A 3-piece jigsaw: patient, radiologist, clinician. But do they fit together?

By Becky McCall

The delicate balance of power and complex set of interactions between radiologists, patients and clinicians was the subject of some lively and frank discussion at yesterday’s Professional Challenges Session, which followed a novel and original format. Nobody held back, considered opinions were given and niggling issues were teased out by the panel members, audience and the one brave clinician in the packed room.

Amongst the panel members were two radiologists, a medical ethicist and a clinician. Former ECR President Prof. Andy Adam kick-started the session by pointing out that 50% of patients do not realise that radiologists are actually medical doctors. I think it’s the fault of radiologists because in many cases, they don’t always deal with patients like a doctor typically does. Radiologists abandon patients and damage themselves as a profession, disadvantage patients and increase healthcare costs,” asserted Adam, professor of medicine at the department of gastroenterology and hepatology at Vienna Medical University, said he felt it was important that radiologists spoke to him directly with the details.

“It’s more a matter of practicality, resources and time. But if I have to decide between the radiologist speaking to the patient so I get the report in two weeks, versus the radiologist not speaking to the patient and I get results in two days, then I prefer the latter,” he said.

Medical ethicist Prof. Georg Marckmann, from Ludwig-Maximilians University of Munich, Germany, offered his thoughts by describing a scenario in which a radiologist not speaking to the patient so I get the report in two weeks, versus the radiologist calling a surgeon to come to look at a patient and discuss what to do, or he orders an image. That’s the difference in attitude and where communication has gone wrong.”

Moving on to the radiologist-patient relationship, Adam said that done properly, radiologist-patient communication can work to the patient’s advantage clinically, but also benefit the hospital’s finances. He described a typical patient pathway in a U.K. hospital with requests, reports and scans moving between GPs, clinicians, radiologists, multi-disciplinary meetings, and eventually reaching a surgeon.

“This could potentially take weeks,” he said. “This is a crazy way to practise medicine in the 21st century, there’s no earthly reason why the radiologist can’t interact with the referring clinician and the patient early on, and organise investigations like a proper doctor.”

This would not only save money, but adrenaline, anxiety and worry for the patients and their families. I reinforce my point that a radiologist is a doctor and he or she has to work like a doctor and communicate with the patient appropriately,” argued Adam.

Audience members were invited to participate and did so with enthusiasm. There was controversy about the language used to ‘order’ or ‘request’ an examination from a radiologist, with one U.S.-based surgeon saying that there were too
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Answers, visualized.
Artis Q and Artis Q.zen – fighting the most threatening diseases
Gymnasts’ spines, footballers’ ankles and golfers’ wrists take the strain

By Philip Ward

The ultra-demanding and highly competitive nature of modern professional sport was visible to all during Sunday’s referee session over oesophageal injuries.

Stress reactions are the most important lesions to recognise in the gymnast’s spine, and although there is no consensus about imaging, plain films and MRI, plus CT in selected cases, is the best option, said Dr Milko De Jonge, from the department of radiology at Zeeuw Hofstot Hospital in Woerden, the Netherlands.

The term ‘gymnastics’ derives from the Greek word ‘γυμνός’, and when the Ancient Greeks engaged in the activity, they were naked. “I wonder how many gymnasts today would take part in it if they had to be naked. Probably not very many of them – I know I wouldn’t!” he joked.

From a medical perspective, a major problem is that gymnasts are so young when they start participating. In the Dutch competition league, gymnasts are as young as six years old, and they are considered to be veterans at 18. There are 245,000 members of the country’s gymnastics union, which represents a slight decline since 2010, stated De Jonge. As many as 200,000 gymnasts train in the U.S. to take part in gymnastics, so participation remains healthy in most parts of the world. It became an Olympic sport for men in 1896, and for women in 1928.

“Low back pain in gymnastics is common. It originates predominately from disc degeneration and rotation, with axial forces,” he said. "Disc disease is also common. Not all disc herniations are degenerative, and a common complaint for Scheuermann’s disease, however. To avoid causing unnecessary anxiety to patients, he recommends avoiding the term Scheuermann’s disease, except for classical cases, and there is no room for three-quarter views. The frequency and intensity of training are high. Up to the age of 14, talented youngsters train for between 15 and 15 hours a week, while national team members train for around 35 hours a week, said De Jonge.

In professional football players, overuse injuries in the ankle are particularly common, according to Dr. Patricia Cunningham, a radiologist from Louth- Meath Hospital Group in Ireland. She said it’s important to diagnose injuries of the ankle ligaments, including sprains such as anterior tibio-talar impingement, as well as injuries of tendons around the ankle and bone and cartilage injuries in the ankle, including anterior and posterior tibio-talar impingement.

Golfers tend to suffer most often from upper limb ailments, and training by the swing mechanics to appreciate the asymmetrical nature of a tracer. "When the club hits the ball", said O’Connor, a musculoskeletal radiologist from Leeds, radiologists spend a lot of time trying to differentiate between established and new tracer-induced stress fractures, he said. For example, a 24-year-old cricketer might have developed his defects at the age of 14, if he commented.

O'Connor, a musculoskeletal radiologist from Leeds Teaching Hospitals and the University of Leeds, U.K. in a recent survey of players on the European Tour, the results of which are due to be published soon by the British Journal of Sports Medicine, the wrist accounted for 55% of total injuries, and of those, 30% were previous injuries. A total of 128 questionnaires were completed, representing a response rate of 84%. The golfer’s lead wrist was injured in 67% of cases, and of those injuries, 35% were ulnar-sided, 11% were radial-sided, 33% were dorsal, and 21% were other.

Fractures of the Hook of the Hamate, also called the Hamulus, are the most common fracture in a golfer, and are usually stress fractures, said O’Connor, who led the imaging team at the 2012 Olympics in London. The non-dominant wrist can be affected, and they are difficult to diagnose clinically and are occult on conventional wrist radiographs. In sports injury encountered at Leeds, radiologists spend a lot of time trying to differentiate between established and new tracer-induced stress fractures, he said.

For example, a 24-year-old cricketer might have developed his defects at the age of 14, if he commented.

In the U.K., a hospital’s radiation safety committee produces a set of policies and approaches. It identifies individual responsibilities for radiographic examinations. Although the nuclear medicine physician has overall clinical responsibility, but it certainly helped to raise and address important issues facing the profession.

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‘Unfair’ regulatory stance over radiotracers poses serious threat to PET’s future development

By Becky McCall

Legal and regulatory issues surrounding the production and uses of radiotracers represent a significant threat to PET imaging. A senior luminary told ECR attendees at yesterday’s Professional Challenges Session on the legal matters related to multimodality techniques.

Speaking emphatically on the issue, Fred. von Schulthess, from the department of medical radiology, nuclear medicine at Zurich University Hospital, explained his frustration with the current situation. "Regulatory issues have become so painful and so costly that university investigators and companies alike are deterred from developing new radionuclides. “There have been so many technologies and that their availability needed to be reined in. "It’s like ordering from a menu of exams," the delegate remarked. An Irish radiologist waded in, disagreeing with the idea that radiologists receive 'orders', saying that he only got 'requests' and that if he felt it was necessary to inform the patient, he would deny it. On the clinician-radiologist relationship, he said, "I have a close relationship with the clinician, I advise on the best tests, I get back to them on the next steps." So addressing the panel he said that he thought their points of view were extreme. "If you need to communicate with your clinician, then just pick up the phone. The panels one clinician agreed with him. A radiologist from Australia piped up to make her point that she believed radiologists were there to interact with the patients. "I think we should always talk to them first. We need to think ‘it was me having the scan done, what would I want? We need to put ourselves in their shoes,’ she said.

"I always tell my patients that this injection is in their laboratory, in a puzzle, and the other bits of the puzzle are in the hands of the referring doc- tor and if they go back to the doctor they will find the rest of the jigsaw is going to be there," she added. This innovative session was never going to lead to universal agreement, but it certainly helped to raise and address important issues facing the profession.

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From a medical perspective, a large number of potential patients. Orphan applications due to the cost of getting a tracer on the market is the only legal provider of F-choline in Switzerland, but to get to this point a cost between Swiss Francs 100,000 and 1 million was accrued, which is a major cost issue, he explained.

Adding further frustration, von Schulthess explained that reimbursement for a tracer is a separate issue from approval, which a researcher might need to do everything you would for a drug to introduce a new tracer just for research, we have to spend 100,000 CHF, he said. "It is now such that in order to even think about doing research for we have to do a toxicity study, which at the newly required level cost Swiss Francs 100,000 (around 81,000 Euros),” he said. "Even to think of producing a new radionuclide labelled tracer for experiments we have to spend 100,000 CHF!"

At Zurich, several PET tracers are produced in-house, and we have gotten approval for fluoroine-labelled choline (F-choline) and so the hos- pital is the only legal provider of F-choline in Switzerland, but to get to this point a cost between Swiss Francs 100,000 and 1 million was accrued, which is a major cost issue, he explained.

