SARS - We’re just getting to know you

Report by Brenda Marsh

Some 4,000 people known to be infected, 204 dead, in 25 countries. Pandemic panic, faces masked, food stocked in Hong Kong (HK) homes to avoid public places. Flights, tourism and business trips cancelled. 

Accusations of a Chinese cover-up business trips cancelled. 

Kong (HK) homes to avoid public 

countries. Pandemic panic, faces 

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Fears over female HIV infections
Over half of newly confirmed cases are heterosexual

UK - New research from Isis Research, the UK based, independent healthcare market research agency, indicates that 51% of newly diagnosed HIV cases in Europe are in fact heterosexual against just 36% homosexual. Thus the number of HIV females (39% of the total infected) is quickly catching up with male numbers (61% of the total).

This trend means more babies could be born to HIV-positive women, raising questions about what treatments to use or avoid during pregnancy and delivery to prevent transmission of the virus to the baby. Currently AZT is the only drug fully approved for pregnancy although small doses of stavudine have been used to prevent mother-child transmission.

Breastfeeding presents a further problem: HIV can be transmitted through breast milk.

The good news: Needle-exchange initiatives across Europe appear effective with transmission via intravenous drug use (IVDU) now almost eradicated in most European countries. However, in the USA homosexual infections are still predominant.

The new Isis figures were based on 3,000 patients in France, Italy, Spain and the UK who received anti-HIV therapy between July-October 2002. 308 of these patients were newly diagnosed in 2002. Of these, over half (51%) were infected through heterosexual contact. In contrast, only 36% were infected during homosexual contact. This is in stark contrast to the picture 10 years ago where Isis Research figures show the split was 28% heterosexual against 38% homosexual (in the 1% infections via homosexual contact still lead, at 51%, against 31% heterosexual).

Dr Amanda Zeffman, a senior research executive in the Isis Research HIV therapy monitor team, pointed out: 'A decade ago, most notably in the UK and the German market, the predominant mode of HIV transmission was through homosexual contact'. The new figures suggest that the heterosexual population has become commonplace about HIV, presuming wrongly that the disease still only affects homosexuals and drug addicts. There is a clear need for heightened awareness campaigns across Europe targeted at heterosexuals if this rise is to be curtailed.

In a three part study in clinical and cost effectiveness of nurse practitioners (published by the BMA in the Emergency Medicine Journal 2003; 20:185-186) a study of the Sheffield and Northern General Hospital have concluded that ‘...a nurse practitioner minor injury service can provide a safe and efficient alternative for the treatment of minor injury. However, the costs of such a service are greater and there seems to be an increased use of out-patient services’.

The three part prospective study took place in Sheffield, where an accident and emergency (A&E) department was closing and being replaced by a nurse led minor injury unit (MIU). The first part sampled patients attending the A&E department. The second part sampled patients from a nurse-led MIU that had replaced the A&E department. In each sample, clinical effectiveness was judged by comparing the gold standard of a research assessment with the clinical opinion. The results in terms of number of errors in clinical assessment, treatment, and disposal. The third part of the study used routine data whose collection had been prospectively configured to assess the costs and costs effectiveness of both models of care.

In which department do you work?
- Surgical innovation/surgical equipment
- Clinical research/Investigative equipment
- Ambulance and rescue equipment
- Physiotherapy updates/equipment
- Nursing: new aids/techniques
- Linen and laundry
- Information technology & digital communications
- Personal hospital administration/management
- Material Management
- DG political updates
- Other information requirements - please list

Yes No

In your department linked to an internal computer network?

In your department linked to an external computer network?

Do you use your own computer with the clinical community?

Do you use your own personal computer?

Do you attend congresses or similar meetings for your specialty?

This information will be used only as an analysis for European Hospital, Höherweg 287, D-40231 Düsseldorf, Germany, and for the mailing out of future issues of the Beta publication European Hospital. Candidates will also be automatically entered for a draw to win the prize featured on this page.

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Breast implants.

The European Commission has asked the European Committee for Standardisation to examine adherence to those rules. In addition, the Commission has proposed for improving the quality of breast implants and patient protection. The report follows on from a Communication of the Commission (November 2001) on the same topic, in which a series of measures was proposed for improving the quality of breast implants and patient protection.

In parallel to the report, the Commission presented its proposal for a Directive on medical devices, which is gradually opening up more opportunities for EU citizens' treatments during a temporary stay in another Member State. For example, Member States have already agreed, at a political level, that EU members visiting other states will be entitled to all required medical treatments, i.e. not only short stays, such as holidays. The Commission has proposed that states that currently do not use cards may apply for a time extension of up to 18 months. In a second phase, the card will replace all other forms covering a temporary stay. In a third phase, the plan is that this identification will be a computer-readable electronic chip card. The card will simplify procedures, but the rights and duties of EU citizens will remain unchanged. For example, the card will enable patients who pay for medical care when abroad to gain a swifter reimbursement from their own social insurance provider. The card will also offer other advantages, because EU law is gradually opening up more opportunities for EU citizens' treatments during a temporary stay in another Member State. For example, Member States have already agreed, at a political level, that EU members visiting other states will be entitled to all required medical treatments, i.e. not only immediate requirements. The Commission's proposal is to be presented at the spring summit of the European heads of state and government. Commission's Communication details: http://europa.eu.int/eur-lex/de/com/cnc/2003/com2003_0073de01.pdf.

The safety of breast implants

In mid-February, the Commission presented a report on the activities undertaken by the Member States concerning the safety of breast implants. This particularly refers to the accessibility of information, rules on consent for female patients, the advertising of breast implants, and reflections in terms of the generation of national registers and long-term follow-up monitoring. The report follows on from a Communication of the Commission (November 2001) on the same topic, in which a series of measures was proposed for improving the quality of breast implants and patient protection.

In parallel to the report, the Commission presented its proposal for a Directive on better classification of breast implants. In the tightening of rules on quality and safety checks, a special certificate will have to be issued for all implants, documenting adherence to those rules. In addition, the Commission has asked the European Committee for Standardisation to examine the current European standard regarding breast implants. Report and further details: http://europa.eu.int/eur-lex/com/enterprise/medical_devices/index.htm.

European Investment Bank: financing opportunities for the hospital sector

The European Investment Bank (EIB), backed by the EU Member States, recently presented its financing options for public projects in the 'human capital' sector. Apart from investments in the education sector, this also expressly includes healthcare and hospital financing, to cover modernization of old and construction of new facilities, plus equipment requirements (such as laboratory equipment, medical scanners, etc.) and IT. The EIB offers medium and long-term loans and equity financing. Individual loans are generally only granted for investment projects costing over 25 million euros, and usually only cover up to 50% of the estimated project costs. Smaller loans are provided within the framework of global loans via intermediary partner banks. Borrowers may be public, private non-profit or private undertakings. To date, in Germany, hospitals in the new states have particularly made use of the EIB's financing facilities. Due to its excellent rating, the EIB can raise long-term funds with very good terms and, as the bank has no gainful objective, the advantage can be passed on to borrowers. Additionally the bank can offer very long-term loans for healthcare, up to 30 years. The terms of these loans also may include redemption holidays.

Healthcare projects undergo an audit which, besides financial feasibility, particularly examines whether the corresponding investments will contribute to cost-effective improvement of the population's health...

EIB contacts for German and Austrian healthcare groups:

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HOSPITAL PLANNING & DESIGN

Selling French savoir faire

Entrepreneurial medical experts, architects, managers and other professionals have combined to develop hospitals and healthcare worldwide.

Report by Brenda Marsh

In 2002, the Bahraini government opened an international competition in 2002 for the design and construction of a new 300-bed hospital in the Muharraq District of Manama in Bahrain. Among two short-listed candidates, our French team was selected over an Australian group.

During the inception meeting in Manama, the Bahrain Under Secretary for Health said we had been chosen to provide his country with the best French, state-of-the art hospital know-how.

As the HospiConseil hospital programme, naturally I had to wonder what was so specific about French hospitals, and that brought a surprising discovery, which I would like to share.

The Bahrain Health Ministry had a North American advisor, whom I met. With uncompromising honesty he told me that he preferred Australian hospital technology, but was out-voted in the selection. However, he hoped that we would consider the North American labour, delivery and recovery (L, D & R) concept in our design of the maternity centre for the new hospital, since that concept was increasingly accepted in Bahrain.

Indeed, the staff of the existing hospital said they had a North American advisor, whom I met. With uncompromising honesty he told me that he preferred Australian hospital technology, but was out-voted in the selection. However, he hoped that we would consider the North American labour, delivery and recovery (L, D & R) concept in our design of the maternity centre for the new hospital, since that concept was increasingly accepted in Bahrain.

In any other country.' Indeed, the staff of the existing hospital said they had a North American advisor, whom I met. With uncompromising honesty he told me that he preferred Australian hospital technology, but was out-voted in the selection. However, he hoped that we would consider the North American labour, delivery and recovery (L, D & R) concept in our design of the maternity centre for the new hospital, since that concept was increasingly accepted in Bahrain.

The challenge thus became how to reconcile the highly clinical French labour environment, entirely geared towards a potential emergency, with the woman-centred natural birth approach embodied in the L, D & R concept. I devised a possible compromise, where women were placed, according to prognosis, either in delivery suites, according to the L, D & R concept, or in an ‘intensive care’ labour unit - similar to the French obstetrics block. I put the question to our team’s medical expert. After several phone calls to some of the most renowned French obstetricians, his verdict was, without question, that the L, D & R concept should be dismissed in the face of the priority – perinatal safety. When asked to argue, our Bahraini protagonists simply repeated: ‘Do your best French thing.’

I now realise now that French expertise leaves so little room for compromise due to a fundamental feature of French society - which goes back to the French revolution, and the permanency it preserved in the French way of thinking. Inspired by philosophers (les philosophes), the French revolution tried to replace Catholicism, the state religion, with the supremacy of the reason, the cult of the supreme being. Represented
by an eye within an equilateral triangle, the supreme being was the fountainhead for raison universelle, universal rationality.

Universal rationality should not be confused with consensus, for the latter is generated within a population. Universal rationality is above individuals. It belongs to the State, to the valeurs républicaines mentioned by politicians whenever they all agree to disagree with one particular individual.

One could argue that birth is, by nature, specific to women and, therefore, that women should decide how it should be done. Few French people would disagree with that, but would disregard such a notion as being non-universal, women being some humans but not all humans. There must be some universal truth about hospital labour units, just like anything else. Where do the French turn to find such universal truth? To the Faculté of course, to the learned. These wise men (few women) disagree so often with one another that, when they do agree, then it must be universally reasonable.

In spite of this norm (perhaps overly detailed here), the thinking of health professionals is evolving and some new features are appearing in French hospitals. In terms of birth, the new trends seem to blow in on the North wind, from our European partners. (In Germany, the labour bed tends to be replaced by a multi-position platform resembling something from a fitness centre).

