Clinical value of new imaging biomarkers remains ripe for discussion

By Paula Gould

Would you drink a half-litre of cream? Not the most appealing prospect, but Prof. David Lomas did just that to check the robustness of liver fat as an imaging biomarker and self-experiment. "Apart from paralysing my stomach for the first 12 hours, the following day my liver fat went up 4%," he told delegates at yesterday's New Horizons Session on biomarkers. "So there is an issue about dynamic range of fat in the liver, and elsewhere in the body. How rapidly does it change? We don't really know the answer to that. In fact, we don't know what the normal level of fat in the liver is either."

Measurement of hepatic steatosis, using MR spectroscopy or chemical shift imaging, is one of a number of quantitative MRI biomarkers that could be used to investigate abdominal diseases, according to Lomas, who is professor of clinical MRI at the University of Cambridge, U.K. He presented four such candidates during his lecture, outlining the biological basis for each and the main methods of analysis, as well as the weight of clinical evidence from animal and clinical studies.

In the case of liver fat measurements, for example, MR-based iron measurements, which can indicate the severity of liver and/or heart disease, are now being used in fields outside of radiology. "This is a good indication of a technique's acceptance," he explained. Researchers have two methods to choose from when measuring the iron concentration: they can either look at the ratio of T2 shortening in the liver and muscle, or measure R2 and R2* directly. Both methods have been validated, but again, repeatability is uncertain.

Diffusion-weighted imaging is another promising MRI biomarker, as being quite challenging. The concept itself is relatively straightforward: mechanical waves directed through the organ of interest are used to assess the elasticity or stiffness of tissue, and hence identify the presence of fibrosis changes. Early results are promising, but the technique is quite complicated and at the moment, the technology is not being used at many sites. "This is not an easy, 'I'll just go home and do it myself after the conference' kind of application because you need special hardware and analysis tools," Lomas said. "And how do you validate this? Actually it is quite tough because there aren't easy ways you can measure stiffness in vivo of the liver except by this technique."

Prof. Eric Aboagye, director of the Comprehensive Cancer Imaging Centre at Imperial College, London, described a selection of PET molecular biomarkers that are of interest for drug development work and may also have clinical applications. However, with all new biomarkers, the questions we have to ask are: Do we really measure the imaging endpoint in a reliable way? Is the imaging endpoint reproducible?

He outlined four key biological mechanisms that PET tracers are being developed to target: angiogenesis, hypoxia, cell proliferation and apoptosis. Imaging biomarkers for these biological targets are advancing, but more validation is still needed.

The clinical value of PET biomarkers must also be established; Aboagye stressed. Fluorine-18 MISO and copper-60 ATSM, for example, have both shown promise in hypoxia imaging and could potentially be used to facilitate dose painting in radiotherapy. This emerging method of treatment would see hypoxic areas of tissue being blazed with higher doses of radiation in a bid to improve efficacy.

F-18 fluorothymidine (FLT), a biomarker for cell proliferation, is also being investigated as a way of tracking treatment response in breast tumours. Issues such as inter-observer variability will need to be taken into account if FLT breast images are used in clinical practice, he said.
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Anderson, chair of medical imaging at Sydney Medical School, University of Notre Dame, Australia, explained how she had interviewed key pioneers to the future of musculoskeletal (MSK) radiology. "If we can try to work together and use the human side of things, then perhaps we can help the next generation be more efficient, and also help patients in a more efficient and human way," she said. Anderson highlighted the human touch and rich medical heritage Argentinians cherish their cultural sites of Buenos Aires. It teaches us humility," noted Ulla. "There is great value in the study of history. It is sometimes said that Argentinians are really Italian, who wish to be French," he commented.

"It is sometimes said that Argentinians are really Italian, who wish to be French," he commented.

The country has about 5,010 radiologists, and it has a rich medical history. Radiology was founded in Argentina in 1917, since when the discipline has always had strong connections with Europe. Buzzi singled out nine pioneers who made significant contributions to the practice of radiology, the most recent being Justin Palmer (an interventional radiologist who introduced the balloon-expandable stent) and Juan Carlos Pardos (a vascular surgeon who developed endovascular prosthesis). He paid tribute to these pioneers. "When we consider what our predecessors did with the crude instruments at their disposal, we must gaze in awe at their imagination, their enterprise, and their accomplishments," he noted. "There is great value in the study of history. It teaches us humility." But he also emphasised the achievements of the current generation of practitioners.

As Spanish speakers, we must accept that our predecessors did with the crude instruments at their disposal, we must gaze in awe at their imagination, their enterprise, and their accomplishments," he noted. "There is great value in the study of history. It teaches us humility." But he also emphasised the achievements of the current generation of practitioners.

The presenters from the ESR meets Argentina session generated considerable interest in their home country during yesterday's well-attended session. Anderson highlighted the human touch in musculoskeletal radiology.

By Paula Gould

People, not images, were the stars of the show at the ECR 2010 Josef Lissner honorary lecture. Prof. Suzanne Anderson used her 30-minute slot to link inspirational teachers and mentors to the future of musculoskeletal (MSK) radiology.

"In radiology, we are so focused on new technology that the human aspects are often underutilised," she said. "If we can try to work together and use the human side of things, then perhaps we can help the next generation be more efficient, and also help patients in a more efficient and human way." Anderson, chair of medical imaging at Sydney Medical School, University of Notre Dame, Australia, explained how she had interviewed key players in MSK radiology while preparing her talk, asking them: Why did you do MSK? What influenced that decision? Each reacted in a similar way, smiling as they recalled a special colleague and memorable moments, she said.

"They have these micro ‘memory videos’ playing in their minds, and then after a few seconds they would grab my hand and say: ‘Oh my goodness me, they were such a great person’ or: ‘Oh you would have loved them, they were so much fun, I really enjoyed working with them,’" she commented.

Others reacted in a slightly more measured way, praising their former mentors for their integrity and knowledge. All, however, had entered MSK radiology and continued for 20 to 40 years in that field, because they had been influenced by just one or two people. This is an important take-home message, according to Anderson. "Now, the current generation who are doing so much great work, are going to be influencing the next generation," she said. "So if we can be a little bit more conscious of the effect that we have, this could be a very useful tool!"

Interest in MSK radiology is undoubtedly growing, as ECR statistics demonstrate. Congress organizers now receive far more abstracts related to MSK imaging topics than any other discipline. Attendance at MSK refresher courses and scientific sessions at ECR has also doubled over the past few years.

So where should the next generation come from? The views of current opinion leaders were extremely similar, Anderson reported. Most emphasised a need for prior clinical experience, ideally in orthopaedics or sports medicine. Others expressed a preference for earlier subspecialisation in MSK imaging. "We must have a greater need for prior clinical experience, ideally in orthopaedics or sports medicine," she said. "While books and bones were previously the mainstay of MSK radiology education, the trend is now towards learning, interactions between students and mentors should not be forgotten, though. Treasurers need to be taught to question why an image looks the way it does and to appreciate the vast ‘grey area’ of differential diagnoses," Anderson said.

"Clinical clerkship and apprenticeship remains the most important aspects of radiology education, we need people to learn and to learn clinically appropriately," she said.

Images were not completely absent from the presentation. Delegates were given a whistle-stop tour of ground-breaking MSK work being conducted in European radiology departments. Examples included 7T MRI studies showing collagen and cartilage in exquisite detail, and diffusion tensor MRI tractography pre-printing the location of critical nerves. Advances in bioengineering were also highlighted, including strategies for reducing age-related muscle loss and a novel method of regrowing damaged knee ligaments from stem cells.

"Musculoskeletal radiology, our anatomy, hasn’t really changed for the past 2,000 years. But what we do to our bodies has changed dramatically, and so has how we look at the body," she concluded.
Professional challenges pose difficulties for ultrasound

By Philip Ward

Too few younger practising radiologists are prepared to embrace ultrasound and push it to its clinical limits, according to Prof. Lorenzo Derchi, professor of radiology at the University of Genoa in Italy.

They can typically perform the most common examinations, but insufficient attention is given to the advancement of the modality in areas like contrast enhancement, volume ultrasound, and musculoskeletal ultrasound, and new examination techniques are often introduced in clinical practice by non-radiologist clinicians, he told ECR attendees at Saturday’s special focus session.

“The relationship between ultrasound and radiology has not always been an easy love story, and it still isn’t,” he said. “Radiological ultrasound is facing professional and research problems.”

Among the professional challenges are a decreased focus on the visibility of ultrasound, emphasis on the technical aspects of ultrasound during residency programmes, and the request for high-level scanning skills at the end of training, Derchi stated.

“It seems like ultrasound is thought of as a mature technique, in which there is no room for advancement. It seems young radiologists are considering other techniques as more rewarding. It seems department heads regard other techniques as the core of the radiology business,” he maintained. “We do not want ultrasound to remain only the stethoscope of the clinician.”

“Ultrasound elastography is an emerging area that deserves particular urgent consideration,” said Prof. Giorgio Rizzatto, chairman of the department of diagnostic imaging at Gorizia General Hospital in Italy. “It has rapidly become a valid clinical tool in daily practice, both for screening and monitoring. In general, a routine transducer can be used, and the technique is reproducible, easy and quick to assess.”

Swiss students express joy about returning to ECR

By Mélisande Rouger

“T’m very happy to be back,” said Lukas Filli, 23, with smiling eyes. “I can enter the real radiologist’s world, and it has nothing to do with university.”

Lukas is a fourth-year student from the Medical Faculty of Basel University in Switzerland. Last year, he and 19 other Swiss students were invited to participate in ECR by 2009 Congress President Prof. Brent Mearns, as part of an initiative to help medical students to decide upon a career in radiology. This year, six of them decided to come back to the congress on their own, including Tobias Teubner, Michael Simon Messerli, Mirjam Strahli and Lukas, motivated by what they discovered last year.

“I found it very inspiring to come to ECR. I particularly liked the atmosphere, and enjoyed learning about the current research and questions, the clinical cases, and the new radiological equipment. I knew I wanted to come back right away, so I booked my plane ticket in May!” Lukas explained.

The experience was so positive that it convinced him to become a radiologist and he has since become a full member of the European Society of Radiology (ESR).

“Coming to ECR helped me to make this decision. I had never been to any other medical congress before, but I’m sure I want to specialise in radiology. It has to do with the whole body, the anatomy and physics, and the devices are fun. In a nutshell, it is a very interesting discipline.”

Some scientific sessions may be too complicated for students, but the ECR programme has enough to satisfy everyone. There is a mix of different levels, young radiologists and medical students can also benefit from the lectures, said Lukas, who will attend sessions on stroke, COPD and multiple sclerosis, as well as the image interpretation quiz. He also particularly enjoyed the Workstation Face Off session, which took place on Friday.

“Getting in touch with reality is one of the things students value at ECR. It is different to watch a disease through the radiologist’s eyes. We don’t learn that at university, where everything is very theoretical. Here, we can really benefit from the radiologist’s view and learn about the clinical questions,” said Lukas.

Even if he has another eight years of study ahead of him, Lukas is already taking an interest in the future of radiology. “I’m curious about the professional challenges session ‘The radiologist of the future: challenges and changes’ (held on Sunday, 14:00 in Room P). I’m very interested in these questions, and also in the current problems with CT, and what the industry is doing about it and what kind of medical devices they will develop.”

Students get free access to ECR and the accompanying exhibition, but they have to finance their own travel and accommodation costs. For most of them, though, coming to Vienna is worth spending the money.

“The combination of ECR and Vienna is wonderful. We like to visit the city after the sessions. I personally like the cafes and these huge impressive buildings such as the Parliament and the National Library. We don’t have anything like them in Basel!”
Avoiding pitfalls can help to determine the outcome of important clinical audits

By Philip Ward

When conducting a clinical audit, you should never assume other people’s work without their knowledge. You must audit teams, not individuals, and be very constructive and confidential. Do not assign blame, and remember that poor performance may be environment-related, not person-related.

These are the golden rules of Dr. Jane Adam, founding Chair of the Audit and Standards Sub-committee of the European Society of Radiology. She presented them during yesterday’s ESR audit session.

Clinical audits are carried out by relevant professionals in a non-blame, confidential environment. They are a positive way of raising standards, and should not be punitive, said Adam, a consultant radiologist at St. George’s Hospital in London. Clinical audit is a tool designed to improve the quality of patient care, experience and outcome. It involves a formal review of systems, pathways and outcomes of care against defined standards and the implementation of change based on the results.

She identified three types of audit. A structure audit examines management structure, accommodation, equipment, staffing and training. A process audit will consider aspects such as request-handling, waiting times, justifications for optimisation, doses received, machine usage, examination protocols and processes, and communication of reports. An outcome audit looks at patient satisfaction, complication rates, and diagnostic accuracy.

Selecting or developing standards will involve analysing requirements (legal or regulatory), published research, local agreements, consensus statements, recommendations by learned bodies. The local circumstances may dictate the choice and level of a standard.

Adam advocates a step-by-step approach: choose the topic, choose the standard, choose what you need to count (indicators) to see if the standard is met, decide how big a sample is needed, collect the data (retrospective or prospective), and compare performance with the standard. Then ask yourself what was achieved or not achieved, she said.

A self audit can be very educational, as can an internal audit carried out within a unit or department. External audits, on the other hand, involve professionals from outside. In all cases, honesty, integrity, and confidentiality are paramount. Additionally, she noted that audits are not designed to be statistically robust, and are indicative, not definitive.

Taking part in an audit can be both an intimidating and an uplifting experience, explained Dr. Birgit Ertl-Wagner, from the Institute of Clinical Radiology University of Munich, Germany. On the one hand, it is frightening that someone is examining me, someone is looking at my affairs, and someone could blame me. On the other hand, it is positive that I can learn from the audit, I can see the improvement, my patients and employees are safer, and I am doing everything possible to continuously improve my practice, she said.

For internal audits, she had the following tips: Plan them well ahead (for the entire year); notify the auditors and audited parties well in advance about the time, place and topic; conduct them at the workplace with a co-auditor; prepare the audits thoroughly; avoid yes/no or suggestive questions; and aim for a relaxed professional atmosphere.

Her other tips are to have a checklist of questions ready, consider indicators that can be quantified (especially key indicators), consider legal requirements, consider risk management, look for continuous improvement, and do a written report with action items.

For further reading, Adam recommends the EC Guidelines on Clinical Audit (for radiological procedures) from November 2009, which is a comprehensive guide and suggested methodology for clinical audit, including external auditing process for all ionising radiation procedures. She also directed attendees towards ‘Clinical audit – ESR perspective’, published in the January 2010 edition of ESR Today.

Experts call for regulatory framework for teleradiology in e-health session

By Mélisande Rouger

Over the past decade, teleradiology has become a well-established practice in Europe. But without homogenous EU legislation, experts are concerned about the clinical risks. Radiologists and an EU representative compared advantages and warned of legal and medical risks during a joint session held yesterday.

The benefits of teleradiology are clear: it brings expertise within reach of remote hospitals where there is insufficient work to justify the appointment of local radiologists, it provides specialists knowledge to deal with complex problems, and it enables the examination of patients without the need for transfer to tertiary centres. It is also particularly helpful in emergency medicine for centres that do not have 24/7 cover. But the legal void concerning the use of teleradiology in the EU may impede patient care.

“There are many potential pitfalls, especially if teleradiology moves from its current specific role to a general method of service delivery,” said Prof. Luis Densos from Barcelona, who is Professional Organisation Committee Chairman and a member of the Executive Council of the European Society of Radiology (ESR).

