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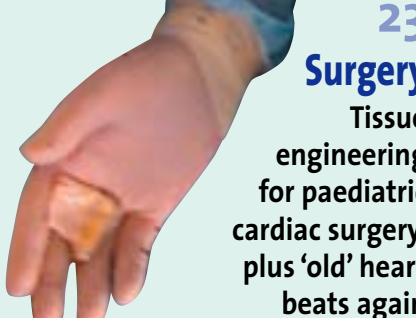
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## Militancy among medics Will it spread?

Common unrest about pay and conditions leads doctors to strike in Germany and Spain; in the UK nurses threaten to do the same

Germany - Dr Lutz Retzlaff, Medical journalist reports from Germany: As of 28 April, doctors at university hospitals and large district hospitals had been on strike for about five weeks. Resentment is particularly prevalent among young, assistant doctors. One of the main demands is for an increase in the basic salary by around 30%, along with better working conditions. There is also a call for a special labour agreement for doctors. Initially, Ulla Schmidt, Federal Minister of Health and member of the SPD (Social Democratic Party of Germany) appeared to be sympathetic towards some of the doctors' demands. The Minister agrees that doctors have to cope with too much bureaucracy, although it remains to be seen how they are to be relieved of this burden. On the other hand, Schmidt publicly spoke out against a flat-rate increase in salaries. One

of the government's objectives is a reduction in ancillary wage costs, which can be influenced through the level of spending in the healthcare sector. However, in Germany, the influence of politics in this area is limited. Schmidt has already made it clear that she is

represented by the Employer' Association of German Länder (TdL) and its leader, the Minister of Finance for Lower Saxony, Hartmut Möllring of the CDU (Christian Democratic Union of Germany). The Marburger Bund (mB), led by chairman Dr Frank



not involved in the tariff policies.

The regional district hospitals are currently affected by the strikes, but they only have indirect means of becoming involved in the tariff negotiations. They are

Ulrich Montgomery, represents the doctors employed by these hospitals. This union of publicly-employed doctors has, by its own account, around 100,000 members  
*continued on page 3*

## MRSA specialists tackle 'worst' hospitals

UK - Although the Department of Health (DoH) demanded a 50% reduction in MRSA cases in hospitals by 2008, a report at the end of 2005 suggested that some hospitals were making poor progress towards this goal. As a result, specialist teams are visiting the 'worst performing' hospitals - in 20 of the country's National Health Service (NHS) Trusts (half the total number of Trusts) to analyse why those hospitals have not reduced MRSA cases. Then the team will develop practical action plans, try to implement them, and organise management and support tactics to bring about long-term improvement. Their work will span all of 2006.

All NHS Trusts must report the number of MRSA bloodstream infections and publish figures every six months. From October 2004 to September 2005, almost 7,270 MRSA bloodstream infections occurred in UK hospitals. However, individual Trust figures might not actually reflect the true number of serious infections acquired in each hospital, because patients are frequently transferred between the Trusts.

It was pointed out that MRSA only affected a very small fraction of the 12 million in-patients in NHS hospitals annually, and that better monitoring resulted in more cases being reported.

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## Bird flu vaccine production to be based in CR

By Rostislav Kuklik

Czech Republic - The US firm Baxter International Inc. is to establish a production facility to produce a quite unique vaccine in CR. First discussed in December 2005, the plan appears to have made a significant step forward. Baxter specialises in medical devices, pharmaceuticals, and biotechnology, and globally employs around 48,000 people in 64 manufacturing facilities, which include those in Austria, Belgium, Czech Republic, France, Germany, Ireland, Italy, Malta, Poland, Spain, Switzerland, Turkey, and the United Kingdom.

In February, Czech television reported that Baxter Vertriebs GmbH (the firm's Austrian branch) had developed a vaccine effective

against an avian H5N1 influenza virus. The report was backed up by statements received both from Michael Vit, Czech Head of Hygiene, and Christian Kunz, the Austrian virologist, who said: 'The vaccine is not yet licensed, but will be soon. It's a candidate for prevention of an infection with deadly bird flu viral strains, including H5N1.'

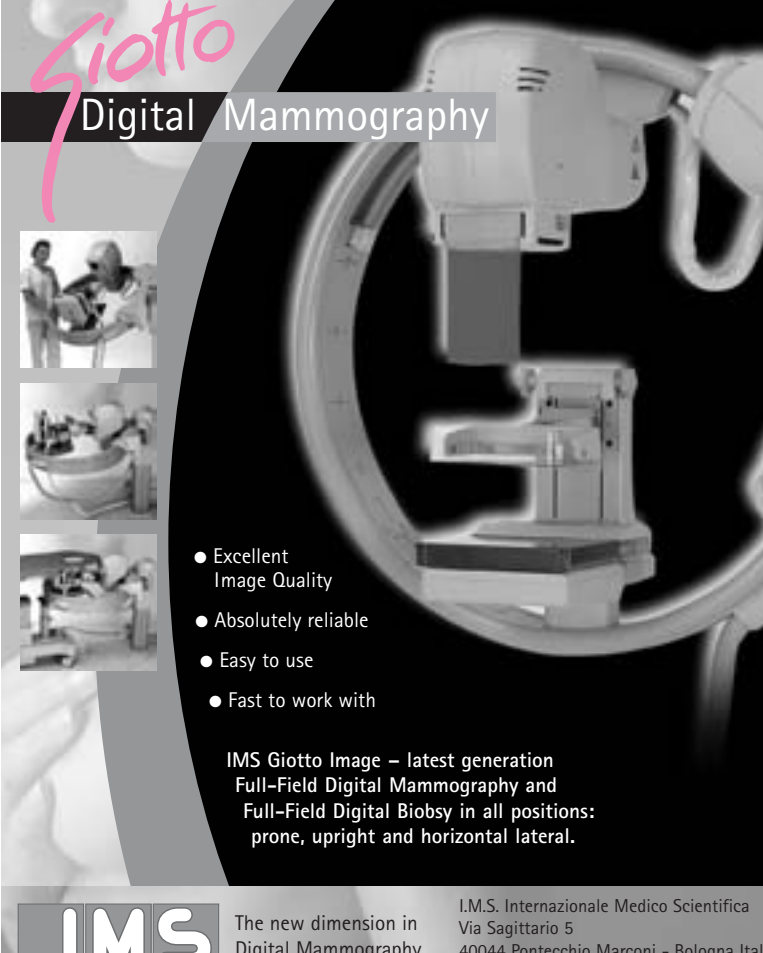
As yet, Baxter has not wanted to issue any statements on this subject, but a statement released to the public reported it had new technologies that would allow the firm to begin production of a vaccine within two months of a possible flu outbreak. However, 'It's too early to make any concrete conclusions,' said Dr Ulrike Engels-

Lange, Baxter's Vienna spokeswoman. According to Michael Vit, Baxter wants to launch clinical tests as soon as possible and, subsequently, start vaccine manufacturing for human use in the Czech Republic. Vladimir Polanecky, Prague's Head Hygiene Officer, added: 'This avian influenza is nothing more than a bird's disease, but the situation will become worse when it becomes a human's disease. We still don't have any medication for this case, because we have no idea on what particular virus or subtype will be involved.'

Baxter actually wants to employ its newly developed technology to produce a vaccine that will prevent human-to-human transfer of viral particles, should this strain of avian influenza break out. The firm unbeatable characteristic of its new method is that it is independent of eggs - usually used to produce inoculations. Instead, Baxter uses cell lines, which would overcome the potential threat of a critical lack of eggs due to poultry infection during an epidemic.

The production facility for the vaccine might be located in Bohumil, a town near Kostelec nad Cernym lesy in central Bohemia. This was  
*continued on page 3*

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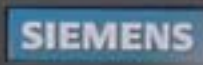
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Militancy among medics - will it spread? *continued from page 1*

- and is making the following key demands to the Employer's Association of Germany Länder:
- Reinstatement of contractually protected working conditions
  - Retraction of the termination of labour agreements on working hours and on Christmas bonus and holiday pay, which has led to a reduction in income by 15 - 20%
  - A means off increasing doctors' salaries by about 30%
  - Full compensation for all work carried out
  - Regular working hours
  - Abolition of short-term labour contracts
  - A reduction of bureaucratic tasks
  - Provision for research and teaching to be done during regular working hours

The latest offer made by employers has been rejected as inadequate. The Marburger Bund has called for nationwide open-ended strikes, every Monday to Wednesday, for all hospitals governed by the Employers' Association of German Länder. There have been mass rallies in different German cities each week in which 4,000 to 6,000 doctors participated. These demonstrations are supported by additional, regional acts of protest. According to the Marburger Bund, over 11,000 doctors at university hospitals and district hospitals 'put down their tools' on 25 April 2006. The union counted over 5,000 participants at the central mass rally in Dusseldorf - in an area where 22,000 doctors work under the jurisdiction of the regional Employers' Association.

The university hospitals affected by the strike are looking at a loss in revenue on strike days of between €300,000 - €500,000, although the strikes that, so far, have been limited to two days a week, have not brought the hospitals to a complete standstill.

The economic losses could grow even further. The Marburger Bund has called for a

total strike from 15-19 May. The effects are cushioned by different emergency agreements that individual hospitals have with their doctors. Overall, this means that a 'weekend service' is in place - selective operations are postponed. There is, of course, room for discussion as to the question of what is selective and what is not.



Pascual Maragall, President of Catalonia, amid strikers on April 26

The tariff negotiations in the hospitals are not limited to the institutions governed by the Länder. There are currently also negotiations with the Federation of Communal Employers' Associations (VKA), with doctors again being represented by the Marburger Bund. As long as it looks like these negotiations have a real prospect of achieving satisfactory results, the institutions under the jurisdiction of the VKA are spared the strikes. However, should negotiations fail there have already been threats that the current protest actions also will be expanded to these hospitals.

These tariff negotiations must not be confused with the acts of protest carried out by general practitioners and specialist doctors in private practice. Because they are considered to be self-employed the word strike does not seem appropriate. However, surgery closures and demonstrations are to increase the political pressure, because doctors who work outside hospitals are also unhappy with the increase in bureaucratic tasks and their conditions of pay. The mood amongst doctors in general is grim.

## SPAIN

## Catalonia doctors strike

In some areas of Spain, doctors are also becoming militant. Eduardo de La Sota reports

Several months ago, the Spanish Government decided to increase funds for healthcare, which is managed and provided by the 17 autonomous regions. This was very well received. But in April, doctors from Catalonia began a strike due to the overload they face (almost 40 patients per day from 8 a.m. to 2 p.m. for general practitioners).

Unions are on the move and the population is somewhat worried by both the strike and the doctors' workload. In Spain, an aging and increasing population (43 million), plus immigrants' needs, and pharmaceutical as well as technology costs, are all pushing up total healthcare costs. The Socialist Government of Zapatero also recently passed a law to protect dependent people and provide new care services. Thus an increase in total costs for Health and Social Services in Spain in the short, and the mid-term, is assured. Spain is growing at about 3,7 % in terms of GNP, which is why a deficit is has not yet appeared, but many people are very worried about it.

The Catalonia doctors - 11,000, including general health practitioners and hospital doctors were called to strike, by the Sindicato de Médicos (doctors'

union), during three days in March, two in April and 3/4th of May. Patricio Martínez, Secretary of the Sindicato de Médicos, stated that doctors must pursue a specific agreement (which differs from that of other healthcare professionals), and that should include responsibility recognition, increase in staffing and the promotion of continuous education.

Meanwhile, Catalonia's Health Minister, Mariana Geli, responded that the government's aim is to continue negotiations.

According to the Union, 84% of doctors have been involved in the strike, but Catalonia's Government reported that only 36% of physicians were involved.

Nonetheless, some basic services in hospitals and emergency units have been maintained.

On 3 May, the Catalan Unions CCOO, UGT, CEMSATSE and CATACT-CTS agreed, in a statement, that they consider unnecessary a law that the Catalan government is promoting to transform the Catalan Institute of Health (ICS) - which provides regional healthcare for Catalonia - into a public service. Luisa Montes, from CCOO-Cataluna union, declared that this plan would not help the ICS to be more efficient.

## UK

UK nurses in revolt *By Clare O'Sullivan*

There is growing unrest in the nursing profession in the UK following announcements of planned job cuts in the National Health Service (NHS).

The NHS, which is the fourth largest employer in the world, is in a financial crisis. One in four NHS trusts failed to balance their books in 2004-2005, leaving the NHS with a deficit of £250 million. At the time of writing figures were not available for the next financial year, but it has been predicted that they will be worse.

At the beginning of this year, it was announced there would be more than 7,000 job cuts across NHS Trusts. And health chiefs are taking other measures, including closing wards, cutting the number of hospital beds, delaying operations and closing operating theatres.

**'Keep Nurses Working, Keep Patients Safe'**

The government's Health Secretary, Patricia Hewitt, felt the anger at proposed changes in the NHS when she attended the Royal College of Nursing's (RCN) annual congress in April. At the entrance to the conference hall she was greeted by the sight of a cardboard coffin bearing the words 'Rest In Peace, NHS?', and many delegates were wearing T-shirts

carrying the slogan of the RCN's new campaign 'Keep Nurses Working, Keep Patients Safe'. Patricia Hewitt also received a cold reception at the congress and was even forced to abandon the end of her speech when nurses booed, stamped their feet and heckled her.

Nurses have been angry and demoralised about rising deficits, the threat of redundancies in some NHS trusts, the Government's pension provision and their 2.5% pay rise, announced in March. Tensions are said to be so high that they would consider taking strike action for the first time in very many years.

The RCN General Secretary, Dr Beverly Malone, said the government risks losing the support of nurses and told ministers to start treating them like valued professionals. Speaking at the conference, she said nurses support reforms that benefit patients but they are prepared to oppose change if it threatens the future of the NHS. She later added that the Government should remember that NHS services rely on the goodwill of nurses, stating that they worked the equivalent of one day of unpaid overtime a week and could stop doing that. 'We may consider not working those hours, but such action is always a last resort because nurses are always going to be looking at how to make sure patients are safe.'

MDS ASSURES GREATER CARE *By Heidi Heinhold*

**Germany** - PG 11 - a new product group added to the medical technical aids register\* relates to decubitus aids. In December 2005 it was announced that, in June this year, registration regulations for the entirely revised product group 11 (PG 11), in the German statutory health insurance medical technical aids register (HMV), will take effect. This relates to decubitus. For a six-month transitional period previously approved products may be distributed with their old HMV codes. Products registered after 1 June 2006 must comply with the new regulations.

What's new in product group 11? The register aims to ensure that comparable products provide a solid foundation for the selection of products that respond to an individual patient's needs. This objective is informed by recent findings, particularly the national standard for the prevention of pressure ulcers and the project

examining the interdependence of the causes of decubitus (*Ursachenzusammenhänge der Dekubitusentstehung*, Krause et al. Hamburg, 2004), which was jointly funded by the German Federal Minister for Family Affairs, Senior Citizens, Women and Youth and the Robert Bosch Stiftung GmbH. Another important source is obviously the relevant international literature, particularly the American national AHCPR Guidelines.

In an application for registry, a manufacturer must provide indications as well as counter indications. In this phase the decision is made as to whether the new aid is a preventive or curative product. Moreover, the manufacturer must prove the product's therapeutic benefits regarding those indications. The product, for example, needs to ensure proper treatment, prevent imminent damage, or mitigate an existing condition. Also, the benefit

must be weighed against risks. Desired and undesired effects of the product's use must be assessed and the therapeutic benefit, combined with all other registered components (e.g. covers) must be demonstrated. Implications

**PG 11 regulations and manufacturers** - The information supplied by a manufacturer on indications and recommendations regarding use and application will be elaborated on, and provided to the customer, i.e. the hospital. These product descriptions will also contain counter indications and point out under what circumstances the product must not be used. If the product is used - despite these warnings - and a patient suffers complications, the nursing staff is responsible.

**PG 11 regulations and physicians, nurses and distributors** - The product choice follows an assessment based on the Braden scale for adults and the Braden Q

scale for children. The authors, however, explicitly state that other scales are also admissible. The assessment doesn't necessarily have to be performed by nurses on a ward where a patient is located. It also can be performed by other nurses, in out-patient settings, and also by a distributor's representative. However, the person assessing a patient must be adequately qualified and able to provide the appropriate supplies within 24 hours. The assessment is meant to offer a basis for the selection of a certain product that is comprehensible to the service provider, physician, nurse, supplier as well as the payers - the health insurer and the MDS.

\*MDS - The medical technical aids register (*medizinischer Dienst der Spitzenverbände der Krankenkassen*) the consulting body of the statutory health insurers, which formulates legally binding guidelines and registers. Further information: [www.g-k-v.com](http://www.g-k-v.com)

Bird flu... *continued from page 1*

confirmed by Martina Havlickova, Head of National Reference Laboratory, and certified by the Czech regulatory authority, State Institute for Medicine Control (SUKL). In Bohumil, Baxter invested around 1.8 billion CZK (\$7.2 million) in a former blood plasma production facility, Sevac, which now has around 200 employees. The Czech Republic is thus the only new EU member, except Hungary, where the real potential to produce pandemic vaccine exists. Further plans are that, later on, Czech-produced vaccine will be exported to Austria and the Netherlands. The question is, what the future will hold for this field - both GlaxoSmithKline and Sanofi-Pasteur are striving to create the technology to enable pandemic vaccine production in various European countries.

Sources: [www.baxter.com](http://www.baxter.com); <http://lbnihmed.cz/>; <http://aktualne.centrum.cz/>

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EH 2/06

## NEWS

# MAJOR ORDER

The largest European service contract in the hospital sector, worth around € 60 million, was recently awarded, by the Charité Hospital in Berlin, to Vamed, the Austrian hospital specialist. The project includes the outsourcing of non-medical service areas.

Vamed has a major holding in the German Fresenius group and ranks among the most successful providers in project development and consultancy, planning and installation, management (facility management, total operational management) and logistics.

Over the last few years, the company has implemented more than 250 healthcare projects in 20 countries worth around €6.5 billion.

'We only live in the old times, in which we had to pay nothing for a health service.' Over 15 years after re-obtaining independence, this is the opinion of almost all involved in healthcare in the Baltic States Estonia, Latvia and Lithuania. However, the idea has not yet

occurred to others, namely patients. Western standards are expected, but governments can no longer guarantee this free of charge. This leads to an excellent medical technology base, but also a chronic financial shortfall - and a partially booming private sector, writes Holger Zorn

# The Baltic States and their health systems - From Soviet to EU

## Estonia

The Estonian health system differs from its Baltic neighbour states thanks to a transformation process and reforms that resulted to an entirely restructuring in 1990. Small hospitals were closed or integrated into bigger ones. At the same time, hospital administrations reduced their length of stays and bed capacities and gradually moved the accounting system from case-overall oriented to diagnosis. To strengthen management, the government decided some years ago to privatise all hospitals - either as a non-profit corporation or as a corporation. Today the government is considering allowing only non-profit maintenance.

The new central hospital at Pärnu, capital of Estonia's biggest district, may illustrate this process representatively: a big hospital, with over 1,000 employees, has emerged from many smaller ones. Today it offers not only broad medical care, but also stands for the highest level of technical standards. The government mainly financed the project; €500,000 for technical devices were funded by the European social funds. Parallel with the renewal process, the hospital management gradually reduced the clinics' bed capacities from 1,300 in 2000 to approximately 940 beds in 2004.

The government also strengthened ambulatory care. Family doctors were upgraded to 'doctor of first contact' and became accessible to everyone, without any patient co-payment. At the same time the government gradually raised the salaries of family doctors and required them to take longer continuing training. From 1992 to 2001 the number of ambulant general practitioners (GPs) and doctor's surgeries increased from 147 to 600. Although the earlier introduced family doctor's system leads to the health service a modern image, it is not praised by all. Criticism of the reforms did not end, because too little money was spent for the health service during the economic boom: The health issue (5.4% of BIP) has not reached half of the EU average value (10.9% of BIP).

## Latvia

The Paula Stradinja University Hospital, in Riga, is one of 121 Latvian hospitals, and one of the two university hospitals. Patients with acute illnesses go to a university hospital mainly, because acute care belongs to basic medical care and is free. Neither time nor money remains for special treatments. Thus,

family doctors urgently transfer less pressing cases because treatment takes place quicker and will be paid. Conversely, chronically sick patients must wait often over six months for treatment, because the limited hospital budget is filled with special treatments again. Up to 2010, the government plans to reduce the number of the hospitals to 52, and centralize the hospital system.

Although resignations of many Latvian hospital doctors has risen due to lack of money, since 29 April a bright spot has shone. The Ministry of Health agreed with the health workers union to raise the salary of



Kardiolita, a private clinic built in 1998 in Vilnius, capital of Lithuania, has two operating theatres, 12 intensive care beds and 42 normal beds and offers a full programme of interventional cardiology, heart surgery, orthopaedics and plastic surgery

physicians from around €330, gross monthly, to possibly double this year. The threatening lack doctors actually might be one of the main reasons for this. Every third physician is over 55 years old, approximately 20% will move abroad in the future. Latvia needs 1,500 additional doctors to guarantee care over the next decade. As in Germany, the situation tightened, first in rural areas because hardly any physicians want to go for the low money there. Another government motive for raising salaries is to fight corruption in the health service. According to a proposed law, medical doctors who accept 'black cash' payments will be punished. However, whether such a law can dam the usual practice is doubtful. If a patient voluntarily gives additional money directly to the hospital administration, it is not rejected.

That is not all. Patients also must pay an official participation of €2.50 for a house visit and €7 hospital admission fee, then €2.20 per day. Independent of the length of hospitalisation, €40 are charged for food and accommodation. Patients' contributions in the whole of healthcare

issues amounts to about €18,000,000 annually. While physicians and officials see patients absolutely in a position to pay these small amounts ('Health is a question of the individual priority settlement') observers of the Latvian health service assume that over a third of the population renounces this due to high additional payments for doctor's visits. 170 doctors work in the biggest Latvian private ambulatory clinic, the patient's case holds 250,000 people. 1,200 patients are treated daily; over 90% are insured privately, or pay for services from their own pocket. In Latvia, there are 16% of private ambulatory medical practices, but most run less than successfully. Many have too few beds and would not have the clientele who could afford private treatment.

## Lithuania

According to politicians and officials, Lithuanian healthcare does not have weaknesses. Due to the recently announced salary increase, doctors are full of hope and hospitals are on the way to becoming high-tech health service centres. However, the number of hospitals and beds are no longer affordable. Since 2000, changing governments began closing hospitals. The bed capacity decreased from 1,300 for 100,000 inhabitants to less than 900 beds. Physicians are not the only victims of the chronic lack of funds, but are well organized. As consequence of low salaries, a lot of overtime and only moderate appreciation from patients, hundreds of doctors demanded more money in 2005. As result, the government now wants to raise salaries over four years. Before the strike, the salary of most doctors lay only briefly above the Lithuanian average income of €380 gross monthly. To reach such an income, GPs ten minutes to dispatch each patient. However, if most doctors did not have two or three positions, the salary increase had no noticeable effect. Well-trained, they will not feel the payment is appropriate. So it is not surprising that patients offer additional payments; the private contribution in 2003 was about 24%. Besides, one understands small financial allowances as gratitude rather than as bribery. The government plans to hit corruption in the health service, but thinks less of a corruption law. Possibly a state medical association to strongly control doctors would be the answer. Whether additional payments are the best way to tackle 'black cash' payments, will probably take some years to be seen.

# ADVANCING INDIVIDUALISED THERAPIES By Anja Behringer

The decoding of the genome has made it possible for molecular biology specialists to detect predispositions for illnesses and treat them accordingly. Family history, belonging to a certain group of people and a patient's individual status, require personalised treatment. Gender, often underestimated, is an important psychobiological variable. However, particularly in those with chronic diseases, men and women are still treated the same, despite documentation that there are gender specific differences regarding morbidity and mortality, as well as to the uptake of medical services available.

To better understand this, and consider it when treating patients, in November 2003, Charité University Hospital, in Berlin, founded the first *Centre for Gender in Medicine*. Professor Vera Regitz-Zagrosek MD is its spokeswoman. One research project at the centre examines the different manifestation of myocardial hypertrophy in men and women, where oestrogens, expression of contractile proteins, regulation of angiogenesis, and other metabolic processes have an effect. Apart from the Charité, another 11 working groups are involved in these projects, based at the German Heart Institute and at the Max Delbrück Centre for Molecular Medicine, both in Berlin.

## Molecular technology enables individualised diagnostics and therapy

During a recent molecular medicine conference held by the Medicine Technology and & Pharma Forum, in Nuremberg, Professor Ivar Roots MD, of the Institute of Clinical Pharmacology at Charité, said: 'The prerequisites for future success in pharmacogenetics, as an important aspect of molecular medicine, are simple and cheap genotyping procedures. We particularly need methods of information that make the knowledge, which we already have, available to doctors treating patients.'

Pharmacogenetics investigates the influence of genetic factors on the effects of medication. Genetic preconditions can change the effectiveness of medication, for instance, in the treatment of asthma, hypertonia and cancer. There are often big differences in the occurrence of genetic variances within different ethnic groups. For this reason, Prof. Roots is lobbying for the inclusion of pharmacogenetic concepts at when new drugs are being developed.

One aspect of the use of personalised medicine is the adaptation of drug therapy to the patient's individual type of metabolism. During the conference, Dr Andreas Görtz of Roche Diagnostics, explained: 'Different abilities in metabolising drugs can lead to undesired side effects, as well as to the drug not having any effects at all.' He also mentioned that there are an annual 16,000 deaths in Germany alone, that could be attributed to the side effects of medication.

Thus a lot of work is being put into fast and cost-effective geno- and phenotyping. Professor Bernhard Wolf MD and Martin Brischwein MD, of the Heinz Nixdorf Chair for Medical Electronics, Technical University Munich, are currently working on in-vitro resistance testing of patients own tumour cells, so that customised and cost-effective medication can be used in therapy.

