MR-PET demonstrates ever greater potential for detecting multifocal cancers

By Becky McCall

MR-PET allows superior early detection and evolution of cancers as they disseminate around the body. That was the key message of Prof. Heinz-Peter Schlemmer in his talk at yesterday’s New Horizons Session. Taking the two sources of information together provides insight into both the biology and location of the tumour or metastases inside the body, according to Schlemmer, professor of oncologic radiology at the University of Heidelberg, Germany, and chair of radiology at the German Cancer Research Center. Combined MR-PET can help radiologists to detect cancer early and characterise its biological behaviour. Also, it’s important to consider the heterogeneity of tumours, which are an evolving structure that started on one side of the organ and disseminated.

“Different tumours in different parts of the body vary in their behaviour and we need to assess these differences and adapt the therapy to the patient accordingly,” he noted. “We also need to monitor therapy to evaluate the intervention across the body. MR-PET will help us to individualise and stratify therapies to the patient!”

Commenting on this point, Prof. Herbert Kressel, from Harvard Medical School in Boston, U.S., who attended the presentation, said he believed that heterogeneity was the sweet-spot for this technology.

“MR-PET is the only thing that can approach imaging the dimensions of tumour heterogeneity at this time,” he told ECR Today. “I think this is an enormously promising area and this evolving concept of cancer cells having their own ecology that adapts to the surroundings can only be displayed by a multidimensional approach.”

The same tumour in different places at different points in time behaves differently and needs to be treated differently. I think this new technology is the only way I can imagine to get a handle on the many dimensions,” he added.

Schlemmer pointed out that if tumour cells have their metabolism blocked in one place, then they move elsewhere. “Also, there are indications that when you irradiate a tumour, it starts to metastasise and the reason is that initially the blood flow decreases and then the cell realises it would be better off if it moved.”

He acknowledged that he had seen this in prostate cancer commonly and that it was visible with MR-PET. However, he tempered his enthusiasm by stressing that MR-PET is only as good as the radiotracer available.

“Without the right radiotracer it is only an MRI,” he said, adding that the radiotracer makes the molecules and pathways visible. “This allows the radiologist to see metabolism and molecules distributed on the cell surface with sensitivity in the picomolar range, the most sensitive level available.”

By way of example, he said there were some new developments in prostate cancer, such as the novel 68Ga-[Ga] Gallium-labelled PSMA tracer. This is a prostate specific membrane antigen tracer that targets the tumour and provides a precise location of the tumour, thereby improving diagnostic accuracy. “It should also help with prognostic stratification and biopsy planning and needle guidance.”

The radiotracer used also helps determine whether to image simultaneously or sequentially, according to Schlemmer. If the radiotracer is slowly taken up, then it’s feasible to inject the tracer and image with PET followed by MRI, and later fuse the images. However, he noted that if the tracer is rapidly taken up or if, for example, there are moving organs (such as lung or liver) then there were often difficulties.

“When you conduct a PET and then transfer the patient to the MR scanner there is often a misrepresentation due to blurring without precise overlaps,” he said, noting that this had implications for tumour biopsy or tailoring radiotherapy to a precise location. “For these types of tumour, the combined MR-PET is more suitable.”

Schlemmer highlighted that MR-PET also had implications in the treatment of oncologic patients who usually require many repeat studies throughout the course of their disease, especially with cancer becoming a chronic disease. He cited the example of a patient with prostate cancer needing repeated imaging to monitor progression or treatment evaluation.

“In this situation you want to minimise use of ionising radiation to reduce harm and further cancer. We anticipate that MR-PET use in these cases would reduce radiation exposure in these patients,” he said. However, it is still early days, and Schlemmer remarked that to date, the clinical benefit has not been fully established. “We can only guess at this stage. There are no large multicentre trials providing evidence. However our experience as oncologic radiologists is that we see the scope and applications. He stressed that people need to remember how to assess costs associated with using MR-PET. “Imaging is expensive, but therapy is also expensive. If you give the wrong therapy then it is also very expensive for the patient too,” he said. “We need to weigh up everything relating to clinical benefit and then conclude whether it is cost effective or not. This can only be answered when it is integrated into the whole diagnostic and therapeutic process in oncologic imaging. We need to move beyond...”
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Gastrointestinal radiologists prepare to enter new era of personalised medicine

By Philip Ward

Gastrointestinal (GI) imaging looks poised to make another quantum leap forward in the years ahead, as fluoroscopic techniques are left behind and the field develops beyond simply anatomical imaging, embracing increasingly functional and quantitative techniques, according to speakers at yesterday’s Special Focus Session on GI imaging.

Over the past decade or so, there have been major advances in abdominal imaging in CT, MRI and PET-CT. Given the emphasis on dose reduction, radiation-free modalities are now taking centre stage as radiology goes increasingly mobile.

As well as the functional techniques, we’re moving into quantitative techniques with which we can look at cellularity, perfusion and inflammation, “ said session moderator Dr. Simon Jackson, a consultant GI radiologist at the Plymouth University Hospitals NHS Trust, U.K., and past chairman of the British Society of Gastrointestinal and Abdominal Radiology. “We’re moving into the next era, that is the era of personalised medicine.

This all translates into patient-tailored therapies, and GI imaging has a fundamental role to play here in driving and defining the primary treatment decision and monitoring therapeutic response. His advice to ECR delegates was to embrace the new responsibilities in the era of personalised medicine.

“Technological advances have led to a revolution in GI imaging, but very importantly, all these techniques are complimentary,” he said. “Clinical applications are changing, and as radiologists, we’ve got to understand the strengths and limitations of each diagnostic technique and where they sit within the clinical management of patients.”

MRI fluoroscopy can replace conventional techniques in swallowing and gastric emptying, and also it can replace conventional methods and increase understanding of a patient’s condition in the case of both gastric emptying and the small bowel, said Dr. Stuart Taylor, who headed the development of functional MRI in oncology and GI diseases at University College London Hospitals (UCLH) NHS Foundation Trust in London.

Protocols require a technique with high temporal resolution and reasonable spatial resolution, and he explained that the two main approaches are: T1-weighted gradient-echo-based imaging (usually with gad spiking of oral contrast) such as FLASH; and T2-weighted dierent echo-based imaging (usually non-spiking of oral contrast) such as TrueFISP or Fiesta.

The main benefits of MRI fluoroscopy are its multiplanar imaging capability, the full view of soft tissue structures (not just the lumen), and the lack of ionising radiation, which is of particular value for repeat studies. The drawbacks are that its temporal resolution is up to 10 times less than standard fluoroscopy, the requirement for the patient to be in a supine position, lack of fine intraluminal detail, and the fact that it takes 20–30 minutes, according to Taylor.

Gastric motility can be broadly divided into changes in gastric volume, for which the gold standard is the barostat device, and measurement of peristaltic activity/emptying rate, for which the gold standard is scintigraphy, he stated.

Assessment of small bowel motility using MRI can be of particular value, he continued. Usually it is vital to distend the bowel, as is done for MR enterography, e.g., with one litre of 2–3% mannitol. If a detailed physiological study is being conducted, it is necessary to control the time of day, smoking, caffeine intake, medication, etc. Basic anatomical data are required to plan motility, and the aim is to cover most of the small bowel volume, using a typical slice thickness of 1 cm, breath-hold acquisition at each slice position, and 10–25 slice positions to cover the whole small bowel.

Motility information can shed light on conditions such as diabetic neuropathy, pseudo-obstruction, Parkinson’s disease, postsurgical autonomic failure, bacterial overgrowth, and Crohn’s disease. However, among the remaining technical challenges are the need for more rapid whole volume small bowel data acquisition, errors due to through-plane motion of loops, automated ROI placement, free breathing, tagging, and the requirement for improved registration techniques.

MRI fluoroscopy is possible and may have uses in long-term follow-up of patients,” he said. “MRI assessment of gastric emptying is now established as a clinical and research tool.”

MRI assessment of small bowel motility is possible with increasingly sophisticated software tools to quantity segmental and global motility, and there are multiple potential clinical applications, noted Taylor, who is co-author of a relatively recent article on this topic, entitled ‘The future developments in gastrointestinal radiology’ (Whelan et al. Frontline Gastroenterol 2012.3 [Suppl_1], p. i36).

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**Seminar**
A new tool for detecting and diagnosing breast cancer: Ultrasound ElastoScan™

**Location**
Room G/H lower level.

**Time**
Sunday, March 10, 12:30-13:30

**Program**
- Introduction to ElastoScan™ by Wim van de Vooren, Clinical Marketing Manager of Samsung Electronics, European Headquarters.
- The positive influence of ElastoScan™ on early breast cancer detection by Dr. Volker Duda, sonologist of Marburg University, Germany.
- Has ElastoScan™ positively influenced the way of breast cancer surgery? by Dr. Christine Kohler, breast surgeon of Marburg University, Germany.

**Bringing the technology of tomorrow, today.**
Cruyff, Bergkamp, van Persie, et al. take second place behind interventional oncology

By Philip Ward

Besides medicine, Prof. José François Geschwind, great passion in his hometown in the Netherlands, “I would love to be asked to give a lecture about Dutch soccer, but unfortunately this has never happened, so I’m stuck giving lectures on interventional oncology and liver cancer therapy. Forgive me, but that’s what I’ll talk about today!” he disclosed at the start of yesterday’s Wilhelm Conrad Roentgen Honor-ary Lecture.

Interventional oncology is now considered to be the fourth pillar of oncology, and has taken root in many hospitals as a valid treat-ment option for cancer patients, said Geschwind, who is director of the division of vascular and interven-tional radiology at the Johns Hop-kins University School of Medicine in Baltimore, U.S., but originally comes from Paris.

“There has been a key paradigm shift towards molecular-based treat-ments,” he said. “To be successful in this field, the true pioneers in interventional oncology will need to understand the basic principles of cancer biology and specifically the hallmarks of the key signatures of cancer.”

Identifying so-called drug-able targets is a key notion here, Geschwind explained. Drugabili-ty, which involves the likelihood of being able to modulate a target with a small-molecule drug, is essential to determine whether a drug discov-ery project progresses in the devel-opment cycle. Predicting how drug-gable a novel target lies at the crux of early drug discovery. Because many of these drugs are found serendip-i-tously, it’s necessary to characterise the drug effects and understand the mechanism of action.

The beauty of targeted therapy is that it becomes realistic to develop a biomarker, and he thinks radiolo-gists are particularly well placed to develop imaging biomarkers. FDG-PET can be used as a biomarker of tumour metabolism, and many oth-ers are now being developed, such as those for hyperpolarised MR spectroscopy.

“How can we integrate image guidance, interventional techniques that are well known to all of us, and targeted molecular therapy?” he asked. “If we can combine all that, we can make it a very happy mar-riage. For that again you have to go back to the principles of cancer biology.”

It’s important to build up an understanding of how healthy cells at some stage undergo genetic muta-tions that will lead to an un-con-trolled growth of a tumour, accord-ing to Geschwind. This in turn will lead to great disruptions of homeo-stasis, and homeostatic imbalance may then lead to a state of disease.

South African radiology demonstrates its dynamism and vibrancy on the big stage

By Becky McColl

It’s dynamic, exciting, and evolving. That’s how an engaging presenter opened her talk about the state of academic radiology training in South Africa. The reality, as dis-played in the following lectures at Saturday’s ESR Meets session, cer-tainly lived up to the promise.

Prof. Zarina Lockhat, professor of radiology at the University of Preto-ria, spoke about radiology training in her country, and recognised that there are a lot of great and furi-ous and that technological advance-ment was driving the agenda.

“Academic radiology has to be balanced against a background of scientific and technological advance-ment,” she said. “In 2002, Tom Cruise fascinated us in the film, Minority Report, by using gesture recognition technology and scanning of images, but now surgeons manipulate images in a sterile environment by just mov-ing their hands.”

Furthermore, so-called reason-ing engines for radiologists are not so far off, she added. “Patient observations, signs and symptoms are punched in and deep reasoning software systems give feedback on recommendations for further inves-tigations and diagnoses.”

Addressing a hot and recurring issue of the day, discussed in depth during other sessions at this year’s ECR, Lockhat suggested that radiologists were emerging from the dark to interact with patients and clinicians. Referring to a recent European survey, clinicians said they wanted old fashioned access to radiologists, and straight for-ward accurate radiology reports, although she reported that in her opinion, reports are a work of art.

Returning to the driving force of technology, she highlighted the current trend for computers to get smaller. “First they were in rooms, then desktops, then in our laps, now in our palms and soon they’ll be on our faces and possibly one day in our brains.”

With a poignant nod to the value of traditional academic radiology, and despite all the technological advances, she read out an apt quote for the radiologist in training: “You only seek what you look for and rec-o gnise only what you know. No mat-ter what you have – smart phones, tablets, e-learning, e-resource – if you can’t see the abnormality you cannot make the call.”

Lockhat acknowledged the con-tributions of the College of Medi-cine in South Africa, the Radio-logical Society of South Africa, and academic institutions in providing academic and clinical training. The RSSA provides an academic plat-form with webinars, conferences, workshops and the publication of the South African Journal of Radi-o-logy. Also, amongst today’s radi-ology training tools are a mixture of didactic lectures, case-based learning, e-learning, and Medical Imaging Resource Center (MIRC) teaching files, she said.

Another South African radiolo-gist recently performed exception-ally well in the UK. Royal College of Radiologists’ examinations, illustrating how South African radiologists are carving a niche for themselves on the international radiology scene. This was confirmed by other lectures during Saturday’s session. Dr. Janse van Rensburg, from the University of Stellenbosch, explained a new concept about the pathogenesis of tuberculosis that he had arrived at with his colleague, Dr. Richard Hewlett, from the same institution.

