Chilled to the bone!

Treating severe frostbite in high-pressure chambers may reduce amputations, John Brosky reports

For people living in Chamonix-Mont Blanc medical services at the nearby community hospital have been reduced to little more than a stopover visit before being referred down the mountain to larger facilities in the network of the Hospitals of Mont Blanc Country.

Yet the small facility continues to hold a specialty for treating frostbite victims that is unique in the world and puts it at the centre of a European-funded study to test a new technique for treating victims of severe frostbite who are in danger of losing fingers, toes or even all of a foot.

The hospital holds the distinction of each year seeing the highest number of cases of frostbite in the world, not only in full winter, but in summer as well.

With this steady flow of frost bitten hikers and skiers, Emmanuel Cauchy MD, is in a unique position at the Centre for Training and Research in Mountain Medicine (IFREMMONT) that is housed at the hospital to study the effects of the condition, to conduct randomised trials for therapies, and to publish findings that advance protocols for treatment.

“Mont Blanc is the deadliest mountain in the Western world.”

His 2011 paper updating and detailing a classification of frostbite in four distinct stages is a landmark reference. “There are more and more cases of frostbite in the largest cities, with the number of homeless people, very bad cases, but there isn’t always a good awareness of the proper treatment,” Cauchy said during our visit to IFREMMONT. Where some physicians may see one case of frostbite each year, or perhaps one severe case in all of their career, we see between 80 and 100 such cases every year – an average that goes back over the past 20 years.

The reason for the exceptional traffic of frostbite cases in Chamonix Mont Blanc stands just outside the hospital door. Towering at 13,780 feet, Mont Blanc is not only the highest point in Europe, it is also the deadliest mountain in the Western world with an average of 100 trekkers perishing somehow up there each year.

Mont Blanc is reputed to be the most accessible summit in the world, which explains why more than 20,000 mountaineers, often 500 on a single day, can be found marching in Indian file to the top. Reaching the roof of Europe from the French side is described as more of a long walk than an arduous alpine climb.

It is easy to forget the local wisdom that it is always winter up there among the glaciers and multiple peaks surrounding the massif of Mont Blanc.

Three-fourths of frostbite cases arriving at the Mountain Medicine center are superficial, Cauchy pointed out, and even the frostbitten hiker or skier doesn’t realise until the following day that some extremity has gone numb, and they turn up at the clinic. One-in-four people have been bitten more deeply by glacial cold, more than half with frozen feet. Hands are almost as frequent and while facial frostbite is more rare, some 17% of cases he sees touch noses and ears. On average one in 12 patients will need an amputation.

“Often you see the tissue is red and you think you’re going to be alright,” Cauchy said. But after a scintigraph scan that shows there is no vascularization of the bone it’s finished in this case, there is nothing we can do.”

Restoring blood flow to the bone tissue of frost-bitten fingers and toes is the critical factor for averting an amputation of the member and encouraging such reperfusion in a hyperbaric chamber is at the heart of a clinical study begun at this alpine hospital in November 2014.

Hyperbaric oxygen therapy has been suggested as a treatment for severe frostbite that may help lower the rate of amputation by more rapidly increasing blood circulation in the bone, but the technique lacks any clinical evidence to support wider use.

For the GELOX study, the Chamonix Hospital is working in close collaboration with the University Hospital of Geneva to test the treatment of 20 patients and compare results with outcomes for 50 patients who underwent standard protocols.

The hyperbaric chamber is located at the University of the Hospital of Mont Blanc.

Continued on page 2
France: Home monitoring in fast action

Every year, worldwide, over a million patients have a pacemaker or defibrillator implanted. Home monitoring systems can significantly improve the safety and quality of life for these patients, says Professor Gerhard Hindricks, head physician in the rhythmology department at Leipzig’s Heart Centre.

Cardiology and internal medicine
Specialist Chilaiditi is a medical graduate of the Westfälische Wilhelms-University Münster, Germany. Today he directs the Cardiology and Angiology Department at the Heart Centre, University of Leipzig, where he has also been Professor of Medicine since 2005. The expert has contributed to more than 150 publications.

CardioMarker: Over the telephone line the device sends the patient data to the attending physician.

Health insurance
We are currently negotiating with the health sector payers. They want to see data proving an improvement of quality before they take over financial responsibility. These data are now given. We made considerable input in setting up a high density of studies about home monitoring with the company Biotronik, in financing and processing it without asking too much from the health sector. Now I have an urgent request to all payers involved: Take a look at these data, take an acceptable position, and take responsibility for your patients. Turn the quality-improvement for the patients into financially relevant services!

Documentation hopes
It’s not an inconsiderable task to successfully manage the connection of all data in a hospital. It would be an optimal approach and an efficient treatment-path if the data showing a decline in the patient’s health would automatically be transmitted through PACS or KIS into the medical record. This would ensure a direct connection, comprehensive documentation and follow-up treatment. ‘This connection is planned - but it has not yet been optimally implemented in all areas because it’s very complicated. No aspect of this, however, affects data security: all data are stored on a multiple-security platform allowing us encrypted access at any time from any computer all over the world. It’s a matter of course that only authorised people have access to these data. The system is well protected!’

Communication and upkeep expenditure
The costs are currently carried by the manufacturers. The patient does not bear any additional cost. In addition, in case of downtime, the data are of course not lost. We cooperate with cellular network providers who guarantee high network reliability. The transmission rate for Home Monitoring lies above 99%; this is very high.

Future prospects
Just like telemedical applications, these systems will play a vital role in disease management in the future. An ever-increasing amount of data regarding frequently occurring illnesses will be transmitted through automatic data systems. In the future, there will even be bio-monitors that will be adapted to the individual patient’s needs; also, in the mid-term, implants for which sensors are activated will be available. A dysrhythmia patient can then have an ECG-monitor activated; a diabetic with dysrhythmia will have an insulin or glucose sensor implanted and the ECG-monitor will also be activated for this patient. ‘This is how cardiology will look, in the future.’

Continued from page 1

Geneva, a scaled room where the pressure can be increase as high as 2.5 times normal atmospheric pressure.

Most large hospitals have such chambers, Cauchy said, typically for treating patients with difficult wounds.

He also points out that portable, inflatable chambers are routinely carried as essential equipment for the base camp of climbing expeditions to treat or prevent acute altitude illness.

Using a mechanical pump, atmospheric pressure is increased inside the chamber to increase the victim’s arterial oxygen pressure, thereby reproducing the effects of a low-altitude evacuation when a real descent is not possible.

Patients enrolled in the study will be hospitalised in Chamonix for up to eight days to undergo specific therapies developed by Cauchy at FREMONT. Each day the patient will be transported to Geneva, an hour away, for a treatment session in a large-scale, 16-person hyperbaric chamber where atmospheric pressure is increased to 1.5 bars. Oxygen levels will also be boosted during the hyperbaric session, Cauchy explained, to increase the oxygen transport capacity of the plasma to counteract ischaemia in tissue. Frosthite patients also suffer from painful wounds and, as with other patients being treated in the hyperbaric chamber, the therapy sessions are also expected to improve wound healing.

The cross-border cooperation for the CHIMIA study is supported by funding of €421,000, half of which is provided by the European Regional Development Fund with the remaining financing raised jointly by French and Swiss regional authorities.

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Report: Sascha Keutel

Aimed what technical and staff are needed by a cardiology depart ment to introduce a home monitoring system, he explained that the technical prerequisites are given in every German hospital. These obviously include internet access and an acceptable bandwidth. However, he points that the personnel infrastructure and workflow need more thorough consideration. ‘Who handles which data and how these data are then processed further must be clearly defined. In Leipzig, we have a specially trained staff-member who checks the data concerning their further processing and then forwards them to the respective staff.

Basically, you can say that the overall infrastructure in the hospital is significantly relieved by our cardiology Home Monitoring System and the treatment quality has improved significantly.

Studies have shown a very positive effect on peoples’ health through home monitoring. Our IN-TIME-report, for example, has shown a significant reduction in the overall mortality of cardiovascular degeneration patients through implant-based remote aftercare.

We analysed whether the rate of cardiovascular mortality is reduced to the same extent as the overall mortality rate. It is indeed! One crucial driver of the reduction of the overall mortality rate is the reduction of the cardiovascular mortality rate.

There’s certainly also a psychological component. For the most part the patients accept home monitoring well. Only a few patients rejected our offer due to possible technology-based doubts they might have had. Most patients are happy that they now only have to plug their devices in after their sleep, and then have had. Most patients are happy that they now only have to plug their devices in after their sleep, and then

Report: Jane MacDougall

The idea of a ‘dossier medical personnel or of an electronic health record) for every French citizen was first inaugurated in 2004. Now, over 10 years and €500 million later, the main DMP aim was that all doctors involved in a patient’s treatment would have immediate access to a complete medical record, to avoid repetition of investigations/ procedures, to ease risk from overlooked illnesses etc., which can occur when relying on an oral medical history.

Also wanted: Faster exchange of secure information between the various healthcare structures involved in a case e.g. an in-patient having exams in different locations. Another long-term aim was to use the information collected for epidemiological and eco-epidemiological syndromic surveillance to help in the early detection of health problems, as has been the case in the USA from 2013-2014.

A brief history
As early as the 1960s, when the potential power of computing first became apparent, the idea was postulated to digitise medical records as a means to help in population healthcare. However, it was not until 2004 that the French health minister, Philippe Douste-Blazy, launched the DMP as a fully-fledged two-year project to ensure the transfer of medical information between healthcare providers, which he declared would result in €3.5 million annually saved from wasted examinations, prescriptions etc.

Nonetheless, the experiment, which had included, private doctors, pharmacies, electronic health records and allowed them access to computerised medical notes, was legally terminated by the end of 2006. In the audit of
still seeks an electronic health record

White elephant or a long-term healthcare investment?

this failed attempt it was decided that any such development had to be considered as a long-term commitment and could not be implemented precipitously. The objectives had to be reconsidered:

Thus, in 2009, it was announced that a new DMP format would be launched in 2010. Online on December 2010, from the 5 January 2014 all French citizens with a Social Security number would be able to create their personal medical dossier. By 2012 the programme still had not met its objectives with only 6,000 medical professionals using the system.

In 2014, Marisol Touraine launched the Second Generation DMP that would be administered completely by Social Security. According to the Health Law of 20 January 2015, the DMP now known as the 'dossier médical partagé' (shared) will be accessible to all chronically ill and their healthcare professionals in order to share the entirety of the patient's medical history.

How it should work

A DMP can be created at the demand of a patient, doctor or healthcare provider. In the latter two cases the patient must be informed and their consent received before the record is created. To create a DMP the healthcare provider or doctor needs compatible software, or to connect to the dossier via the internet. Patient access is by internet only. The dossier belongs to the patient and they control the healthcare provider's access to it.

Any patient with a 'Carte Vitale' and a national social security (SS) number can create a dossier. A doctor or healthcare provider has to be registered with a smart card and know the patient's SS number. Patient secure access depends on their SS number and a password via a protected HTTPS site. All data are stored in France.

IT obstacles

The system's initial failure was blamed on the internet provider for not creating a usable framework in a timely fashion. Since the 2009/10 relaunch, history has repeated itself with computer problems being cited as a major source of trouble; specifications have not been met, repeated resignations from managers, technical failures in digitisation of documents etc.

The fact that the project was initially the domain of the IT world, with no consultation with the end-user, leads directly to another large drawback, lack of enthusiasm from healthcare professionals who, according to the Minister of Health, are not taking the programme on board. Interestingly, 45% of French people are, in principle, in favour of the idea. The burden of work to update the DMP falls to the general practitioner (GP) – the person least likely to profit from the system. Until now, no remuneration is received for the task and therefore the DMP remains a hidden cost for the GP, with little obvious utility. The most likely beneficiaries from improved quality of care are the patients, accident and emergency services – due to a better understanding of the patient – and the health insurers, due to a better vision of costs. In addition, as it stands today the DMP is far from the utopian dream of its 2004 conception. Its creation is not an obligation as originally planned; therefore there is little incentive for patients to have one. It is also no longer the universal sharing of potentially life-saving information envisaged, because the patient decides what is included in the dossier and which medical professionals, including the emergency services have access.

Whatever the future of EHR in Europe, one important thing to consider is cost. By January 2015, only 500,000 dossiers, (many of which are empty!) were opened in France, for an average cost of €1,200 each. This is 10 times higher than the original estimates. Details: http://www.dmp.gouv.fr/

www.healthcare-in-europe.com
Cold atmospheric plasma

Treatment out of a power socket

Interview: Ralf Matelowski

Electricity is not the only thing that should come out of an electrical socket; ideally so should cold atmospheric plasma, according to Dr Georg Daeschlein, at the Dermatology Department, University of Greifswald, who has investigated its medical properties for years.

“Put simply, this plasma only requires ambient air, high electrical voltage and strong, i.e. even visible discharges. Experienced manufacturers now offer stable and safe generators in pocket format, such as ‘plasma pens’ for instance. Admittedly, there are now even battery-operated models...”

“...and the present

Current therapeutic approaches range from the treatment of all types of chronic cutaneous wounds to the use as a skin antiseptic against highly-resistant problem pathogens.

A working group under dermatologist Professor Jürgen Lademann, at Chaoté University Hospital in Berlin, demonstrated antimicrobial effects that reach deeper ‘under the skin’ than conventional treatments, which may have great significance for the fight against postoperative infections. When asked which area of application is currently the most defined, the experienced clinician described this as the ‘promotion of healing processes, in particular those with the involvement of micro-organisms and other processes which are difficult to treat.’

One major advantage of the procedure is the detection of a ‘physical’ antimicrobial effect. Problem pathogens on the skin and in wounds that cannot be treated, or only treated with great difficulty, using conventional methods. The advantages, apart from the high potency described, include the lack of need for ‘chemistry’, i.e. no necessity for the costly storage of dangerous, flammable materials. The solution simply comes out of a power socket. Switch on, disinfect, switch off – and the procedure is entirely without side effects.