Chip laboratory systems manufac-

tured by Siemens and General Electric are other fast and reliable ways of DNA examination or whole genome amplification (WGA). This new method was introduced at the conference by Qiagen GmbH, Hilden. The method uses isothermal strand-displacement technology, which, unlike PCR-based methods, promises '...a very even duplication across the whole of the genome, lowest error rates and large fragment sizes'.

Dr Christoph Petry of Diagnostics Research Germany at Bayer

Healthcare in Leverkusen, reminded us that depending on indication, 20-80% of breast cancer patients do not respond to currently available medication. The firm is developing predictive tests for all the available, potentially effective, therapies, to determine the likelihood of a patient relapsing and the best treatment strategy. 'We have already identified diagnostic algorithms, based on RNA expression in the tumour, for several therapies. In some cases these were successfully verified,' he said.

Bayer is also working on an array

technology, based on planar waveguides. Without amplification, DNA and RNA are detected directly on the analytes. With this, diagnostic tests could be carried out in parallel and cheaply.

**Telemedical care** - Philips Medical Systems has developed Motiva, an interactive communication platform for the long-term monitoring and care of discharged patients or those with chronic illnesses (cardiac, respiratory). Due to be marketed shortly, Motiva networks a patient with doctor and carers via TV and a box

that automatically transmits vital signs to medics.

In a long-term study of patients in Great Britain, the Netherlands and Germany, Philips, and medical partners, showed that telemedicine reduced mortality in patients with heart insufficiency by over 25%. More than 90% of participants confirmed that the system made them feel safer.

According to a World Health Report, 70% of healthcare costs in Europe arise from chronic illnesses. It is hoped that telemedical monitoring will reduce those costs significantly.

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# Europe needs radiologists

**ECR President calls for better working conditions, more training, higher pay - and less administrative work**



ECR Congress President Andy Adam

The 12th annual European Radiology Congress, held in Vienna, received 16,000 visitors from 90 countries. The large percentage of radiologists among them underlines the importance of this congress in Europe, said Professor Christian Herold, Head of Radiology at Vienna General Hospital and President of ECR 2007. But, he added, 'Rapid development in radiology has led to a lack of radiologists in Europe. Many colleagues move abroad. The US in particular are tempting radiologists with more money and better working conditions.' We need to go against this trend, as soon as possible, he pointed out. We need to improve working conditions for doctors across Europe, and we not only need to train more doctors, but also relieve them of unnecessary administrative duties to enable more involvement in clinical management, because only those who appreciate the problems of the whole operation are able to work more efficiently within their own, specialist area.

Indeed, the developmental spiral in this field rotates ever faster. The range of radiology is now very broad and increasingly complex, which

leads to fragmentation into many different areas of expertise. This year, for example, key medical topics, with daily refresher courses, focused on *Staging of Cancer, Radiology of the musculoskeletal system and Radiofrequency-ablation.*

Presentations at the five-day congress were again impressive - only four in ten abstracts submitted fulfilled the standards set by the scientific committee.

Among products exhibited by 200 companies, a lot of new technology was launched and, inevitably, information technology (IT) was also a key focus. The EPOS (Electronic Poster System), introduced in 2003, saw further enhancement, in that radiologists can now receive scientific abstracts by e-mail. In addition, a completely digital, advanced training course was also offered to trainee radiologists. This world's first 'electronic training' course makes the ECR more than a congress,' said Andy Adam, Professor at the Guy's, King's and St. Thomas' Medical School, University of London. 'It sets new standards for science and teaching.'



*The social programme is an important aspect of the ECR. As a resident of Vienna, you will be able to organise events on a different scale to your predecessors in 2007.*

CH: Over the last 15 years, all ECR presidents have tried to find the best venues and organise the best events possible. However, I do have a few insider's tips and know of a few palaces that no one has seen yet. As an Austrian I can afford to be a little less mainstream. Just look at the poster! I don't want to conform to all the clichés - there will be no performance of Mozart by the Vienna Boys Choir, riding on Lipizzaner horses, so to speak. I would also like to show the modern side of Austria - modern Austrian culture. The poster was a first step in that direction. It represents the old and the new Vienna and will finally be a multimedia project, which, through different ways and means, will bring together culture and the congress, modernity and tradition. The music programme will also reflect this.



Professor Christian Herold, Head of the Clinical Department for Radiodiagnostics at the General Hospital Vienna, Austria (AKH) and President of the ECR 2007, discussed his ambitions and objectives for European radiology, in an interview with Daniela Zimmermann of European Hospital



*Does that mean listening to Schönberg?*

CH: I will go even further than that. Why shouldn't Joe Zawinul perform, a Vienna-born jazz performer with an international background, who lives in New York and who brings together people from different parts of the globe with his syndicate. This might shock the audience but, on the other hand, might be perceived as a reference to the quality of modernity. The ECR should show how different generations of ECR visitors deal with the past, present and modernity. In other words, I'd like to emphasize the contrast and connection between tradition and modernity. One night we might possibly have a literary evening at a traditional Viennese coffee house - which would also connect us with the ECR 2007 host country, the Czech Republic. The coffee houses connect Vienna, Prague and Budapest, so our joint history also will be given its place.

*This is a good point. On a scientific level, there have been complaints that Eastern Europe*

*is not given the importance at the conference that it should have. Do they have any foundation?*

CH: This is not an easy subject. ECR visitors have very high expectations for this congress. It lives by its international experts, its stars, its brilliant speakers, those who attract an audience. We try to attract a high percentage of very good speakers and international experts to the congress.

*Aren't there any of those stars in Eastern Europe?*

CH: Of course there are some in Central and Eastern Europe, but we don't know all of them. I've been trying to place representatives from the Central and Eastern European countries and have done the same with my congress committees and sub-specialty committees. Unfortunately, it is not always easy to find those Eastern European experts who are able to perform at an international level - who speak good enough English, are brilliant communicators and thereby fulfil the qualification profile. The question is: What can we do to integrate experts from the Central and Eastern European countries in

the ECR's postgraduate educational programme, in a comprehensible manner? One possibility is the evaluation of the scientific presentations at the ECR, which should give us a data pool of experts who are brilliant speakers and also brilliant scientifically. Through this pool we could build up a think-tank and achieve an objective approach to identify good people. This has already happened, and in that way we can integrate scientists who fulfil the qualification profile into the ECR lecture programme.

We need to be proactive, but we also need the active commitment of the scientists, and those researchers whose scientific presentations are good are invited. If I want to appear at the ECR as a speaker, I must present myself as active and, in an abstract, I must have the heart to get on the 'stage', and once there, I must deliver and then be discovered! How does a football club find its players? It has its scouts.

*But you are not scouting for talent. You simply ensure that the ECR is open to offers and hope there will be takers.*

CH: Yes, on the one hand, but we do scout for talent. Many renowned experts and scientists who work with the ECR, and travel to attend lectures, pass on the names and details of so far unknown hopefuls. The national and international associations also pass on names. In addition, we promote education via the new European School of Radiology so that young scientists can familiarise themselves with the standards. *Not many women are visible at the congress. Does this scouting include them?*

CH: Absolutely! The congress is very much open to women! I'm glad more and more women are visible and that they are becoming

## 2007

## Science and culture: between tradition and modernity

more active at the ECR. I think that, on the whole, the ECR is a congress that is very accommodating towards women. There is a substantial percentage of women on my congress committee; they hold responsible positions and plan the entire congress programme. There are also very many young female experts.

**Which specialist events will you offer in 2007?**

**CH:** A congress must have an attractive programme to draw visitors, and we should achieve this with the multi detector CT course. However, for example, molecular imaging is still a relatively small field, which mainly concerns research, but we have featured molecular imaging for the last three years and have seen a continuous increase in visitors. Lectures are attended by specialists and those who are curious. In 2007 we will offer a mini-course running for three days, and this will also explore the clinical aspects of molecular imaging. We want to show the basics and applications from the laboratory through to clinical applications. So, there will be people speaking from fields other than radiology. There are over 20 different medical fields, subjects and sub-specialties working together to promote molecular imaging in a sensible and comprehensive way. It will be very interesting. As a university we are already exposed to interdisciplinary organisation, and it is a new experience having people from different medical fields sitting at the same table. We have a saying in Vienna: 'Talking brings people together'. Here in Europe we can't do things the American way, which is to buy a superstar for a lot of money, build a large research facility and then get things going. In Europe we must use the resources already available to us, we have to talk and network existing structures, which is something we already do in molecular imaging.

**The number of visitors at the Hospital Administrator Symposium, organised at the ECR for the last three years, seems to be signalling a trend. What do you want for this symposium in 2007?**

**CH:** I'm a founder member of the European Working Group on Management in Radiology. We founded this club as young rebels and weren't always well-received. But it was a long-term initiative that aimed to increase interest in management among younger as well as the older radiologists. We dealt with numerous subjects, ranging from departmental management to quality management, from personnel to finance. This is one of my general concerns. I will not only continue the programme next year but also expand it. Apart from that, it should actually be called the 'Hospital Management Symposium' to emphasize that we deal with active people here.

What I would like to achieve with the 2007 programme is the

inclusion of more politics. We must show those who make political decisions on the role of radiology and imaging within healthcare systems that modern radiology plays a central role within healthcare.

**Does that mean inviting the German Federal Minister of Health?**

**CH:** Of course, but also all European Union Ministers of Health. This is important, because these politicians control our healthcare sector. Maybe only a few European politicians will attend, if any. But we must make a start, just like the newly-founded European Society of Radiology (ESR) will have to set up an office in Brussels. We have to be

politically present, which we have not done enough about in the past.

**Last year it became obvious that the Austria Centre is too small for the ECR. Will you change the venue?**

**CH:** That's one of the consequences of the growth of this congress. However, by next year the Austria Centre will be converted and the entire restaurant area will be available for additional lectures. We

have a long-term contract with the Centre that runs until 2009, because we were offered very good rates. Whether we should give up the Austria Centre is quite a decision, particularly as it has a very, very good infrastructure regarding the quality of the premises, acoustics and IT equipment. This quality does not come cheaply, and you have to earn that money. We are considering a congress centre for the period after 2009 but, for the time being, we are honouring our contract.

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# BETWEEN INNOVATION AND INVESTMENT

By Professor Maximilian Reiser, Director of the Institute of Clinical Radiology - Grosshadern, Munich University Hospital

Many radiologists are fascinated by the exciting new developments in medical technology but they find themselves faced with difficult or even irresolvable problems when trying to purchase this equipment. Whereas in the past the innovation cycles in technology roughly corresponded with the depreciation periods for large-scale medical equipment, new technologies have been coming onto the market since the turn of the millennium with ever shorter gaps. At the same time,

pressure from competition and costs has intensified so that a nightmarish dilemma has developed.

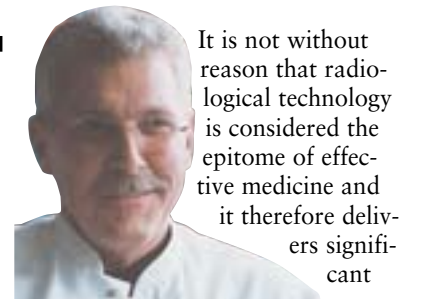
Before a new diagnosis or treatment procedure is covered by medical insurers there has to be proof that the new method will be significantly superior to conventional methods. With diagnostic procedures this is particularly difficult to achieve, because the target is defined as longer survival or better quality of life for patients.

Multicentre studies, with large numbers of patients, can hardly be carried out when propaganda for new and better technology is already occurring while the study is still ongoing. This is the reason why some studies have significant methodological shortcomings and become obsolete even before the results are published. And what can really be defined as the state of technology when several generations of the same technology are being used simultaneously - such

as the incremental one-slice CT along with 64-slice dual source CT?

The required minimum standards in most countries orient themselves around the existing levels of technological installations and therefore investments in the most up-to-date technology are not necessarily reimbursed.

However, despite this situation, there are still a number of good reasons for radiologists and hospitals to invest in new technologies.



It is not without reason that radiological technology is considered the epitome of effective medicine and it therefore delivers significant

advantages over the competition. More and more patients inform themselves about the equipment and results offered and delivered by individual doctors or hospitals via the internet - in the USA this is already done by over a third of the population.

Whereas in diseases that take a longer course, the direct influence of diagnostics on the prognosis is hard to define that there are already clear results in some other areas. The records of the German Society for Trauma Surgery confirm a significantly improved survival rate for polytraumatised patients whose primary diagnosis was carried out using multi-slice CT.

It is no less attractive for patients and referring doctors when invasive, stressful examinations can be replaced by non-invasive, gentle procedures and a series of different, individual examinations can be replaced by a single, comprehensive procedure. Some examples are the MRCP instead of the ERCP, CT and MR angiography instead of catheter angiography and - now a realistic option - the MSCT instead of a heart catheter. MSCT and MRI have evolved into modalities that enable an examination of the entire body during one examination procedure. Diseases that potentially manifest themselves generally, or in multiple locations, can be comprehensively clarified in one course of examination - without a loss in image quality or diagnostic precision. Whole body MRI or CT has already proved itself in the staging and follow-up for patients with malignant tumours or for the diagnosis of vascular stenosis and obstruction in arteriosclerosis.

Improved diagnostic precision of large, modern medical equipment also has a significant economic factor in a hospital. It contributes to a faster and more precise diagnosis for patients. Treatment can be started earlier and hospital stays can be shortened - an economic advantage that must not be underestimated. If effective radiology leads to a reduction in in-patient stays by even only 0.1 days - an extremely conservative estimate from my point of view - this leads to a saving of €225,000 in every 45,000 cases treated.

The savings in radiology itself are also not to be underestimated. There is a lasting, positive effect on radiologists, radiographers and the internal organisation (registration, administration) and workflow in the hospital improves.

Performant radiology information (RIS) and picture archiving and communication systems (PACS) that are integrated into a comprehensive hospital information system (HIS) are of high importance. Voice detection systems for radiology dictation have also proved highly effective and substantially shorten the time it takes for radiological information to become available to the referring doctors.

As difficult and painful the split between innovation and investment for radiologists and those funding the hospitals may be - there is no alternative to thoughtful and long-term innovation politics.

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Whilst almost 90% of hospitals with a traditional PACS still print film for delivery beyond the radiology department, others are working with and benefiting from revolutionary advances for healthcare communications. Among these are systems using Philips Medical Systems iSyntax technology, which enables medical teams to have instant access to as many top quality images as they need, over existing networks.

The company's iSite PACS is a medical image and information management system that provides enterprise-wide diagnostic-quality images and relevant information, advanced radiology workstations, and constantly on-line storage. The system comprises iSite Enterprise, iSite Radiology and iVault.

iSite Enterprise is Web-based image and data management distribution system that circulates diagnostic-quality radiology, cardiology, dermatology and pathology images plus a patient's record, anywhere in a healthcare network. The system works with standard PCs and networks.

iSite Radiology, designed by radiologists, is a reading station providing full-fidelity diagnostic presentation of current and archived studies and associated clinical information in a single application. Diagnostic image presentation and navigation are separated, improving reading efficiency, Philips reports.

For long-term storage, Philips reports that its iVault is the only permanently on-line medical image archive system that can eliminate bottlenecks caused by pre-fetching, routing, forwarding, off-line media management and ad-hoc querying. 'With integrated RIS workflow, iVault provides a single view of images and information to all users across the healthcare enterprise. The system scales to millions of studies per year and hundreds of concurrent users across numerous institutions.



# iSite: an insight into advanced healthcare communications

iVault is a single storage solution for the management of all imaging data including radiology, cardiology, pathology, dermatology, and other imaging domains,' Philips reports.

New and archived images can be accessed in three seconds or less. Other advantages of the system are that diagnostic reports and studies can be stored with images; records can be saved to CD or DVD; there are multi-monitor display configurations; there is a remote reading toolset; it has low bandwidth optimisation, and advanced clinical tools.

This system guarantees 99.99% reliability with clustered work list/database servers, replicated RAID-5 network attached storage units for critical image data, and load-balanced 'failover' DICOM servers, Philips adds. 'iSite

Enterprise, iSite Radiology, and iVault utilize our proprietary Heartbeat technology. On a minute-by-minute basis, iVault monitors all systems and immediately notifies our 24/7/365 Customer Care Centre of any issues.'

The Disaster Recovery Data Centre's primary mission is to provide HIPAA-compliant off-site disaster protection for clients' imaging data. The company develops an integrated disaster recovery plan so that, in the case of an 'Act of God' disaster, (e.g. flood, fire) the entire distribution system can be brought back on line, with complete restoration of data within 72 hours.

iVault is built with intelligent workflow that provides a system-wide work list and workflow management. The system is based on an expandable array of RAID-5

Network Attached Storage Units - modular architecture that provides scalable storage to support the needs of a single institution or integrated healthcare networks.

Significantly, healthcare clients are offered a *pay-per-study* deal, and are guaranteed a 99.99% uptime (less than 4 minutes per month).

Because multiple applications are increasingly sought, iSite's flexible programming interface (API) is appreciated, for it enables individual implementation of, for

## Financing

'Other PACS vendors recognize 100% of their revenue the first day of clinical use and attach an associated yearly maintenance fee,' Philips points out. 'This model is inherently flawed because, although the system may be correctly specified when the initial contract is signed, specifications change during the term of most PACS contracts: study volumes expand, new sites need to be integrated, and both hardware and software need to be updated. In this scenario, the customer pays for the product before implementation and is ultimately responsible for subsequent unknown costs-making it very difficult for hospitals to understand the TCO of their PACS over the term of the contract.'

Philips' iSite pricing model includes all hidden costs incurred in traditional PACS contracts, the company adds, and implementation is quick, low cost, and '...enables a healthcare



example, i-PACS, an electronic patient record (EPR), computerised physician order entry (CPOE), speech recognition, orthopaedic templating, 3D imaging, and structured reporting.

institution to adopt the system by transferring operational film dollars on a per study basis. Contrary to the traditional capital model, revenue is earned one study at a time,' Philips points out.

## SUCCESS OF FORUM FOR MANAGERS CONTINUES

Within the five-days of ECR 2006, the congress management collaborated with **European Hospital** to hold another two-day: *The Hospital Administrator Symposium*, during which invited experts discussed management, information technology and financing.

This successful event drew an audience of 350 hospital professionals. Reports on the Symposium can be accessed on our website: [www.european-hospital.com](http://www.european-hospital.com)



From left: Charles Ricci, Jürg Hodler, Daniela Zimmermann (European Hospital), Hans Wischmann and Wolfgang Brandtner, moderator of the Hospital Administrator Symposium



European Hospital's 2-day Hospital Administrator Symposium attracted an audience of 350 professionals

## Non-invasive therapy for herniated discs

**USA** - Pressure and inflammation caused by a herniated disc in the lumbar spine, and particularly painful sciatica, can be relieved using a neuroradiological technique rather than surgery, according to Dr Jeffrey A Stone, head of Interventional Neuroradiology at the Georgia Medical College, who reported on his procedure at the 44th annual meeting of the American Society of Neuroradiology in San Diego.

Percutaneous dissection, using only a small incision compared with the traditional surgery, has seen increasing use in the last five years. Via a thin tube, inserted into the hernia area, some of the nucleus of the disc is vaporised or sucked out. However, this treatment is not suitable for all the afflicted patients.

To test which patients are suitable for percutaneous dissection, Dr Stone carries out tests that include injecting contrast material to establish whether increased pressure worsens the pain, and whether the patient has less pain when the pressure is reduced.

Another approach is to inject anaesthetic and a steroid in to the compressed nerve. Just one application can ease the pain, but it usually returns with a couple of weeks. Those experiencing 'substantial relief' are good candidates for percutaneous dissection, he explained, which has significantly reduced pain in 85% of those patients selected, many for a few years now.

For patients whose pain is not caused by pressure on the nerve, or inflammation, traditional surgery would be the choice. This is also the case where disc herniation is squeezed away from the adjacent disc or is fragmented and has migrated into the spinal canal.

Dr Stone's next development to relieve symptoms and mend disc tears could be to combine percutaneous dissection with electrothermal treatment, which although time consuming would be less invasive than surgery.

## Pilot Programme

A 'no risk' pilot programme, within an agreed-upon period of time, allows each institution to evaluate the technical feasibility and clinical experience of an iSite deployment, giving them a soft copy image management experience before committing to a contract. 'iSite does not have the architectural legacy limitations of older PACS platforms and our solutions are designed to be implemented within four months compared with the industry benchmark of twelve months.'

Additionally, Philips' Heartbeat monitors all systems on a minute-by-minute basis, to anticipate errors that could cause system downtime. In that event, the firm's 24/7/365 Customer Care team work on the potential problem before it becomes a real one. Hardware configurations are Data Centre grade and supported by IBM's 24/7/365 global support infrastructure.

Many hospitals have an Electronic Health Record (EHR) or Clinical Information System (CIS) to store images, manage workflow, and increase productivity. iSite can be embedded into these applications through a powerful Application Programmer Interface (API).

# From analogue to digital Solutions for transitions



Kevin Hobert

**Kevin Hobert:** Our entire solution set consists of digital products and our customers are imaging customers. When they convert to digital, they must make their film-based imaging digital, so we provide computer radiography (CR), digital radiography (DR), PACS products, radiology information systems (RIS), archive solutions (customers often need an archive for more than just images), and solutions for sharing images. We also provide computer-aided detection and decision support systems, so that systems can be used in an integrated way, as the backbone of quality images from radiology or mammography departments.

Digital X-ray is an example of a platform within the solution set. We have developed outstanding imaging, image processing, workflow and user interface and can apply this to all the various fields of CR products and all different applications, as well as all the DR product line. So the integrated platform means, for example, that if getting a certain view of a patient in another Kodak digital radiography room is a problem, you can shoot that view using CR, drop it in the reader and it will show up automatically on the DR-System. Our PACS and RIS are integrated platforms, so you can share information and look at radiology data as you view the images. For radiologists, our 3-D tools within our PACS are fully integrated into all our PACS review stations, which provides very smooth workflow.

**What about access to an electronic patient record (EPR)?**

**KH:** You can access data from the Hospital Information System (HIS) through the integrated RIS/PACS. But one of the keys to an electronic patient record (EPR) is to have common data storage in the right data storage. That's our focus: our information management solution includes archive products. The software stores images and any other hospital information, and defines intelligent rules for that storage, providing a common storage area, which is also cost-effective. Customers have one type of service to support one kind of archive media. In that architecture, support is easier, the cost per gigabyte of storage is much lower and it gives all the data in an easily accessible place, so it's available for any EPR.

Our archive product has great strength. We can archive images and

Kodak Health Group, Eastman Kodak's second-biggest business, brought in US\$2.7 billion in 2004 (19.9% of Kodak's total revenue), and has reported considerable success in Europe in 2005. In a European Hospital interview, **Kevin Hobert**, President of Kodak Health Group and Senior Vice President at Eastman Kodak Company, discussed some of the reasons behind the firm's success, and particularly its solutions for transitions from analogue to digital imaging, as well as for workflow and management. These involve the development of integrated platforms.

information from any hospital department, and we have web-viewers and diagnostic workstations, and so on, that can be installed in any hospital department, and secure e-mail to share data with referring locations. The information management product can act as an archive for various data within a healthcare group. It simulates their archives, making that information accessible to people with access rights.

We've scaled our solutions to work in the imaging centre, or small hospital, teaching hospital or community-based healthcare centre. We've had considerable success in Europe in community-based projects, such as the National Services Scotland (NSS), where we are providing a common archive. We have also just won the contract for BUPA facilities across the UK. Another huge project is to store all medical data and images for northern Finland, and, in France, we've networked all 26 Assistance Public (APSP) hospitals around Paris with common storage and common HIS, PACS and RIS.

**So, rather than sell a PACS to one hospital, does Kodak intend to focus more on hospital groups?**

**KH:** Our strategy is not to sell a PACS solution to a hospital but to sell a solution for digital transformation. **Just like Fuji and Agfa?**

**KH:** Yes, and others - probably GE and Siemens and so on. There are a few differences, but these depend on which firm you mention. We have focused on solutions for digital transformation, so we really have all

the pieces: CR and DR to transform X-ray imaging, and PACS, integrated RIS, information management solutions, all our own products and all integrated. We made acquisitions and for the last few years have focused on developing those platforms, integrating our products and building those platforms. We also bring in professional services - such as Lean Thinking, Six Sigma - to help customers gain the most out of the implementations. What matters to us is the result our customers get after implementation. Part of our differentiation is that we provide our full solution set in an integrated way, and are focused. In imaging we provide a digital X-ray; that's what you need when you're going digital, not buying a new MRI or CT - we're not investing in multi-slice CT, or high-field MR, or integrated PET/CT. We focus on digital X-ray as a component of this overall solution set, so we develop best-in-class products, for customers with whom we have a relationship through selling films.

Other companies sell modality equipment, with five million dollar deals for capital equipment. Then? Efficient implementation and they're done. We sell film daily, so develop more relationships. And with IT that's what customers want - someone to be a partner.

Some customers do not want a long drawn out implementation that really optimises their workflow. If it's a small hospital, or small imaging centre, they might

want more than an off-the-shelf solution. You simply come in, implement it, and train them. However, with university hospitals and integrated healthcare systems there is far more consultation, much more workflow re-engineering and implementation that is more tailored to their mix of examinations, workflow, management system and way of working. These are skills we had to develop. Now, our global team, solely for implementations, carry out standard work, have common practices for project management, and know how to define customer goals and how to ensure they achieve them.

**What about hospitals with different equipment from yours?**

**KH:** Many years ago there were, for example, no MRI or CT scanners that produced digital images and needed printers. We were the first to produce digital printers for medical use, and more of ours are installed worldwide than from any other company, and we have sites dedicated to carrying out those integrations. Our database also holds all our customers' activity requirements, their different equipment, what we've already connected to and validated, as well as a well-defined process for that validation. We've done it with digital printers for years, and are doing it with our PACS. It's one of our great strengths - and we go beyond that: We can tie information systems from other hospital departments in to our common archive.