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By Mélisande Rouger

Students get first-hand ultrasound experience at ECR 2013

The European Society of Radiology (ESR) is stepping up its efforts to provide members with a comprehensive range of self-assessment modules that are free-of-charge, written by experts and easily available on the ESR website.

Among the important benefits of the tests is that they map the curriculum of the European Diploma in Radiology and they can be done whenever a radiologist has some spare time, noted Dr. Sue Barter, who chairs the Case Collection Committee for the European Board of Radiology and is a consultant radiologist at the Cambridge Breast Unit of the Cambridge University Hospitals NHS Foundation Trust, U.K.

“This is a really useful way for anybody to brush up on their knowledge and keep up to date,” she said. “Each module only takes 15 or 20 minutes to complete, and you’re given a score at the end of it, so you know how well you’ve done.”

The modules consist of a mix of conventional multiple-choice questions (MCQs), image-based MCQs and short cases. The plan is to develop accreditation for continuing medical education, according to Barter, who is also registrar for clinical radiology at the U.K. Royal College of Radiologists.

To access the tests, go to the education and training section of the ESR website and click on the ESR Self Assessment button on the left side of the page. The ESR is particularly keen to hear from any body who is interested in writing or contributing to a new module. Please contact Stefanie Muzik (stefanie.muzik@myESR.org).

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“Let’s do both, centred in patients and in collaboration,” said Marti-Bonmati.
Next year’s ECR will be Russian affair

By Mélisande Rouger, Michael Crean

ECR Today spoke with the ECR’s next president, Prof. Valentin Sinitsyn. He is chief of the radiology department at the Federal Centre of Medicine and Rehabilitation in Moscow, Russia, and currently serves as president of the European Society of Cardiac Radiology (ESCR).

ECR Today: What will be the main highlights of ECR 2014’s scientific programme?

Valentin Sinitsyn: People are increasingly interested in interactive sessions to assess what they have learned from a lecture. The ECR has been developing interactive sessions for several years now, but we want to increase that. Today, you can find a lot of information on the internet and many people might not think it is necessary to travel to a congress. We want to create something attractive and show that it is worth coming here. Nothing can replace shaking hands with your colleagues from other countries. I would be very sad if the ECR were entirely online. This is why we are making live meetings more interactive.

We would also like to change the format of scientific sessions. We are currently discussing the concept of a multimedia classroom, a model which was successfully introduced during the last SIRM congress in June 2012. This multimedia classroom offered 60 work stations from different companies with 25 different cases which were discussed at the end. We are currently discussing the structure with Professor Emanuele Neri from Pisa, who was responsible for the scientific programme of that project.

Soon we are going to use smart phones for voting during audience response sessions. But voting technology has its limits and sometimes networks crash, so it needs a lot of work. Keypads are an old technology but they are very reliable. I am sure that next year, or the year after that, everybody will be able to vote with their own iPads or tablet.

We will also increase the number of multidisciplinary sessions. This is not something we have to do just during the ECR. This year we had the Imaging Biomarker’s Course the day before the congress, which was organized by the European School of Radiology. This will take place again next year with radiation oncology as the topic.

ECR 2014 will feature New Horizons Sessions on therapeutics, oncology and new technology, as radiology is developing so quickly. There will also be new State of the Art Symposia on RECIST, ischaemic stroke, cardiac imaging and obesity. Special Focus Sessions will concentrate on topics as varied as image-guided biopsies in prostate cancers, orphan diseases, dental imaging, US elastography, MR elastography, paediatric abdominal emergencies, safety standards and structured reporting. Finally, Professional Challenges Sessions will be dedicated to interventional oncology, educational challenges and the role of social media in radiology.

ECRT: Will the programme reflect your interest in cardiac radiology, and if so, how?

VS: Actually, one of the major highlights at ECR 2014 will be the ‘ESR meets cardiology’ sessions. We will invite the European Society of Cardiology to take part in joint sessions on cardiac imaging. The ESC has sessions on cardiac imaging during their congress.

Cooperation with cardiologists can be very tricky. turf battles exist, for instance concerning who should perform cardiac MRI. For me, the right answer is a multidisciplinary approach. Every radiologist thinks cardiac imaging should be done by radiologists, but in close cooperation with cardiologists. Cardiologists have very good training in diseases, and they have more contact with patients. Those hospitals where cardiologists and radiologists work together for the benefit of the patient usually have better results. In my hospital, we are friends but things could be improved. Some cardiologists think that radiologists need better training in cardiology and better knowledge of organ pathology, cardiac disease, physiology and anatomy. Our impression is that sometimes cardiologists are not fully aware of the potential of imaging, that some consider cardiac CT or MRI a toy without real benefit for the patient. But the truth is that today cardiac imaging can do a lot for patients.

ECRT: The Social Media Wall and Satellite Symposium organised by GE Healthcare Nycomed last Saturday at the ECR? Do you think it would be a good idea to have scientific sessions in languages other than English as well, and if yes, which ones?

VS: It’s a very good initiative and a good example to follow. I already spoke with Russian-based companies about it and they took it very seriously. Siemens and Bayer HealthCare will seek to do that next year.

I want to continue this over the next few years. As I said earlier, I want the number of delegates from Russia and neighbouring counties to increase in the future, and I believe this is one way of doing it. One problem is language, I always encourage my colleagues to learn English, because it is the lingua franca of modern radiology, become ESR members and attend the ECR. We are discussing the possibility of having a few scientific sessions in different languages and seeing how they go.

ECRT: The Rising Stars programme, which grants students free registration for the ECR, attracts an increasing number of students and residents each year. Last year more than 1,400 students visited the congress, making it the world’s leading student meeting in medicine. What do you think of these efforts to attract young people? Will ECR 2014 include any new features to increase their participation?

VS: This is a very good initiative. Besides medical students, we are also attracting more radiographers. This year, for the first time there is a small team of Russian radiographers at the ECR, and our cooperation with the European Society of Radiographers is improving. I like these student sessions because they can have their own presentations and workshops.

Another exciting initiative is the European Diploma in Radiology (EDIR). Last year I was one of EDIR’s examiners. I am glad to see it is becoming so popular, with 50% more candidates since last year. The diploma is held in different countries at national society annual meetings and I hope it comes to Russia one day.

ECRT: The Media Wall and ECR Live are both in their second year. How are these initiatives working, and how do you see them develop in the future?

VS: I really admire the ECR staff, especially the new media team. The ECR is so important because it’s the most modern and innovative congress. People will really begin to appreciate these new services over the next few years. It reminds me of the Electronic Presentation Online System (EPOS®). When it was launched in 2003, no one fully understood how fantastical a tool it would become. Now we cannot imagine our lives as radiologists without it, and many other congresses imitate it. But there should be a balance; we don’t want to see people checking their e-mails, or their mobile phones and iPads while a speaker is delivering a presentation.

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Highlights ECR Today 2013

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Monday 11 March 2013
Experts discussed the best ways to assess the radiologist’s professional performance during an interactive session on standards and audit on Saturday.

Dr. Giles W. L. Boland, a radiologist working at Massachusetts General Hospital, Harvard Medical School, explained why radiologists should undergo peer review. “If we are not analysing our own performance, I think we are failing in our duty as physicians towards patients,” he said for starters. “We think we’re doing quite well but perhaps we’re not. Frankly, it’s a big problem for medicine.”

He quoted a seminal article published in the United States in 2001 by the Institute of Medicine, in which the author estimated that about 100,000 deaths per year are due to error. “Error is everywhere. Not just in the reporting and interpretation of the case, but actually at every step of the radiology work process,” Boland said.

When polling the audience about whether every member of their department performs routine care review, over 70% responded negatively. Errors can be avoided by standardising imaging utilisation, Boland believes. A noticeable variation in practice exists between countries, and even within the same country, which can lead to mistakes. Looking at a study on MR/CT utilisation in 2009, Boland noticed that there were differences in the utilisation of imaging between the south-east compared to the north of the United States. “There’s a big problem there. How do we review that process? Every aspect in this value change should be reviewed. If one patient is getting a CT in one region and not in another, we as radiologists should be peer reviewing that process as to why this test was ordered. The same goes with the modality: for instance do you use CT, MRI or US to evaluate brain angioma?” he asked.

“And what about reporting? What type of language do you use in a report, are we incorporating electronic medical record data, what do you do with findings and how do you communicate report findings?” he continued. “Boland quoted the example of an incidental finding in a patient with lung cancer. The majority of radiologists chose PET-CT because the patient had cancer. “But PET-CT is the highest radiation and costliest modality. Nobody thought of looking at old films that were done in this patient a year before, which would have been the cheapest test!”

“Bottom line is we have huge variation in our practices, which affects quality and safety, even within the same department. These discrepancies sometimes increase costs and sometimes even morbidity and mortality,” he added. He recommended looking beyond the traditional role of the radiologist, the reporting function, and assessing every aspect of the value change.

