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VOL 21 ISSUE 3/12

JUNE/JULY 2012

## Greek grief...

In the 10 million or so Greek population, life expectancy is 76.85 years (males) and 82.06 (females) – among the highest in OECD countries.

The WHO ranked this country's healthcare among the best in the world, with related costs amid the lowest in the EU. Free or low cost healthcare services, including maternity care, laboratory services, medical devices, transportation, and more, are available for residents (and families) who contribute to social security.

However, with rural healthcare troubles, many called for healthcare reform and EU funding aimed to upgrade the healthcare system -- to include mobile medical units, new care facilities, better A&E units and more top end medical equipment.

So, what happened to the country's heavily subsidised medications – with just 25% of a prescription cost charged to the patient – and why are people with chronic illnesses facing dire shortages of vital medicines?

Greece has seen a five-year recession. Commercial pharmaceutical firms claim that the EOPYY, formed only months ago to run the state's main health insurance fund, owes them an accumulated sum of over €540 million -- and estimates indicate the state's debts to such firms will soon top €1.5 billion. Conclusion: Drugs must be paid for up front.

As EH goes to press, Antonis Samaras, the country's new Prime Minister, is recovering from detached retina surgery, so will not be attending the forthcoming Brussels bailout summit. Additionally, Finance Minister-designate Vasilios Rapanos, has resigned due to serious ill health. Finance Minister Professor George Zaniaras, for two years one of Greece's key bailout negotiators, was also hospitalised with chest pains during October's EU summit.

As of now, Greece has only 10 state pharmacies that provide very expensive drugs free. Recently, when the Greek caretaker health ministry coaxed pharma firms to supply some of the most costly medications to EOPYY pharmacies, there was a stampede of patients. For many there was nothing to gain.

Queues at pharmacies are now common, the patient's stories harrowing. To help patients, one region's association of pharmacists even opened a charity bank account for donations to buy costly drugs.

There is no foreseeable early cure for today's entire Greek tragedy -- unless mercy and charity miraculously step in.

Update: Brenda Marsh

# Surgeons 'fire a warning shot' over Germany's hospitals

## Are surgeons still opting for surgical procedures solely for medical need – or are economics forcing their decisions?

That vexatious question, posed at the 129th Congress of the German, was spurned at the outset by Markus W Büchler MD, President of the Society and Medical Director of the Department of General, Visceral and Transplant Surgery at University Hospital Heidelberg. 'We surgeons must campaign for surgery that is purely orientated around the patient and his illness.' Focusing solely on the patient's well-being is a noble objective when many hospitals are struggling for survival, EH correspondent *Susanne Werner* reflects: 'In the battle to attract patients, hospital managers are involving consultants by offering them lucrative contracts'

For many years German hospitals attracted considerable criticism, with experts deeming their numbers to many and lengths of stay too long. Reforms were meant to alleviate the problems and so, in 2003, the Diagnosis Related Groups (DRG) System was introduced, essentially altering the way hospitals are reimbursed for their services into a flat rate per case system.

Meanwhile, a fifth of hospitals have closed over the last 20 years, with the loss of 150,000 beds. Additionally, the average length of patient stay has decreased from 14 days (1991) to 7.9 days (2010).



Markus W Büchler



Joachim Jähne

Nonetheless, the hospital market is far from recovered: 'Around every fourth hospital in Germany is in debt,' Professor Joachim Jähne MD pointed out.

'The investment backlog is around €30 billion.'

As Head of the Clinic for General and Visceral Surgery at the Diakoniekrankenhaus Henriettenstiftung in Hannover, and the third DGCH Vice President as well as the hospital's expert on the debate around economic pressures and viability. From daily experience he knows that German hospitals must constantly negotiate the balance between economic

necessities and responsible, ethical patient care. However, many establishments struggle with this balancing act. 'In order to work efficiently from an economic point of view many hospitals feel impelled to increase their patient numbers,' he says, referring to the statistics. According to federal healthcare reports, 1.2 million more Germans receive hospital treatment now than ten years ago. 'It is questionable whether this increase in case numbers is in fact always based on justifiable medical indications or whether decisions are actually made for financial reasons due to the enormous financial pressure on hospitals,' he reasons.

**40-50% employment contracts contain bonus clauses**

DGCH presidents Professors Büchler and Jähne are particularly adamant that surgical consultants must not let themselves become

*continued on page 2*

## EU healthy life expectancy Swedes live longest; Lithuanians 12 years less

Every year since 2005 the number of years people have enjoyed without suffering some form of disability has been computed in every EU Member State. The European Joint Action on Healthy Life Years (EHLEIS) project, led by France and coordinated by the French National Institute of Health and Medical Research (INSERM), has produced some interesting statistics. EH Paris correspondent Annick Chappoy reports

The prevalence of disability is measured by a general question on activity limitations known as the GALI question (Global Activity Limitation Instrument): *To what extent have you been limited for at least six months, due to a health problem, in the usual activities people do?*

In 2009, men in the 27 European countries could expect 61.3 healthy life years (HLY), representing almost 80% of their 76.7 years life expectancy at birth; women could expect 62 HLY, 75% of their 82.6 years life expectancy at birth, according to the latest figures released by the French Ministry of Health.

In 2010, Sweden showed the longest life expectancy (79.6 years) for men in the EU but Lithuania presented the shortest (68 years),

*continued on page 2*

HLY (Healthy Life Years) is an important European policy indicator and was selected as part of the Lisbon Strategy (2000-2010) to assess the quality of life and functional health status of Europeans. HLY is also part of the European Community Health Indicators (ECHI) and was set as the overarching target of the first partnership of Innovation Union (research and development component of the new strategy Europe 2020): the Active and Healthy Ageing Partnership, the target being an increase in HLY in the EU of two years by 2020.

HLYs are obtained by applying the prevalence of disability observed in the general population to a standard life table to distribute the years lived into those lived with disability and those lived free of disability.

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# The 2012 China International

Large crowds of medical professionals and healthcare products manufacturers converged on China's boomtown Shenzhen for the recent 2012 China International Medical Equipment Fair (CMEF). Simultaneously held conferences included the China Integrated Medical Imaging Summit (CIMIS) and the Annual In-Vitro Diagnostics Summit China. **Michael Reiter reports**



Held bi-annually, CMEF focuses on IVD, imaging and more

## Imaging

Speaking at CMEF, Professor Tian Jiahe, Director of the Nuclear Medicine Department, Chinese PLA General Hospital, pointed out that there is really no difference between PLA and civilian hospitals; civilians will also be treated at military hospitals. Uptake of CTs is rather high in China, even in smaller hospitals, he added. MRI is

progressing and top hospitals will have several devices. The country has around 160 PET/CTs, with an expected 200 by end of 2012.

PACS are well established in class III hospitals and now also embraced by care providers at the other levels; just as EMRs, the government will subsidise investment.

Although Chinese manufacturers are catching up, the professor believes it will take another 10-15 years to reach the technol-

Quality and support are key success factors for Chinese medical equipment exports



Significantly driven by subsidies from the national and provincial governments, the country's healthcare expenditure continues to rise. As in preceding five-year plans, the current plan includes improved access to, and quality of, medical services among its top priorities. This means heavy investment in imaging and laboratory technology as well as basic ICT – particularly for rural care providers.

CEIC, Deutsche Bank Research, MOH and CICC statistics reveal that total national healthcare spending increased from RMB 476 billion in 2000 to RMB 2,222 billion in 2011 (expected), and government spending on care jumped from RMB 49 billion to RMB 535 billion in 2011 (expected). Subsidised basic health insurance is supposed to reduce saving for out-of-pocket expenditure and foster domestic spending, a key growth and stability factor for China's economy.

## Surgeons 'fire a warning shot' over Germany's hospitals

*continued from page 1*

involved in economic purposes and objectives. This means they should have the integrity to object to operations that they do not consider medically necessary but are being scheduled due to economic pressure. However, adhering to this ideal is unlikely to be always easy. After all, according to Prof. Jähne, around 45-50% of employment contracts now contain bonus clauses, the objective of which is an increase in case numbers. Prof. Büchler: 'When hospital beds must be filled and the performance-oriented contract of a consultant and head of department impacts on hospital income then there will be individual cases where a bed on a surgical ward will be occupied by a patient who possibly might not really need the surgery.'

This, he adds, puts a strain on

the doctor-patient relationship and causes conflicts with the objective 'Surgery in Partnership', the slogan for DGCH meeting, where bonus regulations linked to increasing case numbers were widely discussed. 'The DGCH recommends that these types of contracts should not be entered into,' Prof. Büchler stresses. 'Surgeons will remain credible if they diagnose an indication for surgery based purely around the likely benefit to the patient and if they resist those wrong incentives enter the healthcare system.'

He also criticises the German Hospital Association, which provides a respective clause in its standard contracts. 'We object to these standard contracts. The responsibility for economic risks must not be shifted onto the consultants. We would prefer that employment contracts contain other objectives, such as the introduction of risk management systems.'

Next to the increasing patient

numbers, hospitals sometimes also try to make more profit through their choice of surgical technology. 'Patients are then operated on using the very latest procedures, which, although not always more effective than conventional solutions, are often a lot more lucrative from a financial point of view,' he explains, giving examples such as unnecessary procedures for hernias or arthroscopies.

However, despite all austerity mandates and ethical appeals Prof. Jähne is certain that healthcare in Germany, along with Switzerland, is in the lead Europe. Nonetheless, doctors and their professional associations must still face up to the serious balancing act between economic efficiency and patient benefit. 'The debate at our congress was intended to encourage this. We wanted to fire off a warning shot and emphasise that the German healthcare system is moving in the wrong direction if it concentrates purely on economic reasons.'

## EU healthy life expectancy

*continued from page 1*

a gap of almost 12 years. Swedish men also have the most HLYs (71.7 years) with men in the Slovak Republic having the least (52.3 years), a gap of almost 20 HLYs.

Sweden also has the highest number of years lived without disability (HLY/LE) in 2010 with 90% of life expectancy without limitations in usual activities. Men in the Slovak Republic on the other hand spend the lowest proportion without disability (73%) – a difference of 17%. This suggests that, for men, the longer the life expectancy the greater the proportion lived without disability.

In the short period 2008-2010 and despite its low life expectancy and HLY for men, Lithuania experienced the largest gain in HLY – almost three years – whilst the Netherlands saw the largest decline (a loss of 1.3 years). Thus there is also a tendency for health expect-

ancies in Europe to converge, since the gap between Lithuania and the Netherlands fell by more than four HLY in just three years.

## Better health outcomes for women

In 2010, France and Spain have the longest life expectancy (85.3 years) for women in the European Union, but for Bulgaria the shortest (77.4 years), a gap of nearly eight years. In 2010 Malta has the highest HLY (71.6 years) for women and the Slovak Republic the lowest (52.1 years), the gap being the same as for men, at almost 20 years.

However, for women in 2010, it is in Bulgaria that the proportion of years lived without disability (HLY/LE) reaches its maximum with 87% of life spent free of activity limitation. This contrasts with the Slovak Republic where women spend the shortest proportion (66%), a difference of 21 points. The results for Bulgaria show that a short life expectancy combined with a low prevalence of activity limitation leads to a large

proportion of life expectancy apparently free of disability.

In the short time period 2008-2010, it is again Lithuania that experienced the largest gain in HLY in women (2.4 years), confirming the observation made for men, whilst Finland saw the largest decline (a loss of 1.7 years). As in men, women's health expectancies show some convergence.

## Men and women differ

Whilst the gap in life expectancy between men and women is around six years (5.9 years) in the European Union in 2009, the gap in HLY is less than one year (0.7 years). Thus the proportion of years lived without disability is five percentage points lower for women compared to men (75% vs. 80%).

In 2010, Lithuania has the largest gap in life expectancy (LE) between men and women (10.9 years) and Sweden the smallest (4 years). Lithuania has also the largest gap in HLY (4.6 years) and the Slovak Republic the least (0.2 years). When

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

# Medical Equipment Fair

ogy level of global players. In the interest of patient care, collaboration between European and Chinese hospitals should be intensified, in particular in translational medicine.

## In-vitro diagnostics

The lab market in Europe, the USA and Japan is mature, with low to mid single-digit growth, explained industrial analyst Greg Stutman, Vice-President of Boston Biomedical Consultants. Austerity measures in economically pressed EU member countries are slowing investments

explained Dr Myers, Vice President of Programs and Policy, American Association for Clinical Chemistry AACC.

## Exhibition highlights

A kaleidoscope of Chinese and international goods were on show. Some domestic equipment manufacturers, such as Weigao (Wego), are beginning to look at exporting. For imaging manufacturer Shenzhen Anke, Europe is not yet a focus. China Sinopharm, a large distributor of selected quality prod-

ucts, is interested in increasing volume to the continent, particularly the Eastern countries.

Imaging and IT manufacturer Neusoft is a top player in CT, MRI, and DR in China, with a 64-slice CT launched and heavy investment in PET/CT development; more competitive products will be offered in Europe, predicted Jack Guo, head of European business.

Product quality and focus on support are among key strategies for Landwind's European plans, which include OEM and own branding;

the company's offering spans from IVD and imaging to PACS and IT.

MRI maker Ningbo Xingaoyi Magnetism currently exports to 16 countries (e.g. Poland).

Disinfection equipment manufacturer Shinva works with an Italian partner for Western Europe and with distributors for Eastern countries.

Yuyue exports glucose meters, oxygen generators and more to Europe through dealers, focusing on Russia.

Today, patient monitoring and life support, ultrasound and IVD are Mindray's main products, said David Yin, Managing Director for Europe, who, at CMEF, was show-

ing the firm's 3-D haematology devices, a high-speed biochemistry analyser, top-level touch-screen colour Doppler machine and an end-to-end operating theatre solution reported to integrate seamlessly and display information from digital imaging and patient monitors to infusion pump valves on a collaboration platform. Mindray is, he pointed out, well positioned for further growth in Europe, with its combination of USA and European R&D and engineering as well as manufacturing in China and close contact to hospitals locally.

\* CMEF Autumn 2012: 18-21 October (<http://en.cmf.com.cn>).



Tian Jiaye calls for closer collaboration between European and Chinese care givers

and capping unnecessary lab tests. In France, with its roughly 4,000 labs, a consolidation process will drive automation and integration, as well as price cuts, he explained. Healthcare reform uncertainty is halting investments in the USA, while Japan favours local players, he added.

Trying to offset these difficult trends, global players aim to profit from double-digit lab market growth in emerging regions where, apart from cardiac and cancer, diabetes propels expansion. Local firms also strive to gain a market share in those regions, e.g. in India and particularly China. There, local manufacturers are active in chemistry, including hardware and reagents; haematology, rapid tests, Elisa, urinalysis, and diabetes. Those companies sell domestically and to other emerging markets; some have achieved CE – easier to get than FDA; in EMEA, they distribute to Eastern Europe and the Middle East, Greg Stutman explained.

Chinese manufacturers – roughly 350 – are maturing, and they emphasise hardware and reagent quality and gain certification, market researcher Nat Whitney pointed out, adding that support is a key challenge to increasing Chinese sales to places such as Europe.

What are future IVD trends? It will be a key lab vendor differentiator in the future, he believes. In optimising quality and patient safety, harmonisation of test results will play a key role; a global initiative is coming,

these two measures are looked at in combination, Portugal has the largest gap in the proportion of years free of disability (HLY/LE) between men and women at almost 9% and Bulgaria the smallest gap at around 3%.

However, in all European countries women live longer than men and spend a greater proportion of their lives with disabilities. Differences in HLY between men and women are much smaller than differences in life expectancy and, in seven cases out of 27, men experience slightly more HLY than women. This is indeed the case in 2009 for Belgium, Denmark, Italy, the Netherlands, Portugal, Spain and Sweden, a significant number of western European countries.

France, which has the longest female life expectancy in 2009, occupies the 10th place in terms of HLY, illustrating a case where long life does not coincide with a low report of activity limitation. French men occupy respectively the eighth place (out of 27 Member states) in terms of life expectancy and 11th place for HLY with respect to 2009 values.

