EUROPEAN HOSPITAL

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

2 Competition

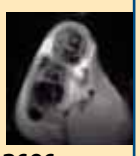
- *Your chance to win a Canon Digital IXUS i7 zoom*
- *Enter today!*

29-30 Diabetes

- EASD reports from Sweden
- DIAMAP - the road to research
- Sensor augmented insulin pump

9-22 Radiology

- MRI in foetal screening
- RSNA 2010 roundup
- Evaluating muscle diseases
- Oslo's tomo trial



24-26 Intensive care

- RFID in medical technology
- Reducing ventilation-acquired pneumonia
- IT-assisted triage system trial

PARKER

Parker Laboratories, Inc.

World leader in ultrasound accessories and supplies

Please see page 18

VOL 19 ISSUE 5/10 OCTOBER/NOVEMBER 2010

England's 'bare minimum' NHS funds

In measures by Britain's new Coalition Government to tighten public sector spending, England's National Health Service (NHS) will -- as promised by the new government -- receive rises above the inflation rate, but only a 'bare minimum' above that rate.

Although health budgets rose more than 4% in the past, funding will rise by £10 billion to £114 billion over the next four years -- only a 0.1% annual increase – a drop of blood when several pints will be needed to treat increasing aged and obese patients. An estimated additional 3% is needed just to keep the NHS at the level it is at today.

The Department of Health also plans to reduce capital spending (on buildings, etc) by 17%.

Scrapped is the previous government's plan to provide one-week cancer testing for an urgent GP referral, and an extended free prescriptions scheme. Retained is that government's request that the NHS make £15-20 billion efficiency savings by 2014.

'The budget will have to stretch further than ever in these difficult times,' said new Health Secretary Andrew Lansley.

'The NHS is not safe,' said David Prentis, General Secretary of the union Unison, adding that some hospitals are already cutting back on surgery, such as cataract, knee and hip replacements.

By 2020 Europe may be short of two million healthcare workers

Today, healthcare professions make up ten percent Europe's workforce. The EU Commission calculates dramatic shortages in healthcare provision in the next decade unless counter measures are taken now. Thus, at this year's European Health Forum Gastein (EHFG), held in October in Bad Hofgastein, Austria, international experts discussed ways to make health employment more attractive

The statistics are alarming. 'Estimates point to a shortage of one million health professionals in the EU by 2020, and this is likely to reach two million if other employees in the healthcare sector are accounted for,' said **Katja Neubauer**, Team Leader Health Strategy and Health Systems in the EU Commission (DG for Health and Consumers), speaking at the EHFG. The forecasts predict a shortage of 600,000 workers in nursing alone by 2020 and a shortage of 230,000 physicians.

'If we fail to deliver, we shall be as popular as bankers'

Experts said the big challenge for our healthcare systems is the steady increase in life expectancy, with the associated need for more care, and the urgent task of successfully recruiting and retaining health professionals.

Katja Neubauer noted that the healthcare system is already an important driver for new jobs in Europe and could become even more so in the future: 'Healthcare provides employment for around 10% of the EU workforce. It is one of the most innovative sectors and could drive the creation of new jobs.'

Initiatives to prevent a healthcare crisis

'In a worst case scenario,' she warned, 'the threatened shortage of professionals in the healthcare sector could mean that about 15 percent of necessary care for patients could not be met.'

The effect of this gap in supply would vary from one individual EU member state to another. The poorer Member States might find it more difficult to retain a sufficient number of health professionals making the shortage of professionals all the more acute in these countries.

A number of activities are underway at the European level to address this and the other challenges facing the European health workforce. In 2008 the EU Commission issued its Green Paper on the European Workforce for Health, thus placing the topic on the European agenda. As part of the Europe 2020 Strategy to overcome the crisis and prepare the EU economy for the next decade, one of the flagship initiatives will be to set an agenda for new skills and jobs. Health professions will be included in these efforts. And at the initiative of the Belgian Presidency of the Council of the European Union, a conference of ministers was recently held on health personnel issues of the future and formulated a number of recommendations.

Making the professions more appealing

Health professions and the work environment in patient care must be made more appealing. Experts call this a central point for preventing a genuine crisis in healthcare provision. 'Evidence suggests that the work environment not only constitutes an important factor in the recruitment and retention of health workers, its characteristics also affect the quality of care, both directly and indirectly,' said expert **Christiane Wiskow** (Basel, CH). 'Examples of what can be done to improve the quality of the work environment in the health sector include policy approaches to promote a healthy balance between family life and work, and better protection of workers' health.'

With this approach, the sector aims to discourage health workers from switching to other occupations and hopes to recruit new people

continued on page 2

Introducing eTRAX™,

a breakthrough needle guidance system, expanding real-time image-guided navigation into a new dimension.

Featuring a sensor embedded into the needle tip, eTRAX gives physicians a highly accurate 3D anatomical roadmap, providing safe, efficient and easy access to difficult targets. eTRAX is brought to market by CIVCO, a trusted leader in image-guidance and infection control.

To see the breakthrough technology in action visit RSNA Booth #8308.

eTRAX™ Guidance like never before.

CIVCO

WWW.CIVCO.COM

COPYRIGHT © 2010. CIVCO IS A REGISTERED TRADEMARK OF CIVCO MEDICAL SOLUTIONS. ETRAX IS A TRADEMARK OF CIVCO. ALL OTHER TRADEMARKS ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. US PATENTS PENDING. ALL PRODUCTS MAY NOT BE LICENSED IN ACCORDANCE WITH CANADIAN LAW. PRINTED IN USA. 2010A-2518

Facing the final curtain?

Germany's dual-financing model

Unable to overcome difficulties in financing essential investments, hospitals discuss and test alternative funding pathways, *Bettina Döbereiner* reports


Thilo Gewaltig


Martin Henze


Michael Mörsch

How to finance the healthcare system? It's an ongoing dilemma, particularly for in-patient care. According to a German Hospital Federation (DKG) estimate, the country's hospitals currently suffer an investment backlog of €30-50 billion.

A dual-financing model, used in Germany for hospital funding, in effect means that the operation costs are traditionally borne by public health funds, whilst investments and building costs must be provided by the Federal States, according to the Federal German Law of Hospital Financing (KHG), and this applies to hospitals funded by the public sector, non-profit charities or by for-profit private groups.

However, this conventional financing model did not work well in past years, because the Federal States failed to meet the task sufficiently. Speaking at this year's German Capital Congress, Thilo Gewaltig, division manager for care structures and client firms at the German Apotheker- und Ärztebank (apo-Bank), commented: 'For years the situation didn't look rosy'.

Focusing on the needs of dispensing chemists and physicians, for hospital financing the apo-Bank promotes investments in properties and in-patient care facilities and provides financial aid to set up ambulant care centres.

Thilo Gewaltig is convinced that the dual financing system for public hospitals is de facto at an end. 'Surveys have shown that 40% of investments today are not covered by public subsidies.'

continued on page 2

contents

EUROPEAN HOSPITAL
Reader Survey

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

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

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

Or post to: European Hospital Publisher Theodor-Althoff-Str. 45, 45133 Essen, Germany

If you win the Canon camera, what colour would you choose?

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

Signature | Date

Reader Number

Name

Job title

Hospital/Clinic

Address

Town/City | Country

Phone number | Fax

E-mail address

For new EH registrations, tell us more about your work, so that we can plan future publications with your needs in mind. Please put a cross ✘ in the relevant boxes.

1. SPECIFY THE TYPE OF INSTITUTION IN WHICH YOU WORK

☐ General hospital ☐ Outpatient clinic ☐ University hospital

Specialised hospital/type

Other institution (eg medical school)

2.YOUR JOB

☐ Director of administration ☐ Chief medical director ☐ Technical director

Chief of medical department/type

Medical practitioner/type

Other/department

3. HOW MANY BEDS DOES YOUR HOSPITAL PROVIDE

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

☐ None, (not a hospital/clinic)

4 . WHAT SUBJECTS INTEREST YOU IN YOUR WORK?

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

Other information requirements - please list

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

What is your speciality?

In which department do you work?

Are you head of the department? ☐ Yes ☐ No

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

How much influence do you have on purchasing decisions?

I can only present an opinion ☐ Yes ☐ No

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

I can purchase from manufacturers directly ☐ Yes ☐ No

Do you consider that your equipment is

out-dated ☐ Yes ☐ No

relatively modern ☐ Yes ☐ No

state-of-the-art ☐ Yes ☐ No

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

If so, what do you use of this kind?

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

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

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

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

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

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

This information will be used only in an analysis for European Hospital,Theodor-Althoff-Str. 39, 45133 Essen, Germany, and for the mailing out of future issues and the EH electronic newsletter. EH 5/10

COMPETITION

Your chance to win a compact *Canon Digital IXUS i7 zoom*

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

Choice: The all-metal camera casing comes in sepia, grey, pink or blue

With a 7.1 Megapixel CCD sensor and ultra-compact 2.4x optical zoom the Canon Digital IXUS i7 can provide detail fine enough for large photo quality prints, because it additionally offers:

• DIGIC III that has '…lightning quick responses, superb image quality and advanced noise reduction. iSAPS technology analyses each scene to optimise key camera settings before a shot is taken,' Canon reports.

• Face Detection AF/AE to '… ensure superb people shots by automatically detecting the subjects in the frame and setting the optimum focus and exposure. My Category tags each image based on face detection and shooting mode for easy image navigation, printing, deleting and much more'.

• A choice of 17 shooting modes, including Special Scene modes to help with tricky lighting conditions. 'Shoot smooth VGA (30fps) and QVGA (60fps) video with Movie mode. My Colors allows special colour effects to be applied both during and after shooting.

• Low-noise ISO 1600 for flash-free shooting indoors and at night. High ISO Auto mode automatically sets an optimal high ISO setting to allow for faster shutter speeds, reducing the effects of camera shake.

ISO 1600 for flash-free indoor shooting/

• A Camera Station dock -- the base for quick, easy, direct printing, PC uploads and battery charging. In addition, the Wireless Controller enables you to play slideshows and movies straight from the camera to your TV.

• Safety Zoom takes advantage of the camera's large resolution to offer extra zoom magnification without affecting image quality, Canon points out. You can capture images at up to 4.6x zoom with enough resolution for lab-quality postcard (10 x 15cm) prints. Shoot VGA quality stills for TV playback at 10x zoom.

• A vertical shutter. The Intelligent Orientation Sensor automatically rotates vertical images and movies before playback. It also converts the Print/ Share button into a shutter release when the camera is held vertically.

• Direct Printing: Connect to any PictBridge compatible photo printer and push the Print/Share button for instant photo lab quality prints.

Why enter?

In the years since we launched our competition many medical and healthcare workers throughout Europe have been delighted to win the fine prizes offered in European Hospital.

When you fill in the Readers Survey coupon (left) your entry will be automatic in this month's competition -- and *you* might become one of our lucky winners.
Good luck!

HOW TO ENTER

Fill in the Readers Survey (left) and send to European Hospital

PLEASE NOTE:

- **The closing date for entries to the EH 5/10 competition: 6 December 2010.**
- **Entries received after that date cannot be entered in the draw.**
- **The winner will be drawn from all the entries received.**
- **Only the winner will be contacted directly.**
- **The winner's name and location will be published in a future issue of European Hospital.**
- **NB: The prize is not exchangeable for cash.**
- **The usual competition rules apply.**

The winner of the Apple iPad featured in our competition in EH issue 4/10 and on our website, is:
Dr Philippe Heliot
Department of Pneumology
Hopital de Bois-Guillaume, France

By 2020 Europe may be short of 2 million healthcare workers

continued from page 1

for health professions and prepare this body of skilled workers for the challenges of the future.

Expert: 'Worries about quantity should not lead us to neglect quality'

During discussions in Gastein, experts pointed out that it is essential not only that there is a sufficient number of workers available in healthcare but also that those workers deliver quality performance. The expectations of healthcare systems on the part of patients and society in general have risen in recent years. The use of innovative technologies and complex processes increases the need for regulation, emphasised **Dr Edwin Borman** (UK). 'The world has learned the lesson that failures in regulation, most recently in the finance sector, can be very costly. In the healthcare sector, these costs are counted in lives damaged or lost. Ensuring high quality in the delivery of healthcare services is a key challenge of healthcare regulation. If we fail to deliver, we shall be as popular as bankers. If we deliver the necessary changes, a new professionalism will characterise the future of healthcare.'

Facing the final curtain

continued from page 1

He was quoting from a study commissioned by Professor Bert Rürup (effective 2008) that estimates the annual investment needs of hospitals are up to €5.5 billion. However, in 2009, the annual investments of the Federal States only amounted to €2.8 billion, according to Michael Mörsch PhD, officer for hospital financing and planning at the German Hospital Federation (DKG) -- thus annually augmenting the gap between effectively invested money and the need for closure as soon as possible to ensure hospitals survive.

Dr Mörsch is convinced, that the lack of funds for investments is not merely caused by Germany's currently tense budgetary situation, but rather it is induced by the appropriation of budgetary funds. In a recently published article (*das Krankenhaus*. 8/2010), with co-author Frank Derix he presents calculations of public revenues and expenses in the last few years (up to 2009) and estimated assessments for coming years. The authors conclude that, to a large extent there is a parallel development of revenues and expenses and an increasing amount of tax revenues. Therefore, he states, while changing priorities the Federal States could fulfil their financial duties better in future.

Dr Mörsch's position -- and therefore the position of the DKG -- is not shared by all experts in this field. Martin Henze, CEO of GSK Strategy Consultants, for example, professes that the budgetary situation of public funds is, and will remain, tense in future. He refers to the increased public debts in 2009 due to the financial and commercial crisis and emphasised in an interview that, in future, the public budget must save on expenses and reduce costs in so far unfamiliar dimensions. Besides, he doubts that more solvent German States would share their budgetary money with the poorer States, which would be necessary for a comprehensive correction of investment backlog. Additionally, public funds will not be able to eliminate the investment backlog of up to €50 billion and, at the same time, the capital needs of hospitals will mount. Therefore, like many others, he is convinced that new financing pathways must be tested to help hospitals in financial dilemmas.

The hospitals are affected differently by an investment backlog. Private for-profit hospital chains, e.g. Asklepios, as well as non-profit hospitals run by charities, e.g. churches, usually have more financial securities in their background due to their mergers, and generally are more flexible in organising funds/financial resources than pub-

LOGISTICS GSI standards in Europe

Clear transparency of the flow of products and information in hospitals not only results in increased patient safety but also, because the documentation of treatments and recording of products used ensures compliance with legal requirements. The ability to retrace all steps is also an economic asset in terms of comprehensive cost control over product consumption. Thus the so-called GS1 standards are increasingly important across Europe. In Turkey, for instance, the marking of drugs and medical products is already a legal requirement, in France the law will come into force as 2011 begins.

How will these standards affect hospitals? The wards, for example, can be identified through their global location number GLN, and this is used to order products based on the global trade item number GTIN. The tracing of internal deliveries is carried out via the global identity number for reusable transport packaging goods (GRAI, global returnable asset identifier), which identifies the material and also facilitates transparency with washing, disinfection and control.

Retracing of the delivery is possible by linking the GRAI with the content of deliveries (marked with the SSCC, Serial Shipping Container Code). Patients and the services they receive are identified through a clear, service-related number (GSRN, global service relation number). This is scanned in and registered in a database during the treatment, medication and transfer of a patient during the hospital stay.

Products and services are identified through their GTIN and lot/ batch number, recorded in the patient file and clearly assigned, to ensure complete safety and transparency of all the treatment.

This information can also be used for cost calculations and therefore cost control and cost reduction.

The heart centre in Bad Krozingen, Germany, for example, was able to increase the quality and speed of its documentation with the help of the GS1 standards, and to make the flow of goods and data much smoother. In terms of time and staff resources, the result was a saving of 100 hours per 1,000 patients.

The Hochtaunus-Klinik and the Kreiskrankenhaus Dormagen were able to cut costs by up to 80% via electronic data exchange. In other hospitals, EAN barcodes supplied by manufacturers resulted in time savings of up to 86% during patient-related usage data collection.

Medical technology manufacturers also participate in the development of these global standards; their commitment to the development of unified, international standards is as much an important contribution in the creation of an optimised, added value as the participation of hospitals and buying syndicates.

lic hospitals. Therefore, one option for public hospitals to handle their financial problems could be seen in privatisation. For example, Ameos, a private hospital chain based in Zurich, specialises in the privatisation of former public hospitals in the German-speaking area.

Apart from this fundamental option, hybrid forms, such as public/ private partnerships (PPP) are discussed, but still not very common in Germany, according to PPP specialist Martin Henze, who regularly organises national PPP-workshops, has authored a book on PPP in healthcare and is a consultant in this sector. He quotes only two bigger PPP-projects in Germany in the high-tech sector of healthcare: the construction of a proton treatment facility at Essen University Hospital and at the University Medical Centre Schleswig-Holstein (Kiel).

In Germany, PPP-constructions are still treated with reserve, he explained, unlike the Anglo-Saxon culture, and also in France, Portugal, Spain, where whole hospitals where build under PPP-schemes. In Austria, for example, the engineering services at the General Hospital (AKH) in Vienna also work with a PPP-scheme. Martin Henze is convinced that German hospital operators must overcome their either-or mentality about public v. private and open up to public/private partnerships to be able to cope with future challenges.

360° wireless

Title: "Schwester Victoria" by Christina Lissmann

Has seca re-invented weighing and measuring?

Find out at Medica 2010

17 to 20 November 2010 . Hall 12, Stand 12A63

MEDICA®

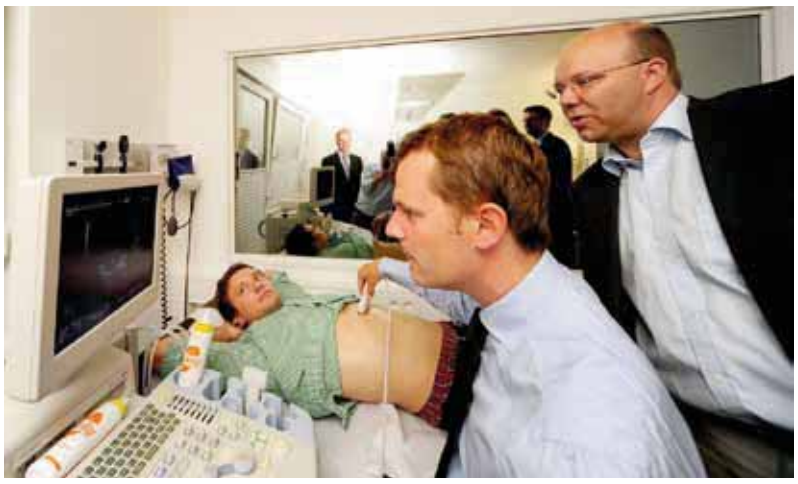
www.seca.com/medica

seca Precision for health

Unique rooms at Münster Training Hospital

Students watch actors simulate ward rounds

At first glance everything looks real, from the equipment and fittings to gleaming white bed sheets and the pallor of the patient. But something is incongruous: a large mirror opposite the bed is reminiscent of a police interview room. It is the sole suggestion that this hospital room may be unusual. It is. Behind the mirrored glass, medical students



and a tutor are observing a 'doctor' who is intent on finding out more about his patient's drinking habits.

The risk of offending the patient emotionally is significant. Avoiding this, creating an atmosphere of trust and making a precise diagnosis is the objective of today's class at the Munster Training Hospital, a unique institution for medical training and qualification within the Medical Faculty of the Wilhelms University in Munster, Germany.

What is happening is more than a simulation. Thanks to support partly received from private industry, it has been possible to create a complete, true-to-detail hospital wing with four rooms and two intensive care wards. The patients are trained actors, each with about six illnesses in their 'repertoire'. Apart from specific symptoms, such as cirrhosis of the liver, the 'patients' also present themselves as individual characters, so that not only medical knowledge but also empathy, tact and intuition are called for from the attending doctor.

'The novelty of this training hospital, which opened at the end of 2007, was to create for medical students a protected learning environment that is as close to reality as possible,' explained Dr Thomas Bauer, spokesperson for the Dean's Office. 'It's concept that far exceeds conventional skills and is still unique in Europe. Doctor/patient communication is very important here, which is why a qualified psychologist is part of the permanent team at the Training Hospital. Around 60 actors are working with us, aged between 12 and 70 years, so we can represent a broad range of patient types and indications -- from a child presenting with a headache to an older patient with dementia.'

Individual sequences of daily professional medical life are presented, as well as a frame of reference for hospital life with considerable care and attention to detail.

Technology is also important

Along with communication and medical skills, trainee doctors at Munster are learning to handle the most up-to-date technology; not for them a range of discarded units from the hospital; new, state-of-the-art technology has been supplied by manufacturers. 'Without this support the true-to-life fitting of everything -- from floor coverings to iron work to respirators and intercoms -- would only have been possible with limitations,' Thomas Bauer said. 'The companies also benefit from this use -- where else would it be possible to check and test products so intensively as to their suitability for practical use?'

That view is shared by Jürgen Hahn, Chief Marketing Officer of Hitachi Medical Systems in Europe, a firm that has supplied the hospital with four ultrasound scanners, one of which is situated in a simulated out-patient consulting room. 'Our products are used by around 750 students per term and so are automatically tested as to their good and easy handling,' he pointed out. 'In this way we receive direct feedback, from 'unbiased' users. In addition, the training hospital offers us the unique opportunity to present our equipment in real surroundings and under authentic conditions without paralysing the operation of the hospital – it's a type of showroom. However, at the forefront remains the really fantastic idea behind this project, which we want to support through our involvement.'

Ultrasound diagnostics plays an important part in Munster: Wilhelms University is the first medical faculty in Germany to have made this topic obligatory for the degree course, which is why the ultrasound scanners are heavily used in the training hospital.

Along with hospital scenarios simulated there, emergencies can also be simulated on site with the help of special technology developed by the Fraunhofer Institute. 'Our simulation laboratory is a type of 3-D cinema. It can recreate the atmosphere of road traffic, and therefore make students feel as if they are in fact attending an external emergency,' said Thomas Bauer. 'It obviously makes a big difference whether one is to check a patient's heart rate in a quiet hospital or at a loud and hectic accident site with sirens, spectators and passing traffic in the background.'

The 'false reality' is not complete by far. The Training Hospital was conceived as a 'permanent building site', he pointed out. It will remain as a location for the implementation, testing and establishment of new concepts and ideas.

France puts public hospitals on the 'Road to Performance'

One year after boldly launching a far-reaching programme for reforming France's troubled hospitals a newly created French agency has surprised its detractors and created a way forward, *John Brosky* reports

No one broke out Champagne for the first anniversary for the Agence Nationale d'Appui à la Performance (ANAP). It's not the kind of government agency that inspires parties.

Charged with moving France's hospitals onto what Health Minister Roselyn Bachelot calls the 'road to performance', ANAP nonetheless can report that one year after its creation it is receiving plenty of telephone calls from hospital directors.

'Thirty major hospitals are currently working with us, plotting a road map to meet performance objectives,' reports Ayden Tajahmady, responsible for the ambitious ANAP work programme.

Four of the country's leading medical centres have already signed a contract to fulfil their plan, a formal ceremony attended by the Health Minister and leading political leaders, including former Prime Minister Alain Juppé at the ceremony in Bordeaux.

In addition to the sprawling university hospital at Bordeaux (CHU-Bordeaux), the other three hospitals now working on a three-year programme to meet performance goals are CHU Nantes, the massive Hospices Civils de Lyon, and the Centre Hospitalier de Mulhouse.

ANAP has also successfully asserted itself in a central role of support for advancing 262 information system projects that had been launched as part of France's Hospital 2012 plan, many identified as struggling or at risk of failing.

Another sign of credibility for the start-up agency is the over-subscription for a programme to bring 100 hospital line managers into a structured coaching programme, which asks them to set performance objectives for their operations and then trains them in the skills required to reach those objectives.

'We aren't offering assistance only to build a managerial community, we want to assist service line improvements with defined projects that directly touch patient's lives,' Ayden Tajahmady said. 'Performance is often seen as having a financial component, but its greatest potential is for improving the quality of services being delivered, as well as improving the working conditions for care providers.'

ANAP was created in late October 2009 as part of a controversial healthcare reform law that consolidated an alphabet soup of existing agencies. *(See European Hospital Issue 2, 2009*)

At the same time the new law restructured decision-making by giving new powers to 26 regional health authorities.

ANAP works hand-in-hand with these regional authorities to affect change, for example, recently launching an emblematic programme to coordinate social and medical services for dependent people in three of these regions.

Ayden Tajahmady explained that the goal is to establish best practice cases in this pilot programme that will guide the other 23 regional authorities in making similar service delivery changes. 'This programme is a key to helping hospitals move services outside their walls and to connect with the surrounding region' -- including private care facilities and government medical and social service agencies.

Surgery theatres are another focus of this strategy, he added. 'An operating room is more complex than running an airport, yet we are hardly at that level of organisation. One of the central pillars for change we have identified is shifting the focus of hospitals to being centred on the patients and increasing the appreciation within the hospital walls on the impact of actions for a complete system of care in a community.

'The hospital staff knows best where there are dysfunctions; they are aware of the problems,' he said. 'Our task is to help de-dramatise the change and advance the performance.

'Medical practice today has little in common with what it was 20 years ago, and in another 20 years it will have changed again,' he added. 'We are creating the tools and changing the culture to adapt to this change and optimise the use of the public monies that fund healthcare services.'

To accompany hospitals and care facilities on the road to performance measurements, ANAP encouraged the creation of five consortiums of private sector companies to bid on consulting contracts.

These contracts cover the diagnostic phase for hospitals drawing up a road map for performance.

'It's not enough for the consortium to file a report and then fold its arms,' he continued. 'They are also required to identify a pilot programme and demonstrate their advice is credible and works.'

Perhaps the greatest accomplishment of the first year for ANAP is having created a performance culture within a government agency, Ayden Tajahmady suggested. 'We're aware that we'll be held to the same standards that we're teaching to hospital directors and managers. It will not be enough for ANAP's people to be consistent with these standards; we need to be exemplary to be credible.'

'We are a staff of 80-some people and soon to be 120-some,' he added, 'and each one is engaged, working long hours without watching the clock, taking the hits and bumps in the road, yet continually advancing. Today we can tell our board of directors how much a project is going to cost, how many people it will require and the results they can expect from the effort,' he confirmed. 'Very few public sector agencies can say that.'

Successful operating theatre re-structuring

The new surgical wing at Knappschafts Hospital in Bottrop, Germany, has exceeded all expectations. In four years the concept has increased available operation times by over 30%. We asked the project supervisor, Dr Peter Hügler, who heads the Anaesthesia, Intensive Care Medicine and Pain Therapy Clinic, how such a significant success was realised


Peter Hügler

Anaesthetists such as **Dr Peter Hügler** are often the only doctors who never leave the operating theatre (OT) during all their working hours, reason enough for their many OT management tasks. They had realised that the decentralised locations of the former operating theatres and the central operating theatre caused many financial and organisational disadvantages. 'We wanted to optimise our operating theatre processes through a centralisation of the operating theatres and by focusing synergies,' Dr Hügler explained. 'Initially, we simply put our ideal processes on paper. It was important for us that the surgeons would have an active impact on the spatial and logistic operating theatre design. That may seem unusual, but surgeons are only rarely involved in these processes because they also spend a lot of time on wards and in out-patients departments, so the OT is not their sole place of work.'

The objective of the rebuild was to free up as much OT time as possible. Germany's DRG system stipulates that, in the field of surgery, money is only 'earned' during an actual operation. 'Therefore we were striving for optimum capacity utilisation of the operating theatres. Therefore, a clear division between the operating time and other processes, such as material transport, patient and staff transport, also had to be reflected in the architectural plans. The optimum solution was the construction of a central operating theatre wing, which supports modern OT processes in many aspects,' Dr Hügler pointed out.

All five operating theatres in the hospital are now located in a row, next to one another. There is a central patient waiting zone and sterile floor leading past all the OTs, he explained, adding that therefore architectural refinement was also developed with other specialists, e.g. hygienists. All pre- and postoperative tasks, such as the administration and removal of anaesthetics and preparation and cleaning of sterile goods were outsourced, away from the operating theatre. 'As all patients go through the same postoperative treatment unit, patient monitoring is much easier and has ultimately improved patient outcome,' he added. During the OT centralisation in one wing, all out-patient departments were also relocated to this hospital area, which resulted in a better division between the busy out-patient and OT environment to quieter wards.

The nurses have both OT and multi-disciplinary training.

Identical equipment facilities in each operating theatre are a decisive feature of the central operating theatre wing, so that all surgeons are always in a familiar working environment. With several OTs spread across the hospital they aren't being used all day, Dr Hügler explained. 'If you have five identical OTs right next to one another you can reduce the programme to three theatres for the same number of operations and therefore achieve a continuous capacity utilisation for both theatres and staff. The remaining two OTs can either be shut down to standby, saving electricity, or even be sublet to external surgeons in private practice. As all OTs are equipped and fitted in exactly the same way, all operations can easily be moved from one theatre to another if the time plan cannot be adhered to.'

Scenarios for certain procedures can be accessed in each theatre via electronic data processing equipment, e.g. computer systems ensure the perfect space and lighting conditions for gallbladder laparoscopy. Each surgeon can also programme his individual settings. Using the OT computer systems via touch screen is easily learned with on-the-job training, he pointed out, and the OT computer system is networked to the HIS so that each surgeon always has access to all data, e.g. lab results, current X-rays. 'Setting up a centralised OT unit doesn't need any specific architectural prerequisites. The important issue is that the structural design supports, or even facilitates, modern operating theatre processes.' *Report: Karoline Laarmann*

A medical image viewer that requires no updates,
no downloads and no extras?

No kidding?

XERO technology, all your images

Delivering images and information to caregivers across a wide range of technical and physical barriers has proven to be a continuing challenge in healthcare. But as care providers expand and integrate their capabilities beyond today's hospital walls and move towards integrated regional and national care solutions, the need for technology neutral solutions has never been greater. To support this need, Agfa HealthCare is introducing XERO, a zero-download medical imaging viewer developed to provide access to imaging information for clinicians at any point of care regardless of network constraints and/or the wide variance of platforms and administrative rules. By bridging the gap between the stringent controls of medical image formats and the flexible access formats of the internet, XERO accesses and delivers your DICOM images and reports, with none of the heavy infrastructure or headaches associated with legacy viewers. We are not kidding when we promise XERO technology for your DICOM images.