“The concept we propose is that basal cisternal meningitis in chil-dren due to tuberculosis is not a conse-quence of the well-known Rich focus, but rather the result of direct infection of the choroidal plexus, which leads to infection in the cerebrospi-nal fluid (CSF) and exposure of the antigen to the basal cisterns. This invokes an inflammatory response leading to CSF obstruction, which in turn leads to the characteristic and predictable imaging findings in children,” he said, summarising the new theory.

“The Rich theory has always been controversial over many years. Van Rensburg said South African researchers had always been scepti-cal because of the discrepancy between the MR images and the gross pathology and what the origi-nal work from the 1930s showed.

“This showed a cortical lesion meningitis that was not basal cista-nal meningitis, but nobody could explain how something high in the brain caused meningitis at the base,” he explained. “People suggested the patient was lying down, but they are usually walking around when diag-nosed, or due to differences in blood vessels in the brain.”

Van Rensburg credits Hewlett for the new explanation. “His explana-tion is just the logical theory after doing this for 20 years. He’s the only person I know with the pathology and neurology knowledge to bring it all together.”
Record participation for diploma examination at ECR

By Mélisande Rouger

The increasingly popular European Diploma in Radiology (EDR) attracted a record number of candidates from all over the world to the ECR. As many as 62 residents and radiologists travelled to Vienna to sit the examination, a 50% increase in participation from last year.

This rise reflects the growing quality and recognition of the diploma, according to Dr. Esmann Bretnach from Dublin, scientific director of the European Board of Radiology (EBR), which organises the examination. “People start to see that the diploma is a qualification agreed to by both the ESR and the European Society of Radiology (ESR). There is more recognition of the value of the diploma, which people see as useful for their individual career paths. Holding the diploma shows your employer that you are enthusiastic and have a good knowledge base, and it can allow you to apply for employment elsewhere,” he said.

The diploma is officially recognised by the European Union of Medical Specialists (UEMS), and its reputation extends well beyond Europe. Candidates from the Gulf countries have come in large numbers since the introduction of the diploma two years ago, and Americans are beginning to show an interest as well. Furthermore, the Argentine Society of Radiology paid for two young radiologists to take the diploma exam, and covered their travel and accommodation costs. Dr. Mariana Jakubowicz and Dr. Santiago Andrés, residents at the Deutsches Hospital in Buenos Aires, found it to be a great experience and acknowledged the quality of the examination.

“The exam really covered every aspect of general radiology. The written part was tough. There were lots of questions and little time to answer them. Cases were not the simplest. The examination was challenging because of the language, but I know the examiners take that into account. I felt more comfortable during the oral exam though and could comment on the images. Besides the examiners were very friendly and helpful,” Andrés said. "One difficulty is that we do things differently back home. For instance I would never do an MR imaging, rather an ultrasound or abdominal examination for appendicitis but instance I would never do an MR.

This time, diploma organis- ers invited a panel of observers to attend the oral exams, in order to train them to become examiners next year. Organisers also announced that they would include a list of recommended literature for the next examination, after candidates requested this option. “We would like to encourage people to be familiar with the ESR publications, which include the publication on the revised training charter and curriculum, the journals European Radiology and Insight Into Imaging, and the case material available on EuroRad. But this list is not exclusive and we are aware that there are very good books in languages other than English, so I want to stress that point, and also insist on the European nature of this examination, which is not a language test,” Bretnach said.

In the future, organisations would like to see the diploma become equivalent as accepted to similar national qualifications, and negoti- ations are currently underway.

The examination will also be held during the annual meeting of the Turkish Society of Radiology in November. Candidates will have the option of taking the oral test either in English or in the local language. Success in the examination will certify a standard of radiological knowledge deemed appropriate by the ESR for independent practice in general radiology. The examination is open to radiologists and radiology residents in their fifth year of training. Examination costs are €500 for ESR full members and members in training, and €1,100 for ESR cor- responding members.

Eurasian collaborative project gets started at ECR

By Mélisande Rouger

The EPOS™ (Electronic Presentation Online System) Area in Foyer A is an essential destination at the ECR and was high on the agenda between Thursday and Saturday. Delegates took part in live discussions on hot topics in radiology, which this time focused on paediatric neuroimaging, MRI of the scrotum, plaque imaging and myocardial perfusion imaging, MRI of the scrotum, plaque imaging and myocardial perfusion imaging.

During these live discussions, poster authors can personally introduce and comment on their work with the public. The chair- woman of the scientific exhibition, Professor Katrine Ahlström-Riklund, is particularly fond of these debates. “I think these presentations are a good opportunity to start pre- senting, it’s a very friendly format. Previously there were just the posters on the wall and people went by, now these discussions invite them to share their views. There were lots of good questions today, lots of exchanges going on,” she said.

Furthermore, five posters, the best ones from a scientific, educational and compositional point of view, received the Cum Laude Awards on Friday to five best poster authors.

Now in its eleventh year, EPOS™ is one of the most popular features of the ECR. It provides radiologists who cannot attend the congress the opportunity to present their work, and many say it has changed the way they interact with new information in radiology.

More than 16,000 poster presen- tations are currently available online and authors can submit their work throughout the year. For ECR 2013 alone, 2,785 posters were submitted.

“The posters cover everything. You can read about things you deal with every day but also about things you will never be confronted with except in the EPOS Area. There is a huge amount of knowledge there. This year is no exception, and you can be sitting here in front of the computer during the whole ECR reading through all the posters,” said Ahlström-Riklund, obviously pleased to be back in Vienna.

A consultant doctor specialising in movement disorders, dementia and PET-CT in oncologic applications, Ahlström-Riklund works at the University of Umeå, a small town in the North of Sweden. “There are no old cities like Vienna in northern Sweden. Our University is very young for instance, it was founded in 1999 with 38,000 stu- dents, a pretty high population for a town of 160,000 inhabitants,” she said.

Umeå will be the European Cap- ital of Culture in 2014 and many activities, concerts and perform- ances will be offered throughout the year. Ahlström-Riklund is very much looking forward to next year, as Umeå University will offer events based on seasonal themes.

ECR delegates are welcome to join, listen, and discuss with the experts again on Sunday.

Live discussions heat up EPOS Area

By Mélisande Rouger

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Gold Medal Ceremony at ECR 2013
from left: Gabriel P. Krestin, Maximilian F. Reiser, José Cáceres, Johannes Lammer, José I. Bilbao
ESIR 2013 Courses

Stroke Intervention
Klagenfurt (AT), April 12-13, 2013
(recommended for level 4/Advanced)

Embolisation
Odense (DK), April 19-20, 2013
(recommended for level 2-3/Intermediate)

Peripheral Arteries & Lower Extremities
Amsterdam (NL), April 26-27, 2013
(recommended for level 1/Basic)

Biopsies & Drainage Procedures
Ankara (TR), May 24-25, 2013
(recommended for level 1/Basic)

Musculoskeletal Interventions
Athens (GR), June 7-8, 2013
(recommended for level 1/Basic)

Lung Interventions: Embolisation & Ablation
Frankfurt (DE), July 5-6, 2013
(recommended for level 4/Advanced)

Renal Denervation
Rome (IT), October 18-19, 2013
(recommended for level 4/Advanced)

Tumour Ablation
Lausanne (CH), November 8-9, 2013
(recommended for level 1/Basic)

GEST 2013

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The rapid technical evolution of CT scanners has made it possible to acquire cardiac images with fewer motion artefacts, and studying the heart should be mandatory for radiologists who are performing a routine chest CT examination to avoid overlooking important findings, advocates a leading chest imaging specialist.

“It is essential for radiologists to consider cardiac and thoracic assessment as a single imaging context,” said Prof. Lorenzo Bonomo, chairman of the department of radiological sciences and biotaging at Agostino Gemelli Hospital, Catholic University of Rome, who will moderate this afternoon’s special focus session on comprehensive CT cardiothoracic imaging.

CT is ever lower radiation dose, faster acquisition speed, higher temporal resolution and larger scan volume per single rotation of the tube-detector system allows good image quality, even in patients with high heart rates. These advantages also help to reduce the incidence of non-assessable coronary segments due to motion artefacts and increase the modality’s capacity to assess the proximal extension of acute aortic dissection in surgical planning.

“In the future, a tube with CT imaging will be a common procedure in the pre-operative assessment of patients, at least for non-cardiac surgery, but this requires a cultural change for radiologists, therapists and physicians,” he said. “In addition, hybrid imaging could offer the advantages of different modalities in a single diagnostic tool.”

CT is currently the gold standard for imaging the lungs and great thoracic vessels, both in routine and emergency. Its role in coronary imaging, on the other hand, is established in carefully selected patients with proven high diagnostic accuracy and negative predictive value.

In the emergency setting, CT angiography triple rule-out protocol can help establish the cause of atypical acute chest pain related either to the lungs (e.g., pneumothorax, pneumomediastinum) or cardiovascular structures (e.g., acute aortic syndrome, pulmonary embolism, coronary disease). Additionally, different imaging findings in non-contrast CT scans may reveal specific cardiothoracic problems, and a hyperdense aspect in a pre-contrast CT scan of the thoracic aorta wall in a patient with acute chest pain is a hallmark of an acute intramural haematoma, according to Bonomo.

Expanding on the optimisation of CT techniques for diagnosis and assessment, his colleague Dr. Riccardo Marano, from the same hospital, will be covering coronary artery imaging, while Prof. Edwin van Beek, SINAPSE chair of clinical radiology at the Queen’s Medical Research Institute, University of Edinburgh, U.K., will discuss the feasibility of cardio pulmonary functional imaging.

Prof. Uwe Joseph Schoepf, director of cardiovascular imaging at the University Hospital of South Carolina, Charleston, USA, points out that a comprehensive examination requires knowledge of a patient’s medical background and a tailored approach.

“For investigating the complex pathologies of the heart-lung axis, patients need more pre-scan involvement of the radiologist,” he said. “In many hospitals, there is still a citadel of the thoracic aorta wall for heart-lung imaging because it is mainly the technologist performing the scan.

Interaction in CT on a routine basis between the radiologist and the technologist in European hospitals may be better than in the USA, but a greater exchange is always desirable, he elaborated. Furthermore, intense institutional dialogue with referring clinicians, such as cardiology and pulmonologists, is crucial to truly understand their clinical questions.

In his talk today, Schoepf plans to outline powerful new CT tools that compensate for cardiac motion, while discussing best methods of radiation dose reduction and the new heart-lung dedicated software available for evaluating cardiac function, defining obstructive coro-nary stenosis and characterising and quantifying disease processes in the lung parenchyma.

“The session should appeal to all radiologists, as such diagnostic imaging will be increasingly asked of them in the general radiology setting, he said, pointing to the impossibility for subspecialists alone to manage this expanding patient population.

For dealing with cardiac motion, ECG synchronisation for imaging structures such as the heart, lungs and lung parenchyma has an ambivalent track record, and the radiation dose involved fluctuates with the type of technology available over time, according to Schoepf.

Four-slice CT scans with retrospective ECG gating meant higher radiation exposure. Latest generation scanners using refined means of ECG synchronisation deliver 1mSv or less in cardiothoracic CT scans, between one third and one quarter of normal yearly background radiation dose, the latter being around 3.5mSv. However, 64-slice CT scanners are still the most widely used platform and they typically deliver higher radiation doses, so radiologists must adapt protocols to the clinical question to deliver the lowest possible dose.

“If we are only interested in the anatomy of the chest, then we should use a clear-cut strategy of minimising radiation dose and sacrificing functional information through use of prospective ECG triggering which will allow clear evaluation of the lung parenchyma, thoracic vessels and heart,” he pointed out.

Using dual-source CT scanners is another way to scan the entire chest with less in less than 600 milliseconds, he added. For other patients, functional information may be needed (e.g., cardiac chamber function and pumping ability of the heart). Retrospectively ECG gated data acquisition gives anatomical and functional information for assessing pump function, for example, but patients will typically receive between 12 and 25 mSv of radiation exposure on a 64-slice scanner.

“This is something we want to apply only if we have to. There are alternative techniques to obtain functional information at low radiation dose. ECG synchronised tube current modulation, patient-specific KX selection, as well as hybrid strategies based on a mix of retrospective ECG gating and prospective ECG triggering help to minimise radiation exposure while providing functional data,” Schoepf said. ECR delegates will hear how CT perfusion can assess pathologies like lung cancer or perfusion defects in the heart muscle. It represents an exciting advance in terms of diagnostic yield, but also requires more radiation.

“There is no such thing as a ‘free lunch’ in terms of diagnosis and radiation dose, with CT,” said Schoepf, adding that although careful patient selection is still paramount when using latest generation equipment, ECG synchronised acquisition no longer involves an extra penalty in radiation exposure, while maximising the diagnostic information obtained from patients.

As for the future outlook, continuous development of different technologies to synchronise CT acquisitions with the patient’s heartbeat and the evolution of ever refined reconstruction techniques means that the journey is far from over.

“We are now in an arena where CT radiation exposure can compete with conventional x-ray,” he remarked. “In a few years, all CT image reconstruction will be performed using iterative reconstruction techniques. We will also see an expansion of indications for disease diagnosis, wider use of CT perfusion for monitoring and more quantification due to the increasing availability of software solutions for determining disease extent and activity.”
Imaging provides important information about traumatic brain injury

By Mélisande Rouger

Traumatic brain injury (TBI) is a major cause of death and disability worldwide, causing about 1.5 million deaths and leading to millions of patients requiring emergency treatment every year. In severe cases, TBI is commonly classified according to morphological criteria based on CT and MRI studies. Experts will show how to image TBI patients appropriately in a dedicated Special Focus Session today at the ECR.

Although MRI may be better for detecting traumatic lesions in later phases following TBI, CT remains the examination technique of choice in the acute phase, according to Dr. Alex Rovira-Cañellas, director of neuroradiology at Vall d’Hebron Hospital in Barcelona. “CT is the modality of choice for the emergency setting. It is good at detecting focal lesions that need to be operated upon right away. We always do CT first,” he said.