Looking ahead

A definite yes’ is Daeschlein’s reply when asked about the prospects of the procedure. The potential use of plasma is huge, although there is still currently a lack of scientifically grounded facts. The use in tumour treatment for instance is at very early stages, with our own group as well as a number of French working groups able to demonstrate the basic effectiveness in animal experiments. The makes this use for primary treatment for instance is only possible with very careful progress, and, due to the comparatively simple technology and handling, also for a home care setting, although there is still a long way to go.

‘Technical safety and protection against undesired effects are of central importance. The prerequisites for use, apart from safety concerns, are a medical indication as well as medical supervision and aftercare: In the second important aspect to him is the stimulation of cellular repair mechanisms and the generation of mediators relevant for healing that promote tissue regeneration and therefore wound healing.”

Looking back...

The use of plasma in medicine, such as for sterilisation and disinfection procedures and especially for surgery, began in the 1930s, although hot (Okos) plasma was already discussed in 1906. Only its ‘domestication’ over the last few years paved the way for use in humans with so-called cold plasma. Its effect on parasites, bacteria, viruses and fungi is impressive and can be medically utilised and the effect has by no means been exhausted.

Therapeutic treatment with cold plasma was first described around 100 years ago, although it was then known as high-frequency or D’Arsonval treatment and recommended for a multitude of diverse indications, ranging from migraine to vaginal yeast infections and depression. Now, however, the effects of plasma are being scientifically studied, using up-to-date techniques to facilitate specific and optimised treatment. It is an interesting fact that clinical success in the treatment of major skin infections, such as cutaneous tuberculosis, was described even in the early days of treatment, but at the time no scientific explanation could be found.

_trainee surgeons suffer permanent stress

‘The prevailing economic view of medicine is wrong. It cannot continue in this way’

Report: Chrysanthi Nikolakudi

“There are still only 24 hours in a day – even for surgeons,” said Professor Vogt MD during our European Hospital interview. The Director of the clinic for plastic, hand and reconstructive surgery at Hanover Medical School and President of the DGCH German Society of Surgeons, is calling for solutions to the dilemma trainee surgeons face: undergoing high-quality specialist medical training while completing acceptable daily shifts that should ideally not exceed ten hours.

Asked why trainee surgeons have such long and labour-intensive shifts and what might be done to alleviate their stress, Prof. Vogt suggests that either the special training duration needs to be substantially increased, or trainee surgeons must be released from additional work, not only to relieve stress but also to ensure they are sufficiently trained. ‘The advanced training should be completed within a reasonable period of time; internationally, this period varies between six and eight years,’ he explained.

If we want to ensure high quality, specialist medical training in Germany we need to change from a system where training is carried out alongside regular work to a truly training-based system.

‘The trainee would then be entitled to comprehensive and systematic medical training and would be exonitated from all the administrative tasks.

Too much administration

The number of administrative tasks has grown to such an extent that it has become almost unacceptable – there is a lot of documentation to be completed, documents to encode beneficial for each individual patient and their symptoms.”

Daeschlein also emphasises the definite basis for many medically suggestive treatments and adds: A further highlight is the impressive, sustainable and effective treatment of pain in cases where severe, chronic symptoms can otherwise not or scarcely be relieved, such as after viral infections or when the cranial nerves are affected.

“The results of this treatment have already attracted attention among surgeons and patients and promise success without the need for conventional medication. This could make patients avoid expensive and long-term treatments redundant. Treatment for pain relief at the patient’s home and under self-direction in the same way as other types of feedback therapy are conceivable.”

“Plasma is a mixture of different, proven biophysical methods of action, which have never before been used in combination. So what should happen next? Apart from further research into basic methods of action the most important objective for the next few years will be not only to determine the optimum configuration of devices (such as energy dose, wavelength, frequency, pulsation, signal shape) for each respective disease where the basic effectiveness of the treatment has been proven, but also respectively to work out the optimum form of treatment for each indication, i.e. treatment intervals, dose, reactions occurring in the tissue and the body.”

“The main is the direction of personalised medicine, i.e. an attempt to find out which entities are the charged particles of the plasma already part of the group, because they combine with the cell membranes of bacteria and produce cracks by mutual repulsion.

Plasma ONE is a therapeutic device that uses cold plasma to introduce and more rapid wound healing.

“Germany we now have a number of reputable suppliers as well as reputable users and researchers. However, the use of plasma in cases where the indication is not assured or with (improper) enhancements of use, which may possibly lead to undesired side effects, could endanger the expansion of the product.’

The mandate

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Future ESR President defines the goals

During an exclusive European Hospital interview, in the run up to ECR 2015, Professor Lluis Donoso-Bach MD PhD, incoming President of the European Society of Radiology (ESR), outlines his plans to tackle challenges facing radiology in Europe – and anticipates a brighter future in Spain.

What is the society’s stance on teleradiology? ‘Teleradiology should be a medical act that includes not only a report but also consultation with the patient, justification and control of the examination, and follow-up of the outcome. Out-sourcing can also do that, but the problem is that some companies only offer the report and for very low fees, which is what endangers the clinical part of our work. We have published many position papers and work tirelessly with the EU Commission and Directorates General in the European Parliament to defend our position, the problem is that we are not always heard.’

What upcoming IT solutions do you foresee in clinical practice? ‘There is a very clear trend for cloud computing. Working in a cloud will revolutionise the way we do imaging. It will be split into image acquisition, analysis and processing. We will need structured reports, where we can automatically combine information coming from all these phases.’

‘The way we write reports will change, and we will move from a subjective approach to using standardised vocabulary based on quantified and processed data. Our reports will be interoperable between different clouds, and systems will emerge to help radiologists write their reports accordingly.’

Interview: Mélisande Rouger

Promoting education remains our core business,’ Lluis Donoso-Bach confirms. ‘We will open new learning centres in Bogotá and Vienna, and are planning a further one in Moscow. We will also launch the ESR e-learning Platforms at ECR 2015 and try to offer an online examination for the European Diploma in Radiology.’

‘On the research front, we will continue our efforts concerning the quantification of data using biomarkers and biobanks, among others. ‘We will soon launch ESR iGuide, a clinical decision support system for European imaging referral guidelines. We recently created a first level of standards on safety, and want to explore the possibility of performing quality control directly on the level of the department management. Meanwhile, we will continue to promote the EuroSafe Imaging campaign to raise awareness on radiation protection.

‘We will also strengthen our lobbying actions with European institutions to influence EU legislation. We notably launched a Call for a European Action Plan for Medical Imaging last November, to highlight heterogeneities in Europe and promote harmonisation.’

What is the society’s stance on telemedicine? ‘Telemedicine should be a medical act that includes not only a report but also consultation with the patient, justification and control of the examination, and follow-up of the outcome. Out-sourcing can also do that, but the problem is that some companies only offer the report and for very low fees, which is what endangers the clinical part of our work. We have published many position papers and work tirelessly with the EU Commission and Directorates General in the European Parliament to defend our position, the problem is that we are not always heard.’

What upcoming IT solutions do you foresee in clinical practice? ‘There is a very clear trend for cloud computing. Working in a cloud will revolutionise the way we do imaging. It will be split into image acquisition, analysis and processing. We will need structured reports, where we can automatically combine information coming from all these phases. The way we write reports will change, and we will move from a subjective approach to using standardised vocabulary based on quantified and processed data. Our reports will be interoperable between different clouds, and systems will emerge to help radiologists write their reports accordingly.’

Continued on page 6

Japanese firm celebrates 140 successful years

The son of a craftsman making Buddhist altars, he was driven to become a leader in science. At the dawn of the industrial revolution and scientific age in 1875 he founded his own business in Kiyamachi, Kyoto. His name was Genzo Shimadzu.

Continued on pages 20-21
Calculating a patient’s attenuation correction

MRI-based AC may work better than CT-AC

PET/MRI scanners have great potential because they combine the strengths of two different systems. Previous problems resulting from respective, mutually exclusive physical effects of both procedures have been resolved. Now these scanners are being introduced to the hospital and assist in the detection of the position and spread of tumours as well as their metabolic activity, says Dr Harald H Quick, Professor for High-Field and Hybrid MRI Imaging at Duisburg-Essen University.

PET has high sensitivity. The system can locate and measure the very smallest amounts of radioisotopes in tumours and metastases and it also makes it possible to quantify their activity. This is important because it allows us to classify and differentiate different tumours based on certain thresholds, Professor Quick explains. "PET also allows us to monitor a therapy after the initial diagnosis and start of treatment and shows how the activity of cell lesions develops over time and whether or not the treatment is having the desired effect."

To fully utilise PET strengths, attenuation correction (AC) is needed. This correction is carried out by software that, in turn, is based on a mathematical solution automatically implemented by the scanner. To make this work, you need to know exactly where in a patient’s body photons attenuate in the tissue on their way to the PET detector, and photons attenuate in the tissue on exactly where in a patient’s body. To make this work, you need to know exactly where in a patient’s body photons attenuate in the tissue on their way to the PET detector, and photons attenuate in the tissue on exactly where in a patient’s body.

PET/CT hybrid systems – however, with the advantage that the raw data of CT imaging can be directly utilised for the AC of the patient tissue. However, with PET/MRI, AC must be performed with new MRI-based procedures. At the centre of this development are the Dixon method sequences, currently experiencing a revival in the context of MRI-based attenuation correction procedures.

The procedure involves the attribution of different levels of attenuation to different types of tissue (air, fat, soft tissue, bone). "We know topographically – similar to maps – which types of attenuating tissues are in which place. This can then be utilised in 3-D to work out the patient’s attenuation correction," he explains. Although this works well, and is already integrated into clinical routine, room remains for improvement. With the help of comparative examinations, Prof. Quick and team are trying to determine how well MRI-based AC works compared to CT-AC. "Bones attenuate the PET signal comparatively strongly. The attenuating components of bones are not very visible in the MRI image and therefore cannot be accurately corrected," he explains.

"This can then be utilised in 3-D to work out the patient’s attenuation correction," he explains. Although this works well, and is already integrated into clinical routine, room remains for improvement. With the help of comparative examinations, Prof. Quick and team are trying to determine how well MRI-based AC works compared to CT-AC. "Bones attenuate the PET signal comparatively strongly. The attenuating components of bones are not very visible in the MRI image and therefore cannot be accurately corrected," he explains.

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Technical pitfalls

Further technical obstacles that PET/MRI scanner manufacturers must overcome are the materials used. As is common in MRI imaging, RF receiver coils are used. These coils are within the field of the PET detector while the PET and MRI data are being acquired, and they attenuate the PET signals accordingly. Therefore, manufacturers should design the RF receiver coils in a way that makes them PET-transparent as possible. This applies to the materials used, plus distribution and the design.
Breast CT

3-D images of the entire breast from any orientation

The Koning Breast CT (KBCT) system, which has been granted FDA approval, provides 3-D breast images for diagnoses.

The technology ftp://5.10.164.234 can acquire hundreds of images in only ten seconds, producing true 3-D images to enable a fast procedure with excellent patient comfort, the manufacturer explains.

‘Optional accessories for KBCT include a biopsy bracket to enable KBCT-guided biopsies of suspicious lesions, and a collimator, used to limit the X-ray beam to the area of interest. The biopsy bracket provides 3-D targeting at comparable or lower radiation exposure compared to stereotactic-guided biopsy.’

A view like no other

The breast CT images have less distortion than mammography and the system is optimised to differentiate between the breast’s soft tissue and cancer tissue, Koning points out. ‘These images will be very different from 2-D mammograms. They’re truly 3-D images of the entire breast from any orientation. You can scroll through the slices (up and down, left and right) and get a unique view of the breast like never before.

‘It gives doctors tremendous freedom in how they look at the interior of the breast and evaluate its structures. It’s almost like seeing the anatomy itself.’

No breast compression

As Ruola Ning PhD, Koning’s President and Founder, a pioneer and leading expert in Cone Beam CT Technology and sole inventor of cone beam breast CT technology, confirms: ‘KBCT represents a revolutionary advancement in breast cancer diagnosis.’

This is the first commercially available 3-D breast CT scanner designed specifically to image the entire breast with a single scan, without compression of the breast tissue – which means this procedure is far more comfortable for patients than regular mammography. Additionally, Koning adds that there is less radiation exposure than during a CT exam of the entire chest, because here only the breast is exposed to X-rays.

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Defining a role and routine differences

Before 2015, when Professor Dietmar Dinter became partner of Radiologie Schwetzingen, a multi-discipline group practice specialising in radiology and nuclear medicine, he was senior resident at the Institute of Clinical Radiology and Nuclear Medicine at University Hospital Mannheim (2005-2012) and head of its Nuclear Medicine Department (2009-2012). Was his work in nuclear medicine altered by the shift from hospital-based to practice-based patient care?

Surprisingly, when asked about key differences between work in a hospital and private practice Professor Dietmar Dinter observed that he had more time for each patient when he was a hospital radiologist. "In the practice there is a certain economic pressure and everything is tightly organised," he explained. Another big difference is staff composition. While we have only fully certified specialist physicians in our practice, in a hospital teaching plays a major role – particularly in larger teaching hospitals you have many examinations in which one or two junior physicians are supervised. That takes time. 'In a practice you gain experience more quickly due to the larger patient throughput, but you also have to arrive at the – hopefully correct – diagnostic decision more quickly.'

Do the range of exams and therapies differ?

