Pandemic panic sends feathers flying

The rare herb Star Anise* grows on small trees in a few provinces of China. It is used for its pungent (liquorice-like) flavour in cooking. But the seeds also contain a special ingredient - shikimic acid - and this has taken on world importance. The acid is used to make the drug Tamiflu (oseltamivir phosphate), the influenza treatment thought to be the only one currently available that might reduce the severity of an attack by the avian virus H5NI, the ‘bird flu’ that, in humans, has caused around 60 deaths and over a hundred illnesses so far. These cases are not many, but the cry of ‘pandemic’ is rising because infected birds have been suspected or confirmed in parts of Europe.

There is little agreement about the actual danger to humans - the threat to people would be serious only if the virus develops into a form that can spread from person to person. The situation has raised a multitude of questions. Meanwhile, politicians and health organisations in Europe, as elsewhere, are under pressure to ensure that if a H5N1 pandemic does occur, their populations will receive the best treatment available to combat this infection. Some are not so sure they want to join the panic zone. In Switzerland, Interior Minister Pascal Couchepin (with responsibility for health issues) has said that it is almost impossible for people to catch this influenza and he has criticised the ‘hystera’ surrounding it.

Meanwhile, Markos Kyripanou, EU health commissioner, advised having enough antiviral medicine to cover 25% of the 450 million people in the union. Belgium’s Health Minister then suggested that the EU buy antivirals and not depend on individual governments to purchase them.

Meanwhile, 30 countries have placed extremely large orders with Roche for Tamiflu, among them France is reported as having 15 million doses of Tamiflu ready for continued on page 3

Top private hospitals acquisition

Germany - Fresenius AG has entered into an agreement to acquire Helios Kliniken GmbH, in Fulda, Germany. Helios is stipulated for having medical quality standards of the highest level in the industry. With expected sales of around €1.2 billion in 2005 the company ranks among the largest and financially most successful private hospital chains in Germany.

The acquisition of HELIOS will establish Fresenius ProServe as one of the leading private hospital operators in this country and create a strong third business segment within Fresenius Group. ‘The hospital management business in Germany has been our clear focus following the streamlining of Fresenius ProServe’s operations in 2003 and 2004. The acquisition of one of the most successful German hospital operators is a unique opportunity to strengthen our position in acute care hospitals. Building on this strong position, we will capitalise on the excellent growth potential and ongoing privatisation process in the German hospital market. Helios is an extremely well-managed company and is, just like Fresenius, strongly committed to delivering best-in-class medical treatment,’ explained Dr Ulf M Schneider, Chairman of the Management Board of Fresenius AG.

Helios Kliniken GmbH is one of the leading private German hospital operators in terms of revenue growth and profitability. Since 2002, the company posted a compounded annual growth rate of 28% in sales. In 2004, Helios achieved revenues of €1,161 million, operating income of €95 million and net income of €66 million. The company owns 24 hospitals with a total capacity of about 9,300 beds. It is the only hospital chain in Germany that operates four maximum-care hospitals with over 1,000 beds each. The company has around 18,000 employees and performs about 330,000 operations and about 700,000 outpatient treatments annually.

The combined business will include 55 clinics with 2004 pro forma revenues of around €1.5 billion. The purchase price for 100% of the HELIOS shares is €1.5 billion plus €100 million for the net cash position. Fresenius will acquire 94% of the HELIOS shares, 6% will continue to be held by the Helios management. The acquisition requires antitrust approval. However, Fresenius anticipates completing the transaction at the end of this year.

Flu outbreaks and fears

Following the 1918 (Spanish H1N1) influenza pandemic - which killed perhaps 20 million or 20-40 million, or in other estimates, even 40-50 million people worldwide - two more influenza pandemics occurred, the first in 1957-58 (Asian, H2N2), was blamed for about 70,000 deaths in the USA alone. The second (H3N2) occurred just three and a half decades ago (1968-69) and was blamed for 34,000 US deaths.

Later incidents of limited spread include: in 1976 the H1N1 influenza A virus threatened, and referred to as ‘Swine’ flu because the possible intermediary between poultry and humans were pigs. The next year the same strain threatened again, but was dubbed ‘Russian’ flu and termed a ‘benign’ pandemic. In Hong Kong the equally named ‘bird flu’ H5N1 emerged in 1997. In 1999 bird flu H7N7 was worrying. Then, in the Netherlands, bird flu H7N7 was recorded. None of these reached pandemic proportions. In late 2003 and 2004, the H5N1, first identified in birds in S. Africa in 1961, was associated with human illness and death in Asia.

Current estimates in the USA, in the case of a H5N1 pandemic, are given as 36,000 deaths and 200,000 hospitalisations.

The World Health Organisation has stated that experts agree that another influenza pandemic is ‘inevitable and possibly imminent’.
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A spokesperson for Roche pointed out that there is inevitably a shortage of the raw material. When shikimic acid is extracted from the harvested seeds, in a three-step chemical process, at low temperature, it is converted into epoxide, then comes a dangerous part of the process, because the conversion of epoxide into azide involves a reaction that produces explosive material. Specialist companies do this and only handle the material in small quantities to reduce that problem. Crystal strands of the active ingredient of Tamiflu are then produced and these are vacuum dried to be converted into capsules.

As for the medicine itself. (Details: www.gilead.com) Nonetheless, this month (October), Gilead Sciences announced its third quarter 2005 financial results: total revenues $493.5 million, up 51% over the third quarter of 2004. This resulted in a net income for the third quarter of 2005 of $179.2 million. The net income in the same period in 2004 was $113.2 million.

Roche spokesman Alexander Klauser: “Tamiflu has killed the bird flu virus in laboratory tests, but the results were more mixed when it was used on some of the 177 people who contracted the virus in Asia since 2003”

Double the production of Tamiflu in 2004 and doubled it again in 2005, and planned to double it again in 2006. However, the firm has enough orders to exhaust its production capacity both this year and next. The very nature of production is a problem. Although Roche now makes Tamiflu at 13 sites worldwide, producing more than 100 million capsules annually, the demand is massive. To meet pandemic demands, Roche reported that it had...
Medical research challenged

A recent media briefing held by the Journal of the American Medical Association (JAMA) at Rockefeller University, NY, a world-renowned centre for research and graduate education in the biomedical sciences, addressed the hurdles medical research currently faces in the United States.

According to a study in the September 21 issue of JAMA (JAMA 2005; 294:1287-1454), total funding for biomedical research in the USA doubled from $94.3 billion from 1994 to 2003, with the industry providing 57% of the funding and the National Institutes of Health providing 28%. Industry sponsorship from pharmaceutical, biotechnology, and medical device firms of clinical trials increased from $4.0 to $4.2 billion, while federal proportions devoted to basic and applied research were unchanged.

Presenting the study’s findings, lead author Hamilton Moses III, MD, of the Alpert Medical Center, Virginia, emphasized the need to change the odds of the bets - don’t put money through sales channels, but put it into translational research instead, he urged.

For all sponsors, the challenge is precise. Biomedical research is an inherently high risk and lengthy process. It would be helpful to remind those making financial decisions that the promise of earlier advances in the basic understanding of physiology in the 1920s and 1930s, or of biochemistry and microbiology in the 1940s, 1950s, and 1960s, took decades to unfold, the authors write.

‘The bone is always a little ahead of the dog,’ said Dr. Moses, citing two examples to underline his point. Penicillin took 15 years, from the time of discovery to wide availability for treatment; knowing insulin’s existence, the author pointed out, did not speed things up either - it took 30 years from that understanding to become a treatment for diabetes.

‘Enhancing research productivity and evaluation of benefit are pressing challenges, requiring more effective translation of basic scientific knowledge to clinical application, critical appraisal of rapidly moving scientific areas to guide investment where clinical need is greatest, not only where commercial opportunity is currently perceived, and more specific information about sources and uses of research funds than is generally available to allow informed investment decisions. Responsibility falls on industry, government, and foundations to bring these changes about with a longer-term view of research value,’ the authors wrote (JAMA 2005; 294:1333 - 1340).

Lead author Jordan J Cohen MD, of the Association of American Medical Colleges (AAMC), Washington DC, presented an article on the challenges that academic medical centers face. The present era, he emphasized, offers more promise in medical research than ever before. ‘Contemporary science has deciphered the human genome, discovered some of the potential of stem cells, and unleashed the power of information technologies. Any one of these three historic scientific achievements would have the potential to effect a fundamental transformation in medicine; their confluence has created unprecedented opportunity for spectacular breakthroughs in human health,’ the authors wrote.

Despite this promise for progress, mastering challenges to exploiting them also exist. A major challenge is the need to maintain public trust. ‘If the public fails to trust in institutions, this is worrisome,’ said Dr. Cohen. Maintaining public trust includes managing financial conflicts of interest, protecting human subjects in clinical research, and managing high public expectations for life-saving discoveries.

Another big challenge to medical research is the widening gap between the costs of research and available funding sources, and the need to attract more physician-scientists to pursue translation research, he explained. Translational opportunity arises from applying concepts of the basic sciences to clinical medicine. With the industry compromising the principal research sponsors (57% in 2003, compared with 28% by National Institutes of Health) the need to maintain academic values while partnering with the industry is another major challenge. ‘The ability to benefit optimal from the growing relationships with industry is heavily dependent on remaining true to fundamental academic values,’ authors wrote. The degree to which medical schools and teaching hospitals are obligated to reimburse their citizens for the costs of treatment obtained in other Member States.

The relevant case law has primarily concerned prior authorisation because the same or equally effective treatment is available in the home Member State. ‘Unfortunately, in the absence of rules and guidance on the interpretation of what “without undue delay” means in these circumstances has also been sought from the ECJ. The hearing took place on 4 October and the Advocate-General’s opinion is awaited. It is expected that the decision for all Member States, particularly those with national health services, could be significant. * McDermott Will & Emery UK LLP (www.mwe.com) is a London-based limited liability partnership regulated by the Law Society and registered in England and Wales. The members are solicitors or registered foreign lawyers.

Karen Dente

Reporting from the USA

Patient monitoring device manufacturer device manufacturer devices are facing tough times in Europe, according to a new report ‘Profiles of Key Participants in the European Patient Monitoring Market’, produced by Karat Ajay, Research Analyst at the global growth consultancy Frost & Sullivan. One of the reasons for this is the severe pressure on national governments to reduce the number of hospitals in their countries, the author pointed out. However, she also says that the market for patient monitoring is growing. ‘Medical devices is rapidly achieving maturity and future growth is incremental and becoming dependent upon the replacement of existing equipment. Therefore, Ms Ajay suggests, manufacturers of patient monitoring devices need to maximise replacement opportunities and increase expenditure on R&D to produce advanced equipment that can replace existing devices.

Strategies – acquisition - to ensure growth, market expansion and new product lines - have been significant, says Mr. Ajay, naming Abbott Laboratories as an example. (The firm first acquired Medisense in 1997, then, a year later Theramartis (2004). Bayer Diagnostics and Lifescan, Inc also have a significant presence in the area of continuous blood glucose monitoring systems and provide strong competition to Abbott. Bayer’s diabetes products range from insulin pumps to blood glucose monitors while Lifescan is a leading provider of blood glucose monitoring systems for healthcare professionals.

Remote patient monitoring - intensive care home is likely to rise due to the aging baby boomer generation. Over 20% of Europeans are over 65 years old, and more likely to need diabetes management. ‘Disease management systems are the path to efficient monitoring,’ concludes Ms Ajay, who pinpoints systems that are available and how to monitor and interact with patients as a key development. Remote monitoring also allows for a comprehensive review of already mentioned potential reduction in the number of hospitals.

Ms Ajay highlights in the report a number of companies that have taken a significant position in this field: ‘Hydration monitoring systems, Welch Allyn Inc, for its light weight multiparameter portable and ambulatory systems, and MMS International for its haemodynamic patient monitor - the world’s first. Report details Key Participants in the European Patient Monitoring Market (B581-56). Full details: http://medicaldevices.frost.com

The future lies in remote monitoring
Perinatal medicine

In September the 5th International Congress for Perinatal Medicine, was held in Croatia. In December, the German Society for Perinatal Medicine will hold its 22nd German Congress for Perinatal Medicine (www.perinatal-kongress.de). In a timely interview with Professor Klaus Vetter MD, director of the Obstetrics Clinic at the Perinatal Centre, Vivantes Hospital Neukölln in Berlin, and Congress President of the 22nd German Congress for Perinatal Medicine, we initially asked: How is this field defined?

Perinatal medicine is an interdisciplinary medicine for mother and child, the professor explained. It comprises the period before, during and after birth. This includes obstetrics, as part of gynaecology in general, and neonatal medicine as part of paediatrics and adolescent medicine. It also includes anaesthesics for pregnant women and newborns.

Prenatal diagnostics is diagnostics for mother and child during pregnancy. This comprises taking of blood pressure, urine testing to monitor kidney function as well as determining the mother’s abdominal girth, and ultrasound scan diagnostics for the unborn child. The most commonly found problems in unborn children are growth problems, macrosomia and growth retardation; the most common problems affecting the mothers are, respectively, diabetes, high blood pressure and pre-eclampsia.

What does the future hold for prenatal diagnostics, particularly in the European economic area?

‘We can assume that, in the future, prenatal diagnostics will be increasingly available during earlier stages of pregnancy, and that triage (determining future treatment and monitoring required to ascertain whether a pregnancy is progressing normally or not) will often be available in the first trimester.

From a general point of view, this may mean that women will feel increasingly encouraged in their decisions to become pregnant, because early triage appears to enable a closely monitored, ‘customised’ pregnancy. This may lead to a higher acceptance of pregnancy in general. However, it is difficult to say what effects this is likely to have on the European economic area.

What are the structural prerequisites for adequate perinatal care within the constraints of the diagnosis related groups (DRGs); integrated care provided by surgeries and hospitals (IV) and medical care centres (MVZ) in a European comparison?

The principle in Germany is that all pregnant women are entitled to the necessary perinatal care. This is set out in ministry guidelines developed by the Federal Joint Committee (www.g-ba.de), made up of providers (members of the German Hospital Association) and those funding healthcare costs. Currently, the DRGs do not actually support the care and treatment of pregnancy complications sufficient. IVs and MVZs currently have no particular bearing on perinatal medicine. During the congress, a panel discussion will address this subject.

The Small Child – causes, diagnostics, birth and postpartal therapy’ is also on the agenda. At what stage in development do you talk about a ‘small’ child who is at particular risk?

A child is considered underweight if it does not fall within the percentile curves, i.e., distributions of length, weight and head circumference at a certain age, and if its weight, depending on age, falls below the 10th percentile. If the child’s weight is below the 3rd percentile, we talk about a significant growth retardation. To assess the situation – and ensure that the child is in no acute danger – it is vital to determine the cause. Modern biophysical diagnostic procedures, such as ultrasound and, in particular, non-invasive, functional examination procedures such as Doppler scans, have proved most suitable for this.

If there is a proven risk of complications, the birth should take place at a suitably specialised unit for mother and child; in very difficult cases this should be in a specialist perinatal centre. When choosing the date and place of birth we also need to consider the envisaged postpartal therapy, so that the lives of both child and, as the case may be, mother, are not endangered.

During pregnancy, birth and postbirth - what does interdisciplinary co-operation entail?