Linguistic problems or incorrect wording of a report or its clinical impact may occur during the practice of teleradiology. In order to increase safety, access to patient information should be granted and quality controls should be organised.

A number of legal issues must also be cleared, such as the proper accreditation of teleradiologists in the country where they deliver their expertise and the agreement between the local radiologist and the teleradiologist. The responsibility of the regulation of teleradiology must also lie with the state where the patient undergoes the imaging procedure. Likewise, if a patient is provided with a service from a country other than the one where they receive treatment, they should be fully informed.

Teleradiology has yet to be defined as a medical act in its own right. “The report is only a part of the clinical act. Our services include evaluation of examination requests, selection of the most appropriate imaging strategy, optimisation of the examination performance, customisation of the imaging protocol, and integration of imaging and medical information into the report,” Densos said.

Teleradiology, a well-established expansion of an already existing medical practice, must be differentiated from telemonitoring, where telecommunications equipment is used to provide patients’ biological parameters to a remote physician.

Radiologists and EU authorities alike must carefully monitor service providers to avoid goshing, Densos recommended.

The EU has taken steps in that direction by launching the CALIOPE initiative, a network which brings together 17 organisations representing national governments and eHealth competent centres as well as 11 EU stakeholder organisations.

But a lot remains to be done. Telemedicine and teleradiology should for instance be clearly differentiated, which does not yet seem to be the case. “We try to identify everything legal and see how it is applied. We’re not doing such an in-depth analysis yet,” explained Catalina Dima from the European Commission’s Information Society and Media Directorate.
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At its session on Friday afternoon, the European School of Radiology (ESOR) provided some insight into the variety of educational programmes, and young radiologists spoke about their experiences.

Iranian radiologists are already starting to turn their attention to ECR 2011, when they will be one of the three host nations. Many of the Iranian attendees at this year’s meeting got together yesterday at the booth of the Iranian Society of Radiology, including the president, Dr. Adolrasoul R. Sedaghat.

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Multimodality display and functional imaging provide added edge in tumour management

By Frances Rylands-Monk

Doctors have seen a worldwide increase in the incidence of hepatocellular carcinoma (HCC) due to the spread of the chronic hepatitis C virus. CT and MRI are pivotal in the orthotopic diagnosis, and the standardisation of CT and MR protocols is now essential for accuracy follow-up imaging.

“Differentiation between regenerative nodules, HCC, and the frequent benign lesions, such as cyst, hemangioma, and focal nodular hyperplasia is very important for successful surveillance of patients,” said Prof. Bernt Marincek, ECR 2009 Congress President and former chairman of the Institute of Diagnostic Radiology at Zurich University Hospital. “The exact definition of number, size, and location of HCC tumours is decisive because this will determine whether the best treatment is radiofrequency ablation, resection, hepatectomy, or liver transplantation.”

To start off the two-day mini course, Yoga from A to Z Liver: “This meeting will outline how multidetector CT (MDCT) and MRI can detect and characterise diffuse or focal liver disease to plan treatment strategies and assess treatment response. Choice of modality much depends on the clinical question.

MDCT provides excellent morphological visualisation of diffuse and intraductal lesions, as well as visualisation of the anatomical relationship between the liver and adjacent organs. Meanwhile, the implementation of new TL-, T2-, and diffusion-weighted pulse sequences and the development of innovative liver-cell-specific contrast agents that have enriched MRI a much valued modality for assessing both morphological and functional characteristics of the liver.

“Continuous technical evolutions in MRI and the introduction of new sequences by manufacturers require ongoing update of radiologists’ knowledge, and standardisation of MRI protocols is a necessity,” Marincek explained.

MDCT has evolved in recent years perhaps even more rapidly than MRI. Its technical advances have led to substantial improvements in temporal and spatial resolution, volume coverage, and acquisition times.

Each machine has its own detector configuration or manufacturer-specific sequences, but is important that imaging examinations performed in different hospitals on a wide range of MDCT and MRI equipment should be comparable. Standardised protocols can provide a common language in the radiological community, but if this standardisation is lacking, it can be difficult to diagnose a focal liver lesion correctly or compare it with images prior to treatment, he stated.

While doctors are close to reaching the limits of morphological examination of the liver, functional or “microscopic” imaging has raised the bar in terms of what is now considered optimal information to be obtained from imaging.

The increasing use of diffusion-weighted MRI and perfusion CT/SMR has boosted knowledge of tumour organisation and its cell kinetics as well as the number, volume, and flow of liver or liver tumour vessels, while MRI spectroscopy has enabled the biochemical content of liver tissue to be studied 

PET, on the other hand, shows the metabolism of tumour cells. Liver-specific contrast media can be used to explore the cellular metabolism of the hepatocyte (Sulphur excretion of Primovist and Teslascan or of the Kupffer cells [uptake of large particles of Resovist or Endorem]).

Most importantly, all these methods may reveal changes in function when a treatment is given, and for this reason the parameters extracted from these studies are considered by specialists as potentially useful biomarkers for monitoring tumour response.

“The main role of functional liver imaging is to provide early and more sensitive information about response to treatment, when morphological results, although reliable, are not available for weeks or months post-treatment,” said Prof. Yves Menu, chairman of the department of radiology at Université Paris VI. “Also, new targeted therapies may change the behaviour of tumours, which might shrink less but be inactivated. Activation or inactivation of tumours might well be the main biomarker of the future.”

While some of these tools are still primarily under research, most are available on the market of commercially released machines and are ready for routine clinical practice. Now, more standardisation and guidelines are required, said Menu, echoing Marincek’s comments.

“Given that oncology is the number one consumer of functional liver imaging today, the general radiologist can no longer ignore those methods,” Menu said.

Knowledge of normal liver anatomy and its most frequent variants and anomalies is vital for radiologists interpreting images for surgery treating liver tumours, according to Prof. Wolfgang Schima, chief of radiology, Hospital of the Divine Saviour, Vienna, who will outline the essentials of liver anatomy and multimodality display at this morning’s session.

“We need to give abdominal surgeons as much anatomical information as they need to plan tailored operations, specific to the needs of the patient. Second, postoperative complications due to atypical anatomical features cannot be diagnosed correctly – and quickly – unless this anomaly is known. An extended left lobe infection after surgery, for example, may be due to atypical vascular supply to the left lobe not known to the surgeon,” he commented.

The radiologist must think like a surgeon and integrate all relevant information into the report from the image, according to Schima.

“Currently most of us would not systematically include a variant arterial or portal venous anatomy requiring a specific, surgical approach, leading to difficulty once the operation was underway,” he said.

The specialist should always be able to interpret images with more precision than the surgeon, noted Schima. Close collaboration between surgeons and radiologists is essential to operations are to continue to improve, both in terms of risk reduction and clinical outcome.

Typically, when faced with a seemingly scarily report, a surgeon will either try to interpret the images alone or go through any potential problems before the operation with a liver radiologist. This, however, is not ideal. The reporting radiologist

should provide comprehensive reports from the outset and then go through any abnormal anatomy mentioned and the implications for surgery with the surgeon in person,” he said.

To gain necessary information pre-surgery, radiologists should use a variety of modalities to gain a wider range of information in a quicker time frame (Mil. cholangiopancreatography (MRCP) is first choice for demonstrating biliary anatomy, variants, and anomalies, using biliary contrast agents that have emerged over the past few years to give functional information on bile ducts and biliary excretions. For arterial, arterial or portal venous anatomy, MRI provides fast and accurate data, with 3D segmentation providing better anatomical display.

“Multimodality display adds very little to the cost of imaging each patient,” Schima noted. “Patients undergoing liver resection or other liver intervention should have preoperative CT and MRI. If the protocols are designed correctly, all information can be obtained first time rather than needing repeat scans for extra anatomical data.”

In this afternoon’s session (MC 1519), the focus will be on diffuse liver diseases, and there will be lectures by Prof. Okan Akhan, Hacettepe Medical University, Ankara, Turkey, about infectious diseases of the liver, and by Prof. Valérie Vigneron, Boussingault Hospital, Clifhuy, France, about vascular diseases, detection and transplantation. Prof. Luis Martí-Bonmatí, chief of radiology at Quiron Hospital, Valencia, Spain, will be introducing the session with his presentation on assessing diffuse liver disease, including cirrhosis.

Tomorrow’s two sessions (MC 1819 and MC 1819) will concentrate on primary liver tumours and liver tumours and management.

Liver MRI enhanced with Primovist (Gd-EOB-DTPA), Peridus in localisation of hypereosin in segment VI, and additional localisation hyperintense in segment I (black arrow). The image was acquired 20 minutes post injection of the contrast agent. The common bile duct was specified with white arrow.

(Provided by B. Marincek)
CT and MR imaging give boost to patient care in ENT emergencies

Proper assessment of otolaryngological emergencies, both traumatic and non-traumatic, is critical in order to help minimize long-term detrimental effects of injuries, as well as to help prevent death and disfigurement. Furthermore, radiologists should bear in mind that injuries to the sinonasal cavities and the anterior skull base are rarely life-threatening, but intracranial bleeding and swelling require immediate care, according to Dr. Jan W. Casselman, from the department of radiology at AZ Sint Jan Van Het O.C.A.M W, Bruges, Belgium.

"Therefore, imaging should always include the intracranial structures," he told ECR Today.

At this afternoon's special focus session, the key points in his presentation will be:

- To be able to exclude intracranial damage, such as oedema and bleeding, which are the major causes of death in cases of trauma involving the sinonasal cavities and the anterior skull base;
- To emphasise the importance of checking the optic canals in trauma with visual loss;
- To know that MRI with gadolinium is the imaging technique of choice in non-traumatic tumour/infection cases.

Imaging is required to save normal function such as vision, mastication, prevention or repair of cerebrospinal fluid leaks that, when impaired, often make normal daily life difficult or impossible.

In most traumatic and bleeding emergencies, CT will be the technique of choice in the early post-traumatic period because of its availability, speed, and access, Casselman explained.

Traumatic involvement of the eye and especially the optic nerve should be checked as fast decompression of the nerve is needed to preserve vision. Both CT and MRI can play a role here. In some cases, such as optic nerve compression or oedema, MRI might be needed in an immediate second stage.

"Most often the value of 3D postprocessing involved in CT imaging becomes important once the patient is stable and reconstruction is considered," he said. "However, sometimes the 3D technique also has value in the acute phase, such as when one wants to check for small fractures and bone sequelae involving the optic canal and/or nerve."

MRI plays a role in major soft-tissue bleeding, which can put a patient's life at risk. Imaging can help here, especially when prompt action by the surgeon is needed. Severe bleeding can also occur after surgery, such as tumour resection. Infection, especially fungal sinus infection, can reach the orbital intracranial structures or intracranial structures. Then, this becomes a real emergency and can have a fatal outcome in the absence of adequate treatment. MRI can help to guide treatment and management.

Emergencies of the ear are represented by the acute infection of the middle ear with mastoiditis, which must be described by the radiologist to the otologist: peripheral abscess, osteitis, fistula of the otic capsule, thrombosis of the lateral sinus, extradural abscess, unique or multiple cerebral abscesses.

"Imaging is important to analyse the extension of an infectious process of the external and/or middle ear, from Service de Radiologie I at Hôpital de Hautepierre, Strasbourg, France. "Imaging also is important in the preoperative evaluation of a traumatism of the windows of the ear."

CT is useful for detecting an ostetis of the petrous bone and a traumatic fistula of the window with or without fracture. Regarding CT imaging, multiplanar reformations (MPR) are useful, while 3D volumetric imaging is not necessary.

Infections of the inner ear, leading to ossifying labyrinthinitis, are regarded as an emergency in cases where cochlear implantation is being considered. Imaging results of trauma of the round window and/or oral windows, with or without fracture or leakage of perilymphatic fluid, generally leads to immediate surgery, Veillon said.

"A precise knowledge of anatomy, a good technique of imaging and a close collaboration with the otologist are necessary," he stressed.

At today's session, Dr. Minerva Becker, from the division of diagnostic and interventional radiology at University Hospital, Geneva, Switzerland, and Dr. Jan W. Casselman from Bruges. will review the most common types of traumatic and non-traumatic emergencies in the neck. Regarding traumatic injuries, she will cover laryngeal fractures, pharyngeal perforation, vascular injuries (including dissection), occlusion, pseudoaneurysms, perforation, and acute bleeding, as well trauma of the brachial plexus.

In the non-traumatic category, Becker emphasised radiologic findings for infectious lesions, including suppurative lymphadenitis, cellulitis, neck abscess, necrotizing fascitis, pyomyositis, osteomyelitis, septic thrombosis of the internal jugular vein and infected branchial cysts.

According to Becker, radiologists must know which examination should be performed and how to tailor it, how to approach common and less common emergencies, the limitations of imaging, and the findings that should not be missed.

Regarding postprocessing, Becker recommends that 2D sagittal and coronal MPR reconstructions are produced routinely in all cases.

"In certain instances, 2D oblique, 2D curved reconstructions and 3D reconstructions are done, depending on the findings, such as vascular lesions or fractures with dislocations. The 3D reconstructions are extremely helpful for preoperative planning purposes," she said.
Hybrid imaging specialists prepare for the decade ahead

By Paula Gould

Nine years ago this month, the world’s first clinical PET/CT scanner was installed at Zurich University Hospital in Switzerland. The fusion of these modalities has proven to be a remarkable success, and the once-novel technology can now be found in hundreds of hospitals and clinics worldwide.

The story of hybrid imaging is still far from complete. PET/CT imaging with the radiotracer fluorine-18 fluorodeoxyglucose (F-18 FDG) is certainly making a valuable contribution to many areas of oncology. But could alternative tracers boost the diagnostic power of PET/CT in these malignancies that are virtually invisible on FDG-PET? And what about the potential of MRI to usurp CT’s place as PET’s favourite imaging companion?

This afternoon’s New Horizons session will unusually begin with a look back in time. Prof. Gerald Antoch, deputy director of the Institute for Diagnostic and Interventional Radiology and Neuroradiology at Essen University Hospital, Germany, will be highlighting the lessons that have been learned from PET/CT since its appearance on the clinical scene in March 2001. He plans to celebrate the gains achieved by PET/CT to date without overstating its performance. After all, the best may be yet to come.

FDG-PET/CT is not the answer to all oncological problems, he explains. Most tumours do have an increased glucose metabolism, which is why they pick up FDG. Certain cancers, however, behave differently and remain difficult to see on FDG-PET images.

"Today we know that FDG PET/CT is the most accurate method that we have as a tool for several different malignancies. Not all malignancies, but many malignancies," Antoch said.

Experience has shown FDG-PET/CT to be particularly helpful in visualising non-small-cell lung cancer. Other indications where FDG PET/CT has a real clinical benefit include lymphoma, colorectal cancer, and malignant melanomas.

In prostate cancer, the situation is quite different and tumours are unlikely to be FDG avid. If PET/CT imaging is performed, it is better to use carbon-11 or F-18 choline as the radiotracer. FDG uptake is also poor in neuroendocrine tumours, though in this case, the preferred alternatives to FDG are F-18 DOPA and Ga-68 DOTATOC.

Another valuable lesson learned is that standalone PET and CT protocols may need to be altered to get the most out of a hybrid imaging examination. For example, although it may be common to perform thoracic and abdominal CT in maximal inspiration breathhold, the image should be obtained at expiration breathhold when using a hybrid scanner to avoid misregistration. Similarly, patients having a PET/CT scan should be imaged with their arms raised to prevent CT artefacts. Patients undergoing PET alone would normally be imaged with their arms by their sides.

