excessive number or inappropriate diagnostic imaging procedures are ordered. This is done to make rapid accurate diagnoses, provide treatment quickly, and deal effectively with a higher volume of patients than an emergency department can support.

The 2008 ALARA conference chairs, paediatric radiologist Donald P Frush MD and paediatric

emergency medicine specialist Karen S Frush MD, both at Duke University Medical Centre, Durham, North Carolina, said that they hope the meeting will provide a foundation upon which methods of working more effectively together as a team will be initiated. "The majority of children receive emergency treatment at hospitals that primarily treat adults. We think that recommendations for protocols of treatment developed jointly by paediatric emergency specialists and paediatric imaging specialists can provide a safer and better quality of care."

Dr Goske added that European hospitals have developed impressive initiatives in keeping paediatric radiation dose to a minimum.


US launches a national initiative

have become affiliate members, representing a total of more than 500,000 medical professionals working in Canada and the United States. GE Healthcare provided a large unrestricted educational grant to fund the project.

The campaign aims to significantly reduce the amount of radiation used when performing paediatric CT scans. It emphasises that children should be scanned only when absolutely necessary, that radiation dose should be reduced using protocols and scanning techniques created specifically for paediatric imaging, and that alternative imaging procedures with less or no radiation should be used when possible. (As an example, the newly published results [*Radiology* online January 14, 2008] of a study performed at the University Hospital in Bologna reported that contrast-enhanced ultrasound is almost as accurate as contrast-enhanced CT for diagnosing solid organ injuries in children following blunt abdominal trauma.) Medical physicists are also encouraged to become more involved and actively monitor paediatric CT techniques.

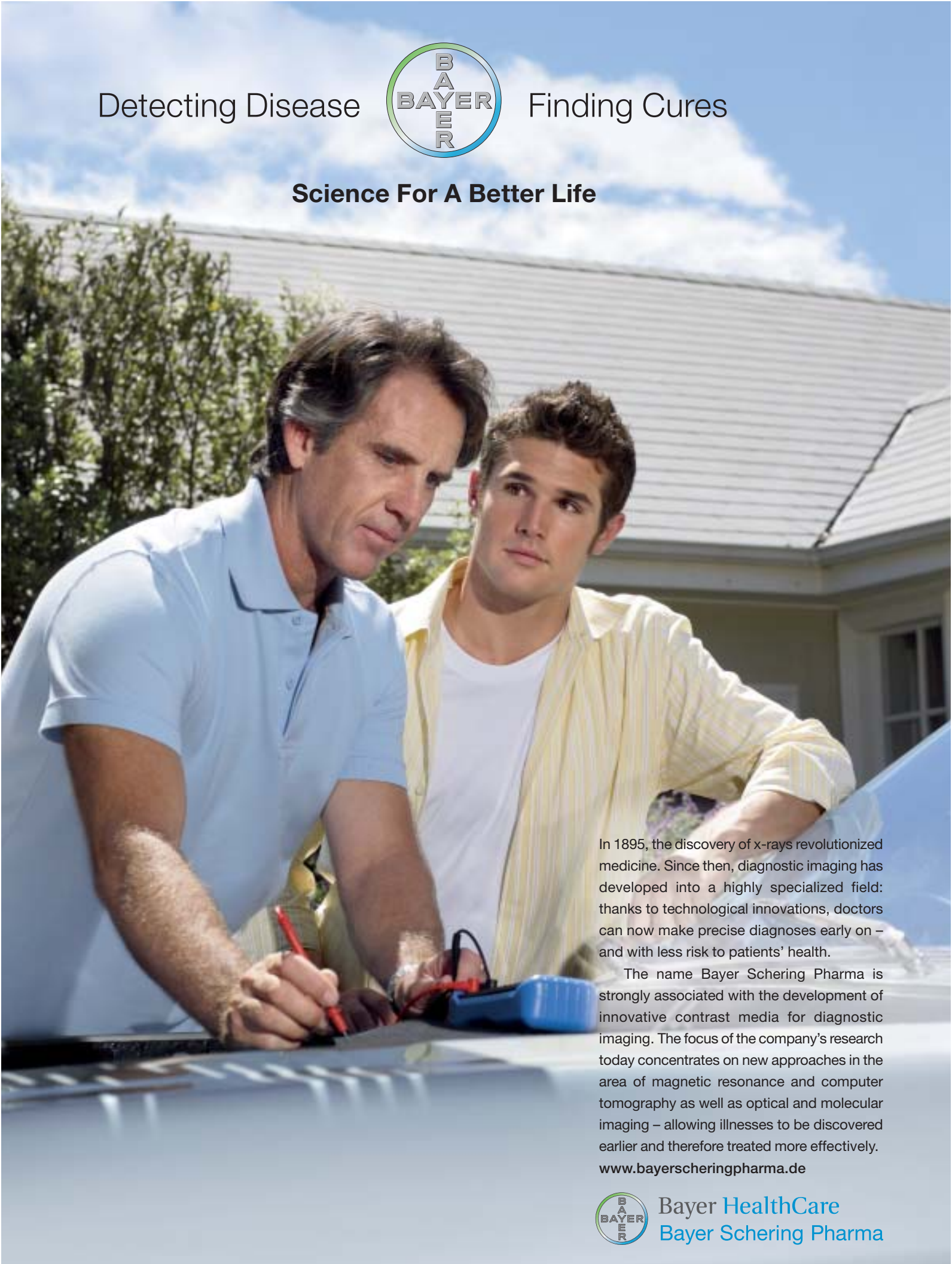
The www.imagegently.org website includes a library of protocols for imaging children. In its first week of operation, over 2,600 providers downloaded protocols. The website also contains research and educational materials.

Marilyn Goske MD, chair of ARSPI and a leading paediatric radiologist at the Cincinnati Children's Hospital Medical Centre in Ohio, said, 'We hope to change the way all children are imaged, using kid-size, not adult-size radiation doses.' In an interview with *European Hospital*, she said that it will take decades to learn if paediatric CT scans are detrimental to the long term health of children who receive them. With the exception of paediatric cancer patients receiving radiation therapy, no records are being kept of the cumulative radiation doses that children receive, which, Dr Goske said, is an issue of discussion by the Society of Paediatric Radiology, as an electronic registry interacting



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Professor Rémy-Jardin MD PhD heads the Department of Radiology and is Chairman of the Department of Thoracic Imaging at the Calmette Hospital, University Centre of Lille. She is also Professor of Radiology in Lille University's Medical Faculty.

The Calmette Hospital specialises in thoracic and respiratory medicine. In her department, Prof. Rémy-Jardin oversees five senior doctors and seven interns. Her international reputation and the quality of the department's research attract radiologists from all over the world – the present senior staff includes doctors from South Africa, Canada and Italy, all at Lille to improve their knowledge in

What do you consider your major professional achievements among the many we can only briefly outline here?

R-J: To have become the Head of a Radiology Department in which it is possible to combine high-quality diagnostic activities, teaching and clinical research activities. This has been possible through the constant collaboration with the previous head of this department, Professor Rémy. Because he was nearing retirement age, he handed over the Radiology



Prof Rémy-Jardin

100% commitment I'd rather not do it. My son is far more important to me than this 'missed' opportunity.

Is it more difficult for women to be radiologists than men?

No, I think medicine is a pretty equal profession for both. I don't think medicine itself makes differences; it is society and perhaps even nature. It is women who commit to the family, who make that extra time and, to do this, they must prioritise, compromise, juggle and eventually decide which the best path is for them. Again, my personal experience is probably very different from that of most women. I had my son late, at 41. My career was already established

'Choose, prioritise, compromise and juggle'

high-resolution computer tomography of diffuse infiltrative and vascular lung diseases; interventional vascular procedures; cardiac and pulmonary functional imaging, and reduction in radiation dose – the professor's areas of expertise. Additionally, much of her published research is in spiral CT imaging, especially technical developments; post-processing; CT angiography and multi-detector CT, including dual energy.

Her university thoracic imagers and scanning research programme is based on a longstanding collaboration with Siemens: the centre serves as a reference site for the company, providing it with access to clinical activities through which clinical research can be undertaken. This research is then channelled into publication in international journals and/or presented at major conferences. It is also used for Siemens' technological investigations. In return, the radiology department can propose the use of the latest scanners and imagers to patients – technology that most public hospitals only dream of buying.

In her private life, Prof. Rémy-Jardin is a wife and mother. During a *European Hospital* interview we asked about her career as well as its effects on her private life:

Department to concentrate on university research interests. Perhaps, due to my close personal involvement with him, I feel very keenly the challenge of keeping not only the same level of quality but also the overall vision for the department's future.

How do you manage family time? Has being a mother compromised your career?

True, my work doesn't leave me much free time, but I have a little boy who is my most important personal achievement. One has to make choices in life. I chose to commit time to bringing up my son. He is still only 10 years old.

I've been extraordinarily lucky in my professional life, because my husband is in the same profession, the same specialty and the same department – very lucky! There is probably only one thing I might have done differently if I'd been a man, or not had a family, and that is to have been more involved in the organisation and politics of our profession – another important aspect of radiology. Unfortunately, this isn't something one can do without full-time commitment and it would involve a lot of time and travel. So my choice has been my son rather than professional politics. I don't really have any regrets. I sometimes think about it, but if I can't do something with

and, because I'm Head of Department, I can organise my working day without having to ask my boss's permission. That's not something someone 10 years more junior could do. I can arrange to leave early and work at home, so that when my son comes home from school we have time together. However, I'm often at the hospital at weekends, much to my son's displeasure! If I employed someone to look after him, I could organise my day differently but that's not what I want.

The same goes for choosing radiology; if you love it you should do it. As a specialty there are plenty of options. The hospital career path is probably the most challenging to balance with a family but, in a private radiology centre, a woman can happily work part time, fitting her professional life around her family.

What advice would you offer women in medicine or, specifically, radiology?

Women, particularly those in senior positions, have to impose some rules. Although we are just as efficient as men (if not more so) our time is more limited. So, if a half-hour meeting is scheduled for mid-day, it starts at mid-day; if people turn up at 12.15, it becomes a 15 minute meeting. Obviously, over time, I've become very diplomatic in the way I say this, but it is important. The time we have for work has to be used effectively. Women must be efficient and flexible with the time at their disposal and our male colleagues must learn to understand and respect this. We are not only doctors but also have other important commitments: husbands and children.

Roles in radiology, research, plus a private life? What could be better?



Professor Maria Cova is one of the two women Board Members of the Italian Society of Radiology (SIRM), of which she was Vice President from 2004-2006.

Apart from spending a year at Johns Hopkins University Hospital, Baltimore, USA, the professor has never worked anywhere other than at the Radiology Department at the University Hospital of Cattinara Hospital, Trieste, of which she is Chairman.

Daniela Zimmermann asked her about what women can achieve in this field, as well as the professor's own multifarious roles and research activities.

DZ: What does your role as a Board Member of the Italian Society of Radiology entail?

MC: The Society is subdivided in many scientific sections, subspecialties such as neuroradiology vascular and interventional radiology, and so on. My function is to co-ordinate the presidents of these subspecialties, mainly with the aim of attracting more young scientists.

How many women do you support in this way?

MC: Actually, very few. The Board has only two. The problem is that, although there are a lot of female radiology residents and a lot of women actually work as radiologists, only very few reach top positions. So far there are few, but I hope in the future more and more women will be motivated to work harder to reach top positions in radiology.

Are they held up because they marry or change professions?

No, they stay in the profession, but it's very tough for them to co-ordinate and manage everything.

How did you achieve this?

First, I really like my job – that's very important. Second, I am ambitious – to succeed, you need to be. Third, you also need to be feminine. Also, I've always done my best to reach where I wanted to reach and then, I have to add, you must be lucky. In my case, things always went right. I chose Trieste, did my exams here, went to America and returned here with my post doctorate. I became Assistant Professor, then Associated Professor and, in 2004, full Professor. That sounds easy, but it was hard work and women must sometimes even work a bit harder. You must always combine the job with your private life. I'm not married and have no chil-

dren, but I do have a very active private life – which naturally I don't want to miss. So I've always done my best for work, but what I've borne in mind that I wanted to preserve my inner self. I am very proud to say this attitude has worked, so far. Of course I'm diplomatic, but I would never change myself only to find a compromise. The most important thing for me is to keep myself balanced.

What about your work at the hospital?

I'm Chairman of the Radiology Department at the University Hospital, so I not only manage the department, the patients and so on, but also have various teaching functions. It's really what I like most! I would never give it up. I am also Director of the postgraduate School of Radiology and Director of the Radiographer's Degree Course in Trieste. And, I carry out research, with a focus on MRI and, within that, muscular-skeletal research, particularly on articular cartilage. Using MRI you can get morphological information as well as biochemical information. So the aim is to use MRI to see the changes that cannot be seen by changing morphology – biochemical changes. You can do it today. I'm also working on the technical aspect of MRI, just optimising the technique. In this field I work with physicists and with the Department of Biochemistry, so there's a very good, dedicated team. We are aiming to get with the right technical sequence, in a short time, both the morphological and biochemical data.

Using contrast media and molecular imaging would be the greatest tool to obtain this result.

Have you already reached the professional level you want?

At the moment, I'm very happy with my position because there are still challenges and managing a department means you have to learn something new every day. And, I'm not a one-man-show: I strongly believe in teamwork and I work with a wonderful team. In a team everyone has the chance to give his or her best and every single person has a special quality that can lead to perfect results.

Of course I'm always open for opportunities that may arrive, but I'm totally satisfied with all that I must deal with every day. I cannot imagine anything better, from the point of view of a 47-year-old woman who loves radiology.

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PET/CT AND CHILDREN

Study shows higher sensitivity, specificity and accuracy than conventional imaging

PET/CT imaging exhibits significantly higher sensitivity, specificity and accuracy than conventional imaging when it comes to detecting malignant tumours in children, according to research published in the *Journal of Nuclear Medicine* (12/07). 'PET/CT is useful in finding small tumours in small children and is a promising imaging tool in evaluating paediatric malignancies,' concludes Richard L Wahl MD, the 'Henry N Wagner Jr. MD Professor of Nuclear Medicine' at Johns Hopkins Medical Institutions in Baltimore, Maryland, who has pioneered the use of PET with FDG and fusion imaging in a wide range of common adult cancers. 'In our study, we found that PET/CT can detect small lymph node lesions diagnosed as negative with conventional (or anatomical) imaging and deny the presence of active disease in soft-tissue masses post-treatment – especially in children with a wide range of malignant cancers. Using PET/CT could help spare children from overtreatment while fighting their disease.'

There are few findings about the use of PET/CT imaging compared with conventional imaging in paediatrics, he points out. The investigators retrospectively reviewed cases to evaluate the efficacy of PET/CT compared with other imaging methods. This involved 151 FDG PET/CT examinations performed on 55 children with non-central nervous system malignancies (30 had lymphoma).

PET with CT imaging – using the radio-tracer fluorodeoxyglucose (FDG) – enables collection of biological and anatomical information during just one examination – PET picks up metabolic signals of body cells and tissues; CT provides a detailed map of internal anatomy. 'PET/CT showed its broad applicability and utility by providing additional information, in over a third of the children's exams, that could be used by doctors to more appropriately manage or treat the disease in children,' adds Dr Wahl. 'When there were discrepancies between PET/CT and conventional anatomical imaging in analyzing cancer lesions, PET/CT was diagnostically accurate 90% of the time.'

Dr Wahl adds that additional studies with specific childhood cancers are warranted.

* Co-authors of '18F-FDG PET/CT in Evaluating Non-CNS Paediatric Malignancies': Mitsuaki Tatsumi, of the Nuclear Medicine Division, and John H. Miller, Paediatric Radiology, both at the Radiology Department of the Johns Hopkins Medical Institutions, Baltimore, Md.

The new IMPAX Solution Suite

Agfa Healthcare's new IMPAX solution suites offer PACS and RIS to cover hospital data handling and cardiovascular, cardiology, orthopaedics, mammography and radiology data. The firm's Enterprise Suite, for example, was designed for the multi-site hospital and Integrated Healthcare Delivery Networks operating in multi-patient ID domains. The system is driven by Agfa's Data Centre, a multi-media archive for medical images and diagnostic results. Other applications in the new IMPAX series include:

Virtual Colonoscopy: This non-invasive CT colonoscopy clinical application produces a complete (supine and prone) CT colonoscopy data set in about 20 seconds. No user interaction is needed before diagnosis begins. Lesion detection takes place in a clinically relevant, user dependent, pre-



defined layout. Automation ensures maximum productivity and streamlines results sharing.

Registration and Fusion: Easy-to-use automated tools and single mouse click make the comparison of high-res images effortless. The application supports the comparison of

images from the same image types (for example CT to CT and / or MR to MR for follow-up studies) as well as in multi-modality cases (e.g. CT to MR). Besides supporting X-ray images, the software also supports nuclear medicine by means of the registration and fusion of PET with CT and/or PET with MR.

OrthoGon: Agfa reports that this advanced measurement tool, for orthopaedic (Orthopaedic) and paediatric (paediatric) specialists, eliminates the need to perform manual measurements because it has an intelligent wizard. This 'guides the physician through complex measurement schemes and compares results with normative values. Results can be saved as images and proprietary records in PACS, printed as reports, or exported for further processing'.

X-ray Angio Analysis: Diagnosing peripheral arteries and angiograms requires dedicated

image processing and analyses. The application provides a comprehensive package for reviewing vendor independent DICOM X-ray Angio (XA) CR and RF diagnostic images in the radiology domain. The application key functionalities are Digital Subtraction Angio (DSA) and quantitative analysis of lesions and morphologies. The package offers three types of analyses: Straight, Bifurcation and Ostial. The creation of reports for hospital-wide distribution is supported.

IMPAX RDS: Agfa reports that the application enables radiologists, and other specialists, to access the world's most comprehensive radiology database of diagnoses, case examples and images. Integration with the IMPAX system allows automatic results filtering based on anatomical region, improving both speed and diagnostic confidence.

Sectra launches a new PACS system



Sectra's wide portfolio on show at the ECR this year includes a new PACS workstation, a photon-counting MicroDose Mammography system, pre-operative solutions for orthopaedic surgery and the company's full range of Enterprise Control solutions

PACS - The IDS7/dx, the latest model in Sectra's PACS workstations, is being launched in Europe for the first time. This comprehensive, high-end diagnostic workstation features a patent pending technology that solves the problem of data explosion, Sectra explains: 'The system enables radiologists to retrieve, display and process image data of extreme sizes with ease - problems encountered in working with large datasets do no longer occur.' The PACS can distribute images for readings in multiple clinics. Even over high-latency networks, the streaming technology distributes datasets in network quality, regardless of size and variations.

Photon-counting - Sectra reports that its MicroDose Mammography L30 is currently the only commercially available photon-counting mammography system on the market. 'The unique photon-counting full-field digital mammography system maximises image quality and increases throughput at the lowest radiation dose on the market. At our booth, we demonstrate a totally integrated solution for mammography screening, including Sectra Screening RIS, Sectra MicroDose Mammography, and Sectra Breast Imaging PACS, all designed to efficiently streamline mammography workflow.'

Orthopaedics - Sectra offers a solution to optimise productivity through advanced image processing capabilities. A comprehensive set of guides for pre-operative planning of hip and knee surgery includes approximately 33,000 views of digital templates, from 18 implant manufacturers, bringing full functionality to plan and template even complex trauma cases.

The company will also showcase PACS-Guard. Control Tower software generates reports, monitors the daily status of a radiology department, reveals long-term production trends in RIS and PACS and identifies potential bottlenecks early.

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Speakers and abstracts

SESSION 1 Management

The Management of Innovation and Efficiency How to inspire creativity while assuming productivity

Britta Fünfstück graduated in engineering physics in Linz, Austria. For the past ten years she has worked in management consulting and healthcare, in Germany and the USA, where she worked with the Boston Consulting Group from 1998-2000. She then joined Siemens Healthcare, where she has managed business development projects, led product definition teams in

healthcare IT, and has been responsible for product planning, global marketing and sales of MR systems. At the beginning of 2008 she was appointed to lead the team as Head of Business Development/Strategy



Globally, many healthcare providers face a dilemma: They not only need to be innovative to provide high quality care but also must reduce the costs of that care. Is this really a contradiction? No. In fact one effort can be directly connected to the other – by increasing workflow efficiency.

How increased efficiency leads to high productivity, as well as to exceeding quality, can be demonstrated by looking at high-tech industry – e.g. the medical engineering industry. Strong process orientation is a common and important factor in reaching and maintaining excellence and best-in-class quality. This is reflected by not only measuring criteria, incentive structures, and productivity programmes, but also by the motivation of the people involved. Yet, at the same time competitive advantage requires innovations that exactly match the market's needs.

Such innovations in products and solutions are the key to success. Innovation management has therefore developed as a discipline and core competence.

These management experiences and insights of driving innovation and at the same time cost efficiency can and often need to be transferred to different markets and businesses – and also to healthcare providers.

During the symposium, examples of innovation and efficiency in healthcare will be demonstrated as well as examples of how industry experience could be applied to hospital management or the management of radiology departments. We will also see how a close collaboration between healthcare providers and the industry can drive innovations in technology and workflow – to shape the future of medicine together.

The importance of strategic partnerships

Harald W Bachleitner studied law at Ludwig-Maximilians University, Munich, and for the bar at Zweite Juristische Staatsprüfung. Further training included Public Management as well as studies to qualify as an assessor, at the European Foundation for Quality.

After a period as a civil servant for the city of Munich, he joined the München-Schwabing Hospital, first as Deputy Administrative Director and Head of Finances, then rising to become the hospital's

Administrative Director.

In 2005 he was appointed Managing Director of SRH Zentralklinikum Suhl gGmbH and, in 2007, became a healthcare consultant and Managing Director of bachleitner contract GmbH and Bachleitner Beteiligungs GmbH.

In January this year, he was appointed Managing Director of Initiative Gesundheitswirtschaft, Berlin.



The healthcare system is in a phase of transition – from planned economy to free market economy. Competition is becoming a challenge. Only entrepreneurs and enterprises that develop creative strategies will stay on top – or make it to the top.

Establishing and maintaining strategic partnerships is a crucial component of any viable strategy for future business.

Although the healthcare market may not be a loud and noisy one, it nonetheless deserves close attention as more and more information about medical services is available on the internet or in quality reports.

Patients have an increasingly clear idea about their interests and know how to look after their own interests. They spend a lot of time and energy on finding the right partner for their particular health issues.

Oversupply leads to competition for the client – the patient.

Incomes stagnate and require cost-saving measures such as product standardisation.

The competition and the market are rather problematic: Services offered are difficult to compare; the service providers offer no clearly differentiated products and prices bear little relation to quality; volumes and product ranges are strictly regulated; approvals and in general tight state regulations are market barriers that are difficult to overcome.

In many countries, healthcare is the biggest industry – as well as among the few that are growing! This means healthcare is a highly dynamic market.

The current situation nevertheless has enormous potential for service providers that manage to sharpen their profiles on this dynamic market by offering prod-

ucts with unique selling points or at least points that differentiate their products from those of other companies.

Strategic partnerships are long-term co-operations between owners of complementary know-how and joint corporate objectives – both factors ensure a level of quality that cannot be reached by one of the partners alone and they offer optimised cost efficiency. Moreover, strategic partnerships enable the parties to enter into large projects and they open perspectives and create visions.

In the high-tech medical technology sector **strategic partnerships** help to secure funding to cover increasing investment costs. If, for example, manufacturers of CT or MRI equipment offer their customers – i.e. the users – provision of the required know-how to operate their equipment, implementation and operating costs remain affordable. Consequently, the use of the equipment is efficient in the long run.

Furthermore, the manufacturers' corporate co-responsibility ensures product development that is based on actual need in the field.

The result is a win-win situation for all players: the patient receives verifiable quality and profits from the realisation of technological potential. The user also realises his potential and at the same time minimises risks; he incurs less implementation and operating costs, increases customer loyalty, number of cases, efficiency and employee satisfaction. Additionally, the manufacturer has satisfied customers and generates demand by offering his customers an added-value.

In short: A **strategic partnership** gives you an edge over the competition. It's worth the effort!

Medical management in the Russian healthcare system

Professor Shlyakhto Eugene Vladimirovich MD studied medicine at the Pavlov Medical State University, St. Petersburg; he also gained a doctorate in science, and worked as Vice Rector for research at the university from 1994-2001.

In 1993 he was appointed Professor in the Department of Internal Medicine, of which he has been head since 1997, when he also became Director of the Cardiovascular Institute in the university.

Prof. Vladimirovich also has been Director of Almazov Federal Heart, Blood and Endocrinology Centre since 2001.

In 2004, he was a corresponding member of the Russian Academy of Medical Sciences, and is a member of various Russian medical societies and associations; among these he is Vice President of the St Petersburg Branch of the Russian Medical Association.

The professor is Editor in Chief of Arterial Hypertension (Russ.) and Vice Editor in Chief of Scientific notes (Russ.)

Since 1992, his monographs/books and scientific manuscripts have been many, covering his fields of interest: Arterial hypertension, heart failure, unstable angina, clinical pharmacology of antihypertensive drugs, cardioprotections and molecular cardiology.

In addition, he has participated in numerous clinical trials



Healthcare in Russia is currently undergoing a comprehensive reform process. In the early 1990s, a new source of funding for the public health system was established: mandatory medical insurance and general practitioners' offices as well as private medical practice. Thus, 'the rules of the game' changed whilst the total financial burden to be carried by the state did not increase. Soon, a paradox emerged: physicians had to go through years of education before being allowed to treat a patient while a healthcare manager was appointed to lead a huge hospital for thousands of

Radiology process redesign, the theory of constraints and the twenty-nine million dollar revenue opportunity

After gaining a degree in Nursing and a qualification as Nurse Practitioner, **Martin Bledsoe MSPH** worked in Kentucky, USA, for 11 years. He then attended the University of North Carolina, gaining an MSc in Public Health, and joined Johns Hopkins Medicine. His roles there included various top administrative roles prior to his current appointment as Chief Administrator for the Russell H Morgan Department of Radiology and Radiological Science at Johns Hopkins Medicine. In this role he manages about 1,000 employees.



He has been actively involved in the leadership and programme development for the Association of Administrators of Academic Radiology, of which he is currently President-elect. He is a consultant and published author of articles on imaging business operations

In almost all US hospitals, in-patient radiology examinations are not scheduled. Instead, they are performed when equipment and patients are simultaneously and serendipitously available. While this flexibility may optimise patient flow for radiology under current conditions, it introduces variability and inefficiency into broader hospital operations, which may result in increased length of stay. In an environment with fixed reimbursement per

patients without having had any special training.

Experienced physicians were 'demoted' to mere team leaders and we lost many good clinicians only to receive poor managers. The situation became even more difficult when the market economy hit Russia. Private medical clinics were actively organised by former dentists, gynaecologists and surgeons, who were bravely diving into the depth of the free market knowing almost nothing about business laws and regulations. Consequently, training programmes on healthcare management soon appeared in Russia.

An important component of such training is financial management, because the Russian healthcare system has three funding sources: state and municipal budgets, statutory medical insurance and patient's direct payments.

A national top-priority project on healthcare is making high-tech medical technologies widely available in Russia - three of fourteen federal medical centres (Astrakhan, Penza and Tcheboksary) were launched recently. These centres are fully equipped with up-to-date medical technologies and they require profound postgraduate training for their staff, including healthcare managers.

admission, a decrease in length of stay of even a few hours over an entire hospitalisation can create tens of millions of dollars of revenue opportunity if the newly created capacity can be utilised.

This presentation shows how the Johns Hopkins Department of Radiology analyzed its in-patient workflows with the intention of redesigning them before moving into its portion of a new 1.6 million square foot in-patient facility. The presentation includes a brief review of a man-

agement concept concerning throughput known as the theory of constraints. Some of this concept's principles are then applied to the process of an in-patient hospitalisation, which leads to the conclusion that to maximise throughput, hospitals must deploy new systems for patient tracking, universal scheduling, and real time systems performance monitoring. These systems have been widely deployed in other industries but for the most part specific applications for healthcare have not been

developed.

One key principle of the theory of constraints is that maximising the throughput of a microsystem often slows throughput of the macrosystem. In the context of an in-patient hospitalisation, radiology can be regarded as a microsystem and given hospitalisation itself the macrosystem. Because throughput has always been important in radiology due to large capital investment in equipment, it is a logical place for early proof of concept work in designing

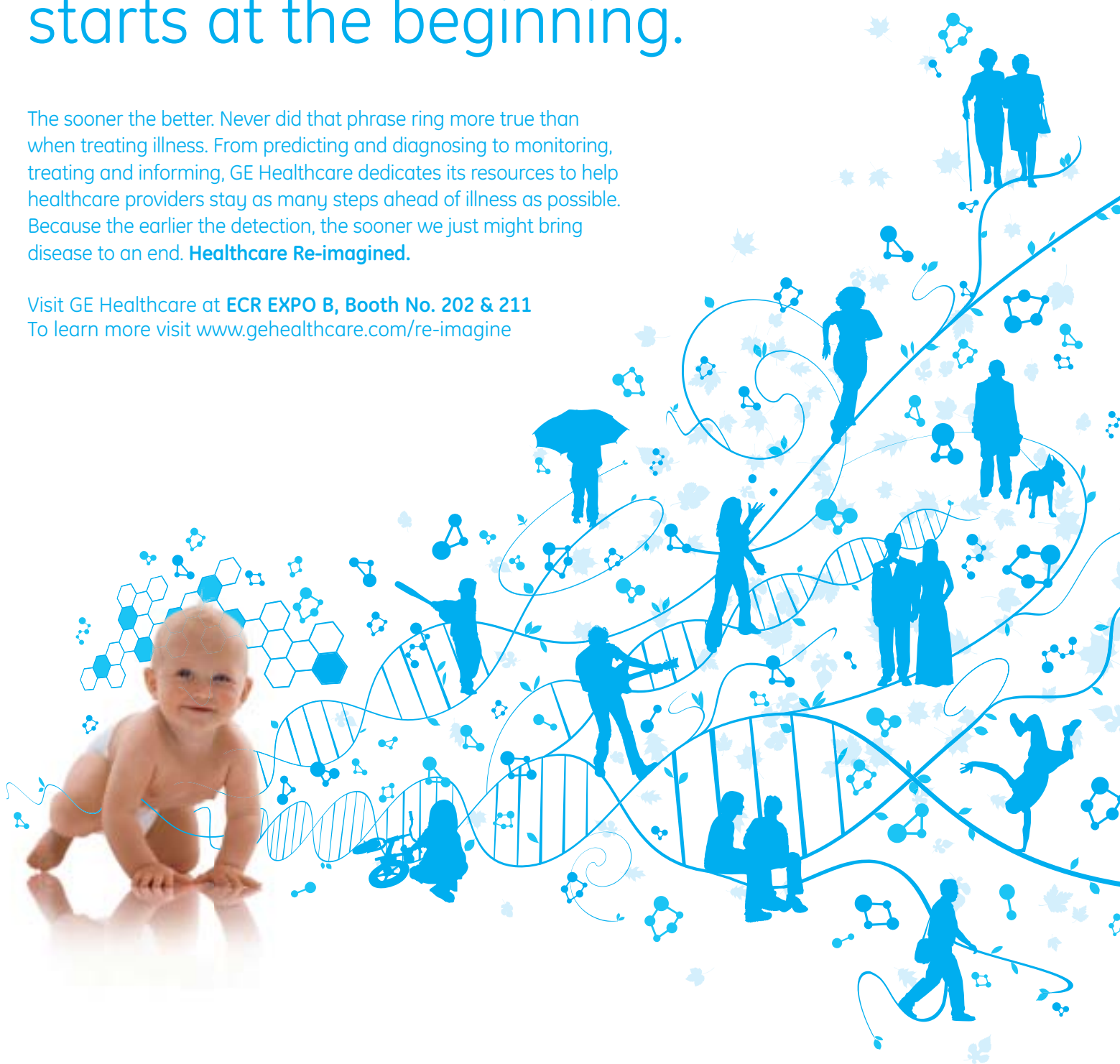
the new healthcare applications. However, as a next step in developing and testing these new applications it will be necessary to perform simultaneous pilot work across all hospital microsystems, including other diagnostic areas, treatment areas, and in-patient nursing care, in order to capture throughput efficiencies at the macrosystem level. Only then can hospital management create the revenue opportunity provided by a length of stay shortened by a few hours.

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SESSION 2 IT & Telemedicine

**Outsourcing as part of hospital IT optimisation
Doing it the right way**

Medical doctor **Thomas Geisinger** studied hospital business administration (VWA) at Mainz University, Germany. Today, he is Global Manager for E-Health integration with Agfa HealthCare.

After being head of medical management at Frankfurt/Main University Hospital for three years, in 2003 he became a hospital business

advisor and director for DRG Product Management at GWI in Bonn — which was acquired by Agfa HealthCare. He then joined a specialist-team to build up the international rollout of the Agfa HIS/CIS business, with a focus on market evaluation and strategy



The trend towards consolidation of healthcare services across a hospital, and across hospital groups, leads to the segmentation between core competences and those services that may be handled more efficiently by a third party. This analysis will uncover opportunities for more efficiency even with improved service levels. However, the execution should be carefully planned and prepared.

The presentation will show the opportunities and challenges that such segmentation offers. It will cover how to best select the right competences, how to prepare and

execute the change and how to manage the providers.

The model shown will begin with a classification of all Diagnostic activities (such as DRGs). It includes the procedures for medical documentation and the cost measurements based on the activities performed. The available DRG models will be shown that could be used to perform such activity/cost correlations.

The second part will focus on the execution: What the parameters are to manage the vendor and what available definitions there are for the service levels.

**Using a single HIS/PACS platform for patient medical data sharing
between healthcare providers**

Dr Peeter Ross studied medicine in Tartu University, Estonia, and in Helsinki University, Finland (1985-91). In 1996, following his residency in radiology at Tartu University, he undertook further studies in radiology at Oulu University, Finland, and in Armed Forces Institute of Pathology, Washington DC, USA. He took on further studies in healthcare management at INSEAD, France.

Dr Ross has participated in the EU funded

eHealth projects InterregPacs, Baltic eHealth and R-Bay.