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Precision for health

The World Health Organisation, which insists that every human being is entitled to good health, defines health as a state of complete physical, mental and social wellbeing, not merely the absence of disease or infirmity. It also defines health inequalities as differences in health status or in the distribution of health determinants between different population groups. This could

should be informed more about his/her medication and treatment and be educated in seeking hospital care only when necessary to reduce both the logistics and financial burden in that sector, and to use community care as much as possible. 'Information about their treatment should be made accessible to them,' John Dalli emphasises. 'They have the right to choose by whom and where they are treated, and this stresses the

elderly patients requiring long-term 24/7 care. Much effort is being channelled into community care, both to make healthcare more easily accessible and to reduce the load from the general hospital. In fact, community healthcare comprises four main primary healthcare clinics and a number of district clinics and geriatric homes that offer care and support to more independent elderly citizens. For decades, geriatrics has

# Perspectives on healthcare inequality

For some, 'life's a bitch' with unfairness and suffering an integral part of it. Many more people actually do not expect any better than the barrenness and misery in which they live, EH Malta Correspondent *Moira Mizzi* reflects. 'Inequality in quality of life between different factions of society thus goes beyond accessibility to a necessary modality but also reaches out to encompass the way of thinking and being at an individual as well as societal level. Health is no exception and inequality in health is a bleak reality even in the European Union, despite being one of the richest and most developed continents by today's standards'



John Dalli

held a pole position and geriatric patients have always been offered the spectrum of healthcare necessary, whatever their age. Oncology and mental health are also being boosted – in fact the oncology department will open a facility in the general hospital in 2013. Patients in Malta are also entitled to free medication for most chronic conditions and citizens at the lower society stratum receive all medication free after rigorous means testing.

One major challenge to any health system is ensuring that the mass of patients receive the best care. In this, Malta is no exception and the fact the service is provided free further adds to the intricacy and burden that surround this issue. A lot of effort has also been made to strengthen community care and trying to educate the public to use the system responsibly. In fact long waiting lists, one of Malta's main healthcare hurdles, have been counteracted by working longer hours in out-patients and radiology departments and doing extra elective surgical procedures – even on Sundays.

Educating the public has proved a tougher nut to crack. Misuse of the A&E for minor ailments is still rampant as is a flagrant abuse of free medication by some patients.

The Maltese healthcare story gives one perspective of the ways in which health inequality can be tackled and the hurdles faced. Although rendering the sterling services accessible to everyone is a commendable way of bridging the gap, misuse of the system due to lack of public education and unsustainable practices from some of the staff can itself lead to a lack of accessibility of some services.

Bridging inequality in any healthcare system involves sustainable practices and an overall mind-set change from patient to healthcare professional to administrator, not just a fair distribution and accessibility of services. Our health needs to be a shared responsibility between the individual and his society not just an unquestionable right to be passed on by our legislators and administrators.

importance of the set-up of cross-border healthcare.'

To reach sustainability, he insists, health systems in every EU Member State need to analyse what is happening today, shift to new ways of working and push to change the mind set in delivering health. 'We need to move caring out of hospitals and into the community because hospitals cost a lot of money,' he explains. 'Working in teams could also support better and more sustainable health systems.'

The Commission's role is to assist all Member States to draw up the necessary structure, hopefully to curb abuse, and to propose the financial systems to health projects (2014 onwards) to support Member States to invest in health systems.

Malta is the smallest EU Member State. With about 450,000 inhabitants, far fewer than those in most capital cities of other EU Member States, this minuscule Mediterranean island has a unique healthcare system – it is the only member state where all healthcare is free to all its citizens and registered long-term residents. The service is funded through general taxation and overseen by the Ministry of Health, headed by psychiatrist Dr. Joe Cassar as Health Minister. Despite its size and limitations in resources at many levels, the standard of care is rated as one of the best in the EC, as regularly seen in statistics from international and official organisations such as the WHO, EUROSTAT and OECD.

Malta's has one general hospital, housing all hospital-based care excluding oncology and dermatology; another hospital with oncology and dermatology departments and a genito-urinary clinic; a geriatric rehabilitation hospital and a nursing home for

entail differences in mobility between the older and younger generation, in mortality rates between social classes, or indeed in healthcare accessibility for financial reasons or logistics. In a nutshell, even health inequality could be looked at from physical, psychological or social perspectives.

Currently the EU faces three well-known challenges to health quality and sustainability: demographic changes, including patterns of population ageing; recent pandemics, major physical and biological incidents and bioterrorism; rising obesity, smoking, alcohol, drugs and sex habits, especially of young populations, not to mention the rise of mental ill-health at the workplace. Last but not least, the recent technology revolution has changed our healthcare systems radically, at a public health level and at the bedside.

Inequality in health was one of the first issues tackled by the then incoming Health Commissioner John Dalli, who said '...the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, not a mere expenditure or cost to society, but an investment for growth and thus money spent on health is money well spent'. He insists that, the 'best way forward is thus to improve health systems, making them as sustainable as possible and that involves a mind change across the board; we need innovative and sustainable health systems'.

He cites two ways to progressively change the mind set. Primarily, the patient should be supported to be more empowered to care for his own health and to seek the best in the field for his treatment, even if this is outside his homeland. The patient also

Specialists in palliative medicine agree that in over 90% of tumour patients pain can be alleviated with modern medication and unnecessary suffering can thus be avoided. The fact that this doesn't always happen has different reasons. There is a lack of care because of missing structures, or a lack of coordination and therapy concepts. Patients may, for instance, have the medication prescribed by their GP changed on hospital admission or discharge.

Due to increasing life expectancy the occurrence of chronic pain, as well as of tumorous diseases and the associated severe pain, is also on the increase. In addition, in Germany the recommended

In Germany's first 'Pain-free City', Muenster in Westphalia, an Action Alliance of all those involved in municipal healthcare, sponsored by a pharmaceutical company, certified the first qualified pain nurses. Head of the project, Professor Jürgen Osterbrink of the Paracelsus Medical Private University Salzburg thinks it is vital for all occupational groups involved in treatment to communicate and cooperate. 'With the changing structures in hospitals pain management must also change. All societies agree that a switch to generic products is likely to be damaging. The guidelines require there to be an agreement between doctors, pharmacists and nurses.'

## Save money: improve pain care in hospitals

Only individualised pharmacotherapy can maintain the quality of life for patients suffering from severe pain – and the benefit for the healthcare system is a resulting reduction in costs. Report: *Anja Behringer*

approach for the assessment of pain in case of dementia (officially described in the BESD guidelines) does not actually make it possible to recognise pain in a large number of patients with cognitive limitations.

Therefore, further studies are necessary to improve pain diagnosis for this group of patients and therefore to optimise the nurses' capability to act, from the point of first intervention to subsequent pain reduction.

61.6% of anaesthetists, 53.6% of nurses and a quarter of registrars and consultants are aware of the hospital-specific critical values for pain therapy



Jürgen Osterbrink

Gerd Mikus

Treatment should be based on effective medication rather than guided by cost. Successful treatment reduces costs because it shortens the patient's stay in the hospital. Investment in doctors' and nurses' training is a prerequisite, he urges.

The professor also states that hospitals need to be well prepared for their patients' requirements and the increasing occurrence of multimorbidity when it comes to pain therapy. Asked about the situation in other European countries he explains: 'In Switzerland, The Netherlands and Scandinavia there is a longstanding tradition in this field amongst hospital nurses. We also need to achieve such a high level of care in Germany.'

At a Pain and Palliative Care Day in Limburg, organised by pharmaceutical company Mundipharma, doctors from the German Pain Association (DGS) and the German Pain League (DSL) pleaded for the implementation of the recommendations listed in the newly introduced tumour pain guidelines.

According to those, morphine is no longer the medication of choice, but the guidelines urge the use of beneficial modern drugs and also advise against changing strong opioids without medical reasons.

Professor Gerd Mikus, clinical pharmacologist at Heidelberg University Hospital, reported that the data on morphine use worldwide – Germany, England, France, Canada and the USA – as established by the International Narcotics Control Board (INCB), indicate a reduction in use. Compared to other strong opioids it has the smallest scope of application and, apart from more side effects, has an 'active metabolite, which, in case of limited kidney function, can accumulate'.

It was concluded that only individualised pharmacotherapy can maintain the quality of life for patients suffering severe pain. The benefit for the healthcare system is the resulting reduction in costs.



Nurses can now gain qualifications in pain management

adaption. Almost half (44.7%) of all analgesics used in hospital are non-opioid medicines (WHO Level 1). Strong opioids (WHO level 3) make up 35.2%. As recommended in valid standards and guidelines, strongly effective analgesics should be used at an early stage as they alleviate pain more effectively. The administration of pain relief should also be improved prior to situations likely to increase levels of pain, such as rising, being moved, or walking. Other illnesses and concomitant medication must be taken into consideration to avoid undesired interactions.

No two types of pain are exactly the same. Pain resulting from tumours and pain experienced after surgery require different kinds of medication. Each change of opioid medication has side effects, which is why the drugs should be appropriately matched.

All patients have individual reactions to the drugs administered and need to be carefully adjusted to the analgesics. This treatment requires a lot of time and knowledge. Doctors still don't receive the appropriate training in the treatment of pain, which is why this part of therapy is being handed over to the newly created position of 'Pain Nurse'. On doctors' written orders, these nurses have permission to administer analgesics – which obviously should be in stock – to patients within half an hour to customise the pain therapy to a patient's individual needs.

# The new Alder Hey Children's Hospital

## Rising from a stark old workhouse to a heavenly landscape of the future

Britain's many new hospitals are more than brave architectural statements – they consistently win awards, inspire others and, above all, improve life for all who use them. Now another stunning creation is about to rise.

Despite beginning life as a workhouse for the poor, and having to grow in bleak, outdated buildings, in its near 100-

The British architects BDP, who won the contract, did that and more. 'Central to our idea was ensuring that the majority of rooms (whether for children or staff) enjoy park views and that gardens and terraces are equally accessible to all.'

Further, the Trust's brief emphasised coming up with 'a unique concept recasting Alder



Designs inspired by and for children

The sloping walls will be alive with plants, overlooked by large plain glass windows in each of the three clinical 'fingers'



year history Alder Hey Children's Hospital in Liverpool not only became one of Europe's busiest children's hospitals but also an esteemed Centre of Excellence.

In 2016 the hospital will gain yet another international accolade – as one of the most splendid hospitals in the world. For it is then, in four years' time, that the Alder Hey Children's Health Park is expected to open its doors to a stream of young patients.

Three open 'fingers' will radiate out from the atrium concourse – the distinctive entrance space that forms the hospital's public hub – all rising above a beautifully landscaped undulating park as if a natural continuation of the gently flowing landscape. Those fingers of clinical space, alternating with gardens, will also have walls vibrantly alive with plants.

To achieve this exciting result, the Alder Hey Children's NHS Foundation Trust issued an interesting brief: 'Create a hospital that engenders well-being and raises patients' and visitors' spirits by adding to their quality of life; integrate the hospital and park for the therapeutic benefit of children, their families and staff flow.'



new hospital will have 60,000m<sup>2</sup> of floor space, 270 beds, including 48 critical care beds for ICU, HDU and burns patients.

Sixteen operating theatres, four for day-case surgery and 12 in-patient theatres, are also planned.

Each of the six 32 beds standard wards will have two four-bed bays and 24 single rooms on each ward. Thus the majority of children will have their own rooms with en-suite facilities, improving patient and family privacy and dignity. The

### The fusion of people and places

As a main board director and architect at BDP, **Benedict Zucchi** leads the firm's healthcare studio in London, where he designs hospital projects and is responsible for a 30-strong team of architects. He was project director for the award-winning Royal Alexandra Children's Hospital in Brighton, and leads the Alder Hey project. 'Our design concept,' he concludes, 'has not only captured the imagination of children, parents and staff but has also demonstrated itself as a flexible and effective approach.'



Benedict Zucchi

Asked what his biggest personal influence might be, he said: 'Italy, and the atmosphere of its towns and landscape, where the human-made and the natural fuse in the most wonderful and unexpected ways.'

**Andrew Smith**, head of healthcare at BDP, believes that 'trading places' with those who use hospitals, is critical when designing a hospital – i.e. thinking oneself into their shoes from the time they leave the bus or car and move into and around a hospital. If you take the fly-through BDP's designs for Alder Hey, you'll no doubt get the feeling: <http://www.youtube.com/watch?v=iyCOAhVQ7KI>  
Update: Brenda Marsh



Hey as the *Children's Health Park* and creating 'a hospital without precedent', including the latest thinking on infection control, patient dignity and privacy, segregation of patient, clinical and facilities management flows and technological advances.

Every year, despite its

antiquated buildings, Alder Hey provides 275,000 episodes of care to youngsters suffering, for example, cancer, heart, spinal and brain diseases. One delightful aspect of the new architecture was to involve present and past child patients in the design. Louise Shepherd, Alder Hey Chief Executive, explained that a drawing from one of those children inspired the new concept. 'We felt it was really important to design this hospital with the help of our children who have been involved throughout the development phase. They have helped our bidder to get the design right for children and young people.'

To be built in Springfield Park, next to the present hospital site, when the new Alder Hey is complete the old buildings will be demolished and that site will become a replacement park. Thus the new hospital will be right in the heart of the grounds, surrounded by green space.

Costing \$237 million for the construction and demolition, the

special design also ensures that the majority of bedrooms have park views and the children will have easy access to play areas on and outside their wards.

A 150-seat restaurant will provide catering, and the 1,200 spaces multi-storey car park raises currently available spaced by 200).

### IN THE NEWS

#### BDP wins Copenhagen's Bispebjerg Hospital Masterplan award

Chosen from over 50 international entries, the British firm BDP has won the masterplan competition for Denmark's new Bispebjerg hospital and psychiatric facility, an appointment to be shared with Danish architects TKT and Rambøll Danmark.

The design, which incorporates beautiful, heritage-listed pavilions and the green gardens, places the general hospital entrance area in the middle of a large, green heart from which staff, patients and visitors will radiate into the various hospital departments.

Regional Councillor Lars Gaardhøj, chairman of the project's political reference group commented that the BDP proposal was favoured because it '...plans the hospital as a city with four different quarters, each with its own distinctive character; because the green and recreational areas are an important part of the plan, and because a simple and consistent traffic solution ensures calm, accessibility and orientation within the site.'

'In our view, Danish hospital projects are the best in the world due to their high design aspirations,' observed BDP's Andrew Smith. 'The project at Bispebjerg is a unique opportunity to develop the parkland site whilst respecting and learning from the original patient centred designs.'

The hospital today



# Molecular diagnoses will become

Molecular diagnostics is one of the most important technological advances in clinical diagnostics, seeing the €3.6 billion market grow 10% in constant currency (CC) in 2010 and predicted continual growth well above the diagnostic industry rates. The recipe for success in this field lies in three critical components: core technology, automation and menu. During our interview with Marc Meyer, the European Marketing Director of Diagnostics for Beckman Coulter Eurocentre, about his firm's perspectives and prospects in molecular diagnostics



Marc Meyer

When it was pointed out that, Beckman Coulter has historically operated outside the core laboratory and the firm's approach and was questioned, Marc Meyer said that the company is 'taking the complexity out of molecular testing. We have a different approach from our main competitors – providing a fully automated, random access analyser for use in the routine lab\*. It brings the whole process closer to the patient.

'This will change where, when and how labs perform molecular diagnostics – and our solution addresses those key marketplace demands of technology, automation and menu. The driver was our understanding of what customers told us they wanted – to build an automated system that was fast and easy to use, making it as simple for them to operate as, for example, the DxI 800 Immunoassay System. Suitable for

a medium- to high-volume lab, the molecular diagnostics systems had to fit into the routine lab workflow processes, freeing up valuable staff resources and delivering a better service to patients.

'We have made this possible by integrating the nucleic acid extraction, purification, and entire real-time PCR testing process into one, automated, stand-alone system. And we have combined this with primary tube sampling and ID, random access, on-board refrigerated reagents and automated sample processing; as well as the ability to calculate the result, offer auto-verification and upload of results to the hospital LIS.

'Our offering starts with infectious diseases and blood virus testing and will expand the menu capability as we have done in immunoassay.'

What impact does he see this having on hospital budgets and lab running costs?



Molecular biologists take an early look at Beckman Coulter's molecular diagnostics solution at this year's ECCMD

'Our solution offers speed, simplicity and flexibility,' he pointed out. 'It gives labs the opportunity to have an individual test result in less than two hours. In comparison, our main competitors rely on a batch system, which means many labs currently have to send out their molecular testing. This makes it a slow and costly system for hospital budgets, involving far more staff time. Batch results for

HIV testing, for example, can take three days.

'We expect the Beckman Coulter random access system to have a fundamental impact on workflow, cost and time efficiencies for hospitals. It will also make better use of already stretched staff resources, enabling highly trained staff to be freed up to handle more complex work.'