Learn more about our solutions via http://www.agfahealthcare.com.

AGFA HealthCare

Cardiac and sepsis markers

Prior to October's 3rd Annual Congress of the Austrian Society for Laboratory Medicine and Clinical Chemistry in Salzburg, Austria, laboratory experts conveyed their opinions in an interview with *Michael Krassnitzer*

'Laboratory medicine is often perceived by the public as 'factory-based' and far removed from actual medicine, merely a place where body fluids are mechanically evaluated,' said Professor **Thomas Szekeres PhD EurClinChem**, of the Clinical Institute for Medical and Chemical Laboratory Diagnostics at the Medical University of Vienna. 'In fact, this is actually a particularly fast-growing discipline, as the last few years have seen significant advances in the successful development of new markers and parameters.'

Research into cardiac markers for the early diagnosis of heart insufficiency and myocardial infarction is international. Cardiac troponin, for example, is now considered the gold standard for cardiac infarction diagnosis, and copeptin – now mainly used as a sepsis marker – may prove similarly valuable. 'It has been possible to prove in a large-scale study that copeptin was indeed very high at the beginning, at the point of admission and even four hours later, whereas the troponin T levels determined via conventional tests were still low,' explained Dr Angelika Hammerer-Lercher, Specialist for Laboratory Medicine at the Central Institute for Medical and Chemical Laboratory Diagnostics, University Hospital Innsbruck. Other thrombosis markers and plaque instability markers are also being discussed: PAPP-A (Pregnancy Associated Plasma Protein-A), the placental growth factor, and the cardiac fatty acid binding protein are both thought particularly promising. In the case of heart insufficiency, whereas until recently the B-type natriuretic peptide (ANP) has been considered the gold standard, the A-type natriuretic peptide (ANP) adrenomedullin, endothelin-1 or galectin-3 have all been named as hot new candidates for usable markers.


© GESPAG


© PRIVATE
Gabriele Halwachs-Baumann


© PRIVATE
Manfred Herold

In the case of sepsis, new markers have been developed over the last few years which, due to their high specificity and sensitivity, facilitate a very early diagnosis and therefore early start of treatment. Patients directly benefit from this advance, said Professor Gabriele Halwachs-Baumann MSc MBA, head of the Institute for Medical and Chemical Laboratory Diagnostics at the Regional Hospital Steyr, Austria: 'Their individual mortality- and morbidity-risk decrease significantly.'

There are now also markers in infection diagnostics that turn positive or increase at a very early stage of infection, such as interleukins. Interleukin-6 – a trigger for the infection parameters C-reactive protein (CRP) and procalcitonin (used for some time) occurs very early on in pathophysiology. It can therefore provide information about an illness in situations where CRP fails. For example, Prof. Halwachs-Baumann quotes sepsis in newborns. During the first weeks of their lives, newborns lack liver function and, as CRP is produced in the liver, cannot react adequately to infection by CRP production.

Precise, clear and targeted laboratory diagnostics is also vital to identify autoimmune diseases. 'Unfortunately, there is a lack of standards for the respective laboratory tests and their correct interpretation,' said internal medicine and rheumatology specialist Professor Manfred Herold, who also specialises in laboratory medicine at the University Clinic for Internal Medicine I, Medical University Innsbruck. He also heads the Austrian Group of the European Auto-immunity Standardisation Initiative (EASI), which aims to standardise autoimmune diagnostics in the EU States as far as possible, and produce guidelines for their correct implementation, application and interpretation. However, the professor warns against a hasty switch between the different testing procedures: 'When carrying out and following a patient's treatment over a period of time it is better to stick to the same type of test.'

BIOMARKERS

Keys to prevention and early detection

Biomarkers as the key to prevention and early detection were the subject this autumn at the 7th Annual Congress of the German Society for Clinical Chemistry and Laboratory Medicine (DGKL) in Mannheim. For the DGKL president **Professor Karl J Lackner MD**, Director of the Institute for Clinical Chemistry and Laboratory Medicine at Johannes Gutenberg University, Mainz, the topic is of increasing importance. 'When it comes to health political decision-making, the subject of prevention is still not given enough consideration,' he pointed out. 'Measures for the early detection of diseases have to move closer into the spotlight to avoid the impending cost explosion. We can already see that, in the future, there will be different approaches to prevention, because it can and should be customised for individuals based on their specific risk profile.'


Hugo A Katus


Karl J Lackner

Biomarkers make it possible to identify diseases such as Alzheimer's, rheumatoid arthritis and certain cancers at a disease stage where the patient shows no symptoms. Based on the assessment of an individual's risk profile it would therefore be possible to examine people preventively, which, according to Prof. Lackner, obviously would have ethical and socio-political implications. For example, diagnosis alone, without follow-up treatment, would not be very helpful.

Biomarkers are also helpful in the development of personalised treatment, because whether a drug is likely to work can often be a genetic issue. Therefore, the determination or exclusion, respectively, of certain genetic changes can make a decisive contribution towards therapy management -- not only minimising costs and side effects but also raising treatment quality. 'In the case of an increased familial occurrence of certain types of tumour, for instance, people with no symptoms but still at higher risks can be identified using biomarkers. This constitutes a meaningful contribution towards prevention,' said **Dr Clemens Kaiser**, press officer for the Professional Association of Natural Scientists in Laboratory Diagnostics and a staff member of the Institute for Laboratory Medicine at the Klinik am Eichert in Göppingen, adding: 'On the other hand, biomarkers can be used preventively to reduce undesired side effects of treatment, or to optimise therapy. For example, if medication against circulatory disorders is prescribed to prevent heart attacks or strokes it is important to know whether the patient will actually respond to treatment with a certain drug.'

Much fundamental research is still needed before other conditions can be diagnosed and treated at an early stage. Moreover, the results of that research should be linked to clinical diagnoses of patients to generate clinical benefit.

At the congress another key focus was on the cardiac biomarker troponin, now detectable in the very smallest amounts, thus also facilitating even more precise diagnosis for mild or unspecific symptoms, as was demonstrated in lectures by **Professor Hugo A Katus MD**, of the Department of Internal Medicine II at University Hospital Heidelberg, and others.

Troponin T and acute myocardial infarction diagnosis

Cardiac troponin T is a heart-specific molecule of the contractile mechanism, which can be detected in blood at increased levels for some time after irreversible cell damage and which indicates severe heart muscle damage. Many prospective and randomised studies have confirmed the diagnostic and prognostic superiority of cardiac troponin measuring rather than measuring cardiac enzymes such as CK-MB. Thus measuring cardiac troponin is now considered the gold standard to diagnose heart attacks.

So far, however, the troponin assays used in clinical routine have been limited by insufficient analytic sensitivity, so minimal increases of troponin could not be detected safely. Hence working groups at various specialist associations have called for improvements to diagnostic tests so that minimal increases compared to the normal range can be safely detected with high precision. Additionally, preliminary studies on large patient cohorts have shown that each – i.e. even a minimal – troponin release is associated with increased cardiac risk.

To meet these analytic requirements, Roche developed the very highly sensitive Elecsys Troponin T high sensitive (HS) assay, which can measure even minimal increases of troponin in blood. This improved test has been in use in clinical practice since 2009.

First clinical results:

- Through more sensitive measurement of troponin T it has been possible to identify 20-30% more patients with heart attacks among those with acute coronary syndrome than was previously possible.
- Using sensitive troponin T assays, heart attacks can be detected much earlier following the onset of pain. This has made earlier heart attack markers, e.g. myoglobin or FABP (fatty acid-binding protein) redundant.
- In acute coronary syndrome patients even a minimal increase, which can only be measured with the highly sensitive assay, has an unfavourable prognostic significance. Also, identification particularly of patients with a lower risk is much better than with the old test (negative predictive value).
- Minimal troponin T increases also can be found in the case of ischaemic heart muscle damage, e.g. pulmonary embolism, myocarditis, tako-tsubo cardiomyopathy and heart insufficiency. In these collectives the highly sensitive troponin T also indicates increased risk.
- In patients with stable angina pectoris, and even in supposedly healthy populations, it has been possible to detect increased troponin T levels. Even in these collectives increased troponin was associated with significantly increased risk of mortality.

In summary: It can be said that the more sensitive troponin T assay has opened up a new dimension in laboratory/chemical heart attack diagnosis and risk stratification of patients with non-ischaemic heart disease.

The MIRACLE begins

Seven-country research project aims to develop a lab-on-a-chip to isolate and detect circulating and disseminated tumour cells in the blood

Detection of circulating and disseminated tumour cells in blood is a promising method to diagnose cancer dissemination, or to follow up cancer patients during therapy. Today's methods and involve time-consuming (more than a day) sample processing and cell isolation steps -- all labour intensive and expensive. A lab-on-chip that could integrate those processing steps would enable faster, easy-to-use, cost-effective detection of tumour cells in blood.

Earlier, in the joint project MASCOT FP6-027652, individual microfluidic modules for cell isolation, cell counting, DNA amplification and detection were developed. Based on this expertise, and strengthened by additional partners, the development of a fully automated lab-on-chip platform to isolate, count and genotype CTCs is envisaged within the framework of the MIRACLE project.

For genotyping, genetic material (i.e. the mRNA) will be extracted from the cells and multiple cancer related markers will be amplified based on multiplex ligation-dependent probe amplification (MLPA) followed by their detection using an array of electrochemical sensors. Full integration of all steps requires innovative research and processing steps that need a combination of the multidisciplinary and unique expertise of the different project partners (ranging from microfluidics to interfacing, miniaturisation and integration skills). The resulting lab-on-chip tumour detection system will be well ahead of the current state-of-the-art, revolutionising cancer diagnostics and individualised theranostics.

Within the framework of the MIRACLE project, imec as project coordinator, is collaborating with the Universitat Rovira I Virgili (Spain), the Institut für Mikrotechnik Mainz, AdnaGen, ThinXXs and ConsulTech (Germany), MRC Holland (The Netherlands), Oslo University Hospital (Norway), KTH Royal Institute of Technology, Multi-D and Fujirebio Diagnostics (Sweden), ECCO - the European CanCer Organisation and ICsense (Belgium) and Labman (UK). The project aims to develop a fully automated and integrated microsystem providing the genotype (gene expression profile) of CTCs and DTCs starting from clinical samples. MIRACLE is partly funded by the European Commission (FP7-ICT-2009.3.9).

Imec is the trademark of Imec International. Specialising in nano-electronic research, imec's HQ is in Leuven, Belgium. Offices: the Netherlands, Taiwan, US, China and Japan.

Project details: www.miracle-fp7.eu

French biologists resist invasion by legions of labs

Facing the risk of an invasion by big international operations, French medical laboratories drew inspiration for their defence from a national hero - Asterix.


The Druid Panoramix would be proud

While the newly launched reform of the French laboratory system will bring the traditionally independent medical labs into conformance with international quality standards, the law builds an elaborate defence against foreign operators to protect what the head of the Syndicat des Biologistes (SDB) describes as 'our tradition of the Village Gaulois'.

'We are a Latin people at heart, and very attached to the idea of medical services delivered on a human scale, not by an industrialised process,' said **Jean Bégué**, the sécretaire général of SBD, the association of French lab directors in a *European Hospital* interview.

According to Jean Bégué, there are more than 4,000 medical biology clinics in France for a population of 64 million, 'too many if we look at the example of other European countries, such as Germany where 400 labs serve a larger population of over 80 million'.

A case before the European Court of Justice in Luxembourg, challenging France's first line of defence, a prohibition of ownership of clinical labs by corporations or limited liability groups, is expected to be decided in October, 2010. 'We have every reason to believe we will prevail,' he pointed out.

Yet, even if this first line is broken by the court decision, France has constructed a labyrinth of provisions in the reform law *Hospitals, Patients, Territories and Health* that should pose formidable barriers for non-French companies. Each of the 26 regional health authorities created by the law have powers over decisions regarding how many laboratory services can be set up in their territory and each region can dictate the kinds of services offered.


Jean Bégué

The articles reforming clinical labs also state that a single lab group may not be present in more than three different regions. 'We are completely in agreement with these articles in the law to avoid the possibility that there are any large-scale companies,' Jean Bégué stated, on behalf of SDB. 'We don't want to see only 400 labs in France. We have traditionally maintained a cottage industry for medical biologists and we do not want to lose the direct contact with patients that this model affords. This is not protectionism,' he pointed out. 'It is the preservation of a form of exercising the profession. We prefer even a semi-industrial structure rather than to see factories built, and none of us wants to become a salaried employee of an anonymous corporation.'

As a member of the scientific committee for the Journées Internationales de Biologie (set for 2-5 November, in Paris) Jean Bégué will be a featured speaker during the European Roundtable., when he will explain: *The consequences of the French reform of medical biology on laboratory staff: towards a new profession for Laboratory Technicians.*

This is the first revision to the rules governing French clinical biology in 33 years and 'it is deep reform of the business, one that will not be easy to realise,' he said, acknowledging that many of the changes 'are long overdue, though it seems to us the pendulum has now swung too far in the other direction.'

True to another Latin tradition, the new law will take effect gradually, coming into full effect in 2016.

It could well take six years for clinical labs to bring about the required restructuring of operations, personnel qualification, and upgrading processes to meet quality standards.

For many lab directors, who are also independent owners of their clinics, there will be a painful process of consolidation the law is forcing with a strategy to gather the clans inside the walls of the Village Gaulois.

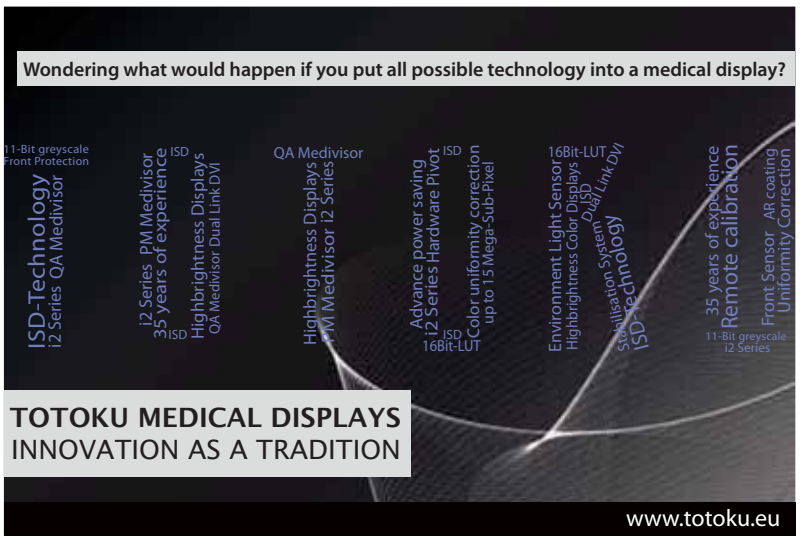
Lab owners are asked to affiliate their operations with colleagues to form larger group with a regional focus. Their existing operations will then become part of a network of neighbourhood access points for clinical services prescribed by doctors.

The group will share a central technical platform for analysis and each medical biologist will be responsible for interpreting results from tests collected at his or her centres.

Rather than go through the consolidation and then the accreditation process, the owner of a lab operation in France, who is approaching retirement age, is looking to sell at this moment, said Jean Bégué. And, he added, other labs that hope, in the Latin tradition, that the severity of the reform will be renegotiated, relaxed or ignored before the 2016 deadline 'are following a poor strategy'.

Part of a major overhaul of the French healthcare system, in the law 'Hospitals, Patients, Territory and Health' passed in 2009, the articles affecting clinical biology labs will affect every aspect of operations:

- Diagnostic testing recognised as a medical act, putting clinical biologists on the same level as radiologists.
- Lab directors are responsible for the entire process from taking samples through transport to analysis and, significantly, the interpretation of results.
- Accreditation to ISO standards required of all public and private labs by 2016.
- Regional health authorities must approve the nature of services offered and establishment of new lab operations.
- Labs may not be owned by corporations or limited liability groups.



Special status award for cobixx

Founded in 1981, IT solutions provider cobixx is a highly successful WLAN solutions innovator, an expertise now recognised by Cisco, a world leader in internet network solutions. Cisco's Advanced Specialised Partner status is awarded solely to providers with a proven track record of competence in design, construction and maintenance of unified wireless LAN solutions.

'Our network solution cibX is based on visualisation and localisation,' explained Bernd Kahnes, cobixx CEO since 2002. 'Visualisation makes it easier for the staff to care for the patient and to move him through the clinical processes. For example, let's look at a centralised emergency department. Each patient is recorded with all relevant data in the electronic system. An icon on the department's computer screen points to the patient, no matter what his current status is – in-patient on a ward, out-patient presenting for a certain examination, or a patient who has been admitted to the emergency room. Access to the full patient data allows the physician or care staff to track the treatment history and to understand the next step in the treatment process - and if necessary implement it immediately.'

Using a touchscreen the staff can easily assign the patient to a certain examination room, change the patient status or update the treatment plan.

The screen also provides a neat overview of available medical devices in the emergency department, e.g. ECG or X-ray, and bed availability in the individual departments. 'The system is not only up-to-date on patient status but also on the status of the medical equipment - available, out of order or in use. The clinical staff can access and display all relevant information and doctors' orders can be implemented without delay. Since the system functions in real-time over-booking of rooms or equipment can be avoided,' Bernd Kahnes added. 'The biggest challenge in any hospital is the optimisation of capacities and utilisation. Our system can help to control length of stay, reduce waiting times, avoid under- as well as over-utilisation.'

Collaborating with the staff, cobixx develops a personalised IT solution for the entire hospital. 'The advantage of our system is the fact that we can display and implement a wide range of features and that every user receives a system that's tailored to his or her specific needs -- and it can grow!' In terms of hospital costs, he added: 'With our IT solution data mining is possible: data can be collected in the different departments and the analysis helps to reveal – and consequently – redress weaknesses and make the entire hospital more cost-efficient.'

The certificate is not only an assurance for customers that they will receive a reliable state-of-the-art solution, but cobixx also hopes it will also provide further business opportunities and expansion into new markets.

Report: Denise Hennig
Details: www.cobixx.de

IT IN EUROPE: the HealthTech Wire update for European Hospital

EUROPEAN HOSPITAL HealthTech Wire®

HIMSS Europe

Three EU hospitals scoop EPR awards

Given that European countries have very diverse healthcare systems with special types of hospitals and even special information systems, comparison of healthcare systems and hospital performances is difficult. Thus, the first HIMSS Europe Leadership IT Summit, which took place in Rome, has provided a platform from which to discuss quality patient care based on IT and particularly the implementation of the Electronic Patient's Record (EPR).

Based on the recently launched European EMR Adoption Model, HIMSS Analytics Europe has evaluated the progress and impact of IT implementation and utilisation in European hospitals based on eight stages (0 to 7).

At the Rome event, best practice hospitals were recognised for the first time with stage 6 awards. They were: Odense University Hospital (DK), ISMETT Hospital (I) and Geneva University Hospital (CH), which have established paperless EPR environments. 'With this award,' explained Uwe Buddrus Managing Director of HIMSS Analytics Europe, 'we are encouraging hospitals to frequently assess their IT solutions so that they can provide better quality and safety for their patients. We look forward to helping hospitals across Europe achieve Stage 6 & 7 EMRAM levels.'

Arve Solumsmo of St. Olavs Hospital in Norway spoke on the implementation of mobile technologies, pointing out that new technologies were always expensive.

Jean-Jacques Romatet, General Director of Toulouse University Hospital, presented patient oriented eHealth methods and tools. Dr Michael Bainbridge, Adjunct Professor Medical Informatics from the University of Victoria BC and Jari Renko, director of information systems at the Hospital District of Helsinki and Uusimaa in Finland, spoke on patient and data security in communication exchange with external stakeholders. Tommaso Piazza of ISMETT Hospital presented an Italian perspective of the processes of communicating IT projects internally.

A Danish delegation illustrated their country's healthcare IT management strategy. Three Norwegian CIOs made a joint presentation with Nuance, detailing their regional speech recognition projects. Another focus group focusing on Cloud Computing was organized by Intel.

The inaugural HIMSS Europe Health IT Leadership Summit establishes a forum for healthcare IT executives. Around 100 participants came to Rome to share their experiences and discuss trends in healthcare IT.

HIMSS Europe 2011: Budapest. 10-13 May, 2011. The event will combine the ministerial eHealth conference of the European Commission and the World of Health IT exhibition and conference.

The 16th IFHRO Congress

15-18 November Milan Italy

Held every three years, a very important healthcare IT event is to be held in Europe after a gap of 14 years. This November, healthcare managers and suppliers from 37 countries will arrive in Milan to discuss the future of world's electronic health services at the 16th Congress of IFHRO (International Federation of Health Records Organisations), held in collaboration with the WHO. We asked congress co-Chair Leonardo la Pietra MD MBA, Chief Medical Officer of the European Institute of Oncology and President of AIDOS (Italian Medical Records Association) for his views on eHealth development in Italy

In Italy, Dr Leonardo la Pietra explained, 'There are positive and negative signals about the implementation of eHealth. Compared to other sectors, such as eBanking and eTravel, eHealth still lags behind. But a survey published in Rome in February 2010 shows some encouraging figures. In 7% of our country-wide Italian hospitals it is now possible to pay online, in 22% it's possible to book online, and in 19% it is possible to access digital reports online, such as blood test results. Of course, these figures represent a national average, and we know that some regions have a more advanced eHealth agenda than others.'


Leonardo la Pietra

In terms of the development of electronic health records and regional e-health networks, he pointed out that Lombardy, Emilia-Romagna and Veneto are the most progressive. 'But a key issue in Italy, as well as in other European countries, is the lack of communication between the regions, which is preventing a further integration of electronic infrastructure. With the constitutional reforms in 2001 and 2005, Italy introduced a significant level of legislative and financial autonomy for the regions, especially in healthcare. So it can be said that, nowadays, we have 20 regional health systems in the country. Therefore, priorities and investments in eHealth deeply vary from region to region.'

The fear of change

There are, he said, several barriers. 'The first is on the technology side, in a sense that medical data are not always recorded in electronic form. This makes it impossible to exchange it between healthcare providers. Secondly, it is due to the non- or inadequate technical standards, which means there are interoperability issues. However, on the other hand, there is also a cultural barrier in the heads of healthcare professionals, which is a paradox, because physicians have a high affinity to technology – but they fear change.

'Even though, they appreciate working with high-end technologies, such as CT or MR scanners, they don't like new information and communication systems that affect the way they work. This also has to do with the fact that there are some obstacles in the financial and economic areas. Not only is too little invested in eHealth in relative terms, there is also a general uncertainty about the reimbursement of eHealth applications, and even about the legal obstacles, for example privacy issues. Data security includes a range of aspects, such as prevention of unauthorised access.'

How to guarantee data security

Dr la Pietra believes that an initial step would be to minimise the collection of information data and the bulging files still carried around by patients in some hospitals. He also espouses the general belief that the risk of drug administration and treatment selection errors can be reduced by electronic records. 'Furthermore,' he added, 'health information management and scientific research is a rather new topic. For instance, health data stored in biobanks or cancer registries are of paramount importance to scientific research, but bring up the new challenge of ownership questions.'

RSNA 2010

Chicago USA

28 November to 3 December

The 96th Scientific Assembly and Annual Meeting of the Radiological Society of North America

A double-edged sword would be a good analogy for diagnostic imaging in 2010. New ways to utilise imaging technologies are being developed, imaging equipment is doing more, faster than ever, and image processing software is increasingly innovative. Today's radiology exams are 'slicing' through the body to reveal anatomy with increasing clarity for better diagnoses and therapeutic treatment planning. Yet radiation also remains harmful -- delivering high levels of radiation dose exposure cumulatively can cause injury and death.

RSNA 2010 reflects this. Its theme -- *Personalised medicine - in pursuit of excellence* -- focuses on recent innovations to customise radiology studies and therapeutic radiotherapy to accommodate the individual clinical needs of a patient, and to use both well established and evolving technologies in innovative ways.

Kicking off the week-long programme of more than 4,200 scientific papers, posters and educational courses, the Sunday opening lectures focus on the ability of oncologic imaging to identify cancer and facilitate personalised cancer treatment.

RSNA President **Dr Hedvig Hricak MD PhD**, Chairman of the Department of Radiology at New York's Memorial Sloan-Kettering Cancer Centre, will discuss the challenges and opportunities of the rapidly emerging fields of biomedical and molecular imaging. **Professor Sanjiv S Gambhir MD PhD**, of Stanford School of Medicine, California, will present the esteemed Pendergrass New Horizons Lecture on strategies for the earlier detection of cancer.

This annual Chicago gathering of an estimated 50,000+ radiologists, radiology professionals, consultants, and industry vendor representatives is also emphasising the pragmatic this year. Concern about radiation dose exposure, particularly from CT scans, is a dominant topic in meeting sessions. The RSNA's new campaign, Image Wisely, which focuses on ordering CT exams only when they are needed, and optimising radiation dose protocols to the lowest diagnostically acceptable levels, will be launched. Emphasis on patient safety is paramount.

Healthcare reform, through the adoption of electronic medical records and best-practice standards from evidence-based medicine, is a dominant topic for the meeting. While many sessions have a US-based federal healthcare policy perspective, they are intent on reducing costs and optimising medical resources for any healthcare organisation in an era of global economic recession. **Dr Atal Gawande**, associate professor of surgery at Harvard Medical School, and MacArthur Award recipient for his books and articles, is presenting the special lecture on reform and the complexity of healthcare.

Methods of using a wide variety of IT tools and technologies designed to better share information, to improve communication between radiologists and radiation oncologists with other clinicians, and to increase efficiency, especially with respect to reporting test results, also will dominate RSNA 2010.

From an RSNA meeting perspective PACS has lost its glamour – although not utility. Now that hospitals have millions of digital images and reports in archives, data mining research has become feasible and efficient. PACS has become pragmatic, a just beginning-to-be-tapped encyclopaedia for researchers, with the potential to add applied clinical knowledge that could only be speculated about in the era of X-ray film files. Additionally, mobile technology that can display imaging is not being ignored either. Additionally, there will be an update on the expanding library of RSNA best-practice templates for radiology reporting.

Following a longstanding ECR tradition, radiology in China and in Lat in America will have special sessions: *China Presents and Latin America Presents.* The China sessions will address the latest applications of MRI, as well as a radiology study of SARS in China. The Latin American session will begin with an overview of radiology in this region, exploring collaborations with RSNA, the role of imaging in diseases endemic to the region, and conclude with presentations of Latin American radiologic innovations currently being developed.

Finally, in a 'first' for RSNA, former US President Bill Clinton will speak to registered professional attendees only, no media allowed. Is this a new trend to invite the famous and influential? Who knows! However, tickets to hear President Clinton's hour-long lecture 'sold out' almost as soon as they became available.

Report: Kerry Heacox, i.t. Communications

Tomosynthesis sessions at RSNA 2010


Mitch Goodsitt

It's been around for decades, re-emerged in the '90s and, today, experts see a bright future for tomosynthesis technology. Thus its progress and future developments, plus specialist uses (e.g. breast) will be a particular feature at the Radiological Society of North America scientific assembly and annual meeting in Chicago this year.

Digital tomosynthesis is a technique to produce slice images using conventional X-ray systems, but it is a refinement of conventional geometric tomography in that they system allows an arbitrary number of in-focus planes to be generated retrospectively from a sequence of projection radiographs acquired during a single motion of the X-ray tube.

In the 28 November session, *Advances in Digital Tomosynthesis - From Physics to Clinical Application: Overview of Tomosynthesis*, Dr Martin Yaffe will focus on the basic concept of tomosynthesis and its differences from CT, as well as technical issues that influence image quality and its clinical value.

Dr Mitch Goodsitt (University of Michigan) will present the *History and Development of Tomosynthesis*, while leading expert Dr James Dobbins (Duke University, Durham, NC) will focus on its future. This will cover state-of-the-art tomosynthesis imaging, commercial implementation and FDA approval of tomosynthesis devices, future work in reconstruction algorithms and dose optimisation, translational issues in breast and chest tomosynthesis, translational issues in radiation oncology applications of tomosynthesis and translational issues in computer-aided detection and diagnosis with tomosynthesis.

Invented by Dutch neuroradiologist and electrical engineer George Ziedses des Plantes in the 1930s, tomosynthesis underwent various periods of development but suffered a marked reduction in research and development in the later '80s because there were no suitable digital detectors and also the rising popularity of CT.

However, late in the '90s came a rebirth due to the development of flat panel digital X-ray detectors and the application of tomosynthesis to full-field breast imaging, pioneered by Loren Niklason and Daniel Kopans (Massachusetts General Hospital, Boston); the application of tomosynthesis to small-field breast imaging pioneered by Richard Webber (Bowman Gray School of Medicine, Chapel Hill, NC); and the application of tomosynthesis to chest imaging by Dr Dobbins and team at Duke University.

Speaking of its 'fascinating history' Dr Goodsitt said that some scientists today describe tomosynthesis as a form of limited angle computed tomography, but he added: 'The advantages of tomosynthesis over CT are better spatial resolution in the imaging plane and lower radiation dose. A disadvantage of tomosynthesis relative to CT is poorer spatial resolution in the depth plane,' adding that there are further developments ahead in the field of tomosynthesis.

Tomosynthesis for imaging the body (chest, knee and legs) received FDA approval in 2006 and, as recently as 24 September this year, the FDA's Radiation Device Panel voted in support of Hologic's pre-market approval (PMA) application for their tomosynthesis breast imaging system. Full FDA approvals for the Hologic system and other manufacturers' systems are anticipated in the near future.

'Promising new developments in tomosynthesis include contrast enhanced (DSA) applications and multi-modality applications, such as combined tomosynthesis and automated ultrasound, combined tomosynthesis and nuclear medicine (SPECT) imaging and combined tomosynthesis and optical imaging,' Dr Goodsitt pointed out. 'The future is bright for tomosynthesis technology.'

On 29 November, Dr Joseph Lo (Duke University) will lead the session *Breast tomosynthesis: Physics Optimization for Clinical Translation*. Key learning objectives will be to understand how radiographic technique affects dose and image quality of breast tomosynthesis; identifying issues with breast compression for tomosynthesis versus mammography; and highlighting other physics research affecting the clinical translation of breast tomosynthesis, including scatter and noise compensation, image display and computer-aided detection.

Other speakers include Dr Michael Flynn on *Skeletal Tomosynthesis* Imaging and a look at how the orientation of bone structures influence contrast in tomosynthesis examinations; James Mainprize on *Filtered Back-projection for Tomosynthesis*; Stephen Glick on *Methodology and Algorithms for Breast Tomosynthesis*; and Daniel Kopans on *Digital Breast Tomosynthesis*.