In 2004, he was appointed to his current position as Director of Research and Development in East-Tallinn Central Hospital, Estonia. He is also acting president of Estonian Society of Radiology and a member of the supervisory board of Estonian Health Insurance Fund and Estonian eHealth Foundation



The presentation will provide an overview of patient medical data sharing and distribution between the hospital, general practitioners (GP) and patient, using recent developments in Hospital Information System (HIS) and Picture Archiving and Communication System (PACS). The effective use of digital medical data requires workflow re-engineering and use of modern data transfer technology.

Using the latest HIS/PACS technology, the radiology department at the East Tallinn Central Hospital (ETCH) has completely re-engineered radiology workflow management during the last four years.

The hospital started to use PACS with limited diagnostic workstations and web user licenses. By the end of 2007 the hospital became 'filmless', with an annual volume of 170,000 radiology examinations. The case mix includes all imaging modalities and radiologists also provide reporting services for external facilities.

Our web-based PACS with streaming technology allow archiving of all kinds of images, including non-DICOM and non-radiology images. The PACS is integrated with the web-based HIS, so the radiologist or referring physician can open images using the HIS and simultaneously view other patient data. The same possibility is available for general practitioners (GPs) outside ETCH. This kind of holistic patient approach achieved by HIS-PACS integration minimises the risk of having inadequate patient history or referral letters before imaging or during reporting.

Inspired by successful digital image sharing with other health care providers, ETHC has opened the entire electronic patient record for authorised GPs and even more — a patient can access his/her medical data in HIS. The security of delicate patient data is guaranteed by using a personal ID-card.

Classic hospital or department workflow is linear, meaning that almost all patient data resides with the individual patient or physician

and can't be accessed from different locations.

Digital processing of patient data opens new dimensions for patient care management. Now, if needed, patient data can be used any time and any place.

From this point of view, the implementation of PACS is allowing radiologists to achieve workflow optimisation. The radiologist can report not only the images made in the department or radiologist's

location, but also the images that have been taken in other locations. Reporting can be done on the basis of the anatomic region, modality, urgency, department, etc. The successful and secure radiology data sharing can be taken as a good example for implementing similar solutions for other medical information distribution.

From the outset of HIS/PACS planning, it is essential that HIS/RIS and PACS should be integrated.

**Managed services in patient data archiving
The impact on IT, finance and physicians**

Following graduation Institut National Polytechnique Grenoble (INPG), **Pierre-Yves Nectoux** has benefited from over 20 years experience in telecommunications, IT and medical IT.

From 1985 to 1998, he was employed by firms such as IBM, Schneider Electric and Digital Equipment Corporation (now Hewlett Packard) in Product Management roles, and has overseen the design of several telecommunication products as well as developed partnerships with big European telecommunication players such as Ericsson, Nokia and Alcatel.

In 1999, he joined StorageTek — now SUN - Solution Business Group (SBG) as programme manager for telecom and e-

commerce and, in particular, he developed hosted managed services. This role led him in to European eHealth initiatives.

In 2003, he became responsible for Europe, the Middle East and Africa business for Kodak Healthcare IT Information Management solutions. Four years later, he joined Carestream Health and its eHealth Managed Service Business Unit to launch eMS offer in Europe. Now, as eHealth Managed Services Business Manager for Carestream Health, his role covers Europe, the Middle East and Africa



Storing, archiving and sharing patient information in an intelligent and controlled manner is one of the 'hot topics' for healthcare organisations. It can become a real nightmare, as the volume of information explodes, technology change rate increases, and the different stakeholders of patient care become more demanding. Questions are immediately raised:

- Should I keep information in-house?
- How can I give ubiquitous access, but in a controlled way?
- How can I ensure legal requirements are fulfilled?

- What will be the costs in the long run? Managed services can provide part of the answer.

The presentation will explain new architectures, often grid based, and delivery models for archiving and sharing patient data. It will detail the impacts of the model on IT, finance and the physician.

It also will provide practical examples from Europe and USA, highlighting the lessons learned. Finally, the presentation will identify how the model can smoothly integrate within global eHealth strategies



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Countrywide Data and Resource Sharing Finland's National Patient Data Repository

Dr Tech Hanna Kaarina Pohjonen gained her MSc in

Engineering at the Helsinki University of Technology (thesis: 3-D

analysis and visualisation of medical images), then her Licentiate of Technology (thesis: Registration and visualisation of multimodal medical images). In 1997 she gained her doctorate (thesis: Image fusion in open-architecture quality-oriented nuclear medicine and radiology departments), and in 2002 became Associate Professor at the same institute (docent in healthcare informatics, post-doctoral merit). In 2008 Dr. Pohjonen became Associate professor at the Tallinn University of Technology.

She has carried out research at the Clinical Perfusion Laboratory of the Papworth Hospital, UK; the Department of Human Anatomy and Cell Biology; the Muscle Research Group, University of Liverpool, UK and at the Dept. of Technical Physics in the Laboratory of Biomedical Engineering, Helsinki University of Technology.

As a clinical engineer she was employed at the Medical Engineering Centre of Helsinki University Central Hospital, working on the registration of multimodal images for neurological cases (computer algorithms & clinical marker designs); 3-D-modelling of medical objects, segmentation, and quality assurance concepts in radiology. At the same centre, she was a network engineer working on healthcare IT procurement; telecommunication networks and had responsibility for RIS/PACS pilots and teleradiology

In 1997, Dr Pohjonen was an evaluator of the European Union Telematics Programme. In that year she also became

Project Manager at the National Technology Agency (Tekes) under the Ministry of Trade and Industry, until 2000, when she began full-time consultancy in healthcare information systems and networks, founding her own company Rosalieco Oy, which has held consultations in 20 countries.

'About 90 % of our turnover is from abroad,' Dr Pohjonen points out.

The company has specialised in large national and regional eHealth programmes throughout Europe (e.g. consultation for almost all the largest PACS installations in Europe, including the NHS Connecting for Health). Consultation also includes healthcare information systems, networks, data privacy and security issues as well as eHealth applications. Typical customers: governments, hospital districts, private healthcare chains, EU, global IT companies, small innovative eHealth companies, investors, big consultancy companies

Dr Pohjonen is also a reviewer in European Radiology and Correspondent for Imaging Management



The EU eHealth initiative and action plan is the driver for patient information sharing and the networking of expertise across different institutions and countries. Launched in 2004, it will be applied in its current form till 2010. Besides organisational eHealth, this initiative encourages eHealth to national-level; simultaneously the focus is being shifted from in-border health to more integrated healthcare provision across the Union.

Sharing of patient data is changing dramatically: from 'point-to-point' to

'many-to-many'. The recent IHE XDS and XDS-I profiles for cross-enterprise document and image sharing are being applied in several eHealth projects in Europe and Canada. In this architecture, IT systems like PACS act as sources and consumers for information. The data are stored in a repository and published in the meta-data registry: this is how we separate IT systems from data and data from metadata. Consolidation of patient-centric data in a common archiving solution is a growing trend in the healthcare IT market. The new solu-

tions allow any type of fixed content data, including images, laboratory results, EPR summaries etc to be stored in one architecture.

The traditional images-only archives are being replaced by new generation enterprise archives that are configured as network-attached systems and they allow a set of standard interfaces and protocols – not just DICOM. The future repositories will form a GRID linked together via nation-wide registries; the European Health Insurance Card (EHIC) will be used to access this GRID data in the coming years.

The archives are changing from separate IT system attached silos to common shared architectures, but at the same time to eHealth platforms: the core is still archiving, but there are also data privacy and security services, messaging services, patient's informed consent, coding services etc. Additionally, the same platform can be used for teaching and research.

In the talk, an example of such a project in Finland will be described.

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SESSION 3 Finance

Hospitals must be governed by business rules

Jürgen Abshoff studied economy, law and social sciences (Diplom-Volkswirt) at the University of Cologne.

His early professional experience includes consultancy for planning government approved hospitals for the North-Rhine-Westphalia Hospital Federation; employment by a leading German insurance firm, and a four-year focus on hospital finance and human resources at the German Hospital Federation. He has also been a finance committee member for the European Hospital Federation; advisor to the health committee of Germany's National Parliament (Bundestag), and executive vice manager for the North Rhine-Westphalia Hospital Federation.

From 1984 to 2007, he was Managing Director of the Hamburg Hospital Federation, and was founder and member of the

steering committee of the Co-operative for Quality Management in Hamburg Hospitals (EQS). Last year, he became President.

Following membership of various committees of the German Hospital Federation, last year he became a hospitals consultant.

Since 2006, he has also worked with quant GmbH, a service institution for quality management in healthcare, which organises the public German database for quality data in hospital care.

He is also a member of the advisory council (Beirat) for the German health industry congress, and a member of the committee for Northern Germany of WIBERA / PWC (PriceWaterhouse Coopers)



successful administrative autonomy of the healthcare system. Health insurers were deprived of their independence and control over their income. If the planned health fund becomes reality, politics will control the income of health insurers and will – mere election tactics – tighten the health insurers' financial flexibility even more. Additionally, to add insult to injury, politicians will hold the insurers and health providers responsible for their disastrous policies.

In 2009, following the so-called convergence, Germany will witness a further fundamental change in hospital financing. This coming reform aims to abolish, or at least entirely change, the principles of German hospital financing employed since 1971: planning, dual-source funding, pricing system.

Most importantly, the dual-source funding system, which means that capital investments are being funded by the state while operating costs are being paid for by the statutory health insurers, is to be replaced by overall financing schemes based on fixed, maximum or recommended (DRG) prices.

In Germany, the dual-source funding scheme has failed and, after a long transitional period, will be entirely discontinued. With tight public budgets the funds provided by the German Länder to finance capital investments by the hospital have shrunk. Consequently, there is an enormous investments backlog in many hospitals. Estimates show that over Euro 40 billion is urgently needed for necessary improvements.

Nevertheless, due to increasing competition and cost pressure, hospitals are forced to invest. They must create the precondition to implement more efficient workflows. To attract

patients, they must also offer modern equipment and effective medical care.

Where will they find the money for these investments? The answer to this crucial question depends to a large extent on whether we are looking at public/municipal, independent/not-for-profit or private hospitals.

Conventional loan financing will gain importance. But the hospitals' financial and legal framework places tight restrictions on this option.

Therefore, to off-set the lack of public funding and complement often difficult loan financing, new and innovative funding schemes are needed. Such new schemes must take into account the current legal framework. Above all, it will not suffice to present old financing concepts dressed up with cool names.

In view of tighter budgets, hospitals should invest in a clearly targeted manner. They must also ensure their investments yield a reasonable return, including refinancing. However, this will not be enough! In recent months, medical employees have increasingly demanded the end of pure commercialisation of medicine and healthcare. However, they fail to say exactly what they mean. Before the reforms they sometimes threatened to pile dead patients on the hospital manager's desk if certain equipment was not purchased.

Today, physicians understand that business rules also reign over hospitals. Put simply: Money spent for one item will not be available for another. Although this may sound banal, many physicians only learn that principle when they must handle their own budgets. It teaches them to become good money managers pretty quickly.

Launching a brand new hospital? Here's how...

The Director General of Torrevieja Salud UTE, **Luis Barcia Albacar** holds degrees in law and as well as Healthcare Management and International Commerce.

Among the various healthcare projects he has managed in Spain, was the foundation of the Valencia Institute of Oncology (1989-1998).

Following this, he became Financial Director, also responsible for the human resources and logistics departments, of the Hospital de la Ribera, Spain's first Private Finance Initiative (PFI) contract.



In those European countries where citizens are entitled to comprehensive healthcare financing the healthcare systems are becoming increasingly daunting tasks. Whilst in some isolated cases medical progress may indeed lead to certain cost reductions, overall this inflates costs. Moreover, with extended life expectancy the number of care-intensive patients will mount, thus contributing to rising healthcare costs.

Although these developments are obvious, politicians in Germany and other countries feed the illusion that in the future everyone will be able to obtain any state-of-the-art medical

treatment. This is entirely unrealistic – at least in the current system of statutory health insurance. Today, the 'pension lie' – the often repeated affirmation that public pensions will continue to rise and cover the needs of pensioners – is complemented by a 'health lie'. The DRG system, introduced in Germany as a pricing system, is used as a budget system. Combined with strict budget capping, this has deeply changed the hospital environment. Recent political healthcare reform has exacerbated this trend in the entire health system. Above all, this reform rang the death knell for the well-tryed and

A newly constructed 220-bed hospital, with 11 operating theatres, an entirely new IT infrastructure and with 1,200 employees, all fully operational and able to provide a comprehensive range of clinical services from day one – impossible? Not if you look at Hospital de Torrevieja (www.torrevieja-salud.com) which opened near Valencia, Spain just over a year ago. Its launch was flawless.

In addition, the Torrevieja has set one record after another. In the first 12 months, 15,000 surgical interventions were performed; the average Accident & Emergency (A&E) waiting time was 40 minutes and average in-patient stay 4.1 days (Spain's lowest). Above all, the patients rated their satisfaction at 9.1 on a scale of 1 to 10.

In addition, the hospital, which is located in an immensely popular holiday area, coolly sailed through its baptism of fire: the tourist season, when the population it serves sky-rockets in numbers.

This impressive performance is no happy accident; it results from meticulous planning, hard work, sound financial management and dedicated players. Hospital de Torrevieja is a public-private endeavour – initiated by Valencia's public health authority but privately managed. The hospital ethos is shared by everyone: to be patient-centred, provide top quality medical care, use resources efficiently, and be motivated professionally – all supported by a comprehensive, stable and affordable IT infrastructure.

To ensure the result, every aspect of the institution was integrated into the planning process. Going far beyond the spatial layout, it encompassed clinical workflow, whether primary, emergency or intensive care, as well as administrative workflow, IT architecture, equipment, staff recruitment and training.

A tightly controlled construction schedule helped the project to stay on track. And last but not least sound financial planning and ongoing financial management and controlling ensure that public funds are used efficiently.

How to afford state-of-the-art technology – and not go bust!

Eric-Jan Rutten was Business Development Manager at Oldelft/Delft Instruments before gaining his Masters Degree in Business Administration at Rijks University Groningen in 1997. That same year, he was appointed by Philips Medical Systems as the company's Commercial Manager for the Netherlands region. Four years later he became its Business Development Manager

for the EMEA region, for which he became Director of Financial Services in 2003.

In 2006, he began his present role as General Manager of Professional Healthcare Solutions, Philips Healthcare International, in Eindhoven, the Netherlands.



When Philips Healthcare looked at today's crucial cost containment challenges that hospitals face, we decided to support them by taking more operational responsibility and sharing some of their business risks. As a result, we don't just ask 'Which technology would you like to buy?' We look at underlying challenges, such as 'How can we optimise the total cost of ownership and workflow for this disease?' and 'Which partnership models can help us to meet this need?' We're trying to understand the business issues of our customers by listening to them to find out what they really need. And what they need is not just money, but also more flexible, predictable, customised and reliable solution.

In our Pay per Use model, for example, we offer to share the risk associated with patient examinations or patient volume with our customers. In this case, Philips offers a new financing approach, for example, for a CT device, built on success-oriented financing. In practice this means that if a radiologist examines fewer patients than planned, they pay less. If they perform very well and examine more patients than planned then we also share in those productivity gains.

Pay per Use models are currently popular in Germany, whereas in the UK our customers ask for financing in the context of public-private partner-

ships. Our solutions vary depending on the scope of the partnership. Sometimes construction work is required, such as a completely new hospital wing or radiology room, and sometimes other operational activities are involved, which the hospital likes to outsource. We do not perform all those tasks – we work with the appropriate partners, in a consortium. Philips Healthcare takes care of the technology – our core business – and our partners contribute other skills. In some cases, we handle everything from air conditioning to medical instruments and lighting systems. The duration of these contracts can vary: In the UK our partners enter into contracts for 10, 15 or 25 years, whereas

in Italy they look for short-term agreements for six or seven years.

The Technology Leap Lease or Managed Service solution: As well as providing financing, Philips can also include a commitment to keep the technology up-to-date over a fixed period. Thus, when a customer signs a Technology Leap Lease for six years we can include fixed upgrades, or options for replacements, for predefined budgets. On a larger scale Philips can also provide a managed service for longer terms when the company provides multiple systems; as technology progresses it will upgrade and replace the systems within the agreed budget. In this way Philips ensures that the customer is

always working with state-of-the-art technology over a defined period, for a pre-agreed budget. In such partnerships we typically also agree on the performance levels of the systems, such as uptime and response times.

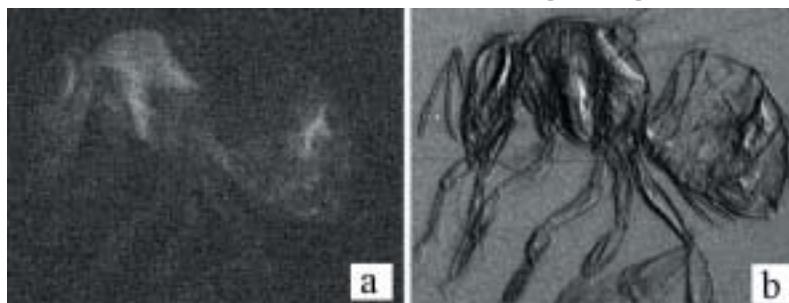
In addition to these financing and service approaches it is important for Philips to provide customers with a 'full scope' of technology solutions. That's why we established Philips' turn-key solutions. The company acts as a main contractor and integrator for all technologies when a hospital is planning a new wing or modernisation of an existing facility. As an integrator, the company plans and evaluates the purchase of all medical devices, from beds to lamps. The company takes care of the programme management, specifications, procurement, project management, installation, testing, and point-of-care management – all for a fixed price.

Responding to these new demands requires flexibility. Approaches as well as technologies and performances change over time, therefore, we also have to design our contracts with the utmost flexibility and on a good working relation – for the benefit of Philips customers and our partners. Long term partnerships need to be predictable for customers from a performance and financial point of view. This is what Philips provides: flexible, predictable, customised and reliable solutions.

XPCi

New technique enables transfer of X-ray phase contrast imaging to clinical practice

X-ray phase contrast imaging (XPCi) is a novel imaging technique with the potential to revolutionise the field of diagnostic radiology. It can do this because it is based on a different physical effect, namely refraction/interference instead of absorption. Studies carried out with synchrotron radiation have demonstrated that the exploitation of such effects leads to a substantial increase of the contrast of all details in an image, as well as to the detection of details classically considered invisible. These studies have shown impressive advantages especially in those fields where small absorption differences are the main factor limiting image quality, such as mammography – where most tumours are characterised by X-ray absorption characteristics very similar to the ones of the surrounding healthy tissue. After preliminary investigations based on ex-vivo studies, which demonstrated substantial improvements both in terms of sensitivity and specificity, the first station for in vivo XPCi mammography with synchrotron radiation is currently in operation in Trieste, Italy. Alongside mammography, substantial benefits in many other radiology fields were



clinical sources. Moreover, the combined effect of two sets of apertures strongly relaxes the requirements on the source coherence, and it was demonstrated that levels of phase contrast signals comparable to the ones obtained with synchro-

tron radiation can now be achieved with source sizes as big as 100 μm – i.e. fully compatible with current mammography sources. This technique has therefore the potential to allow for the first time an effective transfer of XPCi into clinical

The impressive image improvements provided by XPCi (b) compared to the standard image quality of conventional X-ray absorption imaging (a). This sort of improvement, up to now accessible only to synchrotron radiation scientists, could soon be available in clinical environments

practice, and a consequently widespread diffusion of the technique.

The new technique was fully modelled through a computer simulation, a small imaging prototype was realised, and the pilot experiments carried out provided results perfectly matching the simulated ones. Such experimentation confirmed beyond doubt that the advantages of XPCi demonstrated by synchrotron radiation studies can now be achieved by

means of conventional X-ray sources.

A system based on the new technique would therefore be based around conventional, state-of-the-art sources and detectors. As a consequence, its cost would not differ substantially from radiography units currently in use.

The main difference would lay in the introduction of the coded-aperture arrays, which consist of extremely thin (20-30nm) gold layers deposited on graphite substrates. The cost of such a device is currently in the range of a few thousand Euros, but could be reduced by at least one order of magnitude if the devices were mass-produced. Alignment stages to achieve the correct positioning of such devices would be the only further addition to the system, meaning that its practical realisation would thus be very cost-effective.

Contact: aolivo@medphys.ucl.ac.uk

By **Professor Robert D Speller**,
Head of the Radiation Physics Group,
University College London, and
Dr Alessandro Olivo, of the Medical
Physics & Bioengineering Dept.
University College London


demonstrated by means of ex-vivo or animal studies. These include:

- lung imaging, in which the technique showed the potential to spot small lesions with conventional planar imaging without having to rely on expensive (both in terms of cost and patient dose) CT scans
- vascular imaging/coronary angiography, in which the potential to image blood vessels without contrast agents was demonstrated
- bone imaging, where minimal details on the bone trabecular structure are easily and effectively depicted due to the substantially increased sensitivity
- and many others, to include improved resolution and lesion detectability in liver imaging, kidney imaging, etc. Moreover, refraction/interference effects are less subject to decreasing with increasing X-ray energy that absorption effects: as a consequence, images could be acquired at higher X-ray energies, which could translate into dose reductions also of one order of magnitude.

Despite being probably the ideal X-ray imaging technique, the problem so far with XPCi was that its use seemed to be restricted to synchrotron radiation environments. All early implementations of the technique seemed in fact to require levels of spatial coherence (i.e. small focal spot plus large source-to-sample distance) and monochromaticity not available with state-of-the-art clinical sources. Although pilot experiments with synchrotron radiation like the one on mammography currently underway in Trieste have a high scientific significance, a real world-scale impact would be achieved only by developing a relatively small-sized, cost effective prototype. This clearly requires taking XPCi out of synchrotron environments and into laboratory practice.

Researchers at University College London, after having demonstrated that polychromatic radiation can provide the same level of phase contrast image quality of its monochromatic counterpart, have developed a new technique based on the use of coded apertures, which makes all advantages of XPCi achievable with conventional sources.




Unlike other techniques based on perfect crystals, grating interferometers, etc, the coded apertures approach allows for the first time the use of divergent, polychromatic X-ray beams like those produced by conventional




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Science & Humanity

Today, biomedical research faces many challenges for which the traditional approach, based on the subdivision of biological systems, is inadequate. These artificial subdivisions are generally along dimensional scales (body, organ, tissue, cell, molecule), scientific disciplines (biology, physiology, medicine, bioengineering), or topographic anatomy (cardiovascular, musculoskeletal, gastrointestinal, etc.). They make it impossible to unravel the systemic nature that governs physical disease manifestations.

Thus, it is necessary to complement this traditional approach with an integrative approach to combine observations, theories and predictions across the temporal and dimensional scales, the scientific disciplines, and anatomy. This realisation, shared by the vast majority of experts in biomedical research, has given rise to a number of initiatives such as integrative biology, system biology, physiome, etc.



Hans-Ulrich Kauczor

By **Hans-Ulrich Kauczor MD PhD**, (left) Director and Chairman of Radiology at Heidelberg University Clinic, and radiologists **Frederik Giesel MD MBA** and **Hendrik von Tengg-Kobligh MD** of the German Cancer Research Centre in Heidelberg, Germany

What is the role of Radiology?

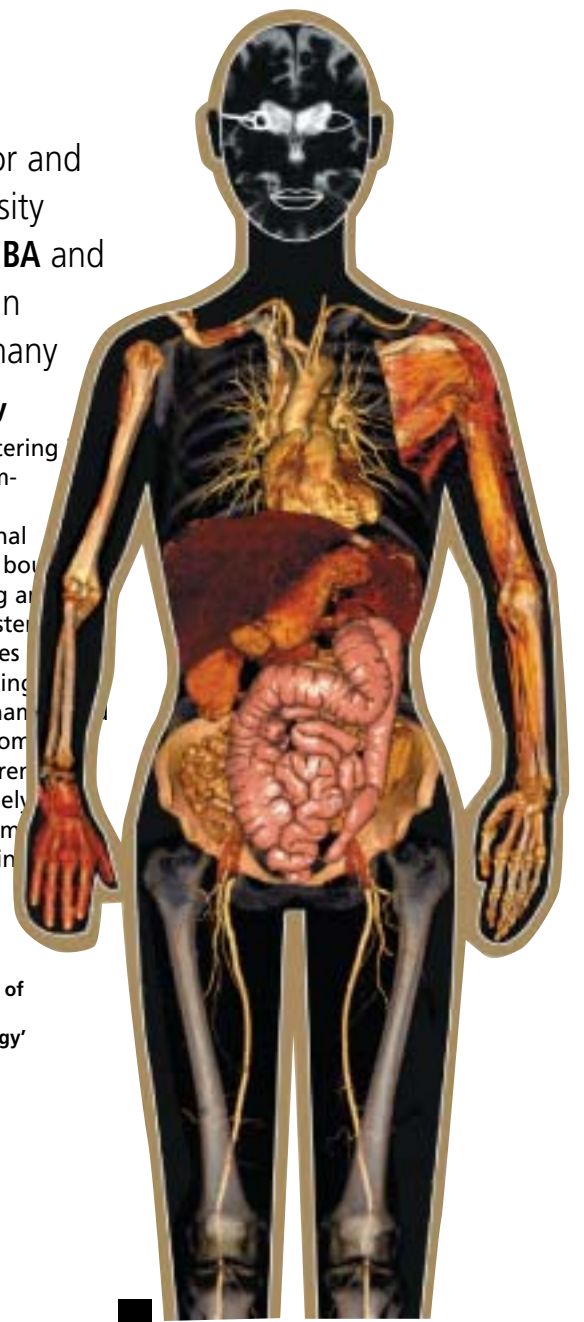
Radiology should play a major role in this integrative approach of the VPH, as imaging provides non-invasive insights into structure and function of human tissues and organs. With revolutionary technological developments during the last decade, radiology has grown far beyond visualisation of 2-D structures. Multi-slice CT and MRI, especially when using parallel imaging and higher field strength, record volumetric data at isotropic submillimetre spatial and subsecond temporal resolution. Together with the assessment of function, such as molecular imaging e.g. by PET, diffusion-weighted MRI or dual energy CT,

multidimensional, so-called 4-D imaging has become reality. With 4-D imaging dynamic processes are observed and analysed, e.g. dynamic cine imaging of the beating heart or the breathing lung and also the moving liver during respiration and the subsequent deformation. When using contrast agents and imaging with high temporal resolution, tissue and organ perfusion are easily addressed. Another major advantage of radiology is its capability to provide all these data of individual patients looking at different scales: cells (molecular imaging), tissue, organ and whole body.

Bio-System-Radiology

As such, radiology is entering a new field – ‘bio-system-radiology’. Image-based geometries and functional assessments are used as boundary conditions for modelling and simulation of human systems and its physiological processes. Pathological changes using computational fluid dynamics and other methodologies. Compared to the non-medical area, modelling has been widely used in research and development in the car or aerospace industry.

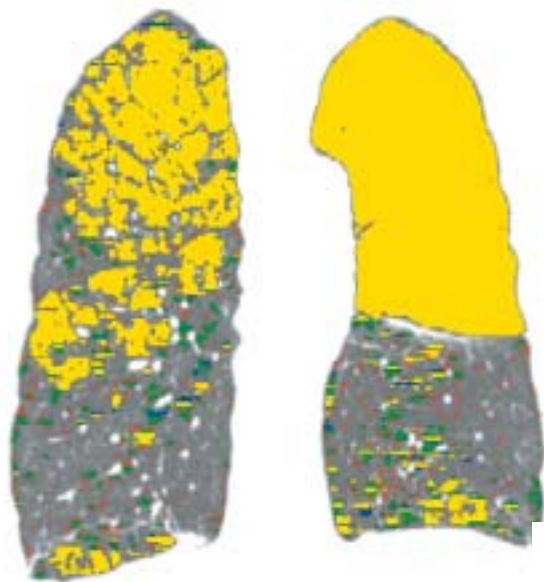
Right: Contribution of Radiology to an integrative approach in biomedical research and the framework of the Virtual Physiological Human: ‘Bio-System-Radiology’



4-D imaging and Bio-System-Radiology

The Virtual Physiological Human

However, most of these are still highly focused and require a general framework allowing experts from a variety of disciplines to work collaboratively to analyse their observations and develop systemic hypotheses. The Virtual Physiological Human (VPH) has been proposed as a methodological and technological framework to serve these needs. The VPH might be a way to share observations (‘description’), to derive predictive hypotheses from them (‘prediction’), and to integrate them into a constantly improving understanding of human physiology/pathology (‘integration’), by regarding it as a single system.



Quantitative CT and cluster analysis of emphysema with left upper lobe predilection as input for ‘Bio-System-Radiology’

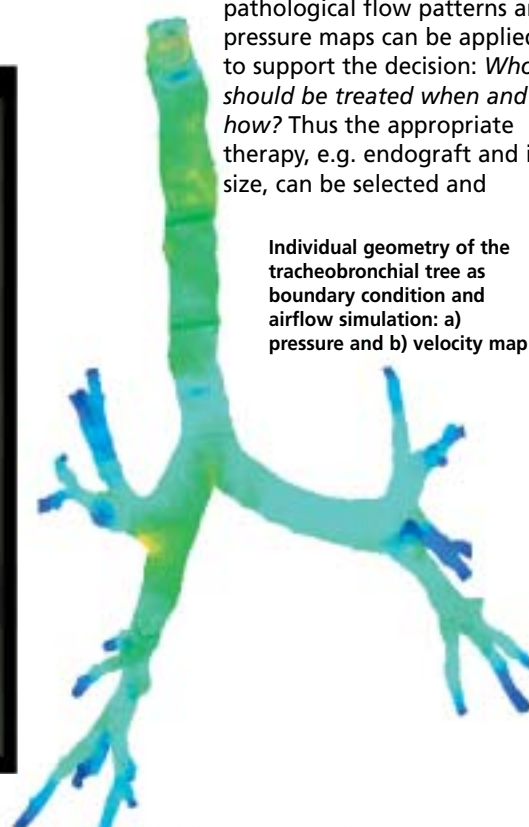
Aiming at improvements of drug and device design, modelling is currently entering the medical arena, e.g. system-biology in oncology or simulation of blood flow in cardiovascular disease. The great advantage of system modelling includes the development of novel dedicated treatment options, which can even be tailored to the individual patient in the context of ‘personalised medicine’. In clinical practice, dynamic imaging of e.g. aortic diseases and simulation of pathological flow patterns and pressure maps can be applied to support the decision: *Who should be treated when and how?* Thus the appropriate therapy, e.g. endograft and its size, can be selected and

accurately targeted. This knowledge will also foster the development of new, dedicated stent designs. Radiology has even more to offer. We can use image data together with rapid prototyping technology to produce reproductions of living structures or organs representing the actual structure in 3-D, the so-called ‘3-D print’.

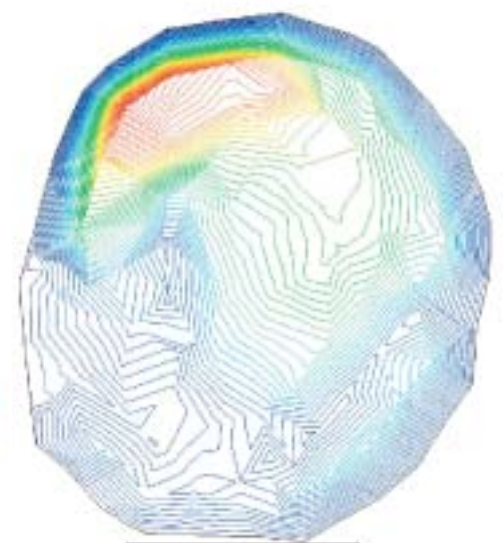
Novel integrative approaches in biomedical research and their translation into the clinical arena will profit substantially from multidimensional radiological imaging. Radiology should seize the chance to expand into the new field of ‘Bio-System-Radiology’ so that patients can benefit from innovations driven by bioengineering and systembiology.



MSCT of the aorta, segmentation of individual geometry and 3-D print generated by rapid prototyping technology



Individual geometry of the tracheobronchial tree as boundary condition and airflow simulation: a) pressure and b) velocity map



Clinical trial validates CT virtual colonoscopy



the American College of Radiology Imaging Network (ACRIN) and funded by the US National Institutes of Health. ACRIN reported that VC procedures performed on 2,531 asymptomatic patients in 15 US academic hospitals and private practice imaging centres yielded a 90% per patient sensitivity for adenomatous colorectal lesions 1 cm or larger in diameter. This level of sensitivity was comparable with that of optical colonoscopy.

Presenting those results, C Daniel Johnson MD, Professor of Radiology at the Mayo Medical School, Rochester, MN, emphasised that rigorous reader training was an important component for the results. All interpreting physicians had to read 500 cases, or attend a 1.5 day training course, and also pass a certified examination consisting of 50 cases of mixed levels of difficulty.

The results of the Munich Colorectal Cancer Prevention Trial, *continued on page 14*

When the International Agency for Research in Cancer (IARC) 2007 statistics report, showed that 429,000 new cases were reported in Europe in 2006, Director Peter Boyle recommended that colorectal cancer screening programmes be implemented throughout Europe.

This disease is not fatal – if diagnosed in its earliest stages. Adults should have a colorectal

By **Cynthia E Keen**

screening examination from aged 50 and then every three to 10 years, based on their level of cancer risk. The barium enema and optical colonoscopy — traditional tests to identify polyps — are resource-intensive and time consuming. Traditional optical colonoscopy is invasive, usually requiring sedation and incurring a 1-in-1,500 risk of colon perforation.

Patients find both processes unpleasant, and many avoid screening. In the USA, for example, although there were over 112,300 new cases of colon cancer and over 52,000 deaths from this disease in 2007, the US Centers for Disease Control and Prevention reports that only 44% of individuals eligible for screening (about 70,000,000 people) had a screening examination.

From a hospital resource perspective, non-invasive CT colonoscopy, or virtual colonoscopy (VC), is a far more efficient alternative, as long as there are physicians qualified to interpret the procedure. With the proliferation of multi-detector CT scanners in hospitals and clinics, the ability to offer this procedure, by medical facilities throughout Europe, has increased significantly.