Prevention of risk through training and diet are generalised. In the labour room, the baby care station is designed as a mobile unit so that ministrations to the new-born can be performed in front of the mother.

The midwife is seen less and less as a nurse and her status as a practitioner is more recognised. The time she spends with the parturient is seen as an important factor in a successful birth. The design of labour units is geared towards limiting the time away from the delivery room and the new legislation requires a full night staff, so that midwives are not alone in the complete running of a labour unit.

France’s poor record of perinatal safety is improved through the concentration of maternity cases in fewer and better-equipped facilities. However, such a medico-technical approach does not preclude research for higher quality care, seen by some as the real source of perinatal safety.

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Geneva - The first indication that a new virus had arrived came last November. As cases mounted, the World Health Organisation (WHO) worked in collaboration with 13 laboratories in 10 countries (Canada, France, Germany, Hong Kong and Mainland China, Japan, the Netherlands, Singapore, United Kingdom and USA) to find out what this deadly newcomer might be.

Canada, mid-March - Dr Donald Low, head of microbiology at Toronto’s Mount Sinai Hospital, sent lung tissue from a 45-year-old Chinese-Canadian who had died of pneumonia, to the USA’s Centre for Disease Control (CDC). Tests there isolated a new coronavirus.

By mid-April this had enabled scientists in British Columbia to map the virus’s genetic code - a rapid time-scale.

Netherlands & Geneva mid-April - Meanwhile, the new coronavirus, which had been named by WHO and member laboratories as the Severe Acute Respiratory Syndrome (Sars) virus, was definitively shown to be the culprit by virologist Dr Albert Osterhaus and a team working at Erasmus Medical Centre, Rotterdam, the Netherlands. These scientists found that the pathogen was present in all cases of the disease: when isolated from the host, and grown in pure culture, the original virus emerged in experimentally infected primates.

The WHO issued a final confirmation that the Sars virus, never seen in humans before, is a mutation from the coronavirus family - one of the causes of the common cold.

‘The pace of SARS research has been astounding,’ said Dr David Heymann, Executive Director, WHO Communicable Diseases programmes. ‘Because of an extraordinary collaboration among laboratories from countries around the world, we now know with certainty what causes Sars.’

Experts have now gathered at WHO to... design the next steps, a strategy for transforming these basic research discoveries into diagnostic tools, which will help us to successfully control this disease,’ said Dr Heymann.

All 13 laboratories involved were credited by the WHO for the coronavirus findings. They had, said Dr Klaus Strowig, WHO virologist and co-ordinator of the collaborative research network, ‘...put aside profit and prestige to work together to find the cause of this new disease and to find new ways of fighting it.’

The scientists collectively dedicated their detection and characterisation of the Sars virus to WHO scientist Dr Carlo Urbani, who first alerted the world to Sars - and died of the disease in Bangkok on 29 March 2003.

Test kits

The WHO collaborative network of laboratories developed several diagnostic tests for SARS, which included a test that allows detection of the distinctive generic information of a virus.

On 4 April, primers - the key elements for a PCR test - were available on the open WHO website (http://www.who.int/csr/sars/prime rs/en/).

The Hamburg-based Berhard-Nocht Institute for Tropical Medicine has reported that it had developed primers in kit form, with built-in quality control. This high-speed test for Sars is said to confirm the presence of the mutant strain in two hours, unlike most antibodies tests, taking over 10 days. The kits are to be distributed by a Hamburg biotechnology firm. However, the institute is offering it free of cost to the WHO collaborative laboratories, which are working to improve the reliability of PCR testing protocols and primers.

Another test, developed by the USA’s Centres for Disease Control, is also ready for use.

Although existing PCR tests are very specific, they may not detect all patients who are excreting coronavirus. Thus an ability to establish, at an early stage, whether patients with clinical features such as cough, fever, chills, myalgia, shortness of breath and diarrhoea, may be infected with the Sars virus, is obviously vital in the prevention of further transmission by so-called ‘super-spreaders’ - by immediately isolating those patients.

Various WHO network laboratories are endeavouring to improve these PCR testing protocols and primers to increase reliability.

However, the Sars threat is by no means over. At the time of writing this report, new cases have emerged in India (Goa), Middle East (Jordan) and Italy, indicating a further international spread of the disease.

And, there are still many questions about the Sars virus profile. The contagion time-scale for Sars is not known, nor is the ‘shelf life’ of the virus when outside the human body.

Additionally, its origin is still being sought; i.e. Did this mutate from other animals to invade humans? Hong Kong University researchers reported that a new genetic sequencing of the Sars virus conclusively proved it came from animals, and research continues to ascertain whether pigs and poultry are susceptible to the virus and could be a source.

Finally, although a new study from Hong Kong University (pub: BMJ website) concluded that the agent responsible for the disease is ‘highly infectious and virulent’, a recent report, from the USA, showed that numbers of probable cases were less than suspected. The Centre for Disease Control and Prevention said that, although 208 people in the US were reported as having Sars, only 35 had pneumonia - considered a key symptom of the disease.
Kodak: committed to a digital future

Dan Kerpelman: Kodak’s Health Imaging Group is one of Kodak’s three business groups, which include photography, commercial imaging and components business. Health Imaging’s revenues in 2002 totalled $2.3 billion. Our portfolio is divided into several areas. Film capture and output is our traditional x-ray film and processing business. Then we have digital capture and output, which is our broad digital portfolio that includes PACS, RIS and EPR. We also have digital output, which comprises our laser imagers that print medical images. Finally we have a major services business, which include traditional equipment repair and maintenance as well as professional services. Those include consulting, systems integration, systems management, financing - not as a bank, but when financing is an important part of providing a solution, this is something we can offer. Those are the product areas and we operate in five world regions.

Dan Kerpelman, President of Eastman Kodak Company’s Health Imaging Group, discussed film versus digital solutions, PACS and Kodak’s goals in diagnostic imaging, with Daniela Zimmermann of European Hospital

Daniela Zimmermann: We have talked about PACS, RIS and EPR for years, but all we see is small solutions in small niche areas, not a holistic approach to integrating healthcare.

DK: I agree with your observation of the industry, which has been characterised by two extremes. The small niche players, as you call them, didn’t exist 12-24 months ago and perhaps will not exist 12-24 months from now. They arrive with a very specific expertise - often with very nice features purely in terms of software comparison, but not necessarily as a holistic coverage, with the ability to understand healthcare processes sufficiently to evolve according to its needs.

At the other extreme are the big providers - the large modality companies.

DZ: Big, yes. But they still offer the complete solution they’d like.

DK: Well, that’s my view - I’m glad you said it first. They have broader regional solutions than perhaps the small niche players, but in a somewhat rigid way. I’ve heard customers say that, as healthcare providers dealing with the large firms, there is a feeling that ‘... if this solution doesn’t solve our problem, then you must have the wrong problem’. We prefer to position Kodak between those extremes, and we are big enough to provide continuity.

Indeed, Kodak has been in the x-ray-business almost since the time that Roentgen discovered the x-ray 120 years ago. And we certainly plan to be here for the next 100+ years. Over the decades, we have grown significantly from a film-oriented business to what we have today: a well-rounded portfolio that makes us a leader in digital imaging, while maintaining our leadership in film. With this broad scope, we have the advantage of size, and can make big investments, when necessary. For example, several months back we decided to commit to healthcare information technology (IT) in a far bigger way. We’re not a giant, but can be a flexible player, recognising that healthcare IT, for instance, is still a field with very specific, local requirements, such as billing and coding, public versus private healthcare, reinvestments, insurance, large hospitals versus small imaging centres, publicly versus privately managed healthcare centres. Our size and flexibility, and commitment is recognised by our customers.

DZ: Big film companies still drive, and seem to waver about investing in the digital field...

DK: That’s a fair criticism of film manufacturers overall. But, speaking for Kodak, things have changed dramatically. For example, Kodak was very aggressive about recruiting me, because I come from the IT world, not from a media or film company. Looking at the evolution of our R&D investments as well as the alliances we are working on now, you can see that we have a long-term strategy in the digital area. We definitely will not be a company that is in and out of digital imaging and IT, and that’s not just about profit. It’s about the future and about leading digital transformation.

As indicated earlier, we have a broad digital portfolio that includes PACS as well as digital capture with computed and digital radiography. Our portfolio also includes digital output, such as laser imaging, which had been a neglected invention in our list, but is now one of the biggest parts of the Kodak portfolio. PACS, RIS and EPR are really at the core of our portfolio. These are critical control products that dictate how those other devices provide service and are part of the much-needed holistic solution.

To be successful in PACS is not about selling hardware or software packages. We have evolved a service-oriented product portfolio that is designed to work together in the healthcare environment.

To be successful in PACS is not about selling hardware or software packages. We have evolved a service-oriented product portfolio that is designed to work together in the healthcare environment.

As highlighted in today’s guest article, our portfolio is divided into five world regions, and we have very dramatic growth. We also have a significant services business, which includes traditional equipment repair and maintenance as well as professional services. Those include consulting, systems integration, systems management, financing - not as a bank, but when financing is an important part of providing a solution, this is something we can offer.

Those are the product areas and we operate in five world regions.

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Toshiba panel of experts

VIENNA - Toshiba Medical Systems Austria presented a top panel of experts at the ECR to introduce the latest developments in dynamic flat-panel technology - the new benchmarks in digital angiography. A further session covered the scientific platform for new uses in ultrasound scanning.

A combination of image amplifiers and high resolution CCD technology, dynamic flat-panel technology (1.5 lp/mm) is considered top standard for digital and interventional imaging. Special features of the flat panel detector, such as bending curvature, are integrated in a single step and minimal pixel size of 10x10 µm - suitable for clinical use. The improved time and image resolution, cut out distortion and reduce the X-ray dose.

P. Peloschek explained the role of radiology at the ThermenKlinikum Baden, expects more detailed imaging and higher resolution from generation flat panel technology - particularly important, for example, in recognizing increasingly small patient details in part segmentation markings on stents. The new technology is expected to offer significant improvements in the diagnosis of abdominal aortic aneurysms, as well as in the examination of peripheral vessel structure in the lower thigh, ankle and neurovascular areas.

The new Toshiba CT Aquilion 64lice scanner, having 64 slices in 0.5mm per rotation simultaneously, achieves far more detailed coronary images whilst optimising workflow. Combined with specialised, cardiac segmentation software, this achieves a time resolution of up to 50 millisecond per slice with a rotation time of 0.4 seconds. This means the entire heart can be tomographed with a 0.4 x 0.4 mm resolution in 35 seconds.

This makes analysis of cardiac anatomy and function possible with only data. A special software tool facilitates the automatic reconstruction of sagittal, coronal and sectional slices, even with unstable parameters with any extra work. The spiral scan area measures 150mm, so there is no need to move a patient in several examinations.

"Whether additional features such as panoramic images will become popular depends on the users," P. Peloschek pointed out. "For progress monitoring of tumour treatment, this view would definitely be a helpful tool."

