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Holidays for dialysis patients

Spain - Dialysis patients who would like a Spanish vacation should check out a new website to gain information on the availability of treatment whilst staying in exotic places such as Ibiza, Lanzarote, Fuerteventura and Cadiz. The SaludCare, holiday dialysis centres network organised by the B. Braun Group combines healthcare using the firm's services and technology that meets ISO 9001 quality standards and the ISO 14001 environmental quality standard.

The website provides information on the centres, resorts and planning of patients' haemodialysis treatment during their trips. This includes admittance formalities, on-line booking service, special rates for accommodation, and assistance for relatives, tour operators and travel agents. The firm reports that its website motto '*Say yes to life!*' aims to encourage people to be positive, rather than basing their lives on their medical pathology.

www.saludcare.com

Laughing gas likely cause of babies' deformities

Michiel Bloemendaal reports from The Netherlands

Six babies born to nurses in the Leyenburg Hospital, The Hague, have serious deformities. Following a confidential investigation by Nijmegen University Medical Centre, the inhalation of the anaesthetic laughing gas was blamed for these abnormalities. During pregnancy, the mothers, who worked as nurses in the delivery room, would have inhaled the gas when changing gas cylinders and when removing masks from women who had been given it as an analgesic during delivery. The nurses were unaware of the dangers, and that in the second and third month of pregnancy defects can occur in the unborn.

Six of the 19 children born to nurses who worked in the obstetrics department, between 1994 and 2004, were born with gullet, anus, lips and palate, and heart defects - a figure regarded as very high by Nijmegen University. In addition, two children have Down's syndrome and a remarkable number of the nurses are infertile.

LAUGHING GAS, discovered 233 years ago, is nitrous oxide, N_2O (dinitrogen oxide). This colourless, non-toxic gas has a sweet odor and taste, and is dissociative - i.e. when inhaled, it can produce disorientation, euphoria, numbness, loss of motor co-ordination. If too much is inhaled too quickly, the gas can also produce mild nausea or lingering dizziness and loss of consciousness. N_2O is thought to enteract with the plasma membranes of nerve cells in the brain, thus affecting communication at their synapses. Long-term use of this gas, in large quantities, has been associated with anaemia and neuropathy.

The investigators conclude that exposure of the then pregnant nurses to Entonox (based on laughing gas and oxygen) is the most probable cause of the serious handicaps.

In October 2004, healthcare inspection authorities ordered that the use of Entonox be minimised. Meanwhile, Leyenburg Hospital stopped using Entonox, although they advised that there is no relation between Entonox and the defects.

Labour inspectors have decided to investigate all hospitals on the use of the gas in delivery rooms and first aid units. In the next three months, all hospitals will receive a questionaire on its use, and advice that this gas is dangerous to women in the early stages of pregnancy. At the beginning of 2006 all hospitals will be inspected.

The inspection is an expansion of an investigation on anaesthetic gases and anti-cancer drugs in operating theatres, which had been planned earlier. In that investigation delivery rooms were not included.

New President for ICN

Switzerland - Hiroko Minami (left) has become the 25th President of the International Council of Nurses (ICN). Dr Minami, who has worked extensively in psychiatric nursing, education, research, and administration, is Vice President of the University of Hyogo; immediate past President of the Japanese Nursing Association, and Director of the Japanese Academy of Nursing Science. She will serve as ICN President for the next four years.

Dr Minami was an active leader in developing a nursing network system at the time of Hanshin-Awaji Earthquake, following which she established the Japan Society of Disaster Nursing. She also led JNA support for disaster victims in Taiwan, Turkey, India, Iran and countries hit by the tsunami disaster.

Nationally, Hiroko Minami is the founder of the first doctoral programme and mental health nursing specialist programme in Japan and has contributed extensively to the development of the nurse specialist systems there. Her awards are many.

The ICN Innovations Database is online: www.icn.ch/innovations. To submit nursing innovations, go to: www.icn.ch

Action, lights, camera...

First European surgical *studio* goes live

The operating 'theatre' exists no longer - at least in St Olavs Hospital (Trondheim University Hospital, Norway) where Europe's first operating studio officially opened this May. Now medical students no longer crane their necks to study surgical procedures. Thanks to this exciting new audio-visual concept they can see more, hear more and learn more.

In two new, adjacent laparoscopy theatres, swivel cameras are mounted, each controlled by a touchpad at the surgical site. From these, audio-visual communications about the surgical procedures taking place are relayed to medical students in the auditorium above. And although the word auditorium is still used for the viewing area, the Trondheim students observe the procedures in a long room that has low windows set above the theatres. There they sit, at 20 tables laid with monitors, keyboards and headsets, eyes moving from the monitors before them, to study on three even larger flat screens facing them, the vividly relayed endoscopic events within the body of the patient below. Certainly the images obtained have truly remarkable clarity, and the system is set to improve students' understanding beyond anything they could have learned by hovering in the theatre itself, hoping for a better view of surgery.?

Their lecturer, with own PC setup, teaches via VIBES, projector, and plasma monitors with sound, and the room contains another camera for audio-video discussions with the surgical team. RSM, DICOM, VIBES applications are also controlled in this room. Microphones in the 'studios' and auditorium are used for questions and answers, as are loudspeakers.

In the auditorium, the complexity of transmission from surgical teams to students and for the additional services, such as archiving, are underlined by the banks of computers stacked high in a small room to one side, and the many more tiered in two discrete cabinets.

Between the two theatres below is the 'studio' control room, which

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The operating 'studio'

continued from page 1

contains video (standard DV Cam and high-definition); DICOM units (burn CD, forward to server, editing pictures); a control screen for selection from operating theatre, and printers for both operating theatres.

For a greater range of video conferencing, which could be accessed by some 200 other healthcare institutes, three advanced video conference solutions aave also been installed in the system. These were set up from the operating theatre (Olympus and Siemens), using VIBES.

Surveillance is also included in the system, which includes patient surveillance via video over IP; video on a PC or on a handheld unit, and there are options for programmed recording and storage.

Thus surgeons, using their hand-held units, can check the level of preparedness in each area and make decisions to attend accordingly. For example, nurses can be seen scrubbing up, the patient seen arriving, the presence of key personnel checked, etc.

This set-up was no mean task to accomplish - and the results are superb for both operating and study purposes. 'It really is like a studio,' said the internationally renowned surgeon Ronald Marvek, who is Head of Department, at the National Centre for Advanced Laparoscopic Surgery, Trondheim University Hospital, who instigated the installation of the system at St Olavs, 'It's changed things for me totally. The students are not nearby, so we have more room in the operating theatre, and we can save on three doctors and nurses.'

Explaining the decisions to dramatically update the theatres, said cardio-vascular surgeon Hans O Myhre, Professor of Surgery at St Olavs: 'We needed to change our way of doing things. The organisation was traditional - full of rituals. We also had lots of equipment; it was messy; a poor work environment ergonomically.' There was also the desire to improve on education, surgical and technical research, for example navigation techniques, new stents and grafts.' He also added: 'We cannot see so well with our eyes, so imaging is increasingly important in this work. We now have the best possible imaging, which helps us as well as the PhD candidates.'

St Olavs Hospital and the Norwegian University of Science and Technology (NTNU) were responsible for the project. Working with the research foundation SINTEF they had already placed Trondheim on the international medical map, due to a series of medical technology projects that resulted in national centres of competence for 3-D ultrasound and keyhole treatments. From this, the idea emerged to establish a 'Future Operating Room', not just to improve surgical procedures, but also to become a laboratory for research, development and educational purposes.

About NOK 40 million funding for the new buildings and equipment needed was supplied by Helse Midt-Norge RHF, Helsebygg Midt-Norge, NTNU and St Olavs Hospital, from its research funds.

From theatre to studio

Sony provided the network for visible light images based on high definition video and the DICOM-standard as well as storage, display and medical print solutions in the two operating rooms. This opens up new ways of education and integration of high-resolution images, into digital patient records for more efficient workflow.

Olympus provided the endoscopic equipment, which is centrally managed, and can be controlled by a nurse in the non-sterile area, by a surgeon using a touch-panel or via voice control from the sterile area. All lights, room temperature, curtains, phone conferences, are controlled via this equipment. (Live standard and high-definition video in/out and recording, audio in/out; videoconference and VIBES communication; DICOM picture storage via touch panel).

Siemens provided the digital angiography lab in the theatres to aid in diagnoses and endovascular treatments. (Live standard and high-definition video in/out and recording; audio in/out; video conference and VIBES communication; DICOM picture storage via Siemens modality)

The first, and presently the only other of this kind of surgical 'studio' was set up in a New York hospital, said Vidar Liverod, Nordic Business Manager, Healthcare Professional Solutions Europe, Sony Europe. 'It's a unique combination of videonet and operating theatre, a multi-layer IT DICOM using high-definition for the first time in the operating theatre - and St Olavs is the first in Europe to install such a system. 50-60% of Sony's equipment used for the visual imaging at the laparoscopy operating suite is used in broadcast, because there is a similarity between the two operations in which Sony is active: broadcast and healthcare. This evolved from standalone to more use in a network environment - to get out of the operating theatre into a network environment.'

Using direct voice transmission the students question the surgeon about the procedure, and he replies as he works, instructing a theatre nurse to close in on the activity - or out for a broader view - using the touchpad to control the camera.

During my visit, we watched a two-and-a-half operation carried out by Dr Marvik on an accident victim, needing a colostomy performed by laparoscopy. In the operating room below we watched the patient's distended abdomen, spiked with laparoscopy tools and surrounded by the small surgical team.

On the screen in front of me the image was so sharp that I could even see fine wraiths of vapour created by the warmth of the endoscope moving against fatty tissue being dissected from the colon. 'What's that, I asked through the microphone. The answer came promptly from the surgeon holding the scalpel. Well! I wouldn't even have seen it, conventionally.

Mobile IC unit goes to work

The Netherlands - Rotterdam's MCRZ hospital and Ambulance Service are using the first Dutch mobile intensive care unit (MICU) after a six-week trial in which 13 runs were made. The MICU transports patients from hospitals to intensive care (IC) centres for specialist care.

Trolley with onboard energy supply and equipment to support vital functions

The Dutch Society for Intensive Care had advocated this service ever since the units proved their value in other countries. Now the MCRZ hospital claims that the Dutch MICU is better than those used elsewhere - particularly the new concept of combining a complete IC-bed with separate equipment trolley that contains all the equipment necessary to support vital functions, including a balloon pump. All design aspects aim for maximum patient stability with very little haemodynamic fluctuations.

The trolley even has its own energy supply, allowing up to 45 minutes patient transportation from the ward to the MICU.

Up till now, IC-patient transportation in 'ordinary' ambulances meant that changes in the patient's condition were not always recognized, or there were no possibilities to give adequate treatment. This often meant

Patients' satisfaction

Netherlands, Switzerland, Germany lead EU healthcare league

Brussels - The Netherlands has topped the league in The Euro Health Consumer Index, officially launched in June, at the *Health Consumer Summit*, organised by Health Consumer Powerhouse (www.healthpowerhouse.com)

The Index aims to empower users of Europe's healthcare systems, by comparing the extent to which various national healthcare systems are designed to meet patients' demands.

SCORES FROM 60 POINTS

Netherlands	48
Switzerland	47
Germany	46
Belgium	40
Estonia	40
Sweden	40
France	39
Spain	37
Britain	36
Hungary	35
Italy	29
Poland	25

A dozen European countries (see box) were surveyed, and points were given based on 20 criteria. These included access to information; degree of choice; waiting times; care outcomes, access to new therapies, and consumer friendliness. The survey is expected to add a new approach, empowering the consumer to take action. The HCP President, Johan Hjertqvist, said the annual Euro Health Consumer Index provides a new perspective by showing how well Europe's health systems perform from the patient's point of view. But, this first effort at producing the index could be improved.

Nonetheless, the findings are interesting - and some surprising.

Although the World Health Organisation (WHO) had rated France the world's top-performing healthcare system, the country came seventh in this study, which concluded that France is '...slightly authoritarian and not fantastic outcome quality'. Both France and Germany were said to be suffering from an 'expert-driven attitude' to healthcare, where information is available only from doctors.

Britain, which has poured enormous efforts into improving its National Health Service (NHS) in recent years, ranked ninth out of the 12. The NHS was highly rated on heart attack mortality, prescription renewals without having to see a GP, and NHS Direct, which provides 24-hour information online or by phone. However, although the NHS was described in general as a 'Star performer on healthcare information', and 'good on heart problems', it was deemed poor on direct access to consultants; the right to a second opinion; no-fault insurance, waiting times for joint replacements, cancer and heart bypass treatments, breast and colon cancer mortality and MRSA.' The bottom line was 'Mediocre overall performer.'

Countries with the gatekeeper systems, meaning that access to a specialist is only through a general practitioner (GP), appeared to have long waiting lists. 'Countries where patients are allowed direct access to specialists do not,' the report points out.

** The Health Consumer Powerhouse is an associate member of IAPO.*

that it took a patient 24 to 36 hours to recover to his/her condition prior to transportation. It also may have lead to deaths during transportation, although the cause is not clear. In the Netherlands, hard figures for this kind of mortality are not available.

In other countries - especially the USA - insurance companies compensate total costs for mobile IC transportation. Why? According to Rotterdam Hospital, there's only one answer: It pays off! In the Netherlands a run costs euros 2,000. With the MICU, the Dutch Society for Intensive Care intends to cover five or six regions. The daily need for it is estimated as four to five.

Report: Michiel Bloemendaal

Spanish model spreads wings

By ***Dr Eduardo de la Sota***, our correspondent in Spain

The Valencia Community Government, applying actual Spanish Legislation, has promoted an innovative healthcare model -based on private management of a public hospital.

The model, which began in the Ribera Hospital, in Alzira, has been extended to the Torrevieja and Denia hospitals, and is being implemented in other areas of Spain and Europe. However, not all experts agree with the concept. Allyson M Pollock, Jean Shaoul, and Neil Vickers (2002) published an article against the private finance initiative (PFI) system in the UK, concluding:

- The private finance initiative (PFI) brings no new capital investment into public services and is a debt that has to be serviced by future generations.
- The government's case for using PFI rests on a value for money assessment skewed in favour of private finance.
- The higher costs of PFI are due to financing costs, which would not be incurred under public financing.
- Many hospital PFI schemes show value for money only after risk transfer, but the large risks said to be transferred are not justified.
- PFI more than doubles the cost of capital as a percentage of a trust's annual operating income.

To discuss this, I met with **Luis Barcia Albacar,** Executive Director of the Torrevieja Hospital in the coastal town of the same name, in the South of Alicante province, and the Vega Baja district. He explained that the hospital, being built on public grounds by a Private Finance Initiative (PFI), which will also provide healthcare services to the area for 15 years. However, after five years, according to an administrative concession, the hospital will be owned by the Health Department of the Valencia Community Government, so then the PFI will be managing public funding.

' The Valencia Government will pay the PFI an annual capitation-fee for inhabitants in the catchment area,' Luis Albacar continued. 'But this has two conditions: The money must follow the patient and the physician must have a free choice. Therefore any patients in the area who seek hospital services elsewhere will incur costs that the PFI must pay to the Valencia Government. On the other hand, the Valencia Government will pay the PFI for all the treatments received by patients who do not live in the catchment area. There will be cross-billing between the Valencia Government and the PFI based on DRGs. Primary and specialised healthcare will be offered. Of course, universal coverage is provided and all services are free of payment for users.

In effect, he said, 'The PFI makes an investment in needed facilities and, in return, receives a fixed capitation fee for a 15-year period. PFI needs to make the right decisions, to avoid being penalised by its own patients going elsewhere. The Valencia health department allows the PFI to manage a public hospital during a period of time but, at the same time, ensures that patients in the area receive universal, equal and high quality healthcare like other citizens.'

Luis Barcia Albacar

The new public hospital, serving a population of 110,000 residents in 11 municipalities from the Vega Baja, will be the second to be built in the town following San Jaime private clinic. It will cost around euros €80 million and will have 250 rooms, 12 operating theatres and a specific theatre for the intensive care unit.

'We are pursuing excellence,' Luis Barcia explained. 'We will implement high technology services and a modern management system, to provide quality of care and generate patient satisfaction. Equity is a key value for us. We will stress the importance of a global information system. We also need to work hard on efficacy and efficiency. In our model the general practitioner is the central element of the system and, using evidence-based medicine and high technology, lengths of stay will be as short as possible.'

An individual incentives system, based on activity, efficacy, efficiency and quality of care, will operate for professionals, and continuing education and R+D will be strongly promoted, he said, adding that the management organisation will be based on 'Service Co-ordinators' leading their own fields to promote teamwork, internal communication and information flow.

When resources are limited and needs unlimited, innovation and creativity might help healthcare delivery, and this is an interesting example.

Luxembourg declaration on patient safety

Report by ***Dr Jesper Poulsen***, Vice President of the Comité Permanent Des Médecins Européens*

The massive increase of interest in patient safety and the limitation of the numbers of adverse events, which may be the biggest single factor with regard to improving the quality of treatment of patients, has spread throughout most European countries in recent years. This has created a need to exchange experiences and more systematic sharing of knowledge gained in national healthcare services.

At the first EU conference to focus on this subject (Patient Safety - Making it happen. 4-5 April 2005), sponsored by the Luxembourg EU Presidency and the European Commission (EC), the adoption of the Luxembourg declaration has now made patient safety an important item on the European agenda.

Participants at the EC-funded conference were representatives of the medical professions, patients, the healthcare industry, the EU institutions and national authorities.

By adopting the declaration, a starting point has been set to establish a number of permanent forums for patient safety at a European level. The EU is encouraged to establish a permanent forum to follow and discuss European and national activities in connection with patient safety. Furthermore, they are encouraged, together with World Health Organisation (WHO)

- to establish a common understanding on patient safety issues and to establish an EU 'solution bank' with best practice examples and standards
- to include patient safety in the programme of DG Health and Consumer Protection in order to create the possibility of support mechanisms for national initiatives
- to ensure that EU regulations with regard to medicine and medical equipment are designed with patient safety in mind
- to enhance the development of international standards for the safety and performance of medical technology
- to ensure that the European regulatory framework protects the privacy and confidentiality of patient records in the best interest of the patient, whilst also ensuring that relevant patient information is readily available to healthcare professionals.

The declaration provides a number of recommendations to national health authorities - e.g. that the 'informed patient' becomes universal; that countries consider implementing confidential reporting systems similar to the Danish system; that risk management becomes standard, as well as electronic patient records; that national societies for patient safety are established; that the safety level for health professionals generally is improved; that patients' safety is included in the standard training of health professionals, and that national health authorities focus on creating a culture that focuses on learning from near misses and adverse events instead of concentrating on 'blame and shame' and subsequent punishment.

Finally, the declaration recommends that the European health providers facilitate a collaborative care approach aimed at enhancing patient safety, and focus on patient safety in the clinic. It also recommends the creation of an open culture regarding near misses and adverse events, and the initiation of co-operation between patients/relatives and healthcare professionals, so that patients/relatives are aware of near misses and adverse events.

By adopting the declaration the Luxembourg presidency has created a European platform for patient safety. The future British presidency has stated that they will follow-up on this important issue.

* Standing Committee of European Doctors (www.cpme.be)

First in-vitro diagnostics forum for Central and Eastern Europe

Greece - At the Central and *Eastern European In Vitro Diagnostics Forum* (IVD), held in June and organised by Roche Diagnostics, a division of the Swiss healthcare firm F. Hoffmann-La Roche, **Michael Heuer**, Head of Central and Eastern Europe, Roche Diagnostics GmbH, Germany, said: 'This is the very first international and interdisciplinary meeting of this kind - covering diagnostics and focusing on central and eastern European countries. Europe and the EU open up many opportunities - as much for business as for scientific co-operation.'

Highlighting areas of Roche's R&D, **Georg Kurz**, of Roche Diagnostics GmbH, Germany, described two initiatives: the development of new markers for cardiovascular diseases and oncology, and cobas, the system platform built on three clinical chemistry and two immunochemistry modules. Michael Heuer, described in his presentation the development of DNA chips that makes new paths accessible in molecular diagnostics: 'The AmpliChip CYP450 is an in vitro test based on Affymetrix's DNA chip technology (A small glass plate the size of a thumbnail on which tens of thousands of DNA fragments are arranged) combined with Roche's polymerase chain reaction (PCR). With the introduction of the AmpliChip CYP450 in December 2004, the first gene chip with CE-IVD approval for clinical routine diagnostics, the efficacy and tolerance of various pharmaceuticals will be measurable for the first time. Genetic factors are becoming the basis of future therapies, this leads to personalised medicine.'

Opening the event: Pierre Monod, the Ambassador for Switzerland in Greece

vitro diagnostics (IVD), is the backbone in the medical treatment, diagnostics or prevention,' he said. 'Laboratory diagnostics influences 70-80% of hospital healthcare decisions and costs between 3-5% of total healthcare costs.' According to Dr Zima, trends indicate that there are expectations for biochemistry, haematology, microbiology, and immunochemistry to grow in a range of 1-5%, whereas in point of care testing (POCT), including glucometers (app. 10% growth), and in molecular biology, an annual growth of around 25% is expected.

Many of the countries involved in the Forum are either new members of the EU, or not yet members. The speakers, from eight countries, hold posts in hospitals, universities, companies, laboratories or institutions, which guaranteed very different views and interesting national perspectives on the subject.

120 participants came from Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Slovakia, Slovenia and Turkey

'One day, the failure to genotype before treatment may be considered unethical'

Echoing this, **Michael S Pepper**, of the NetCare Molecular Medicine Institute, Unitas Hospital, Pretoria, South Africa, spoke of the potential of information from the human genome for individualizing medical treatments: 'There are important inter-individual differences in response to drugs, both with respect to efficacy and toxicity... pre-treatment assessment of polymorphisms may allow for therapy to be maximally efficacious and well tolerated'. At the end of his speech he stated: 'given the knowledge we have, and the relative ease with which this knowledge can be accessed, failure to genotype before treatment may one day be considered unethical.'

Apart from the purely scientific exchange, one objective of the conference was to help improve the quality and adherence to the European IVD Directive in laboratories. Tom·ö Zima, of the Institute of Clinical Chemistry and Laboratory Diagnostics, Charles University, in the Czech Republic, discussed the EU IVD directive and its impact on QM systems: 'Laboratory medicine, including in

Next-generation medical IT Systems

Pervasive, mobile, and here today

Radiologist Henrik E Gregersen MD, of Aalborg University Hospital, Denmark, reports on groundbreaking developments for diagnostic readings of CT, MR, and CR examinations on wireless PDAs

Imagine a clinician standing beside a patient on a ward and evaluating the patient's 500 slice CT scan interactively and online, using a wireless personal digital assistant (PDA). A fantasy, right? But why should it be so difficult to distribute radiological images throughout a hospital, or even outside the facility?

The Challenge and the Vision - For years this scenario has been the dream of radiologists at Aalborg University Hospital, Denmark.