Apart from pregnancies and births where no anomalies are detected, but that have interdisciplinary support, there are pregnancies where interdisciplinary co-operation is of utmost importance and can be life-saving. The specialist fields are perinatal medicine and obstetrics, neonatal medicine and anaesthesics for pregnant women, as well as the newborn.

Concepts in Germany - at least within the scientific societies and associations - orientate themselves on European models. For gynaecology and obstetrics this means the European Board and College of Obstetricians and Gynaecologists (EBCOG - www.ebcog.org). Large differences between countries are increasingly balanced through these international organisations - even when there might be very different conditions in individual cases. The 22nd German Congress for Perinatal Medicine, in December, will also contribute to this progress.

Contact: knk.geburtsmedizin@vivantes.de

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The walls of Robbert Huismans’s office, on the fourth floor of one of Erasmus University buildings, in Rotterdam, are festooned with posters. One of stands out from the rest; it contains a photograph of a stethoscope, and the text ‘Erasmus charges you’. Certainly the professor himself is full of admiration for Erasmus for eight years, although he is now only 43 years old. Lecturing on Integrated Care Management, he demonstrates the extent by the manner in which he discusses his subject: passionately! One push on the button and his enthusiasm pours out.

I head straight to the point. How healthy is Holland? His answer is as short as it is powerful: ‘It could be better. No’, he quickly reflected, ‘the situation is not very glorious’. It all very much depends on where you live and there are doing things in the right way. Are the hospitals organised in the right way, or does one put too much trust in old structures, routines, functions and disciplines? Even here an eye must be kept on the process of a disease, from how it is diagnosed to how the patient is being addressed and served. In this last aspect, alone despite all the policy ambitions, the bill has not been a complete breakthrough.

Consider this from the point of view of a patient in a pattern we should address him, or her, as a fit human being and not as some inferior number in a long row of cases. Also, it is of the utmost importance that various disciplines are attuned to another in multidisciplinary teams, through which the ‘learning ability’ of organisations will also be improved. Working in teams and training the competence battle of the point - at all levels in care, among relief workers, hospital teams and other caretakers, as well as the nursing staff.

Care with the neighbours
On our question of how the state of care is delivered in other countries compared with the Netherlands, Professor Huismans gives a few examples. First he briefly sketched briefly the situation in Belgium, while making clear that the situation there does not really differ from that in the Netherlands. There is no single country that has complete control over all aspects of healthcare, he pointed out. Of course there are observable differences in elements. First, the Belgians are more cautious towards their patients, as well as between themselves, giving each other faith and trust. The Belgians are also, and this is recognisable in their healthcare delivery systems.

This does not mean that, in Belgium, as in Holland, a systemic change does not take place. The difference between the systems in Dutch however is that the Belgians achieve change with- out the discussions that are so charac- teristic in the Dutch healthcare system. For example, the policy discus- sions can extend over and over, for many years, and then they still hesitate to execute their plans. Even then, it sometimes goes very well.

‘Next there is the British situation,’ he continued. ‘Healthcare is also good there, and well organised, but has also its own Achilles heel: i.e. a top-down policy, which means it is much easier to implement new regulations, but does not mean that handling changes in this way creates the necessary support of the professionals. Compared with other countries, the Netherlands lacks leadership in health- care management, both in a narcissitic and the organisationalal level. Without that leadership there will be absolutely no success; but who has the courage to make this a political theme?’

Advice
At Erasmus, students are taught and research is carried out - this is no sur- prise to anyone. It also is no surprise that advice is given, whether demand-
The Netherlands - A public debate reopened recently regarding the position of medical professionals if they come in contact with patients suspected of criminal activity, or if information is acquired that could be relevant in a criminal case.

Medical professional secrecy protects a patient's privacy. The Dutch criminal code lays out how this is legally enacted. A starting point in the debate is that medical professional secrecy prevails over police interests.

Legislation is increasingly corrected in the interest of tracing criminals. The result is that information covered by professional secrecy often can be and is used to trace criminal activities, as is the case in sexual abuse, maltreatment of children, doubts about natural death and medical mistakes etc. So, it is now time to bring clarity to the relationship between medical professional secrecy and police investigation. Last September, Wilma Duijst-Heesters, doctor and lawyer, took her PhD on this subject at the University of Nijmegen.

Medical secrecy and the right to refuse to testify

Medical professionals have, as stated, a medical professional secrecy, and when appearing before a judge they can appeal for that right. However, that right can be ‘out of order’ for several reasons, including a legal demand or if a patient agrees, or there is a conflict of interests. Such a conflict exists if there is a danger to other people, and it could be resolved by placing the out of order rule. Abuse of professional secrecy, without good reasons (which hardly happens) can lead to a sanction of criminal law or an action on civil law. In written law a new development becomes visible in which ‘serious interests’ can lead towards interfering with professional secrecy.

Professional secrecy and tracing criminals

A nursing ward, in which a patient stays, is regarded by law as a house and can only be entered with permission or legal authorisation. However, an investigating officer is allowed to enter an operating theatre (OT) or doctor’s surgery, even without the doctor’s or patient’s permission. According to Dr Duijst, this is a strange difference that should be legally repaired: police admission should only be allowed with a doctor’s permission or the authorisation of the judge.

A hospital search and/or the confiscation of letters and other documentation are out of the question. This should also be the case for X-ray’s, CT-scans and other information carriers. Legislation that forces the medical professional to deliver information for a judicial search and control must be clear about what is going to be done with that information. As long there is insufficient clarity there cannot be an obligation (spoken of) to deliver information that is protected by professional secrecy.

As long as no legal obligation exists to over-rule professional secrecy, and as long as it remains the responsibility of the medical professional to decide whether or not to co-operate, a good relationship between professional secrecy and judicial investigation cannot exist.

Pacts

A number of Dutch hospitals and judicial authorities have made pacts in accordance with a private law, about how criminal procedures in hospitals can be arranged. These pacts are a result of discontent and obscurity about the way things had been organised up to now. When studying these pacts it soon becomes clear that a lot is wrong with them. Private law does not seem the ideal way to organise criminal procedures. The hospital where a suspect is staying is in a vulnerable position. On the one hand it depends on a doctor and, on the other, the law, and therefore it needs legal guarantees.

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RADIOLOGY

GE Healthcare presentations at this year’s RSNA meeting will include a significant number of imaging and IT developments.

These include the Discovery STE, which demonstrates a breakthrough PET/CT imaging system that provides a wide range of clinical relevant capabilities and hybrid imaging flexibility, this is reported as allowing earlier, better diagnosis of cancer, heart disease, and for surgical planning, and the monitoring of treatment. In addition, the integrated Discovery Discovery DeepDrawing tool, which optimizes workflow.

Also highlighted will be the Discovery Discovery T20, a new CT system, which provides both anatomical and physiological information to help diagnose coronary artery dis ease.

Improvements in coverage and acquisition time in GE's Infina HAwkeye nuclear medicine system have also been announced. The Infina Hawkeye 4 (4-slice) focuses on lesion localization and attenuation correction, and the new Evolution for Bone suite of reconstruction tools for the Infina with Xeleris functional imaging workstation is said to provide excellent image clarity and up to a 50% reduction in imaging time. Xpress cardiac results from collaboration between GE Healthcare and University of Utah's T20 Wide-Bore Reconstruction (WBR) technology for faster nuclear cardiovascular imaging.

Also on show: the new PET/Etrace10, "...the world's highest capacity commercial clinical PET system for radioiso tope production," which, the firm announces, provides the highest PET radioisotope production capability in the market.

GE Healthcare will also unveil a new family of scanners, to bring the benefits of LightSpeed VCT to a broader audience, such as commun ity hospitals and outpatient imaging centres.

Lung VCAr, which systematically visualizes lung nodules, automatically ana lyzes lung nodules over a peri od of time, is another exhibit. So is the new IMPAX CT sy stem to scan for radiation oncology, bariatric patients and interventional procedures — and incidentally, this is reported as having the most powerful tub e available, and able to provide the accuracy of table movement for the largest patients — it is cur rently the only CT that can lift and scan a 650-pound patient.

Another exhibit will be the next generation Smart View advanced application for multi-slice CT systems, a fluoro technology to provide one of the fastest real time acquisi tions available, with 12 frames per second. GEHC also says it has the shortest latency time on the market, and provides better control of nec dan placement during interventional procedures.

PACS - Centricity Radiology Business Intelligence dashboard soft ware can provide detailed reporting of various processes in Radiology departments, aiming to compare current performance against precon figured values and industry bench marks, and so provide information that use of various resources, e.g. scanners, patient waiting times, radiology staff performance and optionally providing information about equipment status (servicing etc).

GE reports that it is the only manuf acturer of an entire mam mography imaging chain of products from - tube, detector to review workstation. It will demonstrate the next generation of its mammography system and, at Chicago, also unveil future plans in this field.

In magnetic resonance (MR) the Signa HD family has three new addi tions: Signa HDx 1.5T and Signa HDx 3.0T for the most advanced clinical imaging performance and Signa HDx 1.5T a smaller, more economical, but still powerful package.

New technologies introduced in Signa HDx include 32-channel archi tecture, ultra-fast reconstruction algorithms, breakthrough advance ments in parallel imaging and new acquisition strategies. Clinical perfor mance and productivity is maximized when combined with new enhance ments to unique GE technologies such as PROPELLER motion-resistant brain, VIBRANT breast, LAVA XV body imaging, and TRICKS time-resolved angiography.

In this range, the new space-saving Signa HDx 1.5T MRI, should attract hospital buyers who seek superb diagnostic imaging, but need a small installation footprint and quick return on investment. The equipment has liquid cool ing technology, and can be installed in a week in a single clinical environment.

The Definiun X-ray series will also be launched. The Definiun 8000 is a fixed room digital radiography (DR) system that provides high image quality for the full range of traditional radiography and CT procedures. Definiun AMX 700 is a mobile DR system, with digital flat panel detect or, that can be used virtually any portable application. Applications include: Auto Image Pasting - to provide single panaram ic views of the human anatomy, par ticularly spine/spineles, without visible seam lines, and Volume Radiod, provid ing 3-D high-resolution X-ray anatomical images that include abdomen/chest/hip. These applications complement GE's Dual Energy Subtraction, a clinical technique that eliminates bone obstruction from chest or abdominal images.

The Innovia CT - which enhances GE's innova 4100 and innova 3100 cardiovascular interventional imaging systems - could help change the direction of medical imaging for sur gical patients, according to Laura King, Global Vice President, Interventional, Cardiology and Surgery at GE Healthcare. 'We've combined the best of both worlds - taking 3-D medical imaging to the next level by bringing 3-D interventional imaging.

The new system provides an entirely new approach to the acquisition and reconstruction of CT images, where image data is acquired and reconstructed in a single acquisition, which reduces the number of images acquired and the amount of radiation exposure.

GEHC also will showcase its new Volume Imaging Protocol (VIP) platform, which enables acquisition, optimisation and analysis of volumetric data. Radiographers can ‘sweep across a target area of a patient’s anatomy and collect true, raw data. After image acquisition, the radiologist can virtually re-sect the patient, by manipulating the raw data with new protocols and in a live display view, long after the patient has left,’ the firm explains.

In addition to these products, con tract medical personnel are to be highlighted at the GEHC booth.

IMPAX Enterprise - a single image and data management system that does not require traditional man ual work, orthopaedics, and women’s care as the building blocks of an electronic medical record (EMR) based. New innovations include Agfa’s HealthCare IMPAX RIS/PACS, which integrates the best of both worlds - embedded evidence management and digital imaging, orthopaedics, and women’s care as the building blocks of an electronic medical record (EMR) based. New innovations include Agfa’s HealthCare IMPAX RIS/PACS, which integrates the best of both worlds - embedded evidence management and digital imaging.
The 91st Scientific Assembly and Annual Meeting of the Radiological Society of North America (October 31 - November 5, 2005) will be presented by Lawrence W. Campeau M.D., President of the RSNA.

On Tuesday, the Eugene P. Pendergrass New Horizons Lecture - Imaging in Drug Discovery: Emerging Roles and Challenges - will be presented by Lawrence Schwartz M.D.

Tuesday will feature the Annual Oration in Diagnostic Radiology, Radiology - Back to the Future, by William R. Brody MD PhD, and on Wednesday, K S Clifford Chao MD will present the Annual Oration in Radiation Oncology, Integration of Functional Images into Future Radiation Oncology Research and Practice.

The RSNA annual meeting provides a significant opportunity for radiologists to acquire CME credits - as many as 83 credits can be earned during the course of the meeting. An AOC kiosk at RSNA 2005 will provide attendees with a dedicated location where they can ask questions about the AOC process, see demonstrations of RSNA products related to the AOC, and get information about other AOC resources.

For radiology administrators, Course 941 Capital Asset Management: From Acquisition to Replacement Strategies and Course 943 HIPAA: Ongoing Impacts and Re-inventions in Radiology should be of particular interest.

Finally, RSNA and the Society of Interventional Radiology (SIR) Foundation have collaborated to offer a ‘meeting within a meeting’ to RSNA 2005. This Interventional Oncology Symposium will be held Monday, 28 November to Friday, 2 December. As with other RSNA programmes, the annual meeting registration fees include attendance to this symposium. To reserve a seat, you should register for the days you plan on attending when registering for the RSNA meeting.

Abdominal MR. CT topics also have been expanded and folded into the diagnostic imaging tracks. Four new refresher course tracks have been developed to address the current educational needs of imaging professionals. The new tracks are cardiac radiology, emergency imaging, radiology education and vascular radiology. The emerging technologies track will cover the latest in molecular imaging probes and molecular imaging modalities, as well as pertinent topics in molecular biology.

The radiology education track will include sessions on medical student and radiology resident education, teaching skills, delivering presentations, reviewing manuscripts, continuing medical education, electronic aids and self-assessment. The vascular track will feature the latest in vascular contrast agents and post-processing techniques for vascular imaging. MR angiography, CT angiography and digital subtraction angiography. It will also include presentations on vascular pathology in adults and children.

Also this year, the number of courses incorporating audience-response systems (ARS) will be increased to 15. All of the case-based review courses will also include ARS. ARS technology helps keep the audience involved in the presentation, and it allows the instructors to tailor their courses to the competency level of the audience. Instructors will be able to ask the audience questions and then see their answers on a screen. The instructors can then alter the course material based on the responses. The popular, interactive case-based review courses in interventional, paediatric and neuroradiology were submitted to the American Board of Radiology (ABR) so that RSNA can offer these courses with self-assessment modules (SAMs). SAMs are needed to fulfill the ABR’s maintenance of certification (MOC) requirements.

In the USA, over 6,000 licensed hospitals provide radiology services. Responsibility for the management of a radiology department lies with a radiology administrator. The radiologist who serves as the department’s chairman oversees the professional work of colleagues, supervises clinical research, and leads the direction to determine what diagnostic imaging services are offered. She represents the senior authority for diagnostic imaging in the hospital.

The radiology administrator’s role is to make the department work, which involves responsibility for the hire, pre-motion, schedules and supervision of radiology technologists (radiographers), division supervisors, and all support staff. The administrator also maintains federal and state accreditation, regulatory, radiation safety, quality control and patient privacy/security standards. Other tasks include resolving problems and managing conflict resolution; developing (and adhering to) the capital and operational budgets; evaluating and recommending new equipment, negotiating with vendors, and supervising service contracts and equipment maintenance.