The Hospital Administrator Symposium is supported by



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## THE KITTEN SCANNER

The Philips Kitten Scan is a miniature CT (or CAT) scanner for children - no, not to be scanned in it, but for them to use while awaiting checkups themselves. At the touch of a button children can 'scan' their own stuffed toys, or those kept for their entertainment, and learn how a scanner works, hopefully easing any anxiety about their own scans.



Courtesy of Advocate Health Care's photographer, John Martin-Eatinger

## Six hospitals -

### Asklepios invests € 7 million to network Hamburg hospitals

The LBK Hamburg clinics (General Hospitals Hamburg) became part of the Asklepios group in 2002 and have seen continuous modernisation ever since.

A new picture archiving and communication system (PACS) is enabling image diagnostics with chronological synchronicity and interdisciplinary therapy decisions. In Germany, this citywide PACS networking of several clinics - totalling 5,500 beds - is unique on this scale. Indeed, with an investment budget of around € 7 million, the project ranks among the largest PACS installations currently underway in Europe. The concept, which is opening up completely new means of communication between radiologists and clinicians as well as between individual hospitals, is being developed using a PACS system supplied by Philips Medical Systems.

The hospital management is anticipating a drastic acceleration of work processes and suggests the average inpatient hospital stay will be cut by about a day in the future.

# Small wireless device to improve cancer treatment

**USA** - Engineers are developing a tiny wireless device – the size of a rice grain – to be implanted in tumours to indicate the precise radiation dose received and to locate the exact position of tumours during treatment.

The researchers, at Birck Nanotechnology Centre, Purdue University, West Lafayette, Ind., have tested a Prototype, the size of an average woman's thumbnail, to prove the concept and expect to have the miniature version completed by the end of this summer, according to Babak Ziaie, an associate professor in the School of Electrical and Computer Engineering, and in Purdue's Weldon School of Biomedical Engineering. 'Currently, there is no way of knowing the exact dose of radiation received by a tumour. And, because most organs shift inside the body depending, for example, on whether a patient is sitting or lying down, the tumour also shifts,' he explained. 'This technology will allow doctors to pinpoint the exact position of the tumour to more effectively administer radiation treatments.'

The research paper, by Prof. Ziaie and PhD student Chulwoo Son, was presented in a paper earlier this year in proceedings of the 19th IEEE International Conference on Micro Electro Mechanical Systems, organized by the Institute of Electrical and Electronics Engineers.

The device, a 'passive wireless transponder', has no batteries, but will be activated by electrical coils near the body. Like a capsule, it will be placed inside a tumour with a needle.

Imaging systems already provide 3-D images of a tumour's shifting position during therapy, but these methods are difficult to use during radiation therapy and sometimes require X-rays, possibly causing tissue damage if used repeatedly, the professor pointed out. This wireless technology could precisely track a tumour using three or six coils placed around the patient to pinpoint the location of the electronic device.

Researchers tested the prototype with a radioactive material called cesium.

The device contains a miniature version of dosimeters worn by people in occupations involving radioactivity.

The technology uses the same principle as electret microphones, products found in consumer electronics stores. These microphones



Babak Ziaie holding the prototype device

Purdue News Service photo/David Umberger

contain a membrane that vibrates in response to sound waves. An air gap, between the membrane and a metal plate serves, as a capacitor, storing electricity. As the membrane vibrates, the size of the air gap changes slightly, increasing and decreasing the capacitance and altering the flow of electric current through the circuit, creating a signal that transmits the data stored in the dosimeter.

'It's basically like a very small tuning circuit in your radio,' Prof. Ziaie explained. 'This will be a radiation dosimeter plus a track-

ing device in the same capsule. It will be hermetically sealed, so it will not have to be removed from the body.'

The Purdue engineers are now working with researchers at the Indiana University School of Medicine to further develop the technology.

The research has been funded by the National Science Foundation.

The Birck Nanotechnology Centre is part of Purdue's Discovery Park, the university's hub for interdisciplinary research. Contact: bziaie@purdue.edu

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## one PACS

Dr Jörg Weidenhammer, member of the management at the LBK Hamburg GmbH: 'Medicine will become increasingly networked, so that optimum competency and experience can be offered to patients in the fastest possible way.'



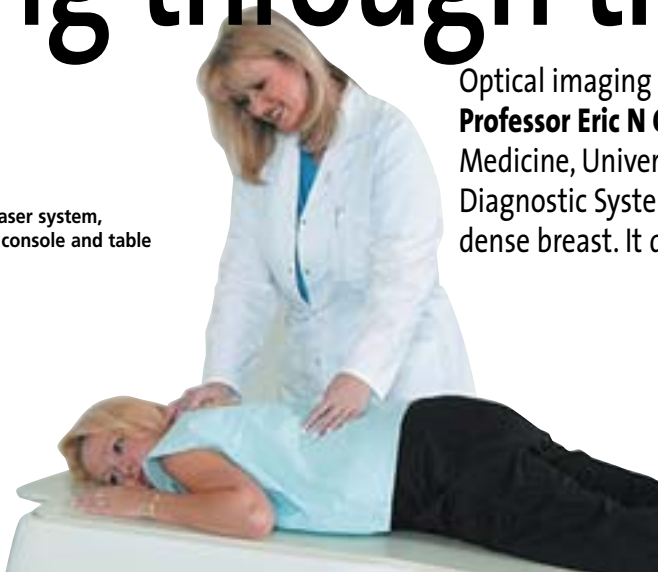
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# CTLM Seeing through the dense breast



Fig. 1. CT laser system, operator's console and table



Optical imaging stands on the threshold of a vast array of imaging uses, writes **Professor Eric N C Milne MD FRCR FRCP**, Professor Emeritus of Radiology and Medicine, University of California Irvine, and Director of Clinical Research, Imaging Diagnostic Systems Inc. 'Presently, its greatest worth lies in higher sensitivity for the dense breast. It detects many more occult cancers than conventional mammography'

'The overall sensitivity of diagnostic mammography in expert hands is about 70%. However, 40% of all breasts are dense, which means the mean sensitivity of mammography is only 45%, and probably the true sensitivity is lower than that. Many dense breast cases are classified BIRADS 0 and are called 'true positives' for audit purposes, although in the majority of these cases diagnosis was made using ultrasound or MRI. Without knowing in what percentage of these BIRADS 0 cases diagnosis was made using other imaging procedures, it is impossible to know the true sensitivity of mammography in dense breasts. Compounding the low sensitivity problem, the incidence of cancers in dense breasts is 4-6 times higher than in non-dense breasts, the type of cancer is usually rapid-growing and dense breasts occur more commonly in young patients, for whom ionising radiation should not be used.

For all these reasons a new form of imaging is needed that can detect malignancies by revealing some of their functional characteristic, e.g. the presence of angiogenesis. This is the basis of *Computed Tomographic Laser Mammography*, which utilises a laser beam at 808 nm, matched to the light absorption characteristics of haemoglobin. At this wavelength water and fat have virtually no absorption. As a result the laser beam, (unlike X-irradiation), passes easily through the densest breast, but is absorbed by haemoglobin, which acts as a natural contrast medium, thus providing a haemoglobin angiogram of the breast.

Other than replacing the X-ray tube with a laser diode the system is similar to conventional X-ray CT, but the gantry is placed horizontally beneath the examination table, on which patients lie face-down (Fig.1) with breast accessible through an opening in the table, and it is surrounded by the gantry ring. Nothing touches the breast and compression is not needed, nor is the breast surrounded by liquid or gel.

The gantry rotates around the breast 360 degrees, creating one tomographic slice. Then it descends 1-4 mm (operator's choice), creates another, and progressively descends automatically until the whole breast is imaged, from chest wall to nipple. Scan time for each breast takes 5-15 minutes, according to breast size. Unlike ultrasound, production of an excellent CTLM image is not dependent on operator skills and

usually a technician, not physician, undertakes the procedure.

Laser imaging is non-ionising and there is no X-ray generator, so no radiation protection is needed. The CTLM system can be installed in any room, using the standard electricity supply.

CTLM has few contraindications other than congenital protoporphyria, a recent tattoo on the breast, or surgery (including biopsy) within the previous three months.

**Reconstruction** is in real time and the image is immediately available. Images are displayed on the physicians reading station as sagittal, coronal, axial and 3-D projections (Fig. 2). The built-in software permits zooming the 3-D image to any size and display in several different formats, including Maximum Intensity Projection, (MIP) front-to-back (FTB) or surface-rendered, and window and level can be altered for optimal contrast.

Other built-in software permits animation, simultaneous synchronised comparison of images with different reconstruction displays, and the ability to 'cut-away' overlying normal anatomic structures to reveal angiogenesis optimally.

Due to intense scattering of light within the breast, reconstructing a CT light image is much more difficult than with an X-ray CT image and the resultant spatial resolution is not as high (1.0 mm resolution on surface), but this is not a clinical problem because the volume of angiogenesis associated with a malignancy is always much larger than the tumour itself... a 3.0 mm tumour can have angiogenesis 3-6 cms wide. (Fig 3) This also helps in displaying tumours close to the chest wall, in which the associated angiogenesis extends much further into a breast than the tumour itself.

**Results** - Over 7,000 CTLM examinations have been performed to date at centres within the USA and throughout Europe, the Arab Emirates, Turkey and China. The most important point from these trials is that CTLM sensitivity, when used as an adjunct to mammography in the dense breast, is considerably higher than mammography sensitivity alone. While mammography sensitivity drops progressively as breast density increases, CTLM sensitivity remains unchanged. So, as a breast gets denser, CTLM sensitivity, relative to mammography, increases progressively. CTLM therefore has the ability to find occult cancers missed by mammography in dense breasts (Fig 4)

#### Future Uses

**After breast cancer treatment:** Since successful treatment with

chemotherapy and/or radiation is accompanied by a progressive reduction in (and eventually complete disappearance of) angiogenesis, CTLM is an obvious candidate for following treatment, enabling rapid treatment alterations if angiogenesis is not reducing

The CTLM system is adapted to image either by light absorption from the incident laser beam, or by recording fluorescence from the breast (from a fluorescent contrast medium) or by attaching a fluorophore to a tumour-seeking proteome. Presently under development, this will permit CTLM to become a unique imaging method to follow processes at the molecular level.

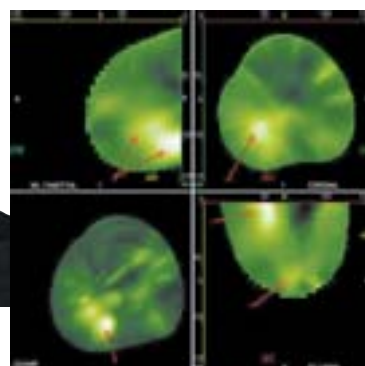


Fig 2. Standard 4 views, cross-sectional and 3-D. Using a cursor, tomographic sections can be viewed across full width, length and height of breast. The 3-D view can be enlarged, rotated in any plane, and animated

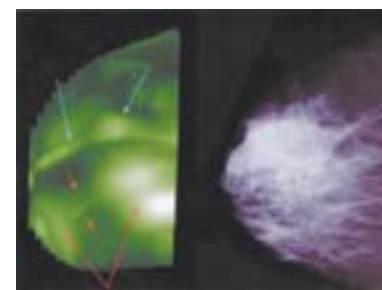


Fig. 3. Lateral CTLM view, compared with medio-lateral mammographic view. Blue arrows point to a large surface vein; red indicate two areas of angiogenesis. The posterior angiogenesis is very intense and correlates with a minute area of microcalcification. Lesion size: 3 mm; angiogenesis: 4.0 cms. Pathology: Extensive DCIS



Fig. 4. Magnified spot view showing faint anterior angiogenesis in fissure 2 correlates with spiculated lesion (circled), not identified on the mammogram. Pathology: Invasive ductal cancer

## Integrated care

**Professor Friedrich Wolff MD**, Head of Gynaecology and Medical Director at Holweide Hospital, in Cologne, Germany, describes a novel approach to obtaining perinatal diagnoses, despite staff shortages and tight budgets



Dr Dariusz Jakubowski, a perinatal specialist and former senior physician at Holweide Hospital, works for three days a week at Holweide Hospital as a resident gynaecologist. During that period he carries out all the obstetrics department's perinatal diagnostics (deformities and other advanced diagnostics). However, for the rest of the week he works in his private ultrasound scanning practice in the town - an arrangement, he says, that succeeds without causing any deficits. We asked Professor Wolff what inspired this unusual work pattern.

**F. Wolff:** 'The special feature of this structure is that we were the first to think of outsourcing this area of perinatal diagnostics into a perinatal centre. This means it was outsourced from clinical routine, but is still on site. The basic problem in large perinatal centres is that the number of births is very high, which also means many high-risk births. Most clinics find it difficult to supply a senior physician who does perinatal diagnostics and at the same time is responsible for the delivery room. This split gave us the idea to bring in a former consultant, who had left and opened his own specialist gynaecological practice outside the hospital, back into the hospital and to assign him to perinatal diagnostics.

**Wouldn't employment of a second consultant be easier?**

**FW:** It just wasn't possible. Perinatal diagnostics is not a very lucrative area for hospitals; the cost of services is barely covered. However, for a gynaecologist in private practice who, in addition, can also offer the IGeL services (individual health services) this is very different. This type of work is indeed lucrative for him and also allows him to acquire new ultrasound scanners. For the hospital, on the other hand, this would have meant a large deficit. So we escaped the economic trap of having to employ additional staff without having more pregnant patients to look after in return for services. However, these now come to us through integrated care. The delivery room consultant is responsible for the delivery room and is authorised to cover for the consultant in private practice. Otherwise, he is on site, in the delivery room, where he is also responsible for obstetric processes and the pregnant patients. **Is this 'outsourcing' of services on the agenda for other diagnostic areas?**

**FW:** Yes, our next, very recent project was developed due to our acquisition of a Xario and to achieve equipment utilisation. We have used the same concept in our mammal-ultrasound surgery, which is in high demand and which we outsourced. This project has only just started. Dr Henatsch, a gynaecologist in private

practice, comes to the clinic each Friday to carry out mamma ultrasound scans on patients whom we have not managed to see during normal surgery hours. He investigates suspected cysts or tumours, which are then biopsied, and he holds a large surgery with the Xario, ensuring the equipment is fully utilised.

**Does Dr Henatsch gain more patients through your clinic?**

**FW:** Yes, definitely - the patients we simply cannot see during the week.

**What other tasks remain for the clinic?**

**FW:** We are trying to focus on our key business, which mainly means treating a large number of patients. We tend many patients during births and surgery, for which a hospital receives a set remuneration. Mostly, prior diagnoses associated with these services have been financially covered already and often just result in additional costs. With personnel resources in short supply - i.e. with only a small number of assistant doctors - one has to consider very carefully who to employ where and where jobs might be reduced through integrated care, but with the same level of service.

**So the managers are very happy?**

**FW:** I think so. From that point of view we are considered examples for others.

# INTO THE BREAST'S DEPTHS

**USA** – Radiologists at Newton-Wellesley Hospital in Newton, Massachusetts have released findings from a breast cancer research study designed to evaluate the use of software from Advanced Image Enhancement, Inc (AIE) for examining regions of interest (ROI) with Hologic's Lorad Selenia digital mammography system. AIE has leveraged the US Navy's technology for locating and detecting undersea mines, tailoring the approach for breast cancer image enhancement.

The researchers compared the ROI of a magnified Selenia image with the corresponding magnified ROI of an AIE-enhanced Selenia image for both views (one cranial-caudal (CC) and one mediolateral-oblique (MLO)) of the breast. 50 women, presenting suspicious abnormalities, who were patients at Massachusetts hospitals (Brigham and Woman's Hospital,

ultrasound and MRI. Hologic is partnering AIE to develop algorithms for digital mammography. AIE's CEO, Michael Duarte, said: 'This study is a tremendous step forward in our research and development activities. It is our goal to build upon this success in future studies, and highlight our technology and its utility to those physicians.'

The study was funded by Aid

for Cancer Research and Hologic, Inc, which specialises in diagnostic and medical imaging systems directed towards women's health. The company's core business units are focused on mammography and breast biopsy, osteoporosis assessment and mini C-arm and extremity MRI imaging for orthopaedic applications.

In April Hologic announced that it is set to acquire R2 Technology

Inc., which pioneered the use of CAD for mammography in 1998 when the ImageChecker system became the first CAD system approved by the FDA for screening mammography. This system was also the first to be approved for use with digital mammography. Based in Sunnyvale, California, R2 Technology continues to specialise in computer-aided detection (CAD), to assist in the earlier

detection of breast cancer, actionable lung nodules and other lung abnormalities, and is developing CAD systems for a variety of imaging modalities and disease states.

Jack Cumming, Chairman and CEO of Hologic, said he believes adoption of CAD will increase as a result of its clinical advantages and the increased uptake of digital mammography systems.

## US Navy mine detection technology aids breast cancer screening

Massachusetts General Hospital and Faulkner Hospital) took part in the research.

According to the study, the AIE software enabled more confident diagnoses in 20%-70% of these cases, depending upon the radiologist. When asked to rate the ability of the software to improve clarity and detail of calcifications in dense breast tissue, the participating radiologist rated it superior in 88% of the study cases.

'Breast cancer detection still poses many challenges to physicians. This study highlights the fact that complementary technologies can be very effective in improving the display of visual information inherent in digital mammograms and can ultimately help physicians detect breast cancer more effectively,' said Alan Semine MD, the study's chief investigator. Dr Semine is Medical Director of The Auerbach Breast Centre and Head of Breast Imaging at Newton-Wellesley Hospital.

The software firm AIE, based in Providence, Rhode Island, produces image-processing tools for medical imaging companies. The firm's core technology evolved from proprietary United States Navy signal and image processing software utilised for the detection, classification and localisation of undersea mines. AIE holds the exclusive license for this technology, and is utilising it as a baseline for the development of image processing algorithms to enhance digital mammograms. There are also plans to expand this for chest x-rays, orthopaedics and other imaging modalities, including

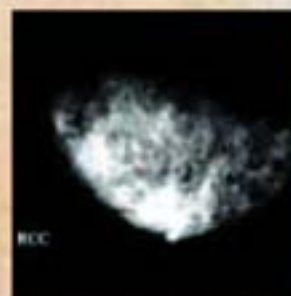
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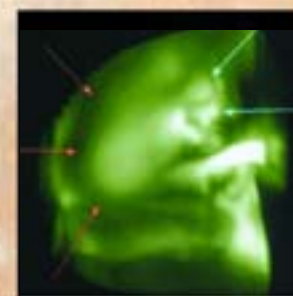
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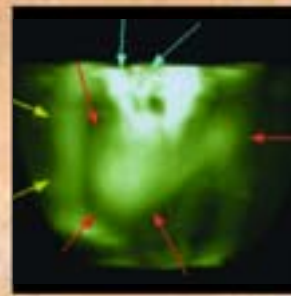
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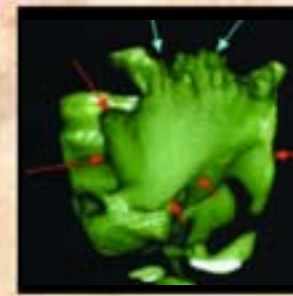
Cranio-caudal mammogram showing a new (since one year ago) minute module (4-5mm in diameter) outlined by radiopaque surface markers. The remainder of the breast is unchanged since one year ago but the physician now noticed some dimpling medially.



Lateral CTLM® (standard MIP reconstruction) which shows a large spherical volume of tumor neovascularity (red arrow) and an area of multiple small new vessels coming from the chest wall (blue arrows). Compare the surface rendered view.



Cranio-caudal CTLM® view of the right breast. Standard MIP reconstruction show a normal vessel (yellow arrows), tubular in shape and in normal anatomical location. The red arrows outline a large area of neo-vascularity, spheroid in shape (non-anatomical), and extending across the breast to involve the skin. Original mammographic lesion was only 4.0mm in size.



The same cranio-caudal view with FTB (surface rendering) reconstruction demonstrates the neovascular area more clearly (red arrows). In particular, a mass of individual vessels is seen entering the tumor area from the chest wall (blue arrows).



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The new *Emscher-Lippe Breast Care Centre*, based in the Marienhospital in Gelsenkirchen, but serving six hospitals\* and four private practices, was established following a directive issued by Germany's North Rhine-Westphalia regional government. The concept aims to raise the quality of breast cancer care by creating a centre of excellence and uniting many of the region's oncology units and experts.

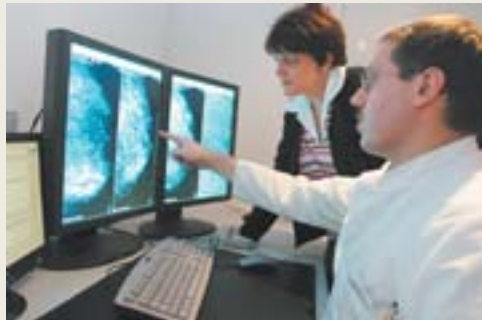
According to official guidelines, the breast cancer centre participants hold case study videoconferences at least once a week. For this, the hospital has a central video-conference server and all locations in the breast cancer centre scheme have the same equipment. All those 'attending' can access the digital images supplied by the radiology and pathology departments involved in each case. This is achieved despite the fact that, although the Marienhospital has foil-storage digital mammography, most private practices in the Centre's catchment area still work with conventional film. The Centre uses a scanner to digitise their film images then feeds these into the digital archive.

Daniela Zimmermann, of EH, interviewed **Dr Uwe Keske**, Head of the Department for Radiology and Nuclear Medicine at the Marienhospital Gelsenkirchen, **Prof Dr H. Otto**, Head of the Radiology, Nuclear Medicine and Radio-oncology Clinic at the Evangelische Kliniken Gelsenkirchen and **Prof Werner Schlake**, Director of the Institute of Pathology Gelsenkirchen, about the pros and cons of the new system, first asking how the concept is financed. This elicited unexpected answers.

'The breast care centre is a clinical institution, so we receive no compensation from medical insurers for any outpatient services,' Prof Schlake explained. 'From an accounting perspective, nothing changes between surgeries and hospitals. So far, there has been no way we can charge for outpatient treatment, and I don't foresee any changes, which presents a big problem. Without compensation for outpatient services – and we cannot provide free treatment – we have to admit patients to wards.'

This is the same for the investments made at Marienhospital, Uwe Keske added: 'The directive states that we must set up these breast care centres, but no subsidies are available.'

There is no financial gain, H. Otto continued, but added: 'The only advantage is that, out of 250 clinics, which, as recently as six months ago, carried out breast cancer operations in North Rhine-Westphalia (NRW),



The patient's images, obtained during a stereotactic vacuum biopsy, indicated early stage cancer. Dr. Keske explains her mammography results. Surgery will be planned during a breast care centre conference



At a breast care centre conference, held in the Marienhospital Gelsenkirchen demonstration room, high-resolution images are projected and procedures discussed by an interdisciplinary team. Results of all mammographies and clinical data in the electronic patient file are accessible online. Other members of the centre, in different locations, use videoconferencing to take part in discussions

there are now only 50 clinics left that can operate on breast cancer patients. 200 hospitals didn't receive the extra pay for breast cancer care and they will not have those operations financed. This is the new model in North Rhine-Westphalia.'

The system is an enforced 'clean-up' through the Ministry, Prof Schlake said. 'The NRW government initiated this process by deciding where to set up breast care centres. Not everyone in the State can call themselves 'Breast Care Centre', unlike in other parts of Germany. We – the individual hospitals – received ministerial notification that we were



From left: Dr Keske, Prof Schlake, Prof Otto, with Daniela Zimmermann of European Hospital

Creating a centre of excellence in NRW was not a painless procedure

# New concepts for breast care

going to be networked by setting up the breast care centre.'

All the hospitals linked via the breast care centre (named at the end of this article) were listed in that ministerial decree. All the other hospitals in the area can no longer provide breast cancer care. It has been dropped from their budgets, explained H. Otto. 'If they still continue to operate – and you can't really ban them from doing so – medical insurers will retract their care contracts and not pay. On the one hand we were forced into this but, on the other, it has ensured that we can actually continue with this work. For patients, the advantage is that now we really can put interdisciplinary concepts into practice, and can develop an exchange of competencies not only between different medical disciplines but also between different hospitals. Despite all the criticism, putting it very bluntly, the politicians had quality improvement in mind when they decided that experts in these operations should carry out as many as possible. With limitations, this is correct, although not quite in this form. The case per surgeon ratio for NRW currently stands at 50. In other parts of Germany there are other figures, which still ensure a high level of quality.'

The difficulty, said Prof. Schlake, is mainly that the regional government initially wanted

key services to be provided in one place. 'This would have meant that radiological examinations could only have been carried out at the Evangelische Kliniken, or that chemotherapy could only be carried out at the Gelsenkirchen-Horst clinic. It would have meant that each patient would have had to go from Dorsten or Ückendorf to Gelsenkirchen-Horst. In reality this was unreasonable and unfeasible, so the regional government reconsidered, then issued a directive that we must ensure all processes are provided in a standardised manner within the breast care centre, and that someone is responsible for each key medical field, and the people entrusted with that responsibility realise those standards. We have already achieved this. Someone must be responsible for quality, and it also makes sense in terms of the format and resolution of transmitted images, otherwise you can't work with them. A lot of progress has been made in the standardisation of pathology. It is critical that all cooperating medical disciplines are united. No matter where and at what stage a patient is admitted to a cooperative breast care centre, there must be a safeguard that she will receive the same, standardised treatment, independent of who is treating her. For example, in oncology there are haematological oncologists with a background in internal medicine, but also gynaecologists who work in oncology, and there is a compelling need for harmonisation between those two disciplines. That's the advantage of the breast cancer centre: we are forced to achieve a harmonisation. These days, to guarantee the best possible standards for patients, team spirit is vital.'