Aalborg is a multi-site research and teaching hospital. With 900 beds it produces 130,000 radiological examinations annually. A main challenge for the radiology department has been managing data from the four radiology units that are scattered within a radius of 30 km. Even with high-speed and high-bandwidths networks, it is troublesome to view and evaluate large exams, particularly from multi-slice CT scanners. One solution has been to distribute image data via a web-based system, which is a slow process and often results in considerable image degradation due to lossy compression methods. Another solution has been to install a large PACS system that sends (pre-fetches) exams to various centrally-placed workstations on wards or in the radiology units.

Radiologists have also acknowledged that modern computing systems, such as workstations, PCs and laptops are not suitable for the nomadic and collaborative working styles of clinicians and radiologists.

Wireless PDAs can access large radiology data sets and interactively perform compute-intensive analysis function

Logging in and out of computers is wearisome and time consuming, and there is always the need to find the nearest suitable computer.

So, the vision at Aalborg has been to find a way to easily distribute data wirelessly, on truly portable devices, with the confidence that this should make clinical staff more mobile and efficient, thus improving patient care.

The Solution - Several years ago, Medical Insight A/S, a Danish software company, presented a next-generation medical IT system to the hospital. The solution was a PACS/RIS system coupled with a unique streaming technology. It immediately became apparent that here was a truly mobile and efficient tool for distribution of data, which could provide the same performance and functionality on all devices, from large workstations to wireless PDAs.

In mid-2002 a pilot system was installed at Aalborg University Hospital and was well received. In the beginning only the main radiology department was wireless, but today wireless access is widely available. By the end of 2005, the PACS/RIS system, with streaming, will be installed in all departments of the 11 hospitals in the County of North Jutland. The County's Healthcare IT Department has developed an infrastructure for wireless devices that efficiently keeps all 1,100 PDAs updated and running, giving clinicians constant access to resources, reference materials, and radiology reports and data (in full fidelity).

The system, from Medical Insight, is a fully integrated PACS and RIS product for image and data management that is easy-to-use and provides standard and specialised modules to support various types of clinical analyses. Based on a client-server architecture, central Linux cluster servers contain all data and applications, and client devices access the data and power of the servers via streaming methods. This allows light clients such as PDAs, PCs, and laptops to access large data sets in seconds and in full-resolution, and to interactively view the data, even in 3D, over standard and wireless connections. No data are transmitted to light clients for processing - all computing is done on the servers, and only final screen images are streamed to clients based upon user interaction requests.

Distribution of access to patient data and analysis tools via portable devices support the nomadic and collaborative work style of clinicians

Real Experiences - At the 2005 European Congress of Radiology, radiologists Henrik Gregersen and Geert Willander from Aalborg University Hospital presented the results of a groundbreaking study that showed diagnostic readings were possible on wireless PDAs for CT, MR, and CR exams of orthopaedic cases. Due to the PDA's small screen size, extra interactions with the images were required (pan, scroll, zoom), but the full-resolution and full-fidelity data proved suitable for diagnosis. More comprehensive studies are continuing.

One drawback of PDAs is the relatively short battery life, which makes it impossible to work an entire day without recharging. However, new industrial-grade PDAs claim long battery life and protection against drop damages.

In summary, the use of PDAs for wireless access to patient data and analysis tools is growing in the County of North Jutland and elsewhere. Radiologists and clinicians are starting to benefit from the new technology - radiology images and reports are accessible online, on time, and on-site in the same manner as in the radiology department. Thus, the vision is being realised - greater staff mobility and full access to tools and data are generating faster evaluations, better quality patient information, and more efficient diagnoses and treatments.

Videoconferencing speeds stroke treatment

France - 10 hospitals have installed a Tandberg-based videoconferencing network that links their emergency rooms to the Bichat Stroke Centre at Bichat Hospital, Paris.

By the time most stroke victims reach their local hospital and are evaluated, it is too late to send them to another medical centre. 'We only have three hours, from the first clinical signs of injury, to diagnose and cure a patient of devastating arm and leg paralysis, as well as loss of speech and vision,' explained Professor Pierre Amarenco, chairman of the stroke centre and Bichat Hospital's Department of Neurology, and a member of the SOS-Attaque Cerebrale Association. Videoconferencing enables local emergency staff in the hospitals to consult with Prof. Amarenco and other cerebrovascular specialists at Bichat. While discussing emergency treatment, the medical teams can share X-rays, CAT scans and MRIs on the system's high-resolution monitors. (Encryption is built into the codec).

The network of Intern II videoconferencing systems extends to four other teaching hospitals (part of Assistance Publique-Hôpitaux de Paris) and six community hospitals, which completes the TELE-AVC network.

In addition to reducing delays, this visual technology has helped the hospitals to reduce the need to transfer non-emergency patients.

Based on the Tandberg 880 system, the Intern II has an 'IV stand' design and twin 15-inch flat-screen LCD displays. Transmission speeds are up to 768 Kbps on IP and 384 Kbps on ISDN for exceptional visual/audio quality.

Microscope sends samples for overseas diagnosis

Lab technician Catherine Gerwitz using Coolscope on-board the Anastasis, docked in Benin, Africa. The ship has three operating theatres, a dental clinic, laboratory, CT scanner and X-ray unit. The goal of Mercy Ships is to serve one million people annually, performing surgery such as cataract, orthopaedic, cleft lip, and gynaecology

Communication between the largest non-governmental hospital ship Anastasis (part of the global charity Mercy Ships) and medical specialists on land are now possible via a Nikon microscope with satellite technology. Combining a microscope with digital camera and network functions in a compact tower unit, the Coolscope transcends the existing concept of a microscope. Onboard, volunteers with minimal training can load samples on to the Nikon Coolscope, which automatically adjusts illumination intensity, contrast and focus. The images are then sent to a secure, dedicated web page to be accessed by authorised experts. A pathologist can view the live image on the monitor and control the microscope by moving the mouse to navigate through the specimen. Verbal communication about a diagnosis is made via telecommunications.

Currently UK-based consultant pathologist Dr Ed Sheffield is transmitting diagnoses and second opinions from his Bristol home to the ship docked in Africa. He had already been an onboard volunteer, in Cotonou, providing the first onsite cytology service to Mercy Ships. This saved sending samples overseas and a possible three-week wait for results. The benefits became obvious. Lord Ian McColl, Professor of Surgery at Guy's Hospital, London, and Vice-chairman of Mercy Ships, purchased Coolscope for the flagship.

Ed Sheffield diagnosing samples in Bristol

Dr Gary Parker, Chief Medical Officer and principal maxillo-facial surgeon onboard, recalled operating on a nine-year-old girl with a large jaw tumour. 'I encountered suspicious tissue and sent a cell smear to Dr Sheffield for preliminary diagnosis, which helped me to decide, while she was still on the operating table, whether to re-sect her entire left mandible. What a great tool!

PSYCHOTHERAPY

Internet chat line prevents relapse

Germany - People who received psychotherapy as in-patients and subsequently kept in touch with their therapists via an internet chat line were less likely to relapse, according to a three-year study published by Techniker Krankenkasse (TK), in Bavaria, in association with Panorama Fachklinik and the Centre for Psychotherapy Research (11/04).

'Tests have shown that psychosomatically ill people have trouble putting their successful therapy into practice at home. Relapses are not rare,' explained Dr Christian Dogs, medical director of Panorama Fachklinik, based in Scheidegg in the Allgaeu, which specialises in psychosomatic treatments, psychotherapy, medicine, naturopathic treatment as well as traditional Chinese medicine. Named 'Internet-Br˛cke' (Internet Bridge), the study was directed by Techniker Krankenkasse, a non-profit statutory health fund. Panorama Fachklinik was responsible for the practical side of the project and the Centre for Psychotherapy Research, Stuttgart, covered theoretical aspects, such as assessment of figures and results. The study revealed that, after clinical treatment, participants in group internet chats held with psychotherapists were over 30% less likely to fall ill again the patients who did not participate.

On average, 84% of all registered patients participated in an online chat every week during a 12-15 week period. 'At the beginning of each chat about 10 participants gave a brief description of their current state and condition. From this we generated the topic of the evening chat,' explained therapist Dr Thomas Wangemann, who conducted the TK project. 'The necessity to participate by writing helped patients to structure their difficulties and see their problems more clearly.'

Dr Thomas Wangemann, assistant medical director of the Panorama-Fachklinik/Scheidegg

Dr Hans Kordy, head of the Stuttgart research centre, confirmed the positive outcome: 'From the beginning of treatment up to 12 months after leaving the clinic, the physical condition, as well as overall state of chat participants improved more strongly than in members of the comparison group.' Additionally, the chat group turned to other psychotherapies far less than the comparison group.

One patient observed: 'We could communicate openly with each other, as if we had a face-to-face conversation, and we described explicitly what we felt or when we cried. Online-support definitely gave me strength.' 53% of the patients concluded that they would even pay extra for medical support via the chat line.

Could this apparent success mean that out-patient therapies could be held by therapists working totally online? Important ambulant psychotherapy could not be replaced, said Dr Dogs, but a chat line could help stabilise a patient up to clinical treatment and help from a psychotherapist.

In 2003, TK's costs for depressed patients were 66.4 million, and 16% of the 1,000 treated in Bavaria were admitted to hospital more than once '... mostly unnecessarily,' observed Helmut Heckenstaller, TK's director in Bavaria. 'We need to improve our clients' healthcare and choose innovative ways to do this. The internet has offered a great opportunity.'

PATHOLOGISTS DESIGN A DIGITAL SYSTEM

Xcellerator - a new suite of web-based digital pathology workflow applications designed by pathologists and launched by Trestle Holdings Inc - develops digital imaging and telemedicine applications for life sciences. The system aims to simplify workflow for anatomic and cytological pathologists by replacing paper reports, providing digital image archiving, case flow and database management, auditing, conferencing, and image-enhanced report generation across a wide range of imaging platforms.

The suite also aims to replace glass slides for certain fields of use, with digital image and case management software, and is available for clinical and educational settings. Each of the following is tailored to the needs of particular use-cases and all are available both as client-based software and as hosted application service provider (ASP) solutions:

The suite provides viewing and management of digital slide images and casework data

Two workbench applications - *Xcellerator Histotech* and *Xcellerator Cytotech* - provide the lab or imaging technician with core interfaces to laboratory information systems.

The *Virtual Pathology Classroom* includes text and whole-slide images, displayed in an intuitive, user-friendly digital case file format. Designed for formal teaching of health sciences, it enables the user to create, notate, assign, score and audit various virtual pathology casebook study assignments and tests. It also can be further customised to meet the specific educational needs.

Details: www.trestlecorp.com
Phone: +1-949 673 1907

Wireless technology

France - Coronis Systems reports that its new, tiny OEM wireless card is the first ultra low-power solution to provide a ready-to-use RF chipset (front-end) in which the controlling protocol software runs on a target device's separate existing micro-controller. The two are linked via simple serial-type connections.

The Wavefront is a front-end radio board designed to provide data communications in ultra low-power products. 'With this new product, a target device's existing micro-controller runs its own firmware applications as well as the Wavenis protocol stack to control the Wavefront add-on.' Costs are kept down

because only a single micro-controller is needed, and the industrial quality RF card is controlled by a simple serial bus. The firm also says that the card is ideal for integrators with product volumes up to around 50,000 units. The kit's software programming tool helps to interface custom applications with the Wavenis communication protocol's software layers. Customising communication features for specific needs is also said to be easy.

Wavenis is frequently used in heterogeneous networks alongside Bluetooth and Wi-Fi protocols and, in its Wavenis Embedded Technology line, fully integrated modems, and technology licensing are provided.

The Wavenis platform includes the ultra low power RF transceiver and complete wireless protocol stack. Sophisticated mechanisms, such as Frequency Hopping Spread Spectrum (FHSS), data interleaving, and Forward Error Correction (FEC) combat interference (with no increase in power consumption), allow for simultaneous use with other RF technologies.

Wavenis technology may be used with any standalone device that requires wireless connection within ISM (Industry-Scientific-Medical) frequencies (868 MHz in Europe) and has the functions to create wireless mesh networks with point-to-point, broadcast, polling, and repeater functions.

Details: www.coronis-systems.com

In our April issue, radiographer **Helga Fischer** described experiences with a new PACS at the University Hospital for Radiodiagnostics, Allgemeines Krankenhaus, Vienna, Austria *(EH issue 2/05. P.17. 'PACS: The never-ending story')*. In response, **Daniela Lichtenberg**, medical technological radiologist assistant (MTRA) at Klinikum Krefeld, Germany and **F. Thanhofer***, at the Kantonsspital Liestal, Switzerland, describe PACS experiences at their hospitals

Continuing experiences with RIS and PACS

Daniela Lichtenberg MTRA, has been the medical technological radiology assistants supervisor at the Klinikum Krefeld since 1993. She was the systems co-ordinator of RIS and interim systems co-ordinator for PACS, and the department quality manager. For six years she has served as regional president of the DVTA (the German professional association of technical assistants)

Daniela Lichtenberg MTRA

The 1,100-bed Klinikum Krefeld, is a maximum care institution with 21 clinical departments. In 1995 ours was one of the first hospitals to go digital and, frankly, at that point I had no clue about what a fully digital hospital would be like - or how it would work.

Here I will mention a few basic facts that need to be considered when analogue technology is being digitised:

- To avoid fear and rumours the entire staff should be informed about restructuring from Day 1
- Each step requires careful planning - that goes without saying. The more staff is involved the better the new equipment and structures will be accepted. Particularly older colleagues tend to be scared of so much new technology. When they are given sufficient and adequate information early on or - even better - can visit a department where digitisation has already been implemented, they will understand that everyone can learn.

When we started with the introduction of a RIS/PACS our department was really outmoded and thus was entirely refurbished. To install the cabling for the new system, ceilings were opened. Walls were torn down or added. We received not one CT and one angio, but an entire department equipped by Siemens. In addition to 5 bucky workstations and 3 X-ray workstations, we also received one thorax workstation. MRI was the only modality that was not replaced.

Parallel with this refurbishment, the Medos RIS was installed by a team of four. Over a period of four month the RIS was customised to reflect the entire range of services provided by the department. All screens and menus for the different user groups were configured. Since we had to do this in addition to our regular workload, our days were often very long. As soon as this phase was completed the staff was trained. A six-week test phase followed immediately, then the RIS was integrated into our routine operations - this all went without a hitch. The RIS contained digital dictaphones from the very beginning, which meant that the typing pool could immediately access dictated files. Speech recognition was added during a system upgrade in 2004.

The PACS, also by Siemens, was implemented step-by-step. Diagnostic work stations in our department are MagicViews 1002 with two screens each. When we first introduced the system we had to think a lot about light and space. Today, with flat screens, space is no longer a big issue.

Since the RIS and PACS are by two different manufacturers there is no synchronised access to patient data, which means the patient record has to be accessed both in the RIS and PACS. We solved this problem by introducing barcode scanners.

In the course of time the wards received MagicViews 200 which only allow viewing and do not have diagnostic features. Today, all wards have web-based systems.

It wasn't easy to focus on the new technology in the middle of all the noise and dirt. But when, once again, one of us accidentally printed 60 single films because the layout function hadn't been set to 12 images per film, we all knew: We are not going to miss the old system.

However, we made one major mistake: We introduced a RIS and PACS before, one year later, the entire hospital followed suit with a KIS. We are still struggling with a few problems due to that decision:

- The conventions of the RIS and PACS didn't correspond to those of the KIS
- Patient data of one whole year had to be entered in the PACS
- The unique patient-ID (PAT-ID) of the KIS has not been completely integrated into the RIS and the PACS (both have their own ID administration)
- KIS overrules RIS and the data must be adjusted manually in the PACS.

We all know that today's technology is short-lived, nevertheless it was a bit of a shock when after only eight years we had to face the fact that once we had been digital pioneers but now we were already old-fashioned.

In the meantime we had increased our short-term archive from 720 Gbyte to 2,56 Tbyte and adjusted it to the CT and MRI data volumes and flow. After eighteen months, we already had off-line MODs shelved. Processing the requested MODs became extremely time-consuming. We consequently outsourced long-term archiving. Today, this task is being taken care of by ISIS/Telepaxx.

Since digital mammography is a stand-alone unit within the hospital, the images by Sectra, which we have had for about 18 months, are archived separately.

The advantages and disadvantages mentioned by Helga Fischer in her article in *European Hospital* perfectly reflect my own experience. From the very beginning we had a systems co-ordinator: a MTRA from our own department was trained as systems co-ordinator. In our department he is the contact for all PACS-related issues and he is in close contact with Siemens. That means problems can be detected early on and don't necessarily lead to down times. The biggest advantage for the MTRA was the fact that the number of mis-exposures was reduced to almost nil.

The biggest disadvantages resulted from the fact that we had tried to save money in the wrong place since we did not understand the necessity of certain investments. For example, we had to wait for three years for a post-processing station for the MTRAs, because it had not been included in the initial plan and afterwards there was no money left to purchase it.

Last but not least I should mention that the road to the digital department is not only hilly but can also be rather thorny. We consistently refused to print images for departments that had a MagicView station and thus were able to view the digital images. With that policy we did not necessarily move up in the 'nice department' ranking and many a ward physician developed very innovative bribery schemes to get hold of hardcopies after all. But to no avail - thanks to the fact that our boss showed backbone and to the administration's decision to simply no longer order films.

Finally, ten points that summarise the major issues:

1. Plan every step and integrate the staff
2. Have a KIS with the necessary interface in place before you go ahead with RIS and PACS.
3. Look for fast image transfer in the network
4. Make sure the RIS and PACS are implemented immediately after the staff has been trained
5. Test!
6. Make sure the naming conventions fit for KIS, RIS and PACS
7. Ensure system maintenance from Day 1
8. Convert without compromise
9. Develop a downtime concept
10. Do follow-up training.

Today, all imaging modalities, including ultrasound and post-processing in the operating theatre (OT) are linked to the PACS and have a DICOM work list. To remain up-to-date and implement future software updates in the PACS we now have to modernise our hardware. All diagnostic workstations will be equipped with faster computers and more storage capacity (RAM and ROM). The operating system will change from Unix to Windows, which will allow synchronised access of patient records in the RIS and PACS.

Very often it turned out that the planning was good, but somehow didn't work in reality. Therefore, it is very important to be open, creative and flexible. There are always new things to look at and to learn and new challenges to be tackled - that can only be accomplished with the co-operation of all hospital staff and staff in the companies concerned. Boredom is definitely a thing of the past. Every change should be an improvement, or, as our boss would say:

There are no problems.
There are only solutions!

F. Thanhofer

In 2001, we posted an online request for suppliers to express interest in supplying the hospital with a PACS. 16 applicants fulfilled the legal criteria and we invited 4 suppliers who met our technical and organisational requirements to submit a tender.

A working group at the Kantonsspital Lieser (KSL), in which representatives of all the stakeholders - administration, purchasing, and technical departments, as well as the IT and clinical staff, were involved in the selection process. The problem with this working group was the enormous demands put forward by individual clinics, which threatened our budget. The objective was to become film-less, because a PACS would never pay off if we continued to use films while also investing in hardware/software. After a trial installation for radiologists and clinicians, and visits to reference hospitals, the working group chose the Agfa system *Impax*.

In mid-2002, the hardware was installed in the computer centre, the network was added and the web server began operating. Modalities were added one by one.

In August 2002, the first radiological consultation via beamer took place. From then on everything went very quickly: every clinic, except orthopaedics, wanted to jump on the moving train.

By October 2002, urology, ENT and ophthalmology were film-less, by February 2003 the medical and surgical clinics had followed suit. Orthopaedics, our special case, was granted four more months to go two-pronged. Thus it was May 2003 when finally our hospital became entirely film-less. Fortunately, the workstations in the out-patient and emergency departments and operating theatres are extremely well accepted.

Interviews - A year and a half after the PACS implementation had been completed, our in-house hospital magazine interviewed the medical directors of individual clinics. All in all, their comments can be considered as one long letter of recommendation, some even are true advertising testimonials. For example: *The X-ray consultations on the large screen are considered further training in anatomy and patho-physiology. During a conventional report, the audience in the two front rows could see everything. However, with the beamer, even the assistants and junior medical staff in the back rows can recognize everything in detail. The fact that all images are accessible at any time and anywhere is considered a major improvement in the working climate. Before, the X-ray images had a tendency to miraculously appear at the wrong time in the wrong place, and certainly 'It wasn't me'*. Today, these stories seem to be anecdotes from a long-gone past. Acceptance is high: No-one in radiology or in the clinics ever wants to return to former times.

Workflow - This had to be reviewed and adjusted. Today, HIS and RIS is almost the gold standard in hospitals. But PACS work lists and speech recognition are not that common. It is not the software itself that is crucial, but its integration into the systems. If, from electronic admission to electronic dictation, electronic X-ray consultation down to an electronic 'exit visa', everything is on one line, so to speak, it makes sense to think in terms of flows. With the integrated system, each department, including emergency, out-patient and operating theatres, can not only look at X-ray images, but also can read reports on the X-ray findings, which saves about 100,000 sheets of paper. Film usage has been reduced by an incredible 90% thanks to high acceptance among referring physicians. Only four general practitioners and one clinic nearby are not integrated in the system - they receive a CD with viewer and autostart.

Future technology - We are now looking into teleradiology as an offer to general practitioners. Our radiologists, who have used teleradiology on night and weekend shifts, are enthusiastic. It works flawlessly. They only have to come to the hospital for ultrasound.

So far, we haven't had any down times and we hope that this won't change in the future. In case the network fails or the server crashes we do have an emergency plan: the memories of individual modalities are designed in such a way that for one week the data remain in the equipment and does not have to be transferred to the PCAS. This means that no data can be lost. With conventional X-rays we have on original image - that's it. With the PACS, however, we archive all data four times: twice (mirrored) on the hard drive and twice on tape.

In our orthopaedics department, the newest highlight is the clinical round using a laptop. We are moving on. Even if we don't now what's ahead, we are always curious and look forward to trying out new things.

** Based on a report by F Thanhofer in SVMTRA Aktuell 4/2004, p. 7-9, Zeitschrift der Schweizerischen Vereinigung der Fachleute für medizinisch technische Radiologie (the Journal of the Swiss Professional Association of Medical-Technological Radiology), Sursee, with kind permission of the publisher.*

Appendicitis complicated by chickenpox

Surgeons Sergey V Stonogin, specialist in infectious cases, Eugeny V Dvorovenko, Head of Emergency Surgery, and Vladimir A Chaplin, endoscopy specialist - report on results from their study to assess the most effective, safe combination of antibiotics to treat patients with acute appendicitis complicated by chickenpox

In our research at the Tooshino City Hospital for Children, in Moscow, we studied cases from 1999 to 2003. 18 cases (3.3 % of all operations for appendicitis combined with infection) were children with destructive appendicitis and chickenpox (or contact with chickenpox). Their age ranged between 3.5 to 13 years.

Antibiotic-sensitivity was defined by Kirbi-Bauer's disk-diffusion method.

12 patients had symptoms of local peritonitis; three had widespread peritonitis. Abscessed appendix was found in 11 patients.