He presented a more pragmatic view of contrast medium examinations which is currently promoted by ultrasound contrast medium manufacturers to examine inflamed joints. This method is very personnel and cost intensive, like MRI scanning, but documentation is more difficult. The procedure is not possible for all patients, so there will be benefitted smaller hospitals, without an MRI scanner, and it may also be of interest for examinations in surgeries, but many doctors will probably await further technological developments in this field.

Report: Christian Pinsky

continued from page 7

Precision radio therapy

Professor Wolfgang Schlegel, Head of the Department of Medical Physics at the German Cancer Research Centre, has been awarded the 2000 clinical section of the German Cancer Award, for significantly improving the precision with which radiotherapy beams can be directed at a tumour. Computer-based multileaf collimators and programmes for 3D-planning promise to improve treatment, but in his department ensure healthy surrounding tissue is not affected by radiation.

Malignant tumours 'horse-shoe' around highly radiation-sensitive organs (e.g. optic nerve, bone marrow). Prof. Schlegel recently developed intensity modulated radiotherapy (IMRT) in which the radiation beam intensity can be modulated within the target area. Consequently, the radiation dose to the tumour can be increased without affecting surrounding tissue.

A first comprehensive study (USA), involving some 700 prostate cancer patients, indicated that IMRT reduced serious side effects and increased disease-free survival rates. The German Cancer Research Centre has been conducting a study since 1998 to clarify which tumours are best treated with IMRT. To date, about 400 patients with head tumours planning developed in his department ensure healthy surrounding tissue is not affected by radiation.

Mr. Schlegel pointed out to the European Association of Radiology's Boris Rajewsky medal.

ECR medalists

Vienna - Dr Erik Boijsen of Lund, Sweden, and Dr. Rafaella De Dominicis of Florence, Italy, were awarded The European Association of Radiology's Boris Rajewsky medal.
Earlier diagnosis for Alzheimer’s

90% reliability that someone who scores badly on this test will be diagnosed with Alzheimer’s, within one or two years. The damage that causes this disease has already occurred, but current behavioural tests to definitely diagnose Alzheimer’s are not sensitive enough.

For patients, diagnosis is a dilemma, but I think there is also some good news because the doctor can prescribe the person medication to slow the progress of Alzheimer’s. Such medication is referred to as a cognitive enhancer, and our own research is aimed at contributing to the development of improved cognitive enhancers.

CP: We are using an existing test (Cambridge Neuropsychological Automated Test Battery (CANTAB), Cambridge Cognition Limited, Cambridge, UK). In about 1990, psychologists at the University of Cambridge, England, began to develop this set of computer touch screen tests. The same tests can be used in humans and monkeys because they don’t require verbal responses - and these tests include the paired-associates learning test, which is sensitive to an early Alzheimer’s condition. It is used by doctors to screen patients who show psychiatric symptoms. For example, people suffering depression have memory problems, yet they score well on this test. People with Alzheimer’s score poorly on the test, so it allows us to make a specific statement about Alzheimer’s.

EH: What are your plans for the future?

CP: We’re working closely with the pharmaceutical industry on the development of new cognitive enhancers, which improve memory and attention, particularly for those people who have trouble with these, which of course includes those in the early stage of Alzheimer’s. In the development of any new drugs there’s a pre-clinical stage, in which potential new compounds are used in specific behavioural tests to see if they affect the performance of animals. We use primates because, in evolutionary terms, they are a step closer to humans. The pharmaceutical industry recognises the importance of primate work in this area; in fact, Simona Spinelli who is conducting some of this research was a student of Professor Joram Feldon and Ms. Denise Hennig at the University of Cambridge, England, in early 1990. Simona Spinelli, at the Behavioural Neurobiology Laboratory of the Swiss Federal Institute of Technology, Zurich. EUROPEAN HOSPITAL interview: Denise Hennig

Christopher Pryce: We use paired-associates learning tests on primates. A task is presented on a touch-screen computer and the subject has to respond to stimuli - these are symbols that appear on the screen in certain positions. When a symbol appears the monkey touches it to show that it has seen it, and as it touches it, the symbol disappears. Then a second symbol appears which it must touch, and so on. Each of these has been presented in a specific position on the computer screen.

Then comes a memory problem: the same symbols that were presented once in a specific location are presented again on the screen - but each is now placed in different positions. By its behaviour, we can see how the monkey tackles the question: ‘Which position did I see that symbol in before?’. Touching the symbol at the location it was originally presented leads to the monkey receiving a reward (i.e. banana milkshake).

EH: Has this system been tested on humans?

CP: The test is developed deliberately for use on both humans and monkeys. The symbols are made up of abstract shapes and lines and of different colours. Because the test is non-verbal, it can be used in monkeys as well as humans. For humans, the idea is to make it as difficult as possible for the subject to think ‘That’s a square’, or ‘That’s a circle’. What they have to remember is the location, or relationship between a symbol and its position. And because he has to simultaneously remember several such relationships, then his working memory is challenged.

This appears to be extremely difficult for patients of Alzheimer’s including those in the very early stages - which standard methods for diagnosing this problem cannot recognise. The aim of our laboratory is to understand, in animals, how the brain controls normal behaviour and when it stops functioning correctly.

EH: How reliable is the test, and what effects does a diagnosis of the disease have on patients?

CP: It has been demonstrated with the market?
FRANCE - Researchers have found new cervical smear tests to be unreliable and conclude that these should not replace conventional tests (PAP smears). Their study also emphasises the need to improve the ‘hard evidence’ in studies of new technologies. It also has implications for the regulation of medical devices and clinical practice, as well as hospital laboratory economics.

The AxioCam MRc5 digital camera is met by the AxioCam MRc5, a colour camera with a high-resolution, 5-megapixel CCD sensor, according to the manufacturer Carl Zeiss. The camera and a fast FireWire data interface also enable connection to a PC or laptop.

A fast, live image of the microscope specimen is available and permits smooth handling and setting of the specimen on the microscope. Thanks to the AxioVision recording software, control of the camera is the ultimate in convenience, ‘the firm adds. Also, ‘...the camera, software and microscope can be upgraded with many software modules. With coloured images and colour contrasting techniques (e.g. polarization microscopy of metal or rock sections) in materials research, industrial inspection and the life sciences, this offers a new dimension in quality to documentation, evaluation and analysis.’

High-res colour photos of micro-specimens

Demand for fast, low-cost production of true-colour, high-resolution micrographs of light microscope specimens or colour contrasting techniques, is met by the AxioCam MRc5, a colour camera with a high-resolution, 5-megapixel CCD sensor, according to the manufacturer Carl Zeiss. The camera and a fast FireWire data interface also enable connection to a PC or laptop.

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The AxioCam MRc5 digital camera

Today’s test formats (gel technology, micro-test plates), plus laboratory electronic data processing and automation, are changing the classical format of blood group serological examinations significantly - and reduced the danger of life-threatening errors.

However, the degree of automation for blood group serological patient diagnoses, in hospitals or in prenatal diagnostics, has not kept pace. In the recently published annual ‘Serious Hazards of Transfusion (SHOT) report covering 2000-2001, 92% of English hospitals reported incidents or near-incidents during transfusions. 315 incidents were registered as occurring during transfusions. In 213 of these, the wrong blood type had been transfused. In 14% of these cases this related to incompatibility of blood group ABO. In 10% it was intolerance of the Rhesus factor B(D). The transfusion of incompatible blood in the ABO group led to one death and severe follow-on illness in three cases due to intravascular haemolysis.

Over five years, the SHOT analysis found that during 699 transfusion incidents, 11 patients died and another 60 became so ill that they were admitted to intensive care units (ICUs).

The SHOT report reveals that about 30% of mistakes and reasons for transfusion incidents emanated from hospital laboratories. Interestingly, over a third of mistakes occurred outside the lab’s routine hours, an observation that questions the experience of night and weekend staff to ensure technically faultless implementation of testing and interpretation of results. Analysis of mistakes shows that, within blood group serology (typing, antibody diagnosis, compatibility examinations), the reasons for the errors were very different.

In blood typing (ABO, Rh(D)) in most cases it was not the choice of reagents or technical procedures that led to the wrong results; it was unsuitable laboratory organisation (necessary controls not being performed, no cross-checks with previous results). The reasons for mistakes in antibody diagnoses (antibody search and identification) are more varied. This involved both unsuitable laboratory organisation, the fact that methods that were not sufficiently sensitive - such as those used to diagnose clinically relevant Kidd antibodies - and the technical failure of reagents, which led to

Global sales of prescription and over-the-counter drugs grew to $430.3 billion in 2002, according to the annual IMS World Review report, which tracks about 90% of all prescription drugs and certain over-the-counter products in over 80 countries.

North America, Europe (EU) and Japan accounted for 85% of audited worldwide pharmaceutical consumption in 2002. North American sales grew 12% to $202.5 billion - over half of all global sales.

European (EU) sales grew 8%, to $90.6 billion, whilst the rest of Europe saw a sales growth of 5%, to $13.3 billion. Japan had a 1% growth, to $46.9 billion. In Latin American sales declined 10%, to $16.5 billion, blamed on economic conditions, while pharmaceutical sales growth in Asia (excluding Japan, Africa and Australia) was $15.6 billion, up 11%.

The top-ten drug therapy classes accounted for 31% of the total audited world market.

Three of these - cholesterol & triglyceride reducers, anti-psychotics and erythropoietin products - each grew more than 10% each, with anti-ulcerants up 9%.

The anti-ulcerant class, covering stomach ulcer treatments, saw $21.9 billion sales last year, keeping it in the lead worldwide, as in the last 15 years. Last year anti-ulcerants represented 6% of all audited global pharmaceutical sales. Losec/Prilosec (omeprazole), the world’s leading anti-ulcerating agent, was number 1 in overall drugs sold, accounted for $5.2 billion of all sales in this class.

The second-ranked therapy class, cholesterol & triglyceride reducers, grew 12%, to $21.7 billion sales. Contributing to this growth was strong demand for Lipitor, a cholesterol treatment - and the top-selling drug worldwide. Lipitor sales were up 26%, to $8.6 billion. Anti-thromboplatin.

The third-ranked therapy class, experienced 5% sales growth, to $71.3 billion.

The top-ten best-selling drugs worldwide accounted for $44.7 billion in sales last year, an 11% percent increase over 2001. Within the total audited world market, Lipitor is the top-selling drug in 2002, with $8.6 billion in sales, compared with $5.4 billion in 2001. The cholesterol-lowering drug Zocor is ranked second, up 22%, to $6.2 billion in sales and 13% growth. Losec/Prilosec, the second-ranked drug in 2002, was the #2-selling product last year, with $5.2 billion in sales, a 15% decline from 2001. Of the ten best-selling drugs in 2002, the fastest growth worldwide, was for Zyprexa, a schizophrenia and bipolar disorder treatment. Sales rose 21% to $4.5 billion.