Two barriers have prevented widespread implementation: procedure cost and validation to show that VC has equivalent detection sensitivity. The publication in 2007 results from major clinical trials conducted in Europe and the USA have validated VC's accuracy and effectiveness. In September last year, the preliminary results were announced from the National CT Colonography Trial, sponsored by

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Computed tomography versus magnetic

COMPETITIVE OR COMPLEMENTARY?



By Florian Schwarz BS, Balazs Ruzsics MD PhD and U. Joseph Schoepf MD, of the Radiology and Medicine Departments, at the Medical University of South Carolina, Charleston, USA.

The rapid pace of technological developments both in cardiac Magnetic Resonance Imaging (MRI) and cardiac Multi Detector-Row Computed Tomography (MDCT) keeps revolutionising the field of cardiac imaging. In this contribution we intend to give a brief overview over the specific imaging capabilities of cardiac MDCT versus cardiac MRI and highlight some typical differential indications.

Multidetector computed tomography of the heart

In the last decade, the majority of clinical studies on cardiac MDCT focused on coronary artery disease (CAD), both in the acute and preventive setting.

Traditionally, the first approach in the evaluation of CAD with MDCT is the quantification of coronary artery calcification. The correlation between the extent of coronary artery disease and

coronary calcification is supported by substantial clinical evidence. Various ways of reporting the calcium burden have been established (Agatston-Score, Calcium Mass, Calcium Volume). It has been shown that the extent of calcification has a high predictive value for subsequent coronary events, so that Calcium Scoring has been established as a tool for risk stratification in a preventive setting.

As there is no one-on-one relationship between coronary artery calcium and coronary artery stenosis, the detection of obstructive coronary artery disease requires assessment of the arterial lumen. This analysis has been traditionally performed invasively with coronary artery catheterisation. Recently, however, the value of CT Coronary Angiography (CTA) has been recognised, particularly owing to its high negative predictive value for non-invasively ruling out significant stenosis in patients with atypical chest pain or prior equivocal or non-diagnostic test results. Compared with conventional coronary artery catheterisation, recent clinical trials of CTA with 64-slice CT or later generation scanners report sensitivities approaching 100% and specificities of over 95% in the diagnosis of obstructive coronary artery disease. It has also been shown that CTA is a valuable tool for the assessment of coronary artery anomalies and coronary bypass patency.

With the advent of faster scanner generations, CTA is increasingly extended to detect coronary artery disease,

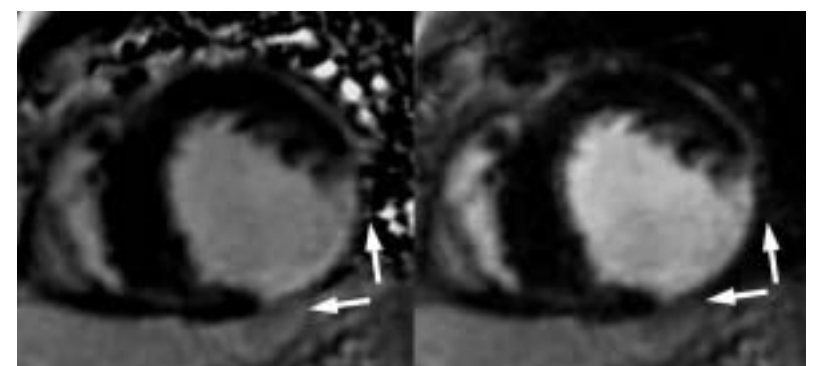
pulmonary embolism, acute aortic syndromes, and other thoracic pathology with a single, ECG-synchronized contrast enhanced CTA study of the entire chest. This paradigm has been dubbed the 'triple rule out' scan and has been demonstrated in initial studies to be both, time- and cost-effective in the assessment of acute chest pain.

The combination of speed and spatial resolution provided by CTA is unprecedented, making it the premier non-invasive tool for the assessment of coronary artery lumen integrity. Increased research interest is currently directed at deriving information on myocardial perfusion and viability with advanced MDCT techniques. Similarly, since

Table: Typical Indications for CT versus MR of the Heart		
	Cardiac MDCT	Cardiac MRI
Differential Indications	Elective evaluation of coronary arteries - atypical chest pain - intermediate pre-test probability of CAD AND - ECG uninterpretable or unable to exercise or prior stress test equivocal	Detection of myocardial scar and viability - post myocardial infarction - prior to revascularisation
	Evaluation of acute chest pain: - intermediate pre-test probability of CAD AND - no ECG changes, serial enzymes negative	Evaluation of LV function: following myocardial infarction or in heart failure
	Prior to invasive procedures: - before placement of biventricular pacemaker - prior to repeat cardiac surgical revascularisation	Characterisation of native and prosthetic cardiac valves: Quantification of flow volumes
	Evaluation of suspected coronary anomaly	Evaluation of specific cardiomyopathies
		Evaluation of myocarditis or myocardial infarction with normal coronary arteries
Shared Indications Choice of modality depends on clinical situation and local expertise	Evaluation of suspected aortic dissection	
	Evaluation of pericardial conditions	
	Evaluation of cardiac masses (tumour or thrombus)	
	Prior to radiofrequency ablation	
	Assessment of complex congenital heart disease	



Retrospectively ECG-gated, contrast enhanced Coronary CTA of a 77-year-old male patient, presenting with chest pain syndrome, reconstructed as 3-D volume rendered image (left) and curved multiplanar reconstruction (right) of the coronary arteries illustrating atherosclerotic changes in coronary vessels with calcified plaques (arrows).



Contrast enhanced cardiac MRI scan in a representative short axis plane of a 57-year-old patient with history of myocardial infarct. Delayed enhancement pattern can be seen in the phase sensitive inversion recovery (PSIR) sequence (left) as well as in the corresponding magnitude image (right). Hyperenhanced endocardial region (hyperintense endocardium) shows the location of non-viable, infarcted area with myocardial thinning (arrows).

Clinical trial validates CT virtual colonoscopy

continued from page 13

first reported at the 2007 International Symposium on Virtual Colonoscopy (ISVC) held in Boston, Mass. in October, yielded 100% per patient sensitivity in identifying lesions 10 mm and larger. Sensitivity for polyps between 6-10 mm was 93.4% and 76.9% for lesions smaller than 6 mm. The 300 asymptomatic patients were given both optical colonoscopies and VCs using a 64-detector row Siemens Sensation CT scanner. The same radiologist read both studies, using a computer assisted detection (CAD) program with the CT scans. Dr Anna Graser, radiologist at the Grosshadern campus, University of Munich and principal investigator of this study, stated that the VC images enabled radiologists to identify clinically significant

polyps nearly as accurately as optical colonoscopy. However, she cautioned that flat lesions were difficult to detect, as is the case with optical colonoscopy.

A clinical trial conducted at 12 medical centres in Italy, sponsored by the Societa Italiana di Radiologica Medical (SIRM), performed both optical and VC procedures on 934 asymptomatic subjects. Principal investigator Daniele Regge MD, radiologist at the Institute for Cancer Research and Treatment (IRCC) in Candiolo, a private, non-profit institution founded and supported by the Fondazione Piemontese per la Ricerca sul Cancro-Onlus, also presented preliminary results at the ISVC meeting. The research team determined that accuracy of VC ranged from excellent to acceptable.

This comparative trial assessed the sensitivity and specificity of

VC in a population at increased risk for colorectal cancer. 40% of the participants had a family history of colorectal cancer or polyps, 36% had had a polypectomy, and 24% had a positive faecal occult blood test result. The 341 postpolypectomy patients represented one of the largest VC surveillance populations studied to date.

10 centres acquired images on 16-slice CT scans and two centres used 4-slice CT scanners. Of the 25 radiologists and gastroenterologists who participated, only five had read more than 500 VC examinations; 11 had read 50-100 and nine had read 100-500.

Dr Sarah Jane LaPorte, radiologist at Northwick Park & St. Mark's Hospitals in Chesham, UK, presented at RSNA 2007 the experiences of her hospital's conversion from barium enemas

to VC for symptomatic and high risk patients. Over a nine-month period, she said, the 287 VC procedures were of adequate quality for interpretation. Detected cancers underwent immediate CT staging and these patients had an optical colonoscopy.

A study conducted at the University of Wisconsin Medical School in Madison, compared the results of VC screening of 3,120 consecutive adults with optical colonoscopy screening of a different group of 3,163 adults. Both groups were from the same general screening population and geographic region. The results (Pub: 4/10/07. *New England Journal of Medicine*) also found comparable results between the two types of procedures.

Cost-effectiveness - VC is still very open to evaluation. Radiologists at the Pitié-

Salpêtrière Hospital, Paris, used simulation modelling over a 10-year period to assess the cost of faecal occult blood tests, optical colonoscopy, and VC for a virtual asymptomatic French population aged over 50.

Dr Medhi Cadi, who presented the results at RSNA 2007, said the team had presumed that 50% of the eligible population would present for screening. Assumptions were made that the optical/VC procedures would be repeated at 10-year intervals if negative, and after 3-5 years if positive with adenomas. The faecal occult blood tests would be repeated every two years.

Medical costs were based on 2007 French rates. The cost per individual over a 10-year period averaged €885 for an optical colonoscopy, €543 for a CT VC, and €459 for faecal occult blood tests.

A cost-effectiveness simulation on

resonance imaging of the heart

functional information is obtained with every retrospectively ECG-gated CTA scan, this ancillary information is ordinarily exploited to also assess cardiac function and segmental wall motion. For the latter applications, however, CTA is in strong competition with other imaging modalities, primarily nuclear medicine techniques, which have been traditionally used for the assessment of cardiac perfusion, echocardiography as the most commonly used tool for the evaluation of cardiac function, and MRI, which currently still exceeds the temporal resolution of CT for the assessment of cardiac function, enables the spatially resolved evaluation of myocardial perfusion and does not expose the patient to ionising radiation.

Cardiac MRI

Because of the limitations of other clinical methods (e.g. poor acoustic windows at echocardiography, limited spatial resolution and specificity of nuclear medicine myocardial perfusion scans), cardiac MRI is shaping up as the new reference standard for the assessment of myocardial function, perfusion and viability. Compared to MDCT, MRI has significantly better contrast resolution and, seen in isolation, in theory has better temporal and spatial resolution. Currently available cardiac MRI scanners and sequences, however, are unable to combine spatial and temporal resolution to match cardiac MDCT for the detailed assessment of the coronary artery lumen.

Our routine cardiac MRI protocol is designed to yield comprehensive information on cardiac morphology, function, perfusion and viability within a 40 min time-frame. For the routine MRI workup of the heart, contrast agent is administered to study two phenomena: First-pass kinetics (= perfusion imaging) and delayed enhancement of the myocardium. The perfusion scan is typically performed twice, after application of pharmacologic stress and at rest.

In 4-5 representative sections of the heart the wash-in of the contrast agent is recorded in real-time. This allows for the reconstruction of a detailed perfusion map. Thus, rather than evaluating for obstructive coronary artery disease directly, such as with MDCT, the presence of significant coronary artery stenosis is indirectly deduced from the presence of perfusion deficits within the dependent myocardium. A milestone in the field of

cardiac-MRI in the '90s has been the discovery of the effect of delayed enhancement (DE). DE Imaging makes use of the fact that hyper-enhancement on DE Images (performed 10-12 minutes after contrast administration) represents irreversibly injured myocardium (due to any kind of heart disease). This way, important information on the likely success of revascularisation (e.g. via bypass grafts) can be objectively established.

Conclusion

For the responsible clinician it is important to recognise that both tomographic imaging modalities of the heart have their unique strengths and weaknesses which are currently intrinsic to the physical underlying principles and limitations, which will not be overcome in the near future. The primary strength of MDCT clearly is the morphological assessment of the coronary arteries, whereas ischemic sequelae and their effect

on cardiac function, perfusion and viability are preferably evaluated with cardiac MRI. Therefore, pending future developments, we have come to discourage the notion of the often proposed "one-stop-shop" in cardiac imaging with a single modality. Both techniques are important, evaluate different manifestations of coronary artery disease and thus complement each other. It is our responsibility as physicians to judiciously choose the appropriate imaging modality for each patient and for each clinical scenario.

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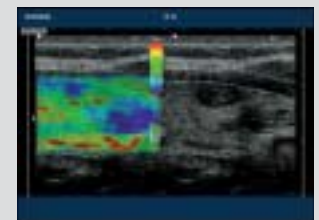
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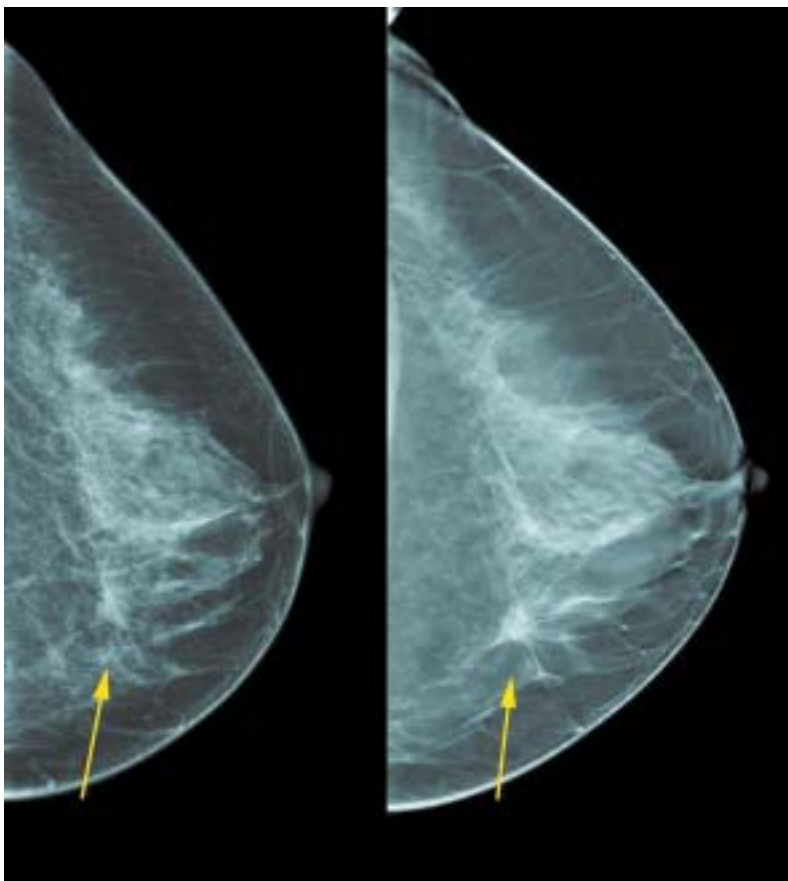
a virtual population of 100,000 Italians was conducted at the Gastroenterology and Digestive Endoscopy Unit of Nuovo Regina Margherita Hospital in Rome: Lead author: Cesare Hassan MD. Based on 2006 Italian rates, all types of screenings were shown to save medical expenses, with the CT VC saving most, at €48 per person compared with €11 for an optical colonoscopy and €17 for a flexible sigmoidoscopy.

The technology of CT colonoscopy, interpretation techniques, 2-D/3-D software and CAD for polyp detection is evolving rapidly. Hospital decisions to offer VC need determination by many factors. However, the good news is that, in 2007, important clinical trials have proved that VC provides another method to help reduce unnecessary death from colon cancer.

Mammography is an effective imaging tool to detect early breast cancer, and is the only screening modality proven to reduce mortality from breast cancer. 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 can be visualised when they are as small as 200 microns. Dose performance is a requirement, because mammography is a screening modality and patient X-ray dose must be kept as low as reasonably acceptable.

The presence of overlapping tissue poses a significant obstacle in interpretation with conventional screening mammography. When screening mammography demonstrates questionable findings, follow-up diagnostic mammograms and other tests, such as ultrasound or MRI, or biopsy, ultimately

A spiculated cancer with microcalcifications (arrowed) is better appreciated in the tomosynthesis slice (right image) than on the digital mammography image (left)



By **Andrew Smith PhD**, principal scientist at Hologic, Inc. in Bedford, Mass, is involved in research and development of digital imaging systems

ranges keep more structures in focus in a given slice. Increased separation might be desired for resolving two closely lying structures, but could impair the appreciation of a cluster of microcalcifications by having individual calcifications appear in different slices. A large lesion might have some of its spicules appear less sharp in any given slice if those spicules are far from the displayed slice. A larger angular range can also be a disadvantage if it requires a longer scan time.

Some commercial units like Hologic's Selenia Dimensions now working its way through the FDA

approval process, have dual functionality to perform both 2-D digital mammogram and breast tomosynthesis with the same unit. Therefore, it has all advantages of 2-D digital mammography, and in addition the ability to perform 3-D imaging. While the exact performance of 3-D imaging is still under investigation, it is likely that 2-D imaging will be a required operation mode for some time, such as to support magnification imaging.

Potential clinical benefits

Tomosynthesis should resolve many of the tissue overlap reading problems that are a major source of recalls and additional imaging in 2-D mammography exams. The biopsy rate should also decrease through improved visualisation of suspect objects. Some pathologies that are mammographically occult will be discernable through the elimination of structure noise. Finally, tomosynthesis may allow for improved detection of cancers in women with denser breasts that are currently not well served by 2-D mammography.

Breast tomosynthesis

A promising mammography screening technology

determine whether the finding is significant. This process creates an anxiety for patients and induces additional healthcare costs for findings that frequently are found to be benign.

As evidence accumulates from clinical trials in the United States and Europe, breast tomosynthesis is on track to provide a superior alternative to the analogue and digital screenings available today. The industry has been talking about tomosynthesis for years. Now, finally, commercial systems are expected to be available soon.

Efforts to use tomosynthesis techniques for breast imaging were pioneered at Massachusetts General Hospital in the U.S. in the mid-1990s before the first digital mammography systems were commercialised. The early trials were promising, but limitations were apparent. Advances in image receptors, computer processing power, and digital mammography system designs have now made the application of breast tomosynthesis practical.

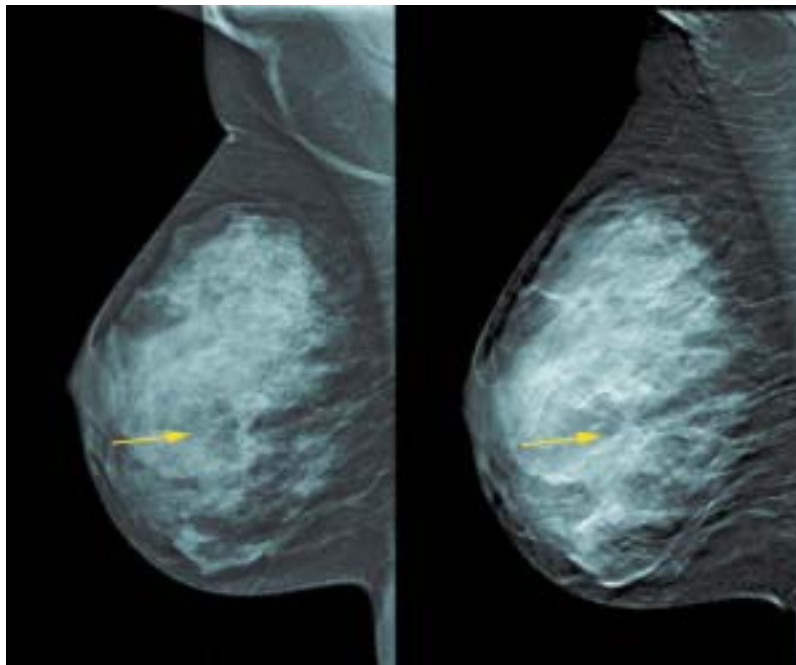
The principle of tomosynthesis is simple. During tomosynthesis acquisition, the breast is held stationary, and images are acquired at a number of different X-ray source angles. The dose of each image is kept low so that the total dose of all the images is similar to that of a conventional single breast mammogram. These images, known as projections, are then converted into 3-D cross-sectional slices through mathematical algorithms similar to CT reconstruction methods. The resultant 3-D image sets can be viewed on a computer workstation. These images are superior to digital mammograms because of the reduction of noise from breast tissue at different

heights in the breast.

Tomosynthesis systems look much like digital mammography machines, and the breast is compressed in a standard way. Similarly to conventional mammography, the breast is imaged in the medio-lateral oblique (MLO) or the cranio-caudal (CC) orientation, although the tomosynthesis system should support the ability to acquire images in any desired view.

A high quality digital detector with rapid readout and minimal image distortion is important for breast tomosynthesis. Current digital mammography technology fulfils this requirement. Detector technology can be cesium iodide crystals on an amorphous silicon thin film transistor (TFT) array, or selenium on silicon TFT arrays. Selenium is an especially good material due to its high dose efficiency, i.e., its greater than 95% X-ray absorption at mammographic energies.

Another consideration in the design of tomosynthesis systems is the motion of the X-ray source during acquisition. The X-ray tube can move in a continuous or step-and-shoot motion. If the tube rotates continuously, short X-ray pulses are used to avoid blurring the image due to focal spot motion during each exposure. If step-and-shoot motion is employed, the gantry must come to a complete stop at each angular location before turning on the X-rays, otherwise vibration will blur the image. With continuous motion, scan speed must be slow enough, or each X-ray exposure short enough, to avoid image blurring due to focal spot motion. The angular range and number of exposures acquired during the



Architectural distortion and associated microcalcifications (arrowed) are better appreciated in the tomosynthesis slice (right) than on the digital mammography image (left)

scan are additional variables that need to be optimised. Minimising the total scan time is important, because patient motion will degrade the visibility of small objects in the breast.

In general, more exposures will allow reconstructions with fewer artifacts. This must be balanced against the fact that for a given total examination dose, more exposures will mean smaller signals for each of the individual shots. For sufficiently small exposures, imager receptor noise will dominate the image and degrade reconstructed image quality. More exposures can also increase the scan time, which degrades the image through patient motion.

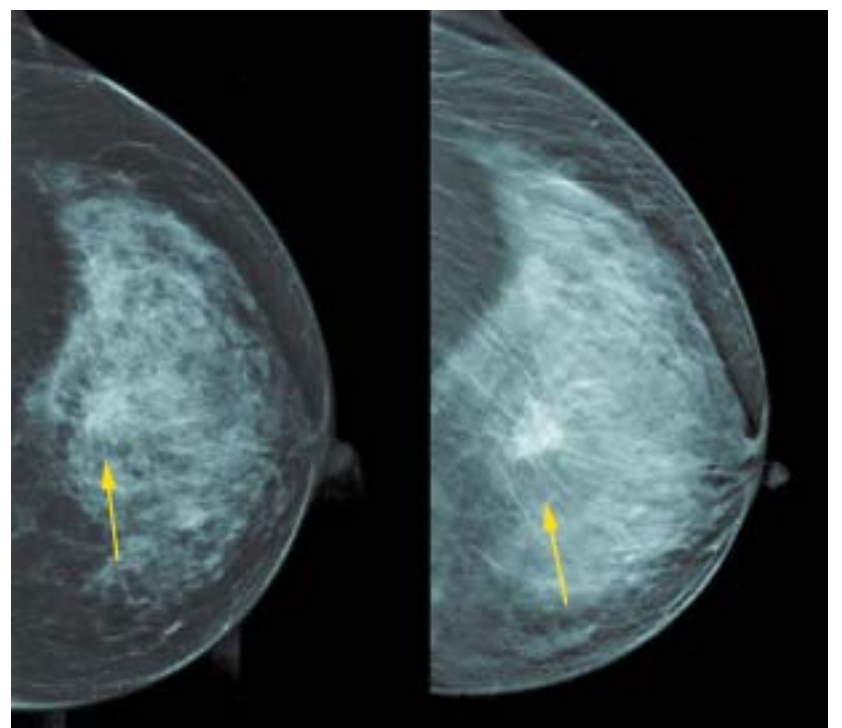
In regards to angular range, a larger angular range gives superior reconstructed slice separation, where smaller angular

Tissue localisation

Because the location of a lesion in a tomosynthesis slice completely determines its true 3-D coordinate within the breast, needle localisation and biopsy tissue sampling methods can easily be done using the tomosynthesis-generated coordinates.

Faster review time

As the images are presented with reduced tissue overlap and structure noise, objects are expected to be visualised with improved clarity. This will likely lead to faster case review and more confident readings. Computer-aided detection (CAD) algorithms might also have improved accuracy.



A spiculated cancer (arrowed) is better appreciated in the tomosynthesis slice image (right) than on the digital mammography image (left)

Mammography in Russia

Breast cancer morbidity has been the leading oncology disease (21.8%) in Russia since 1996 – and since 1981 in St. Petersburg. In Moscow, the morbidity has increased 52.4% in last 14 years.

Almost 13% of all diagnosed cases are neglected. The low success of treatments is due to unsatisfactory early diagnoses – even though worldwide experience has confirmed the high effectiveness of diagnosis from mammography screening. Some attempts are being made in Russian to realise such programmes.

Professor Georgy Manikhas, Head physician at the St. Petersburg Oncology Centre reports: 'The level of breast cancer morbidity in St. Petersburg was always the same as in Scandinavian countries. However, following the introduction of a screening programme in Finland, in 1996 our colleagues there published data that showed a 20% decrease in the country's mortality rate. Their expert recommendations became the basis for the creation of a similar programme in St. Petersburg. With funds from the City Government, we bought 40 ALFA III (Finland) mammography machines and installed them in St. Petersburg's out-patient clinics. The plan was to examine women aged between 40 and 69 years. Unfortunately, this the project was stopped because there were no funds for patient screening and mammography machines were only used as diagnostic devices, not for screening.'

Today, the country's only mammography screening programme is in Moscow. The recommended number of mammograms per one million women is 12; the real number in Russia is 3.7. As is known, expenses

for the examination of one breast cancer case is between US\$2-5,000, which was too high a sum for the Russian Public Health Service until recently. The Moscow screening programme began in 2004, after 85 mammography machines were installed in Moscow's out-patient clinics.

This year, St. Petersburg oncologists asked the City Government to reach concrete decisions to realise a screening programme, and the modernisation of existing city

mammography machines was decided. In the next four years, we plan to digitise mammography equipment and connect the mammograms to the shared city computer network. With the main framework in our clinic, the network will hold all the city's morbidity images and provide flexible management. Unclear or debatable screening results will be evaluated by an expert committee in our clinic. We have only found a similar programme in Tartu, Estonia, but Tartu is, of course, a small town



Prof Georgy Manikhas

compared with the megalopolis of St. Petersburg.'

Professor Vladimir Semiglazov, Director of Petrov's Federal Cancer Research Institute, adds: 'The key concept behind screening is very early stage cancer discovery, so that treatment can change the prognosis and the natural clinical

course of the disease. However, breast cancer is a heterogeneous, multi-faceted disease that may influence screening efficacy. To screen the healthy population, test specificity is vital because it means a minimum amount of false-positive results that lead to unjustified biopsies and sometimes to surgery. Cancer progression is a long process and not all stages are irreversible. Possibly, in the future, screening methods will lead to recognition of early molecular-genetic changes, and then more complete screening techniques will be needed. For now, mammography serves as the main element of screening.'

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Reduced compression pressure

In conventional mammography, breasts are highly compressed so as to reduce tissue overlap. High compression pressure is not needed for tomosynthesis imaging. Just enough breast compression to pull tissues out of the chest wall and keep motion at a minimum is adequate. Therefore, there is the possibility of less painful compression using tomosynthesis. If reduced breast compression is used, the X-ray energies may need to be raised so as to penetrate the thicker breasts more efficiently. In this case, it is important that the image receptor maintain its high quantum efficiency at the higher energies.

Contrast-enhanced imaging

Researchers have studied mammography using IV administered iodinated contrast agents. Using either dual energy or pre- and post-contrast imaging, they have observed enhancement of otherwise occult cancers and differentiation of benign from malignant tumours. While this research is still in its infancy, contrast-enhanced tomosynthesis images might allow for even greater malignant tumour to background contrast and visibility over that observed with 2-D contrast imaging, and could conceivably supplant MRI gadolinium breast imaging.

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For the first article in his series, Prof. Schönberg invited colleagues at Mannheim and partners at Ohio State University, USA, for a roundtable discussion on:



PET-CT for radiation therapy planning: A step towards personalised radiation medicine

For individualised radiotherapy, high-precision delineation and characterisation of the tumour is critical. If highest radiation doses are delivered in a targeted fashion, the chance of tumour cell kill increases and tumour control probability is enhanced. Precise delineation of the target in its anatomical/geometric and functional/biological aspects has long been a great dilemma for radiation oncologists. Traditionally, large margins were added to the tumour volume to account for uncertainties of tumour visualisation and target delineation. This results in a high risk of 'collateral damage' to healthy tissues – and in return the radiation dose to the tumour must be lowered, compromising the chance of tumour control.

Technological progress has enabled advances in cross-sectional imaging, molecular imaging, and 3-D reconstruction. Introduction of

CT was the first key development towards modern 3-D radiotherapy planning. Additional information from other imaging modalities such as magnetic resonance (MR) imaging, MR spectroscopy, or PET, has further improved the target volume definition process by providing better soft tissue contrast or physiologic information. Parallel innovations in radiation therapy technologies enable millimetre-precision with the introduction of stereotactic techniques and online 3-D image-guided radiation therapy (IGRT) based on linac-mounted Cone Beam CT systems. These parallel innovations have brought the fields of radiation oncology and radiology, which had drifted apart in the past decades, together on a novel level. Today, radiation oncologists are able not only to see the tumour but also *treat* the tumour with highest precision for each individual patient.

However, despite 3-D CT-based planning, the definition of target

volumes has still remained a highly subjective process, as shown by several 'inter-user' target volume definition studies. This is likely related to inherent uncertainties in tumour margin definition by anatomical imaging modalities that frequently do not adequately delineate the biologic/physiologic tumour target.

PET as a functional imaging modality adds critically to the existing panel of imaging methods. PET provides physiological information of tissue and tumour metabolism. Increased FDG uptake indicates areas of higher glucose metabolism, which is characteristic of uncontrolled growth of tumour cells. However, PET alone lacks correlative anatomical information. Conversely, CT lacks this physiological information but provides superior definition of anatomical detail, tumour localisation and tissue density. The 'marriage' of the two modalities as a PET/CT provides combined imaging acquired at the same time without patient motion and is superior to either PET or CT imaging alone.

This allows incorporation of biological, molecular, and pathophysiological parameters directly into the radiation therapy algorithms. Incorporating these principles has several aspects for the therapy algorithm, that all build on each other: Proper staging, anatomical and molecular target delineation for radiation therapy planning and image-guided treatment, treatment adaptation, and outcome prediction, and treatment adaptation based on outcome predictions during or after therapy (Fig. 1).

Ample evidence has now accumulated that lung tumour delineation can be significantly refined by the use of PET/CT compared to CT alone, and impact treatment planning in half of patients. Improved delineation of the target volume by PET CT *reduces the target volume* in approximately one fourth of patients, especially for lesions masked by non-cancerous tissue (fibrosis or atelectasis), that is very challenging to differentiate from tumour by standard imaging. Reducing the target volume permits a decrease in the

Meet the experts

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M.V. Knopp

Integration of PET/CT into the radiation therapy planning process

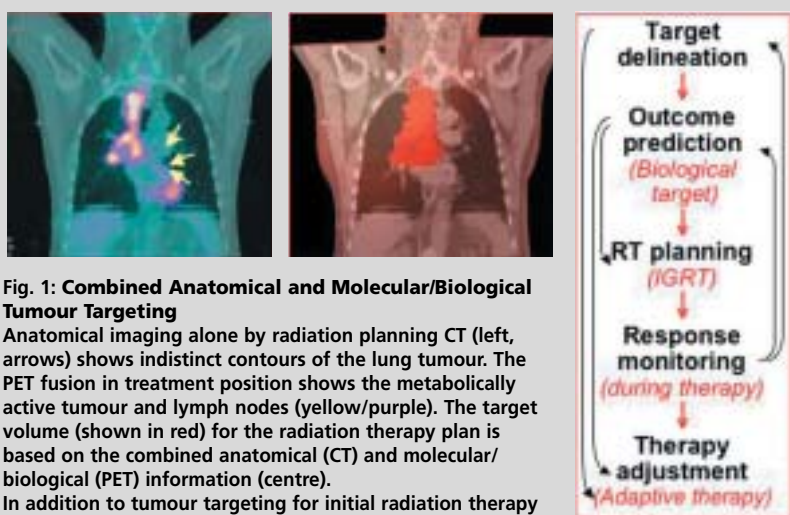


Fig. 1: Combined Anatomical and Molecular/Biological Tumour Targeting

Anatomical imaging alone by radiation planning CT (left, arrows) shows indistinct contours of the lung tumour. The PET fusion in treatment position shows the metabolically active tumour and lymph nodes (yellow/purple). The target volume (shown in red) for the radiation therapy plan is based on the combined anatomical (CT) and molecular/biological (PET) information (centre). In addition to tumour targeting for initial radiation therapy planning, molecular imaging is being explored for outcome prediction. Repeat imaging during or after radiation therapy can be used for image-guided therapy adjustment, and to guide further therapy (right).

Fig. 2: Contrast-enhanced CT (A, C) and F18-FDG-PET/CT (B, D) of a male patient with anal carcinoma vividly demonstrating the added value of PET-CT for target volume definition.

Conventional CT shows a questionable mass in the anal canal; however the exact extent of the tumour cannot be differentiated from the sphincter muscle (A, arrow). PET/CT (B) clearly identifies the tumour by visualising the increased glucose metabolism. Similarly, a right inguinal lymph node, which appears within normal shape and size ranges in contrast enhanced CT (C), can be identified as malignant node by increased glucose metabolism in PET/CT (D) and can be differentiated from a normal contralateral inguinal node (dashed arrow)



radiation dose to dose-limiting normal tissues (lung, spinal cord, oesophagus), and provides the opportunity to escalate the radiation dose for better tumour control. Conversely, an *increase in the target volume* based on PET/CT occurs in about one fourth of cases, where PET/CT identifies tumour involvement that is not evident by CT alone.

Integrating PET-CT into the radiation therapy planning process has the potential to reduce risk for inadequate coverage of the tumour within the radiation ports ('geographic misses'), and reduces inter-user variability in target definition. The higher precision in delineating tumour extent, and excluding non-cancerous tissues, open the door to *dose escalation* to the tumour while omitting large margins or 'elective' target volumes. Radiobiologic modelling studies of such dose escalation in stage N2-3 lung cancer have estimated an increase in tumour control probability by 13-18% - surpassing the gains achievable by many adjuvant therapies.