Although there is no question regarding the use of brain CT in severe and moderate head trauma, there is still considerable uncertainty about the indications for brain CT in patients with minor TBI. Recent data indicates that the liberal use of CT scanning in mild TBI is cost-effective and appears justified.

Now it is more appropriate for identifying diffuse lesions, which better relate to the patient prognosis, and radiologists do T1, T2 and diffusion-weighted sequences on a routine basis to detect these in some patients.

However, both CT and conventional MRI fall short in accurate prediction of outcome, because of their inability to depict the full extent of brain injury, and because they offer qualitative rather than quantitative information. Outcome prediction is crucial because it has an impact on the choice of specific treatment methods, the decision of whether or not to alter treatment, and on advice given to patients and relatives.

Advanced MR techniques may help determine outcome. Diffusion tensor imaging (DTI) and proton MR spectroscopy (MRS) provide quantitative assessment of the extent of brain damage and have been proposed as markers of axonal injury and as indicators of long-term outcome,” said Rovira-Cañellas, who will chair the session. With DTI or MRS, radiologists can better classify patients and see what kind of injuries they have, but most importantly, radiologists can use them to categorise the degree or extent of tissue injury. “From a clinical point of view, it is very difficult to explore a patient with severe traumatic brain injury who is sedated in the intensive unit, so the best way to assess the extent of the injury is to use one of these MR techniques. They are also successfully applied in Alzheimer’s, stroke and multiple sclerosis management,” he said.

DTI and MRS are also increasingly used in research to monitor treatment. New drugs are currently being tested and they must first be assessed in order to improve their efficiency in selected patients, depending on the type of injury they have.

Radiologists must also remember to image cerebrovascular injuries, which are very common after trauma. Quite frequently these injuries are not identified from the initial CT scan, and mortality among these patients (60 percent) is much higher than the rest of trauma patients. “You need to apply a series of protocols to look specifically for head and neck injuries. It is very important to do CT or x-ray angiography to look for these injuries, as many patients may require endovascular treatment to stop or prevent bleeding from vascular lesions,” Rovira-Cañellas said.

“These patients should be diagnosed as soon as possible. Because they often have injuries in other parts of their body, it is easy to overlook cerebrovascular trauma, especially in the emergency setting where staff resources are strained. Polytrauma patients usually undergo whole-body CT from brain to pelvis, but we don’t pay enough attention to these lesions. We have to look at hundreds of images in a patient in an acute setting, so it is not easy for one person to read all of it in detail. In certain European countries, this situation is becoming even more unsustainable with the economic crisis, and the number of people on call in hospitals has been reduced. There are many experts in the same hospital, but very rarely at the same time,” he said.

Experts will provide some helpful advice on how to face these restrictions.

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Intervention gives hope to patients with pleural effusion and lytic bone metastases

By Becky McCall

Prof. Afshin Gangi is passionate about cementoplasty, and believes it must be considered in the context of the whole patient. “Patients need to be treated before and after the procedures and interventional radiologists need to be responsible for the patient from A to Z,” he emphasised.

“The patient is not just a metastasis.”

Gangi, an interventional radiologist from Strasbourg, France, explained that with cementoplasty, interventional radiologists can only control pain and consolidate bone, and not treat the tumour. The procedure involves injecting acrylic cement into lytic bone metastasis. It is usually indicated for painful, lytic bone metastasis especially when there is a risk of compression fracture in the spine, condyles and acetabulum. Large bones for example, the femoral shaft, are not a good indication for cementoplasty.

Also, non-lytic, hard metastases are unsuitable for cementoplasty because there is no space within the tumour.

Cementoplasty must always be considered alongside other anti-cancer therapies and techniques when planning a patient’s disease management, and an ablation may need to be performed initially, followed by cementoplasty.

At this afternoon’s special focus session addressing the need for pal-livative interventional techniques in cancer, Gangi will advise on how and when to use cementoplasty and on the broader aspects of a disease management. He stressed that the core message of his talk would be on the need for interventional radiologists to be more than a technician. “They need to be a complete clinician, and this is currently a weakness of interventional radiology, he believes.

Patients referred for cemento-plasty are often under the care of a chain of clinicians and sometimes certain treatment options can be overlooked due to a lack of communication between the links in the chain. “Everyone needs to work together, there is one conductor, and we are the musicians who need to work at the right time and with the right note otherwise it will be a catastrophe,” stated Gangi.

Patients with renal cell carcinoma and bone metastases exemplify this scenario. The pain and fragility of these metastases can be treated with cement but they continue to grow very quickly inside the spinal canal causing paraplegia. “Here you need to consolidate the vertebral body to treat pain and then use therapy to control the tumour too.”

At today’s session, Prof. Fergus Gleeson, from the department of radiology at Churchill Hospital, Headington, Oxford, U.K., will discuss issues around the management of pleural effusions, highlighting ways of managing pleural effusion in patients as palliation in cancer patients. He explained that a cancer, whether inside or outside the chest, can be associated with pleural fluid either by direct invasion or by seeding along the surface that creates fluid.

“Palliative care aims to treat symptoms, most notably breathlessness. Patients can also present with pleural effusion when a cancer has not been diagnosed in the patient,” he remarked. “Often the first symptom of cancer in these patients is breathlessness caused by pleural effusion. Symptoms are the same whether the patient presents de novo or has a known cancer.”

Diagnosis of pleural effusions can be conducted by sampling pleural fluid. According to Gleeson, this method usually provides a diagnosis of malignancy in 60% of patients. In the other 40%, and also in patients with mesotheloma, the fluid is less forthcoming and diagnosis of the cause of the pleural effusion may be as low as 30%.

Gleeson advocates a simple chest x-ray to diagnose pleural effusion, and then an ultrasound scan to locate the fluid and remove it, followed by a CT scan to determine if the effusion is due to cancer including its extent and primary source.

“In our work, we have shown that ultrasound can be used for more than just taking the fluid off, but it can be used for diagnosis of malignancy by looking at the pleural surface,” reported Gleeson. “Also we have shown that it is possible to teach phy-sicians and others who use ultrasound to do this procedure in outpatients and the emergency department.”

Addressing an ongoing debate, Gleeson will discuss the number of fluid removals required for a reli-able diagnosis, and whether medi-cal thoracoscopy should be used to determine malignancy in addition to tissue biopsy.

“You can do tests related to the pleura using PET scanning to pro-vide a prognosis on how aggressive the tumour is and the locations it might have spread to. In the case of mesotheloma, it is possible to measure the total glycolytic volume which provides a measure of how well a patient will respond to chemotherapy,” he said.

In addition to his clinical work, Gleeson will present his research that highlights a common misun-derstanding of lung anatomy. He has found that the intercostal artery is not necessarily where people think it is located. “Most people are taught that the intercostal artery lies in the flange of the rib on the under surface where it is protected from trauma, but actually it does not lie in the flange of the rib in the posterior region, and is not protected from interventional procedures performed medial to the angle of the rib. With age, vessels become kinked and the flange may not protect the intercostal artery as well at all,” he explained.

He will also use the session to present insights from his experience of conducting pleurodesis as a pal-liative measure. “We will discuss how to train, who to drain and whether a pleurodesis or chest drain is neces-sary, as well as the risks associated with these procedures.

Pleural effusions in patients with malignancy are common and not well managed, according to Gleeson. He pointed out that it would be help-ful if all hospital healthcare provid-ers and GP’s understood a common care pathway so patients do not get missed under GP or emergency care.

The vast majority (around 75%) of large pleural effusions are due to malignancies. In the U.K., with a population of 60 million, there would be about 100,000 malignant pleural effusions. It is common, and the difficulty is that imaging is so good that tiny amounts of pleural fluid can be detected in patients with heart failure, he added.

Understanding the cause of pleural effusions is a huge issue worldwide, which Gleeson fears is managed very badly. He stressed that there was a need for greater understanding of different ways of managing the patient. For exam-ple, after diagnosis of malignancy is confirmed, a physician needs to decide if the patient is suitable for chemotherapy and to provide the most minimally invasive procedure possible so the patient can leave hos-pital promptly.

“The vast majority of radiolo-gists and physicians don’t know about how best to manage pleural effusions. Advice should be sought from experienced radiologists and respiratory physicians on the man-age ment of symptomatic relief of pleural effusions,” he concluded.

Special Focus Session
Sunday, March 10, 14:00–15:30, Room F1
SF 14a: Palliative interventionalt techniques in cancer
▶ Chairman’s introduction
K.A. Hausegger, Klagenfurt/AT
▶ Cementoplasty of lytic bone metastasis
A. Gangi, Strasbourg/FR
▶ Pleural drainage, pleurodesis
F. Gleeson, Oxford/UK
▶ Percutaneous nephrostomy (PCN) and ureteral stenting
O. Oz, Milan/IT
▶ Biliary procedures
M. Pankow, Cambridge/UK
▶ Panel discussion: How invasive can palliation be? When to say no to palliative treatment?
**Advances in forensic imaging bring new opportunities for radiology**

By Simon Lee

The ability to spot pathological imaging findings among normal post-mortem signs of degeneration may not be a universal skill among radiologists, but it could prove to be a useful, if not essential one. As the reliability of modern forensic imaging rapidly improves, forensic pathologists are increasingly seeking the help of radiologists to examine bodies non-invasively, so they should be prepared to answer that call, according to experts who will speak in a Special Focus Session on 'Advances in forensic imaging' today. The development of techniques such as spiral volumetric CT and, more recently, MRI, have dramatically improved the ability of radiologists to determine causes of death and detect other crucial post-mortem signs, providing an invaluable service that can supplement, and in some cases replace, traditional autopsies.

However, training and regulation have not kept up with the pace of technological progress, meaning there is still plenty of room for improvement in this growing branch of radiology. This afternoon's session will see established forensic radiologists review the current state of the field and discuss the most useful imaging techniques available.

Due to its strengths in the visualisation of bone structure and the detection of embolisms and gross abnormalities in soft tissue, CT has been widely used in forensic pathology for some time. Its advantages over MR in terms of the availability of equipment, relative simplicity, and the time constraints inherent in examining corpses, have made it the dominant modality in forensic imaging. The recent development of volumetric measurement has given CT the ability to obtain images in different ways and focus more specifically on areas of interest. "Spiral volumetric computed tomography is largely responsible for the incredible recent development of the role of diagnostic imaging in forensic medicine. If you are looking for specific details in the skin you can make a reconstruction of the skin, if your investigation concerns the skeleton, you can reconstruct bones, and if you are looking at organs, you can reconstruct the soft tissue. You can manipulate the images to find the exact answer you are looking for," said session chairman Prof. Giuseppe Guglielmi, from the University of Foggia, Italy.

"This doesn't always remove the necessity of conducting a regular autopsy, but it helps a great deal with the diagnosis and sometimes proves to be enough to exclude the need for further analysis. There are many exciting developments in this field that can provide information about causes of death, including those originating from the vascular system, time of death, identity, anthropological information like the age, sex and stature of unidentified human remains, and, just as importantly, details of an attack on, or abuse of, a living person," said Guglielmi.

Thanks to the development of specially created contrast techniques, CT can also be used to investigate the post-mortem vascular system. "Multiphase post-mortem CT-angiography (MPMCTA), which involves the performance of one native CT scan and three angiographic phases (arterial, venous, and dynamic), allows the vascular system to be imaged in a similar way to standard clinical CT angiography. A mixture of paraaffin oil and a specially created-oil contrast agent is injected via a device which reproduces the conditions of perfusion in a living body, enabling the radiologist to capture highly accurate images of any abnormalities in the vascular bed of the viscera, or lesions of the vascular system. Based on post-mortem MDCT studies, a new approach called virtual anthropology has been developed. In cases of unidentified remains, positive identification of the deceased can be made by using comparative or reconstructive techniques to determine important anthropological information such as racial phenotype, age at death, sex and stature. More recently, MRI has been used to augment forensic investigations, particularly in musculoskeletal, cardiovascular and angiographic fields and in forensic imaging of the living, such as cases of child abuse, survived strangulation and age estimation, according to Guglielmi. "At the moment, MRI is used for very few cases because it is more difficult to use on corpses than CT, but I am sure that forensic imaging will increasingly turn to MRI to answer certain questions. It is vital that we share more knowledge about forensic imaging in general, because there is a serious lack of awareness about it,” said Guglielmi.

"Very few radiologists are well informed about this subject and it is vital that the national and European societies bring more attention to the topic, because it represents a very real opportunity to extend our discipline. If we are not training in this area, providing personnel and taking charge of forensic imaging, then we run the risk that pathologists will move into this area and make reports by themselves without asking radiologists. With the excellent technological resources available and such an obvious opportunity for the growth of radiology, we have to make sure we don't miss the chance, because this belongs to our field,” he added.
Will digital breast tomosynthesis (DBT) replace mammography for breast cancer screening? The answer is maybe, and it depends on how well the modality performs in some forthcoming clinical trials, say two experts who will share their views with ECR attendees at this afternoon’s special focus session.

The sensitivity of mammography for the detection of breast cancer is less than optimal, primarily because the breast is a 3D structure that is projected on to a 2D radiographic image. This means normal breast tissue can conceal a tumour. DBT is a 3D radiographic technique that reduces the effect of overlapping tissues in breast cancer detection.

DBT appears to be gaining in popularity. The technique improves the accuracy of finding cancers, as well as reducing the recall rate of women with suspicious findings, especially in younger women and those with dense breasts, according to Dr. Martin Yaffe, a senior scientist of imaging research at Sunnybrook Research Institute and a professor in the departments of medical biophysics and medical imaging at the University of Toronto, Canada.

“What’s the excitement is all about,” he said in an interview with ECR Today.