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transfusion incidents. The SHOT analysis also shows that the error rate during mass blood donations is very low. According to the authors, a carefully implemented quality management system (comprehensive validation of processes) and full automation of tests, including documentation, helped to lower error rates significantly.

As only 35% of English hospitals reported (2000) that they had automated their blood group serological examinations, the SHOT analysis concludes that the implementation of full automation could reduce the incidence of human error in hospital laboratories significantly.

Recent developments in equipment and technology not only fulfilled requirements for more safety and certainty in testing and documentation, but they also meet the special standards required in hospitals. These include:

● The highest level of flexibility through random access. With patient diagnostics in hospitals, unlike with donor diagnostics, it is not normally possible to combine individual samples into large test series; moreover, test profiles in hospital patient diagnostics are normally much more comprehensive and more heterogeneous.

● In daily hospital routine it is important that quick testing of emergency samples is given the highest priority and that full automation is constantly available, so that results can be achieved quickly even when there are staff shortages or lack of staff outside routine working hours.

● The presence of long-term storage of patient data and results, for comparison of new and old results and to check for discrepancies, as well as communication with IT systems, enhance the suitability of automation concepts for hospitals and, in future, will help to reduce the number of transfusion incidents.

Outlook - Whist molecular-biological methods for routine typing are increasingly used in transplant diagnostics and other medical fields - with serological methods moving into the background - classical methods, such as agglutination or solid phase techniques combined with automated solutions, will continue to play an important role in routine blood group serology. Molecular biological methods or chip technology will only be of significance for very specific examinations such as determination of very weak Rhesus-D features to D-partial antigens, within the area of donor and prenatal diagnostics in forensic medicine.

BioAnalytica

1st International Trade Fair and BioAnalytica Conference

Live drug transporters - bacteria that deliver medication to targeted body areas; a coating for tooth implants that promotes bone growth; biosioh to test the potential effects of a medication on particular patients, and miniature genetic point-of-care testing laboratories (POCT) for use during medical emergencies, were among exciting developments demonstrated by 270 exhibitors from 14 countries at BiobAnalytica.

The event, held in the New Munich Trade Fair Centre (April 1-4), is an offshoot of Analytica, organised by Munich International Trade Fairs (MITF). Covering the entire spectrum of life sciences, Analytica has quickly become a leading European attraction, said Klaus Dittrich, MITF's Managing Director. Visitors included service providers, and biotech specialists, industrialists, politicians, investors, and policymakers. Communication and networking were encouraged in a variety of meetings.

Human resources

A series of events, organised with the Association of German Biologists (vdbiol) and others, also offered advice about careers in the biotech industry and promoted personal contacts between job seekers and industry representatives.

About 32% of all BioAnalytica exhibitors are from countries beyond Germany, including the USA, Canada, Great Britain, Switzerland, the Netherlands, Scandinavia, France and Japan, and, during a lively ‘European BioRegions Day’ (involving representatives from Eastern Europe, Germany, France, Great Britain, Italy, Austria and Switzerland) there was a lively panel discussion about international competition.

The two-day BioAnalytica Business Conference focused on factors that determine business success in this advancing industry. Experts from economic, scientific and political sectors discussed trends and application as well as financing strategies, stock assessments, strategic alliances and partnerships, with a final discussion examining Europe's international role in biotechnology. (Not to be missed next year!)

Visit us at Euroanesthesia Glasgow or at www.datex-ohmeda.com to learn more about perspective solutions.
MI TREATMENT FOR benign prostatic hyperplasia

An interview with Dr Andre Roggan, head of research and development at Celon AG, and Dr Markus Mueller, consultant at the Urology Clinic at the University Clinic Benjamin Franklin, Free University Berlin. Venue: 1st International Workshop on Radio-frequency Induced Thermotherapy (RFITT) for the treatment of BPH

EH: What is the difference between bipolar radio-frequency induced coagulation and HF coagulation (MI) transurethral prostate resection with high-frequency resection loop (TUR-P)?

Markus Muller: TUR-P is the gold standard for the endoscopic treatment of benign prostatic hyperplasia, but this is not really a MI intervention. RFITT is not in direct competition with TUR-P, but it competes against other MI procedures - mainly in laser technology. Although the buzzword laser is very modern and mainly has positive connotations, there are disadvantages associated with laser procedures, which can be overcome with RFITT.

EH: What are the disadvantages?

MM: During a laser procedure, the surgeon gains little or no feedback from tissue and doesn’t know whether the dose used for tissue coagulation is actually sufficient. With RFITT, the great innovation is that, due to bipolarity, the equipment itself determines how long the coagulation procedure should last and can therefore be used with more precision.

The system has a function that measures the resistance of treated tissues as the current is applied. We know that this resistance correlates with the treatment’s progress, i.e. with the extent of the currently treated area. So the resistance is a direct benchmark for the therapy’s progress. During surgery, the system gives an acoustic feedback signal and the surgeon hears how the therapy progresses. At the end of the procedure, the machine switches itself off and gives the surgeon an acoustic signal - so he can be sure that tissue in the area where the equipment is currently being applied has been completely coagulated.

Apart from the acoustic signal, the temperature indicator, at the top of the probe, has another function. In the MI intervention, the surgeon receives direct feedback on the temperature development in the surgical area. The temperature is indicated on a monitor, in the operator’s direct field of vision, so the surgeon has twofold control during the whole operation.

EH: Very gentle for the patient...

MM: Yes, and - depending on a patient’s anamnesis - the procedure can also be carried out under local anaesthetic. Through optimum positioning of the flexible probe, in the operator’s direct field of vision, so the surgeon has twofold control during the whole operation.

EH: Could the temperature rise too far?

MM: Not at all! This is usually a problem in laser therapy when the length of application is based on previous experience. Too much laser and the tissue carboneises, so not enough energy gets into the tissue, which means that not enough tissue has been removed. This cannot happen with RFITT, because we can apply therapy for precisely the right amount of time. It is more exact and much faster than laser therapy, and more
comfortable for the patient, due to the shorter treatment time and less time spent under anaesthetic. All of which also makes things easier for the surgeon - and it's more cost-effective because it takes less time for us to carry out the procedure.

Andre Roggan: A further safety mechanism for the surgeon and patient is the performance and process regulation, which is independent of impedance and allows us to achieve reproducible coagulation figures. The system is characterised by its bipolarity - two electrodes, enabling current flow, are combined in one instrument. This means that electric current flows only in the precise area, and only this area heats up - as opposed to the classic HF surgical instrument with a single-pole connection. This means that the electric current flows through the whole body and can, in certain circumstances, cause vegetative irritations or burns near the conduction electrode. Single-pole HF technology cannot be used on patients with pacemakers - but our bipolar RFITT can be used without any problems.

EH: Are there further innovations for this technology in sight?
AR: There are always challenges. We can ask whether it is possible to reduce the number of necessary punctures; whether it will be possible to remove larger volumes in a shorter period of time, or whether efficiency can be increased to reduce operating times - less strain on the patient and lower costs. There is also the possibility that the procedure could be used in other medical fields.

We are already working on procedures for tumour treatment - the first probe for this is already in use, but not in urology. Another field will be ear, nose and throat (ENT) medicine. The probe used there is based on the same RFITT technology used to treat tumours - previously treated only palliatively. We also have projects based around liver metastases and liver tumours. So, we have a lot to do.

as the mesentery, peritoneum or omentum prior to cutting. Erbe reports that preparation, dissection and supply of individual vessels usually can be dispensed with, because coagulation is quick and effective. The procedure can be carried out during open surgery as well as laparoscopy. The Erbe VIO System supports BiClamp via specific software and hardware.

Tissue to be separated is grasped by the branches of the BiClamp and coagulated. The VIO software provides effective waveforms and voltages for an optimal coagulation result. The patented Auto Stop function automatically halts coagulation while ensuring safe haemostasis and thereby preventing lateral thermal damage. The instrument is then opened and tissue within the visibly coagulated area is separated mechanically. In the case of highly vascular structures it may be helpful to carry out two BiClamp coagulations, one next to the other, and then to separate the tissue between the coagulation seams, the firm adds.

Coagulation with BiClamp is so effective that an additional ligature or a supplementary conventional coagulation is often not required, Erbe concludes.

FDA clears vaginal oestrogen therapy

USA - The FDA has approved Femring, the first vaginal oestrogen product designed to treat menopausal hot flushes and vaginal symptoms. Developed by Galen Holdings, the flexible ring delivers oestrogen at a constant rate over a three-month period.

... but holds on hypogonadal treatment

Meanwhile, an FDA decision regarding approval for Tostrex testosterone gel, made by Cellergy, was postponed by 90 days (till June), to allow time to review study data submitted by the firm in January. Tostrelle, a testosterone gel to treat female sexual dysfunction, is in a Phase II/III clinical trial in the US.

EU okays Levitra

The European Commission granted marketing authorisation for Levitra (vardenafil HCl), from GlaxoSmithKline and Bayer Pharmaceuticals. The firms will now launch the oral treatment for erectile dysfunction in major European markets. Levitra received tentative approval in the USA last July, but has not been approved.
Prostate cancer, the most common neoplasms in men, often progresses from an androgen-dependent state (androgen deprivation therapy) to an androgen-refractory stage, thereby making hormone therapy ineffective. The response duration to androgen deprivation therapy is finite and ultimately most prostate cancer will become hormone-insensitive.

Therapy of hormone-refractory prostate cancer has been very disappointing for both patients and physicians. If hormone-refractory prostate cancer is dominated by osseous metastases, leading to bone pain and pathological fractures, nowadays many patients present with rising serum PSA values alone despite hormone therapy. Thus tumour burdens may vary substantially between patients, although all are termed as having hormone-refractory (or resistant) prostate cancer.

Until now, hormone-refractory prostate cancer was considered non-curable and most forms of treatment aimed only at improving quality of life of patients who commonly had painful bone metastases at this stage. Indeed no effective standard treatments are currently available for patients with hormone-refractory prostate cancer. Median survival is around one year from onset at that stage. Recently rapid advances in the management of hormone-refractory prostate cancer have been achieved and new therapeutic modalities are investigated.

We present here the significant and most important aspects of these improvements in hormone-refractory prostate cancer.