Similarly, in head and neck cancer, target delineation through PET/CT fusion has shown benefit. Initially used to assess tumour response and guide management of involved cervical lymph nodes after radiation therapy, the technique of co-registration has evolved to *PET/CT-guided intensity-modulated radiation (IMRT)*. This enables selective intensification of the radiation dose ('*dose painting*') in tumour sub-regions that are most metabolically active or in hypoxic areas using ¹⁸F-MISO

PET/CT as a hypoxia tracer.

Now that PET/CT planning is becoming established in lung, head and neck cancer, other tumours, such as gastrointestinal, anal carcinoma, prostate carcinoma, lymphoma and gynaecologic tumours are also being studied. For example, at initial diagnosis of anal carcinoma, 15-39% of the inguinal lymph nodes are involved. In the future, PET may be used as a decision tool whether to include the inguinal nodes to the target volume or not (Fig. 2)

However, the use of this new paradigm is not without challenge. Not all metabolically active areas within malignant lesions represent tumour. Inflammation and radiation-induced reactive changes can represent challenges. Although PET/CT has reduced inter-observer variability in tumour delineation and has further refined how we 'see' tumours in anatomical and metabolic aspects, the optimal use and the proper integration of this relative expensive technique into cancer therapy has to be further defined and long-term follow-up studies to assess the impact on ultimate therapy outcome have yet to be completed. This novel approach holds the promise to improve cancer care in many malignancies. Its effective implementation will bring us closer to a *Personalised Radiation Medicine* approach in cancer therapy.

For more details on this topic see our upcoming Symposium: www.mr-pet-ct.com

MR contrast agents: A step up from compartmental to targeted imaging

The issue of image contrast is inherent to MRI. The natural desire to differentiate structures and reflect function has previously been explored in Roentgen applications. However, owing to the particulars of ionising radiation physics, k-edge characteristics of only a few agents could be exploited, namely iodinated, Barium sulphate-, Gadolinium- and other heavy metal-based compounds as well as gases. These have been applied to what are essentially compartment-based approaches that may be used to image the vascular system, gastrointestinal tract or other body cavities. However, in MRI, contrast agent development has been more diverse and can only be considered as a market issue today. With current use quoted for between 20 and 40% of MRI scans, depending on body area, the development of Gadolinium compounds in the 1980s was a particular success story and the largely intravascular use of

exploited in MRI contrast agents: Unpaired extranuclear electrons act as strong magnetic dipoles and affect hydrogen nuclei in their vicinity. Gadolinium (Gd) with seven, manganese (Mn) with five and iron with three such unpaired electrons, all shorten both the T_1 - and T_2 -values respectively. However, the T_1 -effect is greater and results in a rise in signal intensity in areas of contrast media uptake on T_1 -weighted

images. Compounds based on these materials have therefore been called positive agents. In contrast, very small particles of iron are too small to be ferromagnetic but they may be magnetised, a state that renders them superparamagnetic. The resulting susceptibility leads to a signal intensity decrease on T_2^* -weighted images and a negative image contrast, an effect that can exceed that of Gd by well over an

order of magnitude [Jensen]. Gd-compounds are available as soluble agents while the ferumoxides come in colloidal solutions (superparamagnetic iron oxide, SPIO).

While Gd-based agents will primarily increase the contrast between normal and pathological tissues when there is an increased vascular permeability, such as in breakdown of the blood-brain-barrier, the site of iron-induced

MR relaxation depends on particle size: Larger SPIO will accumulate in the reticuloendothelial system and permit detection and characterisation of focal hepatic or splenic lesions, while smaller particles have a much prolonged intravascular residence and can be used as blood-pool agents. New approaches focus on even smaller, ultra-small USPIOs, enabling cell tracking and the labelling of macromolecules, specifically, antibodies.

In addition, there has been renewed interest in manganese as a cofactor in several critical biological functions where it may serve as a surrogate marker of calcium influx in cerebral or *continued on page 20*

Andrea Martini and **Joerg Larsen**, of the Institute for Roentgendiagnosics, Braunschweig Teaching Hospitals, Germany, discuss nanotechnology, hybrid imaging and the quest for a personalised medicine

Gadolinium is dominating current clinical applications for contrast media in MRI. Nonetheless, recent developments somehow follow the evolution of approaches in Nuclear Medicine over two decades ago: Specifically, the attempt to image a physiological environment and pathological processes in vivo is what unites new approaches to modulate image contrast and with the additional advantage of ever increasing spatial resolution. This article aims briefly to review current MRI contrast media usage, the variety of creative approaches to new exogenous media and the state of their development, highlighting particularly interesting or promising concepts.

MRI contrast media were originally used to make unspecific lesion detection easier, i.e. to contrast focal pathological processes, such as inflammation or tumours, against normal tissue background. Lesion characterisation also became possible through repeated scanning following contrast medium administration and was advanced with the introduction of hepatic agents. As hard- and software capabilities improved, fast imaging became a reality and today we routinely image and analyse the first pass of a contrast agent in perfusion studies. Beyond a need for acceptable tolerability, there are no set requirements new agents must fulfil. Quite the contrary, with developments in image acquisition, more specific clinical questions allow for more specific contrast media.

Para- and superparamagnetic properties have traditionally been

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SECTRA

continued from page 19 cardiac applications, e.g. to assess tissue viability. Manganese may also bind to particular intracellular sites, giving rise to a unique tissue contrast, which has been used to distinguish neuronal cell layers, e.g. in the amygdala and hippocampus [Koretsky and Silva]. Finally, intracellular manganese can be tracked as it is passed on between neurons and neuronal connections may thus be traced in this way. However, certain states of manganese are toxic and some of the above experiments have been conducted in rodents at doses which are not suitable for the use in humans.

In the late 1990s, a new chapter has opened in MR contrast agent research. Proof of concept was provided for yet another class of agents, however, utilising very different

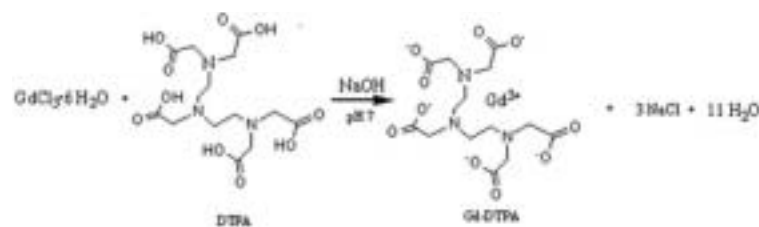


mechanisms: Nanotechnology in targeted or molecular imaging aims to provide specific and sensitive detection of molecular targets that are far too small to be considered with conventional MRI techniques. This approach is analogous to immunohistochemistry, in situ hybridisation, and some scintigraphic methods and positron-emission-tomography [Wickline and Lanza]. While there is considerable experience with issues surrounding the selective binding to target epitopes, the development of agents that provide a sufficient contrast-to-noise ratio to visualise even a single cell constitutes the actual challenge. Nonetheless, this has been realised for some applications in standard clinical MRI settings although mechanisms explored and potential clinical applications are too diverse to attempt to describe the current state of all developments and try to evaluate their future roles.

Nonetheless, a few specific agents from cardiovascular, rheumatologic, neurological, oncological and endocrine research shall be referred to briefly to illustrate the variety of possibilities: Tang has used USPIO particles to detect and characterise the degree of inflammation in atherosclerotic carotid artery plaque, which is today considered the culprit process in plaque instability and subsequent stroke illness. Macrophage activity has been equally assessed in an experimental arthritis to consider MR-based monitoring of disease progression and the effect of therapies [Simon]. Equally, iron oxide accumulation has been shown in spinal nerve roots in a rat model of autoimmune neuritis when uptake interestingly occurred already at a preclinical stage [Stoll]. In a rat-model of transient cardiac ischaemia, French has demonstrated enhancement in hypoxic but later re-perfused muscle using an iron oxide-

labelled monoclonal antibody against endothelial cell adhesion molecule PE-CAM 1 at 4.7 Tesla. This could thus serve as a memory agent for ischaemic events. Spuentrup has shown that fibrin clots implicated in acute pulmonary and cardiac thrombo-embolic events can be visualised in swine models at 1.5 T using a prototype Gd-peptide which specifically binds to fibrin. A very high accuracy in focal solid pancreatic lesion detection has been reported for the commercially available Mn-compound Mangafodipir, although the differentiation between inflammatory and neoplastic lesions was poor in that study [Zanello]. Also using Mn-enhancement, beta-cell activation could be visualised in cell culture experiments, perhaps allowing a non-invasive assessment of beta-cell mass and functionality in

future [Gimi]. Particular efforts have also been directed at the labelling of stem cells to allow their tracking during therapeutic uses when confirmation of 'delivery' and early cell migration are of crucial interest. Iron oxide nanoparticles have been favoured for this purpose, since approaches using radioactive materials have suffered from short-lived tracer activity. Drug delivery may similarly be visualised in this way.



A further field looms: the labelling of gene constructs to ascertain the site and expression of certain genes in the context of gene therapy. These developments must be realised in an environment of optimised image acquisition, post-processing and mathematical analysis, a fertile cocktail of opportunities to further exploit biological specificity as outlined by Roberts PL et al. [Eur J Radiol 2000;34:166-].

What evolves from within the mist of this array of new molecular diagnostic agents may be what has been called *personalised imaging*, the attempt to tailor investigation and therapy to the way a particular illness expresses itself in an individual. However, while embracing these exciting developments, we must not forget that contrast agents are drugs and the fact that it took over 20 years to recognise nephrogenic systemic fibrosis as one of the most harmful side effects of Gadolinium compounds is a sad reminder of this simple truth. Appropriate licensing procedures are therefore mandatory, although the process of development of new contrast media is primarily a technological innovation that leads from the

idea of a technical possibility through the conception of a usable compound to finding an application as an imaging tool and market development. This relies on co-operation between academic researchers and industry but priorities on patents may dominate developments as emphasised by de Haen [TMRI 2001;12:221-]. In all this, there is yet another crucial point to consider: As has been pointed out by Rinck, contrast agents require hardware to image them and developments in these markets have not always been synergic [www.emrf.org]. The basic fact that soft tissue contrast and the physical properties of MR contrast agents change and change independent of one another with rising field strengths [Rohrer M et al. Invest Radiol 2005;40:715-] is only the most obvious reason why the career of a novel contrast drug may be unpredictable. Given current bureaucratic obligations in the licensing process and patent-related legal implications, it can take years before a new compound reaches the market and, suddenly, a new hard- or software development comes along and renders the new agent obsolete. We note, for example, that the first work-in-progress PET-MRI-System was presented last year, using next-generation detector technology and featuring acceptable scan parameters such as a spatial resolution of 3 mm, currently sufficient for brain imaging. While the developers and many others primarily see the introduction of further hybrid-modality imaging technology as a commercial development, it will allow new ways to study cerebrovascular and degenerative brain diseases in particular.

Conclusion

New approaches to modulate tissue contrast in MRI are plentiful and diverse and almost all are very much in their developing stages. Evolving methods are faced with a patent-driven market in which only large-scale applications may advance into the latter stages of clinical trials. These include common uses such as occlusive vascular or tumorous diseases. Many invariably cost-ineffective but intriguing concepts in MR contrast media research may therefore require a certain amount of protection or fostering to succeed. Such policies have long been considered for rare medical diseases [Hughes DA et al., Q J Med 2005;98:829-] and may be needed to allow for a small but medically required research and specialist applications market. Irrespectively, the search for contrast in MRI applications is likely to take us to a more faceted picture than may have been imaginable in the early days of the technique.

Full article and reference details: j.larsen@klinikum-braunschweig.de

A novel PET tracer for early detection of Alzheimer's

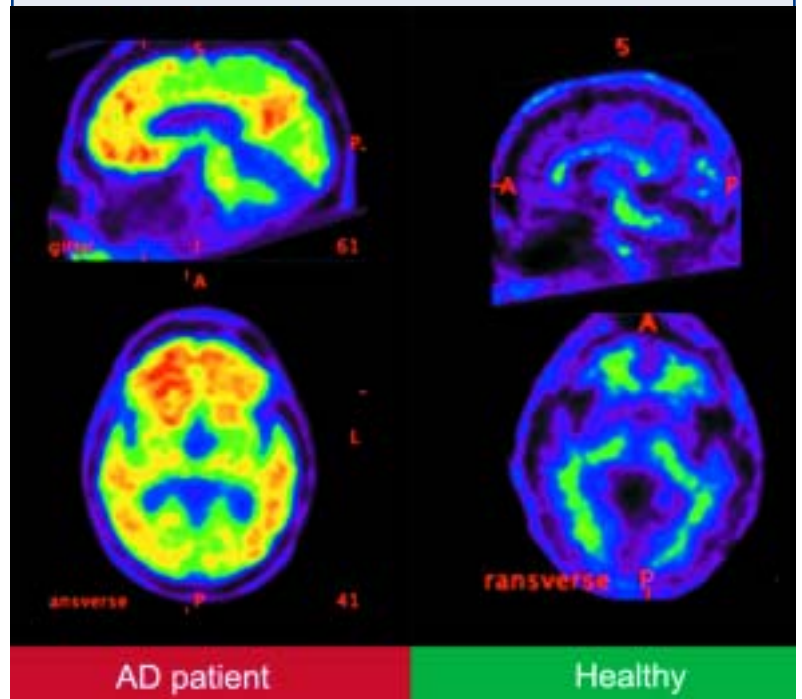
Amyloid β , (A β) plaque formation is a hallmark of Alzheimer's disease (AD) and precedes the onset of dementia. In a recent issue of *The Lancet Neurology*, Australian researchers reported the first data on the validity in humans of a new PET tracer binding to A β . Their data suggest that ¹⁸F-BAY94-9172 of Bayer Schering Pharma AG can reliably detect A β deposition and thereby aid early diagnosis, differential diagnosis, and therapeutic monitoring in AD.

At present, Alzheimer's disease can only be diagnosed at an advanced stage, i.e. when the patient is already suffering from distinct cognitive impairments. Moreover,

novel PET tracer was shown to be able to discriminate between AD, FTLD and healthy controls. Moreover, binding of ¹⁸F-BAY94-9172 matched the reported post-mortem distribution of A β plaques. The detection of beta-amyloid in the brain would enable physicians to exclude Alzheimer's in case of negative scans, or to establish the diagnosis in case of positive scans.'

Based on these results, the company will start the clinical development of ¹⁸F-BAY94-9172 this year.

'Thanks to molecular imaging, an early and precise diagnosis of, for example, Alzheimer's or certain forms of cancer, is becoming very likely. We are hopeful that it



the development of novel, improved therapies for Alzheimer's will greatly benefit from in-vivo imaging procedures that can track the pathology of the disease at very early stages.

Bayer Schering Pharma AG researches and develops new, innovative diagnostic agents – not only for CT and MRI, but also for molecular imaging. Research in this field is focused on the development of tracers for the early diagnosis of tumours and follow-up cancer treatment, as well as neurodegenerative disorders like Alzheimer's.

'We are very happy that early clinical research studies with our most advanced PET tracer have been successful,' said **Dr Ludger Dinkelborg**, Head of PET Research at Bayer Schering Pharma. ¹⁸F-BAY94-9172 was studied in 15 patients with mild AD, 15 healthy controls, and five patients with a non-amyloid degenerative dementia (frontotemporal lobar degeneration, FTLD). The

will become a routine hospital procedure in less than 10 years,' Dr Dinkelborg said. The development of molecular imaging tracers is a complex iterative process that requires close co-operation between interdisciplinary preclinical and clinical teams. 'Bayer Schering Pharma is therefore collaborating with a worldwide network of partners from the biotech field, academia, pharmaceutical companies and manufacturers of imaging devices,' he added. 'Most recently, for example, with four other partners from German industry and the German government, we announced a joint investment of €900 million in molecular imaging research. This *Innovation Alliance on Molecular Imaging* will provide funding for joint projects involving the research and industry sectors. The aim is to develop new tracers, devices and software.'

www.bayerscheringpharma.de

Personalised medicine? It's on the move!

Integration has become a keyword when discussing present and future challenges in healthcare worldwide.

Companies such as Siemens have already begun to change business concepts by offering services that cross departmental boundaries. However, the basis of full integration is a good IT network and compatible technologies. **Daniela Zimmermann**, of European Hospital, asked **Tom Miller**, CEO of Workflow and Solutions, Siemens Healthcare, and **Dr Bernd Montag**, CEO of the Imaging and IT Division of Siemens Healthcare, about the huge challenge they face.

In addition, in the article 'Diagnostics: Uniting the lab and radiology' (Laboratory section of European Hospital — page 10) **Jackie McDowell**, Head of Integrated Diagnostics and Market Development at Siemens, presents further reasons behind the Siemens Healthcare acquisitions of DPC, Bayer Diagnostics and Dade Behring.

DZ: How will integration benefit healthcare?

Dr Bernd Montag: Progress in medical imaging – working closely with laboratory diagnostics by using sophisticated information technology – will lead to an earlier and more reliable diagnosis and localisation of diseases, for example cancer or cardiovascular diseases. Already many examples, such as the diagnosis of breast cancer, show that the combination of in vitro and in vivo diagnostics increases the quality of care significantly. If, for example, the existence of a tumour can be verified using a lab test, then it can be localised and typified by using innovative imaging methods, such as mammography, ultrasound or magnetic resonance tomography.

On the other hand, medical imaging plays an important role in the field of acute care, (e.g., when trauma patients must be examined quickly). The University Hospital Erlangen recently installed our brand new CT system, the SOMATOM Definition AS, directly in their trauma centre. Now, patients can be examined from head to toe within seconds.

We should also note the enormous potential of such innovative systems in the field of functional imaging. Here, trendsetting technologies, such as ultra-high-field magnetic resonance imaging, allow an unprecedented view into the human body. This, for example, dramatically increases our understanding of the causes of many neurological diseases, such as Alzheimer's or Parkinson's. This understanding of the genesis of diseases is the prerequisite to develop new and even more individualised

therapies for people all around the world, as well as to discover new possibilities in preventing diseases.

DZ: Although everyone is discussing the full integration of medical workflow, no-one seems to have a clear idea what it really entails. So, first, who is involved in any kind of integration?

Tom Miller: The answer is simple: Everybody! Looking at the near future, most very forward thinking healthcare providers are looking at care teams, instead of single clinicians, because the likelihood that a single individual could assess all the medical knowledge necessary to handle the complexity of care that our aging population requires is increasingly low. The real problem for hospitals will become patients with three or four conditions. For example, to exaggerate that, it could be a HIV-positive, diabetic, schizophrenic patient with chest pain. Therefore, it's not a single clinician who will treat that patient, but a whole team. In this scenario, a question arises: How can we co-ordinate all the data and how do we ensure the team works efficiently? So every clinician would be frustrated by the lack of holistic information surrounding the patient.

Another example, if a patient has shown up for a radiology examination, and the radiologist does not know what to image, that is a worse case scenario of inefficiency – and it's not that rare. An analogue problem occurs looking at treatment options: How does knowledge arrive



Bernd Montag

Tom Miller

Tom Miller: 'How do you treat the HIV-positive, diabetic, schizophrenic patient presenting with chest pain? By making the necessary information available for personalised medicine'

today? Most often through epidemiology — in other words, we must wait ten years, see what happens to the patient, and then change the standard of care. Again, the problem is due to a lack of available information.

So, in terms of integration, this not only means creating teams but, more importantly, also creating networks of knowledge – through IT. This can be used to bring epidemiological data together, by collecting relevant data from all over the world. So information about treatment options can be obtained in six months instead of ten years.

Another example: Only ten years ago the breast cancer death rate was significantly higher and it was seen as only one disease. Now we know there are different forms and these may be diagnosed through digital mammography followed by biopsy, which then leads to a blood test to evaluate HER-2/neu

serum levels that show a special protein. Its presence can lead to a Herceptin regimen, which is only effective in a certain type of breast cancer, and contra indicates for certain chemotherapy agents that are given at the same time, and can cause congestive heart failure. So, cardiac enzymes must also be tested.

That example describes a very personalised treatment for a particular breast cancer, which is only possible with the ability to bring all the pieces of information together – via a personal exchange as well as a technological exchange.

Are these future scenarios, or are they happening already?

TM: The availability of information and a clinical workflow based on IT is already happening with our Soarian system. To continue the example of breast cancer, we can take women from screening to biopsy,

testing, guided chemotherapy, surgery, through to radiation therapy with all the data from her pre-existing therapies, which are necessary to understand each single step along the treatment of that disease.

Of course this is a very ambitious approach, but we are already very successful with it; Soarian already runs in seven hospitals in Europe with 57 automated workflows. Some university hospitals, such as the University Hospital Eppendorf in Hamburg, Germany, are very forward thinking. They plan to implement Soarian and, from the CEO down, only speak of the optimisation of care processes throughout the enterprise.

The advantage of our Soarian is that we have designed the system to take into account the fact that information comes from many different places. It is the only service-oriented architecture that can manage and process data from other sources and treat it as if it were integrated – a single source. This is the only way such a data process can work, because there are hardly any hospitals working with homogenous IT and technologies across all departments.

How does Siemens deal with its own internal integration of different business units?

TM: It's a huge change. Siemens established a new organisational structure and created the Workflow and Solutions division to co-ordinate all our business units: cardiology, women's health or oncology, aiming to figure out how best to take this incredibly rich set of technological resources and apply it efficiently to these disease settings. It's also an absolutely new approach – applying a disease-centric focus, rather than a technological focus to solutions. It's a huge opportunity that will provide us with the tools to manage future healthcare challenges

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Cardiovascular molecular imaging

Is it ready for internal medicine diagnostics?

Imaging in Internal Medicine is among the main topics for 114th Congress of the German Society of Internal Medicine (March, Wiesbaden). Specialists in internal medicine, radiologists, and nuclear medicine have developed a programme that will not only provide an overview of the values of modern imaging procedures but also tackle controversial subjects.

Professor Wolfgang Bauer MD (Würzburg) specialist in molecular imaging and with special expertise in the cardiovascular field, writes: 'The objective of molecular imaging is to capture physiological and pathophysiological processes on a molecular to cellular level, not only to gain new insights but also to be able to use appropriate therapy strategies at an early stage. Optical technologies, ultrasound, nuclear medical procedures and magnetic resonance imaging (MRI) are all suitable imaging procedures. The latter two procedures have particular potential for clinical use. Two topics are especially relevant for cardiovascular medicine: arteriosclerosis in the coronary vessels as the cause of heart attacks and healing of the heart after the occurrence of heart attacks.'

The motivation for the first topic is that the cause of a heart attack is a tear in an unstable arteriosclerotic plaque. A thrombus then forms on this tear which, in turn, blocks the coronary vessel and therefore interrupts the blood supply to the heart muscle. The problem is the non-invasive identification of this unstable plaque as it normally doesn't much restrict the coronary vessel, and therefore does not produce any symptoms. The plaque is also not characterised by an excessive calcification so that CT, for instance, is of no help here. However, molecular imaging should be able to capture and show the appropriate cell structures known to us from cellular and molecular biology. It is known, for instance, that active macrophages are located in the unstable plaque. These can be shown, for example, through unspecific absorption of ferrous nanoparticles (Jaffer, Libby et al. 2006), or through MR contrast media that specifically bind to surface markers of these cells (Amirbekian, Lipinski et al. 2007). It is also possible to identify early forms of arteriosclerosis. Here we make use of our knowledge that, even in the beginnings of arteriosclerosis, there are so-called adhesion molecules that line the inner walls of the vessels to which we can bind specific magneto-optical contrast media (Nahrendorf, Jaffer et al. 2006). These methods are invaluable for fundamental research. However, use on a patient will require more time because, aside from contrast media development, non-invasive imaging of coronary vessels also still requires significant improvements.

The particular relevance of myocardial healing for imaging results from the observation that, in many patients, the pumping capacity after major attacks declines continuously. Therefore it is important to promote myocardial healing in the best possible way straight after the occurrence of a



Professor
Wolfgang
Bauer

heart attack. For regenerative therapies, hope rests on the administration of pre-stem cells. It is already possible to capture the cell distribution in a patient's heart muscle using nuclear medical technologies (Hofmann, Wollert et al. 2005). But, we must emphasise that this is still an experimental procedure. In other areas there are approaches, for example to make scars as firm as possible

through the modulation of wound healing factors, such as factor XIII. Verifying the efficiency via imaging is crucial and has already been achieved with nuclear medical procedures in animal experiments (Nahrendorf, Hu et al. 2006). The lack of spatial resolution was compensated by using fusion imaging via MRI (Sosnovik, Nahrendorf et al. 2007). Further strategies have tried to impact on programmed cell death (apoptosis) which is an important factor for the development of heart insufficiency after the occurrence of heart attacks. In animal experiments it has been possible to achieve apoptosis imaging with MRI (Hiller, Waller

et al. 2006) and optical contrast media (Sosnovik, Schellenberger et al. 2005), which bind to surface molecules specifically present in apoptotic cells.

In conclusion, molecular imaging offers fascinating opportunities for fundamental, medical research to study processes in a largely non-invasive manner and to derive and verify the according therapy concepts. Molecular imaging is still in its beginnings with regards to direct use on patients. Ideally, we would be able to obtain optimum levels of information by combining highly sensitive, nuclear medical procedures and morphologically functional, high resolution MRI in the sense of fusion imaging.'

MR probes for molecular imaging

By **Silvio Aime**, of the Department of Chemistry & Molecular Imaging Centre, University of Torino, Italy

Molecular imaging aims at the *in vivo* quantitative visualisation of molecules and molecular events that occur at cellular level. The potential towards clinical translation is huge, because the same modalities used in medical imaging are used in molecular imaging investigations.

Traditionally, medical imaging was a tool for non-invasive mapping of anatomy and for the detection and localisation of a disease process. The advent of molecular imaging-based protocols will allow the detection of the onset of diseases at an early stage, well before the biochemical abnormalities result in change in the anatomical structures. Moreover, it will offer efficient methods to monitor the effect of therapeutic treatments.

Molecular imaging agents provide the crucial link between the specificity of the target and the quantitative visualisation of its *in vivo* distribution.

The possibility of carrying out molecular imaging protocols by means of MRI is very attractive for the superb anatomical resolution that is attainable by this technique. However, MRI suffers from an intrinsic insensitivity with respect to the competing imaging modalities that has to be overcome by designing suitable amplification procedures based on the development of reporting units endowed with an enhanced sensitivity and on the identification of efficient routes of accumulation of the imaging probes at the sites of interest. MRI definitively suffers when compared with nuclear medicine and optical molecular imaging techniques for the set-up of molecular imaging protocols, as its low sensitivity implies the use of 10^7 - 10^9 imaging reporting units per cell,

when few are necessary for the latter modalities. Now, the need to target molecules that are present at very low concentration requires the development of novel classes of contrast agents, characterised by enhanced contrasting ability and improved targeting capabilities. Efficient targeting procedures for cellular labelling and recognition of epitopes characterising important pathologies are therefore as important as the task of developing more efficient image contrasting units.

The possibility of delivering a high number of imaging agents to the target of interest appears the solution of choice, to overcome the drawback associated with the low sensitivity of the MRI approach. The use of metal-based particles entered the armoury of MRI contrast agents very early, with the Superparamagnetic Iron Oxides' family, which are still among the most sensitive systems. Currently, much attention is devoted to the design and use of self-assembled systems based on lipophilic molecules, where the imaging reporters are invariably represented by highly stable paramagnetic lanthanide (III) complexes. In general, whatever the paramagnetic lanthanide (III) ion is, the particles act as T2-susceptibility agents whose contrasting abilities increase by increasing the magnetic field strength. In the case of Gd(III) complexes, the systems act mainly as T1-relaxation agents whose efficiency is eventually enhanced by the long re-orientation time of supramolecular aggregates. In addition, to tackle sensitivity issues, such systems may also be designed in order to become responsive to a specific physical or bio-chemical parameter of the micro-environment in which they distribute. Moreover, nano-sized



Silvio
Aime

carriers for Gd-complexes based on naturally occurring systems (e.g. lipoproteins) have also been considered for targeting specific epitopes on diseased cells.

Finally, the structure of liposomes has been exploited to generate a novel class of CEST agents (CEST= Chemical Exchange Saturation Transfer) dubbed LipoCEST. Such systems are characterised by containing a shifted resonance for the water molecules entrapped in the liposomal cavity, which can be selectively irradiated in order to transfer saturated magnetisation to the 'bulk' water signal. In this way, one deals with frequency-encoded MRI contrast agents that open the interesting perspective of detecting more than one agent in the same anatomical region. All together, the achievements made in the use of these nano-carriers in MRI applications also represent the basis for the development of the field of imaging of drug delivery processes. The superb anatomical resolution provided by MR images, together with the availability of targeting and responsive agents, will allow the clinician to pursue the task of visualising the delivery of drugs at the diseased region and, even more important, to monitor the therapeutic output in real time.

Finally, much is expected from the use of hyperpolarised molecules, because it has been shown that hyperpolarised C13-pyruvate can act as an efficient metabolic reporter for cancer cells in prostate tumour bearing mice.

By **Rudolf Schwarz** and **Andreas Krüll**, of the Section of Radiation Oncology Department, Ambulanzzentrum GmbH of the University Medical Center Hamburg-Eppendorf

Designed in the 1990s, the TomoTherapy HiArt treatment system looks like a CT scanner, allowing efficient 3-D-CT imaging to be used to ensure daily treatment accuracy for all patients (Fig. 1). It was designed to combine industry standard imaging and helical radiation delivery (Fig. 2). The accelerator, with an energy of six Megavolts in the gantry, is used for CT scanning and irradiation. It delivers intensity modulated radiotherapy (IMRT) that uses tens of thousands of narrow beamlets, producing the most precise conformal radiotherapy available. HiArt delivers radiation from all angles around the patients. The beam is rotated around the body, while the treatment couch simultaneously moves into the machine. The system ensures accurate delivery of precise helical IMRT plans via 3-D image-guided radiotherapy (IGRT), based on daily pre-treatment megavoltage CTs in treatment position for higher accuracy and precision. Necessary adjustments in patient positioning can easily be made using registered planning and daily CT images for references (Fig. 3).

With every treatment fraction, one can see where the anatomy is, compared with where it should be. An overlay of planned dose

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Dr Roland Talanow, resident radiologist at the Cleveland Clinic, launched the search engine at RSNA 2007 and it will be demonstrated at ECR 2008.

The programme is already implemented as a search engine on several websites and in software applications. A further hope is that this fast uncluttered access to radiology data will be used on the websites of radiology societies.

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Helical tomotherapy

offers further assurance that the prescription dose level will cover targeted anatomy. Imaging dose with 1-3cGy is consistently low. The system allows for organ movements. Radiation exposure to healthy tissue and organs is minimised. The system integrates tools for optimised, individualised treatment planning, quality assurance, imaging technology, helical IMRT, recording and verification. Delivery Quality Assurance (DQA) is integrated in the planning software, allowing seamless calculation of the dose with the patient's plan applied to a phantom.

The DQA plan can be selected and delivered from the Operator Station, and compared with point dose and planar film dose measurements. This ensures the

December 2007, we had irradiated over 120 patients. Comparison of treatment planning showed that helical tomotherapy brings better dose conformity to the tumour and better sparing of normal tissues than 3-D-conformal radiotherapy and intensity-modulated radiotherapy with the step-and-shoot technique.

Many patients with tumours such head-and-neck, brain, upper abdomen, and prostate cancer, benefit from tomotherapy.

It can be used to re-treat patients who had been irradiated and have a local recurrence. It can be dangerous to re-irradiate, because one can risk complications. So it is important to reduce doses to critical, pre-irradiated structures.

precision brings further benefit by reducing the security margins around the targets. Integration of simultaneous boost with higher doses per fraction presents another treatment option (Fig. 4).

The Tomotherapy system allows delivery of a conformal dose or multiple dose levels to complex targets in the head and neck (Fig. 5). With cancers of the tongue, throat, and larynx, often all the lymph nodes must be irradiated, along with the primary tumour. This usually results in permanent damage to the salivary glands with a life-long dry mouth — xerostomia. With tomotherapy doses to radiosensitive structures (e.g. spinal and parotid glands) can be kept low.

Brain tumours: Tomotherapy can treat multiple tumours, such as

and the neuroaxis in one treatment plan and process (Fig. 6).

Tomotherapy in a stereotactic mode can also treat lung cancer. Smaller tumours can be irradiated with hypofractionation at the same time, with low doses to the spinal cord and the lung.

Multiple targets especially multiple metastases can be irradiated simultaneously in one

treatment plan.

It is important to evaluate every patient's cancer to determine which form of radiation therapy is appropriate. 3-D-conformal radiotherapy, IMRT with step-and-shoot or dynamic leaf or stereotactic radiotherapy, are other methods of irradiation and can be beneficial for special cases.



Fig. 1 Tomotherapy system at the Medical Centre's Department of Radiation Oncology © Tomotherapy Corp.