"It needs a little bit of compromise on both sides in order to get the optimal fusion image," Antoch said. "The nuclear medicine physician has to adapt the PET part and the radiologist has to adapt the CT part and then it works."

PET/CT will always be at least as accurate as a stand-alone CT examination, he noted. Oncology departments are unlikely to replace every CT scan with a PET/CT examination, though, owing to the limited availability of PET/CT systems and the time and expense associated with hybrid imaging. There may also be some indications where neither PET/CT nor CT is the best option.

"For instance, if you want to judge the local invasion of a tumour into adjacent structures, MRI may be a better choice than PET/CT," Antoch said.

So where will we be 10 years from now? Will PET/CT be regarded as yesterday’s technology or will the widened armoury of PET radiotracers turn it into a must-have modality?

The tricky task of predicting the future of hybrid imaging has been handed to Dr. Thomas Beyer, chief executive officer of the multi-modality imaging company CMI Experts, based in Zurich. One question that crops up regularly in the discussion on whether PET/CT will be replaced by PET/MR. The answer is definitely no, according to Beyer.

"Whenever a new modality is proposed, there are people who say, ‘This modality will now replace the old modalities.’ What we see, however, is that the new modalities sneak in between the existing modalities and broaden the applications of imaging," he said.

The combination of PET and MRI is appealing for a number of reasons. MRI examinations involve no ionising radiation, making PET/MR a low-dose alternative to PET/CT. MRI is also a more versatile modality than CT, offering a range of varied applications such as MR spectroscopy. MRI examinations are, however, much more time-consuming than CT scans. PET/MR is also an extremely challenging modality from a technological point-of-view.

It is likely that PET/CT will still play a dominant role in routine clinical oncology applications in 10 years time, according to Beyer. PET/MR is more likely to be reserved for selected applications, such as more detailed examinations of prostate cancer patients, or psudocancer oncology.

As we observe PET/MR becoming more clinically viable, we will also see more advances in PET/CT technology," Beyer said. "There are also some completely novel concepts for SPECT/CT that are being developed."
Paediatric CT comes under growing scrutiny

By Mélisande Rouger

Imaging children raises many questions within the medical community and the use of CT in particular has become a hot topic among physicians. With side effects that remain uncertain, paediatric CT has been at the centre of strategies to effectively reduce its radiation doses. The refresher course presented today at the ECR will offer an inventory of the situation and give participants the opportunity to review and discuss the latest advances in this field.

In Europe, cross sectional paediatric imaging is mostly performed with Ultrasound, a widely accepted modality for almost all parts of the body, especially the abdomen. Furthermore, the recent advancements in MRI technology have led to faster scanning and functional imaging, making it especially appropriate for children with indications outside the central nervous system.

Whereas these two modalities are considered risk-free, CT is causing debate because of the possible dangers associated with ionising radiation. To date, it is still unclear what consequences x-ray exposure may have in infants, who are more sensitive than adults to the effects of radiation.

Physicians worry that children are up to four times more likely than adults to develop secondary cancer later in life due to their rapidly dividing cells and higher life expectancy. Consequently, children are imaged with CT less often than adults, except in acute cases such as trauma, neurological and pulmonary diseases, and oncology.

Over the past ten years however, the medical community has been working on how to reduce radiation dose when imaging young patients. In the United States, where radiologists tend to use CT more often for children than in Europe, discussions have spurred the creation of pan-medi- cal organisations to increase awareness of radiation-related risks. Launched in 2007, the Alliance for Radiation Safety in Pediatric Imaging brings together healthcare professionals to develop guidelines for the imaging of the paediatric population. Several other radiological organisations outside the U.S. have joined the alliance, including the European Society of Paediatric Radiology.

In Europe, the concept of diagnostic reference levels (DRL) is under development and is increasingly being used in many countries. Diagnostic reference levels are maximum dose levels for several radiological procedures (including CT) which, under normal circumstances, should not be exceeded during a radiological investigation. They act as a sort of quality control system.

In addition to international initiatives, technical developments in CT have focused on decreasing radiation doses in children.

"First you need to ask yourself the question: is CT the best modality to investigate this problem? If so, then you should optimise the technique by reducing radiation," said Doctor Rutger A.J. Nievelstein, a paediatric radiologist working at the University Medical Center Utrecht, The Netherlands.

"We learned that we could also make a beautiful picture with a lower dose. There has been an enormous decline over the last decade, and it will certainly continue in the future," Nievelstein concluded.

"This technique was almost only applied in adults until recently. Now radiologists and the industry are increasingly focusing on optimising these techniques for paediatric radiology, and all major manufacturers are currently working on their development," Nievelstein said.

"The introduction of dynamic or adaptive collimation in modern MDCT scanners to decrease the so-called over-ranging effect, and faster scan times and larger scan ranges making ‘step-and-shoot’ scanning (in one or two rotations) possible in small infants, also contribute to lowering radiation.

All of these efforts have led to significant dose reductions, and it is now safer to do a CT scan than ten years ago.

"We learned that we could also make a beautiful picture with a lower dose. There has been an enormous decline over the last decade, and it will certainly continue in the future," Nievelstein concluded.
Interventional methods can improve outcome in cases of infection and percutaneous drainage

By Katrina Megget

Infection and percutaneous drainage should be offered in hospitals, and the micro-dissection of the randomised clinical trials always seems to result in increasing the number of cases of infection and percutaneous drainage, where practical information will be supplied by their expert speakers.

"Interventional radiology can save a lot of time and eliminate very expensive parts of medical care. If you can save patients two to three days in hospital, and reduce the cost of your expensive radiology equipment," said Dr. Martin Funovics, senior physician and assistant professor of radiology at the Medical University of Vienna.

In the future, these procedures will be increasingly required and the pressure will be on diagnostic radiologists to perform them. "If you are the ones most familiar with image interpretation, you will perform these procedures. Maybe there is not enough equipment or not enough referrals. It will not always be possible for interventional radiologists to provide these procedures. Maybe there is not enough access to patients." Even so, imaging is central to the diagnosis of empyema, which makes it all the more relevant that diagnostic radiologists take a role in these minimally invasive procedures. Ryan thinks image-guided drainage of an empyema and its subsequent management should already be part of the repertoire of interventional techniques familiar to general radiologists. Further, the arguments over interpretation of increment and over-treatment this year in the U.K. and the U.S. "show that the continents can learn from each other. We have the chance to fill the healthcare gap effectively and efficiently."

"We believe that one of the quality criteria in the near future is that a certain amount of interventional procedures should be offered in hospitals, and in the future diagnostic radiologists will be asked to offer these procedures," Funovics stated. "It will not always be possible for interventional radiologists to provide these procedures. Maybe there is not enough access to patients."

"The British Thoracic Society guidelines recommend diagnostic aspiration of all pleural effusions in patients with sepsis or a pneumonia, and when the effusion is small, ultrasound guidance is recommended," commented. "The Society recommends catheter drainage when the aspiration is perilous, or bacterial growth occurs on a previously aspirated sample."

These guidelines result in a large volume of referrals to radiology for further management, and general radiologists should be prepared to take on the work, he said.

Ryan also noted that procedural skills were on the wane in the clinical specialties. Whereas most qualified junior doctors would have previously been confident about tapping an effusion on the hospital ward, this is no longer the case, and more general radiologists are having to perform these procedures under image guidance.

However, Funovics stressed that there will be a learning curve for diagnostic radiologists when they become radiologists.

"When you become a radiologist, you become used to seeing images and you're not dealing with a patient as a human being. But you go from diagnostic radiology to interventional radiology, you have to learn that the patient becomes your patient. You have to make a transition in your mind and become more involved and responsible for that patient," he said.

This aspect will often determine the success of the procedure, he explained. "Even being asked more frequently to manage pleural effusions of all aetiologies.

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By Matthew G. Wallis, Cambridge/UK, Former EUSOBI President

The European Society of Breast Imaging has two principal aims: to represent and promote breast radiology in Europe through the ESR committee structure, and to promote best practice guidelines and education.

This year, as previously, breast screening has been very much in the news. In November, the U.S. Preventive Task Force published new guidelines in the Annals of Internal Medicine. Their suggestions are very much in line with those of the European screening programmes, expressing doubt about the cost effectiveness and the wider cost benefit for screening both the under 50s, and the annual interval between screens in women over the age of 50.

Unsurprisingly, the American professional bodies and experts in mammography identified guidelines along the lines of “recommendations will result in unnecessary breast cancer deaths each year.”

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Putting patients at ease brings success during screening examinations

By Edna Aubrey-Ward

Patient encounters during diagnostic screening examinations are often short and intensive, and patients may suffer from great fear and anxiety. Allaying anxiety and reducing distress during screening is essential for optimum imaging, and this can be achieved through clear communication and improved interaction between radiology staff and patients.

During the course of a working day in a radiology department, staff meet a wide variety of patients, each of whom is unique and requires an individual approach during a screening examination. Varied interactions during the encounter have different effects on the patient experience, and staff may only have the first few minutes in which to get this encounter right.

At this morning’s refresher course on patient interaction, ECR delegates will learn about improving the patients’ experience of diagnostic screening examinations. Mrs. Rodd Anderson, radiographer from Lund University Hospital in Sweden, will explain the basics of a positive patient encounter. Her presentation will use patient accounts from her research in this area, and also from her professional experience of working in a busy radiology department.

“A good patient experience all depends on how you approach the patient; it may only take one minute of your time, but it is especially crucial where patients may be feeling vulnerable due to the uncertainty of their diagnosis,” she said.

Prior to a radiographic examination, patients may express feelings of vulnerability, including anxiety and fear of pain and having to undress. Good communication and interactive dialogue between staff and patient are vital if the necessary information is to be transferred clearly to the patient during the times of greater vulnerability and anxiety. Anderson suggests that whilst pre-screening written information is important because it contains detailed knowledge, often it cannot provide the comfort or reassurance that can result from an encounter between people. Language is of great importance to the patient in relation to a radiographic examination, and there is a gap between medical jargon and everyday speech that can be difficult for a patient to understand; particularly when communicating potentially bad news, as in the case of false-positive mammograms.

The number of false positives from mammograms remains a major issue in the breast screening debate, but relatively little is known about the negative psychological consequences of these false alarms. Against this background, there is likely to be huge interest in the final presentation at this morning’s refresher course, at which a Danish researcher will explain more about this topic.

Between 5 and 15% of screening mammograms require further investigations, such as additional mammograms or ultrasound. A woman who has yearly mammograms between the age of 40 and 49 has about a 30% chance of having a breast biopsy within the 8% chance of having a breast biopsy within the 10-year period. False-positive results can cause significant distress to many women.

A condition-specific questionnaire designed to measure the short- and long-term impact of false-positive mammograms was developed in 2008 by Dr. John Brodersen and his colleagues at the University of Copenhagen in Denmark. Today’s presentation by Mrs. Anetta Bolejko, a researcher at Malmö University Hospital, Sweden, will provide further insight. She will explain how Brodersen’s questionnaire, which has recently been adapted to a Swedish context by Bolejko and colleagues, can be implemented in radiology departments. She will outline how this helps increase understanding of the impact of false positives.

The increase in breast self-examination may result from anxiety caused by false-positive mammograms. Explaining her understanding of the impact of a false positive mammogram to women, Bolejko notes that although women with a false-negative do not have breast cancer, the additional breast examinations they have undergone to exclude and diagnose the diagnosis of breast cancer may result in adverse psychological effects.

“Radiology departments should know how to act and what information to give in order to reduce these consequences,” she said. “Radiology departments are best placed to provide the additional support for women who may have suffered adverse consequences as a result of false-positive mammography as they have the expertise and knowledge in such matters.”

Bolejko says she can only speculate on what may ameliorate negative consequences of a false-positive mammogram, particularly in the long-term, and she suggests offering women focus groups or internet-based meetings to enable them to discuss the results with a radiologist or a radiographer retrospectively. Her recommendations for further research would be to investigate the consequences of false-positive mammograms using condition-specific measures.

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Less talk, more action will reduce patients’ radiation burden

By Paula Gould

Is that CT or x-ray examination really necessary? If it is, can diagnostic-quality images still be produced but with a lower dose of ionising radiation? If so, why don’t we talk about it? Just do it! That’s the message from the three speakers at this afternoon’s radiation dose management refresher course.

The level of ionising radiation associated with medical imaging procedures is undoubtedly a cause for concern. Excessive exposure can raise the risk of cancer, particularly in younger patients. Radiology personnel need to weigh up the dose-benefit balance, and where they can, they must take steps to reduce unnecessary exposure, ECR delegates will be told.

Radiology departments that switch from film-screen technology to digital radiography (DR) should be able to cut the amount of radiation that patients are exposed to, but this doesn’t always happen, according to Prof. Jan Persliden, professor of medical radiation physics at Greves University in Sweden. For example, when computed radiography (CR) equipment is installed, departments often carry on using similar settings, so the dose output remains unchanged. Practitioners could, however, lower the dose and use post-processing tools to enhance the image contrast.

Dose reduction is even more effective with direct DR systems that have flat panel detectors. For some x-ray examinations, the dose is 70% lower when the patient is imaged on a DR unit rather than on a conventional film-screen system.

At today’s session, Persliden will use examples from his own experience to show how image quality is not always reduced when moving from film-screen technology to DR. The examples will cover both CR and DR technology. The work was carried out together with radiologists to ensure that image quality was not compromised.

“It is important that we work together as a team,” he said. “There is no point reducing the dose and having images that can’t be used by the radiologists. That is a waste of radiation.”

The dose delivered by a single CT examination is almost always low, according to Prof. Willi Kalender, director of the Institute of Medical Physics at the University of Erlangen, Germany. The upper threshold for a ‘low dose’ of ionising radiation is often taken to be 100 to 200 mSv. This is well above the effective dose for a clinical CT scan, which will typically be between 1 and 10 mSv.

“So many people look at the cumulative dose from all CT examinations and say yes, this is a big number, but this is because there are so many examinations being performed. The dose to a single patient is acceptably low in most cases and the benefit is clear,” he said. “The risks of a wrong diagnosis from poor quality images are much, much higher than the hypothetical risk of radiation damage.”

Kalender will outline a number of practical steps that radiology staff can take to minimise the radiation dose from CT scans. These include the use of tube current modulation and automated exposure control, two features that are now available on modern CT systems. The tube voltage setting can also be lowered, for example to 80 kV, for paediatric CT examinations. Although this is a relatively simple dose reduction strategy, evidence suggests that it is not implemented as widely as it could be.

Dose reduction has to be a team effort between medical physicists and radiology personnel, according to Prof. Jan Persliden.

Another possible way of reducing the dose, and one that should also be considered, is to lower the time-current product (mAs). This strategy has to be followed with care because it can compromise image quality.

“It is for radiologists to recommend the noise and dose level according to the ALARA principle (as low as reasonably achievable), not physicists,” he explained.

Work to minimise the dose associated with CT examinations is ongoing. One of the latest innovations is the introduction of dual-source CT, which allows extremely fast, high-pitch spiral scanning. This approach to imaging is helping to cut the effective dose from cardiac CT studies. Looking further ahead, researchers are investigating new approaches to image reconstruction and alternative x-ray detector materials that may also help reduce patients’ radiation burden.

There is, of course, another approach to dose reduction that is to cut the number of scans performed. Prof. John Mayo, professor of radiology at Vancouver General Hospital, British Columbia, Canada, will discuss the importance of benefit-to-risk ratios when deciding whether patients should go to CT. The process of justifying a scan can extend way beyond the radiology department. In the case of suspected pulmonary embolism (PE), for example, a potentially fatal condition, emergency room physicians may want to use CT to confirm their clinical judgement. The patient will then leave hospital with documentation showing that they underwent a test that excludes the presence of PE with high accuracy.