In Germany, radioiodine therapy is pretty much limited to hospitals, since it cannot be properly performed in private practice because German radiation protection laws require in-patient facilities – the patient has to spend at least 48 hours in a "bunker", an entirely separate area. Most practice-based physicians do not have access to such facilities. "There are also differences in terms of technology. Very few practices have a PET-CT, for example. That limits the range of exams compared to an emergency/out-patient facility or a hospital. Currently in Germany more than 100 PET-CT systems are installed in hospitals – most of these are operated at a loss due to the low reimbursement rates offered by statutory health insurers. 'In some cases, hospitals cannot recover the costs of PET-CT, they often have to negotiate the number of exams they can perform with the health insurers. That's impossible in private practice. The health insurers' reimbursement parameters for PET-CT exams are clearly defined and adhered to. Lung cancer, for example, is usually imaged with PET-CT and the insurers reimburse. However, the Federal Joint Committee, the relevant non-governmental body, decided that the costs will only be reimbursed in the exam is performed in a certified lung cancer centre with the cooperation of surgeons, oncologists and radiotherapists. Thus a number of clinical specialists are needed, such as thoracic surgeons, and tumour boards must be established to discuss the case. In a practice this is close to impossible, unless you negotiate many cooperation agreements with hospitals, which then send the patients to your practice.'"

Do you face many other issues that were never contemplated when working in the hospital?

"Yes, exactly. I learn a lot with all the new and different cases. The two-pronged approach in Germany with a practice-based and a hospital-based segment creates a multitude of referral, exam and treatment paths. Most patients in practices are referred there by other office-based physicians, whilst, in a hospital, you mostly see in-patients – unless the hospital has an out-patient department and thus treats in- as well as out-patients.'"

Are there turf wars between hospital and private patient care?

"There are patients, particularly those who need a bone scintigraphy, who are imaged in hospital although it would be better if they were referred to a practice: practices can often offer appointments much quicker and are closer to the patients’ place of residence, so patients can be treated in a familiar environment. But there are colleagues in emergency and out-patient departments who prefer having the exams performed entirely by the in-house team.'"

Do you prefer working in hospital or in a practice?

"That's a difficult question because there are advantages and drawbacks to both. I'd like to have more time for our patients because, as a physician, one of the main reasons to work in a practice is patient contact, particularly in diagnostic radiology. As senior resident in a hospital you often only interpret MRI or CT images without ever having seen the patient, but in a practice many exams are scheduled per physician, so you have three to six minutes to talk to a patient. This is just not enough time to communicate a diagnosis that might change the patient's life. However, you do get used to the advantages of a practice very quickly and take them for granted: no overtime, no weekend duty, better pay."
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Is there a simpler way to guide my interventional cases?
Xe-MRI advances body exploration

Clinical routine would be inconceivable without Magnetic Resonance Imaging. Without exposure to radiation, doctors can make a patient’s organs and tissue structures clearly visible. However, pathological changes in the early stages, degenerated cells or small areas of inflammation, have so far remained almost invisible on these images. In 2014, for the first time, a team of cell biologists, chemists and physicists working with Dr Leif Schröder, Head of the ERC-Project on Biosensor Imaging at the Leibniz-Institute for Molecular Pharmacology (FMP) in Berlin-Buch, succeeded in generating ‘two-colour’ images for different molecular markers with the help of Xenon-MRI.

Magnetic Resonance Imaging (MRI) is a medical imaging technology which constructs a picture of a specific section of the body using strong magnetic fields and radio waves. Xe-MRI advances work with Dr Leif Schröder, Head of the ERC-Project on Biosensor Imaging at the Leibniz-Institute for Molecular Pharmacology (FMP) in Berlin-Buch, in generating two-colour images for different molecular markers with the help of Xenon-MRI.

Cerenkov luminescence merges optical imaging with nuclear medicine in a novel modality

Cerenkov luminescence is a unique light that occurs when charged particles travel through water. The effect was discovered in 1934 by Russian physicist Pavel Alekseyevich Cerenkov, who shared a Nobel Prize for this work. Cerenkov, who shared a Nobel Prize for this work, was the first to describe the phenomenon which is now known as the Cerenkov effect. The phenomenon is characterized by the emission of light when charged particles travel faster than the speed of light in a medium.

The technique is being used in animal studies

The ability to capture Cerenkov light and analyze it can be used to detect and image the presence of various substances in the body. This technique is particularly useful in medical applications, as it allows for non-invasive imaging of biological tissues and organs.

The technique is being used in animal studies

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Yet, this presents a new challenge because the aperture for endoscopic cameras is small for the long and narrow instruments, exactly the opposite of the ideal setting for imaging Cerenkov luminescence emanating from a radiotracer.

In addition to an on-going clinical trial at Memorial Sloan Kettering Cancer Center to explore Cerenkov light in patients, 30 patients are currently being enrolled at the Guy’s and St Thomas’ NHS Trust in the United Kingdom for a pilot study to evaluate Cerenkov luminescence imaging using an analyser developed by Lightpoint Medical Limited for the ex-vivo measurement of surgical margin status in breast cancer surgical specimens and the metastatic status of excised lymph nodes.

Another 30 patients are being enrolled at University College London for a prospective, single-centre feasibility study testing the feasibility of 18F-choline Xe MRI to measure margin status in radical prostatectomy specimens.

Research at Memorial Sloan Kettering, supported by two the United States National Institute of Health and in collaboration with Lightpoint, aims to bring Cerenkov luminescence imaging over the next five years from testing in animals to patients, ‘...and then,’ Dr Grimm predicts, ‘all the way up to an open surgery procedure.’

In the future, the refined procedure will facilitate more precise diagnosis because the stronger signals can visualise structures not previously detectable in the MRI. ‘As a non-invasive procedure with excellent soft tissue contrast and no radiation exposure the only entity missing is the molecular specificity to turn MRI into the ideal procedure,’ the medical physicist believes.

The method is also very important for the development of active ingredients. He hopes it will help to reduce the number of animal experiments required and to assess the effectiveness of new active ingredients quickly.

Although the team’s current research focuses on oncology diagnostics Xe MRI is not limited to any particular type of disease. ‘Everything that has an identifiable molecular marker can, in principle and at sufficient concentrations, be detected with biosensors.

‘Currently the detection limit is in the nanomolar range, making these markers around 1,000 times more sensitive than conventional MRI contrast media.

‘We have developed sensors for inflammatory processes and for certain receptors on the surface of cancer cells, but we can build on this in a very flexible way,’ the physicist points out.

Whether or not Xe MRI will become established in clinical routine is currently difficult to assess. The first trials on animal models are planned for this year, but Schröder cautions: ‘It’s likely to take several years before the procedure can be used in clinical routine. However, patients will also benefit indirectly from the use on animal models, which is expected to begin much sooner, through the improved development of new active ingredients and treatments.’
Precision medicine in oncology offers tremendous potential and challenges. Are these obstacles? "Probably one of the greatest challenges to the implementation of precision medicine in oncology is the tremendously inter- and intra-tumoral heterogeneity. The notions of inter- and intra-tumour heterogeneity have been recognised for many years, but recent advances in sequencing technology are allowing the true extent of both forms of heterogeneity to be revealed in detail.

Furthermore, sequential analysis of tumours has also revealed that intra-tumour heterogeneity temporally evolves during the disease course, which enables development of tumour resistance to therapies. Imaging has a tremendous potential to play in addressing this challenge, as it is the only test that can examine biological heterogeneity both within an entire tumour and across multiple tumour deposits in the body, in vivo.

However, wide-spread use of imaging for this purpose will require tremendous further research, test-validation further combine with overcoming regulatory hurdles to tracer development and approval, educating current and future radiologists to have a deeper understanding of molecular biology, and implementing biomarker tests on a much larger scale.

You have said MRI has extensive unexplored potential to contribute to molecularly-based precision medicine. Where is this being realised? "Tell me to point out that my comments are limited to the abdominal and pelvic MRI – as those are the areas of my expertise. Functional MRI techniques, such as dynamic contrast-enhanced (DCE) and diffusion-weighted (DW) MRI, are already providing prognostic, predictive, and early-response biomarkers that can be used to help determine the need for treatment, pre-

New 3-D system quickens black-blood sequencing

Tobias Saam studied medicine at Heidelberg University where he also gained a doctorate in 2003. In July 2010 he wrote his habilitation on ‘Methodical Development and Clinical Evaluation of High Resolution MRI of Atherosclerotic Plaques in the Carotid Arteries’.

Since 2007, Dr Saam has worked at the Institute for Clinical Radiology at the Ludwig Maximilian University Munich. His numerous honours for work on MRI use to detect atherosclerotic plaques include the Coolidge Award. "Black-blood sequences primarily visualise the actual walls of the blood vessels rather than blood flow. These sequences are routinely used for cardiac imaging and to identify artery dissections. However, they have great potential in imaging atherosclerotic plaques and inflammatory changes in the vascular walls. Up to recent years, black-blood sequences could only be shown in 2-D as running these was very complex. It used to take us up to 40-50 seconds to visualise a section of the intracranial vessels of 2mm thickness. It took five to six minutes to acquire a small number of images. A new 3-D procedure, which we developed along with Philips Healthcare, now makes it possible to acquire images of the entire head, and with even better resolution, within the same space of time, so the procedure is now much more time efficient,' Dr Saam explains.

The procedure visualises significantly higher number of masses

The new MRI technology is allowing the true nature of the vascular walls to be shown, to its possible to detect - at an early stage and with the help of contrast media - thickening of the walls, which can be evidence of atherosclerosis or inflammation of the vascular walls. Therefore we can use the procedure for direct imaging of inflammatory changes of intracranial as well as extracranial arteries.

Black-blood imaging can reveal central nervous system (CNS) vasculitis

The new 3-D system allows us to detect more metastases and tumour supression. The procedure, also has fewer artefacts than in 2-D and 3-D sequences. The procedure also gives us a better chance to detect masses, lesions better.

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Advantages for the visualisation of vascular walls

Vascular walls are capable of visualisation of clini-cal symptoms; its early detection shows a particular challenge for all clinicians. Vesicles are primarily based on changes in the vascular walls. Diagnostic difficulty increases because any luminal changes detected are usually unspecific and they can also manifest as a result of other diseases. Therefore, the validity of conventional imaging procedures is often limited.

This is of clinical relevance as the new procedure may not sound helpful - but it is. The MRI specialist can work with clearer contrasts and gain greater certainty in tumour diagnosis as well as the detection of inflammatory changes in tissue.

MRI procedures can be divided into those that show blood flow as bright (bright blood) and those that show it as dark (black blood). Although the latter method has numerous advantages compared to conventional imaging it is not yet used in clinical routine, according to Dr Tobias Saam, Head of Magnetic Resonance Imaging at the Inner City branch of the Institute for Clinical Radiology at the Ludwig-Maximilian University Munich.

Black-blood sequences primarily visualise the actual walls of the blood vessels rather than blood flow. These sequences are routinely used for cardiac imaging and to identify artery dissections. However, they have great potential in imaging atherosclerotic plaques and inflammatory changes in the vascular walls. Up to recent years, black-blood sequences could only be shown in 2-D as running these was very complex. It used to take us up to 40-50 seconds to visualise a section of the intracranial vessels of 2mm thickness. It took five to six minutes to acquire a small number of images. A new 3-D procedure, which we developed along with Philips Healthcare, now makes it possible to produce images of the entire head, and with even better resolution, within the space of time, so the procedure is now much more time efficient,' Dr Saam explains.

The procedure visualises significantly higher number of masses

The new 3-D Black-Blood T1-TSE Sequence does not require pre-pulse for blood suppression and is therefore particularly time-efficient. In a first study on intracranial tumour imaging Saam’s team showed that the new procedure visualises a significantly higher number of masses compared to conventional sequences. This new 3-D black-blood one Tesla sequence with variable flip angles allows us to detect more metastases than with 3-D gradient echo sequences that are normally used for tumour detection. The difference is significant. The procedure also has fewer artefacts than 2-D and 3-D sequences, Saam explains. ‘This is of clinical relevance because the earlier we can detect metastases or lesions the better we can treat them.’

A further effect of the new sequence is that conventionally used gradient sequences blood and lesions appear bright. The black-blood sequence shows masses/lesions brightly, but not the blood, which is shown as dark. This makes it easier to detect lesions, as there is less distraction from bright blood vessels; he adds.

Advantages for the visualisation of vascular walls

Vascular walls are capable of visualisation of clinical symptoms; its early detection poses a particular challenge for all clinicians. Vesicles are primarily based on changes in the vascular walls. Diagnostic difficulty increases because any luminal changes detected are usually unspecific and they can also manifest as a result of other diseases. Therefore, the validity of conventional imaging procedures is often limited.

So far, the gold standard for imaging large vessel vasculitis has been PET-CT. However, Saam sees considerable advantages in the new procedure. ‘Black-blood technology enables us to directly visualise the vascular wall, it is possible to detect - at an early stage and with the help of contrast media - thickening of the walls, which can be evidence of atherosclerosis or inflammation of the vascular walls. Therefore we can use the procedure for direct imaging of inflammatory changes of intracranial as well as extracranial arteries.

Black-blood imaging can reveal central nervous system (CNS) vasculitis

The specialist cites central nervous (CNS) system vasculitis as an example: ‘We cannot visualise this with other imaging procedures. In this case, black-blood imaging is the only procedure that makes this possible. This capability has recently caused a lot of interest amongst neurologists,’ Saam points out. ‘Although this still has to be evaluated in larger studies, the procedure definitely has potential.

We are already having patients referred to us whose doctors are excited about it.”
Precision medicine in oncology

for use in patients. Because of these practical characteristics, HP-MRSI could easily be incorporated into routine MRI examinations that include other sequences, such as T2-weighted imaging, DCE-MRI or DW-MRI. When these capabilities are also combined with an overlay of augmenting information from radiomics and radioinformatics, MRI may become an extremely powerful tool for increasing precision in all areas of cancer care, from diagnosis to treatment selection and planning, treatment monitoring and follow up. Of note, machine learning, construction of radioinformatics algorithms and automated pattern recognition should make it possible to develop augmented programmes and therefore disseminate and introduce the added value of radiomics/radiogenomics in clinical practice, thus improving accuracy in oncologic imaging among radiologists who do not sub-specialise in the field. Getting to that point will need a great deal of teamwork and much greater integration of advanced biomedical informatics in clinical settings.