“Peer review is an interpreting process. It should be structured, transparent and fair by your peers, and you should benchmark the data against your peers. In the United States, this data is now being used for credentialing,” Boland said.

What the referring clinician thinks of the radiologist’s work should also be taken into account, according to Jan Bosmans, a radiologist at Ghent University Hospital and consultant radiologist at Antwerp University Hospital, Belgium, who also spoke during the session.

Clinicians mainly evaluate the radiologist’s work through the report produced by the latter. Radiological reports pretty much look the same since the creation of the discipline in 1896. “We could say that their reports look remarkably modern – or that our reports look remarkably outdated,” Bosmans said. The number of studies on reports has increased in the last decade. Until the 1980s, most papers expressed the personal views of the authors, based on life-long experience, while recent studies are more evidence based.

There have been qualitative and quantitative studies by clinicians and radiologists alike. Bosmans compared 13 studies conducted in the 1980s with recent ones, and found surprisingly similar conclusions. Notably, he referred to a study by Naik from the University of Toronto in 2001, as well as the COVER (Clinicians’ Opinions, Views and Expectations on the Radiology Report) and ROVER (Radiologists’ Opinions, Views and Expectations on the Radiology Report) studies. Radiologists should always address the clinical question, which they sometimes fail to do, the various authors found. Radiologists should also provide value to subspecialists who feel they can interpret images themselves, as radiologists see things clinicians wouldn’t notice. The type of examination determines the length of the report, which should contain a conclusion. The report should offer advice. Clinicians also want radiologists to communicate better and to be available for consultation. Finally, radiologists should educate clinicians about new technologies, for instance.
Radiologists emerge as central players in tackling global healthcare challenge of hepatocellular carcinoma

By Rebekah Moan

Hepatocellular carcinoma (HCC) has become a worldwide problem, and radiologists need to learn more about it, according to two experts. Luckily, ECR delegates will have a chance to educate themselves about this disease in a special focus session held this morning.

Chronic hepatitis and cirrhosis may lead to HCC, and they are the underlying pathological situation in which HCC can occur, according to Prof. Carlo Bartolozzi, a professor of radiology and chairman of the department of diagnostic and interventional radiology at the University of Pisa in Italy. The main problem the radiologist may encounter in his or her daily practice is to detect inside a cirrhotic liver the nodule that might already be HCC or the nodule that might become HCC, he said in an interview with ECR Today.

“The role of diagnostic radiology is very important because we may detect such development, and our diagnosis nowadays is absolutely specific, in other words, we can make the diagnosis of HCC on the basis of typical findings,” said Bartolozzi, who will moderate this morning’s session. “And if we, as I said, make this specific diagnosis, needed is an efficient therapeutic approach. In other words, diagnostic workup is over.”

Typical findings will be reported in depth by Prof. Carmen Ayuso from Barcelona, but in brief, contrast material can identify hyper-vascularity of the nodule and subsequent washout and the presence of neosangiosis, which is the most important finding for making a diagnosis of HCC, he added.

“In this way, we can make the diagnosis of HCC, and we can assess the volume of the lesion, the diameter of the nodule, the number of lesions,” he said. “All these elements are important not only for the diagnosis, but also important for the staging and consequently the management of the patient in terms of decision-making,” he stated. However, about 30% of cases do not show these typical findings, despite the neoplastic nature. The methods are specific, but not sufficiently sensitive, so even if the radiologist does not detect typical findings, the patient may suffer from HCC. Atypical findings are, for instance, benign nodules or vascular findings that might mimic HCC, according to Dr. Christoph Zech, from the Clinic of Radiology and Nuclear Medicine at the University Hospital Basel, Switzerland, who will discuss atypical findings during the session.

There are many aspects to consider in the cirrhotic liver, including regenerative activity, benign nodules, and vascular findings that might imitate HCC, he said. “It is very important to be aware of these pitfalls and different findings, and it’s important not to overdiagnose patients, to report nodules as HCC which are in fact benign nodules,” he explained, adding that if there is one clear HCC nodule and three or four indeterminate nodules wrongly called HCC, the patient might be withdrawn from a curative approach.

On the other hand, if patients in surveillance programmes with unclear findings have strong negative and positive criteria, HCC may be treated with liver transplantation, but only one out of 10 patients may undergo the procedure. So how do physicians treat a huge number of patients, and how do they evaluate the tumour response? In oncology, RECIST (response evaluation criteria in solid tumours) criteria are used, focusing on tumour size, Bartolozzi said.

“In HCC, the classical RECIST criteria are not applicable, so we have to talk about mRECIST (modified RECIST) criteria,” he added. “This classification is based on the assessment of tumour necrosis.”

RECIST will be addressed during the session, but so will topics such as how to evaluate the tumour response to therapies and the effect of information technology on the management of patients.

“Delegates should attend the session because it’s really appealing,” Bartolozzi said with a chuckle. “We as the radiologists are so strongly involved – considering the diagnosis is up to us, considering that most of the treatments are performed directly by the radiologists, considering that evaluation of tumour response is by radiologists. We are so deeply involved that we have to and to play our role at our best.”
A vital consideration in multiple sclerosis (MS) is that earlier diag-
nosis minimizes the potential for disease-related progressive dam-
age. Barkhof, from the department of radiology, VU University Med-
ical Center, Amsterdam, The Netherlands, explained: “The problem is zero.

Many patients with MS. He recommends using high field strength (7 Tesla) or

to identify smaller lesions with less signal-to-noise ratio, researchers are now investigating the capacity to identify smaller lesions in the cortex presents challenges to radiologists. (Provided by Prof. Majda M. Thurnher)

In addition, the field strengths of MRI units are constantly increas-
ing, and what was considered to be high-strength a few years ago, such as 1.5 Tesla, is now considered to be normal, he said. Although 3-Tesla systems are acceptable for diagnosis of suspected MS cases and have the capacity to identify smaller lesions with less signal-to-noise ratio, researchers are now investigating the capacity of the 7-Tesla machines. They are partly experimental, but can offer great advantages, because it is difficult to spot the smaller lesions in lower signal strength images, according to Barkhof.

Detection of small lesions situated in the cortex presents challenges to radiologists. One of the reasons why the McDonald criteria were introduced: Juxtaposition of the lesions in the cortex and not in the white matter appears to be important. Even under a microscope, they may require specific staining. These lesions can be in contact with the cortex, where no intervening white matter is seen, and although some lesions do extend beyond the cortex, some are completely con-
tained within the cortex and not in the white matter, he pointed out.

Speakers at this afternoon’s refreshers course will discuss the importance of early detection, new developments and treatment-related complications of imaging in MS. They will hear how Barkhof’s team is developing techniques that will detect these small lesions, either by using high field strength (7 Tesla) or normal pulse sequences at 3 Tesla. One of the new techniques under investigation is double inversion recovery (DIR), which can be used to highlight specific lesions in the cortex. DIR can be particularly use-

ful because lesions in the cortex and in the spinal cord are unique to MS. "Patients often wait until they have the next attack of MS, which may not occur for a year following initial investigations," he said. "A diagnosis of MS is based on showing disease dissemination in space and time. One of the main advantages of adopting the revised 2010 McDonald criteria is that the modifications allow the potential to demonstrate the dissemination of lesions in space and time. Moreover, the revised cri-
ters make it easier and quicker to form a diagnosis of MS."

Novel therapy options are also moving ahead for these patients, with drugs such as natalizumab significan-
tly reducing inflammation, but not all smooth sailing, according to Prof. Majda M. Thurnher, associ-
ate professor of radiology, depart-
ment of radiology, University Hos-
pital Vienna.

“There is a need for better monitoring of MS patients treated with new therapies. Unfortunately, MS patients treated with natalizu-

mab have increased risk for devel-
oping progressive multifocal leu-
enoencephalopathy (PML), which is a potentially fatal demyelinating disorder caused by the JC virus,” she noted. “PML was previously mainly diagnosed in the HIV population, and imaging characteristics in HIV-associated PML and natalizu-

mab-associated PML do not differ substantially.”

Attendees at today’s session will hear about key imaging features in diagnosing PML in MS patients treated with immunomodulatory therapy, and they will learn how to distinguish between focal MS lesions and PML, the risk of which increases with a longer treatment duration. Since both MS and PML result in demyelination, and clinical presen-
tation depends on white matter tract involvement, it is very difficult to clinically distinguish between them, she added.

Thurnher advises that in patients treated with immunomodulators, it is vital to look carefully for large white matter lesions, which might represent PML lesions rather than focal MS plaques. Think of PML when there are rapidly progressing white matter lesions in patients with lymphoma or other haematological malignancies with immunomodula-
tory therapy, she suggests.
Promising new contrast agents are more than ever improving visualisation of tissues and organs, as well as their function and inflammatory disease progression data, but experts still seem uncertain about exactly how and when to use the agents, particularly in renal insufficiency patients.