## 1. Recent chemotherapy trials in hormone refractory prostate cancer

<table>
<thead>
<tr>
<th>Authors</th>
<th>Chemotherapy agents</th>
<th>Year</th>
<th>Number of patients</th>
<th>Type of trial</th>
<th>PSA response rate/ time to progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berry et al</td>
<td>Mitoxantrone</td>
<td>2002</td>
<td>120</td>
<td>Phase III</td>
<td>50%/8.1 months</td>
</tr>
<tr>
<td>Di Paolo et al</td>
<td>Mitoxantrone</td>
<td>2002</td>
<td>22</td>
<td>PSA progression after local therapy</td>
<td>45%</td>
</tr>
<tr>
<td>Petrylak et al</td>
<td>Eustamustine-Docetaxel</td>
<td>1999</td>
<td>34</td>
<td>Phase II</td>
<td>63%</td>
</tr>
<tr>
<td>Beer et al</td>
<td>Docetaxel-Calcitriol</td>
<td>2003</td>
<td>37</td>
<td>Phase II</td>
<td>59%/11.4 months</td>
</tr>
<tr>
<td>Milikan et al</td>
<td>Ketoconazole-docrubin vs Paclitaxel-Estramustine-etoposide</td>
<td>2003</td>
<td>75</td>
<td>Phase II</td>
<td>30%/16.1 months</td>
</tr>
</tbody>
</table>

However, new chemotherapy agents such as the taxanes or the combination of mitoxantrone and corticosteroids have changed these old concepts dramatically. There is clearly an emerging, renewed enthusiasm for the role of non-hormonal therapy in hormone refractory prostate cancer.

Mitoxantrone and prednison might potentially delay time to treatment failure, especially in asymptomatic patients when the tumour burden, is logically smaller than in extensive disease. However most studies failed to observe significant differences in median survival.

Combination chemotherapy with paclitaxel, estramustin and carboplatin is one the many investigated. Other regimens have been used in many different disease settings to alleviate pain but they also play a key role in oncology. Zoledronic acid, a new powerful biphosphonate, has been studied in a randomised, placebo-controlled trial in patients with hormone-refractory prostate cancer to prevent skeletal complications. At a dose of 4mg, zoledronic acid hormonal therapy.

Two years ago, a randomised study using docetaxel and estramustin, in a selected group of patients with advanced androgen-independent prostate cancer, was among the first to demonstrate a significant benefit in terms of survival (28 months versus 14). Strontium-89, a radioactive analogue of calcium selectively irraduates metastatic sites in the bone, while generally sparing normal bone tissue.

## INCONTINENCE

Various incontinence devices help with hygiene, skin damage, social problems and skin damage. These include:

- Absorbent products (pads, diapers, diaper briefs, bed pads)
- Deviating devices (catheter, urihealth)
- Mechanical devices (pessary, penis clamp, sphincter prosthesis).

Absorbent disposable (table 1) are used by about 80-90% of patients with therapy-related incontinence. These products should be sufficiently soft and fast absorption plus fluid transfer and retention, and should be skin-friendly. They also need to be discreet and body-shaped, easy to handle and to dispose, and finally economical.

### Table 1: Overview over product groups, indication and fixation

<table>
<thead>
<tr>
<th>Product group</th>
<th>Indication</th>
<th>Fixation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pads</td>
<td>Minor forms of incontinence. Bedridden and mobile patients (home care)</td>
<td>Elastic net pants, closely fitted to the body to prevent leakage</td>
</tr>
<tr>
<td>Pads fitted, small</td>
<td>Light incontinence. Discreet care for persons who want to participate in social life</td>
<td>Elastic net pants</td>
</tr>
<tr>
<td>Pads fitted, medium to large</td>
<td>Medium to severe incontinence. For people who want to or must care for their pants</td>
<td>Elastic net pants for easy change</td>
</tr>
<tr>
<td>Incontinence briefs (= all-in-one; similar to baby diapers, highly absorbent)</td>
<td>Extreme urinary and every form of faeces incontinence. Absorption capacity very high</td>
<td>Different fixations, adhesive tape tabs</td>
</tr>
<tr>
<td>Bed pads (available in different sizes)</td>
<td>Bed-ridden</td>
<td>No fixation necessary</td>
</tr>
<tr>
<td>Textile products (briefs or pants that can be worn with a disposable diaper)</td>
<td>Intensive nursing; bed protection</td>
<td>Different fixations</td>
</tr>
</tbody>
</table>

### Table 2: Requirements for absorbent products

<table>
<thead>
<tr>
<th>Briefs</th>
<th>Minimum requirements according to the German list of medical aids and appliances</th>
<th>Average value brand products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total absorption capacity</td>
<td>750 ml</td>
<td>1,180 ml</td>
</tr>
<tr>
<td>Wetting &lt; 2 g</td>
<td>0.7 g</td>
<td></td>
</tr>
<tr>
<td>Absorption speed</td>
<td>3 ml/sec</td>
<td>5.3 ml/sec</td>
</tr>
</tbody>
</table>

### Use of incontinence devices

Incontinence does not automatically mean mental illness or inability to participate in professional or social life. Particularly when the incontinent person wants to participate in professional and social life and contributes to the medical insurance system An incontinence device must meet individual needs, and the following aspects must be considered, to select the appropriate material:

- Quality and quantity of the voids (faeces? urine? both?)
- Change frequency: material is changed more often in the day than in the night, i.e. a product for the day might not be as absorbent as for the night.
- Handling: for self-care patients pads that are fixed to net pants are better than briefs. Briefs are more suitable for mobile patients.

* cf: Melchior, Hansjörg and de Geeter, Patrice: Qualitätskatalog 08 (Gesellschaft für häusliche Praxis e.V.)

Miktionsstörungen & Harninkontinenz - Diagnostik und Therapie in der hausärztlichen Praxis, pm Verlag, August-Schäfer-Str. 8, 60439 Frankfurt/Main

**NEW AVENUES**

**HORMONE RESISTANT PROSTATE CANCER**
And finally...

Bicycles and erection disorders

Unsuitable bicycle saddles can disturb blood circulation in the genital area, thus causing erection disorders for long-distance bikers, according to a new study carried out by urologists at Cologne University Hospital. The narrower the saddle the greater the pressure on testicles. Bikers are therefore advised to use a well-cushioned and ergonomically formed saddle, adjusted to the correct height; to frequently change between standing and sitting in the saddle and to take regular breaks from cycling.

Source: The maker of a homeopathic remedy, called Virgil, made from chasteberry combined with picric acid - said to be helpful in potency problems caused by fatigue.

Drivers and cystitis

People who suffer circulatory disturbances or neurogenic problems in the pelvic region - and who spend lots of time sitting in cars - are at risk of developing chronic cystitis, which may be caused by air conditioning set at the wrong temperature. So says a director of occupational health working for a major car manufacturer. Air streaming from the car floor can make people's pelvic floors too cold (summer) or too hot (winter) and, if the body cannot react well to temperature changes bladder inflammation can result. Although air conditioning is often overlooked in diagnosis, the health expert says it's easy to eliminate as a cause.

EUROPEAN HOSPITAL
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UROLOGY

The diagnosis of kidney and urinary tract problems can be particularly difficult when young patients are involved. Ultrasound, as the imaging choice, can provide clear images to help decide for or against surgery, thus saving time and patient stress. A new (German language) book focusing on ultrasound diagnosis of the kidneys and urinary tract collection system in children, presents 23 cases, covering diseases that range from tract infection to varia. Ultrasound images are accompanied with brief disease descriptions and symptoms, as well as some preliminary diagnoses and therapeutic outcomes.

Heidi Heinhold, who reviewed the book for EH, concludes that radiologists or paediatricians who do not speak German could nonetheless gain worthwhile insights from this book.

2. Possible cascade of therapy in hormone-resistant prostate cancer

Confirm testicular androgen suppression

- Discontinue anti-androgen therapy; anti-androgen withdrawal responses have been reported after cessation of the use of the anti-androgen. These may activate specific mutant androgen receptors cloned from prostate cancers.

- Oral chemotherapy + anti-androgen: estramustine phosphate is well-known conjugate of a nitrogen mustard and estradiol, whose mechanism of action is likely antimitic, specifically by binding to microtubule associated proteins. Estramustine phosphate is often used in combination with other agents, then using intravenous chemotherapy (see further).

Adrenal androgen inhibitors

Aminogluthetimide, ketoconazole and corticosteroids act through this pathway (although corticosteroids may have direct actions as well). Ketoconazole is used in combination with corticosteroids. Corticosteroids are also used in combination with chemotherapy as well as other agents such as mitocantrone.

Consider chemotherapy

Mitocantrone + corticosteroids, Estramustine combinations (+ vinblastine, oral etoposide, cyclophosphamide, taxanes).

Consider using bisphosphonates during hormonal therapy and in hormone-resistant prostate cancer, to prevent skeletal events.

Radio-isotopes - Strontium for decreasing painful metastases or in combination with chemotherapy.

New targets and investigational drugs

- Anti-endothelins, CDK inhibitors, anti-angiogenesis, use of immune therapies such as dendritic cells, gene therapy protocols.

Palliative care - The current trend is the transformation of hormone-refractory prostate cancer in a chronic stage, namely in a stage not curable but which is controllable by new therapeutic agents. The next step will be the emergence of truly effective therapies with a direct impact on survival, which unfortunately has not been achieved so far with any of the drugs or agents.

E-mail: azlotta@ulb.ac.be
Wheelchair guidance by facial movements

Visual interfaces facilitate natural and simple interfaces for human-robot interaction. Nowadays there are many applications using these, such as teleconferencing with improved visual sensation, virtual reality systems, lip readers, assistance for mobility assistance for the disabled, etc. The use of head movements and gestures offers a natural way for severely disabled people, who cannot use a joystick, to control an electric wheelchair.

System architecture (Fig.1)

Facial images are acquired via a CCD colour micro camera, placed in front of the user. These are digitised by a frame-grabber and loaded onto a Pentium memory PC. To locate the head in the image, an original skin colour segmentation algorithm - the Unsupervised and Adaptive Gaussian Skin-Colour Model (UAGM) - is used. This segments any skin colour, under changing light conditions and random backgrounds, in an unsupervised and adaptive manner. To achieve this, a stochastic adaptive model of the skin colour in a normalised red, green (RG) colour space is adjusted for the user, using a clustering process. Then the parameters of the model are adapted by a linear combination of those known and using the maximum likelihood criterion. A 2D facial tracking is applied to the skin blob and, depending on its state vectors, a fuzzy detector of head movements activates the transitions of a high control state machine, which generates the wheelchair’s linear and angular speed \( (V_{cmd}, W_{cmd}) \).

Applying the Kinematic model, linear and angular speed become angular speeds for each wheel \( (w_r, cmd, W_{cmd}) \) and are sent to the low level control. At this level a PI controller has been designed to control the velocity of each wheel. A visual feedback loop can be clearly seen as the human user reacts to changing circumstances.

Fuzzy commands generation

Applying the criteria of simplicity and robustness, and taking into account the disabilities of an intended user, the estimated minimum number of commands necessary to guide a wheelchair are: on/off, forward/backward and speed commands (turn left/right and increase/decrease speed).