Hyperpolarised MR spectroscopic imaging may revolutionise the way MRI is used in cancer care. What does this revolution look like?

Hyperpolarised MR spectroscopic imaging (HP-MRSI) is a new technology that increases the MR signal 10,000–100,000-fold, and therefore enables MR imaging of nuclei other than H with great speed and sensitivity. Imaging after injection of a hyperpolarised agent, such as 13C-pyruvate, allows visualisation of the distribution of the agent itself as well as its downstream enzymatic products. By allowing precise identification of aberrant molecular processes, HP-MRSI should enable better treatment selection and earlier assessment of treatment response.

How do you see these advanced MRI techniques being translated into clinical routine for greater precision in medicine?

Importantly, HP-MRSI allows short imaging times (seconds to minutes) that can be added to existing protocols without significantly affecting workflow, and injected HP-MRSI agents are naturally occurring substances with no inherent toxicity, making them safe and inherently toxic, making them safe and...
Harmonising European imaging

Could the dream ever come true?

Boris Brkljačić, professor of radiology at the Medical School University of Zagreb, Croatia

The situation of imaging equipment is dramatically heterogeneous as well, and the density of CT and MR machines differs a lot in the EU, according to data acquired by the Organisation for Economic Co-operation and Development (OECD) in 2012. (Diagram 4 & 5) Least equipped was Hungary, with 2.8 MR and 7.7 CT scanners per million inhabitants. Romania, Bulgaria and the Czech Republic were also below European averages, as well as, perhaps more surprisingly, the UK and France. Conversely, Greece, Italy, Austria and Scandinavian countries did generally well. More importantly than the sheer number of machines is their national distribution. Boris Brkljačić, professor of radiology at the Medical School University of Zagreb, Croatia, points: “What matters is whether the machines are utilised or not and where. It is more important to have excellent CT machines in hospitals that treat polytrauma patients than, say, a rehabilitation hospital.”

Session speaker Brkljačić also underlines that equipment age as a key factor in imaging quality. Experts agree that the golden rule is to have 60% of equipment aged between one and five years old, and 30% between six and ten. It is also acceptable to have 10% of equipment older than ten but, at this stage, one should think of a replacement strategy. This issue is gaining momentum in Europe because equipment is rapidly ageing. According to the European Coordination Committee of the Radiological Electromedical and Healthcare IT Industry (COCIR), 60% of CT machines were up to five years old in 2008. [age profile of CT and MR equipment in Europe (2009) http://cocir.org/fileadmin/Publications_2009/new_members_w_ lusti-coci_age_profile_17_june_2009.pdf]. In 2013, their number dropped to 45.5%. That’s a considerable drop within just five years, and it means that equipment is not being renewed, probably as an impact of the financial crisis.” Brkljačić notes: “In Croatia, public hospitals, for instance, new CT scanners only represent 11% of all CT equipment, which is an absolute disaster. That’s why the ESR is pushing this issue now more than ever.” (http://link.springer.com/article/10.1007/s12639-014-0345-1)

The number of CT scanners aged six to ten also increased between 2008 (50.7%) and 2013 (58%). Similarly, the number of machines older than ten grew from 9.1% in 2008 to 12.5% in 2013. Trends are the same for MRI data. Regularly serviced, well-maintained and not over-used machines may still work well after ten years. One should avoid performing more than 15,000 CT scans annually and less than 8,000 with an MR scanner.

Regardless of economic contractions, health managers should not hesitate in investing in new equipment, because it improves imaging quality tremendously, Brkljačić insists. These examinations are highly profitable to patients and healthcare systems. In many countries, there are waiting lists and huge pressure on radiologists to image as many patients as possible. “Governments should ensure that hospitals have proper equipment, especially those that treat acute patients and perform complex procedures. Politicians tend to have their own policy and buy things that are nearer. For instance, in Croatia you’ll find the best CT equipment in a rehabilitation hospital that doesn’t treat acute patients, while a few kilometres away, the structure for trauma patients has only 16-slice scanners.” His conclusion: “I think it’s very important for radiologists to have proper arguments to fight on these issues.”

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Displays benefit from auto-calibration

The standard Digital Imaging and Communications in Medicine (DICOM) enables the integration of scanners, servers, workstations, printers and network hardware from multiple manufacturers into a picture archiving and communication system (PACS). It can also sort out when, where and how to calibrate a display. DICOM recommends regular calibration, in the centre of the display with a 10% target and 20% grey surround, using a calibrated photometer.

For auto-calibration the aim was not to compromise

When Dome (a brand of the medical visualisation technologies firm NDS Surgical Imaging) introduced the first medical imaging panel displays the company knew that auto-calibration was a key feature that would dramatically improve display quality and reliability. In 2001, Dome introduced the first auto-calibrating, liquid-crystal display system.

DICOM calibration required a photometer to measure and characterise the display’s behaviour. ‘This is the first and most critical step in the calibration process,’ Dome explains. ‘To perform auto-calibration, we knew we would have to compromise where, when or how this characterisation was done. We believed that where and how must not be compromised, because that directly affected the display characterisation. Instead, we compromised on when.’

Ultimate accuracy in display characterisation

‘Dome uses true DICOM test targets and takes measurements over the full dynamic range with a high-precision, instrumentation photometer,’ the manufacturer reports. ‘This provides the most accurate characterisation of the display possible. The characterisation data is then permanently stored in the panel and is always available to be read back and used to perform an instant calibration at any time.’

Other vendors, the firm point out, ‘choose to compromise where and how the display is characterised, using a tiny front sensor instead of a calibrated photometer and measuring at the very edge of the display, rather than the centre. Due to bezel crimping and backlight non-uniformity, the edge of the panel is a poor substitute for centre measurements. Using a low-precision sensor to take measurements also yields much poorer results. ‘Not surprisingly, front sensor calibration is less accurate and more volatile, but it’s hard to know this if the same front sensor is also used for QA and for the conformance testing as well.’

Promising long-term reliability

‘For our system to work,’ Dome explains, ‘the display behaviour must be stable over time, and it is. Over a decade of research and experience has demonstrated this. A10-year-old Dome display is still as perfectly calibrated as it was the day it left the factory. The huge advantage of this approach is that the display will always be DICOM calibrated.’

Dome adds that it encourages users to measure for themselves. ‘If you compare the conformance of a Dome display to any other display on the market, we are content that you’ll see our superior calibration. In fact, if you do a full 256-step conformance test, you’ll not only see our extraordinary calibration, but you can witness the volatility of front sensor based approaches.’ Details: www.ndssi.com

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Can, should and must MRI replace mammography?

In breast cancer care each patient receives personalised, highly effective diagnosis and treatment procedures. In breast diagnostics this mainly revolves around new MRI scanning procedures that allow the quantification of biological and physiological processes on a cellular and molecular level. "The talk here is of molecular MRI (mMRI), which even today makes it possible to differentiate between benign and malignant breast cancers without needing biopsies, with an impact on treatment procedures – such as minimising over-diagnosis – and of the early prediction of the therapy response of individual cancers," says Professor Thomas H Helbich, Vice Chairman of the University Department of Radiology in Garmisch, his lecture centred on mMRI. Various processes, such as tumour angiogenesis, cell proliferation, molecular movement and numerous metabolic changes, play a key role in the development of breast cancer. mMRI facilitates the quantification of these key processes on a cellular and subcellular level. "The combined use of different MRI procedures, such as contrast enhanced MRI, diffusion weighted imaging (DWI) and MR-Spectroscopy (MRS) provides first insights into the world of mMRI. This method allows us to measure multiple imaging biomarkers simultaneously and non-invasively," Prof. Helbich explained. It has been shown that the acquisition of these parameters enhances specificity considerably without over-looking breast cancer. Therefore he advocates increased use of mMRI in routine breast diagnostics.

Osteoporosis risk assessments with dual-energy X-ray absorptiometry

Women over the age of 50 are not only at higher risk of developing breast cancer but also osteoporosis. Would it not be practical to use the same method to detect both diseases early on? Definitely, decided Sectra, the Swedish company specialising in PACS and mammography systems. Based on international scientific studies and data, the company developed an algorithm that determines the risk of developing osteoporosis based on digital radiology images of the hand. The equipment used for image acquisition utilises the low-dose mammography modality.

First the breast and then why not the hand?

For women who would like to have their bone density assessed, the Schwabing Radiology practice, in Munich, has been offering the special OneScreen solution by Sectra for several years, under the direction of Dr Michael Risch. Following a mammogram, the same digital radiology equipment is used to take an additional X-ray of the hand. This is sent to a trained expert at Sectra in Sweden where it enters the PACS along with the mammography image. The expert checks whether all parameters important to the evaluation of the examination have been met – the metacarpal bones of the index finger, middle finger and ring finger being the important ones – and puts the images through a specially developed programme: "In our practice we offer three procedures to measure bone density: Quantitative Computed Tomography (QCT), Dual-energy X-ray Absorptiometry (DXA) and digital radiology examinations with low-dose mammography. The latter are particularly suitable for early screening where there is no evidence of suspected disease as the procedure is carried out with only a very small radiation dose of just a few microsieverts," explains Dr Michael Risch, who has gained very good experience with the procedure with the initial selection of patients.

Apart from low radiation dose, the ease and speed of the examination particularly make the procedure highly attractive for routine medical practice: "Acquiring images in a matter of seconds and the evaluation is fully automated. This is extremely convenient and allows us to offer this service, which is not covered by the statutory medical insurers or patients at a reasonable price – quite a bit less than one hundred euros," he points out. "If, based on the Sectra evaluation, osteoporosis, i.e. early stage osteoporosis, is diagnosed, further examinations are carried out for quantification and then treatment is recommended."

Global data comparison

Sectra OneScreen already allows significant conclusions about bone density, according to Maria Bolin, General Manager and head of the Global Data Comparison Division. "Our system measures more than 1,000 points on the metacarpal bones of the three middle fingers. The system evaluates the volume as well as the curvature of the bones and the data is then used to determine the
The biggest is its versatility. And its size. **RadiForce™ RX850.**

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Liberating radiologists to be expert consultants

Where some decry the commoditisation of radiology, Gabriel Krestin MD, sees an opportunity to redefine the profession, for radiologists to rise up from basement reading rooms to consult as equals with other medical specialists in multi-disciplinary conferences focused on patient care. ‘If we are going to think about the future, we should not be looking in a rear view mirror. We need to be open to the changing environment,’ he said in this interview with European Hospital editor John Brookes.

A past-president of the European Society of Radiology, Krestin will address the European Congress of Radiology on 5th March in a session dedicated to the future of radiology with his presentation entitled ‘Quo Vadis the Radiology Profession: A Pragmatic Approach.’

Professor Krestin spoke from his offices in Rotterdam, the Netherlands, where he chairs the Department of Radiology at the Erasmus Medical Centre.

EH: What is your assessment of the state of radiology today?

In this moment, when medicine is changing, and looking at the role of radiologists, we are increasingly available where structures, functions and biomarkers that we consider important can be objectively measured. If radiologists don’t measure these things, automated processing will help them to make reports more objective, more precise, and contribute to the concept of precision medicine.

Is the resistance to structured reporting due to the way it pushes against a tradition in radiology of interpreting images from an examination?

That is one of the reasons. A second reason is that it narrows the freedom to be more subjective, or to emphasise aspects you find of interest and tend to report more often. Structuring reports obliges a radiologist to go to a template each time and clearly and objectively refer to each part of the exam. It obliges us to use more objective characteristics. It does not always need to be a number, but it does need to be a classification that is objective. This is what is meant by structured.

It does not leave room for subjective descriptions where you are free to say something is ‘enlarged’. What can a clinician do with ‘enlarged’? Is it larger than five or seven centimetres? The clinician needs to know exactly what is meant by ‘enlarged’. Quantification and structuring go hand in hand.

Do you see the role of radiologists diminishing?

Definitely not! We still have leverage, perhaps even more, because we will be taken more seriously. While there are measurements, and even if they become standardised, these measurements stay within radiology.

Two other issues that come in here; first, that the more an examination contains objective, measurable markers, the more it approaches other diagnostic specialties, such as pathology or laboratory medicine. A lab report, for example, delivers a long list of numbers of biomarkers measured in the blood or urine. My prediction, which is perhaps exaggerated and says exactly what radiologists would fear, is that our reports will look similar to lab reports, long columns of numbers, saying things like ‘at position N 27 the number is 78’.

Don’t really believe our reports will even look like that. Yet it is the direction we should be moving toward. My colleagues who are thinking in this way would love to have measures that are validated, consistent in delivering the same number no matter what technology is used. Like the creatinine value in blood, our measurements of let’s say the plaque volume in the coronary artery, should always be consistent and delivered as the same number.

‘We are very far away from this because industry is not really collaborating in this effort. We are far from standardisation in acquisition techniques. We are far from being standardised in processing techniques. We still have a long way to go. Yet this is where radiology, as a diagnostic specialty, needs to go, to be like laboratory medicine, moving toward reports that are open to integration – and this is the next topic – the integration between laboratory, pathology and radiology.

‘Many people see this as the future of our profession. Integrating our diagnostic information with diagnostic information from other specialties to deliver a comprehensive report based on all these elements.’

In light of overwhelming utilisation of radiology today in every area of medicine, wouldn’t radiologists welcome the assistance of automation and standardisation to manage the sheer volume of the workload?

They should do. In some healthcare systems, as is the case in the Netherlands and surely in many other countries, the product from the radiological service is the report, and less so the images. Radiologists are still spending a lot of time producing these reports. Where the real added value of radiologists should be is in the multi-disciplinary conference where they can contribute to the management of the patient.

‘Here, I tell my radiologists that if we have a shortage of staff with so much work to do, when we are forced to choose, it is better to postpone the reporting and get to the conference! This is where a radiologist should always be present as an adviser to consult with the primary care physicians and other specialists in deciding about the management of the patient.