Today's refresher course on optimising contrast administration will serve to update ECR delegates on the latest thinking about media dose and administration techniques, and hopefully destroy any lingering doubts and myths about blanket contraindications in at-risk patients. The course will also highlight the importance of planning and patient management – or biopsy. This will lead to better detection of disease with greater sensitivity, and will certify disease spread with better specificity, or not contrast media could even be applied in end-stage renal disease.

"This is why my part of the session will appeal to general and subspecialist radiologists alike: respect the contrast media guidelines for NSF; stay away from high-risk contrast agents in suspected renal impairment and apply contrast media of the low or intermediate risk group with highest relaxivity at smallest dose", he advised.

While institutes across Europe continue to work on updating standardised approaches on fast multiphase CT, its increased use in the ageing population, due to the growth of CT angiography, for example, has fuelled the interest in reducing contrast media doses, injection rate and contrast media doses, injection parameters and the CT scanner used, it becomes simpler and far more comprehensible.

"Diagnostic information in elderly patients with co-morbidities such as diabetes mellitus, heart failure and reduced renal function need to be got from reduced volumes of media at lower kV", said Leander, noting there has been little development in CT contrast media itself and those on the market have been available for many years, but much has changed in administration strategies. "My talk is less about 'which' we use and more about 'how' we use it." His talk will focus on how to reduce volumes for patients at risk of impaired kidneys and the pre-medication of patients with contrast media allergies. In addition, optimal diagnostic yield linked to the speed of delivery, media volumes, as well as bolus-monitoring to time imaging in arterial or portal-venous phases will be covered. Scanning factors and scan timing will also form a key part of Geneva-based Dr. Xavier Montet's lecture about optimising PET-CT media administration. Leander warns delegates about the dangers of feeling pressured to cover all clinical questions in one CT exam that may yield suboptimal results. A CT dedicated to detecting a pulmonary embolism will not necessarily provide answers for abdominal questions, for example. "We may have to choose the best organ dedicated technique and appropriate imaging phase which may only answer one particular question, sometimes meaning that one has to repeat a CT for other questions," he said. "Tailoring CT protocols may appear complicated at first, but by understanding about human circulation, the tissue that should be enhanced, correct contrast media doses, injection parameters and the CT scanner used, it becomes simpler and far more comprehensible."

**Course attendees will hear about**

- Smart contrast media yet to be marketed, such as iron-loaded microspheres for demarcation of macrophages in inflammatory states, and lymph nodes. These agents containing ultra small particles of iron oxide (USPIO) can be taken into the vascular system structures in great detail from tissue to reveal necroses, occlusions and aneurysms.
- Course attendees will hear about organ-specific contrast media yet to be marketed, such as iron-loaded microspheres for demarcation of macrophages in inflammatory states, and lymph nodes. These agents containing ultra small particles of iron oxide (USPIO) can be taken into the vascular system structures in great detail from tissue to reveal necroses, occlusions and aneurysms.
- The diagnostic yield linked to the speed of delivery, media volumes, as well as bolus-monitoring to time imaging in arterial or portal-venous phases will be covered. Scanning factors and scan timing will also form a key part of Geneva-based Dr. Xavier Montet's lecture about optimising PET-CT media administration.
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Make sure you’re up to date on how to optimise contrast media administration, speakers urge...
Imagining plays major role in fight against head and neck cancers

By David Zizka

Organ-sparing surgery and radiation treatment such as intensity-modulated radiotherapy (IMRT) – often combined with chemotherapy – have increased the need for advanced imaging in the head and neck during pretreatment and post-treatment stages. Precise and vital, as any tumour that remains undetected outside the treatment field could adversely affect the patient’s prognosis and survival, according to Professor Vincent Vandecaveye, from the department of radiology at the University Hospitals Leuven in Belgium.

It is important to spot any tumour recurrence as early as possible, especially in the post-treatment phase, in order to avoid the best possible chances of salvage treatment. The most common imaging methods in the head and neck area remain CT, MRI and PET-CT; each comes with its own advantages and disadvantages.

When ECR Today asked Vandecaveye about his thoughts on the progress taking place in the field of MRI and how this could influence head and neck imaging he gave us a very promising answer: “Personally, I think the increasing ability of MRI to provide functional imaging assessment, for example diffusion and perfusion-weighted MRI, of head and neck tumours, staging, recurrence imaging or treatment prediction holds great promise. MRI not only a single-modality; I believe functional MRI techniques can provide a better correlate to metabolic imaging than the classic anatomical imaging sequences. The latter are of major interest in the development of hybrid PET-MRI systems. Functional MRI is quite difficult to perform in the head and neck, from a technical point of view, but the vast progress made in MRI-techniques including hardware and software developments, and the gradual increase in knowledge and experience in several centres will improve it.”

In the struggle against cancer we tend to only look at the possibilities offered by technology and science, which have, without doubt, become extremely sophisticated and effective in modern medicine. However, modern clinical practice also depends very heavily on a multidisciplinary approach, which is only possible through the establishment of clear communication strategies and teamwork within a hospital or department.

“I think the single most important component is direct communication with your clinician. Although there are clear guidelines for diagnosis and treatment; techniques and habits may vary depending on the individual surgeon, oncologist or radiation oncologist.”

Your report should of course primarily contain what we usually do in the majority of cases, such as describing the extent of lesions. In addition to that, it is useful to indicate abnormalities that are decisive for treatment and highlight them,” said Vandecaveye.

Tumour boards represent the perfect opportunity to directly communicate with clinicians and to discuss reports, if anything remains unclear. “From my experience, your head and neck imaging will create a false idea of a so-called one-size fits all but the vast progress made in MRI means that the topic is varied and interesting for radiologists, who should combine their knowledge of guidelines with their common sense, clinical abilities and reasoning. We should be aware; however, of what extent advanced imaging truly helps the patient and clinician. We probably have a better chance of reducing costs by trying to avoid overdiagnosis,” said Vandecaveye.

Another issue that is becoming more and more important in modern medicine is cost efficiency and its influence on the quality of diagnosis.

It is important to combine knowledge of the different imaging modalities’ abilities with clinical guidelines, which are quite well organised for head and neck cancer.

For instance, the risk of distant metastases increases significantly with nodal metastases at the low neck levels, and for these patients more stringent staging should be done in order to rule out distant metastases before initiating local therapy, which should be done with PET-CT.

However, there is no need to carry out advanced imaging for distant staging in patients with low risk locoregional disease, and in these cases costs can be safely reduced by just using chest x-ray and ultrasound of the liver for distant staging. “Sometimes these discussions about cost-effectiveness worry me as they create a false idea of a so-called one-stop-shop imaging modality that can solve all diagnostic problems. Of course this would be the holy grail, but I have rarely seen this happen in clinical reality,” said Vandecaveye.

Radiologists should combine their knowledge of guidelines with their common sense, clinical abilities and reasoning. We should be aware; however, of what extent advanced imaging truly helps the patient and clinician. We probably have a better chance of reducing costs by trying to avoid overdiagnosis,” said Vandecaveye.

The session on the fight against head and neck cancers will also feature talks by Dr. Frank Pameijer on ‘Building blocks for loco-regional staging of head and neck tumours’. Professor Minerva Becker on ‘Detection of tumour recurrence in head and neck cancer: challenges and pitfalls’ and finally, Professor Roberto Maroldi on ‘Locoregional treatment failure in head and neck cancer: causes and clinical implications’.

Finally, when asked why he would recommend this session to ECR attendees, Vandecaveye had this to say: “I think we have excellent speakers who have major experience in the field of head and neck cancer imaging, each covering different but complementary areas of expertise. At the same time the lectures provide a good mixture of daily practice, advanced imaging and future developments. This means that the topic is varied and interesting for radiologists, who deal with head and neck cancer while working in a more general setting, and radiologists who work in a more specialised setting. Finally, we provide a close correlation between imaging and clinics which also brings the topic closer to clinical practice.”

Clinical Corner

Monday 11 March 2013

Special Focus Session

Monday, March 11, 08:30–10:00, Room N/O

SF 16b: Head and neck cancer battle: the power of imaging studies

• Chairman’s introduction
  V. Vandecaveye, Leuven/BE

• Building blocks for loco-regional staging of head and neck tumours
  F.A. Pameijer, Utrecht/NL

• Detection of tumour recurrence in head and neck cancer: challenges and pitfalls
  M. Becker, Geneva/CH

• Locoregional treatment failure in head and neck cancer: causes and clinical implications
  R. Maroldi, Brescia/IT

• Panel discussion: Advanced imaging in clinical practice: how does it help the patient?

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Many radiologists are not sufficiently trained in, or familiar with, the spectrum of MRI to appreciate the variants leading to unnecessary examinations and follow-up that rarely yields definite answers. Radiologists must therefore be familiar with the changes in the brain in relation to the processes of myelination and brain maturation, particularly in the first two to three years of life, according to Dr. Andrea Rossi, head of the department of paediatric neuroradiology at G. Gaslini Children’s Hospital, Genoa, Italy (see Figure 1).