Two patients had microflora growth in the abdomen - a massive growth of Escherichia coli. In first case Escherichia coli was sensitive to: Ampicillin/Sulbactam, Aztreonam, Cephazolin, Cefotetanum, Ceftazidime, Ceftrizoximum, Ceftriaxon, Cefuroxim, Cephalotinum, Ciprofloxacinum, Gentamycin, Imipenem, Mezlocillin, Piperacillin, Tobramycinum; it was also stable with Co-Trimoxazole.

In the second case Escherichia coli was sensitive to: Amikacin, Aztreonam, Cefotaxim, Cefotetanum, Ceftazidime, Cefuroxim, Ciprofloxacinum, Gentamycin, Imipenem, Ofloxacinum, Tobramycinum, and stable with Ampicillin/Sulbactam, Ampicillin, Cephalotinum, Mezlocillin, Piperacillin.

After surgery, antibacterial therapy was carried out on 14 patients. Penicillins were used to treat 11 patients. Aminoglycosides was used to treat 17 patients. Cephalosporins were used to treat nine patients. Third generation Cephalosporins were used for seven patients. Metronidazole was used in eight cases. Fluoroquinolones were used to treat two patients. The highly effective combination of cephalosporin, aminoglycoside and metronidazole was applied in three cases. It should be noted that three patients received two consecutive antibacterial therapies.

The period in which patients returned to normal temperature after surgery for destructive appendicitis decreased from 8 to one day (average: 3.5 to 1.8 days). For patients operated on for destructive forms of appendicitis, the change decreased from 21 to seven days (average: 11.2 to 3.4days).

We concluded that for patients with appendicitis and chickenpox combined, the most effective and safe preparation is the third generation cephalosporin Ceftriaxon, which, if necessary, can be combined with aminoglycosides and metronidazole (depending on the severity of the condition).

The preparation is administered once a day, intravenously or intramuscularly (if there are no pain symptoms). Considering skin abrasions associated with chickenpox and pain symptoms, administration is best via a peripheral or central venous catheter, and care is important - a good measure is to soak the catheter in an antibiotic for 40 minutes before beginning the intervention.

Contact details: S V Stonogin, svas70@mail.ru; D E Viktorovich, phone 949-03-04; V A Chaplin, phone 949-35-68.

Sergey Vasiljevich Stonogin

NEW

For Laryngectomy and tracheotomy patients

Germany - The VoiceMaster, a voice prosthesis launched by Tracoe medical, features a special ball valve system for ultra-low airflow resistance. The device is front-loading for anterograde insertion. Using the loading device with colour indicators, insertion and removal can be carried out under local anaesthetic in an outpatient setting, the firm reports, adding that the Voice Master has a titanium sleeve, with Candida resistant characteristics, which ensures a prolonged lifetime, thus reducing the number of early replacements.

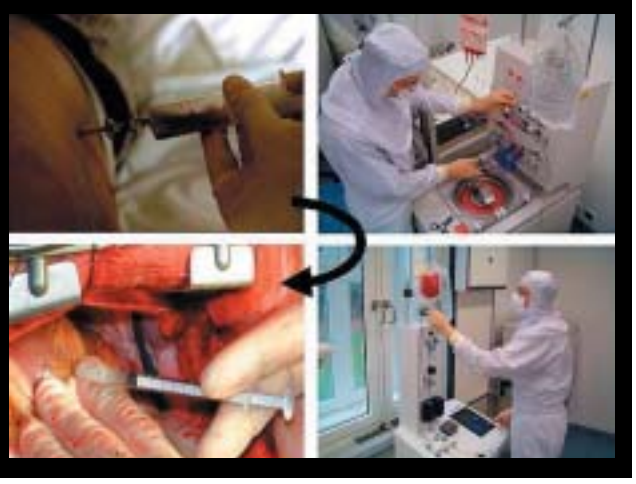
Tracoe's VoiceMaster Primo - a silicone prosthesis with ball valve made of Candida resistant PTFE material - is for use in primary and secondary retrograde insertion.

A large range of accessories is available for both devices.

Current research and the future of regenerative medicine

STEM CELLS

By **Professor Gustav Steinhoff MD**, director of the Department for Cardiac Surgery, and **Christof Stamm MD**, co-ordinator of clinical studies, at Rostock University, Germany



Clockwise, from upper left image: In our clinical trial on stem cell therapy for ischaemic heart disease, a bone marrow aspiration is performed one day before the scheduled CABG operation. In the haematology lab, CD133+ stem cells are labelled using paramagnetic antibodies. The labelled stem cells are then purified using the CliniMacs system (Miltenyi Biotec). During the subsequent CABG operation, the stem cells are directly injected in the infracted heart tissue

Cell therapy for myocardial regeneration is an exciting new field of medical research that has the potential to revolutionise cardiovascular medicine. Despite significant improvements in emergency treatment, myocardial infarction leads to a loss of contractile tissue in many patients with coronary artery disease. Often, this is the beginning of a downward spiral towards heart failure and life-threatening arrhythmia. Other than heart transplantation with its obvious limitations, current therapeutic means aim at preventing further episodes of myocardial ischaemia and at enabling the organism to survive with a heart that is working at a fraction of its original capacity. They are far from representing a cure. At present, the fast emerging research field of stem cell technology opens a new vision of regenerative therapies for heart disease. In this situation, it is understandable that cardiac stem cell therapy attracts considerable attention and has raised many hopes.

Stem cells are unspecialised cells that renew themselves for long periods of time and can be induced to become cells with a specialised function. The traditional definition requires the capacity for 'asymmetric' cell division (i.e. the stem cell divides into one stem cell and one differentiated cell), while a classic progenitor cell divides in two differentiated daughter cells. Whereas embryonic stem cells are uncommitted and pluripotent in their differentiation capability, adult stem cells are believed to be committed to differentiate only into specialised cells of the organ or tissue they are derived from. Understanding of adult stem cell biology has been upset by recent experimental data indicating that adult stem cells derived from the bone marrow can give rise not only to blood cells but also to other (non-haematopoietic) cell types by crossing lineage boundaries ('stem cell plasticity').

Ideally, a stem cell that has been implanted into infarcted myocardium would give rise to new blood vessels and new contractile cells (i.e. angiogenesis and myogenesis). In 2001, two experimental studies of myocardial repair by adult stem cells from haematopoietic sources, after experimental myocardial infarction, promoted an unparalleled boost of clinical and experimental regenerative SC therapy studies. Kocher et al. found that systemic intravenous infusion of purified human CD34+ cells can improve heart function in rats by generating new blood vessels within the infarct area ('neo-vasculogenesis'), and our own group has recently reproduced this phenomenon using human cord blood cells. Orlic et al. reported on both neovasculogenesis and trans-differentiation of transplanted cells into cardiomyocytes following intramyocardial application of mouse bone marrow-derived stem cells. The initial enthusiasm, however, has largely faded. While in situ neo-angiogenesis induction by haematopoietic cells, associated with functional improvements, is consistently observed, it proved difficult to find corroborating evidence for true cardiomyocyte differentiation. In fact, two independent groups reported early in 2004 that they did not detect any meaningful evidence of cardiomyocyte differentiation of haematopoietic stem cells in mouse models that were designed to confirm the earlier findings.

Clinical application: Whether the first clinical pilot trials were initiated too early remains subject to very controversial debate. The first clinical application was reported by Menasche and colleagues. During an aorto-coronary bypass operation, skeletal muscle progenitor cells ('skeletal myoblasts' obtained from the patient's own thigh muscle two weeks before the operation) were injected into the infarcted myocardium. This procedure has been repeated worldwide ever since, and the reports quite uniformly describe a mild improvement in heart function. The myoblast injection, however, appears to result in a transient period of electrical instability a few days after the injection, which repeatedly led to sustained ventricular arrhythmia. Therefore, myoblast injection as a stand-alone treatment is currently limited to patients who have an automatic defibrillation device implanted.

Cell therapy with bone marrow or blood-derived stem cells may evolve in a novel treatment option for both chronic ischaemic heart disease and acute myocardial infarction. In either situation, the angiogenic potential of certain adult stem/progenitor cell types is probably the key to functional improvements, whereas true neomyogenesis is, at present, rather unlikely. Around 2001, several clinical trials were initiated, and among the first published was the work by Hamano et al, who injected bone marrow mononuclear cells intramyocardially during a CABG operation, Tse et al, who used a catheter-based system for direct intramyocardial delivery of mononuclear cells, and our own group, who at first injected a purified population of CD133+ bone marrow stem cells, again in conjunction with a CABG operation (Figure 1). What these trials have in common is that patients with chronic ischaemic heart disease are addressed. In the chronically ischaemic heart, still vital cardiomyocytes are dispersed within the fibrous scar tissue. Theoretically, such 'hibernating' cardiomyocytes can be re-recruited for contractile work once sufficient blood supply with oxygen and nutrients has been re-established, and stem cell-induced growth of microvessels in the infarct border zone may thus translate into improved myocardial contractility.

Over 40 patients in Rostock have been treated with bone marrow stem cells in the chronic ischaemic heart, which has proved safe and effective in improvement of cardiac perfusion and function, especially in those with previously deteriorated heart function.

It was fundamentally different in acute myocardial infarction studies. The onset of myocardial ischaemia was usually between several hours and a few days ago. If possible, the blocked coronary artery is immediately reopened by emergency catheterisation, balloon dilation, and stent placement. Analogous to the chronically hibernating myocardium, acutely ischaemic cardiomyocytes are still vital, but have temporarily lost much of their capacity for contractile work ('myocardial stunning'). Tissue infiltration with inflammatory cells is beginning, but fibrous scarring has not yet occurred. In this situation, direct injection of cell suspension into the weakened myocardium is prohibitive, but infusion of stem/progenitor cells into the reopened coronary artery is currently being evaluated.

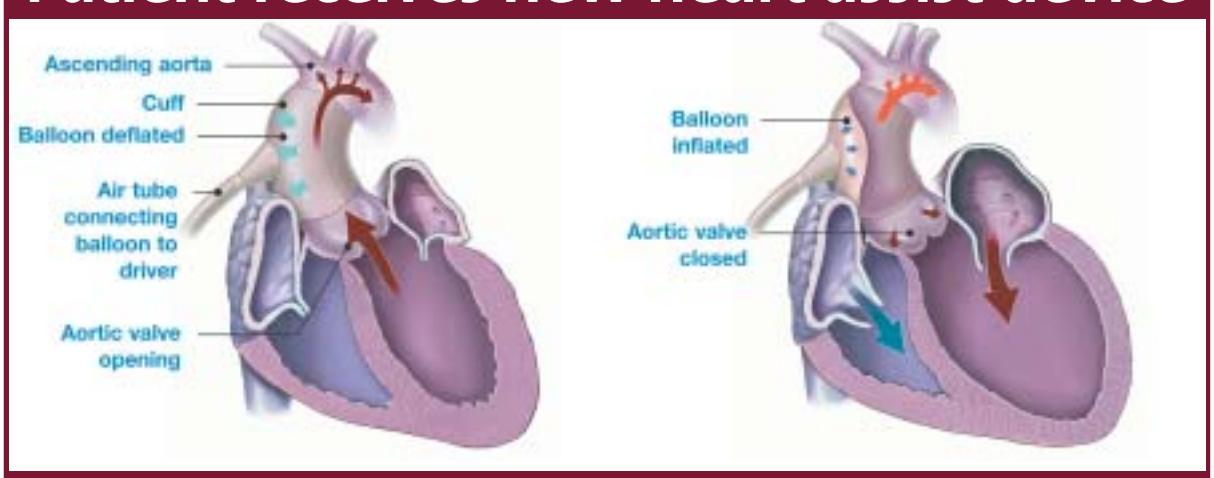
So far, mainly bone marrow mononuclear cell preparations have been used in such trials. A few days after the onset of myocardial infarction, a second cardiac catheterisation is performed and the cell suspension is injected into the infarct vessel while blood is temporarily interrupted by balloon inflation. Pilot studies have demonstrated feasibility and safety of this approach, and controlled efficacy trials are on the way. In one of the first of those trails, there was a difference in LV ejection fraction of 6% at six months follow-up between 30 patients who received intracoronary cell injection and 30 patients who only had standard infarct treatment. Other clinical trials based on the same principle are currently undertaken, but it is too early to make a definitive judgement about long-term functional efficacy and possible side effects. One of the most interesting questions is how, and to what extent, the intra-coronary cell injection leads to stem cell migration into the myocardial interstitium.

Outlook

Based on existing clinical experience, it should be justified to conclude that transplantation of autologous bone marrow cells in the heart can be safely performed in patients with ischaemic heart disease and leads to a functional recovery with improved cardiac perfusion. Whether neo-angiogenesis, neomyogenesis - or both - occur in the human situation as yet remains unclear. Carefully designed controlled studies are needed to further determine the efficacy of clinical cell therapy for heart disease. Scientific controversy regarding the regenerative potential of adult bone marrow stem cells in the heart of mice has fuelled a heated debate about further experimental and clinical approaches. However, given the tremendous amount of data demonstrating functional benefits in large animal models, the therapeutic potential needs investigation in further clinical trials.

In medical research, it is not unusual that novel treatment concepts are evaluated in a close combination of laboratory investigation and explorative clinical studies. Of course, every clinical trial must be designed and conducted with greatest care, to minimise patient risk and exclude ethical conflicts. If the translation of experimental approaches in clinical medicine succeeds, we will, for the first time, be able to offer patients with heart failure a true cure. The development of clinical stem cell therapy for different diseases, use and application of new knowledge from embryonic and adult stem cell research and the development of new pharmacological tools will guide the way to future applications of a regenerative medicine.

Patient receives new heart assist device



New Zealand - A 56-year old patient at Auckland City Hospital, has become the first to be fitted with C-Pulse, a new electro-hydraulic assist device designed to treat moderate (class III) heart failure (HF). Invented by the hospital's cardiac surgeons William Peters and Paget Milsom, Head of Cardiothoracic Surgery, the device has been developed by Sunshine Heart Inc, of Sydney, Australia.

Last November, C-Pulse data, presented by Dr Milsom at the American Heart Association meeting in New Orleans, indicated that when C-Pulse operated for 20 minutes in six patients undergoing coronary bypass surgery, blood flow in the left coronary artery increased by 67%.

C-Pulse is a cuff that consists of an inflatable polyurethane balloon and polyester wrap, which is stitched to the outside of the ascending aorta and follows its contours. (Being outside the aorta means that surgery is less invasive and bleeding risks are reduced). By applying counter-pulsation to the aorta, C-Pulse is reported as augmenting cardiac output and inducing recovery. On cuff inflation, the aorta is partially compressed, while the aortic valve is closed and the ventricles are filling. This augments blood pressure and the amount of blood flowing through the coronary arteries during diastole. The device can be switched on and off as desired, or the amount of heart support can be adjusted for the patient's activity level.

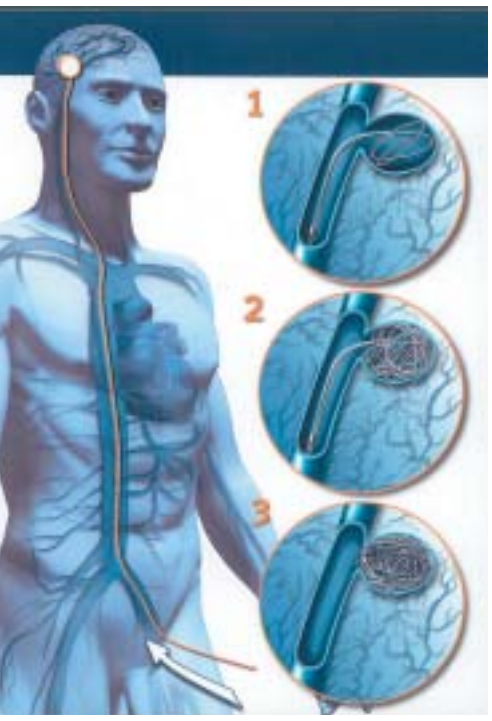
Leads, surgically implanted on the heart's surface, transmit activity data to a processor - worn by the patient - which uses air from an external pump to instruct the balloon to inflate and deflate. The processor has a rechargeable battery or can be mains powered when a patient is not mobile.

'Follow-up measurements of quality of life and heart function will be completed in this patient at three and six months,' said Dr Peters, adding that up to 10 patients will be enrolled in the study and additional study centres are expected to be established at leading Australian hospitals '...in the near future'.

Tiny platinum coils in the brain prevent stroke

Minimally invasive procedure blocks blood flow into an aneurysm

Until a few years ago, surgery on intracranial aneurysms was a high-risk intervention. The cranium was opened and the aneurysm was separated from the blood flow by a technique called clipping. However, today many patients can be treated with a minimally invasive procedure called coiling. 'In general, the intervention takes only one to two hours Professor Forsting of the Department for Neuro-Radiology at the University Hospital Essen is one of the coiling



Tiny platinum coils are deployed in an aneurysm via a catheter. When the aneurysm is filled with coils, the vessel can no longer rupture

specialists in Germany, 'and it carries far less risk, because the cranium doesn't have to be opened. Consequently the patient recovers much faster.'

The surgeon inserts a microcatheter into the femoral artery and navigates it through the vascular system into the head where the aneurysm is located. Soft platinum coils are threaded through the catheter and deployed in the aneurysm. The spirals uncoil in the aneurysm and fill it up entirely thus blocking blood flow and preventing rupture. If the aneurysm has a wide base, a stent is put in place, which prevents the coil from moving (see illustration).

Clinical trials - both short- and long-term - have proven the effectiveness and the safety of coiling (ISAT study*). In economic terms, coiling is cheaper than clipping, because the length of the hospital stay, particularly in the expensive ICU, is reduced significantly.

**International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomized trial. Pub: The Lancet 360 (2002) 1267-1274.*

Details: www.aktion-meditech.de

1st portable heart-lung machine

Lifebridge, reported as the first portable heart lung machine, and presented at the 34th Annual Meeting of the German Society for Cardiovascular Engineering last month, provides instant haemodynamic stabilisation for patients suffering from cardiogenic shock. The machine is attached percutaneously via femoral vessels to the patient. Afterwards, air elimination of the heart-lung machine is performed automatically. Due to the integrated oxygenator, Lifebridge, unlike conventional cardiac assist devices, can fully take over the functions of the heart and lung.

In animal testing, adequate flow rates and gas exchange were demonstrated under simulated transport conditions.

The first clinical use is planned for later this year. The developer, a German start-up headquartered in Munich, hope for similar successful results. Lifebridge will become particularly interesting when safe and reproducible out-of-hospital use has been proven because, in many cases, it is the lack of oxygen supply between the event and a cardiological or cardiosurgical intervention that causes irreversible organ damage - and sudden cardiac arrest can happen to anyone, anywhere and any time.

Report: Holger Zorn

R&D

Technology conversion: Integrating systems into one unit

***Omar Ishrak**, President and CEO of GE Healthcare's Clinical Systems division, and **Hannu Syrjäla**, Product Manager at Clinical Systems, describe R&D for the firm's Clinical Care System, in which the experience of airline pilots is being utilised to present data to anaesthesiologists in a more meaningful way. Interview: **Daniela Zimmermann**, Managing Director of European Hospital.*

Clinical Systems produces point of care devices, including life support systems (anaesthesia), monitoring, ultrasound and diagnostic cardiology, which are used clinically in a wide variety of settings. The Clinical Care System aims to combine several of these technology components because, Omar Ishrak explained, 'Our customers need to use multiple technologies in one product, and we foresee a growing technology conversion, as well as a clinical conversion.' Eventually, he said, even ultrasound will be integrated in the system, but that will come later.

'Combining these technologies, then working with airline pilots to enhance the user interface to make a very complicated set of parameters into a very simple set, is really what's unique - it's one of GE's imaginative breakthroughs. An earlier one was VIVID I, a miniaturised ultrasound product. Due to miniaturisation it is possible to integrate VIVID I into the rest of the Care Station products*, which is what I mean by technology conversion - different types of products, previously used separately, can be integrated in one offering. Once you have the technology you can ensure that those products can be used seamlessly - that's where the airline pilots come in, because, over the past 20 years in the airline industry, ever more complex instruments and displays have been integrated for easier use.'

Medical devices manufacturers have used the aviation industry for some time as an analogy for anaesthesia, explained Hannu Syrjälä: 'In anaesthesia, first you induce a patient to sleep - a very critical phase, when the anaesthesiologist is very vigilant, just like a pilot during takeoff. When the patient has fallen asleep, the anaesthesiologist keeps him stable, and the surgeon starts to operate. Similar to flying, a lot of things are going on. Then, when the surgeon has finished operating, and the patient needs to be woken, again the anaesthesiologist becomes very active to ensure everything happens safely - it's like landing, hence the comparison with flying. So, when building the system, we said: Hey, why not talk to pilots? The Care Station is primarily being developed in Helsinki, where GE acquired Instrumentarium in 2003. So we contacted Finnair, and pilots are helping us to understand critical phases in flying. Pilots receive a lot of critical data. Similarly, in anaesthesia you have maybe ten or fifteen devices, or in a complex operation maybe 20-25 devices showing data. So we want to collect data and present it in a meaningful way to clinicians.

'Anaesthesiologists use different drugs to obtain the stable conditions for the surgeon, but the drugs affect one another,' he continued. 'And, up to now, clinicians had to calculate the effects of those drugs, either on paper or in their heads - typically in their heads. What this model does is simulate the synergy of the drugs. It also looks at events that are going to happen. So, the anaesthesiologist can see when the surgeon needs, say, only five more minutes to stitch the patient up, and he can start lowering the anaesthesia. By metabolising the drugs, taking the dosage down, the patient recovers quicker - that's very valuable for clinicians and patients, and it reduces drug costs and length of stay. It optimises anaesthesia.

By the end of this year, the new Care Station should be ready for the European market. 'Germany will be a key market for us,' said Omar Ishrak. 'Then Central European and Scandinavian countries and, when we have the capacity, we will spread all over Europe.'

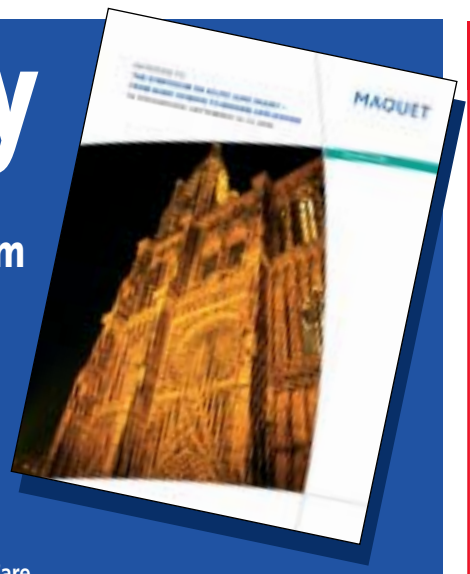
**Full integration of Ultrasound will probably be integrated with Care Station probably in a year or so.*

© Airbus

The Clinical Care System. Pilots are helping with ways to present data in a meaningful way

Acute lung injury

World's leading experts in ventilation research to speak at September's symposium



The *Acute Lung Injury Symposium - from basic science to bedside application*, set for September in Strasbourg, has attracted an impressive line-up of international speakers from the USA, Germany, Italy and Spain. The event will be chaired by Professor Arthur Slutsky, Professor of Medicine, Surgery and Biomedical Engineering, University of Toronto, St Michaels Hospital, Canada. The organiser, MAQUET Critical Care of Solna, Sweden, says the symposium has been planned as an interactive event with discussions between speakers and audience.