“Given that, it is no wonder that we overuse CT examinations,” he said. “We need to make clinicians aware of the fact that just because they think of PE as a possible diagnosis, they don’t necessarily need a CT scan. They can look at the clinical evidence and say: ‘That’s the likelihood of PE in this patient’?”

The risk of fatal PE in 20-year-olds is quite low, but the risks from radiation exposure are much higher in this patient group than they are in 60-year-olds, Mayo pointed out. Yet too many younger patients are still undergoing CT examinations for suspected PE.

“Right at the moment, education is the key. Referring physicians are often unaware of the radiation doses that are being delivered by CT examinations,” Mayo said. “We need to make them aware that a risk-benefit ratio can be calculated and that we need to have stronger indications for CT in younger people than in older people.”

Refresher Course
Sunday, March 7, 14:00-15:30, Room 1
RC 1313 Radiation dose management
Moderators: M. Koutalonis; London/UK
J.N. Vasilevskaya; Sofia/BS
A. Justification in clinical practice
J.R. Mayo; Vancouver, BC/CA
B. Practical CT dose reduction strategies
J.J. Kalender; Erlangen/DE
C. Digital vs conventional radiography: What about the dose?
J.R.G. Persliden; Örebro/SE

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Communicating more to avoid litigation

By Melisande Rouger

Cases brought before Court against physicians have been on the rise for the past ten years, and radiologists have not been spared by this growing trend. Gaining awareness of this phenomenon and increasing communication with both patients and fellow clinicians can help radiologists avoid troublesome litigation. This is what the experts invited to take part in the "Professional Challenges session: Radiology and the Law" will explain this afternoon.

Long gone is the time when radiologists were sitting in a dark room at the bottom of a hospital tower, all day, explaining Dr. Emanu Brethaut, radiologist at the Mater Misericor- diæ University Hospital, Dublin, who will chair the debates.

"Radiology has utterly changed and it has now become a full clinical specialty. And one of the areas that we need to be aware of with increasing clinical and direct patient contact is our obligation to communicate issues both with patients and fellow clinicians," he said.

The result of the expansion of workload due to the increasing amount of information now available in imaging examinations, and the heightened diagnostic accuracy and specificity of modern imaging are a very high expectation of accurate, comprehensive and clinically informed reporting. This expectation has to an extent been driven by radiologists themselves. Radiologists are increasingly likely to be held legally responsible for any inaccuracy or ‘miss’. Additionally, because of the increased amount of information in modern imaging, mistakes can be expected more frequently when radiological images were less sophisticated.

The fact that radiology reports are written down and not verbally communicated as occurs in other specialties makes radiology very vulnerable to review and retrospective blame when the clinical outcome is deemed poor by patients.

Litigation has been increasing in the U.S. and Western Europe. But Eastern European radiologists should also develop them themselves, as the trend could spread in time.

Mistakes are more likely to occur when the image in question is being examined for a specific clinical indication and an incidental or unex- pected abnormality is present and ‘missed’. For instance, if a radiologist is performing a CT scan for a specific indication and misses an incidental kidney tumour on that CT scan, this may have major implications for the patient. But what are the implications for the radiologist?

Not only is it difficult to establish international norms for misreading incidental findings, but also for misuse of guidelines. "There is a very poor evidence base for what constitutes an acceptable 'miss' for radiological examinations. This will vary with the technique in question and the reporting rate, reporting environment, clinical information given etc.," Brethaut said.

Ligation on the basis of a 'miss' is far more frequent than that relating to medical misadventure or negligence on the part of the physician, but if that physician fails to inform the patient and diagnosis of the finding, if it is a significant and unexpected finding, to the referring doctor. In the past, reports have been known to get lost/be misplaced and this is happening increasingly frequently. It is apparently not so obvious to all radiologists, and that’s why we will use the session to highlight now important communication is," Brethaut concluded.

Professional Challenges Session

Sunday, March 7, 16:00-17:00, Room N/0

PC 14 Radiology and the law

• Chairman’s introduction
  E. Brethaut, Dublin/E

• Radiologic communications: Dilemmas and pitfalls
  E. Breatnach; Dublin/IE

• Medical negligence: The lawyer’s perspective
  G. Lalićer; Vienna/AT

• European legislation big brother: What the practitioner should know to avoid being sued and what to do if you are
  R. McHale; Woking/Hampshire/UK

• Panel discussion: Illustrative cases on:
  • What is an ‘acceptable’ error rate for radiologists?
  • What is the patient’s personal physician who explains the findings to the patient, but if that physician fails to inform the patient and diagnosis of the disease is delayed, resulting in severe injury to or death of the patient, the Courts will not only hold the referring physician liable, but now more and more often, the radiologist as well."

While Berlin acknowledges that the standard of care does not yet mandate radiologists to communicate radiological findings directly to all patients, nevertheless he encourages radiolo- gists to consider doing so routinely, and definitively doing so when the referring physician is not available.

In any event, radiologists should make sure that important findings are communicated to the referring clinician. "Radiologists must remem- ber that they have the responsibility to get the finding, if it is a significant and unexpected find- ing, to the referring doctor. In the past, reports have been known to get lost/ misplaced and this is happening increasingly frequently. It is apparently not so obvious to all radiologists, and that’s why we will use the session to highlight now important communication is," Brethaut concluded.

2009 proved to be a successful year for radiology in Slovenia

By Dinko Verkli, Ljubljana/SI, SAR President

2009 was a very fruitful year for the Slovenian Association of Radiology (SAR).

Standard time frames for all diagnostic and ther- apeutic procedures performed in Slovenia were established. The standards were set by radiologists, working in primary, secondary and terti- ary centres as well as those in private centres. The data from some European societies were obtained and partly included. The aim of setting these standards is to show the overrun of work for radiologists in most centres in Slovenia, and to emphasise the lack of radiologists in Slovenia (approx. 76/million inhabitants).

Two meetings of Slovenian radiologists were organised by the SAR in May, a meeting con- cerning the pathology of the shoulder was held in Velenje hospital. The invited lecturers were radiologists, orthopaedic surgeons and trauma-ologists, and a fruitful debate about the tech- niques and aims of radiological procedure took place afterwards.

The second meeting concerned localised Ilerx lesions and was held in Ljubljana. Major Slo- venian radiological departments as well as Slovenian abdominal surgery and Gastroente- rological centres were invited to dispatch their members as lecturers and as participants. The aim of the meeting was to define and publish diagnostic algorithms and radiologists concern- ing localised pathology in the liver. The meet- 2009 proved to be a successful year for radiology in Slovenia

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Standard time frames for all diagnostic and ther- apeutic procedures performed in Slovenia were established. The standards were set by radiologists, working in primary, secondary and terti- ary centres as well as those in private centres. The data from some European societies were obtained and partly included. The aim of setting these standards is to show the overrun of work for radiologists in most centres in Slovenia, and to emphasise the lack of radiologists in Slovenia (approx. 76/million inhabitants).

Two meetings of Slovenian radiologists were organised by the SAR in May, a meeting con- cerning the pathology of the shoulder was held in Velenje hospital. The invited lecturers were radiologists, orthopaedic surgeons and trauma-ologists, and a fruitful debate about the tech- niques and aims of radiological procedure took place afterwards.

The second meeting concerned localised Ilerx lesions and was held in Ljubljana. Major Slo- venian radiological departments as well as Slovenian abdominal surgery and Gastroente- rological centres were invited to dispatch their members as lecturers and as participants. The aim of the meeting was to define and publish diagnostic algorithms and radiologists concern- ing localised pathology in the liver. The meet-
Bracco, a leader in healthcare solutions, has been an ESR supporting member and ECR exhibitor for years. ECR Today met with Fulvio Renoldi Bracco, the company’s chairman and CEO, to discover Bracco’s latest products and views on radiology.

ECR Today: What makes Bracco unique in the healthcare business?

Fulvio Renoldi Bracco: Bracco, an international group that is present in all major healthcare sectors: diagnostics, therapies, equipment and services, is unique in its relentless focus on diagnostic imaging and its commitment to address changing healthcare demands across all imaging modalities.

In the diagnostic imaging sector, rather than focus solely on matching an agent and a delivery system with a medical condition, our approach is to view patients and challenges through radiologists’ eyes. This means delivering more integrated imaging solutions that meet radiologists’ needs for safety and efficacy, while addressing the myriad economic and regulatory challenges that accompany diagnostic imaging today.

Customers ‘assemble’ the solution to meet the unique needs of their practices by selecting elements that integrate and work synergistically to enhance safety, efficacy and patient outcomes.

ECRT: What are your latest innovations?

FRB: Bracco Imaging’s 2008 acquisition of E-Z-EM, Inc., a major manufacturer of contrast media and medical devices for gastrointestinal (GI) radiology, demonstrated the company’s dedication to the cultivation and development of an integrated solutions approach to research that fosters innovation through its expanded contrast agent product portfolio offerings and services.

ECRT: How does Bracco help to ensure that technological development benefits all patients?

FRB: We make great efforts to adapt R&D results to optimised hospital patient management. This is well reflected in the SOLUTIONS approach, in which we maintain attention continuously from development to the use of products in different applications within the healthcare system.

Our support of scientific research and education is a continuous, ongoing process aimed at expanding our customers’ knowledge and enhancing their practices in line with market evolution and trends.

ECRT: Which products will Bracco exhibit at ECR?

FRB: Bracco, as a worldwide provider of diagnostic imaging solutions, has available products and solutions for all key diagnostic imaging modalities. Diagnostic imaging agents promoted during the ECR include Iopamiron (Solutrast, Nioamiun, and Lipamiron) and Iomenon for x-ray imaging, computed tomography and Cath Lab procedures; PreVance and Multihance for magnetic resonance imaging; SonoVue for contrast-enhanced ultrasound (CEUS); PROTOCOL for computed tomography colonography; and contrast delivery platforms for CT, MRI and IB.

Regarding CEUS, our SonoVue® is positioned as ‘Changing the role of ultrasound’. This imaging modality is becoming more and more useful from a clinical point of view. In fact SonoVue® is a true Ultrasound Contrast agent and not simply an echo-enhancer. This means the physician who uses it has access to functional information which is not attainable with conventional ultrasound or which is difficult to obtain with first generation ultrasound contrast agents.

Contrast-enhanced ultrasound has diagnostic capabilities comparable to those of second level examinations such as nuclear medicine, MDCT or contrast-enhanced MRI that are generally more invasive and less accessible.

ECRT: You have been an exhibitor at ECR since the early days of the congress. What major changes have you observed at the congress in this time?

ECRT: Bracco usually organises Satellite Symposia and Hands-On Workshops at ECR. What themes will you deal with this year?

ECRT: Bracco has been focusing on high value to education and to developing a model for participation. We believe that the opportunity offered by the ECR to be a part of the teaching programme again this year, supports our strategic educational approach, allowing Bracco to confirm its commitment to an environment that provides quality patient care.

This year the main themes of the symposia will address the ever growing needs of improving workflow and effectiveness in the CT and MRI suite, by optimising contrast administration and techniques for safety and diagnostic efficacy. The ultrasound symposium will focus on the technological development and the clinical role of contrast-enhanced ultrasound in general imaging.

ECRT: How important is ECR to Bracco and why?

FRB: The ECR has helped industry partners to make the radiological workforce aware of the crucial role that industry plays in healthcare and, in particular, in medical imaging. At the same time it has given industry the opportunity to contact directly not only an ever increasing number of specialists, radiologists and nurses, but also stakeholders, including hospital managers and administrators both from within Europe and from elsewhere.

We believe the ECR is unique in offering the industry this opportunity across the range of radiological disciplines.
ECRT: How does it compare to other medical congresses worldwide?
FRB: We have to be cautious in this type of benchmarking since different congresses are influenced both by the number of specialists in the various disciplines and the size of the host countries.

We believe the ECR is one of the best examples of how qualitative and quantitative criteria can be combined without losing sight of the objectives and expectations of the participants involved.

ECRT: In your opinion, what could be improved at ECR? Was the enlargement of the technical exhibition in 2008 a step in the right direction?
FRB: Yes, it certainly was. It definitely helped to answer and satisfy the needs of the healthcare community and to address a higher attendee demand for up-to-date information on the increasing complexity of products and techniques.

While there should always be an opportunity for improvement, we believe the current format of the ECR is ideal for the needs of the healthcare community at present. The balance between scheduled events, scientific sessions and technical exhibition is recognised by everyone.

If I were to make one suggestion it would be to enlarge the interaction between the academic world and the international associations, which have a fundamental role in establishing standard references. A good example of this would be the reference to Asia as a leader in some areas and subsequently look to the U.S. as a reference and leader.

Unfortunately, meetings or other ongoing activities sometimes preclude attending interesting symposia whose varied audience and informal atmosphere is one of the greatest challenges faced today.

We will carefully evaluate the rolling business activities where, in my opinion, the interactions and collaborations with scientific associations will be even more key and decisive in ensuring not only continuous product improvement, but also the development of next-generation products and innovation.

ECRT: Aside from providing the perfect opportunity to reach European customers, does exhibiting at ECR enable you to reach out to any other particular client bases? Which ones?
FRB: We have a major focus on medical specialists and healthcare managers. Other operative healthcare personnel find it easier to be involved in a wide range of activities at the global level, such as CME and legislative issues. Their services portfolio has a very important role for Asia.

ECRT: What further collaborations do you foresee with them in the future?
FRB: Maintaining an environment that provides quality patient care while staying abreast of ever-changing regulations and standards, is one of the greatest challenges faced today.

We believe the ECR is one of the best examples of how to achieve these goals. A good example of this is the reference to Asia as a leader in some areas and subsequently look to the U.S. as a reference and leader.

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ECRT: What characterises the European market from Bracco’s point of view? Have you found that demands differ in Asia and the U.S., and if yes how?
FRB: Over the past few years the European market has confirmed its growing importance, especially when compared with the U.S. imaging market. The European market today constitutes roughly 30% of our global imaging business.

Today in Western and Central Europe we see mature markets with an increasing number of imaging procedures and with an opportunity to consolidate our already strong presence in a way to further grow in MRI and to develop the ultrasound segments. Eastern Europe, due to the increasing need for state-of-the-art patient care, represents the priority for us to expand the delivery of our integrated imaging solutions offering.

So Bracco again represents a brand of choice for effective patient management thanks to its wide portfolio, vast experience in the educational services and to consolidated growth in fast growing market segments.

In regard to the Asian market (or markets) I should say, because of the great heterogeneity that still characterises Asia), they have traditionally looked to the U.S. as a reference and leader market. Now this is changing, and Europe today has a very important role for Asia.

As a supplier of contrast agents (solutions), we are requested to expand our presence/portal to Asian countries and address specific clinical needs with attention to their different medical environments. This is our current focus. Our customers have good experience with our well-established products, they travel more and more, and would like to gain access to the latest products and diagnostic techniques: contrast ultrasound, a modality where we are leaders, in a good example of this.

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ECRT: Which parts of the European Congress of Radiology’s scientific programme stand out as being particularly interesting to Bracco?
FRB: How difficult to choose! In fact, as a company with a strong reputation for innovation, we find it interesting to attend and present at the New Horizons Sessions. However, we could certainly never neglect the Special Focus Sessions where innovation is dominant, or the Categorical Courses whose primary focus is on the various clinical applications. Without forgetting the symposia whose varied audience and informal approach highlights future trends and visions, and new clinical applications.