Beckman Coulter's new system

## 1920s drug shifts into today's alcohol addiction arena

EH Paris correspondent **Annick Chapoy**, reports on a French study that confirms the relevance of a drug with a long history in the management of other diseases

According to a preliminary study led by a team of French doctors, high-dose baclofen can be efficient against addiction to alcohol, opening the way for clinical tests to precisely assess the use of that muscle-relaxant drug to treat the illness.

Baclofen is not new. Formulated in the 1920s, the medicine is primarily used in neurology, spasticity and multiple sclerosis, but is increasingly prescribed for alcohol dependency.

In 2008, its popularity was boosted by the publication of 'The end of my addiction', a book written by cardiologist Olivier Ameisen, an alcoholic, to describe how he experimented with the drug on himself. Used at high-dose levels, baclofen totally suppressed his craving for alcohol – indeed he reports that he became effortlessly 'indifferent' to it.

'We estimate that between 20-30,000 people use baclofen today in France for alcohol problems; that's a lot,' says Dr Philippe Jaury, of the University of Paris-Descartes, who is the main author of the retrospective 'open' study published in *Alcohol and*

*Alcoholism* last March.

Together with another Dr Renaud de Beaurepaire (Centre Hospitalier Paul-Guiraud in Villejuif, near Paris), one of the first to have prescribed high doses of baclofen in France, Philippe Jaury studied 181 heavy alcohol consumers, of whom a follow-up evaluation was possible for 132. After one year of baclofen initiation, 80% of 132 patients had become either abstinent (78), or moderate low-risk drinkers (28). Even after considering as 'failures' the patients with whom contact was lost, (meaning a complete evaluation was impossible), the rate of success still stands at 58%.

'This allows us to think that it's more efficient than what we have now,' Philippe Jaury concludes. The rate of success after one year, with the two most used drug today, naltrexone and acamprostate, stands between 20 and 25%.

That preliminary study opened the way for a comparative clinical trial taking place between May 2012 and the end of 2013. This double-blind randomised controlled study is directed by Philippe Jaury, involves 60 other

doctors and includes 320 high-risk drinkers who will be followed for the year, divided into two groups, one using baclofen the other a placebo.

That clinical survey (cost: €1.2 million euros) will be financed mostly from Social Security funds (€750,000 euros) and the rest from a private sponsor, according to Dr Jaury.

Baclofen doses will be increased gradually up to 300 milligrams daily, with the aim of suppressing alcohol craving.

'In the preliminary study, we had gone up to 300, 350, 400 mg,' Dr Jaury explains. The average efficacy dose on a one-year basis was between 130 and 140 mg. In his book, Olivier Ameisen reports taking 70 to 160 mg daily, after reaching 270 mg.

The most prevalent side effects from high-dose baclofen were tiredness or sleepiness, insomnia, dizziness or digestive problems.

'It's a fact that the more we are going to prescribe, the more we should be faced with unwanted effects that could be unusual,' Dr Jaury admits, although adding, 'We have a certain hindsight with multiple sclerosis, for which baclofen can be prescribed at high doses.'

Referring to intense information exchange on numerous websites, Dr Jaury stresses: 'We're under strong pressure from alcoholics.'

## The UK pharma industry

### Fear grows over government's 'breakthrough drugs' fixation

In the lead up to further talks on medicine pricing, Stephen Whitehead, Chief Executive of the Association of the British Pharmaceutical Industry (ABPI) has accused the UK government of being too focused on encouraging breakthrough drugs at the expense

of significant gains for patients from incremental innovation in medicines. 'The government wants to target resources at big breakthroughs, but the science shows us that developments in medicine are made in small steps.

'We have to make sure that we recognise and reward the investment that goes into creating innovative new medicines. Manufacturers take a £1bn gamble when they decide to create a medicine in the UK, and they won't take that plunge if there is no reward for success. The UK is a global leader in medical research and development, but we have to do all we can to prolong and build on this success; we have to ensure that the huge risks discoverers and developers take are rewarded.'

#### The Many Faces of Innovation

In a study commissioned by ABPI various types of medical innovation are highlighted, placing them within the current context of increasing pressure on the pharmaceutical industry to justify itself as innovative. *The Many Faces of Innovation* report points out that innovation is an 'uncertain

activity' and outcomes can be only poorly predicted, if at all. Experience effects are important, and successive improvements derive significant economic benefit through experience processes. Thus, innovation is a cumulative activity in which small steps build on past developments.

In addition, because innovation has many dimensions, the study warns that it is misleading to attempt to categorise the degree of a medicine's innovativeness as a 'breakthrough' or not one.

'One of the main problems that arise from using a binary classification is the pejorative sense that is then attached to the term "incremental". Innovation in pharmaceuticals should not be classified using this dichotomy, given its complexity and multi-dimensionality and the importance of cumulative steps to overall innovation,' the report points out, adding: 'A broad perspective needs to be taken when evaluating innovation in medicines; otherwise, we run the risk of ignoring some, or all, of the advantages of follow-on products.'

Emphasising that the pricing negotiations will decide the future of pharmaceutical research in Britain, Stephen Whitehead stressed: 'If we minimise the reward for innovation in the UK, then our manufacturers will go abroad. Our industry, our economy, and our healthcare system will suffer and UK patients will suffer. Details: [www.abpi.org.uk](http://www.abpi.org.uk)

# routine

will be launched in 2013, initially in Europe and targeting medium to high-volume labs, he said. 'But, we wanted to give clinical microbiologists at this year's European Society of Clinical Microbiology and Infectious Diseases (ECCMID) the chance to have an early look at the new system and to obtain their feedback. We've had very high calibre visitors talking to us, and the interaction and their response has been very encouraging.'

Asked about the costs and possible work efficiency provided by the system, Marc Meyer said that, among many benefits, 'two key benefits for hospital department heads and budget holders would have to be space and labour. First, our new system is compact like the DxI 800 Immunoassay System and you will be able to handle more tests as demand increases by adding another unit without taking up too much floor space—and you don't have to re-engineer the lab at extra cost.'

'Secondly, the impact on staff budgets and resources will be considerable as DNA testing, for example, becomes more routine, faster and part of core lab workflow processes.'

He went on to explain that the firm had a long-term strategy – beginning in 2006 with talks with customers worldwide to understand precisely what type of system they wanted to cope with increasing demands, such as HIV testing. 'As part of putting the pieces of this molecular puzzle together, we made acquisitions of Lumigen and Agencourt to secure their expertise in genomics. Overall, we have made a significant investment both financially and in resources to bring this new system to fruition.'

Now that Beckman Coulter is part of Danaher, what impact will this have on its expansion into molecular diagnostics?

'Beckman Coulter has received a major boost to its long-term business development strategy of "improving patient care and reducing cost" by becoming a flagship brand within the Danaher portfolio of companies,' he explained. 'We are recognised and respected world-wide for our automated platforms serving the core lab and this will add to that portfolio, further strengthening our offering to global healthcare systems.'

Danaher is recognised for 'innovation', which highlights what Beckman Coulter is offering in molecular diagnostics, he pointed out. 'Of course, we started our R&D work on this new molecular diagnostics system well before we became part of Danaher – it's one of the key initiatives that attracted Danaher to the brand. Beckman Coulter dedicates itself 100 percent to its laboratory customers. Taking what is already respected in Beckman Coulter, we can now leverage the business expertise Danaher has in building companies and making them even better.'

*\* In development, pending achievement of CE compliance; not yet available for in vitro diagnostic use*

## ELF helps to assess chronic liver disease

Devised by the European Liver Test group, the new, non-invasive Enhanced Liver Fibrosis (ELF) test on Siemens ADVIA Centaur Immunoassay Systems can identify, in under an hour, blood-based biomarkers to detect the amount of fibrosis in the liver.

One of the ELF inventors, Professor William Rosenberg, Peter Scheuer Chair in Liver Diseases University College London, said: 'A large proportion of patients we see with end stage chronic liver disease present at a point where it's too late for effective treatment to be started. Because the accumulation of liver fibrosis is largely asymptomatic, what we need is a test that we can use to detect the presence of fibrosis before

it causes irreversible damage. In patients who are at risk of liver disease, ELF now gives us a test that enables us to identify those who do have liver damage.'

The simple, standardised ELF blood test assesses the severity of liver fibrosis by combining three direct serum biomarkers—hyaluronic acid (HA), procollagen III amino terminal peptide (PIIINP), and tissue inhibitor of metalloproteinase 1 (TIMP-1) — in an algorithm. The result is an ELF score that correlates to the level of liver fibrosis



William Rosenberg

assessed by liver biopsy.

Clinically validated in an international multi-centre study with a mix of patient groups, including viral hepatitis, non-alcoholic fatty liver disease and alcoholic patient groups, the ELF test has proved highly accurate, he concludes.

In patients already known to have liver disease, ELF can be used to assess how bad that damage is and deliver quicker diagnosis and treatment. 'If you start treatment for someone before they have cirrhosis we think their liver disease is reversible, whereas if you wait until they have got end stage liver damage then you will not be able to completely reverse the pathology and it may then be too late, leaving them at risk of liver

failure and liver cancer,' he adds. 'This test is a significant step forward -- a transformational change.'

While it is too early to produce data on the effectiveness of its clinical use, he is confident ELF will benefit patients greatly. Dave Hickey, CEO of the Chemistry, Immunoassay, Automation and Diagnostics IT Business Unit, Siemens Healthcare Diagnostics, said: 'By offering an automated, routine, minimally invasive blood test, Siemens provides an additional tool to physicians to aid them to easily assess the severity of liver fibrosis in their patients with chronic liver disease.'

Current research to assess ELF's ability to detect cirrhosis in advanced liver disease include the ELUCIDATE study funded by the UK's National Institute for Health Research.

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they can accommodate. And when needs change, the system easily adapts.

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## COMPANY PROFILE

With a share of 70%, routine diagnostics continues to be our mainstay within the laboratory diagnostics sector. We benefit from the inconspicuousness of the laboratory in the hospital, which encourages hospital decision makers to outsource this service – similar to what happens in radiology, another sector in which we are also active; and, whenever hospitals decide to outsource laboratory services we are considered to be a preferred partner. We have shown through more than 200 partnerships that we can take on the services formerly provided by hospital laboratories without any time delays, or friction,' explains Associate Professor Dr Thomas Brinkmann, Group Chief Medical Officer at Unilabs.

There are also country-specific developments, such as the politically driven consolidation of the French laboratory market, which will see the number of private laboratories fall from the current 4,000 to less than 1,000 by 2016/2017. In the last six months, Unilabs has already acquired 70 laboratories there,

These centres provide companion and predictive diagnostics as well as supporting clinical trials. 'This is a lucrative market; there are now a handful of drugs that require companion diagnostics so that they can be prescribed, and this number is on the rise,' explains Dr Brinkmann.

The company has also entered into joint research and sponsorship collaborations with universities in Geneva, Zurich, Paris and Stockholm for the purposes of joint research and sponsorship.

The objective for Thomas Brinkmann and his colleagues is to position Unilabs itself as a scientific organisation: 'We don't just want to achieve the numbers - we want more. This is why we maintain fruitful partnerships with various Centres of Excellence in fields such as molecular biology.'

He also sees a big potential for the sector of specialty testing, which Unilabs hopes to increase substantially by 2013. 'Next to quality and service, specialty testing is the only area offering potential for differentiation.'

## More pizzazz in the laboratory market



Thomas Brinkmann

### Unilabs banks on creativity and a unique approach

In a market dominated by consolidations and falling prices, aiming to double turnover within three years requires either possession of the Philosopher's Stone or extremely large amounts of creativity, entrepreneurial spirit and boldness. Diagnostics expert Unilabs, headquartered in Switzerland, belongs to the latter category. Be it clinical evaluations, specialty testing, collaboration with science and the pharmaceutical industry or the advance into new areas such as anatomic pathology



Unilabs' 150 laboratories carry out more than 50 million tests annually

with more due to be taken over this year. This may push the company, currently in fifth place, higher up the ranks in the French market, and could put it on a par with Spain, where Unilabs is one of the top three providers. In Switzerland its home country, as well as in Scandinavia, Unilabs, by its own account, is already the market leader.

### Faster, more comprehensive and reliable

To be ranked as one of the top diagnostics providers and to continue to grow means that laboratories these days need to offer more than just sample processing. Thomas Brinkmann: 'At Unilabs we distinguish ourselves by offering concrete added value to our customers. Our services include fast evaluation of samples and close cooperation with doctors, for whom we provide assistance and advice and who can contact us almost around the clock.'

The advance into specific medical fields also appears promising. Unilabs is currently developing a division of oncohaematology in Geneva and has already created a team of leading haematologists for this venture. 'This puts us on a par with the university hospitals,' the Chief Medical Officer points out. 'Unilabs is taking on the task of training pathologists – in Sweden, for example, since the public sector just cannot keep up in this area.' Cellular pathology analyses are in strong demand and many European markets experience a shortage of qualified pathologists.

### Pharmaceutical industry and science as partners

Unilabs also carries out drug development in a number of locations, with centres in Copenhagen, York and Moscow.

Accordingly we see good opportunities for further growth in this field. Through our collaboration with the industry, we have access to new tests. We are also attracting the best talents.'

Unilabs ventures into the laboratory market with the numerous initiatives and innovations, which gives the company an advantage that may become more pronounced in the future – at any rate, there won't be a dull moment.

### Unilabs Profile

Headquartered in Geneva, the Swiss company currently has almost 4,000 employees, including 225 doctors and scientists. The diagnostics specialist has a presence in 11 European countries, and has more than 150 laboratories that carry out more than 50 million tests annually. Besides laboratory diagnostics, the company also offers radiological services and produces around one million images a year in 30 imaging centres across Europe. The company is also one of the leading providers in the field of reproductive medicine.

### Unilabs provides lab tests in the following areas:

#### Laboratory

- Clinical biochemistry
- Haematology and coagulation
- Microbiology
- Special chemistry
- Serology
- Immunology
- Transfusion medicine
- Nuclear medicine
- Molecular biology. Drugs of abuse testing, therapeutic drug monitoring

#### POCT

#### Genetic Testing

Switzerland - It is a classic problem in any business. Everyone is working so hard to keep up with the rapid pace of orders that no one has time to get ahead.

For the clinical laboratory the problem has grown greater each year, to the point that today's new high-throughput instruments are still shackled to slow-throughput wires.

Vital patient information from blood work-ups and molecular diagnostics is running through old 9-pin cables that are becoming harder to find on the back of computers. Some instruments are running at the extremely low-bandwidth rate of 9600 baud, for those who remember what a 'baud' is.

complexity and variability in the exchange of information related to patient and quality control test orders.

The kick-off meeting was held in September 2010. Eighteen months later, the partners were ready to see if it would work – live and in real time.

In May this year, six of the companies sent technical teams to Bern, Switzerland for the IHE European Connectathon, the connectivity marathon where, for five days, 350 software engineers validate that their new systems will work with any other HIT system.

By the fourth day, Ed Heierman was smiling broadly, reporting that the performance was 'flawless for this first effort using the draft sup-

report results for clinical trials.

An unknown for future development is how faster communication speeds on Big Iron may impact on the software packages that to this point have done the work of enriching patient specimen analysis with data linked to the patient, a well as physician and facility information.

It could change the game, Rob Bush said, with the migration of this capability to the instrument performing the analysis. 'Managing more complex patient information in a single system will create more efficient and effective reporting of results.'

Another change would be the ability to add advanced capabilities for analysis to the instruments, he added. A complete blood count,

# Upgrading 'Big Iron' for the digital century

The biggest names in clinical instruments unite to steer laboratory communications out of the last century, John Brosky reports

Rob Bush, at Orchard Software, knows this technology from the last century only too well. 'With the volume of information moving on high volume analysers, this port has become a bottle neck,' he said. In the best cases, instruments currently are connected to reporting software with two cables, one for input, the other for output, which he said is a work-around solution, like putting a plaster on a problem.

The risk for each of the major manufacturers of what is affectionately called 'Big Iron' instruments is to develop a solution to the problem that leads to a dead end. In other words, a smart answer that no one is ready to adopt.

Rather than competing with each other, these companies agreed to form the IVD Industry Connectivity Consortium (IICC). The impressive membership includes top makers of clinical instruments such as Abbott Diagnostics, Beckman Coulter, Becton Dickinson, bioMérieux, Data Innovations, Orchard Software, Ortho Clinical Diagnostics, Roche Diagnostics, Siemens Healthcare Diagnostics, and Systelab Technologies.