As departments convert to near-filmless and paperless operations, the radiology administrator has had to become IT knowledgeable – for HIS, PACS and speech recognition implementation and management. She also supervises coding and financial reimbursement for the radiology department.

Other highlights
On Monday, the Eugene P. Pendergrass New Horizons Lecture - Imaging in Drug Discovery: Emerging Roles and Challenges - will be presented by Lawrence Schwartz M.D.

Tuesday will feature the Annual Oration in Diagnostic Radiology, Radiology - Back to the Future, by William R. Brody MD PhD, and on Wednesday, K S Clifford Chao MD will present the Annual Oration in Radiation Oncology, Integration of Functional Images into Future Radiation Oncology Research and Practice.
The development of multi-detector row helical acquisition CT scanners has advanced our ability to examine pathologies of the neck and skull considerably. Recent advances in multi-slice CT (MSCT) technology are relevant to a spectrum of imaging tasks in this body region. The improved spatial resolution is critical, e.g. to the evaluation of the thin bony membranes of the facial skeleton, assessment of dysplasias of the osicular chain or staging of perineuravascular spread of neoplastic processes. The improved temporal resolution is not only of practical help when critically ill, uncooperative patients or children require CT imaging but also of essential importance when we consider that the time span of arterio-venous transition is no more than about seven seconds. In this respect, non-invasive CT-angiography (CTA) may serve, for example, to accurately assess tumour vascularisation, or to demonstrate the site of bleeding in cases of uncontrollable epistaxis.

However, the greatest impact of MSCT may have been on the evaluation of carotid artery disease. The vast majority of referrals for CTA certainly are in the setting of symptomatic ischaemic or haemorrhagic stroke. Applications at and below the skull base in the acute setting comprise the search for a source of arterio-arterial embolism, in particular the assessment of carotid artery stenosis, its site, length and degree or haemodynamic significance as well as plaque composition and documentation of possible stenosis in the proximal arterial tree which may make access to the symptomatic stenosis during secondary prophylactic procedures difficult. The socio-economic impact of stroke disease on western societies is vast and well documented. Much work has been done to advance our ability to document in particular prognostically significant parameters that characterise carotid stenotic disease: Calcified plaque has been
shown to be less symptomatic and therefore possibly more stable than a soft one. This has been confirmed by MRI studies of plaque morphology. It is therefore demonstrable forthwith that the volume of calcium within carotid plaque correlates with the degree of luminal narrowing. In addition, important technical comments were made by Claves and colleagues who established that an accurate measurement of carotid stenosis depends upon the density value of the blood-contrast medium mixture as well as window settings.

**Assessment of carotid stenosis**

The initial evaluation of the arterial system in the neck is usually carried out using Doppler-ultrasound. This shows carotid plaque as the morphological correlate of the stenosis as well as the flow acceleration across it, which allows an estimate of its degree. However, on anatomical as well as technical grounds we require a more robust method that has, in our experience, been realised with modern CTA.

A volume scan is obtained in the caudo-cranial direction. For the assessment of the extracranial arteries, acquisition starts at the aortic arch, which allows the use of bolus triggering software. Intracranial scans are started just below the skull base and triggered visually once contrast medium inflow is observed. In both instances scans are extended to cover the course of the callosomarginal arteries. Intracranial scans are performed with 0.5 mm collimation with no more than 1.0 mm used extracranially. From the volume data sets overlapping 0.5 mm transverse axial ‘source images’ are calculated routinely. Because of the complex image reconstruction algorithms in MSCT, consideration of manufacturer recommendations e.g. with respect to the choice of pitch etc. has been advised.

Review of the axial reconstructions alone is insufficient for the proper evaluation of a CT-angiogram. Rather a systematic stepwise image post-processing is recommended. While the patient remains on the examination table, a brief review of the source images may however be performed in order to ascertain the technical quality of the examination while gaining an overview of the gross pathology. Afterwards dedicated multiplanar reconstructions (MPR) are made on a medical imaging workstation to bring out detailed findings. Finally, 3-D reconstructions may be created for demonstration purposes only, since the degree of luminal narrowing on rendered images is highly variable depending upon window settings.

The emphasis in the evaluation of the data set is on its systematic approach. For example, demonstration of a stenosis at the origin of a proximal artery is highly relevant to the report of a skull base aneurysm if the stenosis may make access during coil embolisation difficult (Fig. 1). Careful and systematic review of all vessels throughout their course in the source images is therefore required in the first instance. With respect to carotid stenosis, multiplanar reformations should be as thin as possible and the plane of sectioning aligned with the angulation of the course of the vessel at the point of maximum stenosis. Thin slicing is of such importance since stenoses commonly fail to assume an hourglass-like configuration but are frequently eccentric or ragged, i.e. the apparent degree of stenosis depends upon the plane of sectioning such as it depends upon the projection in conventional angiography (Fig. 2). The minimum short axis of a luminal stenosis should therefore be measured. In other words, maximum intensity projections are not suited to the accurate reporting of carotid stenotic disease with one exception: they are useful when choosing the length and calibre of stents prior to stent-protected percutaneous transluminal angioplasty of stenoses while serving as ‘eye-ball’-review image at the time of the procedure.

Actual measurement of carotid stenosis is carried out according to the protocols of the large international series, namely the NASCET and ECST-trials. However, it has been shown that the so-called common carotid-method is consistently the most reproducible (Fig. 3).

**Anatomical variants and common pathologies**

There are many clinically and, in particular, therapeutically relevant variants of normal arterial anatomy in the neck. These include looping and coiling of vessels (Fig. 4). Kinking, even to a degree of significant luminal narrowing, may also occur (Fig. 5). Such variants may be interpreted as a consequence of years of untreated arterial hypertension similar to the elongation and unfolding of the thoracic aorta. It is also recognised that the carotid artery may protrude into the sphenoid bone. The osseous membrane to the sinus may then be eroded, which is highly relevant to functional endoscopic sinus – as well as pituitary surgical procedures (Fig. 6).

Common pathologies of carotid artery disease include aneurysms, dissection of the arterial wall and stenoses. Aneurysms may involve both the skull base (Fig. 7) or the carotid siphon. Thin MPR-images allow measurement of aneurysm dimensions relevant to the choice of the first coil for the embolisation procedure (Fig. 8). These are equally suited to demonstrate sites and extent of dissections (Fig. 9). Appearances of carotid stenoses vary widely. As indicated above, their site, length, degree or haemodynamic significance as well as plaque composition are relevant to the choice of possible therapeutic interventions (Fig. 10 a-c).

* Adapted from an oral presentation, 4th Multislice CT Symposium, Charité, Berlin, August 2005
Molecular MRI
Moving into the clinic

Molecular imaging has been defined as the non-invasive visualisation of cellular and molecular mechanisms in vivo. While molecular imaging has been carried out for decades using different techniques (e.g. thyroid scintigraphy, bone scintigraphy and FDG-PET) its popularity rose just a few years ago with the publication of studies showing the feasibility of target specific imaging in MRI, optical imaging, and ultrasound. For clinical use, MRI is a particularly attractive tool for molecular imaging applications, due to its broad variety of applications, excellent tissue contrast and higher spatial resolution compared to optical imaging techniques. However, it must be considered that the sensitivity of MRI to contrast agents is over 10,000-fold lower than that of nuclear medicine techniques, which require dedicated labelling strategies and target structures in vivo. So far, it is uncertain to what degree specific MR-imaging can really be transferred into the clinic.

Superparamagnetic iron oxide particles (SPIO) and ultra-small superparamagnetic iron oxide particles (USPIO), amplify the MR signal considerably, as compared to established Gd-based contrast agents, due to the crystalline structure of thousands of iron ions. SPIO and USPIO, which accumulate intracellularly, are usually used for specific and cellular MR imaging. These dextrans or carbodextran coated SPIO regularly show high hepatic uptake and are clinically used for liver imaging (e.g. Resovist, Schering, Berlin). For specific imaging it is desirable that the unspecific uptake by the liver and the RES is low and the size of the particles is small. Among those particles are citrate coated, very small, superparamagnetic particles (VSOP), developed by the former Siemens AG, Germany (1). These particles show good biocompatibility and have already entered clinical evaluation as contrast agents for MR-angiography and cardiac MRI. Nano AG is a multicentre project with partners from the industry (Siemens, Erlangen, Germany; Ferrapharm GmbH, Teltow, Germany; Mevis GmbH, Bremen, Germany) and academic institutions (Charité Universitätsmedizin Berlin, Germany; University of Freiburg, Germany; German Cancer Research Centre, Heidelberg, Germany) funded by the German Ministry for Education and Research (BMBF) and co-ordinated by Arne Hengerer from Siemens AG (Erlangen, Germany). The primary aim of Nano AG is to develop target specific VSOP and imaging strategies to visualise dangerous vulnerable plaques in atherosclerosis using MRI. In addition, it will be investigated whether these contrast agents can also be used translationally, e.g. to detect angiogenesis in cancer. In contrast to most previous projects, it is not the aim of Nano AG to show only feasibility of molecular MR-imaging concepts, but to develop specific contrast agents that can subsequently be applied in patients. Superparamagnetic particles, which are used for this purpose, must fulfill important requirements: First, to be non toxic and highly biocompatible. Second, high T1- and/or T2-relaxivity are required to allow visualisation of the targets in vivo by MRI. This high relaxivity is desired to improve extravasation, target binding in vivo and provide sufficient contrast. The Nano AG project particles will be provided by Ferrapharm GmbH, which specialises in superparamagnetic iron oxide particles for MRI. In the course of the project the physical characteristics and pharmacokinetic properties of the particles will be tailored to the particular application. VSOP will be functionalised by coupling to ligands to make them bind to arteriosclerotic plaques. Finally, MR-imaging techniques will be optimised and post-processing algorithms for the MR-data will be developed.

Summary - Nano_AG is a unique interdisciplinary project that combines world-class expertise in MR-imaging hardware & software) for a hitherto unmet requirement (unmet) needs of cardiologists, of quantitative MRI developed by Philips Research Hamburg with an approved agent from Schering for the detection of cancer.

The Eisenherz project
Recent developments in genomics and proteomics in the past ten years have increased our knowledge on the molecular processes of diseases. This feeds the hope that the susceptibility of an individual to many diseases can be predicted and that these diseases can be diagnosed at a much earlier stage and more individually designed therapies can be developed. Molecular imaging aims at the early detection and quantification of molecular processes associated with disease by using sensitive imaging methods together with targeted contrast agents. In order to make this vision happen, an interdisciplinary effort between different academia and industries is necessary.

The Eisenherz project is funded by the German Ministry of Education and Science (BMBF) to develop new targeted MR contrast agents and hardware & software) that enables clinicians to detect cancer cells earlier, to stage the cancer, and ultimately, to quantify therapy effects of individual cancer treatments. This has implications for cancer management and could have sizeable cost-saving implications for hospitals.

In order to achieve these goals, Eisenherz has created an alliance for nanotechnology in cancer - a partnership between academic institutions, two of the leading medical imaging companies, Philips Medical Systems and Siemens Medical Solutions, and Schering, the leading contrast agent and pharmaceutical firm. The three-year research project, which began on 1 September 2005 under the leadership of Schering in the Nano-for-Life Partnership between academic institutions and leading companies for cancer management and diagnostic imaging.

The Nano-for-Life Partnership between academic institutions and leading companies for cancer management and diagnostic imaging.

Siemens to produce preclinical contrast agents

Advances in the non-invasive visualisation of biological processes at the cellular and molecular level are mandatory for MRI to be competitive in the age of molecular medicine. However, many molecular targets are expressed in considerably low concentrations. In recent years, new contrast agent concepts have enabled molecular MRI (molecular MRI), and molecular imaging has commanded attention from beyond the field of nuclear medicine. In cardiac diagnostics, innovative contrast agents (e.g. USPIO) will pave the way towards a significant improvement in early detection of inflammatory disease within the vessel wall, and therefore will bring significant improvement in the medical treatment for patients at risk for sudden cardiac death.

The Nano-ag consortium intends to foster cardiac mMRI. We will develop imaging solutions (including contrast agents and imaging hardware & software) that will provide an additional level of information at the molecular or cellular level. Thus we will extend cardiac MRI further, beyond the anatomical and physiological level. By acquiring new parameters for risk stratification we will address the so far (unmet) needs of cardiologists, today a customer group that uses MRI sporadically. Advancements developed within the Nano-Ag will translate into more powerful MRI scanner generations, not only after market launch of VSOPs in the future, but sequentially as we proceed in the project. Better protocols for cardiac MRI including navigators, sophisticated postprocessing tools, etc. will be commercialised as soon as possible. Last but not least, this is the very first time that Siemens is becoming actively involved in preclinical MR contrast agent development - an investment for the future of our business. In conclusion, we foresee a substantial growth potential within our establishments. This has ramifications for cancer management and could have sizeable cost-saving implications for hospitals.

By Dr. Tobias Schaeffter PhD, Principal Scientist, Philips Research Laboratories, Hamburg, Arne Hengerer PhD, Director of Molecular Imaging, Siemens Medical Solutions, Erlangen, and Andreas Briel PhD, Eisenherz project manager, Schering Research Laboratories, Berlin, describe...
processes within the body. Quantitative MRI together with advanced PK modelling gives a valuable indication of, for example, the behaviour (uptake rate) of a tumour before and after therapy. Therefore, this technology has a high potential for an objective evidence of the effectiveness of therapy and can be used for individual dosage.

The project focuses on breast and prostate tumours - the most relevant cancer types. Therefore, targeted nanotechnology based contrast agents, common among these cancer types, will be developed by Schering in collaboration with the Max Planck Institute of Colloids and Interfaces (Prof. Antonietti) and the start-up company Capsulation NanoScience AG. Regarding the dedicated tools and methods to characterise nanoscaled systems, the project will be supported by Nanolitics GmbH - a Berlin-based nanotechnology characterisation laboratory.

The developed contrast agent will be tested at three different hospitals for the different cancer types. The University Hospital Muenster (Professors Heindel and Bremer) will work mainly in the field of breast cancer. The detection of cancer cells will be tested and cross-validated with optical fluorescence tomography on animals. The German Cancer Research Centre Heidelberg (DKFZ, Prof. Semmler, Dr. Beck) is evaluating the newly developed nanoscale contrast agents on various cancers models and will develop new animal MR-coils for clinical MRI scanners. Since the hospital Muenster and TU-Munich are working with Philips equipment, these two sites are closely collaborating with Philips Research in Hamburg, whereas the DKFZ is collaborating with Siemens Medical Solutions in Erlangen. Both imaging industry partners (Philips Medical Systems and Siemens Medical Solutions) are working on standardisation issues, e.g. reference measurements for new, target-specific contrast agents, and their limit of detection. 

Eisenberg is a unique interdisciplinary consortium for the improved cancer management by means of Molecular Imaging: the early detection, the quantitative diagnosis and the selection of an appropriate treatment of cancer. This integrated approach has a high potential to improve the quality of life in future.