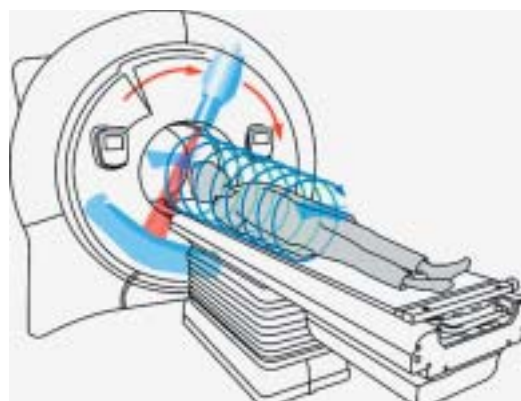


Fig. 2 Tomotherapy HiArt: During imaging or irradiation, the 6MV linear accelerator gantry rotates around the patient as the couch simultaneously moves through

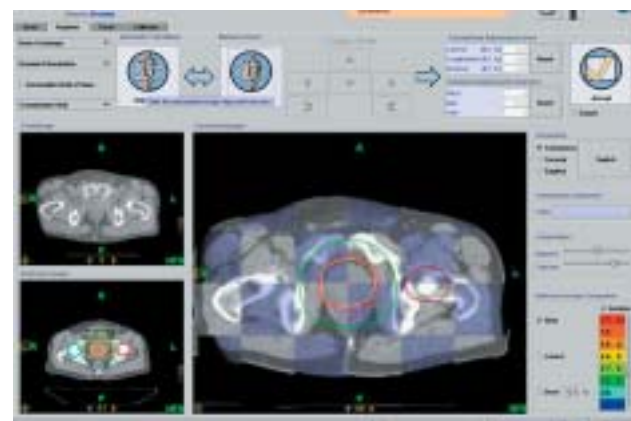


Fig. 3 Adjustments in patient positioning are easily made, matching registered planning and daily CT images

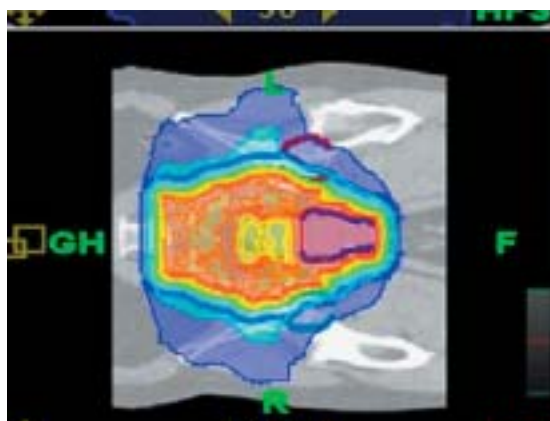


Fig. 4 Integration of simultaneous boost with higher doses per fraction in the treatment of prostate cancer

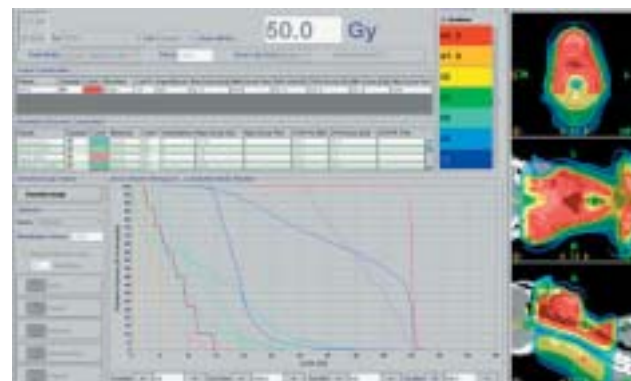


Fig. 5 Tomotherapy of complex target volumes with selective dose reduction for normal tissues, such as the spinal cord

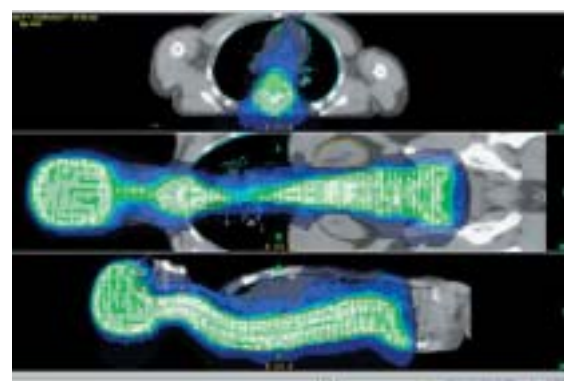


Fig. 6 Tomotherapy of neurocranium and neuroaxis in one volume and treatment process

prescription will be carried out according to plan.

On average, the full procedure takes about 20 minutes from patients' arrival in the treatment room until they leave. This includes about five minutes for performance of the daily CT and another five to ten minutes for treatment delivery.

The Tomotherapy HiArt-System was installed at our institution in autumn 2006, and up to

Tomotherapy can offer this.

Helical tomotherapy can be done for curative as well as in palliative purposes.

Dose escalation over 80 Gy is essential for the primary treatment of prostate cancer. The limiting factor for this dose escalation can be proctitis. Tomotherapy is a safe tool to reduce the rectal dose and minimise the incidence of proctitis. The higher accuracy and

brain metastases and large or complex shaped primary brain tumours. For brain metastases it is possible to treat the whole brain to a moderate dose and to escalate the dose to metastases by integration of a boost at the time. Another option is to irradiate recurrent brain metastases after previous whole brain irradiation. Tomotherapy brings substantial benefit for the treatment of the neurocranium

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SAFIRE: THE WORLD'S FIRST DIRECT-CONVERSION R/F-FPD

The 52-bed, acute care Hachiya Orthopaedic Hospital conducts 330 surgical operations annually, including minimally invasive artificial joint surgery and endoscopic surgery. In 1996, the hospital digitised ordering; in 1998, imaging was digitised; in 2004, a urology department was added.

Dr Hiroyasu Yano reports on the effective use of tomosynthesis in orthopaedic surgery

During orthopaedic surgery, metal implants, plates, and screws are commonly employed. These frequently cause problems with metal artefacts during CT or MRI examinations of bone union and in post-surgical follow-up observations. This is a report on the use of tomosynthesis to restrict metal artefacts in images.

Current tomosynthesis status: Since introducing the flat-panel detector (FPD) in 2005, we have conducted tomosynthesis examinations on 35 artificial joint cases (20 hip, 10 knee, 5 elbow), 8 spondylodesis cases, 3 arthrodesis cases, and 4 osteosynthesis cases.

Evaluation as clinical images: Tomosynthesis images created by the shift-and-add method and filtered back projection (FBP) method were

compared with CT images. For this we used the Shimadzu Sonialvision Safire* R/F system with Tomosynthesis Workstation option and the MSCT: Company A, 6-slice CT.

Evaluation of the bone union of the grafted bone is based on the continuity between the grafted bone and original bone, and on the reduction in radiolucent lines. As doctors found evaluation difficult due to the strong enhancement of the FBP image in Fig.3 d), subsequently the shift-and-add method image in Fig.3 c1) was used. The shift-and-add method image in Fig.3 c2) was taken 14 months after surgery. It shows that bone union is almost complete.

Conclusions

Fig.4 compares CT and tomosynthesis images. For a CT examination in which radiography is conducted while

rotating the body axis, the significant metal artifacts centred on the metal, and the beam hardening occurring between metals, affect the raw images. Blurring occurs along the path of the X-ray tube during tomography. However, as the images are two-dimensional, the effects of the artifacts are less than with CT. Low-artifact images can be achieved by selecting shift-and-add method images or FBP images according to the aim of the examination.

CT is superior in some aspects, as it allows flexible image reconstruction and produces 3-D images. However, due to concerns about X-ray exposure from

radiodiagnosis since the publication of a paper in the Lancet in 2004 (A Berrington de Gozaiez, S Darby: *Risk of cancer from diagnostic X-rays: estimates for the UK and 14 other countries.* Lancet 363: 345-351, 2004), CT examinations have been classified in the highest exposure class of all radiodiagnostic techniques, with a tissue- absorbed dose between 10 and 100 mGy (T Ishiguchi: Risk

Management in Radiology, Nichi-Doku Iryo, Vol. 31 - 3849, 2004).

As tomosynthesis requires fewer images than CT, the exposure dose should be lower.

Examining these topics and efficiently applying digital image technologies to take even better images in the future should make tomosynthesis an effective means of post-operative follow-up.

* Safire = Shimadzu Advanced Flat Imaging Receptor

		Radiography	Artifact effects	Artifact generated	Flexible image reconstruction and 3D images	Exposure (thorax)	No. of Images
CT		360 deg. around body axis	Large	Metal artifact Beam hardening	Possible	10 to 20 mGy	200 to 300 average
Tomosynthesis	Shift & add	Linear path, max. 40 deg. With respect radiography position	small	Blurring	Change tomographic plane and slice thickness 3D images not possible	4 to 5 mGy	67 images in 1 direction
	FBP		less than CT	Metal artifact			

Fig. 4

Fig. 1: Post-surgical images of bilateral total hip replacement
Due to looseness of the stem, 11 years after bilateral total hip replacement surgery the left joint was replaced in a 73-year-old female. The bilateral hip replacement post-surgical CT image in Fig.1 b) includes significant artifacts due to the implant between the acetabulum and trochanter. The shift-and-add method image in Fig.1 c) exhibits no effects of artifacts, whereas the FBP image in Fig.1 d) exhibits artifacts in the tube-shift direction and at the boundary of the implant.



Fig. 2: Fracture after knee replacement
A 59-year-old female, who had undergone knee replacement surgery due to osteo-arthritis, fractured the lateral tibial plateau in a fall. The CT image in Fig.2 b) exhibits effects of the implant artifacts to the lateral side of the tibia. However, these effects do not extend to the lateral side in the shift and add method image or the FBP image (Fig.2 c, 2 d).

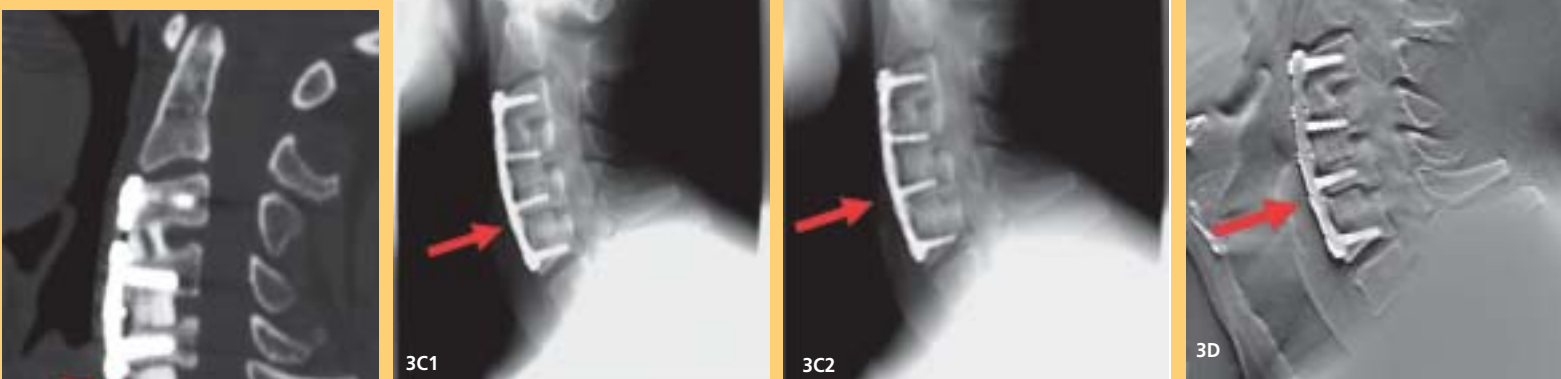
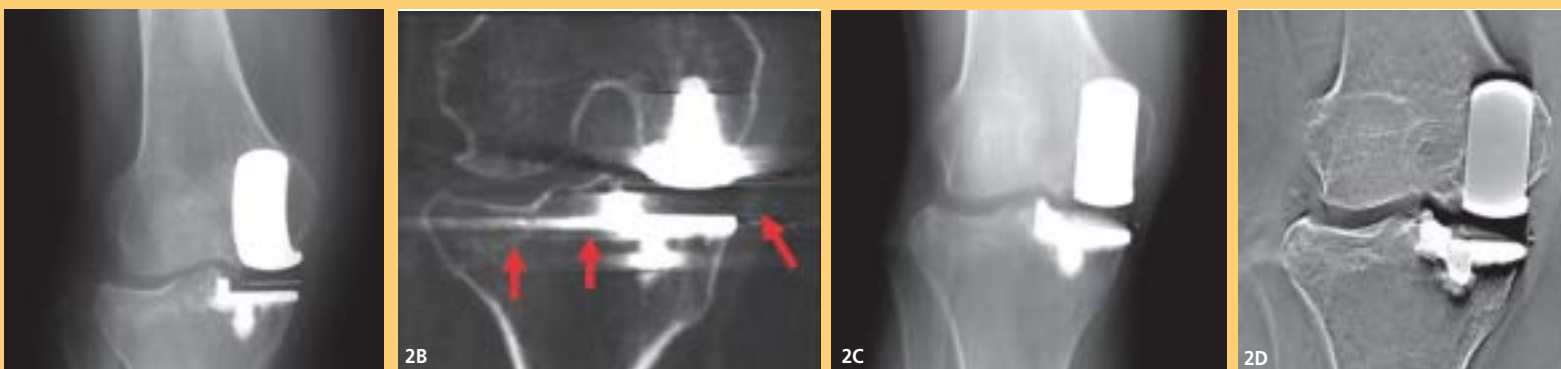


Fig 3: Follow-up of anterior fusion of cervical vertebrae
After surgery for a cervical hernia on a 39-year-old male, anterior fusion was conducted from the 3rd to the 6th cervical vertebrae. Periodic follow-up observations were required due to delays in bone union at the bone graft periphery on the 5th and 6th cervical vertebrae. Due to its lower X-ray dose than CT, tomosynthesis was used.

MR diffusion and perfusion

Can they replace PET?

Marco Essig MD, Professor of Radiology at the German Cancer Research Centre, outlines relevant presentations at the ECR



Prof Marco Essig

While, in the past, MRI was praised mainly for its superb anatomic display and tissue contrast, a number of advanced, non-enhanced and contrast enhanced MR imaging techniques have been developed within the past years that provide new insights into the physiology of tissues and the pathophysiology e.g. of tumours. These techniques include MR-spectroscopy, perfusion MR imaging, dynamic contrast enhanced MRI and diffusion tensor MR.

At the ECR, in a new horizon session, on Friday morning, perfusion and diffusion MRI and their potential in oncological imaging will be described and the provocative question of whether they can replace PET will be discussed on the basis of the latest results from PET and PET-CT, presented by Professor Steinert from Zürich.

Today, the combined PET-CT acquisition is becoming the standard to assess focal and systemic cancer. PET-CT provides an excellent combination of morphological and metabolic imaging and, for example, can identify metastases that are 5 mm in diameter or larger, thanks to metabolic uptake of fluorine-18 FDG. The addition of anatomical information from CT then allows practitioners to precisely locate those metastases. However, lesions that are smaller than 5 mm cannot be detected reliably. This is one area where MRI could perhaps aim to compete. However, whilst FDG-PET is the standard tracer method in most cancer types, alternative tracers with a more specific uptake are being investigated and may enable better imaging of anti-tumour effects involving angiogenesis, apoptosis and reporter gene expression.

Should we see the modalities as rivals and how can they stimulate each other? What can functional MRI learn from PET and vice versa? Another key question for the radiological community, for the panel discussion, is how and when to use MRI instead of PET.

Prof. Herneth (Vienna) will present his results on diffusion weighted imaging in the assessment of lymph node metastases. DTI is a promising new methodology that allows insight into the integrity of tissue, not only of the brain. Lymph node imaging and prostate cancer are good examples to prove the potential use of this method in the description of tumour infiltration. Later in the session Dr. Berger (Munich) will explain how perfusion MRI may assess treatment monitoring in anti-cancer therapy. As at initiation, tumours in a pre-vascular phase are supplied by oxygen and nutrients that diffuse from pre-

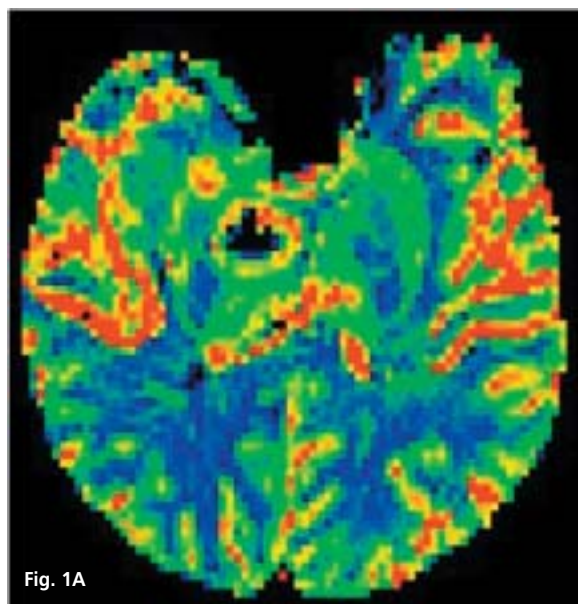


Fig. 1A

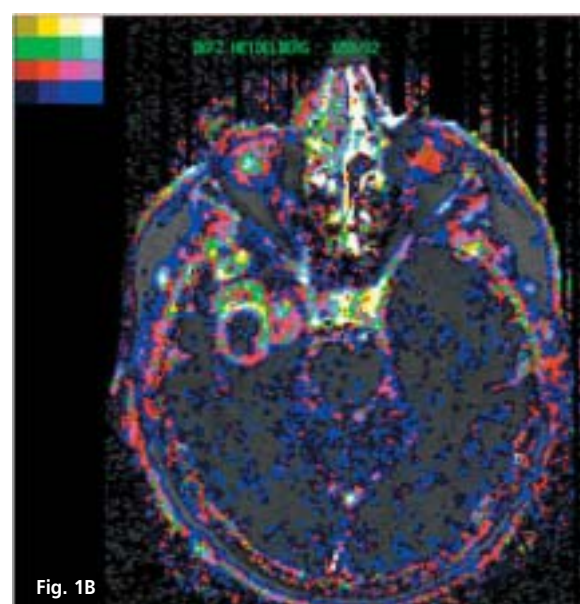


Fig. 1B

Fig. 1: DSC (A) and DCE (B) MRI presenting the heterogeneity of malignant glial brain tumours. DSC acquires a series of EPI images after a bolus injection of contrast media and using the indicator dilution theory for quantification of blood flow and volume. DCE MRI acquires a series of GRE images after slow contrast media infusion for quantification of tumour vascularity and vessel permeability. Histology proved the presence of low grade and high grade areas with different vascularity and molecular vascular profiling within the same tumour and in good correlation to the imaging findings

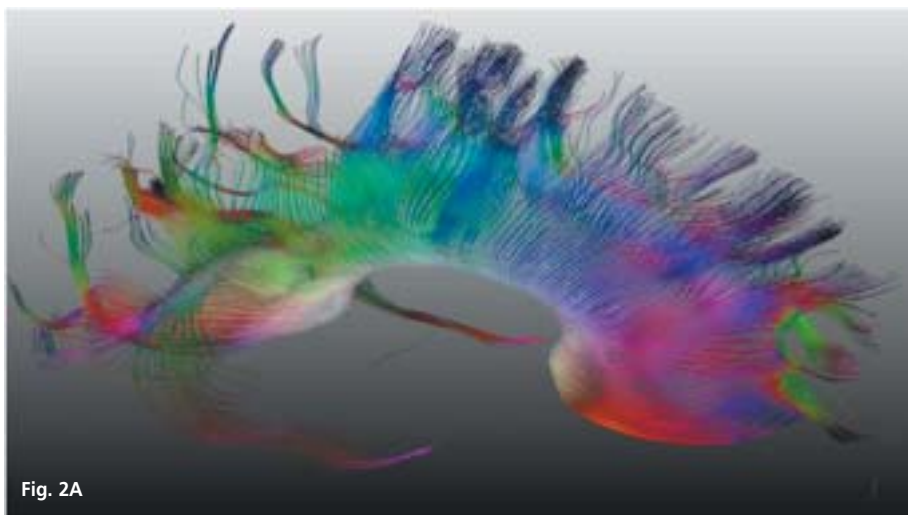


Fig. 2A

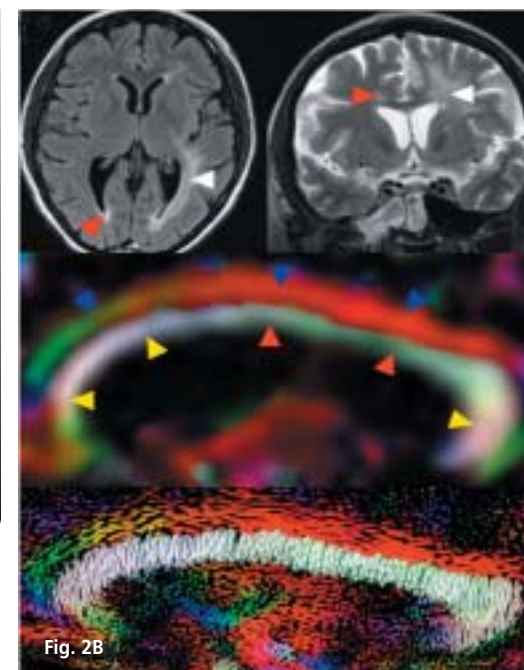


Fig. 2B

Fig. 2: Tractography (A) and quantitative FA mapping in a patient with glioma. FA mapping allows the display of infiltration not visible on conventional T2 and FLAIR imaging

existing normal vessels, ischemia leads to the secretion of angiogenic factors when the tumour reaches a critical size. These factors, such as vascular endothelial growth factor (VEGF), recruit and maintain tumour vessels that exhibit increased blood volume and permeability compared with normal vessels. MR-based techniques, such as dynamic susceptibility weighted (DSC) MRI or dynamic contrast enhanced (DCE) MRI can be used to measure the blood volume, the vascularity, size of the vascular space within designated areas, and behaviour of contrast within those vessels. DCE-MRI has been investigated for a range of clinical oncologic applications including cancer detection, diagnosis, staging and assessment of treatment response. Tumour microvascular measurements by DCE and DSC-MRI have been found to correlate with prognostic factors such as tumour grade, microvessel density (MVD), and vascular endothelial growth factor expression (VEGF) and with recurrence and survival outcomes (Figure 1).

In addition, changes of DCE-MRI in follow-up studies during therapeutic intervention have been shown to correlate with outcome, suggesting a role for DCE-MRI as a predictive marker. The Munich researchers are trying to find out whether

perfusion MRI can monitor the efficacy of anti-angiogenic treatment in kidney cancer. This type of cancer has been shown to respond particularly well to anti-angiogenic drugs. Functional measurements related to the tumour blood supply should provide a surrogate marker of whether the treatment strategy is working. This may not necessarily be obvious from measurements of the tumour size or morphology.

Work to standardise and quantify diffusion and perfusion MRI procedures is just beginning. This will be most essential if multi-centre trials are to be conducted. Dr. Stieltjes (Heidelberg), an expert in quantification strategies for structural and functional MRI techniques, will give a brief overview of how MRI data can be reliably quantified to allow them to be used for follow-up assessments and in clinical trials. Both, DTI and PWI require specifically tuned sequences and extensive post-processing. In his presentation he will illustrate the importance of both sequence development and post-processing, by going through this process for DTI (Fig. 2). The availability of different measurement techniques and their applications will be addressed. Also, he will highlight common pitfalls in DTI quantification and potential approaches to overcome these issues.

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Open High-field MRI

Microtherapeutic interventions under radiological image control

As part of a research and development project, doctors at the University Hospital Magdeburg, Germany, are treating oncology patients with local minimally invasive surgery (MIS) which, for the first time, can be carried out under radiological image control using high-field magnetic resonance imaging (MRI). The system offers excellent image quality under extremely favourable, radiation-free conditions.

Due to the closed, tube-shaped construction of magnetic resonance tomographs, minimally invasive interventions have so far been controlled with the help of ultrasound or CT. However, both procedures have their disadvantages — either the image quality is not ideal or a patient is exposed to additional radiation.

Open high-field MRI can significantly improve micro-surgical procedures. 'This equipment is a milestone for microtherapy: Due to its open construction it offers us doctors the important, free access to the patient which we need for these procedures,' explained Prof. Jens Ricke, Director of the Clinic for Radiology and Nuclear Medicine at the University Hospital Magdeburg. 'Moreover, the new system shows soft tissues with excellent image quality and works



The open high-field MRI in use. Prof. Jens Ricke injects a patient with a slipped disc an analgesic under MRI control

without ionising radiation.'

The open version of MRI enables the implementation of microsurgical procedures near tumours, under permanent image control. First studies indicate that minimally invasive procedures, such as image-guided brachytherapy or thermal radiofrequency ablation combined with conventional surgical or chemotherapeutical treatment, can achieve better therapy success with lower follow-up costs.

As part of the project, which the university hospital started

with Philips Healthcare, the development of new procedures, such as those against chronic pain, is also to be promoted. There is to be particular emphasis on interdisciplinary co-operation. 'Microtherapeutic interventions are always part of a whole, interdisciplinary concept. The University Hospital Magdeburg develops an individual treatment plan for every patient and puts it into practice, with close cooperation of all specialised areas of medicine involved in the delivery of oncological therapy,' Philips pointed out.

DYNAMIC

By **Georg Bohner MD**, of the Department of Neuroradiology, Charité University of Medicine Berlin, Germany



Professor Eberhard Siebert (left) and Dr. med. Georg Bohner (right) (Department of Neuroradiology)

A 320-row CT scanner (Aquilion One, Toshiba Medical Systems Co., Tokyo, Japan) was installed for the first time in Europe, at the Charité University Hospital, Berlin, Germany, in November 2007. Its capability to cover the whole brain in a single rotation means this new type of scanner has the potential to impact strongly on the field of neuro-imaging.

Due to the limited detector width available in conventional multislice CT scanners dynamic imaging used for perfusions studies, or time-resolved angiography, was limited to partial organ coverage only (20 to 40 mm scan length). To overcome this limitation, repeated scanning in an adjunct region or table movement during examination was necessary, which limited time resolution in dynamic imaging studies.

For the first time, this limitation has been overcome by volumetric, time-resolved whole-brain imaging using the 320-row scanner with its high-resolution coverage of 160 mm during a single rotation.

Simultaneously morphological

as well as functional image data are collected.

The dynamic volume CT uses a detector module arranged in a 320 x 0.5 mm configuration. There are 896 detector rows x 320 elements, with an element size of approximately 1 x 1 mm, which corresponds to a 0.5 mm (transverse) x 0.5-mm (longitudinal) beam width at the centre of rotation. The fastest gantry rotation time is 0.35 seconds and the data sampling rate is 2,572 views per second.

Within the first weeks of usage the following acquisition techniques were applied at the Charité for neuro-imaging studies using the dynamic volume CT: Single rotation cranial CT (SR-CCT), incremental cervicocranial CT-Angiography (3-D-CTA), time resolved intracranial CT-Angiography (4-D-CTA) and a combined whole brain 4-D-CTA and CT perfusion protocol (4-D-CTA/CTP).

GE high-definition CT technology

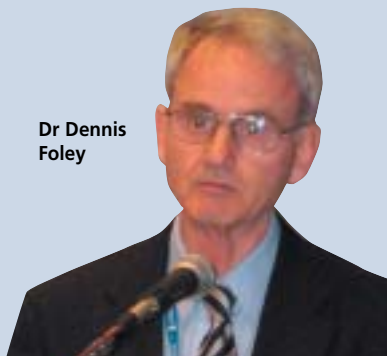
High definition CT (HDCT) technology developed by GE Healthcare promises to revolutionise image acquisition for CT scanning. **Dr Dennis Foley**, Director of Imaging at Milwaukee's Froedtert Lutheran Medical Center and the Medical College of Wisconsin was the first to utilise a number of HDCT technologies. Here, for *European Hospital* readers, Dr Foley reports his experiences.

HDCT technologies are a portfolio of developments that improve the hardware, software and electronics of the system. From the hardware, GE designed a new scintillator, which should perform dual energy with almost simultaneous acquisition of the projection data at different beam energies. Due to rapid beam energy switching and electronic readout within 8ms, almost identical projection angle data at the two different beam energies can be obtained. This is much faster than a system that is fundamentally mechanical in approach and has two X-ray tubes inside the gantry, which results in a 83ms delay in obtaining the same projection angle at different beam energies.

Potentially, the new scintillator can enable subtraction imaging of coronary artery calcification — a major breakthrough. Today, the challenges in coronary CT are

improved temporal and spatial resolution, in addition to the removal of artifacts. Artifacts relate largely to coronary calcification. When performing selective coronary arteriography, subtraction imaging is an integral part of the cardiologists process. If CT can emulate selective coronary catheterisation by removing calcification, this would be a major advance.

Prospective gating for cardiac CT has already been implemented for GE Healthcare's LightSpeed system. This technique which is fundamentally a step-and-shoot technique, and is applied in patients with regular heart rate, produces images equivalent to those obtained with retrospective gating, but with significant reduction in radiation dose. Radiation dose is reduced as data is obtained only at a predefined point in each R-R interval, compared with retrospective



Dr Dennis Foley

gating in which the X-ray tube is on continuously, throughout the cardiac cycle. Prospective gating reduces radiation dose to approximately one half of that obtained with retrospective gating, even with EKG gated tube current modulation. Prospective gating requires a system with adequate beam width and appropriate software.

A new approach to CT image formation is iterative reconstruction. This is a relatively software intensive approach in which images that are smooth, and have good sharp anatomic outlines, are obtained at about one half the radiation dose utilised for conventional CT scanning.

Volume dual energy techniques for cardiac and non-cardiac imaging and iterative reconstruction remain in clinical developmental phases and implementation depends on software engineering and initial clinical applications. However, I am optimistic that these technologies will come into clinical practice within the next 12 months.

Mental health and

The Uliazpi Foundation in Spain, which studies and cares for severely mentally retarded patients, carried out an interesting study to identify bone mineral density values in a group of its patients, compare these with the general population and investigate the possible influence on these values on certain clinical variables and therapeutic regimens.

The bone mineral density value of 192 male/female patients was obtained via digital densitometry, using a compact desktop system with dual X-ray absorption measurement technology. The data obtained was contrasted with sex, age, degree of mobility and anti-epilepsy or sedative medication.

Mugica et al, found that the patients' bone mineral density was significantly lower than that of the general population: 25% presented osteopenia and 22% osteoporosis. The latter is frequent among severely mentally retarded patients. The greatest risk is associated with insufficient mobility, Down's syndrome and regular doses of Phenobarbital. The authors concluded that digital densitometry is a simple procedure that may be useful to identify the true dimension of this problem and the efficacy of the various preventive or curative procedures presented.



Neuro-imaging in Psychiatry (US)

The new 'omics' technologies (genomics, proteomics and metabolomics) heralded a new era of biomedical discovery that is affecting every field of medicine. With the rapid growth of the older population worldwide, there is great interest in applying these technologies not only to diagnose and prevent disease, but also to enhance brain longevity and mental wellness. Nearly two-thirds of the c. 30,000 genes in the human genome are related to brain function, and up to half of the variance in age-related changes in cognition, brain volume, and neuronal function appears to be genetically determined. Neuro-imaging is being employed to study the effects of genes and how neurogenetics may affect future radiology research and practice (Petrella et al, Department of Radiology, Duke University Medical Centre. Pub: 2008).

Mood disorders

Clinical research in mood disorders increasingly involves advanced neuro-imaging techniques.

VOLUME CT The impact on neuro-imaging

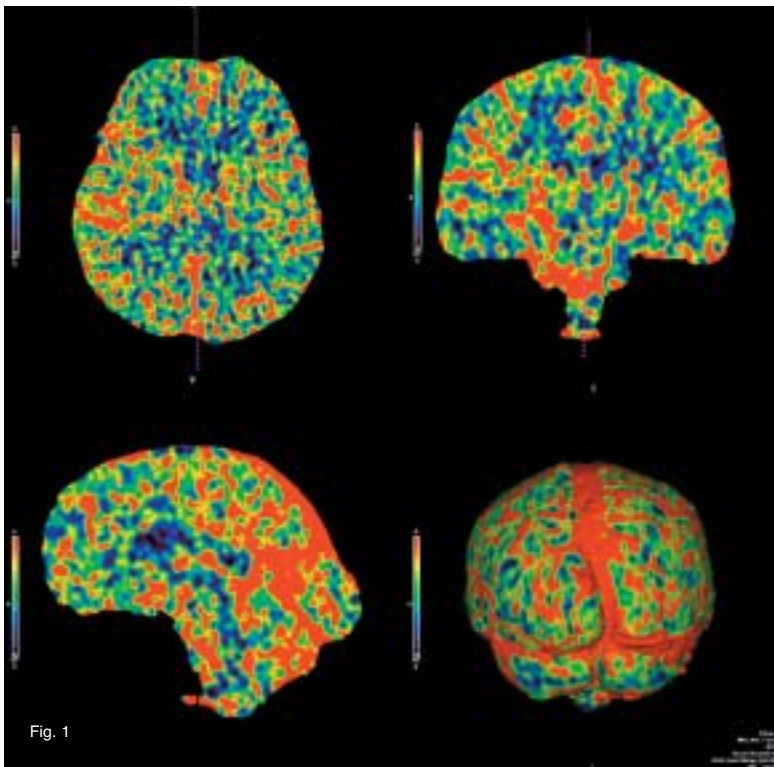


Fig. 1

ischemia due to arteriosclerosis of cervicocranial vasculature as well as veno-occlusive disease.

Based on our initial experiences the scan speed of SR-CCT and 3-D-CTA protocols are the main advantages over conventional multislice CT scanners, with the potential to reduce motion artefacts in uncooperative patients.

In stroke imaging, it is likely that the sensitivity of CT perfusion imaging will increase, especially with respect to infratentorial ischemic lesions, or lesions within the semioval centre and the frontoparietal cortex, although the clinical impact of such findings is still a matter of discussion. As illustrated here (Fig. 1), volumetric perfusion imaging enables whole brain coverage and calculation of high resolution parameter maps with 0.5 mm voxel size along the z-axis.

Especially when altered haemodynamics are suspected, the time resolution combined with the complete brain coverage provided by the 4-D-CTA and the combined 4-D-CTA/CTP protocols are interesting new scanner features. Up to now, no dynamic whole-brain angiography was available based on CT technology; thus assessment of circulation time changes in shunting vascular disorders,

venous arterialisation or prolongation of venous outflow in the setting of veno-occlusive disease, especially in cortical vein thrombosis, remained limited using CT. All these neuroradiologically important issues can now be addressed directly and dynamically by whole brain 4-D-CTA.

However, with the new technique of dynamic volume CT not only the quality of information increases but also the quantity, as for a complete stroke

examination, together with the postprocessed images, a total amount of up to 18,000 images can result. Not only high-end workstations for image reconstruction are needed to limit the time of data postprocessing, which can take up to 15 minutes only to calculate the parameter maps in stroke evaluation, but also high speed network connections and a powerful PACS system are needed to cope with the large amount of data.