The Chief Technology Officer for the IICC consortium, Eric Olson, who is Vice President for Informatics & eBusiness for the Diagnostics Division of Siemens Healthcare, explained that the goal is plug-and-play moving from the slow pin-cable serial port to a high-speed TCP/IP interface. 'We are building a better pipeline connection between laboratory information systems (LIS) and the lab analysers,' he said.

The partners agreed to use an open and collaborative process for developing a new technology for clinical instruments through Integrating the Healthcare Enterprise (IHE), the joint initiative of healthcare professionals and industry dedicated to improve the interoperability of health information systems (HIT).

According to Ed Heierman, 'Of all the groups IICC has worked with, IHE provides a better place for us to work than any other organisation, creating the most opportunities to test and validate our solution while making a space for the engineers to interact.'

### Writing a new LAW

The IICC-IHE work teams moved quickly to create a system integration profile named Lab Analytical Workflow (LAW). This reduces



Software engineers from Abbott Diagnostics testing the new Laboratory Analytical Workflow (LAW) profile at the IHE European Connectathon held 21-25 May in Bern, Switzerland. Abbott was one of seven clinical lab manufacturers that successfully validated the new high speed connectivity for data exchanges from lab instruments using TCP/IP ports

plement for trial implementation,' in the language of IHE.

The next step, he said, is to prove out LAW at the next Connectathon, set for October in Tokyo. 'Then we'll go to Chicago in January where we hope to implement and use this specification with companies that have not been able to join us in Europe or Japan.'

In his day job, Ed Heierman is the Informatics Software Architect for Abbott Diagnostics. LAW, he said, will help the company's customers make it easier to install the new generation of high-speed analysers.

Before the new LAW, each company has a connection interface with reporting systems that is unlike anyone else's, he said, and the challenge for a customer becomes the amount of time required and the effort spent to connect a new instrument.

### Game changer for software developers

Rob Bush travelled from Indianapolis to Bern to test his company's system at the first-ever trial of LAW, which he sees as a welcome development.

'We have 1,200 labs using our software with interfaces for roughly 350 different Big Iron analysers from Abbott, Roche, Siemens, Biomérieux, Beckman Coulter and others,' he said. 'None of them use the same interface.'

The issue to be overcome, he explained, 'is this critical connection between IVD instruments and the lab information systems (LIS) or any software the instruments need to speak to, such as systems used to

for example, is the most frequently ordered test for clinical labs that yields 20 parameters on red and white blood cells and platelets. 'The limitation of the test is that analysers are very good at identifying a normal count, but the more abnormal the result, the more necessary it becomes to hand off the work to a lab technician at a microscope.'

'We want to minimise the need for this transfer because the test suddenly changes from being inexpensive to quite expensive,' he added, explaining that a lab technician at the microscope can process from up to eight slides per hour by physically counting cells, where new software on an analyser can process 30 slides per hour. 'This became even more complex with molecular diagnostics.'

The new IHE LAW profile creates a path through this workflow that in a next step allows development of more sophisticated instruments with computer-assisted detection software built in.

According to Ed Heierman, science is continuing to advance the capabilities of instruments, 'and it makes sense to migrate analysis functions to the big machines.'

There is a great need for customers to have this ability to precisely specify the order for processing, and precisely describe patient information and results, he said, adding that a richer test will send back richer information.

Ultimately this information will continue to be captured by software for management, which will quite likely create new opportunities in LIS, he added.

# Present and future clinical laboratory management systems

## Exit the monoliths, enter diversity

IT for labs is continuously progressing; solutions in the European market are becoming ever more complex and richer in functionality – all occurring in parallel with consolidation of equipment suites. To handle or manage the software systems that have evolved over the past years is now a serious challenge, according to chemist Dr Markus Neumann and physicist Heiko Kindler, who are currently creating cross-subsystem data mining tools to optimise quality management in the laboratory. We asked them how design concepts for next-generation systems would need to change to accommodate emerging needs

Outlining developments in IT for laboratories Dr Markus Neumann explained: 'Over the years, all related disciplines – clinical chemistry, haematology, microbiology, transfusion, histology, histopathology, as well as hygiene, billing, quality management and documentation – were consolidated on one code base. The drivers were clinical labs whose staff had to use the entire spectrum of the functionality – even during night shifts, with only one team member present. From about 2000 onward, many clinical labs therefore opted for that trend towards end-to-end systems. However, in privately owned labs a homogeneous user interface does not play a major role, and different IT systems may be in use for the lab's sub-disciplines.'

*Could these morphologies co-exist, for example as Windows-based solutions with a uniform codebase and legacy systems?*

'Neither users nor manufacturers can opt for a two-tier landscape in



Markus Neumann (left) and Heiko Kindler are CEOs of Bochum-based dr. neumann & kindler, a firm specialising in service and solution management for clinical labs

the long run,' thinks Heiko Kindler. 'Vendors need to integrate product lines for cost reasons and users are asking for resilient standard software which allows for convenient upgrades and extensions. However, integration of established process know-how needs to accompany integration of data.'

'Data integration,' Dr Neumann added, 'has prepared the stage for IT in the diagnostic lab in the past – managing testing equipment and importing patient data from administrative systems are well established IT functions; today, sophisticated interfaces, for order

entry and result reporting are state-of-the-art.'

Dr Kindler: 'Process integration is on the agenda of interoperability initiatives, such as IHE, with HL7 interfaces and TCP/IP or files as the current technical platform. However, in order to integrate process know-how from legacy systems the embracement of service-oriented architecture (SOA) is a sine qua non. In a lab software market with diverse dedicated systems, investments will be future-proof thanks to SOA, interoperability, appropriate middleware, and proper orchestration of the solutions. This implies, for example, the implementation of a centralised electronic patient record in the lab and a "testing brokerage" tool managing the heterogeneous subsystems in accordance with the service requirements of each order.'

Asked to describe the future potential of this lab information management concept, Dr Neumann said: 'Orchestrated IT, which integrates evolved process know-how is not only, a reasonable economic approach for consolidation of legacy IT systems, Dr Neumann responded when asked to describe the potential of this lab information management concept. 'It also provides the technical base for the next step in clinical decision-making. There is a broad consensus in literature that up to sixty percent of diagnostic services in hospitals is performed in the lab. Therefore, knowledge-driven decision support will improve productivity, quality and precision in the lab. Finally, SOA-based services directly support the diagnostic pathways initiative, run by the German Society for Clinical Chemistry and Laboratory Medicine (DGKL).'

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

# Caradigm is here

## New healthcare IT products reach the market

Back in December 2011, when General Electric and Microsoft announced their joint venture, Peter Neupert, then head of Microsoft's healthcare solutions group said: 'This industry needs a Windows-like platform.'

This June their efforts resulted in an 'all systems go' for Caradigm IT products, which aim initially to enable hospitals and large private medical groups to use a real-time, organisation-wide open healthcare intelligence platform and collaborative clinical applications.

The new company provides Microsoft health products that include Amalga – software for entering lab test results, imaging scans and other data in real-time into electronic patient's records for diagnoses.

Caradigm's Board of Directors and leadership team is composed of executives from both parent companies, led by CEO Michael Simpson, formerly General Manager for GE Healthcare IT

Bei-Jing Guo, who is now Vice President of Operations and Chief of Staff at Caradigm, was previously senior director of product management and marketing for the Microsoft Health Solutions Group.



Michael Simpson

Additionally, Dr Brandon Savage, formerly chief medical officer (CMO) of GE Healthcare IT is Caradigm's CMO and Senior Vice President for Product Strategy.

Although based in Bellevue, Washington, Caradigm will also be present in Salt Lake City, Utah; Andover, Mass.; Chevy Chase, Md.; and other cities around the world.

**Products**  
Along with the mentioned Amalga, Caradigm is offering Vergence, ExpreSSO and eHealth Information Exchange.

The latter is described as 'a secure, standards-based infrastructure that integrates clinical data from across disparate systems and manages the wide variety of clinical records, document types and terminologies pervasive in today's healthcare system'.

The system includes cross-community clinical summary sharing; cross-community referral management; ED access to community wide clinical data; community wide clinical summary viewer; medication history service; image exchange service; vendor-neutral EMR integration; results delivery service; interoperability in action: profiles and standards.

Details: [www.caradigm.com](http://www.caradigm.com)



Bei-Jing Guo

# There's no meteoric rise to the clouds for medical images

For technology suppliers the potential return on investment in medical images storage via cloud computing will not be lightning fast, market analyst for healthcare IT

Theo Ahadome told EH correspondent Michael Reiter

When assessing the market for cloud technology in medical imaging, InMedica\* market analysts found that cloud business models fall primarily into the realm of 'managed services' delivery: a vendor manages the IT infrastructure, providing service level management, and application as well as system administration, taking on responsibility for maintaining this infrastructure, including the data centre/storage, housed locally or remotely. Benefits include reduced need for capital investment, such as costly in-house IT support staff and IT infrastructure. It also provides regular access to the latest software upgrades and allows flexible storage capacity to suit end user's needs, according to Market analyst Theo Ahadome.

So, how does cloud technology in medical imaging work? There are numerous forms of managed services depending on the location of the two components of imaging IT: software/application and storage,' he explained. 'Cloud storage refers to where the storage/data centre is hosted by the vendor or third party, as in

the managed hosting and Software as a Service (SaaS) off-site models. The application, such as PACS or vendor-neutral archive (VNA), may also be cloud-based, such as in SaaS off-site and SaaS on-site models. Only SaaS off-site offer full hosting for both application and data centre, and may hence be considered the true 'cloud.'

**The potential for healthcare organisations**

'As the amount of data generated rapidly increases in various industries, so too does the need to provide safe and affordable storage solutions. Cloud technology, by enabling scalable storage, reducing upfront costs and facilitating data sharing, has risen to the challenge; it can do the same for healthcare. Within the sector, medical images account for the majority of data generated. As procedural volumes grow from X-ray, CT, MRI, ultrasound, and other modalities, medical images have become the largest driver of growth in healthcare data.

Increasingly, further image-generating departments, such as cardiology and pathology, are becoming digitised.

'Cloud technology has the potential to reduce the costs to healthcare organisations of storing and managing this large growth in data. It also allows hospitals to consolidate images from different departments into a central archive, in lieu of the departmental silos in which they currently reside. This gives hospitals greater oversight of their data and facilitates the sharing of this data.'

What does he consider to be the key barriers to embracement? 'Key barriers include data security – strict procedures and regulations govern storage

and access of sensitive patient data,' he explained. 'It's therefore significantly difficult for a hospital to hand over this data to a third party to host via a cloud-based model. Further barriers are performance concerns, budgeting systems, vendor lock-ins and data migration costs. Hospitals that have the capital budget to purchase long-term image management and storage solutions upfront are less inclined to shift to a pay-as-you-use model without understanding the long-term difference in costs and benefits. There is currently a lack of data on this ROI.

How is implementation progressing in Europe? 'In 2011, managed service business models accounted for about 25% of radiology PACS revenues,' the analyst explained. 'However, cloud technology "cloud" – SaaS and managed hosting services – accounted for less than 5%; by 2015, this is projected to increase to only 10%, due to the security, performance and ROI concerns. The UK and Ireland, Benelux, and France lead Europe in terms of managed service penetration, including cloud-based models. Germany has been slow to adopt such models due to strong concerns about data privacy.

Conclusion? 'Until the notion of vendor hosting in terms of security, regulatory compliance, performance, end-user trust, and ROI are met, the adoption of cloud technology will continue to be slow.'

\* InMedica ([www.in-medica.com](http://www.in-medica.com)) is a division of IMS Research. Contact for further details about the healthcare IT report: theo.ahadome@in-medica.com



Theo Ahadome

## Why measure body composition? **seca** Precision for health

Whether it's a case of obesity or muscle wasting disease, the patient's body composition data are essential for diagnosis and treatment of weight-related disorders. Too much fat in the body is unhealthy – so is too little.

At first glance, risky body composition may not be obvious. A heavyweight boxer, for example, has great muscle mass and a high weight. According to the Body Mass Index (BMI) this combination indicates obesity, but the boxer is a very healthy, competitive athlete. Another example involves a patient with normal weight but a very high proportion of water. In this case the BMI is also wrong because, although actually at risk, the patient falls within a normal range.

These examples clearly show that a valid assessment of a patient's overall health cannot be made solely on weight and height. Body composition must also be considered – and that's exactly what the medical Body Composition Analyser seca mBCA 515 does.

**The seca mBCA 515**

In less than 20 seconds the system analyses the human body's individual constituents, such as fat, water and muscle, and compares those measurements with medical reference values. Clinical studies were made that validated the device and correlated its results with medical science's gold standards. With this diagnostic instrument, seca gmbh & co. kg of Hamburg has thus achieved a level of precision previously unknown in bioelectrical impedance measuring and has opened up a new dimension in diagnostic medicine, the company reports.

**Analytical modules for prevention and therapy monitoring**

The six analytical modules of the new seca mBCA 515/514 offer the user innumerable diagnostic options. With precise ratios, such as fat mass to weight or extracellular to intracellular water, the doctor can now obtain indications of medical disorders that were previously difficult to diagnose without additional examinations. Another significant advantage comes with the graphic presentation of measurement results, which visualises the doctor's findings for the patient.

**Convenient use**

The seca mBCA 515 has been adapted ideally to working conditions in doctors' practices and hospitals. It features quick, simple operation, reproducible measurements and easy integration in the seca 360° wireless system and computer networks.

Details: [www.seca.com/mbca](http://www.seca.com/mbca)



## Side by side to combat MRSA

With complementary portfolios, GlaxoSmithKline (GSK) and B. Braun have been working together since mid-May to develop a complete one-stop system for the decontamination of MRSA patients.

GSK's Turixin nasal ointment containing the active substance mupirocin has been an established antibiotic treatment for years and is recommended by the Robert Koch Institute to decontaminate nasal MRSA colonisation\*. B. Braun's Prontoderm range, containing polyhexanide, includes a shampoo for the hair; moist cleansing wipes, a mouth rinse solution and a whole body wash product – either ready for use or as a concentrate,

and as a shower gel. Used together, both products enable comprehensive elimination of MRSA bacteria.

In its future advice booklets and specialist documentation B. Braun will recommend the nasal ointment with mupirocin for decontamination of nasal MRSA. Further joint activities, such as networking events, participation in trade shows, an MRSA kit and a film on MRSA are also planned. Actual sales of Turixin will continue directly through GSK.

\* N. Wischniewski, M. Mielke 2007.

Overview of current eradication strategies for methicillin-resistant *Staphylococcus aureus* (MRSA) from various countries. *Hyg Med* 2007; 32 [10], 389

# Electrical sensors detect MRSA



Scientists in Scotland have developed a new test using a strip with electrical sensors that can show whether wounds or lesions have been infected with bacteria, including MRSA, Mark Nicholls reports. The hand-held test provides rapid results and allows almost

material before testing but, in the future, they hope to integrate this within the strip for use outside the lab, as a POC test in healthcare settings.

Currently in hospitals, laboratory tests to confirm MRSA presence in a wound can take a full day using conventional techniques.

Dr Till Bachmann, chief operating officer and head of biochip research at the Division of Pathway Medicine, said: 'Current tests for MRSA tend to be expensive and not very fast. By developing a rapid and cost-effective test, we would know what kind of infection is present straight away, which will improve the chance of success in treating it.'

The new test was developed using swabs from diabetic foot ulcers taken from patients attending NHS Lothian's Diabetic Foot Clinic at Edinburgh's Royal Infirmary.

The research behind the test was presented at the Advances in Biodetection and Biosensors conference in Edinburgh earlier this year. Its development was funded with £2.26 million from Scottish Enterprise's large Scale Research and Development Programme and involved input from the University of Edinburgh's Division of Pathway Medicine,



School of Chemistry, School of Physics and Astronomy and the Scottish Microelectronics Centre working with NHS Lothian's Diabetic Foot Clinic and Microbiology Department.

The scientists are also using similar technology to monitor signals that bacteria send to each other to spread infections and chemicals that patients produce that indicate the wound's response to the infecting bacteria.



## Technology for Safety and Hygiene

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immediate detection of bacteria, which means patients can be given more effective drugs much quicker and speed up their recovery.

The University of Edinburgh's Division of Pathway Medicine team, in partnership with Scottish Enterprise, is confident of the benefits of the new test and hope that it will be on the market for hospitals in the near future.