Proven Outcomes in Molecular Imaging. Healthcare costs are on the rise. The challenge is to improve the quality of healthcare and at the same time reduce expenses. By integrating molecular imaging technologies, biomarkers and clinical applications, Siemens provides molecular solutions that can diagnose disease earlier – saving lives and reducing costs. From our exceptional preclinical systems to our award winning clinical imagers to wide ranging solutions for biomarkers, Siemens Medical Solutions that help Siemens is helping to transform healthcare along the entire care path. With our proven success and our market-leading innovations, we continue to develop new instrumentation, IT solutions and biomarkers which will expand molecular imaging and lead you into the future.
Patients with an acute stroke syndrome present with hemiparesis, hemisensory loss, hemianopia, speech disturbance, or impairment of consciousness. The two most common causes are cerebral ischaemia and intracranial haemorrhage. Less frequent differential diagnoses include migraine, seizure, cerebral venous thrombosis, focal encephalitis, demyelination disorder, or tumour. Brain imaging is necessary to assess the exact diagnosis and the acute pathophysiological state of the brain. Both will determine the patient’s clinical outcome.

Computed tomography (CT) has been revolutionizing the understanding and treatment of stroke since its introduction into clinical practice around 30 years ago. Magnetic resonance imaging is another upcoming imaging modality that must ask whether its use really affects patients’ outcomes. Kent and Larson proposed five levels of clinical efficacy for assessing diagnostic technology: 1) technical capacity 2) diagnostic accuracy 3) diagnostic impact 4) therapeutic impact, and 5) patient outcome. This article addresses the question of which pathology CT is able to assess in patients with acute stroke; how accurate this information is; and whether imaging with CT has any impact on stroke diagnosis, stroke treatment, and finally on the clinical outcome of patients.

Technical capacity of CT in acute stroke

Based on changes in X-ray attenuation, non-contrast CT is capable of detecting the following changes:

- Intracranial haemorrhage appears clearly hyperdense, e.g. as parenchymal mass or filling of the subarachnoid space (figure 1)
- Thrombo-embolic arterial occlusion: well-defined hyperdensity in the course of the middle cerebral artery (figure 2)
- Ischaemic brain oedema: hypodensity of grey or white matter manifesting e.g. as ‘loss of cortical ribbon’ or obscuration of the lentiform nucleus (figure 3).

Adding intravenous contrast media, CT can assess intracranial vessel status (CT angiography, images 4 and 5) and brain parenchyma perfusion (perfusion-CT, image 6).

Diagnostic accuracy

Because CT was the first modality that could image the brain in vivo, a reference standard for CT findings in acute stroke has seldom been available. However, surgery or autopsy regularly confirms the CT finding of intracranial haemorrhage. In cerebral ischaemia, hypo-attenuation on CT is highly specific for irreversible brain tissue damage. In its very early stage, ischaemic oedema might be too subtle to be detected by the human eye. However, even within three hours from symptom onset, CT is positive in about 40-60% of patients.

CT has diagnostic impact by reliably differentiating between haemorrhagic and ischaemic stroke. In addition, it is used to differentiate among types of cerebral ischaemia like territorial infarcts caused by emboli, infarcts in end-supply areas or ‘watershed areas’ often associated with major artery occlusion or stenosis, and disseminated small infarcts caused by small vessel disease.

Therapeutic impact

For the first time in history, CT enabled identifying patients suffering from cerebral ischaemia. As a consequence, specific treatment like thrombolysis could be tested. CT has thus an enormous therapeutic impact just by differentiating between ischaemic and haemorrhagic stroke.

In acute cerebral ischaemia, the only treatment that is proven to improve clinical outcome is intravenous thrombolysis with recombinant tissue plasminogen activator (rt-PA) applied within three hours of symptom onset, or intra-arterial infusion of pro-urokinase in patients with MCA occlusion if applied within six hours of symptom onset. In selected patients, the time-window for intravenous thrombolysis can be extended to up to six hours from symptom-onset and CT identifies those patients at risk for thrombolysis-related secondary intracerebral haemorrhage.

In acute haemorrhagic stroke, prothrombotic treatment with Factor VIIa appears to be a therapeutic option in the near future. Impact on patient outcome is the most important criterion for the usefulness of a diagnostic test.
Scans and strokes

Greece - The Clotbust trial recently demonstrated that continuous 2-MHz Transcranial Doppler Ultrasound monitoring of acute intracranial artery occlusion effectively enhances systemic thrombolysis in stroke patients. At the European Federation of Neurological Societies (EFNS) September meeting, in Athens, many presentations attested to the growing use of non-invasive imaging modalities in neurology.

- French stroke specialists (Tours hospital, Abstract P1058) found that creating a specialist stroke unit reduced delays in hospital admissions, imaging, and length of hospital stay, but access to MRI was crucial for this scheme's success.

- Neurologists from Nordland Central Hospital, Bodø, Norway reported that early Perfusion-CT scans in acute stroke might predict the potential benefit of thrombolysis in individual patients (Abstract P2001).

- Using functional magnetic resonance imaging of patients with mild cognitive impairment, Finnish neurologists showed that function and metabolism of cortical neuronal networks are already compromised prior to manifestation of dementia (Abstract P2174).

- High-resolution cerebrovascular duplex ultrasound is enabling studies of vessel wall morphology, plaque development and vascular remodelling, reported Dr Stephen Meairs, University Of Heidelberg, Germany. Combined with other vascular imaging modalities (CT, CTA, MRI and MRA) outcome and progression in stroke patients can be predicted. Dr Meairs believes that ultrasound mediated gene therapy will be a future weapon against stroke.

- Stroke infarct volume quantified via magnetic resonance diffusion weighted imaging appears to predict both short-term (24-hours) and long-term (90-days) clinical outcomes, according to neurologists at The Stroke Centre, University Hospital, Olomouc, Czech Republic (Abstract SC210).

- A combination of functional and structural imaging with neuropsychological testing should be able to provide highest diagnostic specificity in diagnosing dementia, according to neurologists from Ludwig-Maximilians University Hospital Munich, Germany (Abstract P2103).

We have innovative technology...

Some patients who suffer a right-hemisphere stroke develop 'neglect' syndrome, in which they ignore the entire left side of the body and objects around it. The deficit is caused by abnormal activation in intact areas of the brain connected to the damaged areas, rather than by original damage itself, according to a paper in the November issue of Nature Neuroscience (http://www.nature.com/nn/)

Using functional magnetic resonance imaging (fMRI), Maurizio Corbetta and colleagues, at Washington University School of Medicine, St Louis, MO, USA, scanned 'neglect' patients immediately after a stroke.

- when these patients were impaired in detecting targets on their left side
- several months later, when the patients were much better at the task. They found that an undamaged brain area in the right hemisphere - the dorsal parietal cortex - did not activate at all in the first scan, but did activate strongly later, when the patients' performance improved. This area is normally involved in shifting attention, and is connected to the temporoparietal junction and prefrontal cortex, areas that are damaged in spatial neglect.

Their results suggest that behavioural deficits might result not from actual damage to a brain area, but from alterations in activity in brain areas connected to the damaged region.

HIV thins the brain

Almost 40% of HIV/AIDS patients have neurological symptoms. A study by Dr Paul Thompson, of the University of California, Los Angeles, and colleagues at the University of Pittsburgh (Proceedings of the National Academy of Sciences) has demonstrated that the brains of participating AIDS patients were 10-15% thinner than those of healthy people. The team suggest that the use of 3-D MRI scanning might help to identify early changes in neurologically asymptomatic patients with HIV who might benefit most from neuroprotective agents.

According to studies, at least two in five HIV/AIDS victims suffer cognitive impairments, ranging from minor deficits to dementia, but the pattern of brain damage caused by the virus has not been fully understood.

The brains of 26 AIDS patients were compared with those of 14 healthy people. The AIDS patients had 10-15% thinner brain regions, including the primary sensory, motor and pre-motor cortices, whether they took anti-HIV drugs or not. The thinned tissue, shown by brain mapping, correlated with the cognitive and motor deficits that the patients displayed in the many brain function tests used.

To see innovative technologies that work the way you work, visit Agfa at RSNA 2005, Hall A, Booth 2729

A truly innovative solution is one you don’t think about. It just works. Perfectly. In exactly the way you need. It’s why we devised breakthrough technology like DX-S, a superior quality, yet completely mobile CR solution perfect for the diverse needs of radiology today. As you face new challenges, you require new solutions. And the most innovative solution is the one that requires no innovation from you.
New navigated brain stimulation technique
Aiding consciousness research

By Marcello Massimini MD, PhD, of the Department of Psychiatry, University of Wisconsin, Madison, USA

We know that the presence and the anatomical integrity of the thalamo-cortical system are critical for consciousness to emerge. However, our everyday experience also suggests that consciousness is something that can come and go, grow and shrink, and that it depends strictly on the way our brain is functioning. Indeed, everyone is familiar with the impression of nothingness that we experience upon awakening from dreamless sleep—the sense that we were not even there, nor, as far as we are concerned, was the entire universe. Interestingly, even during the deepest stages of sleep when our conscious experience is extinguished, our brain does not shut down and the thalamo-cortical system remains very active. So, what is the fundamental ability that the brain loses when consciousness fades?

In designing an experiment that could address this question we were guided by a theory, the information integration theory of consciousness, recently formulated by Professor Giulio Tononi, at the Department of Psychiatry, University of Wisconsin. According to this theory, what matters for consciousness is the ability of the brain to integrate information, which, in fact, depends on the ability of the different areas of the thalamo-cortical system to effectively talk to each other. Testing this hypothesis with an experiment was not easy, because we needed to find a way to ‘knock’ directly on one cortical area and record how this area then communicates with the rest of the brain. Adding to our difficulties, we needed to do this while subjects were falling from wakefulness into sleep. Our solution was to use a new Navigated Brain Stimulation (NBS) technique produced in Finland by Nexstim Ltd (www.nexstim.com) that combines transcranial magnetic stimulation (TMS) and high-resolution electroencephalography (hr-EEG). TMS allows stimulating the human cerebral cortex, directly and non-invasively, while hr-EEG enables the recording of how the entire brain responds to that stimulation.

The results were very clear. During wakefulness the activation of one cortical area was promptly transmitted to other connected areas in the thalamo-cortical system and echoed in these brain regions for a long time. As soon as the subject entered sleep, the initial activation, although very strong, remained localized to the chemically stimulated area and died away rapidly. Thus, during sleep, different elements that make up the thalamo-cortical network became isolated and unable to exchange information. This change may be the key difference between the awake, conscious brain and the sleeping, less conscious brain. Similar changes, more subtle or more pronounced, might also occur in some pathological conditions such as schizophrenia, dementia or in comatose patients, as well as in subjects under the effect of anaesthetics. Thus, the ability to measure directly in humans the degree to which cortical areas can talk to each other when consciousness is affected can be important in clinical neurology and psychiatry.

Co-authors: F. Ferrarelli, R. Huber, S. Esser, H. Singh, G. Tononi

Imaging for war zones
CR equipment is mobile and ready to move

From left: Dorian Cook, National Sales Manager Ferrania LifeImaging, with Surgeon Commander Peter Burton, Squadron Leader Martin Coleman and Captain Catrina Eaton

Ferrania Imaging Technologies is supplying the British Army with computed radiography (CR) equipment for use in Basra, Iraq. Two LifeInVision CR systems, along with two LifeJet printers, two mega pixel monitors, especially rugged laptops, and robust Hardigg cases in which to transport all the equipment.

One system is installed at the Royal Naval Hospital, Haslar, and the other is in use at the forward field medical centre in Basra.

According to Ferrania, this system represents a big step forward and offers massive benefits for the army’s medical teams, particularly in the field. ‘Previously, they had been using traditional X-ray technology, with all the inherent problems of transporting the necessary chemicals and equipment, not to mention the difficulty of keeping chemicals stable in the heat of Iraq and the limited space in which to store all the materials and equipment. By contrast Ferrania’s LifeInVision CR system with its laser scanning ability, erasable phosphor plates and advanced image management software, offers complete, flexible and multi-purpose imaging solutions. The unit can quickly and easily produce high quality images of any body part. Images can be stored for convenience on CDs or even memory sticks for simplicity and mobility.’

In addition, the firm points out that the whole system is fully portable, a valuable feature in a busy, space-limited environment.

Details: www.ferraniait.com
German engineering has a valued history, which continues and ever advances. Today, the importance of the Made in Germany stamp on electromedical technology is underlined by the combined annual turnover of €3 billion - two thirds derived from exports - of companies associated with the German ZVEI Association for Electromedical Technology.

Valued worldwide

Positional emissions tomography (PET) scans present that differentiation. Deposits in arteries can lead to constrictions, or complete blockages. This can be alleviated in a minimally invasive procedure, using a balloon catheter and fitting a stent.

Three-dimensional (3-D) images of coronary vessels, provided by modern angiography equipment, show the position, size and angles of constrictions or calcifications of coronaries with great accuracy. These are just a few examples of medical developments that can now improve patient care. They enable more effective and efficient healthcare, and are available now. However, only the healthcare services themselves can decide to take advantage of their development.

Industry and users work together

The medical technology industry and its end users have taken steps to optimise processes through the European umbrella organisation COCIR and, in Germany, via the ZVEI Association. Doctors and medical companies have also united in the Integrating the Healthcare Enterprise (IHE) to solve the problems of interoperability of primary systems. Clinical processes, such as a request for diagnosis and transmission of the results, are defined by the user and put into practice by the industry, an initiative that has produced such success that it has been copied across Europe. Clinical departments, e.g. cardiology and the laboratory, are already integrated and, in the future, this will extend, for example, to pathology and surgery.

* The German ZVEI Association for Electromedical Technology represents about 100 companies that produce 90% of the country’s imaging and other electromedical equipment. Apart from political lobbying in the interest of this high-tech field, the Association also co-ordinates the exchange of information and experience in all relevant business areas. Information regarding market developments during the last few years can be accessed at: www.zvei.org/medtech (Branchen-Information).

The association also represents members at a European and international level through active involvement in the European umbrella organisation COCIR (www.cocir.org), which, among other activities, focuses on European legislation originating in Brussels. COCIR also tackles topics such as the EU-recognised licensing procedure for medical technology products in relation to partner associations in North America and Asia.
In 1982, Ulrich Medical—a third-generation family concern based in Ulm—presented the first contrast agent injector for CT examinations. Twenty years on, Ulrich not only offers a high-end portfolio of contrast agent injectors—many installed on the fastest MSCTs—but it also has a highly active international distribution network.

‘Unlike common syringe injectors,’ Ulrich explains, ‘all our injectors are based on the special roll pump system. Pre-loading syringes is not necessary because injection is made directly from the media container, a feature that allows big storage bottles to be mounted. So several injections can be made consecutively without loading or decanting media. This comfortable handling contributes to a high patient turnover, as well as the saving of time and costs for disposables. In addition to the economic performance and consumption, the construction principle of a roll pump system reliably ensures the hygienic safety for multi-dosing.’

In addition to its CT injector Ohio tandem, the company has now developed the Ohio M, to also provide the tandem function for MRI examinations. This means two different contrast agents can be chosen without a time-consuming change of media containers. ‘Because two of the three media accesses can be equipped with different contrast agents, the optimal contrast medium, plus NaCl for each patient or examination, can be chosen without re-organising the daily workflow,’ Ulrich points out.