In addition, participants will be offered a visit to the Maquet Surgical Academy, training and communication centre.

The array of international speakers will focus on mechanisms and therapies related to ventilator-induced lung injury and discuss topics ranging from lung recruitment strategies, to cellular and tissue stress failure, to gender and genome in ARDS. They include: Prof. Luciano Gattinoni, of the Instituto di Anestesia e Rianimazione, Ospedale Maggiore Policlinico, Universita di Milano, Italy; Prof. Stefan Uhlig, Director of the Division of Pulmonary Pharmacology, Research Centre Borstel, Leibniz Center for Medicine and Biosciences, Borstel, Germany; Dr Jesús Villar, Director of Research, Hospital de la Candelaria, Carretera del Rosario, Santa Cruz de Tenerife, Canary Islands; Dr Fernando Suarez Sipmann, Department of Critical Care Medicine, Fundación Jimenez Diaz, Madrid; Rolf D Hubmayr, Professor of Physiology and Medicine, Director of Pulmonary and Critical Care Medicine, Mayo Clinic College of Medicine, Rochester, MN, USA; Professor Michael Quintel, Institut für Anästhesiologie und Operative Intensivmedizin, Universitätsklinikum Göttingen, Germany; Professor Marco Ranieri, Ospedale S. Giovanni Battista, Dipartimento di discipline Medico-Chirurgio, Torino, Italy; Gary F Nieman, Adjunct Assistant Professor of Surgery, State University of New York, Upstate Medical University, Syracuse, USA.

For more information and registration:
www.maquet.com/criticalcare

Conference language: English with simultaneous interpretation to French and German.

The European Society of Intensive Care Medicine has endorsed the symposium.

Simple, novel anaesthetic device still saving 3rd World lives

UK - The Glostavent, an anaesthetic machine designed by Dr Roger Eltringham, consultant anaesthetist at Gloucestershire Royal Hospital, works on or off mains electricity. If the power fails, medics simply switch to reserve oxygen cylinders - which takes about five seconds - even in the dark.

In addition, because oxygen concentrate is used the supply lasts up to 14 hours, whilst more traditional machines run out in about 100 minutes. Maintenance and repair are also easier than for more sophisticated machines, which means a running cost saving of about euros 57 monthly. The Glostavent's purchase price is also under half that of more sophisticated Western machines (euros 22,000 v. euros 59,000).

When working in the developing world, Dr Eltringham, who is also a lecturer and member of the World Federation of Societies Anaesthesiology, had found donated equipment from other countries often arrived without operating manuals, or did not work, or needed sophisticated maintenance to keep going. 'There's a graveyard of old anaesthetic machines littering countries like Africa,' he added. The result was a considerable work in his spare time to develop equipment that would work and be cheap to run. Initially helped by Dr Roger Manley, who invented 'Manley ventilator technology' in the 60s, the Glostavent prototype resulted, using that technology to supply anaesthetic.

10th ANNIVERSARY

Today about 50 machines, made up of four components commonly used in anaesthesia (the draw-over anaesthesia system, Manley multivent ventilator, oxygen concentrator and air compressor) are in use in at least 12 countries, in Asia, Africa and parts of Eastern Europe - as well as in the UK. Dr Eltringham said he regularly uses a Glostavent for his own patients.

In Shanghai, Republic of China, Dr Quiwei Fan who to-date had used the Glostavent to anaesthetise over 500 patients, undergoing a wide variety of surgical procedures, said: 'I found it satisfactory in every case'.

TAP WATER

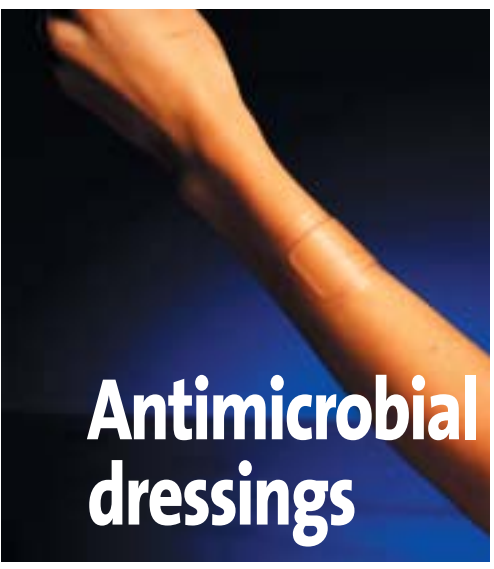
Professor Martin Exner

an underestimated source of infection

Hospital acquired infections affect about half a million people annually, and water is a serious source of infection - a fact recognised in the Water Guidelines of the *World Health Organisation* (WHO). However, although particularly dangerous micro-organisms, such as Legionella and Pseudomonas aeruginosa, can multiply in a water pipe system, the fact that 'clean' water from a tap might present such dangers is frequently ignored.

According to **Professor Martin Exner**, Director of the Institute for Hygiene, Bonn University: 'Up to now, between 10,000 and 12,000 Legionella infections have been said to occur in Germany every year. However, recent studies suggest that this number is significantly higher. The incidence of Legionella infections in Germany can be estimated at 25,000 to 30,000 per year. Today we know that at least 40 percent of all Pseudomonas infections, for example in intensive care units, can be traced back to the water pipe system,' he added. Experts also indicate that these infections are of significance in the domestic environment, especially for immuno-compromised people.

Whilst water companies provide clean water, complex water installation systems provide excellent growth conditions for bacteria and ideal temperatures from 20-50 degrees Celsius. They can multiply in the biofilm, the slimy layer inside pipes, and are protected from disinfection and high temperatures. The organisms can then be transmitted during showers or face and hand washing. If Legionella or Pseudomonas are detected in water, counter measures must be taken by an operator. In hospitals, for example, disposable point-of-use filters, installed on showerheads or water taps, clean water by using high-tech membranes, and these are reported to be efficient.
Details: info@pro-wasser.de



Antimicrobial dressings

Novel antimicrobial gels have been added to the range of hydrogel products for moist wound care produced by First Water (www.first-water.com) the UK-based firm that specialises in R&D and mass-scale manufacture of sheet hydrogel products.

The company reports that the dressings are designed to absorb, contain and kill any bacteria that come into contact with the gel or are contained with the exudate. Eliminating the need for preservatives, or antimicrobial agents such as silver, the firm says the gels provide a skin-friendly environment that is antimicrobial to a broad spectrum of species: 'When independently challenged with C.albicans, A.niger, P.aeruginosa, S.aureus and E.coli, the gels demonstrate their effectiveness by killing these species on contact. As well as reducing the incidence of infection, the gel systems help promote an optimal moist healing environment, for wounds ranging from cuts and grazes to major lesions.'

The wound dressings are backed with a breathable polyurethane bacterial barrier in adhesive-bordered and non-bordered versions. Range size: 75 x 45mm up to 200 x 200mm.

Other products: Hydrogel Skin Adhesives for wound care, ostomy and medical device fixation; Hydrogel Roll Stock for biomedical electrode manufacturers; Delivery of Actives to/through the skin. ■

CORRECTION
The website printed for the Institute of Sustainable Healthcare (page12, EH issue 1/05) was incorrect. The current website is:
www.inges.com

Top class treatment for utensils

TopLine, the latest range of cleaning and disinfection equipment made by Meiko, of Offenburg, provides high-tech washing, rinsing and disinfection for care utensils such as bed-pans, urine bottles, commode buckets. These machines '... revolutionise everything that has gone before and everything currently offered in the market,' Meiko reports.

As in previous models, to suit structural or space requirements a Topline machine can be supplied for wall-mounting, free-standing or to be built-in. Complete care units can also be supplied. On delivery, all they need is the power supply connection.

Both standing and cabinet models have manual door operation or, optionally, AT models can have automatic door opening.

The new line is particularly easy to load, Meiko reports. 'Utensils are positioned in brackets on the appliance's open door, outside the wash-chamber. When the door closes, the utensils are emptied automatically in the sealed compartment, avoiding the spread of unpleasant odours.' And, at the end of a programme, a new cooling technique means utensils can be gripped immediately, ready for re-use.

Microprocessor controls, with optimal fine-tuning to meet hygiene requirements, allow the machines to be individually adjusted according to specific needs. Then short, normal or intensive programmes, selected via a touch button on the new switch display, start automatically.

'The machine's appearance, its impressive power-cleaning system with lifting jets, its ultra-efficient disinfection technology, its drying system, the innovative MIKE.2 controls using infra-red technology, and much more, are all new,' the maker reports, adding: 'Further advantages include a self-cleaning wash-chamber, sound-proofed operation and absolute certainty of achieving a perfect quality of cleanliness and hygiene every time the machine is used. Everything combines to guarantee the best possible cleaning quality and the most effective standard of disinfection possible.'

Borrelia burgdorferi sensu lato!

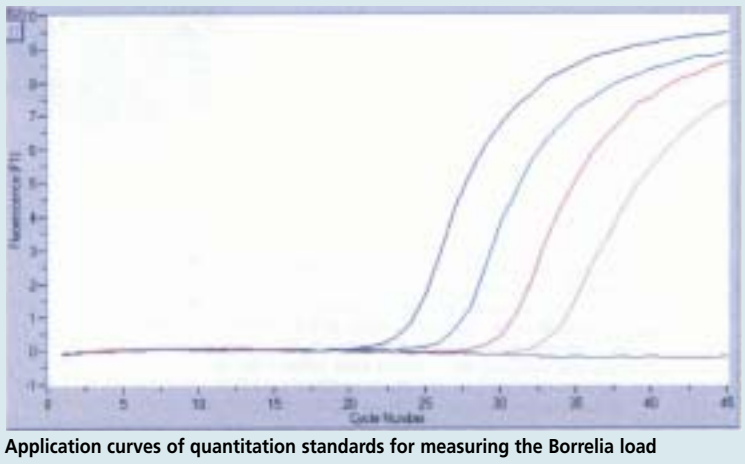
Real-time PCR rapid detection

Pathogens transmitted by ticks are a particular hazard during warm summer months, and the most common tick borne disease in Europe is Lyme Borreliosis, a multi-systemic infection often indicated by a local skin rash (Erythema migrans). The causative agent of Lyme Borreliosis is Borrelia burgdorferi sensu lato, which comprises several pathogenic Borrelia species. Infection with B. burgdorferi sensu lato is localized in the early stage and characterized by flu-like symptoms. The untreated infection can develop into a disseminated disease that spreads to many of the major organ systems. In the late stage a persistent infection may develop that causes serious symptoms like chronic arthritis or chronic encephalomyelitis.

Due to the variety of symptoms, clinical manifestation of Lyme Boreliosis is often unclear. The Hamburg-based biotech firm artus GmbH, which manufactures the RealArt Borrelia LC PCR Kit, reports that it offers an optimised ready-to-use system for the specific detection of Borrelia DNA by Real-Time Polymerase Chain Reaction (Real-Time PCR). 'The method is based on the simultaneous amplification and detection of a specific region of the Borrelia genome, which guarantees high levels of specificity, sensitivity and reproducibility.'

The kit also contains an internal control to exclude false-negative results. To ensure the highest sensitivity, it has been optimised to detect low pathogen copy numbers. Various sample materials can be used including ticks, cerebrospinal fluid, synovial fluid, skin biopsies, blood, and culture, artus points out.

www.artus-biotech.com



Application curves of quantitation standards for measuring the Borrelia load

Flowers

Good for patients - or bad?

The myth that flowers kept near patients' beds are not good for their health was examined by the Robert Koch Institute (Berlin) and Drs Klaus Weist and Tim Eckmann at the Charité Hospital, Berlin. The researchers concluded that, on general wards, freshly cut flowers or potted plants, with either traditional compost or hydroponics, cause no harm. Nonetheless, they must be well maintained, to prevent the development of airborne bacteria. Additionally, dried plants should be avoided because they can contain fungi that are airborne.

Photo: ecovaas

Potted plants should *not* be kept in ICUs and on wards with immunosuppressed (oncology, transplants) and surgery patients, because the plants could spread aspergillus and other potentially harmful fungi. Here the emphasis is on 'could'. There is no evidence on actual hygiene-related medical conditions that plants may have caused, and no links between infectious diseases and plants suggested in scientific literature. If the thousands of bouquets in 2,230 German hospitals had any statistically relevant impact on nosocomial infections, the Robert Koch Institute assured *European Hospital*, by now we would have known it.

Conclusion: Apart from some exceptions from the pont of view of hygiene, there is no reason to ban flowers and potted plants from general wards (although visitors and less incapacitated patients should handle their care, to ensure already stretched nurses are not left with yet another task).

Report: Heidi Heinhold

NEW

Combating latex allergy

UK - Biogel Eclipse is said to be the first powder-free, De-Proteinised Natural Rubber Latex (DPNRL) surgical glove that can help reduce the risk of developing latex allergy, due to a deproteinising process involving an enzyme. Regent Medical, which specialises in R&D and production of surgical glove technology and glove barrier protection, produces the Biogel range, and reports: 'Eclipse is 20% thinner than standard Biogel, 30% softer than Biogel SuperSensitive and still has 30% greater tensile strength than a leading competitor. In a UK trial 80% of users preferred Eclipse over their current glove. Eclipse is also less expensive than non-latex gloves.'

Whilst Eclipse has a low potential for the development of latex allergy and allergic contact dermatitis, Regent Medical cautions that latex-sensitive people should not use the glove.

HPV bio-decontamination

Reports of successful eradication of dangerous and deadly pathogens by Hydrogen peroxide vapour (HPV) in infected wards is raising interest in a relatively new *Room Bio-Decontamination Service*

UK - A process that uses hydrogen peroxide vapour to bio-deactivate dangerous and deadly micro-organisms, has been successfully used in hospitals in Britain (34), Greece (1), France (1), the USA (5), and Singapore (3).

The hydrogen peroxide vapour is applied using unique, patented *Clarus Technology*, developed by Bioquell PLC, based in Andover, Hampshire. The system was developed throughout the early to mid nineties, predominantly for use in the pharmaceutical industry where it is used in place of formaldehyde, a known carcinogen. Bioquell has developed a number of different applications utilising the same technology on different scales, for example, for the decontamination of items of equipment to the decontamination of buildings.

'The process involves a team headed by an Engineer. They plan and carry out the decontamination process, which involves isolation of areas to be treated (relocation of patients), transporting the portable equipment, and running the cycle, which is controlled via lap top computer from outside the decontamination zone,' explained Mike Cann, Bioquell's Business Development Manager.

Following the bio-decontamination process, hydrogen peroxide is catalytically converted to water and oxygen - so that the technology is 'residue-free'. In addition, he added: 'The process has no detrimental effect on either the building of any equipment within it, including sensitive electronics, such as computers and medical systems. Depending upon the volume of the area to be decontaminated the process is complete within, typically, 6-8 hours, including the removal of the hydrogen peroxide from the room. There is no residue and the room can immediately be returned to use.' Bioquell teams work all hours to reduce disruption of health care, he added.

Bioquell Room Bio-decontamination equipment at work in a UK hospital ward

With hospitals throughout the world battling outbreaks of dangerous or deadly pathogens, this technology has proved effective against MRSA, VRE, *Acinetobacter, Klebsiella, Clostridium difficile* and *Serratia*, the firm reports. In addition, when used for bio-terrorism 'cleansing' the system is reported to be effective against anthrax.

The company offers a *Room Bio-Decontamination Service* (RBDS) and an *Equipment Bio-Decontamination Service* (EBDS). Full after-sales service, including preventative maintenance contracts and bio-decontamination, is provided on all the equipment sold in the UK via a team of 40 specialists. The company also has sales offices in France and the USA.

Recently, in the US, an RBDS team was called in to tackle *Clostridium difficile*, the bacterium that causes diarrhoea and more serious intestinal conditions such as colitis. As a nosocomial threat, this pathogen is increasing at an alarming rate. Latest UK figures reveal that it caused 934 deaths in 2003, a 38% rise in two years. In 2004, there were 43,672 cases. In recent years, Bioquell has worked to provide a unique service to that country's National Health Service (NHS), to eradicate nosocomial pathogens from hospitals, and the Department of Health HPA's Rapid Review Panel recently noted that the sporicidal nature of the firm's technology might be of use in relation to *C.difficile* infection.

C.difficile produces hardy spores that are resistant to normal methods of cleaning and can persist on hands, clothes, bedding and furniture, transmitting the infection to new patients. Alcohol gels used by medical staff to clean their hands between patients, in an attempt to combat MRSA, are ineffective against the spores of C.difficile.

The recent emergence of a more virulent strain of *C.difficile* in Canada has already infiltrated the USA, and Bioquell was called in. This new strain has caused a particular threat to hospitals because of its virulence and toxicity. Press reports in the UK confirmed that an outbreak of this worrying strain has infected around 300 patients in an Oxfordshire hospital, in the last 18 months. Currently, this is the only hospital in Britain where large numbers of cases of the new strain have been recorded. Bioquell was called in.

Apart from the firm's bio-decontamination presence in the UK, its first deployment in Europe occurred in July 2004, when Bioquell successfully tackled two intensive care units (ICUs) in a hospital in France, using its then recently launched Room Bio-Decontamination Service.

The computer controlled device tackling SARS and MRSA in Singapore

Earlier last year, following a co-operated R&D programme, a research paper jointly written by Bioquell, King's College London and Guy's and St Thomas' Hospital, was published in the *Journal of Hospital Infection*. This research showed that conventional cleaning methods were not effective against the high level of MRSA contamination found in the hospital environment. However, the research concluded that Bioquell's RBDS bio-decontamination technology was dramatically effective against MRSA.

Bioquell (www.bioquell.com) has a direct sales force in the UK and sales offices in France and the USA. The firm is in discussion about licensing the RBDS internationally - and it also sells and manufactures *Clarus* bio-decontamination equipment.

SEPSIS

PCR-based sepsis detection test

The culprits: Aspergillus fumigatus, Pseudomonas aeruginosa, Streptococcus pneumoniae

The first clinical trials of a new quick test to detect pathogens that cause sepsis are being conducted in Frankfurt, Bonn, Bergamo, Amsterdam and Copenhagen.

Based on Polymerase Chain Reaction (PCR) technology, the test identifies fungal and bacterial pathogens responsible for about 90% of all cases of sepsis, and takes about 41/2 hours to run (current methods can take up to 3-5 days). Unlike conventional tests that work with microbiological cultures and identify one pathogen at a time, the new test is said to detect several pathogens at once from a single, whole blood sample.

The manufacturer, Roche, reports that a technically outstanding feature is the MGRADE quality of the reagents used, which are '... practically free of microbial genetic material that would impair the quality of the results obtained', adding that the test 'opens up new horizons in sepsis diagnosis'.

The firm predicts the test will be ready for the market from the start of 2006.

Cleaner conversations

France - Preserphone Contact creates an effective barrier against germs lingering in the telephones. The device has a holder to receive a menthol-scented tablet that has been soaked in a broad-spectrum bactericidal and virucidal solution (the maker reports that one of the components is, in vitro, sufficient assurance against the HIV/AIDS virus. This solution is said to work in five minutes, and 'because the compounds act by absorption, it is fully effective even when the tablet is dry. After two months, it can be discarded.

Suitable for all kinds of handsets, the device is easily installed or removed by pressing with thumb and index finger. Preserphone Contact comes in a blister pack containing holder box, case and tablet wrapped in protective film. Once placed in the case after use, it fits in a pocket or handbag, and the device is distributed via the same channels as phone cards and prepaid mobile phone cards.

Effectiveness of antiseptics: Preserphone Contact complies with French standard AFNOR 72151, and with the French Ministry of Health: Dermatological innocuity registration.

Mail: preserphone@wanadoo.fr

SPECT-CT versus PET-CT

When it was suggested, during our interview with **Dr Torsten Kuwert**, Director and Professor of Clinical Nuclear Medicine, Clinic of Nuclear Medicine, at Friedrich-Alexander University Hospital, Erlangen, that SPECT-CT is the little sister of PET-CT, and that he might have preferred to install the 'big brother', Dr Kuwert pointed out the greater cost of PET, explaining: 'The isotopes are more expensive than substances generally used for SPECT - at least in Europe. For example, the substance injected for a PET scan of the glucose metabolism costs from 300 to 500 euros. The substance used for bone scintigraphy is between 10 and 30 euros. Correspondingly, SPECT is a workhorse for nuclear medicine departments. For example, in Erlangen we perform 10 times more SPECT than PET examinations. At the university hospital we have a stand-alone PET and we want a PET-CT. But it is difficult to raise the funds. However, I'm sure we'll have such a camera in the near future, because we our clinic will soon have a new building and the budget includes equipment.

'For basic research, PET is the more flexible tool, because innovative tracers are more easily synthesised for PET than for SPECT. In addition, the spatial resolution of PET is better than that of SPECT - far better. This is due to the physical nature of nuclear decay of positrons. Scatter radiation can be calculated better and is less compared with SPECT. This is what happens: During the annihilation of the positron, two gamma rays are emitted that move at a 180° degree angle from each other, whilst with SPECT only one gamma ray is emitted. Consequently, in SPECT the scatter radiation is more difficult to reduce than in PET. This is just one difference. In general, one can say that the spatial resolution of SPECT is not as good as that of PET. But it is also true that PET requires more expensive substances than SPECT. That means, in the end, SPECT is, as I said, the workhorse. Maybe in ten years time that won't be the case, but today there are far less PET than SPECT scans.

Hybrid systems combine CT with SPECT or PET. The cameras' CT component also differs, particularly in the number of CT detectors. How many slices should such a hybrid system have?

'I think every user would answer that question individually, in terms of the particular needs of his or her department. A general answer cannot be given. In cardiology, for example, you need a 16 or 64 slice CT for coronary imaging; in oncology the lowest standard would be a two-slice, but probably a six-slice would be better. If you use the CT component just for attenuation correction and rough localisation of SPECT-positive lesions, a one-slice could be sufficient.'

By what criteria do you decide whether a patient should undergo a SPECT- or PET-CT scan?

'There is no general answer, because, to a great extent, this depends on the indication. We can perform a SPECT following any nuclear medicine exam, but there are special PET indications in oncology. For example, with PET you can perform lymph node staging of a bronchogenic carcinoma, which you can't do with SPECT. That's a classic example, since SPECT cannot process the radioactively marked glucose solution used as a radiopharmaceutical. Nuclear medicine means that a radiopharmacological substance is injected, and there are many of these substances for a wide range of purposes. The choice depends on the individual patient and his condition and the situation, and then which imaging procedure is selected.'

Is that an empirically validated selection?

'Yes. A further reason is that radiopharmaceuticals are specifically developed just like any other pharmaceutical. This means that the initial discussion is about which metabolic process would be interesting to image, then radiopharmaceuticals are developed that can "infiltrate" that process. Currently, for research into psychiatric illnesses, in co-operation with Professor Gmeiner from the Institute of Pharmaceutical Chemistry at our university, we are trying to visualise certain sub-types of the dopamine receptor, and we are trying to develop substances that dock on to these receptors - the so-called radioligands.