ECRT: How well do you think the technical exhibition and the scientific sessions of the ECR are connected? Should there be more integration between these two aspects of the congress?
FRB: There is always interconnection between the scientific sessions and the technical exhibition. However, it would not make sense for one to fully reflect the other. On the other hand, I believe digital technology could be used to make congress activities more usable and enjoyable to congress participants at different times of the day or week.

Unfortunately, meetings or other ongoing activities sometimes preclude attending interesting congress sessions. It would be of enormous value to make these sessions accessible (mobile phone, interactive body screen application etc) at different times - much in the way of the EPSON® electronic exhibits.

The interview was conducted by Mélianne Rouger.
Company Profile: Bayer Schering Pharma outlines its activities and products for ECR

ESR supporting member Bayer Schering Pharma (BSP) is a pioneer in the field of in-vivo imaging. ECR Today met with Hans Maier, Head of the Diagnostic Imaging Global Business Unit at BSP.

ECR Today: What makes Bayer Schering Pharma unique in the healthcare business?

Hans Maier: BSP is an innovation-driven pharmaceutical company with a track record of pioneering in the field of in-vivo imaging. In 1930 we launched the first injectable contrast medium for urography and since then have been at the forefront in introducing contrast agents for all major imaging modalities and are committed to research and development in contrast-enhanced in-vivo diagnostic imaging. We pursue over 20 imaging projects in early research in CNS, oncology and cardiovascular diseases, covering modalities from CT and MRI to PET. Furthermore, we continue clinical-development studies in various fields.

I think a key differentiator is our unique combination of in-house know-how in two areas; diagnostic imaging and development of therapeutic compounds. We understand diseases from both the diagnostic and the therapeutic perspective. It's important to bear in mind that a good diagnosis always lays the foundation for a successful therapy. These synergies, which are reflected in our motto, Enhancing Diagnosis. Empowering Care, open up great opportunities.

ECR Today: What are your latest innovations?

HM: Let me mention two of our most recent innovations. Primovist is our liver-specific MRI product. It improves sensitivity in the detection of lesions and diagnostic confidence in the characterization of lesions compared to computed tomography, most notably in the case of small liver lesions (<1 cm). Once taken up by hepatocytes, Primovist enhances healthy liver tissue while lesions with few or no hepatocytes – such as cysts, metastases and most hepatocellular carcinomas – remain un-enhanced. An MRI scan using this liver-specific contrast agent can spare patients with suspected liver cancer an additional biopsy, which is often necessary after conventional diagnostic imaging to optimize therapy planning.

Last year we presented encouraging Phase II data on our new liver-specific compound Florbetaben. This is a specific PET tracer that binds to beta amyloid, which is among the leading products in CT, we will present data from the first clinical experience at the ECR. HM: For Ultravist, our iodinated contrast agent, which is among the leading products in CT, we will present data from the first clinical experience in low radiation dose imaging with the newest high-signal Gd-based MRI contrast agent for imaging of various-body areas and patient groups, as well as of Primovist.

Furthermore, we will provide information on what is in our pipeline, and projects in the field of molecular PET imaging. Our medical devices company MEDIRAD will also be at the ECR presenting their product portfolio.

ECR Today: Have you been an exhibitor at the ECR before the early days of the congress. What major changes have you observed there during this time?

HM: We have been seeing innovations in scanner technology for many years now, and I am convinced that this will continue. Take low-radiation CT and high-field MRI, for example. Innovations in imaging devices could lead to even better spatial and temporal resolution and thus to more brilliant images, as well as new imaging indications in the future. We are committed to focusing our own R&D on these developments with projects such as non-invasive imaging of breast cancer and cardiovascular diseases.

In addition, the established imaging modalities such as CT and MRI are merging with emerging imaging modalities such as PET, an innovative technology that detects pathological changes at the molecular level. Hybrid scanners combining CT and, in future, MRI with PET will ultimately shape in-vivo diagnosis by combining anatomical and functional imaging. Because of the outstanding potential of these new techniques, BSP is strongly focusing on developing innovative PET tracers with the ability to considerably improve (for example) the diagnosis of neurodegenerative diseases and cancers. We are pursuing these programmes in addition to our research programmes in conventional contrast media. The medical need for an earlier and more precise diagnosis, as well as for patient stratification and early therapy monitoring, is of critical importance to improving patient care and contributing to saving healthcare expenses.

Above all, well-trained radiologists, engineers and scientists will be pivotal in mastering the technological and medical challenges and great opportunities that will emerge in the next decade.

ECR Today: Aside from providing the perfect opportunity for reaching European customers, does exhibiting at the ECR enable you to reach out to any other particular client bases? If so, which ones?

HM: Again, the ECR is the place to be for many disciplines involved in radiology. We meet not only radiologists, technicians and radiographers, but also application specialists, scientists and industry partners. Even though the ECR is a European meeting it attracts participants from around the world. It is important for Europe to have its own recognised meeting in the field of radiology. However, with the well established ECR in Europe and the ASNR in the USA and the AOCD in the Asia-Pacific region gaining importance in the coming decade, the ECR needs to continuously improve.

ECR Today: Which products will BSP be exhibiting at the ECR?

HM: For Ultrascan, our iodinated contrast agent, which is among the leading products in CT, we will present data from the first clinical experience in low radiation dose imaging with the newest high-signal Gd-based MRI contrast agent for imaging of various-body areas and patient groups, as well as of Primovist.

We will present new scientific data on the unique characteristics of Gadovist, our macrocyclic, high-signal Gd-based MRI contrast agent for imaging of various-body areas and patient groups, as well as of Primovist.

HM: The ECR has been getting bigger and more important every year. The dramatic increase in the number of participants from around the world and especially the Asia-Pacific region speaks for itself.

The ECR is the congress for scientists and industry for presenting and discussing new data, and covers the entire radiology field. I personally enjoy this event very much because it gives me an opportunity to talk to customers from all over the world. The world of radiology meets here. This is the place to be.

HM: BSP usually organises satellite symposia and hands-on workshops at the ECR. What themes will you be dealing with this year and why?

HM: Education has always been of key importance to us. We offer support training and education courses, especially in emerging markets, and have its own recognised meeting in the field of radiology. However, with the well established ECR in Europe and the ASNR in the USA and the AOCD in the Asia-Pacific region gaining importance in the coming decade, the ECR needs to continuously improve.

ECR Today: What aspects of the European Congress of Radiology’s scientific programme stand out to any particular client bases? If so, which ones?

HM: We greatly value the ECR as a whole. Cutting-edge radiological science is presented and discussed at this congress. The aspects covered range from new capabilities for existing equipment to first experiences with new modalities. Detailed attention is also paid to all kinds of important safety issues, considering the evidence from and the full spectrum of scientific data spanning preclinical experiments to large-scale clinical studies. We truly value the scientific spirit, excellence and openness at the ECR.

The interview was conducted by Mélanie Rouger.
Quantitative Image Analysis & Visualisation – a project by the Eindhoven University of Technology

By Bart ter Haar Romeny

The research group Biomedical Image Analysis (BMIA) at Eindhoven University of Technology, the Netherlands, is part of the Department of Biomedical Engineering, and is, with 500 students, the largest BME study (BSc and MSc) in the Netherlands.

The group, headed by Prof. Bart ter Haar Romeny, focuses on the development of efficient applications for diagnostic radiology, image-guided surgery and the life-sciences. There is a close collaboration with the Dutch medical imaging industry.

To benefit from a multi-disciplinary approach the research and education is divided into a chain of five areas:

1. Algorithm Design for Quantitative Medical Image Analysis

Powerful and smart algorithms form the core of effective quantitative and CAD medical image analysis tools, such as enhancement, segmentation, registration, etc. The new methods that are developed use state-of-the-art mathematics. One focus is the analysis of tensor valued images, for diffusion tensor imaging applications, brain motion analysis and surgical navigation. Another focus is trying to bio-mimic the segmentation and recognition mechanisms of the spectacular human visual system. This led to new and unconventional algorithms, such as catheter detection at much reduced x-ray doses, de-noising of microscopy images (even with crossing line structures, see Figure 1), and detailed non-invasive MRI-based heart motion quantification of infrastructed areas and image retrieval from large databases. The algorithm design is primarily done in Mathematica, a sophisticated high-level mathematical software environment.

2. Multi-valued Image Analysis and Visualisation

Nowadays, 3D medical imaging techniques allow complex (tensor-valued) measurements such as diffusion or flow. This multi-valued and high-dimensional data is best appreciated when properly visualized, preferably immediately and interactively. A focus is the development of new GPU-based visualisation techniques for Diffusion Tensor Imaging data (DTI). The in-house developed software package ‘DTI-tool’ allows the interactive visualisation and exploration of DTI data. Techniques for visualisation and analysing High Angular Resolution Diffusion Imaging (HARDI) have been incorporated (see Figure 2). HARDI allows the distinction of intra-voxel fibre crossings. As applications, the methods are applied to precise brain surgery navigation, as well as to heart and peripheral muscle fibre analysis.

3. Cardiac Image Analysis

Here it is all about quantitative image analysis. The detailed local deformation of the left ventricular wall is measured during systole and diastole with high-resolution tagged MRI for non-invasive infarct area assessment. Another focus is the segmentation of the cardiac left atrial myocardium with deformable models, to measure local atrial wall thickness. This application assists electrophysiologists during the ablation procedure.

4. Computer-aided Diagnosis

New quantitative CAD methods are developed for dynamic contrast-enhanced (DCE) MR images of the breast, in collaboration with Philips Healthcare and the University of Chicago. The team exploits pharmacokinetic multi-compartment modelling to optimise the relation between spatial and temporal resolution, and pattern recognition techniques for voxel classification. Other projects include the automated detection of pulmonary embol, and polyp detection in low-dose virtual endoscopy.

5. Image-guided Surgery

Located in the Maastricht University Hospital, the Image-guided Surgery group closely collaborates with the neurosurgery department. A software tool is developed for Deep Brain Stimulation procedures to accurately locate the stimulation target and the safest entry path. For tumour resection surgery the work is focused on (GPU-based) multi-modal (mix of MR, CT, SPECT, DTTI) visualisation and planning tools, interfaced with Medtronic’s Stealth Station and Medtronic’s intra-operative MRI scanner, the Polaris N20.

The Netherlands has a strong tradition in Medical Image Analysis. For further information, see www.bmia.bmt.tue.nl

Figure 1. Left: Noisy confocal microscopy image of collagen fibres in cartilage bone. Right: De-noising, traditionally difficult when crossing line structures are present, is done by applying anisotared filters in all directions in each voxel, and subsequent non-linear manipulation. (Provided by E.M. Frankani & R. Dubis, 2008)

Figure 2. Visualisation of brain nerve fibre tracts with DTI, combined with HARDI (glyphs), indicating local branching and intersections. (Provided by A. Wannov, V. Prokonska & T. Peeters, 2009)

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Elastography advances feature prominently among ultrasound exhibits

By John Bonner

The exhibition booths occupied by the vendors of ultrasound systems in the ECR 2010 Technical Exhibition are likely to be very busy places throughout the congress. Difficult economic conditions are causing a dip in global demand for the more capital-intensive modali
ties like CT and MRI, and hospital managers are keen for their staff to explore the clinical potential of this versatile and cost-effective technology.

Delegates are eager to hear more about the latest hardware and software applications being unveiled by this sector’s major names, and the biggest buzz emanating from ultra
dound exhibits is the relatively novel applica
tion, elastography. The technique uses mecha

nistic compression to analyse the stiffness of different tissues; fibrotic or cancerous lesions are usually considerably more resistant to compression than the surrounding healthy tis

ues. The technique has developed alongside conventional B-mode ultrasoundography, and it is also attracting the interest of companies seeking to apply it in combination with other imaging modalities, like MRI.

Hitachi Medical Systems has been a pioneer in the clinical development of elastography, and is offering its own version of this technology. Hitachi Real-Time Tissue Elastography (HT- RTE), as a key application on its new compact ultrasound platform, Hi VISION Preirus, which follows last year’s launch of the Hi VISION Preirus.

The application is a package of advanced product features provided with the new machine, including established technologies such as Hi Rez (tissue adaptive filtering), HiATTH (high definition dynamic tissue har

monic imaging) and Hi Com (frequency and spatial compounding), as well as new features such as RVS (real-time virtual sonography). The latter is a software application that uses magnetic tracking sensors on the ultrasound transducer to display real-time, free-hand ultra

dound images, alongside synchronous other images.

"Elastography-based palpation using the ultra

dound transducer is a simple, non-invasive, real-time technique that improves the sensi

tivity and specificity of the detection in a range of clinical applications, including the breast, thyroid, prostate, pancreas, liver and many more," said Ellison Bibby, Hitachi’s European product manager for ultrasound.

"Ease-of-use, free-hand manipulation and real-time feedback are fundamental attribu

tes that have allowed elastography to become an efficient and easy-to-perform component of the ultrasound examination. Recognising that this modality has been clinically valida

ted as an accurate and reproducible technique that can provide significant diagnostic benefit in routine clinical applications, Hitachi has added this option to its full platform range."

Another company that has been at the fore

front of developments in elastography is SuperSonic Imagine, based in Aix-en-Pro

vence, France. The company made its ECR debut last year, demonstrating a breast exa

mination package on its Aixplorer ultrasound system, and this year it is introducing two new applications for abdominal and thyroid exami

nations.

SuperSonic Imagine describes itself as a ‘the

ragnostic’ company, believing that its software for the high-speed analysis of shear waves will have applications at all stages of the treatment process. Its products are reportedly equally useful in the diagnosis and characterisation of lesions, in planning and in guiding interven

tions such as biopsies and tissue ablation, and in monitoring response to treatment.

Other more established players in the radio

logy field are equally convinced of the poten
tial of this new technology. Toshiba Medical Systems is offering a quantitative elastography application in its new Aplio MX platform, which is being shown for the first time at ECR and is designed to provide a cheaper alterna

tive to its top of the range Aplio 5G model. In due course, the product will be available with another development called ASQ, or acoustic structure quantification. This is a software package capable of analysing echo signal data at a resolution more than 100 times higher than normal grey-scale or colour flow images by using a special hardware extension, the Toshiba ultrasound raw data interface.

"We believe that ASQ, together with other advanced applications such as precision ima

ging and quantitative elastography, enables us to provide valuable packages of diagnostic tools for the clinician to perform comprehensive ultra

sound diagnostics in specific regions of the body such as the abdomen," explained Joop van de Kant, clinical marketing manager for the company’s European ultrasound business.

Phillips is another of the big names that is offe

ring elastography as part of an advanced breast imaging package available on the latest version of its iU22 ultrasound system. It has expanded its range with the Vision 2010 upgrade, the fifth major enhancement of the iU22 device. Elastography is provided by an L1-5 trans

ducer and advanced breast tissue specific imaging preset that helps users to differentiate relative stiffness of tissue through colorographic examination.

Siemens is presenting its own version of elas

tography with the latest upgrade to the Acuson S2000 ultrasound platform, which includes enhancements to its acoustic radiation force imaging (ARFI), virtual touch tissue ima

ging, and virtual touch tissue quantification technologies.

"These leading-edge technologies redefine the use of ultrasound in the diagnosis, treatment, and therapy of diseases affecting areas of the body that cannot be examined through phys

ical palpation, for example, the liver," said Norbert Gaus, CEO of Siemens ultrasound business unit.