It works by taking swabs from a wound or sores for analysis using a strip with electrical sensors that can detect MRSA.

The swab samples are then processed in the laboratory to isolate the required genetic

Along with a call for earlier identification and intervention in sepsis cases, intensive care consultant **Dr Ron Daniels** also stressed that timely intervention is cost-effective for health systems as it leads to fewer sepsis patients needing treatment in intensive care units (ICU).

With 100,000 sepsis cases a year in the UK leading to 37,000 deaths – more than breast, bowel and prostate cancers combined – Dr Daniels said a key factor to an effective medical response to sepsis was increased awareness of the condition and symptoms among health professionals and the public enabling basic, but highly-effective, treatment to begin promptly.

Dr Daniels, from the Good Hope Hospital in Birmingham, is also Chief Executive of the Global Sepsis Alliance, a coalition of healthcare professionals and healthcare bodies operating worldwide to raise awareness of sepsis and drive resources into research and rapid response at a time when cases are increasing by 8-13% annually.

'Sepsis is a serious problem,' he said. 'We are looking at an incidence of 240-300 cases per 100,000 population, with a mortality rate in the order of 30%. Each case of sepsis costs a health economy around €25,000. For the UK alone we are looking at £2.5 billion to be spent every year to treat sepsis.'

Sepsis is the immune-mediated response of the body to an infection that causes injury to its tissues and organs and while anyone can get sepsis, those who have chronic illness, or are very young or very old, or have conditions such as pneumonia, a perforated bowel or urinary tract infections tend to be more vulnerable.

Uncomplicated sepsis caused by minor infections is common and does not always require hospital treatment but can deteriorate to severe sepsis, which occurs when the body's response to infection has started to interfere with the function of vital organs.

Dr Daniels stressed that sepsis is primarily caused by community-acquired organisms, rather than healthcare associated infections (HAIs) and can give

## SEPSIS

Thousands of lives could be saved through early identification and intervention, says Global Sepsis Alliance expert. **Mark Nicholls reports**

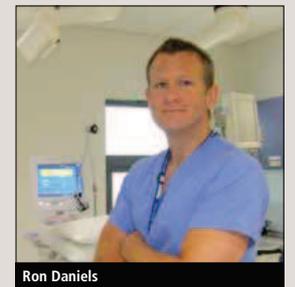
rise to influenza-like symptoms, slurred speech, a racing heartbeat, unusual skin colour and laboured breathing.

When identified quickly, Dr Daniels said treatment is under the Sepsis 6 care plan – a six-stage treatment response that focuses on sampling of blood cultures (and cultures of other body fluid) to find microbes that are causing the problem; antibiotics delivery; supplemental oxygen therapy; administering rapid intravenous fluids to restore circulation; measurement of lactic acid, and urine output monitoring.

However, patients identified at a later stage often suffer septic shock, which usually requires treatment in a critical care setting using an Early Goal-Directed Therapy care package to improve circulation with central venous catheters and vasoactive drugs.

'The Sepsis 6 and Early Goal-Directed Therapy together complete the gold standard of care known as the Resuscitation Bundle, but as other organ failures ensue, a patient may also need supporting with a ventilator or kidney machine,' Dr Daniels explained. 'By the time they reach the stage of septic shock they are very ill and have a 50/50 chance of making it: Early Goal-Directed Therapy gives about a 16% reduction in the risk of death.'

'The basics are more effective, but we need to get to patients early in order to deliver them. Our modelling suggests that if we can get 80% of patients treated in a timely fashion, for every 500



Ron Daniels

acute beds in a particular geographical area we will save 80 lives and £750,000 or €0.9 million a year.'

While recognition of sepsis is more embedded in critical care and emergency medicine, he added that a key part of that rapid response process is in raising awareness among primary care physicians, community nurses and paramedics.

As well as trying to raise awareness, the Global Sepsis Alliance – which includes the World Federation of Societies of Intensive and Critical Care Medicine and the World Federation of Critical Care Nurses – is also seeking government-approved evaluations of the economic and health burdens of sepsis in member countries. It has also organised the first World Sepsis Day (13 September).

Sepsis research is also underway on two main fronts – to improve and simplify early sepsis detection and to study immune-modulatory therapy to focus on the various molecules involved in the immune response that causes sepsis and seeing whether drugs can be developed to tackle this.

Other organisations involved in the fight against sepsis include the UK Sepsis Trust, which is allied to the Global Sepsis Alliance; the UK Sepsis Group, a voluntary group of healthcare professionals helping to embed sepsis care within working practices; and the Surviving Sepsis Campaign, an international coalition of professional bodies whose function is to create professional guidelines.

NEW

# System identifies more pathogens and antimicrobial resistances than any other

By integrating all necessary pre-analytical and analytical steps into one solution, the recently CE-marked Unyvero system, which is now commercially available in Europe, provides pathogen identification and antibiotic resistance marker information without needing expert staff and a sophisticated infrastructure, its manufacturer Curetis reports. Of even greater interest is its range of targets. 'The first available application is for the diagnosis of pneumonia and it is able to identify 17 pathogens (16 bacteria, 1 fungus) and 22 antibiotic resistance markers in a single, automated run,' the firm adds.

'So far, there is no comparable system available on the market that combines the detection of as many pathogens and as many antimicrobial resistances as the Curetis system,' according to Professor Ingo Autenrieth, Director of the Institute of Medical Microbiology and Hygiene at Tübingen University, who is currently evaluating the system in a multicentre clinical trial.

In a performance evaluation using real-world patient samples, the Unyvero System was compared to standard microbiology techniques. It had a better than 95% specificity and identified 74 additional pathogens, e.g. mixed infections, missed by standard microbiology culture.



The Unyvero System. From left: The Unyvero Analyzer, Cockpit and Lysator

Further Unyvero Cartridges, e.g. to diagnose surgical site infections, sepsis and tuberculosis, are under development, to provide pathogen and resistance information within four hours and all simply operated by an assistant medical technician or nurse.

The system can be placed wherever needed, and also integrated with the hospital information system.

'The work flow is very easy,' says Oliver Schacht, CEO of Curetis. 'Four steps, and you're done. This sim-



The Unyvero P50 Pneumonia Cartridge for pneumonia diagnostics (interior view)

ple process with five-minute hands-on time ensures consistent work flow and reduces potential handling errors.'

First, the user transfers the patient's sample into the Unyvero Sample Tube prefilled with specific reagents. Subsequently, the tube is handled by the Unyvero Lysator, which can process all types of body fluids e.g. sputum, aspirates, lavage samples and protected brush specimens.

After lysis, the Unyvero Sample Tube with the processed sample and a Unyvero Master Mix Tube are inserted into the Unyvero Cartridge, which integrates all sample analysis steps to execute a complete test based on endpoint-PCR. For quality control purposes a synthetic gene alongside each patient sample is processed. 'As a physically closed system,' Schacht adds, 'the cartridge avoids spilling of sample fluids or reagents and minimises contamination risks. After use, it is compatible with standard waste disposal procedures of hospitals and laboratories.'

'Once the cartridge is loaded, the Unyvero Analyzer automatically performs the handling of the Cartridge, including DNA purification, amplification with endpoint PCR and the detection of the target sequences after hybridisation on a special array.'

Both the Unyvero Lysator and the Analyzer are controlled by the Unyvero Cockpit, which also guides the user through the workflow. 'An integrated bar-code reader enables quick patient information entry and traceability throughout the entire workflow. The software manages automatic results generation and storage and supports users with detection of lot numbers and checking of expiry dates. Results are automatically processed and displayed without requiring any further interaction.'

Details: [www.curetis.com](http://www.curetis.com).

COPPER



## The contact killer

Bacteria, viruses and fungi are killed on copper surfaces within seconds. This powerful germicidal effect, termed 'contact killing', is increasingly noted by hospitals due to several recent studies that confirm its antimicrobial effects. These have shown the efficiency of antimicrobial copper against bacteria, viruses and fungi, including MRSA, Influenza A, Salmonella enteritidis, Vancomycin-resistant Enterococcus faecalis (VRE) and many more pathogens.

There is no single answer as to how contact killing works – because many mechanisms are involved in the process. Based on various studies it is assumed that copper-ions are released on the metal surface and these damage the cell wall and membrane. After copper-ions enter the nucleus, cell sap leaks through the opened membrane and the cell dies.

**Hygiene potential** – Toilet push buttons or handles, light switches and door handles can hold dangerous pathogens. The use of copper for these surfaces could break the

transmission of hazardous germs. The downside? Time consuming implementation and the high cost of full copper surrogates.

**New approaches** – Innovative thin copper foils can be added to critical contact surfaces – even later. According to the manufacturers, assembly is quick and not cost-intensive, while the antimicrobial effectiveness is similar to other copper solutions.

A recent feasibility study by the INM - Leibniz Institute for New Materials (Germany) – conducted with CopperProtect foils proved that a micro structuring of their surfaces led to an increased emission of ions, which makes these foils even more effective in killing germs than non-structured copper surfaces. The results, they conclude, indicate that there are even more possibilities for this technology. The research will continue – as will copper usage.

Further details: [www.copper-protect.com](http://www.copper-protect.com)  
[www.antimicrobialcopper.com/](http://www.antimicrobialcopper.com/)

## Centre Hospitalier de Rambouillet

Paris Correspondent Annick Chapoy reports on the first hospital in France to choose copper against nosocomial infections



## The first International Centre of Excellence in Infection Prevention

Hospital infection control specialists from across Europe, the Middle East and Africa are travelling to Liverpool to learn how an English hospital Trust has become a world leader in infection prevention and control, Mark Nicholls reports



Sue Redfern

Infection prevention at the Royal Liverpool and Broadgreen University Hospitals NHS Trust (RLBUHT) has been highlighted with its naming as the world's first International Centre of Excellence in Infection Prevention by Advanced Sterilization Products (ASP), a member of the Johnson & Johnson Family of Companies.

The accolade follows a reduction of over 80.5% in *C. difficile* infections from April 2008 to March 2011 and an 86% reduction in hospital acquired MRSA cases with savings in the region of £2.3m (€2.85m), taking it from one of the poorest to one of the best performing health organisations in England in terms of infection control.

Deputy Director of Nursing Sue Redfern said the award reflects the hard work and investment throughout the organisation over the past four years. 'We've reduced our infection rates through strong team work and are now looking to share our best practice but

still continue to learn from other centres as well.'

RLBUHT has 870 beds across three sites with about 982 medical staff, 1,660 qualified nurses, 1,700 allied healthcare professionals and 1,700 support staff, and sees in excess of 60,000 inpatients a year and almost 570,000 outpatients with 100,000 A&E attendances.

Before November 2008, it had a poor record in terms of infection control and during an outbreak of Norovirus in 2007 lost 1,770 bed days in three months costing the Trust around £708,000.

In a bid to address this, the Trust searched for new, innovative ways to replace the traditional manual processes, which had often resulted in incomplete cleaning.

In the USA Mrs Redfern identified a process utilised by John Hopkins Medicine in Baltimore that partly attributed a reduction in hospital acquired infection rates to deep cleaning methods and area decontamination.

The Trust invested in a hydrogen peroxide mist technology. This sprays out and thus disperses a low concentration mist to rapidly kill a multiple of infection-causing pathogens.

However, she stresses that the improved performance went much deeper than investment in technology – the environment, cleaning methods, culture and approach to infection control all changed with better education of staff and patients, improved hand hygiene and innovation, such as the introduction of an isolation unit for CDT and Norovirus cases, which very soon produced impressive results in containment.

She said the infection control team attends daily beds meetings; there is thorough reporting and monitoring of infections and potential outbreaks, greater emphasis on cleaning standards, the use of innovative decontamination solutions and close stewardship of antibiotic use at RLBUHT.

The hospital has cut infection risk by reducing patient stay times, holding regular mattress audits and constantly re-evaluating protocols and procedures. It also reinvests any savings in its deep clean programme.

From ASP, Rebecca Eldridge said: 'The turnaround in infection rates at the Trust is one that clinical leaders globally should hear about.'

Copper and its alloys reduce the rate of nosocomial infections in hospitals by 40%, according to an American study led by Michael Schmidt (University of South Carolina). For the first time in France, one hospital near Paris chose to bet on the antibacterial quality of copper on commonly touched items to lower risks of HAIs, which annually claim 3,500 lives in the country – comparable to the annual road toll. Additionally, a 2006 nosocomial infections study (rapport Vassel de 2006) indicated that their cost health insurers between €2.6 and €6 billion annually.

Intensive care and paediatric wards at the Centre Hospitalier de Rambouillet have been supplied with antimicrobial copper-coated door handles, trolleys, soap dispensers, light switches, bed rails, tray-tables, nurse-call buttons, and the arms of visitor's chairs.

According to the US study, in more than one in three cases, nosocomial infections are caught from contact with contaminated objects or surfaces.

With its capacity of eradicating 90-100% of bacteria, including those caused by MRSA and Vancomycin-resistant Enterococcus (VRE), copper stands out as a first choice material to fight infection in hospitals as well as in everyday life.

Although the antimicrobial nature of copper has been recognised for millennia, it was scientific evidence that convinced Jean Pierre Richard, head of the Rambouillet, to mandate antimicrobial copper surfaces, saying he wanted to 'lead the way with the most innovative prevention policy'.

For one year, the Rambouillet will monitor the impact of the copper surfaces on the infection rates in the two units involved, with the hope that results will prove as promising as those obtained in US hospitals.

Mobile phones, computers, toilet seats – all sorts of everyday objects could be coated with multi-resistant bacteria. The disinfection provided by copper is continuous rather than episodic, and copper kills bacteria within two hours of exposure.

# Safer sleep, safer sugar

'Anaesthesiology means patient safety,' says Professor Hugo van Aken, General Secretary of the German Society of Anaesthesiology and Intensive Care Medicine (DGAI), who refers to the 2010 Helsinki Declaration on Patient Safety, which was intended to establish anaesthesiology as a key medical discipline taking on categorical responsibility in this field.

Much has already been achieved. Whilst the mortality rate from anaesthetics was between 1:2,500 and 1:5,000 in 1980, by the turn of the millennium it had fallen to below 8.8:100,000 thanks to the comprehensive introduction of pulse oximetry and capnography; currently the rate in developed countries stands at 1:100,000. However, at lot still remains to be done: 'Every fifth administration of anaesthesia does not go according to plan,' says Dr Lars Friedrich, Consultant at the Clinic for Anaesthesiology and Intensive Care Medicine at the Hannover Medical School (MHH). Because human factors are responsible for around 70% of all incidents, he also emphasises the importance of the most intelligent assistance systems available. 'We always need to base our assumptions on the dumbest possible user, i.e. basically anyone working in the hospital at 2.30 a.m. at night after a ten hour shift.'

Dr Friedrich, who is also lecturer and head of the Simulation Centre at the MHH, uses the new *Anaesthesia Workstation Perseus A500* by Dräger as proof of his requirements: Automated functions contribute towards a reduction in the amount of work needed. With its intuitive user concept for desktop, nomenclature and touchscreen the equipment conforms to the user philosophy of the existing Dräger systems.

The *VaporView*, an assistance system for gas dosing, is a new addition. 'This can lower the risk

Ensuring the safety of hospitalised patients is vital – and brought under a particularly strong focus in anaesthesiology. Launched in 2010, the Helsinki Declaration\* provided a further boost: In many places the mastering of critical situations no longer needs to be learnt during real emergencies – it can be practised on simulators. Among the many medical and technological advances, including the latest anaesthesia workstation from Dräger, complex computing models calculate prognoses and support anaesthesia administration. EH Correspondent *Holger Zorn* reports on these, plus intelligent blood glucose management for non-diabetics in the ICU and other topics aired at the German Anaesthesiology Congress 2012 in Leipzig



The new Anaesthesia Workstation Perseus A500 by Dräger. The 15.3' widescreen monitor can be combined with the Infinity Acute Care System Monitoring (IACS). The middle screen also visualises VaporView

of user errors as well as the time required for user training on the equipment,' he points out. His colleague Dr Bert Mierke, Consultant for Anaesthesiology and Intensive Care Medicine at the St. Elisabeth Hospital in Damme, confirms: 'Especially for

young colleagues it is particularly difficult in the case of low-flow anaesthesia to precisely estimate the concentration of anaesthetic gases in the breathing gases during all phases of the anaesthetic administration based on the setting of the Vapor.'