**CONTRAST AGENT INJECTORS**

In 1982, Ulrich Medical—a 3rd generation family concern based in Ulm—presented the first contrast agent injector for CT examinations. Twenty years on, Ulrich not only offers a high-end portfolio of contrast agent injectors—many installed on the fastest MSCTs—but it also has a highly active international distribution network.

‘Unlike common syringe injectors,’ Ulrich explains, ‘all our injectors are based on the special roll pump system. Pre-loading syringes is not necessary because injection is made directly from the media container, a feature that allows big storage bottles to be mounted. So several injections can be made consecutively without loading or decanting media. This comfortable handling contributes to a high patient turnover, as well as the saving of time and costs for disposables. In addition to the economic performance and consumption, the construction principle of a roll pump system reliably ensures the hygienic safety for multi-dosing.’

In addition to its CT injector Ohio tandem, the company has now developed the Ohio M, to also provide the tandem function for MRI examinations. This means two different contrast agents can be chosen without a time-consuming change of media containers. ‘Because two of the three media accesses can be equipped with different contrast agents, the optimal contrast medium, plus NaCl for each patient or examination, can be chosen without re-organising the daily workflow,’ Ulrich points out.

**MARKET LEADERS**

<table>
<thead>
<tr>
<th>Country</th>
<th>2004 Imports</th>
<th>2004 Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>€2.45 billion</td>
<td>€5.22 billion</td>
</tr>
<tr>
<td>Japan</td>
<td>€34 million</td>
<td>€68 million</td>
</tr>
<tr>
<td>Germany</td>
<td>€5.5 billion</td>
<td>€10.1 billion</td>
</tr>
</tbody>
</table>

**GERMANY**

<table>
<thead>
<tr>
<th>Share of export turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan: 42%</td>
</tr>
<tr>
<td>USA/Canada: 39%</td>
</tr>
<tr>
<td>Germany: 19% (plus 42% since 2000)</td>
</tr>
<tr>
<td>UK: 8%</td>
</tr>
</tbody>
</table>

**Total MRT systems worldwide (2002): 25,210**

Installations per million population

- Japan: 42
- USA/Canada: 39
- Germany: 19 (plus 42% since 2000)
- UK: 8

**Total CT systems worldwide (2002): 41,000**

Installations per 1 million inhabitants

- Japan: 87
- USA/Canada: 32
- Germany: 30 (plus 15% since 2000)
- UK: 8

**Ultrasonic (sonography) systems used in Germany: about 40,000**

Average age of the country’s medical electronic systems

- Over 10 years: 34%
- 6-10 years: 43%
- Up to 5 years: 23%

**CONTRAST AT THE RIGHT TIME – AT THE RIGHT PLACE**

PUBLISHED BY JOURNAL www.european-hospital.com
Mammography

Greater control plus comfort

Immobilisation of the female breast for diagnostic examination and biopsy is one of the prime foci of the Noras Company. In 1996 the predecessor of the firm’s well-known MR-BI 160 Biopsy Unit was submitted for examination and biopsy is one of the prime foci of the Immobilisation of the female breast for diagnostic examination and biopsy. Immobilisation is realised by the compression unit, which can be rotated by 360° parallel to the frontal plane for optimum accessibility to the lesion. Noras also points out that a further development of the well-known PE 162 Positioning Unit is used for needle guidance and offers access to areas close to the axillary region (chest wall).

System independence, simple assembly and disassembly and easy cleaning (the system is 100% plastic), plus comfortable patient beddng, are among the unit’s many other advantages. Additionally, the components of the biopsy unit are made of Peek and can be reused after disinfection/sterilisation.

*A special Noras adapter permits use with the Vacora Vacuum Biopsy System of the C R Bard Company.

The tabletop film processor

Ecomax – a brand new plug and play system for analogue X-ray film processing - is being launched at the RSNA by the Oberstenfeld-based company Protec Medizintechnik GmbH & Co. KG. The firm reports that this concept of mounting all components that substantially influence image quality (e.g. pumps, heaters, guide bars, rollers etc.) has resulted in:

- Optimised image quality due to a brand new tank design
- Reduction of wasted chemicals due to oxidation, because of smaller tank sizes (environment-friendly and money-saving for consumables)
- Less required space, due to the more compact overall processor design
- Easier access to components that require regular maintenance saves time and reduces maintenance costs
- Preset, optimal parameters ensure consistent good results.

To be marketed early next year, Protec adds: ‘Ecomax convinces with its simplicity, its design and the image quality it produces.’

Mobile patient positioning table with quick-change battery

The bucky table is an inexpensive tool for X-Ray departments. However, due to the increasing use of movable stands, especially combined with digital imaging receptors, further requirements for a patient positioning table arise. Along with tabletop movements in XYZ directions, to optimise the advantages of movable stands, table movement is desirable with a patient in the room. To this end, Provotec GmbH & Co. KG, based in Espelkamp, has developed the Prognost XPE - a mobile patient positioning table with motorised elevating and floating tabletop that allows variable patient positioning as well as the optimal use of modern X-ray tube/image receptor combinations.

Not having a line cable makes the Prognost XPE - Akku particularly comfortable, Provotec also points out. ‘A rechargeable battery (accu) supplies sufficient energy for moving approximately 120 patients up to desired working heights. While one accu supplies energy to the table, another is loaded in the loading station. This is very user-friendly, because the accu can be changed simply, quickly and without a tool. Even if charge signals are overlooked and the accu is “suddenly” empty, changing it takes only seconds. The loaded accu can be removed with one hand from the loading station and replaced in the Prognost XPE - Akku against the empty one.’
Diagnostic System - ADS has been put into practice, the system’s core - a Task-focused Diagnostic System - ADS - has been put onto a completely new technological foundation, Medos reports. By means of the incremental pre-processing of the new ADS, the advantages of pre-processing are used to full capacity, leading to a significant acceleration of data transfer and interaction, particularly with large data sets, while remaining flexible in dealing with newly incoming series. Established in 1978, to design and develop medical information systems, by 1984 around 200 of this firm’s systems were installed in university hospitals, general hospitals and large radiological practices. In 1998, the firm introduced its multi-media electronic patient documentation, which enables data supply from external IT Systems via secure web technology. Following the first installation of its PACS, in 1999/2000, this system also became widely used in large university and general hospitals, as well as large radiological practices. With several regional centres in Germany, as well as a subsidiary in Denmark, in May this year Medos, as part of Sweden’s Ortvius Group, was listed on the Stockholm stock exchange.

Integrating imaging and management systems

Enjoying its specialist role in the integration and tailoring of imaging and management systems specifically for hospitals, private clinics and practices, Vediys Medical Solutions explains: ‘We provide much better communication - internally and externally - in other words. Direct image access at any place, any time, instead of manual transport, snail mail or even Taxi. A substantial part of our solution is a high performance, reliable and modern image management system that significantly reduces costs for X-ray films, chemical processes as well as all the archiving and distribution costs of films and patient records.’ By working on full integration within existing infrastructure (hard/software) Vediys points out that customers can reduce the hardware investment to a minimum as well as ‘... upgrade existing HIS or RIS systems with the features of a perfectly integrated image management system that works directly in the desired electronic patient record. Optimal image and patient record distribution throughout a hospital, innovative web-technologies, and most secure archive solutions are framed with digital radiography and mammography systems, information voice recording/recognition systems, as well as economic, high quality paper print solutions, the firm points out, adding: ‘Vediys stands for the best of breed products and solutions from one strong partner.’

New diagnostic software

PACS plus selenium technology

The medical information technology (IT) firm medigration company specialises in PACS picture archiving and communication systems (PACS) and provides, for example, customised and vendor independent small to mid-size solutions. Established in Erlangen six years ago, medigration's products include: F: Radiography ● 1710 Radiographic units, digital L: Film and Image Management ● 3380 PACS ● 3385 PACS components ● 3387 Paper print equipment ● 3395 Teleradiology R: DICOM-Compliant Systems ● Data storage ● PACS ImageBroker, medigration’s main product is a complete system for digital short and long-term storage of all DICOM image objects with integrated image distribution via intranet. We also offer a DICOM review workstation the Rendoscopy workstation and surface calculation of the colonic mucosa and splitting of the colon along the track also occur automatically. Full cross-sectional imaging data (MPR and oblique use) is updated as tracking continues.

Although 3-D rendering of the colon eliminates invasive endoscopic probing and thus potential perforation, the adoption of virtual colonoscopy by physicians has been slow - mainly because using the software proved too time-consuming. A fully automated system promises to remove that problem. Developed by a team of computer scientists in co-operation with radiologists at the Clinical Radiology Institute of LMU (Klinikum Grosshadern), Rendoscopy Gentle Color is intuitive software that accelerates visualisation of the whole colonic mucosa. The entire 3-D Post-Processing is fully automated, without any need for interaction by a doctor or assistant,’ the Rendoscopy team explains. ‘This applies to the Multi-pathfinding as well as to endoscopic image generation and the view behind-the-folds-images.’ The colon mucosa is examined using an ultra low dose technique, so the mucosa assessment is in no way restricted in addition to a virtual intra-luminal view, this provides a view behind the folds. (Splitting the colon provides it without distortion, whereas flattening the colon leads to artefacts). Consequently blind areas can now be assessed. The Multipath Tracking System finds each path in the 3-D dataset without manual interaction. As the gas-filled colon is blocked by fluid or a collapsed colon part, the part of the colon before and behind the collapsed part can still be examined. After scanning, axial slices are automatically transferred to the Rendoscopy workstation and surface calculation of the colonic mucosa and splitting of the colon along the track also occur automatically. Full cross-sectional imaging data (MPR and oblique use) is updated as tracking continues.

Rendoscopy 3-D imaging algorithms create surfaces with practically no partial volume effect, so images have a far higher technical contrast resolution than 2-D axial cuts. The 1 Voxel spatial resolution (0.3 mm) on 3-D surfaces provides the physician with a very powerful zoom view on the colon mucosa.

A physician can choose to make an interactive examination, or to assess images in paper or electronic form (e.g. PACS assessment console, intranet or CD-Rom). The software utilises DICOM data from advanced multislice CT scanners, such as those made by GE, Toshiba, Siemens, Phillips and Hitachi. Rendoscopy’s documentation operates smoothly with all common PACS systems, such as Agfa Impax, GE Centricity, Siemens Magic View, systems produced by Sectra, Philips, Kodak, Cedara, etc. Added to these benefits, virtual colonoscopy means no sedation for patients. Obviously, all things considered, many gastroenterologists are calling for virtual colonoscopy to be recommended as a front line screening examination. ‘The attractive nature of solution from Rendoscopy exists for virtual bronchoscopy and traumatology.

Seamless enterprise-wide IT

Based in Karlsruhe, medavis GmbH has been developing system solutions for radiology since 1994. As a well-reputed and experienced supplier for radiology IT solutions, especially RIS and PACS, we cover the entire workflow of findings and of all related processes. Therefore we combine ease of use and efficiency with a seamless integration into enterprise wide IT structures - all over the world, the firm says.

The medavis RIS - designed to manage all radiology data - exists in several information systems with various manufacturers. To that end the firm uses HL7 and DICOM standards and provides modules that harmonise with and complement each other, and they also can be integrated independently of one another in existing structures. ‘We support our participation in the IHE Initiative not only with our compatible products but we are also a driving force in its design. We also regularly demonstrate our performance capability at every IHE Connection.’ The medavis PACS is known for its excellent integration into medavis RIS and its high speed, the firm points out. Due to its flexible interfaces it can be easily integrated into an existing system infrastructure. The modular structure and modern distributed system architecture enable free scaling and configuration according to individual requirements.’
History, images and report dictation all-in-one workstation

The hospital’s previous Kodak System 4 PACS worked well, he added, explaining the hospital’s progression to the latest System 5 with RIS when it became available. To ensure a smooth roll out, Kodak will continue to work with individual clinicians within the Hereford NHS Trust as the new system integrates fully into their workflow. So far, users are said to find it very intuitive, and more user friendly, and they add: ‘The manipulation tools for diagnostic reading are excellent.’ Designed to increase radiologists’ reporting efficiency, the system avoids the need to access separate ones. Previously, a radiologist had to access patient demographic details and history on RIS, images on PACS, then dictate a report into a third system. Now the whole process is launched instantly and simultaneously, with everything displayed at one workstation.

The hospital now intends to incorporate Philips SpeechMagic voice recognition. The implementation of the Kodak RIS 2010 web module, interfaced to patient demographics and the PACS is also proving a huge advantage for clinicians requesting reports. The new RIS can accommodate paper based, paper light (scanning requests) and electronic requesting. The RIS 2010 web module has provided users outside radiology with the ability to track a complete radiology episode, including image availability, preliminary dictation and final verified reports.

Next, the hospital intends to widen access to the community by distributing patient booking, appointment details, images and clinical reports to referring physicians and General Practitioners within Primary Care Trusts.

Cancer scanners may not solve problems

UK - Despite the announcement of a £20 million investment in high-tech scanners, which could double the seven positron emission tomography (PET) scanners used in the country’s National Health System (NHS) in England. However, it is not clear how many new scanners this budget will buy because there has been no decision, as yet, about what proportion of fixed and mobile scanners will be ordered and where they will be based.

With predictions that the demand for scans will quadruple by 2008, cancer charities say even more scanners will be needed. As the Macmillan Cancer Relief organisation, its CEO, Peter Cardy, speaking for several cancer charities, said that, whilst the new funding was welcome, it would not go far enough. ‘The UK lags behind the rest of Europe and the US in the provision of PET,’ he pointed out, adding that the NHS currently needs at least 15 scanners to meet the needs of cancer patients. In certain areas of the country, because of the distance to the few scanners, patients are often not even referred for scanning.

Although there was reassurance from the present Health Minister, Rosie Winterton (Labour) that the NHS Cancer Plan (providing more investment and staff) is reducing cancer deaths, the Shadow Health Secretary Andrew Lansley (Conservative) pointed out that, due to tight hospital budgets, they might have to struggle to use the scanners they receive.

Pioneers of Vision

With its visionary technology, Shimadzu has always offered physicians new possibilities for diagnosis, such as the development of the first commercial X-ray instrument in Japan soon after the discovery of X-rays. Countless patents and world premieres, setting the standard today, have contributed to Shimadzu’s leading role in diagnostic imaging.

Shimadzu is also a pioneer in the groundbreaking direct-conversion FPD technology:

- direct conversion of X-rays to digital image data
- cassettes and X-ray films are unnecessary
- much higher image quality and expanded diagnostics
- radiation dose reduced by half
- fully digital and faster data handling
- full DICOM-compatibility

Shimadzu Deutschland GmbH
Albert Hahm-Straße 8-10
D-47208 Duisburg, Tel. 0203-7697-0
www.shimadzu.de

Direct-conversion FPD is the technology of the 21st century. It is the present as well as the future. Shimadzu’s X-ray and fluoroscopy systems are economical, meet the highest diagnostic requirements and are easy to operate.
Although Europe has many female paediatric and gastrointestinal radiologists, few women become interventional radiologists. Professor Malgorzata Szczerbo-Trojanowska is among that minority. When the former ECR President Professor Helen Carty retired from the congress, Prof. Szczerbo-Trojanowska became the only female Member of the Board of the European Congress of Radiology. Daniela Zimmermann, Executive Director of European Hospital journal, asked the professor about her choice of career and future prospects for women in this field.