At today’s refresher course on paediatric variants, he will outline why incidental findings constitute a major pitfall in paediatric brain imaging. Most cases of pituitary or pineal gland cysts are normal, but they are often reported, resulting in a repeated MR scan. Moreover, in neonate brain imaging, normal large pericerebral spaces are often confused with atrophy, as is transient shrinkage of the brain with enlargement of the ventricles and subarachnoid spaces in patients undergoing steroid treatment.

“Many general radiologists are familiar with paediatric musculoskeletal (MSK) imaging, but it is not uncommon to see a number of ‘adult misorientated’ x-ray reports each year, according to Dr. Fermin Saez, head of paediatric radiology, Cruces University Hospital, Barakaldo, Spain. Usually x-ray is the only imaging required to differentiate between normal variants and significant pathologic entities. However, in unclear cases, other modalities, or even a biopsy, may be needed to make the right diagnosis. Overuse of these techniques, as well as potential ensuing family anxiety, should be avoided through careful combined analysis of the x-ray and clinical findings, he warned.

The most common mistakes are related to normal irregularities in the ongoing ossification of the infants visualised in x-ray, especially when these irregularities are asymmetric. In Saer’s experience, epiphyseal irregularities, such as osteochondrosynthesis (see Figure 2), and the distal femoral cortical irregularity (Figure 3) are the more frequent sources of errors. In rare cases, ultrasound and MRI are the preferred methods in children when the diagnosis is not straightforward in x-ray. In some cases a bone scan or CT can also solve the problem.

CT is commonly performed for congenital or developmental abnormalities. However, the main scenario for the use of MSK CT is in polytrauma when paediatric patients may not be able to cooperate with positioning, leading to poor quality plain films. In these cases, CT allows the evaluation of fractures in locations too difficult for depiction on a x-ray, such as the pelvis, spine, and any joint.

Although dose reduction systems for CT, the use of appropriate child-size machine settings, with iterative reconstruction systems, make this technique more patient-friendly, concern over radiation risks in young patients has led to an increased use of non-ionising imaging techniques such as ultrasound and MRI. Ultrasound is the primary means of ruling out developmental hip dysplasia, while MRI is the preferred method for a thorough evaluation of soft tissue and mediulary lesions.

In recent years, paediatric imaging has benefitted from several improvements, including different view settings in digital plain film to display bone and soft tissue adequately, high-resolution ultrasound probes that provide good spatial resolution of soft tissue and superficial bone lesions, smaller coils that improve signal to noise ratio for the MR study of small joints, and new immobilisation techniques that help in keeping the child still, reducing the need for sedation in some cases. Hybrid techniques are also becoming increasingly recognised as useful tools for MSK oncology, and in future, paediatric total body MRI, PET-CT, and PET-MRI may be more widely used for multifocal pathology and metastatic disease. For now, centres still need well-trained technicians and radiologists to perform appropriate immobilisation, positioning and collimation, and are mandatory for obtaining a good quality x-ray examination, according to Saer.

“Most radiologists have to tackle plain films performed in patients of any age, including children,” he said. “Count to three, and consult the literature available on normal variants before interpreting plain films with supposedly abnormal findings.”

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**Figure 1.** Top MR images of a normal individual at three months show the physiological lack of myelination at this age. Bottom a pathological example of the same myelination disease (Pelizaeus-Merzbacher disease), in which the cerebral corpus callosum myelin does not form. The two sets of images are essentially clinical, the only significant difference being the age of the two subjects. Knowledge of the normal age-dependent appearance of myelination on MRI is necessary in order to correctly discriminate what is normal and what is not. (Provided by Dr. Andrea Rossi)

**Figure 2.** Irregular ossification of the posterolateral condyle in a 10-year-old boy. A, B: plain films show fragmented ossification at the posterior condyle, not to be confused with osteochondritis dissecans. C: MRI shows normal overlying cartilage. The site of the irregularity is the posterolateral condyle, not to be confused with osteochondritis dissecans. C: MRI shows normal overlying cartilage. The site of the irregularity is the posterolateral condyle, not to be confused with osteochondritis dissecans. In Saer’s experience, epiphyseal irregularities, such as osteochondrosynthesis (see Figure 2), and the distal femoral cortical irregularity (Figure 3) are the more frequent sources of errors. In rare cases, ultrasound and MRI are the preferred methods in children when the diagnosis is not straightforward in x-ray. In some cases a bone scan or CT can also solve the problem.

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**Figure 3.** Irregular ossification of the posterolateral condyle in a 10-year-old boy. A, B: plain films show fragmented ossification at the posterior condyle, not to be confused with osteochondritis dissecans. C: MRI shows normal overlying cartilage. The site of the irregularity is the posterolateral condyle, not to be confused with osteochondritis dissecans. In Saer’s experience, epiphyseal irregularities, such as osteochondrosynthesis (see Figure 2), and the distal femoral cortical irregularity (Figure 3) are the more frequent sources of errors. In rare cases, ultrasound and MRI are the preferred methods in children when the diagnosis is not straightforward in x-ray. In some cases a bone scan or CT can also solve the problem.

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**Figure 4.** General views of the examination arena in this workshop. A: Dr. Francesco Rossi, Genoa/IT. B: Dr. Fermin Saez, Barakaldo/ES. C: Dr. Andrea Rossi, Genoa/IT.**
Applying Formula One-type methods can help smooth the way in urogenital emergencies

By Edna Arthur-Ward

There is no single gold standard for training teams in medicine, but it can pay off to adapt team-working principles from other high-reliability industries such as aviation and Formula One motor racing and integrate them into crisis resource management training, according to emergency room (ER) radiologists.

"Only by continuously evaluating what you do, will we be able to improve our skills and understand the blind spots of our knowledge," said Dr. Vibeke Løgager, from the department of diagnostic radiology, Hospital Herlev, University of Copenhagen, "Emergency urogenital imaging, always expect the unexpected."

It is important that the receiving doctors have the relevant clinical information in order to understand whether or not the patient has suffered a high or low energy trauma, and therefore the clinical examination and information given in the ER is very important. It is crucial that the team receiving the patient is trained in heavily wounded patients since time is valuable, she noted.

ECR delegates at this morning’s categorical course will hear speakers discuss how radiologists can prevent diagnostic errors in trauma first and in the process and how good follow-up management may contribute to a reduction in morbidity and mortality.

"Imagine a patient with a small subcutaneous haematoma or a haematoma. This patient suffers a mild fall trauma, and due to the pain, is taken to the ER and the primary exam includes analysing how much urine is indicative of not visible haematoma, or micro-haematuria," explained Løgager. "Stick to your guidelines/algorithms of patients with suspected patient aged over 40 with microscopic haematuria. If there is no clear fracture, one must rule out cancer whether there has been an accident or not. If the clinical picture and the urine are not the same, then one should always expect the unexpected."

If the patient is stable, it thinks it is worthwhile doing the full phase scans to ensure clinical colleagues have the necessary information to make the right decisions. Radiologists should aim for the maximum imaging of the patient is stable, but if this is not the case, minimise imaging and go straight to the operating room, she recommends.

When dealing with urogenital imaging emergencies, the most important requirement is having specialist knowledge and promotion effective collaboration between clinical radiologists and multidisciplinary teams who are trained in working together. She cautions against complacency: because experienced radiologists know what to expect and have for in different trauma cases, mistakes can be made, for instance when radiologists find one cause of haematuria (or cause of disease), they tend to stop and think the problem is solved. We should always avoid jumping to conclusions and consider if there are other possibilities, she said.

Close monitoring and early intervention contribute to a reduction in morbidity and mortality in urogenital imaging, according to Dr. Sanjay Agarwal, consultant diagnostic and interventional radiologist at Wrexham Maelor Hospital, Wrexham, U.K. He considers it important to keep the patient's bladder pressure low noting that high pressure in the bladder is reflected back into the ureter and the kidneys and is the cause of most problems, especially in cases of infection and deterioration of renal function, leading to kidney damage.

Regarding follow-up of patients with bladder dysfunctions, he advised that there is no agreed follow-up schedule, but in general, two yearly ultrasound scans and plain x-ray of the kidney, ureter and bladder should be followed. However, if the patient is symptomatic or the symptoms are not explained by plain radiographs and ultrasound, he cautions that there should be a very low threshold for further imaging.

"Cross-sectional imaging is not always routinely used at present – CT due to radiation dose and MRI due to logistics and availability. I am, however, a strong advocate for early and if necessary frequent use of these modalities with caution and dose optimisation," Agarwal said. "Until a few years ago, use of intravenous urography was routine in several centres, now a CT KUB (unenhanced renal tract CT) can be carried out with lesser dosage and more information. In my opinion, the ultra low-dose CT is the way to go, coupled with judicial use of MR urography."

"Image should be part of good follow-up protocols, which also includes clinical consultation and aurodynamics assessment, he continued. All these are important to reduce long-term problems with bladder dysfunction, but certain protheses can make imaging more difficult, such as spinal or other bone metal devices used for fixation of trauma or corrective spinal surgery for deformity. Prostheses associated with these implants that may also cause imaging difficulties are neutronodemination devices such as socal nerve stimulators or artificial sphincters."