Report: Mark Nicholls

The Oslo Tomosynthesis Screening Trial


Per Skaane

Digital breast tomosynthesis (DBT) is a promising new technology that acquires 3-D breast images. The individual images are presented as thin, high-resolution slices, which can be displayed individually or in a dynamic cine mode. Preliminary studies in a clinical setting have demonstrated that this new technology has the potential to improve not only the breast cancer detection but also to reduce the number of false positives. Many experts believe that the greatest benefit of DBT would be in breast cancer screening. Following an initial experimental clinical study at Oslo University Hospital Ullevaal from March and May 2010, the Oslo Tomosynthesis Screening Trial will begin in November. Professor Per Skaane MD, who heads the trial, discussed its potential outcome in an interview with *Meike Lerner*

An offer to take part in the Oslo Tomosynthesis Screening Trial will be made to all the 50-69-year-old women in Oslo who are invited to Norway's nationwide breast cancer screening programme, Professor Skaane said. 'Approximately 16,000 women are invited per year, and with an attendance rate of 60%, roughly 9,600 women will show up. Out of those 9,600 women we expect 80% -- 7,680 women -- to agree to participate in the tomosynthesis trial.

'All women will receive conventional 2-D mammography as well as tomosynthesis, which we call 3-D. We'll have three different arms for independent interpretation of the data: In one arm the radiologists will read conventional 2-D mammography. In the second arm, the reading includes 2-D plus computer-aided detection and, in the third arm, conventional 2-D mammography plus tomosynthesis images will be read.'

All the mammographic examinations are to be independently interpreted by the eight radiologists taking part in the study. 'There will be a common consensus meeting for all examinations having a positive score in at least one of the study arms. Obviously, we will comply with all relevant European and Norwegian guidelines,' he pointed out.

Recalls and diagnostic work-up will be according to daily practice at the Oslo University Hospital Ullevaal and the guidelines of the Norwegian Breast Cancer Screening Programme (NBCSP) and, since the project is part of the official NBCSP, interpretations will be carried out on-line into the national database of the NBCSP.

The trial is planned to run for three years. Outcome measures will include the performance indicators for organised screening programmes including recall rate, false positive scores, cancer detection rate, positive predictive values, and cancer characteristics for the individual readers and the study arms of the project. Ultimately, explained Prof. Skaane, 'We want to find out whether tomosynthesis is better than mammography in detecting breast cancer. The hope is that this new technique not only increases sensitivity, which means it picks up more cancers but also reduces the false positives, meaning it increases specificity. In Europe according to the European guidelines the false positives should be below 3-5 %, this explains the much higher recall rate in the US. We have a much lower recall rate in Europe.'

The women who undergo both mammography and tomosynthesis will be informed about the project, the technique, and the additional compression and radiation dose. What about that double dose of radiation? 'For tomosynthesis the dose is 1.4 to 1.5 mGy compared to 1.24 mGy for 2D. You have to double it. That means there is a slightly higher exposure, but we discussed this issue with the Norwegian Radiation Protection Authorities,' the professor explained, adding: 'Since this is a once in a lifetime dose it was not considered a problem.'

Tomosynthesis advantages

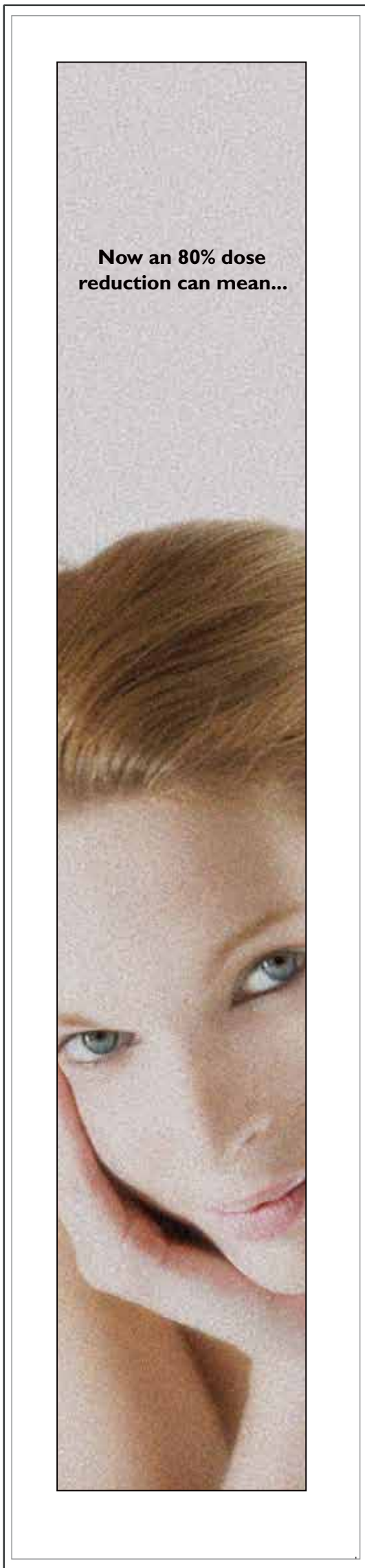
'The main advantage seems to be in the small distortions of speculate masses. They are much better visualised with tomosynthesis,' Prof. Skaane pointed out. 'A challenge will be the time needed for the radiologist to interpret the examinations. Therefore, we intend to record all interpretation times to see if tomosynthesis is cost-effective. Time is money. It is great if we detect more cancers and have a lower recall rate, but if the workload for tomosynthesis is too high we have to question the new technique.'

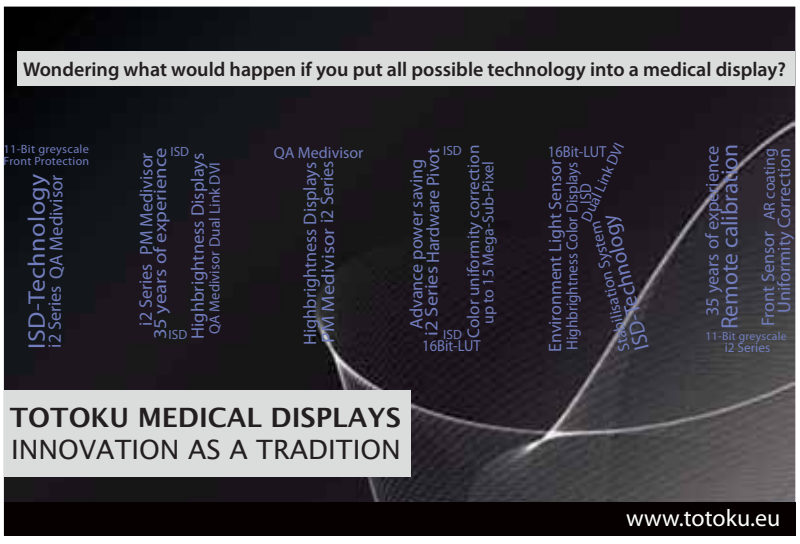
Use in a clinical setting

'In March this year, we installed tomosynthesis in the Oslo University Hospital Ullevaal, and we did a pre-test study. Our experience so far is very promising but, as far as I'm concerned, the future of tomosynthesis will be in the screening setting, not in the diagnostic setting. In diagnostics you have high-resolution ultrasound, MRI, biopsy, etc. However, particularly when screening women with dense breast parenchyma, that is women in the younger age group and women on hormone replacement therapy, tomosynthesis might increase sensitivity.

What next?

If tomosynthesis is found to be more effective than mammography, will it be implemented as a screening method? 'It is too early to say,' said Prof. Skaane. 'If it is better, we have to see how much better and how much time is needed to achieve this improved diagnostic performance. There are several factors. A question we have to answer is: Will we need tomosynthesis in both views – craniocaudal and mediolateral oblique – or do we need only one view? Or, should we combine one view of conventional mammography with one tomosynthesis view? For a long time, we discussed whether only women with dense breast parenchyma should be offered screening with this new technique. In the end, we decided to include all women, but we still do not know whether one view is sufficient. Perhaps we will need to do a second study after closing this trial to see how many lesions we missed.'





The potentiated value of MR/PET imaging

One plus one equals three

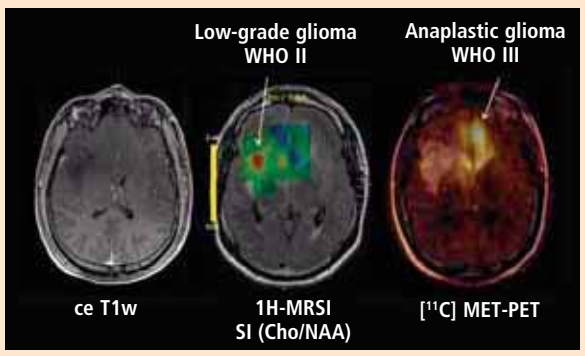
H-P Schlemmer

Even more precise diagnoses, even better process controls -- the future of MR-PET technology has dawned. The first commercial, full-body hybrid scanners are either waiting in the wings or already installed. But what does the introduction of the MR-PET really mean for clinical practice? Professor Heinz-Peter Schlemmer MD, Head of the Radiology Department at the German Cancer Research Centre in Heidelberg, sees enormous potential, particularly for oncology

Medical doctor and physicist Professor Heinz-Peter Schlemmer was formerly a senior consultant at the Department for Diagnostic Radiology in Tübingen University Hospital, where he was responsible for MRI scanning and significantly involved in the development of the world's first full-body MRI scanner.

Since early this year he has headed the Radiology Department at the German Cancer Research Centre (DKFZ), where his main research involves the early detection of prostate, colon and lung cancers, as well as the further development of functional imaging procedures for tumour characterisation and therapy monitoring

As Professor Heinz-Peter Schlemmer explains, MRI scanning offers functional methods that help to gain important information about blood supply, metabolism or movement of a tumour. 'These biochemical and physiological parameters enable us to make conclusions about the aggressiveness of a tumour and are therefore important decision-making aids for treatment planning and process control.'



The image can safely confirm a suspected highly aggressive, malignant growth for many tumours, for instance brain tumours, liver tumours or prostate cancer. For many parts of the body, such as the brain, the abdominal and pelvic organs and the bone marrow, MRI is considered the most sensitive diagnostic imaging procedure.

High resolution PET scanning offers similar help for tumour diagnosis on a microbiological level. 'Depending on the substance, the radiotracers fulfil different tasks. They accumulate in benign or malignant changes, bind to certain receptors at the cell surface or measure the process of substance absorption- and change in the cell. Therefore, whilst PET-CT shows a combination of anatomy (CT) and metabolism (PET), MR-PET allows us to show a combination of anatomy (MRI) and two sources for the determination of functional information, such as metabolic activity (MRI + PET). Future studies will show the extent of the benefit that can be derived from this potentiated imaging information,' the professor points out, adding that a further advantage of MR-PET is the simultaneity of the examination. Unlike the PET-CT, which is carried out sequentially, this procedure guarantees a particularly precise spatial and chronological attribution of imaging information.'

A further important quality criterion compared to hybrid technologies such as PET-CT and SPECT-CT is and will remain that MR tomography can be carried out without exposure to X-rays. This significantly reduces the radiation dose for patients during the MR-PET examination, as the exposure caused by the radiotracers used for PET scanning is comparatively low – however, combined with CT it adds up to a not insubstantial overall dose. As functional imaging procedures are often used repeatedly for the individual control of treatment progress for cancerous diseases this additional exposure for patients has to be viewed particularly critically. It will not only be tumour patients in general but particularly young people -- down to the very youngest cancer patients -- who will benefit from the lower radiation exposure generated by MR-PET scanning.

'With all this technological and medical finesse we must not forget that a PET – no matter whether integrated into a CT or an MRI scanner – is only ever as good as the radiotracers used with it. The PET itself only shows the spatial distribution of the radioactive substance or the marker. This is why the development of specific radiotracers with high sensitivity has an important, key function within the field of nuclear medical imaging procedures,' Prof. Schlemmer points out.

Currently various radiotracers are being controversially discussed in terms of their therapeutic significance. However, when it comes to the development of new cancer medication, it is very important to document success and failure in the individual treatment of patients. The urgency of research into suitable radioactive probes is also reflected in the desperate search for qualified radiopharmacists. Prof. Schlemmer: 'A good radiopharmacist can make the most hidden biochemical processes visible.'

However, as he points out, in the future specialists will be needed to evaluate imaging information from a MR-PET scanner. 'Apart from a radiologist who is very familiar with MRI scanning, a nuclear medicine specialist familiar with PET scanning will also be required. Indeed, MR-PET scanning is a very extensive and complex examination, which requires a high degree of expertise but, on the other hand, it will result in enormous benefits for the visualisation of tumours.'

9- 10- or even 11-Tesla Does higher mean better?

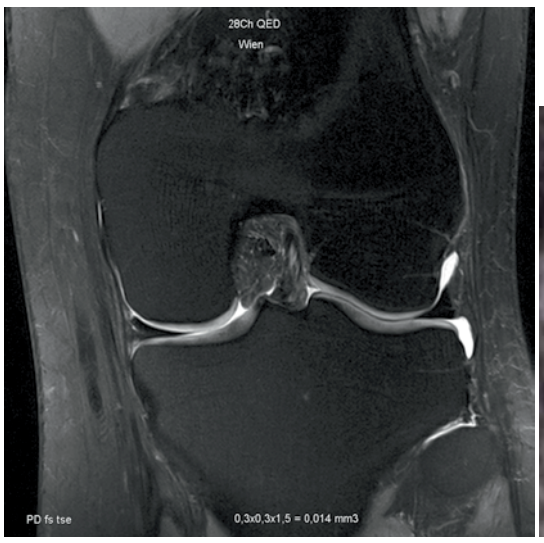
Less can be more

Advancing magnetic resonance imaging (MRI) up the Tesla scale may sound good, but will it produce the results and patient safety radiologists actually desire? Faced with the question: 'How many Tesla should it be?', Professor Siegfried Trattnig MD, head of the Centre of Excellence in high-field MRI at the University Clinic for Radiodiagnostics, Medical University of Vienna, and Austria's only professor of high-field MRI research, provided his answers at the Austrian-Bavarian Radiology Congress held in Linz this October

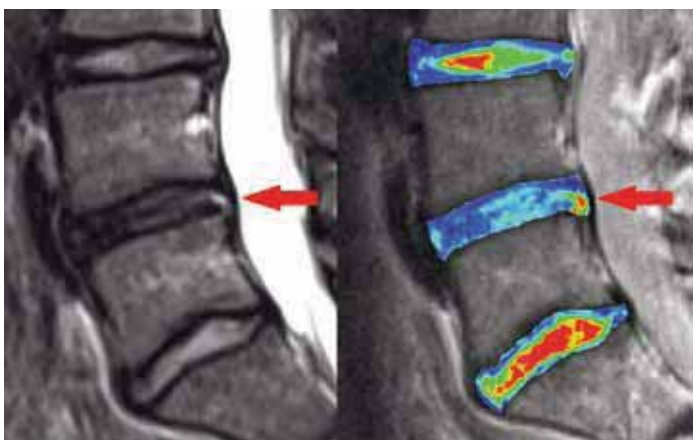
Siegfried Trattnig MD became Medical Head of Austria's first high-field (3 Tesla) MRI research scanner ten years ago and, in 2003, founded the Centre of Excellence for High-Field Magnetic Resonance Imaging at the Medical University of Vienna. Today, as Professor for Radiology and specialist in high-field MRI, he heads the 7-T and 3-T Project at the university. The professor has pioneered parametric or biochemical imaging of articular cartilage with MRI sequence and procedure development, up to its clinical use after cartilage replacement

The 1.5 Tesla MRI scanner, according to Professor Siegfried Trattnig, is still the 'workhorse' of radiology, but this, he foresees, may change in just a few years. 'The trend with new installations is definitely heading towards 3-T scanners.'

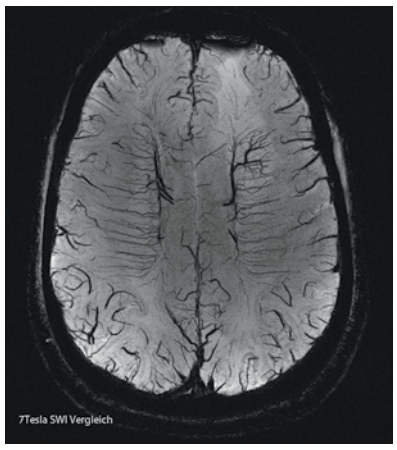
Today, some 15 years after the first generation of high field strength MRI was introduced, the advantages are quite clear: better image quality and quicker examination times, which means higher patient capacity. Economic aspects also make 3-T MRI more interesting for private practices. 3-T scanners have also proved themselves in research around functional MRI (fMRI). 'For example, the equipment is used in our brain activity studies and for metabolic examinations,' Prof Trattnig pointed out. 'Whereas we only capture about 2-3% of the so-called image interferences that occur due to paramagnetic haemoglobin with our 1.5-T scanner, 3-T scanners capture 4-6% of these interferences. And now we even have 7-T scanners that actually allow us to capture up to 10% of interferences.'



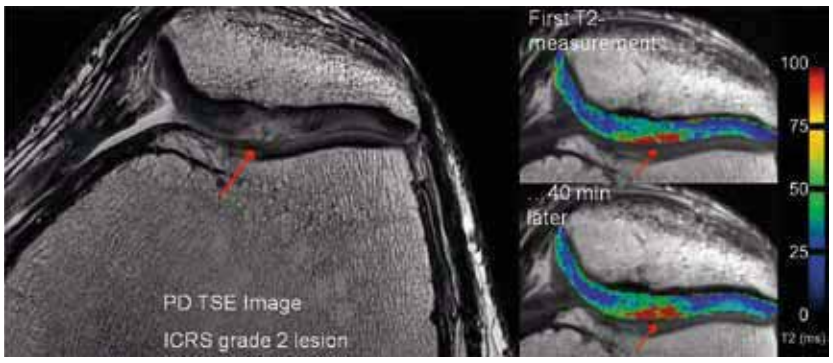
Left: High-res image of the knee joint with 7-T



Below: Anatomic and biochemical imaging (in colour) of worn out lumbar disc



Left: High-res image of the smallest cerebral vessels on submillimetre level with 7-T



Above: Anatomic and biochemical imaging (in colour) of kneecap cartilage damage

Worldwide, thirty-five 7-Teslas have been installed, and purely for research – none have entered clinical routine. With good reason, he believes. 'With 7-T scanners we must work very methodically to compensate for the disadvantages of stronger artefacts. With this high field strength we also encounter inhomogeneities of the magnetic field, which we must first get to grips with so that we can then actually utilise the advantages of high field strength at all. Additionally, although a 3-T scanner is delivered complete with all protocols, when a 7-T scanner acquisition the coils must be specifically developed and manufactured separately. So these scanners are currently only used in combination with hardware development, fundamental research, method development and clinical studies. Basically, there's a development process between science and industry before the equipment will become deployable for future, practical use.'

That future may not be so distant. Medical University of Vienna studies have shown that functional MRI (fMRI) with 7-T is more precise in pre-operative planning for brain tumour treatment than scanners with lower field strengths. This is also something appreciated by neurosurgeons at the AKH Vienna, who want this technology established in clinical practice. 'In some sub-specialties, such as neurology, the advantages of 7-T are already so significant that, in certain cases, we should not stop the technology being offered to patients,' Prof. Trattnig believes, although exclusively for use in large clinical centres; he sees no need for the use of these strong magnets by private practice doctors.

With 7-T scanners heading for routine use, how far off might the routine use of the 11.4-T MRI scanner be? 'A difficult subject,' he acknowledged, because 'the prestige project near Paris clearly shows the limitations of the technology. On the one hand there's the structural implementation required to shield the magnetic field, which is very complex. It requires building elements from the field of nuclear fusion. On the other hand, occasionally 7-T scanners have already shown physiological effects on people – dizziness, a metallic taste or pulses of light before patients' eyes. We can only guess the kind of physiological effects 11.4 Tesla scanners might have on people.

'Against this background, it's probably right to say that the technology will take us toward the limitations of its possible, practical use in human medicine. Considering the technical complexity and costs, as well as additional gain in information, in my opinion only a field strength up to a maximum of 9- or 10-T will make sense for radiological diagnosis in human medicine.'

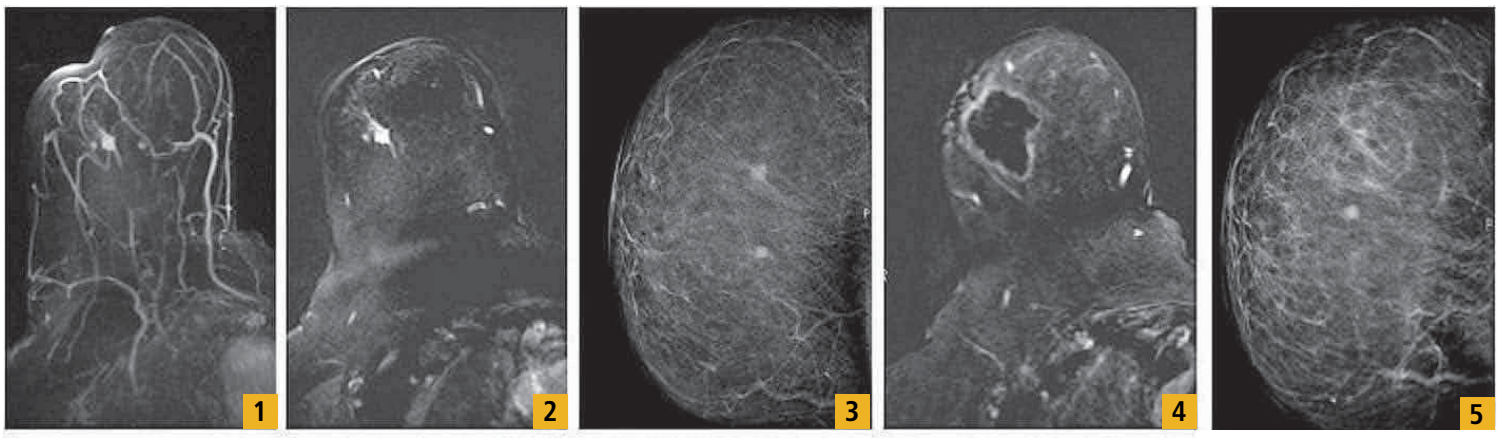
From East to West

HIFU for tumour therapy

Radiofrequency ablation (RFA) and microwave ablation repeatedly compare well with surgery in the treatment of primary and secondary liver, kidney and lung tumours and the palliative care of bone cancer. Thus oncologists are increasingly attracted to using bloodless, non-invasive treatment methods. High Intensity Focused Ultrasound (HIFU), primarily used in myoma therapy, is leading medical scientists to hope for its use to treat malignant tumours.

With HIFU, ultrasound waves are focused on a target region and temperatures within the target point rapidly rise (< 1-2 sec) from 60 to 80°C. The tumour tissue is cooked, yet the surrounding or overlying tissues are not damaged. Indications for HIFU may be all lesions that ultrasound waves can reach, and in organs not containing gases (liver, kidneys, pancreas, bone, breast, uterus, ENT area, prostate, muscles, adipose tissue).

HIFU? It's like removing the seeds from an apple without slicing it open



HIFU of breast cancer. 1,2) MRI shows hyperintense nodule of right breast before treatment; 3) Mammography before treatment 4) MRI, one month after treatment, shows a huge necrotic area. There's no evidence of the previous nodule; 5) Mammography after treatment.

Clinical study

So far, the biggest clinical experience in HIFU has been in the Far East. In 1997, at Chongqing Medical University, China, **Professor Lian Zhang** first used the JC Haifu Focused Ultrasound Tumour Therapeutic System (Chongqing Haifu Ltd.). 'In the beginning,' he explained during a European Hospital interview, 'it was difficult to enrol patients for our clinical trials because only patients with no other treatment option, or with advanced stage tumours, could be considered -- even though at that time HIFU showed encouraging results. From 1999-2004 we treated 35 cancer patients who were not suited to surgery. The follow-up-results after five years was a survival rate of 71%, which is close to other techniques, such as RFA or surgical resection. I know osteosarcoma or breast cancer patients who were treated with HIFU ten years ago and who are still tumour-free. That's why we switched from a palliative to a curative concept of treating tumours, also in the early stages.'

Three years ago, interventional radiologist **Professor Franco Orsi**, at the European Institute of Oncology in Milan, Italy, visited Prof. Zhang at the Chongqing centre and was highly sceptical about HIFU. 'Then he began to believe,' Prof. Zhang recalled with a smile. Back in Milan, Prof. Orsi began clinical studies immediately, investigating three indications for HIFU in three trial prongs: pancreas, breast and bone palliation.

Then, organisational problems arose. 'HIFU therapy was so effective in breast cancer that some patients refused additional surgical treatment. The MR control showed that they were tumour-free after HIFU and they didn't wanted to be treated twice. This brought us trouble from the tumour board's ethical committee because, after current standards, surgical tumour resection is obligatory.'

MRgFUS or USgFUS – which is best?

The debate is ongoing as to whether Magnetic Resonance-guided Focused Ultrasound (MRgFUS) and Ultrasound-guided Focused Ultrasound (USgFUS) are competitors. MRI is undoubtedly superior to ultrasound in image quality and precision, and also enables thermal mapping of tissue, making ablation safer. Nonetheless, the practical management during a procedure is better with USgFUS. There are no hours of patient positioning in the magnet, no lengthy job training for the user – perhaps one reason why radiologists reject it. USgFUS is a user-friendly technique that can be performed by different consultants from different disciplines.

The debate, Prof. Zhang agrees, is less about technical superiority and more to do with personal preferences: 'In the USA and Europe radiologists have been trained with MRI, so they like MR better. It's also considered more sophisticated technology than ultrasound, so everyone wants to work with it. I work with both, so I know there are in fact clear indications about which is better in which case. In the liver, for example, ultrasound guidance is always better because, first it's difficult to position the patient in the MR, and secondly the liver moves with breathing.'

Prof. Orsi adds another crucial difference: 'While the MRgFUS transducer works with phased array technology, the USgFUS uses a one element transducer. The difference is that, with the MR transducer, you can change the focal point position, which makes the procedure more controllable, but the focal field is not homogenous and needs longer to heat up properly. In USgFUS with very high energy levels in only one transducer it's much faster; the energy delivered is so high that cavitation effect can be even obtained.,.'

This may explain why, in China, tumour size, e.g. in myoma therapy, is not a limitation to HIFU. Prof. Zhang's colleague, Prof. Wang Wei, at the China Military General Hospital, Beijing, has treated uterine fibroids up to 20 cm in a two-hour session, while in European centres where MRgFUS is preferred, uterine fibroids are mostly treated up to 8 cm – without taking into account that tumours are commonly diagnosed earlier in Western countries.

A 60 years old patient with pancreatic cancer.

The notable risks in the use of bone cement

Used in numerous orthopaedic medical procedures, PMMA is a self-curing two component system that includes liquid and powder components. The liquid is methylmethacrylate monomer, a known deadly toxin, and PMMA toxicity is well documented in medical journals and regulatory publications.

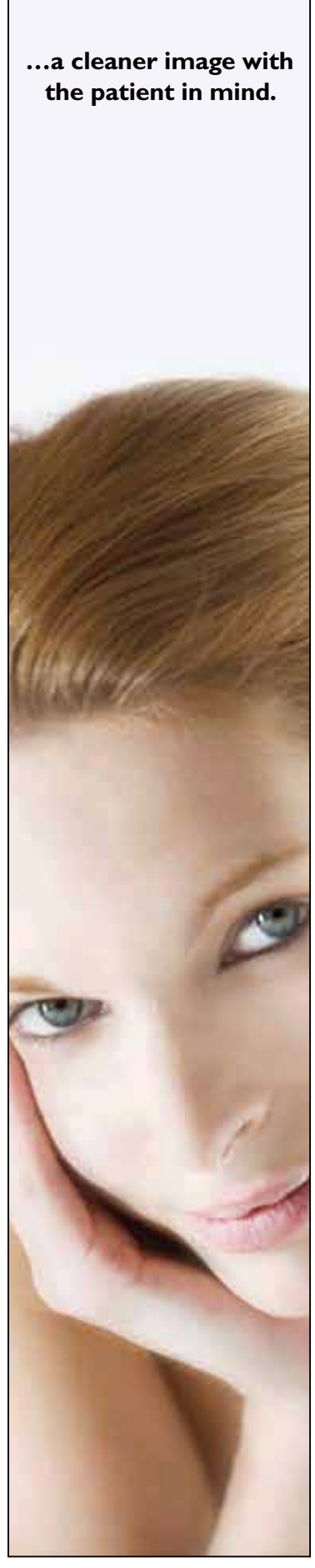
After many years of reported patient issues related to PMMA, doctors began calling these surgical complications 'bone cement implantation syndrome'. The United States Food and Drug Administration (FDA) recognises that PMMA use has risks.

In its guidance document (17 July 2002) the FDA states serious adverse events, some with fatal outcome, associated with the use of acrylic bone cements, including myocardial infarction, cardiac arrest, cerebrovascular accident and pulmonary embolism. In a public hearing on 28 April 1998, Hany Demain, a scientific reviewer in the Orthopaedic Devices Branch, reported on behalf of FDA that, since 1985, '95% of reported events related to PMMA were associated with death'.

Polymerisation of PMMA bone cement is an exothermic reaction, which occurs while the cement is hardening in situ. The released heat may damage bone or other tissues surrounding the implant. The liquid monomer is highly volatile and flammable. Ignition of monomer fumes caused by the use of electrocautery devices in surgical sites near freshly implanted bone cements has been reported.

Risks associated with PMMA are not limited to patients. Medical personnel are exposed to harmful PMMA monomer vapours during its mixing and delivery. According to the FDA: '… caution should be exercised during the mixing of the two components of PMMA to prevent excessive exposure to the concentrated monomer vapours, which may produce irritation of the respiratory tract, eyes, and possibly the liver. Personnel wearing contact lenses should not be near or involved in mixing this bone cement'.

Further, the FDA warns that women of child bearing age should not mix PMMA bone cement at all.



In a *European Hospital* interview **Professor Hermann Requardt**, Head of Corporate Technology and CEO of Siemens Healthcare Sector, offered his views on current and future healthcare manufacturing needs as well as the market challenge arising from the dynamic economic ascent of other nations

Following early work as a research assistant at the German Institute for Aviation Medicine, Professor Hermann Requardt joined the Siemens AG Medical Engineering Group to work on nuclear spin tomography physics, imaging systems and magnetic resonance. In 1989 he became Head of Development in the Magnetic Resonance Division and headed various development projects.