Women in Radiology

W
omen radiologists are not rare in Poland, Professor Szczerbo-Trojanowska explained. ‘They became interested in the field many years ago, when only X-ray machines were available. Due to the X-ray exposure, the job description stipulated shorter hours and two weeks extra holiday time. Today, given advances in equipment, machines were available. Due to the X-ray exposure, I expect, and hope for changes because, many radiologists who work those short hours opportunistically seek additional jobs elsewhere.’

Are women radiologists well accepted by male counterparts in Poland, or are they perceived as a potential threat?

‘Those who achieve a high standard in their practice or performance are fully accepted. They are so very much involved in the profession that they don’t want to compete with the men, or take their places. However, there are quite a number of women in leading positions – as heads of departments and chairs of societies,’ she pointed out, adding: ‘However only few women chose interventional radiology. Being an interventional radiologist, is hard work. You have to stay in the operating theatre or cath-lab for many hours, wearing heavy aprons, mask and cap. So it is a stressful, hard job.’

For a year before becoming the only woman ECR Board Member, she had enjoyed the presence of the former ECR President Professor Helen Carty. ‘Professor Carty’s professionalism was so high that there wasn’t a single problem that could arise because she’s a woman. If you want to compete with a man you must be a good radiologist and an open minded, tolerant person. Professor Carty has such a great personality that she managed the Board and complex European issues smoothly. I really admired the way she ran the ECR Board as its chairman. She was very diplomatic, and absolutely excellent. It’s probably something I could not achieve. She had another advantage: we use the English language for our discussions. If that’s your mother tongue you can be very precise and sometimes when things are very difficult you need a lot of diplomacy to find the right word to express thoughts, or a way to argue with someone, so as not to offend him. Professor Carty had a very delicate way of convincing opponents. Also, I think women generally are more tender, cautious, delicate and diplomatic than men. Along with diplomacy they pay more attention to details, because excellence is made of small details. Men will often go straight forward, not caring about particulars. This may lead to failures,’ she pointed out.

Does Professor Szczerbo-Trojanowska want to become ECR President?

‘Ambitions always run high. We say: If you go step by step then you gain an appetite. But you should develop a way of waiting and looking and talking to people and to make your way slowly. Some individuals are driven by too high ambitions, I favour modesty and criticism in modulation of ambitions. I am convinced that success of ECR should come before ambitions of an individual. Quite early on, in Poland, I became head of a department, and then quite soon took a chair of radiology at the university where I work. Then I had the great honour and pleasure to be the first woman to become president of the Polish Radiological Society. It all happened in a natural way; I suppose I did not compete with the men, but I was simply promoted higher and higher by step. I gained experience in being in a society, working first on a Board, then in various sections, then becoming chairman of small sections, and so on. And I had a few new ideas. I had observed my society for many years and thought it is time to change many things - the statutes, for example - which a lot of people actually wanted, because my election occurred along with the political and economic changes in Poland. Traditionally, the presidents served two terms up to 6 years, so a society did not develop as quickly as it should. The first year is for running in, the second you have to do something, but then, if you are to be routinely re-elected, you think there’s no need to make a big effort. So I introduced changes; one was to have no re-election. The president has one term and knows that it is the only period he or she can contribute to the society, introduce new ideas. Then someone else takes over.

I succeeded with most of my ideas. We changed a lot of paragraphs in our statutes. I convinced most of the Board Members that it was a good way to change a society. For example, we changed our journal, quickly. In one year an old-fashioned journal became a very modern one. We also radically changed our education system, radiology specialisation and examination. So, in a short time, many things occurred that convinced people that this was a good direction in which to proceed. I was not forcing the changes - I had the feeling that almost 100 percent of the board wanted and supported changes, and everyone came up with their own ideas. It was time to become up-to-date.’

The ECR is of course very different from a national society. It deals with radiologists in the diverse countries of Europe. ‘For many years, especially before we changed our system, we knew that countries such as Poland and Hungary could not have adequate presence in European radiology, due to politics and economics. Europe was divided,’ the professor observed. ‘Since most countries are now joined in one Europe I thought it would be easier for radiologists from Eastern countries to appear on the scene, but I thought this process would be quicker. At the ECR there are not enough moderators of sessions or members of sub-committees from East European countries; most are from Western Europe. I’ve had lots of discussions with presidents and Board Members about this, and was told that nominations come from sub-committees and sub-specialisation societies. Obviously for years scientists from Western countries were well known. But when I looked at statistics I found that for example the number of abstracts accepted from Poland ranked in the first ten countries with highest contribution.'
neurosurgeon the thought of one more surgeon in the family led me elsewhere,’ she replied. Inspired by a tutor who had a vision that interventional radiology would flourish in the future, the professor said she realised this field was a little akin to surgery and felt she had found the right compromise. I also felt I would have more contact with patients than other radiologists.’

In 1970, at Lublin’s Medical University, she qualified with distinction as a physician, and in 1976 gained her PhD and became a Board Certified specialist in diagnostic radiology. In 1977 she became an assistant professor at the Department of Interventional Radiology, University Hospital Lublin.

How did her father react to her work?

‘When I told him in early seventies that it is better to do a percutaneous nephrostomy rather than an open nephrostomy, he asked: How could you puncture a renal pelvis through the kidney, just percutaneously, just under fluoroscopy? You should open it, he said, you should take a look. Then he said: Try it! He was very impressed when we did the first nephrostomy and it worked.

Now aged 58 years, the professor reflected: My father and husband have always been supportive, because, as a radiologist I provided diagnoses to neurosurgeons - and now we even co-operate closely, because I treat patients with vascular lesions of the brain, such as aneurysms, AVMs, percutaneously, doing embolisations. So the number of the patients who have open surgery to clip an aneurysm is decreasing, but we can propose the best treatment option for each patient.’

Does her intensive work plus society and political involvements encroach on her family life?

‘It’s impossible for a doctor to close the hospital door and stop thinking about patients. There are many difficult cases to think about every day, day and night,’ Professor Szczerbo-Trojanowska observed. ‘However, being a family of two doctors makes it easier to understand each other and easier to accept that a telephone call in the night means one of them has to leave home to treat an urgent case. It has also been accepted by my two sons.’
Telemetry and telemedicine

When Claudia Dario, the CEO of Treviso Healthcare Structure, decided to take his hospital departments into the 21st Century by experimenting with telemedicine applications, he brought about huge improvements for providers and users alike.

In 2003, Escape, the first telemedical project - later extended and renamed TelemedEscape - was up and running in Treviso Healthcare Structure, and it has since been adopted by other Italian healthcare divisions in other regions to provide a service for three million patients.

This completely digital system of signing, transmitting, delivering and storing clinical documents, maintaining the privacy and security of healthcare data, brings big healthcare delivery advantages, including the fact that patients can read their results on the internet (35% of patients now download results) or by post (11% receive results directly at home).

The Health Optimum Project - Closely connected to TelemedEscape, this is interdisciplinary, with clinical partners from Italy’s Veneto Region, Spain’s Aragon Government, and Denmark’s Country of Fynen, and with technological assistance and support provided by the Partners Telemedicina Rizzoli (Italy), and TB Solutions Technology Software S.L. (Spain), organisational assistance and support by PriceWaterhouseCoopers (Italy), and by the EuskoIT Healthcare Structure.

It is approved and co-funded (budget €2,200,000) by the European Community within the 4CT programme.

Health Optimum is validating the re-engineering of healthcare delivery via telemedicine - tele-counselling, tele-laboratory, virtual referral, tele-consultation, and shared clinical data. It aims to re-organise processes, standardise clinical and technological procedures and manage patient documentation digitally.

A wide variety of specialties have been tested in this project, namely: neurological tele-counselling and tele-laboratory in Veneto, tele-diabetes, tele-cardiology in Fynen and tele-haematology, tele-radiology, tele-urology, tele-endocrinology, tele-nephrology, tele-cardiology and tele-laboratory in Aragon. At the root of these tele-counselling initiatives lies the need to provide prompt consultancy by specialists for urgent medical cases and also to provide services for citizens living in hard-to-reach, remote areas.

During a tele-consultation an emergency department specialist, using a digitally signed electronic patient record containing all necessary clinical data and images, asks a tertiary hospital specialist for an opinion, and that centre of excellence sends back a digitally signed opinion. An addition specialist in the circuit can also be consulted, for example one on duty in another tertiary hospital, or the Head of a Department who, through a remote connection, can view the data even from home.

For the Tele-laboratory applications a new generation of instruments allowing tests to be carried out on site and to show the results immediately at the patient’s side, make for a simplified workflow and cost reduction. The system is based on a palm-size device (POCT – Point of Care Testing), which interacts with a portable PC equipped with a specific software application. Test results collected on the spot can later be uploaded onto the hospital server for certification by the laboratory using a digital signature.

The clinical partners are presently working on field trials and collecting results. A preliminary market survey has been carried out and also a Business Plan has been drafted based on the ex ante situation and with the results of the field trials, it is being constantly refined. A quality of care impact assessment is also under way. An ex ante and ex-post indicators are being collected. The UCLN is to launch an important final conference at the end of this year.

In 2006, the Health ‘Quality of Life’ Project is to be completed in January 2006, with an important final conference taking place at the seminar on ‘Telemedicine and the Patient’ at University College London Hospitals (UCLH)

The Treviso Healthcare Structure, based in the city of Treviso in Italy, is an integral component of the Treviso Metropolitan Area, covering a population of about 259,000 inhabitants.

The Treviso Healthcare Structure has a variety of facilities and services, including: open-care (including day-case), general care and hospital care departments, long-term care, and an in-patient care facilities. It offers a wide range of healthcare services within the register's catchment area.

The Treviso Healthcare Structure is also working as a model for the development of similar healthcare services in other regions in Italy.

The Treviso Healthcare Structure is a public body, independent and autonomous, and is assigned to the Ministry of Health, working towards the improvement of the quality of healthcare services.

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The HP Medical Archive is today's solution. And tomorrow's.

Like most providers, your medical data will triple in size in the next two years. The HP Medical Archiving Solution provides cost-effective, scalable storage for your diagnostic images that makes it easier to access vital information and provide improved patient care.

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This means that patient care is accelerated. Collaboration across medical facilities is made easier. And knowledge-driven solutions are promoted.

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What’s more, the solution is designed to interface with existing Picture Archiving and Communications Systems (PACS) and Radiology Information Systems (RIS).

All of which makes the HP Medical Archiving Solution the key to meeting your digital archiving challenges – today and for years to come.

To find out more please visit www.hp.com/eur/medicalarchiving
Problem wounds represent a significant and growing challenge to our healthcare systems. The incidence and prevalence of these wounds are increasing in the population resulting in growing utilisation of healthcare resources and budgets expended. Foot ulcers in patients with diabetes contribute to over half of lower extremity amputations. Localised wounds due to critical ischaemia, granulated after amputation flap healing. It can also be used during assessment of patients with lower extremity wounds as a screening tool for occult peripheral arterial occlusive disease. Hyperbaric oxygenation is achieved when a patient breathes 100% oxygen at an elevated atmospheric pressure. Physiologically, this produces a directly proportional increase in the plasma volume fraction of transported oxygen that is readily available for cellular metabolism. Arterial PO2 elevations to 1500 mmHg or greater are achieved with 2 to 2.5 atm abs with soft tissue and muscle PO2 levels elevated correspondingly. Oxygen diffusion varies in a direct linear relationship to the increased partial pressure of oxygen present in the circulating plasma caused by hyperbaric oxygen therapy. This significant level of hyperoxygenation allows for the reversal of localised tissue hypoxia, which may be secondary to ischaemia or to other local factors within the compromised tissue. In the hypoxic wound, hyperbaric oxygen therapy acutely corrects the pathophysiology related to oxygen deficiency and impaired wound healing. A key factor in hyperbaric oxygen therapy’s enhancement of the hypoxic wound environment is its ability to establish adequate oxygen availability within the vascularity and connective tissue compartment that surrounds the wound. Proper oxygenation of the vascularised connective tissue compartment is crucial to the efficient initiation of the wound repair process and becomes an important rate-limiting factor for the cellular functions associated with several aspects of wound healing. Neutrophils, fibroblasts, macrophages, and osteoclasts are all dependent upon an environment in which oxygen is not deficient in order to carry out their specific inflammatory or repair functions. Two groups of induced responses occur: 1) Improved leukocyte function of bacterial killing, antibiotic potentiation, and enhanced collagen synthesis occurring during periods of elevated tissue PO2. 2) Suppression of bacterial toxin synthesis, blunting of systemic inflammatory responses, and prevention of leukocyte activation and adherence, which results in decreased fibrin deposition. Oxygenation benefits are effects that may persist even after completion of hyperbaric oxygen therapy. In addition, vascular endotheial growth factor (VEGF) release is stimulated and endothelial derived growth factor (PDE 5) receptor appearance is also induced. The net result of serial hyperbaric oxygen exposures is improved local host immune response, clearance of infection, enhanced tissue growth and angiogenesis with progressive improvement in local tissue oxygenation, and epithelialisation of wound beds.

Innovate and Tradition.
within 12 months and 28-52% wound healing. The cost of care for a new diabetic foot ulcer has been calculated to be $27,987 in the first year following diagnosis. Management, likewise, has been extensively described and includes careful attention to identification and management of infection, aggressive surgical debridement, evaluation and correction of vascular insufficiency, ambulatory off-loading, and glycaemic control. While a full discussion of these interventions is beyond the scope of this review, they form the basis of effective diabetic foot ulcer care and must be applied consistently if adjunctive interventions are to provide an additive value. Other interventions that have been recently advocated including topical application of a recombinant human platelet derived growth factor (PDGF-BB, beprecelmine), bio-engineered human monolayer fibroblast grafts, and bi-layer fibroblast and keratinocyte grafts, and neoprostaglandin, pressure wound therapy (wound vac). Clearly, regardless of the intervention applied, clinical outcomes improve when care is applied in a multidisciplinary setting using comprehensive protocols for care.

Local wound hypoxia plays a pivotal role in diabetic wound healing failure and limb loss as evidence by the report by Pecoraro (December 1998) stated: ‘There is increasing evidence to support the use of hyperbaric oxygen therapy in the treatment of diabetic foot wounds. However, convincing evidence to support the use of HBO in ischaemic wounds is lacking. This is likely to be due to a number of methodological problems, to suppressive local factors and to the difficulty of standardising HBO therapy across centers. ’

Hyperbaric Oxygen Treatment Protocols

Treatment protocols vary depending on the severity of the problem and the type of hyperbaric chamber used. In larger multiplace chambers, treatments are delivered at 2.0 to 2.5 ATA for 90 to 120 minutes once or twice daily. In monoplace chambers patients are treated daily. Patients with serious infections may require hospitalisation for intravenous antibiotics and better diabetes control. Hyperbaric oxygen treatment in such cases is usually rendered twice daily for 90 minutes. Once stabilised most of these patients can be treated on a once daily basis as outpatients. When infection is controlled, blood flow optimised (wherever possible), other interventions that may hasten tissue growth and wound closure such as negative pressure wound therapy (wound vac), bio-engineered tissue grafts, or surgical reconstruction or closure can be used in combination with adjunctive hyperbaric oxygen treatment to hasten recovery. The October 2000 Office of the Inspector General report to the Department of Health and Human Services identified that active physician oversight of hyperbaric oxygen treatment led to improved outcomes.