'The problem with psychiatric diseases is that, in most cases, there are no animal models. There is no such thing as a schizophrenic mouse. Therefore, we need to examine the brain of a schizophrenic patient. To do this we need, above all, imaging technologies that can visualise metabolic processes, and that means nuclear medical imaging: PET or SPECT. The diagnostic value of such scans depends on the radiopharmaceuticals used. The brain has many interesting metabolic aspects: receptors, transmitter metabolism, etc. The researchers' task is to provide substances with which the metabolic steps in question can be visualised in a living patient. Hyperactivity disorder is a good example. We know that it is probably caused by a lack of dopamine and that it can be treated - at least sometimes - with dopaminergic medication. But we don't know what exactly happens. We don't know much about the receptor systems that are relevant in this context. Their function in the human brain as a whole is only marginally known, because it is difficult to research. It has to be done on the living person, it can't be done only with a brain slice.

What is the Working Group on Correlative Imaging?

'In general, correlating means that one tries to establish a relationship between different data. So, correlative imaging means that one tries to establish a relationship between different imaging data. In the case of the brain, PET and SPECT are usually combined with MRI but, on the other hand, this is usually done retrospectively - retrospective fusion - because presently hybrid cameras combining those modalities are not available.

Why can't the SPECT problem be solved with fusion?

That's a very good question, and one we've been thinking about a lot. We initiated a research project with Professor Hornegger at the Technical Faculty, which aims at developing intelligent fusion algorithms. The problem is that we have to deal with the different positions of a patient in the different camera systems. This is done by non-rigid transformations, but calculating them correctly is a major problem. For us, the Working Group on Correlative Imaging does not mean that we have a piece of equipment that we install and that that's, but that we look at all existing research approaches. This is comparative imaging with the objective to match - to generate an image of a patient that has three-dimensional features that are matched with each other. Let's say you have a certain region of the brain and you ask: *What exactly does it look like? How does metabolic process X function in that region? Or metabolic process Y?* and *How can we match X and Y 100%?* That is the objective of correlative imaging. There are many different approaches. Unlike ten years ago, we can now at least use the data of all modalities on one computer - thanks to DICOM. We can superimpose these data - but then we realise that unfortunately the patient was positioned differently in scan A and scan B. Then we have a problem. It still yields interesting results, no doubt, but that's not the exact match that we had envisaged. The matching procedure could be done with a hybrid camera or with a good non-linear transformation, but that doesn't exist yet.'

What is SPECT's molecular task?

'SPECT is a form of molecular imaging. Today, molecular imaging is a buzzword. As soon as you visualise a metabolic process in a living human being, that's molecular imaging. The term has recently been a little overused in marketing efforts for the PET-CT. Molecular imaging is the old principle of nuclear medicine, initially developed by a Jewish-Hungarian scientist called von Hevesy, who received the Nobel Prize in 1943 for his discovery that metabolic processes can be studied with radioactive substances. So that's not particularly new.'

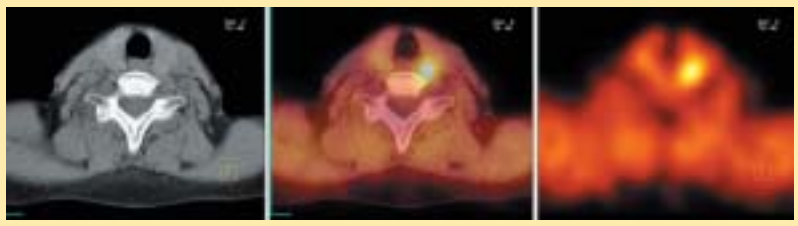
In what situations would PET-MRI would be useful?

'There are issues for which MRI and not CT is used clinically, let's say the differentiation of liver tumours. If you combined that with a PET scan, differentiation of liver tumours might be easier. For such things, PET-MRI would indeed be useful. Basically, MRI is intensively used for brain examinations. However, I should add that, due to the fact that the brain does not change much between the different scans, a rigid retrospective image fusion will do. The brain undergoes no major changes in position and form, no matter how the patient is positioned. But if there were hybrids it would be more interesting to look at regions outside the brain. It seems that there are still hardware problems because PET detectors and magnetic fields don't like each other. But I am sure it will happen one day. And let's hope we are the ones to have that machine!

At work - the new TruePoint SPECT system

SIEMENS MEDICAL SYSTEMS

Torsten Kuwert MD



Multi-slice CT showing anatomical details (left image) combined with the functional sensitivity of SPECT (right). The SPECT-CT image (centre) produced by Symbia, shows a transverse section of the parathyroid with a bright spot: a benign tumour

Europe's first SPECT-CT installed

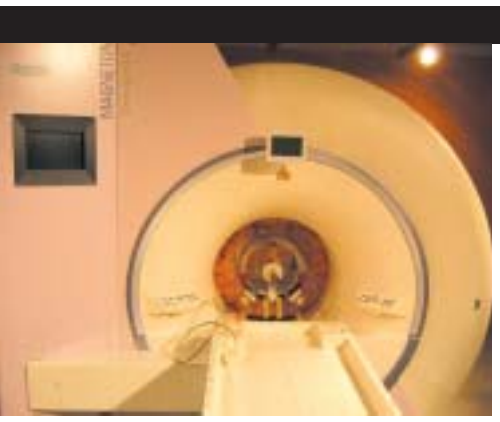
Symbia TruePoint SPECT-CT, the first European system that combines single photon emission computed tomography and diagnostic computed tomography, has been installed at the Nuclear Medicine Clinic and Radiological Institute, Friedrich-Alexander University Hospital, Erlangen, Germany. To date, the hospital is one of only two, worldwide, to clinically implement this new Siemens Medical Solutions technology. *Report: Frank Hoffmeier*

The Symbia TruePoint SPECT-CT

During the opening ceremony to launch *Symbia TruePoint SPECT-CT* at Erlangen, Siemens Board Member Professor Erich Reinhard pointed out that the hybrid functions offered by combining several technologies - particularly CT and SPECT - play a crucial role in speeding up diagnoses - particularly in oncology.

Symbia combines the functional sensitivity of SPECT with the detailed anatomical information provided by diagnostic multislice CT. SPECT, the nuclear medicine imaging procedure, enables organ function, cell metabolism, and other functional parameters in the human body to be displayed. Metabolic processes are displayed using different radioactive substances, administered to a patient in extremely small doses. As a result, pathological changes can be detected at the molecular level, before changes in the anatomical structure at the submillimetre level are visible with CT. However, due to the high specificity of the radioactive test substances used, detailed anatomical data that is also required is limited, and precise localisation of the diagnostic findings is often difficult. Nuclear medicine examinations are function-oriented, as opposed to structure-oriented procedures, such as CT. Combining nuclear medicine technology with a multislice CT unites advantages in both procedures and significantly increases the diagnostic precision of SPECT. After an examination, the CT slice images are superimposed on the SPECT images, enabling the physician to detect the location of diseases in the body with submillimetre precision.

At Erlangen, physicians will use this technology to diagnose tumours and cardiac diseases; e.g. SPECT-CT will help detect additional metastases in patients with thyroid cancer. If the tumour has spread, CT images generated with the hybrid system could help localise the metastases in the body and, depending on results, determine whether treatment should continue. The combination of a skeleton scintigram and CT enhances the diagnostic precision of bone metastases. Consequently, the patient benefits from a shorter period of uncertainty until a final diagnosis is made. After a heart attack, the system enables fast and precise determination of the location and degree of damage to cardiac muscle due to insufficient blood supply.



An experimental combination of PET and MR

Defying physics

MRI-PET COULD ARRIVE IN 3-4 YEARS

Dr Robert Krieg, Director of MR Molecular Imaging at Siemens Medical Solutions, described, in an interview with **Daniela Zimmermann** of European Hospital, the limitations of physics and the potential clinical benefits of hybrid technology - and a hitherto hush-hush MRI-PET project

So far, it has been impossible to combine PET and MRI because current PET systems are based on photo multipliers that are incompatible with the magnet. 'Our approach is to replace the photo multiplier with semiconductor detectors - a bit like a CCD chip in a digital camera,' Dr Krieg explained. We want to use a semiconductor detector that is magnet-compatible. This new MRI-PET will only work if we really succeed in applying semiconductor technology to PET. So, in that sense, it's a re-invention of PET. It means we are facing two technological challenges. So far, we have been able to establish the proof of principle - we can prove it works.'

What is a proof of principle?

'An experiment that proves that a certain method works in principle; based on that proof, a company usually decides whether to proceed with a certain idea and turn it into a real project, or ditch it. Once the proof of principle is established the actual work starts: *How can we turn the idea into a functioning system that meets all requirements?* This is no longer lab talk, it's the real world. Realistically, MRI-PET could take three to four years to develop. First we need to tackle several problems: Semiconductors are tailor-made in only a small batch. The production process for these is quite different from that of regular photodiodes. Currently there is only one company, worldwide, that comes close to mastering that process: Hamamatsu. And we have no idea yet how stable the process is.

'Then there is the issue of temperature stability. We put real stress on our gradient coil. If the temperature fluctuations resulting from that high-performance use influence the PET detector the image quality will suffer. We have to solve that problem. In addition to technical questions, we also try to look at this entire issue from a holistic viewpoint. In other words we also ask what clinical benefits the MRI-PET will have and we collect cases that show findings that a PET-CT would not detect. For example, we detected a breast carcinoma in a 73-year old woman, which a CT could not have detected with such clarity. One objective of our clinical co-operation is finding cases that prove that indeed there is an added clinical value and that there are patient groups who would profit from MRI-PET. We must also ask ourselves whether this additional market not only exists but whether it is big enough to warrant the expense.'

Those are the first steps, and then...?

'Then we will reach the really innovative part. We still have a long way to go and many colleagues will put their shoulder to the wheel. We will celebrate progress and suffer setbacks until we finally have a product.

Now that the veil has been lifted on this project, aren't you afraid that competitors will jump on the bandwagon?

'We have a head start in terms of knowledge. It will be difficult for the others to catch up. Look at the synergies: Typically engineers who deal with PET haven't a clue about MRI. In this we are quite a bit ahead, because we have all the experts sitting around one table: colleagues who have worked on semiconductor detectors for years, as well as excellent MRI physicists. Getting these experts together - that's the real work of art. The results so far are definitely exhilarating and this motivates the team - and enthusiasm creates wings. Once you have wings, you fly.'

The MRI team won a Best Innovator Award. **Dr Robert Krieg** *(above left, receiving the award)* is Director of MR Molecular Imaging at Siemens Medical Solutions, and represents a group within the MRI business division that focuses on molecular imaging. Such groups also exist within the Nuclear Medicine business divisions (renamed 'Molecular Imaging' (MI) last June) and Ultrasound. In addition, a business division also covers molecular imaging issues that do not fit in currently existing modalities. The groups co-operate as an intermodality team with the Molecular Imaging business division, particularly on MRI-PET, animal imaging and the development of contrast agents.

The advent of personalised therapies

12 distinguished researchers and industry representatives presented the latest molecular medicine research at the Molecular Medicine – from Diagnostics to Therapy symposium – one in a series of annual diagnostics seminars organised by the Forum Medicine Technology & Pharmaceutics e.V. The event, held in June, was hosted by Siemens AG (Erlangen, Germany) and opened by Professor Erich R Reinhardt of Siemens and Dr Thomas Feigl, Forum's Managing Director

Dr C Petry, Bayer HealthCare, Prof E Reinhardt, Siemens and Prof G Schmitz, University Hospital Regensburg

Speaking of communication networks and the potential for customised treatment for individual patients, **Professor Gerd Schmitz** (University Hospital Regensburg) foresaw that fast, efficient, individualised treatment for each patient will be enhanced by the networking of hospitals, doctors, pharmacies and other players in the health service facilitates, as well as the arrival of the *Electronic Health Card* *, which stores health-relevant data and prescriptions. The card has already been introduced in several European countries, and is due for introduction in Germany. As the data on the health card has to be networked with bio-banks, this provides opportunities for a comprehensive transfer of knowledge, Prof. Schmitz said. Molecular medicine in particular can profit from that knowledge transfer, because it depends on comprehensive clinical data that can be made accessible for doctors through new technologies available, he pointed out. In the future, it will be possible to compare individual health-related data with comprehensive data parcels gathered from population genetic studies, which should significantly improve our understanding of individual disease patterns. In the future, doctors will be able to use E-Health-Portals as case-related training media, Prof. Schmitz prophesied.

Introducing the subject *Molecular imaging – disease-specific imaging*, **Professor Wolfhard Semmler** (German Cancer Research Centre, Heidelberg) emphasised that new imaging procedures will visualise abnormalities on a partly molecular level at an early stage, before morphological or other secondary changes occur. This is of particular importance for those diseases where the chance of a cure depends very much on an early diagnosis (e.g. cancer). Disease-specific markers, or surrogate markers, are used for this purpose.

Describing the early location and evaluation of malignant diseases **Dr Sabine Martina Eschmann** (University Hospital Tubingen) used images and explanations to introduce features of the new PET/CT. This combination of a PET-scanner and computed tomograph (CT) – mostly a multi-slice CT – is termed hardware-fusion. This combined imaging enables detailed study of the anatomy and function of tumours. PET/CT works faster and is more reliable than existing procedures, avoids doubling up on examinations and reduces ambiguous results, which can occur with the isolated procedures currently in use, she explained, adding that its potential areas of use are manifold, for example staging, i.e. the grading of a tumour by size, etc.

Dr Claus Tempelmann (OvG University, Magdeburg) introduced the first European 7 Tesla Magnetic Resonance Tomograph. Apart from being affected by the high levels of noise caused by the 7 Tesla-Magnetic Resonance Tomograph, some people developed dizziness and a metallic taste in their mouths. However, these adverse effects can be limited by using headphones and sound absorbing measures, as well as by guiding patients into the scanner very slowly. The scanner facilitates high resolution, structural measurements with spatial solution of less than half a millimetre, which allows, for example, the visualisation of Alzheimer's plaques in the brain.

Speaking of the connection between personalised medicine and molecular diagnostics, **Dr Christoph Petry** (Bayer HealthCare LLC, Leverkusen) pointed out that molecular diagnostic analysis is of particular importance in breast cancer treatment – to improve and individualise the choice of available therapies. The choice of predictive tests to determine the likelihood of relapses is a key area, because data that become available through these procedures can be used to develop effective therapies. Bayer Healthcare Diagnostics is working on an array technology that facilitates direct detection of DNA and RNA without the need for prior amplification, he said, which means that diagnostic tests can be carried out effectively and made parallel within the context of personalised medicine. Using micro arrays, researchers will be able to screen a sample onto thousands of genes at the same time. Patients' genetic dispositions can be automated and standardised with the help of arrays, which could contribute to individualised therapy.

Further opportunities presented by microarray technology were presented by **Dr Mathias Prucha** (Affymetrix GmbH, Langenau), who explained that molecular causes of diseases such as diabetes, or arteriosclerosis, could be quickly and precisely identified due to enormous progress in resequencing on arrays.

Dr Gerald Schock (QIAGEN GmbH, Hilden) said that the problems with carrying out amplifications, caused by insufficient amounts of DNA, would soon be overcome. Introducing a new procedure, called *Whole Genome Amplification* (WGA), he said that this kind of amplification of genetic material offers consistent duplication with low error rates, which enables the immediate use of DNA in gene tests, without first having to determine and adapt the amount of DNA to be used.

Dr Thomas Rygus (Applied Biosystems Europe, Darmstadt) discussed Integrated Gene Expression Analysis – the use of DNA micro arrays and new alternatives in data interpretation. Lab-on-a-chip technology represents a significant advance for molecular diagnostics. The new technology, introduced by **Dr Walter Gumbrecht** (Siemens AG, Erlangen), a winner of the *German Future Award 2004*, carries out human DNA examinations, yet the lab system is contained only in plates the size of credit cards. A drop of blood or other body fluid can be duplicated and analysed through amplification.

Professor Ivar Roots (Institute for Clinical Pharmacology, Charité, Berlin, highlighted the influence of genetic predispositions on drug effects – the basic principle of pharmacogenetics, a key to individually customising drug dosage and frequency for patients. Professor Roots is focusing on this using his CENiMED spin-off.

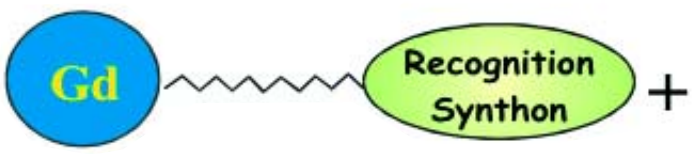
Dr Andreas Görtz (Roche Diagnostics GmbH, Mannheim) introduced the firm's new AmpliChip 450 test, a significant step, he said, on the way to personalising medicine. The chip helps to quickly determine a patient's metabolism and ascertain how that body might tolerate drugs.

Representing Professor Bernhard Wolf (Technical University, Munich) **Dr Martin Brischwein,** spoke of possibilities for bioelectric chips for diagnosis and high-throughput-screening – a project that could one day be used for tumour cell cultivation, to examine their sensitivity to different therapies, parallel with actual treatment, to study drug effects.

** The electronic health card will be discussed during a symposium in Nuremberg (7/7/05), also organised by Forum Medicine Technology & Pharmaceutics e.V.*

The diagnostics of tomorrow

Bracco, the international diagnostic imaging and pharmaceutical company, has described molecular medicine as 'arriving as a blizzard of new genes and their proteins'. Fulvio Uggeri, Director of the Bracco Imaging Research Centre, Milan, outlines ways in which the company is tackling the challenges presented by this far-reaching medical development



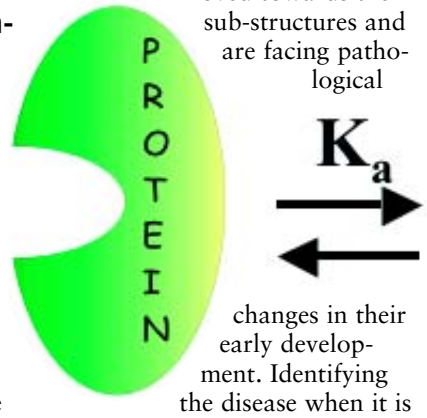
An example of molecular imaging applied to contrast agents

The needs of medicine are growing and diagnostics has always been the eye onto pathologies. Understanding in good time what will be required of us in the medium to long term, is therefore crucial for planning research and development activities in a company such as Bracco.

The consolidated chemistry of recent years, targeted at contrast agents for X-rays, is gradually giving way to a different kind of chemistry that is more in keeping with the emerging means of diagnosis. Iodine chemistry is substituting that of complex metals, of peptides, and is approaching the boundaries of biochemistry and the chemistry of formulations. Tools that are increasingly effective in the fight against disease and improving the quality of life are being perfected thanks to the parallel growth in molecular imaging and molecular medicine.

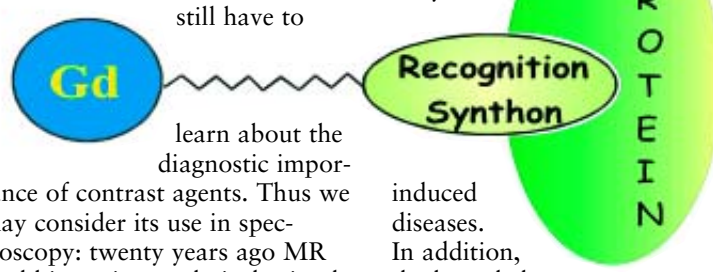
But what exactly do we mean when we talk about molecular imaging? In short, it is the visualisation *in vivo* of biological processes at a cellular and molecular level, i.e. an investigation into the infinitesimally small.

Diagnostic imaging originated as a collection of means to view the organism and the morphological changes associated with disease. From aspects relating to form, the ability to investigate has gradually expanded to functional elements and it is in this aspect that imaging today shows its greatest potential. However, until recently it was necessary to limit the investigation to complex structures, such as the heart, liver and lungs. With cellular and molecular imaging we have moved towards the sub-structures and are facing pathological changes in their early development. Identifying the disease when it is still in its initial stage, i.e. when it can be handled more effectively, is one of the new frontiers of medicine. Prevention is the key to defeating numerous diseases.



Up to now the most important examples of molecular diagnostics have been seen in nuclear imaging. An example is PET using **fdg 18**, i.e. a glucose molecule containing radioactive fluorine, which enables observations of the differing metabolism between sick and healthy cells. Today research aims at identifying new vectors (molecules than can reach sick cells) that can be linked to efficient *probes* (signal emitters), and at the same time developing increasingly less invasive techniques.

In the medium and long term we may reasonably expect significant developments also from other methods, especially from magnetic resonance (MR), a technique that has a lot of potential both because of the likely development of the machines, and because of what we still have to learn about the diagnostic importance of contrast agents. Thus we may consider its use in spectroscopy: twenty years ago MR could investigate relatively simple structures while today, thanks to the continuous improvement of the machines and the associated technologies, complex structures, such as those of proteins, are being investigated.



X-ray and scanning techniques, while offering important advantages, do not seem able to reach down to the cellular and molecular level. Interesting developments are, however, expected from optical imaging, which has shown itself suitable for the study of surface tissues. Other important innovations will probably arise (but not in the short term) from the use of nanotechnology in researching contrast agents.

Imaging, therefore, is evolving: distinctions compared to therapeutic practice are increasingly narrower, as shown by the use of diagnostics in the follow-up to pharmacological procedures and in assessing the impact of drugs on deliberately induced diseases. In addition, the knowledge acquired in making contrast agents is proving promising in transporting drugs to targeted parts of the body, so-called drug delivery.

Companies that are active in the diagnostics field, and which must face large scale investments and wait years for them to bear fruit, are therefore being asked to make very risky decisions, which are also exposed to the unknown factors of the simultaneous development of the machines and equipment. Technologies applied to the construction and development of images can in fact create new situations and lead to requirements over time that are not foreseeable today.

Three hospitals to be linked by impax EE

MKO system could inspire others to follow

Klaus Hölscher, CEO of the Catholic Hospitals Management Company

Germany - A €1.3 million contract for a digital radiology information system was signed in June by the **Catholic Hospitals Management Company** in the Osnabrück Region (MKO) and GWI AG, the Bonn based international healthcare technology company.

GWI reports that the introduction of the *Impax EE* image reporting, communications and archiving system will be the largest Picture Archiving and Communication System (PACS) project of this kind in North Germany and could well be a model for other hospitals to follow. 'I never dreamed that we'd take such leap forward,' said Klaus Wystub of MKO's Informatics Division. By selecting Impax EE, MKO is opting for integrative, process-controlled expansion of the *Orbis* hospital information system.

Three MKO clinics - the Marienhospital (Osnabrück), the Franziskus Hospital (Harderberg) and the St Raphael Hospital (Ostercappeln) - already have roughly 1,000 computer workstations equipped with GWI AG's ORBIS hospital information system. Following integration of the new, centralized PACS Impax EE, all X-ray images in the three hospitals will be stored locally as well as centrally via a highly sophisticated archiving concept. MKO's CEO Klaus Hölscher pointed out: 'Large-scale networking is a major boon for patient care as well as for our personnel. The versatile, high-speed data interchange is highly useful in connection with integrated care, i.e. when different healthcare units collaborate, such as hospitals and physicians in private practice.'