DBT is exciting because it’s the newest and most realistic competitor to digital mammography that has come up in years, according to fellow speaker Dr. Sophia Zackrisson, an associate professor of diagnostic radiology at Lund University, Skåne University Hospital in Malmö.

“It is a similar technique to digital mammography, with images that are like digital mammography, so the radiologists can easily adapt their reading of this new technique,” she said. “It is also easily integrated in the clinical setting. This is in contrast to MRI, for instance, which is more expensive, time-consuming, and more challenging in interpretation.”

In tomosynthesis, the x-ray tube moves over a range of angles about a pivot point located above the digital detector to obtain a series of low-dose digital projection radiographs, Yaffe explained. The detector may be stationary or also rotate about the pivot point. The x-ray tube may temporarily halt as each projection is acquired or may move continuously during acquisition. A computer algorithm reconstructs a 3D image. The images are usually viewed as a ‘movie-loop’ where adjacent x-y planes are displayed sequentially. Imagers are able to see structures within the breast without overlap. The tumour is clearer, easier to see, and separate from structures in the breast.

“Tomosynthesis from what we’ve seen is promising in the North American context, where a high percentage of women get called back,” he said. “We can reduce that rate by 50% or more as well as find some cancers that have not been detected.”

Tomosynthesis’ most likely application is in breast cancer screening, but its precise role will only be determined after a study that is comparing full-field digital mammography with DBT, the T-MIST trial, a multisite trial. The trial is only for sites in North America, but will have implications for countries on other continents as well.

“Personally, I do not think it (DBT) should be used in screening before we have evidence from trials showing that we gain in detection and not lose too much on the false-positive side,” Zackrisson said.

During his presentation, Yaffe will explain how tomosynthesis works, point to preliminary results of the T-MIST trial, show images, and explain why tomosynthesis is better than conventional projection. In Zackrisson’s lecture, ERC delegates will get a good overview of DBT and hear results from recent studies with updates on the accuracy of the technique.

“Aspects of reading time and image presentation will be discussed, which is important since this is one of the major obstacles at least in screening,” she said. “What views should be used? How should the image stacks in digital breast tomosynthesis be presented? Can we find a presentation mode which is acceptable in the screening workflow?”

DBT is a promising tool in breast imaging, she concluded. However, further evidence from the ongoing trials is needed to establish its place in breast cancer diagnosis and screening.

Excitement builds over digital breast tomosynthesis, but debate surrounds its screening role
Keep aware of looming difficulties in assessment of MR-compatible devices

By Edna Astbury-Ward

Most radiologists have a basic understanding of which implanted devices are contraindicated for an MRI scan, but due to the rapid development in MR-compatible devices, it is very difficult to stay completely up-to-date with the wide array of new devices and implants.

Help is now on hand at this morning’s risk assessment and risk communication refresher course, at which ECR attendees will learn about the importance of being aware of the latest trends and developments in MR-compatible devices and where to go for the best advice on this important topic. They will also learn about the best ways to explain to patients about any doubt, radiologists should contact experts such as specialist radiologists or MR physicists to check for compatibility.

Many patients do not understand the difference between CT, PET and MRI, and few patients understand the risk associated with these procedures and implantable devices, according to Peeters. Therefore, it is always very important that referring clinicians check for any possible implanted devices in their patients prior to MRI procedures. Radiologists require further compatibility details, most of the latest information is available on the internet and in online product manuals, he noted. Manufacturers also provide an ID card that the patient carries with them, stating the devices type/number and possible compatibility issues and conditions of use.

Many compatible devices are actually conditionally compatible, like maximum main field strength allowed, maximum gradient strength allowed, maximum specific absorption rate allowed, which scanning protocols are allowed, etc., and therefore the correct literature and correct type of device must be known before proceeding to MR scan.

“Before a patient enters the radiology department, the importance of procedural advice cannot be underestimated, and when a clinician requests an MR examination, a checklist must be completed. If patients answer ‘yes’ to certain questions, they must contact the radiology department immediately to allow the MR personnel (or specialist staff) time to check for contraindications or compatibility issues of the device,” said Peeters.

Responsibility can differ, depending on what is filled in on the checklist and if the checklist is correctly completed and the presence of an MR compatible device has been stated, but if the patient still enters the MRI system, the healthcare professional who carries out the procedure is responsible. If the problematic device was not mentioned on the checklist, then the responsibility may lie with the clinician who ordered the scan, or the patient who may not have properly filled in the questionnaire, he explained.

On the other hand, if the manufacturer states wrongly that the device is compatible and an adverse incident occurs and the manufacturer’s conditions for scanning have been followed, the manufacturer is responsible.

The task of communicating risk varies from case to case, as individuals’ levels of knowledge and expertise about specific subjects vary, said Dr. Gaya Gamhewage, from the department of communications in the Office of the Director-General at the World Health Organization, Geneva, Switzerland.

“As experts, our perception of risk from a radiological procedure is vastly different to patients’ understanding of the concept of risk from undertaking such a procedure. Communicating risk to patients is complex and requires time,” she said. “Voluntary risk-taking by patients is compatible and an adverse incident occurs and the manufacturer’s conditions for scanning have been followed, the manufacturer is responsible. If the problematic device was not mentioned on the checklist, then the responsibility may lie with the clinician who ordered the scan, or the patient who may not have properly filled in the questionnaire, she explained.

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Imaging proves value in impingement syndromes, but turf battles loom over musculoskeletal ultrasound

By Frances Rylands-Monk

When it comes to cases of shoulder subacromial impingement, imaging has a crucial role to play in diagnosis and decision-making. Ultrasound not only aids diagnosis but also helps to broaden the treatment options. X-ray still forms the mainstay of impingement imaging in Europe owing to speed and cost, delegates will learn at this afternoon’s state of the art symposium, which will also cover the ankle and hip.

Shoulder impingement patients are a significant referral group in daily clinical practice. Awareness of the usefulness of ultrasound continues to increase, and many general radiologists now attend dedicated courses, according to Dr. Philip Robinson, musculoskeletal (MSK) consultant radiologist and clinical director of radiology at Leeds Teaching Hospitals, U.K.

“The four to three patients can be examined by ultrasound for tears or inflammation during the same time it takes for one patient to be scanned with MRI, with results explained to the patient at the time of examination. If a tear is excluded but symptoms are severe, treatment such as an ultrasound-guided injection of corticosteroid and anesthetic only adds minutes to a normal examination,” he said.

Patients with tears should usually be referred for surgical opinion on possible repair, and the success of a repair is highly dependent on various imaging factors, including how large the tear is and the presence of joint degeneration or muscle atrophy. In some centres, pre-treatment assessment of impingement might involve the use of MRI, which can assess muscle atrophy and provide a more global assessment of the shoulder joint. In other centres, ultrasound and x-ray alone or combined can point to joint degeneration, muscle atrophy or bony abnormalities on the acromion ahead of surgery.

Ultrasound findings of subacromial impingement are clear, usually showing a thickened subacromial bursa with fluid in it. Dynamic assessment with ultrasound and shoulder movement can allow radiologists to see if the bursa is catching on the ligament or on the acromion, requiring surgical treatment.

As image quality increases in ultrasound and the modality becomes more cost-effective, it will gain further ground, according to Robinson, who thinks general MSK ultrasound may eventually become an extension of the clinical examination conducted by MSK doctors or shoulder surgeons, rather than being separately referred to radiology.

“There will be increasing turf battles as GPs and surgeons do more ultrasound. In Germany, for instance, MSK ultrasound is nearly exclusively performed by non-radiologists,” he said.

While the imaging regime is relatively simple in shoulder impingement, the causes of common impingement syndrome are still open to debate. Cases of posterosuperior impingement, on the other hand, are rare and more difficult to diagnose in patients who are often young and athletic. Its causes and treatment tend to be hotly disputed, and even MSK radiologists may be less familiar with it, he noted.

This more complex syndrome involves rotator cuff tears with shoulder microinstability, and therefore needs MRI assessment, usually via an MR arthrogram to increase the contrast between tissues to define joint margins, ligaments and cartilage. Because contrast enters areas of defect, MR arthrograms can assess cartilage or ligament injury, as well as more subtle partial tears in the rotator cuff that can’t be picked up easily by ultrasound or standard MRI.

Differences in MRI accessibility across Europe pose a challenge to shoulder impingement imaging. In countries where there is a lower proportion of MRI systems and fewer MRI-related training opportunities, ultrasound is more commonly used among shoulder specialists, including surgeons and soft-tissue doctors.

At today’s symposium, the advantages and limitations of each imaging modality for diagnosis and pre-treatment assessment will also be covered by Prof. Mario Maas, professor of radiology with a special focus on MSK imaging based at the Academic Medical Center, University of Amsterdam. In particular, he plans to highlight the additional value of multidetector CT in posterosuperior and anterior ankle imaging.

In the hip, meanwhile, diagnosis of femoro-acetabular impingement (FAI), a pain syndrome caused by impingement of the soft tissue structures between the acetabulum and the proximal femur, cannot be established solely on the basis of imaging findings. In such cases, a clinical diagnosis is essential, according to Dr. Klaus Wörler, associate professor of radiology at the department of diagnostic and interventional radiology, Technische Universität Munich, Munich.

The primary role of imaging is to reveal abnormalities that develop from the process. Imaging findings can support the diagnosis of FAI through their capacity to depict predisposing osseous deformities, assess the presence and extent of joint damage, and rule out other causes of hip pain. The basic imaging technique is plain x-ray of the pelvis, but MRI is the next step if advanced degenerative changes can be excluded. To increase the sensitivity of this method for the detection of labral and cartilaginous pathology, MR arthrography is recommended for suspected cases of FAI, but the depiction or exclusion of articular cartilage lesions of the hip is still a significant limitation, even in MR arthrography, according to Wörler.

In a patient with cam-type FAI, a typical pattern of findings would be an anterosuperior labral tear with an adjacent articular cartilage lesion in combination with deformity of the femoral head-neck junction. In a patient with pincer-type FAI, the combination of an anterosuperior labral tear, posterosuperior labral damage, and acetabular over-coverage or retroversion would be typical. However, many orthopaedic surgeons believe that FAI can only be evaluated intraproactively. For clinical practice this means, that many patients will undergo surgery regardless of the imaging findings, believes Wörler.

“These imaging patterns are not necessarily seen in every patient with FAI. The joint lesions only represent the chronic sequela of the dynamic process of impingement, but the process itself cannot be visualised on imaging,” he said.

High-resolution MR: systems have to a certain degree improved radiologists’ ability to evaluate the labrum and articular cartilage, but there remain diverging opinions about the clinical relevance of several imaging findings and also about treatment strategy for FAI patients, explained Wörler. Nevertheless, patients with FAI should be treated as early as possible in order to prevent premature osteoarthritis, in light of a recent study showing that advanced degenerative changes can already be seen in two thirds of patients who undergo arthroscopy with the clinical diagnosis of FAI.

“If the spatial and contrast resolution limitations in assessment of articular cartilage of the hip can be overcome, MR imaging will be the most important imaging modality in the future. Such improvement may allow for better visualisation of cartilage deterioration, which represents a typical finding in FAI,” he continued.

For now, radiologists should become familiar with the imaging findings of FAI, and the specific weaknesses of different imaging techniques. In addition, confirmation of FAI or any other hip, shoulder or ankle impingement can only be established in conjunction with a thorough clinical examination.
Overuse injuries in gymnasts and professional golfers

By David Zitka

Overuse injuries due to excessive exercise are normally seen in professional athletes, but they are also becoming more frequent in amateur athletes. The Refresher Course on overuse injuries in sports will present three examples of how these injuries, caused by different sports, can be diagnosed and treated.

Gymnastic exercises, for example, are not just performed on the axis but also the peripheral skeleton, and they involve strong forces due to hyperextension and hyperflexion exercises. A certain degree of hypermobility and increased flexibility is necessary to perform some gymnastic exercises, and so training is required to improve this flexibility. Unnatural movements are sometimes necessary in order to increase this hypermobility and flexibility.

Although the human spine can endure these movements, it is mainly suited to withstanding axial loads. Prolonged exposure to hyperflexion and hyperextension forces will ultimately lead to injuries, as the level of force exceeds the regenerative capacity of the bones and ligaments.

Children are able to perform these exercises more easily than adults due to the relative laxity of their ligaments, which allows them to move beyond the normal range of motion. However, this also puts the spinal column at increased risk. The increased peak axial load for gymnasts is also much higher than for non-gymnasts due to repeated jumps and landings.

A comparison between the injuries seen in children and adults is hard to do as there are hardly any adult gymnasts; so it’s difficult to determine what long-term overuse injuries adults will develop. Overall, it can be said that stress and apophyseal joint injuries are the most common findings in children and adolescents, whilst degeneration, predominantly of joints, is frequently seen in adults.

It is difficult to establish an estimate of how big the risk of back injury is in gymnastics, as there are hardly any adult gymnasts; so it’s difficult to determine what long-term overuse injuries adults will develop. Overall, it can be said that stress and apophyseal joint injuries are the most common findings in children and adolescents, whilst degeneration, predominantly of joints, is frequently seen in adults.

When asked why gym attendees choose to attend his talk, Dr. De Jonge gave a clear answer: “There are lots of things that radiologists have to be aware of if they deal with athletes in general and gymnasts in particular. They need knowledge of the sports-specific injuries, so awareness is very important and they must have good contact with sports physicians and other professionals who are dealing with the athlete to obtain the best possible information about the patient. The sensitivity and specificity of the different imaging modalities used is important. For instance the diagnosis of a stress injury of the lumbar spine can be missed if no fat-saturated images are used in the MRI exam. I am going to address all these issues during my talk.”

The Refresher Course will also feature a talk by Dr. Philip O’Connor, consultant musculoskeletal radiologist at Leeds Teaching Hospitals NHS Trust, who led the imaging team at the 2012 Olympic Games in London. His talk at ECR 2013 will focus on more conventional injuries, like upper limb overuse injuries in golfers.