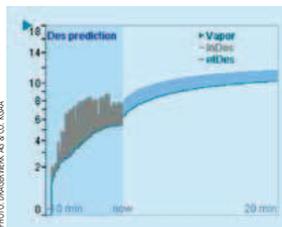
Space GlucoseControl, the intelligent control of the blood glucose level for patients in intensive care, also increases patient safety for non-diabetics

Based on pharmacokinetic models, the VaporView function on the Perseus A500 calculates the current and predicted concentration of anaesthetic gases in the breathing gasses of an adult patient. It graphically displays the actual inspiratory and expiratory concentration of anaesthetic gases over the last ten minutes and the predicted concentration for the next 20 minutes onscreen.

'When the fresh gas flow is being reduced, after the introductory phase and consecutively the patient's rebreathing increases, we use comparatively fewer anaesthetic gases and simultaneously establish a better breathing gas acclimatisation,' Dr Mierke explains. VaporView supports the

anaesthetist in better calculating the concentration of anaesthetic gases in the inspiratory and expiratory breathing gases. If he changes the setting of the Vapor, the VaporView shows him the calculated, predicted concentration of anaesthetic gases in preview before this concentration actually reaches the patient. It helps him to adapt the setting of the Vapor to the respective status of an adult patient more easily. 'This helps us to dose more safely and to avoid under- or overdosing,' Dr Mierke confirms. This is a contribution towards increased patient safety within the meaning of the Helsinki Declaration.

Also focused on patient safety, B. Braun adds: 'With the *Space*



Retrospectively over a ten-minute period, VaporView graphically displays the concentration of the currently dosed anaesthetic gas. The grey line shows the inspiratory concentration of gases, the coloured line indicates expiratory. The grey area in between shows the patient's uptake. In addition, the predicted inspiratory and expiratory concentration of anaesthetic over the following 20 minutes is calculated based on patient models. If the fresh gas flow or vapour setting (displayed by the triangle on the screen) change, the predictive curve also changes

Dräger

## HYGIENE

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## England creates multiple Major Trauma Centres

Around 20,000 people become major trauma victims every year in England. Studies have shown that Major Trauma Centres (MTCs) with dedicated personnel and specialist equipment save more lives and reduce the risk of serious disability.

Thus, to offer such victims better chances of survival, a new network of 22 MTCs has been established across the country to provide centralised care, with experts predicting that the initiative could save around 600 lives annually. The project's clinical leader, Sir Keith Porter, Professor of Clinical Traumatology at University Hospitals Birmingham NHS Foundation Trust (which runs the QEH) said: 'This initiative is all about a culture of developing integration and cross-cultivation of specialities to produce the best possible care for our trauma patients.'

The centres have been working towards 'going live' for two years following a National Audit Office (NAO) report in 2010 that found many such deaths from could be avoided if care is improved.

A number of the new MTCs – partnerships working between hospitals to deliver trauma care services in a geographical area – became fully operational in April to treat the seriously injured – head injuries, knife or gun wounds or major damage from accidents.

Working alongside local hospital

GlucoseControl the company has introduced a system for monitoring blood glucose levels in patients in intensive care. Increased blood glucose levels in hospital are not only found in patients with a history of diabetes. Hyperglycaemia and insulin resistance are often also found in severely ill patients.

'Medical studies have shown that controlling blood sugar levels and the introduction of an insulin treatment protocol contribute towards a reduction in mortality and morbidity and to shorter stays in intensive care,' says Jan Hendrik Kwiatkowski, Junior Marketing Manager for Automated Infusion Systems at B. Braun Melsungen AG. Space GlucoseControl ensures regular control, calculates the required dose of insulin using an underlying algorithm and also takes into account the patient's enteral and parenteral diet.

Without such a system control has to be carried out manually. 'A very time consuming method,' Jan Kwiatkowski observes, 'which asks a lot of responsibility from the nurses, as they mostly have to determine the insulin dosage intuitively, and also because strict glucose control always has an inherent risk of hypoglycaemia.'

Thirteen partners from seven European countries have developed this intelligent dosing algorithm – a EU project that also attracted the interest of the German Health Minister Daniel Bahr in Leipzig.

*\* The 2010 Helsinki Declaration for Patient Safety in Anaesthesiology, prepared jointly by The European Board of Anaesthesiology (EBA) and European Society of Anaesthesiology (ESA) provides a focus for improvements in the safety of patient care in Anaesthesiology and related medical fields of perioperative care, intensive care medicine, pain therapy and emergency medicine throughout Europe. The specialty of anaesthesiology has been at the forefront of the patient safety movement for many years.*

trauma units, the 22 MTCs will operate 24/7 and be staffed by consultant-led specialist teams with access to the best diagnostic and treatment facilities.

Previously, patients who suffered major trauma were simply taken to the nearest hospital, regardless of its level of serious injuries skills, facilities. Now, ambulance staff will use a trauma triage tool to assess patients and have the most severely injured taken directly to the nearest MTC for urgent treatment.

The Queen Elizabeth Hospital Birmingham went live at the end of March as a Major Trauma Centre to treat the most badly injured patients from across the West Midlands. It will be one of four such centres in the region capable of delivering specialist care to those with major head injuries, severe knife or gunshot wounds, spinal injuries and amputations.

Evidence has indicated that having a major trauma system could save 45-60 (20%) more lives every year within the West Midlands region – as part of up to 600 lives saved nationally.

In addition to the 22 MTCs across England, there are four in London – at King's College Hospital, Royal London, St George's and St Mary's hospitals – which were the first to be set up.

In the last year around 4,000 people (about 11 a day) have been treated at these centres. Rob Bentley, Director of Trauma at King's and Clinical Director of the South East London Major Trauma Network, said: 'Over the last 12 months, since becoming operational as a Major Trauma Centre, we have seen significant advances in the care of majorly injured patients.'

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ABSTRACTS

The deadline for submissions is August 24, 2012

Topics

- Oesophagus, gastric and intestine surgery
- hepatic-pancreatic-biliary surgery
- colon and rectal surgery
- breast surgery
- endocrine surgery (thyroid, parathyroid and adrenal)
- emergency and trauma surgery
- intensive care, burn, vascular surgery
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- surgical education, medico-legal issues

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SHARING EXPERTISE

# E-Cube 9 convinces with powerful features, outstanding transducer technology and value for money

Following 13 years at the University Hospital Erlangen, in January this year radiologist Dr Boris Adamietz became a partner in the radiological group practice at Herkomerplatz in Munich. So far he has no regrets about his role change. Along with more intense patient orientation and the end of weekend and night shifts, he is pleased with the innovative ultrasound solution in the practice, which is specially customised to the needs of continuous diagnostics in private practices and non-university hospitals.

Ultrasound remains a central diagnostic tool for breast examinations. 'To clarify diagnoses in the context of complementary breast diagnostics there's no point in carrying out a mammography without an ultrasound either before or afterwards,' Dr Adamietz explains.

Although high-resolution mammography can detect microcalcifications really well, ultrasound is vital for differentiation in the case of solid focal findings. 'Particularly in the case of smooth-edged, round lesions, mammography shows us that there is something there, but it doesn't help us differentiate between a cyst or a fibroadenoma, for example. That's why we need ultrasound.'

When a new ultrasound scanner for the practice was chosen, the innovative strength of the equipment was as important as financing and cost. 'We were looking for a scanner that's really good value for money and provides a good B-scan image and Doppler quality. We chose Alpinion's E-Cube 9,' explains Dr Adamietz, who had experienced high-end equipment at the University Hospital. 'The E-Cube 9 has features that other manufacturers



Boris Adamietz

only provide in scanners of higher quality. Alpinion's ultrasound solution is very comfortable, particularly regarding workflow and operational controls, and it can be integrated into the PACS without problems. The single crystal transducer also makes a big contribution towards user friendliness.'

Single-Crystal Technology developed by Alpinion offers higher energy conversion than the conventional piezo element. It achieves more uniform images and a significantly higher sensitivity. Alpinion's 4-D Single Crystal Transducers are not only much lighter than those in conventional scanners, but the use of single-crystal materials also facilitates very large bandwidths, which guarantee higher image resolution and outstanding image quality. 'Alpinion is the first company worldwide to offer this high frequency transducer, which now obviously puts pressure on other manufacturers who have so far not moved beyond 18 MHz transducers. Overall, we can certainly say that Alpinion has succeeded in bordering on the standards of high-end machines, but at a far more reasonable cost, so that doctors in private practice and smaller hospitals can benefit



significantly from this innovation,' Dr Adamietz points out.

Integrated gel warmers, micro pin-less transducer connectors and sliding port covers over the probe connections are also small, but important details that reduce the user's workload.

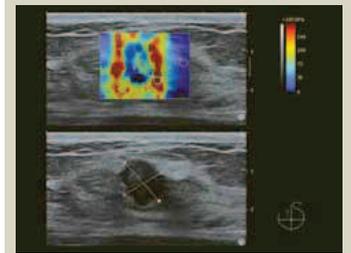
The radiologist is now anticipating the coming year when new software solutions will also make the E-Cube 9 suitable for elastography -- a fine method to observe the observation of patients undergoing neo-adjuvant therapy. 'You not only see how the tumour changes in size but also its elasticity,' he explains, adding that he is currently writing his habilitation thesis on *Elastography for breast cancer*. 'Elastography is the better technology for the sizing of lobular carcinoma and also for chest wall infiltrations. This examination procedure will soon also be possible with the E-Cube 9, so our decision for the Alpinion scanner has turned up trumps -- we have found a powerful scanner that utilises all types of ultrasound examination in breast diagnostics in the best possible way.'

## Study proves benefits of ShearWave Elastography

The multinational, multicentre *Breast Elastography 1 (BE1)* study -- launched in April 2008 and led by Professor David Cosgrove of Imperial College of Medicine, London -- has shown the clinical benefits of ShearWave Elastography in ultrasonic diagnoses of breast lesions.

The study, involving 17 prestigious American and European sites -- the Imperial College of Medicine London, Hammersmith Hospital, London (UK), Curie Institute of Paris (France), DKD Wiesbaden and academic hospitals in Greifswald and Kiel, Schleswig-Holstein (Germany), Yale Medical Center and Northwestern Memorial Hospital, Chicago (USA) -- had two aims. First, to demonstrate that images obtained using ShearWave Elastography are reproducible and then compare ultrasound alone versus ultrasound and ShearWave Elastography combined for breast lesion characterisation.

The goal of the latter was to improve lesion classification in categories BI-RADS 3 and BI-RADS 4, to improve patients' direction towards clinical short-term follow-up or biopsy.



Over 1800 breast lesions were assessed. Clinical Results: 1: ShearWave Elastography features were accurate and reproducible. To determine this, each clinical investigator was asked to perform and compare features on three separate ShearWave Elastography image acquisitions of the same lesion. Results clearly showed that ShearWave Elastography was reproducible both qualitatively and quantitatively:

- Qualitative: 88% of consecutive repeated ShearWave Elastography exams were rated by physicians to be all three similar in appearance.
- Quantitative: ICC rates for ShearWave Elastography measurements were close to perfect, ranging from 0.84 to 0.95.

Reproducibility assures a physician of a reliable and precise lesion evaluation during an exam and over time. Reproducibility is key for reporting, follow up and therapy monitoring.

- 2: ShearWave Elastography increased specificity and Positive Predictive Value (PPV) values.
- 3: Using the ShearWave Elastography Maximum Value (kilopascals), ultrasound specificity increased by 26% with no loss in sensitivity and the PPV for biopsy of the BI-RADS 4a class increased by 122%. Using the ShearWave Elastography Color-Coding of Maximum Stiffness, the specificity of ultrasound diagnosis increased by 28% with no loss in sensitivity and the PPV for biopsy of the BI-RADS 4a class increased by 155%.

The outcome exceeded expectations for Claude Cohen-Bacrie, Executive Vice-President of SuperSonic Imagine and Senior Author of the two study publications. 'The study protocol, as it was designed, did not introduce any a priori on the role of SWE as a complement to B-Mode. These published findings are providing the groundwork for a major clinical breakthrough in breast ultrasound. The results will certainly have an important impact on patient management in an area where the need for improvement in screening, diagnosis and therapy has been a driver for the entire medical community.'

ShearWave Elastography technology provides additional, important quantitative information about tissue elasticity to ultrasound imaging. Unlike conventional elastography methods, which rely on manual compression and measure tissue displacement, no manual compression is needed and true tissue elasticity is measured by the velocity of shear waves as they propagate in tissue. Shear wave propagation speed in tissue is directly related to tissue stiffness.

The generation of a shear wave and its subsequent capture are only possible with UltraFast Imaging -- acquiring images at up to 20,000 Hz, 200 times faster than conventional ultrasound. Shear wave propagation speed is calculated and the colour-coded, real-time ShearWave Elastography map produced shows quantitative (kilopascals), local tissue stiffness.

ShearWave Elastography, which has been used in various organs (e.g. liver, prostate, thyroid and breast) with compelling results, is only available on the Aixplorer MultiWave Ultrasound System.

1. *ShearWave Elastography for breast masses is highly reproducible.* Cosgrove DO et al. *European Radiology* 2011 Dec
2. ICC Intra-class Correlations Coefficient
3. *Shear-wave Elastography Improves the Specificity of Breast US: The BE1 Multinational Study of 939 Masses* Radiology (2012 Feb;262(2):435-449) by Wendie A. Berg, MD, PhD, et al. ©

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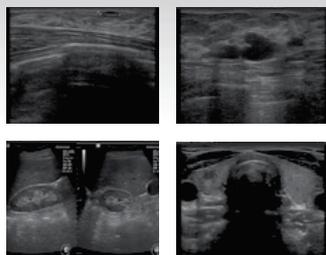
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# Breast MRI

## The (non-)beloved gold standard

Magnetic resonance imaging is a long-established, high-quality and safe examination tool. Why, therefore, do German gynaecologists and radiologists question its value in breast cancer diagnoses? Indeed the question 'Breast MRI - yes or no?' has split the medical community. One ardent champion of breast MRI is Professor Christiane Kuhl MD, director of the diagnostic and interventional radiology clinic at Aachen University Hospital, who explains why she believes this is still the gold standard for the detection of early-stage breast cancer

'In the past few years, even though there have not been any real technical advances that improve breast cancer diagnostics, MRI is still the best method to detect breast cancer - including those lesions that mammography and/or ultrasound do not detect,' explained Professor Christiane Kuhl, whose experience at Aachen University Hospital is that well produced breast MRI will convince even the most sceptical physician. 'Within a very short time at our institution MRI was able to change the hearts and minds of many colleagues although the technology is more expensive than other options. The results of MRI speak for themselves. They do not need advertising.'

Not everyone in Europe shares this opinion as two recent studies, conducted in the Netherlands and Great Britain, show. Both aiming to improve pre-surgical staging, they arrived at the conclusion that MRI does not enhance surgical planning but seems to lead to an increase in mastectomies. Prof. Kuhl begs to differ. 'One explanation for this rather surprising result may be the fact that, at many institutions that participated in the study, breast MRI had previously rarely, if at all, been used for surgical planning. Thus MR-guided biopsies were not available. Obviously surgical planning cannot be improved if the MRI findings cannot be histologically assessed.'

She calls it 'scandalous' that in the participating centres 'mastectomies were performed without histological confirmation - on suspicion, so to speak. In Germany, that is inconceivable and even illegal'. The studies' conclusions that breast MRI increases the rate of mastectomies is, Prof. Kuhl believes, 'with all due respect - complete nonsense'.

Without a doubt, she concedes, all imaging modalities have their blind spots; however, they are of different sizes and in different locations. Those blind spots can be offset with the help of other modalities. 'When you have been working with all three imaging modalities - ultrasound, mammography and MRI - for years you gain a very clear idea which modality is superior when, how and why. You also can say precisely why, in a certain clinical situation, you can rely on one modality but not on the other, even though the other one might be your favourite modality. You know when for example you'd better stick to mammography.'

The expert is also convinced that, particularly in breast diagnostics, too many scientifically



Christiane Kuhl MD

unfounded methods are introduced only to disappear as quickly as they appeared. Case in point: impedance tomography and sestamibi breast scintigraphy, two technologies that enjoyed a short boom in the mid and late 1990s but sank into oblivion. 'Today tomosynthesis, shearwave elastography, contrast-enhanced digital mammography and positron emission mammography are the flavours of the week.'

However, research results quickly show the limitations. As far as positron emission mammography (PEM) is concerned, studies in the USA have shown good results but also made abundantly clear that PEM

can only visualise function and metabolism, but not morphology. 'The observation that PEM has a higher specificity can be explained by the fact that it is easier to interpret and facilitates the recommendation of a biopsy.' Whether PEM indeed improves the diagnosis and saves lives remains to be seen, the professor points out, since indeed, because of the modality's higher specificity, it may well be that women are denied life-saving surgery.