‘This is my argument to address the fear some radiologists have about becoming obsolete because radiology is becoming commoditised. Already some aspects of radiology services are commoditised, but not necessarily in a negative way.

For example, scheduling of the examination can be outsourced to a scheduling management company. In most cases, radiographers and techns already perform this work. The same thing is happening in the reporting where the report is sent to less expensive sources where radiologists dictate the report.

‘But what can not be outsourced, and what will never be commoditised, is the added value of consulting by the radiologist in a decision-making process and participating in the management of the patient. It’s where a radiologist brings knowledge of the technology, both for its benefit and limitations. To be the specialist who knows what a structured report and the numbers in that report mean, as well as their significance for the patient.

‘This is what we need to deliver, not just a report. To give other physicians an appreciation of the study and an understanding that goes beyond their own specialties. This is where radiologists should be going. It brings us out of the basement and reporting rooms into the conference room and even closer to the patient.’

Thursday, 5 March 08:30–10:00. Room E2.

Session: Quo vadis radiology profession—from a pragmatic approach—Looking into the future of radiology

Professor Gabriel Krestin MD (Rotterdam), former President of the European Society of Radiology, will speak on the challenge of precision through standardisation, quantification, automation and integration.
Launching many imaging and IT concepts

On show at ECR 2015

First unveiled at RSNA 2014 last November, Carestream’s Touch Ultrasound System is on show for the first time in Europe at this year’s ECR.

‘This innovative ultrasound platform delivers a unique all-touch control panel, integrated GPU processing power and smart transducer technology coupled with a single-board system design,’ the manufacturer reports. ‘This creates a highly reliable product with advanced imaging capabilities, a compact footprint and a modern user interface. The sleek, all-touch control panel blends the best of both worlds by combining the speed and flexibility of a soft user interface with the tactile feedback of traditional keys. Etched marking for primary controls assists the user with easily locating key functions without looking away from the image display monitor.’

The company is also demonstrating notable new features for its healthcare IT platforms, which manage, store and share patient data and medical imaging exams. ‘Carestream’s new Clinical Collaboration Platform can boost collaboration among clinicians, break down walls between ancillary departments, sites and networks, and provide physicians with a single view of critical patient records and information,’ the company explains. ‘The Clinical Collaboration Platform enables healthcare providers to capture, archive, manage and distribute clinical data such as images, videos, photos and reports related to the patient from different ancillary departments, such as endoscopy and dermatology.

‘This creates a patient-centric clinical record that complements the electronic health record. Capturing structured data will also deliver greater clinical insight with interactive reports where a single click of a hyperlink takes physicians to the actual data.’

The firm suggests that this Web-enabled platform can be used for telemedicine, to provide specialist input in remote areas. ‘The platform also offers a secure distal patient portal that allows patients to download, view, store and share their own medical imaging studies with physicians and specialists,’ the report adds.

Carestream is also highlighting new features in its radiology portfolio to help diagnose and treat a wide range of conditions, including:

- **A compact new Vita Flex CR system** that provides excellent image quality and can process images while set on a floor, table or other flat surface. This affordable platform can meet the diverse needs of imaging centres, private practices and smaller hospitals, as well as orthopaedic, veterinary and chiropractic providers,’ Carestream points out.

- **New tools for digital breast tomosynthesis designed to enhance the early breast cancer detection and treatment.**

- **The latest version of the company’s radiology information system that enables the importation of a patient’s clinical history for referring physicians can have a more comprehensive file on which to base diagnostic and treatment decisions.**

Carestream’s newest cardiology image management platform enables text messages or e-mail notifications to be sent to a physician when a patient has a critical condition, and a dashboard that provides data to assist with diagnosis of a current examination.

Finally, there’s a new premium laser imager that produces images from CT, MR, digital mammography and other imaging modalities on radiographic film.

Details: www.carestream.com/ecz.
Seeking the best systems

When the Medical Radiological Institute (MRI) at the private Bethanien Hospital in Zurich and the local hospital in Årø, Denmark, needed new fluoroscopy and radiography equipment, they investigated quality, functionality, service quality and cost. Among systems examined was Shimadzu’s Sonialvision G4, which has been completely revised, with innovations in all areas, including dose reduction and enhanced image quality, simplified processes and improved patient comfort. The premium application software offers the most recent improvements for diagnostic imaging. It supports useful applications, such as multi-slice imaging, slot radiography as well as DSA & real-time and motion-tolerant RSM-DSA, which are all options to extend its functionality,’ Shimadzu explains.

Multi-purpose needs in Switzerland

Dr Thomas Vollrath, board certified radiologist said that the MRI Bethanien needed to increase capacity with optimum use of existing space. Fujifilm Switzerland presented the institute with a multi-purpose examination room containing Shimadzu’s high-performance R/F-T.

The robust X-ray table allows bariatric studies with a patient load up to 310 kg in horizontal position

Dr Vollrath concludes. ‘The Shimadzu system is simply newer, more modern and more manageable.’ Bissig confirms that the image quality and intuitive operation shortening work processes soon convinced staff of its value. The combination of X-ray tube and detector covering the examination area more than 200 cm longitudinally without the tabletop having to be positioned is also welcome. ‘In our small examination room we can thus avoid any possible collisions, for example with infusion stands,’ Bissig adds. ‘It’s also very helpful that the patient mattress can be fixed to the top lateral mounting stands,’ Bissig adds. ‘It’s also very helpful that the patient mattress can be fixed quickly and easily.’ This allows us the great advantage of patients no longer having to be moved, which is very comfortable for them,’ notes Franziska Bissig, supervising radiographer. The mobile FPD is compatible with our second X-ray room and offers additional flexibility for further emergency and bedside examinations.’ Equipped with the largest available FPD at 43 x 43 cm, the X-ray table of the Sonialvision G4 offers large, long-view examinations of the patient from head to toe, so that the MRI Bethanien can also perform digital slot radiography. Very soon, slot radiography provides high-resolution, homogeneous and dose-reduced long-view imaging (e.g. full leg and full spine imaging). ‘We have been able to improve in all respects,’ Dr Vollrath says. ‘It’s also very helpful that the patient mattress can be fixed to the top lateral mounting stands while standing and that the handles can be fixed quickly and easily.’ Roughly 50 km long and up to 8 km wide, Årø is one of Denmark’s Baltic Sea islands. The local hospital recently installed the first Sonialvision G4 equipment in that country; therefore the hospital will be used as a reference when new customers want to see how it operates.

An X-ray image presented in two minutes

For Ole Gilberg, head of the X-ray department, the new equipment has much to offer: ‘Earlier, it took 10 minutes to produce an image. With the new equipment we can present an X-ray image in two minutes, which means a lot when we have trauma patients from a car accident, for instance.’

In addition, the robust X-ray table can be lowered to 47 cm, thus giving easier access for children, older patients or patients with limited mobility. It also allows bariatric studies with a patient load up to 310 kg in horizontal position.

Another plus: ‘The fully flat table top and built-in cable system of the X-ray table is a good improvement in terms of hygiene and workload,’ Gilberg adds.

Details: www.shimadzu-medical.eu

Japanese firm celebrates 140 years

Celebrating its 140th anniversary in 2015, Shimadzu sits among leading international manufacturers of analytical instrumentation and diagnostic X-ray imaging systems. The firm’s technologies are essential tools for quality control of consumer goods and articles of daily use, in the fields of environmental and consumer protection. Spectroscopy, chromatography, environmental analysis, balances, biotechnology, material testing and medical technology make up a homogeneous yet versatile offering. Along with many industry firsts and products that Shimadzu has created and invented since 1875, there has also been the exceptional awarding of the 2002 Nobel Prize for Chemistry to Shimadzu engineer Koichi Tanaka for his outstanding contributions in the field of mass spectrometry.

As a global player, Shimadzu operates production facilities and distribution centers in 76 countries, with more than 10,000 employees worldwide. For over 45 years the European headquarters has been
High-tech R/F solutions
Confident launch for a new French system

Launching in March, Optima is the latest offering from the French R/F specialist Aplem (part of the high-tech medical solutions DMS Group).

Based on the firm’s Platinum technology, Optima is reported to provide nearly all the benefits of the Platinum in a cost efficient, robust mechanical package, the firm points out, adding that Optima “…is the ideal choice for centres looking for the advantage of digital in an easily accessible price range”.

Sweatless transition
With the same platform used by both Platinum and Optima, the transition from one solution to the other is reported to be seamless. ‘In terms of service, maintenance and applications the two systems are nearly identical,’ Aplem confirms.

Platinum provides a ‘most comprehensive technical package available on the market,’ the manufacturer adds. ‘These include excellent image quality; optimised settings for maximum dose reduction; SID 180 cm for chest and stitching exams; variable height 48-130 cm for comfortable patient charging; and brushless motors for smooth precise movements. Additionally, it takes a patient’s weight up to 265 kg with no limitation to any movements, has a long table top for maximum patient coverage 240 cm as well as optional 4-way movement of the table top, and there’s full access around the table for easy patient transfers. A video camera integrated in the collimator enables radiation free positioning, with fully motorised movements and unlimited pre-programmes for table positioning. There’s also relaxing ambient light and a music player, collimator, touch screen, foot pedal, remote control and maintenance. Internationally over eighty Platinum systems have been installed. Details: www.apelem.com

See what you’ve been missing
Introducing the Dome S6c widescreen 6MP diagnostic display — a new benchmark in optical clarity. With an ultra-thin bezel, fanless cooling technology, and sleek, lightweight design, the Dome S6c brings you next generation engineering that’s worth looking into.

> Long-life LED backlight
> Factory calibrated for life
> 30” widescreen viewing
> Ultra-slim bezel
> Fanless cooling
> Lightweight design

www.ndssi.com
The fourth Management
How secure are your data?

The appetite for mobile information technology (IT) seems insatiable.Boosted by sales of the iPhone 6 Plus, Apple generated a record $18 billion profit in 2015’s first quarter alone. Social media use is exploding, and dedicated professional platforms, such as Figure 1, a sort of Instagram for doctors, increasingly emerge. These changes are affecting our daily lives, and this is also true for radiologists. While tablets and smart phones create unprecedented opportunities for radiologists to connect with their colleagues and patients, mobile IT also raises a number of questions, especially regarding its safety. A panel of experts are tackling these issues in a dedicated refresher course during the European Congress of Radiology.

More and more radiologists succumb to the charms of mobile devices. Apps like Osirix enable cases to be reviewed at home, prepare slides, give a conference, and, increasingly, to communicate with other physicians. Mobile tools may also improve communication with the patient, and a number of institutions are already enabling patients to access their images online, or to discuss their record with physicians during teleconferences.

However, in the absence of a clear regulation on the topic, a hefty question has been on everyone’s lips for some time: with mobile IT, how safe is our data?

Hospitals are increasingly a target for hackers. A large number of cases were reported in which cardiac devices, or parameters of a CT examination, had been manipulated at a distance (ref: http://www.wired.com/2014/04/hospital-equipment-vehicle/).

Data security is simply insufficient in healthcare facilities, according to Erik Ranschaert, radiologist at the Jeroen Bosch Ziekenhuis teaching Hospital in’s Hertogenbosch, the Netherlands, a speaker during the course.

‘Hospitals will have to change their security protection. Hackers are targeting systems that store personal information in electronic medical records,’ he said. ‘In the United States alone, there has been a 600% increase in attacks on hospitals in 2014, according to a report published by security firm Websense (ref: http://www.cnn.com/id/2012090222).

With mobile devices, patient data are being transported outside the hospital, so the risk of leaking data is multiplied exponentially. There is currently no firewall to protect data on a tablet – just a login and a password. One can certainly remotely cancel access to an iPad, but there is no 100% certified protection for data. What happens if they are stolen?

‘Imagery you are treating Barack Obama and you have, on your tablet, the images of his colonscopy that you performed a day earlier. How, suppose the results show he has cancer, and suppose you lose your tablet during a flight. What happens next? You risk having these images exposed to the whole world before even discussing them with your patient,’ said Emanuele Neri, associate professor of radiology at the University of Pisa, Italy, and Chair of the ECR course.

To make matters worse, most hospital managers are still unaware of these risks. They also do not realise that data can be lost or damaged during their transmission from one device to another, according to Neri. Stakes are high because valuable personal information can be used for commercial purposes; knowing which medication a patient uses offers a unique opportunity to advertise products – just like Facebook already does using your own data. The medical legal loophole concerning the issue only exacerbates the risks.

‘I suspect there will be a great business around data selling. It may even be the biggest business of our century. I expect there will soon be a policy to protect data security. However, I don’t think there will be one regarding privacy so soon. How will we manage these issues in the future? I expect our data are already everywhere,’ Neri pointed out.

The European Union is addressing the issue but its resolutions may come too late. The Horizon 2020 research programme plans to offer solutions to security and privacy... by 2020.

In the meantime, hospitals can defend their systems by making sure tablets and smartphones are used in a protected environment. Raising the level of protection of an IT system against hackers is of course mandatory, but it is not the only way. Ranschaert explained. ‘One could also develop solutions to deliver access only after identification, or force data to remain within safe containers and make sure it cannot be downloaded or accessible by private apps – e.g. for image or photo sharing.

Furthermore, one should be able to remotely wipe the data, and the hospital’s policy should be adapted to usage of social media within the facilities. For instance, Breda hospital in the Netherlands forbids everyone to take pictures in the hospital with mobile devices,’ he said.

‘Training personnel and radiologists on how to use mobile devices and social media safely is key to improving safety. Part of healthcare will soon become multichannel, so physicians and providers should get ready for the switch.

We should try to avoid it; the ostrich strategy will not pay off. We have to think how we can use mobile IT for the mutual benefit of our patients and ourselves. There are advantages in using these tools to facilitate our services and improve education but,’ Ranschaert concluded, ‘we have to be aware of the risks, too.’
Facing challenges common to any manager, Russian radiologists must also confront a funding crisis, system dysfunctions, self-referring patients, and head-hunters chasing staff, John Brosky reports.