\* Hospitals served by the Breast Care Centre: Marienhospital Gelsenkirchen; Evangelische Kliniken Gelsenkirchen; St. Marienhospital Gelsenkirchen-Buer; St. Elisabeth-Hospital, Dorsten; the Institute of Pathology in Gelsenkirchen and the St. Barbarahospital in Gladbeck

The first certified breast cancer screening centres are opening in the German federal state of North Rhine Westphalia (NRW). The Kassenärztliche Vereinigungen (regional Associations of Statutory Health Insurance Physicians) are inviting women aged 50-69 years for mammography screening and, slowly but surely, the appointment books of the centres that perform this early detection examination are filling.

European Hospital spoke with **Andrea Jachtmann MD**, one of the diagnostic radiologists responsible

## MAMMOGRAPHY SCREENING ARRIVES IN GERMANY

for the programme (Programmverantwortliche Ärztin (PVA) operating in the cities and surrounding areas of Mönchengladbach, Viersen and Krefeld. In that catchment area, the Kassenärztliche Vereinigung posted invitations to around 98,000 eligible women, giving a specific date and time for their free breast screening appointments. What was the response? 'There was no need for their feedback. We assume they'll show up for their appointments if they do not inform us otherwise. In addition, many women call us for an appointment indepen-

dently,' Dr Jachtmann explained.

What response rate would make possible a valid assessment of the programme? 'We will be quite happy with a 30% participation rate, because that would cover our costs,' Dr Jachtmann responded. 'Don't forget, the mammography centres receive no external funding. In terms of data analysis we are obviously trying to have an examination rate that's as high as possible. We need a 50% response rate and we are aiming for 70%.'

This means two different issues are involved: recovering the centre's costs and establishing a useful cancer register. 'However, you need to consider the fact that we receive no external financial support - at all. We provide a completely voluntary service and we invested €1.2 million to upgrade to fully digitised mammography equipment from Hologic\*, to offer this service. We

went for fully digital because we want to be able to use the post production capabilities and to send images easily, wherever they need to go - hospitals, cancer centres, etc. Furthermore, we bore the costs of training radiology assistants and ourselves. We did this so that we could be linked to the cancer register, which we hope will happen by the end of this year. As soon as we are connected, the data of women who tested positive will be captured automatically in the cancer register. That would be ideal.'

This means cooperation with the breast centres. 'Due to our location we are currently linked to breast centres in Mönchengladbach and Krefeld. The centres in Neuss and Düsseldorf are also nearby. Certainly, the women concerned will still have a free choice of physician. They don't have to go to a breast centre but may undergo surgery in a



Dr Andrea Jachtmann

hospital of their choice, but you normally want the same level of quality with your therapy as you received for diagnostics, and the breast centres can guarantee this level of quality.

Probably, in the future, not all hospitals will be allowed to perform breast surgery. 'To be able to carry the label *breast centre*, 150 new breast cancer surgeries must be performed annually,' she explained. 'Consequently, every woman who has breast cancer will opt for a breast centre. Eventually, this may become mandatory.'

\* Supplied by service and distribution partner for Germany and Austria Medicor Medical Supplies, Kerpen, Germany. [www.medicor.biz](http://www.medicor.biz)



Hologic's SecurViewDX

With some 12,000 University Hospital medical staff currently on strike in Germany, issues of pay and working conditions are high on the agenda. However, amongst the long list of demands of their representatives is also a call for a comprehensive indenture governing postgraduate training. Here, few doctors are privileged to be signed up for the entire time of their higher specialist training. Training, certification and, thereafter, maintenance of standards are interrelated and key to the concept of quality management - a growing issue for healthcare providers and, ultimately, the general public. With reference to radiology, a recent insightful editorial by Forsting (Forsting M [2005] *The future of radiology - from the necessity of a vision*. Fortschr Röntgenstr 177: 1485-8) has highlighted the need to make structural changes to the German healthcare system. He proposes adoption of the Anglo-American concept of organ-based sub-specialisation. Such change may lead to individual consultants maintaining mastership of their chosen area of interest while providing more clinically relevant reporting. This approach could also impact positively upon scarce resources with a more efficient and economical use of expert opinion and hardware, thereby closing the circle of quality management.

However, a commentary imme-

## Mors certa, hora incerta

diately attached states that such presumed visionary considerations have been put forward frequently before and that the case for preserving the status quo is strong. The 28th President of the United States, Woodrow Wilson, is quoted as saying: 'If you want to make enemies, try to change something'. Resistance to change somehow seems a natural approach. In contrast, actual change has often derived momentum from more emotional, headline-making issues that attracted people's attention. Scandals have frequently triggered change. Healthcare reform may

## The case for structured training, board certification and revalidation\*

By Dr Joerg Larsen MD FRCR, consultant radiologist in the Medical Faculty Neuroradiology Department, at Georg-August-University Goettingen

thus need to be public opinion- if not patient-driven. Calls for changes to Western healthcare systems date back to the 1980s in the US, when Arnold Relman, the then editor of *The New England Journal of Medicine* envisaged 'a new era (of) assessment and accountability'. Specifically, he suggested that any medical activity should pass the test of 'costs, safety and effectiveness' to allow an informed argument of clinical management issues both with patients as well as healthcare providers. Further progressing from here, 'the 21st century would be the era of resource constraints' (Friedenberg).

But what is so wrong with our current system? The problem lies within medical self-regulation. Klemperer quotes BMJ editor Dr Richard Smith as saying in 1999 that the medical world has a culture of covering up mistakes and of forgiving those who made them (paraphrased). A US study of the same year found that at least 40,000, and perhaps as many as 98,000 people, die in hospitals annually as a result of preventable medical errors. Furthermore, a systematic review of the relationship between years in practice and quality of care found the performance of the majority of physicians evaluated to be decreasing with time. If such occurrences are indeed serious and wide-

spread, they are considered by many as being immanent to the system rather than due to individual failures. However, failing individuals may still be key to the process in that we require ways of identifying and suggesting ways of dealing with problem doctors.

Revalidation aims to ensure that medical staff is up-to-date and fit to practice. To retain his licence, the obligation is on the practicing doctor to prove this is the case. The two elements of such proof are factual information regarding maintenance of

science is evolving and that certain statements made in the publication should be checked against other, usually more up-to-date information. Considering learning as a process in today's medicine thus cannot be done in isolation. Much theory evolves around the question of how we acquire knowledge. It is not feasible to briefly summarise this multi-faceted issue. What unites articles concerned with medical learning is the context of clinical training in which learning takes place. This defines a relation with the level of patient care as well as outcomes. So, to achieve excellence, i.e. to practice well, one must first be an effective life-long learner. Subjects of learning are as plentiful as demanded for the revalidation process and include knowledge and reflection on performance, i.e. identification of gaps and critical appraisal. Given that communication has been shown to affect patient outcomes, improvement of social skills and communication in particular are part of the enterprise. Learning should further be evidence-based, with feedback as the most available and influential measure at its centre. Wood concludes that 'Without a system of constructive feedback, we are in danger of producing uncertain and overconfident physicians without adequate self-checks to regulate their activities and decisions.' She also asserts that feedback, as a form of information sharing, is much desired by learners and it facilitates a communal sense of responsibility for learning.

To illustrate the application of these considerations for radiological training, UK practice may serve as an example: Following several years at senior house officer level, UK radiologists receive five years of structured, higher professional training before board examination and certification. Apart from providing a curriculum, The Royal College of Radiologists' *Structured Training* document lays down the basic principles of training, namely the apprenticeship system, definition of core competencies, log book recording, annual appraisal and, finally, the testing of knowledge and competence, leading to board certification. There is particular

*continued on page 16*

# Life-long learning in Clinical Radiology

Previously, as Smith asserts, the old way founded on the expectation that doctors would keep up-to-date professionally and would do something about colleagues who performed badly (paraphrased). Such half-hearted self-regulation appears to have failed, although there is perhaps no better way as replacing it with self-regulation: 'The specialised knowledge and skill that form the basis of a profession (may) also make lay people largely unsuitable for regulating it'. While doctors primarily discharge their responsibilities to patients, they have special responsibilities to healthcare providers, i.e. funders of healthcare, which, ultimately, also represent the general public. If we accept the need for change to the way medical self-regulation is organised, ample best-practice examples have been drawn from the success story of quality management in civil aviation. In 1998 the International Civil Aviation Organisation initiated a cultural change by introducing regular and mandatory safety audits for all member states. Principally, the concept of revalidation for doctors has been modelled around those experiences.

In 2003 a Gallup poll established that over 80% of the general US public valued certification and regular certificate renewal to an extent that they would change physician if the attending doctor failed to maintain certification. A system of revalidation therefore has the potential to establish and maintain trust in the patient/doc-

standards of competence, care and conduct as well as evidence of reflection on the doctor's performance. The instrument of the latter is regular formal appraisal, its outcome a personal development plan. Revalidation thereby takes continuous professional development beyond the mere certification of knowledge and competence to include performance, which also comprises social skills and, in particular, communication. More specifically, in addition to the backbone of a personal development plan and participation in appraisal, key evidence may include a description of an individual's practice, results of benchmarking and medical audit, particularly relating to errors and other outcome measures, written knowledge tests, certification from an approved local person as well as results of validated questionnaires asking patients to rate a doctor's performance. Irrespective of doctors' likely natural trepidation when validated in this way, it is argued that could be gained from participating in such process. To this end, revalidation is only the final common pathway, the foundation of which could be laid down during postgraduate, or even undergraduate training. Indeed, there is no good reason why medical students should not be brought up in an environment that actively engages with clinical governance issues.

The front pages of medical textbooks frequently contain a disclaimer, stating that medicine as a

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We show our solutions during the **German Congress of Radiology, Messe Berlin, May 24 - 27, 2006, booth A17 and A19** and the Annual Meeting of the German Society for Senology, Aug 31 - Sep 2, Congress Center Dresden.

Professor **Bernd Hamm MD**, Director of the Institute of Radiology, at the Charité University of Medicine, Berlin and **Matthias Taupitz MD**, Head of the Department of Experimental Radiology within the Institute



Team members of the **Magnetic iron oxide nanoparticles** working group at Charité Berlin - from left: Jörg Schnorr DVM, Matthias Taupitz MD, Prof. Bernd Hamm MD and Eyk Schellenberger MD

Iron oxide nanoparticles are interesting and versatile markers for biomedical imaging. Their physical characteristic, superparamagnetism, leads to sensitive detectability of these nanoparticles through magnetic resonance imaging. Depending on the composition, or specific modification, iron oxide nanoparticles are suitable for use in functional MR imaging to display disease processes in vivo on the basis of cellular or molecular mechanisms. This is also known as cellular or molecular MR imaging.

From a pharmacokinetic point of view these substances, due to the character of their particles, are suitable for the marking of cells that are capable of phagocytosis. The nanoparticles, following phagocytosis in macrophages after i.v. injection, are predominantly absorbed in the liver. Here they cause a loss of signal intensity in the MR image in healthy tissue, i.e. normal liver tissue appears dark. Liver metastases, or primary liver tumours, do not absorb these particles and are therefore easier to detect. This principle makes MR diagnostics of the liver more accurate and reliable. Two substances based on iron oxide nanoparticles have been clinically licensed for the MR diagnosis of the liver (Endorem, manufactured by Guerbet, and Resovist, manufactured by Schering AG). In this area, the concept of cellular MR imaging is already in clinical use.

Through variation of the size and surface consistency of the particles the organ distribution can be systematically changed. Whereas the relatively large iron oxide nanoparticles (50 - 120 nm total diameter, Superparamagnetic Iron Oxide - SPIO) are absorbed in particular by the liver and spleen, smaller iron oxide nanoparticles (ca. 20 nm total diameter, Ultra-small SPIO- USPIO) remain in the bloodstream for longer. Following i.v. injection, this leads to increased accumulation of the nanoparticles in healthy lymph node tissue as well. In experimental and clinical studies it has been possible to show for one of these sub-

stances (Sinerem, manufactured by Guerbet) that small lymph nodes affected by metastases can also be detected. Consequently, it is conceivable that, in the future, we may be able to do without diagnostic lymph-adenectomies in oncological patients, or to achieve a better-

directed removal of lymph nodes. Sinerem was extensively, clinically tested for intravenous MR lymphography and an application for clinical approval has been filed.

A further, promising approach for improved imaging diagnostics is based on the detection of phagocytosing immune cells through i.v. injected iron oxide nanoparticles. From a scientific and clinical point of view, an outstanding example for the in-vivo detection of inflammatory activity is the so-called vulnerable atherosclerotic plaques. Vulnerable plaques can cause sudden, life-threatening vascular obstructions through rupture and the formation of thrombi, particularly in the coronary vessels or in the arteries supplying the brain. Vulnerable plaques cannot necessarily be detected through conventional X-ray angiography because they may not be associated with stenoses. However, vulnerable atherosclerotic plaques are characterised by a high number of inflammatory cells, which, through the i.v. injection of iron oxide nanoparticles, can be marked in vivo. Experimental and first clinical results show that i.v. injected iron oxide nanoparticles in combination with high resolution MR imaging can detect inflammatory changes in

the arterial wall. However better understanding of the physiological basis of these effects is required before clinical use can be contemplated. Further interesting applications for SPIO and USPIO are currently being experimentally researched or, in some cases, even already clinically tested. This includes the display of inflammatory changes in the central nervous system, (in the detection of multiple sclerosis, for example) or the functional imaging of bone marrow, which could be of importance in tumour therapy.

Iron oxide nanoparticles can also be used for research into the effectiveness of cell-based therapies.

at a very early stage. Iron oxide nanoparticles, marked with the appropriate molecules, accumulate in apoptotic tissue after i.v. injection and make the occurrence of apoptosis visible on the MR image. With this detection of apoptosis through MRI in tumour therapy, in future we should be able to ascertain the effectiveness of therapies at an early stage. This makes for the improved, more targeted application of different therapy approaches, which are often expensive and sometimes also have many undesired side effects.

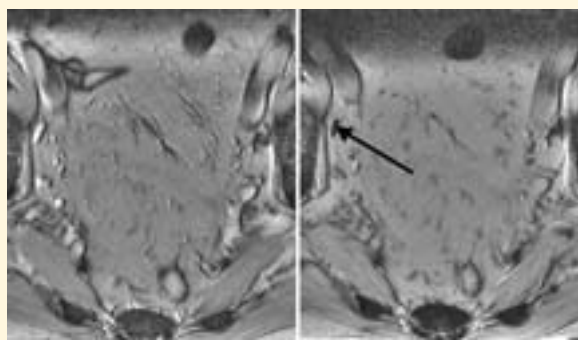
The Institute of Radiology is testing new approaches for superparamagnetic iron oxide nanoparticles. Whereas in all previous approaches

much more suitable for cell marking. The Charité is carrying out examinations with stem cell therapy for the detection of inflammatory activity as well as in tumour diagnostics. One focus here is on the research into non-invasive characterisation of vulnerable atherosclerotic plaques. For molecular imaging these very small particles open up new opportunities as their size, combined with coupled, target-specific molecules, is sufficiently small to achieve good bio-availability within the desired target area. These very small particles, apart from being suitable for cellular and molecular imaging, can also be used as so-called blood-pool contrast media for high-resolution display of very small vessels in terms of MR angiography.

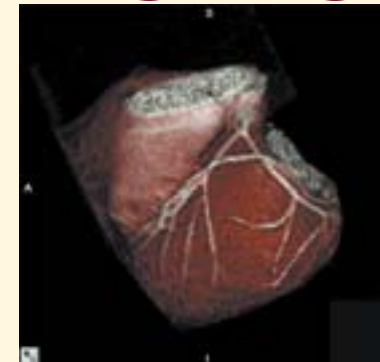
Research into these new iron oxide nanoparticles at the Charité is

Researchers open up new opportunities for cellular and molecular MR imaging...

# Iron oxide nanoparticles for biomedical MR imaging



Cellular in vivo imaging in lymph node diagnostics: Following in vivo injection of magnetic iron oxide nanoparticles (in this case Sinerem, produced by Guerbet) the lymph node (arrow) shows an even blackening, which means metastasis can be ruled out



High resolution, 3-D MR angiography of the coronary vessels after in vivo injection of very small iron oxide nanoparticles (VSOP, manufactured by FerroPharm) as blood-pool contrast media with excellent display of the main and side branches

Concepts for cell-based therapy are currently being developed, among others, for the treatment of Parkinson's disease, spinal injuries or cardiac infarction. The fate of transplanted stem cells in the organism can be monitored for many months through prior labelling with iron oxide nanoparticles through MR imaging. With efficient labelling and the appropriate in vivo procedure the detection of just a few hundred cells is possible in-vivo.

Apart from these approaches for cellular in vivo imaging, iron oxide nanoparticles can also be coupled with target-specific molecules. This facilitates the in vivo visualisation of specific molecular structures or processes. An important example for this is the imaging of programmed cell death (apoptosis). In apoptosis, certain cell surface molecules propa-

for a potential in vivo use polymers, such as dextran, polyethylene glycol, or starch, have been used as coating material for the particles, the Charité, together with FerroPharm GmbH, a Brandenburg-based start-up company, have used nanoparticles that are coated with low-molecular weight organic molecules. This, compared with the above-mentioned USPIO, results in the development of even smaller nanoparticles with a diameter of around 7nm (Very Small Superparamagnetic Iron Oxide Particles - VSOP). Through this, so far unique size in combination with the surface coating, the researchers have opened up new opportunities for cellular and molecular MR imaging. They were able to show, on a few examples, that these VSOPs, compared with the previously used iron oxide nanoparticles, are

partially sponsored by the German Research Foundation (DFG), the Investment Bank Berlin (IBB) and the Technology Foundation Berlin (TSB), and by the Federal Ministry of Education and Research (BMBF) within their initiative 'Nano for Life'. There is also a network with other institutions (the German Cancer Research Centre, in Heidelberg; Freiburg University; Mevis, a Bremen-based firm) and with companies such as FerroPharm GmbH in Teltow, Brandenburg, Siemens AG in Erlangen and Schering AG in Berlin).

continued from page 15

emphasis on evidence-based practice, audit and research activities. More recently, instructional technology with web-based tools, telemedicine etc. has been put forward as a timely addition to the evolution of this textbook and apprenticeship-based model. With the establishment of three radiology academies, the UK has already implemented this development. Applicably, the Health Minister, Lord Warner, spoke at the launch via video link. Radiology as a technology-intensive specialty in many ways lends itself to the application of such strategies. A recent symposium in Frankfurt regarding the present situation and opportunities that arise through

e-learning for general practice concluded that the development of e-learning activities is both sensible and urgent.

However, few international societies or regulatory bodies have adopted the concept of board certification built upon structured training. As an investigative and, in a lesser part therapeutic speciality, radiology already holds a high degree of transparency of work processes, making it an ideal candidate to pilot the introduction of structured training. Aiming for a high and consistent level of performance, a very large number of standardised routine procedures can be defined in standard operation procedures, a key tool in quality management. As long as examination numbers are sufficiently high enough locally, a very

good standard of organ-based speciality training could be given. As with consultants, it seems legitimate to ask how then to assess what residents are capable of doing. This is easier to answer than how to identify those individuals who lack 'the necessary humanistic qualities required of a physician'. It is certain that 'putting effort into teaching and the challenging of residents coupled with supervision at a local level (paraphrased)' may allow residents to be 'the best that he or she can be' (Friedenberg RM [2000] *An endangered art: teaching*. Radiology 214: 317-9). What does that mean for German radiology practice? Forsting suggests there has been little regarding necessary structural change in this country. This is supported by a search of

the online database of the German publishing house Springer on 20/4/06, using the key words in this article's title: it yielded no hits within radiology journals. German radiology needs to build upon its many and internationally envied advantages with respect to state-of-the-art infrastructure, healthcare spending and high level of clinical care given. Much work has already been done elsewhere. It takes no genius to consider it.

Practicing medicine is at the heart of the human condition. Empathy towards one's fellowman, whether patient, colleague or oneself, demands careful consideration of the path, if changes to the German healthcare system are being considered. If the case for structural change is acknowledged, the belief that lifelong learning supports quali-

ty in healthcare is, in my opinion, key to the approach. The move from loose self-regulation through variable compliance with continuous medical education towards a transparent system of regular revalidation with lay involvement remains an emotional one. Just as learning must be sought, change must come from inside. The methods required to carry out meaningful performance assessments are still being evaluated, but that should not necessarily hold back measures to improve on current regulations governing training, certification and maintenance of excellence as well as continuous improvement in healthcare provision.

\*a referenced version of this article is available upon request by contacting the author at [jlarsemmd@hotmail.com](mailto:jlarsemmd@hotmail.com)



## Biochip for the early detection of cancer



Lukas Huber (6th from the right), director of the Innsbruck Biocentre, with project partners from Germany, Finland, Sweden and Great Britain

The Innsbruck Biocentre, led by Professor Lukas Huber, is involved in a major European research project. This involves the development of a 'biological interface' for a new semiconductor developed by Siemens. The objective is to develop a chip that will be able to take numerous medical-diagnostic measurements simultaneously. This works by electronically recording and evaluating changes in the chip's frequency patterns. Certain proteins, or DNA-sequences, are fixed onto the sensor area of the chip, which, when coming into contact with other proteins (via a drop of blood, for example) cause changes in the frequency pattern. To put it simply, these reactions could be detected and immediately evaluated through a special reader.

The researchers hope to extract a multitude of information from just a single drop of blood or serum, which could revolutionise the diagnoses of complex diseases, such as certain types of cancer.

With their Innsbruck research team, Prof. Huber and Prof. M Widschwendter are concentrating on the proteins and DNA-sequences, as well as on the development of the relevant markers, which, once fixed to the chip, will deliver that information. Researchers at the Technical Research Centre VIT, in Helsinki, are working on a process to chemically fix the DNA-strings from Austria to the measuring field. The test models finally will end up at Siemens, in Munich, where the new semiconductor-technology is being further refined. Other partners in the project, for which the EU has provided subsidies totalling €3.8 million until 2008, are based in Great Britain and Sweden.

## Regular intake of NSAIDs reduces breast cancer risk

By Karen Dente

**USA** - Non-steroidal anti-inflammatory drugs (NSAIDs) could reduce the risk for breast cancer by 71%, according to recent studies published in the journal BMC Cancer. In colorectal cancer, these protective features of painkillers have already been known to exist for a while.

Besides alleviating pain, NSAIDs are known to demonstrate anti-inflammatory activity, which plays a role in cancer development. Several animal experiments have shown these substances, which exert their activity by inhibiting the cyclooxygenase (COX) enzymes, to protect from cancer. NSAIDs include drugs such as aspirin and ibuprofen, but also Vioxx and Celebrex - selective COX-2 inhibitors - that have been withdrawn from the market due to an association with increased heart and stroke risks.

The recent observational study by epidemiologist Professor Randall E Harris and colleagues, at Ohio State University College of Medicine and Public Health, in Columbus, analysed the data of 323 patients shortly after diagnosis with invasive breast cancer, and compared it with 649 people without cancer. The results of the study indicate that selective COX-2 inhibitors are associated with a significant reduction in breast cancer risk, when they are taken over the course of two years. A daily dose of 200 milligrams of Celebrex (manufactured by Pfizer) reduced the risk by 83 percent, while the ingestion

of 25 milligrams of Vioxx (manufactured by Merck) reduced the breast cancer risk by 64%. The regular intake of non-selective COX-2 inhibitors, aspirin and ibuprofen, also demonstrated a favourable reduction in the risk for breast cancer.

Harris, who also examined the effects of selective COX-2 inhibitors on colon, prostate, and lung cancer, said: 'It's the first observation in humans that illustrates the positive effect that COX-inhibitors exert on breast cancer risk.' He has studied the effect of NSAIDs on the development of tumours for 20 years, and swears on their preventive effect - he takes three to four pills of 200 mg ibuprofen weekly, as a precautionary measure for colon cancer. The professor claims to have no personal financial ties to the drug firms.

The study that appeared in BMC Cancer was supported by grants from Pfizer and the National Cancer Institute.

## NEW MICROARRAY TECHNOLOGY TO CHECK BIRD 'FLU

**USA** - A new technology, named glycan microarray, can identify pathogens in a few hours and give advance warning of the ability of a virus to infect humans. This could prove vital in efforts to control the spread of bird 'flu, say its inventors, who work on the Consortium for Functional Glycomics (CFG), a project of the National Institute of Health's National Institute of General Medical Sciences. CFG members work at the Scripps Research

## Donation to Swedish Brain Foundation gains research funds

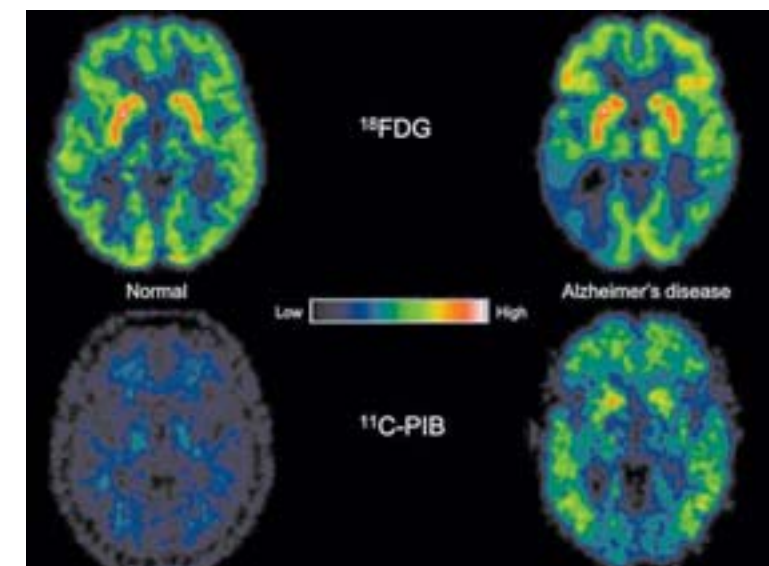
**Sweden** - The Swedish Brain Foundation has received a donation of SEK 250 thousand (approximately €27,593) to support advanced research and development, from GE Healthcare, based in Uppsala. Since 1996, the Foundation has issued stipends to gifted brain researchers, enabling them to continue their research. To date, over 100 researchers have successfully met the criteria to receive this help.