In 2006, Prof. Requardt received an Honorary Professorship (Physics) at Johann Wolfgang Goethe University in Frankfurt. Prof. Requardt is now CEO of the Siemens AG Healthcare Sector, Head of Corporate Technology and a Member of the firm's Managing Board

Where are we ~ and what lies ahead?

'Healthcare costs are continuing to increase substantially throughout the world,' Prof. Requardt pointed out. 'That development can be attributed, first of all, to demographic trends: life expectancies are rising almost everywhere in the world. And that, in turn, is one of the main reasons why the world population is increasing. More than nine billion people will live on our planet by the middle of this century. Today, the world population is slightly less than seven billion.

'However,' he added, 'another factor behind rising healthcare costs is the equation that still applies today: Better medical care equals higher costs. Obviously, this phenomenon cannot go on forever. We are working on ways to make an inequation out of this equation. In other words, better medical care at constant or even falling costs. That is indeed possible, but it will take innovations. Such as innovations in the areas of imaging techniques, for example: Faster, more precise diagnoses allow for earlier and more targeted therapies. Or also innovations related to the wider use of IT systems in healthcare: Faster and better-coordinated work steps in hospitals and medical practices lower the number of multiple examinations, saving time and money. And innovations in the area of laboratory diagnostics: The ability to identify a genetic predisposition quickly and precisely makes it possible to assess the probability that certain therapies will be successful.

'Thus, we are confronted with a qualitative and a quantitative challenge: We need to provide better healthcare than before, to more people than ever before. We are on the forefront of the efforts to solve this problem!'

Asked about the potential impact of competition from China, Prof. Requardt said he would not limit this to the Chinese alone. 'As we see it, competition is intensifying on several levels. First, certain well-established competitors are stepping up their research and development efforts considerably. To counter that trend, we need to defend and extend our position as an innovation leader. Second, large corporations from the IT sector, for example, which had hardly been active in the medical engineering sector before, are now venturing into these markets to a heightened degree. And third, new competitors are rising up in the emerging-market countries, as they seek to capture a strong share of their fast-growing home markets. On the other hand, we are also seeing new opportunities for us in the mid-price segments of these markets. Thus, the competition landscape is becoming more diverse, and so are the opportunities.'

Do new medical approaches, for example, the emergence of interdisciplinary teamwork, involving physicians from all specialties to focus on a tumour therapy, mean new ways of thinking are needed? 'In oncology especially, the expertise of radiologists is increasingly in demand in all phases of the healthcare process, from diagnosis to therapy and follow-up care. The data and findings of different departments need to be combined, in order to represent the patient both in his entirety and in his individuality,' Prof. Requardt pointed out. 'For that purpose, Hospital Information Systems (HIS) and Radiology Information Systems (RIS) need to be networked throughout the institution.

'Furthermore, hospitals need to communicate externally as well, specifically with the patient's regular doctor or practicing specialist, who have known and provided medical treatment to the patient for a longer period of time. In a sense, all healthcare providers just need to agree to share specific patient data and diagnoses with each other, so as to arrive at a common, complex and individualised understanding of the disease and apply the best therapy. That is a technical (IT) challenge. But, even more, it represents a mental challenge for the healthcare providers involved.'

Are the changes in radiological practice cause for concern or do they present opportunities for Siemens? 'That,' he responded, 'is a complex question. I understand it to mean, first of all, that diagnostics and therapy are increasingly converging. Indeed, that is a trend we are monitoring. And that trend is being driven by the clinical presentation, which plays a crucial role in early detection and prevention, and in the planning, administration and monitoring of therapy.

'Another important development is image-guided, minimally invasive surgical techniques in oncology and cardiology. The advantages include higher therapeutic success and less strain on the patient, as well as time and cost advantages.

'We definitely see a great opportunity in this trend. Therefore, our new organisation, which entered into effect on 1 October 2010, reflects this trend exactly.'

How will Siemens Healthcare benefit from or be altered by acquisitions? 'In 2006 and 2007 we strengthened our business through three acquisitions: Diagnostics Products Corp. (DPC), Bayer Diagnostics and Dade Behring. Naturally, integrating these companies into our Diagnostic Products Division posed a challenge, especially considering the fact that the integration had to be handled in the midst of an economic crisis of historical proportions. Though we have achieved our cost objectives in the course of the integration, we still have some work to do on the growth side, which we are now tackling with our full attention. Thanks to our entry into the field of laboratory diagnostics, however, we are now the only fully integrated supplier, offering products for every phase of the process, from preventive care to diagnosis and therapy to follow-up care. We are very proud of this prominent position. But that also means we need to lead the field of competitors in all areas in which we operate.

Which markets are most important for Siemens? 'The United States is still the biggest market and will continue to be so in the coming years. We generate slightly more than 40 percent of our revenues in that country. The greatest growth, on the other hand, can be found in the emerging-market countries, especially China and India. In those countries, the dynamic growth trend will continue and could even accelerate. A key element of the next five-year plan of the Chinese government, which will take effect as of 2011, is to expand healthcare. And we intend to capitalise on the opportunities that will create for us.

How important is the healthcare business for Siemens as a whole? 'The Healthcare Sector accounts for 15 percent of the company's revenues and nearly one fifth of the profits of the company's Sectors. That speaks for itself. In addition, Siemens Healthcare is one of the most important innovation engines of Siemens, and therefore also an important initiator for topics that affect the overall company. One such example is the sustainable development of our cities. This topic is very high on Siemens' agenda; and, for that purpose, Siemens Healthcare has launched its own programme for hospitals: Green+Hospitals.

'Our business is very well aligned. Our new organisation will help us to address new growth markets in emerging-market countries in a targeted way. In addition, the new organisation reflects new, pioneering trends, such as the convergence of imaging techniques and therapy, which I mentioned before. We have created the conditions that will enable us to grow our business on our own strength. And that's what we are focusing on now.'

CONTRAST

at the right time – at the right place

Contrast agent injectors for:

- Computed Tomography
- Angiography
- Magnetic Resonance Imaging

Disposables

RSNA 2010

Meet us at
Lakeside Center, Hall D, Booth 1633A

MEDTRON® AG

Hauptstr. 255 · D-66128 Saarbrücken · Phone: +49 681 97017-0 · Fax: +49 681 97017-20 · info@medtron.com · www.medtron.com

Understanding breast cancer functions

High resolution radionuclide imaging

High resolution radionuclide imaging is a technique increasingly used to detect breast cancers and has already been shown to offer improved diagnosis in many clinical situations. The technique, which will be discussed at RSNA 2010*, is also allowing clinicians to detect previously unknown areas of breast cancer in women with newly-diagnosed disease, *Mark Nicholls* reports

Professor Rachel Brem, Director of the Breast Imaging and Interventional Centre and Professor of Radiology at George Washington University, Washington DC, has been involved in the development of the high resolution radionuclide imaging technique since its inception in the mid 1990s. On 28 November, at this year's RSNA meeting, she will lead a session on high resolution radionuclide breast imaging.

Prof. Brem explained that high resolution nuclear medicine imaging of the breast is a functional approach to breast cancer diagnosis. 'This uses a high resolution, breast specific gamma imaging that allows for the detection of both invasive and non-invasive breast cancer as small as 1mm. We can reliably detect 2mm cancers with this approach.' The approach of breast specific gamma imaging (BSGI) is that unlike mammography and ultrasound - which is based on anatomy and asks the question what does breast cancer look like - BSGI asks the question how does breast cancer function differently to the normal surrounding breast tissue. 'This allows us to use a fundamentally different approach to improve breast cancer detection. The imaging can also be a comfortable experience for the patient, who can sit and read or watch a video during the process and is of particular benefit to women who cannot undergo an MRI scan.'

High resolution radionuclide imaging has a number of advantages in the diagnosis and detection of breast cancer. Professor Brem, who is also Vice-Chair, Research and Faculty Development, at George Washington University, explained: 'It is used in surveillance of high risk women, in women with newly diagnosed breast cancer for surgical planning as well as for detection of occult foci of breast cancer.

Ten per cent of women with newly diagnosed breast cancer have another focus of cancer that would not have been detected without BSGI. It has at least equal sensitivity and better specificity than MRI and can be used in all women who have venous access. Therefore, women who cannot undergo MRI can undergo BSGI with at least equal sensitivity and better specificity.'

During the RSNA session Professor Brem will review the BSGI literature, discussing clinical uses and demonstrating clinical situations where BSGI is used, and the newly-approved direct gamma biopsy device as well as looking at comparison to breast PET or PEM and future developments regarding BSGI.

Use of the technique is growing, several hundred units are in use and over half a million women have been imaged, she said. The technique is in daily use in Professor Brem's practice and, in practices that have BSGI, it has become an integral part of their breast centre. The number of centres with BSGI continues to grow, both in the USA and elsewhere.

And there are clear benefits of BSGI for the clinician and also for the patient. 'It results in improved diagnosis of breast cancer in many clinical situations. It allows us to detect additional, previous unknown areas of breast cancer in women with newly-diagnosed disease and it's a powerful and novel addition to our armamentarium of approaches to optimal breast cancer detection,' she pointed out. 'For the patient, it offers improved breast cancer detection using a physiologic approach with better specificity than MRI.'

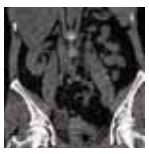
Work continues in developing the technique, with ongoing studies targeted at lowering the 'already low and acceptable dose' of radiotracer used, as well as further integration of BSGI with other imaging modalities.


Rachel Brem

** RSNA 2010. Chicago. 28 November to 3 December*

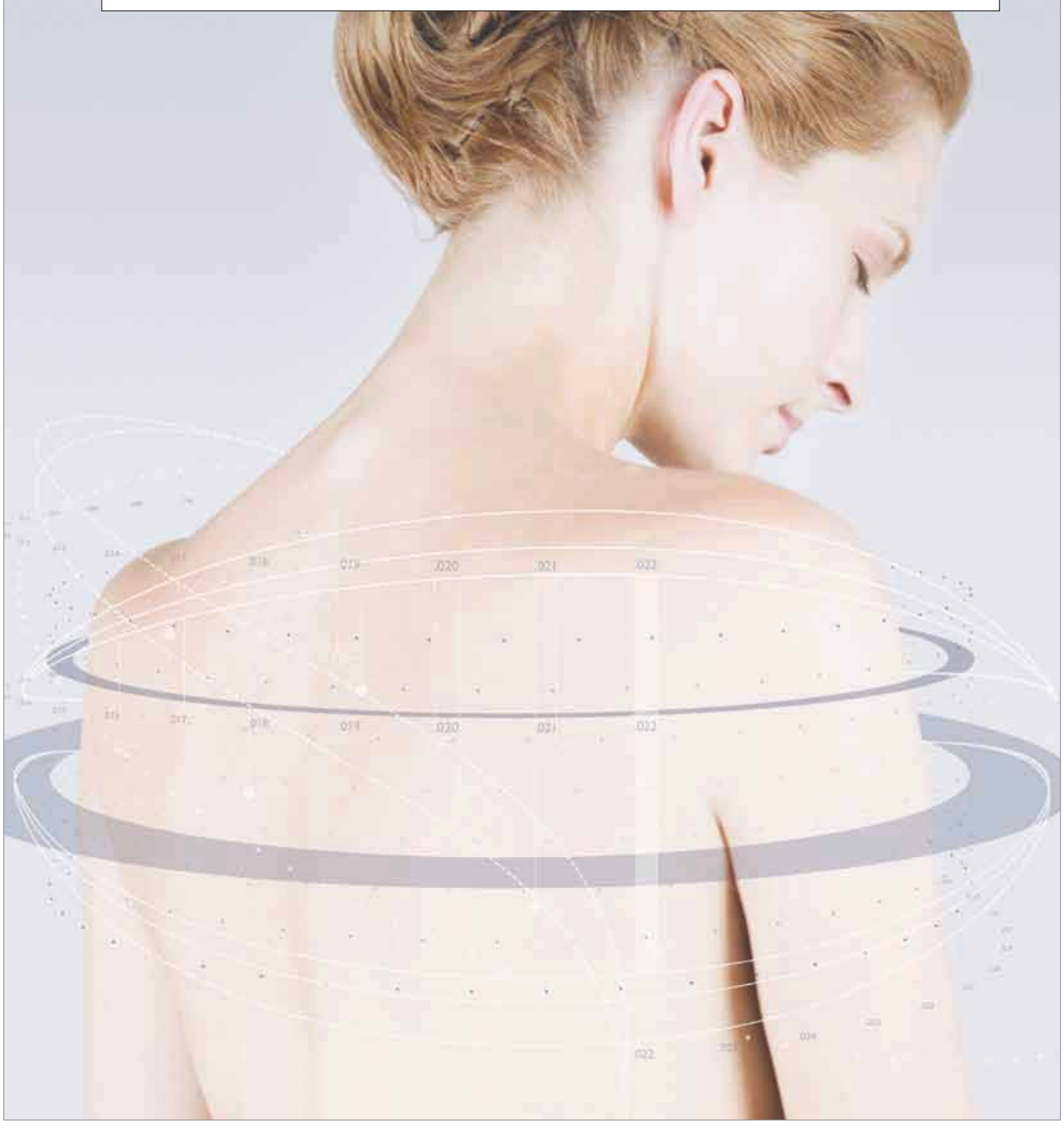
What inspired our high-quality, low-dose CT innovation? Exposing less and revealing more.

Lower radiation dose levels don't have to mean lower image quality. The Philips iDose feature reduces the noise and artifacts that result from a lower radiation dose. Now, you can reduce the dose by up to 80% and still maintain diagnostic image quality. It is our latest evolution of DoseWise radiation management, our commitment to high image quality at a low dose. To see for yourself, take the challenge at www.philips.com/iDoseAd.



*Because our innovations are inspired by you.

PHILIPS
sense and simplicity



The economic value of PET-CT

A scenario-based analysis

PET/CT is an established clinical tool especially for cancer-related diagnosis. This involves both initial diagnosis and follow-up examinations. There are other procedures, like CT/MRT, bone scan, or mediastinoscopy, all of which are also costly. Given the fact that PET/CT is widely used anyway, the question arises whether it is medically responsible and financially favourable to focus solely on PET/CT examinations.

By **Frederik I Giesel MD**, Associated Professor of Radiology at the Nuclear Medicine Department, University of Heidelberg, Germany, and **Philip Herold** (Dipl.Econ.), Project Manager at RICT Heidelberg

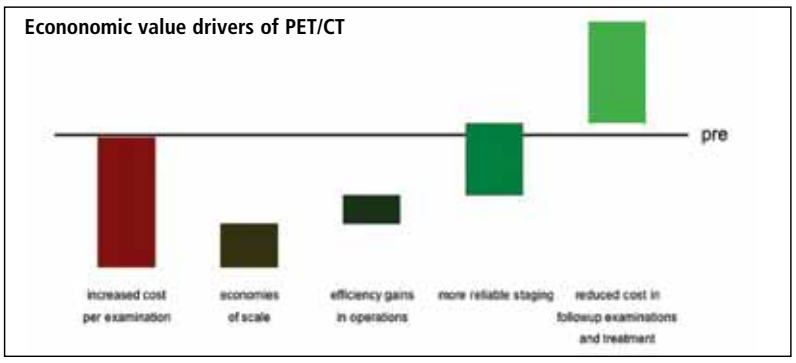
Frederik I Giesel MD, Associate Professor of Radiology, Department of Nuclear Medicine, University of Heidelberg

Philip Herold Dip. Econ. Project Manager RICT Heidelberg, Germany

At the RSNA meeting in Chicago this November, Prof. Frederik Giesel (above) will be presented with the US$1,000 RSNA Research Prize for his abstract *Comparison of Lesion Detection and Characterisation in Patients with Neuroendocrine Tumours Using DOTATOC-PET in Correlation with Contrast-enhanced MRI and Contrast-enhanced CT*

A study of 120 cases of lung cancer has shown that patients are properly restaged during follow up examinations with PET/CT, which makes the procedure sufficient in medical terms. PET/CT can thus replace a combination of the three other procedures, which both saves money and spares the patient from excessive diagnostic-activity.

The impact of switching from a case by case decision on what procedure(s) to use, to only relying on PET/CT, entails both direct and indirect effects. A direct effect, for example, is the immediate cost or



time comparison between PET/CT and any other examination method. An indirect effect is, for example, the altered restaging (probability) for patients. Both groups of effects are discussed in detail.

Direct effects

The two most obvious direct effects of using PET/CT instead of other diagnostic methods are the difference in result and the difference in cost.

With respect to lung cancer, PET/CT basically delivers output of the same quality in terms of not overseeing lesions as CT/MRT, bone scan, or mediastinoscopy. Thus the results of all methods will be treated as equally useful for follow-up examinations.

However, the study shows that the likelihood of upstaging (follow-up results in operation rather than no operation) increased by 16% in the sample. This immediately changes the examination result in terms of quality. Assuming that patients were not mistakenly upstaged, this implies PET/CT was more effective. Hence, treatment quality increases. Thus, PET/CT becomes valuable in terms of exposing the patient to less follow-up examinations and the physician being able to react earlier.

Being left with the cost, one basically regards the cost per examination of one method or another. PET/CT is cheaper than mediastinoscopy, but more expensive than bone scan and CT/MRT. However, early upstaging implies (a) fewer follow-up examinations which in turn yields immediate savings and (b) might result in chemotherapy treatment rather than surgery, which would mean cost savings of about 40% per case.

The study further showed that about 8% of the patients could be down staged earlier when using PET/CT. This implies not only more certainty for the patient, but also savings in further follow-ups and mistaken treatment.

Indirect effects

A second view reveals that the choice of the examination method also influences the cost per examination. There are indirect effects of the decision about which method to use on the cost structure of all the examination processes.

If management decides to use only one rather than three examination methods, so called economies of scale can be realised.

Increased standardization and routine helps staff to decrease process time and handle cases more effectively. For example, the time-intensive step of deciding on the appropriate method and eventually revising this decision can be left out.

Using only one method also implies that only one type of device has to be in place. The utilisation of this device can be maximised by concentrating all examinations on this device. Note that this argument doesn't hold if other devices are fully utilised anyway.

Maintenance cost and related decrease as well as specialisation effects rise. This can be sourcing-related in terms of, for example, a help desk. This could also be material related in terms of, for example, tracer. As more patients are scheduled per day, management might be able to use tracers reserved for cancelled examinations elsewhere and thus avoid the cost of having tracers expire.

Further economies of scale may incur in the diagnosis-routine, as physicians become more specialised and the output (report) naturally more standardised. In turn, this also benefits the treating physician.

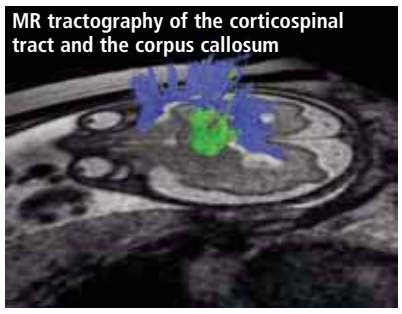
Conclusion - Focusing on PET/CT is clinically favourable in terms of patients' convenience and financially favourable in terms of cost savings. It further evaluates the economies of scale of focusing on that one procedure e.g. decreased marginal cost and enhanced operational efficiency due to routine.

Based upon these insights it seems advisable to reconsider further diagnostic sequences for their economics. Not only on a stand alone basis, but also for how they interact. On only a holistic basis, synergies can be identified both in terms of financial impact and patient distress.

MRI in foetal screening

Does a foetus think -- if so, how?

Ultrasound is the undisputed choice for foetal imaging. However, the lack of amniotic fluid, an unfavourable foetal position or maternal obesity could daunt even the best radiographer. In such circumstances prenatal magnetic resonance imaging (MRI) – a non-invasive and non-irradiating procedure – is a helpful diagnostic tool. It is also considered if the ultrasound image does not offer conclusive findings, e.g. an unclear malformation. 'Or,' as **Dr Daniela Prayer**, paediatric radiologist at the University Clinic for Radiological Diagnostics, Vienna University Hospital, put it, 'if there is uncertainty regarding normal organ development. Or if a malformation is detected that is often associated with a genetic syndrome and it needs to be confirmed or excluded. A further indication for prenatal MRI is the presence of familial genetic defects, which means the imaging procedure aims to check whether the foetus shows morphology that indicates such a defect. Unclear miscarriages in the mother's family may also indicate prenatal MRI.'



MR tractography of the corticospinal tract and the corpus callosum

Skeletal dysplasia visualised using MRI

Daniela Prayer

In July 2009, Daniela Prayer MD. was appointed Professor of Neuroradiology at Vienna Medical School and Director of the Clinical Department of Neuroradiology and Musculoskeletal Radiology at the University Clinic of Radio Diagnostics, one of the worldwide leading centres of prenatal MRI.
Dr Prayer is a member of the board of the Austrian Society of Perinatology as well as the International Society of Prenatal Diagnosis. Her research focuses on epilepsy, brain tumours, degenerative diseases and diffusion tensor imaging (measuring the diffusion movement of water molecules in body tissue using MRI) of peripheral nerves.

Almost all foetal body parts (e.g. face, neck, thorax, abdominal organs, surplus renal tissue) as well as maternal tissue can be reliably and precisely visualised in prenatal MRI. Brain development can be assessed with almost histological precision. Detection of the intrinsic movements of organs in real time is also possible. 'If a foetus with a stenosis in its oesophagus has problems swallowing amniotic fluid,' Dr Prayer explained, 'this can be detected with the help of prenatal MRI, which enables obstetricians to plan for possible post-partum surgical procedures.'

The good news for clinical practice is that high quality prenatal MRI does not necessarily require state-of-the-art technology, e.g. a 3-Tesla or even 7-T system. 1.5-T can yield very good results, Dr Prayer believes. Whilst she uses 3-T for research she said, 'If and when the 3-T will dominate foetal imaging is entirely unclear. But we expect to be able to answer this open question in about half a year.'

MRI applications continue to expand, she said. 'We are looking at morphology, but recently functional MRI has been allowing us to visualise connectivities in the brain, to observe non-brain organ development and to assess metabolic processes.'

As early as the 17th or 18th week of pregnancy, Dr Prayer performs resting state examinations to assess brain activity. This procedure will in the medium term allow categorisation of normal and deviant brain activities.

Initial results should be ready for publication in early 2011.

RSNA 2010

Chicago USA

28 November to 3 December

Refresher course: A focus on major contrast agent issues

The 90-minute refresher course '*Contrast Agent Issues 2010: What the Experts Really Do for Allergies, Contrast-induced Nephropathy, Nephrogenic Systemic Fibrosis, and Extravasation*', to be held during this year's Radiological Society of North America meeting, will focus on the use of iodinated and gadolinium-based contrast media and the issues, advantages and considerations for patient groups. The use of premedication in patients at increased risk of having adverse reactions, current thinking about contrast-media induced nephrotoxicity and recent developments concerning NSF and extravasation will be examined.

In an interview with *Mark Nicholls*, the session leader **Dr Richard Cohan**, Professor of Radiology at the University of Michigan, Ann Arbor, explained: 'We believe that all these issues are important, with nephrotoxicity and nephrogenic systemic fibrosis of particular interest at present due to a number of interesting developments. The aim is to raise awareness and suggest options for preventing adverse outcomes after contrast material is administered. Contrast material is used frequently and at high doses by radiologists throughout the world. As a result, it is imperative that radiologists and any other physicians who administer contrast agents be aware of the issues related to its use and of important recent developments.'

The specific learning objectives of the session include the utility and use of premedication in patients at increased risk of having adverse reactions to iodinated and gadolinium-based contrast media; current thinking about contrast-media induced nephrotoxicity, including the frequency with which it occurs, whether there are patients at increased risk, and whether any measures can minimize the likelihood of its developing; recent developments concerning NSF, including postulated mechanisms and the recent changes in FDA guidelines; and also a review of contrast media extravasations, including the frequency with which they occur, how often severe injuries develop, and whether there is any effective treatment.

Speakers include Dr James Ellis (University of Michigan), Dr Jeffrey Newhouse (Columbia University), Dr Jeffrey Weinreb (Yale University) and Dr Cohan.

Dr Ellis will focus on allergies, with his discussion including a review of which patients should be prepped, whether there is any cross-reactivity between gadolinium and iodinated-based agents, the effectiveness of steroids and with specific premedication regimens.

Dr Newhouse will address Contrast-Induced Nephrotoxicity (CIN), posing the question of whether it actually exists and if some patients are at greater risk, as well as looking at the effectiveness of prophylactic measures and the type of contrast-enhanced imaging to recommend for patients with varying levels of renal insufficiency.

Dr Weinreb will review the current status of NSF, which agents have been associated with the most cases, precautions that should be taken and current EMEA, American College of Radiology and FDA recommendations concerning the use of gadolinium-based contrast agents.


Richard Cohan

Dr Cohan, who is also Chair of the American College of Radiology Committee on Drugs and Contrast Media, will conclude the session on extravasation (the accidental administration of intravenously infused medicinal drugs into the surrounding tissue, either by leakage or direct exposure), with his talk addressing the likelihood that a serious injury will develop once an extravasation occurs and whether there is any effective treatment.

Overall, Dr Cohan said, the dose issue is complicated with respect to the use of contrast agents. While some adverse outcomes are clearly dose-related, others are not.

'For example,' he said 'reducing dose is a felt to be a factor in preventing contrast induced nephrotoxicity. However, allergic reactions are not dose-related and can be triggered when even a very small volume of contrast material has been injected. 'Yet, in comparison, in high risk patients with severe chronic kidney disease, NSF is felt to be more likely to develop in patients receiving large doses of gadolinium-based contrast material, while patients with normal renal function, who are not at high risk, can receive large doses of gadolinium-based contrast material without a problem.'

He added that with the appearance of NSF, the choice of whether to use iodinated or gadolinium-based contrast material patients with severe chronic or kidney disease or acute kidney insufficiency has become much more complicated.

Breast Tomosynthesis Detects Smaller Cancers at Earlier Stages

CHU Tivoli Hospital, La Louviere, Belgium

Breast Clinic radiologists say they can see abnormalities better with tomosynthesis than with two-dimensional mammography, and they are finding smaller cancers earlier.

„Our radiologists prefer tomosynthesis to digital mammography because of the additional views," states Dr. Gosset. "I prefer tomosynthesis because it wins time by finding cancer earlier."

A pioneer in the use of leading-edge technologies for the early detection of cancer, the Breast Clinic at CHU Tivoli hospital began offering digital tomosynthesis at its breast clinic two years ago, installing a Hologic Selenia® Dimensions® tomosynthesis system. "I see abnormalities better with tomosynthesis than with two-dimensional mammography, and I am finding smaller cancers earlier," explains radiologist Johan Gosset, M.D, Head of the Breast Clinic. "Three years ago I only found three or four architectural distortions in a year. Now I find 50 in a year. Tomosynthesis is a great benefit."

A teaching hospital, located in La Louviere in the Central Region of Belgium, CHU Tivoli is the third largest hospital in the region and the only hospital in the area to offer tomosynthesis.

While digital mammography has greatly improved the detection of breast cancer, dense breasts or overlapping breast tissue make it difficult to correctly identify lesions. "Our radiologists prefer tomosynthesis to digital mammography because of the additional views," states Dr. Gosset. "I prefer tomosynthesis because it wins time by finding cancer earlier."

"The advantage of tomosynthesis is to provide multiple views of the breast." explains Dr. Gosset. "Tomosynthesis allows us to obtain a more precise view of lesions. It improves the visibility of masses and architectural distortions. I can see the margins and determine if an abnormality is a possible small cancer. And with tomosynthesis I can see anomalies that I don't see with two-dimensional mammography and can catch much smaller cancers with tomosynthesis."

Initially, the Breast Clinic used tomosynthesis as a diagnostic tool for abnormalities as well as for the localization of microcalcifications. After two years of experience, it now uses the modality for regular screening mammograms for all patients.

Tomosynthesis is helping CHU Tivoli keep its commitment to provide patients with cutting-edge technology that will improve outcomes and their quality of life. Concludes Dr. Gosset, "In the end, the greatest benefit of tomosynthesis is time for the patient and the doctor."


"Three years ago I only found three or four architectural distortions in a year. Now I find 50 in a year. Tomosynthesis is a great benefit," says Johan Gosset, M.D, Head of the Breast Clinic.

Joerg Larsen MD FRCR and **Andrea Martini**, of the Clinical Radiology Department, Weende Teaching Hospitals, Gottingen, Germany, describe a new MRI technique that is finding its place in the diagnosis and staging of malignant disease

DIFFUSION WEIGHTED WHOLE BODY MRI

Malignant diseases rank second in mortality rates in Germany. These patients thus receive a major proportion of ambulant and hospital care, with apparent socioeconomic consequences. To optimise treatment planning, for all solid tumour entities it is mandatory to delineate or stage the primary extent of tumour invasion and spread prior to therapy as precisely as possible.

The most widely used staging method is the TNM-system developed by the American Joint Committee on Cancer (AJCC) and the International Union against Cancer (UICC). This classification considers the local advance, metastatic spread into loco regional lymph node stations and distant metastatic deposits. To evaluate the effects of therapy and, specifically, identify recurrent disease as early as possible, follow-up examinations are required.

Computed Tomography (CT)

CT has become the standard technique in diagnostic cross-sectional imaging. Progress in technical developments with helical and sub-millimetre scanning, as well as multi-slice detector systems, are increasingly permitting high temporal and spatial resolution acquisition of volume data. Advances in image reconstruction algorithms as well as contrast media application protocols have followed these developments, adding informative value to data sets. Nonetheless, it must not be forgotten that CT contributes the highest proportion amongst the non-natural causes of ionising radiation to the overall population burden today.

PET-CT

By contrast, positron emission tomography (PET) is a nuclear medical imaging modality that may be combined with CT to improve spatial resolution, i.e. improve allocation of tracer uptake to specific anatomical details in the millimetre-range.

Patients are injected with a radioactive tracer molecule, most commonly ^{18}F-fluordesoxyglucose (FDG). This is taken up by all cells throughout the body, although a hydroxyl group of the glucose molecule has been replaced by the radionuclide 18F. Since FDG-6-phosphate is not metabolised once phosphorylated, it accumulates. The bodily distribution of FDG then permits inference with the glucose metabolism of different tissues. Given that tumour cells tend to consume larger than normal amounts of glucose due to a general increase in metabolism, differential FDG uptake may indicate malignant growth at an early stage. In PET-CT, functional information from PET is thus combined with high spatial resolution CT-data through image fusion.