The company’s product provides a numeri

cal value related to tissue stiffness at a precise anatomical location, which helps to identify early-stage liver disease. Using intelligent algo

rithms that automatically calculate the values, it also addresses the challenges related to user

dependence and variability, as well as consis

tency and reproducibility.

Curiously, in view of its pivotal role in develo

ting technology that combines the diagnostic capabilities of elastography with MRI, GE Healthcare appears to be putting less stress on elastography and ultrasound. Its announce

ment in relation to the latest release of its Logiq E9 platform emphasises the device’s broad-ranging clinical utility for improving image quality and productivity in paediatric, vascular and cardiac imaging.

"The Breakthrough 2010 enhancements extend Logiq E9’s extraordinary imaging, expert tools and easy workflow to more clinical specialties. Innovative agile acoustic architecture, E-Series transducers, expert tools like fusion and a new cardiac suite of tools combine to create amaz

ing capabilities that are truly expanding the boundaries of ultrasound," said Brian McEl

thomas, general manager of the general imaging and ultrasound division.

Seven new transducers are being introduced in this release, covering cardiac, vascular and paediatric applications. Vascular enhance

ments include auto IMT (intima media thick

tess) and cardiac tools include Q-analysis, tis

sue velocity imaging, and colour M-mode.

Real-time sonoelastography has been shown to be useful in the differential diagnosis of breast cancer. (Provided by Hitachi)

Elastography may also have applications in cases of rectal cancer. (Provided by Hitachi)

Image of large breast fibroadenoma taken using Siemens Acuson S2000 system.

ASQ acoustic structure quantification of the liver in a patient with severe fibrosis (grade 3). In the region-of-interest, elevated average value of Cm2 with frequency distribution shifted to the right. (Provided by Toshiba)
The pyramidal brain atlas: from blocks to brain

By Wieslaw L. Nowinski, Biomedical Imaging Lab. ASTAR, Singapore.

Since IMAGINE 2009, we have made a tremendous advancement in atlas development in terms of concept, implementation and applications. Last year we presented a pyramidal concept of a brain atlas, meaning that the atlas content is extendable in height and breadth while preserving the atlas concept and main features. This concept has been refined, extended and implemented. The atlas of structure with cortical areas and subcortical structures has been built (Magna cum Laude, ASNR 2009) followed by a creation of the atlas of structure, vasculature, and connections (Magna cum Laude with Excellence in Design, RSNA 2009), and new applications are being developed to expand atlas availability and range of use.

Scalability and decomposition are two main principles of the pyramidal atlas. Content and functionality scalability enables the atlas to grow by parcellating the existing content and adding new materials, while keeping its complexity and performance manageable. Brain model composition and decomposition enable the whole brain, or any part or circuit of it, to be built from individual components. The cerebral model is spatially consistent as it is derived from a single specimen. Moreover, radiological, surgical, and educational presentation conventions are embedded in one.

Consequently, the resulting new atlas is comprehensive, detailed, completely parcellated, fully labelled, three-dimensional (3D), spatially consistent, of high resolution, volumetric, stereotactic, exploriable, dissectible, and interactive. The atlas with 3D models of the brain's structure, vasculature and tracts is derived in vivo from the same specimen. Moreover, radiological, surgical, and educational presentation conventions are embedded in one.

The atlas is created manually (by WLN) from multiple 3T and 7T acquisitions (MP-RAGE, 2D/3D TOF, SWI, SPGR, DTI) by employing dedicated editing tools. It contains cortical areas, subcortical structures, arteries, venous dural sinuses, and white matter tracts completely parcellated and fully labelled with their names. The vessels are additionally labelled with diameters. The atlas contains over 1,100 pieces and the smallest vessels have 90 microns in diameter. The 3D brain is dissectible electronically into gross components (hemispheres, cerebrum, cerebellum, brain stem, spine, and groups of vessels and tracts), selectable individual components (structures, vessels, tracts), and layers (cortex, white matter, subcortical structures), and can additionally be exposed with multiple 3D cutting planes (in 6 predefined directions and 1 arbitrary). The cerebral models are placed in a stereotactic system which enables measurements and coordinates. Fast exploration, composing, decomposing, and quantification are all possible with a few clicks.

Through the main purpose of development of the new atlas was for stroke (see Singapore's Stroke Suite: CAD systems for ischemic and hemorrhagic strokes, ECR Today, March 7, 2008), this atlas also serves as a foundation for several new educational, research, and clinical applications. After releasing a commercial version of the 3T atlas (The Cerefy Atlas of Cerebral Vasculature, Thieme 2009 (CACV)), an enhanced 7T version is now in production. A commercial version of an atlas of variants (Summa cum Laude, ASNR 2008) is in development as well. We have also implemented two public domain versions, i.e., a free CAV (www.cerefy.com/dw/Media/iCACVsite.htm) and an education atlas with structure and vasculature (www.cerefy.com/dw/Media/iCRA-M3.htm). New types of atlases under development include a motion atlas and an atlas of neurodevelopmental disorders.

Clinical applications include atlas-assisted interpretation of 320-slice CT scans and deep brain stimulation (DBS). A 320-slice CT scanner is able to produce about 6–7,000 images per minute. Reading this huge amount of data is challenging and our atlas, combined with 3D visualisation techniques, can potentially assist in interpretation. To enable that, the atlas is in a process of integration with a radiological workstation.

The insertion of electrodes into the brain during stereotactic procedures may potentially cause microbleeds not discernible on standard scans. An atlas-assisted simulator enables the neurosurgeon to analyse the spatial relationships between the track and the cerebrovasculature, ventricles, subcortical structures and cortical areas. This allows the DBS electrode to be placed more effectively, potentially lowering the invasiveness of the procedure to the patient.

A vivid interest in our atlas at the RSNA 2009 from numerous medical schools and radiology departments caused us to put more emphasis on educational aspects at various levels (undergraduate, graduate, residents/fellows, CME accreditation). The atlas is being trial licensed to centres in North and South America, Europe, and Singapore. Finally, at the end of the year we aim to expand the atlas to 2010 cerebral pieces.

For further information please contact wieslaw@sbic.a-star.edu.sg.
HAMAM drives applied research for early detection and diagnosis of breast cancer

By Sonja Guttenbrunner

Nearly one third of all cancer cases among women in Europe every year are breast cancer cases. Currently, the primary goal of fighting breast cancer is its early detection in order to prevent a fully developed stage of the disease. Thus, there are strong demands for tools beyond the state of the art that allow for more accurate and earlier detection of breast cancer.

The project HAMAM – HighlyAccurate Breast Cancer Diagnosis through Integration of Biological Knowledge, Novel Imaging Modalities, and Modelling (www.hamam-project.org) tackles this challenge through its mission to develop and provide tools for advanced breast cancer detection.

The all-in-one-approach.

The ultimate goal of HAMAM is to significantly improve the characterization and classification of suspicious breast tissue by integrating available multispectral images and patient information on a single clinical workstation.

HAMAM is a three-year EU-funded project that started on September 2008 with the European Institute for Biomedical Imaging Research (EIBIR) as the coordinating partner. Nine project partners with leading expertise in the field of breast imaging diagnosis form the consortium. They are confident that with HAMAM, Europe has the potential to strengthen its leadership in the whole area of image-based breast cancer diagnosis.

HAMAM looks back on a very successful first project year.

The first project year has already brought the first major achievements. The clinical goals of the project were discussed and defined in detail, modality-specific tasks were described, and the scope of tumour modelling and risk analysis integration was refined and delineated. The clinical workflows and indications were clarified, and a first complete description of all relevant use cases was delivered. A functioning online data base prototype was developed and made accessible for storing multi-disciplinary data from all partners. A special highlight was the implementation of a first workstation prototype.

The HAMAM workflow.

HAMAM is structured around nine different work packages with the aim of fostering exchange and collaboration between basic scientists, clinicians and IT experts.

Clinical and diagnostic requirements

Under the lead of the project partner Fraunhofer MEVIS (DE), the aim is to collect and define detailed requirements from a clinical perspective. To secure the clinical practicability, a clinical advisory board, composed of leading experts in the field of breast imaging and breast cancer diagnosis in Europe and the U.S., was established. Two workshops (October 2008 and March 2009) were held with all partners plus the clinical advisory board, with the major objective of aligning the technical and clinical goals of the project and combining the two areas in a suitable way.

Development of multi-modal environment

A first workstation prototype was implemented by the project partner M4M Medical Solutions (DE). It incorporates a new patient-centric workflow as opposed to the traditional examination-centric workflow. This prototype is already capable of providing a first impression of future multi-modality presentation of medical data.

Imaging spatial correlation

Challenging problems regarding the spatial correlation between imaging sequences were approached. First steps and achievements were related to intra-modality motion correction, both for breast MRI and IODIR, to registration of prior and current MRI examinations. This included a first prototype implementation for efficient comparison of images with earlier examinations, and for co-registration between MRI and MG, despite acquisition in very different anatomical configurations.

Model-based analysis of integrated imaging data

Model-based analysis of integrated imaging data is targeted at the overall objective to develop robust methods for extraction of quantitative tissue parameters from multi-modality breast imaging data. This work concentrated on the research applications of breast cancer detection, diagnosis, and determination of therapy response. In accordance with the clinical advisory board it was decided to focus research on the three most important modalities: x-ray mammography, breast MRI, and 3D ultrasound. In addition, for Position Emission Mammography (PEM) efforts will be made to develop lesion segmentation.

Research during the first months concentrated on breast MRI. The main aim was the development of a reliable method for bias field correction, segmentation of anatomically relevant regions, and lesion detection.

Integration of multi-disciplinary data

The ETH Zurich took the lead in collecting clinically and scientifically required information to be used for the project and provided a specifically tailored database setup for storing multi-disciplinary case information. Some efforts were to be invested in the build-up of project infrastructure, including solutions for data storage and transfer, such that the multi-modal data collection could be taken up by all clinical partners.

By the end of year one, several novel and improved algorithms based on the collected data were developed by the technical project partners. These algorithms and methods are now to be evaluated both from a technical and clinical perspective (Technical and clinical validation and verification).

Introducing HAMAM to the community

The project partners presented their work at several scientific conferences and congresses, including such prestigious events as the European Congress of Radiology 2009, Informatik 2009, the American Society of Clinical Oncology (ASCO) Breast Cancer Symposium, and the World Congress 2009 on Medical Physics and Biomedical Engineering.

Additionally, various articles about the HAMAM project were published. All articles can be accessed via www.hamam-project.org > Press.

A highlight was surely a TV documentary on the HAMAM project content, broadcast on EuroNews, in which leading project partners from Germany and the Netherlands presented recent developments and expected results of the project. This TV-documentary is available in different languages on www.hamam-project.org > News.

By the end of year one, several novel and improved algorithms based on the collected data were developed by the technical project partners. These algorithms and methods are now to be evaluated both from a technical and clinical perspective (Technical and clinical validation and verification).

Promising outlook

After successful completion of HAMAM, the project partners expect that the developed prototype workflow will implement the final multi-modal workflow and use cases as defined through interactions with the clinical advisory board. All developed and relevant modality-specific and inter-modality algorithms will be available in this workstation. The assessment and diagnosis of multi-modality data will be made possible in a more efficient way, and the assessment of suspicious areas will be more sensitive and reliable.

For more information, please visit www.hamam-project.org.
ESNR dedicates its resources to the education of future neuroradiologists

By Marco Leonardi, Bologna/IT, President ESNR, and Pia Malty Sundgren, Lund/SE, Editor ESNR

During the past year there have been several developments and changes in the European Society of Neuroradiology (ESNR). Professor Marco Leonardi is the current society president and assisting him in the executive committee and the various subcommittees he has a group of young, enthusiastic European neuroradiologists to take the lead in the many tasks and issues that lie ahead.

The society modified its name over a year ago to the European Society of Neuroradiology – Diagnostic and Interventional Neuroradiology to reflect the fact that it represents both diagnostic and interventional neuroradiologists in Europe.

The society continues to organise annual scientific meetings with the same spirit as before, this year the most recent of which was in Athens, Greece in September 2009, as well as holding various European training courses at basic and advanced levels, and providing a forum for the professional development of European neuroradiologists.

One of the most important issues for the ESNR is the continuing work with the creation of the Neuroradiology Division of the UEMS Section of Radiology. This was initially proposed by the UEMS Section of Radiology and in the autumn of 2008 the division was established. The work to build the Neuroradiology Division is ongoing, led by the Executive Committee of the Division and its first President, Professor Olaf Fullmer. We are all very excited by the new possibilities that have been given to us by strong support from the Board of the UEMS Section of Radiology.

Last year we wrote about the issue of the fairly low number of paying society members compared to the number of full-time practising neuroradiologists in Europe. I am proud to say that the number of paying members, especially young neuroradiologists, has increased significantly over the past year and we will continue our efforts to increase the number of members, which is important in making our voice heard.

The society continues to give special benefits to full members, such as access to a dedicated website with continually updated information, course programmes, teaching files and links to other international societies, and to introduce lower registration fees for full members for the annual meeting.

As a member of the society you also receive the journal Neuroradiology, which is the official journal of the society. The issues not only contain well written original and review articles but the society news pages have increased and are updated regularly to keep the members informed about upcoming meetings, courses, reports from different events and from the students in the ESNR exchange programme.

The ESNR exchange programme, which aims to support and develop mobility and communication between fellows and residents training in neuroradiology in Europe, offers training in topics not available in home institutions, supports educational and research cooperation between institutions of neuroradiology, and helps to build networks between the communities in Europe.

If radiology remains as a medical specialty and is not ‘bought up’ by other specialties, the education of future generations of radiologists and neuroradiologists remains an important issue for the European radiological community. The ESNR – European School of Neuroradiology – is the most important and complete training programme, organised by the ESNR in partnership with the European School of Radiology (ESOR). The aim of this training and education programme is based on the vision of what the ESNR considers the range of competencies and skills that are the basis of a highly qualified neuroradiological activity. The programme is designed to offer a pathway to reach such professional and cultural levels. The final points will be the examinations to gain certification at the different levels and in the different branches of this discipline.

The programme is divided into three levels; the first level is the ESOR Galen Foundation Courses in Neuroradiology, which offer a first approach to neuroradiology and are designed for radiology students, radiologists, neuroradiologists, neurosurgeons or simply physicians with an interest in neuroradiology. The second level is the ESNR Pierre Lasjaunias Course in Neuroradiology, Diagnostic and Interventional. This course has been organised since 1984 with the precise aim of adhering as closely as possible to the EC regulations for academic education programmes. As a matter of fact, the didactic credits provided by the course are meant to comply with the regulations for academic education programmes such as 3rd level master’s degrees, and some European universities have already recognised the certified course, as part of their own master’s degrees. The cycles are structured in four modules held twice a year. At the end of each module a certificate reporting CME credits is issued after completing a test. Upon completion of all four modules (one entire cycle) the participant can ask to hold a final oral examination. If he/she passes, certification as a qualified neuroradiologist (European Qualification in Neuroradiology EQNR) is issued by the ESNR.

The 10th cycle is directed by Prof. Massimo Gallucci (Dauphila, Italy) and Prof. Alex Revore (Barcelona, Spain). The first set of courses in this 10th cycle took place in Tarragona (Spain) in October 2008, Rome (Italy) in March 2009 and again in Tarragona in October 2009, and the last course in this cycle will be held in Rome in March 2010. A certification examination to achieve The European Board Certification of Fellow in Neuroradiology in cooperation with the UEMS Division of Neuroradiology is possible after completion of the full EQNR cycle for those who have a neuroradiological curriculum.