‘We are not reinventing the bicycle here in Russia,’ said Sergey Morozov MD PhD MPH. ‘Radiologists anywhere would be familiar with the experience of restructuring imaging services for the nation’s healthcare system, he added. Thanks to a recent modernisation programme, together with the new radiology systems installed in even smaller community hospitals across the country, the operation of these healthcare facilities face the same kinds of issues confronting our colleagues across Europe or the United States. The equipment we have is the same, the standards for operating the equipment are the same, the protocols are very similar,’ stated Prof. Morozov, who is Deputy CEO at the European Medical Centre in Moscow, and a member of the Management in Radiology (MIR) Subcommittee of the European Society of Radiology (ESR). ‘As a system solution.’

Currently there is a widening gap between the level of digitisation and IT capabilities between public and private hospitals, which are moving faster to introduce PACS and hospital information systems (HIS). ‘They can make purchasing and installation more straightforward, they are more transparent in their operation, and they can assure financing because they are structured as businesses,’ said Prof. Morozov.

‘With public hospitals this all can become more complicated, he acknowledged. ‘It can sometimes be difficult for public hospitals to understand why they need things like PACS or IT, and HSS, and to understand why they need to find the funding for these projects.’ The good news, he said, is that there is increasingly a top-down support for IT and PACS as the heads of hospital administration see an advantage to prepare detailed business plans and financial analysis predicting cash flows. It is a recognition of radiology as a business; by being state hospitals as well as the private hospitals.’

Making a tough situation even more difficult, he said, is that financing has collapsed for the national programme of healthcare modernisation that equipped hospitals and clinics. ‘Unfortunately much of the equipment was often provided without service contracts, only guarantees for one year after installation. In addition, not all equipment was installed according to the proper specifications. This has led many hospitals without equipment service. Clearly the lesson has been learned that we cannot just buy a piece of equipment without thinking about service from the beginning; and on-going financing; and proper staffing and training.

‘In these areas we also have some challenges that are specific to Russia,’ he said. ‘A huge difference here is that many patients refer themselves for radiology exams. They do not come from a specialist or even a general practitioner. They go to Google Doctor and come to us saying they would like an MRI. I had one patient who, when I asked her what her health issue was, she answered she suffered T2 hyperintense lesions in the brain. Because there is not an absolute requirement that a physician must order a scan or radiological exam we have a major policy issue and we need to define patient flows to radiology.’

Another issue is that the percentage of patients who pay out of their own pockets for health services is rapidly expanding. Patients don’t always go to the appropriate public hospital service, but instead search for better diagnosis and treatment among private clinics. ‘Money has become the major driver of healthcare.

The radiologist as manager

The lessons learned to this point are also very similar. ‘We have found that a good radiologist can become a manager, but it does not mean this good radiologist is going to suddenly become a good manager,’ he laughed. With the expanded number of radiology systems, and a rapidly increasing demand on the utilisation of that equipment, we now understand that doctors given charge of these departments need specific skills to run them effectively. They need to define processes and key performance indicators, he added.

Prof. Morozov’s work with the ESR on the MIR committee is part of a larger effort to introduce a programme for retraining Russian doctors as professional managers of healthcare services.

The next level of challenge, he said, is to find individuals from radiology (IT) systems on top of these processes to better manage hospital departments. ‘I can tell you that IT people in Russia are the same as IT people everywhere else,’ he said. ‘They often believe that they know all the answers about how to organise workflow, for example. Yet you can not start by making IT decisions, or you will not be free in decision for managing the processes. It comes in having a visibility for what is happening inside the hospital and the ability to better manage what is going on.

Radiology as a business

As with other European countries, the Russian healthcare system is under financial pressure with severe constraints for radiology, some of which would seem familiar, but much of which is peculiar to Russia. Prof. Morozov: ‘An important development is that, today, when we want to develop a new project or programme for radiology we need to prepare detailed business plans and financial analysis predicting cash flows. It is a recognition of radiology as a business; by being responsible for all hospital activities, the radiology department can become the major driver of health care.

Radiologists as stars

‘Today, in Russia, radiology services are perceived as a source of revenue for hospitals. Radiologists have become the stars of the healthcare system. Consequently, qualified radiologists are requesting high salaries, head-hunters are after them, making it difficult to find good radiologists and trained technicians – critically, experienced radiologists who can act as managers to run a department efficiently.

In addition to my hospital work, I teach at the chair of radiology at Sechenov Moscow Medical University. Five years ago we would have 10 to 15 residents each year. Now we have about 50 and 60 Young doctors who wish to enter radiology must find a programme themselves, yet the program for training has not kept pace, so that hospitals and state universities cannot provide life courses enough.

This is creating a business of post-doctoral medical education in Russia where we see private companies providing specialised training courses with experienced doctors. These private companies have radiologists to train young radiologists. Combined with a fee-for-service model of payment, this drives costs higher and higher until we see that Russia’s healthcare spend per patient is constantly increasing. With understaffed state hospitals providing patients with poor service and a lower quality of treatment and diagnosis, those who can afford it prefer to go to a private hospital.

‘The good news is that, over the past three years, Moscow Healthcare has acquired about 150 CT and 70 MR scanners. They are now acquiring a regional PACS system from Agfa Healthcare to connect all these scanners to create a centralised Centre of Excellence that can offer second readings for other medical centres. Here we are seeing a concerted state effort in a policy to provide better standards for radiology in imaging and interpretation. ‘The Centre for Excellence in Moscow is proving a driver for increasing quality. It creates an opportunity to enhance the education and training system. Radiologists learn a second opinion is not a punishment but a systematic review to identify discrepancies. In this way people learn how to avoid any mistakes, whether in equipment use or interpretation.’
M9 brings maximum mobility

For medical ultrasound it’s quick, easy and portable – and so popular with Professor Christoph Dietrich, chief of Medical Department 2 at Caritas Hospital, Bad Mergentheim, Medical Clinic Two focuses on hepatology/oncology, palliative medicine, gastroenterology and herpetic, gastrointestinal, endocrinologic and metabolic diseases and has an excellent reputation for specialised and innovative endoscopic and ultrasound techniques.

Dr Dietrich uses the M9 ultrasound system for any standard diagnostic exam, from head to toe, and simply opens up M9’s high-resolution 15 inch LED monitor for swift bedside exams. Despite its compact design, the M9 offers outstanding image quality that’s definitely comparable to that of a stationary system, he happily reports. ‘It offers all image data needed in a general hospital or medical office environment.’

Above all the patented 3-T transducer technology provides excellent visualisation in B-mode and colour mode, Dr Dietrich adds. ‘It offers higher sensitivity and larger bandwidth as well as enhanced transmission efficiency and excellent signal-to-noise ratio.’ The single crystal probe technology allows imaging of deep structures. ‘Not only is the transducer state-of-the-art; the small and lightweight five kg system itself is chock-full of premium Mindray imaging technology, such as Echo Boost, High Dynamic Range Flow (HDR Flow) for visualisation of minute vessels and complex flow patterns, as well as the Natural Touch elastography package for reproducible and user-independent measurement of tissue elasticity. The professor highly values that ability to perform bedside exams. Where every second counts, particularly in emergency and trauma care, quick intuitive diagnostic tools are in high demand. The mobility of current ultrasound devices has swiftly shifted them from an emergency modality to a primary diagnostic modality.

Caritas Hospital is a certified regional trauma centre in the Northern Bavaria trauma care network. Prof. Dietrich cooperates closely with the emergency department. ‘Thanks to the M9’s portability and immediate usability we can immediately start radiography on an injured patient – even while other clinical tests are being performed. We unfold the M9, it’s up and running within seconds.’

To accelerate diagnostic work-up in trauma care, the ultrasound exam follows an internationally recognised standard, Focused Assessment with Sonography for Trauma, FAST for short. This rapid bedside screening test is designed to detect or exclude free fluid, mostly bleeding, in certain anatomical regions. The procedure lists clear questions that can be answered with an unambiguous yes or no, Professor Dietrich explains. ‘By systematically imaging the entire abdomen the physician can tell, in less than a minute, whether free fluid is present or not.’

Even for abdominal contrast-enhanced ultrasound (CEUS) the professor relies on the M9’s image quality. ‘With the M9 you can quickly detect or exclude a splenic or liver rupture. Two to three minutes after contrast administration you can see blood flow.’

For CEUS the M9 offers another advanced Mindray technology: Ultra Wideband Nonlinear Contrast Imaging. This transmission uses second harmonic as well as non-linear signals, which results in excellent contrast-to-tissue specificity.

Prof. Dietrich is convinced that ultrasound, while still essential in a clinical setting, will continue to gain importance in disciplines such as intensive and trauma care due to its mobility and POC availability.
Ultrasound system sharpens paediatric hepatic imaging

High quality B-mode with advanced functions makes UltraFast the “go-to” device for paediatricians

Ask about UltraFast ultrasound and you might expect a technical answer explaining why the ultrasound is faster. However, for Stéphanie Franchi-Abella MD, fast means just fast, an ultra-quick acquisition she can take of a squirming, agitated newborn in the blink of an eye: “These babies are small and breathing rapidly, the organs are moving fast in the image and it’s sometimes difficult to record Pulsed Wave Spectral Doppler in their vessels that are small.”

UltraFast facilitates Doppler acquisitions. It only takes two seconds to record all Doppler data in an image and you can obtain all conventional Pulsed Wave Spectral Doppler measurements retrospectively and assess them in these vessels recorded in the image. This is interesting in young patients because one acquisition can be sufficient to assess arterial and vein patency.

“In liver disorders it is very interesting in showing a transient inversion of peripheral portal blood flow that we would not be able to see with a Doppler. For this, this can be a sign of portal hypertension,” explained Dr Franchi-Abella, who is a paediatric radiologist at Bicêtre Hospital in Paris, the leading tertiary centre for paediatric liver disease and liver transplantation in France.

At this year’s ECR she is presenting a lecture on “The Benefits of Using UltraFast Ultrasound Imaging in Paediatric Patients” during the SuperSonic Imagine Satellite Symposium (4 March).

In 2012, her clinic was first equipped with an Aixplorer ultrasound platform from SuperSonic and the following year the group presented at JFR (the French meeting of Radiology and ESPR European Congress of Paediatric Radiology) preliminary findings from a study of 98 children, half of whom were healthy while the others had liver fibrosis. The study compared the metrics reported by the ShearWave Elasticography function on the Aixplorer with histological staging of biopsies from the same time. “In 90% of cases the ShearWave Elasticography (SWE) matched the liver fibrosis staging obtained from biopsy,” Dr Franchi-Abella said.

An article reporting these preliminary findings is now in press with the journal Radiology. Meanwhile these results caught the interest of the French ministry for health, which is co-sponsoring an expanded study, which will enroll over 200 children to establish and validate SWE as a non-invasive tool for the diagnosis of liver fibrosis. “I would not want to promote any findings ahead of the definitive results, but, what is clear, and what we can say, is that the preliminary findings are very encouraging. There may be a possibility that we can better decide when to perform biopsy in certain indications,” she said.

While the primary endpoint of establishing a correlation between histology reports and SWE remains the same, the method for analysing the histological samples calls for a computer-assisted assessment. In other words, instead of having only a visual assessment, where the pathologist looks at a slide, we will scan the slide for an additional and more objective assessment with software analysis,” Dr Franchi-Abella explained. “We expect to be able to complete this study next year.”

In her ECR symposium presentation, the expert said she will discuss specific applications of Aixplorer, both for its advanced UltraFast functions and elastography, as well as for its B-mode, “although I plan to show examples of how we apply the Ultrafast ultrasound in clinical practice, notably for liver disorders,” she said. “We have high-end ultrasound systems with complicated keyboards and so many buttons everywhere that there is nothing natural about learning how to use them. The Aixplorer has proven to be so much simpler to use that most radiologists in our service have taken it up easily and rapidly. It became quickly accepted by everyone in our clinic. It is the ‘go-to’ ultrasound system because of the high-quality imaging.”

The multi-task Aixplorer can cover routine clinical assessments of morphology, whether for a neonatal brain, or the hips, and notably for the digestive anatomy, she added. “We have improved our diagnostic performance in some disorders since using the Aixplorer. For example in biliary atresia – a progressive biliary fibrosis leading to biliary obstruction in newborns – the presence of a microcyst (<0.5 mm) next to the portal bifurcation is quasi pathognomonic of this disorder. The quality of the SIIH-2 probe improved the detection of such microcysts a lot, and that is helpful in assessing this pathology. For this diagnosis we don’t want to lose any time: Babies who have surgery before 40 days have a better outcome with a greater chance to resolve the pathology and avoid liver transplantation, so it is essential to make a diagnosis as early and as quickly as possible.”

“The fact that we have advanced functions for measuring liver stiffness, or to better see microvasculature, helps us to understand certain pathologies better. For children receiving liver transplants, the earliest month can be complicated with many things that could happen (rejection, infection, vascular disorders and so on). Sometimes the ability to link a morphological image with elastometry helps to understand what is happening better and make a much more precise diagnosis. I’ll be sharing examples from such cases of children with a liver transplant in my ECR presentation.”

Lever Fibrosis of a few months old child measured simultaneously in kPa (4.7 kPa) and m/s (1.2 cm/s) with 5G Probe corresponding to a PS Metavir score

UltraFast Doppler displays multiple spectra in a single image in this neonatal liver with cholestasis. Full display achieved in a single acquisition
**Value in an open platform**

As Hitachi deploys its new generation of Oasis 1.2-T MRI scanners throughout Europe, our Madrid correspondent asked Dr Manuela Jorquera Moya about her experiences with the new scanner over the past few months.