The potential for seamless integration and extensive functionality of Impax were the pivotal decision-making criteria, explained Winfried Post, Head of the Diagnostic Systems Division at GWI AG, adding that the system provides a significant increase in process transparency for physicians, nursing staff and patients alike. 'The radiology unit can hardly wait for the new system to go into service. I'm delighted that we have reached this advanced stage,' said Dr Rainer Herrmann, Head Physician at the Franziskus Hospital in Harderberg.

GWI AG reports that its Orbis software is the market leader in the German-speaking countries: GWI operates local firms in Germany, Austria, France and Switzerland and is owned by Agfa Gevaert N.V., based in Mortsel, Belgium.
Details: www.gwi-ag.com

NEW Non-invasive, handheld ultrasound device for urologists

The Diagnostic Ultrasound Corporation, which specialises in the development of portable, application-specific ultrasound devices, has introduced the world's first 2-in-1 handheld scanner for urological diagnosis. Gerald McMorrow, the company's CEO, said: 'BladderScan BVM 6500 allows urologists to measure both Ultrasound-estimated bladder weight (UEBW) and bladder volume rapidly and non-invasively, during an office visit.' The hand-held device also helps in the diagnosis of bladder outlet obstruction (BOO). Recent clinical studies indicate that bladder wall thickness and related bladder wall mass may correlate with BOO. The device provides a non-invasive means of assessing bladder wall mass via portable, handheld ultrasound. BOO is reported to be one of the most common urologic problems among elderly male patients. To date, achieving a precise diagnosis of BOO has required invasive and time-consuming urodynamic testing.

The BladderScan BVM 6500 uses patented V-MODE 3-D ultrasound technology.

Users can view, save, and print examination results and ultrasound images on ScanPoint, Diagnostic Ultrasound's innovative imaging service.
Details: www.dxu.com.

Photographed with the cooperation of Edward Hospital, Naperville, Illinois.

SR TECHNOLOGY

By Cynthia E Keen, consultant for imaging IT and PACS/IT communications

This is no longer a world for the status quo in radiology reporting. Radiology PACS is stimulating the demand for rapid diagnosis and report turnaround. Delays that were grudgingly accepted with film-based departments are not tolerable in a high-tech medical IT environment.

Speech recognition technology offers the means to accelerate the radiology reporting process. SR technology is still evolving. It is still controversial. To be most effectively utilised, it places demands on radiologists that may not be economically feasible, or culturally acceptable. Radiologists do not want to be 'transcriptionists'. The early zeal of technology evangelists to implement a product that could radically reduce radiology report turnaround time, and significantly reduce overall reporting costs, failed to fully understand the impact on radiologists of self-correcting the reports they dictated.

Yet SR is an economic necessity for hospitals. Over the past five years, SR systems have improved, with steadily enhanced workflow adaptability and performance intelligence. They also have become 'politically correct'. Today's workflow design flexibility offers the option of SR designed as a digital dictation system. Transcriptionist/correctionists (working anywhere), empowered with SR and its efficiency tools, can edit and proof reports in a fraction of the time compared with traditional dictation. Radiologists now have the choice of transcriptionist review or self-editing.

Linguistic interpretation of regional accents within languages and unique speech patterns has also significantly improved. Nonsensical words (ah, um) are ignored. SR systems learn automatically from corrected mistakes. They grow smarter and more accurate with steady use. User profiles containing word association vocabularies unique to specialists (e.g. neuroradiologists) further enhance accuracy of specific medical terminology. With RIS and PACS integration, and use of reporting templates, patient and exam-related information transfer can be automated, saving time and minimising error. With a well-designed library of normal reports and macros, radiologists can expedite and reduce the time and tedium of reporting normal results - possibly 25% or more of their average workload.

The utilisation of speech recognition technology for radiology reporting is just beginning to be tapped. Properly implemented, SR has the potential right now to benefit radiologists, referring physicians and medical staff, hospitals and patients themselves.

Contact for comments: itcommckeen@earthlink.net

Fast forward for clinical reporting

Digital dictation devices are demonstrating their worth by speeding up medical reporting. They can read a patient's data, automatically assign information to the relevant report as well as interpret human speech into a text version. *Armin Scheuer reports*

José Luis Díaz

When Philips Dictation Systems launched the first analogue dictation device in 1954, doctors soon made it standard practice to dictate reports then despatch cassettes to typists. Today about 50% of European medical professionals work in this way. However, cassettes are now outmoded. Digital dictation has eliminated cassette despatch, and potential loss or damage of the contents. Directed to a PC, or saved on an SD memory card, each digital dictation becomes immediately available in audio file format, for typists to transcribe. In addition, because the newer digital devices have clearer sound quality than analogue devices, errors and corrections are significantly reduced.

Dictating directly into the PC

Digital dictation devices offer a number of user benefits. For example, the Philips SpeechMike, is a microphone, barcode scanner, speaker and mouse in one. Connected directly to a computer via USB interface, the doctor can record and play back dictations, navigate through PC applications and read in-patient data electronically.

The combination of dictation device and barcode scanner has become extremely popular, given the importance of assigning the correct medical report to the correct patient with 100% accuracy. Previously, doctors had to carefully dictate the patient number, name, sex, age, address etc; using a barcode scanner, this data can be read in from the patient record automatically - a huge time saving for the doctor and typists, plus minimisation of the risk of incorrect data assignment.

On the move

The Digital·Pocket·Memo·9450·VC understands voice commands, which is highly practical for patient visits, when a doctor could record several short dictations. Prior or at any point of a dictation, he simply says the patient number or type of document and the device can automatically append the correct patient number to the recorded file. Back at his desk, the doctor then transfers the files to his computer or sends them to his secretary over the network or via email. Demographic data, such as a patient's name, age, sex, or information such as the type of report, are already in the document. Benefits are twofold: the doctor can assign dictations quickly and easily to send for transcription, while the secretary does not need to add key data manually.

Accelerating report turn-around

Digital speech processing has opened a new range of workflow options. For example, if dictation volumes peak, dictations can be sent to a temporary typist, via a secure internet connection, and the finished document returned in the same way. Integrated network solutions such as these offer major benefits to typists. They allocate pending dictations according to available employees and current workload, and the software even automatically assigns difficult files to typists with relevant experience.

To eliminate manual transcription and to offer physicians the option to finalize their reports right away, speech recognition technology has established itself as a convenient tool.

In the United Kingdom Philips SpeechMagic won the *E-Health Innovation Awards*, in the category '*Best use of e-health to improve efficiency*'.

Similarly, the system was chosen in Spain as one of the best technology ideas of 2004 by the economics magazine *Actualidad Económica*. Reína Sofia University Hospital, in Cordoba, one of the first to adopt speech recognition in Spain, began using SpeechMagic in its radiology department a year ago. The benefits - plus a successful pilot project with the MultiMed ConText (specialised recognition vocabulary covering over 90% of all medical disciplines), formed the basis for the expansion of speech recognition beyond radiology.

According to the hospital's general director, José Luis Díaz, SpeechMagic has proven its positive effects, such as an increase in efficiency and flexibility. In addition, he said: 'The software provides features specifically tailored for the creation of medical reports, which stands in contrast to other systems we've tried before.'

SpeechMagic largely automates processes and its high recognition accuracy improves the quality of reports and minimizes the risk of errors. Mr Díaz said the resulting improved workflow, with immediate availability of medical reports, has saved time and improved patient service because treatment can be started immediately after the examination.

The hospital has currently expanded the system to various specialities including internal medicine, endocrinology, digestive surgery and rehabilitation. Other areas will follow shortly, until all 300 physicians are equipped with speech recognition.

Philips reports that over 25% of Spain's radiologists are already working with SpeechMagic, making it the country's market-leading medical speech recognition software. Globally the firm's share of the dictation market is also 25%.

Help is at hand for hands free recording

Digital dictation devices are demonstrating their worth by speeding up medical reporting. They can read a patient's data, automatically assign information to the relevant report as well as interpret human speech into a text version.

Would-be users of new electronic devices are often concerned about the time it will take to figure out all the functions they offer. The Olympus DS-4000 digital voice recorder, with full metal body and slide-switch control (running on rubber rollers to reduce click noise), has an LCD menu available in English, French and German and, says Christopher Seyffert, of Voice Processing Products, Olympus Europa, the firm's authorised dealers can help new users to programme the device to suit their specific needs.

The recorder contains new DSS Player Pro software for archiving, editing and later processing of recordings and documents. Additional comments can be inserted into existing files, folders are individually named, and IDs and work type settings are also an option.

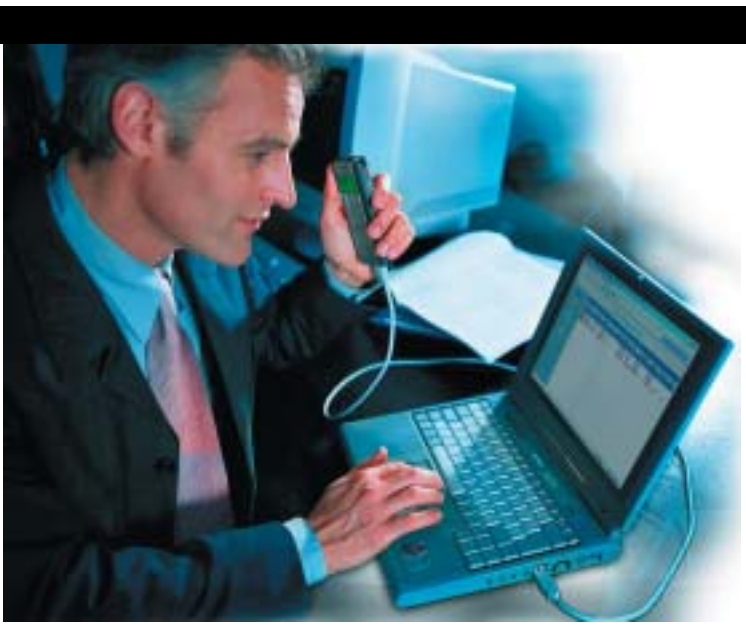
The Olympus AS-4000 Transcription Kit, with footswitch and headset, contains a software module to convert spoken words to text. This also includes file and document management, auto receipt and redirection of e-mails into corresponding in-trays via FTP, POP3, SMTP or network, and an encryption function.

Compatible with USB Audio Class, USB AutoConnect, USB HID Classes, the USB docking station enables fast transfer of files to a Mac or PC. The docking station also acts as an interface between the voice recorder and optional RS-26 footswitch, for hands free dictation.

Data is saved on removable xD-Picture Card. High quality (SP) or memory-saving (LP) modes can be selected, so over five hours of talk can be recorded in SP mode and over 11 hours in LP mode on the 32MB card. Talk time can be extended to over 179 hours on a 512MB card. Recordings are saved in the high compression digital speech standard (DSS) format, a small data size that makes saving to the network and emailing simple.

MEDICALLY SPEAKING...

Based on the recognition engine Dragon NaturallySpeaking, and exclusively designed for healthcare and medical professionals, the software for *voice4medicine* digital speech processing can be adapted to various working patterns and diverse needs. The manufacturer reports that the specialised vocabulary ensures productivity gains, so a return of investment can be reached in 6-12 months. 'Diagnostic reports are easily created and more quickly available, while quality increases, administration is simplified and waiting times for patients and referring doctors are reduced. Seamless integration into Hospital Information Systems (HIS), e.g. iSoft, Siemens Medical Solutions, SAP-based systems, also optimises documentation workflow in clinics.'
Details: www.4voice.de



Doctors' digital dictation direct to a PC

For over half a century Grundig has been a leading name in recording systems. Today, with over 4 million dictation systems sold, Grundig Business Systems has reported that it is the market and technology leader in professional dictating systems. Discussing the firm's constant progress with the times, Grundig said: 'While the trade name *Stenorette* is the standard for reliable analogue dictation on cassettes, the trade name Digta stands for innovation in digital dictation.'

Grundig's digital dictation systems can be easily integrated in existing IT-structures. Dictations can either be recorded with a portable dictation machine, such as the Digta 4015 or new stationary microphone DigtaProMic 840 USB. Using these, dictations can be made directly on to a PC, and they are stored in DSS-format, the international speech-recording standard, which ensures high audio quality for spoken language. DSS also allows a high compression rate, making it easy to manage audio files in the workflow system and to exchange them by e-mail. Innovative, add-on modules and software ensure easy operation; secure documentation and perfect storage, Grundig pointed out.

Intelligent speech processing systems

The new DigtaRFID 414 RFID reader (RFID = radio frequency identification device) and the DigtaScan 404 barcode reader are plug-in modules that provide 'reading in' a patient's number, for example, via transponder or barcode technology, and using this function to assign dictated patient's notes to a file, document or procedure.
Details: www.grundig-gbs.com.
Kristina.hoffmann@grundig-gbs.com.

Voice Messenger to facilitate web-based reporting

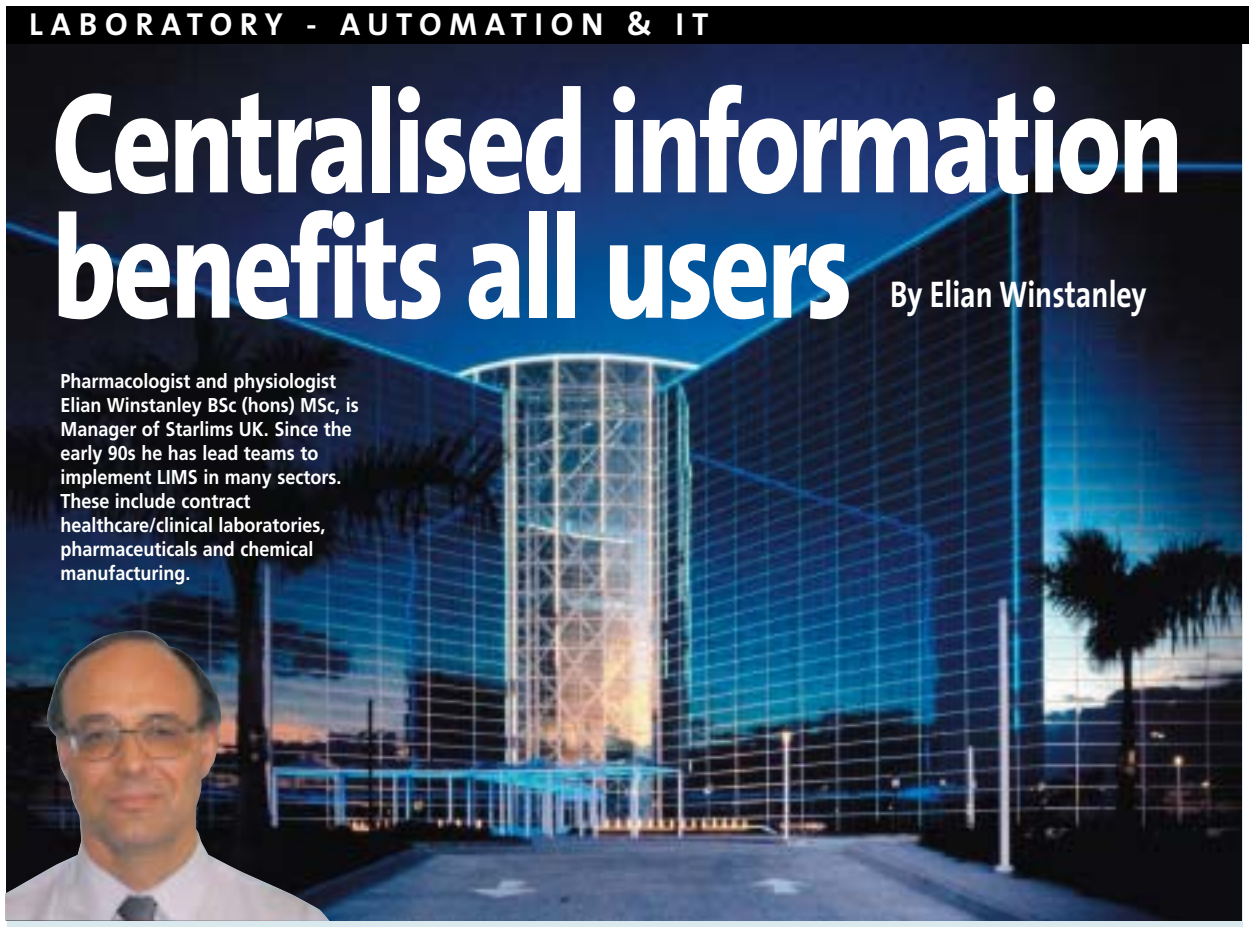
Voice Messenger, a new medical speech recognition solution made by Voice Technologies, and based on the Philips SpeechMagic engine, is the first in the UK to enable physicians to access and use their hospital's reporting system from any location over a web browser.

In collaboration with the Glasgow School of Art's Digital Design Studio, the company developed the system to be integrated with other data streams, such as radiology & hospital information systems. Using this, doctors can navigate templates, insert standard text blocks and format text by voice command, so that they can create, check and edit reports immediately, without typing, or can forward dictations to medical secretaries for transcription. Either way, the firm points out, minutes after an examination, the dictated text can be released to a ward or consultants, for example.

Based in Paisley, Voice Technologies Ltd reports that it is the leading provider of digital dictation and speech recognition solutions in Scotland, and National Health Service (NHS) Trusts are among its major clients.

Centralised information benefits all users

By Elian Winstanley



Pharmacologist and physiologist Elian Winstanley BSc (hons) MSc, is Manager of Starlims UK. Since the early 90s he has lead teams to implement LIMS in many sectors. These include contract healthcare/clinical laboratories, pharmaceuticals and chemical manufacturing.

One of the biggest challenges facing today's laboratories is that of converting the mass of data generated into useful information, then disseminating that information across the whole organisation. This leverages operational excellence by facilitating rapid and accurate decisions, driving up efficiency whilst reducing costs. Traditionally, laboratory information management systems (LIMS) have often been isolated, accessible only to laboratory personnel. New technologies have facilitated the extension of LIMS outside traditional laboratory confines, providing deployment options that allow remote access from satellite laboratories, field workers and other remote data clients. The advent of web-enabled applications has provided a paradigm shift in technology, for instance enabling the interconnection and integration of previously disparate business applications using Web Services, allowing functionality to be shared across systems. Today, LIMS can truly be considered an enterprise level business system, with the capability to be deployed globally.

Regulatory requirements for electronic record management specify the need for archiving not only traditional database information but also all related information. The modern LIMS now offers secure storage of a wide range of textual and graphical documents, such as instrument-generated reports or graphics, digital photographs, standard operating procedures, analyst certifications, material safety data sheets, electronic training materials etc. This additional information is not only simply stored and retrieved; technology exists to enable meaningful extraction of data, setting the stage for powerful querying and analysis facilities. LIMS offers laboratory document and scientific data management in one, easy to use, compliant platform.

Time and resource savings are key benefits obtained from maintaining a central point for the collection of laboratory information. Operational excellence can be leveraged by increasing efficiency, automating existing business processes and reducing operating costs. Validated methodologies, logistical and data management support, robust and flexible reporting systems, and cohesive quality control are crucial to meeting the requirements of both modern organisations and regulatory agencies.

The Starlims Corporation delivers a LIMS solution to a wide range of laboratories in both the public health and industrial sectors. The multi-lingual solution provides complete traceability, facilitates regulatory compliance and supports versatile processes and is designed for easy upgrading, effectively 'future proofing' investments in internal know-how. It is specifically designed to fully integrate the daily functions of a multidisciplinary public health laboratory and manage analytical data covering a variety of diverse healthcare programs. The system offers comprehensive public health reporting, surveillance and networking capabilities compatible with national and international standards.

IN COMMAND

With the launch of Command Central - a laboratory workstation with in-built Remisol 2000 Data Management - we asked Al Akiyama, Manager of Information Systems Product Management at Beckman Coulter Inc, whether such systems might transform the role of the lab professional into that of an IT specialist 'Not necessarily," said Al Akiyama. 'We found that work in laboratories around the world is constantly increasing but no one hires more staff. While labs need new technology to help them manage more information and workflow more effectively, it also must be simple and easy to use among staff with varying degrees of expertise.. ' The firm designed this new system for easy, efficient use by a lab technician. 'From one workstation test results can be monitored and managed - and so can all the lab instruments, without having to actually go to each instrument individually every hour.'

When a sample tests normal or acceptable, Remisol with Command Central, automatically releases the result to the laboratory information system (LIS), which forwards it to the hospital information system (HIS) for entry on the electronic patient record (EPR). 'The technician does not have to do anything about those cases,' Al Akiyama explained. 'However, if a test is critical or demonstrates that a patient needs immediate attention, the Remisol and Command Central alert the operator - the key here is that patients are being analysed and monitored. This means we are helping to improve patient care. The operator is alerted automatically to critical results, which then must be validated, to ensure that they are in fact critical, then the physician is alerted.'

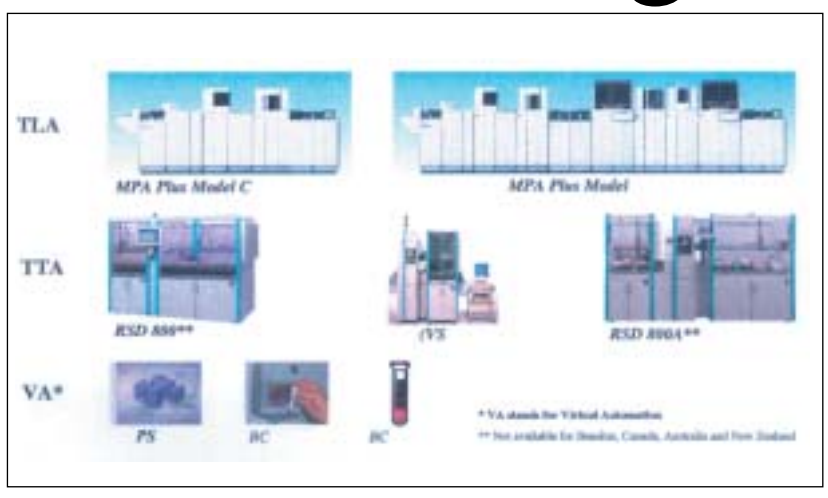
If there's a warning that an instrument has a problem, the technician simply clicks on the icon for that instrument, which gains direct access to it via the Command Central workstation. Additionally, Beckman Coulter services its own equipment. 'If there's an issue with the Command

Integration in 3 stages

By Dr Burkhard Ziebolz of Roche Diagnostics GmbH

Hospitals increasingly co-operate with other establishments, and networking is becoming a way of life. Such change is also occurring in many hospital laboratories. By co-operating with other hospital labs and laboratory institutes, hospital labs try to improve their financial situation. Some tests, due to the small numbers involved, are uneconomical to implement, and often can be provided more cost-effectively by a laboratory institute. Co-operation between several hospital laboratories can also produce significant cost savings in service provision by allowing individual hospitals to concentrate on specific analyses (e.g. tumour markers, infection serology, etc). Studies have shown that such strategies can also have a positive effect on the quality of results.