Head, eyes and mouth movements, e.g. hiding the lips and winking an eye at certain intervals (the latter not covered in this report), have been chosen to activate speed commands, direction and on/off commands. Thus, if the user turns his head to the right or left the wheelchair will turn in that direction. Head rising and lowering controls the increase and decrease speed of the wheelchair, commands shown in Fig.2(a); the 2D face tracker calculates the following parameters: centre of gravity \( (x,y) \), horizontal and vertical size of the skin blob \( (h,v) \), to obtain its position and orientation. A zero-th order Kalman filter is used to estimate two independent state vectors, one of them for the horizontal variation \( (x_h, -1(x)) \) and the other one for the vertical variation \( (x_v, -1(v)) \). Thus reducing computation time. Derivatives of the estimated state vectors \( (\dot{x}_h, \dot{x}_v) \) are the fuzzy inputs for a Sugeno detector with an output. It controls the transitions of the machine which is responsible for generating commands. The last transition \( (\text{trans}(n-1)) \) is an extra input that controls the rules used by the detector each time. The knowledge-base of the fuzzy system is made up of the initial calibration process that normalises all the input variables within a range \([-1,1]\).

Each input variable has three membership functions (Neg, Zero, Pos). These functions are adjusted in an experimental way and fuzzy rules are chosen by direct observation. Fig.2(b) shows a detection sequence of several head movements, as well as the temporal evolutions of the state variable derivatives used in the fuzzy detector. The state machine generates linear and angular speed \( (V_{cmd}, W_{cmd}) \) as a function of time and the command activated.

Turning commands modify angular speed in fixed quantities each 100 m/s, and depending on the direction and on/off states. Acceleration and braking commands work in a similar way but with the linear speed. Speeds are saturated to a pre-arranged limit, to improve the system’s security.

Experimental results and conclusions

The vision system process up to 25 images per second, with a resolution of 128x128 pixels. Ten commands per second are issued to the low level controller. The maximum wheelchair linear velocity was set at 1 m/s and the angular at two rad/s.

To increase safety during navigation, the prototype wheelchair is fitted with an ultrasonic ring and bumpers. After some training on a simulator, eight users tested the system in the labs and corridors of the Electronics Department. The run performed by one user, and the evolution of the wheelchair’s linear and angular velocity, can be seen in Fig.3. The test lasted 100 seconds, taking five samples per second.

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Minimally invasive endoprosthetics

Early in the history of endoprosthetic hip and knee replacements almost exclusively had cement fixations. Now the objective is to replace only the areas of joints actually affected by arthritis and which cause a patient pain.

Apart from the conventional, cemented and non-cemented, fixed total endoprostheses, in our clinic we increasingly use a ‘resurfacing’ replacement as an alternative. A typical indication for this may be a young patient who has developed arthritis following an accident. In that case, it is initially sufficient to resurface the femoral head and replace the cup without cement fixation, to preserve as much bone substance for any subsequent surgery that may become necessary at a later stage.

For knee joints it is possible to only replace the particular part affected by arthritis with a small incision. We use uncondylar, a minimally invasive (MI) prosthesis that allows removal of as little bone as possible and, from a biomechanical point of view, facilitates a very natural joint movement. This implant can significantly shorten the time it takes to restore full functioning of the affected leg, as the MI procedure also enables early postoperative follow-up treatment.

The objective and focus of our working group is to improve implantation precision through navigated use of new generation prostheses, whilst minimising access trauma. For knee joints we studied synthetic and cadaver bones, to compare the precision of the different navigation procedures and for comparison with conventional saws. With implantation of hip resurfacing prostheses, we have succeeded in placing the guide wire which must be inserted centrally into the femoral neck with the new navigation procedures in actual surgery. The concrete aim of our research is the development and clinical realisation of the complete navigation for the prostheses mentioned. At the same time, we plan to minimise the access areas needed for prosthesis implantation, due to the surgeon gaining better orientation from the navigation system.

At the first international congress on minimally invasive hip and knee replacements (March 2003), Professor P. Eysel, Dr D. P. Koenig and Dr F. Popken, described their work on developing minimally invasive endoprosthetic surgical techniques.
During the past decade total hip replacements have increased, even for younger patients with degenerative joint disease. Due to new bearing surfaces, such as the ceramics-ceramics combination, the range of postoperative free movements is gaining importance, particularly for younger patients.

With ceramics bearing surfaces, the load edge needs special attention, so more precise implantation is necessary. Apart from infection, dislocation represents one of the main postoperative complications, resulting in delayed mobilisation, extended rehabilitation time or, if recurring, even revision surgery, which may cause significant stress for patient/doctor. In recent studies, joint instability is shown to occur in 1.5-4% of all first hip replacements and revision surgery can increase up to 26%, which may have considerable socio-economic and psychological consequences.

Apart from implant positioning, the geometry of the prosthesis is decisive for a free range of movements. Thus, the prosthesis head size is as crucial for the development of a luxation as is the relation of the head to its neck. The bigger the head, the greater the freedom of joint movement, without which the
disadvantages, such as the need for placement of fiducial markers, increased operating times and higher overall costs have to be resolved for the future.

**Surgical Technique**

**Placement of fiducial markers**

To facilitate orientation, the robot requires placement of a femoral and a tibial pin that serve as fiducial markers. The pin design is a self-tapping bone screw to which a special CT cross can be affixed. This will be detected by later computed tomography. The pins are placed in the femur by an anterior approach and into the tibia via an anteromedial approach (figures 1-2). The stab incisions are positioned in such a way that they can later be incorporated into the primary surgical incision. The robot uses these pins for spatial orientation and performs geometric calculations based on their location. To maintain the pins in the required stable position, they are placed bicortically. The incisions are closed over the pins and the main incision is performed on the following day. Placement of both pins takes about 15 minutes on average. Major problems or complications were never encountered during the pin placement procedure. No stress fractures at the pin sites were observed in the follow-up period.

**CT-scan and preoperative planning**

A helical CT scan is obtained immediately after the pins have been placed. Particular attention is paid to the areas of the femoral head, pins, knee and ankle. A calibration rod is placed next to the extremity. The rod helps to control the CT scan quality, in terms of motion artefacts. The average time for the preoperative CT scan is 15-20 minutes. During imaging, our patients are maintained under a spinal or epidural anaesthesia from the pin placement procedure, greatly reducing the risk for motion artefacts. However, if the CT unit is too far from the operating room the CT scan can certainly be taken at any later time without anaesthesia.

The CT data are then transferred into the PC-based planning station. The scan's technical quality is automatically checked and the pin position verified. The surgeon identifies specific anatomical landmarks and the anatomical and mechanical axes of the femur and tibia are calculated in the frontal and sagittal planes. The joint line, epicondylar twist (angle between epicondylar line and posterior condylar line), torsion of the tibia (angle between dorsal part of the tibial plateau and a line through the centre of the ankle), as well as the relationship of the dorsal part of the tibia and the condylar line, serve as additional important parameters. All angles and possible geometric translations are displayed on the video screen at the end of the planning procedure (figure 3).

The system allows the user to select and position a specific implant size. One needs to decide on the required degree of femoral and tibial external rotation to assure central patellar tracking. Either a classical or anatomical joint line plus the amount of dorsal slope may be selected. Unintentional notching can easily be avoided. With computer-assisted planning, the strong 'extension' and 'flexion gaps' and the resulting ligament tension. This feature of the planning software enables the surgeon to anticipate the amount of intraoperative soft tissue balancing.

After positioning the implants, it is important to specify the milling areas, to avoid redundant cutting and to protect surrounding soft tissue. As a last step, the system prints out an overview of the final plan. All data are stored on a PC card and transferred to the robot control unit immediately before surgery. After an initial learning period the preoperative planning procedure requires about 15 minutes.

**Robot-assisted surgery**

A conventional median incision with parapatellar approach to the knee joint is used. The knee joint is secured by a transfemoral and transtibial self-cutting screw to a specially designed frame. This rigid frame is also used for fixation of self-holding soft-tissue retractors.

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**Continued on page 20**
A range from 35º to 55º was simulated for the inclination of the acetabulum. The acetabular anteversion was simulated from -10º to +20º. The CCD angle was simulated between 115º and 145º and the anteversion between -5º and 35º. The CD of the range of the thigh was analysed as follows:

- flexion: 0º - 110º internal/external rotation: 60º - 0º - 60º abduction/adduction: 60º - 0º - 60º

The calculation is a sequential impact observation, in relation to a computer generated range of interest (ROI). This is derived from intraoperative data and from the planning of the planned movement range. The computer programme was based on Borland C++. The basis for processing individual patient data is a non-commercial programme developed by Orthopaedic Services, through which anatomically adapted endoprosthesis are developed. The platform for the whole programme is MS-DOS, but the programme also runs as a task under Windows 95/98, ME, NT and 2000. For up-to-date application, the calculation time is in the order of magnitude 1. Depending on the rhythm frequency, simulation time of a data record is between 30 sec to 4 min at 0.1 GHz up to 4 hours at 75 MHz. The system has an open data port for postprocessing of patient data, with customary spread sheets (EXCEL) to represent and evaluate the data.

Results

These demonstrate that a practical method could be introduced with the virtual computer simulation. The results are plausible and correspond in the clinical experience.

Some examples of Movement Mapping (MM):

- In a simulation with a shaft CCD angle of 125º and an anteversion of -5º, the motion range with an acetabular position of -10º anteversion and 35º inclination is clearly lower (above) than with a acetabular anteversion of 20º and 30º. Independent of all other parameters, the calculation of the influence of the CCD-angle shows an optimal motion between 120º and 130º. Independent of all other parameters, the calculation of the influence of the acetabular anteversion shows an optimal motion between 10º and 20º.

Discussion

The contact free range of motion has special clinical relevance for patients with an aseptic hip replacement. The theoretical angle freedom of movements of the endoprosthesis components in two vertical levels was stated for semi-circular acetabulum with 110º. However, these calculations only allow for limited conclusions about the complicated axis environment in situ. With fully or partially

MOVEMENT MAPPING

continued from page 19

Intraoperative difficulties can be caused by a very tight quadriceps muscle or patellar tendon. To control for unwanted leg micro-movements during robotic surgery, rigid bodies with reflective spheres are firmly attached to the robot frame. The passive markers are constantly monitored by an infrared camera system which will automatically shut off the robot in the event of excessive motion (figure 5).

After registration of the fiducial markers, robotic surgery is started by the surgeon. As a safety measure, the surgeon must constantly depress the robot button on a sterile remote control, to control the surgical action. The cutting tool is equipped with internal water-cooling and irrigation. A splash-guard helps to keep the operative field and reflective spheres dry and clean (figure 6). Milling heads are changed during the procedure depending on the type of cut to be made. Varying with the size of the implant and bone density, the entire milling procedure takes approximately 18 minutes. If required, it is possible to revert to conventional manual technique at any point during surgery. The resulting bone surfaces are accurately shaped and smooth (figure 7). After the fixation frame and pins are removed, soft tissues are balanced in the classic technique, according to the prothetic plan. The components of the implant are then inserted.