Neuroscience is one of the medical fields in which Swedes have long been at the cutting edge. One in six Nobel Laureates in this field is Swedish, and Swedish research is frequently quoted in international science journals. 'We greatly appreciate that GE Healthcare chose to partner with us as we continue to explore this exciting medical frontier,' said Hillevi Engbrant, CEO of the Swedish Brain Foundation.

This non-profit, non-government funded, fund-raising foundation, initiated by Professor Lennart Widén, of the Karolinska Institute, Stockholm, in 1994, creates resources for research and information not only about the brain and brain diseases, but also peripheral nerve disorders.

About 20 postdoctoral research scholarships are awarded annually to young scientists in the country's universities, which make it possible for the holder to continue their research and to qualify for an associate professorship.

During 2004, the Foundation began long-term support of four



major research projects. The aim is to increase the number of grants to major projects.

The Foundation's Scientific Board consists of 23 of Sweden's leading neuroscientists.

Brain research is advancing rapidly. Imaging technology means we can see the brain 'in action' and genetic analysis can predict possible illness. To highlight some of that research, GE Healthcare partnered with the Foundation to host a 'Brain Day' forum at its Uppsala site, showcasing the frontier line of medical research with clinical implications in Sweden in the area of neurological diseases, with a special focus on Parkinson's and Alzheimer's diseases. Currently, neither of these diseases can be cured. Research is focused on

both understanding what causes them and developing new treatment models.

'What is truly encouraging about the research progress presented at our Brain Day forum is the very real way in which a basic understanding of disease translates into usable research and diagnostic tools...tools that allow us to observe and monitor changes in specific molecules in the brain and easily differentiate between different conditions,' said Nigel Darby, Head of Life Sciences Research and Development at GE Healthcare. 'It confirms to us that the promise of molecular medicine and the possibility of early and accurate diagnosis of serious neurological conditions is within reach.'

## Prenatal stem cell therapy

By Anja Behringer



Computer-controlled equipment freezes the cord blood products to -145°C

While today prenatal diagnostics provides a wide range of possibilities, prenatal therapy is still rather limited. Stem cell therapy is very promising, but since the recipient body often fails to accept the cells, the search for a suitable donor is a complicated and time-consuming procedure. Autologous stem cells are the cells of choice since according to Swiss researchers they provide unprecedented possibilities especially for prenatal therapy. Many disorders of the blood forming system and autoimmune diseases can be treated early on, using such stem cells, to avoid permanent damage. In Italy, prenatal stem cell therapies with children with immune system disorders have been extremely successful.

Researchers are optimistic that many genetic disorders can be treated with stem cells from the baby's umbilical cord. These stem cells are re-injected into the baby via the umbilical cord. The cells move to the bone marrow where they reproduce.

But post-natal stem cell therapy can also save lives.

Since 1997, Vita 34, a biotech company in Leipzig, Germany, has provided a cord blood bank for storage. This is the first company in the country to receive public authorisation to produce umbilical cord blood products. It also develops new therapy concepts.

Details: [www.vita34.de](http://www.vita34.de)

host cell, which causes infections. The CFG was established to ascertain what carbohydrates coat which cells, and to catalogue their vulnerability to infections from various pathogens. Thus, in their new microarray, the researchers spread glycans (carbohydrate) molecules across the whole array. 'Our technology allows hundreds of different varieties to be put on a single glycan array,' explained Jeremy Berg, Director of the National Institute of General

Medical Sciences. 'There's a universe of carbohydrates on the surface of cells. Our technology was not developed specifically for influenza. It is a very broad research tool.'

However, if an influenza virus, for example, is introduced, the hemagglutinin (HA) - glycoprotein on its surface - binds to the surface carbohydrates of a host cell and, using a tagged antibody, the technology could recognize the particular carbohydrate, from human or bird cell, to which the hemagglutinin has bound.

# Controversy

## Who should manage intensive care?

The question of who should manage intensive care was hotly debated at the 35th Annual Meeting of the German Society for Thoracic and Cardiovascular Surgery (GSTCVS); not always essentially, frequently aggressively, sometimes even insulting says *EH Correspondent Holger Zorn*

Since Diagnosis Related Groups (DRG) became the basis of accounting for hospital services in German hospitals at the expensive end of the market, university hospitals and other large hospitals have sought ways to optimise treatment processes. To save costs, following the example of central surgical areas plans are afoot to set up centralised intensive care wards (ICUs), which has been standard in primary and general care hospitals for a long time. Anaesthetists who have additional qualifications in intensive care usually run these wards.



Unlike many other surgical patients, cardiac and neurosurgery patients generally spend time on the intensive care wards following operations, which is why cardiosurgery and neurosurgery departments set up their own ICUs. Professor Thorsten Wahlers, Head of Cardiac Surgery at Cologne University Hospital and Board Member at GSTCVS, thinks that the proposed centralisation of intensive care will put patients at risk as '...an impairment of vital

functions in these critically ill patients is always intrinsically linked to their underlying condition and their operations'. He sees intensive care as a 'continuation of heart surgery' and does not believe that anaesthetist colleagues are suitably qualified to supervise these patients' care. 'The patient comes to hospital for heart surgery, and to be treated by a cardiac surgeon, from the time

when the diagnosis and treatment plan are made, followed by surgery, then intensive care, right through to the day of discharge.'

However, Prof. Joachim Radke, Head of Anaesthesiology and Intensive Care Medicine at the University Hospital Halle (Saale) and President of the German Society of Anaesthesiology and Intensive Care Medicine, retorted with the

following figures: Whereas at the end of 2003, 2,237 anaesthetists had undergone advanced training in intensive care, only 54 cardiac surgeons had done so. And whereas there were 403 anaesthetists who were licensed to provide advanced training in intensive care, there were only 35 cardiac surgeons with this licence - in 79 hospitals! Surveys also show that, in purely surgical ICUs, some of the medical staff also carry out other duties, for example, work in the operating theatre (Muhl. E. *Results of a survey on intensive care medicine at surgical university clinics in the first quarter of 2005*. Chirurg BDC 2005; 7: M198-M203). In the surgical disciplines, additional training is limited to clinical images and disease patterns that are particular to that core medical field. Often, this part of training is given at the beginning of the advanced training period, before medics have actually gathered much surgical experience. However, in anaesthesiology, the additional training comprises the intensive, medical care of all critically ill patients in cooperation with those doctors treating their underlying medical conditions. Radke favours the interdisciplinary surgical intensive care ward where, with strict division of labour, shared legal responsibility and everything based on mutual trust, everybody works together with the motto 'Let the best person do the job'.

'Various training programmes for Surgical Assistants seem to tell us that medical jobs, for instance harvesting vessels, can be learned within a few weeks,' a member of the audience remarked. 'That's why I'm not surprised some people believe that somebody who has had six months of advanced training can look after critically ill patients and head up an ICU in the same way that somebody would do after years and years of training.'

## OPINION



Across Europe there are different answers to the question of who should manage intensive care. In Germany the issue is linked to a discussion on which medical field could claim surgical intensive care for itself. There is general agreement that, along with increasing general medical specialisation, intensive care calls for a particular qualification and doctors' training. However, the prerequisite for this concept is scientific training for doctors, adequate training for ICU staff, an adequate supply of equipment and individual motivation. Undoubtedly, personal and institutional experience improves the prognosis for intensive care patients significantly. Qualification of a treatment team (doctors, nurses) is essential.

Patients spend significantly less time in an ICU and show significantly less morbidity when specially trained ICU medics are in charge. Such specialist treatment also reduces mortality in the ICU and across the hospital. In a prospective, multicentre observation study, carried out over a four-month period on 89 ICUs in twelve European countries, involving case histories of 12,000+ patients, a connection was also shown between patients' outcomes and the skill of the ICU team.

Specialised ICU medics tend to find work in university hospitals and large community hospitals,

# AEIOU A Web guide for mechanical ventilation in intensive care and emergency medicine

Care Network, an online educational website ([www.aeiou.cn](http://www.aeiou.cn)), is providing a reference guide to help users refresh and extend their knowledge of the basics of mechanical ventilation in intensive care medicine, anaesthesia and emergency medicine. Languages: English and German.

University Professor Christoph Hörmann MD, Head of the sub-department Transplant Anaesthesia of the Dept. of Anaesthesia and Intensive Care Medicine, University Hospital Innsbruck, and University Professor Wolfgang Mazal, international legal expert, Faculty of Law, University of Vienna, are responsible for the contents of the portal. They explain: 'As a medium for this educational project we chose an online website, because of its advantages concerning the latest

developments and flexibility compared with conventional data systems e.g. books, CDs, transparencies. The concept of AEIOU.CN is to expand and improve with the constantly growing knowledge throughout the next years. Therefore the website always represents a current source of information and up-to-date education.'

The rapid development and improvement of technical equipment has turned respirators and anaesthesia machines into computers, they point out. 'As a consequence these devices consist mostly of software components and only partly of hardware components, which are regulated by different computing programmes. Therefore it is relatively simple to create further modes of ventilation

by developing new software packages without major changes of hardware components of the respirator.'

However, this means that keeping up with the speed of development is a problem due to information communication. Most hospital staff can research literature via the internet, but this is time consuming, and can provide insufficient information. 'You also need to take into consideration that a lot of the tiny problems of daily clinical practice cannot be solved with evidence based medicine,' the professors point out, adding that although educational books, CDs, etc. try to cover the rapid technological development, it takes too long to bring them to publication, so relevance can be lost. This has been the case in artificial



On-screen: an inter-active respirator guide

# A qualification in intensive care is essential

By **Professor Joachim Radke**, President of the DGAI, the German Society of Anaesthesiology and Intensive Care Medicine and Director of the University Clinic for Anaesthesiology and Surgical Intensive Medicine, at Martin-Luther-University Halle-Wittenberg

medicine, paediatrics, neurosurgery and neurology, is currently being discussed and, if implemented, will require 24 months training, during which ICM must be practised actively. There is now a much closer link between competency in ICM and the core, specialist medical discipline. The catalogue of requirements for an additional ICM qualification comprises a general and a specific part, linked very closely to the original

medical discipline. Unfortunately, attractive, leading positions in ICM are lacking, so it is not surprising that highly motivated young colleagues often do not choose to use their scientific ICM expertise but wherever else they feel their professional advancement is likely to be greater.

Disciplines that claim ICM for themselves, particularly in universities, are only believable when they can demonstrate and back up

their scientific reputations. They must prove they can make a contribution - through scientific and economic achievements - to the development of this increasingly important medical field. For anaesthesiology, in Germany at least, this has been proven: the percentage of publications by German anaesthesiologists in the journals *Critical Care Medicine* and *Intensive Care Medicine* was 60% respectively in the years 1992-97.

where they also play a central role in cost monitoring. As ICUs are among the most expensive hospital departments, the specialist intensivist is predestined for a leading role in cost cutting, and has various administrative responsibilities.

Clearly it is logical that critically ill patients need specialist ICU teams. But how far should that specialisation go? The Union Européenne des Médecins Spécialistes (UEMS) definition is: Intensive care medicine joins doctors, nursing staff along with all those working in non-medical areas, into a coordinated treatment team for patients with life-threatening single or multiple organ failure, who need to be stabilised after major surgical intervention.

However, the UEMS emphasises that intensive care medicine (ICM) is still not a separate specialty, but is integrated with different medical fields. In its Common Core Curriculum, the UEMS has divided the training content for ICM into six main subjects, with 15 sub-headings and 56 individual topics - almost all of also named in the German regulations on further training for trainee anaesthesiologists. That is why operative intensive medicine is very interlinked and has a thematic interface with anaesthesiology unlike any other medical discipline.

These recently modified German regulations have led to significant changes in ICM. An additional ICM qualification for key fields, e.g. anaesthetics, surgery, internal

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**CRITICAL CARE**

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Christoph Hörmann

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Dr Johan Decruyenaere

# Cost-effectiveness analysis in the ICU

By **Johan Decruyenaere** MD PhD, of Ghent University Hospital, Belgium

In most OECD countries, healthcare costs take 8-15% of GDP and, even more problematic, they are rising faster than the GDP growth rate. Often, new therapies offer a minimal improvement in survival and quality of life but are extremely expensive. Therefore, governments and third-party payers are demanding improvements in efficiency and optimisation of the use of the limited resources.

ICU medicine in particular will not be immune for this pressure to deliver quality for an acceptable cost. Indeed, it is one of the most

expensive medical disciplines. With only 10% of the hospital beds, ICUs consume over 25% of a hospital's budget and, from a societal perspective, the total cost of ICU medicine is estimated between 0.5 to 1% of the GDP. Furthermore, the demand of ICU care is estimated to continue to grow more than 5% a year.

### What is cost-effectiveness analysis ?

Cost-effectiveness analysis (CEA) is not a magic bullet; it is just one of the tools that can provide insight into the allocation of scarce

resources and the determination of the relative value of different alternatives. Instead of approaching cost-effectiveness analysis with trepidation, ICU physicians must play an active role and therefore be familiar with the basic concepts that underlie cost-effectiveness analysis.

CEA is a technique for comparing the relative value of various clinical strategies. In its most common form, a new intervention is compared with current practice in the calculation of the cost-effectiveness ratio:

$$CE\ ratio = \frac{Cost_{new\ intervention} - Cost_{current\ practice}}{Effect_{new\ intervention} - Effect_{current\ practice}}$$

The cost in the numerator is typically expressed in monetary values, whereas the denominator is expressed as number of quality-adjusted life years gained (QALYs).

Table 1 delineates the various possibilities a new intervention may compare with the current practice and is called the cost-effectiveness plane. In this plane, an intervention is grouped into four quadrants (I to

IV) based on its cost-effectiveness.

When a new intervention is both more effective and costs less (quadrant II), this intervention dominates the current practice, and should be adopted. Conversely, when the new intervention is less effective and more costly, it is dominated by the current practice. In quadrants I and III, CEA can attribute in the decision of choice between the alternative treatments.

Table 1

Cost	Effectiveness	
	Less effective	More Effective
Costs more	Quadrant IV Intervention is dominated = Keep current practice	Quadrant I CEA relevant
Costs less	Quadrant III CEA relevant	Quadrant II Intervention dominates = Adopt new intervention

Table 2

Study	Intervention	Incremental CE per QALY
Sznajder et al (2001)	ICU therapy in general	\$ 4100
Hamel et al (2000)	Mechanical ventilation for acute respiratory failure	\$29.000 to \$110.000 depending on initial severity of illness
Mans et al (2002)	Drotrecogin alfa (activated) in patients with APACHE II of 25 or more	\$16.309 if patient < 40 years \$ 28.100 if patient > 80 years
Korkeila et al (2000)	Renal replacement therapy for acute renal failure in the ICU	\$ 80.000
	Passenger airbag with 60% with 60% belt use	\$ 64.998

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### Cost-effectiveness in the ICU

Several issues hamper CEAs in the critically ill and are discussed in detail in a report of the *Second American Thoracic Society Workshop on Outcomes Research*, published in the *Am J Respir Crit Care Med* (2002). One of them is that typical outcome in ICU studies is short-term mortality and that the preferred CEA long-term outcome data are not collected. However, the report provides solid guidelines to perform a standard approach of CEAs of ICU therapies. One prerequisite of a good CEA is the performance of a sensitivity analysis. The data used to determine a CEA come from different sources and are associated with different degrees of precision and uncertainty. Sensitivity analysis means varying the important input variables in the model and looking at what the effect is on the outcome of interest. A low effect means that the CEA model is robust and, of course, makes this CEA more valuable.

Observational studies suggest that the closed ICU model, which means reliance on full time intensivists, is both more effective and cost saving. That would be an example of a CEA with a result in quadrant II, where there is no discussion to adopt the closed

# LEARN FROM OTHER'S MISTAKES

Every day, critical events occur in hospitals but do not harm patients. Today we know that, in most cases, these 'near misses' are not caused by lack of knowledge but a series of unfortunate incidents, for example, tiredness, distraction or poor organisation. Experts estimate about half of all the incidents are avoidable.

Although anaesthetics, for example, have never been safer than today, the German Society of Anaesthesiology and Intensive Care Medicine ([www.DGAI.de](http://www.DGAI.de)) wants to increase patient safety even further. To this end the Society has introduced an anonymous reporting system aimed at reducing the number of 'near-misses' in hospitals. The *Patient-Safety-Optimisation-System* (PaSOS) records near misses and their causes, which are then analysed by a team of experts and the results and analysis are made available to all hospitals involved. 'Each participant can learn from the others' mistakes,' explained Dr Alexander Schleppers, Medical Director at the DGAI. The system was modelled on those used in aviation, where analysis of near-misses has helped improve safety from some time.

The most important principle of the PaSOS system is anonymity. Each department employee (doctors or nurses) can report incidents, which are securely fed into the central system and anonymised so that no one can be called to account later for their voluntary information. The case study, inclusive of expert analysis, is then made available to other hospitals. The department where the incident was reported also



## Anonymous reporting to increase patient safety

Dr Alexander Schleppers

receives feedback so that the cause of the near-miss can be eradicated quickly.

A good PaSOS can do more than just analyse incidents: Precise case analyses and the official feedback also increase pressure on hospital managers and medical equipment manufacturers to tackle existing problems. 'This achieves more than a vague, verbal report,'

Dr Schleppers pointed out. 'If the system discovers systemic errors it could lead to purposeful further training recommendations.'

The system, which only works if a large number of hospitals participate, is provided with information and training from a working party at the DGAI and BDA. To view and try this system go to: [www.pasos-ains.de](http://www.pasos-ains.de)

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model. However, formal CEAs that include the costs of the change of organisation from an open to a closed model are lacking.

Sznajder et al (2001) investigated the cost-effectiveness of a cohort of over 200 patients in seven French hospitals. This study, with an excellent methodology, shows that the incremental cost-effectiveness ratio of ICU care was US\$ 4100 per QUALY saved, which means that ICUs in general are very cost-effective. However, this is especially true for severe but rapidly reversible illnesses. Other results of specific ICU therapies are shown in table 2.

### Conclusion

Without doubt, critical care medicine is expensive and intensivists will come under increased pressure to contain costs and provide evidence that ICU therapies are worth the attributed costs, considering the gain in lives and quality of life. Cost-effectiveness analyses are an important tool to assist in decision-making. International, accepted guidelines exist on how to conduct a cost-effectiveness analysis to assure that the results can really contribute to help allocate scarce ICU resources to the most optimal patient populations and offer them the most efficient therapies.

\*Prof. M. Struys, Gent, Poster Presentation, BJA 94 (3); 306 - 317 (2005)  
TCA is not yet available commercially in the US.

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## RESEARCH GGT level proves a strong risk factor for cardiovascular disease

A connection has been discovered between raised levels of the liver enzyme *Gamma-Glutamyl-Transferase* (GGT) and the probability of death from diseases of the cardiovascular system or strokes. During the study, scientists at Innsbruck Medical University, with experts at the Working Group for Preventive and Social Medicine in Vorarlberg, analysed examinations of around 164,000 healthy adults (89,000 females and 75,000 males) carried out in Vorarlberg from 1985 to 2001.

A research team, headed by Hanno Ulmer, Professor for Medical Statistics and Dr Elfriede Ruttman-Ulmer, of the Department for Cardiothoracic Surgery at Innsbruck Medical University found that the GGT enzyme - previously only important in liver diagnostics and the evaluation of alcohol consumption - is often significantly raised many years prior to the occurrence of fatal heart disease or strokes. Through the measurement of GGT in the blood, and analysis of other known risk factors, e.g. high blood pressure, smoking, raised cholesterol or diabetes, it is possible to improve the early detection of cardiovascular disease. This opens up new, possibly vital opportunities for preventive medicine. 'Participants in the study with raised GGT, compared with people with normal GGT levels, had a more than 1.5 times higher risk of dying from cardiovascular disease,' Prof Ulmer said. 'For people aged under 60 this risk was more than twice as high.'

21.9% of the male and 15.6% of the female study participants had raised GGT levels (>28 U/l in men and >18 U/l in women). During study period 6,990 deaths occurred, 3,027 (43.3%) due to cardiovascular or cerebrovascular disease. Men with raised GGT levels (>28 U/l) had a 28% higher risk of dying from cardiovascular disease, men with significantly raised GGT (>56 U/l) had a

64% higher risk. In women the risk increased by 35% (>18 U/l) and 51% (>36 U/l) respectively. Raised GGT in younger people presents an even higher risk constellation than in older people. Men with raised GGT showed increased mortality with chronic coronary disease, heart insufficiency, ischaemic insults (stroke through vascular obliteration) and haemorrhagic insults (stroke through haemorrhage). No statistically significant effect was seen in acute coronary disease (such as acute heart attack) or other forms of heart disease. Women with raised GGT showed a higher risk for all forms of heart disease. This connection was not statistically significant for deaths caused by cerebral apoplexy. GGT is a statistically independent risk factor; the inclusion of age, gender, smoking, blood pressure, cholesterol, triglyceride, blood sugar and social status does not change this assessment. Raised GGT, compared with other established risk factors, is a comparatively strong risk factor and ranges in third place, after smoking and high blood pressure but before raised blood sugar, cholesterol and triglyceride. The results of the study showed a correlation between GGT and cardiovascular mortality. The pattern (the higher the GGT level the higher the mortality) is consistent across the various subtypes of cardiovascular disease. Measuring the liver enzyme GGT has been a standard procedure to monitor liver function in clinical routine for many years. Although the connection between alcohol consumption and cardiovascular disease has been the subject of numerous studies, there have been few studies so far that have examined the connection between raised GGT and cardiac disease or strokes, although researchers at Pisa University showed, in an experimental study, that raised GGT is a possible indicator for the early development of arteriosclerosis.

### Better chances for early detection

For Dr Hans Concin, scientific head of the Working Group for Preventive and Social Medicine in Bregenz, and co-author of the study, GGT now assumes a completely new significance. 'Whereas previously it has been dismissed as an unspecific parameter, we now have a completely new situation, looking at it in combination with other, recognised risk factors. Raised GGT means raised risk and, in terms of disease prevention and health promotion, it calls for more precise clarification and early treatment.' As GGT also correlates with known risk factors, e.g. obesity, diabetes, hypercholesterolemia, recommendations for the primary prevention of cardiovascular disease should also have a favourable effect on the reduction of GGT: smoking cessation, more exercise, healthy diet plus medicinal therapy of raised blood pressure and cholesterol. The study results could also lead to a change in thinking about prevention and therapy of arteriosclerosis, because raised GGT is also a helpful risk factor to identify patients at highest risk for impending vascular obliteration.

'Further clinical and experimental studies are needed, to examine the exact pathomechanisms and their effects in more detail,' say the authors. 'In future, clinical intervention studies, GGT should no longer remain unconsidered.' The transferability of the study results to other population groups must also be confirmed through epidemiological studies.

Publication: Ruttman E, Brant LJ, Concin H, Diem G, Rapp K, Ulmer H (2005). *Gamma-Glutamyl-Transferase as a Risk Factor for Cardiovascular Disease Mortality: An Epidemiologic Investigation in a Cohort of 163,944 Austrian Adults*. *Circulation*, in press  
Contact: hanno.ulmer@uibk.ac.at

NEW

## Robot navigates catheter to correct atrial fibrillation



Carlo Pappone

Italy - A remotely-controlled catheter device guided by magnetic fields provides a safe and practical method for delivering radio frequency ablation treatment in the hearts of patients with atrial fibrillation, according to a new study (Pub: *Journal of the American College of Cardiology*. 4/4/06). 'A new era in interventional electrophysiology is beginning as magnetic, very soft catheters can be navigated in the heart more precisely and safely than manual catheters without risk of major complications, even in less experienced centres,' said Carlo Pappone MD PhD, of the Department of Electrophysiology, San Raffaele University Hospital in Milan, Italy.

Radio frequency ablation to correct atrial uses a high-energy pulse to destroy a small area of heart muscle cells, to prevent them from conducting nerve signals that trigger fibrillation. Typically the radio frequency pulse is emitted by from a catheter tip, threaded through blood vessels into the heart until it is positioned next to the target area. Conventional catheters are somewhat stiff, so they can be pushed and pulled through blood vessels, and the tips curled and pointed by an operator standing next to the patient.

The device tested in this trial uses a very soft, limp tip with a magnet on the end. Rather than manually pointing the catheter tip, the operator uses a computer to control a magnetic field that robotically steers the catheter tip to a target visualized on 3-D scans of the patient's heart.

'Catheter ablation for atrial fibrillation is now an important treatment for this common disorder, but the current strategy of manual catheter manipulation is highly operator-dependent, with a long and variable learning curve and a great potential for both inefficacy and complications in inexperienced hands. Robotic navigation may increase the ability of inexperienced operators to perform this procedure easily and safely, as it is most dependent on a well-trained team rather than on a single operator,' said Dr Pappone.

Since catheter procedures of this type require frequent use of X-rays to track the location of the target and catheter tip, another advantage of remote navigation is that the operator can work from a shielded control room, rather than having to stand

next to a patient for several hours while wearing protective lead aprons.

This first trial of the robotic magnetic navigation system in patients with atrial fibrillation involved 40 participants whose conditions were not adequately controlled by medication. After encountering some difficulties in the first three patients, the researchers said the remaining procedures went smoothly. In all, the catheter tip was successfully guided by magnetic navigation to the target and radio frequency ablation was applied in 38 of the 40 study participants. There were no reported complications during the procedures.