At the highest level of co-operation, all routine analyses can be focused in one location. This produces the highest economies of scale and thus the greatest financial improvement. Before such a strategy can be implemented, the legal - and particularly the organisational aspects, e.g. the medical needs of the participating doctors - need to be analysed. The organisation of such co-operation models by Roche Diagnostics is based on years of experience and several successfully implemented strategies.



Roche Diagnostics' comprehensive product range for laboratory automation

Optimisation in diagnostics requires integration at various levels, starting at the small scale: Within the hospital, the work involves tasks performed in the laboratory, co-operation between several in-house laboratories and the interaction between centralised and decentralised diagnostics. On the large scale, this process continues, with co-operation between several hospitals and the interaction between the hospital, private laboratory and doctor in private practice. Offering advice, products and support, Roche helps in the implementation of efficient laboratory processes and development of a laboratory as a service provider (CONSULAB services). In each individual case the process is implemented in close co-operation with the customer.

Stages of automation that form the backbone of this service:

1. Support for manual workflows
2. Task Targeted Automation (TTA) i.e. part automation, automation of certain operations
3. Total Lab Automation (TLA)

These stages are served via equipment platforms. On the basis of the laboratory types prevailing in the market, Roche Diagnostics developed nine concepts that aim to take those laboratory types to a higher level of efficiency. Each concept is adapted individually to the specific laboratory situation, so that almost all our clients' needs are satisfied with relatively low complexity. The automation solutions cover the whole workflow, from centrifugation, via decapping, sample sorting, aliquoting, recapping to archiving. In providing support in the form of advice and implementation, Roche can rely on a solid base of experience: All of the relevant processes have already proved effective in practice.

Digitised lab orders

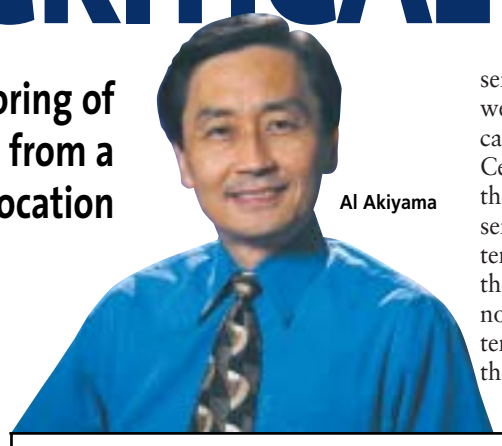
With its web-based tools for the paperless generation of laboratory orders and for test result information management MCS has been providing tools for processing laboratory information for over five years. Today more than 40 hospitals, of all sizes, use MCS solutions to communicate between departments and laboratories. These tools - accessed via the web browser - are easy to operate and thus ensure smooth data flow even when different people use one workstation. The LINUX server takes care of the entire order administration and sender-specific configuration.

Order entry - MCS-Isyauftrag, an uncluttered order screen, guides the user through the order entry process. The digital lab receipt can be tailored to each order type and sender. Additional context-specific information for individual tests can be provided. Diagnoses and comments can also be entered. Additionally, each department can define individual profiles based on the electronic list of services, i.e. the whole lab order can be generated with one mouse click.

Data can be accessed either via a pick

OF ALL CRITICAL EVENTS

Access and monitoring of multiple lab instruments from a centralised location


Al Akiyama

Central or Remisol, or any Beckman Coulter instruments attached to Command Central, the technician calls us. We then log into the Command Central and monitor all the systems in that laboratory to analyse where the problem lies. So we can help troubleshoot with them.' (Currently the firm only connects with its own-brand analysers).

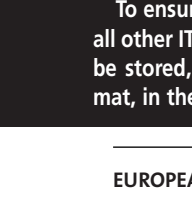
Presently, in a laboratory that has perhaps seven or eight instruments in an automation line somebody there is trying to monitor every event, he pointed out. In this scenario Command Central is a real advantage: 'Because everything that's going on the automation line can be seen and accessed from one workstation.'

The workstation does not have to be situated next to an instrument, but can be placed in a separate office - or anywhere else in the lab - and it can coordinate and monitor the functions of up to 12 instrument systems - including chemistry, immunoassay, haematology and automation platforms. Command Central automatically displays alerts for conditions such as instrument troubleshooting, calibration status, reagent status, and quality control (QC) status, as if the instruments were monitored separately.

Non-automated laboratories could also use the new system. 'Laboratories don't have to buy new instruments,' Al Akiyama pointed out. 'Our new UniCel DxI 600 and 800 Synchron chemistry systems, the DxI 800 immunoassay system, and the COULTER LH series haematology analysers as well as our automation systems can all be hooked up to Command Central. Many labs already have the LHs or our chemistry analysers, so they could start with systems they already have, and as they start the transition out of the non-Beckman analysers to our systems they can start hooking up to the Command Central.'

Command Central can be linked to monitor and access laboratories housed on different floors, but this use has not yet spread to service labs in associated hospitals. Nonetheless, if they have a linked network, that could be a future development. 'Currently, with Command Central and Remisol, one operator can manage multiple instruments in one hospital. Then the next step might be to connect their associated hospitals. It would certainly save on costs to have one lab manager responsible for analysis and control of all the instruments, on a daily basis.

'The main intention behind our information systems product line is to provide the laboratory technician with a way to push critical results to the physician. Critical information means a patient's critical results as well as critical information about an instrument with a problem. We want to make all this information available at their fingertips - constantly



By Annette Suttarp, Managing Director of FMCS Labordatensysteme GmbH & Co and MCS Board Member

list of all patients in a department, which is permanently updated by the lab IT system, or by accessing the programme directly from the clinical work station, which has been successfully realised with a number of providers of KIS.

On order completion, all necessary labels containing the desired information are printed automatically. In addition, the order can be transmitted electronically to the LIS.

Result reporting - MCS-ISYREPORT can be accessed via the existing KIS from the current patient file or can be started from the web browser. The results information system informs the sender immediately when new results are available and being printed in the lab. All results are archived in a results archive for future reference. The system includes an emergency module and a module for automatic and decentralised printing in departments.

To ensure easy communication with all other IT systems, the lab results can be stored, either in HTML or pdf format, in the database.

New routes for pathology

Disciplines supported by Lorenzo include:

Haematology	Bacteriology	Histopathology
Blood Transfusion	Virology	Gynae. cytology
Biochemistry	Serology	Non-gynae. cytology
Immunology	Parasitology	Autopsy
Endocrinology	Mycology	Tissue/transplant management
Toxicology	Environmental	Genetics and pedigree mapping
Microbiology	Cellular pathology	Bio-informatics and genomic messaging system language

UK - A website demonstrating the key features of the *Lorenzo* system has been created by ISoft Group plc, which supplies application systems for the National Health Service (NHS) National Programme for IT (NPfIT). 'Our goal in creating the site was to demonstrate how easy it is to use and the significant advancement in Healthcare IT that it represents,' explained Gordon Lorimer, iSOFT's NPfIT Commercial Director. Lorenzo can connect healthcare personnel, departments, hospitals and organisations. 'Based on Microsoft's .NET technology, the system's service-oriented architecture offers a higher degree of flexibility.'

Traditionally in the laboratory, information management systems were discrete 'vertical' systems, but now iSoft reports that it not only satisfies computing requirements in traditional pathology departments, but also addresses the needs of emerging specialties. 'This is particularly relevant in areas such as Integrated Care Pathways (ICPs), where pathology data will contribute to, respond to, and possibly terminate or initiate an ICP. The architecture of Lorenzo allows for major enterprise levels of scalability. At

Linking disciplines, personnel, departments, other hospitals and organisations

ITALY

Enrico Ratti, Technical Manager at Dianoema S.p.A. describes a LIS system used in over 200 hospitals

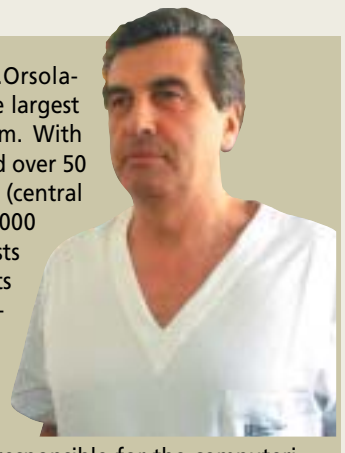
Over 200 medium-large Italian hospitals use the laboratory information system (LIS) DNLab, produced by the Dianoema Corporation (est. 1996), which today is probably the leading producer of web applications for healthcare in Italy. Thus ***DNLab*** automatically connects about 2,000 analysers and handles over 300 million tests and 25 million medical reports annually.

The system manages continuous and real-time analytical activity by immediate programming of the analysers. Analyses are carried out parallel with order entry. Every sector and workstation can apply its own organisation model - for work schedules or modalities. Using priority settings, the system optimises the management of emergency and routine patients, providing analytical activity in real time, throughout a 24-hour day, without the need to change data for work schedules. The system administrator can define and customise priority levels.

STAT as well as routine samples can be placed in the same analysers, because the assigned priority level automatically guarantees that urgent samples are tested first.

The system's architecture and application software enable management of very complex situations with different laboratories, thus minimising costs and improving productive processes, even in dynamic situations such as organisational restructuring. On the same database, work configurations and data from different laboratories can co-exist, without crippling and narrowing limits for coding data. The 'unified' admission point distributes orders to the appropriate laboratories (distribution criteria can be customised for client needs).

Each sample is assigned a unique ID (bar-code) that contains, among other data, the case and collection time, which is fundamental for automatic tube despatch to the computerised systems. In addition, the possibility of precisely identifying all the elements involved in the analytical process



Bologna - The University Hospital S.Orsola-Malpighi has 1,800 beds and is one of the largest to install the DNLab management system. With 150 workstations connected to the LIS and over 50 analysers, each day, the two laboratories (central and microbiology) receive almost 3,000 orders and carry out over nine million tests annually. Hospital wards and departments are connected via Web to the LIS for on-line data entry, result delivery and retrieval of diagnostic information from the data repository.

Doctor Roberto Motta (right) who was responsible for the computerization of the Central Laboratory, pointed out that the pre and post-analytical phases are perhaps the most problematic to deal with, and in these the system has provided 'great satisfaction'. With two pre-analytical instruments perfectly integrated with DNLab, the work of technical operators, and sample preparation times from the analytical phase, have been consistently reduced. Dr Motta also said the team is particularly proud of its system of quality control. This is integrated with the administration of instrumentation but independent of it, and operates in real time, verifying the analytical quality through customisable algorithms (analyte by analyte) and guaranteeing the fastest intervention times on the very same analytical quality. 'In the post-analytical phase, DNLab helps us with a system of validation of results based on an expert system which warns the validator according to pluri-parametrical personalised rules that concern one or more analytes and the information concerning the patient included in the requests, as well as the normal acceptability, pathology, plausibility and deltacheck tests. This system was born in our laboratory and is the result of our joint work with Dianoema and the DEIS of the University of Bologna.'

one end of the spectrum, the system may be installed as a single pathology discipline in a single hospital, perhaps only serving twenty users. Alternatively, Lorenzo can be deployable singly, to satisfy various specialties, in one hospital or several hospitals - as seen in the emergence of pathology networks.'

Whilst all the features of Lorenzo have been designed to operate over single or multiple laboratory/hospital installations, the need for more collaborative work - within pathology departments and with pathology departments in other hospitals, has increased, iSoft pointed out: 'Because the Lorenzo architecture has been designed for these needs, seamless delivery in sharing or rationalising work across different localities and simplified and comprehensive sample tracking and traceability are efficiently and effectively available. Advances in device connectivity have enabled access to data from many points outside the traditional confines of the pathology department. This includes facilities such as wireless connectivity, PDA access, and the use of dITV (Digital Interactive Television). This not only gives the pathology staff easier and more convenient system access, but also allows the patients' data, e.g. home testing for blood glucose, to be entered.'

Website for demonstration: lorenzo.isoftplc.com

supports the adoption of quality rules applied to specimen collection and treatment. Different Sample ID methods can co-exist, which allows different work modalities and sample management.

Configuration changes can be applied immediately, without interrupting lab workflow. So intervention is possible if events require changes in operative modalities. The parameterisation process is driven by validation and control functions, which allow safekeeping of system configuration congruence whenever changes are made. The system records main configuration parameters to provide complete report reproducibility for years, even after analyses are modified, or the workflow or analysers are no longer the same.

DNLab completely integrates microbiology management with the LIS, and allows elaboration of results from bacterial investigations for epidemiology. It also provides complete support for results validation with the control of a range of acceptability and pathology, the ¥delta check¥ and plausibility control. The opportune parameterisations are predisposed to individualise and manage the characteristics of control samples, and these are treated as real patient samples to make the control more precise.

Functions are available for periodical off-line archiving or export of data to other systems. The last function exports data to the inter-laboratory quality control management system on a regional basis. In addition, the system can be integrated near its own modules, to manage quality control and external modules, for example the Statistical Quality Control UNITY for Windows, by Bio-Rad.

The DNLAB System has a high security level. Many system functions are configurable for every installation, for which the user selects the security level. Users' personal identification codes and passwords can be modified periodically.

Automation - Its introduction implies laboratory re-organisation because it affects the preliminary phase of sample processing and influences successive phases. For significant benefits, the pre-analytical phase should be integrated with the rest of the laboratory. The laboratory information system (LIS), which unifies and integrates pre-analysis, analysis execution, workflow control and supervision systems, permits the co-existence of analysers from different manufacturers by passing necessary data to the different areas. The system can provide an open solution for these and enables management of different pre-analytical machines by using qualified checking procedures.

The adoption of ODBC standard (Open Database Connectivity)/SQL (structured query language), and Open-System/Client Server architecture allows independence from the database and makes integration with the hospital information system (HIS) and national healthcare system (CUP, general practitioner, etc) easier. Various integrations are possible, if isolation of the lab system from the HIS is avoided.

With this system in a Web environment, integration with the laboratory is possible using a common browser: application software is not needed on the PC that sends or requests data to/from the lab.

In preparation for EU entry, Romania's laboratories are in the process of raising standards. Last year ROMAR Medical-Colentina Clinical Laboratory, ROMAR Medical, based in Bucharest, received accreditation from the Romanian Accreditation Association (RENAR). **Manole Cojocaru MD PhD**, scientific consultant at Colentina Central Clinical Laboratory, reports.

Manole Cojocaru

ROMANIA

Upgrading the laboratory's role in clinical medicine

There is an increasing awareness in medical laboratories of the need for total quality management. A quality system requires a quality manual to be compiled, describing the laboratory's organisation, including functionality and staff organisation. Operating procedures should describe pre-analytical, analytical and post-analytical activities.

In daily clinical practice, physicians request laboratory tests to assist in diagnosis, monitor a patient and to suggest or change a treatment. Activities need to be standardised to harmonise test results, and new parameters set to aid prevention, diagnosis and therapy monitoring of various diseases. In the implementation of knowledge-based systems to improve medical knowledge it is evident that such developments are also connected with several analytical and interpretative problems for the laboratory scientific consultant as well as the clinician.

Laboratory results might be outside the normal range. All analytes are entered using various units that are converted internally to those in the knowledge base. Both the original and converted units are listed in the report. Variations may be caused, for example, by race, dietetic preference, age, sex, menstrual cycle, degree of physical activity, problems with collection and/or handing of the specimen, non-prescription/prescription drugs, alcohol intake and a number of non-illness-related factors. Any unusual or abnormal results are discussed with the physician. It is not possible to diagnose or treat any disease or problem with a blood test alone. An abnormal test does not mean that something is wrong. Discussion of results between laboratory staff and clinicians plays a crucial role in the use of knowledge-based systems in laboratory medicine.

The basis of interpretation of the analytes is not limited to a comparison with the reference ranges. The final report consists of laboratory findings, with partly age and sex-dependent reference ranges in a table, and the knowledge-based interpretation resulting from selected text items. The interpretative text covers not only underlying disorders but also comments on pre-analytical and analytical problems - measures needed to improve comparability of test results in the disease state.

A laboratory result is only as good as the understanding of its meaning and the action taken upon its receipt. As more and more diagnostic tests become available, the laboratory's role is becoming a provider of knowledge (and interpretation) rather than results. Thus we must find ways to enhance the role of laboratory medicine professionals as clinical consultants by basing our clinical research on evidence-based medicine and working with our medical care partners to translate emerging laboratory sciences into services that enhance the quality of care. We must also continue to develop high-quality scientific programmes for students and recent graduates.

No diagnostic test is 100% effective. A test has a potential for false negative results (abnormality may be present but not detected) and false positive results (an abnormality is reported but does not actually exist). In Colentina Central Clinical Laboratory over 50% of reports contain significant abnormalities. It is totally impracticable for our lab to contact requesting clinicians directly about every report that contains unexpected abnormalities or that may be liable to misinterpretation.

Unreliable laboratory results may have serious consequences for the health of an individual - and the community. The initial concept of quality control (QC) was concentrated organisation of the evaluation of analytical performance, i.e. the testing of analytical sensitivity and specificity, as well as of accuracy and reproducibility. Later, that concept was expended to quality assurance (QA), which incorporates broader organisational issues, including patient preparation, specimen collection, specimen processing, measurement performance, validation of results as well as their reporting and interpretation. It is also essential to interpret results in the light of the patient's history and in the clinical context. The main objective of QA is to provide reliable laboratory data and to ensure inter-laboratory comparability of results, to improve the accuracy of clinical diagnoses, and to reduce costs (via avoidance of repeat tests). Total quality management (TQM) means that every variable that could possibly affect the quality of the test results has been controlled. TQM of laboratory services requires a comprehensive system of quality surveillance that integrates quality development, maintenance and improvement.

Accuracy was defined quite simply as the relationship between the actual, observed result and the true result of an analysis. Precision is the reproducibility of a given degree of accuracy. Both require QC to maintain them within acceptable limits in the laboratory. Techniques of QC needed to be used in all branches of pathology. To be successful, QC must be independently applied to commercial materials and the work of laboratories themselves. An effective QA programme covers all aspects of the clinical laboratory. QC begins at the time of specimen collection from a patient, not afterwards. In the lab, the aim of QA is good workflow via all phases (pre-analytical, analytical and post-analytical). From then until a result is achieved we need to control random errors, day-to-day errors in reading or performance, largely unavoidable and systematic errors and those with a definite cause.

For Colentina Central Clinical Laboratory, internal quality control is both preventive and prospective. An important element in maintaining day-to-day uniformity in lab results is an established procedure manual, used by all laboratory personnel, which details all phases of the lab's operation (including safety precautions). It should include instructions for collecting, transporting, and storing specimens, preparing and storing reagents, and for performing tests. In addition, controls and calibrators should be listed along with directions for their use, expected results, and instructions for corrective measures if the expected results are not obtained.

Guidelines for the collection and transportation of specimens should be available to clinicians in a lucidly written format. These should be regularly revised depending upon the needs and the availability of new technology. There should be frequent (at least annual) consultations between physicians, nurses and the laboratory, to update guidelines. Quality is the degree of congruence between expectation and realisation. The basic aim of QA is to generate the confidence of the user in the final report.

The Central Clinical Laboratory in Colentina has a well-defined and constant workload. Each speciality and department function independently. The team faced assessment of a series of challenges and opportunities. For example, could the volume of samples needed be reduced, potentially reducing lab administration as well as patient trauma? What might be the role and impact of sample handling robotics and the reduction of sample splitting? Before committing to such major change, detailed analysis of process, workflow and technical analysis in each area has been necessary. Key decisions for the team included whether or not to move to using a single sample tube for clinical chemistry and immunoassay.

The laboratory operates 24/7 and all performance targets have been achieved. The centralised laboratory improves service to our clinicians and creates a more stimulating environment for everyone in the department.

As we have seen, careful process analysis can lead to the development of radical solutions. Using flexible automation and integration, significant process improvements and workflow enhancements can be organised.

Organisation and consolidation is now a reality. Such effects must be followed carefully if a lab is to remain a reference laboratory in our country. An additional consideration is the role of the emergency laboratory and what opportunities exist to integrate this part of the service into the central laboratory. The trend for laboratory organisation has led to the need to effectively process a large numbers of tests - rapidly and effectively. We can introduce emergency samples at any time, without interrupting routine workflow. The central laboratory is compatible with the hospital's emergency needs and provides a turn-around of 30-40 minutes for all samples. Every report is signed. The physician has to control plausibility and correct errors, namely before sending. Clinically relevant results are immediately discussed with the physician by phone.

Progress in medical science typically follows a stepwise course: a phenomenon is noted and described; a method for its measurements is devised; through the application of the method, new correlations are established between the phenomenon and its clinical manifestations. This conclusion is consistent with my own views from my vantage point as the scientific consultant

Drug spending out-paces total health expenditure

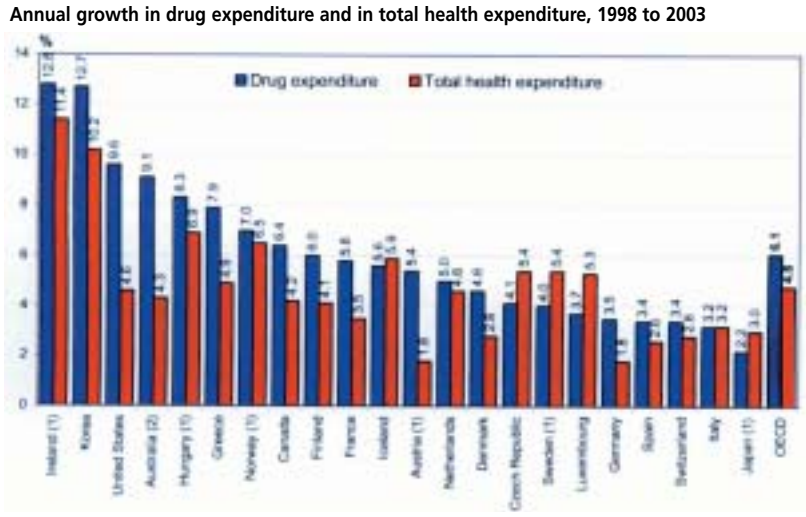
32% average increase in 5 years

Spending on prescription and non-prescription drugs rose by an average of 32%, reaching over US$450 billion in 2003, according to a study of the five-year period 1998-2003, by the Organisation for Economic Co-operation and Development (OECD). This is an underestimate, because drugs given to patients in hospitals were not included.

but the rate was more moderate in Japan, Italy and Switzerland.

In 2003, in OECD countries, drug spending averaged about 18% of total health costs. The high percentages (c. 30%) arose in the Slovak Republic, Korea and Hungary, the lows (around 10%) were recorded in Denmark and Norway. In 2003, total drug expenditure per person was high-

Annual growth in drug expenditure and in total health expenditure, 1998 to 2003



Note: Countries are ranked from left to right by annual growth of per capita pharmaceutical expenditure (1) 1998-2001. (2) 1997-2001. *Source OECD Healthdata 2005, June 05*

In many OECD countries, drug spending is taking an increasing share of health costs, and its growth has out-paced total health expenditure over the past five years in most OECD countries (see chart). Spending on drugs grew more than twice as fast as total health expenditure in the USA and Australia between 1998 and 2003,

est in the USA (over US$700 per person), then France (US$600+), then Canada and Italy (c. US$500). Mexico and Turkey had the lowest records - just over US$100 per person.