It is noteworthy that the radiation exposure through a PET-examination alone is of the order of 5 mSv, to which the burden of the CT-scan must be added (approximately 10 mSv for a CT of, e.g. abdominal and pelvic cavities). A particular difficulty arises from the fact that the liver itself is a powerful glucose store, wherefore it physiologically shows a significant uptake of ^{18}F-FDG in the healthy state. The sensitivity of FDP-PET-scanning with respect to focal liver lesions, such as metastases, is thus reduced.

Diffusion Magnetic Resonance Imaging (MRI)

Diffusion MRI is a further imaging method that provides functional information in the area of neoplasia. The process of diffusion principally describes the spontaneous mixing of gases and fluids that are in intimate contact with one another. Diffusion also refers to the equalisation of concentration gradients in solutions.

Diffusion occurs due to thermal motion or, in the case of particles, due to Brownian motion. When measuring diffusion in clinical MRI it is only the extracellular water that contributes to signal intensity. The size of the extracellular space consequently determines image contrast.

MR diffusion imaging using echo-planar imaging techniques has been successfully used in cranial imaging for many years, most commonly to detect restricted diffusion from cytotoxic oedema in areas of ischaemic stroke. However, diffusion imaging is equally helpful when considering other pathologies, specifically solid tumours and epidermoid cysts (increased cellularity), vasogenic oedema (facilitated diffusion), abscess formation (restricted diffusion), haematomas and axonal (neuronal) injury following, for example, cranial trauma.

DWIBS

In the last few years, diffusion imaging has been further developed: most recently the short-TI-inversion-recovery-echo-planar-imaging sequence (STIR-EPI) with a high so-called B-factor has become available, which may be utilised on any body part, even while the patient is breathing freely.

This sequence, termed Diffusion Weighted Whole Body Imaging with Background Body Signal Suppression [DWIBS] (Koninklijke Philips Electronics N.V., Eindhoven, The Netherlands), permits longer scan times than those usually tolerated by patients who need to hold their breath throughout a sequence. Furthermore, a higher than usual number of excitations and signal read outs per slice can be chosen in order to increase the signal-to-noise ratio, which in turn improves overall image quality.

Finally, slice thickness may be reduced to achieve single image volume elements of near equal edge length (isotropic voxels) which allows 3-D post-processing of data sets as in PET-CT.

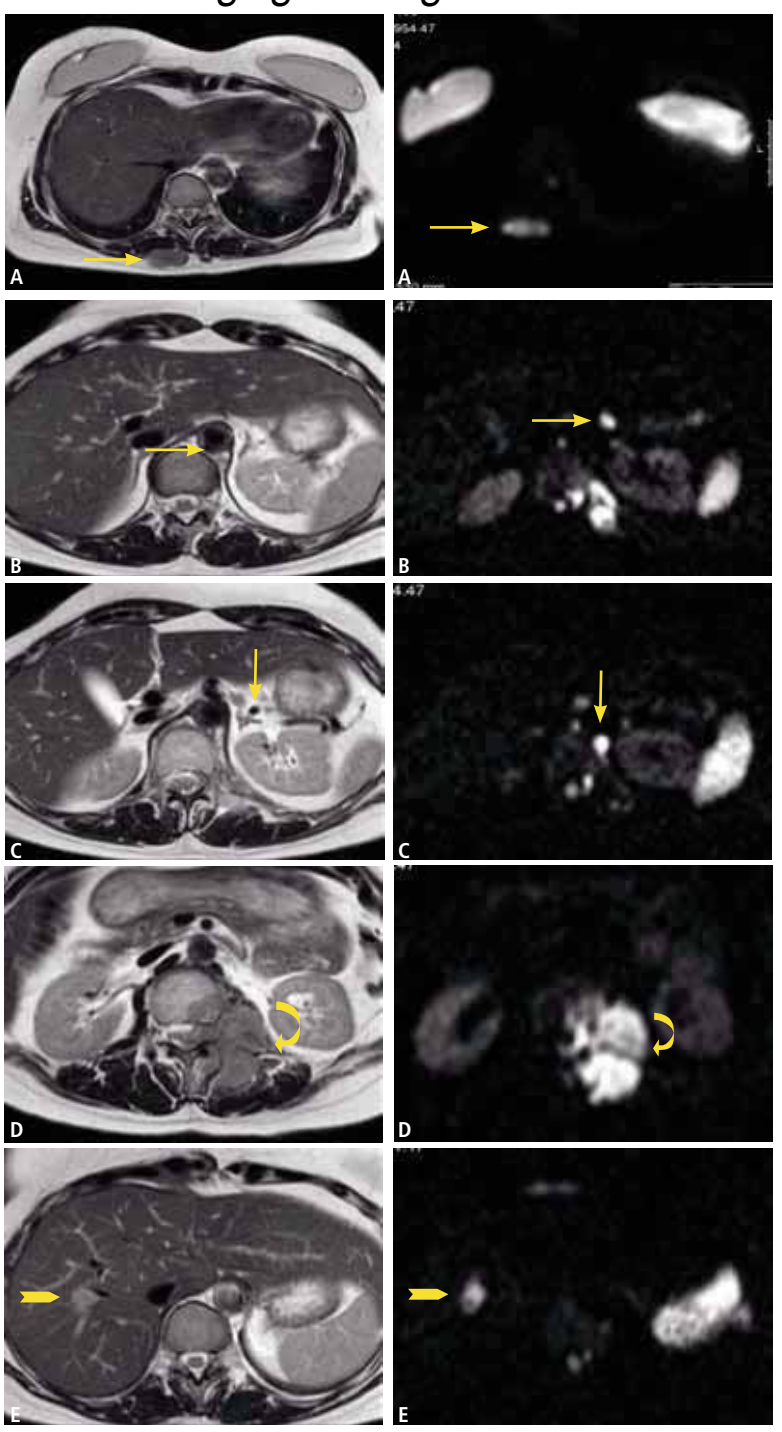
In contrast to the more commonly used spectral fat suppression technique (SPIR) in diffusion imaging of the brain, fat suppression in DWIBS is achieved through an IR-preparation pulse (STIR), which provides a more homogeneous suppression, specifically in the periphery of the tissue being examined. Through this potent fat suppression, a non-overlapping maximum-intensity projection (MIP) only of restricted diffusion areas becomes possible, enabling the understanding and appreciation of all pathologies at a glance. However, to date, it remains unclear as to why the method functions while the patient is breathing, since it is assumed that motion-probing-gradients that are applied to moving objects don't produce significant signal.

Therefore, intuitively it does not seem sensible to use such gradients while a patient is breathing, although there are physiological phases of stagnation throughout a normal respiratory cycle and these gradients are being used at very short time intervals of approximately 50 ms (shorter than time to echo). Thus, motion-probing gradients applied during periods of respiratory motion cessation in fact do result in signal return.

Since a number of excitations and read-outs are carried out for each image slice and after signal averaging, this signal achieves meaningful levels throughout a respiratory cycle.

Expectedly, preliminary studies at 3 Tesla suggest that one may exploit the higher field strength to gain signal relative to image noise, albeit at the cost of increased artefacts.

Finally, lesions need to be fully evaluated using ADC-mapping, whereby multiple (≥3) b-values should be used



T2-w transverse-axial MRI sections (left) and corresponding DWIBS images (right) from a patient with widespread metastatic disease from breast carcinoma: (a) metastatic deposit (arrow) superficial to right erector spinae muscle [note breast implants], (b) left retrocrural deposit, (c) left para-aortic lymph node metastasis, (d) left paraspinal metastasis, which erodes the vertebral body and infiltrates the adjacent neuroforamen, and, (e) hepatic deposit in segment 7 [note the hyperintense spleen]

for ADC calculation. For clinical purposes, DWIBS is thus characterised by rapid data acquisition, relative lack of image artefacts as well as the lack of need to administer contrast medium, but does require time for interpretation. In this respect, standards for DWIBS-imaging have still to be agreed upon.

Biological background and research findings

While the exact explanation has not been found for the discovery that diffusion in malignant tumours is restricted, this may be due to a higher cellularity with consequent higher density of diffusion barriers compared with healthy tissues.

Considering data published so far, DWIBS-imaging seems to be highly sensitive for many malignant tumours that return hyperintense signal relative to normal tissues. This is true both for primary tumours as well as lymph node and distant metastases (Images a-d), except for haemorrhagic malignancies and osteoblastic metastases. Destructive and infiltrating bone lesions (e.g. multiple myeloma), lymphoma and gastrointestinal malignancies appear to be particularly well demonstrated. However, specificity has been found to be less than sensitivity, although there may be fewer false-positive findings than with PET-CT. Additionally, there are nonetheless a number of limitations and restrictions that apply to current data: not unexpectedly, artefacts do in fact occur in DWIBS examinations, including movement-, specifically respiratory motion-artefacts, geometric distortions and susceptibility artefacts, e.g. around metallic implants.

Several cohorts of primary tumours, lymph node and distant metastases have been studied to date. These were, in part, rather heterogeneous with respect to tumour entities. Furthermore, most of these samples were relatively small – between 12 and 200+ cases.

Finally, besides malignant lesions, a number of normal anatomical structures as well as certain benign pathologies were found to be hyperintense on DWIBS in healthy subjects. Importantly, this is not the case with hepatic parenchyma. The liver may thus, in contrast to PET-CT, be well considered by DWIBS imaging (image e).

Outlook - Tumour staging and follow-up play a major role in daily clinical radiology practice. Both are integral to optimised treatment planning and patient management. Commonly, a number of different imaging modalities are utilised in parallel or in sequence: first and foremost the cross-sectional ultrasound techniques, CT as well as MRI and, lately, specifically including the combination of structural imaging with nuclear medicine applications through PET-CT.

Irrespective of the completely different technique, the recently introduced Diffusion Weighted Whole Body Imaging with Background Body Signal Suppression produces images highly similar to PET-CT-derived appearances and, of course, MRI is rather more available and less costly than PET-CT.

Most of the methods described require a substantial commitment in terms of time and finance. With repeated follow-up examinations, CT also carries a significant radiation burden while the need to administer contrast medium has additional costs, potential side effects and may be obsolete in the case of a previous adverse reaction. DWIBS imaging of pregnant patients and children is of particular interest in this respect.

If diffusion weighted imaging with background body fat suppression proves to be comparable to current gold standards in the delineation of tumour spread, and given their relative limitations, DWIBS is highly likely to become a valuable part of the routine diagnostic repertoire, certainly for some tumour types. Specifically, given that PET-CT has a certain blind spot with respect to liver lesions, the role of DWIBS in staging hepatic spread is of considerable interest.

Contact for article references: larsen@ekweende.de

Three megapixel greyscale display with ISD technology and FDA Mammography approval

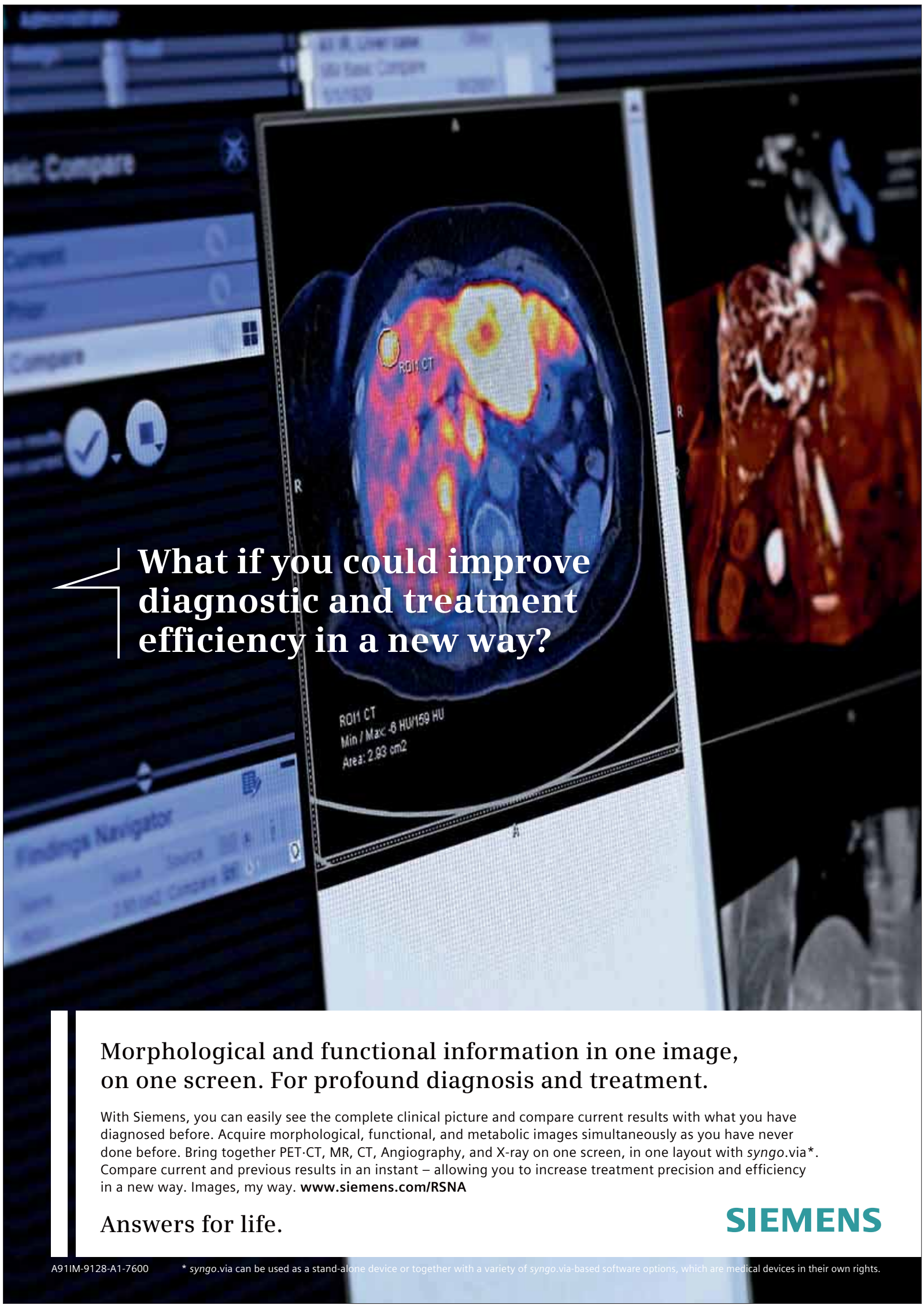
With the greyscale display MS31i2, Totoku has introduced the first 3 Megapixel with ISD Technology. The high resolution display is suitable especially for X-ray diagnosis and thorax images, the company reports, adding: 'With its high brightness of up to 1500 cd/m² it offers a very long backlight lifetime.'

The Totoku MS31i2 is the first display with a resolution of less than 5 Megapixel to have received Official certification for Mammography Diagnostics use from the US Food and Drug Administration. 'This was finally possible due to the three times higher ISD resolution of 9 Sub-Megapixel,' the company explains.

The brilliant resolution results from the newly designed and patented Independent Sub-Pixel Driving (ISD), which utilises the sub-pixel of the LCD panel independently, offering a pixel pitch of 70µm instead of the usual 210µm. 'This offers a three times higher resolution without any disadvantage in quality,' Totoku points out. 'All ISD products also support the latest enhanced ISD technology, which supports more than true 10-Bit greyscale and ISD at the same time. This is further supported by the newly developed anti-reflection coating, which decreases the noise and improves the contrast and viewing angle.'

With specially developed uniformity correction the display is split into several areas, which are extensively measured, the company adds. 'A combination of hard- and software adjusts the display now based on the measurement data to achieve a uniform brightness on the entire screen. The result is a perfectly levelled brightness on the entire screen. In addition to this the Lambda-Sentinel-II secures a constant image quality over the entire lifetime of the display. Together with the newly developed network software PM Medivisor Pro the result is a powerful solution that helps the administrator to solve trouble even before it appears to the user.'

Full details: www.totoku.eu



Modern radiological diagnostics for the evaluation of muscle diseases

By Erick Amarteifio[1,2], Hans-Ulrich Kauczor[1], and Marc-André Weber[1,2]


Erick Amarteifio


Hans-Ulrich Kauczor


Marc-André Weber

Muscular diseases belong to a heterogeneous group with various causes like neurogenic, metabolic, dystrophic, or inflammatory mechanisms as well as channelopathies leading to disorders of the muscle cell membrane potential. In most progressive disease cases the result is a focal or general muscle weakness that, unfortunately, is a very unspecific symptom. Standard neuromuscular literature suggests that radiological imaging would play an inferior role because of absent pathognomonic findings.

Why does radiologic imaging hold low significance in the case of muscle diseases? Routine magnetic resonance imaging (MRI) protocols will only show morphology and demonstrate oedematous changes, lipomatous changes, atrophy or hypertrophy (Fig. 1). Unfortunately, these morphologic changes are not specific. Morphologic changes such as consecutive muscle haematoma after blunt trauma can be shown nicely, but the huge group of myopathies of different origins cannot be differentiated further because the underlying (patho-)physiology is not demonstrated.

The following short review introduces some examples of modern functional imaging methods for evaluation of muscle diseases.

^{23}Na magnetic resonance imaging

Standard MRI bases upon depiction of protons (^{1}H) basically of water and carbohydrate compounds in the human body. ^{23}Na MRI uses the tissue sodium ions (Na^+) for image acquisition. A limiting factor is the fact that the emitted signal of Na^+ ions is about 20,000 times lower than the emitted signal of ^{1}H. Another limitation is the short T2-relaxation time of Na^+ ions, which generates a low signal to noise ratio and thus requires long examination times. Moreover, specific hard- and software is needed, for example a double resonant birdcage coil that can work with the resonance frequency both of sodium cores (16.8 MHz at 1.5 Tesla; 76 MHz at 7 Tesla) and proton cores (63.6 MHz at 1.5 Tesla; 300 MHz at 7 Tesla). This technique has effectively achieved value in the radiologic management of muscle sodium channel diseases.

In the affected patients, an autosomal-dominant bequeathed defect of muscle Na^+ channels leads to a pathologic Na^+ influx, which causes intermittent or permanent muscle paresis as well as muscle stiffness (Fig. 2A). Typical triggers are exposure to cold or ingestion of potassium-rich food. The diseases appear rarely, examples would be hyper- and hypocalcaemic periodic paralysis or paramyotonia congenita. ^{23}Na MRI is able to depict an intracellular muscle sodium accumulation simultaneous to the development of muscle paresis or muscle stiffness (Fig. 2B). The sodium accumulation correlates well with the grade of paresis and is reproducible. Using special ^{23}Na MRI sequences, a sufficient monitoring of therapy is possible. For example, mexiletine can block pathologic cellular Na+ channels in patients with paramyotonia congenita, which increases the patient's muscle strength.

With ^{23}Na MRI, a simultaneous decrease of muscle Na^+ content becomes visible. Another example is hypocalcaemic periodic paralysis that goes along with intramuscular ^{23}Na accumulation and consecutive muscle oedema. Young patients suffer from muscle oedema, which at a young age can be the only morphologic transformation of their muscle tissue. With proceeding age, a lipomatous degeneration of muscle tissue will take place and the patients develop a permanent muscle weakness, which, however, even then can sufficiently be treated with acetazolamide. The muscle oedema as well as muscle weakness will disappear under treatment, and muscle strength will increase. Recently, the development of ^{23}Na MRI at field strengths of 3 to 7 Tesla (standard are 1.5 Tesla devices) allows for a more precise quantification of intracellular ^{23}Na homeostasis.

^{31}P-magnetic resonance spectroscopy

^{31}P-magnetic resonance spectroscopy was introduced in the 1980s, aiming to evaluate the energy metabolism of muscle tissue. The phosphorous magnetic resonance (MR) spectrum demonstrates several peaks of specific energy metabolites, such as phosphocreatine, which mirrors a typical short-time energy deliverer, as well as inorganic phosphate that is a degradation product. Moreover, adenosine-5´ triphosphate, necessary for muscle contraction, as well as phosphodiester, can be extrapolated. When the chemical shift of inorganic phosphate to phosphocreatine is analysed, the intracellular pH-value can be calculated.

These techniques can successful be used in vivo during muscle exercise and can depict a decrease of phosphocreatine during isometric trial. The technique offers a useful diagnostic tool: For example, in patients suffering from the glycogenosis McArdle`s disease, the muscle glycolysis is disturbed, and the physiological decrease of pH-value due to lactate production does not take place. This can reliably be demonstrated in patients with glycogenosis McArdle's disease using ^{31}P-MR spectroscopy.

Several research groups tried to find a specific pattern using ^{31}P-MR spectroscopy, but the muscle degeneration finally leads to lipomatous conversion and consecutive loss of high-energy phosphates within the spectrum that can finally be regarded in all chronic myopathies. Moreover, the cross-sectional area of muscle fibres correlates with the amount of phosphocreatine and adenosine-5´ triphosphate. This correlation makes sense, as both metabolites are necessary for muscle contraction. Further developed ^{31}P-MR spectroscopy related imaging techniques allow a spatial illustration of the received phosphocreatine signal and thus a two-dimensional illustration of the muscle energy level.

Proton (^{1}H)-MR spectroscopy

This method has reached a high level of acceptance, because it delivers the opportunity to quantify intramyocellular lipids. Further interesting metabolites are phosphocreatine, choline as marker for rebuilding of the cell membrane, or extramyocellular lipids that are present within the lipomatous intermuscular connection tissue and the subcutis.

However, intramyocellular lipids show a highly inter-individual variability and it is obvious that different physical conditions of muscles obtain different concentration of this lipid fraction. Therefore, it sounds paradoxical that athletes show a high level of intramyocellular lipids and high insulin sensitivity of their muscle tissue. But the intramyocellular lipids serve as energy donators for the muscle mitochondria. Physical work leads to a decrease of intramyocellular lipids. Interestingly, untrained patients suffering from type 2 diabetes with peripheral muscle insulin resistance show a high level of intramyocellular lipids, too.

In the end, many parameters influence the level of intramyocellular lipids, e.g. dietary nutrition, sex, gender, body-mass-index and the oxygen content of tissue. Additionally, modern spectroscopic techniques deliver the possibility of spatially visualising the evaluated resonance peaks with aid of parametric colour maps.

Whole body MRI

Using whole body MRI, the entire human body can be examined within a single examination. It is necessary that the patient has to be completely covered with coils (Fig. 3a). The examination lasts up two about 60 minutes, whereas the duration depends on the protocol and sequence design, for example turbo-spin-echo and gradient echo sequences

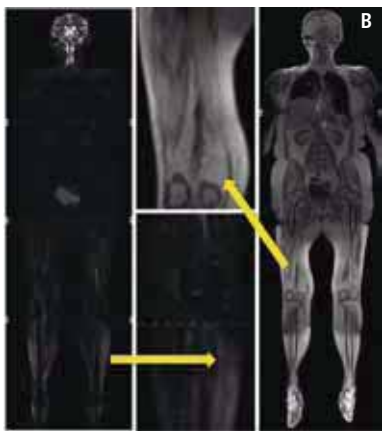


Fig. 3: Example of a completely covered patient during a whole-body MRI examination (a). Whole-body MRI of a 67-year-old with sarcoidosis associated chronic myositis. Cleary visible are lipomatous changes of the lower limb as well as oedematous changes (b)

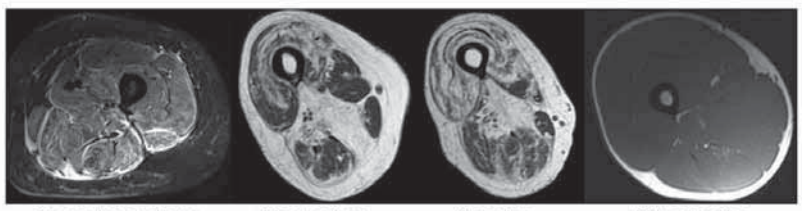


Fig. 1: Typical pathologic changes of muscle tissue shown in standard proton (^{1}H)-magnetic resonance imaging (MRI)

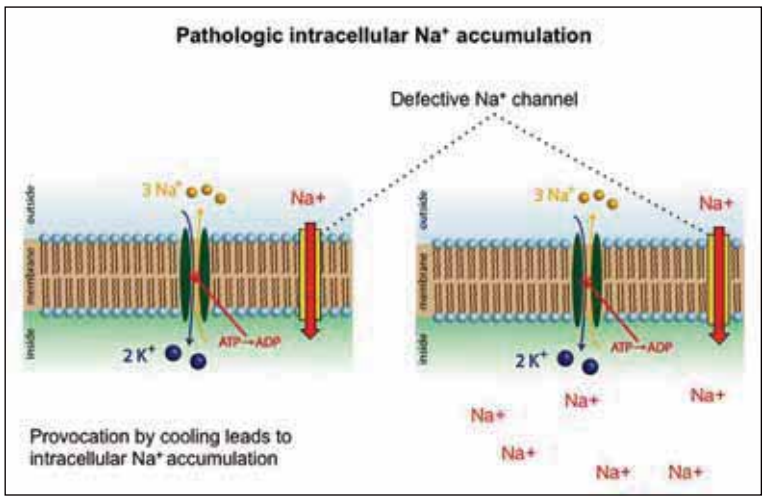


Fig. 2a: In muscle sodium channel diseases, a defect sodium channel within the muscle cell membrane leads to a pathologic influx of Na^+ after provocation with typical triggers, e.g. exposure to cold. Results are muscle weakness or muscle stiffness

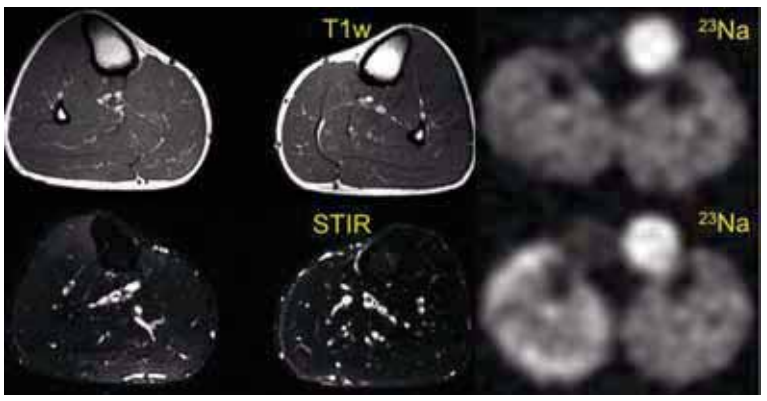
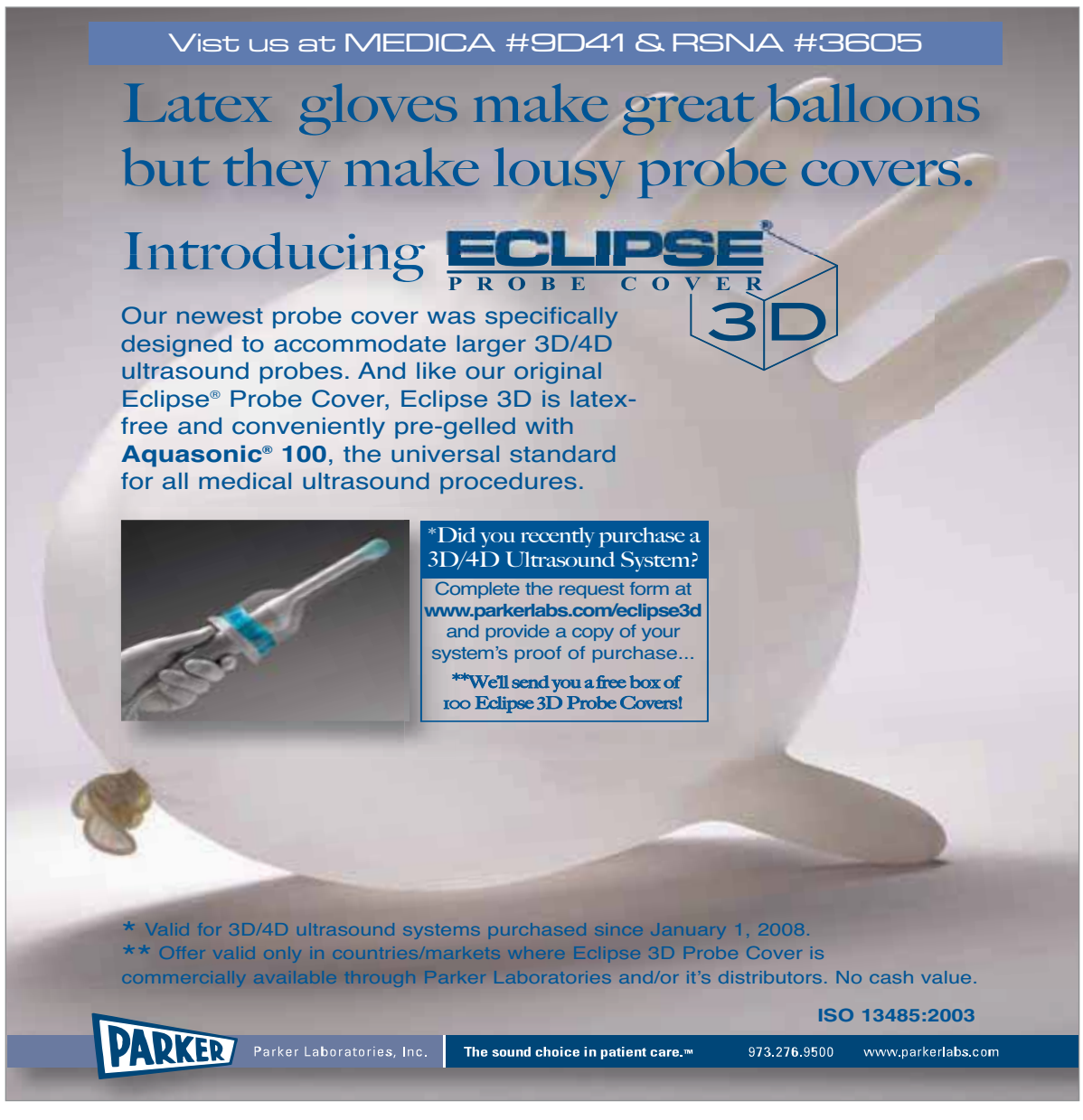


Fig. 2b: The intracellular Na^+ accumulation can nicely be visualised with ^{23}Na MRI. While standard T1-weighted and STIR 1H-MRI showed no signal abnormalities after provocation by cooling in this patient with paramyotonia congenita, an intracellular sodium accumulation within the right lower leg's muscle tissue was shown by ^{23}Na MRI



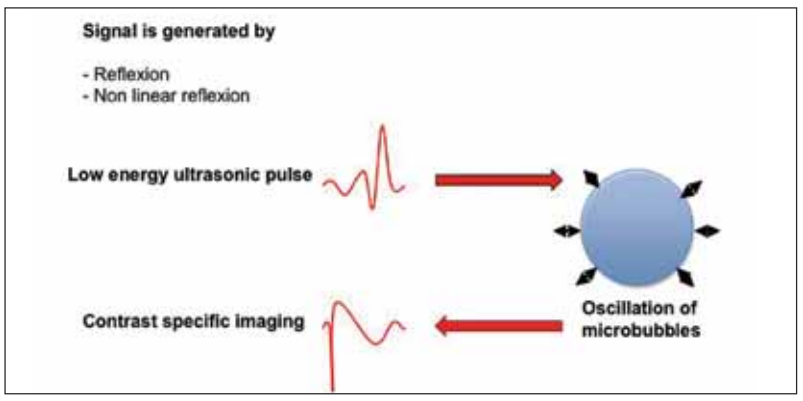


Fig. 4: Contrast-enhanced ultrasound – 'non-destructive imaging': An ultrasonic pulse of low energy level hits microbubbles, causing their oscillation, which emits an echo. 'Harmonic' effects are the relevant mechanisms that allow image acquisition. Advantage: the opportunity of real-time imaging. The most important contrast media are those of 2nd generation, e.g. SonoVue (Bracco Imaging SpA, Milan, Italy), that are mechanically more stable than contrast media of the 1st generation, e.g. Levovist (Bayer AG, Leverkusen, Germany)

require comparatively less time than spin-echo sequences. To diagnose muscle disorders, axial and coronal T1-weighted sequences, as well as axial and coronal short-time inversion recovery (STIR) sequences with fat saturation, i.e. suppression, are useful (Fig. 3b).