There is also cause for optimism with regard to the use of MRI in breast cancer diagnostics: any new method is and will be compared to MRI. 'Even tomosynthesis results are compared to MRI results. That is the mark of approval for this modality, the acknowledgement that, despite all scepticism, MRI is the gold standard,' Prof. Kuhl confirms.

Within the past two years, she says, there have not been any real technical innovations in breast MRI. Additionally, despite all the ballyhoo surrounding image fusion, clinically usable methods are not in sight for breast MRI. 'Breast

MRI is performed with the patient in prone position, for ultrasound the patient lies flat on her back and for mammography the breast is compressed with the patient standing upright. Consequently, you get three entirely different configurations of the breast, which makes analysis of the findings of the three modalities extremely difficult.' One possible fusion, she suggests, is the combination of ultrasound during an MRI exam with the breast coil. However, in view of the enormous technical requirements and concomitant costs, Professor Kuhl does not consider this type of fusion to become a routine option in the short term.

## German breast screening

### Success: A higher detection rate of smaller tumours and carcinoma without lymph node involvement at follow-up

Germany's mammography screening programme, introduced in 2005, was rolled out across the country in 2009 for women between the ages of 50 and 69 years.

The mammo screening coordination office, which heads up and monitors the country's 94 screening units, has published for the first time an evaluation report with follow-up examinations after a two-year period. 'We are well on our

way for women with small tumours that have not spread. The affected women also benefit from a gentler and mostly breast-preserving therapy,' Dr Bock pointed out.

Larger tumours (more than 2 cm), which are less favourable from a prognostic point of view, make up only 23% of all invasive carcinoma detected at the first screening and 19% at the follow-up screening, whilst this figure was 40% before the introduction of screening. 80% of tumours detected are invasive, i.e. metastasising carcinoma. At the point of the first screening there was no lymph node involvement in 75% of women, and at the second screening this percentage even increased to 79%.

However, the screening coordination office is concerned that only around 50% of those invited for screening take up the option. Dr Bock sees the best advertisement for screening is those good results: 'There are fewer deaths, fewer amputations and less invasive treatment.'

She does not believe that a legal obligation is the way forward, but that the correct and comprehensive education of women as the basis for voluntary participation in screening is very important. The involvement of GPs and gynaecologists in screening conferences is a further measure to increase the acceptance of screening. Due to the women's increased life expectancy the gynaecologist also advocates the extension of the examination age to 75 years. 'I consider the statistical rationale that women over the age of 70 are more likely to die from a diagnosis other than breast cancer to be problematic. The current limitation of screening only up to the age of 69 goes back to a time where the average life expectancy of women was 75 - that figure has now increased to 85 years.'



Karin Bock

way to lowering the breast cancer mortality rate and hope that we'll be able to present figures by 2018 similar to those in the Netherlands, where the mortality rate for women dying from breast cancer has dropped by up to 35% thanks to screening,' explained Dr Karin Bock, head of the mammography southwest reference centre in Marburg.

Reliable information on the effects of screening on mortality can only be made around 9-12 years from the start of the screening programme; in Germany this would not be possible until 2015. However, even seven years after the introduction of screening in the first German States, success is clearly visible: 30% of all invasive carcinomas detected at the first screening examination are smaller than 10mm in size. At follow-up after two years this figure even increases to 35%. By comparison, before the introduction of screening this figure was only 14%. 'The best chances for successful treatment are those



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See the future

'We are very pleased to be able to offer our patients top quality and, most importantly, very precise radiotherapy,' said Professor Wolfgang Mohnike, Medical Director of the Diagnostic and Therapeutic Centre (DTZ) in Berlin – one of the leading outpatient cancer centres in the city. The newly equipped Radiotherapy Centre at the DTZ was inaugurated at the beginning of June and the new equipment – the TomoTherapy HD and the linear accelerator Elekta 160 MLC – was introduced to the public.

pointed out. This shortens the required treatment time significantly. 'A simple prostate treatment can now be carried out in five minutes, more complicated and dispersed tumours can be radiated in up to 15 minutes,' he explains.

Due to radiation from all angles around the body, the tissue surrounding tumours and organs can be far more effectively protected than before. This also facilitates the radiation of highly sensitive areas, such as acoustic neuromas, and also enables re-radiation: 'Previously it was only possible to treat vertebral tumours just once, but with the 360° rotational radiation we can now treat them again if medically indicated,

## Targeting several tumours simultaneously



TomoTherapy HD opens up new dimensions in cancer treatment

Using TomoTherapy HD, the X-ray source moves around the patient in a 360° rotation so that the tumour is radiated from all sides during treatment and its volume is optimally targeted. Combined with a fully automated examination table, this all-round radiation also enables the sequential treatment of up to three tumours simultaneously.

HD stands for Helical Direct. 'Helical' refers to the 360° rotational movement of the X-ray source around the patient; 'Direct' refers to the ability to choose a certain rotational area, i.e. being able to stop the rotation during the treatment process, as is necessary in breast cancer treatment.

That rotation is unique to this new technology. 'We can, for instance, radiate the entire neural axis, i.e. the entire brain including the complete spinal cord in one treatment session,' explained Dr Hendrik Herm, Radiation Specialist at the DTZ. 'Assuming you have a patient with lung cancer, an individual brain metastasis and a bone metastasis in the pelvic region,' he said, 'we used to have to separately adjust the X-ray source each time, depending on the location of the tumour or metastasis respectively, and the patient might have had to be moved. Now this is fully automated and done in just one go.'

The radiation dose also can be individually adjusted during rotation and the radiation source reacts flexibly to changes in the radiation field, Dr Herm



Wolfgang Mohnike (left) and Hendrik Herm

because the highly sensitive spinal cord can be completely spared from radiation,' Dr Herm pointed out.

The TomoTherapy HD System is supplied with the PET-CT data on the position, size and characteristics of the tumour exactly as is with the help of the 'syngo-via' software. A low dose CT then double-checks the target volume again immediately before the start of the treatment to capture any possible changes which may have occurred. For prostate treatment in particular the status of the bladder and rectum are important for tumour localisation and radiation. From 1st July the second TomoTherapy HD System in Germany (the first machine is located at Heidelberg University Hospital) will be operational at the DTZ. The treatment is available to all patients because both statutory and private medical insurers cover it.

# The impact of imaging on personalised cancer medicine

Enormous technical developments over recent decades, along with greater understanding of tumour biology, have made imaging, pathology and laboratory medicine indispensable tools in personalised cancer treatments. Professor Hedvig Hricak, Chairperson of the Department of Radiology at Memorial Sloan-Kettering Cancer Center in New York, highlighted opportunities for advancing personalised cancer medicine through imaging at this year's EFO, where EH Correspondent Bettina Döbereiner met up with her



Hedvig Hricak

Professor Hedvig Hricak, who prefers the word 'precision' to 'personalised', explained that in precision medicine, biomarkers are essential for precise diagnosis, therapy selection, therapy monitoring and early detection of recurrence. 'To take a somewhat simplified view – three types of biomarkers are of special importance in cancer care: prognostic biomarkers for anticipating patient outcome regardless of the specific treatment, predictive biomarker for the outcome of treatment with a specific drug or other form of therapy, and early response biomarkers. Complementing the more widely accepted tools of pathology and laboratory medicine, imaging can provide important additions to the biomarker armamentarium.

'Perhaps the best way to explain the importance of imaging as a source of biomarkers is by giving an example: Consider a patient with breast cancer metastases in the brain. Today, for many targeted therapies we require biopsy before treatment selection, because we have learned that up to 30 percent of metastases de-differentiate – that is, have a different molecular profile than the primary tumour. Furthermore we have learned that there is tremendous heterogeneity in the genomic landscape of tumours, and that this heterogeneity can be found within and between tumour metastases in the same patient. It would be difficult to biopsy a single brain lesion, let alone obtain multiple biopsies from the same lesion or from different lesions in the same patient. Molecular imaging with different targeted tracers is the only answer for assessing the vast heterogeneity of cancer.'

### Then it's important in the selection of the right treatment?

'Correct. It's very important to know if metastases will respond to a treatment that targets the genetic signature of the primary tumour, or if they require different treatments. Imaging is indispensable for this purpose, especially when metastases are located in highly sensitive areas that are difficult to biopsy – such as the brain – or if there are more than two metastases, because it would be impossible to biopsy each one. We, and others in the field, have developed a number of novel radiopharmaceutical cancer specific tracers that can image a biology of a specific cancer metastasis – so we can now go beyond detection, which was the hallmark of anatomic imaging, to characterise the metastasis and thus choose the best treatment approach.

### You mentioned that imaging biomarkers are also used to assess early response?

'Yes, because sometimes, even if you've selected a certain drug based on the tumour's specific characteristics, the tumour host reaction, that is to say the person-drug interaction may be different than expected. So, with molecular imaging, we can assess very early on if there is a response, or not.'

### Where else is imaging in personalised medicine important?

'It's also very important for drug development, because we can use it to better select patients for clinical trials and obtain proof of principles sooner. For example, we performed a clinical trial for the new drug MDV3100, a form of androgen deprivation therapy, for metastatic prostate cancer. The

conventional follow-up CT scan showed no change. In the past, when we used CT findings as the measure of tumour response, we'd have thought that the therapy had failed. Adding the new molecular imaging technique of FDHT PET/CT, an androgen receptor imaging, we saw a tremendous response following androgen deprivation therapy. So, to see the effects of targeted therapy, we need targeted imaging.

### Is the FDHT tracer already on the market?

'Unfortunately not; In my lecture I showed a list of 23 radiotracers that we have in clinical trials at MSKCC, and I don't know if you noticed, but the last column indicated that most of the tracers are being used under Memorial Sloan-Kettering Cancer Center FDA INDs for in-house use of those tracers. So we use a special FDA-approved mechanism to obtain permission for in-house use of those tracers.

'Addressing regulatory requirements is a huge hurdle to widespread dissemination of new molecular imaging tracers. We need far more specific tracers than the commonly used tracer FDG, which shows only the metabolism of glucose. New radio-tracers can be specific for a common feature of tumour biology as in the case of FMISO, which evaluates hypoxia or specific for a certain kind of tumour as in the case of an androgen-receptor imaging for prostate cancer.'

### Why aren't these new radiotracers on the market?

'It's a regulatory problem: They still aren't FDA approved. I think today the regulatory approval and dissemination of molecular imaging agents are a bigger problem than the development of such agents. There is an urgent need to solve this problem and translate new radiotracers more rapidly to the clinical setting.'

## The dose stops here

Low doses are a major issue among radiologists – but dose management for every single patient, every single system and across modalities is a quite different issue

Assessing the amount of radiation exposure to a patient and the amount of radiation that is really saved by dose-reducing measures is very difficult for the radiologist. DoseWatch, a new software solution by GE Healthcare, tracks and collects dosimetric data of all X-ray-based modalities, documents the effects of dose management procedures and warns the user when pre-set thresholds are about to be exceeded.

'The introduction of new dose reduction technologies in a hospital is often applauded, but quite as often the initial euphoria quickly subsides. In the beginning, everybody is eager to apply the new solutions but after a while the data flood is unmanageable,' says Marc Jopek, sales manager for DoseWatch at GE Healthcare. 'While some RIS show the dose, it is only DoseWatch which allows the user to collect the patient data, to access the dose-length-product (DLP) for each single exam and to react immediately when the reference value is exceeded.'

In such a case an automatic dose alert is triggered. 'In a combined protocol the values are added in order to determine the thresholds,' Marc Jopek explains. 'Moreover, DoseWatch calculates the average value per protocol as well as the double average as a dynamic limit. That means a well-equipped system and a well-trained team will easily be able to stay below the reference value.'

A major advantage: the software tool is manufacturer-independent. Located on a server it integrates into the internal imaging network and connects to the hospital RIS and PACS. This infrastructure offers highest

data security. All pertinent details can be accessed with a few mouse clicks such as dose history by patient, anatomical region and modality or acquisition parameters.



Marc Jopek

In addition, DoseWatch analyses whether certain peaks are observed, for example during night shifts or even with certain team members. Thus DoseWatch becomes a virtual radiation protection officer that allows full assessment and control of the internal workflows.

# Tackling cancer information overload

**Cancer specialists everywhere increasingly face new findings from molecular biology. Genetic profiling of tumours opens up entirely new perspectives on the disease. How to cope with and integrate new insights into cancer diagnosis and treatment was among key issues discussed at the 2nd European Forum on Oncology, held in Berlin this May**

Due to demographic ageing, scientists such as **Professor Richard Schilsky**, Deputy Director of the Comprehensive Cancer Centre, University of Chicago, foresees that cancer will soon overtake cardiovascular diseases as the most common cause of death. In his lecture during the 2nd European Forum on Oncology, he projected 13.2 million deaths worldwide from cancer by 2030 and more than €150 billion Euros spent on cancer treatment.



Richard Schilsky

Ulrik Ringborg

Unsurprisingly, there was full agreement among participants: in terms of cancer prevention, healthcare policymakers need to take more action.

A new perspective on disease has evolved - the molecular angle - which changes almost everything. For example, keenly discussed was how to tackle the diversification of non-small cell lung cancer, which splits into a variety of still unknown subtypes, characterised by a specific genotype.

#### Wanted: rapid-learning systems

*'All in all the amount of data a physician has to be able to process now, to deliver care to a single patient, is becoming overwhelming,'* according to Prof. Schilsky. Therefore, rapid learning healthcare systems are indispensable.

At the George Washington University, a rapid learning project for healthcare, funded by the Robert Wood Johnson Foundation, is exploring strategies for the USA to merge compatible electronic health records from private and public sectors into research databases and rapid-learning networks that contain clinical information of millions of patients. The aim of this project is to gather information on new treatments, drugs and medical technologies much faster than is currently possible so that physicians can immediately apply the findings in medical practice and better tailor care to patients.

#### The EurocanPlatform

The professor also foresees a change in cancer research and the framework of clinical trials: *'International collaboration and sharing will be essential to make progress in developing new therapies for increasingly rare and small subsets of different types of cancer.'*

In Europe, several promising approaches to enhance such collaboration are

already underway. Professor Ulrik Ringborg, Director of Stockholm's Karolinska Cancer Centre, presented one - the EurocanPlatform - a network of leading EU cancer research institutes that also served as scientific advisor to the European Forum on Oncology. The EurocanPlatform goal is to coordinate and structure European cancer research and facilitate the swift transfer

of results from research to prevention, early detection and patient care. 28 European cancer institutes and societies now collaborate within the EurocanPlatform.

#### Prevention

According to Prof. Schilsky, the lives of millions of people worldwide could be saved by tobacco control, enhanced vaccination against infections

and equal access to healthcare. The forum participants agreed that European healthcare policymakers need to take more action to bring forward measures of prevention.

The next European Forum on Oncology will be held for the first time in Brussels and it is hoped that this could strengthen demands on European healthcare politicians for more prevention.

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'The holy grail analogy occurred to me because radiologists – particularly when imaging the liver, wanting to do the best for the patients – have searched for answers without really knowing what they are looking for,' explained Professor Richard Baron. 'Similarly, during the Middle Ages, the knights searching for the holy grail actually didn't know what the grail looked like, they didn't know where to look for it and they didn't even know what the grail could do for them if they found it.'