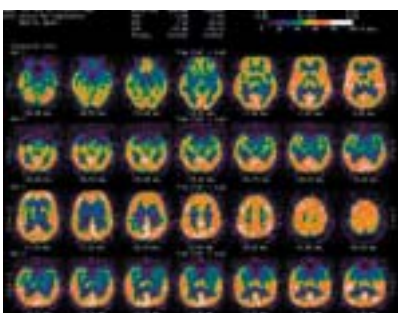
Following the scan protocol for the combined angiography and perfusion scan will be addressed briefly. For the 4-D-CTA/CTP protocol we use a combination of intermittent and continuous scanning for a total examination time of 50 seconds, after having performed a test bolus scan to determine the circulation time. After injection of 50ml iodinated contrast agent, scanning is performed using an 80kV protocol that results in a dose

length product of 2355,4 mGy x cm. Multiplied with the ICRP-factor ($k=0.0023 \text{ mSv} \times \text{mGy}^{-1} \times \text{cm}^{-1}$ for the head) this would result in a calculated effective dose of 5,4 mSv. This is in line with manufacturer's phantom measurements where radiation exposure for the dynamic whole brain 4-D-CTA/CTP combination results in 6.4 mSv.

Indications for dynamic volume CT comprised, amongst others, trauma, acute stroke, chronic

radiology

Advances in neuro-imaging technology have refined models of disease pathophysiology in mood disorders and the mechanistic basis of antidepressant action. Magnetic resonance (MR) approaches provide information on white and gray matter pathology (segmentation), cellular metabolism (MRS), oxygen consumption (BOLD), and neurocircuitry (DTI). Radionuclide-based neuro-imaging methodologies provide quantitative estimates of brain glucose metabolism, regional blood flow, and ligand-receptor/transporter binding.



Clinical implications of neuro-imaging methodologies are widely recognised (Konarski et al. Canada).

Bipolar disorder

Strakowsky et al (2004) reviewed existing structural and functional neuro-imaging studies of patients with bipolar disorder and discussed how these investigations enhance our understanding of the neurophysiology of this illness. Findings from structural magnetic resonance imaging (MRI) studies suggest that some abnormalities,

Eduardo de la Sota MD reports on the increasing use of radiology and neuro-imaging in psychiatry

such as those in prefrontal cortical areas (SGPFC), striatum and amygdala exist early in the course of illness and, therefore, potentially, predate illness onset. In contrast, other abnormalities, such as those found in the cerebellar vermis, lateral ventricles and other prefrontal regions (e.g. left inferior), appear to develop with repeated affective episodes, and may represent the effects of illness progression and associated factors. Magnetic resonance spectroscopy investigations have revealed abnormalities of membrane and second messenger metabolism, as well as bioenergetics, in striatum and prefrontal cortex. Functional imaging studies report activation differences between bipolar and healthy controls in these same anterior limbic regions. Together, these studies support a model of bipolar disorder that involves dysfunction within subcortical (striatal-thalamic)-prefrontal networks and the associated limbic modulating regions (amygdala, midline cerebellum). These studies suggest that, in bipolar disorder, there may be diminished prefrontal modulation of subcortical and medial temporal structures within the anterior limbic network (e.g. amygdala, anterior striatum and thalamus) that results in dysregulation of mood. Future prospective and longitudinal studies focusing on these specific relationships are necessary to clarify the functional neuro-anatomy of bipolar disorder.

Brain scanning (Australia)

Nevertheless, CT has its limitations according to some researchers. Agzarian et al (2006) published research on the use of routine CT brain scanning of psychiatry patients in Australia. Their aim was to evaluate the usefulness of CT of the brain in patients presenting a psychiatric condition without focal neurological signs. The reports of 397 consecutive CT brain scans of patients at two acute tertiary hospital psychiatric services over a two-year period were assessed retrospectively. 377 (95%) of the CT scans showed no abnormality; specific abnormalities were described in 20 (5%). Three scans showed non-specific minor abnormalities, which, when followed up by MRI, showed no relevant abnormality. All the abnormalities shown on CT were considered clinically unrelated to the patient's psychiatric condition. In conclusion, the pretest probability of finding a space-occupying lesion or other pertinent abnormality in the patients with psychiatric illnesses in this study appears not to be greater than that of the general population.

FMRI (Japan)

Functional magnetic resonance imaging (FMRI) has become the most widely used method for imaging normal brain function in a relatively short period of time. Its use in clinically related research has been much slower. However, FMRI is becoming a valuable tool in the study of many neurological and psychiatric disorders (Professor Matsuda. Japan).

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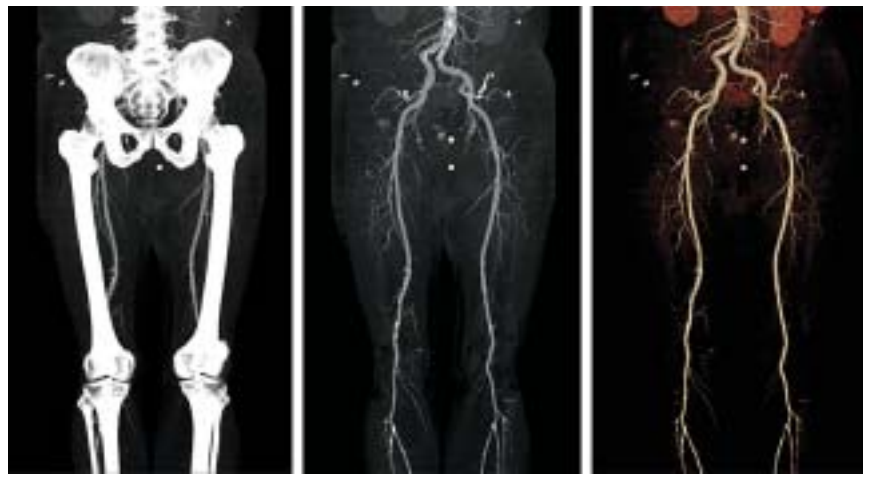
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Thin client products aim to 'unleash the potential of scanner technologies'

The Visage Thin Client product range on show at the ECR provides a fully-integrated system with advanced tools for 2-D, 3-D, and 4-D image review and interpretation, post-processing, data management, and image distribution.

The thin client-enabled PACS solution produced by Visage Imaging (a subsidiary of Mercury Computer Systems Inc.) has new features for use in radiology, cardiology, neurology, oncology, surgery and other subspecialties. These include application-specific

display and post-processing protocols, saving and sharing of annotations as well as post-processing results, volume analysis of lesions and structures in 3-D, improved automatic bone removal, sharing of roaming sessions,



Visage CS Thin Client/Server includes tools to access CT and MR angiography images from any location. All from the same study: 3-D MIP of a contrast-enhanced CT study, with bone included (left). 3-D MIP with bone removed automatically by Visage CS (centre). Volume rendered image with bone removed (right)



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easy switching of layouts and viewers, etc.

The latest version of the Visage CS Cardiac Analysis is also on show. Assets: new tools and optimisations such as calcium scoring, improved reporting, and efficient manual editing, the company points out. 'This makes Visage Cardiac Analysis the only comprehensive and fully integrated cardiac analysis application on a thin-client-server platform. With Visage's CS client-server technology the image data as well as the applications within the Visage platform are not bound to specific workstations and become instantly accessible anywhere, anytime within the PACS workflow. The Visage Thin Client platform allows sharing data and applications across radiology and cardiology departments, and helps to unleash the true potential of the latest scanner technologies and diagnostic tools.'

The web and thin-client technologies make it easy to deploy this integrated solution across an entire hospital.

New injectors from ulrich



ulrich medical has added a number of new products to the firm's wide range of injectors and accessories for computer and magnetic resonance tomography.

The new MRI injector tennessee is accumulator free and ready for use at any time, ulrich points out. 'It

avoids permanent time-consuming charging and handling of heavy accumulators. The tennessee is throughout flexible, comfortable and safe and simplifies daily workflow.'

The new passive temperature preservation for contrast agent system preserves the temperature of a contrast agent up to four hours without any need of power supply. The new ceiling suspension for CT injectors, a space-saving alternative that should prove particularly worthwhile for small examination rooms, ensures fast, comfortable positioning of the injector, the firm reports, adding: 'The fully internal cabling establishes a secure and convenient examination environment for patient and user.'

ulrich injectors are known internationally for high quality "made in Germany", economical performance, smooth and comfortable workflow and meet the requirements of modern imaging technology.

* ulrich medical, of Germany, has manufactured contrast agent injectors for 25 years. Today, they are available in about 40 countries.

The contribution of the anaesthesiologist

By Jean-Louis Vincent, of the Erasme Hospital, Université libre de Bruxelles, Brussels, Belgium

Since its early beginnings in Europe, during the polio epidemics of the 1950s, intensive care medicine has grown to become a specialty in its own right and the intensive care unit (ICU) occupies an increasingly important position in every hospital. Intensive care doctors are responsible for the management of very sick patients often with multiple and complex disease processes, and ICUs are now distinct areas of the hospital where such patients, who need specialized, 'intensive' (in terms of equipment and staffing levels) care can be managed in an environment that groups the necessary equipment and facilities.

Historically, medical and surgical ICUs developed separately and were managed, respectively, by medical and surgical/anaesthetic teams, but with the growth of intensive care medicine, these separate units have progressively been combined into large, multidisciplinary ICUs. Indeed having separate ICUs for different groups of patients is now a rather outdated concept, because the initial surgical or medical status of a patient

is only one small aspect of their need for intensive care; for example, are there really any great differences in surgical or medical patients with acute exacerbation of chronic obstructive pulmonary disease (COPD), or with pancreatitis, or acute respiratory distress syndrome (ARDS)? The real

management of the intensive care patient focuses around the organ failure(s) (respiratory, cardiovascular, renal, haematological, neurological, etc.) associated with the underlying disease process, and this has little to do with the original medical/surgical nature of the patient. Nevertheless, ICUs have evolved differently in different geographical areas, with most ICUs in the US remaining either medical or surgical.

The background training of intensive care doctors has also varied over time. In most countries, physicians wishing to specialize in intensive care medicine must still obtain a qualification in another specialty first, and then spend an additional training period in the ICU (which is usually considered as a subspecialty). In the US, the majority of intensivists are respiratory physicians starting from the management of respiratory failure. However, in Australia and Spain it has been possible to choose critical care medicine as a primary specialty, and this pattern is likely to be copied soon by other countries. Within Europe, the majority of intensivists have come from a background in anaesthesiology, partly as a result of the impact of the polio epidemics when the focus of the fledgling ICUs was respiratory care and ventilation, very much the domain of the anaesthesiologist. In Europe, it is estimated that a small majority of intensivists still have an anaesthesiology background, while other specialties are increasingly represented (internal medicine about

25-30%, paediatrics about 10%, surgery about 5%).

However, there are important international differences within Europe. For example, in Scandinavia and Italy, virtually all ICU doctors are anaesthesiologists; similarly, most intensivists in Germany and the UK have an anaesthesiology background. In some countries, notably Germany, the place of intensive care medicine as a separate specialty is causing considerable debate, with some doctors wanting to become independent of their anaesthetic tasks to focus on intensive care, whilst others are concerned that the specialty of anaesthesia without its ICU component would be less attractive, thus drawing in fewer young doctors.

Importantly, the input of a full-time intensivist on the ICU has been shown, in many studies, to be associated with improved outcomes. However, intensive care medicine is becoming increasingly sophisticated and changing rapidly as ongoing research offers insight into the disease processes that affect critically ill patients and as new techniques of diagnosis, monitoring and treatment are developed. Keeping up to date with all the latest advances in intensive care medicine is, in itself, a full-time occupation and, for doctors involved in more than one specialty, this task must be impossible. Therefore, to remain fully involved and competent in the specialty, ICU doctors need to be full-time intensivists. As a famous Belgian anaesthesiologist once said, 'You cannot drive two cars simultaneously'. In today's ICU the most important factor is to have doctors who are fully committed to intensive care medicine and this can be achieved whatever the doctors' initial training.



Jean-L Vincent

Ever since Boston surgeon John Collins Warren commented on the first successful ether anaesthesia at Harvard University with the now famous words, 'Gentlemen, this is no humbug!' anaesthesiology has developed into a separate and modern medical discipline.

The story of anaesthesiology is a story of success unparalleled in modern medicine. Despite the fact that, in Germany, anaesthesiology as a profession does not look back on a particularly long tradition - the German Society for Anaesthesiology and Intensive Medicine (Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin - DGA) celebrates its 55th anniversary this year - it was here that anaesthesiology was expanded significantly beyond its originally one-dimensional task of intra-operative anaesthesia. Modern anaesthesiology follows a truly interdisciplinary approach - it links anaesthesia with surgical critical care; plays an important role in the treatment and care of trauma patients and provides chronically ill patients with pain and palliative care. Anaesthesiology thus contributes considerably to therapy success.

Due to its excellent training and education programmes, anaesthesiology assumes a leading position in all these disciplines. Current education guidelines in Germany state: 'Anaesthesiology encompasses general, regional and local anaesthesia, including pre- and post-surgical treatment, maintenance of vital signs during surgical and diagnostic interventions as well as measures in critical, trauma and pain care.'

In short, our discipline today focuses on two core issues: First, anaesthesia,

which means insensitivity towards pain and touch. It is the task of the anaesthesiologist to ensure that any invasive medical intervention - be it surgical, therapeutic or diagnostic - is as safe and pleasant as possible for the patient. The anaesthesiologist creates ideal conditions for the intervention and contributes to its success. The expertise required for this core task qualifies the anaesthesiologist for certain areas in pain medicine.

At the World Congress of Anaesthesiologists (WCA), March 2-7, Cape Town, **Professor Hartmut Buerkle MD**, head of the department of anaesthesiology, critical care and pain therapy, at Memmingen Hospital, and **Professor Hugo Van Aken MD, FRCA, FANZCA**, director of the hospital and polyclinic for anaesthesiology and intensive care medicine, give an overview of

ANAESTHESIOLOGY TODAY

Second, the anaesthesiologist is responsible for monitoring vital signs or managing homeostasis. Anaesthesiological knowledge is crucial when the patient's vital signs are impaired or at risk during an intervention. Such impairment or risk may result from the required anaesthesiological procedure, the intervention itself, or the patient's health status, or a combination of these factors. The know-how required for peri-operative management of vital signs qualifies the anaesthesiologist for these tasks in peri-operative critical and trauma care.

In basic, as well as clinical research, anaesthesiologists now contribute to almost all medical disciplines - from cardiovascular research down to neuronal plasticity. Their research results are reflected not only in professional national and international publica-

tions but also in interdisciplinary or non-medical publications. On a global scale, the total volume of third party research funds acquired by anaesthesiologists is impressive.

As a so-called cross-cutting or service discipline, anaesthesiology is set to progress towards peri-operative process management. Anaesthesiologists are over-proportionally represented among operating theatre (OT) managers and co-ordinators, as well as

recovery. Anaesthesiologists and their surgeon colleagues therefore developed 'fast rehabilitation', or early recovery programmes that promote better and faster recovery of the patients.

Today, the tasks of need-based peri-operative care go far beyond traditional cardiovascular haemostasis management and encompass peri-operative normothermia, balanced goal-directed fluid therapy, sophisticated

catecholamine and haemostasiological therapy and individualised and optimised peri-operative analgesia using regional anaesthesia.

Anaesthesiological outcome research creates a medical and economic advantage for the individual patient and for the entire healthcare system. Most of the surgical interventions would not be possible without the direct transfer of complex new knowledge regarding physiology, pathophysiology of all organ systems into diagnostic and therapeutic anaesthesiological concepts. Or rather such new knowledge would be associated with exorbitantly high morbidity and mortality rates.

Since this complex knowledge-web, as well as its maintenance and its expansion to a competent profession 'physician of anaesthesiology' is a time



Hartmut Buerkle

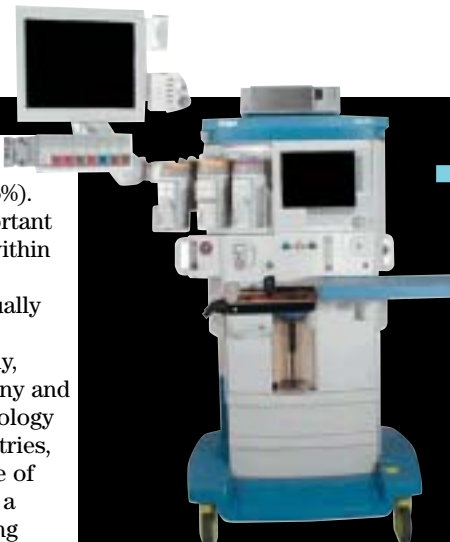
Hugo Van Aken

medical directors and hospital managers. In these roles, their ability to communicate across disciplines and professions is a particularly valuable and sought-after asset.

Modern anaesthesiology is well positioned and prepared to help tackle the challenges of an ageing society. Interventional medicine is faced with the fact that older patients more frequently than younger patients present with multi-morbidity and polypharmacy, which in turn negatively impact on

The Apollo

Emergency, peri-operative, critical, perinatal and home care — this system was designed for all



Draeger reports that the Apollo includes an advanced ventilation capability that provides ICU quality ventilation in the operating theatre (OT), as well as

- Spontaneous breathing support
- Electrically powered piston ventilator requiring no drive gas (unlike bellows ventilators)
- Enhanced monitoring capability
- Easy use and movement, with a central foot break to lock in place
- A choice of re-usable or consumable accessories, sensors for sterilisation or non-sterilisation, two or three mounted vaporizers
- Infinity patient monitoring system and peri-anaesthesia information management system can be integrated
- Infinity's Pick and Go system enables monitoring during patient transportation
- Intelligent docking stations and clean cabling system to minimize transition times and maintain monitoring

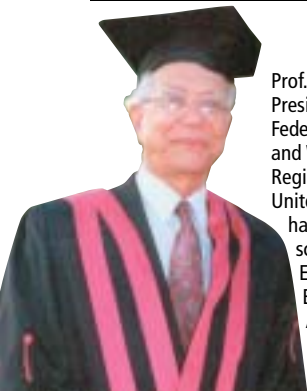
The new Infinity Omega Solution has a two-screen system to enable simultaneous viewing of patient monitoring and clinical data. Also included is an Infinity Delta patient monitor with the Infinity Docking Station and a 17" touch screen smart display. Draeger points out that the new Infinity Kappa XLT patient monitor is the first split-screen monitor suited for the operating theatre (OT). The intuitive 17" touch screen provides expanded monitoring, arranged according to clinical context on one section of the screen, while real-time vital signs and trending are displayed on the other

(there are no compromising pop-ups and no interruption of vital signs monitoring, Draeger adds).

On the large, configurable high-res TFT colour screen, the virtual flow tubes allow an exact dosing of distinct gases, combined with the safety and reliability of mechanical flow controls and a backup total flow tube. 'Due to electronic gas-flow measurement, the export of fresh gas data to an information system allows monitoring of gas consumption. This supports cost reduction as the use of low-flow anaesthesia is promoted.'

In addition, incorporation of the Innovian Anaesthesia data management solution allows automated anaesthesia record keeping.

The E-Vent plus servo controlled, high-speed piston ventilator has a very short response time. In Pressure Mode, Apollo has several features of particular benefit for paediatric or critical-care patients, Draeger adds. 'Decelerating flow control and optimum flow in the face of inspiratory resistance add up to critical-care-quality ventilation. This eliminates the need for a separate ICU ventilator in the OT and sets a new ventilation standard. In synchronized Volume Mode, Apollo offers benefits such as an adjustable flow trigger that reduces the patient's respiratory work and adjustable PEEP. With E-Vent plus, you can switch smoothly from controlled to spontaneous respiration. In addition, Apollo is available with Pressure Support, an assisted spontaneous respiratory mode which allows the patient to breathe spontaneously for extended periods by reducing the work of breathing.'



Prof. Anis Baraka is Vice President of the World Federation of Anaesthesiologists and WFSA Representative to the Regional Commission of the United Nations. The professor has published hundreds of scientific papers and is also Editor-in-Chief of the Middle East Journal of Anaesthesiology and reviewer for various specialist journals

By Professor **Anis Baraka MD FRCA (Hon)**, Chairman of the Anaesthesiology Department at the American University of Beirut, Lebanon

desaturation by about 50s. Also, the application of continuous positive airway pressure (CPAP) during pre-oxygenation has been suggested to optimise pre-oxygenation in the morbidly obese, on the assumption that CPAP will increase FRC. However, CPAP only resulted in an insignificant increase of the mean

in the morbidly obese patient having acute lung injury. Potential adverse effects of non-invasive BiPAP include gastric insufflation, distension and aspiration. However, there are no reported cases of barotrauma or serious haemodynamic changes associated with non-invasive BiPAP. Nasopharyngeal oxygen

introduced the term apnoeic diffusion oxygenation, which is achieved by pre-oxygenation with 100% oxygen followed by oxygen insufflation during subsequent apnoea. During the apnoea, oxygen is extracted from the FRC into the blood at a rate of about 250 ml.min⁻¹ to maintain metabolic oxygen consumption. However,

Morbidly obese patients

Optimising pre-oxygenation by nasopharyngeal oxygen insufflation

In morbidly obese patients, oxyhaemoglobin desaturation during apnoea following standard pre-oxygenation is significantly reduced compared with non-obese patients. This is hazardous, since morbid obesity may be associated with increased risk of difficult tracheal intubation. The rapid haemoglobin desaturation during apnoea may be attributed to increased oxygen consumption associated with reduced oxygen reserve. The FRC, which is the main oxygen store, is decreased with obesity secondary to the increased mass of the chest and abdomen. Also, the supine position further decreases the FRC, due to cephalad displacement of the diaphragm by the abdominal contents, and hence the tidal volume of the obese may fall within the closing capacity. Whereas the FRC of normal patients decreases by around 20% following induction of

anaesthesia, it decreases by approximately 50% in morbidly obese patients, causing micro-atelectasis resulting in ventilation/perfusion (V/Q) mismatch, with a subsequent increase of alveolar-arterial oxygen gradient. Also, the intrapulmonary shunt in the obese patient is 10-20% compared with 2-5% in the non-obese (Fig 1).

The head-up position has been recommended to optimise pre-oxygenation in a pregnant woman, as well as in morbidly obese patients. The head-up position during pre-oxygenation in morbidly obese patients has been shown to prolong the mean time of



Fig 1: Morbidly obese patient with low FRC due to cephalad displacement of the diaphragm

due to the high solubility of carbon dioxide in blood, it is only added to the alveolar space at a rate of 10 ml.min⁻¹, resulting in a net gas flow from the alveoli to the blood at about 240 ml.min⁻¹. Hence, a subatmospheric pressure is produced in the alveoli, and the ambient oxygen is drawn 'en masse' into the lungs and maintains oxygenation. This explains the delay of hypoxemia in morbidly obese patients when pre-oxygenation is followed by nasopharyngeal oxygen insufflation.

In conclusion, in the morbidly obese patients traditional tidal volume pre-oxygenation is followed by a rapid oxyhaemoglobin desaturation during the subsequent apnoea, with a significant negative correlation between the time to oxyhaemoglobin desaturation and body mass index. However, when nasopharyngeal oxygen insufflation followed pre-oxygenation using 5 litre/min, the onset of oxyhaemoglobin desaturation during the subsequent apnoea is significantly delayed.

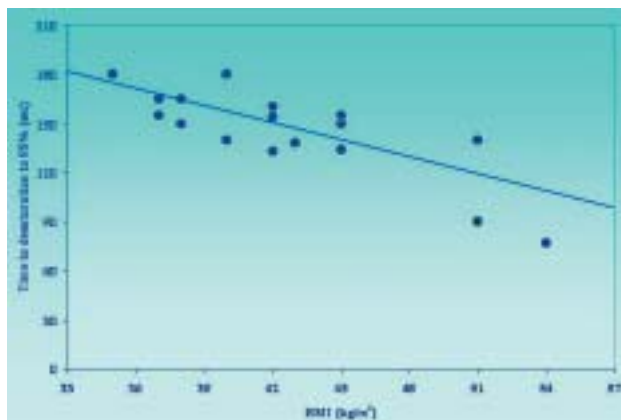
time to desaturate to 90%, as the FRC will return to pre-CPAP levels once the patient is anesthetized and the CPAP mask is removed.

In critically ill patients, Baillard et al showed that pressure support ventilation in the ICU ensured improved oxygen saturation before, during and after endotracheal intubation as compared with the standard pre-oxygenation. In our department, we use non-invasive ventilatory support in the form of BiPAP to optimise pre-oxygenation

insufflation can optimise pre-oxygenation in the morbidly obese. Following pre-oxygenation, the morbidly obese patients desaturate rapidly during the apnoeic period following traditional pre-oxygenation to a SpO₂ of 95% in a mean time of 145(27)s. In addition, correlation of BMI with the time to desaturation showed an inverse linear correlation i.e. the higher the BMI, the shorter the time to desaturation (Fig 2).

In 1956, H M Holmdahl

Fig 2: Correlation of BMI with the time desaturation to 95% in the morbidly obese, showing an inverse linear correlation. (Baraka et al; Anaesthesia 2007; 62: 769-773)



FDA ADVISORY ON FENTANYL PATCHES

Several cases of death and life-threatening side effects due to the incorrect use of fentanyl patches have led the US Food and Drug Administration (FDA) to issue a second public health advisory for the safe use of the very potent pain medication to healthcare professionals.

Reports indicate that doctors still inappropriately prescribed fentanyl patches, e.g. to patients with acute post-operative pain, occasional mild pain or headaches. The use of the Fentanyl Transdermal System is only indicated for the treatment of persistent, moderate to severe pain – patients who need an around-the-clock narcotic pain medicine and often are opioid-tolerant. Opioid-tolerant people are more resistant to the dangerous side effects of narcotic pain medicines, such as respiratory depression.

In addition, patients should be told precisely how to use the fentanyl patches. The FDA was informed about individuals changing the patches more frequently than stated in the package insert, or applying heat to the patches, resulting in dangerously high fentanyl blood levels. The FDA recommends fentanyl patch manufacturers to update their product information immediately and to develop a medication guide for patients.

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NUTRITION AND HEALTH Strict weight control for ICU patients

Illnesses treated in intensive care units (ICUs) often result in significant problems with the balance of fluids and electrolytes. For example, this can be unclear loss of fluids through diarrhoea, severe vomiting or third degree burns. It is important to detect these changes in the body's fluid balance quickly, and at an early stage, to prevent complications, by monitoring body weight. Strict monitoring of body weight is also important for diseases resulting in high fluid volumes, such as heart insufficiency, liver cirrhosis, lung diseases and hypothyroidism.

Intensive care patients are often not able to weigh themselves on scales independently. This requires a solution that does not involve unnecessary moving or discomfort for these patients. The seca 985 bed- and dialysis scales have been designed for just this purpose, the manufacturer reports. With a reliable patient weight indication up to 250kg the weight determination and monitoring of very obese patients also does not present a problem. Patient weight is measured in graduations of 100g up to 200kg, after that in graduations of 200g. Because it facilitates the detection of the slightest fluctuations in weight, such precision can save lives. For treatments involving patients with high fluid retention, e.g. dialysis, it is important that the patient's weight does not fall below a certain level and respectively that he reaches his target weight. For these cases, the seca 985 has a critical value function which acts as an alarm function, seca points out. 'All it requires is programming the patient's target weight. Once this is reached the seca 985 indicates this through an audio warning.'

The bed scales are complemented by the optional multifunctional display seca 435. It offers an additional alarm function, which immediately acoustically alerts the ICU specialists to dangerous fluctuations in weight, both upwards and downwards. This ensures a stable fluid balance for burn patients, for example. When the pause function of the seca 435 is activated, items could be placed on the bed, or removed, without impacting the weight monitoring process. This means, seca suggests, that the patient can be handed another pillow etc. without any problems.

28th International Symposium on Intensive Care and Emergency Medicine

BRUSSELS
27-30 MARCH
2008

As in 2007, the ISICEM's upcoming annual scientific gathering in Brussels expects to welcome around 5,000 participants from 90 countries

'There is a huge amount of literature being published and even with improved access via the internet, accumulating all the relevant data and applying it correctly to clinical practice is a challenge for even the most fastidious amongst us. The ISICEM gives us all an opportunity to catch-up with the latest advances so that we can return to our individual units full of newly learned information and techniques for the ultimate benefit of our patients. Join us and recharge your scientific batteries at the 28th ISICEM!' the organisation's chairman Jean-Louis Vincent urges.

'This year,' he points out, 'there will be more than 500 standard presentations, supplemented by more than 30 tutorials, 10 pro-con debates, 10 physiological or historical notes, as well as plenary lectures, case discussions,

round tables, workshops, and meet the expert sessions.

'Topics covered during the symposium will be diverse and varied and provide something of interest and of practical use for everyone who attends. There will be sessions on sepsis, ventilator-associated lung injury, acute respiratory failure, cerebrovascular accidents, pain management, cardiopulmonary resuscitation, pancreatitis, ICU management and safety, cardiorespiratory monitoring techniques, mechanical ventilation, neuromonitoring and head trauma, vasopressors, liver and renal failure, nosocomial infections, long-term outcomes, nutrition, clinical trial design, ethics, information technology as applied to intensive care, and massive bleeding to list just a few.'

Over 440 accepted abstracts of original work will be displayed as posters. In addition, 80 medical devices manufacturers as well as publishing firms will display their relevant products and publications.

How to achieve tight glucose control

By Professor Jean-Charles Preiser MD PhD, of the Department of General Intensive Care, University Hospital Centre, University of Liege, Belgium



Following the publication of the landmark Leuven study, which reported a four percent decrease in the mortality rate following the restoration and maintenance of normoglycaemia by intensive insulin therapy in critically ill patients, there was a wide enthusiasm for this cheap and easily accessible technique. However, the successful implementation of tight glucose control is a major challenge for most intensive care units worldwide. The increase in workload related to the frequent checks of blood glucose (BG) levels, preparation of insulin, the frequent changes in infusion rate of insulin, and the risk of hypoglycaemia, all represent a major burden for the nursing teams.

A stepwise approach is therefore mandatory to implement safely tight glucose control. Whichever the desired target for blood glucose level, it is necessary to implement a systematic algorithm, which will not only indicate the rate of insulin but also the time for the next glucose check. The use of dynamic rather than sliding scale appears safer. Of course, such an algorithm must be user-friendly in order to be used and applied when any change of the intake of carbohydrate and/or insulin infusion rate is anticipated. For example, the adaptation of the insulin infusion rate must be planned when enteral nutrition is discontinued. This aspect, as many others, requires close collaboration between the nursing and medical staff, which should co-operate to develop locally applicable protocols. Importantly, the nurses and available medical equipment must also be adapted. Once developed, the protocol must be carefully explained, implying an educational aspect, particularly important in this area, which involves every ICU healthcare professional.

The basic questions raised for the design of an insulin algorithm are particularly suitable for computerised protocols that will calculate mathematical formulas with several entries. The relevant questions of the clinicians can be easily translated in binary language. Several centres have already designed and validated their own computerised protocol. Of note, the use of a computerised protocol does not decrease the number of glucose checks to be performed. For instance, the SPRINT protocol requires the recording of blood glucose, nutrition and insulin administration rate every two hours.

Using such a stepwise approach, frequent evaluations of the rate of hypoglycaemia and the proportion of BG values within assigned range are probably valid quality indicators that could be used for self-evaluation of the performance and benchmarking. The calculation of the time within range requires the recording of each glucose value measured (and not only the morning value). Compared with the hyperglycaemia index, the time spent in range could be more reliable. In studies that compared two targets of blood glucose, the proportion of time spent within the assigned range was seldom reported. In the yet unpublished Glucontrol trial, which compared the outcome of patients assigned to 4.4-6.1 versus 7.8-10.0 mmol/l, we observed a time

spent in range of about 50%. Finally, the reduction in glucose variability parameter could also positively influence the outcome, and could also represent a tool to compare the quality of different protocols for tight glucose control.

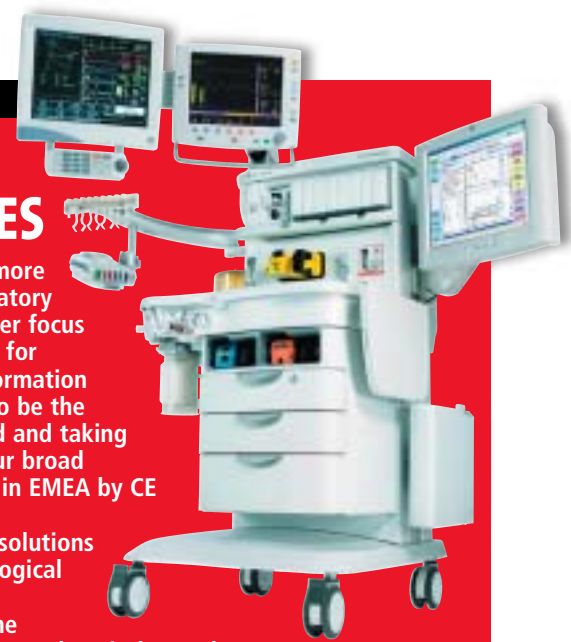
GE GAINS CE MARK FOR IT SOLUTIONS AS MEDICAL DEVICES

GE Healthcare has received the CE mark for its Centricity Clinical Information Systems (CIS), Centricity Anaesthesia and Centricity Critical Care as a medical device according to the European Union Medical Device Directive (MDD)93/42/EEC.

Nicolai Mokros, General Manager at GE Healthcare Integrated IT Solutions for CIS in Europe, Middle East and Africa (EMEA) commented: 'With this initiative we stay abreast of the changing markets in EMEA, which more than ever demand higher safety standards and proven compliance in healthcare information technology. As

these changes become more evident, European regulatory authorities will put higher focus on precise requirements for hospital and clinical information systems. We are proud to be the engine driving this trend and taking an important step for our broad customer installed base in EMEA by CE marking our solutions.'

To CE mark clinical IT solutions as medical devices is a logical sequence in the eHealth revolution because, in the future, the frontiers between hospital IT and medical equipment will disappear, GE points out.



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Hemicorporectomy

Czech Republic – The second successful hemicorporectomy (translumbar amputation) was carried out several months ago by surgeon **Frantisek Antos** and team at the Bulovka Faculty Hospital, Prague.

The patient had severe spinal cord injury from a motorbike accident when aged 19. Now 35 years old, due to many complications, including inflammatory areas in his crumbling pelvis and deeply infected bed-sores, the paraplegic patient had undergone 32 surgical operations, which included a colonostomy and urethrostomy. He was still struggling for life.