'Based on our results, we believe that incorporation of remote navigation and ablation in the electrophysiology laboratory may represent a true revolution regardless of age and experience of the operators leading to a seismic change in electrophysiological paradigms for many laboratories worldwide. People always have had a love/hate relationship with robots, but this psychological barrier must be overcome. After performing more than 10,000 procedures with manually deflectable catheters, I have become enthusiastic for this emerging field,' Dr Pappone said.

Mitchell N Faddis MD PhD, at the Washington University School of Medicine, St. Louis, Missouri, who was not involved with this study but helped develop the remote magnetic navigation system the researchers used added: 'The work of Pappone et al. is extremely exciting to me as the culmination of this work, and to the cardiology community in general as a potential important technical advance in the treatment of atrial fibrillation.' The new system should be easier to master, as well as being more precise, than conventional catheter ablation, he added. 'Because of computer control, the efficiency of the procedure may improve. By the end of the 40 patient cohort of Pappone et al., procedures were routinely performed in less than an hour. This is likely to have an important impact on the complication rate for the procedure, which is likely to be affected by procedure duration.'

Dr. Faddis is a consultant with Stereotaxis Inc and receives research funding from the company. The study was supported by a grant from Johnson & Johnson.

Source: *American College of Cardiology*

## Firemen to treat emergency cardiac cases

UK - Fire-fighters are being trained to assess possible cardiac patients in emergencies, and to use automatic defibrillators and oxygen therapy. Aiming to enhance patient care in its area, this six-month pilot co-responders scheme is being monitored by Gloucestershire County Council's Fire and Rescue Service and the county's Ambulance Service NHS Trust.

The town chosen for the pilot study has a fire station, but ambulance services are some distance away. In a possible cardiac emergency callout, the trained firemen drive the fire service's 4x4 vehicles, rather than fire-fighting vehicles.

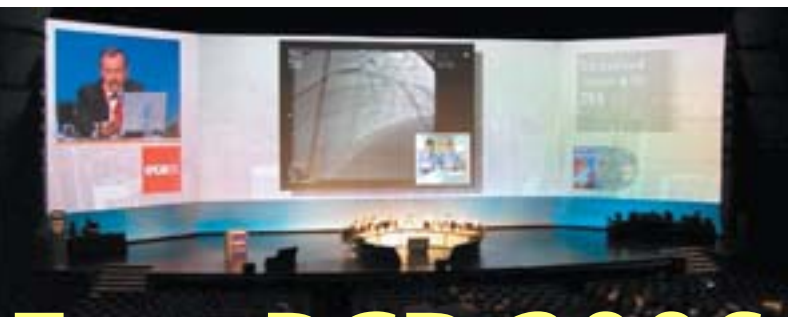
## Measuring oxygen uptake

USA - A satellite symposium will be provided at the 53rd ACSM Annual meeting in Denver, Colorado (30 May) by VIASYS Healthcare Inc. and the American College of Sports & Medicine. The meeting will focus on: the importance of quality control studies prior to using automated systems for the measurements of oxygen uptake in Exercise Science.

Professor Per-Olof Åstrand of the Karolinska Institute, who is the author of the *Textbook of Work Physiology*, a worldwide reference on the physiological bases of exercise, will chair the symposium and also present a historic overview about the measurement techniques of oxygen uptake during physical activity since the 18th century.

Hans Rosdahl, University College of Physical Education and Sport; Lennart Gullstrand, Swedish Sports Confederation; and Christopher J. Gore, FACSM, Australian Institute of Sport will also take part in the ACSM event. Additional topics will include validation studies for the Jaeger Oxycon Mobile portable metabolic exercise system, and a review of dynamic calibrations of in-house cardiopulmonary exercise systems.

VIASYS Healthcare Inc. focuses on research-based respiratory, neurology, medical disposable and orthopaedic medical technology. Symposium details: [www.viasyshealthcare.com/promo/acsm\\_spEvent.asp](http://www.viasyshealthcare.com/promo/acsm_spEvent.asp)



## EuroPCR 2006

France - EuroPCR is a major European event for interventional cardiologists and radiologists. Focusing on existing and new technologies in percutaneous interventions (coronary, peripheral and non-coronary cardiac diseases), cardiac and vascular invasive and non-invasive imaging, this year's meeting will take place at the Palais des Congrès, Paris, from 16-19 May.

During the multiple concurrent sessions, live case transmissions demonstrating techniques will be broadcast in the main rooms. Live centres transmitting will include, for example the Clinique Pasteur, France; Erasmus University Medical Centre ThoraxCentre, The Netherlands; Cardiovascular Centre Aalst, Belgium; Leipzig University Heart Centre, Germany; Miami Cardiac and Vascular Institute, USA; Villa Maria Cecilia Hospital, Italy; Columbia University Medical Centre, USA; Washington Hospital Centre, USA; Southampton University Hospital, UK; and Her Majesty Cardiac Centre, Faculty of Medicine Siriraj Hospital, Thailand.

In 'A glimpse into the future' sessions new technologies and innovations will be presented. Other sessions are themed: 'complications'; 'a call for clinical cases' and 'nurse & technician', during which participants will present their own experiences. Case review sessions will be dedicated to the presentation and discussion of clinical cases with peers and the EuroPCR faculty.

Utilising virtual reality simulators for training session, participants will take an active part in simulated procedures, practising techniques, and focusing on technical issues.

Programme details: [www.europcr.com](http://www.europcr.com)

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# TISSUE ENGINEERING IN PAEDIATRIC CARDIAC SURGERY

When heart valves need replacing mechanical or biological heart valves are usually used. Both have disadvantages: Mechanical prostheses promote the development of blood clots so that patients need anticoagulant treatment for their lifetime. Biological valves on the other hand only last for a limited amount of time. Both types of valve cannot grow with the heart - an important issue for paediatric patients. It has meant that, previously, those children had to be operated on repeatedly, throughout their growth.

Cardiac surgeons in Hanover, led by Prof. Alex Haverich, have now successfully developed heart valves that can 'grow': In the laboratory, all cells are removed from a human donor heart valve until only the tissue 'frame', the acellular matrix, is left. In the second step, stem cells from the patient's blood or bone marrow are 'settled' on this frame, and these will grow into tissue cells. After two to three weeks the new heart valve is ready for implantation. Seeing that the method uses the body's own material there are no issues with tissue rejection and the implant lasts a lifetime.



Professor Axel Haverich implanting a 'growing' heart valve

The objective of the project, which began in 1996 at the Leibniz Research Laboratory for Biotechnology and Artificial Organs (LEBAO), is the development of heart valve prostheses that are the equivalent of natural valves both from a conceptual point of view and from their biological behaviour. The implants must neither be immunogenic nor thrombogenic, but resistant against infections and must be able to

grow. After animal tests on small and large animals the first clinical implantations on humans were carried out on seven paediatric patients with heart valve disease, in May 2002 at the Republican Centre for Cardiac Surgery in Chisinau, Republic of Moldova.

Today, after 3.5 years of regular cardiac examinations there are no signs of any aneurysmatic changes, degeneration of the heart valves or stenosis. Moreover, physiological expansion of the pulmonary valve rings has been detected, which is proof of the valves' ability to grow inside growing children. At the same time, valve function has been preserved unimpaired. 'From everything we now know, and looking at the latest examination results, I can assume that we will never have to touch these valves again,' says Haverich. The Hanover-based researchers are now waiting for permission to use the new procedure in Germany as well. In Germany, two out of every 1,000 babies have congenital valvular heart disease. Experts estimate that 150 of those could benefit from the new method.

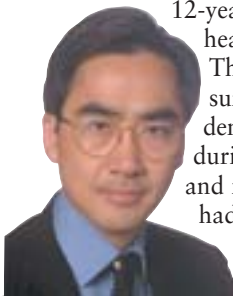
Report: Holger Zorn

## DISEASED HEART PUMPS EFFECTIVELY AFTER 10-YEAR REST

UK - Ten years ago a donor heart was transplanted into a 2-year-old patient, suffering cardiomyopathy, to take over the function of her own enlarged and failing heart. However, unlike many transplant cases - her own heart was not removed. After the donor heart had been implanted in the right of the chest, its aorta was connected to the patient's heart aorta; then the donor heart's pulmonary artery was connected to her heart's right atrium, and the donor heart's left atrium was connected to the existing heart's left atrium. The surgeons have referred to this as a 'piggyback' heart. Both hearts then pumped, but the donor heart pumped the hardest. Although her heart muscle was very enlarged, 'At the time we thought there was an outside possibility that her heart would recover,' said Professor Sir Magdi Yacoub, explaining this pioneering operation, which he carried out with a team at the Harefield Hospital.

Hannah Clark has also battled lymph cancer for the past few years but is currently in remission after a successful course of chemotherapy in January of this year. The patient is reported to have led a healthy life, but for the past few years had suffered lymph cancer. In 2005, a decade since the transplant, severe immune system complications meant that immunosuppressive drugs should no longer be administered. In addition, doctors were concerned that the removal of the donor heart and reconnection of her own had no previous record of success. Prof. Yacoub, now 64, was invited to advise the team in charge of her case, at London's Great Ormond Street Hospital, renowned as a centre of excellence for childcare. After careful planning of a new procedure, in February, consultant cardiothoracic surgeon Victor T. Tsang, and team at Great

Ormond Street Hospital, removed the donor heart, then restarted the 12-year-old's own heart - successfully. Their innovative surgery has demonstrated that, during her growth and its rest, the heart had indeed been



Surgeon Victor Tsang

helped to recovery. Five days after the four-hour operation, the patient was discharged. 'It worked out. That's wonderful,' said Professor Yacoub.

'As far as we know,' Victor Tsang added, this is the only such case in the UK, and it may be unique in the world. Nowadays we have alternative methods to support a failing heart. The significance of this case may be to encourage us to look at the heart's ability to recover.'

Report: Brenda Marsh

## RESEARCH

# The transcatheter paediatric heart valve

Many companies are competing to develop the ideal transcatheter heart valve and catheter-based valve replacement procedures, which are revolutionizing valve replacement for larger patients. However, small children cannot benefit from this technology, because the valves are too bulky.

A collaboration between researchers at the UCLA Henry Samueli School of Engineering and Applied Science and paediatric cardiologists at Mattel Children's Hospital, at the University of California, Los Angeles (UCLA) may soon change this. Using 'thin film nitinol' - a super-elastic, shape-memory metal alloy, originally developed for defence applications, with support from the US Air Force Office of Scientific Research and the Defence Advanced Research Projects Agency - a UCLA team is developing a collapsible heart valve to be loaded into a catheter, inserted into a vein in the groin, guided into position, then deployed in a precise location within the heart. As the valve is released from the catheter it will spring back to its original shape and begin to function.

Gregory Carman, UCLA mechanical and aerospace engineering professor, who, along with UCLA researcher Lenka Stepan, crafted the valve, explained that the memory retaining alloy and butterfly design that opens or hinges from the middle of the valve, rather than its edges, makes this a novel device. 'The unobtrusive leaflets within the valve mean there is no obstruction to blood flow. This smaller, low-profile design is well suited for children and, over time, will potentially allow children born with heart valve

defects to experience less pain and live much fuller lives.'

Dr Daniel Levi, assistant professor of paediatric cardiology at Mattel Children's Hospital, UCLA, designed the valve and joined Carman and Stepan to create and develop the revolutionary new device. 'Using catheters and collapsible valves, heart valves can be replaced without stopping the heart, without cutting the chest open and without long recovery times,' he pointed out. Open-heart surgery typically requires breaking the breastbone, a lengthy procedure and three to four days in intensive care, at least a week or two in hospital, followed by lengthy recovery at home. In contrast, patients who have valves replaced via catheter might go home the following day, with little pain.

The valve, being designed to replace the pulmonary artery, but later perhaps also the aortic valve, is strong and biocompatible, which should also present lower risk, as well as cost savings for hospitals.

'Recent studies we've conducted have shown that thin film nitinol can be used to cover stents and to provide a barrier in preventing tissue re-growth into stented arteries and veins,' Dr Levi explained. 'Beyond its use in either percutaneously or surgically placed valves, I anticipate that thin film nitinol will have a wide variety of applications in the development of future implantable biomedical devices for both adults and children.'

To bring their new valves and stents for children to market, the researchers are seeking an industrial partner, but it will be a number of years before the valves will be marketed.



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# European transplants society says organ supply must increase

The European Society for Organ Transplantation (ESOT) - Europe's leading transplant society - has called for the universal backing of new schemes to safely and ethically increase donor organ numbers.

Philippe Morel, Professor of Surgery, University Hospital Geneva, Switzerland, said that, although around 89,000 organ

transplants were performed globally last year, this number is still very low compared to existing needs. 'Even in developed countries, where health systems are well organised and organ donation is publicly promoted, the number of people waiting for a transplant is over 200,000,' he pointed out.

Leo Bühler, Associate Professor of

Surgery, University Hospital Geneva, Switzerland, added: 'There are also wide inter-country discrepancies in organ donation rates. In Spain, for example, rates are relatively high, at 34.6 donors per million inhabitants. By contrast, in Switzerland, we only have 12.6 donors per million inhabitants.'

Professor Bühler said that WHO initiatives ([www.who.int/transplantation](http://www.who.int/transplantation)) and schemes such as the International Organisation Fair Transplant's 'A Gift for Life' donor scheme could help overcome this shortage. He highlighted the need to make more use of living donation to overcome the limited supply of organs from deceased donors, but said that health authorities must carefully oversee the procurement of living donor organs in order to control risks for both donor and recipient.

Report: Ian Mason

Fractures and disruptions of the pelvic ring are most often unstable, and can therefore jeopardise patients' standing and walking functions. They are frequently caused by high intensity mechanical trauma. However, some lesions cannot be considered unstable because they do not sustain any load: lower anterior and posterior fractures of the acetabulum, even if associated fragmental fractures of the pelvic bone, are no threat and only need bed rest.

Displaced and comminuted fractures most often require open reduction and internal fixation (ORIF). The only emergency situation is hip dislocation that demands quick reduction. However, these are dangerous and difficult procedures.

Because of these dangers, the most usual treatment of non or slightly displaced fractures is continuous longitudinal traction. During a 30-45 day period, the patient stays in bed sometimes with a traction device set on a transosseous Kirschner wire. Prolonged bed rest, however, has its own complications, sometimes lethal in elderly patients.

Conservative treatment is often unsatisfactory, and ORIF is an obviously more aggressive method.

The development of CT-guided surgery attempts to avoid most of these complications. This technique aims at a quick fixation of pelvic fractures, allowing early standing. Precise guidance and easy control of the different phases of the operation lessen the operative complications and allow a more accurate positioning of the fixation device.



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## A percutaneous dilation tracheostomy kit

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'The modular approach provides an economic benefit and further allows the tube with inserter to be used for re-insertion according to the Seldinger technique, and tube changes with percutaneous tracheostomas,' Tracoe medical GmbH reports.

# Intra-operative imaging

By **Professor Geirmund Unsgaard MD PhD**, of The Norwegian University of Science and Technology - who is also Head of the Neurosurgical Dept. and Manager of the National Centre for 3-D Ultrasound in Surgery, at St Olavs University Hospital, Trondheim, Norway - and research scientists **Tormod Selbekk MSc** and **Frank Lindseth PhD**, both research scientists at SINTEF Health Research, and the National Centre for 3-D Ultrasound in Surgery

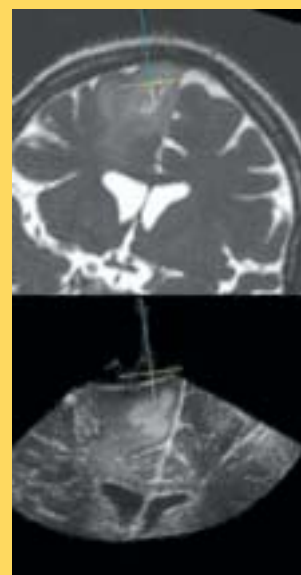


Figure 1 (left): Screen dump from the navigation system, showing corresponding image slice extracted from the MR T2 volume (top) and ultrasound volume (bottom). Note the apparent difference in tip position of the navigated instrument (cross-hair) between the images

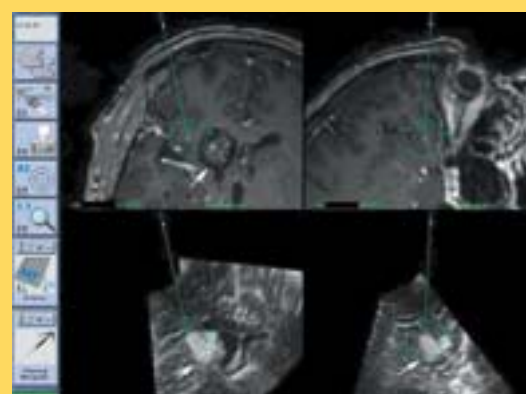


Figure 3 (below left): Display from the navigation system during resection of a cavernous haemangioma, showing corresponding tool oriented image slices (perpendicular) of MR volume and US volume. Note the difference in the offset tip position (centre of circle) indicated in the respective image volumes. The real position of the tool is at the edge of the lesion

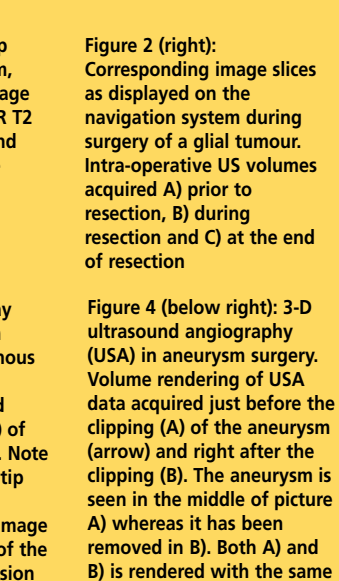


Figure 2 (right): Corresponding image slices as displayed on the navigation system during surgery of a glial tumour. Intra-operative US volumes acquired A) prior to resection, B) during resection and C) at the end of resection

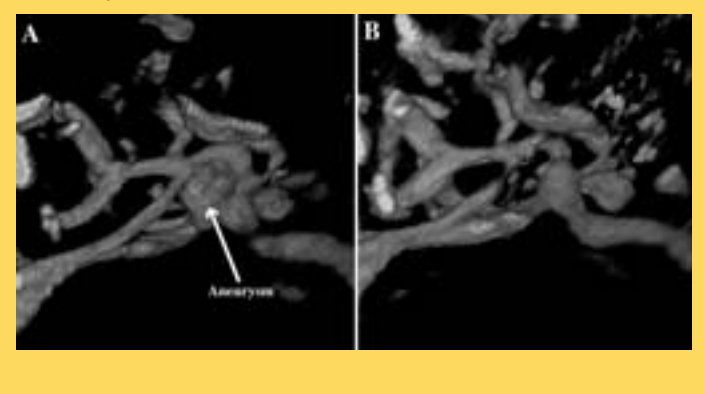


Figure 4 (below right): 3-D ultrasound angiography (USA) in aneurysm surgery. Volume rendering of USA data acquired just before the clipping (A) of the aneurysm (arrow) and right after the clipping (B). The aneurysm is seen in the middle of picture A) whereas it has been removed in B). Both A) and B) is rendered with the same view



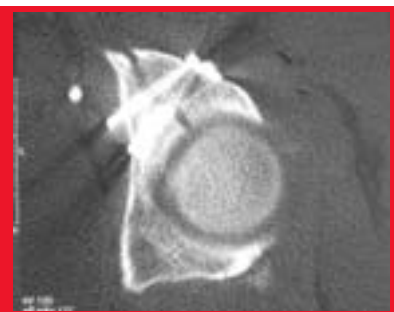
# Percutaneous therapy for pelvic fractures

By Patrick D Eude, Centre Hospitalier H. Mondor, Aurillac, France

**Procedure** - Our experience is based on a series of 86 patients, 63% male and 37% female, between 14 and 94 years old. Almost 50% were traffic accidents and 40% were falls (most frequently sport and work). We noticed 10% of these patients attempted suicide; these are obviously most fragile patients whose comfort must be considered as an element of therapy.

After initial X-ray diagnosis, helical-CT evaluation of the whole pelvis was quickly implemented, with multiplanar and sometimes 3D reconstructions. Non or slightly displaced but unstable fractures were proposed for surgery and, in most cases, a traction device was set. Feasibility of percutaneous fixation and optimal approach(es) were discussed with surgeons and interventional radiologists. According to the patient's status, the operation took place between three days and three weeks after the accident.

Spinal anaesthesia was sufficient in over 90% of cases. After carefully and precisely positioning a guide-pin just beyond the fracture line through a small skin opening, a cannulated screw was driven on the pin and tightened. One to four screws were inserted, according to the type of injury. CT slices were used to control the pin, the drill and the screw position. Each cutaneous opening required



Acetabular posterior fracture - CT slice



Acetabular posterior fracture - Control radiograph



Sacroiliac disruption fixed by one screw

one or two stitches. Anaesthesia allowed us to remove the traction device at the end of the operation. In only one case of a highly comminuted fracture did this

device have to be kept for 18 days. Further consultations are planned after 15, 30, 45, 60 and 90 days. Such an operation takes from 20 to 60 minutes, and the total occupancy of the CT room is two to three hours.

**Results** - Blood loss was less than 25 cc in all cases. No vessel or nerve injury was noticed; no infection was reported, and no screw had to be removed. Painkillers were required only during 36 to 48 hours. No antibiotics were necessary unless for other reason (open fracture, thoracic or abdominal injury).

In 90% of the cases the patient could sit on the day after (day one), in three cases on day two, in four on day three or four. Other injuries prevented one patient from sitting before day 18. They could resume walking with crutches on the same day and were discharged from the surgical department as soon as they could ambulate safely. Walking on both legs was allowed after 30 (simple fractures) to 45 (complex fractures) days.

After a 100 to 240 day follow up, 87.5% of patients were satisfied (14 cases), since they had recovered their previous everyday activities, and even most sports and work capacities, with no or only occasional pain. Dissatisfaction was due to residual pain.

**Conclusion** - In the light of this experience, we can conclude that:

- Close cooperation between surgeons and radiologists is mandatory

- Only usual instruments are required to insert the screws
- Prudent positioning of pins and screws, guided by CT-slices, should avoid complications
- The occurrence of an infection is extremely low (no case in most published series), therefore antibiotic therapy is not systematically required
- Quick pain relief and usually short stay in bed (2 days instead of 30 to 45) notably increases

patient's comfort and shortens the period for recovery since rehabilitation may be initiated at once

- The considerable reduction of hospital stay (seldom longer than 6 days) generates important savings
- CT guided percutaneous screw fixation of pelvis fractures therefore appear as a quick, safe method if carried out by well-trained radio-surgical teams.

Contact: eude\_p@hotmail.com

## in modern neurosurgery

The brain has few anatomical landmarks. During surgery it is critical that the neurosurgeon knows the exact locality of surgical instruments in relation to important brain structures. Thus neuronavigation systems have become standard tools for planning and guidance. However, conventional navigation systems, based on pre-operative images, are of limited value during surgery due to brain shift caused by the removal of cerebrospinal fluid as well as the surgical procedure. Therefore, there is a strong need for intra-operative imaging either by CT, MRI or ultrasound (US).

Intra-operative CT is not very attractive due to radiation and low sensitivity in the CT images.

Many research groups and large companies have tried to solve the brain-shift problem by using intra-operative MRI, which has proved useful for guiding certain surgical procedures and for control of tumour resection. The industry has invested in developing solutions for the operating theatre. The concept of operating inside the magnet has not been very successful due to the narrow space and need for special non-magnetic instruments. Recently, firms have made operating suites in which a patient can be transported in and out of the magnetic field. But however well designed, this transportation will interrupt an

operation. Another solution is to lift small magnets in and out of the operating field (PoleStar).

Although most intra-operative MRI solutions provide good quality images, the main drawback is cost - too high for most clinics, anywhere. On top of MRI equipment operating rooms need special shielding.

Ultrasound (US) is a very interesting alternative for intra-operative imaging. In recent years US has gone through considerable technical development, mainly driven by cardiology needs. Many neurosurgeons have not recognised this development. Today, image quality from high-end US scanners is usually as good as that of pre-operative MR images (Fig 1). By some simple clinical arrangements high US image quality is also obtainable during and towards the end of an operation (Fig 2). We have used a system that integrates high-end US with neuronavigation (SonoWand). It takes under a minute to obtain a 3-D US volume, then we can immediately navigate in that volume. A new US volume can be acquired at any time during an operation. This solves our brain-shift problem, and also our need to follow the operation's progress and the final control of the tumour resection. The system is very flexible and can be used for any operation without a time increase - rather, it reduces it, because

surgeons feel more confident with the updated information.

Compared with intra-operative MR, one disadvantage of 3-D US is that it only shows a region of interest, not the whole brain. This potential problem is minimised by the navigation system, which displays corresponding image slices from both intra-operative US and pre-operative MRI (Fig 1 and 3).

Another disadvantage is that neurosurgeons are less familiar with US than MRI. In our experience the learning curve is very steep.

We have used intra-operative 3-D US for several clinical applications; not just brain, spinal and skull base tumours and cavernous haemangiomas (Fig 3), but also vascular lesions (Unsgaard, G et al. *Intra-operative 3D Ultrasound in Neurosurgery*. Acta Neurochir. 2005 Dec 19) One important feature of intra-operative 3-D US is its ability to make 3-D angiography volumes based on power Doppler. This has been useful in tumour, AVM and aneurysm surgeries (Fig 4).

3-D US is cheap, flexible and very useful equipment for a range of neurosurgical applications. It is the workhorse of the operating theatre. We think that, because neurosurgeons are gradually discovering its usefulness, most operating theatres, worldwide, will be equipped with this type of instrument.



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World renowned for audio, video, communications and information technology products used for entertainment as well as business communications, Sony has continued to utilise and develop that technological expertise to take an increasing role in operating theatres.