Utilisation Review

Hyperbaric oxygen treatments are performed at 2.0 to 2.5 ATA for 90 to 120 minutes of oxygen breathing. The initial treatment schedule is dictated by the severity of the disease process. In the presence of limb-threatening infection after debridement or incompletely corrected peripheral arterial occlusive disease, patients may require twice daily treatments. Once stabilised, treatment frequency may decrease to once daily. Utilisation review is required after the initial 30 days of treatment and at least that frequency thereafter.

Cost Impact

Hyperbaric oxygen therapy as an adjunct to medical and surgical treatment of difficult problem, chronic wounds, particularly diabetic lower extremity wounds, has been shown to be cost effective in limited reviews, especially when compared to major lower extremity amputation. Preventing an above the knee amputation is usually performed twice daily, possibly representing a cost-effective outcome in these high-risk patients. Wounds healed with adjunctive hyperbaric oxygen treatment have also demonstrated excellent results.

Outlook

Considering the existing evidence, the Jury of the ECHIM Consensus Conference on hyperbaric oxygen in the treatment of foot lesions in diabetic patients, held in London (December 1998) stated: ‘There is some evidence from a number of trials, each of which suffers from methodological problems, to support the use of HBO in ischaemic limb-threatening problems in diabetic patients. Patients with diabetic foot problems warrant treatment by foot care teams with careful evaluation of metabolic, neuro-pathic and vascular factors. Potential candidates for HBO may include those with Wagner grade 3 to 5 lesions treated unsuccessfully by standard methods when amputation seems to be a possibility.’

A result of the meeting was the recognition of the urgent need for a collaborative international trial for the application of HBO in diabetic foot lesions. This study is now well advanced in Europe as a multicentric, prospective, controlled, randomised project to evaluate the efficacy of HBO in the healing of foot lesions in diabetic patients. This had been designed by the Working Group 4 of the COST Action B14 (www.oxygen.org) which was co-ordinated by the Research Foundation of the European Commission until March 2005. Results of that study should become available in the near future.

Table 1. Wagner Grading System for Diabetic Foot Ulcers

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Intact skin</td>
</tr>
<tr>
<td>I</td>
<td>Superficial without penetration deeper layers</td>
</tr>
<tr>
<td>II</td>
<td>Deeper reaching tendon, bone, or joint capsule</td>
</tr>
<tr>
<td>III</td>
<td>Deeper with abrasion, osteomyelitis, or tendinitis extending to those structures</td>
</tr>
<tr>
<td>IVa</td>
<td>Gangrene of some portion of the toe, toes, and/or forefoot</td>
</tr>
<tr>
<td>IVb</td>
<td>Gangrene involving the whole foot or enough of the foot that no local procedures are possible</td>
</tr>
</tbody>
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Peter HJ Mueller MD is the lead Clinician at London Abnormal Medicine Ltd, and a consultant at Whipps Cross University Hospital, London.
Fatal blood clots claim 500,000 EU lives annually

As hospital administrators and clinicians across Europe are urged to take action to cut these unnecessary deaths - experts call for screening of surgical and medical patients, and thromboprophylaxis for those at risk. Ian Mason reports

Fatal blood clots claim 500,000 EU lives annually

Pulmonary embolism following venous thrombosis claims over 500,000 lives in the EU annually, according to a new study. The need for preventive measures is clear, since most premature deaths due to blood clots are avoidable, says Dr Alexander Cohen, on behalf of the Venous Thrombo-embolism (VTE) Impact Assessment Group in Europe (VITAE).

‘VTE kills more Europeans each year than breast cancer, prostate cancer, HIV/AIDS and road traffic accidents combined,’ said Dr Cohen, of Guy’s, King and St Thomas School of Medicine and King’s College Hospital, London, UK. ‘The direct cost of VTE to EU healthcare systems exceeds three billion euros annually.’

Failure to preventing thrombosis is now the single most common cause of medical negligence litigation in the USA, and cases in the EU are now soaring, he cautioned.

‘Hospital administrators and clinical directors need to check they have adequate protocols in place. In many EU countries government regulators are looking closely at the problem of VTE, and audits may soon be mandatory,’ he added.

The VITAE study - the first major attempt to establish the burden of VTE across the whole EU - shows that the annual toll of fatal and non-fatal symptomatic VTE, which includes pulmonary embolism (PE) and deep vein thrombosis (DVT), exceeds 1.5 million events annually in the European Union. This figure includes 543,500 deaths, 435,000 cases of PE and 684,000 cases of documented symptomatic DVT.

The VTE burden is probably much higher than these figures suggest, because in many cases it is clinically silent and difficult to diagnose. Most fatal PEs remain unrecognised as post mortem are rarely performed. ‘More than 70% of fatal PEs are only detected during post-mortem examination,’ said Professor Juan Arcelus, Department of Surgery, University of Granada Medical School, Spain. Patients should be screened, and if at risk, considered for thromboprophylaxis - this includes surgical patients and medical patients with restricted mobility, such as those with myocardial infarction, heart failure, stroke, acute infection or acute rheumatological disease - it is not often appreciated but PE kills three times more medical, than surgical patients.

Dr Marie-Antionette Sevestre, Service de Medicine Vasculaire, CHU Amiens, France, said: ‘VTE is a silent disease that is not widely recognised as post mortem are rarely performed. ‘More than 70% of fatal PEs are only detected during post-mortem examination,’ said Professor Juan Arcelus, Department of Surgery, University of Granada Medical School, Spain. Patients should be screened, and if at risk, considered for thromboprophylaxis - this includes surgical patients and medical patients with restricted mobility, such as those with myocardial infarction, heart failure, stroke, acute infection or acute rheumatological disease - it is not often appreciated but PE kills three times more medical, than surgical patients.

Prof Michel-Meyer Samama, Hotel-Dieu University Hospital, Paris, France, has authored several influential textbooks on clinical thrombosis and hypercoagulable states. He says that too many relatively young patients die due to lack of adequate prophylaxis. ‘VTE is a silent disease that prematurely takes life although available and effective prophylaxis and treatment exists.’

Preventive treatments for DVT include early mobilisation, sequential compression devices and stockings to prevent blood clotting, and anticoagulants and/or blood-thinning drugs.

DVT results when a blood clot inside a deep vein, commonly located in the calf and or thigh, PE a potentially life-threatening complication occurs when a fragment of a blood clot breaks loose and travels to the lungs.

Venous thrombo-embolism: The facts

Venous thromboembolism (VTE) is caused by the formation of blood clots that partially or completely block a vein. The most common form is deep vein thrombosis (DVT), occurring when clots form in deep veins, usually in the legs. Parts of the clot may break off and lodge in the arteries that supply the lungs, forming a pulmonary embolus (PE) - a medical emergency that can cause irreversible damage to the lungs and which frequently results in death.

Risk factors for DVT and PE include age, increased weight, smoking, pregnancy, varicose veins; cardiac dysfunction; and hormone replacement therapy.

VTE prevention

Thromboprophylaxis is available in both medical and pharmacological forms. For patients with moderate to low risk of blood clots mechanical prophylaxis may be used instead of, or in combination with, pharmacological prophylaxis. Mechanical methods of thromboprophylaxis include pneumatic calf compression and compression stockings.

Surgical patients (especially those undergoing orthopaedic surgery) and medical patients classified as medium or high risk may be given anticoagulants to decrease the risk of blood clots.

Pharmacological agents for thromboprophylaxis include unfractionated heparin, LMWH, thrombin inhibitors, oral anticoagulants, and specific factor Xa inhibitors.

Many surgeons now advocate that prophylaxis after joint replacement should continue after the patient is discharged from hospital (extended prophylaxis). The duration of extended prophylaxis depends on the risk category of the patient and the treatment that is undertaken.

Extended prophylaxis normally lasts for five weeks but in high-risk patients, or in those who have previously experienced DVT, prophylaxis can be administered for a significantly longer period.

In a double-blind, placebo-controlled trial the risk of DVT/PE was reduced by 63% in acutely ill medical patients treated with enoxaparin when compared with placebo, without increased major bleeding.

Enoxaparin reduced the risk of VTE by up to 50% in patients undergoing high-risk surgical procedures versus unfractionated heparin.
First Cyberknife centre opens

Germany - A new centre has opened in Munich to provide what is reported as a pain-free and patient-friendly treatment for tumours. The Cyberknife Centre is led by Dr Alexander Muacevic and PD Dr Berndt Wowra, in co-operation with Professor JC Tonn, at the neurosurgery department, University Hospital Munich.

CyberKnife, combines digital image-guidance robotic surgery with a high-precision radiotherapy device, Dr Muacevic explained. Its design derives from the original concept of a frameless alternative to frame-based radiosurgery, and it has three key components: an advanced, lightweight linear accelerator (LINAC) (used to produce a high-energy (6MV) ‘killing beam’ of radiation), a robot that can point the linear accelerator from a wide variety of angles, and several X-ray cameras (imaging devices) that are combined with software to track patient movement. The cameras obtain frequent pictures of the patient during treatment and use this information to target the radiation beam emitted by the linear accelerator.

The robot is instrumental in precisely aiming that device. If a patient moves during treatment, the cameras detect the change in position and the robot compensates by re-targeting the linear accelerator before administering the radiation beam. This process of continually checking and correcting ensures accurate radiation targeting throughout treatment. Thus, the tumour receives a concentrated dose of radiation while minimizing exposure to surrounding normal tissue. With sub-millimetre accuracy, the CyberKnife treats vascular abnormalities, tumours, functional disorders, and cancers of the brain and spine, the maker reports, summarising: ‘CyberKnife replaces the stereotactic head frame with a patient-friendly image-guided localisation system. This technology has the added benefit of enabling the system to be used for radiosurgical applications outside the brain. Radiosurgery can now also be applied to spinal tumours. It is difficult if not impossible to perform these other procedures with standard frame-based radiosurgical systems.’

Patients benefit from greater comfort (there is no invasive head frame), and treatment free of anaesthesia, and no hospital stay or rehabilitation.

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THE EUROPEAN TISSUE ENGINEERING PROJECT

The project European clinical engineering project (funding just under €25 million) is expected to make human tissue grown from stem cells available for transplant in the next few years. The technology will be developed to treat heart failure, diabetes, chronic ulcers and neurodegenerative diseases in particular.

Funded by the European Commission and led by the University of Liverpool and Italian pharmaceutical company Fidia, this tissue-engineering project will draw together experts in 23 academic and industrial groups across Europe.

‘For tissue engineering to be successful clinically, it has to be able to generate exactly the right type of tissue, on a patient, in a cost-effective manner,’ explained Professor David Williams, Director of the E. Tissue Engineering at the University of Liverpool. ‘This is not really being achieved anywhere in the world yet, but this major new project will bring together a team, with critical mass, and a range of expertise from stem cell biology to bio-manufacturing processes, including ethics and business models.’

Tissue Engineering involves taking human cells - such as stem cells - from blood or bone marrow and encouraging them to produce new tissue through the use of growth factors. The Liverpool researchers have been developing methods of growing a variety of tissue, including human arteries, from adult stem cells. The arteries could be used, for example, to replace blocked arteries in those suffering coronary heart disease.

The new project, A Systems Approach to Tissue Engineering Products and Processes (STEPS), is one of the largest research contracts in Europe and a major part of the EU’s Framework Six programme.

‘The University of Liverpool is one of the UK’s leading research institutions. It attracts collaborative and contract research commissions from a wide range of national and international organisations, valued at more than EUR-13 million annually.

The firm adds that the system provides perfect balance and stability and is easy to manoeuvre. ‘Neurosurgery, otolaryngology, surgery or spine require the highest level of expertise and concentration on part of the surgical team,’ Leica points out, adding that the Leica M520 surgical microscope facilitates this task due to its exceptional bright illumination and outstanding depth of field that reduces refocusing to a minimum. ‘The slim design of the Leica F40 stand represents innovation and art in engineering. High-precision bearings and perfect aligned joints allow for a homogeneous mobility that was previously reserved for premium systems. When you move the stand for the first time you’ll be surprised by its smooth motion. Smart brakes and soft motion are the magic words of this new technology.

‘Even with the large range of the swing-arm, the stand remains extremely low in post oscillation,’ the firm reports. ‘Post oscillation is prevented by the Leica FBS technology (electromagnetic brakes system) on six axes. This allows the microscope system to remain steady, especially during one-hand operation. Comfortable working is ensured by the system’s high flexibility in any possible posture.’

A small, solid base forms the stable foundation. Combined with a large all-around handle, any positioning at the operating table is easy. The stand fits into any surgical environment, and the surgeon can communicate perfectly with the team during their work. Xenon illumination and electronics are integrated at the rear and are easily accessible,’ Leica adds.

Along with this, interface solutions also allow compatibility with Neuromation/IGS systems.

Smooth action stand has smart brakes

The Leica M520 Optichrome - used in microsurgery - now features a compact stand: the Leica F40. Using Optichrome technology, the equipment has a working distance up to 470 mm, provides 30% higher depth of field, and 30% higher light intensity. Six electromagnetic brakes are fitted to the stand, and vibrations are low. It also comes with a stable space-saving foot.

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New concept offers ten-year guarantee for hip and knee joints

Germany - From the beginning of 2004, integrated contracts became possible between different healthcare providers, aiming to overcome barriers between in and out-patient sectors, improve cooperation, and optimise overall treatment, through higher quality yet shorter treatment. With falling numbers healthcare funds could also save money.

A new contract between the German medical fund Techniker Krankenkasse (TK) and the Bavaria-based hospitals Rummelsberg, Hessing Stiftung and Orthozentrum München aims to fundamentally improve treatment for hip or knee surgery patients. ‘Best results for the patients and a long durability of the artificial hip or knee does not only depend on surgery alone,’ explained Helmut Heckenstaller, head of the TK country division in Bavaria. ‘Our contract makes sure that all steps are perfectly intertwined: intensive preparation for and with the patient, including special training before the surgery as well as the engagement of an experienced surgical team, immediate rehabilitation after the operation and ambulant aftercare.’

To ensure long-term success of the treatment, patients receive aftercare within the following four years where specialists check whether the artificial joint fits correctly.

Due to these measures, the three participating hospitals will even provide a ten-year-guarantee. If within this period of time the artificial hip or knee joint becomes loose or has to be replaced, the hospitals bear the expenses - at least to an extent. The orthopaedic hospitals hope that this quality-contract will improve their image and also attract more patients.

Richard Wolf GmbH, one of the early major innovators in minimally invasive surgery (MIS), has carried out workflow studies of everyday operating theatre (OT) procedures and continuously provided adaptations, refinements and solutions for medical teams, which resulted in the firm’s development of core - a complete OT concept that centralises control via its modular, integrative structure.

The system’s main task is to network individual theatre devices and provide interactive monitoring. Thanks to standardisation - the widely adopted communications standard CAN Open BUS protocol is used - an excellent platform for continuous integration of further components has been developed. ‘Vendor specific communications interfaces that were often used in the past are losing importance,’ the firm points out.

The networking of the devices and the unique visualisation and operating concept ensures a centralised control of the entire system from one central operator panel. core brings with it a further significant increase in efficiency in the form of voice control that is not significant increase in efficiency in the form of voice control that is not possible intra-operative visualisation of pre-operate image data (X-ray, CT) on suitable monitors in the operating field of the physician plays just as great a role in cost reduction as in increased operating safety.