Contrast media is not needed in most cases. When a biopsy is planned, adequate targets can regularly be found using MRI, e.g. in suspicion of dermato- or polymyositis. The diseases must be diagnosed quickly because, unlike many other muscle diseases, they can be treated successfully with immunosuppressive therapy. Unfortunately, they lead to irreversible muscle weakness when the diagnosis is missed.

A central problem is that muscles may be affected focally, and false negative biopsy findings are found up to 25% in random biopsies instead of image-guidance. In MRI, common findings are oedematous changes of the muscle tissue, which can be identified and mapped using whole body MRI. With the image-guided biopsy, fatty degenerated muscle tissue can nicely be differentiated from oedematous affected muscle tissue as an indication for acute inflammation. However, the pathologic changes of muscle tissue are not very specific. For example, rhabdomyolysis, muscular dystrophy or acute neuromuscular denervation can appear with muscle oedema, too. Generally, oedematous changes give an indication for an acute happening, whereas lipomatous degeneration is observed in chronic stages of disease.

Contrast enhanced ultrasound

Usually, B-mode ultrasound (US) is the first practiced and the most frequently used examination to evaluate muscular disorders. The outcome of sports accidents like ruptures of muscle fibres, haematomas, ruptures of ligaments or extrusion, can well be demonstrated.

In recent years, the development of US made it possible to visualise (patho) physiological information about muscle microcirculation. Ultrasound contrast media are stabilised microbubbles that stay within the vasculature and thus can be used to evaluate capillary muscle perfusion.

US contrast media of the first generation consist of microbubbles that are burst using high energy US pulses. During the burst, an US signal is emitted, a so called stimulated acoustic emission (SAE), and can be received. Using this technique, increased muscle tissue perfusion in correlation with an increased number of capillaries could be evaluated. During rest, endurance trained athletes obtain an increased muscle tissue perfusion combined with a high density of capillaries compared with non-trained volunteers. Moreover, the quantified local blood volume within the selected US slice correlates with the aerobic capacity and with the perfusion evaluated with venous occlusion plethysmography.

In the case of confirmed dermatomyositis or polymyositis, a significantly higher muscle perfusion compared to healthy volunteers was shown. Additionally, the oedema visible in B-mode US underlines the suspicion of acute myositis. In the case of confirmed polymyositis, immunosuppressive therapy causes increased muscle strength, reduction of creatine kinase level and decreased muscle perfusion at rest.

The first generation US contrast media was disadvantaged in that an evaluation of local perfusion in real-time was not possible. For example, examination during muscular exercise could not be performed. Second generation US contrast media like SonoVue (Bracco Imaging SpA, Milan, Italy) are not destroyed by US waves but are put into oscillation (Fig. 4).

Special US techniques enable the detection of oscillating microbubbles, separation from muscle tissue and deliver the opportunity to assess muscle tissue perfusion in real time. Depending on the grade of isometric physical exercise, a reduced perfusion due to compression of muscle venoles can be observed. At the end of physical exercise an increased US signal could be detected due to reactive hyperperfusion. These findings showed that the resulting hyperperfusion depended on the grade of muscle exercise.

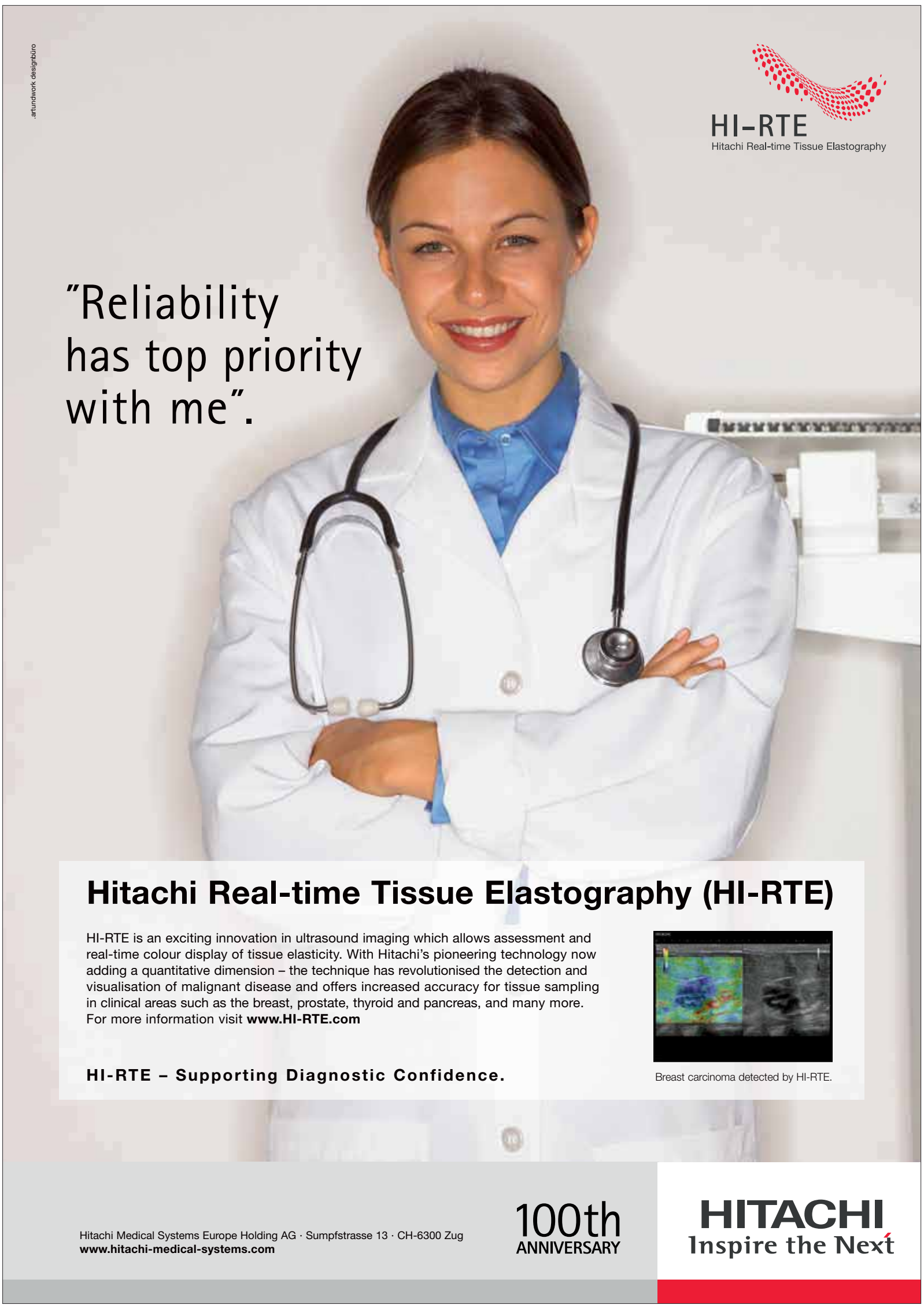
Further techniques

Until now, further interesting techniques to assess muscle physiology and pathophysiology have been developed, e.g. MR- or US-elastography, which enable evaluation of tissue rigidity and differences of tissue elasticity. Elastography is also beneficial to distinguish malignant tissue from normal tissue. With special MR sequences, e.g. diffusion-tensor-imaging, the distribution and integrity of muscle fibre can be evaluated.

In conclusion - Modern US and MR imaging facilitate much more than a simple evaluation of lipomatous, oedematous, hypertrophic or hypotrophic changes within muscle tissue. In addition, muscle microcirculation, sodium homeostasis, energy- and lipid-metabolism, muscle tissue elasticity, and distribution of muscle fibres can be examined.

We expect a much higher level of acceptance for these new techniques in the near future especially with increased knowledge and availability.

1. University Hospital of Heidelberg, Department of Diagnostic and Interventional Radiology, Heidelberg, Germany
2. Department of Radiology, German Cancer Research Centre, Heidelberg, Germany
Contact: Erick Amarteifio MD. Phone: +49-6221-5637265. E-mail: erick.amarteifio@med.uni-heidelberg.de



Real-time tissue elastography as a complementary procedure

Tissue hardness provides radiologists and gynaecologists with significant information to help distinguish between benign and malignant tumours. Tumour tissue is harder and less malleable than normal glandular and fatty tissues. Therefore, the classification of tissue hardness determines whether a biopsy is necessary. For breast diagnoses, real-time tissue elastography, along with conventional B-image ultrasound, helps to improve diagnostic specificity through tissue hardness analysis. In Germany, a multicentre study has released important findings on the suitability of sonoelastography in clinical practice. Involved in the study, **Dr Thomas Fischer**, at the Institute for Radiology, Charité Berlin, and **Professor Friedrich Degenhardt**, Senior Consultant at the Gynaecology and Obstetrics Clinic in Franziskus Hospital Bielefeld, discussed the study findings with *European Hospital*


Thomas Fischer


Friedrich Degenhardt

The value of previous sonoelastography studies has involved only small cohorts of patients. At the Charité Berlin, in Bielefeld-Herford and in Bad Homburg, data from 779 patients was evaluated*. Following the discovery of a lesion, each received an ultrasound-guided punch biopsy and analysis if their tissue samples then determined whether elastography delivers better results than B-image ultrasound. The data evaluation showed that, for certain subgroups, 'it is imperative that sonoelastography is carried out,' concluded Prof. Degenhardt. 'This includes patients with breast cancer in BI-RADS categories three and four. In these cases, sonoelastography allows for a much more explicit differentiation between benign and malignant lesions.'

Sonoelastography has a specificity of 89.5% compared to 76.1% for conventional B-image; the positive predictive value can also be significantly increased from 77.2% to 86.6%. For focal findings in the BI-RADS categories III and IV diagnostic accuracy improves significantly by using elastography and the data also shows improved specificity of 92.8% in the case of dense glandular parenchyma.

The data have resulted in a current study group recommendation to the American College of Radiology to include sonoelastography in the BI-RADS atlas, so that it can be used in a similar way to the power Doppler or the colour Doppler as a complementary procedure. 'Our objective is to see this procedure being used purposefully and comprehensively to help either to prevent a biopsy in the case of a clearly benign diagnosis or, in the case of an ambiguous diagnosis, to ensure that biopsies are definitely carried out if a lesion has been assessed as malignant based on the elastography,' Dr Fischer explained, and, Prof. Degenhardt added: 'We obtain the morphological information through the B-mode of the ultrasound and can gather additional, important information about the hardness of these lesions with elastography.'

Many medical technology manufacturers have now integrated elastography software into their ultrasound scanners as an additional option. The differences in the quality of the technology depend less on the elastography tool than on the B-image quality, Dr Fischer emphasised: 'If I don't find a lesion during the first step then I have nothing to carry the elastography out on. Therefore elastography will only ever be as good as B-image ultrasound implemented in the equipment, which is what points towards a suspicious area in the first place.'

Dr Fischer recommends that new, interesting developments, such as sheer wave elastography, should always be assessed as part of the whole picture: How good is the B-image? How good is the quality of elastography? How does the evaluation tool work? The improvement of primary B-mode screening is also close to his heart because it can spare patients an MRI scan, which some find claustrophobic, and a biopsy is also quite complex in the narrow tube. 'Although MRI is supersensitive, unfortunately it is also unspecific. However, despite this problem, we depend on MRI in certain cases to find certain types of lesions. Preliminary stages of breast cancer and invasive lobular carcinoma can be captured well by MRI, in their entirety. However, once they have been detected, we can then often also see them on the ultrasound and can then determine whether the tumours are benign or malignant via punch biopsy,' he pointed out. Elastography can also be used in a helpful way for this 'second look'.

** Multicentre Study of Ultrasound Real-Time Tissue Elastography in 779 Cases for the Assessment of Breast Lesions: Improved Diagnostic Performance by Combining the BI-RADS(R)-US Classification System with Sonoelastography. Wojcinski S, Farrokh A, Weber S, Thomas A, Fischer T, Slowinski T, Schmidt W, Degenhardt F.*

The HI VISION Preirus by Hitachi Medical Systems provides:

- Second generation graphical user interface with Smart Touch Technology
- Patient Scanning Selector (PSS)
- New image formats
- Patient Dependent Correction (PDC)
- Real-time Tissue Elastography (HI-RTE)
- Dynamic Contrast Harmonic Imaging (dCHI)
- Real-time Virtual Sonography (RVS)
- Biopsy Guidance
- Single Crystal Transducer Technology
- Full DICOM connectivity

This is imaging with a 'wow' effect: The Swedish Centre for Medical Image Science & Visualisation (CMIV) in cooperation with the Norrkoping Visualisation Centre has developed a 'Virtual Autopsy Table' that allows a unique look inside the human body and takes interaction with volumetric medical data to a new level. The table technology uses Dual Energy Computed Tomography and high resolution MRI, rendered and processed into 3-D-images to be shown on a 46' multi-touch glass screen. By moving and rotating the body hologram users can peel away layers of skin, muscle and bone with simple hand gestures – with no touching of the table-top.

Thus, said Professor Anders Persson, director and senior researcher at CMIV, what began as a university research project may become tomorrow's way of image analysis in operating theatres or radiology departments. *Karoline Laarmann* reports

'Absolutely,' responded Professor Anders Persson, when asked whether the new Virtual Autopsy Table developed at CMIV could do more than a 'CSI' kind of criminal investigation of the dead. 'The forensic aspect was just the origin of our national funded research project. The aim was to give the viewer a good and quick understanding of 3-D post-mortem anatomy and

CT and PET

When planning radiotherapy the combination of positron emission tomography (PET) and Computed tomography (CT) can provide a better outcome than CT alone. Michael Krassnitzer asked Terri Bresenham MSc, Vice President for Molecular Imaging at GE Healthcare, for her views on the value of PET/CT, the new EANM guidelines, novel tracers and the future of other hybrid imaging technologies


Terri Bresenham

Radiation therapy planning uses the anatomical structure to decide where best to focus radiation. 'By heightening the information of the metabolic clusters it's possible to spare more of the normal tissue and to deliver more intense radiation in the areas where there is more metabolic activity. Thereby, radiation therapy planning takes a leap forward. But we don't forget to do some research on different tracers, in addition to today's use of glucose,' Terri Bresenham explained. 'It's a very eciting area, because the process of understanding cancer is very complex.'

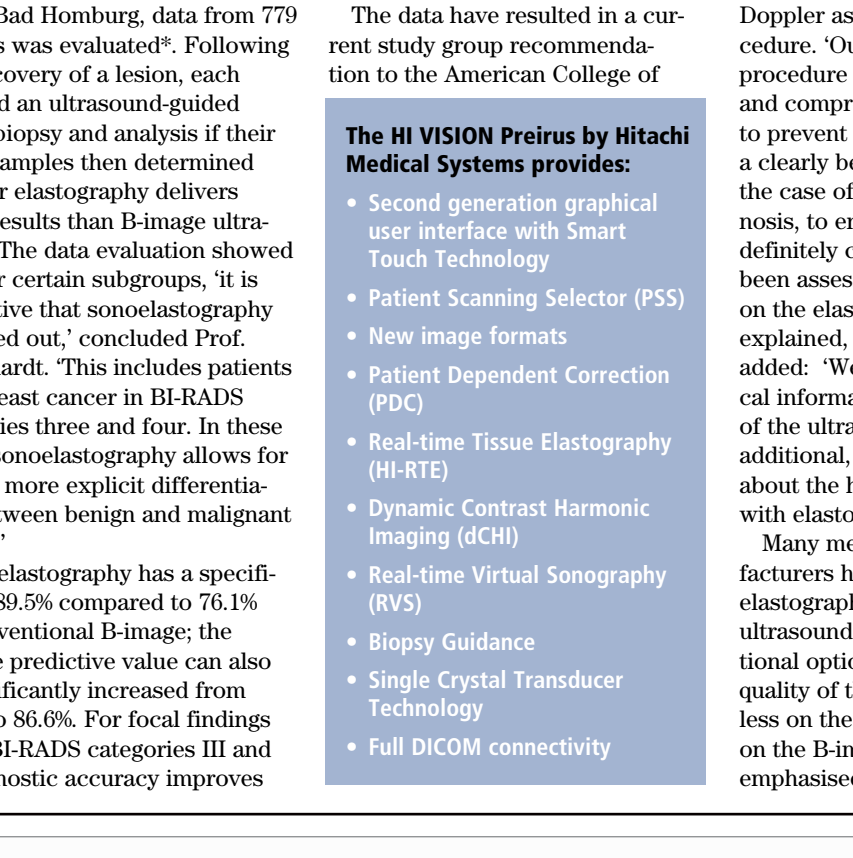
The European Association of Nuclear Medicine (EANM) recently published guidelines concerning the use of PET in radiotherapy planning. 'Previously, there were only guidelines in some countries as well as for certain cancers,' she pointed out. 'The newly established guidelines are a pioneering work. For therapy planning of particular cancers – tumours in the brain, head and neck, lung, and also gastro-intestinal, genito-urinary and gynaecological tumours – the guidelines show that the outcome is better

American-Made Precision and Quality

MEDICAL SCALES

Available from the DETECTO European Warehouse in the UK

DETECTO®
A Division of Cardinal Scale Manufacturing Co.



Visit us at Hall 12 Stand 12B33

FOLDING PORTABLE WHEELCHAIR SCALES

Detecto's model 6550 scale (shown left) offers extensive features all in one scale: sloped ramps on each side, battery or AC power, EMR-ready connectivity, Body Mass Index calculation, and high 300 kg x 0.1 kg capacity. The versatile scale's column can fold down and latch securely into position, ready for easy transport in four directions or vertical storage.


Eye-Level Physician Scales


Bariatric Scales with Digital Height Rods


Rolling Chair Scales

European Clinical Warehouse: Units 17/18, Mercers Road • Chapel Pond Hill • Bury St.Edmunds, Suffolk • England, IP32 7HX • Phone: 44.1284.703117 • www.detectoscale.co.uk

NEW

The virtual autopsy table

a possible cause of death. In this context we first had to develop a totally new software for Magnetic Resonance Tomography, called' synthetic MRI', to scan dead bodies. *Normally, the MR scanners are calibrated to 37°C body temperature. If you scan a cold body of 5°C, you have a really noisy image. Now temperature doesn't matter anymore, because we scan in only one sequence that provides quantitative tissue data.

'In daily clinical routine this one sequence technology has enormous potential: a complete brain scan can be accurately performed at high resolution in less than five minutes. This saves a lot of time. I believe that this is the future of MRI, because you can scan more patients, you have less data and it is a quantitative method. It can also be installed directly in to the PACS and a plug in, for 'Synthetic MR' is now available for the SECTRA PACS.

'The first software packages are already implemented in several hospitals, for example in a forensic department in Bern, Switzerland, and soon will also be installed in Zürich. At the CMIV, located inside the University Hospital in Linköping, we already use this technology in daily clinical routine, for forensic cases and clinical examinations on living patients. So this is not a research tool that stands in the lab or autopsy room far away from the living.'

What is the key to this virtual table technology? 'First, the graphic interface opens up totally new ways of interacting with image data. You don't need great foreknowledge to understand how it works, because it's so intuitive. You don't even have to touch the screen -- there are cameras inside the table filming your hands and adapting their movements into movements on the 3-D-hologram, which means you can also have it in the operating theatre, for example, where you have to keep everything absolutely sterile. The special thing about the visualisation in the table is that we have full resolution, even in clip playing. Normally, you suffer shadings in this mode, but we have the same resolution as in 2-D-imaging.'

Educational and other uses

Prof. Persson pointed out that the virtual table is a good educational tool because a deeper understanding of the body functions and processes can be gained,. 'Up to ten students can gather around it and interact collaboratively and simultaneously. So it's also the ideal platform for strategic surgical planning. Interdisciplinary teams can discuss the complexity of a case and define the surgical strategy before placing the first cut.'

Volumetric medical data handling

The main tool is volume rendering, he explained. 'This means that you map a certain opacity and certain colour value to image data. For example, for CT we use the Hounsfield scale in which the radiodensity of distilled water at standard pressure and temperature (STP) is defined in Hounsfield units (HU). Each pixel of the reconstructed image is assigned an X-ray attenuation value, which is expressed in HU.

The system renders about 40 images per second independent of the size of the data set that loads from the scanner. It's so fast because it only moves the information from the hard drive to the graphic board that you want to look at and is mapped by the volume rendering algorithm. This means you can have a 100 GB data set and only move 100 MB.

Availability

'We're still in the prototype phase, but worldwide interest in the table is so huge that we are still quite overwhelmed. Since our first presentations in July 2009, science centres and hospitals all over the globe have been calling us. So far we've built five tables and we're now preparing to implement a full PACS service into the table so that it's possible to retrieve images from the PACS server directly into the table. We're working closely with our partner Sectra Medical in this IT issues. We've also developed a plug-in for the synthetic MR. Let's hope that the first commercial tables will be ready for the RSNA 2010 in Chicago.'


Anders Persson

** A related European Hospital report appeared in issue 2/2008. Title: Radiologists are set to gain new control of images. Current source: http://www.european-hospital.com/en/epapers/157*

Improving radiation therapy planning

with the use of PET information. A lot of technology inherently has the disadvantage that scientific comparative effectiveness work has not been done to show the evidence. Doing this scientific work is a part of our responsibility.'

This is why GE healthcare supported the working out of the guidelines with research funds, she pointed out. 'In terms of technology innovation, GE Healthcare has a responsibility. We don't look only at the technology; we try to look at improvements in quality and in the costs of care because, in the end, the long-term sustainability of healthcare technology relies on the fact that it brings a limitation of costs and demonstrated quality improvement.

New tracers

'We are entering a period of discovery, in which everything that we know clinically today will completely change. There will be,' she forecast, 'a menu of specific tracers that we will use to get specific answers to our questions. You can couple this with advances in understanding the genomics, proteomics and metabolism. Knowing more about the basis of biology and biochemistry will enable us to build tracers that can identify those receptors or discover that biological process.'

Could CT remain the gold standard in radiotherapy planning? 'CT is a wonderful tool. I don't see that going away anytime soon,' she believes. 'Certainly the future of radiation therapy planning is CT accompanied by metabolic information from PET.'

What about other hybrid imaging techniques, e.g. PET/MRI and SPECT/CT (single photon emission computed tomography)? 'What will be overtaken is the use of SPECT without any CT. In the user's community there are many cameras that only have SPECT, hence no CT. That population of cameras gradually will be replaced with PET/CT, because they offer better diagnostics.

'PET/MR is a very interesting idea. There are plenty of papers that say that PET/MR would be absolutely the right tool to use. However, for today -- and probably for the next five to ten years -- the PET/MR-combination will be applied more in laboratory research than in clinical use.'

Radiology services: In or out?

How does a hospital decide what to do about in-house radiology if, for example, its consultant retires? Select a 'new broom' to brush out earlier practices, or make this an opportunity to redefine its radiology department's services and objectives? In the latter case, outsourcing to receive diagnoses from an external radiologist might be potentially interesting. However, **Dr Winfried Lessmann** (above), one of the founders and current director of the Radiology Network Rheinland, Germany, prefers a novel way of 'in-sourcing', *Daniela Zimmermann* reports

'Thirteen out of 20 locations within our RNR group, working in radiology and radiotherapy, are directly linked to a hospital,' explained Dr Winfried Lessmann, whose Radiology Network Rheinland (RNR) concept is unique in Germany. The Network covers in-patient as well as out-patient care, which consists of private patients as well as those whose treatment is covered by statutory medical insurance.

Basically, the business model aims to optimise efficiency and therefore cost effectiveness in radiology within an entire hospital. 'Restructuring radiology often means investing in a new range of equipment and introducing new procedures. Often there money, know-how and space are lacking for both of these,' he pointed out. 'Therefore, taking over a department often happens when a new construction or an extension is carried out. For example, currently our biggest customer is the Leverkusen Hospital, where we took over radiology services in 2007. We moved the nuclear medicine department into the main building on the campus. Moreover, we established a type of radiotherapy that previously had not been available on-site.'

The situation at the Dreifaltigkeits Hospital, in Wesseling, was totally different. Radiology care was in the hands of surgeons and internists – a situation that, from a professional point of view, was not a problem for conventional radiology, but certainly was for CT and MRI examinations because these could not be carried out during the day by using teleradiology diagnoses. Such examinations need the on-site presence of a radiologist – a dilemma that was resolved by partly taking over the radiology department including the staff, and by linking up with an external radiological practice with CT and MRI facilities.

'The key competence of a hospital is in-patient care. Our key competence is radiological care. And, a well functioning radiology department can result in cost savings of around €5 million a year – simply due to shorter in-patient stays for those who sometimes have to wait for an examination for two or three days. We contractually assure our customers that we will carry out a certain contingent of examinations within 24 hours. Moreover, the radiological diagnosis is available within two hours – a further advantage,' Dr Lessmann emphasised.

The 800 staff in the RNR Network ensure a structured workflow and quality standards are guaranteed. A further pivotal point is the Network's service centre; this deals with, administers and controls around 40,000 patient calls a month. The staff at this Leverkusen centre is medically trained and also knows the various locations. So, if, for example, a patient calls from Remscheid, he is automatically connected with the staff member responsible for radiology in Remscheid, so that each RNR patient feels 'at home'.

Winfried Lessmann is particularly proud of that service: 'The concept allows us to keep the appointment lines in our surgeries up to 95% free of unnecessary calls. A further advantage of central control is that we have an overview of substitute and alternative options. Instead of giving patients only one rigid appointment time, we can offer them a more timely examination in another surgery or hospital.'

The service centre not only coordinates out-patient appointments but also in-patient examination appointments. In the service team consists of specially trained hospital schedulers, who are directly connected to the hospital and radiology information systems (HIS and RIS) and can ensure the best possible use of equipment capacities – including a reminder function for hospital transport.

Technology

Next to staff know-how, said Dr Lessmann, technology plays a decisive role. 'Of course we always try to be ahead regarding technology and the introduction of new procedures to surgeries and hospitals to benefit patients. Mammography is one such development. Having introduced full-field digital mammography at a very early stage, we were among the first to use the tomosynthesis procedure. Currently, we are introducing the automated breast volume scanner ultrasound procedure, which scans the breast via an ultrasound detector, evaluates data, stores them and therefore makes them reproducible.'

The human aspect

'The training of young doctors and medical staff and therefore the quality of care for our patients is so important to us that we have founded our own RNR Academy,' Dr Lessmann pointed out. 'Additionally, the standardisation and centralisation of processes that results from the Network structure is of great benefit to patients, because we can spend our time with them rather than dealing with administrative tasks.'

Europe's first fully digitised hospital

He was among the pioneers of hospital digitization. Way back in 1988, **Professor Walter Hruby**, Chair of the Institute for Radiological Diagnostics at the Donauspital Vienna, in Austria, decided that, when his hospital reopened its doors, state-of-the-art technology would be implemented. Thus, in 1992, the Donauspital became Europe's first, fully-digitised hospital. Today, recollecting that progressive move, Prof. Hruby declared: 'The sweat and tears were definitely worth it!'

'Medicine today,' Professor Walter Hruby reflected, 'would be inconceivable without information technology; the increasing penetration of full digitisation can be felt in all medical departments – along with the resulting advantages for all involved. The ability to examine and diagnose online, to have information available in different places at the same time, to use voice recognition, and so on – all this has improved our work a lot. I'm therefore very pleased and proud that we were at the cutting edge of this technological advance in Europe, and the contribution we made.

Walter Hruby

The implementation became a longer process than planned. What obstacles were overcome? 'Convincing the decision makers initially took quite a bit of time. Once we got the green light from the city and the hospitals association, regarding space and costs, that's when the work really began. We were involved in all the different technologies to be implemented from the start. Playing an active part is indispensable. As a user you have to know what facilities you expect and how you'd like to see them implemented. We're not only customers of electronic data processing but also partners, part of the system, the human interface so to speak. Even today, doctors and systems specialists still meet on a weekly basis to give feedback and ensure everything works properly.

How was the IT provider chosen? 'We talked to many providers and then decided to go with Siemens, and we continue to do so today. However, when it comes to digital equipment, in the hospital archive and workstation structure there have been fascinating developments amongst all providers, so there are now outstanding products, both for quality and performance, also being offered elsewhere.

Is the hospital completely paperless? 'Regarding assignment and return of diagnosis we've been paperless right from the start, and we now also operate paperless within all other structures. We have a network of all available patient data that extends right across Vienna. The city-wide hospital information system has been in operation for over 25 years and is currently being replaced by a new system.