The most common injuries we see in professional golfers are overuse injuries to the tendons and bones. These are a result of a higher frequency of play and practice, together with the fact that they have more repetitive swing motions, channeling the forces repeatedly through the same areas of the kinetic chain and skeleton. The lead wrist, spine, lead hip and lead shoulder are the most common areas of injury in professional golfers. Amateurs on the other hand, tend to have less repetitive swing motions, and are also generally older so are prone to exacerbations of pre-existing conditions.

“Magnetic resonance imaging is the modality of choice for imaging the musculoskeletal system, although ultrasound can be of great value in terms of the dynamic assessment of structures and in guiding injection therapies,” explained Dr. O’Connor.

The wrist is the most common site of overuse injury in the upper limb, accounting for 50 percent of golf injuries, but there are some simple methods for preventing these specific injuries. The first step is to modify equipment and training regimens in terms of the type of play and frequency of play. Golfers should hit off soft grass rather than mats, hard ground or heavy wet grass, as this can take some pressure off the wrist.

General conditioning is also important, as in any sport golfers tend to be more prone to injury when fatigued or recovering from injury. When asked about any recent or future developments in upper limb imaging, Dr. O’Connor said that there is a large study coming up in 2013: “The development of a structured medical service including musculoskeletal imaging has been the most important recent development in golf imaging for me. A multidisciplinary approach with a structured research programme has helped us learn a great deal about all aspects of golf injury. To date our focus has been on the wrist and shoulder. In 2013, we are going to launch a grant-funded three-year study assessing hip disease in golfers.”

The session will begin with a talk from Professor Stephen Eustace, radiologist from the Mater Misericordiae Hospital in Dublin, on overuse injuries in the footballer’s ankle.
PACS developers put renewed emphasis on patient empowerment and safety

By John Burner

PACS is now a mature technology in Europe, but who has benefitted from its introduction? Certainly, radiologists and radiographers have gained because they now have a reliable tool for storing and accessing vital diagnostic data. Also, hospital administrators tend to feel reassured that medical staff in all departments can work more efficiently and provide a higher quality of service.

Yet what about the patients themselves? In truth, it is unlikely that many of them will have even heard about the huge changes in working practices that have occurred over the past two decades as a result of the digital revolution, but that situation is changing rapidly, as visitors to the commercial exhibition at ECR 2013 can see.

Companies in the healthcare IT sector are developing PACS applications that don’t just passively support the diagnostic process by providing key information. Instead, there is increasing evidence that these technologies can actively direct the decisions made by medical staff and also help patients to have a say in treatments they are given.

Sectra, for instance, has developed its DoseTrack software to automatically monitor the radiation dose received by patients in the course of their treatment and to help physicians to keep the dose as low as possible. The product has been in use since 2008 in a network of 10 hospitals in the Skåne region of southern Sweden, where it has analysed data from more than 2 million examinations in a range of different radiology modalities. The original project was set up by Mats Nilsson, a professor in the department of medical radiation physics at Skåne University Hospital, Malmö, and developed as a collaborative project between the academic and industry partners.

DoseTrack can access and store information from any imaging modality that can transfer dose information from any imaging technology, so this helps staff to steer their investigations towards the modality which will provide the optimal results in terms of radiation exposure and the clinical information obtained.”

She noted that the system can also be used to set thresholds for dose alerts, and it creates a way of integrating reports with national registries. But at the local level, it will also put the radiology department back where it belongs at the centre of all activity within the hospital and empower individual patients, she claims.

“IT is important in cases such as those individuals who may have to be given chest examinations as neonates. Later in life, they will know to avoid unnecessary examinations, which is something that is happening all over the world,” Ekström said.

Carestream Healthcare is aware of this trend, and is making its contribution through the MyVue patient portal that it is showing for the first time at ECR 2013. This application allows patients to securely access, manage and share their medical images and radiology reports with their own physician and other healthcare providers. The hospital creates a unique and secure log-in that is emailed to the patient after an examination. Through this, the patient can download information.

Continued on page 18
The healthcare industry is moving to embrace new technologies that allow patients to play a greater role in their medical care," said Saskia Groenewold, European regional marketing manager for the company's healthcare information solutions business. "With MyVue, healthcare providers can also benefit because they can use the patient portal to boost referral volumes while simultaneously reducing the time and cost of outputting medical exams on to DVD/CDs or radiographic film.

MyVue is currently available as an option for the True PACS and Vue Archiving which uses third-party PACS users and is now available as part of the True Cloud Service. Launched in February 2013, the service reportedly offers the flexibility of a monthly fee and can accommodate growth without the need for healthcare facilities to fund and manage PACS expansion in terms of additional patient users.

Meanwhile, Siemens Healthcare is striving to improve diagnostic decision-making and speed workflow throughout the hospital and beyond with new applications for its 3D routine and advanced read- ing via its Syngo via, as well as an update for its syngo plasma system.

"The latest version of syngo via doesn’t just give our customers the opportunity to view images, it gives them the full picture, allowing them to dig deeper into that image and extract more clinical information,” said Dr. Marc Lauterbach, director of global marketing with Siemens’ syngo business unit. "A good example of this is our new bone application for CT images. When looking for fractures or metastases in a rib, radiologists would normally have to scroll through the image and examine multiple planes. This application automatically ‘unfolds the ribs’ and presents the different bones in an unobstructed view. It also labels each bone so that the site of the lesion can be rapidly identified in the report.”

Syngo via is still a relatively new product, and researchers from Siemens are busy developing software to incorporate new imaging modalities and work flows. The current version allows staff in client hospitals to access and display material from CT, MRI, nuclear medicine and angiography, and the new version launched at ECR 2013 also includes a magnification function.

For users of mobile devices, Si- mens will also show how products like the iPad can be used for diagnostic reading when the physician is on the move. The latest version of the syngo Web Viewer provides access to images from CT, MRI, computed and digital radiography, PET and PET-CT devices. It features new layouts that allow the display of multiplanar reconstructions on one screen. At the Philips booth, the com- pany is demonstrating the fruits of its new bone applications of telediagnosis users to influence clinical decisions by including new modalities. It has broadened the visualisation capabilities available on its web portal, Intellispace, with the introduction of advanced MR car- diac and neuro processing features. First launched in 2010, Intellispace is a thin-client applications server and ‘virtually access-anywhere solution’ for multimodality clini- cal review, analysis and diagnosis, with key applications for CT, nuclear medicine, and MRI. The latest version of this technology is similar to the advanced capabilities available today on the dedicated MR workstation in Philips’ portfolio. However, optimised workflow and task guidance have been introduced to create a new easy to use and more effective system, according to the vendor. It will enhance the ability of customers to perform their work without the need to move between locations or systems. Furthermore, by allowing physicians to review data without the need to install dedicated workstations, it will enhance the ability of different hospitals to collaborate more easily in making the final diagnosis, the company explained.

GE Healthcare is heading in a similar direction with the launch of its Universal Viewer, which brings together advanced visualisation, intelligent productivity tools, and multimodality workflow for oncology and breast imaging, all within one intuitive workspace that can be accessed anywhere, anytime. The system is compatible with Centric- ity PACS, Centricity PACS-IV, and the Centricity Clinical Archive.

Based on independent research, GE said Universal Viewer has the potential to provide a 5% produc- tivity improvement in departments using the system. It has a unified user interface with a look and feel that is easy to learn and able to adapt to radiologists’ preferences, automat- ing examination setup. Referring physicians can access the viewer from anywhere, and patients can get from the examination to their results in less time, GE explained.

Fujifilm is promoting ‘clinical value’ products at ECR 2013. Synapse 3D aids clinical decision support by providing a comprehen- sive suite of advanced visualisation applications aimed at improving diagnosis and surgical outcomes. It supports fast and easy communications while also providing images and related clinical data on mobile devices, enabling special- ists outside of a hospital to support emergency diagnosis and treatment.

Finally, Agfa HealthCare is dem- onstrating its IMPAX Radiation Exposure Monitoring (REM) solution, which provides an automated way to collect, organise and ana- lyse a patient's radiation exposure data. It tracks radiation exposure information across multiple modalities, departments and institutions, according to Agfa.
At present, lung cancer is the most common and most deadly cancer in men and women worldwide. The five-year survival rate for all stages combined is only 16 percent. If the disease is still localised when detected, the five-year survival rate is substantially increased (52 percent). Therefore, screening has been proposed as a means to detect lung cancer at an early stage. The recent positive results from the National Lung Screening Trial (NLST) in the United States have provided scientific evidence that screening with low-dose CT reduces lung cancer mortality. The National Comprehensive Cancer Network has revised its recommendations for screening and now strongly recommends the use of low-dose CT screening for individuals at high risk of lung cancer.

In its current form, however, the large scale introduction of CT lung screening systems faces an enormous burden on radiologists. Therefore, it is crucial to develop dedicated chest reading workstations with a number of innovations that allow for an optimised throughput workflow for reporting on low-dose chest CT scans. Building upon our clinical and technical experience in reading, image analysis and data processing for large screening trials in Europe (over 30,000 CT scans from 10,000 participants) and a careful review of the existing commercially available lung workstations, we have developed a prototype for a dedicated chest reading workstation.

An important component of the workstation is computer-aided detection (CAD) of pulmonary nodules. We have developed two CAD systems for detecting solid nodules and subsolid nodules, both of which have been extensively evaluated using data from the Dutch-Belgian lung cancer screening trial (NELSON). Both CAD systems have been integrated in the workstation and the user can adjust the number of marks that are displayed by the CAD systems. Presented marks can be quickly accepted or rejected. High throughput reading with CAD, as a first reader operating at high sensitivity, is supported. In this reading mode, the user can reject incorrect CAD marks, but does not have to inspect the entire section by section.

Furthermore, a completely automatic elastic registration between the current and prior scans is performed using linked scrolling. Prior scans of the same patient are presented on a second screen and the radiologist can easily switch between various prior scans to compare lesions over time. Importantly, the elastic registration is also used to add annotated lesions from prior scans to the current scans, which have to be accepted or rejected by the radiologist.

Advanced segmentation algorithms have been included, which have been designed to handle complex vascular and pleural attachments, and subsolid nodules can be delineated automatically in 3D. Volumetric segmentations of the same lesion in prior scans are played to allow the user to check for consistency of the segmentations over time. Important characteristics of the lesion are calculated automatically, such as volume, mass, average density, equivalent diameter, volume doubling time (VDT), and mass doubling time (MDT). Mass has been shown to be a more important predictor of growth for subsolid nodules. Lesions with suspicious values for VDT or MDT are automatically flagged.

Finally, findings have been summarised in a structured report in HTML and PDF format in a database, and can be sent to physicians and PACS upon request. Follow-up recommendations according to various screening algorithms and guidelines from leading societies, including the updated revised Fleischner Society guidelines for the management of pulmonary nodules, can be included in the reports.

The application is currently available as a research prototype and is in use at five sites. The current prototype will be presented at the IMAGINE Workshop presented by the European Institute for Biomedical Imaging Research (EIBIR). More information about the project can be found at: www.drgastmeesen.de
www.mevis.fraunhofer.de

**Dedicated workstations crucial for success of low-dose CT lung cancer screening**

By Colin Jacobs, Eva M. van Riksoort, Jan-Martin Kubinyi, Torsten Twellmann, Pim A. de Jong, Ernst T. Scholten, Cornelia M.M. Schaefer-Prokop, Mathias Prokop, Bram van Ginneken

At present, lung cancer is the most common and most deadly cancer in men and women worldwide. The five-year survival rate for all stages combined is only 16 percent. If the disease is still localised when detected, the five-year survival rate is substantially increased (52 percent). Therefore, screening has been proposed as a means to detect lung cancer at an early stage. The recent positive results from the National Lung Screening Trial (NLST) in the United States have provided scientific evidence that screening with low-dose CT reduces lung cancer mortality. The National Comprehensive Cancer Network has revised its recommendations for screening and now strongly recommends the use of low-dose CT screening for individuals at high risk of lung cancer.

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Towards instant computational support for interactive diagnosis

By Katja Bühler, David Major, JI Hladíková and Rainer Wegenkittl

Fully automated computer-aided detection (CAD) systems are used, even today, in only a few special cases. Imaging methods and diagnostic questions are constantly evolving and demand a paradigm shift from previously envisioned static CAD systems towards more flexible interactive support systems integrating, rather than replacing, the diagnostic abilities of the radiologist. The majority of readings in daily clinical routine are still done in an interactive manner and often with just basic computational support. Although sophisticated image analysis, quantification and annotation methods have been proposed by the research community, many of them have not been integrated into common radiological workflows yet. Their hardware and time requirements are often incompatible with real world settings in a clinical environment, where results have to be delivered within seconds on standard hardware.

Our research aims at bridging the gap between academic research in medical image analysis and real world applications. We investigate methods amalgamating sophisticated, fully automated server-side image processing with the cognitive skills of the radiologist by enabling them to enhance the automatic results through online interaction within seconds, allowing them to reach a final diagnostic decision. The goal of our research is to minimise the user interaction and time required for expensive server-side image processing tasks by exploiting the time from scanner to workstations. The major challenge we face in this context is splitting the processing pipeline into parts, which can be robustly implemented in a fully automated manner and react interactively and semi-automatically, almost in real time; even under real world conditions.

During the IMAGINE session we will showcase two solutions following this paradigm: The spine provides an internal frame of reference to describe positions in the superior part of the human body. Its usage requires the semantic annotation of vertebrae and disks, which is, especially in 3D data sets, an inconvenient task. We present a method that automatically labels the spine on CT scans based on a combination of a machine learning-based classification approach and iterative matching of local models, capturing the appearance and morphometry around two subsequent vertebrae. The algorithm showed robust handling of full and partial scans of the spine. Our tests report high recall (95.5 percent) and precision (99 percent) rates. Nevertheless, the method might deliver shifted results, or even fail completely, in certain cases like the presence of extreme morphological variability of vessel branches. For these cases we have included the ability to interactively manipulate the result delivered as an offline pre-processing step on the server. For cases of complete failure it is possible to initialise a new labelling sequence by placing a single label that delivers almost instantaneous results.