## EUROPEAN HOSPITAL

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



[www.european-hospital.com](http://www.european-hospital.com)

**Editor-in-Chief** Brenda Marsh  
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### Correspondents

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### UK editorial address

55 Wey Meadows, Weybridge, Surrey KT13 8XJ

### Subscriptions

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

### Subscription rate

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

**Printed by** Frotscher Druck,  
Darmstadt, Germany

**Publication frequency** bi-monthly

**European Hospital** ISSN 0942-9085

### Representatives

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

**Germany, Austria, Switzerland:**  
Ralf Mateblowski, Hintertgasse 1, 55234 Hangen-Weisheim, Germany  
Phone: +49 6735 912 993  
E-Mail: rm@european-hospital.com

**France, Italy, Spain:** Eric Jund, 2264 Chemin de Sainte Colombe, 06140 Vence, France  
Phone: +33 493 58 77 43  
E-Mail: ej@european-hospital.com

**GB, Scandinavia, BeNeLux:** Simon Kramer, Willem Alexander Plantsoen 25, 2991 NA Barendrecht, The Netherlands  
Phone/Fax: +31 180 6200 20  
E-Mail: sk@european-hospital.com

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

**South Korea:** CH Park, MCI, Room 103-1011, Brown Stone, 1330, Baekseok-dong, Ilsan-Ku, Goyang-si, Gyunggi-do, Korea 410-360  
Phone: +82 2 730 1234  
E-Mail: ch@european-hospital.com

### USA & Canada

Hanna Politis, Media International, 8508 Plum Creek Drive, Gaithersburg, MD 20882, USA  
Tel: +1 301 869 66 10  
E-Mail: hp@european-hospital.com

# LIVER IMAGING

'My lecture focuses on reviewing the dramatic improvements radiologists have made in the past 30 years in their search to 'do good' in liver imaging. Similar to the knights, radiologists have been a little narrow in thinking only of what they see in front of them rather than what the patient and clinicians are looking for, or needing. We keep looking to find smaller and smaller tumours on CT. However, if our findings do not affect patient outcome, we are not answering the question of how we can help this patient. We need to define how we can impact on patient care and give information and answers that will help our referring physicians and the patients.'

Isn't it important to see the smallest tumours? 'Yes, of course that's an example of how we have certainly improved helping patients over recent decades but, in the course of this lecture, I gave some examples where in fact it didn't make a difference or even may have negatively affected patients. It's really terrific how we've improved our technology, but the process that provided the best gain wasn't the specific search for a smaller tumour; it was the process of taking the walk.'

'My point is: it is the search that teaches you the most, and how you look around and see what you are seeing and how you are affecting people. When you look at the radiology literature from the very first CT scans in 1978 with very low resolution, until today, you've got thousands of papers and every single one says that we see 80-90% of liver tumours. That's what they said in 1978. The technology got incredibly better and in 1988 the papers still said we see 80-90%. The technology got

**For his Wilhelm Conrad Röntgen Honorary Lecture at ECR 2011, Professor Richard Baron MD (right) from the Radiology Department at the University of Chicago, USA, focused on Detecting liver tumours: the search for the Holy Grail. Why does he compare this aim with that of the medieval knights?**



even better with helical CT and MR and in 2000 the papers still said we see 80-90% of tumours. It's part of the process that we are learning how to search better. Obviously we didn't see 80% of tumours 30 years ago, although the scientific papers would say we did. The researchers were very honest people; they were sincere and serious. It's just that the process of searching has taught us so much and we've learnt how to do it better, including learning the appropriate gold standard to evaluate our efforts.

'The professor has no doubt that 'magnetic resonance imaging and the associated contrast agents that have evolved over the last 10 to 15 years for liver imaging have enabled us to detect and characterise tumours in ways we never could have done 20 and 30 years ago. MR is the top modality. It's been very important to search for the best technology, but that's just part of the solution we're looking for. In fact, we also have so many false positives because we see these little things now, so that we may be adversely affecting patient outcome. We may deny them treatment because our techniques are so sensitive that we see meaningless things that are assumed to be significant.'

'We need radiologists who use their cognitive skills to integrate

the patients' clinical data, their history and the current imaging, and we have to be translators who understand the language of imaging, including the nuances of meaning that occurs in different clinical settings, as part of a team to determine the best patient outcome. Radiologists need to be clinical physicians who understand clinical medicine and can integrate imaging findings and discuss with referring clinicians. Thus I'm looking back to the future: radiologists need to be practicing physicians. We should not lose sight of the important role of a radiologist who understands clinical medicine.'

Most often, a combination of ultrasound and CT are used for liver imaging,' he explained, 'Both technologies have greatly improved over the last 20 years and they are really wonderful for staged screening examinations. While MR is probably the most superior technology, it's the most expensive and there's limited access to it. We use MR as a problem solver, or in certain specific situations, but having said that, MR is increasingly becoming the standard examination with patients at high risk of liver disease. For patients with hepatitis, for example, who are at risk for hepatocellular carcinoma, we rely very heavily on MR. Even

so, the prevalence of chronic liver disease is so high, we typically screen more with ultrasound and when we suspect more serious problems we move to MR.'

'We occasionally use PET-CT, but not as much as for other parts of the anatomy. Since the liver has so much inherent metabolic activity PET-CT has not become a mainstream modality for the detection of tumours. Occasionally we'll use it for characterisation but, as far as the liver is concerned, it has not significantly changed the way we approach patients.'

How important is the interdisciplinary approach? 'That's another analogy to the search for the holy grail: it's who you interact with and encounter in your processes that can have such a large impact on what you learn, and may even be the key value more than ever finding the grail. So, in my searching for the Holy Grail I'm interacting extensively with hepatologists and surgeons and they teach me what it is they need to know to effect treatment. This is very different from me saying: I want to optimise how many of these lesions I can see when I may not know what they are when I see them.'

'My colleagues have taught me a crucial lesson: sometimes these lesions are important to find and sometimes they aren't. Without those multidisciplinary interactions we don't function well as radiologists – for a variety of reasons, not just in the specific case: How do I take care of this one patient? I educate my clinical colleagues as to what radiology and imaging can do for them and their patients and then they educate me as to what they need to learn to effect patient management. Then I can help to determine whether imaging can answer those questions. It's the communication that's essential – not just for taking care of patients but also for optimising the lifelong education process.'

**Professor Hans-Ulrich Kauczor looks forward to 'lung MRI being as easy as a knee MRI is today, with fewer sequences and examination times of no more than 15 minutes'. Thus MRI will replace CT exams, which usually have to be performed several times and thus generate higher radiation exposure. MRI screening for lung lesions and whole-body MRI for staging of lung carcinoma will increase.'**

There is often a thin line between prognosis and mere hope, as Professor Kauczor is well aware. His particular hope is that native CT will be replaced. 'I am convinced that technologies such as dual energy or spectral CT will allow us to perform all chest CTs with contrast agents, as long as there are no counter-indications. From these contrast-enhanced studies we'll be able to cull all native information, such as densitometric data.' Instead of the current two examinations there will only be one – which would be a significant reduction in radiation exposure. 'This is a step towards quantifying analyses, which we need not only in chest imaging,' he explains, referring to his vision of a structured diagnosis that goes well beyond the thorax.

With regard to lung imaging Prof. Kauczor demands that, '... we look at the whole picture:

## Viewing the lung in 2022

To avoid any misunderstanding, ten years from today CT and MRI will still be the pillars of lung imaging. However, Hans-Ulrich Kauczor (right), Professor of Radiology and Medical Director of the radiology clinic at Heidelberg University Hospital, is convinced the emphasis will have changed. MRI will be the routine modality that replaces CT in many indications. The loser in this battle of modalities may well be X-ray. Today ubiquitous, the two-plane chest X-ray, might become obsolete, he points out, because CT radiation exposure will be lowered to X-ray levels, making the two modalities interchangeable



lungs, interpleural space and heart. The thorax is a functional unit and, in the future, image quality will visualise the entire unit in a meaningful way'. In less than a decade, he hopes it will be possible to perform prospectively ECG-triggered CT lung scans that will allow assessment of the lung, coronary arteries and overall cardiac function in one image. In such a scenario, turf wars between cardiovascular and thoracic

radiologists are sure to come, but he has little patience with such – as he calls them – artificial categories. 'When you look at diseases with identical or similar risk factors, it's frivolous to focus on one issue and disregard the other. Take smokers, for example: supra-aortic vessels such as the larger arteries in the thorax, heart, lungs and respiratory tract are implicated. Therefore, we must look at the big picture in

order to assess the situation comprehensively.'

Professor Kauczor's approach to possible turf wars with regard to the hybrid systems PRT-CT and MR-PET is similarly pragmatic: 'If the hybrid devices are really the future of nuclear medicine it would make sense for nuclear physicians to move towards radiology. It is important not to quibble about who operates which machine – who examines which patient and who sees what in which image – but to cooperate. We need to jointly exploit the potential of the hybrid systems and define their role in the clinical workflows.' Ten years from now PET-CT will most likely play a minor role in lung imaging, apart from certain specialised applications, the professor predicts. However, MR-PET will be a different story. FDG will no longer be the major tracer since it triggers too many further examinations to be able to confirm or exclude certain findings. One alternative might be the proliferation tracer FLT, although it still needs to prove its usefulness for lung cancer.

# Future radiology infrastructures

'Radiology will increasingly be organised in centres in, at and around hospitals that provide both in- and out-patient services,' Professor Hamm predicts. In, at and around are more than spatial descriptions. They are associated with content. In the hospital' refers to centres operated by the hospital or a medical care centre; 'at the hospital' describes centres jointly operated by hospitals and office-based radiologists and are located at the hospital and 'around the hospital' are interdisciplinary medical co-operations located in the hospital where equipment is jointly used. In such an environment, he is convinced that interlinkage of in- and out-patient care will increase. 'There will be a concentration process in the in- and out-patient departments and the combined areas that will lead to significantly larger units than we currently have.' In the future, he adds, regional radiology co-operations and teleradiology networks will serve smaller healthcare facilities. Thus out-patient centres with more than 20

## There will be centres in, around and at hospitals

When asked about his vision of imaging in the year 2020, Professor Bernd Hamm MD, director of the three radiology clinics at the Charité University Hospital in Berlin, qualified his focus: 'Technology is always only a vehicle. When we talk about road traffic, we don't talk about the design of cars but about structural issues'



On the other hand, emerging clinical disciplines increasingly want to integrate areas of imaging into their realms – such as MRI or many interventions. 'Continuing training committees, physicians' associations and other medical bodies need to ensure that radiology maintains its sharp profile and broad range,' he emphasises.

### Hybrid imaging

Prof. Hamm predicts that hybrid imaging, a combination of PET/CT, MR/PET or SPECT/CT, will shape the future of imaging. Yet again, it is not so much the technological wizardry that interests him, but the structural setup: 'Radiology and nuclear medicine will move closer together. In the mid-term I expect the combined specialist physician for diagnostic radiology and nuclear medicine to materialise. Image fusion is also more than a buzzword for the professor,

because 'it challenges radiology to expand its competencies – in all areas of slice imaging and ultrasound.'

He is convinced that image fusion, contrast-enhanced ultrasound and ultrasound elastography will give a boost to sonography and this modality will regain significance in radiology.

Last, but not least, there is molecular imaging. 'At the moment the initial euphoria has given way to certain disillusionment. Molecular imaging has yielded spectacular results in experiments. However, translation into clinical practice – with the exception of nuclear medicine – has not been successful.' Molecular imaging, he adds, will only prevail if the technology can prove not only diagnostic but also curative relevance. Negative case in point: tracers to diagnose Alzheimer's disease. 'What use is it to be able to diagnose Alzheimer's disease but the diagnosis does not have any therapeutic implications because, at this point, no treatment is available?'

specialised physicians are likely to fare well.

This centralisation, he explains, 'is not only a result of economic pressure, but also of the increased specialisation in the medical profession'. The different clinical disciplines want and need ever more specialised high quality radiology because they heavily rely on imaging. However, today's economic and clinical interests sometimes conflict. Specialisation has created high clinical

competency, as the professor notes: 'Today, radiology is extremely good at diagnostics and thus assumes more clinical responsibility. The full potential of these two skills – imaging and diagnosis – has to be exploited. This, however, requires radiologists to be more closely involved in patient management and responsibility for the patient.' In the coming years, he anticipates a significant increase in image-guided minimally invasive treatments.

## The digital broadband MR experience

Ingenia 3.0-T, the digital broadband MR system launched by Philips at RSNA 2010, is today used in almost 200 hospitals worldwide. Eight months after the installation of an Ingenia at Germany's Bonn University Hospital, the radiology department's managing physician Dr Winfried A Willineck sums up her experience with this new technology that is increasingly competing with whole body CT and pet-CT

To be fully digital the Ingenia 'reinvented' signal transmission. Rather than converting the signal with an analogue/digital transformer in the technology room or in the magnet, the MR signal is digitised directly in the radiofrequency coil. A newly developed super small chip, which can resist the strong magnetic field, is the Ingenia's ingenious aid.

In conventional MR technology the signals that are transmitted in bundled copper cables are in each other's way, which creates image noise. 'In a fully digital system the additional signal is used to exploit the potential of parallel imaging, for example to increase spatial resolution and the field-of-view and to decrease echoes, which in turn reduces artefacts. That's a dream come true for the radiologist. In addition, since the measuring times are shorter than before we can avoid complicated respiratory triggering and instead can examine in short breath holds. The examination time for a whole body MR scan has been reduced to less than ten minutes and the system offers functional PET-like images. Clearly,' Dr Willineck believes, 'the modality now competes with PET-CT and multi-slice CT.'

The digital coil increases the signal-to-noise ratio by 40-50% depending on the type of exam. Previously, the field strength had to be increased. 'The new technology reduces noise and at the same time increases flexibility. A new 3-Tesla whole-body magnet offers a field of view of 500 x 500 mm,' she explains. The coils can be accessed and controlled individually because each Ingenia receiver has an independent IP address.

This feature and the fact that the coils are integrated in the gantry facilitate patient positioning since the coils no longer have to be exactly placed. The new 70 cm bore increases patient comfort significantly during an examination – similar to a CT, the patient is placed feet first and hands below the head.



Winfried A Willineck

## Predicting the future of neuroradiological imaging

### As this decade ends we'll be watching the brain think

Although anticipating very important technical developments, Professor Olav Jansen MD (right), President of the German Society for Neuroradiology (DGNR) and Director of the Institute for Neuroradiology at Schleswig-Holstein University Hospital in Kiel, Germany, foresees even more important crucial advances in stroke therapy



Speaking of potential advances for neuroradiological imaging, Professor Olav Jansen says: 'As far as diagnostic imaging is concerned, MRI is without a doubt in the focus.' He also expects molecular imaging techniques that visualise morphology as well as function will become available for clinical use by the end of the decade. So far, research into physiological processes and disease diagnoses at the molecular level are limited to animal studies. 'In the end, we need to go beyond morphology, beyond watching the brain think toward visualising brain functions,' he stresses.

There are two routes that lead towards molecular imaging, the professor explains, one of these being increased resolution: 'I'm convinced we will see 7-Tesla imaging, at least with regard to the central nervous system (CNS), in clinical use.'

The other route is the development of new imaging methods, such as magnetic particle imaging, in which dynamic body processes are imaged in the MR scanner without radiation exposure for patient and examiner. Last year, the German Federal Ministry for Education and Research founded MAPIT (magnetic particle

imaging technology) to promote the development of MPI. Other promising examples are hybrid modalities such as PET/CT and MRT/PET, the combination of computed tomography, magnetic resonance imaging and positron emission tomography.

Professor Jansen particularly forecasts significant changes in stroke therapy. 'In the coming decade we'll most likely see the fusion of angiography and computed tomography, which is in fact the fusion of primary cerebral imaging and therapy in one device.'

Whilst initial developments in this area are promising, image quality does not yet offer satisfactory visualisation of brain tissue; additionally, perfusion measuring is not yet available. Today, the first-line diagnostic imaging procedure for stroke patients is a CT scan. If the physician in charge decides to perform an angiography in order to open the clogged vessel, the patient is moved to a different room where the intervention is performed. In the future, CT and angiography will be done with a single system. 'Being able to do diagnosis and therapy on the same table saves about one crucial hour;

and we know: time is brain.'

Stroke – a major public health issue – is currently treated with an endovascular intervention. 'For the past two years the trend has clearly been towards severe strokes being treated by neuroradiologists, rather than radiologists. Catheter-based therapies yield much better results than a systemic lysis,' the professor points out. Furthermore, thrombolysis is not indicated for vessels of more than eight millimetre diameters.

According to recent studies, the outcome of angiographic neurothrombectomy in severe strokes is good in up to 60% of the cases, while thrombolysis achieves positive outcomes in 20 and 25% of cases. 'That's a dramatic improvement,' he concludes. 15% of all strokes recorded in Germany are classified as severe – which means that 25,000 patients are affected each year.

'The major public health challenge will be the setting up of structures that will provide all patients with severe strokes, all over the country, with endovascular therapy.' Consequently the idea of local stroke units that treat all stroke patients needs to be rethought. Far better, he recommends stroke networks with one neurovascular centre that offers endovascular therapy 24/7. In this concept the problem of patient transport is less crucial, since the time window for endovascular therapy is greater than that for a thrombolysis, which needs to be initiated within four and a half hours after the stroke. Prof. Jansen: 'For recanalisation the window is eight to nine hours – in some cases even 24 hours.'

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