The surgeons decided on a hemicorporectomy, between the third and fourth lumbar vertebrae (L3-L4) but a post-operative complication resulted in their decision to go up one vertebra (L2-L3). This has resulted in the second successful hemicorporectomy among three carried out at the hospital. The first, involving a 34-year-old male patient, took place seven years ago.

Successful healing and survival depends on a patient's age, will to live and healthy condition. That was not the case for Dr Antos' last hemicorporectomy patient – a 65-year-old male who died within a month after surgery due to kidney failure and the lack of will to live.

Czech report: Rostislav Kuklik

A brief history?

Hemicorporectomy (translumbar amputation, or sometimes called halfectomy) is extremely radical and rare surgery. Thus there is little literature on the subject. Only about 45 hemicorporectomies are thought to have been reported. Because post-operative morbidity and mortality rates are high, there is generally a protocol not to resuscitate patients presenting the kind of serious injuries or disease level that might suggest a hemicorporectomy as the only solution. In addition, most surgeons would not contemplate the procedure because they consider it pushes the boundaries of surgery beyond reasonable frontiers.

Clearly the decision to opt for this surgery is reached only as a last resort in cases of severe, potentially fatal diseases or trauma in and around the pelvis.

Procedure - Depending on the circumstances, hemicorporectomy may be carried out in one, two or even more stages, with a gap of weeks or months between procedures. The first stage(s) involves colostomy and ileal conduit, transferring waste functions to the upper torso. The second stage is the amputation of the entire lower half of the body by transection of the lumbar spine. **Critical care** - Because almost 50% of the circulatory system has gone, complexities are inevitable. The usual monitoring parameters for kidney and cardiac functions and blood pressure have changed; temperature control, fluid replacement and pulmonary care become critical.

Prostheses - Because there is usually no remaining pelvic girdle musculature, it is extremely difficult to design comfortable and useful prostheses. The prosthetic used is referred to as a 'bucket', which has an inflatable lining to prevent uneven pressure distribution.

The colostomy bag and ileal conduit are connected through two outlets in the bucket.

Physiotherapy & body management - This is also an enormous issue. Needless to say, the long-term management of hypertension, temperature control, stoma management, as well as sex hormone replacement, patient's weight control and skin care is intensive.

Almost above all in importance is the physical fitness and emotional disposition of the patient – his/her strength and will to live.

History - The type of severe injuries experienced during WWII pushed the boundaries for new surgical techniques. Reflecting on this period, B. E. Ferrara referred to hemicorporectomy in an article: '*...battle field injuries quickened innovative treatment of congenital and acquired conditions... [the surgeon] devised extensive cancer operations including extended radical mastectomy, radical gastrectomy and pancreatectomy, pelvic exenteration, the 'Commando operation' (tongue, jaw and neck dissection), bilateral back dissection, hemipelvectomy, and then hemicorporectomy or translumbar amputation,*

referred to as the most revolutionary of all operative procedures'.

In 1950, Professor Frederick E Kredel at the Medical College of South Carolina broached the prospect of hemicorporectomy (or halfectomy, as he referred to it) as an alternative to pelvic exenteration for patients with advanced pelvic malignancy. Although the professor demonstrated the procedure in cadavers and recommended it be carried out in two stages, he did not perform this procedure on a living human.

Nine years later, in Detroit, Michigan, surgeon Charles S Kennedy carried out the first actual hemicorporectomy on a 74-year-old male patient with locally invasive rectal cancer. Surgery was carried out in a single stage. The man lived for 10 days. Cause of death: pulmonary oedema.

A year later (1961) surgeon J Bradley Aust, University of Minnesota, performed the first successful hemicorporectomy, in two stages, on a 29-year-old paraplegic who suffered a malignant tumour in a decubitus ulcer. He survived for 19 years.

Other hemicorporectomies have been undertaken through the years; some 45 cases have been reported, among which the several successes have led experts to believe that results could be improved with greater multidisciplinary planning and aftercare.

The 57th ESCVS Annual Congress



24-27 April
Barcelona,
Spain

Stephan Schueler
PhD MD

The first day of the European Society of Cardiovascular Surgery Annual Congress* will focus on live surgery, endovascular topics and controversies.

Training courses on simulators will also be held to gain direct experience on the practical and theoretical aspects of the most challenging and innovative procedures in both cardiac and endovascular surgery, which need thorough evaluation in consideration of the rapid development of the surgical techniques and technologies, the organisers* explain. High attendance at the training courses last year led them to continue this activity, mainly for young surgeons, who can simulate a real procedure once demonstrated by the leading experts in this field.

*Stephan Schueler MD, ESCVS President; Claudio Muneretto MD, Secretary General, ESCVS; José Luis Pomar MD, Chairman of the Local Organising Committee and Cardiac Surgery Programme Committee, and Vicente Rimbau MD, Chairman of the Local Organising Committee, Vascular and Endovascular Surgery Programme Committee
Details: www.es cvs.org

NEUROLOGY



The computer technique could help to reassure the elderly with mild memory loss that they do not have Alzheimer's. For those with the disease, it may enable study of its progression

PC diagnoses Alzheimer's better than physicians

Earlier, cheaper diagnosis predicted

Standard computers can be taught to diagnose Alzheimer's disease from brain scans, according to researchers at the Wellcome Trust Centre for Neuroimaging at University College London. Publishing findings in the journal *Brain*, Professor Richard Frackowiak said the computers were better able to distinguish signs of Alzheimer's than humans, and proved quicker and more accurate than present methods, as well as less costly.

A standard computer was taught the difference between brain scans from patients with known Alzheimer's disease and people with no signs of the disease. These two conditions are distinguishable with high accuracy on a single clinical MRI scan, without the need for time consuming follow-up tests, the researchers pointed out.

Diagnosis via the standard computer obtained a 96% success rate; diagnostic accuracy from standard scans, blood tests and interviews by a clinician was 85%. 'Machines are clearly able to do that sort of thing better. It's beginning to look like it will have to come into clinical practice', Prof. Frackowiak said. 'In the long-run, we'd like to use these techniques as ways of classifying patients with something like a degenerative disease into various stages. From the point-of-view of developing new pharmaceuticals for these disorders,' he added, 'there's great potential.'

DBS may improve memory

Six patients are taking part in a pilot study to test whether deep brain stimulation (DBS) can help in early Alzheimer's disease to improve their memory. This follows a finding by a Canadian team of doctors who came across an interesting finding when using DBS to treat a 50-year-old morbidly obese diabetic, who suffered sleeping disorders and had failed to respond to diet, medications, psychological help, and had turned down gastric surgery.

DBS became an experimental option because, in animal tests, it has been shown to have an impact on appetite. It has not been widely tested as a treatment for obesity in humans, but the procedure has had some success in the treatment of Parkinson's disease, chronic pain, severe cluster headaches and depression.

Following the implantation of electrodes into the brain's limbic system (hypothalamus) which is thought to control the appetite, and stimulation by electrical impulses, the patient began to experience feelings of déjà vu. The sudden perception of being in a park with friends followed, in which he was an observer. He felt younger, thought his age to be about 20, and that his then girlfriend was there. The scene was in colour, and as the stimulation intensity increased, details in this scene became more vivid.

Following surgery, the patient recovered for two months. Later, when the electrodes were stimulated for again, he experienced a similar effect. After three weeks of constant electrical stimulation the patient performed better in memory tests than he had previously done.

A year later he again performed well in memory tests when the electrodes were stimulated, but less well when they were switched off.

Reporting their findings in the *Annals of Neurology*, lead researcher Professor Andres Lozano, of the Toronto Western Hospital, said that this single case was completely unexpected, but added: 'We knew immediately it was important and were sufficiently intrigued to see if this could help people with memory disorders. Hopefully, we have found a circuit in the brain that can be modulated by stimulation, and which might provide benefit to patients with memory disorders,' said Professor Lozano.

The 1st Central European Congress of Surgery 2008

23-26 April
Prague, Czech
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In his invitation to surgeons to attend the 1st Central European Congress of Surgery the Congress (CECS) president and host Miroslav Ryska writes: 'The Prague congress of CECS will establish a new tradition for all surgeons of the Central European Region. Our aim is to put great emphasis on all developing fields of surgery, evidence-based medicine and new technologies; as well as on new approaches of surgeons with live demonstrations of surgical, endoscopic and X-ray procedures. Young surgeons are especially encouraged to participate.'

This event is destined to continue as one of Europe's most important gatherings: The scientific committee for the first congress includes numerous leading surgeons – all members of Surgical Societies or Associations in their own countries: Austria, Croatia, Czech Republic, Hungary, Poland, Slovak Republic, and Slovenian Republic.

The programme will include contributions from many international experts in surgery, oncology, radiology and other fields of interest.

Details: Congress Secretariat, Guarant International spol. s r. o. / CECS 2008, Opletalova 22, 110 00 Prague 1, Czech Republic. Phone: +420 284 001 444. E-mail: cecs@guarant.cz



Miroslav
Ryska

Kidney donors: a long-term follow-up

What is their quality of life after donation?

Archil Chkhotua MD PhD, Head of the Kidney Transplant Programme at the National Centre of Urology in Tbilisi



Kidney transplantation (Tx) is a treatment of choice for patients with end stage renal disease, providing the best results and high quality of life (QoL). However, donor shortage remains the main problem in organ Tx. Today, only a few possible ways to enhance the organ supply are considered. One of these is the increasing use of living donor organs. It has been shown by numerous studies that kidney donation does not cause serious medical problems such as deterioration of kidney function, arterial hypertension or proteinuria. However, it should not be forgotten that a donor is not a patient; this is a healthy person voluntarily donating the organ. The decision-making process is complex for every donor and analysis of their postoperative health and QoL is a matter of utmost importance. Only limited reports examine the QoL issues in living donors.

The QoL concept is well-known in clinical medicine and frequently applied to assess surgical or other treatment modalities to determine their therapeutic success. It is a wide concept, comprised of four main aspects of human well-being: physical (health, mobility, somatic comfort etc.), psychological (happiness, satisfaction, tranquillity, etc.), social (family relationships, financial well-being etc.) and spiritual (sense of life, religious beliefs etc.). Several surveys and questionnaires have been used for this purpose. The Short-Form 36 (SF-36), Giessen Subjective Complaints List-24 (GBB) and Zerssen's Mood-Scale (Bf-S) are internationally validated and frequently used questionnaires.

Differences in educational, cultural and socio-economic backgrounds may influence the QoL of donors in different countries. Previous studies have shown that donors in the USA, Sweden and Germany scored better than the general healthy population in several QoL items. Results from these studies provide evidence that donor QoL should be at least comparable, or even better than, that of the general population.

We evaluated the QoL of 45 kidney donors (Group I) and compared it to: 120 age/sex matched healthy individuals (Group II); and 40 patients who underwent nephrectomy due to: renal tumour (80%) and hydronephrosis (20%) (Group III). All the donors and patients were operated on at our institution. The SF-36, GBB and Bf-S questionnaires were mailed, e-mailed, or handed

By **A Chkhotua, T Pantsulaia*, N Maglakelidze** at the National Centre of Urology, Tbilisi, Georgia

to the donors and patients. All the respondents were given some short information about the goals and objectives of the study. To ensure maximum objectivity in the results, the evaluation procedure was completely anonymous. All respondents were

free of any charges related to the filling or sending in of questionnaires.

In five out of eight items the donors scored better than the controls and patients. For three of them (Social function, Bodily pain and Vitality) the difference was

statistically significant. The Bodily pain and Vitality indexes of the controls were higher compared with those of the patients. The GBB scores of the donors were higher than those of the controls and patients; however, these differences did not reach significance. The mood analyses performed by the Bf-S questionnaire have shown significant differences between the groups in favour of the donors.

In conclusion, the donors should be educated about the extent of psychosocial impairment that might occur in the postoperative period. They should be monitored for both physical and psychosocial outcomes of the donation. Further, prospective studies are needed to facilitate potential donors' understanding of the complex issues related to the organ donation.

* T Pantsulaia: also at the Georgian Association of Psychology

The 23rd annual EAU Congress

Milan, Italy
26-29 March
2008

The Milano Convention Centre (MIC) is the largest of its kind in Italy. Certainly that space will prove valuable this March, when 9,500 urologists from 100 countries attend the 23rd EAU Congress, the second biggest of its kind in the world. Apart from attending the congress and related trade fair, they may also glimpse Milan's many attractions: the cathedral, La Scala, Sforza's Castle, or even the dazzling fashion houses.

The Italian EAU presidents and hosts are Professor Walter Artibani (Padua), Prof Vincenzo Mirone (Naples) and Prof Patrizio Rigatti (Milan).

Advances covered in the scientific programme will include, for example, the use of biomarkers and the treatment of bladder and renal cell cancer and, as Prof. Artibani points out: 'There is attention for every aspect of the urological spectrum.'

In addition, about 35 post-graduate training courses organised by the European School of Urology, in association with the congress, will be held.



Twelve EAU section offices, including the European Society for Uro-Technology (ESUT) and the European Society for Oncological Urology (ESOU), will hold their annual meetings at the venue, as will the European Association of Urology Nurses (EAUN). In Berlin last year, the EAUN's annual meeting drew

Prof. Walter Artibani

over 240 participants; this, Prof Artibani adds, 'underlines the growing interest among professional nurses in Europe not only to hone their skills but also share their knowledge with colleagues from more than 25 countries.' Along with various specialist events, the nurses will be invited to visit a local hospital.

Never has there been so much international collaboration in the medical field, Prof Artibani says, which is 'evidenced by joint meetings between the EAU and the Chinese Urological Association, the Arab Association of Urology and the Urological Society of India'.

The latest results from the Global Prevalence Study on Infections in Urology (GPIU study) also will be presented. 'This worldwide study is internet based and investigates the prevalence of nosocomial infections, since these pose a serious threat to urological patients,' Prof. Artibani explains.

Details: www.eaumilan2008.org
EAU website: www.uroweb.org

New... A highly practical male urinal



UnoComfor is a single-use male urinal designed to optimise safety and hygiene. Unomedical, its manufacturer, reports that the urinal is 100% leak-proof and incorporates a non-return valve that eliminates the risk of contact with infected urine and urinal spillage.

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Unomedical reports that it has been intensively tested by Kathryn Harris, Urology Nurse Specialist at Southmead Hospital in Bristol, UK, who found the product to be overall very cost effective in terms of the time saved.

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INTERIM SOLUTIONS

Prof. Huland: Nerve-preserving prostatectomy was originally developed in the United States. Researchers discovered that the nerves that cause erection run along the surface of the prostate gland and that those nerves are destroyed in traditional prostate surgery. Our work generated important new insights regarding the actual sensitivity of these nerves and we concluded that any surgical intervention should stay clear of these nerve bundles. We were also the first to show exactly where and how many nerves are on each side of the prostate gland – namely fifty. That told us how much tissue had to be spared during surgery in order to preserve erectile function.

Based on this new knowledge, we developed a procedure, which – at Martini-Klinik – has proved very successful regarding the preservation of sexual potency. Because there usually is no comprehensive follow-up, it is not so easy to collect data. Therefore, in 1991, we began to build a data base, which we feed with internationally validated questionnaires that patients fill out before and after surgery.

Surgical success depends to a great extent on the patient's age and whether the nerves on both sides of the prostate can be spared during the intervention. Normally, this means that, if the patient is fully potent prior to the procedure, and if the nerves on both sides of the prostate can be preserved, 60 percent of the patients will regain erectile function without the aid of medication. A further 30 percent can have intercourse with the aid of potency-supporting medication. If

Advances in prostate cancer imaging spark hopes for better therapies. *Meike Lerner* asked **Professor Hartmut Huland** (right), Medical Director of Martini-Klinik in Hamburg, and pioneer of the nerve-preserving prostatectomy method, currently the gold standard in prostate cancer therapy, about his technique and whether the optimism regarding imaging is justified or misplaced



Visualising prostate cancer

the nerves were spared only on one side of the prostate, only 40 percent of the men can have an erection without medication. Generally speaking, the chances to preserve erectile function are higher for a 50-year-old patient than a 65-year-old patient.

This year, you began a research project on diagnostic imaging of prostate cancer with Professor Dr Ferdinand Frauscher of University Hospital Innsbruck, Austria. Which methods are you studying?

Until recently there was no imaging method for prostate cancer. Professor Frauscher is a pioneer in prostate imaging. In our research we follow a two-pronged approach: First, elastography, a method that has been around for some time, but which did not provide adequate resolution. However, due to recent innovations, the method is now suitable for diagnostic purposes. In the framework of our research project, to test the specificity of the method we are looking at 'normal' prostates. We are examining patients who will have

to undergo a radical prostatectomy due to a bladder carcinoma. Using elastography, we assess the status of the prostate prior to and after surgery. We compare the actual status with the diagnostic image. Second, we test Doppler ultrasound, a modality also advanced by Professor Frauscher. This ultrasound procedure primarily visualises vessels. Since Doppler sensitivity by itself does not provide sufficient sensitivity, we use a contrast agent. As yet, we have results for neither of these approaches, but we are confident that we will have answers soon.

How do developments in diagnostics impact on therapy? Currently, we experience problems with identifying patients who are suited for nerve-preserving prostatectomy. The nerves are located very close to the membrane of the prostate capsule. If the tumour has already penetrated the capsule, the nerves are affected. In fact, the tumour uses the nerve sheaths through which the nerves enter the organ, in order to exit the prostate.

Today, there are three methods to determine on each side whether the

tumour has penetrated the capsule. First we look at the biopsy results. If the tumour turns out to be aggressive, the tissue-sparing procedure is impossible. In some cases, prior to surgery we additionally perform a biopsy of the nerve region to confirm that there is no, or only little, cancer growth. During surgery, a microscopic examination of the nerve bundle region run will show whether the tumour touches the nerves.

This is very complicated. If we had imaging procedures that could tell us, without a doubt, that on the left side the tumour is inside the capsule but on the right it has already penetrated the capsule, for example, we could plan the intervention far better. The surgeon could determine beforehand where nerves can be preserved and where not. This is what we hope for: that imaging will provide us with diagnostic confidence and complex and time-consuming methods become obsolete.

Second, we certainly hope that imaging will improve early detection of prostate cancer, so that more patients will be able to

benefit from the nerve-sparing procedure. The further the cancer has progressed, the smaller the chances for nerve-preserving tumour removal.

In the long term, does this mean that radical prostatectomy will remain the procedure of choice, or do you expect that at some stage you will be able to save the prostate at least partially?

Radical prostatectomy will remain the procedure of choice. It is being hotly debated whether we will reach the point where we can do a partial removal. However, many experts, including myself, consider this discussion dangerous because, in 86 percent of cases, prostate cancer, even in the early stage, is a multi-focal event, unlike kidney cancer, for example, where the carcinoma is limited to a single region. Molecular biological studies show that the entire prostate is always affected. Therefore partial prostate removal is risky. Certainly, we have to think about the idea, particularly if diagnostic imaging provides good results. But it is unlikely that it ever will be more than an idea.

Real-time tissue elastography Aiming for a 'manogram' programme in Europe



Professor Ferdinand Frauscher

Today, Real-time Tissue Elastography (HI-RTE) provides a method to determine tissue elasticity of certain organs, such as the prostate, in real-time and to perform precise biopsies for reliable tumour diagnosis during standard examinations. **Professor Ferdinand Frauscher (FF)**, consultant in radio diagnostics at the Innsbruck University Hospital, Austria, who has pioneered elastography, particularly in urogenital diagnostics, and regularly uses it in a screening programme, discussed the value of this method in an interview with Meike Lerner

FF: Real-time elastography is gaining increasing importance, because it is a patient-friendly, reliable and very affordable method to diagnose cancer. The idea behind the method – to measure elasticity and thus density of tissue – is not new. However, for a long time this kind of measurement required complex and time-intensive procedures and therefore was not useful in clinical practice. The introduction of HI-RTE by Hitachi Medical Systems offered a rather simple method which can be applied routinely.

HI-RTE has become an invaluable tool particularly for the diagnosis of prostate cancer, because, before this, systemic ('blind') biopsy had been the only method. In Innsbruck we have been running a prostate cancer early detection programme with PSA (prostate-specific antigen) screening since 1988. Within this programme we

examined many men who did not present with complaints, but where a prostate carcinoma was suspected. Before the introduction of real-time elastography we had to perform a systemic biopsy, which in 40% of all cases generates false negative results. From a radiological viewpoint there was an urgent need for an imaging method that allows visualisation of the prostate. Around 1993, we started to work with colour Doppler ultrasound, which we used until real-time elastography became an alternative.

Today, we have data on about 1,500 patients for whom we used real-time elastography to visualise known prostate cancer. Before radical prostatectomy the patients were examined with elastography, the tissue density was recorded and results were compared with the post-surgical results. Sensitivity of the

method reached 90%, specificity around 70%.

We also compared real-time elastography with MRI. In screening programmes MRI is significantly more time and cost intensive and more unpleasant for the patient. An examination with MR-guided biopsy takes up to three hours - that is unfeasible in every-day clinical practice, because only two to three patients can be examined per day. **The Federal State of Tyrol is one of few regions that offer a comprehensive prostate screening programme. What kind of patients present?**

FF: Most of our patients show a PSA value between four and five. Here, in Tyrol, we set the screening threshold at 1.25 since earlier studies indicated that in 20% of men with a PSA value below four a tumour was detected. That means even a slight increase in PSA

may indicate cancer. On the other hand, a harmless infection can also cause an increased value. With real-time elastography we can perform a transparent examination that is painless for the patient. Combined with a biopsy the detection rate reaches 60-70%.

Real-time elastography is also excellently suited for therapy control. Patients with dense tissue are scheduled for regular follow-up

exams, as are patients with a low-aggressive tumour that does not receive treatment.

Today, real-time elastography is being used in two further Austrian clinics and in a hospital in Hamburg, Germany.

So, thanks to real-time elastography the diagnosis of prostate cancer has been significantly improved. What are the next steps?

FF: Next, we want to look at possible new therapies. As far as men are concerned, we are lagging behind a bit. Our goal is – similar to breast cancer therapy – to avoid radical resection if at all possible. Resection is still the procedure of choice, even if a tumour has a size of only three to four millimetres. With the support of imaging methods, we can treat these cases with high-focus ultrasound or can apply special gene therapies. The US is ahead of us, because more funds are available for research. The term 'manogram' is already widely used in the US. We would like to adapt this trend for Europe, which would result in significantly improved diagnostics and treatment of prostate cancer.

Real-time Tissue Elastography at the ECR

Organised by Hitachi Medical Systems, the symposium 'Real-time Tissue Elastography: stretching diagnostic boundaries – myth or valuable clinical tool?' will be held during the European Congress of Radiology (ECR), on Sunday, 9 March (12:30-13:30, room E1).

High profile specialists will present the latest developments in RTE, and Prof. Frauscher will describe his experiences with this method and explain 'The value of real-time elastography in the diagnostic evaluation of prostate cancer and testicular masses'.

Four months of ADT delays prostate cancer growth by up to eight years

THERAPY

USA - Just four months of hormonal therapy before and with standard external beam radiation therapy slowed cancer growth by as much as eight years, especially the development of bone metastases, according to a study* carried out at the University of California, San Francisco. The therapy also increased survival in older men with potentially aggressive prostate cancer. This 'neoadjuvant' hormonal therapy may allow men most at risk of developing bone metastases to avoid long-term hormonal therapy later on. In addition, the short-term hormonal therapy did not increase the risk of cardiovascular disease — a potential side effect of long-term hormonal therapy.

The treatment — androgen deprivation therapy (ADT) — lowers levels of cancer-fuelling testosterone in the blood. Whilst this is an

important treatment option for men with prostate cancer that continues to progress despite initial treatment with surgery, radiation therapy, or chemotherapy, it has been associated with side effects (e.g. bone loss, osteoporosis, depression and an increase in cardiovascular risk factors).

'This study demonstrates that the benefits of short-term hormonal therapy for men receiving radiation therapy for prostate cancer far outweigh the risks,' said lead author **Mack Roach III MD**, professor and chair of radiation oncology and professor of urology at the University of California, San Francisco. 'While four months of hormonal therapy isn't enough to cause significant side effects, we found that it can delay the development of bone metastasis by as many as eight years, which is very significant.'

Starting in 1987, Radiation Therapy

Oncology Group researchers studied 224 men with high-risk prostate cancer who received ADT (goserelin and flutamide) before and concurrent with external beam radiation therapy, and 232 men with the disease who received radiation therapy alone. After 13 years of follow up, they found better 10-year disease-specific death rates (the rate of death from prostate cancer) for men who received ADT plus radiation (23% versus 36% of the radiation-only group), disease metastasis rates (35% versus 47%), disease-free survival (the percentage of men free of cancer at 10 years; 11% v. 3%) and biochemical failure rates (a rise in PSA levels; 65% v. 80%).

Among men who received neoadjuvant hormonal therapy, there was up to an eight-year delay in the time it took 40% of patients to develop bone metastases compared with men

receiving radiation alone. Men who develop bone metastases often require long-term hormonal therapy, which can increase their risk for side effects. 'So by taking a little bit of hormonal therapy early, patients may avoid having to take a lot of it later,' Dr Roach added.

Fatal cardiac events occurred in 12% of patients in the ADT group compared with 9% of the radiation-only group — a difference that was not statistically significant.

* 'Short-Term Neoadjuvant Deprivation Therapy and External Beam Radiotherapy for Locally Advanced Prostate Cancer: Long-Term Results of RTOG 8610 a Phase III Prospective Randomized Trial.' Mack Roach III, et al. University of California San Francisco, CA. Published by the peer-reviewed *Journal of Clinical Oncology (JCO)* of the American Society of Clinical Oncology (ASCO). Published online 2/1/08. Also, for consumer information go to ASCO's patient website: www.plwc.org/CancerAdvances.

Childless men show lower risk of the disease

Denmark – Childless men have a lower risk of developing prostate cancer than fathers; but, the more children a father has, that risk decreases, according to a new study led by **Kristian Jørgensen** of the Statens Serum Institut, in Copenhagen, published in the *American Cancer Society* journal, *Cancer**.

The research team used a national population-based register to analyse data from all men born in their country between 1935 and 1988. Among these, 3,400 had developed prostate cancer. They found men without children were 16% less likely than those with children to be diagnosed with prostate cancer during up to 35-years of follow up. The analysis also revealed that, among fathers, with an increasing number of children the prostate cancer risk gradually reduced. The authors suggest that, theoretically, this might reflect a 'healthy father' phenomenon, in which men who retain fertility are less likely to develop a malignancy. The study found no association between prostate risk and child gender.

Their analysis did not reveal what factors associated with childlessness might be responsible for the risk reduction. Currently known risk factors for prostate cancer are race, family history of prostate cancer, and advanced age. 'Regardless of the underlying mechanism, the results of the current study provide prospective, epidemiologic support for the view that childless men are somehow at lower risk of developing prostate cancer,' the authors wrote.

They add that additional studies are needed to identify the underlying biological, environmental, social and/or behavioural factors that explain the observed differences in prostate cancer risk between fathers and childless men and between men fathering few and those fathering many children.

* 'Fatherhood Status and Prostate Cancer Risk.' Kristian T. Jørgensen, Bo V. Pedersen, Christoffer Johansen, and Morten Frisch. *CANCER*; Pub. online: 7/1/08 (DOI: 10.1002/cncr.23230); Print Issue Date: 15/2/08.

Prospective Phase III trial for MRI-guided galvanotherapy

Galvanotherapy is a tissue-saving procedure that utilises a direct electric current. 'With galvanotherapy we are able to retain the function of the concerned organ and can protect healthy tissue in a more targeted and much better way than with conventional methods,' explained **Professor Thomas Vogl**, of the University Hospital Frankfurt, Germany), who, developed the treatment with Dr Heinz Mayer (Regensburger Competence Centre for Non-Surgical, Minimally Invasive Tumour Therapy) and the support of scientists at the Medical University of South Carolina, USA.

From February 2005 to August 2006 the researchers used the MRI-guided procedure to treat 44 patients suffering histologically confirmed prostate cancer. Under a local anaesthetic, in a transgluteal puncture, two platinum-tipped electrodes were inserted into the right and left region of the prostate.

Three times a week, direct current charges of max. 350 coulombs were applied to the tumour during the

treatment. Since the tumour cells show a high level of ions, the current focused on the tumour tissue whilst healthy tissues remained unaffected.

Three, six and twelve months after the treatment, the tumour size and the prostate-specific antigen (PSA) levels were measured. Median tumour size had decreased from 1.90 cm³ to 1.12 cm³ – a significant reduction of 41%. The treatment also reduced PSA levels: In the final follow-up examinations, one patient showed no tumour signs and a partial reduction was recorded in 18 patients. The health status of 23 patients was stable; two patients showed disease progression with an increase in tumour size. No metastases were detected.

According to the scientists, this new method is particularly suited for tumours of less than 8 cm that are not located close to an artery or nerves. The therapy costs are less than for comparable treatments.

As soon as the procedure is approved, Prof. Vogl said he expects it to be covered by statutory health insurers.

Genes and cancer susceptibility

At least ten newly identified genetic variants are associated with increased susceptibility to prostate cancer, according to three studies published online at Nature Genetics (<http://www.nature.com/naturegenetics>). These findings double the number of variants known to be associated with risk of prostate cancer and, in the future, may allow predictions of high risk in particular individuals.

The three groups independently carried out genome-wide association studies of thousands of individuals with or without prostate cancer. Rosalind Eeles and colleagues (Institute of Cancer Research, UK) identified seven loci that were significantly associated with the disease on chromosomes 3, 6, 7, 10, 11, 19 and X. Stephen Chanock (and colleagues National Institutes of Health, Bethesda, MD, USA) report risk loci on chromosomes 7, 10 (two loci) and 11, as well as nine other loci showing suggestive

association. **Julius Gudmundsson**, **Edward Farmer** and **Berglind Olafsdottir** (deCODE Genetics, Reykjavik, Iceland) report risk loci on chromosomes 2 and X. Each group's findings were replicated in an independent population, and each confirmed previous susceptibility loci on chromosomes 8 and 17.

Although the specific genes that are affected by these variants have not yet been pinpointed, the authors of the studies note a few candidates. One of the risk variants on chromosome 10 is just upstream of MSMB, which encodes a protein that is produced in the prostate, and loss of MSMB expression is associated with recurrence of disease after prostatectomy. The variant on chromosome 19 is near KLK3, which encodes PSA, an enzyme that liquefies semen and is used as a standard serum marker for screening and disease monitoring.



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1. JAMA 2007;297(14):1769-1776.

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Even non-touch taps can harbour dangerous pathogens

How to banish waterborne infections

USA - Urging public health and infection control officers to be proactive against *Legionella* and other waterborne microbes that contribute to soaring hospital infection rates everywhere, international *Legionella* expert Janet Stout PhD* warned: 'One small water line feeding one hospital faucet alone can house millions of bacteria.' In her article *Understanding and Controlling Waterborne Pathogens: Applying Lessons Learned from Legionella*, published in *Managing Infection Control*, (12/07) Dr Stout outlined a protocol for prevention and discussed the technologies found most effective in controlling exposure to waterborne microbes – copper/silver ionisation, chlorine dioxide and point-of-use filtration by Pall-Aquasafe filters. The best solution, she wrote, is likely to be a combination of chemical or physical disinfection together with point-of-use filtration.

The author also pointed out a surprising finding: Although electronic, non-touch faucets would appear to be a logical solution, studies have shown them to be a source of dangerous germs that can cause serious pneumonia and other infections.

* Dr Janet Stout is director of the Special Pathogens Laboratory, based in Pittsburgh, and Associate Professor at the University of Pittsburgh. She founded SPL with Dr Victor Yu. Both have over 25 years experience in infectious disease and microbiology. The laboratory provides healthcare, water treatment and other industries with services that specialise in the detection, control and remediation of waterborne pathogens such as *Legionella*, *Pseudomonas*, *Mycobacteria* and other clinically relevant pathogens. Details: www.specialpathogenslab.com.

VACCINATION MAY COMBAT CLOSTRIDIUM DIFFICILE

UK – Whilst the life-threatening *Clostridium difficile* is not absolutely resistant to antibiotics, after an individual has been infected the bacteria often reappears. Vaccination against it is therefore seen as the possible answer, and now results from initial trials of one made by Acambis, a Cambridge-based biotech company, have encouraged its scientists to discuss involvement of the National Health Service (NHS) in tests in hospitals this year.

Rather than targeting the infection, this developing vaccine focuses on the toxins produced by a *C. difficile* infection. Trials on 200 patients indicate that the vaccine was effective at combating one of the major toxins in 100% of cases and a second major toxin in 75% of cases.

It is hoped that a course of three injections will provide long-lasting protection for over a decade.

Evolving bacteria present new and difficult problems

Ireland - Researchers are investigating a new breed of bacteria that carry extended spectrum beta-lactamases (ESBLs) enzymes which can destroy many common antibiotics, including penicillins and cephalosporins. These multi-resistant strains have appeared not only in hospitals, but also in nursing homes as well as in the community.

In the UK, during 2003 and 2004 a severe outbreak of cystitis was caused by *E. coli* bacteria that could produce a particular type of ESBL.

Researchers at the National University of Galway wanted to know how common similar strains of antibiotic resistant bacteria are in Ireland. 'Our results showed that ESBL producing bacteria, especially of the type that caused those bladder infections in the UK, are now common in Ireland as well as in other countries in Europe. We also showed that they are not just found in hospitals but also in nursing homes and in the community,' said Dr Dearbhaile Morris.

Their study of 732 samples, obtained at 22 Irish hospitals over the past decade, showed that 61% tested positive for bacteria that produce this

enzyme. 'The ability to make ESBLs enzymes spreads very easily between different types of bacteria,' Dr Morris explained. 'It lets them break down many different penicillins and cephalosporins. So the genetic ability to resist very important antibiotics often spreads with the ability to make ESBLs, and that means doctors increasingly have to use antibiotics which in the past were held back for exceptional cases.'

'It is very important to track the spread of antibiotic resistant bacteria so that doctors have the information to make a good choice of antibiotic in the early stages of infection before the lab has had time to find out exactly which type of bacteria is causing the infection and which antibiotic they can depend on to work,' Dr Morris pointed out. 'ESBL producing bacteria can break down several of the most commonly used antibiotics in clinical practice today so it is important that we know how common they are.'