Agarwal believes that it is especially important to address sexual dysfunction as an integral part of management of patients.

"The needs are obviously different between males and females, depending on the cause and extent of physical disability and level of spino damage. It is not only important to manage the physical and neurological aspects, but also evaluate the psychological and emotional needs," he said.

Currently, there is ongoing research for management of neurological bladder dysfunction. In the short-term, simple things such as safer tube drainage using biofilm blocking and dispersive agents and closed tube drainage systems may help with reduction in infection rates. More complex research is being conducted from multipleangles, for example application of gene therapy (use of herpes simplex virus-derived vectors, etc.), development of new medicine (affinant pathway drugs) and tissue regeneration (tissue-engineered autologous augmentation cystoplasty). All will have role to play in future management of these patients, making this a very exciting time, Agarwal pointed out.

Like Løgager, Agarwal believes imaging evaluation is a relatively easy task in this group of patients, more importantly, you need a multi-disciplinary approach to patient management with a full understanding of the pathophysiology and clinical implications, he said.

To deal with these patients requires dedication, empathy and focused interest in the subject. Very promising research is being done in this area, and it will improve long-term outcomes and further reduce morbidity and mortality, he concluded.
Radiologists must pay attention to dose reduction strategies and watch out for diagnostic pitfalls in paediatric imaging

By Mélisande Rouger

Mistakes are inevitable in clinical practice. In paediatric imaging, pitfalls may be encountered when diagnosing diseases, but may also arise as a result of inappropriate radiation protection strategies. Some settings can be particularly challenging for non-specialists, who must remember that pathologies look different in children. Experts will present common pitfalls and explain how to avoid them during a dedicated Special Focus session today at the ECR.

Radiation protection is vital when considering potential mistakes in paediatric imaging, explained Dr. Paolo Tomà, a paediatric radiologist at Bambino Gesù Children’s Hospital in Rome. “The main mistake in paediatric radiology could be not to optimise the technique and not to control the dose of radiation,” he said.

In Europe, many hospitals do not have a dedicated paediatric imaging department and a lot of paediatric imaging is done by non-specialists, who tend to be less aware of radiation dose optimisation strategies, which are tailored to paediatric patients. This can lead to children being exposed to unnecessarily high doses of radiation, particularly in trauma radiology, where CT is often the first modality used to rule out bleeding and other life-threatening injuries.

“If you leave a CT scanner on the adult setting, it will of course be too much radiation for children. Paediatric radiologists know about these protocols, but very often examinations in children are carried out by other specialists, who are not so focused on this issue. They may use the adult setting for children, which is a big problem, so this is why we have to spread this knowledge,” Tomà explained.

Speakers will also focus on common diagnostic pitfalls in three different regions of the body, starting with the abdomen, where the anatomy of infants and children differs quite significantly from adults. Radiologists must be aware that even pathologies look different in children, whose organs are still growing. When using ultrasound, the gold standard of paediatric imaging, tissues and organs can also be difficult to image, especially if the patient is overweight.

The anatomical difference between an adult patient and a child, or newborn, is even more apparent in imaging the central nervous system (CNS), Tomà said. “Images of the developing brain differ massively according to the age of the patient. In young patients, radiologists mainly look for malformations and metabolic diseases. MR spectroscopy is the best tool to diagnose metabolic diseases, which means that the radiologist performing the examination needs to have a thorough knowledge of this technique. “MRI is a much more complex modality than US or x-ray examination. Here as well, children’s anatomy and the developing body must be considered. These differences can be particularly challenging in the trauma setting, the radiologist pointed out. “All the pieces of the skeleton are not fused in a child, who has cartilage between the pieces, so it means that the appearance of trauma injuries may be very different,” he said.

The shape and the nature of diseases vary a lot as well, and osteomyelitis looks different in children, while juvenile arthritis is typical.

In addition, the session’s experts will address the current controversies regarding the approach chosen for US screening programmes for the development of hip dysplasia. “We have to discuss whether screening should be universal or selective in paediatric patients with familiarity or clinical signs. We will evaluate the problems and mistakes linked to both approaches,” Tomà concluded.

The type of disease in question also depends on the age of the patient. In young patients, radiologists mainly look for malformations and metabolic diseases. MR spectroscopy is the best tool to diagnose metabolic diseases, which means that the radiologist performing the examination needs to have a thorough knowledge of this technique. “MRI is a much more complex modality than US or x-ray, so that’s another difficulty to take into account,” he said.

Patterns also look different in paediatric musculoskeletal (MSK) imaging, whether one performs a US, MRI or x-ray examination. Here as well, children’s anatomy and the developing body must be considered. These differences can be particularly challenging in the trauma setting, the radiologist pointed out. “All the pieces of the skeleton are not fused in a child, who has cartilage between the pieces, so it means that the appearance of trauma injuries may be very different,” he said.

The shape and nature of diseases vary a lot as well, and osteomyelitis looks different in children, while juvenile arthritis is typical.

Ultrasound screening of hips. Developmental dysplasia of the hips with a severely dislocated hip.

Brain MRI: Left frontal dermoid. Fibre tracking overlaid on the isotropic diffusion map. Displaced (medially) and thinned out inferior fronto-occipital fasciculus on the left side due to tumour compression (All images provided by Dr. Paolo Tomà)
Structured reports and learning about dosimetry can improve quality and workflow efficiency

By Rebekah Moan

Harder, better, faster, stronger – it’s not just a song; it could also be the mantra for radiologists as they try to improve workflow efficiency and quality. This morning’s computer applications refresher course will cover radiology reports and dose management, plus computerised order entry. Enhancing radiology reports and becoming more familiar with dose management regulations and registries can help in this process.

When it comes to reporting, there are two types of structures: clinical and technical. Clinical structure is important because it conveys information to someone else about a patient. Technical structure is important because it allows for the easy (sometimes not-so-easy) transfer of images and reports from one institution to another.

“In radiology, we can’t give normal or abnormal reports – these are complex texts,” said Dr Neelam Dugar, consultant radiologist at Doncaster Royal Infirmary, U.K., and former chair of the U.K. Royal College of Radiologists’ Imaging Informatics Group in an interview with ECR Today. “We’d like the conductor of the orchestra. I’d like that analogy because we’re hugely involved and giving a direction to the way the patient needs to be managed.”

Dugar structures clinical reports to include the indication (why the test is being done), findings, description, conclusion, and recommendations. Radiologists don’t create reports for themselves, they create reports to communicate, which is why the format, structure, narrative content, and technical aspects need to be clear and easy to follow, she added.

“There have been lots of talks about structured reports,” she said. “Often the previous talks have been about how we can structure the narrative content into drop-down menus, which is not possible for complex imaging. Radiology reports are opinion. Disease doesn’t follow the rules, and that’s why you can’t have computers diagnosing patients.”

Much of the complexity lies in the technical structure. While it sounds like it would be an easy task to send images and reports somewhere else, it can be quite troublesome. It’s fairly easy to transfer images because of DICOM standards, but trying to transfer reports from one place to another may be difficult, Dugar said.

“We have suddenly ended up with very bad practices that are going forward to PACS,” she remarked. “The worst practice we’ve ended up with is ordering reports and images in an electronic world. That is causing enormous problems. Radiologists would have had the request, they would have looked at it in a proper light, and suddenly those images go off to somewhere else.”

For instance, a radiologist in another hospital may be asked by someone to take a look at the images. The individual has no prior knowledge of what has gone on and there is a danger of giving an inaccurate, incomplete report. Because there is no report, a radiologist has to generate a new one and time has been wasted, Dugar explained.

It’s important to bring together both sides of structured reporting, and from a clinical perspective, we need to indicate what we want from structured reports, she noted. In her lecture, she also aims to focus on the IT aspects of the entire process.

Another problem area is radiation dose. Prof. Eliseo Vaño, professor of medical physics in the radiology department of the Complutense University of Madrid in Spain and at the San Carlos University Hospital, will focus on this area during today’s session.

The European directive on radiation doses, to transfer these values to patient protection departments and interventional systems, he said. Patient dose limits do not apply, but diagnostic reference levels (DRLs) will be used to help optimise clinical procedures. The new European directive will require a periodic update when new technology can allow patient radiation dose reduction while maintaining enough image quality, Vaño added.

“These requirements will push the industry and the users to develop better strategies to evaluate patient doses, to transfer these values to the patient reports – contributing to the patient dose tracking system – but also to offer software to process these dosimetric data and to do some automatic analysis,” he said. Radiologists need to learn about dosimetry because the knowledge of patient doses and the estimation of radiation risk is a key point when justifying some imaging procedures and helpful when selecting the most appropriate imaging modality, he noted. Radiologists and radiographers have to optimise the procedure, or use the appropriate protocols to obtain the necessary diagnostic information with the lowest radiation dose compatible with the needed image quality.