Computer-aided tracking of blood vessels in CTA images is the basis for many higher level diagnostic tasks in the context of vascular diseases. The high morphological variability of vessel systems and high variations in contrast agent saturation hamper the development of completely automatic methods. We present a hybrid solution that performs the time consuming model-based tracking of possible vessel segments as a preprocessing step on the server. Vessel tree growing, i.e. the selection and connection of relevant vessels, can be performed semi-automatically on the client within seconds. The integration of anatomical region dependent rules leads to a highly robust solution delivering, in most cases, the whole tree of relevant vessels with just one click, even in the presence of vessel gaps caused by small or medium size stenoses or soft plaque. Our method has been tuned and tested for CTA datasets of peripheral vessels of the lower limbs. Future work includes the extension of the method to other vascular systems.

We would like to invite you to share your opinion and ideas on our approaches and solutions in a personal discussion with us. Our software is on display at the VRVis booth at IMAGINE.

Katja Bühler, David Major and Jiří Hladíková work at VRVis Zentrum für Virtual Reality und Visualisierung Forschung-GmbH in Vienna/AT. Rainer Wegenkittl works at AGFA Healthcare, Vienna/AT.

VRVis is Austria’s leading centre for applied research in the field of visual computing and acts as a bridge between academia and industry. The presented projects are results of a joint technology transfer project with AGFA Healthcare and are supported by FFG as part of the Austrian COMET initiative.

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Colorectal cancer is a leading cause of cancer mortality with 1.23 million individuals developing the disease and 608,000 deaths annually. Population screening aims to prevent the development of advanced cancers through early detection and removal of both localised cancers and premalignant adenomas, from which more than 80 percent of cancers are thought to arise. Optical colonoscopy is the current gold standard method to inspect the whole colon. However, colonoscopy is time consuming and uncomfortable for the patient, and is occasionally associated with serious complications such as colonic perforation.

Computed tomographic colonography (CTC) is now widely considered the preferred radiological technique for detecting cancer and polyps, and has comparable sensitivity to optical colonoscopy while being more acceptable to patients and relatively safe. Patients undergo full bowel preparation to cleanse the colon, which is then insufflated with gas immediately before helical CT imaging of the abdomen and pelvis (gas insufflation maximises attenuation contrast between the endoluminal surface and intraluminal space). Graphics rendering software is used to generate high resolution ‘virtual colonoscopy’ images of the three-dimensional colon surface, simulating those obtained using conventional colonoscopy.

CTC is performed routinely with the patient in both prone and supine positions to redistribute gas and residue within the colon. This helps differentiate fixed colonic deformations from mobile faecal residue because abnormalities whose position remains fixed in relation to the colon luminal wall in both acquisitions are more likely to be true polyps. Using two data acquisitions also increases the chance of discovering pathology occluded by retained fluid or hidden by luminal collapse. Matching corresponding locations between prone and supine endoluminal colonic surfaces is therefore an essential aspect of interpretation by radiologists. However, interpretation can be difficult and time-consuming due to the considerable colonic deformations that often occur during repositioning of the patient. These deformations can induce diagnostic error and increase interpretation time. Hence, a method for automatic registration of prone and supine datasets has the potential to improve efficiency and diagnostic accuracy.

We propose a novel method for automatically establishing correspondence between the two acquisitions. The problem is first simplified by detecting and matching corresponding haustral folds, which are elongated, ridgelike endoluminal structures that can be identified by extracting curvature measurements from a triangular mesh representation of the colon surface (see Figure 2). Image patches are generated at the fold positions using depth map renderings of the endoluminal surface and used to support virtual camera optimisation, providing cost value for the matching of folds between the two views. An additional pairwise cost function compares the geometric relationship between neighbouring pairs of hastral folds in the prone and supine CT images. The problem is modelled as a Markov random field and solved to estimate the correct fold labelling. This process can establish an accurate correspondence between a set of positions in the two views, even in cases where endoluminal collapses occur, which is very common in clinical practice. An accuracy of 96.1 percent was achieved when comparing the resulting fold matches against a reference standard of 1,743 corresponding fold pairs over 17 validation datasets, five of which exhibited local colonic collapse.

Most scenarios require obtaining a one-to-one surface correspondence between acquisitions, for example locating a possible polyp position in both the prone and supine views. Our surface-based registration algorithm recognises that the colon is topologically cylindrical and reduces the complexity of the registration by mapping each point on the endoluminal surface onto a cylindrical representation with the use of a conformal mapping technique. This allows the registration to account for the large 3D deformations between the prone and supine views as a more simple 2D cylindrical deformation (see Figure 3). The registration is then represented as a transformation between the two cylinders and includes non-linear stretching along the cylinder, and local torsion and rotation. We use the set of hastral folds, for which we have found matching positions in both views, alongside a shape index metric calculated at each point of the cylindrical image to create a non-rigid registration in the cylindrical domain. This registration achieves correspondence between the two views over the entire colon surface. Using the same set of 1,743 references standard points, a mean error of six millimetres was achieved over 17 CTC cases.

The authors are from University College London, Centre for Medical Image Computing, London, UK.


Present and future trends in imaging informatics

By Osman Ratib

With the evolution towards fully digital imaging departments, imaging informatics have become an integral part of our daily practice and have fundamentally changed the daily workflow of many radiologists. The rapid evolution of information technology (IT) and the wide accessibility of modern communication tools have driven the industry to adopt many consumer-market solutions into their products. From the adoption of portable tablets to the seamless storage of data in the ‘cloud’, innovations in technology have brought us many convenient solutions for wider access to information, adding flexibility and mobility for a more efficient workflow.

Acquiring knowledge in this field can help radiologists better understand recent developments in information technology, and keep up with the latest trends. It is not necessary to become an IT expert, but to have an idea of current concepts and IT tools that could help radiologists improve their daily work.

To help the radiology community keep up with some of the recent developments and technical evolutions, the ESR’s eHealth and Informatics Subcommittee has prepared some informative posters on different relevant topics in information technology:

- Introduction and overview on DICOM and IHE
- Workstation development and multimodality viewing
- Structured reporting
- Image access on tablets and portable devices
- Image compression
- Radiation exposure monitoring
- eLearning: overview of ESR activities
- Integrating teaching files into PACS using IHE/TCE
- eHealth: developments and initiatives in Europe
- An international high-level expert panel on ‘image compression’ initiated by the ESR
- New developments in imaging management and image processing

There will also be a chance to meet experts in this area. Interested visitors are welcome to share their experience and expertise with the eHealth and Informatics Subcommittee.

Visit the eHealth and Informatics Information Booth in Foyer A on the 2nd Level.

Professor Osman Ratib from Geneva, Switzerland, is Chairman of the ESR’s eHealth and Informatics Subcommittee.
Cardiac radiology represents one of the most dynamic fields in modern radiology. This is evident from the constant growth of cardiac radiology papers submitted to the ECR – up to 21 percent in 2013.

The Annual Scientific Meeting of the European Society of Cardiac Radiology is the most remarkable and visible of its activities. Every ESCR annual meeting is a perfect combination of tradition and innovation. The ESCR Annual Scientific Meeting 2012 continued the society’s focus on the most important scientific and practical issues in cardiac radiology. In 2012, the ESCR annual meeting took place in the splendid city of Barcelona. This vibrant multicultural city is a very popular location for all kinds of medical congresses and conferences, making it an ideal location for the ESCR Annual Meeting. This meeting was a repeat of the success seen at the ESCR 2011 Congress in Amsterdam. The meeting in Barcelona attracted 466 participants from 44 countries. The top five countries, by number of participants, were Spain, the Netherlands, Germany, Russia and Italy. Congress president, Dr. Teresa de Caralt contributed immensely to the success of the meeting.

The meeting in Barcelona had many memorable events. One of them was the opening ceremony: the famous Spanish-American cardiologist Professor Josep Brugada (everybody knows about the genetic cardiac disease called Brugada syndrome) delivered a brilliant lecture. “New concepts in cardiac imaging applications and image quality evaluation,” which was complemented by a presentation from ESCR vice-president, Professor Johannes Wenger. In Barcelona, the Society presented and launched its long-awaited pan-European project, the ‘MR/CT Registry’ [www.mrct-registry.org]. We invite you to join, details can be found on the website.

Another major event at every ESCR annual congress, since 2009, has been the Cardiac Imaging Examination, which is now an essential part of the ESR-endorsed European Board of Cardiac Radiology (EBCR) Diploma. During the last congress, top European and international experts delivered state-of-the-art lectures and presentations on major fields of cardiac radiology. The meeting’s educational programme gave all the information necessary to pass the cardiac imaging examination and get the Diploma in Cardiac Radiology.

There were also live teaching case presentations during ESCR 2012. An Electronic poster (EPOS) area with free internet access provided an excellent opportunity to become acquainted with electronic posters from current and previous meetings. The Asian Society of Cardiac Radiology (ASCR) held a scientific session during the Barcelona meeting, presenting lectures from our friends and colleagues in Asia.

Long-standing industry partners of the ESCR (Bayer HealthCare Medical Care, Bracco, Circle Cardiovascular Imaging, Covidien, GE Healthcare, RAPID Biomedical, Siemens, Toshiba and Wiwpress) offered participants the opportunity to visit their booths at the exhibition area, and they had interesting and well-attended company symposia, which highlighted the latest in imaging equipment and contrast media.

The ESCR continued supporting young radiologists through its Young Abstract Presenter Programme (YAPP), helping them attend annual meetings and present their papers and posters. In 2014, the ESCR is going to expand this project, offering more grants and holding special sessions for medical students. Eight young radiologists, with the eight best posters, received ESCR Magnus Cam Laude, Cam Laude and Certifi cate of Merit diplomas.

In 2013, the ESCR Annual Scientific Meeting will be held at RMA House, London, UK, headquarters of the British Medical Association.
New EIBIR research projects kick off this month

By Alana Morrison

In March the European Institute for Biomedical Imaging Research will start two new EU 7th Framework Programme research projects to improve health outcomes for breast cancer and dementia patients.

Last year saw the successful conclusion of three research projects coordinated by EIBIR: ENCITE (European Network for Cell Imaging and Tracking Expertise), HAMAM (Highly Accurate Breast Cancer Diagnosis through Integration of Biological Knowledge, Novel Imaging Modalities, and Modelling) and PEDDOSE.NET (Dosimetry and Health Effects of Diagnostic Applications of Radiopharmaceuticals with Particular Emphasis on the Use in Children and Adolescents).

EIBIR’s coordination efforts in Euro-BioImaging will continue through 2013, and two new projects have begun this month. Both projects will tackle diseases with a major impact on the European population. VPH-PRISM will focus on breast cancer, while VPH-DARE@IT is concerned with dementia.

VPH-PRISM

The positive effects of breast cancer screening are unquestionable; however, breast cancer screening is not 100 percent accurate, nor is screening able to differentiate between invasive or non-invasive cancers, or predict the rate of transformation from one to the other. Because of the shortcomings of current diagnostic tools, many women in Europe are subject to overdiagnosis, overtreatment, and unsuccessful treatment.

The key issue underlying these problems is poor individual phenotyping of highly heterogeneous cancers. VPH-PRISM will substantially contribute to overcoming major obstacles that currently lead to overdiagnosis, overtreatment and unsuccessful treatment of breast cancer in women. By linking research and disciplines and integrating data from a variety of sources (clinical, biological, epidemiological and environmental), predictive models of breast cancer development and more accurate imaging will allow for early, accurate and effective treatment.

During the initial stages, data acquisition of images, whole-slide digital pathology and non-imaging data will feed into a data model alongside data analysis for environmen
tal interactions. Statistical correlations to quantitatively characterize breast tissue will be realised through the integration of radiological and histopathological images, efficient processing of high-volume digital images as well as development of specific algorithms that automatically quantify and characterize early breast cancers and surrounding breast tissues. Next, a proof of concept and demonstration for treatment decision support is carried out, followed by the final stage during which all basic and advanced processing modules from earlier work process are integrated to develop a phenotyping concept, predictive treatment models and visualization tools.

Proposed in response to a call from the EU 7th Framework Programme, VPH-PRISM has been successfully evaluated by the European Commission and had the first meeting before the start of the ECR 2013. Running for 36 months, the project will receive €3.7m of funding from the EC.

Contributing to the project are nine organisations representing five countries. EIBIR will be responsible for the project management as well as dissemination activities.

VPH-DARE@IT

There are currently about 36 million individuals suffering from dementia and by 2050 that number is expected to rise to 115 million. Acknowledging the impact dementia is having worldwide, the WHO declared dementia a global health priority in 2012, highlighting the urgent need for improvement in this area.

Addressing these challenges, VPH-DARE@IT promises to shorten the current average time-lapse between the onset of cognitive and memory deficits and its specific clinical diagnosis. Twenty-one organisations from nine countries will participate in the project. EIBIR will provide dissemination channels to the relevant academic and industrial stakeholders to ensure adequate outreach to the scientific and industry communities, an essential prerequisite for the development of the exploitation strategy and business plan within the project. Additionally, EIBIR will contribute to training activities to foster knowledge transfer and awareness of the results.

Also starting in March 2013, VPH-DARE@IT will run for 48 months and will receive over €18m in funding from the European Union FP7 research programme.

EIBIR is honoured to be taking part in such innovative research projects and the opportunity to collaborate with the scientists and research organisations who are contributing. If you would like to discuss any of EIBIR’s projects – concluded or commencing – please visit the EIBIR Booth in the entrance hall.