Professor Kevin Kerr, consultant microbiologist at Harrogate District Hospital, said: 'MRSA is often thought of as a hospital superbug, but we are

Intensive care units are associated with the best state-of-the-art technology and round-the-clock treatment from experts. However, patients who enter ICUs risk hospital acquired infections (HAI), which are not only very expensive to treat but also could kill them.

In the USA alone, around 80,000 patients annually acquire catheter-related bloodstream infections during an ICU stay, costing about \$2.3 billion to treat. They are fatal between 5-28% of

Innovations in Quality Patient Care, and associate professor at the Departments of Anaesthesiology and Critical Care Medicine and Surgery at Johns Hopkins School of Medicine.

The checklist requires that, when a central venous catheter is placed in a patient, the medical team involved: a) wash their hands with soap; b) clean the patient's skin with chlorhexidine antiseptic; c) put sterile drapes over the entire patient; d) wear a sterile mask, hat, gown and gloves; and e) put a sterile dressing over the

The New Yorker on December 10, 2007.

(http://www.newyorker.com/reporting/2007/12/10/071210fa_fact_gawande), Dr Atul Gawande, a general and endocrine surgeon at Brigham and Women's Hospital in Boston and Assistant Professor of Surgery at Harvard Medical School, stressed that a newly implemented 'protocol', stressing acceptability and encouragement by any member of the medical staff to point out to any other member of the medical staff if they were not adhering to the checklist,

Simple checklists could save healthcare billions

By Cynthia E Keen

cases and result in the avoidable death of around 28,000 people. European statistics are believed to be comparable.

Adoption and strict adherence to a simple five-step checklist, designed to enforce hygiene practices in intensive care units (ICUs), potentially could dramatically reduce, if not entirely eliminate, catheter-related bloodstream infections. The World Health Organisation's World Alliance for Patient Safety (WAPS) is working with the Quality & Safety Research Group (QSRG) at the Johns Hopkins School of Medicine Centre for Innovations in Quality Patient Care, in Baltimore, Maryland, to implement this programme in Europe and other interested nations. Details of the programme are expected soon or early this summer, according to Christine Goeschel RN MPA, administrative director of QSRG. WAPS was organised in October 2004, with a mission to promote patient safety worldwide, and is headquartered in London.

The checklist was the brainchild of Peter J Pronovost, MD PhD, medical director of the Centre for

catheter site once the line is in. These are procedures taught in medical school and expected to be practiced in hospitals. But are they?

In 2001, Dr Pronovost initiated and oversaw the implementation of a programme at Johns Hopkins Hospital that mandated and monitored complete compliance of the checklist. Over a 27-month period, the 10-day line infection rate of patients in the ICU dropped from 11% to 0%. During that time, exactly two line infections occurred. Johns Hopkins Hospital estimated that use of the checklist prevented 43 infections and eight deaths, saving \$2,000,000.

However, this hospital is one of the best in the USA, with a large staff and many resources. Could similar results be achieved in 'ordinary' hospitals? A study designed to evaluate the effect of the checklist utilisation for an 18-month period (March 2004-September 2005) was funded by the US government's Agency for Healthcare Research and Quality. This received an unwieldy name: Michigan Health and Hospital Association Keystone Centre for Patient Safety and Quality Keystone ICU Project.

103 hospitals in Michigan State, representing 85% of all ICU Michigan hospital beds, participated in the programme. The results were remarkable. The median rate of catheter-related bloodstream infection per 1,000 catheter days dropped to zero from an average 2.7 infections — only three months after implementation — a 66% reduction. This achievement was maintained throughout the 18 months of monitoring. An estimated 1,500 lives and \$175,000,000 were saved in a programme that cost \$500,000 to administer.

Details of the Keystone ICU Project were published in the 28/12/2006 issue of *The New England Journal of Medicine* (Vol. 355, No. 26: 2725-2732). Those remarkable results were largely ignored by both the North American and international medical and consumer press.

Core elements of the program were teamwork and the anonymous nature of reporting data. Hospital culture also changed. In his article published in

enforced compliance and reinforced awareness. Senior level physicians were not exempt. Another important element contributing to the success of the Keystone project was the active hands-on involvement of and support by senior hospital administrators. According to Dr Gawande '...the State of Michigan's infection rates fell so low that its average hospital ICU outperformed 90% of all other hospital ICUs nationwide'. This statistic incorporated the higher rates of the 15% of non-participating Michigan hospitals.

In 2005, a survey of infection control officers, conducted by the VA Ann Arbor (Michigan) Healthcare System in a random sample of 600 hospitals throughout the United States and all 119 US Veterans Affairs Medical Centres, revealed that fewer than 50% of non-government hospitals reported concurrent adherence to the items listed in Dr Pronovost's checklist.

The catheter-related bloodstream prevention checklist is not the only one that Dr Pronovost has created. 'The question — still unanswered — is whether medical culture will embrace the opportunity,' he observed.

Meanwhile, the results of another survey of VA hospitals, and a random sample of 600 hospitals representative of 2,671 larger than 50-bed hospitals with ICUs, has been published in the 15/1/08 issue of *Clinical Infectious Disease*. A team of patient safety experts, headed by Sanjay Saint, MD MPH, director of the University of Michigan Health System/Veterans Affairs Patient Safety Enhancement Programme, in Ann Arbor, has determined that 56% of all responding hospitals did not have a system to monitor patients who had urinary catheters placed, and 74% did not monitor the duration that patients had the catheters. Urinary catheter reminders were used in under 10% of the hospitals.

25% of all patients in US hospitals have urinary catheters inserted. One in 100 will acquire a urinary tract infection from the catheter, requiring antibiotics and potentially other costly medical treatment. Urinary tract infections are responsible for 40% of infections related to hospitalisation. Dr Saint encourages hospitalised patients to ask their medical caretakers on a daily basis if they still need the catheter — but perhaps they should ask whether their hospital would like to use a checklist.

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Precision for health

ЕН: На основании каких принципов разработана методика операции простатэктомии с сохранением нервов, посредством которой Вы в клинике Мартини в Гамбурге добиваетесь на данный момент самых больших успехов, что касается сохранения потенции?

НН: Метод зародился в Америке. Там ученые впервые обнаружили, что непосредственно рядом с простатой расположены двигательные нервы мужского полового члена, которые до сих пор при операциях повреждались. Нашим достижением было осознание того, насколько чувствительными являются эти нервы и то, что в ходе операции, по возможности, необходимо держаться от них подальше. Кроме того, мы первыми указали на широкое распространение этих нервов с обеих сторон простаты. По нашим данным с каждой стороны простаты находятся около пятидесяти нервов и соответственно этому необходимо сохранять во время проведения операции большое количество ткани, чтобы сохранить потенцию пациента. Благодаря этому знанию и базирующейся на нем операционной методике мы уже несколько лет здесь, в клинике Мартини, добиваемся больших успехов в сохранении потенции. При этом необходимо заметить, что вести статистику этих результатов не так то легко, так как хирург, обычно, после операции не встречается больше с пациентом. Поэтому, в 1991 г. мы создали базу данных, куда мы вносим результаты, содержащиеся в анкетах, разработанных в соответствии с международными требованиями, полученных от пациентов перед операцией и примерно через 2 года после операции.

Разумеется, успех метода в большой степени зависит от возраста пациента и возможности сделать операцию с односторонним или с двусторонним сохранением нервов. В нормальном случае, то есть при наличии полной потенции у

Последние достижения в получении изображения карциномы простаты позволяют надеяться, на то, что в будущем методики лечения карциномы могут быть улучшены. Насколько эти ожидания обоснованы - об этом беседовал журналист газеты EUROPEAN HOSPITAL (ЕН) с проф. Хардвигом Хуландом (НН), главным врачом клиники Мартини в Гамбурге, который разработал методику проведения операции простатэктомии с сохранением нервов, являющейся на данный момент - „новейшим словом” в терапии рака простаты.

При улучшении диагностики - улучшается лечение рака простаты

пациента до операции и при двустороннем сохранении нервов во время операции, существует 60-процентный шанс, что после операции у этого пациента сохранится эрекция без вспомогательных средств. Другие 30 процентов пациентов могут вести половую жизнь, принимая медикаменты, способствующие повышению потенции. При одностороннем сохранении нервов только 40 процентов пациентов обходятся без медикаментов, способствующих повышению потенции. В целом, шансов на сохранение потенции у 50-летнего мужчины больше чем у 65-летнего мужчины.

ЕН: Вместе с проф. д-р. Фердинандом Фраушером из Университетской клиники г. Инсбрука в Австрии Вы в этом году приняли участие в научных исследованиях по диагностике карциномы простаты на основе полученного изображения. Какие методы используются при этом?

НН: До недавнего времени ситуация была такова, что имевшаяся техника не позволяла получить изображение карциномы простаты. Одним из пионеров, работающих в области получения изображения карциномы простаты является проф. Фраушер. Вместе с ним мы работаем по двум направлениям: первое – это эластография, которая уже давно существует, но до сих пор изображение, полученное с её помощью было не четким. Новые методы получения изображения только в последнее время дали возможность получать необходимую для постановки

диагноза четкость. С помощью эластографии в рамках научного сотрудничества мы исследуем „нормальную простату”, чтобы определить специфичность метода. Для этого мы обращаемся к пациентам, которым из-за наличия карциномы мочевого пузыря должна быть удалена и простата, и до операции с помощью эластографии определяем состояние простаты. После операции мы можем сравнить диагностическое изображение с действительным состоянием простаты.

Другой методикой, применяемой нами является доплер-сонография, развитием которой также занимался проф. Фраушер. Это ультразвуковое обследование даёт возможность получать изображение особенностей кровоснабжения сосудов. Но, так как одной доплер-сонографии для этого не достаточно, мы используем дополнительно контрастные вещества для получения изображения кровеносных сосудов. У нас пока нет результатов по этим двум направлениям, но мы уверены, что ответы в ближайшее время будут получены.

ЕН: Какое влияние оказывают новые достижения в диагностике на терапию?

НН: На данный момент у нас существуют большие трудности определить, кому из пациентов можно, вообще, проводить вариант операции с сохранением нервов. Причина в том, что нервы расположены в непосредственной

близости к внешней оболочке капсулы простаты. Если опухоль, уже выросла в капсулу, тогда мы находимся как раз там, где расположены нервы. Опухоль в своём росте использует даже перинеуральные каналы – каналы, по которым нервы соединяются с органом.

Сегодня существуют три метода при помощи которых можно определить с каждой стороны, проникла ли карцинома через капсулу. Мы берем пробы ткани. Если мы имеем дело с очень агрессивной опухолью, то в этом случае нельзя проводить операцию с сохранением нервов. В некоторых случаях мы проводим до операции биопсию области простаты, где расположены нервы, чтобы убедиться, что в этой специальной области мало или вообще нет пораженных клеток. А во время операции мы осуществляем гистологический экспресс-анализ тканей в области простаты, где проходят нервы, чтобы определить затрагивает ли их опухоль.

Все это очень сложно. И если бы у нас была бы возможность получения изображения, которое продемонстрировало бы, скажем, что опухоль с левой стороны находится внутри капсулы, а с правой стороны уже вышла за её пределы, то было бы возможно заранее лучше планировать ход операции и хирург смог бы решить с какой стороны возможно сохранить нервы, а с какой – нет. Это и есть большая надежда на возможность получения изображения, что позволит нам делать

более точный прогноз, а также отказаться от сложных и длительных по времени методов.

Во-вторых, мы конечно надеемся на то, что с помощью получения изображения рак простаты в целом станет возможно раньше диагностировать и, соответственно, мы сможем оперировать больше пациентов с сохранением нервов. Так как, чем в более поздней стадии находится опухоль, тем меньше шансов на проведение операции с сохранением нервов.

ЕН: То есть, радикальная операция и в будущем остается единственным средством или можно рассчитывать на то, что простату будет возможно частично сохранить?

НН: Нет, радикальное удаление останется единственным средством. В настоящее время ведутся жаркие дискуссии о том, сможем ли мы когда-либо добиться того, чтобы удалять только часть простаты. Многие эксперты, в том числе и я, считают эту дискусию очень опасной. В отличие от почки, где карцинома находится только в одной области, рак простаты даже в ранней стадии в 86 % случаев образует много очагов. Молекулярно-биологические исследования показывают, что всегда поражается вся простата. Поэтому, только частичная терапия очень рискована. Естественно, об этом надо думать, особенно, если получение изображения даст нам хорошие возможности для диагностики. Но можно ли идти этим путем, пока что неизвестно.



Институт Статенс Серум

Рак простаты-отцовство может являться фактором риска

Исследование, опубликованное в журнале CANCER, показало, что мужчины, не имеющие детей, менее подвержены риску заболевания раком простаты по сравнению с мужчинами, имеющими детей.

Группа исследователей Института Статенс Серум (Statens Serum Institut), Дания, Копенгаген,

использовала в качестве источника национальный регистр населения и проанализировала данные о мужчинах, родившихся в Дании с 1935 по 1988 гг. При этом было отмечено, что мужчины, не имеющие детей, кажется, менее подвержены риску диагноза рака простаты, чем те, у которых есть дети. Коэффициент составил 16%. Анализ

выявил также последовательное уменьшение риска заболевания раком простаты по мере увеличения количества детей.

Проведенный анализ не выявил, какие факторы, связанные с бездетностью, могли стать ответственными за уменьшение вышеупомянутого риска. Известные в настоящее время факторы риска – это расовое происхождение, наличие заболеваний в истории семьи, старение. «Вне зависимости от лежащего в основе механизма, результаты исследования, тем не менее, дают возможную эпидемиологическую поддержку той точке зрения, что бездетные мужчины в какой-то мере менее подвержены риску заболевания раком простаты», пишут авторы.

Гальванотерапия под контролем МРТ

Щадящее лечение рака простаты.

Гальванотерапия является терапевтическим методом, в котором применяется лечебное воздействие прямых зарядов электрического тока. Метод разработан немецкими исследователями профессором Томасом Фоглем (Thomas Vogl) и доктором Хайнцем Майером (Heinz Mayer) в тесном сотрудничестве с американскими учеными. Ученые проводили лечение 44 пациентов с раком простаты. Осуществлялась трансглутеальная пункция, после чего два электрода с наконечниками из платины вводились в левую и правую области простаты. В ходе повторявшейся процедуры, контролируемой путем магнитно-резонансной визуализации, на опухоль воздействовали прямыми



проф. Томас Фогль, Университетская клиника, г. Франкфурт

зарядами тока максимально в 350 кулонов три раза в неделю. Так как клетки опухоли демонстрируют высокое содержание ионов, ток фокусировался на тканях опухоли, в то время как здоровые ткани не были затронуты.

При контроле пациентов через год после курса лечения средний размер опухоли уменьшился на 41 %. По информации, представленной учеными, новый метод может быть особенно хорошо применен при лечении опухолей размером менее 8 см, причем если они не расположены близко к нервам или артериям. Стоимость лечения меньше стоимости других сравнимых методик.



Профессор Др. Фердинанд Фраушер

Диагностика заболеваний простаты при помощи метода эластографии в режиме реального времени

Благодаря методике «эластография тканей в режиме реального времени» теперь стало возможным получать данные об эластичности тканей определенных органов, таких например, как простата, в режиме реального времени. Это дает возможность делать более точные биопсии в целях надежной диагностики опухолей в рамках стандартных обследований. Профессор Др. Фердинанд Фраушер (FF), главный врач радиологической диагностики Университетской клиники в Инсбруке, Австрия является одним из пионеров в области эластографии, в особенности, в области терапии мочеполювых органов. Он применяет эту методику в рамках рутинной практики проведения массовых медицинских обследований. В интервью, данном им газете EUROPEAN HOSPITAL (EH), он говорит о преимуществах этой технологии и успехах, которых уже достигнуты в Инсбруке.

EH: Профессор Фраушер, вы занимаетесь эластографией в режиме реального времени с самого появления данной методики, как вы оцениваете её релевантность, в особенности, в урологии?

FF: Эластография в режиме реального времени выходит все больше на первый план, как щадящий, надежный и наиболее экономичный метод распознавания карцином. Идея, лежащая в основе данной методики, а, именно, измерение эластичности и степени уплотнения тканей, не является новой. Длительное время подобные измерения проводились путем очень долгой и трудоемкой процедуры и, следовательно, не применялись в медицинской практике. После введения новой методики с использованием оборудования фирмы «Хитачи» мы имеем возможность без особых сложностей ввести данную процедуру в рутинную практику работы.

Распознавание карцином простаты путем применения данной технологии приносит нам неоценимые преимущества, по сравнению с так называемой системной «слепой» биопсией. Здесь, у нас в Инсбруке, мы осуществляем уже с 1988 года программу профилактики простаты при помощи специального антигенного обследования простаты. В рамках данной программы мы обследуем большое количество пациентов-мужчин, которые не имеют жалоб, но у которых, однако, было подозрение на наличие карциномы простаты. До внедрения системы эластографии в режиме реального времени мы имели возможность проводить этот вид профилактического обследования только посредством системной (слепой) биопсии, которая в 40% случаев давала негативный результат, не соответствующий реальному состоянию пациента. Поэтому, было крайне необходимо иметь возможность получения изображения карциномы простаты. Примерно с 1993 года мы начали практиковать цветную доплеровскую сонографию, а затем перешли на использование нового метода.

Сейчас мы располагаем данными на 1500 пациентов, у которых по данной методике было получено изображение выявленной карциномы. Мы провели также эластографическое обследование пациентов перед

радикальным оперативным вмешательством – простатэктомией, определили области уплотнений и сравнили затем с результатами после операции. Эффективность метода составила – 90%, специально в данной области – около 70%.

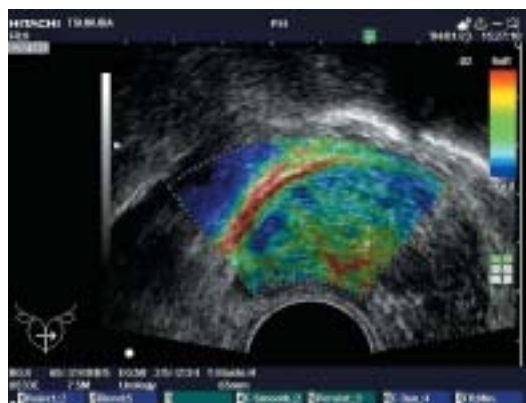
EH: Имеет ли в этой области также какое-либо значение метод магнитно-резонансной томографии?

FF: Мы сравнили метод эластографии в режиме реального времени с методом магнитно-резонансной томографии (МРТ). В плане получения изображения магнитно-резонансные методики более трудоемки, дорогостоящи и менее приятны для пациентов. Такое обследование (направленная магнитно-резонансная биопсия) длится около трех часов, что в медицинской практике делается не часто - это сокращает количество обследуемых

пациентов.

EH: Земля Тироль является одной из немногих, где осуществляется программа массового обследования простаты для всего населения. Что за пациенты к Вам приходят?

FF: Большинство наших



Соно эластография простаты ©Hitachi Medical Systems

пациентов характеризуют показатели по данным ПСА (простата-специфический антиген) от 3 до 5. Здесь, в Тироле, мы, однако, установили нижний показатель 1,25 в качестве исходной точки для проведения обследования. Ранее проведенные исследования показали: у пациентов - мужчин с данными ПСА ниже 4 в 20% случаев была обнаружена

карцинома. Это означает, что уже при небольшом повышении показателей ПСА карцинома может иметь место. С другой стороны, даже небольшое воспаление может послужить причиной роста этих показателей. Благодаря применению этой методики, мы имеем теперь возможность проводить наглядные обследования, безболезненные для пациента. В сочетании с биопсией процент обнаружения составляет 60-70%. Она даёт прекрасные возможности для проведения контроля за ходом течения болезни. Это означает, что пациентам, с выявленными уплотнениями тканей, назначаются регулярные последующие обследования, также как и пациентам, у которых были выявлены карциномы с малой степенью агрессивности, не требующие терапии.

Следует отметить, что эластография в режиме реального времени введена в практику еще в двух австрийских клиниках, а также в одной из клиник Гамбурга, Германия.

EH: Применение новой методики позволило значительно улучшить диагностику карцином простаты. Каковы Ваши дальнейшие планы?

FF: Наши следующие шаги направлены на разработку новых лечебных методик. Что касается пациентов-мужчин, то мы здесь несколько отстаем по сравнению с терапией рака груди у женщин. Нашей целью здесь является отказ от тотального удаления органа, если это не является абсолютной необходимостью. До

Эластография тканей в режиме реального времени как тема обсуждения на Европейском радиологическом конгрессе (ECR).

В рамках Европейского радиологического конгресса в Вене фирма «Медицинские системы Хитачи» («Hitachi Medical Systems») организует симпозиум в воскресенье 9 марта 2008 года по теме: «Эластография тканей в режиме реального времени раздвигает границы диагностики – миф, или реальность?» Профессор Фраушер детально расскажет об опыте своей врачебной деятельности в докладе на тему: «Значение эластографии в режиме реального времени для диагностической оценки при заболеваниях раком простаты и заболеваниях тестикулярных тканей». Наряду с профессором Фраушером и другие специалисты самого высокого уровня обсудят в своих докладах новейшие достижения в этой области.

с тех пор это вопрос выбора, даже если опухоль имеет величину от 3 до 4 мм. С помощью визуализации мы могли бы проводить лечение с использованием высокосфокусированного ультразвука или применять специальную генную терапию. В Америке в данной области имеют место ее большие достижения, там для исследований выделяются большие средства, там уже укоренилось понятие «манограмма». Мы хотели бы следовать этим тенденциям в Европе, и тем самым улучшить диагностику и терапию рака простаты.

Интервью провела Майке Лернер, газета "European Hospital"



University Medical Center
Hamburg-Eppendorf

Martini Klinik

Клиника Мартини специализируется на диагностике и лечении рака простаты и является частью Университетской клиники Гамбург-Эппендорф (UKE), Германия. Концепция интеграции частной клиники в инфраструктуру университетского комплекса является уникальной в Германии. Клиникой руководят известные всему миру в этой области профессора Хартвиг Хуланд, Маркус Грэфен и Ганс Хайнцер. Многолетний опыт и персональное медицинское обслуживание являются основой индивидуально подобранных методик лечения, для каждого пациента. В прошлом году медицинский коллектив провел свыше 1000 операций простатэктомии. Одной из специальных областей является проведение операций радикальной простатэктомии, сохраняющих нервы. Благодаря бесценному опыту и самой современной технике в большинстве случаев у пациентов не возникает проблем с инконтиненцией и потенцией.

Высокоточная техника проведения операций даёт возможность пациенту встать уже на следующий день после операции. В среднем пребывание в клинике составляет не более шести дней. Кроме того, клиника извлекает пользу от расположения на территории университетского комплекса и играет большую роль в рамках широкого спектра национальных и международных научных исследований. Клиника Мартини

предоставляет своим пациентам стандарт пребывания первоклассной гостиницы с высокоскоростным интернетом, телефоном и изысканным питанием.

UKE известна не только своей высококачественной медициной, но и своими революционными научными исследованиями в области онкологии, а также во многих других областях, таких например, как неврология, кардиология, сердечная хирургия, все виды трансплантации, внутренние системные заболевания.

По этим причинам пациенты со всего мира, в поисках отличного медицинского обслуживания, лечения и последующего ухода доверяют высококвалифицированному медицинскому персоналу клиники UKE.

Коллектив Международного отдела UKE, имеющий сотрудников, говорящих на многих языках мира, координирует все административные, организационные и финансовые вопросы для пациентов из различных стран.

Вы можете связаться с нами по эл. почте: patients@uke.uni-hamburg.de или по телефону: +49 40 42803 1690.

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Expo D, booth 428

In addition:

Analytica 2008

From 1-4 April, in Munich, Germany, our European Hospital journals will be available (free!) at the trade press stand



Along with the conference, Job Day, Business & Markets Forum, and a focus on growing fields such as nanotechnology, new additions include the InnovationsArea, new educational events and an Executive Roundtable.

other chips being developed is AmpliChip p53, which detects defects in the tumour-suppressing gene p53, making customised cancer therapy possible.

Chip technology is also becoming user friendly. Detection kits with ready-to-use reagents, all-in-one concepts consisting of microarrays, hybridization

analytica 2008

Analytica, to be held in Munich for the 21st time, has become a leading international trade fair for instrumental analysis, laboratory technology and biotechnology, showcasing the entire range of equipment, solutions and services for laboratories in industry and research. About 400 exhibitors will fill five halls in the New Munich Trade Fair Centre.

1-4 April
Munich,
Germany

The **InnovationsArea** is dedicated to research institutes and small innovative companies, presenting their products and concepts to industry. The area will also hold a Technology & Innovations Forum.

Life Sciences and Diagnostics - From genetic testing for diagnostic purposes to protein analyses on chips - the latest tools in molecular biology, bio-analysis and the move toward personalised medicine will be on show.

Personalized medicine revolves around DNA chips, e.g. for breast cancer, a microarray from Eppendorf will allow physicians to determine whether a patient should undergo radiation or chemotherapy following a lumpectomy, and which patients do not need this treatment. The breast-cancer chip has over 200 genes that identify the type and stage of a tumour.

Roche has developed the AmpliChip CYP 450 (already licensed for diagnostic purposes in the USA and Europe). This recognizes deviations in two genes that are coded for liver enzymes in the Cytochrome P450 family. Patients with a deviation, for example, break down beta-blockers used to lower blood pressure too quickly or too slowly. Using genetic testing, physicians can adapt medication treatment to their patients' metabolisms. Among

stations, scanners and analysis software as well as ongoing advances in automation, are making it easier for chip technology to be incorporated into routine clinical applications.

Identifying minor genetic defects - When patients react differently to a therapy despite a 99.9% genetic match, it's frequently due to single-nucleotide polymorphisms (SNPs, pronounced 'snips'). A SNP is a minor defect in the script of the genetic mapping. Only a single letter, i.e. a base, is interchanged. Experts assume that there are ten million SNPs in the human genome. In many cases, SNPs are the cause of diseases.

Aiming to identify the genetic causes of obesity, Alzheimer's, neurodermatitis, schizophrenia, tuberculosis and many other diseases, the NGFN (Germany's National Genome Research Network), wants to use DNA chips to examine 25,000 patients and a control group. Peter Nürnberg, Professor of Genomics at Cologne University and co-ordinator of the NGFN genotyping platform, and colleagues are collecting over 20,000 individual samples; the chips used will have over a half-million SNPs and other gene variations.

The tools for such research are but a few of the many laboratory attractions at analytica. Details: www.analytica.de

World conference on breast cancer

4-6 June, Winnipeg, Canada

'Heart, Soul & Science: It's a small world after all' is the theme for the 5th World Conference on Breast Cancer, a five-day international event for all those involved with this subject - researchers, healthcare professionals and patients.

This year's event will also focus on two new populations - men and youth. About



one percent of all breast cancers develop in men, most often in a hereditary form, which makes it an important issue for all family members, the organisers point out.

Details and registration: www.wbcf.ca

GLOBAL



EVENTS

MARCH

1-5 San Antonio, USA
American Academy of Dermatology Annual Meeting www.aad.org

2-3 Dusseldorf, Germany
10th International Symposium: Diagnostic and Therapeutic Endoscopy www.cocs.de

2-7 Cape Town, South Africa
WCA 2008 - World Congress of Anaesthesiologists www.wca2008.com

3-6 New Orleans, USA
PITTCON Pittsburgh Conference and Exhibition on Analytical Chemistry and Applied Spectroscopy. www.pittcon.org

5-9 San Francisco, USA
AAOS Annual Meeting American Academy of Orthopaedic Surgeons. www.aaos.org

7-11 Vienna, Austria
ECR Annual meeting of the highly influential European Congress of Radiology. www.ecr.org

10-14 Portofino, Italy
International Comparative Programme in Hospital Management
Details: Domenico.salvatore@unobocconi.it
Or: www.sdabocconi.it/icphm

11-13 Tel Aviv, Israel
MEDAX - International Exhibition on Medical Technology Medical & Hospital Equipment and Supplies. www.stier.co.il

12-14 Poznan, Poland
SALMED International Trade Fair of Medical Equipment. www.salmed.pl

12-15 Vilamoura, Portugal
1st Iberian Congress of Internal Medicine secretariado@spmi.webside.pt

13-15 Tbilissi, Georgia
GIHE - Georgian International Healthcare Exhibition www.gihe.ge

13-16 Seoul, South Korea
KIMES International Medical and Hospital Equipment Show. www.kimes.co.kr

14 London, England
Clostridium difficile - The Super Bug Explained Symposium organised by the Health Protection Agency. This day of seminars will be led by some of the UK's top experts, and talks and discussions will be hosted by the Standards Unit, Evaluations and Standards Laboratory, at the Centre for Infections. The aim is to support the need for a standardised approach to the processing of faeces for C. difficile and cover the key issues associated with diagnostics. standards@hpa.org

14-16 Rome, Italy
JIM 2008 Joint Interventional Meeting with emphasis on live cases. New this year: a virtual training session. www.jim-vascular.com

14-16 Mumbai (Bombay), India
HOSPI Medica INDIA International Exhibition for Medical Equipment, Hospital Equipment and Pharmaceuticals. www.hospimedica-india.com

18-21 Brussels, Belgium
ISICEM 28th International Symposium on Intensive Care and Emergency Medicine. Launched in 1980, and organized by the department of Intensive Care Emergency Medicine of Erasme Hospital, Free University of Brussels, in association with the Belgian Society of Intensive Care and Emergency Medicine (SIZ), this meeting has become established as one of the biggest in the field, now attracting more than 4,700 international participants. www.intensive.org

24-28 Orlando, FL, USA
HIMSS08 Healthcare Information and Management Systems Society Annual Conference & Exhibition. www.himss.org

25-29 Antalya, Turkey
2nd International Patient Safety Congress www.patientsafetycongress.org

26-29 Milan, Italy
EAU - The 23rd Congress of the European Association of Urology The EAU has developed into a leading event in urology. www.eaumilan2008.org

27-29 Mannheim, Germany
74th Meeting of the German Society of Cardiology (DGK) www.dgk.org

27-30 Monte Carlo, Monaco
PCICS Europe 2008 European Symposium of the Paediatric Cardiac Intensive Care Society. Contact: pcics@kenes.com

For the diary 2008 kicks off with three key IT events



In February, the Healthcare Information and Management Systems Society (HIMSS '08) Annual Conference and Exhibition took place in Orlando, Florida. This presented almost 200 educational events that included interactive workshops, symposia, electronic sessions, and the involvement of more than 900 exhibitors.



To be held in Berlin, Germany (8-10 April), the conHIT (successor of the ItEG) will still focus on its industry exhibition, but the organisers have expanded the number of educational sessions to be held. With its academy and network events the exhibition & congress should prove an effective information and communication platform for all participants.



Med-e-Tel, the International Education and Networking Forum for eHealth, Telemedicine and Health ICT, will be held in the same month (16-18 April in Luxembourg). The conference programme will again feature international speakers presenting a wide variety of topics e.g. telemedicine and eHealth applications in diabetes management.

New products and technology will also be on show, and the forum will provide opportunities to forge new partnerships.

22-24 Munich, Germany
37th Congress of the German Society for Endoscopy and Imaging Diagnostic (DGE-BV) www.cocs.de

23-26 Jerusalem, Israel
From Concept to Cure Contact: professionalcouncils@hadassah.org

23-27 Rome, Italy
SIRM 2008 Congress of the Italian Society of Radiology. www.congresso.sirm.org

28-2 April Singapore
International Symposium on Respiratory Viral Infections www.themacraegroup/default.htm

29-1 April Chicago, USA
ACC - The American College of Cardiology Annual Scientific Session www.acc.org

29-2 April Wiesbaden, Germany
114th Congress of the German Society for Internal Medicine (DGIM) www.dgim2008.de

APRIL

1-4 Munich, Germany
Analytica 2008
The international trade fair and conference for instrumental analysis, laboratory technology and biotechnology. www.analytica-world.com

3-5 CIEC Beijing, China
CHINA MED International Medical Instruments and Equipment Exhibition. www.chinamed.net.cn

8-10 Berlin, Germany
conHIT (in the past ItEG)
Healthcare IT fair, congress, academy and networking events. www.conhit.de

9-10 Barcelona, Spain
Smart Systems Integration
European Conference & Exhibition on Integration Issues of Miniaturized Systems. www.smart-systems-integration.org

9-10 Florence, Italy
ET 2008 First European Conference on Embolotherapy. Contact: info@cirse.org

10-12 Florence, Italy
ECIO 2008 First European Conference on Interventional Oncology. Contact: info@cirse.org



1st International ATTD (Advanced Technologies and Treatments for Diabetes) Meeting

27 Feb - 1 March, Prague, Czech Republic

Current therapeutic strategies for diabetics are aimed at improving metabolic control, thus achieving near normal glycaemia, minimise the risk of severe hypoglycaemia, improve quality of life, and delay or prevent vascular complications at a later stage. The use of an insulin pump has become increasingly popular, providing a treatment that can help to achieve those goals. Yet, to administer appropriate insulin doses, this also necessitates repeated measurements of blood glucose levels. Similarly, continuous glucose monitoring devices have been developed to gain more intensive and accurate blood measurements. Many entrepreneurs today are racing to develop a fast and painless way of measuring blood glucose levels.

The ultimate goal is 'to close the loop', namely that such a sensor would be tied to an implanted insulin pump that would

deliver the correct amount of insulin precisely when needed, without involving the patient in the process, thus creating an artificial pancreas.

With this in mind, **Professor Moshe Phillip and Professor Tadej Battelino**, as part of the Loop Club, have organised this first international ATTD meeting in Prague, which will highlight innovative technologies in diabetes treatment. It aims to draw together new technology developers and diabetes professionals, and acquaint clinicians with techniques for new treatments, including new insulins, insulin pumps and glucose sensors.

Participants will include diabetologists, endocrinologists, gynaecologists, internal and general practitioners.

Details: Conference Secretariat: kenes@kenes.com, 1-3 Rue de Chantepoulet, P.O. Box 172, CH-1211 Geneva 1, Switzerland. Phone: +41 22 908 0488. Fax: +41 22 732 2850. E-mail: attd@kenes.com. www.kenes.com/attd