In April 2004 *European Hospital* featured the advanced Sony set-up in surgical units at St Olavs Hospital (Trondheim University Hospital), in Norway, which

Hospital in Essen. 'I knew it would be a huge asset for my new neurosurgery centre at Kiel,' he said. 'The system gives my team the facility to seek advice directly from the operating theatre if a difficult situation arises without waiting for senior consultants to move from their office, scrub up and get down to the theatre. This means patient safety remains paramount, with swift senior counsel and no delays in treatment.'

Slotervaart Hospital, Amsterdam, which wanted to increase its role as

accelerate it.'

Another theatre system has been set up in Muscat. Serving the Sultanate of Oman, the government-owned 524-bed Sultan Qaboos University (SQU) Hospital provides clinical care and medical training. However, limited operating theatre space meant that no more than four students could attend surgical procedures at a time. Today, the hospital provides videoconferencing-based telemedicine, which has allowed it to develop a 'hybrid' teaching

transmitted to plasma and LCD screens over a broadband fibre optic network linking the College of Medicine & Health Sciences with the rest of the University Hospital campus.

Remotely controllable Sony CCD colour video cameras in six operating theatres are used to capture images from surgical procedures. As well as being displayed live on

Sony plasma and LCD monitors around the campus, images are also recorded on DVCAM tape in an



David Dowe (left) with Klaus Cramer and EH representative Denise Hennig

## SONY'S NEW NICHE IN HEALTHCARE SEES CONTINUING GROWTH

# Digital operating theatres



Sultan Qaboos University (SQU) Hospital provides clinical care and medical training. Limited operating theatre space meant only four students could attend a surgical procedure. Today, the hospital provides videoconferencing-based telemedicine, enabling the education of innumerable students, even beyond the campus

provides students not only with real-time detailed viewing of certain surgical procedures, but also vital video records and a complete network of communications to aid workflow.

At Kiel University Hospital, the Department of Neurosurgery is similarly equipped with video/audio signal transmission from three different operating theatres, including one with MRI. In addition, a fourth theatre (for emergencies) has been provisionally set-up with a cabling infrastructure for future use.

Professor H M Mehdorn MD, Director of the Department of Neurosurgery, University Hospital Schleswig-Holstein, Kiel, had seen the Sony system in action at the Evangelical Huysens Foundation

a teaching hospital, training medical, paramedical and nursing personnel, also opted to make two of its seven new operating theatres completely digital. The hospital wanted to record images from various kinds of scopes (e.g. for minimally invasive surgery), store them in digital form with other images, and have all the data available in an Electronic Patient Record (EPR). Sony developed two digital operating theatres in conjunction with Smith and Nephew. Reflecting on the resulting system, Boudewijn Dwars, general surgeon at the hospital, said: 'What we are achieving here is fairly unique. The development of endoscopy is already progressing rapidly, but I think that digitisation will only

model that can accommodate the demands of increasing student numbers.

Supplied and installed by local Sony agent Muscat Electronics, Sony a PCS-1P IP-based videoconferencing system allows live video images and audio to be

adjacent control room for subsequent review and training. Content can be edited using a non-linear editing system and 'burned' onto disc for distribution to students using the Sony RDR-GX7 DVD recorder. The system is also used for videoconferencing over

ISDN links with other hospitals and teaching centres in India, UAE and the USA.

The hospital also plans to connect Radiology and Clinical Physiology Department as well as care wards with similar videoconferencing links.

Sony supplies such systems, but none are standard. These are all tailored to the needs of the individual hospital - and now many more hospitals are adopting such systems.

In effect, Sony has discovered a niche for itself in medical imaging technology, Klaus Cramer, of Sony Healthcare Professional Solutions Europe, confirmed, in a recent discussion with Denise Hennig of *European Hospital*. 'Each company has its key competencies within the imaging market - radiologists, microscopists and the endoscopists/surgeons. We contribute our experiences from image formation, broadcasting and transmission. Everything is combined and serves to achieve improved image quality and transmission.'

David Dowe, who became Director and European Head of Sony Healthcare last year, further elucidated: 'We have a long heritage in the broadcast industry, providing cutting edge technology to all leading broadcasters worldwide. In the last two years we saw a very good opportunity to bring some of that expertise into healthcare, because healthcare is becoming far more multimedia-based than before. Multimedia is used in radiology imaging and there is much greater use of video technology in the operating theatre. Sony now has the opportunity to bring in skills in video and video transference to networks within healthcare. For surgery and endoscopy we have produced a visible light PACS, which is similar to a radiology PACS but uses visible light imaging instead of MR or CT images. The technology relies on

### UK's £6.2bn IT project attracts fact-finding tours

Britain's massively funded IT for healthcare project has drawn heads of healthcare IT in Canada, Japan and France to study the development.

The French electronic health record institute is currently conducting pilot studies before deciding on the country's model for the introduction of electronic patients records (EPR). During their one day visit, Richard Granger, Director General of the National Health Service project, met with the institute's managers for sessions that covered, for example, systems procurement and the technical approach to the UK's health service technology improvement programme.

Jacques Beer Gabel, Director General of Groupement d'Intérêt Public Dossier Medical Personnel, said: 'We came to improve our knowledge of what we should do in France. We've learned a lot and want to inspire those working on our system with the UK's experiences. Whatever we do we will face large contracts and there will have to be a procurement of major companies. The British experience will be very helpful.'

### TELEMEDICINE Land-based surgeon operates on 'patient' under the sea

Canada & USA - Apart from its medical expertise, Canada has advanced space robotics technology and telecommunications. In April, three astronauts and a doctor went under the sea off the Florida coast for 18 days, to test space medicine concepts (as well as moon-walking techniques).

The mission, named NEEMO 9, was led by Dr David Williams, a Canadian Space Agency astronaut. He and his crew conducted experiments using the latest remote surgical technologies and techniques. From Hamilton, Ontario, Dr Mehran Anvari, Director of the Centre for Minimal Access Surgery (CMAS) at St Joseph's Healthcare, directed them during complex surgical simulations, using two-way high-speed telecommunication links, in this real-time, real-life underwater situation, where conditions are similar to those in space.

From Hamilton, Dr Anvari also performed surgical procedures on a mock patient inside the Aquarius, 19 metres underwater and

thousands of miles away. The success of such telerobotic developments bodes well for future surgical treatment for those living in remote communities, he pointed out.

The project included Dr Tim Broderick, University of Cincinnati; NASA astronauts Nicole Stott and Ronald Garan; Chris Hadfield, Canadian astronaut, and engineers Jim Buckley and Ross Hein of the University of North Carolina, Wilmington.

This, the ninth NASA Extreme Environment Mission Operations (NEEMO) mission, is a joint project involving the Canadian Space Agency, the National Aeronautics and Space Administration (NASA), the Centre for Minimal Access Surgery at McMaster University, Hamilton, and the National Oceanic and Atmospheric Agency (NOAA). The latter is a multi-disciplinary technological education and research centre that supports the research and development of specialized techniques for minimal access surgery

### PACS for Scotland

Kodak Health Group and National Services Scotland recently signed a formal contract, at the Southern General Hospital, Glasgow, which officially appointed Kodak as the leading supplier to the Scotland National PACS project. The project, to be phased in over the next two



modalities that use visible light, such as endoscopy, laparoscopy and open surgery. Visible light was neglected in medicine for historical reasons, because hospitals very much invested their money in radiology systems.'

Nowadays, David Dowe added, surgeons in certain disciplines want better image quality in endoscopy and surgery for diagnostics as well as in the operating theatre. Many endoscopic examinations must be recorded, not just for diagnostic reasons but also for quality control and training aspects in operations and treatments. 'Video is a good tool to show the quality of the work,' he said. 'The main driver for visible light is better training. The reason is simple: when endoscopic procedures are carried out, far more junior doctors can see how they are done. The old fashioned method was that three or four junior doctors stood around a surgeon, watching the monitor. That creates great difficulties in terms of workflow in the theatre and the number of people who can be trained is quite small. With a video you can train 75 surgeons simultaneously, potentially sitting in different countries within our network. We have some evidence-based video studies in Sweden where the outcome of particular types of surgery depend entirely on how quickly surgeons can learn the latest techniques. Because many techniques are very precise, it is not sufficient to describe this in still images or text. A surgeon really needs to be shown, in detail, how the technique works. The outcome of that Swedish study proved much better results, simply because more surgeons are using the best technique.'

'The high-definition procedure represents a significant improvement through increased image information particularly in neurosurgery - vessels, detailed views of eyes and ears, vocal chord analysis, wherever one needs to examine very fine details.'

Several firms cooperate with Sony to make these systems viable. The end user is also increasingly important to the company. 'We keep up contact with endoscopists and surgeons,' David Dowe pointed out. 'We currently work with clinicians from different medical fields - gastroscopy, arthroscopy and ear-nose-and throat specialists. Working in close cooperation with them means we can adapt to their individual requirements much better and provide customised solutions.'



**T**ransplant surgeons use checklists to establish whether donor and recipient hearts are compatible - almost like people looking for suitable partners. Speed dating and internet dating involve a comparison of people's own profiles with those of potential partners. Everyone, surgeons, patients, those running dating agencies and people seeking partners want the highest possible match and fear rejection. At the Schauspielhaus Zurich (Zurich Playhouse) all these players have united in the performance of *Blaiberg and sweetheart19*.

Dentist Philipp Blaiberg, was the second person ever to receive a heart transplant (the first, Louis Washkansky, survived the operation for less than three weeks and is almost forgotten). *Sweetheart19* is a typical nickname used on internet chat rooms and singles websites. Docu-drama producers Helgard Haug, Stefan Kaegi and Daniel Wetzel, working under the label Rimini Protokoll, have combined Blaiberg and *sweetheart 19* to bring on stage a heart transplant patient; cardiac technician; a woman with donor card, two dating organisers, and a vet. These are not actors, but 'real people' acting out their own lives - reality which, often interwoven and entangled, is turned into theatre.

On stage are just four stands overhung with four video screens, to alternately represent an operating theatre and dance hall; four spotlights with beam spots suggest operating lamps, four rows of coloured floor lights suggest a dance floor.

A simulated heart operation is transmitted via video and Heidi enters, stops the transmission and tells her story: suffering atypical amyloidosis, she first had received a mechanical support system, then a

donor heart. Now she must trick her immune system with drugs for a lifetime to beat possible rejection. Next, Renate appears. A cardiac technician at the Zurich Triemli-Spital, she has brought a heart-lung machine and delivers medical wisdom live, whilst experts, surgeons and cardiologists deliver statements via video: 'A transplant patient feels no cardiac pain' (nerves have been severed), or 'patients are not properly cured, just less ill'. To stop a donor heart beating and ready for transportation, Renate

seeking a partner. Doctors will check her blood and tissue compatibility; for now, she checks for visual and character compatibility of people on an online dating agency.

Jeanne joins them. She runs such an agency to bring Swiss men with Russian women together. Each standing in front of a stand, the four people talk simultaneously. After two (not seven) minutes a bell sounds and they swap places. Again they talk, but not to one another. The people and levels they represent (heart disease, a search

biological heart valves, but is later fried by Jeanne.

So, whilst everyone remains separate on the stage/in life they come together in this virtual world. Here everyone could recreate themselves, but they limit it to shape and hairstyle and otherwise stay who they are: patient, cardiac technician, dating agency owner. Only Crista D. takes on the identity of her deceased son (a suicide).



Photos © Christian Schnur

ANOTHER KIND OF THEATRE...

# Seeking a compatible heart

By Holger Zorn

Together they are to save a life by transplanting a heart, but the mission fails. While patient and perfusionist dance together, Nick compares the dating agencies used by Crista D. and run by Jeanne. Statistically, he says, it takes 60 contacts to establish a relationship.

So, in the same way that Heidi's mechanical heart support system only supported one half of her heart, the entire story seems half-hearted. It suggests that private happiness can be planned in the same way as a surgical intervention - despite the fact that Heidi's new lease of life is the result of coincidence: If her cancer had actually been detected as the underlying cause, doctors would never have short-listed her for a transplant. At the end of the performance, Nick tries his luck as a rodeo-rider on a bull with a pig's head. The smell of fried meat wafts through the hall and everyone takes bets on when the rejection will occur. What is bound to happen happens: Nick falls off and Heidi quickly takes her medication.

The performance will run from 10-14 October, in Berlin. Details: [www.hau-berlin.de](http://www.hau-berlin.de)



uses five litres of Custodiol (a drug that protects organs) and seven minutes of her time - the same time that clients using Nick's speed dating events have to meet a potential new partner. When the session is over, a bell sounds; ladies remain seated, gents rise and seek another possible partner. 'Seven minutes can be a long time,' explains Nick, who, if required, helps with questionnaires. There are plenty of questionnaires on the internet, which is where Crista D. - willing to give her heart away once to a new partner and twice, on her death, for a transplant patient - is

for a partner; the affected, the professional) remain finely separated. Only once do they come together, to dance along at a pensioners' tea dance, transmitted via video. The audience must make all the connections; Haug, Kaegi and Wetzel rely on everyone's ability to make associations and on the strength of the individual stories. In fact, they rather try to confuse the audience with the arrival of Hansueli, microbiologist and professor of veterinary medicine, who specialises in pig diseases. He brings along a pig's heart, which is not used to supply

and a half years, will connect up to 39 hospitals and 67 satellite centres across the country, handling around 3.2 million annual studies.

At the event, Andy Kerr, Scotland's Minister for Health, was introduced to Kodak's PACS system by Diane Thompson of Kodak's Health Group



## Home monitoring project cuts hospital stays up to 67%

United Kingdom - Telemedicine projects to assess home monitoring of patients, have proved that some hospital inpatient stays could be cut by up to 67%.

In one project, the patients, aged 35-82 years, all with chronic respiratory diseases, received self-monitoring equipment - S21 telemedicine monitors produced by the firm Tunstall - which proved easy to use and has had a 94% acceptance rate among users. During the study the participants measured their own temperatures, pulse oxymetry, heart/breathing rates, ECG and blood pressure, sending the data via their telephones to a secure server to be saved in an electronic patient record. Doctors and nurses then reviewed the data. If these deviate from levels set by the case doctor an alarm can be sent to the patient's doctor or, for example, the retirement home where that patient lives.

The first project, set up by the Carlisle and District Primary Care Trust and the

Carlisle Housing Association, indicated that hospital stays had been reduced from 10 days to 5.5 days for some patients. One of the reasons was that their physicians could adopt a more preventative approach to the cases. In the beginning, the project team expected to cover 70 COPD cases, however, the number rose to 210, with an estimated saving of 1,000 inpatient days.

In another project, run by Medway NHS and Teaching Primary Care Trust and the Medway Council, a 67% reduction in hospital stays for the patients with chronic respiratory disease was achieved.

In addition, 75% of people in the project did not need visits from their general practitioner during the year-long period.

Significantly, in one case, a local hospital consultant used the telemedicine monitor to collect data from a cardiac patient, when planning that patient's hip replacement, which eliminated the need for lengthy pre-operative assessment.

## IT build-up for Irish hospitals

A £9 million capital investment in Information and Communications Technology (ICT) has been earmarked for hospital services in the South-West of Northern Ireland. 'The proposals are in line with the HPSS Regional ICT Strategy, launched last March, and will ensure that patients benefit now from the most up-to-date information and communications technology, equipment and systems available and that hospital staff are fully trained in its use in advance of the new hospitals being delivered,' explained Shaun Woodward, Department of Health for Northern Ireland Minister.

Between the project's commencement and the new hospitals opening, modern ICT equipment and systems will be installed and staff fully trained in its operation, to ensure a seamless transfer of services to the new buildings.

The redevelopment is being supported by the Strategic Investment Board Ltd (SIB), which was established as a company under the Reinvestment and Reform Initiative in 2003 to address the legacy of under-investment in Northern Ireland's infrastructure. The Board aims to help to deliver key investment programmes and projects, support reform of public services and build a 10-year investment strategy for Northern Ireland. New ideas for improvement and reform are being incorporated into its supported programmes. It is also challenging established ways of thinking and working and helping departments deliver more and better projects, at a faster rate, as well as looking at ways to realise surplus assets and leveraging its asset base.

# Rapid growth in wearable wireless monitoring

Wireless networking, already widely adopted by healthcare facilities across Germany, France and the United Kingdom, is set for 'rapid growth', according to a report by the global market consultancy firm Frost & Sullivan (F&S). More emphasis on home care, plus heightened awareness of the benefits of remote monitoring, and technological developments that improve patient flexibility as well as present substantial cost savings to healthcare authorities, will result in the predicted growth in the European wearable wireless patient monitoring market in the next 4-5 years.

In addition to already recognised advantages to patients' health and hospital costs, wireless systems are also helping avoid the very high costs involved in the laying of wires

and cables in hospitals, says F&S Senior Research Analyst Aarati Ajay. 'The return on investment is higher than that provided by wired systems, and with advancements in wireless technology, the systems are likely to reach higher standards of sophistication.'

According to the report, technological progress is likely to assuage concerns over the reliability of vital signs data transmitted over shared wireless networks. The ability of sophisticated wireless wearable sensor networks to ensure the safety and integrity of such data is set to drive adoption levels over the next 5-7 years, with growth opportunities arising in hospital and homecare settings.

However, minor technical challenges still exist. 'There are several

competing technology platforms that are being tested to create unique patient area networks.'

Concerns also linger about regulatory challenges and high outlays involved in achieving cost-benefit data. The process of accumulating cost-benefit data needed to receive regulatory approvals is lengthy and extremely expensive. Additionally, sufficient clinical data must be presented to medical practitioners to convince them of the value of novel devices. Accordingly, only large, established companies can attempt to introduce these new technologies, and they need to unite to promote cooperation over cooperation. Conclusion: 'There needs to be a consensus regarding the wireless models required, interoperability issues and security standards that should be used in these devices.'

Report: *Strategic Opportunities Assessment for Wearable Wireless Patient Monitoring Markets in Europe (B757-56)*. Details: <http://patientmonitoring.frost.com>

# ID speeds up

The labelling of people and objects for quicker identification has seen remarkable advances, which continue. The Sato Corporation, which invented thermal transfer printing, for example, specialises in state of the art label and barcode printers, data collection systems (DCS) and radio frequency identification (RFID) technology. The company's *Healthcare ID Solutions* include stationary and mobile barcode label printers, mobile barcode readers, and special purpose labels. Patient's individually printed, machine-readable wristbands can be latex-free and the range includes those for direct thermal or thermal transfer printing, as well as a very soft version suitable for infants.

The freely configurable ID system can work with 2-D data encoding on labels - allowing storage of more detailed information on the labels themselves.

The antimicrobial-coated Sato CT400 printer was designed for use in medical/pharmacy environments, and the lightweight mobile MB200i - worn on a belt - prints labels wherever needed. Portable hand-held scanners are also available to read barcodes as well as 2-D codes on labels or patients' wristbands.



SATO CT400 printer and wristband

# Text messaging beats missed appointments

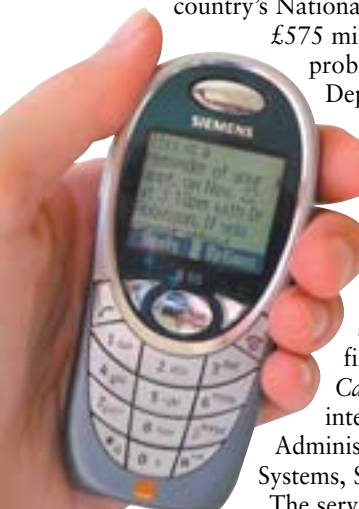
UK - Patients who miss medical appointments cost the country's National Health Service (NHS) around £575 million annually. To address this problem, in 2003 the Government's Department of Trade and Industry awarded a SMART Feasibility Grant to the firm iPLATO Ltd, which specialises in mobile healthcare applications. The aim was to study the feasibility of using a text messaging system to remind outpatients about their appointments. Consequently the firm produced the service *Patient Care Messaging*, which can be fully integrated with a Patient Administration System, EMIS, InPractice Systems, Sepia and Psymon.

The service is reported to have reduced

missed appointments by up to 40%, offering a potential annual saving of over £500,000 for an average Primary Care Trust.

15 NHS Trusts, including GP surgeries and hospitals across London, now use the system. Along with setting up automatic text reminders of appointments, text campaigns also can be designed by healthcare staff to encourage patients to attend clinics for flu jabs or other vaccinations, and participate in health programmes, e.g. screening, smoking cessation, etc. Patients are said to respond well to the text messaging system, in which their text replies are converted into e-mails that are automatically directed to the relevant doctor or nurse.

The firm reports that it has now been contacted by healthcare organisations in over a dozen countries, leading it to predict global potential for this technology. Based in London, and with a technical development centre in the Czech Republic and offices in the US and Saudi Arabia, iPLATO Ltd will launch the service in Germany shortly.



Patients receive automatic reminders

# NEW FOR NICU NURSING



ClinicalVision, software produced on Dräger Medical's Infinity Kappa XLT split-screen monitor, enables nurses to view all clinically relevant patient data, as well as supporting information. Vital signs are displayed on one side of the screen - without any pop-ups or obstructions - whilst, on the other side, web-based access to data on the hospital information system (HIS) or reference material can be viewed. In addition, a video\* option can capture and record video images of the baby and import video signals from other sources.

Fully integrated with Dräger Medical's infant ventilators, Kappa XLT provides complete neonatal parameter support - including TcPO<sub>2</sub>/CO<sub>2</sub>\*, FiO<sub>2</sub>\*, and dual SpO<sub>2</sub> - and facilitates easy assessment of apnoea, bradycardia and desaturation with an OCRG (OxiCardioRespiroGram) review summary. The monitor offers a choice of leading SpO<sub>2</sub> technologies\*, including Masimo and Nellcor. It automatically notifies the user of lab results and imports patient demographics from the HIS using Infinity Gateway. Additionally, Kappa XLT provides a complete patient record by storing up to 96 hours of trending and 150 events with all parameters.

\* The Infinity Kappa XLT monitor with VF6 features requires 510(k) review and is not yet available commercially in the USA.

The Infinity Kappa XLT monitor with VF6 features is not yet licensed in accordance with Canadian Medical Device Regulations.

# Asklepios develops an international showcase



Left: The €140 million building at Barmbeck opened in February

Dr Bernard Broermann has built up the Asklepios hospitals group and its US-based sister company Pacific Health Corporation since 1984



Right: Future IT developments are displayed for patients, medics and visitors on three touch-screen monitors in a 'showroom' at the hospital



Intel and Microsoft are developing pilot networks to link hospitals and healthcare participants. This project involves just three hospitals worldwide: one in the USA, another in Shanghai, and one in Germany - where the Asklepios group of hospitals decided to take part when the former Barmbeck General Hospital, Hamburg, was privatised and construction of a new building began.

Asklepios predicts that, in the future, hospitals can only be run economically if activities are centralised around patients, beyond institutions and, to do this, the entire treatment process must be standardised. To this end, the following Information technology (IT) projects are to be set up at Barmbeck:

- **radio frequency identification (RFID)** to be used in treatments and logistics, e.g. in the Central Accident and Emergency Admissions Department, so that no patient could be 'lost'
- **dashboards** to visualise the current status of patients, rooms and equipment, to avoid under-usage and enable precise and efficient planning, and to record which patient is treated where, when and by whom

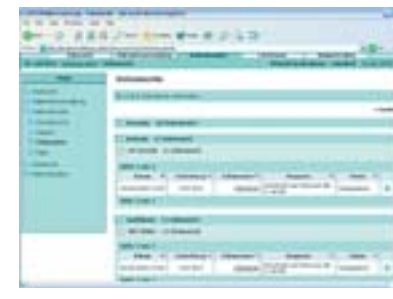
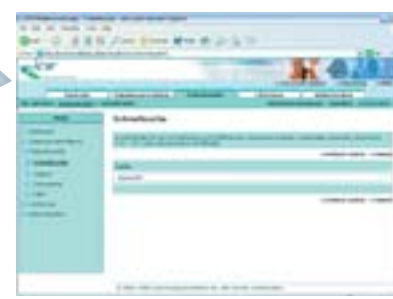
- **mobile ward-rounds** - medical staff will be issued with tablet PCs to access patient data and documents from the clinical information system at any time and place, with authentication and security controlled via smart cards
- **The eHealth Interoperability Platform (eHIP)** - a medical portal that enables doctors to communicate securely with the hospital and to use public interfaces with other medical service providers
- **ECG telematics** - mobile ECGs that enable the transmission of patient data from an ambulance before arrival and hospital admission.

**Reorganisation of treatment processes** - The hospital's traditional ward-based system is to be replaced by a central organisation, which means that each patient is to be allocated a special treatment team.

Barmbeck is therefore set to become a global reference centre; if the new technologies and structures prove successful during daily use there, they will be adopted by a further 100 institutions (which include 72 hospitals) owned by the Asklepios Group.

Report: *Anja Bebringer*

# EPR includes images



Germany - The Walldorf-based firm InterComponentWare AG (ICW) launched its hospital networking solution for electronic patients' records (EPR) at MEDICA 2005, reporting that the system can connect existing but so far isolated hospital information systems (HIS) without having to change currently used software. Now the firm has enhanced this by integrating the Chili webserver, which enables access to digital images in DICOM format in a uniform viewer. Images, such as CT, MRT, and ultrasound scans, can be viewed and edited as usual (e.g. zooming in, setting the contrast and performing measurements). In addition, Chili's remote radiology functions can be used via ICW's virtual patient record. For teleconferencing, physicians also can select a virtual patient record and click to obtain the desired image and connection.