Variations in drug spending across countries reflect differences in prices and consumption, as well as the pace of introduction of new and often more expensive drugs, the OECD points out. 'Difference in income levels across countries is also a significant factor affecting spending on pharmaceuticals.'

Across OECD countries, on average around 60% of drug purchasing is publicly financed. The remainder is paid by private sources. By contrast, around 75% of total health spending is funded by public sources, but there are significant cross-country variations in levels. In 2003, the United States spent US$5,635 per person on health, over 50% more than the OECD average and about 10 times more than the lowest-spending countries (Mexico, Turkey).

In 2003, percentages of GDPs earmarked for health spending were: 15% - USA; 11% - Switzerland and Germany, and at the bottom end, under 6% - Korea and the Slovak Republic. The OECD average was 8.6%.
Data: www.oecd.org/health/healthdata

Drug sales 2004-2005 - IMS Health, the global healthcare information company, reported a 6% growth in drug sales in the world's key markets from February 2004 to January 2005. In Europe's five key countries, sales in US$ millions were: Germany 25,145; France 21,371; United Kingdom 15,666; Italy 14,488; and Spain 10,324 . (www.imshealth.com)

Professional pregnancy (hCG) tests

A range of rapid immunoassays for the qualitative detection of human chorionic gonadotropin (hCG) for early pregnancy detection has been re-launched for professional use by Unipath Ltd.

Re-branded Inverness Medical (Unipath's parent company), the TestPack + Plus hCG with OBC range now provides a clear-cut +/- result, an in-built window that changes colour when a test ends, and On Board Controls (OBC), for added reassurance and test reliability, the firm said. 'This range can qualitatively test, urine only and urine or serum (Combo) specimens, for human chorionic gonadotrophin (hCG) at concentrations of 25mIU/ml or greater. They provide laboratory and Point of Care users with a rapid result with a >99.9% analytical sensitivity and specificity.' When a small volume of patient specimen is added to the sample well hCG is indicated, in about five minutes, by a plus sign (+) in the result window. However, timing is not necessary because an in-built window changes colour from white to red on test completion.

TestPack + *Plus* hCG with OBC are cassette/pallet format tests,

based on the principal of colloidal gold linked immunosorbent assay technique. A specimen placed in the sample well migrates through the membrane. If hCG is present, the anti hCG monoclonal antibody-colloid is mobilised and forms a complex, which continues migration and is captured by the immobilised anti hCG monoclonal antibody in the result window, visualising the presence of hCG.

Colour changes in the result window; a correctly performed test is indicated by a horizontal control line, and if only that appears the end result is a minus (–) sign, indicating hCG (at a concentration of 25mIU/ml or greater) was not detected. If 25mIU/ml or greater hCG is present in the specimen, a vertical line also appears and the end result is a plus (+) sign.
Details: www.testpack.com.

LAB IN A CARD

Catcher in the Chip

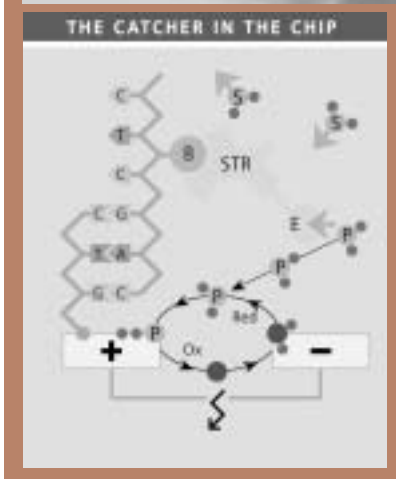
Lab reports average a two-day turn-around, which delays therapies. The prototype of a handheld mini-lab, under development by Siemens and simply named quicklab, can perform a test in just under an hour, according to **Dr Walter Gumbrecht**, an expert working in the Power & Sensor Systems department at Siemens Corporate Technology (CT), Germany. He also predicted: 'We'll be able to make it even faster than that.'

The size of a credit card, quicklab

The development of the DNA analysis progressed significantly in the last six months, when researchers designed a microfluidic system composed of channels, chambers and pumps. Capillary forces draw a microlitre of an injected drop of blood into a channel. Water is pumped in to dissolve chemicals in the sample, breaking down the cells in minutes. Again water is pumped in to rinse the constituents through a chamber in which the DNA is extracted and held.

DNA tests could soon be conducted on handheld devices. Siemens is working on a prototype, called quicklab. The large image shows its channels and reaction chambers; the smaller image illustrates how a quick test could look in the future

THE CATCHER IN THE CHIP



If the DNA sequence tested for is contained in the sample, it binds with the receptor on the gold electrode. The DNA marked with biotin (B) acts as a docking point for the enzyme alkaline phosphatase (Str/E), which releases a molecule (P) from the substrate (S). P releases two electrons at the positive electrode. After that, it migrates to the negative electrode, receives two electrons again and shuttles back to the positive electrode. Because of P's migration, an electric current flows between the electrodes - this is the actual proof that a matching DNA sequence was found. Otherwise, there is no pairing of the DNA with the receptor; no substrate molecule P and no electrons are released, and therefore no current is measured.

automatically extracts DNA or proteins from a drop of blood or other bodily fluid and emits the diagnostic information as an electrical signal. Siemens pointed out that it could be used in a doctor's office, to track down pathogens that cause infectious diseases and to detect allergies, hereditary diseases and incompatibilities when medicine is prescribed or transplants are performed. 'In the future, there will be quick tests for every medical requirement,' the firm predicts.

There, a tiny initial quantity of DNA is reproduced on a large level and marked with biotin molecules.Then the DNA reaches a chamber that contains the biosensor.

quicklab cards must have a shelf life of at least six months, at room temperature, to ensure that a doctor can keep them in stock. 'The system is designed to be economically efficient,' said Dr Birkle, Siegfried Birkle, head of the Power & Sensor Transducer Systems unit, pointing out that non-reusable cards will cost only a fraction of a laboratory test. To this end, existing technologies were combined into an innovative platform. For example, the researchers succeeded in placing dry forms of all of the enzymes and reagents on the inner walls of the reaction spaces. In addition, the gold contacts of a conventional chip card are used as electrodes. Gold is the ideal base for the 'receptors', which are synthetically produced biomolecules that pick out specific DNA sequences or proteins from samples. The binding of enzymes and the decomposition of a substrate ultimately give rise to an electric current that the researchers can record with a read-out device (see box).

E-PRESCRIBING FOR BLOOD

The first UK electronic prescribing system for blood products, using hand-held computers with in-built barcode readers, has been developed at the John Radcliffe Hospital, in Oxford.

On sampling, the computer issues a barcode to uniquely link a sample with the patient, and barcodes are repeatedly used throughout a series of checks, to ensure the right blood is transfused to that patient. Professor Mike Murphy, a specialist in blood transfusion medicine at Oxford Radcliffe Hospitals Trust, said that for over three years the Trust has worked with Olympus osYris*, which provides medical barcode technology, and the resulting system, named BloodTrack, is now in use in the haematology department, cardiac surgery unit, intensive care, and the day care unit.

A study of existing transfusion procedures showed that two nurses made paper records after following 27 stages. This was very complex, he said. The system was reduced to a series of simpler steps and software was designed around those. The new system prompts one nurse to carry out 14 checks. BloodTrack also electronically records all data collected during the transfusion process, e.g. length of time, monitoring, and any adverse events. However, the professor said this electronic transfusion record is not yet integrated into the hospital's main electronic patient record (EPR) system, which he hopes will occur when integrated care records are developed.

Safety - Compliance with correct procedures was very poor previously, he pointed out. However, since the introduction of the new system compliance has been 100%. The next development will be decision support to guide in the appropriate blood product prescribing. An algorithim is being developed for this, he added.

** **Olympus osYris** has developed a UK-wide electronic triage, patient referral and monitoring system for dermatology, dentistry, ophthalmology, general referral and radiology.*

Drive to raise dementia awareness

Austria - For the third year running, a 'Memory-Bus' has hit the road in a drive to promote mental training for the prevention and early diagnosis of Alzheimer's disease and dementia. From 19 May - 5 June the bus will have stopped in 18 cities, where those on board - a promotion team of four who are trained in memory cames, plus a physician and a Montessori-teacher, all contracted by Pfizer - will have provided information on age-related memory weakening and encouraged older people to engage, in a playful way, in regular, active mental pursuits.

The memory games were devised by Austria's memory trainers association and dementia specialist psychologist Antonia Croy, head of the Alzheimer Angehörige Austrian, a relatives self help association.

The programme focuses on simple exercises, dialogue and expert advise. Details: www.memorybus.at

Self-help groups for relatives of dementia patients, as well as care providers and memory trainers joined the bus at each locality

Aging and death

A medical failure or biological necessity?

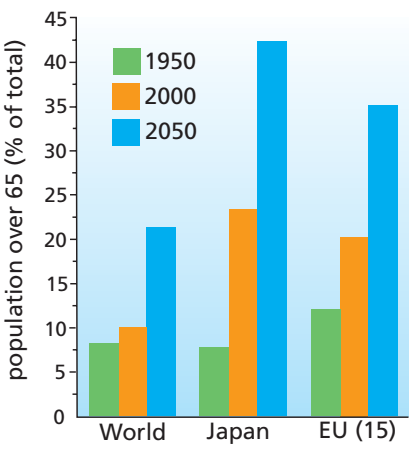
Europe will see a drastic increase in its aged populations by 2055, and with this an increase the percentage of age-related illnesses will become an even greater burden on healthcare. Whilst researchers seek cures, we also need to understand the biology of aging, says **Dr Andreas Simm**, biologist and lecturer affiliated with the Martin Luther University Halle-Wittenberg medical faculty and the German Society for Thoracic and Cardiovascular Surgery's *Working Group for The Elderly Patient in Heart Surgery*.

"In a 100 years average life expectancy has more than doubled globally (men: from 25-65 years; women up to 70 years), mostly due to better hygiene, nutrition and infection cures. In the first half of the 1900s infant mortality fell dramatically and, in the second half, life expectancy also improved, particularly for the elderly.

However, over 100 years ago the oldest person, Thomas Peters, reached 111-year-old (1745-1857). More recently Jeanne Calment became the oldest authenticated person dieing aged 122-year-old (1875-1997). So, despite the augmentation of years for an average person, the maximum age reached has changed little. Researchers worldwide estimate the number of supercentenarians, i.e. over 110 years, to be under a thousand (www.grg.org/Adams/E.HTM).

We can conclude that our maximum age appears to be genetically determined. Depending on how and where we live, maximum extended life will remain between 110 and 120 years, but actual life expectations will be environmentally determined - or, better, by changes in the way we live.

Aging can be defined as the loss of the capacity of homoeostasis, i.e. an increasing incapacity to adapt to a fast-changing condition. For



example, the young can handle unexpected and sudden physical exertions easily, whereas older people have difficulty. This seems valid for the psychical load capacity as well. Many old people report reduced mental mobility. This does not mean they are incapable of high performance. They simply need more time. The population often places aging as a synonym for age-associated diseases, particularly cardiovascular diseases (at about 50%, the frequent cause of death in the western industrial nations), tumours (at about 25%, the second most frequent cause of death) and Alzheimer's, a well-known example of degenerative diseases of the brain.

What causes those diseases? It is important to put some trust in biology. To ensure humans continue as a species, Nature ensures we reproduce when young, healthy and strong. S J Olshansky (School of Public Health, University of Illinois) compared the human body with a racing car, constructed to reach its aim as quickly as possible, without needing repairs. Although a certain reserve is always built in, what finally counts is only the distance between the beginning and end. By contrast, a human should reach reproductive age (aim), then live on, aging only from his reserve. This analogy is not absolutely wrong; we see that very old animals are not usually found in the wild, but are in a protected environment, e.g. the zoo. Similarly, for a long time the average life expectancy of humans was around 25 years. There are indications that the same mechanism and/or gene functions that provide the biggest advantages in the period from birth to reproduction also actively contribute in great age to common aging diseases. This is described as pleiotropic antagonism - one of the evolution-based

theories of aging.

This will serve as an example of the replicative senescence in relation to the origin of cancer. Tumours originate mainly from mitotic cells (self dividing). Long-living organisms with renewable tissues have many such cells and so a higher risk of tumorigenic transformation. This transformation increases exponentially with age. Most of the age-dependent tumours are carcinomas and originate from epithelial cells. Tumour cells, or premalignant cells (precursor of tumour cells), have requirements in order to grow as a tumour, which include an accumulation of damage to cell molecules, such as the lipids, proteins and particularly DNA. DNA mutations accumulate with age and heaped up, to be found as tumours. However, it was shown that such genomic changes/instabilities often appear already in benign tumours or early tumour stages. This means that for the growth of a tumour, additional components are important - and one is the micro-environment, where potential tumorigenic cells are found. Stroma cells, e.g. particularly cells of connective tissue (fibroblasts), are responsible for the micro-environment of tumour cells. For example, if one injects embryonal stem cells into adult tissues, they could develop teratocarcinoma. On the other hand, these cells are capable of reproducing normal tissues after injection into an embryo.

According to the environment in which tumour cells are found, their growth can be blocked - or promoted. Components for this environment - extracellular matrix proteins - are synthesized by fibroblasts. During aging, these synthesize another spectrum of proteins and contribute to the changing environment. Senescent fibroblasts enrich themselves in tissue with age and are demonstrable e.g. through the expression of an age-associated acid galactosidase activity. At Berkeley, the Campisi team showed that the growth of premalignant epithelial cells could be strongly stimulated by co-culture of senescent and not young fibroblasts. If premalignant breast epithelial cells are injected with fibroblasts in an immune deficient mouse, big lethal tumours originate only from co-injection with senescent fibroblasts.

Fibroblast aging, known since the 1960s, was first described by Leonard Hayflick (San Francisco) as replicative senescence: in a culture human cells divide themselves up to 80 times, then lose the capacity for cell division. A possible cause of this is the shortening of telomeres (ends of the chromosome) with each cell division. However, cellular senescence is also a programme that is induced through potential tumorigenic stimuli, such as radiation, radical and heterochromatic disturbances. This has been described as operating as a tumour suppressor mechanism. The induction of cellular senescence is disturbed in transgenic mice, which often die early from tumours. Consequently, this is a classical example for a pleiotropic antagonism. Cellular senescence avoids tumours in the early years, however, such aged cells enrich themselves during tissue aging and can promote the growth of tumours through a changing micro-environment.

Georg Wick, at the Institute for Biomedical Aging Research, Innsbruck, describes other substantial examples of this. These include the reaction of inflammation due to arteriosclerosis. The human immune system is extremely effective in fighting infections in youth, when antibodies against the bacterical heat-shock-protein HSP60 are formed. If the endothelium (internal blood vessel layer) is damaged by necrosis, for example due to high blood pressure, these antibodies react against human HSP and can cause a chronically auto-immune response. In the lung, RAGE, the receptor of the Advanced Glycation Endproducts (AGE) appears to function as a tumour suppressor. However, chronic activation in old age contributes to an inflammatory response and diseases such as arteriosclerosis.

The concept of antagonistic pleiotropism may give some explanations as to how a beneficial mechanism that effectively protects the body in youth, contrarily transforms itself in aging. That is why aging, on the cellular level, cannot be renounced - it is a biological necessity and not a failure of a medical disposition. If we disturb or switch off these mechanisms, humans would probably die before reaching the reproductive age. Biological mechanisms point to how we could treat age-related diseases more effectively in the future. Despite improved disease treatments, human aging, per se, actually cannot be influenced. Nowadays, the only proven and effective possibility to prolong life is caloric restriction. If animals are deprived of up to 50% of their calories, about 30% of life prolongation has been observed. All other possibilities of ' anti-aging medicines' should be views with caution, because they either do not work or, as in hormone therapy, have side effects.

Given the circumstances, we could conclude that aging is an aspect of our private lives. Finally, aging is also important for us as a species, because it affect evolution, which works through the renewal of generations. Otherwise we would still live the sad existence of early cavemen.

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GLOBAL EVENTS

2005

JUNE

19-26 Sweden
European Federation of Audiological Societies

22-25 Berlin, Germany
CARS 2005 – Computer Assisted Radiology and Surgery - 19th International Congress and Exhibition
ISCAS – 9th Annual Conference of the International Society for Computer Aided Surgery
Plus: **CAD** 7th International Workshop on Computer-Aided Diagnosis CMI – 11th Computed Maxillofacial Imaging Congress.
Plus: **EuroPACS** – 23rd International EuroPACS Meeting. www.cars-int.org

22-25 Madrid, Spain
2nd Latin American Congress on Qualitative Health Research

23-25 Cancun, Mexico
1st Latin American Congress in Aging Male

25-27 Kuopio, Finland
School of MRI - Advanced Neuro Imaging - Diffusion, Perfusion, Spectroscopy.
www.esmrmb.org

26-30 Montreal, QC, Canada
International Interdisciplinary Congress on Emergencies

30-3 July Aarhus, Denmark
23rd Int. Symp. on Diabetes and Nutrituion
email: annemarie.kruse@ki.au.dk

JULY

2-6 Athens, Greece
IX European Congress of the International Society of Blood Transfusion

3-9 Positano, Italy
Europe/Asia Medical & Legal Conference

16-19 Los Angeles, USA
9th Annual Meeting of the International Association of Medical Science Educators

24-29 San Francisco, USA
Meeting of the International Union of Microbiological Societies (IUMS)

AUGUST

15-19 Sydney, Australia
11th World Congress of Sport Psychology (ISSP)

18-19 Sydney, Australia
Partners in Pain: Patients, Clinicians and Pain Management

26-28 Sydney, Australia
4th Int. Conference on Oro-facial Pain and Temporomandibular Disorders

SEPTEMBER

1-3 Lund, Sweden
School of MRI - Advanced Cardiac MR Imaging
www.esmrmb.org

3-7 Sydney, Australia
International Society of Developmental Biologists 2005

4-7 Lisbon, Portugal
9th International Conference on Methods and Applications of Fluorescence: Spectroscopy, Imaging and Probes

8-11 Ljubljana, Slovenia
ESUR 2005 – 12th European Symposium on Urogenital Radiology
www.esur.org

8-10 Istanbul, Turkey
School of MRI - Applied MR Techniques, Advanced Course
www.esmrmb.org

8-10 Stuttgart, Germany
25th Joint Meeting of the Austrian, Swiss & German Society of Senology
www.senologiekongress.de

13-16, Brunn, Czech Republic
HOSPIMedica
www./node1.bvv.cz

14-17 San Diego, USA
14th International Congress and Endo Expo 2005

15-17 Prague, Czechoslovakia
11th Prague Dermatology Symposium
Regional Meeting of the International Society of Dermatology
www.praguedermatology.cz

15-18 Basle, Switzerland
22nd Annual Scientific Meeting of the European Society for Magnetic Resonance in Medicine and Biology (ESMRMB)
www.esmrmb.org

15-21 Rome, Italy
Pan Europe Asia Medical & Legal Conference

18-22 Melbourne, Australia
7th World Congress on Inflammation

18-23 Bethesda, USA
14th International Pigment Cell Conference

18-22 Breckenridge, USA
Tissue-Selective Nuclear Receptors

21-24 Arad, Romania
2nd International Danube Symposium of Laboratory Medicine
www.ralcom.ro

21-24 Oxford, United Kingdom
18th Annual Scientific Meeting - refresher course
stephen.golding@radiology.ox.ac.uk

22-26 Nashville, USA
27th Annual Meeting of the American Society for Bone and Mineral Research – ASBMR 2005

22-26 New Delhi, India
Interim Meeting of World Federation of Sleep Research Societies

25-28 Basle, Switzerland
ESMRMB 2005
www.esmrmb.org

28-1 Oct Singapore, Malaysia
International Skeletal Society - 32nd refresher course
www.iss2005.com

28-2 Oct San Francisco, USA
American Academy of Family Physicians Annual Meeting

OCTOBER

2-7 Rio de Janeiro, Brazil
International Phlebology XVth World Conference

6-7 St Julian's, Malta
ISS Malta
Wendy.Pullicino@rjah.nhs.uk

13-15 Cape Town, S. Africa
School of MRI - MR Imaging of the Abdomen
www.esmrmb.org

14-16 Nice, France
10th Annual Meeting of the European Council for Cardiovascular research (ECCR)

15-18 Berlin, Germany
1st Congress of the World Association of Sleep Medicine (WASM)

19-20 Essen, Germany
International congress: High-tech in Medicine
See details in box

21-22 Zurich, Switzerland
ESCR 2005
www.escr.org

27-29 Basle, Switzerland
33rd Congress of the European Association of Geriatric Psychiatry
Details: r.ihl@alexianer-koeln.de

NOVEMBER

2-5 Toronto, Canada
2005 Annual Meeting of the International Society for Traumatic Stress Studies

3-5 Mumbai, India
Hope 2005

10-12 Rotterdam, Netherlands
School of MRI - Advanced MR Imaging of the Vascular System
www.esmrmb.org

10-13 San Francisco, USA
19th Annual Congress of the American College of Phlebology

12-15 Bangkok, Thailand
XIIIth Asia Pacific Congress of the ISBT

16-19 Dusseldorf, Germany
MEDICA
www. medica.de

17-20 Havana, Cuba
3rd International Meeting on Visual and Neuromuscular Disorders

27-29 Haridwar, India
Psychotherapy, Yoga and Spirituality

2006

JANUARY

3-8 Sydney, Australia
International Congress of Obesity 2006

16-18 Florida, USA
17th Annual International Colorectal Disease Symposium

MARCH

3-7 Vienna, Austria
ECR 2006

APRIL

1-5 San Francisco, USA
2006 Annual Meeting of the American Society for Investigative Pathology

19-20 October Essen Germany

HIGH-TECH IN MEDICINE CONGRESS

Congress President Professor Rainer Seibel

Announcing the ***High-tech in Medicine Congress***, Professor Rainer M Seibel, Head of the Müheim Radiology Institute, and Congress President pointed out that the German healthcare system is close to collapse and, in the long run, become unable to subsidize in-patient care. *'Public medical facilities are threatened with insolvency,'* he said. *'A recent study by the management consultancy Ernst & Young indicated that a quarter of around about two thousand German hospitals will disappear by 2020. However, the health market is constantly increasing worldwide and offers unique opportunities. Efficiency, modern technology, and a readiness for and competence with innovations will determine the global hospital landscape of tomorrow. Effective management and economic analyses must affect diagnostics, therapies and patient administration.'*

The event aims to provide an interdisciplinary overview regarding the options and opportunities that could create a profitable hospital. It also aims to close the gap between single medical departments and promote discussion by experts from various fields. Hospital managers, IT experts, administrators and physicians will be informed about the latest developments in medical technology. Main subjects: digital medicine and networks (e.g. the digital hospital, sensor networks for patient monitoring and homecare in surgery); minimally invasive therapies and image-guided surgery (micro and nano medicine, ultrasound-guided neurosurgery and MR mammography); robotic surgery and 3-D tracking (microsensors, and MRI compatibility of vascular implants).

Congress organisers: Mülheimer Radiologie Institut and the Haus der Technik, in co-operation with acatech and the Initiativkreis Ruhrgebiet

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