*Report: Mélisande Rouger*

Musculoskeletal and neuro-radiologist Dr Moya works at San Carlos Hospital, a public facility, and at the Advanced Surgery Centre of Virgén de la Paloma Hospital, a private institution where an Oasis 1.2-T MRI Scanner was recently installed. Open from 8am to 10pm her department scans 20 to 24 patients a day, mainly for ambulatory care.

Dr Moya: ‘A high percentage of the patients suffer from claustrophobia, and a significant number of patients prefer to be examined in an open-platform, probably because they feel more comfortable here than in a confined scanner.

‘The Oasis platform offers high field imaging, so we mainly perform MSK and nervous system examinations. Most of our patients come from traumatology and neurology. We also perform abdomen and mammography examinations, mainly in patients with claustrophobia. We rarely image obese patients; this population is still low in our country.’

Why did the Centre choose Hitachi’s equipment?

‘Oasis is the first Oasis system installed at a private facility in Madrid. Only one public hospital had previously been equipped in the capital. This means we can now also offer this service to patients coming from the private sector, who represent a large number of patients in Spain.’

What is specifically good about working with Oasis?

‘Oasis is useful for any study that requires high field imaging. The wide open-platform enables us to perform high field studies in patients with claustrophobia who otherwise would never be able to benefit from, for instance, specific abdomen, liver or whole-body MR examinations, unless they are sedated.

‘The open-platform is very convenient. I have been working with the system since last September, and I find it very good not only for patients with claustrophobia but also for children. Young patients who undergo an examination in a confined bore tend to move because they are nervous. If one of their parents can sit and chat with them during the examination, it helps them relax. Putting them at ease definitely reduces the risk of repeated scans, decreases scan time and provides higher quality diagnostic images.

‘Oasis 1.2-T features susceptibility weighted imaging (SWI), spectroscopy and perfusion, which all play an important role in neurological exams. For MSK examinations, the open platform architecture helps to acquire an image rapidly. Many patients will voluntarily or involuntarily move during an examination. The flow and motion compensation technique of radial acquisition significantly improves image quality and expedites interpretation without having to sedate patients.

What could be changed in the future?

‘I am not sure how Oasis is going to develop further, but I think technology will soon enable the magnet power to increase to 1.5 or 2-T, which would definitely improve the offer for open high-field equipment. However, for the moment, I believe developments will rather focus on short bore MR equipment.’

**Cardiac CT scanner drops radiation dose**

Further big plus: Even patients with AF and high heart rates can be scanned.

A British Society of Cardiac Imaging (BSCI) survey has confirmed that Toshiba’s Aquilion One scanner not only delivers exceptionally low radiation doses for cardiac CT, but also widens the scope of diagnostics in Cardiac CT because even patients with conditions eliminating them from a CT exam before this machine arrived can now be scanned.

An incredible 40% lower radiation dose

‘This data is possibly the most powerful I can show about the Aquilion One with the PureVision detector,’ said Russell Bull MD, Consultant Radiologist at the Royal Bournemouth Hospital, Dorset, United Kingdom, where the study data was collected. Over a one-month period at the hospital, an unselected patient population was surveyed. The group included all patients, as well as those with atrial fibrillation and high body mass index.

The radiation dose of around 1mSv for an unselected population is amongst the lowest ever recorded for cardiac CT. ‘I would have been happy with 20% reduction in radiation dose compared to the previous survey,’ Dr Bull said, when presenting the BSCI findings. ‘In fact, there was a 40% reduction in dose. This is extraordinary as the Aquilion One was already a low dose scanner in the previous survey.’

Better imaging with high contrast

Adaptive Dose Reduction in 3D (ADIR 3D) is integrated in the Aquilion Vision. This not only minimises image noise, thereby enabling radiologists to lower the radiation dose, but also assures high diagnostic quality images.

Combined with the wide detector array of 16 cm, this CT scanner enables volumetric scanning, where entire organs can be captured with perfect temporal uniformity and completely free from 2-axis misregistration at a rotation speed of 0.275 seconds. As a result Dr Bull said: ‘The image quality is actually much better, which has to do with the combination of the PureVision detector and the ADIR 3D processing. We are seeing better images for 40% less radiation dose. With Aquilion One we can scan patients we wouldn’t even consider scanning on a conventional scanner.’

4D imaging and more

With this Toshiba CT scanner time can be added as the fourth dimension paving the way for high-quality dynamic volume applications, or 4-D dynamic volume imaging, the manufacturer reports. Each individual set of data, acquired in a dynamic volume, shows an exact moment in time, or the exact phase of contrast enhancement. Dr Bull also added that, the ability to change the table speed on the fly with Variable Helical Pitch (VHP) is unique to Toshiba. This, for example, makes it easier for the technician to do a TAVI scan,
Cardiologists gain MRI training

Seeing a substantially increasing importance of the cardiac MRI procedure, cardiologists have developed a specialist cardiac MRI training programme for their colleagues, Bettina Dobereiner reports.

Over the last two years technical developments in cardiac MRI have undoubtedly had a major impact on cardiovascular medicine. To acknowledge this development, at least to some extent, the German Cardiac Society (DGK) has developed a specialist Cardio-MRI training programme. This January, Professor Hugo Katus, Head of the DGK’s Working Group for Training and Advanced Training, introduced the new curriculum at the annual DGK press conference in Berlin.

These days, cardiovascular medicine would be inconceivable without cardiac MRI and, according to Prof. Katus, who is also Medical Director of the Clinic for Cardiology, Angiology and Pulmonology at the University Hospital Heidelberg, its importance will continue to grow.

Therefore, Katus and his DGK colleagues aim to ensure that this imaging procedure has a firm place in out- and in-patient cardiovascular medicine.

Unified standards
As a first step, the society’s cardiologists have developed an additional qualification in Cardio-MRI, which members of their profession can attain. The initiators hope that the curriculum (V. Hombach et al., Curriculum Cardiac Magnetic Resonance Tomography (CMR), in: Cardiology 2014, 8:451-451) developed by the DGK Working Group will set the first, unified standards for well-conceived MRI training (education CMR curriculum) across Germany.

Advanced training in this field is closely aligned with existing international curricula, such as those developed by the European Society of Cardiology (ESC) and the American Society of Echocardiography (ASE).

Continued on page 28
Safer head and neck imaging

‘The engineering evolution of the NewTom range has delivered an ultra-modern, ultra-technological, ultra-competitive device – the most complete CBCT, the device manufacturer reports.

‘NewTom VGi evo performs 3-D imaging, panoramic imaging, teleradioigraphy and 2-D sequential imaging. The device introduces a new image chain, which includes features that increase standard CBCT performances, such as an enlarged flat panel sensor, with an improved signal/noise ratio and a rotating anode generator with a 0.3 mm focal spot.’

With 51 scan modes, NewTom VGi evo adapts to specific needs of different clinical applications. The FOV range goes from 5x5 cm to 24x19cm, recommended for Head & Neck applications. NewTom also introduces SHARP 2-D technology, enabling the VGi evo to generate a complete set of 2-D images (AP, PA and LL cephalometric images), the manufacturer explains, adding: ‘It also features the CineX function, a dynamic sequence of 2-D images for analysing swallowing, salivary ducts, TMJ with contrast and flexion and extension of spine.’

**Dose reduction**

To protect users, the device uses pulsed emission that activates the X-ray source only when needed and a total exposure for a standard exam takes only 1.8 seconds. Further dose reduction is achieved by using VGi evo’s new Eco Scan mode, available for all FOV, combined with SafeBeam technology.

**Details:** www.newtom.it

the Society for Cardiovascular Magnetic Resonance (SCMR).

Just like its international models, the DGK curriculum is divided into three CMR-levels. Level 1 and 2 will provide the basis for a cardiologist to assess the indications, perform and interpret CMR examinations correctly in a large database of patients with a broad range of cardiovascular diseases. The third level will enable the cardiologist to lead a CMR laboratory and to perform scientific CMR examinations at a defined high level.

However, this curriculum is only a first, modest step; Prof. Katus believes there is still much to do to integrate CMR into cardiovascular medicine as envisaged by the cardiologists. At the conference, Katus pleaded for CMR to become a mandatory part of training for all those specialising in cardiology, and for CMR-qualifications to be recognised in all German Federal States – currently not yet the case. He pointed out that safe performance of cardiac MRI investigations in patients with critical heart disease, and proper interpretation of the functional MRI images, requires in-depth training and substantial expertise in clinical cardiology.

**Reimbursement**

Katus also argued for the statutory health insurers to comprehensively cover all out-patient CMR examinations without any limitations, and for in-patient CMR examinations to be reimbursed as a ‘separate charge’ (currently, cardiac MRI is only accounted for by being included in lump sum payments).

The professor also made a further demand in the name of the DGK, thereby venturing into somewhat controversial territory. He called for the equal treatment of cardiologists and radiologists from an accounting perspective, because the statutory medical insurers currently only reimburse costs if CMR is carried out and evaluated by a radiologist qualified in cardiac MRI. However, as recently as 2014 and in response to a lawsuit from a cardiologist, the Federal Social Court of Germany upheld the current regulation that governs that only sufficiently qualified radiologists are entitled to receive reimbursements for CMR costs.

In its decision, the court referred to, among other regulations, the ‘Two-Man Rule’, which remains intact as long as the division of duties between radiologists and cardiologists continues. The principle is also used to ensure that diagnosis is made independent of potential financial interests.
Iron deficiency and resulting anaemia cause fatal comorbidities worldwide. Despite this, they are generally underdiagnosed and untreated. Thomas—a pathologist at the Central Laboratory in the Frankfurt/Main University Hospital—is seeking more information about new laboratory parameters for diagnosis and monitoring of iron deficiency and iron substitution therapy. The professor spoke with Dr Wolfgang Hildebrandt, of Siemens Healthcare Diagnostics GmbH, about recent options in laboratory diagnostics.

To initiate targeted therapies the cause and stage of iron deficiency must be identified. Asked to recommend a laboratory strategy for simple iron deficiency, Prof. Thomas advised: ‘In patients with uncomplicated iron deficiency, i.e. without chronic inflammatory diseases, the blood panel including the MCV, MCH, Hb, and the determination of serum ferritin as a marker for iron supply is the standard iron reserve, is completely sufficient.’

For complicated iron deficiency the situation changes. ‘As soon as there are inflammations, infections, autoimmune diseases, hepatocellular diseases, and deficiency, cancers, alcoholism or hypothyreosis, or women taking contraceptives, then ferritin, the acute-phase-protein, is no longer specifically increased and cannot be used as an indicator for iron deficiency.’

‘Twenty percent of patients with chronic inflammations develop anaemia. This lack of iron, anemia (ACD, anaemia of chronic diseases). Therefore, it is highly important to clarify the iron deficiency. The treating physician must then determine whether the patient is suffering from any chronic inflammations. After all, about fifty percent of patients with iron deficiency are suffering from 1-2 chronic diseases.’

‘After three months with chronic inflammation, anaemia must always be excluded. If a chronic disease or a chronic inflammation is known, then ferritin, the acute phase protein, could be measured. In about 50 percent of affected patients, the iron requirement is not sufficiently covered due to chronic anaemia, and is caused by increased hepcidin and that, in many patients, an additional loss of iron is through bleedings caused by the illness. The combination of CHr as an early indicator of the iron requirement and the ferritin index for iron supply enables classification of iron deficiency into four stages. At the beginning and during therapy monitoring, the patient values are arranged helpful to interpret complex iron metabolism disorders that is difficult in chronic inflammations.’

The Thomas Plot

The Thomas Plot is a practical aid that helps to interpret complex iron metabolism disorders that is difficult in chronic inflammations. The combination of CHr, which can be measured at 5 mg/L mean there is an inflammation.

Meaningful parameters to diagnose early iron supply limitations

‘It’s important that any iron deficiency be diagnosed in patients very early and before the manifestation of anaemia. This can only be achieved when the actual situations are based not only on the overall cellular level but also in the individual cell itself.

‘The usual parameters of the small blood panel such as the MCV, MCH or Hb, are summary sizes, which are not suited for a condition analysis of the individual cell. Reticulocytes are better suited because they can only be verified in the blood for a few days after their formation. The cellular parameters CHr (reticular haemoglobinol and %FeHb (percentage of hypochromic erythrocytes) bring us a good bit further.

‘In accordance with guidelines on iron deficiency and anaemia issued by the DGHÖ – the German Society for Diagnosis and Therapy of Haematologic and Oncologic Diseases – the ADVA values of < 28 pg CHr and also >10 %FeHb are deemed as proof for an iron deficient erythropoiesis. The ‘large advantage of these parameters is that they are not only independent of chronic inflammatory diseases, but they also show which need for iron much earlier than the MCV, MCH and Hb, namely within a time frame of three to five days (CHr) or a mean time range of 25 days (>5 %FeHb). This is of invaluable help for the monitoring iron substitution therapies such as intravenous infusions of ferric carboxymaltose.’

Intravenous correction

For a short while now, it has been known that iron deficiency is a strong risk factor in patients with chronic heart failure (CHF). CHI is a disease for which every patient stays and an increased mor- tality. Jankowska EA, et al. (iron defi- ciency: an ominous sign in patients with systolic chronic heart failure. Eur Herz J 2010; 31:1872-1880) demonstrated that in their prospective study on 546 patients with systolic heart failure that 57 percent of these patients suffered from iron deficien- cy and only 54 percent of them sur- vived after an observational period of seven days compared to 67 percent of patients without iron deficiency. CHI patients have a particularly bad outcome, if they already suffer from anaemia with haemoglobin levels of <12 g/dL.

‘After a recent analysis of EVITA-HF [EVIDence Based Treatment of chronic Heart Failure-Register] Wienbergen H, et al. 2012, 101, (Suppl. 1): V1138), 22.4 percent of 1,278 examined CHI patients already had markedly increased serum ferritin levels and were without an iron deficiency caused the anaemia. This proves clearly that iron deficiency is not only a marker for iron supply but also an independent prognostic factor for the bad clinical outcome.