First clinical results - After a developmental phase in 1999 and a series of successful experiments on phantoms and cadaver bones, a prospective clinical study was started in March 2000 at the Kassel Orthopaedic Clinic. The first clinical robot-assisted TKR was performed on 27 March 2000. Since then, 70 robot-assisted TKR's have been performed in 69 patients (48 women, 21 men). One female patient received simultaneous, bilateral TKR. The average age in the robotic group was 66 years (46-87 years). The manually operated historic control group consisted of 52 patients (40 women, 12 men) - average age 68 years (48-82). The indication for TKR was idiopathic gonarthrosis in all cases. The L.C. Search Evolution knee-system (Aesculap, Tuttingen, Germany) was used for all patients in the robotic group, because this was the first knee implant system geometry that was loaded into the planning software. All patients in the historic manual control group received NexGen (Zimmer Inc., Warsaw, Indiana, USA) implants. All complications during surgery and in the postoperative course were recorded. Patients were scored before and after surgery according to the Knee Society Score.

Before and two weeks after surgery, standing long-leg anteroposterior roentgenograms were taken of all patients to control for correct alignment (figures 8 a+b, 9 a+b). The mechanical leg axis was measured on these X-ray films and directly compared to the preoperative plan. Data were statistically analysed by using a two-tailed Student's t-test. Statistical significance was assumed at a p-value smaller than 0.01.

We can foresee that surgical robots and navigational systems will be combined in the future. This approach would use the full potential of both computer-assisted systems.

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ADVANCED THERAPY PLANNING IN hepatic surgery

The planning of hepatic surgery of primary and secondary liver tumours is a multimodal process, using modern imaging techniques - mainly contrast enhanced imaging such as CAT and MRI - depending on the patient's individual situation as well as on the experience of the medical personnel who are planning the therapy. New surgical strategies, such as segment oriented and parenchyma-saving resections of tumours and split liver transplants, created the need for preoperative surgical planning for each individual patient.

Due to recent developments in the quality of CAT-technology, PC-based high-performance computer technology and semi-automated software for liver segmentation, virtual and interactive liver surgery planning is now generally available for surgeons. This clinical application is convincingly demonstrated by software developed as a research prototype at MeVis, Bremen, Germany, for hepatic surgery planning.

The Somatom Sensation 16 multislice scanner (Siemens Medical solutions, Erlangen) provides highly defined abdominal images, showing the liver, vessel structures and the individual lesion. It was found that the optimal ratio between signal and noise is achieved with a slice thickness of 2 mm for venous contrasted images, and 1 mm for arterial contrasted images. After anonymisation, images are transferred, by a high-speed internet connection, to MeVis for image processing and the creation of a virtual 3D model of the individual patient’s liver anatomy.

The software has two components: HepaVision and InterventionPlanner. Liver and tumour segmentation are performed with a modified live-wire approach, a semi-automated contour finding algorithm. The live-wire contours are interactively determined on a slice about every 10 mm and the contours of intermediate slices are automatically interpolated and optimised. Analysis of the contrast-enhanced vascular systems utilises image filtering, segmentation of the vascular structures with a sectionally increasing algorithm, the determination of main vascular lines, and structural analysis and separation of the resulting vascular trees. This analysis includes the identification of eight major branches of the portal vein, branches of hepatic veins and arterial supply, allowing for a liver segmentation of individual blood supply areas, related to Couinaud’s scheme. Vascular areas and volumes for each vascular region can be calculated separately. A risk analysis is then performed. Based on the determination of vascular structures and their dependant areas, volumetric information can be gained for tumour resections with different safety margins (Fig. 1).

All results are managed by HepaVision and can be displayed in a freely rotating 3D model, or superimposed on the 2D slices. Image analysis takes under an hour, on average. InterventionPlanner, the second software module, utilises the segmented data to provide interactive generation of resection proposals, with arbitrary safety margins around the tumours and user-defined cutting lines. The volume of remaining liver parenchyma is calculated separately for each resection proposal. (Fig. 2).

The process of oncological liver resection planning is in clinical use at our institution. Virtual resection planning provided valuable information particularly for surgical decision-making in cases of more than one liver metastasis, or of tumours located close to the liver hilus. Precise calculation of the liver volume remaining after different surgical scenarios provides a perspective of potentially curable surgical interventions for an increasing number of patients.

A study of virtual surgical planning vs. the conventional approach is currently underway. *Researchers D Wetzel, U Stangl, H Feussner at MITI (www.miti.med.tum.de), and A Schenk and H O Peitgen at MeVis Centre for Medical Diagnostic Systems and Visualisation, Bremen (www.mevis.de)
Improving blade geometry

Komet Medical report that the firm’s K-2000 saw blade has been further improved, and that a completely new blade geometry for ‘Evolution’ has been developed, to provide an even smoother and more controlled penetration into bone. ‘An increased number of teeth ensures smooth running; blade wobbling is avoided,’ the firm points out. ‘The TiN-coating on the teeth (fig. 1) increases efficiency of sawing due to higher stability. The saw blade maintains its sharpness, achieving an optimum quality cut. Additionally, the coating minimises material abrasion.’

The matt and non-reflective surface eliminates reflection from theatre lights. The saw blade openings increase the field of vision during surgery and reduce heat generation. The high bending resistance for even, precise cuts has not changed, which allows for a precise prosthetic fit, the firm continues, adding: ‘The Evolution saw blade features a uniform blade and cut thickness (zero offset) and can be optimally guided in the template allowing a perfect cut and eliminating damage or heat generation. All blade thicknesses from 0.89 to 1.47 mm cut zero offset (fig. 2).’

For optimum results, a new saw blade is recommended for each operation, but Komet Medical says this saw blade can be used several times - until the TiN-coating starts to ‘come off’, then the blade should be replaced. A FREE sample is available from the Komet Medical catalogue, which also shows a wide range of saw blades (see fig. 3) for the most popular power systems: cutting depth: 50 to 90 mm, width:13.00 to 31.20 mm. Blade and cut thickness: 0.89 to 1.47 mm. Catalogue details: info@kometmedical.de

80% of sharps injuries are avoidable

Injuries caused by needles and other sharp medical devices - and the related risk of potentially fatal disease transmission - remain a major threat to medical staff. A film shown at a recent seminar on this subject revealed that between 60-80% of sharps’ injuries are unreported and over 80% of those accidents were avoidable.

Now a campaign against sharps’ injuries is underway, organised by Eucomed, along with the Standing Committee of Nurses of the EU (PCN), the European Dialysis and Transplant Nurses Association/European Renal Care Association (EDTNA/ERA), European Medical Association (EMA), International Alliance of Patients’ Organisations (IAP), European Federation of Public Service Employees (EUROFEDO) and European Institute of Medicine (EOM).

They are asking EU institutions to communicate clear policy and requirements to EU Member States to ensure consistent compliance with existing EU Worker Safety and Health Directives among EU healthcare providers, and in particular, to provide better information/education on the risks of exposure, prevention methods and effective incident reporting to ensure safer working practices: use of protective clothing, safe disposal and effective response in case of injury to use ‘sharps protection’ technology, particularly for high-risk medical procedures.

Dr Francisco Jesus Alvarez Hidalgo, Principal Administrator, Commission DG Employment and Social Affairs, pointed out that, in general terms, existing EU worker health and safety directives are sufficient. ‘There is a good piece of legislation and if we manage to implement it, it would be a very important step forward... a current challenge is to emphasise the improvement of workers’ training and awareness, the spread and diffusion of good practices and guidelines.’

MEP Mrs Malliori added: ‘I think that the most difficult part in our discussion has to do not only with directives, the legislation and guidelines, but also with their implementation. Do the Member States have the facilities or the funding to react, to implement or to monitor what we decide? Usually, we are very quick with legislation and we don’t care about implementation.’

Source: Eucomed

ROBOTIC SURGERY TRAINING

Robotic technology has helped to advance MIS - particularly for the very small anatomies of children. Among the newest innovations is the Socrates Robotic Telecollaboration System, which integrates telecommunication equipment, networked surgical devices and robotics, to enable remote teaching and surgical cooperation.

This spring, during paediatric endoscopic surgery training, this equipment was used in international linkups between Robert Banieghbal, surgeon at the Chris Hani Baragwanath Hospital, Johannesburg, South Africa, and Benno Ure, Professor of Paediatric Medicine at the Hanover Medical School, Germany.

The system’s manufacturer, Computer Motion Inc, specialises in the development of robotic surgical systems and provides equipment to 900 customers and 3,000 surgeons in 32 countries. The firm said this was the first international use of telecollaboration to introduce this new technology and MIS procedures to paediatric surgeons globally.

During the procedure, the operating surgeon fully controls the surgical instruments, but, via voice commands, the collaborating remote surgeon can also control Aesop, the robotic arm holding the endoscopic camera positioned inside the patient. Both surgeons see the same magnified area of the anatomy during surgery.

Three procedures took place, on 1-3 year-olds, including laparoscopy on a 2-year-old girl suffering severe gastro-oesophageal reflux (acid reflux). Mr Banieghbal, who is experienced in Nissen fundoplication procedures, also performed his first Thai procedure on a one-year-old boy, under real-time guidance from Prof. Ure. ‘This is a fantastic way to further surgical training,’ he said later.

Computer Motion also produces the Zeus Surgical System for MIS, and the Hermes System Centre, a centralised system that enables a surgeon to voice control a network of smart medical devices.
Birmingham, UK - Giving interleukin-2 receptor antibodies to patients after a kidney transplant can halve the risk of rejection, according to a study published in the British Medical Journal (Interleukin-2 receptor monoclonal antibodies in renal transplantation: meta-analysis of randomised trials BMJ Volume 326, pp 789-91).

Consultant Nephrologist Dwomoa Adu, and a team of researchers at the Nephrology Department, Queen Elizabeth Hospital, reviewed eight trials of interleukin-2 receptor antibodies versus placebo in 1,858 patients receiving standard immunosuppressant drugs after kidney transplants. Treatment with interleukin-2 receptor antibodies reduced the risk of acute rejection by 49% after six months. Patients receiving antibodies did not have an increased risk of infection, and there were no significant differences in the rate of graft loss or survival after one year.

Reducing the rate of acute rejection is important in kidney transplantation, as patients who have had one or more episodes of acute rejection have at least a 50% reduction in long term graft survival, say the authors. They conclude that longer follow up studies are needed to confirm whether interleukin-2 receptor antibodies improve long term graft and patient survival.

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Innovative Technologies are the driving force behind the development of medical procedures aimed at minimum invasiveness with the highest possible and best clinical results. Advanced technologies in the Operating Theatre, such as imaging systems, robotics, computer assistance, navigation and monitoring, involve significant effort and a very high level of training and education. Because an appropriate technological qualification is not always present, severe technical mishaps and malfunction may occur which increase the risk for the patient as well as time loss.