Vaño’s talk will cover aspects of dosimetry because the knowledge of patient doses and the estimation of radiation risk to the population, “he concluded.

Refresher Course: Computer Applications
Monday, March 11, 10:30–10:50, Room Q

ECR 1405: Improving workflow efficiency and quality

▼ Chairman’s introduction
D. Caramella, Pisa
▼ A. Improving quality and efficiency of computerised order entry through decision support
P. Mildenberger, Mannheim/DE
▼ B. Improving quality and efficiency of reporting by structure and templates
N. Dugar, Doncaster/UK
▼ C. Improving quality and efficiency of dose management through exchange between modalities and registries
E. Vaño, Madrid/ES
▼ Panel discussion: Will novel IT tools really improve quality and efficiency in daily radiological practice?
X-ray equipment vendors turn the spotlight firmly on women's health issues and dose reduction

By John Bonner

Women's health appears to be top of the agenda for the digital radiography equipment manufacturers displaying their wares at the technical exhibition at ECR 2013. Several of the leading companies are using the congress as an opportunity to unveil their latest technologies in the mammography field, and they hope to make routine breast cancer screening safer, faster, more accurate and less stressful.

Siemens has a proud history of innovation in the mammography arena, having developed the first tungsten anode tubes for this purpose. This year the company is presenting another development intended to reduce the dose required to produce optimal quality images. Called Mammomat Inspiration Prime Edition, it can reduce the average dose per examination by 30%.

“We are always motivated by the desire to provide the highest possible image quality with the lowest dose necessary. But with mammography, we can never forget that the people whom we ask to come in and be screened are healthy women, not patients. For that reason it is even more important that their safety is taken very seriously,” said Dr. Axel Hebecker, director of marketing for Siemens women’s health business.

The new product is based on a new reconstruction algorithm named PRIME, which stands for Progressive Reconstruction, Intelligently Minimising Exposure. “In conventional systems, there is a grid between the breast and the detector to absorb any scattered radiation. But these also absorb some of the essential primary radiation needed to produce the image,” he explained. “Our algorithm eliminates the need for the grid by identifying the structures that cause scatter and recalculating the image. This reduces the primary radiation needed to produce the image. A study carried out by one of our academic partners, Prof. Detlev Uhlenbrock in Dortmund, showed that the reduction varies according to the volume of breast tissue, and it is greater in women with smaller breasts.”

The new technology is also intended to reduce the risk that women will find their examination an uncomfortable experience. The system features the OpComp function, which applies compression only as long as the patient’s breast is soft and pliable, and for best image quality, it stops at the point of optimal compression. Also, to keep patients relaxed during the scan, the new technology is presented with a LED light panel that creates light conditions according to the patient’s personal preferences.

The new product aims to lighten the load of technical staff carrying out mass screening operations. After an examination is completed, the system automatically opens the patient scheduler, and the next patient is selected with just one click and the user interface is set for the whole examination. The system selects a single-touch rotation with a pre-set angle, and with a single click the tube head is moved into position for the next procedure, Siemens stated.

Concerns about radiation dose is not the only reason why many women find the process of undergoing mammography screening to be a challenging experience. Research carried out by GE Healthcare suggests that the environment in which the examination is carried out also deters many women from taking part. The company hopes to change that with its SensorySuite, which creates a customised environment involving sight, smell and hearing during the mammography procedure.

“Compliance rates for annual mammograms have long been an issue. In fact, one in four women avoids a mammogram because of worry and fear,” explained Prahlad Singh, general manager for women’s healthcare. “SensorySuite is designed to reduce perceived patient anxiety by giving them control over their experience, and this should help us fight breast cancer by encouraging early detection.”

The process begins before women arrive at the mammography clinic. They watch an online presentation on the facility’s website that explains what will happen. Women can learn more by looking at a tablet PC in the clinic waiting room, and they can choose the sights, sounds and smells that they will experience during the actual examination.

“Healthcare is very personal and this is certainly true of mammography. SensorySuite is a great example of the intersection of technology and the human side of healthcare,” said Hooman Hakami, GE’s chief executive, detection & guidance solutions. “We are confident that women around the world who experience SensorySuite will see that GE not only strives to develop great technology, but that we also aim to develop solutions that approach every element of the care continuum with empathy, feeling and respect.”

While GE researchers are working to restore the ‘art’ of providing good medical care, Fujifilm is focused firmly on the science.

“On our digital radiology stand this year, we will be demonstrating a new mammography system featuring a completely new a-Se (amorphous selenium) detector, which gives outstanding performance in terms of dose reduction, speed and...”

continued on page 18
continued from page 17

detection accuracy, said Joerg Muel- ler, digital radiography (DR) product manager with Fujifilm Europe. “The new component offers an additional 20% dose reduction compared with our previous detector, which was already one of the most efficient systems on the market. At the same time, we have improved the sharpness of the images produced to a level we believe is unique in the current market.”

The system, called the FDR Ama- let Innovality, fully supports 3D mammography examinations, and provides different tomosynthesis modes in terms of dose and angula- tion, which enables the user to be more flexible, depending on each case. In addition, the system allows the technician to take direct 3D mammograms in routine use within standard 2D dose levels, which can improve diagnostic confidence in routine mammography. The first 3D mammography studies have shown a significant reduction of false positives close to 40%, which helps to reduce the number of biopsies needed, he explained.

At ECR 2013, Philips is also displaying mammography equipment (an update to its MicroDose Mammography SI technology), but the company is putting particular emphasis on DuraDiagnost, a flexible range of DR systems designed for healthcare providers with a smaller budget but a demand for fast digital workflow. It offers customisable room configura- tions and the ability to use a track and due to its low radiation foot print, all DuraDiagnost units fit into examina- tion rooms with a normal ceil- ing height. Workflow features like a floating table top or default source to image–receptor distance (SID) pos- itions simplify the processes followed in the examination room, according to the company’s statement.

The product is equipped with fixed rather than portable detectors. To provide smooth workflow in the examination room, it has the SmartOne button for easier geom- etry movements and EasyAlign to indicate correct alignment between the detector and tube.

One of the highlights at the Shimadzu booth is the Trinias F12 angiography system, which comes in the form of a floor-mounted C-arm and features a 30.5 cm flat-panel detector with a field of view able to cover the entire body to support cardiovascular and angiographic procedures. The field size is switchable in five steps, and the smallest coverage is used in cardiovascular and neuro-interventions. The unit also features a six-axis triple-pivot construction, which achieves a range of coverage close to that of a ceiling-mounted unit.

At the Toshiba booth, the focus is on the SpotFluoro feature on the company’s Infinix Vascular imaging system. It can reduce the radiation dose needed per examination by up to 80%, without sacrificing func- tionality, image quality or field of view, noted the vendor. This benefit is due to an improvement on tradi- tional collimation methods used to reduce the dose needed by localising the image to the main region of inter- est. Normally, this will involve fixing the limits of the image to a position symmetrical with the whole field- of-view. The new approach allows any symmetric or asymmetric region of interest to be chosen without the need to move the patient table. SpotFluoro combines last image hold (LIH) with the collimated live fluoroscopy image, giving the full field-of-view at a minimum dose. It allows the operator to maintain the full overview of the region of inter- est and its surrounding anatomical markers and references.

Spot Fluoroscopy is like having an adjustable spot light over the refer- ence LIH image, helping to reduce dose exposure and allowing the cli- nician to view the critical region of interest and the surrounding area at the same time,” said Mark Hol- miahw, vice president of sales and service at Toshiba Medical Systems Europe.

Agfa HealthCare is introducing the new CR 12 X TABLET computed radiography system at the ECR, and is showcasing a portfolio of digital radiography (DR) systems that use its Musica2 image processing soft- ware. These include its mobile DR products, as well as high-perform- ance DR rooms such as its DX-D 600 system.

Carestream has developed the DRX 2530C detector as a work- in-progress. The caesium iodide detector is designed to offer high efficiency for dose-sensitive paedi- atric, orthopaedic and general radiology examinations, and is intended to be used with the DRX- Revolution or DRX Mobile Retrofit Kits for mobile imaging of neonatal or paediatric patients. The smaller detector is designed to fit into pae- diatric incubator trays.

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- Friday, March 8 to Monday, March 11: 10:00–18:00

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New FPD technology in digital x-ray drives modular future

By Stephen Holloway

The fundamentals of static x-ray imaging have changed little in decades, yet the majority of radiologists to pay scant attention to developments in this sector. However, the emergence and increasing use of flat panel detector technology (FPD) has brought surprising results, improving workflow, image quality, cost of ownership and patient safety. Below, we discuss how FPD technology is shaping the future of x-ray imaging.

**Fixed room x-ray**

Fixed FPD x-ray rooms have become a mainstay of general radiography in Western Europe, offering near instant processing, lower dose and near-seamless integration with healthcare IT solutions. While the initial cost of these systems caused many to question the benefits of FPD over analogue and computed radiography (CR), technology manufacturers have clearly established the long-term benefits in workflow and life-time cost of ownership.