Isn't it extremely complex to replace the system? 'No. We already restructured the systems in our own department i.e. the radiology information system and the archive, five years ago, and the problem of logistics required for data immigration has basically been solved. It's vital during the planning stages that every step is clearly planned and that a very clear logistic structure with the corresponding security concept is developed. This meant that a small team, consisting of decision makers and those responsible, started meeting up regularly from about nine months beforehand, to clearly define the individual steps so that, during the actual implementation phase and the required parallel operation, no one even noticed anything because, as part of the project, we exchanged the internal network for a 2GB/sec data line.

What was the recipe for success? 'My colleagues,' Prof. Hruby affirmed. 'They've shown the necessary understanding and patience if something has not quite worked correctly right from the beginning. Moreover, our cooperation is so disciplined that we handle all processes almost within the same day, so that everything, from transmitting the diagnosis to the clinical team meeting, is done very promptly. On weekends alone, I examine an average of 700 patients, which requires tight organisation. For example, patients are only collected in time for their appointments – this gives us more time and calmness for the examination and we can avoid waiting times. The only area that cannot quite be controlled in this way is the out-patient department, but we work with the necessary flexibility there. Information technology supports and promotes our commitment to patients so that we improve even further.'

STROKE New options for prevention and treatment

Every year in the EU at least a million people suffer a stroke – reason enough for this to be among the subjects discussed at the 20th meeting of the European Neurological Society (ENS) held in Germany this June. *Bettina Döbereiner*, of European Hospital, asked ENS co-chair, Professor Karl Max Einhäupl, Director of the Department of Neurology at the Charité - University Medicine Berlin, Germany, and its Chairmen of the Board, for insights into the current level of stroke research, diagnostics and treatments

Stroke provokes a general immunosuppression in the entire patient's body, leaving them more susceptible to infection. As Prof. Karl Max Einhäupl pointed out, they die more frequently due to pneumonia or septicaemia than of other acute diseases. Immunosuppression thus pushes the mortality rate of stroke patients higher. 'In future, deaths could possibly be circumvented by antibiotics, which was shown by first pilot studies. However, there is a second problem, because the stroke event itself is worsened by systemic inflammations; inflammatory cells damage the area of ischaemia. That's why we have to understand what parameters of immune defence, while being suppressed, enable infections and how this could be prevented.'

Drug therapy

'Some innovative drugs have been developed to reduce stroke risk among patients with arterial fibrillation. In the past it's been shown that the stroke risk of atrial fibrillation patients, the most common cause of abnormal heart rhythm, is 18 times higher than that of patients without heart problems. That's why atrial fibrillation is particularly important in stroke prevention. Innovative drugs, such as blood thinners or anticoagulants, offer them a new perspective. They can reduce the risk of stroke by up to 80 percent.'

Asked about promising innovative drugs for this purpose, Prof. Einhäupl spoke of new substances such as Dabigatran and Rivaroxaban, produced by Boehringer Ingelheim and Bayer Health Care AG. 'Both can be taken orally twice a day and both do not require regular blood coagulation checks, as is essential when applying standard blood thinning drugs, for example Marcumar. However, these drugs still aren't approved as special anticoagulant drugs for stroke prevention.

Stroke research and prevention

'First it should be mentioned that thrombolysis, the therapy given immediately after a stroke, can be applied for longer than pre-assigned until now. Thrombolysis involves administering drugs intravenously to break down the blood clots and enables blood perfusion again. In 2008, the large scale European study ECASS III demonstrated that the use of thrombolysis up to four and a half hours is safe and efficient. This increased the time window for one and a half hour.

'Along with this, experiences at the Charité have shown, that comprehensive, rapidly conducted MRI examinations on acute stroke patients could also offer new treatment options. In the course of eleven stroke patients with ischaemia, after MRI examination thrombolysis was safely conducted. This was done although it was unclear when the patient had suffered the stroke.

'Diffusion weighted imaging is a MR-method,' he explained. 'It produces in vivo images of biological tissue, weighted with the local micro-structural characteristics of water molecule diffusion. Using this method in combination with other MR-sequences we can examine, as in traditional computer tomography, if there is an acute bleeding in the brain and, in addition, differentiate between acute dysfunctional brain tissue at risk, the penumbra, and already dead tissue. Our first results showed that the imaging patterns of diffusion and the size of the penumbra might give you suitable criteria to decide whether thrombolysis should be performed or not, and additionally if you don't know exactly when the stroke happened, maybe we'll be able to enlarge the time window for thrombolysis even more.'


Karl Max Einhäupl

RFID in medical technology

How hospitals profit from tiny transponders

An RFID transponder (also known as a tag) consists of a chip and tiny antenna. Thanks to their small size these transponders can be integrated into almost any object, including clothing, boxes or even sheets of paper. Thus the logistics industry numbers amongst the prolific areas of application for wireless frequency identification using RFID (radio frequency identification) technology.

RFID systems simplify the identification, tracking and storage of goods and products. Furthermore, the radio technology is used in toll systems and for access control; it has also been used in the field of medicine in recent years. The technology, for example, allows medical devices and accessories to communicate with each other and simplifies frequently recurring activities such as the connection of ventilation hoses in intensive care and the operating theatre.

RFID in daily clinical routine

Dräger is the first manufacturer to produce RFID technology for medical devices and accessories,

and one of the first hospitals to use RFID in technical medical devices and mechanical accessories is Zurich University Hospital. The hospital equipped its surgical area and anaesthetic induction and recovery areas with Dräger's anaesthetic devices with radio technology. Ventilation hoses equipped with radio chips, for example, can store the ventilation settings of a patient. These ventilation settings are transferred to the new device when switching to another RFID-capable anaesthetic device or intensive ventilator.

Without that tool, the ventilation settings must be entered again, every time a new device is used. The radio technology allows the information stored on the integrated radio chip at the end of the hose to be transmitted to the medical device. To do so, a reading module in the device sends an impulse to the chip in the hose and can then receive its stored data. A piece of software further processes the data and converts it into information that the user can understand.

Not only is the transmission of ventilation parameters between accessories and devices quickly and easily possible, but also, with the help of RFID systems, a certain accessory can be clearly assigned to a medical device. An RFID ventilation hose, for example, is provided with specific device recognition which significantly simplifies finding the suitable hose for the respective RFID-capable medical device.

The proper hose on the right nozzle

Another advantage: Frequency identification helps to place the ventilation hose on the right nozzle of the anaesthetic device. The inspiratory and expiratory port, as well as the connection for the ventilation hose, are all standardised for anaesthetic devices and have the same diameter. The connection thus requires increased attention. If an inspiratory ventilation hose is mistakenly connected to the port for the respiratory bag, changes in the ventilation parameters will alert the user about the mistake. However, with RFID technology the mistake will be indicated immediately, acoustically and optically.

RFID systems can also be used to monitor replacement intervals of accessory parts with limited lifetimes, such as water traps and CO2 absorber, more simply. In the past the standard procedure was to monitor the timely replacement of accessory parts of an anaesthetic or ventilation device manually, with the help of lists and stickers. However, with RFID the date of the first use is stored on the radio chip and the need for replacement is automatically communicated on the device screen upon the expiration of a preset deadline, e.g. 28 days for a water trap.

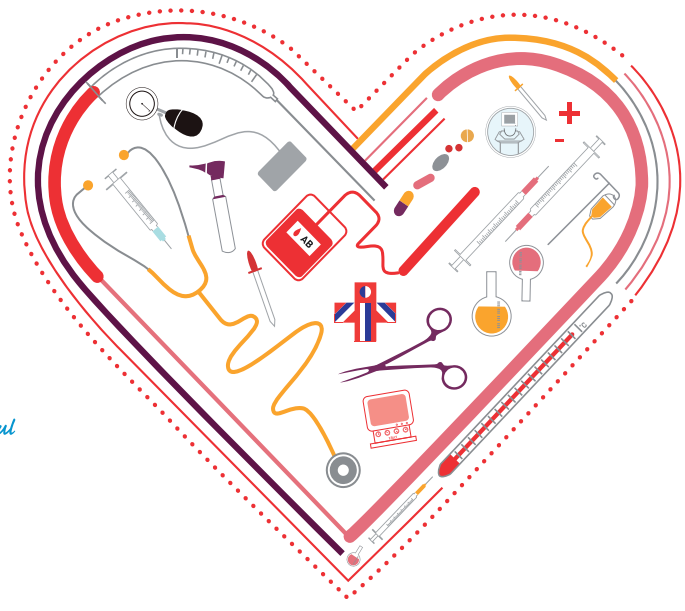
Outlook

'The RFID technology supports hospital personnel during routine work and simplifies tasks,' Dräger reports. 'We are, however, still at the beginning in terms of the use of RFID in medical technology. Alongside RFID-capable anaesthetic devices and intensive ventilators, Dräger has also been offering a ventilator specialised for neonatal ventilation with this technology since the beginning of the year: the Babylog VN500.'

As Andreas Otto, Senior Product Manager Lifecycle Solutions at Dräger, said: 'Overall, the use and further development of frequency identification in medical technology offers a great deal of potential and is far from being completed.'

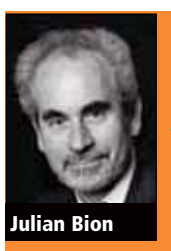
KiMES 2011 www.kimes.kr
27th Korea International Medical + Hospital Equipment Show

More than 1,200 companies from 35 countries and 60,000 visitors from well over 80 countries are expected to fill-up 36,000 sqm of exhibition space in KIMES 2011



17-20 March 2011
COEX, Seoul, Korea

ORGANIZERS Korea E & Ex Inc., KMDICA, KMDIA
Contact : Korea E & EX Inc.
Rm. 2001, WTC, 159-1, Samsung-dong, Gangnam-gu, Seoul 135-729, Korea
Tel : +82(2)551-0102 Fax : +82(2)551-0103 E-mail : kimes@kimes.kr



Julian Bion

NEW

A Faculty of Intensive Care Medicine

Critical care, worldwide, has been closely related to anaesthesia and traditionally considered the role of anaesthetist. However, about 30 years ago critical care expanded and intensive care unit (ICU) teams increasingly spread expertise to critically ill patients in other hospital wards, ultimately to become intrinsic in decisions on patients with co-morbities.

In most European countries there are now a variety of multidisciplinary training schemes, but only Spain has provided a specific training scheme and qualification in intensive care medicine (ICM). So, similarly, has Switzerland.

In the United Kingdom the Intercollegiate Board for Training in Intensive Care Medicine [IBTICM] was formed in 1996 to oversee the UK Diploma in Intensive Care Medicine (DICM) and to support career entry for trainees in anaesthesia, medicine, emergency medicine and surgery.

Following the lengthy efforts of the presidents of various Royal Colleges with members working in critical care medicine, *The Faculty of Intensive Care Medicine of the United Kingdom*, hosted in the Royal College of Anaesthetists, was launched at last in May 2010.

Dr Judith Hulf, Chair of the Faculty of ICM Steering Group, has now announced that intensivist **Professor Julian Bion FRCA**, of Queen Elizabeth Hospital, Birmingham, will be formally admitted as the Foundation Dean of the new Faculty this November, when FICM Board Members* meet for the first time.

** Appointed representatives of the parent Colleges, representatives from the Intensive Care Society, plus a trainee in advanced ECM and one lay member.*
Report: Brenda Marsh

No more machines!

Prolonged weaning by a specialist team helps to reduce long-term ventilator dependence

For many ICU patients, entering the Kloster Grafschaft, in Schmallenberg, Germany, a hospital specialised in pneumology and allergology, is a last resort. On average, they have been in an ICU for seven weeks and have failed three attempts to be weaned from the ventilator. They have been deemed 'unweanable'. However, Director of Pneumology, **Professor Dieter Köhler** and team help more than two thirds of the 200 'unweanables' who arrive at the hospital annually to breathe without mechanical support – all within ten days – and they can even return to a home environment. This significant success has resulted in an increasing adoption of the team's special approach by other hospitals

'Our prolonged weaning concept is based on the specific pathophysiology of overstrained breathing muscles. It is precisely this chronic strain put on the muscles that makes a patient dependent on the ventilator. The patient's muscles are either too weak to begin with – which is often the case with COPD patients, or the muscles degenerated due to the long ICU stay,' Professor Köhler explained. Since the 1990s the Schmallenberg experts have been applying a special mix of therapeutic measures that temporarily relieves the muscles and then trains them to allow the patient to breathe without mechanical support.


Dieter Köhler

'Most importantly, we try to avoid assisted breathing and rather use a technique that simulates the patient's individual breathing pattern. As soon as the brain understands that, then breathing can be temporarily suspended, which allows the muscle to recuperate. Another important factor is the way the patient is being bedded. In half-sitting position the muscles do not have to carry their own weight and are less strained,' he pointed out. However, he believes the crucial issue is the significant reduction of secretion. His patients therefore undergo bronchoscopy almost every day and receive supplementary inhalation therapy in addition to antibiotics. To remove infected secretion from the periphery, the patients must cough up the secretion, which they can only do if the tube access is closed. The Schmallenberg physicians thus developed a special device that closes the access but also prevents it from shrinking. This also allows an early transition to mask ventilation. This comprehensive weaning approach is supported by specialised physiotherapists, integrated into the procedure from day one.

An impressive outcome

About two thirds of patients are entirely weaned from mechanical ventilation while 20% are discharged for home ventilation. Life expectancy of the weaned patients – most are multimorbid – is also remarkably high at 3.5 years and approximately 1.5 years for COPD patients. 'But, as in any hospital, death cannot be banned,' Prof. Köhler reminded us. 'About 15% of our patients do not respond to the therapy. If this happens, it's our task to allow the patients to die in dignity. Terminal weaning, the termination of ventilation, is an issue that many ICUs do not dare to address.'

Care of a ventilated patient can cost up to 15,000 per month. Thus health insurers took a closer look at Prof. Köhler's weaning system. Convinced of its efficacy, they now cover all the costs. However, as the professor pointed out, not every weaning process is created equal. There are significant differences in quality: 'Therapies that continue for weeks cannot be called weaning because within days it's clear whether a patient can be weaned or not. We therefore introduced a quality label in Germany.' WeanNet is an association of certified weaning centres, which was founded to improve cooperation among weaning centres and to assure quality. A weaning register and certification of the centres are important tools. 'In view of the fact that the number of ventilated patients is increasing, quality assurance is crucial in order to avoid useless therapies and unnecessary costs.' *Report: Meike Lerner*

Alere™

Connecting diagnostics, connecting information, connecting the dots.

We are the faces of Alere.

We are scientists, specialists, health coaches and more – all working to connect diagnostics and health management solutions that deliver timely, actionable information anywhere, anytime. The result: remote testing and services that enable better outcomes whether in the lab, the hospital, the home, or even remote, hard-to-reach locations. We're giving providers and physicians the information to more effectively direct care. And empowering people to take more control of their own healthcare choices.

Because we know connected health is the key to better health. Everywhere. Learn more at alere.com.

Alere International Sárl
Rue des Vignerons 1A - 1110 Morges, Switzerland
Tel: + 41 21 804 71 50 - e-mail: professionaldiagnostics@alere.com

© 2010 Alere. All rights reserved.

11ALE0758EN

Ventilation-associated pneumonia

‘We must reduce mortality’

Every year in German hospitals about 15,000 patients acquire ventilation-associated pneumonias (VAP). This number, and the associated mortality, is striking enough to make it one of the topics at HAI 2010, the annual conference of the German Society for Anaesthesiology and Intensive Care Medicine (DGAI). Like many physicians, **Dr Maria Deja**, senior physician at the Charité Clinic for Anaesthesiology, aim to reduce the incidence of such pneumonias and other nosocomial infections. Report: *Bettina Döbereiner*


Dr Maria Deja

According to Maria Deja hospitalised patients in Germany stay in intensive care units (ICUs) 6.5 million days annually and, within that number, undergo artificial ventilation for 2.6 million days.

The ventilation rate, as reported in KISS, a hospital infection surveillance system run from the National Reference Centre for Nosocomial Infection Surveillance, is low (40%). Physicians see 15,000 VAP patients annually, and a contributed mortality of up to 25%. Thus, in German ICUs 1,500 patients die annually from VAP (KISS-data).

If multi-resistant bacterial infections are involved, mortality rises up to 75%. This is reason enough for a pronounced debate.

Reducing pneumonia is not only a question of saving lives; it also decreases costs, lowers medication of antibiotics and consequently shrinks the increasing resistance to anti-infectives.

The highest risk of pathogenic bacterial infection in ICUs lies in mechanical ventilation. Therefore, decreasing VAP cases has become of high interest in ICU management. To that end, Maria Deja favours the strict introduction of quality measures and advocates imposing key performance indicators and a focus on hand disinfection, oral hygiene, analogue sedation according to protocol, early weaning off ventilation, subglotic secretion aspiration and elevating the upper body of a patient.

Another vital measure is an accurate regulation of mechanical ventilation. VAP means ventilation associated and therefore every unnecessary ventilation day diminishes the rate of VAPs and reduces mortality. ‘The risk of becoming infected rises daily for those patients,’ she points out.

Precise sedation and weaning protocols are of great importance. The less the patient is sedated, the better he can cough up bronchial secretion.

The Charité Medical University organises peer reviews and participates in the nationwide KISS hospital infection surveillance system. Physicians at Charité have also developed ABx, a computerised, web-based decision support programme to assist the rational use of antibiotics, above all aiming to reduce the generation of resistant or multi resistant pathogens*.

An additional problem for physicians is the lack of new generation antibiotics. As cultures studies of new infections reveal, there are often highly resistant gram negative bacteria, such as Pseudomonas aeroginosa. About 40% of VAP patients have a Pseudomonas aeroginosa infection. The pipelines appear to be empty. Really new anti-effectives don’t exist to work against this often multi-resistant pseudomonas, she points out. ‘Patients already die because of the lack of adequate drugs. That‘s why we sometimes have to go back to drugs from the ’60s and ’70s with undesirable side effects, for example acute renal failure.’ She appeals to the pharmaceutical industry to develop new anti-effective against gram-negative pathogens.

** The ABx programme can quickly provide information regarding diagnosis, therapy and local resistance patterns and forms a basis for individual therapy decisions.*
The programme is an official project of the German Society of Anaesthesiology and Intensive Care Medicine (DGAI) in cooperation other societies and is currently used in about 200 ICUs in Germany. The aim is to introduce a Europe-wide programme. An English version already exists; French and Spanish versions are in progress.

IT-ASSISTED TRIAGE

The ALARM research team presents its first results


Torsten Schröder

The project consortium *ALARM* has developed new software to enable a computer-assisted triage-system for mass accidents and catastrophes. **Torsten Schröder**, emergency physician at the Charité Clinic for Anaesthesiology, with the focus on operative Intensive Care Medicine in Berlin, gave a mid-term review of the project and explained the advantages of the IT-supported triage-system for mass-casualty-incidents at HAI 2010

‘Generally, we must assume a chaotic and confusing period when the first ambulance crew arrives on scene,’ said Torsten Schröder, addressing this year’s annual conference of the German Society for Anaesthesiology and Intensive Care Medicine (DGAI) in Berlin. ‘At this stage, the emergency team is too limited to help all the injured at the same time. Seriously injured people must be singled out from the less injured.’

Shortening a period of disarray

To face this chaotic period adequately, a special method called STaRT (Simple Triage and Rapid Treatment) was developed in the ’80s and is now an internationally used method to categorise casualties by the severity of their injuries. The whole evaluation process for one person should be conducted in 60 seconds or less. The Berlin fire brigade, one of the consortium partners, for example uses STaRT.

Instead of the paper-based questionnaire in A4 format, ALARM developed a computerised triage algorithm for a handheld computer. Compared to the paper version, according to Torsten Schröder the computerised triage algorithm has, many advantages, the most significant being immediate information transfer. The triage findings can be consulted immediately from a central database, which enables selected, prompt decision-making for the on-scene incident leader. The results of algorithm-based triage are edited and consequently easier to manage. Additionally, a GPS function identifies the location of the injured. ‘Our current terminal device is a tough handheld device, which offers redundant information transfer by different tools, such as the radio and mobile telephone service -- the function to broadcast via Satellite -- WLAN coverage of 2.4 gigahertz, RFID-Scanner and a Bluetooth interface to ensure a secure data-transfer,’ he explained.

The project consortium consists of eight partners, one half responsible for the software solutions, the other for the expertise as protagonists of mass-casualty-incidents, such as Torsten Schröder, deputising the Charité Clinic for Anaesthesiology with the focus on operative Intensive Care Medicine.

The project is promoted for three years by the Federal Ministry of Education and Research and is headed by the Telemedicine Centre at Charité. For its second period the consortium plans to complete the IT-supported handling of first aid to an integrated system, comprising computer-assisted treatment areas for follow-up intervention. The integrated system of IT-supported medical care has to prove its usability in a full scale exercise, which is scheduled for the end of project term.

Report: Bettina Döbereiner

HOSPITAL BUILD EUROPE 2011
EXHIBITION & CONGRESS
4–6 APRIL 2011
NÜRNBERGMESSE, GERMANY
INVEST PLAN DESIGN BUILD OPERATE MANAGE REFURBISH
THE TRADE FAIR FOR HOSPITAL CONSTRUCTION AND OPERATION
150 exhibitors 3,000 visitors 500 delegates



Opening by Dr. Markus Söder,
Bavarian State Ministry of Environment and Public Health
SAVE YOUR FREE TICKET NOW!
Ticket code: Z1220
Register here: http://www.hospitalbuildeurope.com/reg
Phone: +49 (0)211/9686–3621

Alcyone Technology

A means to fast, complete functional and anatomical cardiac assessment

Cardiologist, nuclear medicine specialist and researcher **Dr Alessia Gimelli** works for the Fondazione Toscana Gabriele Monasterio, National Research Council in Pisa, Italy. For the past year she has used *Discovery NM 530c*, GE's latest Nuclear Cardiology platform, featuring an innovative CZT collimation technology called *Alcyone Technology*. This system not only improves dose management but also performs a complete functional and anatomical cardiac assessment in less than five minutes. During ESC 2010, *Daniela Zimmermann* asked Dr Gimelli about this and other cardiac assessment methods


Alessia Gimelli

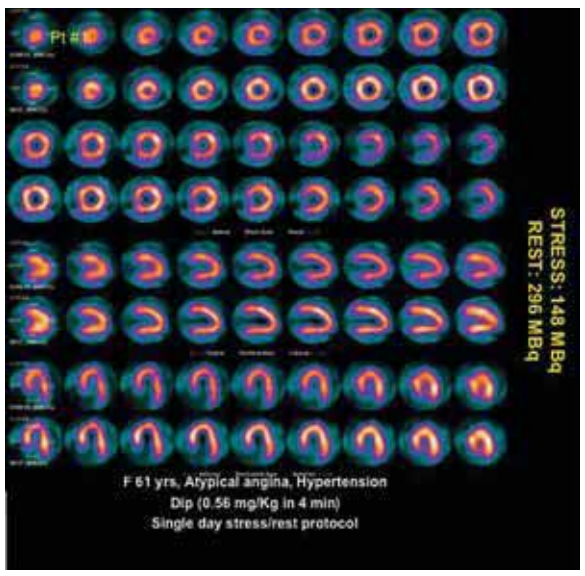


Fig.1 Stress/rest single day myocardial perfusion imaging with 99mTc Tetrofosmine, performed by Discovery NM 530c. These images showed absence of perfusion abnormalities

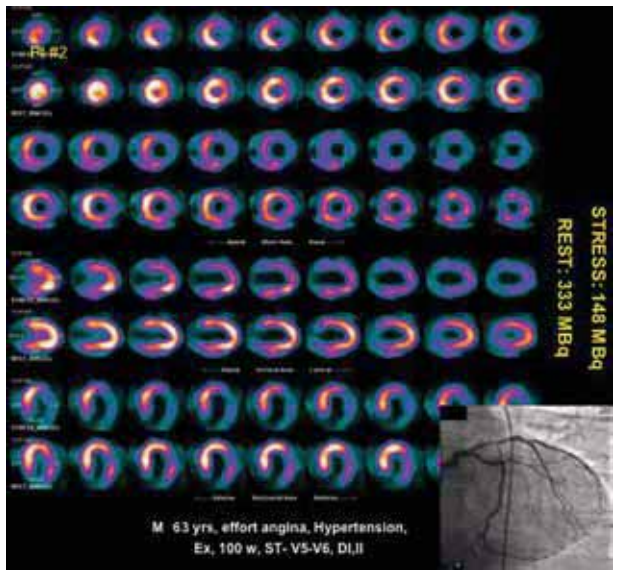


Fig. 2 Stress/rest single day myocardial perfusion imaging with 99mTc Tetrofosmine, performed by Discovery NM 530c. The images demonstrated ischemia in different vascular territories, confirmed by coronary anatomy

The new *Discovery NM 530c* system is not Single Photon Emission Computed Tomography (SPECT). It is, explained Dr Gimelli, a completely new type of camera using a gamma photon tracer. Whilst a standard camera needs a lot of tracer to perform myocardial perfusion imaging, Alcyone's totally new collimator design allows for lower tracer dose, yet the acquisition is the same. 'This is very important because one of the major problems of standard SPECT in nuclear medicine is the high dose that must be given to a patient to see something. While you perform the same SPECT, with Alcyone you can use a very low dose, -- for instance, for a standard dose you use 11 mSV while for Alcyone you can use as little as 5 mSV (Fig.1).'

In standard SPECT, a patient receives the tracer, the camera performs a series of images and then all the images are reconstructed, Dr Gimelli pointed out. 'With Alcyone, the camera is in a fixed position and all the collimators are focused around the heart. At the end, a 3-D reconstruction of the left ventricle can be performed. Standard SPECT acquires 32 different images for 180 degrees and at the end you can perform a 3-D reconstruction with a back-projection. In terms of efficiency, the technology used for standard camera produces among 3000 charges every detected electron, due to the photo-multipliers. With this new technology, the new type of cadmium zinc telluride (CZT) collimation, the number of charges produced for every detected electron is among 31,000. This type of collimation is the same as is in an airplane's black box. The applications of this new type of material are incredible. You can use this material for different kind of jobs and have different types of results'.

'We have had Alcyone for a year now, so have studied many patients. In the first study we compared standard SPECT and Alcyone technology – obviously in the same patient. Alcyone technology shows a better sensitivity in the detection of coronary artery disease especially in patients with 2 and 3 vessel disease (Fig. 2). In particular, we found that the Alcyone could detect ischemia in all the vessels, whilst with standard SPECT you can detect ischemia but only in one or two vessels. In cardiology this is important because you can better stratify the patient's risk and this has a greater impact on the routine clinical decision-making.

Additionally, the best result from this new technology is that it uses a very low dose. All cardiologists know that the main SPECT limitation is due to patient' exposure. With Alcyone technology you can reduce the injected dose, reducing patient's dosimetry. Due to its characteristics, you can use Alcyone technology also for the follow-up of the patients. If, for example, after coronary angiography the patient has new symptoms, you would normally perform stress echocardiography, even if the type of information that you can obtain is different. In the ischemia cascade, perfusion abnormalities are the first problem, and function abnormalities the second one. Nuclear medicine is able to detect the first abnormal pattern and thus the sensitivity in detecting coronary artery disease is very high, while specificity is lower, because perfusion abnormalities are present not only in coronary artery disease but also in presence of microcirculatory dysfunction. 'We see many patients with perfusion abnormalities and normal coronary arterial disease. These are not false positive, but patients with a higher risk due to metabolic abnormalities. For these patients, clinical strategies must be chosen in order to reduce risk in the follow-up.'

Calcium score and risk

In the EVINCI study, for which the European Community provides a grant on the FP application, the enrolled patients were submitted to a complete imaging strategy (echo, nuclear medicine, CT, and a coronary angiography), in order to detect the best method for diagnosis and prognosis of ischemic patients, Dr Gimelli explained. 'This protocol is very important especially in patients with detection of ischemia and normal coronary arteries. In these patients, the use of IVUS or FFR during coronary angiography can help to clarify the mismatch from functional imaging and anatomy. Then, at the end of the study, the best process for stratification and diagnosis of ischemic patients -- that should be hybridised with CT or PET or SPECT and echo, or echo without any of the others -- should be identified.' One of the goals of the EVINCI study is to standardise the strategy to evaluate ischemia in order to optimise cost-efficacy. In terms of cost effectiveness, Dr Gimelli added 'today we can have lots of information without standardisation, but we still spend too much'.

'In cardiology no one uses all this kind of information; it's redundant. You already have a lot of information about biological parameters, cholesterol, blood pressure and diabetes. Clinical studies are very important; so are the patient's symptoms. Many patients can have coronary stenosis but no symptoms -- they could even die aged 90 with no problems. If you perform coronary angiography in the entire population you'd find many patients with coronary anatomy, but probably without ischemia. So, in cardiology, the only presence of calcium abnormalities doesn't necessarily relate to the need for re-hospitalisation. Nixdorf Recall study (focused on CT and calcium) showed that high calcium score indicate a worse prognosis, especially in selected subgroups of intermediate risk patients. However, clinical cardiologists prefer to have functional information related to the presence and extension of ischemia before, and add the ones relative to calcium score after.

In reality one of the most important parameter for the evaluation of ischemic patients is the quantification of absolute myocardial blood flow, now obtainable through PET. However, how many cardiology patients can receive a PET exam today? The number is lower than one percent, because PET is mostly dedicated to patients with cancer and it is also very expensive. Although this information is very important, from a practical viewpoint the likelihood of managing it all is not so easy. *The Discovery NM 530c* with Alcyone technology should be able in the next future to quantify absolute myocardial blood flow. This is a very important point, because you can have an important variable at low cost and high availability.'

In conclusion, when is SPECT the best choice? 'As reported by the international guidelines, you can perform SPECT as a second level examination, in patients with intermediate and high risk of coronary artery disease or in other cases when culprit lesion should be detected. This new technology is the best diagnostic tool we can apply in these circumstances, because overall it is very safe for the patient.'