The third level is the ESONR courses of Higher Qualification in Interventional Endovascular Neuroradiology, Interventional Spine Neuroradiology, Advanced Interventional Neuroradiology and Paediatric Neuroradiology. These courses and the subsequent certifications are open only to neuroradiologists. All these courses will be followed by a specific examination with multiple-choice questionnaires, reserved for ESNR members to obtain the Higher Qualification in interventional neuroradiology, interventional spine radiology, advanced diagnostic neuroradiology and higher qualification in paediatric neuroradiology. The first set of these advanced courses will take place in the autumn of 2010.

In the era of internationalisation and collaboration, the first joint meeting between the ESNR and the American Spine Society in Radiology (ASSR) was held in Rome in July 2009, and we hope there will be more of these joint adventures to come.

The field of neuroradiology and interventional neuroradiology is constantly increasing. The scientific research spans a broad range of topics and uses today’s most advanced radiological techniques and methods. Neuroradiologists all over Europe continue to be at the forefront in the further development of existing techniques and in the development of new imaging techniques. Advances are constantly being made in areas like brain tumour imaging and treatment response, in the detection of structural and metabolic changes underlying neurological diseases, in different ways to imaging treatment response, and in the development of new coils and catheters for more advanced interventional procedures. Awareness of the risks of radiation has resulted in ongoing research to reduce the radiation doses in some neuroradiological examinations, for example with the implementation of so called ‘low dose’ CT-protocols for multi-trauma spine imaging, and continuous work is being done to polish the protocols in other areas of neuroradiology. Like in other areas of radiology, awareness of the devastating effects of indiscriminate use of gadolinium in patients with severe kidney failure has resulted in changed management of these patients when performing neuroradiological MRI examinations.

Further information on the society can be found at www.esnr.org.
The Alliance for MRI was officially launched in March 2007 in response to the implementation of the EU Physical Agents 2004/40/EC (EMF) Directive in April 2008 and aims to ensure that the threat posed by this Directive to the future of MRI is averted and that patients in Europe will not be precluded from state-of-the-art healthcare services.

The current version of the Directive puts limits on the exposure of operating staff (including those maintaining equipment) from zero frequency up to 300GHz. The limits proposed are huge extrapolations from largely hypothetical conditions and are an overcautious interpretation of very limited experimental data. The Directive has consequences for clinical MRI, and a large number of European and national scientific organisations, has been instrumental in raising awareness of this threat to MRI.

In October 2007 the European Commission proposed the postponement of the implementation deadline from April 2008 to April 2012 to allow comprehensive radiological workforce census in the summer 2010. This revision is a result of the consensus reached by the Alliance for MRI and recognition by the EU institutions that the Directive severely curtails the use of MRI to the detriment of patients in Europe. We hope that the Commission will follow the position of the Alliance for MRI by providing an exemption for the medical use of MRI and related research from any limit values eventually mentioned in the amended Directive.

The Alliance for MRI, initiated by the ESR, together with leading European patient advocacy groups, many Members of the European Parliament, and a large number of European and national scientific organisations, has been instrumental in raising awareness of this threat to MRI.

Royal College works out how best to revalidate all U.K. radiologists

By Nicola H. Strickland, London/U.K., Registrar of the Royal College of Radiologists

Issues facing imaging in the United Kingdom are similar to those concerning the rest of Europe, although in some ways we are more fortunate than some of our other European colleagues in that we already have a rigorous five-year radiology training programme, standardised throughout the country, with a national radiology examination – the FRCR (Fellowship of the Royal College of Radiologists), which is a prerequisite to practising as a consultant (staff) radiologist in the U.K. We are now addressing the need to revalidate our radiologists on a regular basis, as mandated by the U.K. government for all doctors, and we are working out how best to do this in an equitable and achievable manner. A consequence of the revalidation programme will be finding a means to help those (few) radiologists who may be falling behind in some areas, so that they can ‘get up to speed’ in order to revalidate successfully.

The Royal College of Radiologists (RCR) is an active national body working in the interests of patients and its own Fellows. It continues to publish helpful standards and guidelines for radiological practice, including imaging-related information technology, which it makes freely available to all radiologists via its website. The sub-committee responsible for these standards and guidelines has been elevated to full College Board status in 2010. The RCR has a remit to improve the standard of practice and reporting of the newer imaging technologies such as PET-CT and cardiac CT and MR, which it believes should be primarily reported by radiologists, and there is clearly a need to provide our Fellows with a means to quickly improve their reporting skills in these rapidly growing areas.

Last year, the RCR organised the first comprehensive radiological workforce census in the U.K., and this will be continued and expanded every year from now on. It is vital for every country to be aware of the exact numbers of trained consultant radiologists, the numbers of radiologists in training and the numbers of unfilled radiology posts, in order to attempt to match the total numbers of radiologists required to the current and predicted imaging workload locally and nationally.

Teleradiology services are seen by U.K. radiologists as having advantages and disadvantages. When used appropriately teleradiology can have many benefits for patients and healthcare organisations. However, the RCR believes that though outsourcing of imaging reporting is occasionally necessary where resources are lacking, outsourcing represents a second-class reporting service. Patients are best served by expert informed radiological reports rather than by outsourced teleradiology reporting services where the past imaging and clinical history is frequently not known by the reporting radiologist, the qualifications and calibre of the individual generating the report may be an unknown entity, and – most importantly – the valuable personal dialogue and interaction between the referring clinician and the reporting radiologist is lost.

An exciting new event for all British radiologists is the purchase by the RCR of a new building for its headquarters. This building is larger than the previous one, and should allow provision of much improved facilities for its Fellows, including state-of-the-art teaching and education facilities (within the ever-constraining financial realities of the funds available!). This project will be a challenge, but a rewarding one, and should be completed within the next two years.

Further information on the Royal College of Radiologists can be found at www.rcr.ac.uk

Alliance for MRI launches online petition to safeguard the future use of MRI

By Sonja Guttenbrunner

No more MR in Europe?

The Alliance for MRI aims to safeguard the future use of Magnetic Resonance Imaging (MRI) in Europe through an EU-wide exemption for the medical use of MRI and related research from any exposure limit values set in the Physical Agents 2004/40/EC (EMF) Directive.

This petition will be sent to European institutions, national governments, parliaments and other decision-making bodies to enhance the profile of the Alliance for MRI and demonstrate the significance of this issue.

Please support the Alliance for MRI and sign the online petition! This petition will be sent to the European institutions, national governments, parliaments and other decision-making bodies to enhance the profile of the Alliance for MRI and demonstrate the significance of this issue.

Sign the petition today at http://petition.myESR.org

For further information visit: www.alliance-for-mri.org

By Sonja Guttenbrunner

The Alliance for MRI launches online petition to safeguard the future use of MRI.
Ultrasound expert to address the role of modern diagnostics in Honorary Lecture

By Mélisande Rouger and Simon Lee

In recognition of his authority in ultrasound, and his expertise in the male and female urinary tracts, Dr. Andrzej Pawel Wieczorek from Lublin, Poland, will present the Maria Skłodowska-Curie Honorary Lecture ‘Female urinary incontinence: Is there still a place for radiology/radiologists?’ at ECR 2010.

As well as being Associate Professor of Radiology and Director of the Department of Paediatric Radiology at the Medical University of Lublin, Poland, Andrzej Pawel Wieczorek is an expert in ultrasound and an authority on the genitourinary tracts. In his lecture at ECR 2010, he aims to highlight the existing gap in awareness of what radiology can offer to other specialties, focusing particularly on urinary incontinence.

"As radiologists we have vast knowledge and unique tools in diagnostic imaging which nowadays give more and more possibilities to clinicians,” said Wieczorek. “Unfortunately not all specialists/doctors are aware that such opportunities exist. It is our role to open up and provoke discussions with clinicians about opportunities and the place of modern diagnostics, which would be bilaterally fruitful and most importantly good for the patients. Up-to-date imaging is not commonly used in diagnostics and the monitoring of treatment of urinary incontinence."

Born in 1963 in Lublin, Wieczorek obtained his medical degree from the Medical University of Lublin, Poland, in 1987. Then, after completing his residency in 1988, he became a Radiology Assistant at the Regional Hospital in Lublin and in 1993 was appointed Radiology Assistant at the Department of Paediatric Radiology of the Medical University of Lublin. There, he completed his training in 1996 and became Senior Assistant. Before being appointed Vice-Director of the Department in 1999, two years later, he was appointed to his current position.

Wieczorek gained his experience training abroad in various locations, including London, Berlin, Copenhagen and Boston, and he is still very active on an international level. Combining his interest with his leadership skills, he was involved in the organisation of the Leonardo da Vinci exchange programme for 30 junior radiologists from Poland in 2004 and 2005.

Although primarily a paediatric radiologist, he has also focused on the male and female genitourinary tracts with special attention to male infertility and female urinary incontinence. He is an expert in ultrasound (US) diagnostics, and is involved in the research and development of innovative US techniques such as high-frequency (3D/4D) modes, vector-based movement tracking technique, segmentation, fusion, quantitative evaluation of perfusion and others.

He has authored or co-authored more than 60 papers and published 10 chapters in monographs. He is an editor of the book ‘Pelvic Floor Disorders’, which will be published in May 2010.

"Nowadays imaging is often a few steps ahead in comparison to clinical management and may indicate the directions of medicine,” said Wieczorek when asked what keeps him engaged in his work. "The motivation for me is the development and progress that is possible in therapy and follow-up thanks to imaging diagnostics. The development of imaging can result in the progress of many other branches of medicine."

"I treat ECR as a reference point for all European radiologists in acquiring new knowledge about new techniques, new protocols and therapeutic opportunities. ECR helps all of us to realise what a huge branch radiology is nowadays and how much time and effort each of us need to sacrifice to become good radiologists."

He is married to Hanna, a Medical Director of Regional Blood Centre, and has two daughters, Monika, a student in philosophy and Katarzyna, a pupil at secondary school. His hobbies include travelling and cooking, which he enjoys with his family and friends in his free time.

"Maria Skłodowska-Curie – Honorary Lecture
Sunday, March 7, 12:15–12:45, Room A
‘Female urinary incontinence: Is there still a place for radiology/radiologists?’
Andrzej Pawel Wieczorek, Lublin/PL
Andrzej Pawel Wieczorek from Lublin, PL, will hold today’s Honorary Lecture.

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EPOS™, ECR’s revitalised poster exhibition and a new area dedicated to electronic learning

By Stefanie Muzik

EPOS™ is a core part of every ECR – the all-electronic poster exhibition includes a huge number of educational and scientific posters, all presenting the most recent work and achievements. This year, EPOS™ has a number of new features, resulting from various improvements and changes that have been made to the platform in recent months.

A much larger collection of posters will include some extremely up-to-date achievements, submitted as recently as January, proving that ESR brings you the latest scientific results in the shortest possible time frame. In addition to improvements in content, the EPOS™ area has also been given a new look for ECR 2010. The ‘EPOS™ Lounge’ in foyer A, on the second level, is part of a new area dedicated to electronic learning, which also hosts ePACS, the poster exhibition ‘IT supports Radiology’, free internet terminals and access to ‘Free Publications’, a collection of print and online media, freely accessible especially for ECR 2010.

Premiered at ECR 2003, EPOS™, the Electronic Presentations Online System (EPOS™) and ESR has revolutionised medical congresses worldwide. The ECR was the first meeting to present its poster exhibition as an electronic database of digital posters accessible via various computer terminals, rather than printed papers or a wall. Many Congresses have borrowed or imitated this innovation, and the traditional poster exhibitions are now almost non-existent.

EPOS™ grew again last year, with almost 860 scientific contributions, presentations by invited lecturers and paper presentations from the annual congress’s poster exhibition. Accessible during ECR at over 100 computer terminals, all of the more than 11,700 EPOS™ presentations are also available to ESR members online free of charge throughout the whole year.

EPOS™ is a link to the scientific work distributed electronically during various meetings past and present, which guarantees ESR members a permanent connection to the congress, whether they have attended or not, and gives authors and readers the opportunity to present and access state-of-the-art educational material and the latest scientific achievements.

In the course of preparations for ECR 2010, the ESR saw that demand was high enough to warrant enlarging EPOS™ even further to give more authors the opportunity to participate as presenters at a scientific meeting, which ultimately led to over 5,200 electronic posters and presentations being added to the database. Furthermore, at the end of 2009, a software and graphic re-launch of EPOS™ was introduced to pave the way for a better, faster and larger educational tool in future years. The design has been harmonised with other ESR educational tools, such as EURORD, to represent the part of EPOS™ in a steadily growing and developing platform for online radiological education.

As well as an image change during off-congress season, the EPOS™ area at ECR 2010 has also undergone something of a facelift. The EPOS™ Lounge, as the name suggests, integrates the familiar computer stations with a comfortable lounge, enabling participants to sit down, relax, and browse through EPOS™, either on the terminals provided or even on their own laptops.

The whole EPOS™ area, consisting of the EPOS™ Lounge and a classroom-style area with workstations, can be found up on the second floor (level 8) of the building in foyer A. The idea behind it was to create an atmosphere for studying the posters in peace as well as providing a more open, library-like ambience, allowing enough space for discussions and exchange.

ePACS offers PACS-supported radiological training, giving attendees the opportunity to improve their reporting skills in different radiological subspecialties. It is a radiological e-learning project, developed at the Medical University of Vienna (MUV) with the support of the European Society of Radiology, and combines an electronic patient record with collaborative design (Unified Patient) and a Java*-based DICOM viewer (by Trans-spirit) for a browser-based learning environment.

The poster exhibition ‘IT supports radiology’ introduces digital imaging in all fields of radiology and digital workflow using HIS and PACS, which has led to immense changes in the daily work of many radiologists. Fundamental facts on the underlying IT concepts will be presented to strengthen knowledge in this field, which can help in decisions regarding the acquisition of new IT systems, in the evolution of workflows, in discussion with IT administrators, and in other situations. The exhibition should give an idea of the current concepts and IT tools, which could help radiologists to improve their work. There will also be a chance to meet outstanding scientists in this area. Interested attendees are very welcome to share their experiences and expertise with the ICT committee (ESR Sub-committee on Information & Communication Technology), headed by the ICT Committee Chairman Peter Mildenberger from Mann/DE.

There will be a special ICT Meeting on Image Compression in Radiology on Monday, March 8, 12:30–14:00 in Meeting Room 5 on the 3rd level – O3.

Visit the ‘EPOS™ Lounge on the 2nd Level.

Radiological issues in Croatia in 2010

By Boris Bilić-Džajić, Zagreb/IR, CSR President

The Croatian Society of Radiology (CSR) is the only professional association of Croatian radiologists, and is among the most active professional societies within the Croatian Medical Association. Croatia has 4.4 million inhabitants, and 380 radiologists. The CSR is concerned with all professional issues related to radiology in Croatia.

We are currently introducing a five-year radiology residency programme, as opposed to the current four-year programme. A written exam will also be introduced in addition to the current oral and practical board exams.

Regarding the amount and quality of radiological equipment, the situation in Croatia is not bad, although the country was affected by the recession quite severely. Regarding the number of CT and MRI units per number of inhabitants, Croatia has better indicators than most other transitional countries, and even compared to some old EU countries, and radiology is considered to be a very attractive residency among young doctors. The latter fact is that the number of residents has been increasing over the last five-to-ten years, because there is still a shortage of radiologists, especially in small hospitals and practices in the province. The number of radiologists per number of inhabitants is higher in comparison to some countries like Iceland, Slovenia, and the UK, but is lower compared to other neighbouring countries such as Hungary and Serbia.