The system can be variably installed in ceiling supply units, distributed nurse stations and mobile system trolleys, and theatre tables and other peripheral devices can be integrated.

‘An essential part of our company philosophy is to maintain close customer contact to and to concentrate on precise implementation of customer requirements. Solutions in which usefulness and efficiency are in the foreground,’ the firm emphasises.

The core team also provides specialist consultation and planning services, and additional services include the organisation of installation ‘– and commissioning of the customer’s system solution and formulation of tailored service concepts.’

Richard Wolf will be demonstrating its latest concepts at this year’s MEDICA, in Dusseldorf. (Hall 10, Stand D57)

Deminerised bone matrix products

Switzerland - boTs Orthobiologics has entered into a three-year non-exclusive worldwide distribution agreement for its deminerised bone matrix products DynaGraft II and OrthoBlast II with Lifetek LLC and Endoplast AG, two subsidiaries of PLUS Orthopaedics Holding AG. The boTs products will be marketed and sold by Lifetek Orthobiologics under the brand names Nexus and Nexus IC. European distribution will be primarily through the PLUS Sales Organisation. Lifetek Orthobiologics will handle sales in other countries, directly or through third-party distributors. The Nexus Products were launched internationally last week at the worldwide SICOT meeting in Istanbul, Turkey. Financial details were not disclosed.

Lifetek Orthobiologics, a global manufacturer and distributor of human tissue products used in orthopaedic and neurosurgery, was established in 2002. The firm’s CEO, Michael Evertsen, said that the agreement gives his firm the ability to market proven products, and he added: ‘The Nexus and Nexus IC product line will give us access to the growing DBM market and an important opportunity to expand our product offering to surgeons.’

PLUS Orthopaedics AG, of Rotkreuz, Switzerland, is a globally operating, privately held orthopaedics firm, manufacturing implant systems for hip, knee and shoulder joints, surgical navigation systems and products to treat orthopaedic trauma.
The usefulness of musculoskeletal MRI

Musculoskeletal MRI has been used for non-invasive diagnosis of joint disease since the 1980’s. In our practice we have seen a continual increase in the utilisation of this imaging modality. Our surgeons have found it very useful in predicting which patients will benefit from surgery as opposed to those who will benefit from physiotherapy. Additionally, MRI aids the surgeon in pre-surgical planning, and this can reduce the time required for the patient in the operating room, thus helping to reduce surgical risk. In our experience, musculoskeletal MRI has been useful in excluding patients from surgery. A patient with a negative MRI seldom has positive findings at surgery.

The inherent soft tissue contrast and high spatial resolution of MRI available on high field scanners allows for very accurate diagnoses. Musculoskeletal MRI also has been useful for determining the extent of disease in soft tissue and bony tumours - often not well seen on conventional radiograph or a CT scan. Often, a bone scan can demonstrate increased radiotracer uptake in such cases, but lacks the specificity of MRI. A bone scan will demonstrate increased uptake in trauma, infection or tumour. MRI will demonstrate very specific findings in tumours that help differentiate them from trauma or infection.

MR is useful in demonstrating the presence and extent of infection, which helps guide the right course of action in treating infections. The treating physician is better able to determine whether surgery will be beneficial or whether the infection can be treated with antibiotics only.

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Overall we have found MR to be a highly accurate non-invasive diagnostic test for early and specific diagnosis of many types of musculoskeletal disease, and this has significantly improved the treatment of patients with many types of musculoskeletal disease.

About the author

Radiologist Thomas Magee is a known figure at radiology gatherings, including the Radiological Society of North America (RSNA), where last year he was Moderator for the Musculoskeletal Knee Internal Derangement session. He is Board Examiner for the Musculoskeletal Section of the American Board of Radiology, and has authored and presented many research papers and manuscripts, and organised a number of radiology workshops.

For the past five years, he has worked at Excellence in MRI, which runs centres in Melbourne, Merritt Island and Orlando, Florida. Memberships: International Skeletal Society, Skeletal Society of Radiology, RSNA, ARRS, ACR, International Society of Magnetic Resonance in Medicine, and the Clinical Magnetic Resonance Society.
Test could reveal CD death risk

A simple blood test may identify people who have an increased risk of dying from cardiovascular disease, according to a new study. The test measures gamma-glutamyl transferase (GGT), an enzyme produced primarily by the liver and involved in the body's detoxification processes.

Analyzing data from a long-term study involving over 160,000 Austrian adults, the researchers found that the higher a person's GGT levels, the greater their risk of cardiovascular death. The levels are given in units per litre (IU/l) of blood. Normal low is less than two-fold elevated. Over the past decade, some researchers have suggested that elevated GGT could indicate disrupted liver function, and may also be a sign of alcohol consumption.

Dr Hanno Ulmer, PhD, senior author and associate professor of medicine at the Lüüscher Institute Medical University, says: 'GGT can indicate cardiovascular disease, and we have found that the risk of cardiovascular death is increased in people with highly elevated GGT. It's related to the ill effects of heavy drinking on the heart.'

The study, published in the European Heart Journal, looked at the long-term risk of cardiovascular death in the largest study to date of its kind. The researchers found that the risk of death was 28 percent higher for moderately high GGT, compared to men with normal levels of the enzyme, and rose to 64 percent for those with highly elevated GGT. In women, the increase in risk ranged from 35 percent to 51 percent.

Women with elevated GGT had an increased risk of death from all cardiovascular diseases. However, the association with myocardial infarction and ischemic strokes was not statistically significant. GGT proved a strong predictor of cardiovascular death, thought to be associated with an increased risk of death from non-cardiovascular causes, such as cancer or accidents.

The participants included 74,830 men and 20,000 women, aged 46-85 years on average, nearly 90 percent of whom were Caucasian. The participants were recruited from general practitioners' practices in Austria, which is a westernmost province that examines risk factors for cardiovascular disease.

The participants were followed for an average of 11 years, and 56 percent of the men and 51 percent of the women had died. The researchers used statistical models to adjust for age, gender, and other cardiovascular risk factors, such as smoking, high blood pressure, diabetes, and high cholesterol.

The results showed that people with moderately high GGT levels had a higher risk of dying from cardiovascular disease than those with normal GGT levels. The risk was highest for people with highly elevated GGT levels, and was similar to the risk of dying from smoking.

The researchers say that the test could be used in primary care to identify people at risk of cardiovascular disease, and could help to target interventions to reduce the risk of death.

Professor of Medical Statistics, Hanno Ulmer PhD, senior author and associate professor at the Lüüscher Institute Medical University, adds: 'Our study shows that GGT is a marker for liver function and alcohol consumption, and is a strong predictor of cardiovascular death.'

The findings are significant because cardiovascular disease is the leading cause of death worldwide, and is responsible for more than half of all deaths globally. The disease is caused by the build-up of plaque in the arteries, which can lead to a heart attack or stroke. Early detection and treatment of cardiovascular disease could help to reduce its burden.

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The study was funded by AstraZeneca, and the researchers have no conflicts of interest to declare.

PREVENTIVE CARDIOLOGY

Nurse-led multidisciplinary teams can lead to reduced CVD risk factors

The EuroAction project - an initiative of the European Society of Cardiology (ESC), which is solely funded by the pharmaceuticals firm AstraZeneca - is the largest demonstration project in preventive cardiology, involving staff in busy general hospitals in Denmark, the Netherlands, France, Italy, Poland, Spain, Sweden, the United Kingdom, and over 10,000 patients and their families.

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The sense of smell exhibits numerous peculiarities. Odorous sensations, and most importantly, flavours, are typically not only brought about by the olfactory system, but other sensory channels are also involved in this chemosensory perception, namely the gustatory system, mediating sensations like sweet, sour, salty, bitter, and umami, or the trigeminal system mediating sensations like tickling, tingling, or burning. Thus, smells or, even more so, flavours are the result of the integration of sensory information through many different channels.

Humans express approximately 330 olfactory receptors. Every olfactory receptor neuron only expresses one single olfactory receptor gene. Further, axons from all olfactory receptor neurons expressing the same olfactory receptor gene project to two specific glomeruli in each olfactory bulb. This organisation is called glomerular convergence. Olfactory receptors are not selective for only one odorant but numerous molecules may bind with varying affinities to a certain olfactory receptor. Thus, odors are typically not only recognised by one but by several olfactory receptor neurons simultaneously, according to their particular chemical properties. At the level of the olfactory bulb this leads to a specific activation pattern for each odorant, which is believed to be responsible for the discrimination between different odorants. Other than other sensory systems the majority of the olfactory fibres does not cross to the contralateral hemisphere but projects ipsilaterally to the brain. Second, most olfactory fibres bypass the thalamus and project very early and directly to the piriform cortex, amygdala, and entorhinal cortex, which are implicated in emotional and memory processing. This particular anatomy is claimed to be responsible for the emotions and memories produced by many odours. In addition, the olfactory system exhibits amazing plasticity on several levels: On the level of the epithelium, olfactory receptor neurons are continuously replaced throughout lifetime. Similarly, on the level of the olfactory bulb interneurons are being replaced constantly (accordingly, the volume of the olfactory bulb decreases in cases where sensory input to the bulb is lost, e.g., following head trauma with severed fila olfactoria). Such plasticity provides a basis for adaptive capabilities of this system, which allows humans to adjust quickly to environmental challenges. It is also the basis for recovery of olfactory function following destruction of olfactory receptor neurons, e.g., following infections of the upper respiratory tract.

In a clinical context testing of olfactory function is important as many people misjudge their olfactory capabilities. To this end, standardised systems are readily available, e.g., the Sniffin’ Sticks. Apart from simple, but effective screening test, these test kits contain sub-tests for odour identification, odour discrimination, and odour thresholds. In addition, electrophysiological techniques like olfactory event-related potentials allow to objectively measure whether subjects perceive an odour or not. Such techniques are important when it comes to the diagnosis of olfactory loss - which is not a rare finding. In fact, 5% of the population are anosmic! The highest incidence of olfactory loss is found in the age group above 65 years, indicating that we typically lose olfactory abilities as we age.

Accordingly, the quality of our lives decreases as we age, especially because we are less able to enjoy sophisticated (or not so sophisticated, but delicious) foods and drinks. In addition, people with loss of olfactory function experience hazardous situations like eating spoiled foods or not recognising smoke or gas leaks. Apart from ‘aging’ as a significant cause of olfactory loss, there are four other major causes: (1) sinonasal disease, e.g., chronic sinusitis or nasal polyposis, produces a gradual decrease of olfactory function; (2) olfactory loss is found after head trauma, and here particularly frequent after occipital trauma; (3) infections of the upper respiratory airways, e.g. a cold or a flu, and (4) neurodegenerative disease like Alzheimer’s disease of Parkinson’s disease. Interestingly, olfactory loss is an early sign of Parkinson’s disease preceding motor symptoms by several years. This symptom is so reliable that in patients with signs of Parkinson’s disease but normal olfactory function the diagnosis should be revisited.

With regard to therapy, relatively little can be done in patients with olfactory loss. Patients with sinonasal disease can be treated through surgical or anti-inflammatory regimens using both systemic and local corticosteroids. In patients with post-traumatic or post-infectious olfactory loss for no conservative treatment has been established. However, recent studies show that training of the sense of smell (the rigorous practice of daily sniffing of four odours in the morning and evening over a period of 4-6 months) is beneficial to patients with olfactory loss. In addition, approximately 40-60% of patients with post-infectious olfactory loss and 10-20% or patients with post-traumatic olfactory loss experience recovery of the sense of smell over a period of 1-3 years.

Considering the therapeutic void it appears important to counsel patients with regard to their prognosis.
The IVIS 3D Imaging System provides a full 3-D diffusion photometric analysis of bioluminescent light sources in living animals as well as two-dimensional multi-view fluorescent imaging capabilities,” Xenogen explains. “The system captures and processes numerous views/orientations taken around the mouse to provide researchers with better spatial representations of the light sources (e.g., cancer metastases, inflammatory markers). It is designed to enable researchers to more accurately pinpoint where and when a drug candidate has an effect on or is affected by a normal or disease process. The detailed surface topography measurements provided by the IVIS 3D Imaging System are ideal for co-registering with other modalities such as CT and MRI.

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Flow sensors for medical device manufacturers

Continuing Royal Philips Electronics SpeechMike concept of in-built dictation microphone, playback speakers, dictation control and PC navigation, the firm’s new SpeechMike Pro and SpeechMike Classic include sensitive navigation tools, which makes these the first dictation devices to feature a scroll wheel for both navigation and volume control, Philips explains. "This allows users to move through formal documents using only one hand. The unique optical trackball offers unparalleled navigation accuracy and requires no additional cleaning. Early usable LIDs indicate record, insert and overwrite mode, making operation simple."

Ergonomically designed, the Classic comes with a programmable 4-Position-Switch and the Pro has programmable push buttons. "(The larger buttons provide greater sensitivity, enabling customers to use the dictation devices without looking away from the computer screen," Philips adds. "The controls on the lightweight device have also been carefully positioned for use by those with smaller hands or who are left-handed.) For integrators, advanced versions with four programmable function keys have been added to the range, enabling users to control additional applications as required. The microphones have a wide frequency and sensitivity range, Philips also points out. ‘The microphones enable additional applications as required. The microphones enable additional applications as required. The microphones enable additional applications as required. The microphones enable additional applications as required. The microphones enable additional applications as required. ’

Syntax—Philips has added a new component to the SpeechMagic platform to enable it to work in Citrix environments. This results in a more efficient documentation workflow and enabling the centralisation of IT administration, the firm reports. ‘By centralising applications and data delivery the systems can provide an extremely high level of security (no files stored locally), which improves data protection. ’ By adding bi-directional audio capabilities, Citrix enables the digital recordings to be uploaded and Philips developed a real-time speech recognition channel. This channel improves the usability of dictation hardware, such as SpeechMike, and allows for the deployment of the full range of speech recognition features within a Citrix environment. Numerous authors can now dictate simultaneously anywhere within the Citrix network and either delegate the dictation to a secretary, or correct it themselves.‘

Porvorim Filteration Group, which produces an extensive I-Vyon porous polymer group, will be exhibiting at ComPaMED, the International Trade Fair for Components, Parts and Raw Materials for Medical Manufcaturing, held alongside MEDICA, 16-18 November, in Dusseldorf, Germany. The polymers are used in applications involving fluid transfer, filtration and chemical separation, including sample preparation for chemical analysis, chemical wiring, reagent support and diagnostic devices.

Modification of their surface properties can be further modified with functionalised material can be hydrophilic over a wide range of chemical and physical conditions. I-Vyon can also be laminated and formed as a composite, making it a family of materials particularly suitable for bio-science industries, Porvorim adds. ‘The internal surfaces of I-Vyon can be function- alised with a wide variety of chemical groups - e.g. CO2, COOH, & -NH2. The functionality and material can be further modified with linker molecules with carbon chains from 2 to 20 carbon atoms long. A range of chemically active or biologically active species can then be attached to the linker, making this form of I-Vyon an extremely useful support for organic synthesis and biochemical applications. ’

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37th WORLD FORUM FOR MEDICINE
International Trade Fair with Congress

DÜSSELDORF, GERMANY
NOV. 16 – 19, 2005