The FAIR-HF study [Ferinject Assessment in patients with Iron deficiency and chronic HF] Anker SD, et al. [Eur J Heart Fail 2009; 11: 1084-1091] proved clearly that the intravenous iron substitution therapy in patients with iron deficiency caused the anaemia with haemoglobin levels of <12 g/dL. The FAIR-HF study [Ferinject Assessment in patients with Iron deficiency and chronic HF] Anker SD, et al. [Eur J Heart Fail 2009; 11: 1084-1091] proved clearly that the intravenous iron substitution therapy in CHF patients is not only a marker for high risk but also an independent prognostic factor for the bad clinical outcome.

Iron requirement of erythropoiesis

<table>
<thead>
<tr>
<th>CHr</th>
<th>MCV</th>
<th>MCH</th>
<th>Hb</th>
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<tr>
<td>&lt;28 pg</td>
<td>&gt;25</td>
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Recommendation of iron substitution therapy

In the table, the lab’s role in iron deficiency care

‘It’s necessary to estimate progress, i.e. success or failure of such substitution therapies as early as possible, using a suitable diagnostic moni- toring tool. Ferritin alone, and the transferrin saturation are not always sufficient because many patients have inflammations that falsify both parameters. It also helps with the clarification that an inflammation is present, the causes of which must be dealt also because it affects iron metabolism. The CHr should be checked no later than one week after the iron infusion started; the CHr should be increased at the latest after two weeks (relative increase is sig- nificant). If the CHr did not increase, then the iron substitution therapy failed and the cause must be deter- mined. For example, the success of the iron therapy in chronic inflammations of the intestinal tract, which are only expressed in an increased ferritin level in at least 10 percent of patients, is limited.

‘At the latest, the %FeHb must be determined within 10 days after the iron therapy. Because, under normal conditions, it can be assumed that the reticulo- cytes are now sufficiently supplied with haemoglobin. If, after some time, a lower CHr is found compared to the (still) normal MCH, then the patient is dealing again with an early iron deficiency.

‘If both parameters are low then we are talking about the old iron deficiency, because it is older than three months.

‘If the CHr is already normal, but instead the MCH is (still) low, we have a clear indication of a response to the therapy. Such diagnostic un- certainty is uncomplicated and only needs the small blood panel and reticu- locytes (CHr). This is also helpful for the transfusion physician when the CHr decreased by 20 percent, the pre- operative iron infusion is effective enough to improve the autologous regeneration ability of the patient during peri-operative blood loss, during the therapy period, so the patient should be spared any blood transfusions.’
Reducing laborious microbiology testing

**One step detection of toxigenic C. difficile**

A new CE-IVD certified molecular test has been added to Greiner Bio-One’s Genspeed test portfolio for nosocomial infections. In addition to the recently introduced MRSA test, the Genspeed C. diff OneStep test addresses the international need to combat Clostridium difficile (C. diff) infections. The test is analysed on the Genspeed R2 Analyser.

CDI is causing antibiotic-associated diarrhoea (AAD) that can lead to pseudomembranous colitis and even to death. It is estimated that C. Diff infections leads to an average of 1-3 weeks longer hospital stays, increasing costs in Europe of up to €3 billion annually.

Recently EUCLID study data reveal that more than 39,000 C. diff cases might be missed due to lack of clinical suspicion or inadequate laboratory testing. Without intervention, an infection spreading it is essential to know the C. diff status of patients as quickly as possible.

**Reliable, rapid and there’s no re-testing**

**Staying one step ahead**

The Genspeed C. diff OneStep test identifies toxigenic C. diff by combining detection of Glutamate dehydrogenase (GDH), Toxin A, Toxin B and binary toxin in a single, molecular diagnostic test, the manufacturer reports. The complete analysis including the detection on the Genspeed R2 Analyser takes under 100 min – time can vary with validated PCR-cycler used – and features a simple, one-step molecular diagnostic test following the motto OneStep – one test – four results. The test avoids currently used sequential two-step diagnostic test procedures, which combine different test systems and assay principles for GDH and the C. diff toxins, the manufacturer adds.

The rapid Genspeed C. diff OneStep test provides conclusive results without the need for confirmatory re-testing and enables inter-laboratory comparisons of test results. Additionally, ready-to-use reagents and automated dispensing minimise the number of manual process steps within the workflow.

The virtually service-free system is simple to operate and, Greiner Bio-One is available at an attractive cost-benefit ratio.

The Genspeed R2 Analyser and Genspeed C. diff OneStep test

Under the terms of the agreement, Copan has granted distribution rights to bioMérieux for its Walk-Away Specimen Processor (WASP) and the WASP Lab system, effective immediately in France, Germany and United Kingdom. Progressively, these rights will extend to other countries. The specimen processor allows customers to add capabilities such as broth inoculation, gram staining, or diffusion for antimicrobial susceptibility testing.

‘We want to be able to go step by step with customers, first providing key components, such as the Walk-Away Specimen Processor and WASP Lab and, said Lacoste, ‘over time, providing additional capabilities, including an integration of bioMérieux’s Myla middleware platform.’ He noted that, while Copan has an installed base of 250 WASP systems and a strong brand recognition, there are 30,000 microbiology lab operations worldwide, creating a broad opportunity for partners to build on bioMérieux’s leading sales and marketing position in this lab analytics segment.

bioMérieux is present in more than 150 counties through 42 subsidiaries and distributors. In 2014 the company reported full year revenues of €1.698 billion.

A graduate of the National Veterinary College of Toulouse and with post-graduate degrees from the Pasteur Institute, Paris in Virology and from the National Veterinary School, Maison Aflort, in Immunology, Lacoste has held various management positions in R&D at Rhône Mérieux and Merial. He joined bioMérieux as Executive Director for Design Control and Clinical Trials in 2000, and, from 2005 to 2011 was Global Executive Director for R&D Immunomasa. In April 2011, he was appointed Corporate Vice-President of the Immunomasa Unit and, in July 2013, he took additional responsibility for Global Quality. He has been Corporate Vice-President of the Clinical Unit since April 2014.

A new CE-IVD certified molecular test was being on-going for more than a decade, yet central laboratories only recently dared to take on the daunting task of automating the more complex processes of microbiology. Microbiology tests are performed on a far more diverse range of specimen formats and workflows, require more time-intensive manual operations, incubation periods, experienced reading of results, and reflex testing that leads to further analysis. To develop a comprehensive system more rapidly, bioMérieux, a leading microbiology company, has formed a strategic partnership with Copan, an Italian firm specialised in the automation of traditionally manual tasks performed in microbiology labs.

According to François Lacoste, bioMérieux Corporate Vice President of the Clinical Unit since last year, the partners intend to develop a comprehensive, modular solution for microbiology that will start with upstream manual tasks, such as the streaking of Petri dishes, and continue to automate processes along the entire workflow to the downstream reporting of test results.

‘Automation itself is not a magic solution,’ he said, adding that, while automated instruments for microbiology have been introduced, there remain stand-alone operations that are not connected to the larger lab systems. ‘Reporting patient information more quickly to physicians, and improving the standard of care, are driving a revamp of the way microbiology labs work, a need to reassess the processes and see where automation can be applied.’

Other dynamics that are accelerating the need for automation in microbiology labs is the aging of the workforce of technicians and an increasing stringency for accreditation and for traceability.

Lacoste said bioMérieux has already developed other modules for automation, among some key assets that we will bring to the co-development agreement with a goal of merging the best from each company, he added.

Additional capabilities to be developed that more to downstream processes include plate transport systems moving specimens into smart incubators, where imaging systems replace visual reading of the plates with algorithms to detect, without an intervention by a technician, the presence or absence of pathogens growing on the plates.

bioMérieux brings to the final stages of the workflow its Myla middleware with what Lacoste termed ‘a capability to connect different systems, to follow, monitor and optimise workflow between systems, and finally to provide reports to the lab managers and technicians.’ It also contributes to improve the overall lab efficiency.

Reducing laborious microbiology testing

One Step detection of toxigenic C. difficile

Reliable, rapid and there’s no re-testing

**Report: John Brophy**

Automation of high-volume biochemistry and immunology laboratories has been on-going for more than a decade, yet central laboratories only recently dared to take on the daunting task of automating the more complex processes of microbiology. Microbiology tests are performed on a far more diverse range of specimen formats and workflows, require more time-intensive manual operations, incubation periods, experienced reading of results, and reflex testing that leads to further analysis. To develop a comprehensive system more rapidly, bioMérieux, a leading microbiology company, has formed a strategic partnership with Copan, an Italian firm specialised in the automation of traditionally manual tasks performed in microbiology labs.

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Held every year in March, for the past 35 years, the International Symposium on Intensive Care and Emergency Medicine has been organised by the Departments of Intensive Care and Emergency Medicine at the Université Libre de Bruxelles in association with the Société Belge d’Intensiviste et d’Emergency Care Trials Group (SIZ). For three and a half decades, the event’s main organiser has been Jean-Louis Vincent MD PhD, Professor of Intensive Care at the Université Libre de Bruxelles and Head of the Department of Intensive Care at Erasme University Hospital. Here he reflects on the simple beginnings of the ISICEM, its huge attendance and authority today, and current key issues in intensive care.

This year we are celebrating our 35th ISICEM, a date that has firmly anchored itself in our calendar. Our programme is as busy as ever, with 1,500 hours of educational content, and 70 parallel sessions. This is perhaps the clearest indication of the importance of the event in the medical community.

Emergency care medicine has also evolved and one interesting session will cover the key changes in clinical practice and understanding that have occurred during the last 35 years that the possible changes that have occurred during the last 35 years, and the likely or possible changes for the future.

With such a full programme, it is always difficult to select so-called ‘highlight sessions’. However, in the area of emergency care, one aspect of our meeting is to provide participants with the results of the very latest research. In this year’s meeting, the results of the randomised controlled trial comparing transfusion of red cells based on inflammatory mediators in trauma patients are presented. In this study, called the A340-300 containing its large isolation unit. Team members with viral haemorrhagic fever while working on the Ebola outbreak in West Africa, receive intensive medical care during any stages of the disease, while being evacuated.

The concept was developed by experts at the Robert-Koch-Institute for infectious and non-communicable diseases, under the supervision of the Federal Foreign Office. Previous, smaller transport isolation units, such as those used in standard air ambulances, can only safely transport patients who are central venous catheters and protective clothing. Patient and staff enter the treatment area via a decontamination chamber to prevent spread of the pathogens. The isolation unit has a vacuum and is hermetically sealed, and is present with the present framework.

Cautious measures for Ebola evacuations

The ‘Robert Koch’ plane for medical evacuations (MedEvac) is the winged equivalent of a German hospital isolation ward. Within it, patients are treated with virus haemorrhagic fever while working on the Ebola outbreak in West Africa, receive intensive medical care during any stages of the disease, while being evacuated.

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Two in one

The recently launched Respironics V680 ventilator, from Philips Healthcare EMEA, was guided onto the market by Arne Cohrs, its Sales and Marketing Director of Therapeutic Care in Patient Care and Monitoring. We asked him about his department and the merits of non-invasive and invasive ventilators.

In 2014, we restructured Philips into two strong companies,' Arne Cohrs explains. 'One focuses on healthcare, the other on lighting. It's our ambition to make the world healthier and more sustainable with our innovations – that is from the patient's room to the living room, starting with healthy living, prevention, diagnosis and treatment. This is where ventilation comes in. To realise our vision we merged the former consumer lifestyle segment and our healthcare segment. Here, ventilation is a key element, offering a respiratory solution for home and hospital care. With our launch of Respironics V680 we built upon experience and expertise in non-invasive ventilation to develop a non-invasive ventilator with invasive modes.'

Whilst Philips sells the V200 premium ventilator applying invasive ventilation with non-invasive functions, the V680 ventilator brings both together in one device. In the non-invasive part the firm improved monitoring in the V680, he explains. 'The device now carries loops in non-invasive. We also included dynamic measurements, such as dynamic elastic's resistance compliancy. These are great tools and an important next step for us. Asynchrony between the patient and ventilator:

In 2014, the disease, insufficient protection to the virus. 

Experts agree on one issue: they believe that usually people with an epidemic broke out, that is in Western Africa, we are also suffering from a real epidemic in West Africa,' underlines Jack Woodall of Lagos and international partners to successfully fight the disease,‘ there is, however, good confidence: 'We can stop the disease from spreading if we manage to break the chain of infection.'

Experts confirm the disease can be contained by stopping the chain of infection: Ebola. 'In 2014, panic among medics for 3-T scans appeared in a population or has been known for some time but ising infectious disease: Ebola. Over 15,000 cases were reported in eight countries, including Nigeria, Senegal, Sierra Leone, and Guinea. In 2014, the Nigerian Academy of Medical Sciences set up an Ebola crisis intervention centre that we were able to successfully fight the disease, said Dr. Arinze Oyibo, President of the Nigerian Academy of Medical Sciences. 'Ventilation and 3-T scans are key elements in the treatment of Ebola patients. Invasive ventilation is necessary to provide help where the epidemic broke out, that is in Western Africa,' underlines Jack Woodall, the Department of Public Health and Communicable Diseases (NCDC) declared an Ebola emergency on 18 November 2014, more than the index case had had contact with 72 patients. On 20 October 2014, a preliminary diagnosis – Ebola – was made following acute symptoms. Patients died. On 20 October 2014, an epidemic broke out, that is in Western Africa, we are also suffering from a real epidemic in West Africa,' underlines Jack Woodall, the Nigerian Academy of Medical Sciences. 'Ventilation and 3-T scans are key elements in the treatment of Ebola patients. Invasive ventilation is necessary to provide help where the epidemic broke out, that is in Western Africa,' underlines Jack Woodall, the Department of Public Health and Communicable Diseases (NCDC) declared an Ebola emergency on 18 November 2014, more than the index case had had contact with 72 patients.

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