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Accomplished professor to become editor-in-chief of European Radiology

By Mélisande Rouger

ECR Today spoke with Professor Maximilian Reiser from Munich, Germany, about his ambitions and the challenges he expects to face as head of European Radiology.

ECR Today: You will become editor-in-chief of European Radiology in 2014. What are your plans and ambitions regarding this new position?

Maximilian Reiser: Professors Luis, Baert and Dixon, together with their deputy editors, the advisory editorial board, editorial staff and section editors, have worked hard and shown impressive dedication, as well as admirable and generous commitment to the European Radiology what it is today – the flagship of radiology in Europe. I am aware that it will not be easy to follow in their footsteps, but Prof. Dixon has offered to give me an in-depth introduction to my new task – an offer which I have gladly accepted. My ambition is to consolidate and further develop the scientific impact of European Radiology, which is a journal of international repute. To this end, innovative thoughts and ideas will certainly be required, which I would like to develop, discuss and implement together with the ESR leadership.

ECRT: Could you please tell us about your experience in journal editing? How many publications have you authored?

MR: I have been editor-in-chief of the German journal Der Radiologe for many years, serial editor of the book series Medical Radiology – Diagnostic Imaging (Springer), member of the advisory editorial board of European Radiology and reviewer for several radiological journals. I have authored or co-authored 502 publications since 2002, which owes to the fact that we have a very active scientific team at our institute.

ECRT: Do you have any advice for aspiring authors? What is the best way for them to present their work?

MR: It is important that authors present significant topics with valid methods and use adequate biostatic methods. Wherever possible, authors should not only demonstrate the diagnostic significance of a radiological method but also the outcome for the patient. It goes without saying that clearly defined reference methods need to be used in every article.

ECRT: Where do you see scientific publishing in ten years? Will there be any print journals at all? If not, do you think this will reduce the scientific quality of publications?

MR: Electronic media offer many very interesting possibilities for editors, authors and readers. Along with the increase in online material, however, more guidance is needed to allow the reader to find valuable and trustworthy information. Therefore, I am absolutely convinced that peer-reviewed journals will continue to play a very important role in the future – regardless of their form of distribution (online or printed). In both cases, of course, the ethics of publishing and handling scientific data will have to be strictly followed and clearly laid out.

Research is best way to turn resources into knowledge, states today’s Honorary Lecturer

By Michael Erin

In recognition of his dedication to scientific research and development, Professor Luis Martí-Bonmatí from Valencia, Spain, has been invited by the European Society of Radiology to present the Santiago Ramón y Cajal Honorary Lecture, ‘Research and Science: from Individuals to Societies – The Ramón y Cajal background,’ at ECR 2013.

Luis Martí Bonmatí is director of Medical Imaging at La Fe University and Polytechnic University Hospital, and chief of radiology at Quirón Hospital, Valencia, Spain. He is also professor of radiology at Valencia University.

After completing his undergraduate medical training at the University of Valencia in 1983, Prof. Martí-Bonmatí worked as a resident at La Fe University Hospital Valencia until 1987. He then began work on his PhD, which focused on abdominal and characterisation of focal liver lesions, earning him a doctorate with excellence from the University of Valencia in 1990.

As a researcher, Prof. Martí-Bonmatí’s interests lie mainly in the fields of liver MR and CT, abdominal and pelvic MRI, contrast agents, image processing, and imaging biomarkers. With more than 200 articles listed in PubMed and 55 book chapters to his name, he is an established scientific author. As an editor he has contributed to eight books. He has also supervised more than 20 Ph.D. students, and has delivered hundreds of presentations at scientific meetings, symposia, and international conferences.

“In my position as director of medical imaging, my work focuses on the paradigm change; from improving diagnostic performances to taking care of the patient, and its particular clinical conditions in an integrated and individualised manner. In this way, we execute the necessary diagnostic and therapeutic procedures that are better for integral patient care, using the whole technological potential and biological knowledge of the disease. To do this requires the help of every member and an increase in research activity and technological transfer to the clinical innovation,” Prof. Martí-Bonmatí explained.

On top of his work as a clinician and academic, Prof. Martí-Bonmatí has also been engaged in strengthening international ties within the field of radiology. He is an active member of many European scientific societies and has served as president of the Spanish Society of Radiology, the European Society for Magnetic Resonance in Medicine and Biology and the Spanish Society of Abdominal Imaging. In addition to these presidencies, he has served as vice-president of the European Society of Gastrointestinal and Abdominal Radiology.

He is a long-time member of the European Society of Radiology and currently serves as chairman of the society’s Research Committee. “Research is also at the forefront of my career. Both as a Valencian and as chairman of the ESR’s Research Committee, I recognise that research is the best way to turn resources into knowledge across the scientific world and that innovation consists of developing,” Prof. Martí-Bonmatí stated.
Ten years of EPOS: A decade of digital innovation

ECR Today spoke with Professor Nicholas Gourtsoyiannis, founder of EPOS®, on the platform’s tenth anniversary.

ECR Today: This year the Electronic Presentation Online System (EPOS®) is celebrating its 10th birthday. How far has it come in ten years? How would you gauge the success of this enterprise?

Nicholas Gourtsoyiannis: A timelessness change, productive, useful and creative, the first of its kind, which has literally transformed the way major radiological congresses function, by going completely digital. ECR 2003 was of course the first big meeting ever to introduce and stage EPOS, presenting all its posters electronically. The immediate major benefits were that, unlike attending the whole world of digital natives, and it opened up new horizons for thousands of radiologists who could not attend or present at the ECR. Poster presentations are essential for every young radiologist’s career, as it gives them a platform to prove their excellence and professionalism, even if they are not yet advanced enough to become an oral lecturer. There are thousands of radiologists in the world that want to present their work, but as we all know, space and time are limited.

Starting with 870 posters at ECR 2003, EPOS today includes more than 2,500 posters per congress, in essence an eLearning library in itself, and is the connecting platform for around 1,500 presenters – it has developed into a very powerful tool for the ECR.

ECRT: What was the idea of EPOS born?

NG: The idea was to move forward with how could a very modern, advanced and technical specialty like radiology, working with high quality images, stick to paper printouts? Considering the many important features of digital posters (ability to zoom into images and play videos), the answer was obvious. There was a need for a revolution, to enhance the quality and attractiveness of the congress, for authors as well as for participants. We felt the need for an effective change, allowing scientific dialogue to expand and continue after the ECR, as well as a need to offer the corpus of the whole congress digitally.

A positive result was that there was room for more posters, which came with the growth of the ECR. Poster panels need space, which can now be used for other projects, such as special exhibitions, lounges, or more lecture rooms.

ECRT: What has EPOS brought to the world of radiology?

NG: It has brought international congresses to another level – not on its own, but as part of the ongoing revolution that the ECR has begun: it is beautiful, modern and develops new trends, and therefore drives the radiological meeting scene.

EPOS was also a revolution in terms of sustainability, as all posters are stored electronically and can be accessed online, not only during the congress, hence making science available all year long.

ECRT: The EPOS Lounge is always a popular destination at the ECR. Have you used it yourself? Have you noticed any developments over time (more visitors, location expansion, etc.)?

NG: Due to my many commitments, I unfortunately have not used the EPOS Area as often as I would have liked. What I can see is that over the years, it has become a central location within the Austria Center, which is always crowded with many different people, telling me that the concept of having a lounge in front of the EPOS room to sit, relax and chat, is good and enjoyed by the congress participants. I have the impression that EPOS has become a central element of ESRS’s online activities and, especially at the congress, consolidates many projects, such as self-assessment, Eurorad and Cases of the Day.

ECRT: Do you have a personal wish or message for EPOS on its 10th anniversary?

NG: Being Greek, I would say návα μαθήματα (ta panta rhei), which means everything is in constant change – I am confident that there will be a lot of new things in the future for EPOS and the ECR, and I am very excited to see these future developments.

I am proud that the ECR Electronic Poster Online System has been called EPOS®, a four-thousand-year-old Greek word, which refers to a narrative celebrating heroic deeds. Our vibrant scientific community is embracing it as their platform for dialogue and integration. Inevitably it will prosper even more in light of the growing popularity of social media and other electronic tools for learning. There should not be any congress without e-posters, so that their contents are accessible to all radiologists, and so young radiologists will no longer be excluded from contributing towards the progress of our specialty.

Last but not least, I hope that no radiologist will be excluded from our scientific community just because they cannot attend a meeting for financial reasons or any other reason – EPOS should always complement personal interaction.

Horizon 2020: European Union’s Framework Programme for Research and Innovation

By Javere Hennetberger

The framework programme for research and innovation, Horizon 2020 is going to run from 2014–2020 and will integrate the European framework programme, the programme for the competitiveness of enterprises and SMEs (COSME), as well as the European Institute of Innovation and Technology (EIT). The Commission has put forward, will amount to €80 billion, of which €8bn will be dedicated to health research.

Tense negotiations between European Parliament and Member States over the EU budget are still going on.

The Horizon 2020 package, which provides research funding for the 2014–2020 period, has been caught up in the tense negotiations between the European Parliament and Member States over the EU budget.

Due to a lack of progress on the EU budget, the chairs of the European Parliament and Council on Horizon 2020 can be found at

ECRT: How was the idea of Horizon 2020 born?

More information on Horizon 2020 can be found at

Please contact ec.europa.eu/research/horizon2020

The adoption of legislation by the European Parliament and the Council will still amend procedures proposed in the Commission’s proposed budget.

An agreement on Horizon 2020 will not be reached before spring 2013. It is still unclear how this will impact preparatory work for the call for proposals, or whether the European Commission will be able to launch the first calls in January 2014 as planned.

On November 28, the European Parliament’s Industry and Research Committee (ITRE) adopted its position on Horizon 2020, voting to increase the total budget from €80 billion to €100 billion. The ITRE Committee is also seeking to strike a balance in the attribution of funds between fundamental research projects and projects closer to the industry.

Given that the Parliament and the Council will still amend procedures proposed in the Commission’s proposed budget, the Commission has not yet defined the 2014 work programme and subsequent project calls. The Irish Presidency is expected to push for a deal with the European Parliament ahead of a meeting of research ministers in May 2013.

The adoption of legislation by the Parliament and Council on Horizon 2020 is slated for the end of 2013. Horizon 2020 will be launched on January 1, 2014.

The ESIR has issued a statement on Horizon 2020, outlining the ESIR’s view on the future of EU scientific research. This view is in line with Horizon 2020’s three main objectives: maintaining and promoting excellence in research, developing competitive industries and, most importantly, building a better society.
By Nevra Elmas

The Turkish Society of Radiology is one of the foremost medical specialties organisations in Turkey. It was formed in 2000, from the merger of the two main radiology societies in Turkey; one of which was founded as early as 1924 (the other, the Turkish Society of Medical Imaging and Interventional Radiology, was founded in 1991). The society’s main office is in Ankara (capital of Turkey) and has 1,930 members in good standing. It aims to promote radiological education and cooperation among its members with regard to professional, social and legal issues.

The Turkish Society of Radiology, which is a member of the Turkish Medical Specialist Board, an official body of the Ministry of Health in Turkey, is a non-governmental organisation, dedicated to promoting radiological education and cooperation among its members with regard to professional, social and legal issues. Accordingly, the main radiological issues that our society handles are related to education. Radiology education in Turkey is mostly provided by university hospitals, as well as teaching hospitals run by the Turkish Ministry of Health. There are 50 state-run university hospitals, nine private university hospitals and 29 government teaching hospitals in Turkey. Radiology residency training programmes are under the legal authority of the Ministry of Health.

Unfortunately, the training period was reduced to four years, from five years, by the Ministry of Health last year. The Turkish Society of Radiology is actively trying to have the training period restored to five years; a five-year residency training programme has been prepared by the Turkish Society of Radiology for educational centres around the country.

The Turkish Society of Radiology has initiated two important educational programmes for residents and young radiologists in 2010. With these two projects, we expect radiologists to become the best educated physicians in the country. The Turkish Society of Radiology has established the Winter School for the training of residents. In this programme, each resident undergoes a two-week training programme once they begin their residency period. Every year, approximately 200 residents are trained in the fundamental radiology of radiology by distinguished lecturers (there are 800 residents in training in educational hospitals). The first Winter School programme was in December 2010, 180 residents took part, while the second one was in January 2011 with 175 residents, and the third one, in January 2012, had 357 participants. All costs were covered by the Turkish Society of Radiology and residents participated free of charge.

The Turkish Society of Radiology has also established a Scholarship Programme to support young radiologists in furthering their education. This programme was introduced to support our young colleagues who want to get a better education in the field of radiology in either Turkey or abroad, for 6 to 12 months. The Turkish Society of Radiology supports candidates with a stipend of $1,200 per month for training abroad and $750 per month for training within Turkey. In 2011, seven young colleagues were awarded scholarships by the programme with this programme, we aim to support 30 colleagues per year.

Radiology board exams have been administered by the education council of the Turkish Society of Radiology since 2004. The board exams are composed of two parts: one theory exam and one practical exam. Only participants who pass the theoretical exam can take the practical exam. We encourage our residents, who go through the Winter School training programme, to take the theoretical exam before the final exam of the residency period.

The Society holds an annual national congress of radiology, as well as symposia and other small-scale meetings. Attendance at annual congresses is in the range of 1,500 to 2,000 radiologists. Impressive numbers of world-renowned radiologists, from many subspecialties of radiology, attend these meetings to present lectures.

The 33rd Turkish Congress of Radiology was held on November 7–11, 2012 in Antalya, and 1,736 radiologists attended. Every year the number of participants grows. At the Turkish Congress of Radiology 2012, there were 19 lecturers from Europe and the United States, a total of 149 oral presentations and 897 electronic exhibits were presented. There were three main topics: ‘Women Imaging’, ‘How to do it?’ and ‘Radiologic Physics’.