EUROPEAN HOSPITAL

EUROPEAN HOSPITAL Publisher,Theodor-Althoff-Str. 45, 45133 Essen, Germany
Phone: +49 (0)201 87 126 850
Fax: +49 (0)201 87 126 864
E-mail: info@european-hospital.com

www.european-hospital.com

Editor-in-Chief Brenda Marsh
Art Director Mary Pargeter
Executive Directors Daniela Zimmermann, Reiner Hoffmann
International Media/Editor Denise Hennig
Managing Editor Meike Lerner
Editor Karoline Laarmann

Production & Distribution Janka Hoppe
Russian Supplement Sergey Bezrukov, Fibrotex GmbH, Fischerstr. 1, 40477 Düsseldorf Tel: +49 211 550 49 70, E-mail: fibrotex@gmx.net

Founded by Heinz-Jürgen Witzke

Correspondents
Austria: Michael Kraßnitzer, Christian Pruszinsky. **Czech Republic:** Rostislav Kuklik. **France:** John Brosky, Jane MacDougall. **Germany:** Anja Behringer, Annette Bus, Bettina Döbereiner, Karl Eberius, Guido Gebhardt. **Great Britain:** Brenda Marsh, Mark Nicholls. **Poland:** Pjotr Szoblik. **Russia:** Olga Ostrovskaya. **Spain:** Eduardo de la Sota. **Switzerland:** Dr. André Weissen. **USA:** Kerry Heacox, i.t. Communications.

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

Subscriptions
Janka Hoppe, European Hospital, Theodor-Althoff-Str. 45, 45133 Essen, Germany

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

Printed by Frotscher Druck, Darmstadt
Publication frequency bi-monthly
European Hospital ISSN 0942-9085

Representatives

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

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

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

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

USA & Canada Hanna Politis, Media International, 8508 Plum Creek Drive, Gaitherburg, MD 20882, USA
Tel: +1 301 86 96 610
e-mail: hp@european-hospital.com

NEW

A rapid NT-proBNP cardiac biomarker test to manage HF

Switzerland -- Used in conjunction with clinical assessment, the new Triage NT-proBNP (N-terminal pro b-type natriuretic peptide) test is a useful biomarker in the diagnosis and management of patients with heart failure (HF) its manufacturer Alere International reports. 'BNP (b-type natriuretic peptide) and NT-proBNP levels can help doctors differentiate between HF and other problems, since the level of natriuretic peptides in the blood increases as chronic heart failure advances.'

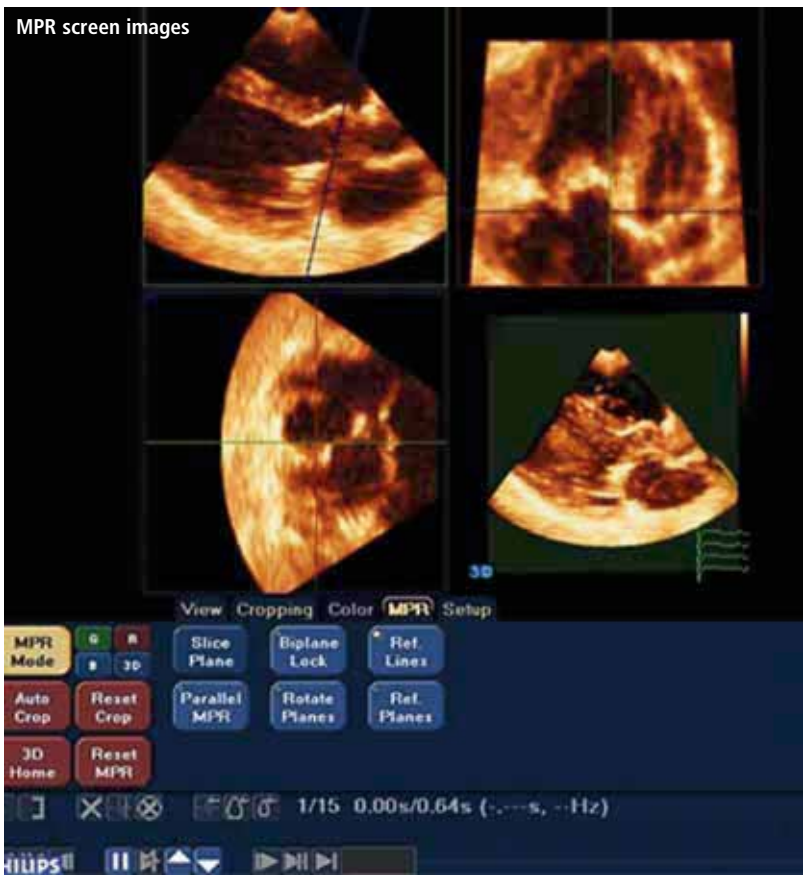
In addition to a diagnosis in cases of suspected HF, the firm adds that the new test can also aid in assessing the risk of patients with heart failure, or acute coronary syndrome (ACS), or the increased risk for cardiovascular events and mortality in patients with stable coronary artery disease (CAD) who are also at risk of HF.

The Alere Triage NT-proBNP Test is CE marked for EU distribution.

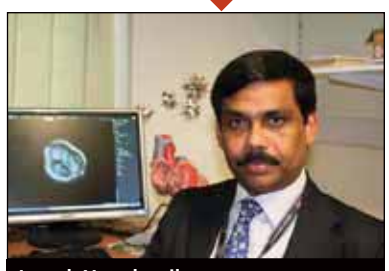
MPR 3-D echocardiography

NEW

A cardiologist at a UK hospital has become the first in the world to develop a technique to 'slice' 3-D images of the heart into intricate sections using computer software. *Mark Nicholls* reports



MPR screen images


Joseph Vettukattil

The method, devised by consultant congenital cardiologist **Dr Joseph Vettukattil** at Southampton General Hospital, is known as multiplane review (MPR) 3-D echocardiography. This allows cardiologists to identify heart defects more accurately than on traditional 2-D or standard 3-D scans. 'The most important aspect is the operator's ability to slice the dynamic cardiac structures in infinite sections through all the three dimensions, which was not possible before we developed MPR 3-D echocardiography,' Dr Vettukattil explained.

The hope is that the technology, which, for the first time, lets the user see the three dimensions of the heart move simultaneously, could eventually replace the need for magnetic resonance imaging (MRI) for most aspects of cardiac imaging.

Dr Vettukattil said the technique enabled cardiologists to see what was wrong and exactly where it was wrong on the screen. 'By using MPR, because you are slicing and seeing it in three different planes, you can get a clear understanding of a patient – especially in a child whose heart is congenitally malformed.'

Traditionally, diagnosis of heart defects has been made using 2-D scans with the addition of invasive cardiac catheterisation. 'The 2-D images show pictures of the heart in two planes, so it just takes one slice of the heart and, because it has not been easy to know without doubt what the problem is, surgeons have often had to perform exploratory operations as well,' he said. 'Now, though, we are able to visualise even more than a surgeon can during an operation, minimising the need for additional and invasive assessments.'

The system also enables cardiologists to compare the anatomy before and after surgery. 'The main benefit is in delineating the anatomic details before surgery in complex cases,' he pointed out. 'This helps in better decision making and a better surgical approach and it has helped to find certain conditions that were not possible to define without opening up the heart.'

For the patient it means that more often the most appropriate surgical procedure is carried out and for the hospital it can have cost benefits in reducing the number of other investigations, such as cardiac MRI or catheterisation. 'It potentially could reduce the hospital stay by identification and early and appropriate re-interventions,' Dr Vettukattil added.

The 3-D MPR is not specific for detecting a particular defect, he pointed out, but a tool that helps cardiologists to understand the cardiac anatomy and pathology better and the method has been most helpful in detecting valve abnormalities and complex congenital heart defects.

Dr Vettukattil made the discovery after an upgrade from conventional 2-D imaging on echo machines in the children's heart unit at his hospital. He set up two PCs with 3-D software programmes to read results from the echo scans and developed MPR from that.

A next step in the technique's development is to further software modifications and improve image resolution, along with developing tools to visualise the 3-D images on a 3-D screen.

Dr Vettukattil said that remote uploading and data analysis of images should be possible soon via the internet and he has set up a website (www.3dechocardiography.com) to discuss and teach related topics.

He has also taught the use of MPR in countries such as Germany, Denmark and Sweden and aims to help develop Southampton University Hospitals NHS Trust as a world leader in advanced 3-D echocardiography through the establishment of an imaging and training centre.

'The success of our work has led to 3-D echocardiography moving from a research tool to a clinical tool, with bi-weekly clinics and ward echograms performed in Southampton,' he said. 'We are also seeing increased numbers of patients referred for 3-D assessment and are determined to push forward our vision.'

New diagnostic tools win the hearts of cardiologists

During the 2010 ESC meeting, held in Stockholm, new guidelines for myocardial revascularisation were handed down by a prestigious Task Force made up of representatives of both the ESC and the European Association of Cardio-Thoracic Surgeons (EACTS). The Task Force was co-chaired by the past president of European Association of Percutaneous Cardiovascular Interventions (EAPCI), William Wijns MD, from the Onze-Lieve-Vrouw Hospital in Aalst, Belgium.

The diagnostic technology that won the strongest endorsement of a Class I recommendation with A-level evidence is not an imaging technology but Fractional Flow Reserve (FFR), an index determining the functional severity of narrowings in the coronary arteries as measured by a catheter-based wire.

The panel also signalled the end of an era in cardiology by replacing the venerable combination of a treadmill and electrocardiogram (ECG) test with the new generation of stress echocardiography, a non-invasive diagnosis of myocardial viability that is more accurate in the detection of ischemia, according to the new guidelines.

'Stress imaging techniques have several advantages over conventional exercise ECG testing, including superior diagnostic performance, the ability to quantify and localise areas of ischaemia, and the ability to provide diagnostic information in the presence of resting,' the authors stated.

Multi-detector computed tomography (MDCT) emerged as a preferred modality for the detection of coronary artery disease (CAD) in the new guidelines.

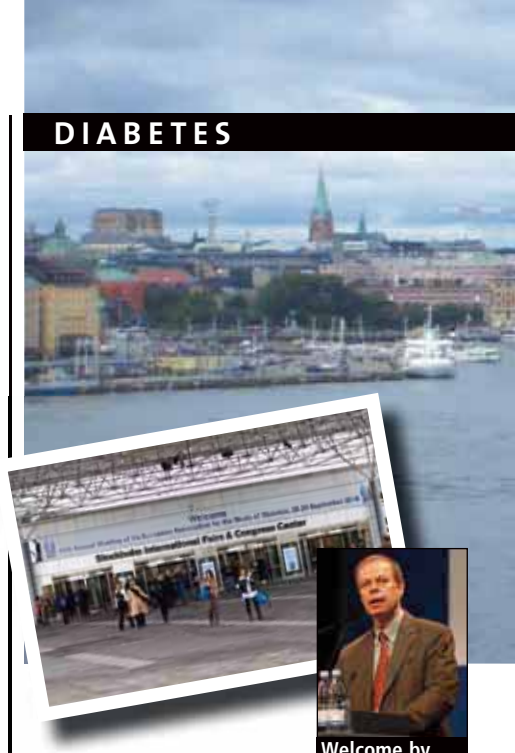
The authors provide a detailed discussion on the reliability of MDCT for ruling out significant CAD in patients, as well as its tendency to overestimate the severity of atherosclerotic obstructions.

However, magnetic resonance imaging (MRI) appeared to be considered a novel technology that has not yet proven its worth. 'Data suggest that MRI coronary angiography has a lower success rate and is less accurate than MDCT for the detection of CAD,' the authors reported, while adding in a later section that 'cardiac MRI has been applied only recently in clinical practice and therefore fewer data have been published

The august panel almost gushed praise over the emergence of 'hybrid imaging', combining two modalities in the same scanner for a single imaging session. According to the panel, 'the combination of anatomical and functional imaging has become appealing because the spatial correlation of structural and functional information of the fused images may facilitate a comprehensive interpretation of coronary lesions and their pathophysiological relevance.'

Finally, the authors held forth on perfusion techniques, pronouncing that 'newer single photon emission computed tomography (SPECT) techniques, with ECG gating, improve diagnostic accuracy in patient populations including women, diabetics, and elderly patients'.

Meanwhile, positron emission tomography (PET) studies with myocardial perfusion PET are reported to provide 'excellent diagnostic capabilities in the detection of coronary artery disease,' according to the Task Force, which added that the comparisons of PET perfusion imaging have also favoured PET over SPECT.


Welcome by Claes-Göran Östenson

7,000 people from 120 countries met in Stockholm this September to hear international experts discuss the progress, solutions and challenges of one of our greatest healthcare burdens. Prevention, self-monitoring, surgery, guidelines, economic problems, drug-safety, and co-morbidities – these are just a few of the problems associated with the care of about 55 million diabetics in Europe. *Meike Lerner* reports from Sweden

Diabetic care consumes up to 10% of healthcare budgets – rising to over 18.5% in some countries (Source: International Diabetes Federation, Diabetes Atlas, 4th edition. 2009). However, despite huge scientific and other efforts to tackle the problem, a report funded by the European Commission, coordinated by EURADIA -- a unique alliance that advocates increased diabetes research in Europe -- found a significant deficit in the level of diabetes research funding across the EU. The estimated research sum is €500,000,000. The estimated spend on diabetic care is an astounding €50 billion -- annually. These figures, as well as a comprehensive strategy for European diabetes research, were presented during EASD by DIAMAP - a project funded under Framework Programme 7.

DIAMAP – a roadmap for research and a coordinated research platform


Philippe Halban

If adopted by European funding organisations and researchers, DIAMAP will help to improve treatments for both type 1 and type 2 diabetics; it will also produce the first online resource (***www.DIAMAP.eu***) for funders and scientists to view potential areas of collaboration, skills and resources among other diabetes research teams.

During the report presentation, the DIAMAP coordinator, **Professor Philippe Halban**, said: 'Europe has historical strength in diabetes research, but such expertise is underexploited through lack of vision, poor coordination and inadequate funding. The major outcomes of this road map strategy will be to ensure that research

The 46th Annual Meeting of the European Association for the Study of Diabetes (EASD)

is focused on the individual with diabetes, leading to improved treatment and prevention of this devastating disease. Research would be coordinated to exploit regional expertise in particular and improve competitiveness. Funding would need to be in proportion to the costs of the disease, with closer collaboration between academia and industry. DIAMAP is a battle plan to combat the diabetes crisis. If there is no significant increase in research investment, the numbers of people with diabetes will continue to rise and become increasingly costly, especially in younger people, for whom the impact of complications is even more devastating with a correspondingly greater impact on the economy.'

Drug development guidelines: Reducing cardiovascular risk

The case of Avandia, the diabetes drug recently banned from European pharmacies by the European Medicines Agency (EMA), reveals another huge topic to be finally tackled: the safety aspects in the development of new diabetes drugs. Avandia, a real diabetes blockbuster from GlaxoSmithKline, was suspected of significantly increasing the risk of heart attacks for a long time before the EMA stopped the drug's use (September). According to the British Medical Journal, reporting at the beginning of that month, the first hints that the benefit of Avandia could not be sufficiently proved had already appeared during the accreditation phase in 1999. In 2007, a first study indicated the risk of a heart attack. The problem was that accreditation studies showed that HbA1c could be reduced by 1%, but the long-term consequences had not been considered.

To improve drug safety, at the beginning of 2010, the EMA published draft guidelines on clinical investigation of medicinal products to treat diabetes mellitus. Those guidelines were issued and commented on by the EASD Panel on Global statements, which was presented at the congress. In particular, the EMA wish to ensure that add-on and combination studies compare against established agents and that there is robust analysis of success based on therapeutic targets, non-responders and hard outcomes.

The EASD welcomes the consideration on safety aspects of new drugs and its requirement for cardiovascular outcomes and long-term safety to be assessed. It is of note that both major cardiovascular events and other major events, including heart failure, must be evaluated. The EMA's position is that a reduction of insulinaemia, or insulin dose, can be of clinical interest but is not considered a sufficient measure of efficacy unless accompanied by a favourable evolution of HbA1c. For future developments, the research programme undertaken by pharmaceutical companies should provide sufficient data to support the lack of a drug-induced excess cardiovascular risk, from both a clinical and a regulatory perspective. In this respect, the EMA requires studies on patients with an over five-year diabetes duration, and an analysis of outcomes in those with microvascular and/or macrovascular complications.

Measuring, educating and treating diabetics

The congress symposia and exhibition underlined massive efforts undertaken to improve quality of life for diabetics from several directions. We can present just a few:

Sensor-augmented insulin pump therapy

A long-term and large, randomised, controlled study of sensor-augmented insulin pump therapy in type 1 diabetes showed that patients using this type of technology (Medtronic MiniMed Paradigm Real-Time System) achieved better glucose control without an increase in hypoglycaemia, compared to multiple daily insulin injections. The STAR 3 trial (Sensor-Augmented Pump Therapy for A1C Reduction) data also shows a statistically significant reduction in glycated haemoglobin (A1c) levels. The reduction of the A1c levels was four times greater than the multiple daily injection (MDI) group (0.8% vs.0.2%). The mean decrease was from a baseline of 8.3% to 7.5% in the sensor-augmented pump therapy group, compared to only 8.3% to 8.1% in the MDI group. In addition, for the adult participants, there was a full 1% reduction of the A1c levels.

Every percentage point drop in A1c can reduce the risk of microvascular complications by 40%.

New systems for insulin delivery: 'patch-pumps' and artificial pancreas

Focusing on *Engineering the future of Diabetes Care: from Insulin Pumps to Nanomedicine*, during the Eli Lilly Symposium, **John Pickup**, Professor of Diabetes and Metabolism at King's College London School of Medicine, Guy's Hospital, UK, said that a major impact in improving diabetes care lies in three areas: insulin delivery, glucose sensing and attempts to build an artificial pancreas. Whereas insulin pumps are already known to be beneficial in Type 1 diabetes, new 'patch-pumps' are likely to be smaller, more convenient, and may open up insulin therapy to selected type 2 diabetics. However, present uptake of insulin pump therapy varies and, in the future, needs to be more widely available throughout the world.

A partially closed-loop system connecting continuous glucose monitoring to an insulin pump has already entered clinical practice, whereby basal insulin delivery is automatically suspended for up to two hours if glucose falls below a hypoglycaemic threshold.

The barrier to a safe, effective, fully artificial pancreas for everyday use is considered to be the present lack of a sufficiently reliable and accurate glucose sensor. 'We are researching a new generation of glucose sensors, based on glucose-induced changes in fluorescence lifetime, rather than electrochemistry. Glucose sensors, using a glucose receptor based on engineered bacterial glucose-binding protein labelled with an environmentally sensitive fluorosphore, can be encapsulated in nano-engineered membranes, for potential implantation in the skin or, alternatively, incorporated in a fibre optic probe for monitoring of subcutaneous interstitial glucose concentrations. The long term aim is to use this technology to engineer an artificial pancreas.'

Structured self-monitoring of blood glucose

William H Polonsky PhD, Associate Clinical Professor in Psychiatry, Behavioural Diabetes Institute, University of California, San Diego, and principal investigator of the STeP study (Structured Testing Protocol) presented the results of an expanded self-monitoring of blood glucose (SMBG). The aim of the 12 month prospective randomised, multi-centre study was to determine whether the use of the Accu-Chek 360 View Blood Glucose Analysis System, a novel SMBG data collection tool from Roche, can positively influence glycaemic control when used as part of a comprehensive intervention in which primary care physicians and patients work collaboratively to address glycaemic abnormalities. Indeed, it could be shown that the use of this new diabetes management concept, including structured SMBG, data visualisation, pattern analysis and derived therapy adjustments, can significantly contribute to a reduction of HbA1c values and

continued on page 30

Think tank

Thinking helps.

Our innovations help millions of people by alleviating their suffering and improving their quality of life. We give them hope.

Roche

We Innovate Healthcare

continued from page 29

improved glycaemic control in non-insulin treated type 2 diabetics and, at the same time, help to reduce diabetes-specific psychological distress and depression levels.

SMBG needs to be tailored for diabetics


Oliver Schnell

According to the International Diabetes Federation (IDF) guidelines, 'SMBG should be considered because it is currently the most practical method for monitoring post-meal glycaemia.' However, during a Bayer Healthcare conference, **Professor Oliver Schnell**, of the Diabetes Research Group at the Helmholtz Centre in Munich, reported and acknowledged that SMBG protocols should be individualised to address each diabetic's specific educational, behavioural and clinical needs. 'The optimal intensity and frequency of SMBG protocols depend on a variety of factors, such as the type of diabetes, chosen therapy options, individually set target ranges for the long-term marker HbA1c indicating the average blood glucose level over a period of weeks or month, as well as pre- and postprandial results. Therefore, SMBG is an effective strategy but needs to be complemented by treatment approaches tailored to patients.´


Bayer

Innovative blood glucose meters offering meal-marker functions, integrated software and different levels of personalisation definitely support those aims, but as **Professor Louis Monnier**, of the Laboratoire de Nutrition Humaine Institut, Universitaire de Recherche Clinique, in Montpellier, France, stressed: 'Given the relatively high costs of SMBG, it would be remiss to ignore the economic implications of SMBG. The potential benefits of SMBG must therefore be balanced against its costs, especially when such expenditure may come at the expense of other treatment modalities.'


Louis Monnier

To provide an adapted diabetes education, healthcare providers are therefore eager to gain better understanding of their patients needs. Recent studies show a significant relationship between existing information gaps, motivational deficits and limitations with regard to behavioural skills and the reported frequency of SMBG. 'Patients often show poor motivation to measure their values regularly if testing is not explained sufficiently, or meters, strips or lancets are not reimbursed by the healthcare system,' Prof. Monnier said. 'SMBG is an effective tool and essential for people with diabetes to obtain accurate blood sugar results, but gaining the full benefit from it takes knowledge, skills and willingness.'


Magdalena Annersten Gershater

Diabetes nurse **Magdalena Annersten Gershater**, from the Department of Endocrinology at University Hospital, Malmö, Sweden, has daily experience of the challenges involved in diabetic education. By offering psychological support, expert advice and guidance, she empowers patients to take over the decision-making role and control their disease in a self-determined way. 'By evaluating individual requirements, such as the level of knowledge and education, as well as analysing problems perceived by the patients on a physical, psychological or social level, diabetes educators approach existing, underlying conditions and counteract them by offering proper information on blood glucose measurements or the effects of lifestyle changes,' she pointed out. At the end of the day, she added, no one can be forced to perform SMBG and live a life considering the changes that consequently arise from the SMBG results – the task of Diabetes Nurses is to outline clearly that this might be related to a shorter life.

Metabolic surgery


Andreas Hamann

Bypass, gastric band or – the relatively new 'sleeves'. Surgery can also be an effective weapon in the fight against diabetes.

During the Ethicon Endo-Surgery Johnson & Johnson symposium, **Professor Andreas Hamann**, senior consultant, medical director and specialist for internal medicine and endocrinology at the Diabetes Clinic Bad Nauheim, Germany, discussed the *Metabolic effects of bariatric surgery with special focus on the outcomes on Type II Diabetes Mellitus*. 'The effect of so called metabolic surgery, that is, the use of surgical means with the objective to improve metabolism, has the largest effect in the case of diabetes.'

Moreover, lipid metabolism and blood pressure – i.e. all components of the metabolic syndrome – are also affected. Not only the weight loss leads to this result, he pointed out. 'It's the change in the secretion of various intestinal hormones in particular that is important for diabetes, and specifically the secretion of the incretins. The GLP 1 increases drastically after food stimuli, which affects the glucose metabolism favourably. However, we are still at the very beginning when it comes to researching and explaining these mechanisms, and have some way to go with our research work.' This is also why there is no satisfactory answer as yet to the question of why diabetes improves only a few days after gastric bypass surgery, whereas the effect of the gastric band depends exclusively on the resulting weight loss, and therefore takes several months.

Generally, a bypass is the most common surgical intervention today and, as proven by numerous studies, is superior to the gastric band in terms of weight loss and metabolic effects. Therefore, in people with a BMI over 45 the gastric band should not be fitted; advice that is often still not followed.

With the gastric sleeve, the situation is different; here about two thirds of the stomach is removed. Latest studies have shown that, in the medium-term, the sleeve has comparable effects on diabetes to those of a bypass. However, as the professor pointed out, this surgery is not reversible, '… and as it is a relatively new procedure we also don't yet have any studies on the long-term effects.'

Which method makes sense for which patient depends on various factors, such as the initial weight, and this must be individually assessed. Metabolic surgery is definitely an effective means to treat diabetes, but it does have risks and side effects. 'There is a basic risk associated with all surgery. Because of the decreased absorption of food after bypass surgery, essential nutrients, such as vitamins, can no longer be absorbed and must be substituted,' Prof Hamann pointed out. 'Both types of intervention therefore require a comprehensive follow-up.'

Many patients are also put off by the high costs of the intervention which, in some countries, is not covered by medical insurers – despite the fact that the costs of treating diabetes can be lowered or even avoided by this type of surgery.

ADVERTORIAL Sponsored by

NUTRITION AND HEALTH

seca Precision for health

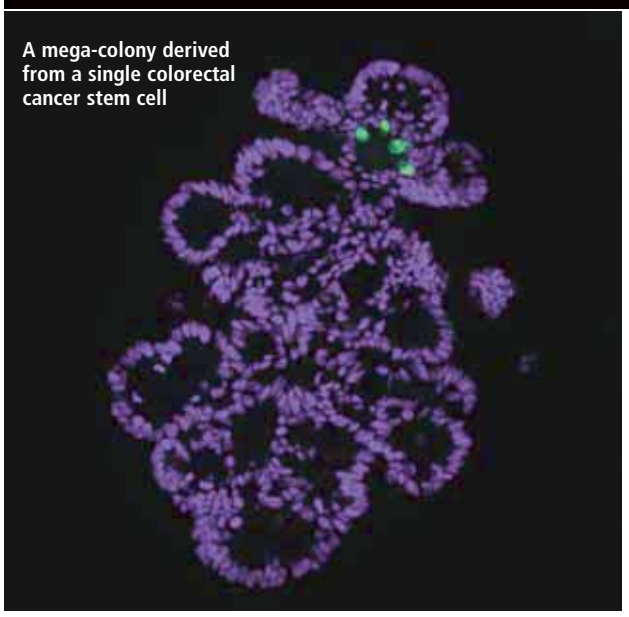
Diabetes mellitus in children

In Europe, the number of children under age 15 with diabetes mellitus – type 1 as well as type 2 – is increasing.
Type 1 diabetes is caused by an autoimmune reaction of the body that destroys the cells that produce insulin in the pancreas. Treatment encompasses regular insulin injections. The young patients tend to be of normal weight or underweight, but since insulin is an anabolic hormone, which means it builds up organs and tissues, their weight should be monitored in order to avoid uncontrolled weight gain or even overweight.
Historically, type 2 diabetes was considered to be a disease that typically is seen in adults over 40 years of age. Recently, however, more and more younger people – primarily overweight and obese adolescents and children – are affected.
If fatty tissue accumulates around the waist, the risk of insulin resistance is particularly high. Weight reduction, exercise and a strict diet are important ways for type 2 diabetes patients to improve their blood glucose values to a level where medication can be reduced or even entirely avoided.

Monitoring the physical development of young diabetics is thus as important as medication. Long-term observations allow physicians and dieticians to assess whether the patient's body weight and height develop as desired.

The new seca 360° wireless product family facilitates diagnosis as well as therapy. Wireless scales and measurement systems determine weight and height quickly and reliably and transmit the data to the secure seca network.

The medical software package seca analytics 105 allows the physician to analyse the recorded values on a PC. Percentiles ensure correct monitoring of growth and weight developments. If a weight reduction is recommended, the software calculates the daily energy requirements as part of a diet plan.



A mega-colony derived from a single colorectal cancer stem cell

Cancer stem cells

Cancer stem cells (CSCs) are the engine that drives tumour growth. They can not only reproduce themselves but also differentiate to form all the specialised cells found within a tumour.

While chemotherapy and radiotherapy non-specifically target all rapidly dividing cells, evidence is increasing that CSCs are more resistant to these treatments. Thus, if a targeted treatment can be devised to work specifically against CSCs, it might become possible to eradicate a cancer completely as well as prevent its later recurrence. 'It's like trying to weed a garden,' reflected laboratory scientist Dr Trevor Yeung, from the Weatherall Institute of Molecular Medicine, Oxford University, UK: 'It's no use just chopping off the leaves; we need to target the roots to stop the weeds from coming back.'

At this year's ESMO (European Society for Medical Oncology) Cancer Biology Symposium, to be held in Nice, France on 26 & 27 November, Dr Yeung's lecture will focus on CSC – *fact or fiction*?

So, what indeed are CSCs? 'Part of the problem is that the terminology may be confusing and evocative, especially the phrase stem cell,' he said, during an interview with *Karoline Laarmann*. 'A better term would be cancer-driving cell. Nevertheless, whatever we call these cells, there is overwhelming evidence that different subpopulations of cancer cells exist, and that it is the CSC subpopulation that drives tumour growth.'

Dr Yeung is a member of an Oxford study group that developed a new way of cultivating CSCs samples in the lab that should greatly speed its study and allow the development of drugs targeted against them.* Previous cancer stem cell work has relied on cancer biopsies obtained from patients, which is labour intensive and may not be easily repeatable. The Oxford team developed a new technique to enrich these cancer stem cells in the laboratory using established cell lines; this will enable high throughput testing of drugs that may be more specific for CSCs.

Because the technique makes it much easier to work with cell line material and gain more of it than with fresh tumour tissue, the technique also enables greater analysis of stem cell functions. Furthermore, better *in vitro* cell culture methods might help to reduce the use of animals for preclinical evaluations of drugs. 'CSCs may express different surface proteins to the non-CSC population, so this may provide another mechanism of attack,' them,' Dr Yeung said. 'With regards to personalised treatment, such treatment is already widely practiced for cancer – e.g. Herceptin only on Her2+ breast cancer, not giving anti-EGFR treatment to patients with Kras mutations in colorectal cancer, Gleevec for CML and GIST.'

Several groups, across the globe, are researching different aspects of CSCs – for example, how best to identify them, how they behave in a tumour, and how to develop new therapies to target specifically them.

Conferences such as the ESMO Symposium naturally allow medical researchers to share ideas and form new collaborations. 'Clinician scientists are in a unique position to be able to translate basic biological research into benefits for clinical practice,' Dr Yeung added.

COURTESY OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND

Trevor Yeung received a Sir Alan Parks Fellowship (2009-2010) for his *Characterisation of colorectal cancer stem cells* project

**Cancer stem cells from colorectal cancer derived cell lines. Yeung TM, Gandhi SC, Wilding JL, Muschel R and Bodmer WF. Proc Natl Acad Sci U S A. 2010 Feb 23;107(8):3722-7.)*

MEDICA®

Be part of it!

17 – 20 Nov 2010
Düsseldorf · Germany

www.medica.de

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

Messe Düsseldorf®