The webserver is made by Chili GmbH, which develops software components for imaging in radiology, cardiology, pathology etc. Chili has installed around 200 of these systems in Germany, Switzerland, Belgium and the USA, and is actively involved in the standardisation committees of the German Radiology Society and the DIN. Dr Uwe Engelmann, one of Chili's three founders, explained that systems covering all aspects of sector-spanning communication need to be integrated to meet future needs, but there are hardly any manufacturers that can cover such a broad spectrum alone. Chili needed to find a partner with a powerful, open platform for healthcare integration, hence the partnership with ICW.

ICW, located in Germany, Austria, Switzerland, Bulgaria and the USA, is also part of the German government-consulting consortium bit4health, and has provided consulting services for the introduction of the electronic health card in Germany. In addition, the firm is involved in the Austrian eCard project.

Source: ICW

# Decade of IT under-funding in the USA

The destruction caused by Hurricane Katrina was felt so strongly at HIMSS '06, the annual meeting of North America's Healthcare Information and Management Systems Society, which drew over 24,500 healthcare IT professionals and hospital executives to San Diego in February, that the Society decided to hold its 2007 meeting in New Orleans to bring dollars to the city's damaged economy.

The HIMSS 06 theme - *Transforming healthcare through IT* — had greater urgency in the context of destruction of hundreds of thousands of medical records and the need to provide medical care for tens of thousands of evacuees, many with no knowledge of their own medications. The resiliency of electronic medical records, and the need for medical professionals to access them regardless of location, reinforced the relevance of the keynote speeches and over 300 educational presentations (CD available at: [www.himss.org](http://www.himss.org)).

A 2005 report from the PricewaterhouseCoopers Health Research Institute and Global Technology Centre estimated that a typical US hospital spent 2.5% of its annual operating budget on healthcare IT, approximately US\$14 billion in 2005, and should spend a minimum of 3-5% in 2006. The message at HIMSS'06 was that investments made in the past decade are insufficient.

*Modern Healthcare* magazine's 2006 annual survey of hospital administrators regarding the top ten IT priorities for 2006/2007 mirrored the major topics discussed: creating cost-effective, productivity-oriented, open standards-designed electronic patient records (EPR); strategic planning and management of clinical IT innovations; improvement of patient care and clinical decision-making to maximise budgets and reduce healthcare costs; security, and the development of viable information



## EH correspondent Cynthia E Keen reports on the HIMSS meeting in San Diego

sharing networks through Regional Healthcare Information Organisations (RHIOs).

However, in 1993, at the first HIMSS meeting the topics were much the same, with additional emphasis then on the need for mature open standards. Fewer than 5,000 people attended, and many seemed to disbelieve the radical changes predicted. In the early 90s, the concept of RHIOs were called Community Healthcare Information Networks (CHINs), with emphasis on their formidable challenges of implementation and financing. Only a handful of CHINs ever materialised, but they created the models for Integrated Delivery Networks (IDNs) among healthcare institutions with multiple hospitals and clinics.

Now, in 2006, the IT revolution is well underway, with impressive pioneering initiatives by Canadian provincial and federal health departments and the US Armed Forces and military veterans hospitals, highlighted at the two countries' pavilions. HIMSS' joint initiative with the RSNA — Integrating the Healthcare Enterprise (IHE) — has achieved global support among vendors and healthcare institutions in industrialised nations. An Interoperability Showcase, modelled

as a RHIO, demonstrated the exchange of physician reports, medical tests and lab results, and diagnostic images by 47 vendors. Some 3,000 attendees participated.

Keynote speakers included Dr David Brailer, new US National Coordinator for Health Information Technology, who is overseeing new \$61,700,000 federal government funding initiatives for health IT deployment; Richard Alvarez, president and CEO of Canada Health Infoway, an organisation representing Canada's provincial and territorial health departments that to date has funded over \$400 million to create an interoperable pan-Canadian Electronic Health Record (HER); and Richard Granger, chief executive of Connecting for Health, the United Kingdom's multi-billion dollar initiative to create an IT-focused healthcare system.

Among the 875 exhibitors were global corporations such as Agfa Healthcare, Cerner Corp., Eastman Kodak, Eclipsys Corporation, GE Healthcare, McKesson Corporation, Philips Medical Systems and Siemens Medical Solutions, all demonstrating comprehensive, integrated systems for 'one stop' shopping that encompassed hospital EMRs, specialty department-specific information systems, PACS for radiology and cardiology, and speech recognition systems. Dell, EMC Corporation, IBM, Network Appliance and StorageTek showed the latest in CAS and SAN storage and archiving. State-of-technology in mobile computing, bar coding, security and virus protection, and wireless telecommunications also were highlighted. Exhibitors also included numerous IT infrastructure designers, service providers and consultants. This mix attracted several thousand IT professionals from Europe and Asia, for whom the appeal was to evaluate commercially available and emerging healthcare IT technology that was debuting at the show.

## IT for cardiovascular workflow

Leading representatives of the Bush administration are politicising IT systems as a cornerstone for the revision of US healthcare. Updated technology is seen as mandatory for the future of healthcare, by improving chronic disease management, increasing disease prevention efforts, and the sustainability of the health insurance system.

Former nurse, Sandra Vogeler has seen positive results from the use of advanced IT systems in cardiovascular medicine, for example. With a master's degree in public health, she lead operations at Nebraska Heart Institute Heart Hospital, and now heads a division at Siemens Medical (Malvern, Pennsylvania) that specialises in IT solutions for cardiovascular medicine, for which the acquisition and integration of images into a single operating system is a big challenge.

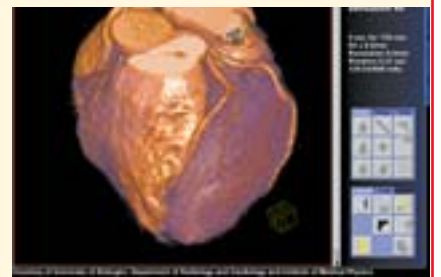
'Traditionally, many cardiovascular departments don't use a PACS. They save images on hard media - film, CDs or tape - the latter to store echo images.' She believes that significant productivity gains could be achieved by enhanced workflow automation. IT Solutions exist that provide PACS, enabling sites to profit from a far more automated and smooth process, from image capture to integration of data from various equipment into a single powerful IT system. This major function, which she refers to as 'managing the media', saves physicians'

time by presenting the most holistic patient picture to enable accurate diagnosis and treatment planning. 'Physicians can do a much more representative, in-depth report in *Soarian Cardiology*, which lets them view the entire longitudinal cycle of a patient. They see all the lab results, all the documentation, as it's rolled out to begin to comprise the full, cross-modality holistic picture of those studies.'

In addition, inventory management, documentation of supplies for treatments, plus billing, can be dealt with in a single, automated entry, thus releasing scarce clinical staff to tend patients.

When the South Carolina Heart Centre, an outpatient facility in Columbia, used IT systems for chronic disease management, the re-admission rate for congestive heart failure patients fell by 75% - a good example of success.

Report: Karen M Dente



Scan from Siemens Somatom Sensation 64. The user interface 'syngo' is the basis for the Soarian Cardiology

## PACS aids Czech cancer crusade

By Pavel Andres MD, Deputy Director of Medical Preventive Care at the Masaryk Memorial Cancer Institute



MOÚ is a member of several international professional organisations, often as the country's sole representative

The Masaryk Memorial Cancer Institute (Masarykův onkologický ústav – MOÚ) in is unique in the Czech Republic, for it covers all aspects of cancer care, provides medical training plus public health education, and participates in research. Around 180,000 outpatients and about 7,000 in-patients are treated annually.

Based on data from the national oncology register, the institute's specialists have developed a unique, complex prevention programme to cover all age groups and assure that those examined do not suffer a malignant disease. MOÚ's Department of Epidemiology and Genetics also attends to those with a family history of malignant disease.

Novel chemotherapeutic regimens and application techniques are frequently introduced here, to increase chances of recovery. MOÚ also participates in numerous international clinical trials, studying the effects of new cytostatic drugs and therapeutic combinations, e.g. chemoradiotherapy.

The latest cancer surgery (e.g. the sentinel lymph-node biopsy, radiofrequency ablation), and radiotherapy (e.g. adjuvant brachyradiotherapy for breast cancer) are also performed. The radiology department has a digital mammography, to more accurately diagnose breast lesions.

The pharmacy uses special equipment to dilute and prepare individual chemotherapy doses for each patient.

Without needing physician recommendations, patients from other facilities can have outpatient medical consultations to provide second opinions, as well as diagnosis and treatment discussions.

Currently, 25 modalities and 60 PACS workstations are connected to the institute's PACS, which was first launched in 2002 with two digital modalities (computer tomography, digital mammography) and four PACS workstations. A Communication PACS Server enables transfer of PACS images from other institutions, and an Educational PACS Server is used to archive interesting images for educational purposes.

## IT PLANNING AND IMPLEMENTATION

By Ing. Petr Vyskocil, the hospital's IT manager, and Dr Dagmar Zezulová, head of the radiology department

The 300-bed Svitavy County hospital was completely restructured in 2003-2004. The catchment area represents around 60,000 citizens. Transportation to the hospital is not always easy, so satellite hospitals in nearby towns were extensively used for standard RTG examinations. Thus the Svitavy hospital management decided to gradually employ a new technique of radiology data-sharing between these facilities. At the end of 2005 the first step towards full digitisation began. Indirect digitisation of skiagraphy, skiascopy and ultrasound departments was launched with the digital archive. Investment was c. CZK 8.5 million, which bought two CR systems (Kodak Orex scanners plus terminals and scanning cassettes), connection of all modalities with DICOM outputs into the PACS system, digital archive MARIE PACS (manufactured by OR CZ, s.r.o.) with 2.4 TB capacity with back-up feature and 24/7 international supervision, three diagnostic terminals with 3 - displays BARCO monitor

system special viewing software, and other network switches and accessory parts.

The next step is to connect both C-arms with DICOM output situated in operating and endoscopy theatres, videogastroscopy and video-colonoscopy, etc. Thus, the patient database will contain complete imaging documentation, from screening to final diagnosis. Digitised data are immediately available to all participating physicians via a secured network connection, and CDs with viewing software are supplied for patients or their own physicians. For other departments, or hospitals in the region, the system allows data viewing via secured internet connection, or transmission by e-mail in encrypted format.

The hospital aims to set up a digital system to enable sharing of all data in the database gained from radiology examinations. After that, all previous data for an individual patient will be accessible in one file for an attending physician to

review and assess the dynamics of the illness. The system is also extremely beneficial - the link between departments and/or hospitals enables a double-review of findings, to minimise diagnostic errors.

The next purchase will be multi-detection CT - not so necessary, but wanted, is double-photon densitometry in osteology diagnostics.

Inevitably these medical devices mean an overall reconstruction of the premises where the RDG department is based. So far, the initial stages needed an additional investment of CZK 3.2 million.

This revision brings changes to the current examinations schedule and physician/patient communication, all minimising time for examinations and diagnostic processes. The management strongly believes that, stepwise, patients will soon add to this new initiative, and effectively integrate potential examinations needed into their daily programme.

Details: [www.mou.cz](http://www.mou.cz)

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# Healthcare in Italy

The world's best health care, according to the World Health Organisation (WHO), is provided by France, closely followed by Italy (the USA, for example, ranks 37th in the WHO report). This says much for the sophisticated healthcare service provided in Italy, which is underpinned by an economy that is the sixth largest in the world. Italy spends about €3.2 billion on medical equipment.

The National Healthcare System (SSN) is the major healthcare provider, but in recent years the increase in the number of private healthcare facilities is greater than that of public hospitals. About 75% of purchasing of medical equipment is made by public hospitals; the private sector accounts for 25% of medical equipment purchases.

The Italian Constitution, amended in October 2001, granted ordinary regions exclusive powers on all matters not expressly the domain of central government. Additional legislation brought major changes to healthcare expenditure funding, which previously had been supported by central government. Regions now must provide minimum levels of healthcare services.

Prior to the new system the use of certain funds was restricted. At least 90% of local tax (IRAP), collected by the regions, had to be allocated for healthcare services funding. IRAP funds are no longer restricted and regions have greater flexibility to use those revenues for various expenditures, including healthcare services (intended to improve cash flow). Annually, a region must spend the same amount on healthcare as it did in the previous year. However, if a region improves the management of its healthcare services, it no longer has to devote 90% of the IRAP to healthcare. The concept aims to improve the level of healthcare services, partly via outsourcing, to reduce costs. If, on the other hand, a region does not have sufficient revenues for healthcare expenditure, it can raise local taxes.

# Health Optimum

## Hospital networking in Veneto

By Dr Claudio Dario



Downloading digitally signed clinical test results from home is not only possible, but 40% of users residing in the Treviso region in Veneto, do so regularly.

In eight elderly people's homes in the region, lab results are managed on site using simplified, standardised workflows. With new point of care testing (POCT) instruments, nurses carry out tests and receive results at a patient's bedside, reducing the turnaround time (TAT) from 24 hours to 10 minutes. This eliminates the transfer of samples and results on paper and saves cost, particularly when tests are carried out in remote areas.

Furthermore, in emergencies - thanks to tele-counselling - in 2005 about 160 inappropriate patient transfers from peripheral hospitals to centres of excellence were avoided, with calculated savings around €200 per tele-counselling case. The time that trauma patients spent in peripheral hospitals under observation was reduced, along with the waiting time for trauma patients needing neurosurgery.

This also is thanks to the European project Health Optimum (May 2004 - January 2006), which validated the re-engineering of

healthcare delivery through telemedicine - telecounselling, telelaboratory, virtual referral, telecare and shared clinical data in three European regions: Veneto, Italy; Aragon, Spain, and Funen, Denmark.

The basis of the success of Health Optimum was the network created including six centres of excellence (hubs) and six peripheral structures (spokes) in the Veneto Region for tele-laboratory and neurosurgical telecounselling.

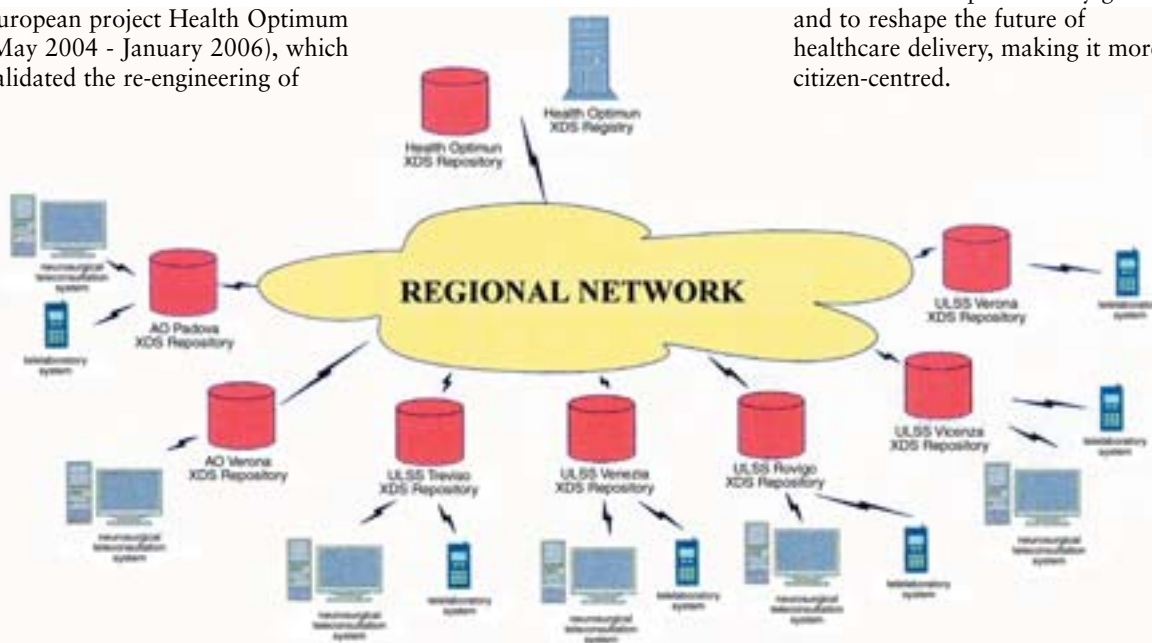
Meeting monthly, neurosurgeons, neuro-radiologists, laboratory technicians, IT experts and the project working party discussed and agreed on work to be done. Cooperation was paramount to fulfil the objectives set.

Physicians working on the Health Optimum circuit can count on consultations from neurosurgeons and neuroradiologists in any centre, at any time. Whether in a peripheral hospital needing a neurosurgical consultation, or from a centre of excellence needing a second opinion, the physician fills in

and digitally signs a standardised form that is sent with the CT images.

All data produced in these trials are stored in a common, regional, electronic health record (HER), which includes test results, medical reports, requests for second opinion and replies. The system is based on an IHE XDS profile (cross enterprise document sharing), and comprises two IHE actors, i.e. Document Registry and the Document Repository, to save and retrieve a set of documents and to query information.

Health Optimum was an important and essential stepping stone towards a more encompassing consortium - the 'Consorzio Telemedicina'. Set up in October 2005, it includes 22 Veneto healthcare structures. It is an organisational platform to diffuse best practices and define, analyse and develop common telemedicine semantics, and to facilitate the sharing of project results. Through this new consortium the essential aim is to offer healthcare providers a means to cope with an increasing demand for healthcare services with substantial productivity gains and to reshape the future of healthcare delivery, making it more citizen-centred.



# ITALY'S ELECTROMEDICAL

The ANIE Federazione, a member of Confindustria, is an association of 800 electronics companies operating in Italy. Within ANIE Federazione, the Electromedical Manufacturers Association represents the electromedical sector. Among its members are companies that produce, market and install electromedical equipment and offer a wide range of related services. Here, the federation reports on Italy's healthcare-related products, and their position in the global market

Today, the electromedical sector encompasses about 60 companies, employing 3,700 people and covering, for example, imaging diagnostics, ultrasound diagnostics, electromedicine, healthcare IT and clinical engineering services. In 2004, this market generated a turnover of €1 billion, 45% of which were realised in the services sector alone. 66% of the

entire production volume is exported. 10% of the electromedical technology turnover is reinvested in research and development (R&D), which ensures that the products reflect state-of-the-art technology and current market trends. Permanent innovation is the most important driver of medical technology and diagnostics, a case in point being information and communication technology, electronics, contrast media and medical-scientific knowledge.

Italian companies not only develop and market their own highly specialised products and services but also join forces with multinational corporations and contract dealers to explore global opportunities. They are indeed competitive, as the worldwide use of Italian medical technologies clearly demonstrates, be it X-ray diagnostics (remote-controlled, conventional radiology,

mammography), non-invasive diagnostics (ultrasound and dedicated MRI equipment) or electromedicine, particularly in cardiology.

### Excellence in X-ray diagnostics

Research, production, sales and technical support of X-ray equipment has long been a mainstay of Italian medical technology and these are renowned worldwide. The highly diversified product range encompasses:

- tiltable remote-controlled tables for conventional and digital radiology
- mobile x-ray equipment for surgery, orthopaedics and cardiology
- irradiators for haemoderivatives, cell cultures and research labs
- conventional and digital mammography equipment
- digital radiology systems and image processing
- control panels, x-ray tubes, scanning

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# Exposanità

25-28 May  
Bologna, Italy

Piero Proni,

Piero Proni, the fair's project manager, discussed developments for this year's event with Alfredo Spanò

## the 15th international healthcare exhibition

The fact that Exposanità maintains an exclusive position in its trade-fair sector is no doubt positive, but this simultaneously represents a great responsibility for the organisers who must satisfy increasing expectations of their customers. Responding to their requests, which are numerable, and being able to respond to visitors' expectations of quality, will be effective if the event focuses on administrators' interests.

Initial requests from exhibitors indicate that attendance at the next Exposanità will be very high: confirmations are on the rise, in many cases accompanied by requests for larger exhibiting spaces, which is significant; the will to invest in this fair acknowledges its usefulness.

Although the general theme - healthcare - is totally relevant, and all aspects and specialties are continuously dealt with, through an enormous number of initiatives Exposanità has expanded its exhibition surface to 25,000 sq.m, and counts on 20,000 visitors. It is now the second biggest healthcare fair in Europe, even though Italy does not hold the same rank in terms of expenditure.

However, Exposanità, which had been the physical reference point for the expression of government and regional healthcare policies, lost that dimension in past years. 'Despite much success,' Piero Proni, the event's project manager explained, 'our commitment must remain high. In the past, visitors have increased, though not as much as we expected. Considering the development of the exhibition, growth was not significant, particularly in terms of the historical nucleus of the exhibition: hospitals. Unlike other fair events we have organised, it is not easy to make Exposanità the main event in healthcare, the unique and essential opportunity for meetings and high-level situations. Currently, that is the main limitation of Exposanità: the overall

attitude to their professions by our administrators is lukewarm, with scarce response and inadequate realisation capabilities compared with our proposals.'

*The sector seems to promise positive development, so why are there limits to the involvement of the sector within the scope of the event?*

'One element of weakness is information: it isn't easy to directly reach healthcare administrators. Also aspects that concern the commercial mechanisms of the healthcare system have changed: economic choices are no longer simply linked to seasonal requirements. The advantage of holding the fair in May was that the budget was passed in December, the Regional assignments were established in January, with those for the districts in February, then investments were defined. Currently there is a shift from a financial to an economic approach, and that means planning investments for future years. A third significant factor is that the public approach also blights the private healthcare sector.'

'By contrast, during previous Exposanità fairs, the more evident, liveliest features came from more recently introduced sectors of activity: orthopaedics, rehabilitation and equipment for the disabled.'

'When consolidating and launching an event, an element that should not be forgotten relates to the transformation process that has characterised world fairs for some time: shows are no longer the place for commercial exchanges, but are an opportunity for meetings, direct relationships, and encounters among those who belong in the same world.'

*What actions have been foreseen to maintain the positioning, respond to expectations and reduce weaknesses?*

'First, to ensure a full overview of the healthcare sector. All fields relate to the competence of a single manager, but refer to many structures, which are also homogeneous

and interact among themselves. Any growth in various segments and ensuring their presence may represent a stimulating element and contribute to overall growth. That's why we are committed to strengthening the nine existing halls and launching a tenth, to present products, technologies and solutions for dental care. If Exposanità wants to be a thoughtful fair, it must undertake new challenges and lead the way in new directions,' he stressed. 'I believe it is ethically correct, economically sustainable and also profitable if public healthcare offers a dental service.'

'In addition to featuring a traditional exhibition and congress, our initiative proposes a contribution in implementing a mechanism by which the local units and hospitals will find incentives to reinforce existing services or add new departments to their structures.'

'A second pursuit Exposanità intends to follow is that of kindling collaboration with visitor associations, to involve them more aptly in the event. A more rational re-organisation of the pavilions, and a more compact setting compared with the past, will enable visitors to move around more easily; in addition to the main entrance, in Piazza della Costituzione, there will be a new direct entrance from in front of the large Via Michelino parking lot; exhibitors' parking on the pavilion roof and heliport, and

escalators that make moving easier for people, all these will be further elements aimed at the overall growth of the fair, to make it an all round reference point for healthcare in Italy.'

The halls will showcase medical innovation & technology, including equipment and supplies for diagnostics; IT and telemedicine;

the handicapped, orthopaedics, rehabilitation, healthcare humanisation; accident & emergencies; dental and veterinary surgeries. Also, in the Friendly healthcare section, projects and realisations for quality in healthcare services will be reviewed. In addition, a 'Silver Years' section will offer ideas, products and services for our aging populations.



Gruppo Tecniche Nuove spa



## EXPOSANITÀ

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**HOSPITAL**  
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**MIT**  
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**HORUS**<sup>(\*)</sup>  
Handicap, Orthopaedics, Rehabilitation, Healthcare Humanisation



**DIAGNOSTICA 2000**  
Exhibition of diagnostic equipment and products



**EMERGENZA SANITARIA**<sup>(\*)</sup>  
Exhibition on sanitary emergency



**SISTEM**  
Exhibition on health care informatics and telemedicine



**ANNI D'ARGENTO**  
Ideas, products, and services for the third age



**HEALTHY DENTAL**  
Products, technologies and solutions for the dental health



**SANITÀ ANIMALE**  
Organisations, technologies, solutions for animal health

## TECHNOLOGY

equipment, ionisation chambers and generators

X-ray diagnostics covers applications from dental X-ray equipment to sophisticated digital diagnostics systems for hospitals. In addition, the Italian electromedical industry produces components for foreign manufacturers.

### Highly acclaimed non-invasive diagnostics

There is one area in which the Italian medical industry particularly excels: ultrasound imaging. Italian ultrasound equipment enjoys an excellent reputation - so it comes as no surprise that the companies hold a significant market share worldwide.

Italian companies also play a major role in diagnostic technologies and MRI. Moreover, high-tech IT and communication systems are being developed and modules as well as

integrated solutions are installed throughout the healthcare market.

### State-of-the-art electromedicine

Cardiovascular equipment is another specialty of Italian companies, reflecting many years of research, development and production experience.

Electrocardiography products and systems monitoring the patients' vital functions can transfer wireless data and integrate them with other clinical patient data, helping to advance healthcare IT.

### Opportunities for partnerships on international markets

Hospital modernisation, the strengthening of medical care networks and the introduction of new diagnostic procedures open up new perspectives for the biotech industry.

Italy plays a pioneering role, thanks to its ability to offer excellent value for money. The development potential of Italian companies outside Italy has to be assessed and explored, particularly if such partnerships create a win-win situation and are strategically relevant. Due to its high specialisation in certain technology sectors the Italian electromedical industry closely watches international markets and is prepared to enter into promising partnerships or agreements for industrial activities, trade and distribution or staff development - a fact that has a positive impact on the educational and professional level of physicians and on the public healthcare system.

Contact: [www.anie.it](http://www.anie.it) - [asselmed.segreteria@anie.it](mailto:asselmed.segreteria@anie.it)



Bologna Fair District

**25 ■ 26 ■ 27** All theme-based halls<sup>(\*)</sup>Horus & Emergenza sanitaria **28** may 2006

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