Our next National Radiology Congress is going to be held on November 6–10, 2013 in Antalya. The Turkish Society of Radiology publishes the quarterly peer-reviewed journal Diagnostic and Interventional Radiology. This journal, which has been published since 1994, has the highest standards of peer-review, editorial content and publication quality. In 2007, Diagnostic and Interventional Radiology was accepted for indexing in Index Medicus and SCIE (Science Citation Index-Expanded). The Impact Factor of Diagnostic and Interventional Radiology in 2011 was 1.1. This journal is also available free to all readers on the web (www.dijuradiol.org). It is one of the best medical journals published in Turkey, south-eastern Europe and the Middle East.

The number of scientific articles by Turkish authors in radiology journals has increased substantially over the last 15 years, and Turkey consistently ranks among the top five countries submitting articles to the most respected radiology journals such as the American Journal of Roentgenology, Cardiovascular and Interventional Radiology, European Journal of Radiology, American Journal of Neuroradiology, Pediatric Radiology and European Radiology.

I think growth in the number of articles published in radiology journals from Turkey will continue in the future.

The Turkish Society of Radiology is an ESR Institutional Member Society, which develops infrastructure and human resources, implements high quality training programmes for residents and young colleagues, and shares invaluable scientific knowledge with the international community. I hope that these endeavours will gradually increase in the future.

More information about the Turkish Society of Radiology can be found at www.turkrad.org.tr

Professor Nevra Elmas from Izmir, Turkey, is President of the Turkish Society of Radiology.

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(Congress of the Polish Medical Society of Radiology)

October 18–22, 2013, Paris/FR (JFR)

October 28 – November 2, Antalya/TR (TURKRAD 2013)

www.myESR.org/diploma
Eventful year for Serbian radiology

By Milos A. Lucic

The Radiological Society of Serbia (RSS) is an association representing radiologists, specialists in training, and other professionals working in the field of diagnostic and interventional radiology, as well as diagnostic medical and functional-molecular imaging in Serbia. The RSS is an institutional member of the European Society of Radiology (ESR) and the International Society of Radiology (ISR).

Last year, the city of Novi Sad hosted two important radiological events: the first European School of Radiology Galen Foundation Course in Neuroradiology in April, and a European School of Interventional Radiology course on tumour ablation in May, which attracted many prominent international speakers, including Professor Paul M. Parizel, ESNR past-president, and Professor Nicholas Courtissoyannis, director of ESOR, as well as participants from numerous countries around the world.

The Serbian Society of Neuroradiologists, headed by Professor Tatjana Stoic-Opic, held the third Serbian Congress of Neuroradiologists and Advanced Course in Interventional Neuroradiology, which took place in Belgrade from May 31 to June 2, 2012, with participation from the vast majority of Serbian diagnostic and interventional neuroradiologists along with a large number of very prominent European neuroradiologists. It was a successful demonstration of what to expect from the upcoming ESNR Annual Meeting in 2016.

November 8, 2012 is an important date for the RSS, and it strongly supported the celebration of the first International Day of Radiology (IDoR) 2012. Numerous newspapers, radio and TV news programmes informed the public in our country of the International Day of Radiology 2012 and the importance of radiologists in medical care. It did so by raising awareness of our profession and the process of establishing the diagnosis and the treatment decision-making process.

The RSS strongly supported and encouraged the establishment of the new subspecialty society: the Serbian Society of Interventional Radiology, founded in September 2012 and led by elected president Professor Petar Bosnjakovic. Another important task for Prof. Bosnjakovic this year, and also for the RSS, will be the Serbian Congress of Radiology 2013, which will be held in Nis, October 24–27, 2013. The national biennial congress will be held for a second time, in close cooperation with the Radiological Society of Serbia and the Section for Radiological Diagnostics of Serbian Medical Doctors Society. We expect the last extremely successful congress to be surpassed by the upcoming one. Numerous programme topics selected by the scientific committee will be presented at the Serbian Congress of Radiology 2013, not only by foreign academics but also by our local lecturers, in a united effort to raise the quality of the scientific programme.

In addition, the RSS runs many radiological and multidisciplinary courses in collaboration with numerous other professional organisations, offering a wide spectrum of core and advanced state-of-the-art radiological knowledge in various fields of radiology and subspecialty disciplines.

Meet & Greet at the Rising Stars Lounge

Meet & Greet with your RTF Representative

Don’t miss the opportunity to get in touch with your national RTF representative during the ECR! Visit the RTF Meeting Point in the Rising Stars Lounge (Foyer B, 2nd Level) where resident representatives from various countries will be available daily from 13:15 to 13:45 to provide you with first-hand information.

ESR President in the Rising Stars Lounge

Take the unique chance to meet and greet the ESR President in the Rising Stars Lounge during the ECR.

Sunday, March 10, 12:45–13:05

Prof. Gabriel P. Krestit (Netherlands)

ESR President

Rising Stars Programme

Basic Sessions

Sunday, March 10, 08:30–10:00, Studio 2013

Basic Session on Interventional Radiology

• Management of aortic aneurysm and dissection
  • Overview of the development of interventional radiology techniques
  • Embolisation of liver malignancies

Student Sessions

Sunday, March 10, 14:00–15:00, Studio 2013

Final Student Session

The four best student presenters will be awarded by the ESR during this session.

Student Hands-on Workshops on Ultrasound

In cooperation with Sonov4You

After last year’s success, hands-on workshops exclusively for students will again be held at ECR 2013. An expert team of tutors will lead the students through the workshops, which will include six different workstations to expose every participant the chance to familiarise themselves with the wide range of possibilities with ultrasound.

Workshop Advanced:

Sunday, March 10, 16:00–18:00

Suitable for advanced students and residents.

RTF Highlighted Lectures and the RTF General Assembly

Make sure you catch the RTF Highlighted Lectures and the RTF General Assembly.

Sunday, March 10, 10:30–12:00, Room Q

Radiology Trainees Forum

RTF Highlighted Lectures

Moderators:

D. Baia, Sarajev/BA

M.A.A.J. van den Bosch; Utrecht/NL

emergency radiology management in patients with polytrauma

R. Morgan; London/UK

Overview of the development of interventional radiology techniques

Z. Metovic, Sarajev/BA

embolisation of liver malignancies

P. Pilevics, Vienna/AUT

case-based learning in radiology

E. Molnar; Prague/CZE

Comparative imaging of non-traumatic polytrauma

D. Zilberman, Munich/DE

imaging of non-traumatic intracranial haemorrhage

P. Fycik; Reuze/CZE

case-based learning in radiology

RTF General Assembly

Sunday, March 10, 14:30–16:00

Meeting Room 9, 3rd Level

Extension Expo A

The final draw for the Pin to Win game takes place today in Extension Expo A at the Samsung Booth, between 5:00 and 5:30 p.m.

More information about the Radiological Society of Serbia can be found at www.udruzenjeradiologasrbije.org

Professor Milos A. Lucic from Srem'ska Kamenica, Serbia, is Chairman of the Radiological Society of Serbia.
The Metamorphoses of Egon Schiele

The Leopold Museum reveals the Expressionist’s ability to transform

Following the huge success of the exhibition ‘Melancholy and Provocation’, which highlighted the antitheses in the œuvre of Egon Schiele (1890–1918), the profound sadness and world-weariness on the one hand and the provocative, stirring aspect on the other – the Leopold Museum now presents Schiele masterpieces from the Leopold Collection in a new context. The exhibition, curated by Elisabeth Leopold, is dedicated to Schiele’s ability to transform.

Metamorphoses: Schiele transformed his own figure into various shapes

The main focus of the exhibition, which comprises some 20 paintings as well as documents and autographs, is on the artist’s self-portraits. Since the Renaissance the self-portrait has been a central theme for many artists, including Albrecht Dürer, Anthony van Dyck and Rembrandt. Schiele, however, transformed himself in his self-portraits. “Schiele often used himself as a model, changing and transforming his body into various shapes,” explains Elisabeth Leopold. These transformations could best be described as ‘metamorphoses’. The intensity with which Egon Schiele used body language as a medium of expression is largely unprecedented. According to Elisabeth Leopold “the depicted becomes a symbol of the dying man who becomes a hermit, naked and levitating.”

Hermits and Levitation: transformation of life into death

Right at the start of the exhibition visitors encounter three large-scale figurative depictions which are among Egon Schiele’s most important paintings. The 1912 work ‘The Hermit’s’ sees Egon Schiele and Gustav Klimt melting into a double-figure under a black cloak. The two figures also appear as generalised types of men. In a letter to the industrialist and emigrant art collector Carl Reinigau Schiele explained, “They are the bodies of sensitive beings.” In his impressive early masterpiece ‘Seated Male Nude (Self-Portrait)’ of 1910 the artist rendered himself as a highly expressive, gestural figure. A few years later Schiele showed the transformation of life into death in his two-figure depiction ‘Levitation’ (1915).

Oneiric images and forbidden love

These three chief works are framed by the surreal oneiric images that Schiele presented in his 1913 exhibition at the reputable Galerie Miethke under artistic director Carl Moll: ‘Lyrical’, ‘Self-Seer II’ and ‘Revelation’. The same room also hosts numerous significant works from 1912, most importantly ‘Self-Portrait with Physalis’ and ‘Portrait of Wally Neuzil’ which depict Egon Schiele and his great love Wally and are among the most famous pairs of paintings in art history. Much in keeping with the theme of their amour fou, Elisabeth Leopold also presents the work ‘Cardinal and Nun’, symbolising a ‘forbidden’ but nevertheless inescapable attraction between man and woman. The ‘Self-Portrait with Raised Bare Shoulder’ shows a face full of panic and horror. Seemingly forced into a corner, the artist screams open-mouthed and wide-eyed in protest of a hostile world that refuses to understand his message.

Farewell paintings and anthropomorphic houses

Another part of the exhibition is dedicated to Schiele’s landscapes. The work ‘Sinking Sun’ (1913) is a farewell painting. The foreground is dark and infused with an infinite sense of cold, the sea is grey. The sky glows in a faint shade of carmine red. The horizontal lines are broken up by two young, almost bare trees whose dry leaves are stiffened by the cold. The sun is sinking almost imperceptibly as a small ball into the sea. It is taking its leave, and perhaps it will never return. This section also includes Schiele’s anthropomorphic, houses inspired by the Bohemian city of Český Krumlov on the Moldova River, with its Gothic and Renaissance buildings set in narrow lanes and surrounded by the black river.

‘No-man’s-land and the end of the world’

Schiele’s Houses by the Sea

According to Elisabeth Leopold “these houses are expressions of the artist’s spiritual world”. She points out the slightly animated contours and the subdued colours, which are occasionally shot through with bright objects such as gutters, window frames and hung up laundry. To Elisabeth Leopold these renderings represent “landscapes of the soul” which are “permeated by a sense of melancholy and transience”. The highlight of this part of the exhibition is the rarely exhibited work ‘Houses by the Sea’ (1914). A partial settlement could be reached last year concerning this painting with the sole heir of the work’s original owner Jenny Steiner. Elisabeth Leopold says of it: “Each house resembles a human face. A sharp, horizontal boundary line behind the buildings marks the transition to the light grey sea from which rocks emerge in the distance that stand out against the dark grey sky. Rudolf Leopold called this horizon ‘the eternal line of the no-man’s-land and the end of the world’.”

Leopold Museum

at the MuseumQuarter | Museumsplatz 1, 1070 Vienna

Opening Hours:
The Museum is open daily: 10am to 6pm
Thursdays: 10am to 9pm
Closed on Tuesdays
www.leopoldmuseum.org

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What’s on today in Vienna?

**Theatre & Dance**

*Please note that all performances are in German!*

- **Akademietheater**
  1030 Vienna, Lisztstraße 1
  Phone: +43 1 51444 4145
  www.burgtheater.at
  19:00 Einige Nachrichten an das All by Wolfram Lotz

- **Burgtheater**
  1010 Vienna, Dr. Karl-Lueger-Ring 2
  Phone: +43 1 51444 4145
  www.burgtheater.at
  19:00 Der Ignorant und der Wahnsinnige by Thomas Bernhard

- **Theater in der Josefstadt**
  1080 Vienna, Josefstädter Straße 26
  Phone: +43 1 42 700 300
  www.josefstadt.org
  15:00 Forever Young by Franz Wittenbrink
  19:30 Forever Young by Franz Wittenbrink

- **Volkstheater**
  1070 Vienna, Neustiftgasse 1
  Phone: 43 1 52111 400
  www.volkstheater.at
  15:00 Ratgeber für den intelligenten Homosexuellen zu Kapitalismus und Sozialismus mit Schlüssel zur Heiligen Schrift by Tony Kushner

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**Concerts & Sounds**

- **Musikverein (Classical Music)**
  1010 Vienna, Bösendorferstrasse 12
  www.musikverein.at
  11:00 Wiener Philharmoniker, conductor Zubin Mehta & Bruckner

- **Porgy & Bess (Jazz)**
  1010 Vienna, Riemergasse 11
  www.porgy.at
  20:30 David Friesen Trio

- **Arena (Alternative Music)**
  1010 Vienna, Baumgasse 80
  www.arena.at
  20:00 Long Distance Calling (Germany) + Sólstafir (Iceland)

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**Opera & Musical Theatre**

- **Volksoper**
  1020 Vienna, Riehnergasse 79
  www.volksoper.at
  18:00 Die verkaufte Braut by Bedrich Smetana

- **Wiener Staatsoper – Vienna State Opera**
  1010 Vienna, Opernring 2
  www.wiener-staatsoper.at
  16:00 Don Giovanni by Wolfgang Amadeus Mozart, conducted by Louis Langrée, with Ildar Abdrazakov, Marina Rebeka, Toby Spence, Véronique Gens, Erwin Schrott

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*Please note: images used for illustrative purposes.*