Generally, neither technical training facilities nor specific technology study courses are provided for medical and technical staff. Apart from the utmost safety of surgical technologies, the goals of the future operating theatre are efficacy and efficiency, which can be achieved by optimising environments with systems-oriented integration of devices, instruments and ancillary equipment. Additionally, process analysis/management, and workflow control are essential for optimum co-ordination of procedural stages and personnel, and to enable the best surgical planning and economic analysis/management, and workflow and ancillary equipment.

Such a complex operating system needs a specialised, dedicated technological profile - a 'clinical engineer', who should have a broad technology background and appropriate competence in the basics of clinical applications, along with practical experience in minimally invasive procedures.

**Operating Theatres: the Future**

**Professor Andreas Melzer MD, University of Applied Sciences, Gelsenkirchen, Germany, describes the world's first experimental Operating Room System for Intervention, Tomography and Endosurgery (OT SITES)**

After five years of planning, the first experimental Operating Room System for Intervention, Tomography and Endosurgery (OT SITES), a satellite of imaging technologies, was installed at the University of Applied Sciences Gelsenkirchen in June 2002.

Industrial sponsors include: Innomedica AG, Automatica B.V., Robicon, ComputerMotion, G-Tec, KaldunskiSrl, Innomed, Imedco, Philips, Olympus, WinterBcbe, Neuromed, TecMed, Simag, Trumpf and Richard Wolf. Finance has also been provided from university and public grants. OT SITES is dedicated to research and development (R&D) as well as projects and education (student and postgraduate courses).

Students from the Department of Physical Engineering can focus either on micro-technologies (MEMS) or health technologies. Laparoscopic surgery, arthroscopy, neurosurgery etc. can be virtually simulated and the imaging modalities of computed tomography (CT) and magnetic resonance imaging (MRI) can be implemented. Thus, medical technologies are being further developed and the current use and ergonomics of medical devices and ancillary systems can be analysed. Waldemar Zylika and his team have improved CT navigation, based on the Philips TomoGuide system. TecMed, Gelsenkirchen, is developing video optic registration and navigation. Active resonantimplants, vena cava filters, including catheter and delivery systems with active MRI communications have been realised and pre-clinically tested. MRI compatible robots are currently being developed in a project with Innomedica, Hersheim and E&Z Karlsruhe, and pre-clinical evaluation will be performed in the MRI unit.

Inter-disciplinary projects are conducted in co-operation with other departments. Medical technologies are reviewed from both technical and economic perspectives - including DKG reimbursement options. The Incubator Centre, FH Gelsenkirchen, is supporting start-ups.

This close relationship with industry carries outstanding potential for commercialisation of developments and the OT educational platform.

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**New Approaches for Gentler Healing**

**Professor Horst Neuhaus MD, Head of Internal Medicine at the Evangelical Hospital, Dusseldorf, describes highlights during April’s 33rd Congress of the German Society of Endoscopy and Imaging Procedures (DGE-BV)**

High-resolution video endoscopy as well as endoscopic ultrasound, zoom-endoscopy, tissue colouring and new computer- or magnetic resonance imaging procedures enable early detection of malignant tissue changes. European and Japanese experts presented a critical comparison of the technological expense and clinical benefit of these procedures. One of these new "bio-endoscopic" procedures is fluorescence, used to light up cancerous tissue. Other technologies even promise tissue differentiation in real time, i.e. during endoscopy. With laser-supported technology, even single cells can be seen endoscopically, which means tissue can be more precisely removed and diagnosis often can be carried out during an examination.

**Endoscopy for which cancers?**

Endoscopy is increasingly used for diagnosis, treatment and organ preservation, in pre-cancerous growths and the early stages of cancer, and new techniques of tissue ablation or destruction have been developed for this. Almost every other stomach cancer is treated in this way in larger Japanese hospitals. German cancer centres lead in the diagnosis and endoscopic treatment of early stage cancer of the oesophagus caused by gastrointestinal reflux. The development of colon cancer can be largely prevented through early colonoscopy and preventive removal of any polyps that may be pre-cancerous. Based on conclusive studies, costs for preventive colonoscopy for patients, aged 55+ years, are now born by medical insurers.

**Capsule endoscopy** - Experts described results and experiences in various European countries. In this exploration, a patient swallows a miniature camera, which transmits excellent images, particularly from the small intestine - previously not accessible for endoscopy. Patients with bleeds from undetermined sources and those with inflammation or tumours of the small intestine particularly benefit from this procedure. Crohn's disease - Endoscopy, and other imaging procedures, as well as capsule endoscopy (recent studies) play a very important role in Chrones' diagnosis.

In difficult cases, great progress has been made with a substance called infliximab which blocks an inflammation mediator (TNF-α). New data shows that the success of therapy and further prognosis can be judged reliably through endoscopically determinable healing of previously inflamed mucous membrane.

**Reflex** - About one in ten Germans suffer frequent heartburn due to gastrointestinal reflux. Less commonly known is that night reflux of acidic stomach contents can lead to laryngitis, hoarseness, chronic coughing and asthma. The cause of these symptoms is often not recognised by doctors.

Reflex can be treated with drugs, newly developed endoscopic procedures or laparoscopic surgery - but the choice is not easy and individual patients need interdisciplinary advice. In one in ten of frequent heartburn sufferers, reflux destroys parts of the mucus membrane in the oesophagus, which is then replaced by Barrett's mucous membrane. Barrett's oesophagus increases the cancer risk.

**Video endoscopy** and other complementary therapies, play an important role in diagnosing, monitoring and treating this disease. Reflex case studies were presented in an interactive forum, and a computer-controlled voting system (TED) recorded reactions to controversial issues. Gastroenterologists, surgeons, ENT specialists, etc described recent studies.
The role of computer graphics is helping to revolutionise medical treatments, and this prize acknowledges this and aims to encourage further development. Submission deadline June 30th, 2003 - Granada, Spain

The winner of the EG2003 Medical Prize will be announced during the closing ceremony of the Eurographics 2003 conference. The author(s) of the winning entry will receive a total prize of 500 euro.

The submission must consist of a one page description of the medical application detailing how it is making use of computer graphics. In addition, one or more of the following must be included in your submission:
● images from the application showing computer generated graphics
● a movie file of the application in use
● a runnable executable to demonstrate the application

Package your submission in a zip file or compressed tar file and put "EG 2003 Medical Prize Entry" in the subject field of your e-mail to Dr. Nigel John.

More info is available at the Eurographics 2003 Web site.
Mobiles to monitor asthma and diabetes

CT and MRI-compatible compression harness

The DynaWell L-Spine, a compression harness that axially loads the lumbar spine in the supine position, has no magnetic parts, so can be used with most CT and MRI scanners. Closely resembling a spinal column when loaded with a strap to an upright position, this compact, lightweight system includes a compression vest attached by straps to a foot-driven compression device. Pressure exerted by the system is not placed directly on a patient’s shoulders, says DynaWell International. When examining patients in an unloaded, prone-relaxed position (PRP), narrowing of the spinal canal could remain undetected. However, when examined in a slightly extended position, during axial compression, pathologic features can become more visible. Use of the spinal-compression device helps detect encroachment of the spinal canal, associated with pathologic changes (e.g. stenosis, disc herniation). Clinical studies have shown that a more specific and valid diagnosis can be achieved by using a lumbar-spine compression system rather than a traditional non-loaded procedure. Further clinical studies indicate that, by using the compression system, the likelihood of spotting a stenotic situation in the spinal canal increased by 60-70%. Doppler ultrasound is used to detect the presence of blood flow in the reagent strip. Within a few seconds, the equipment (Oz xda) and GPRS network access. Careful monitoring of lung function can help detect when the e-San improves control of the condition and reduces the risk of an acute asthma attack. However, e-San points out that most asthmatics do not always record peak flow values accurately in their personal diary. Retrospectively at the Asthma Clinic (three months), and they often record nothing for several days. The new equipment can also be used for monitoring and quicker essential treatment following any deterioration in the patient’s position.

E-San Ltd, based in Oxford, is a spin-off from the Neural Networks and Signal Processing research group in the Department of Engineering Science at the University of Oxford. The research group, run by Prof. Lionel Sanaraski, has been working to develop a system for medical signal analysis.

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Watercone - the winner

Stephan Augustin (36), a Munich-based industrial designer, has scooped the international IF Design Award for his ‘Watercone’. Up to 16 litres of fresh water can be produced per day, by placing this device on moist ground. Heat from the sun evaporates the moisture, which condenses in the Watercone, forming droplets that trickle down the inside wall of the device into a collecting trough - ready for use. Stephan Augustin chose to make the Watercone from an impact-resistant, even at extremely high temperatures, making it highly suitable for water treatment and washing down harsh climates. ‘Watercones are fully mobile and adaptable, even if it’s simple and effective,’ says the designer, who won the competition concept goes into production this summer.

Details: www.augustin.biz
and medical insurance

By Claire Mahoney

Successful applications

Telemedicine applications are being developed in areas ranging from dermatology to pathology. In home care, video consultation and mobile monitoring devices can reduce lengths of hospital stays, while still maintaining care.

A recent study undertaken at Aristotle University in northern Greece used multi-media cardiac monitoring equipment that, on average, reduced hospital stays by 40%.

Telemedicine has proved vital in countries where distance and remote areas make traditional methods of healthcare delivery very difficult. UK company Motion-media has taken part in a project in Australia that uses videophones to send video and data signals to a Mobile Intensive Care Ambulance (MICA) paramedic or emergency department specialist, based hundreds of miles away. The satellite videophone can be connected to a range of medical devices, such as electrocardiograms, vital signs equipment, and digital photo recorders.

The future for Europe

Some commentators predict that the general strain on European health services may end up forcing insurers to open up to telemedicine and e-health.

Last year’s European Court of Justice judgements, which ruled that patients need not obtain pre-authori- sation from their health insurance companies for cross-border care, may help as well.

Herve Doare, EHTEL’s executive director, states: “The healthcare insurers and companies will stick as long as possible to their current position. But cross-border care is a challenge for them – it is a cultural revolution as that means it for the first time they will have to be competitive.”

Andreas Lymberis, Scientific Officer in the Applications Relating to Health unit of the Commission’s Information Society Directorate-General, says: “We are trying to do is develop a methodology that is of the highest quality, cost- effectiveness and accuracy of care in these projects.”

EHTEL is hoping to highlight successful applications by putting together a matrix analysis of telemedicine, which not only gives an overview of the issues but also shows applications where telemed- cine needs to be presented to insurers in a balanced way,

Benedict Stanford points out. This balanced and practical approach is also a crucial factor when present- ing arguments for the technology to healthcare professionals. “In a great many countries, and certainly in Europe, telemedicine threatens to upset referral patterns that doctors have spent a lifetime building up.”

Research problems

The trouble with telemedicine is that it is a moving target and as the technology develops the scope for implementation in healthcare becomes much broader,” says Andreas Lymberis.

Axel Bacciari, healthcare analyst at the European market research company Frost and Sullivan, agrees: “Telemedicine is a so-called diffuse technology, in other words it is not limited to a specific area.”
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