Current radiological issues are numerous. In addition to the constant struggle for new equipment, radiologists are facing turf battles, especially in the area of interventional radiology, where cardiology and, to some extent, vascular surgeons tend to perform endovascular procedures. The whole CSR and interventional radiology sections are fighting this problem as much as they can, trying to provide good care for patients and to establish radiology as the leading specialty in this field. Also, some insurance companies have formed their own imaging centres, and even small private hospitals. They attract radiologists by offering them much higher salaries compared to academic institutions. But academic institutions are the major sites for educators of residents and places where the most complex clinical problems are dealt with. The loss of radiologists to small private places may, in the long run, jeopardise the education of residents and create severe problems in large hospitals. There is also a lack of organised, proper education for some important subspecialties, especially cardiac imaging, and molecular imaging is poorly represented in our country.

The CSR was very active in introducing a natural breast cancer mammographic screening programme, which commenced in October 2006, and has shown promising results.

The CSR is very active in the organisation of radiological and subspecialty meetings. In October 2010 we will hold a large national radiology congress in Opatija, by the Adriatic sea, close to Rijeka. In July, we will organise the U. – Croatian Breast Imaging State of the Art Seminar in Dubrovnik. In September, the CSR will be one of the organisers of the interdisciplinary Adriatic Vascular Summit in Split. In November, a CIRSE basic vascular course will be held in Zagreb. In 2011 we will host the joint meeting of the European Society of Urogential Radiology (ESUR) and U.S. Society of Radiology (SUR) in October, in Dubrovnik. Many other small meetings will also be held.

The CSR strongly encourages its members to be active in research. The Croatian Ministry of Science and Education currently supports four projects run by radiologists in Croatia. The principal investigators of these projects are Prof. Stanić-Poddar, Prof. Mlačič, Prof. Miletić and Prof. Bilić-Džajić. These are projects in the field of neuroradiology, abdominal, and vascular radiology, and they mostly focus on clinical research.

There is a problem with radiology research, once again because of the shortage of residents in Croatia, and many young radiologists do not find research particularly stimulating. Of course, research is mandatory for the academic promotion of radiologists, but it is mostly limited to larger academic institutions in Zagreb, Split and Rijeka, where some young people are motivated to be promoted and are motivated for research. Nevertheless, the publications of Croatian radiologists in scientific journals have been steadily increasing over recent years, although we are not completely satisfied with the current situation.

Further information on the society can be found at www.radiologija.hr

Last year at ESR the Croatian delegation proudly received the CSR meets diploma.
Radiology in Greece in 2010

By Kiriakos A. Stringaris, Athens/GR, President of the Hellenic Radiological Society

The Health System in Greece (25 years after the endorsement of the relative law) falls into the category of mixed models of care. Notably, the National Health System (NHS) is based both on social insurance and the private sector, providing health services, pharmaceutical medication and hospital healthcare. This coexistence concerns the funding, as well as the provision of technical infrastructure.

According to officially registered data, approximately half of health expenses are covered by the state (52.8% of the total) with the remainder covered by private insurance [data OECD 2008]. The expenses of social insurance constitute approximately 25–30% of the public health expenses, while the remainder comes from direct and indirect taxation. The NHS hospitals are provided by government/state funds with foreseeable and controlled expenses. The funding of hospital care is formally done through the contracting system, which means health insurance institutions cover hospital care expenses for those insured in the NHS [Services of Health, G. [Tourist] 2008]. Overall, state/public expenses for health represent about 9.6% of the GDP, a little higher than the average (9.9%) in other countries of the OECD [Data: OECD 2009].

With reference to the infrastructure, the NHS allocates the majority of hospital beds (69%), whereas the private sector accounts for 28% of beds. The NHS is composed in total of 319 state, university and military hospitals and 2,500 primary health medical centres with 24,728 doctors and approximately 41,760 nurses. [Data: Greek National Statistical Organisation 2006].

The total number of doctors in Greece is estimated at approximately 64,000. Of those, 11% are unemployed and 14% are part-timers. The total number of certified radiologists runs to 1,800, while the total number of radiologists in training reaches up to 500. In Greece, radiology, nuclear medicine and radiation specialties, separate from radiology.

Greece has seven medical schools with corresponding radiology faculties (two in Athens and one each in Thessaloniki, Patras, Ioannina, Iraklion, Larissa and Alexandroupoli, all of which are a part of the respective university hospitals.

Regarding installed imaging systems, the private sector owns the majority of them. For instance, 76% of CT units, 84% of the mammography units and 86% of MRI units are installed in private health service institutions [Data from Scanner magazine 29,2009]. According to the OECD a considerable increase in available imaging systems was noted during the last decade. Specifically for 2010, there is an official recording of 25,6 CT units per million inhabitants (compared to 20.2 in the other OECD countries) and respectively 152 MRI units per million inhabitants (compared to 11 in other OECD countries). It is a fact that this number today is considerably higher. In addition, it should be mentioned that relatively recently there has been a tendency among all radiological departments in the country toward progressive digitalisation.

The specialty of radiology in Greece is practiced by board-certified doctors. Radiologists are trained for a total period of five years, which covers all sectors of imaging and interventional techniques. Training is provided by certified state and university hospitals.

For the acquisition of the title of specialty, written and oral examinations are required, held by three-member state committees of evaluation after the completion of five years of training, during which a specific number of procedures and radiological examinations must be completed.

Recently, the Supreme Scientific Organization of Greece has recognised the subspecialty of interventional radiology and neuroradiology, which will be practiced in specialised centres. Pain radiology will be next. Around 70% of ultrasound is practiced by radiologists. The remainder is practiced by doctors of other specialties, relevant to the organ under examination. In every radiological department of the NHS there is a Director/Chairman, the consultants of subspecialties and modalities, as well as radiologists in training. The radiologists serving in the NHS hospitals are full time, with the right to have private patients in the hospital in afternoons. Academic, military, and radiologists appointed by insurance institutions have the right to practice private medicine.

Greek radiologists have representatives among the elected members of European scientific societies, including the ESR, ESUR, ECR, CIESE, MBIR, the ESSR and others.

With reference to the scientific work of the Greek radiological community, during 2006 there were 632 publications in PUB MED, and during 2007 there were 763. At the annual ECR, Greece is regularly found within the top ten countries with the most scientific abstracts and posters according to Apostolos Karantanas from Iraklion/GR, in his lecture on the structure of radiology in Greece at the MBIR Annual Scientific Meeting, held in 2008 in Athens. Further information on the society can be found at www.helrad.org.
ESOR and ASKLEPIOS – new opportunities for young radiologists

Although times have been challenging for establishing new educational programmes, given the economic environment, ESOR is fortunately in a position to further extend its activities for young radiologists. In 2010 ESOR will enhance its Asklepios project, established in 2009, which is tailored to address recognised needs and to serve professional development by continuing radiological education. The programmes include multidisciplinary, multi-therapeutic, organ-oriented and multi-modality-oriented advanced courses aimed at general radiologists and private practitioners. They offer the participants an opportunity to update and deepen their knowledge, technological improvements, new applications, optimised protocols and sequences, as well as the most recent achievements in diagnostic imaging, related to topics across the modalities.

The established multi-therapeutic courses for radiologists from Russia and CIS countries proved to be very successful last year and will once more be held in St. Petersburg, Russia. On top of this, Covidien, the industrial partner in this endeavour, has decided to expand its valuable partnership with ESOR and will support an organ-oriented course on advanced abdominal imaging in the Middle East.

Another course, already held last year, will be organised in Lisbon, Portugal, in partnership with Euroimaging, dedicated to topics across the modalities. It is aimed at general radiologists and private practitioners who want to update their knowledge on new applications, optimised protocols and the most recent achievements in diagnostic imaging.

A new topic, which has so far not been covered by ESOR, will be advanced ultrasound and contrast-enhanced ultrasound, a tailored course series, developed to give participants the opportunity to update their knowledge on technological improvements, the role of contrast enhancement and state-of-the-art applications of day-to-day practice in ultrasound. This year two courses will be held in partnership with Bracco, one in Europe and one in Seoul, Korea.

Creating educational ties and partnerships with national societies in the broader domain of imaging is a key feature of the ESOR philosophy. One such partnership has been successfully built up with the Chilean Society of Radiology, with a course held in Santiago on advanced abdominal imaging. The main focus is on the value of CT and MRI in assessing abdominal disorders, with comprehensive coverage of the most recent technological advances and state-of-the-art applications.

The ESR and ESOR are proud to be able to deliver high quality education outside Europe, in places such as Chile, the Republic of Korea and Lebanon. This confirms the need and importance of knowledge exchange worldwide.

Further information on the activities of ESOR is available at www.myESR.org/esor
What’s on today in Vienna?

Theatre

Please note that all performances are in German!

Akademietheater
1030 Vienna, Lustgartenstraße 1
phone: +43 1 51444-4145
www.burgtheater.at

19:00
Othello
by William Shakespeare

Burghof
1010 Vienna, Dr. Karl-Loepp-Ring 2
phone: +43 1 51444-4145
www.burgtheater.at

19:00
Warten auf Godot
by Samuel Beckett

Rabenhof
1030 Vienna, Rabengasse 3
phone: +43 1 712 82 82
www.rabenhof.at

20:00
Kottan ermittelt Rabengasse 3a
by Helmut Zenker, adapted by Jan and Thor Zenker

Schauspielhaus
1090 Vienna, Porzellangasse 19
phone: +43 1 317 01 01
www.schauspielhaus.at

20:00
faust hat hunger und verschluckt sich
an einer grete
by Ewald Palmetshofer

stadtTheater walschgasse
1010 Vienna, Walschgasse 4
phone: +43 1 512 42 00
www.stadttheater.org

20:00
Losert Meisterwerke

Theater in der Josefstadt
1080 Vienna, Josefstraße 26
phone: +43 1 42 70 00 01
www.theaterinderjosefstadt.org

15:00
Moser
by Franzobel

19:30
Moser
by Franzobel

Volksoper
1070 Vienna, Neustiftgasse 1
phone: +43 1 52111 400
www.volksoper.at

19:00
Kehraus um St. Stephan
Opera by Ernst Krenek

19:30
Simon Boccanegra
by Giuseppe Verdi, conducted by Paolo Carignani

Concerts & Sounds

Konzerthaus (Classical Music)
1030 Vienna, Lothringerstraße 20
www.konzerthaus.at

10:30
Wiener KammerOrchester, conductor Ludwig Müller
Un Ughi, violin
S. Barber, L. Spohr, W.A. Mozart

Musikverein (Classical Music)
1010 Vienna, Bösendorferstraße 12
www.musikverein.at

15:30
Wiener Philharmoniker, conductor Lorin Maazel
L. Mozart, C. Debussy, M. Ravel

19:30
Wiener Symphoniker, conductor Thomas Dausgaard;
Gauthier Capuçon, violoncello
C.A. Nielsen, R. Schumann, A. Dvořák

Porgy & Bess (Jazz)
1010 Vienna, Riegergasse 11
www.porgy.at

20:30
W. Mitterer / M. Philadelphia / J. Klammer ‘Badminton’

Opera & Musical Theatre

Volksoper
1090 Vienna, Währingerstraße 78
www.volksoper.at

19:00
Kehraus um St. Stephan
Opera by Ernst Krenek

Wiener Staatsoper – Vienna State Opera
1010 Vienna, Opernring 2
www.wiener-staatsoper.at

19:00
Simon Boccanegra
by Giuseppe Verdi, conducted by Paolo Carignani

myESR.org
Gustav Klimt
at the Leopold Museum
1070 Vienna, Museumsplatz 1
Opening hours:
Wednesday–Monday 10 am–6 pm
Thursday 10 am–9 pm
www.leopoldmuseum.org

Gustav Klimt, Studie zum Bild »Judith«, um 1908 © Leopold Museum, Wien
Uppling the value of scientific integrity: How to electronically detect misappropriated content

By Sarah Edwards

Authors are responsible for the accuracy and originality of the scientific content published in their papers; nevertheless editors also seek ways to protect fair-minded authors and honest science by detecting unfair players and dishonest material.

European Radiology’s Editor-in-Chief, Adrian K. Dixon, is pleased to rely on the guidance and support of peer reviewers with considerable knowledge of their respective areas of expertise. Dixon values the tremendous amount of work that peer reviewers put into their reports. “I am always impressed by how accurately the peer reviewers identify previous work by the authors, even when the blinding is perfect!” It is obvious that none of the reviewers have spent several hours on the report and the authors should be very grateful for their constructive comments, whether or not the article is eventually accepted by European Radiology,” he observed.

Astute reviewers, noting similarities, greatly facilitate the often time-consuming peer review process of a high-ranking academic journal. Although manual manuscript screening is increasingly seen as outdated, repeated publication of the same data, Dixon notes that there are increasingly sophisticated software packages that enable recognition of such duplication.

Following the rising prevalence of plagiarism among college students, plenty of electronic tools have been developed to counteract this alarming trend. Lately, the biomedical publishing industry has started to show an interest in web-based software solutions for electronic content verification. Plagiarism detection tools check papers for originality using web technologies similar to search engines. They are designed to seek out linguistic similarities between text documents.

The underlying technology of tools such as EBLAST, iThenticate and Turnitin is a content search system that compares new material to databases of previously published work in a given topical area. Links to bibliographic databases such as PubMed/MEDLINE, the National Institutes of Health’s CribD database, proprietary offline databases or the open web provide comparison material.

EBLAST is very useful for detecting duplicate publication as it enables users to find MEDLINE abstracts similar to the abstracts and paragraphs they feed into the tool. The industry leader in electronic plagiarism detection, iThenticate, was developed by iParadigms, LLC. While Turnitin is primarily used by high schools and colleges, professional book editors as well as scholarly journal publishers employ iThenticate as their document checking software of choice. iThenticate is becoming an increasingly attractive tool for the previously labor-intensive task of screening thousands of manuscripts that gush through the submissions pipeline each year.

Recently, CrossCheck teamed up with iParadigms and rebranded their service as CrossCheck powered by iThenticate. In its latest version CrossCheck combines the CrossCheck database with the iThenticate plagiarism screening tool. A similarity check is run during which CrossCheck compares an uploaded text file against the body of existing scholarly literature. The system returns the results in a report revealing the percentage of the document that matches previous work. It is now easy to spot substantial similarities in text between the compared works as suspicious parts are highlighted and organized in order of similarity to the source texts.

Comprehensiveness of the databases’ coverage of biomedical literature plays a key role in identifying plagiarized text and increases the accuracy of similarity reports. CrossCheck databases are stocked with proprietary content that scholarly publishers must first authorize for indexing and inclusion in the CrossCheck system. Springer journals are already using CrossCheck, a tool that has been developed by the non-profit association Crossref (a prerequisite to participating in the CrossCheck service is CrossRef membership).

To keep the CrossCheck databases growing continuously, publisher participation is greatly encouraged. Among those offering access to their full-text journal articles are the BMJ Publishing Group, Elsevier, Oxford University Press and Sage. CrossCheck has also been incorporated into ScholarOne’s electronic manuscript submission and peer review system, Manuscript Central, which is also used for European Radiology. A continuously growing database of current and archival scholarly literature offers publishers an automated way to verify the originality of submitted manuscripts.

iThenticate by iParadigms, LLC http://www.ithenticate.com/

Turnitin by iParadigms, LLC http://turnitin.com/static/company.html

eBLAST http://invention.swmed.edu/etblast3/

CrossCheck powered by iThenticate https://crosscheck.ithenticate.com/