The main beneficiaries of this shift to FPD have primarily been larger hospitals and imaging centres, here reducing processing time across large-scan volumes has significant benefits both in terms of efficiency and cost. More recently, projects adoption of automated, multi-plate systems and tables will further drive gains in efficiency, a positive outcome for many healthcare providers struggling with current levels of austerity.

Another notable trend has been the creation of a tiered FPD fixed room market, providing more options in terms of configuration and panel type, allowing customisation for the requirements of each unique user. Increased availability of lower priced fixed room systems is also forecast to rapidly increase avenues of FPD systems in smaller institutions and emerging markets, particularly with panel prices continuing to decline year-on-year.

**Mobile**

The evolution of mobile x-ray equipment has also been heavily shaped by FPD technology, particularly with more widespread use of wireless FPD panel technology. Mobile x-ray has often been overlooked as an account of the lower price of systems and relatively low utilisation compared to fixed-room systems. However, mobile digital x-ray systems offer even greater rewards in terms of efficiency, workflow and cost saving over system lifespan than fixed rooms.

A large portion of mobile x-ray use occurs with patients too unwell or critical to be taken to the fixed system, most commonly in the intensive care or emergency medi- cation scenarios. Using wireless FPD mobile x-ray, many radiologists are finding the current level of the detector is improved, thereby reduc- ing risk for the patient and workflow processing and review achieved in FPD also removes the need for the user to return to central processing locations to check the image, cutting out any need for the radiographer to return later to re-do the same scan.

Wireless FPD mobile x-ray fur- ther offers inherent flexibility for hospitals, allowing sharing of wire- less panels between mobile systems, or even between fixed-room and mobile systems. While in many large healthcare institutions equipment is in near-constant use, smaller facil- ities can make significant savings.

**Retrofit**

In terms of increasing accessibility to digital FPD x-ray, the develop- ment of retrofit FPD x-ray solutions could have the greatest impact of all. While onlookers may view these upgrades as a short-term response to the current challenging economic climate, it may in fact bring FPD digital x-ray imaging within reach of those that need it most. In the wider EMEA region, many parts of Eastern Europe, the Middle East and Africa remain critically underserved by ageing analogue x-ray systems. Assum- ing FPD prices continue to decline as has been observed in the last 5 years, retrofit FPD solutions could soon be affordable users in these regions. Furthermore, an increas- ing number of vendor-neutral retrofit solutions are commercially available, allowing more flexibility and choice for users.

**Conclusion**

The changes discussed above have all developed through produc- t evolution of one technology, refining and developing products based on the demands of users in today’s challenging healthcare market. FPD technology applied across all forms of general radiography is now allowing far greater customisation of systems, evolving towards a truly ‘modular’ market. Yet at the same time, making real changes to the way x-ray imaging is conducted, increasing efficiency, saving money and providing tangi- ble opportunity for emerging mar- kets to adopt 21st century imaging. Maybe it’s time to take a closer look at what’s on show in the x-ray exhibit this year.

Stephen Holloway is a senior market analyst in the healthcare IT research group at Medica, a division of InMedica (NYSE:IHS). InMedica is a provider of market research and consultancy in the medical electronics industry (www.in-medica.com).

**Next generation MRI: integrated, affordable, progressive, accessible?**

By Stephen Holloway

Development of MRI technology has reached an extended expectation in the last decade, boosted by advances in high-field magnet technology. Manufacturing processes and power and analogue digital processing processes; they have even managed to develop a quite one.

Such progress has placed MRI at the pinnacle of advanced imaging technology, while also providing a flexible platform for use in multi- ple clinical disciplines. However the demand of modern healthcare is changing the way MRI is used. The majority of hospitals and facilities in Europe currently rely on scanners supplied by major hospitals and facilities in Eastern Europe, the Middle East and Africa has become big busi- ness, driven by strong economic growth and huge demand for improvements in healthcare serv- ices. Yet, investment in advanced imaging, most notably MRI, in these regions has been restricted to major hospitals in metropolitan areas. However, average sell- ing prices have continued to fall with improvements in technol- ogy, manufacturing processes and increasing supplier competition. This has led to the emergence of ‘value’ MRI, relatively low-cost systems (mostly 1.5T field strength) with solid performance and image quality but few advanced features. The economic downturn has admittedly slowed uptake of these systems more recently; how- ever demand is projected to rise in the next two or three years pro- viding a major opportunity for users. Most evident has been the clear shift in focus of manufacturers towards workflow and managing the cost of ownership for health- care providers. The emergence of hybrid IT in the last decade has demanded improved workflow solutions from imaging solutions, further facilitated by increasingly stringent legislation across many countries regarding advanced imaging. Combined, these factors have driven signifi- cant progress in scan-speed, meas- urement, processing and archiv- ing.

*Workhorse* MRI

While the majority of the evidence discussed here suggests MRI differ- entiating into ‘user-defined’ groups of systems, manufacturers are customising their current and future systems to better understand diseases such as Alzheimer’s Syndrome, Osteoarthritis and in diagnosis and decision making in the treatment of critical spinal lesions. Many questions and concerns remain around the potential safety and scalability of MRI, despite this, initial results with research suggest it will feature heavily in the future of advanced imaging.

*Ultra-High-Field* MRI

MRI will also remain a constant at T1 MRI systems for research are already highlighting the future potential when exploit- ing this unique imaging modality. Recent investigations are provid- ing a fascinating insight into the potential of such technology for better understanding diseases such as Alzheimer’s Syndrome, Osteoarthritis and in diagnosis and decision making in the treatment of critical spinal lesions. Many questions and concerns remain around the potential safety and scalability of MRI, despite this, initial results with research suggest it will feature heavily in the future of advanced imaging.

**Conclusion**

The changes discussed above have all developed through produc- t evolution of one technology, refining and developing products based on the demands of users in today’s challenging healthcare market. FPD technology applied across all forms of general radiographic highlighting how advanced tech- nology can be used safely to pro- vide accurate, high quality images for diagnosis across a vast range of clinical fields and applications. Future obstacles to development will undoubtedly slow or divert the future development of MRI equip- ment, be it economic, legislative or political. However, as the trends and evidence observed above demon- strate, MRI is set to play a lead- ing role in the future of diagnostic imaging.
Top radiologists read more than just images
Accurate models of tumour motion to guide next generation treatments of lung cancer

By James Martin and Jamie McClelland

Lung cancer is the most common cancer in the world, with less than 10 percent of those diagnosed surviving for more than five years. Radiotherapy is an important method available to clinicians, with treatment occurring over a series of fractions. The use of cone-beam CT to position the patient immediately prior to each fraction has greatly improved the accuracy with which the tumour can be aligned with the intended dose. However, breathing motion still remains an issue. If this can be accounted for then margins around the tumour could be shrunk, sparing healthy tissue and increasing the dose delivered to the cancerous region.

Our approach involves enhancing the appearance of the tumour in the cone-beam CT, and relating the motion seen to an external breathing trace. Figure 1 shows how visibility of the tumour is improved after enhancement. A motion model is used, which can accommodate for changes in inhale and exhale tumour trajectories, length of breathing cycles and depth of breathing. Markers are not needed, avoiding the surgical risks and inconveniences associated with implantation of markers. We use the VisionRT optical imaging system to obtain a 3D representation of the patient’s chest (Figure 2). This system allows the patient to be monitored continuously throughout treatment without delivering an extra dose. The patient and fraction-specific motion model provides a prediction of tumour position for each real-time chest surface; hence we intend our method to drive cutting-edge gated or tracked radiotherapy treatments.

For our simulated case, compared to assuming the average tumour position, mean error was reduced from 4.1 to 1.0 millimetres, with maximum errors reduced from 16.5 to 4.0 millimetres. For our patient datasets, our results provided mean absolute errors under 2.5 millimetres when compared to clinically identified tumour centres, with maximum errors under 7.5 millimetres. The patient data included a case where the patient may have coughed during the cone-beam CT. See Figure 3 for reconstructions before and after motion correction. Note that since only the tumour motion is being accounted for, anatomy outside this region will appear more blurred. Accounting for motion of other anatomy (e.g. organs at risk) is the focus of future work.

For more detailed information, please see:


Improvement of tumour visibility in cone-beam CT projection during and after tumour enhancement.


Planning to take a taxi?
Why not help reduce pollution by sharing it with others?
Rise of mobile technology brings risks as well as benefits

By Simon Lee

Tablet computers can be a surprisingly divisive subject. The passion with which some people argue the relative merits of competing devices and operating systems can be almost frightening. In the field of medicine, however, there appears to be very little argument about the top product, with professionals from many disciplines enthusiastically embracing the iPad as a tool for research, education and general communication.

Instead the most important debate is focused elsewhere, on matters of data security and patient privacy.

As mobile technology spreads throughout the hospital, data naturally follows, and it is slowly falling into the hands of an increasingly broad spectrum of people. Radiologists and clinicians therefore need to be aware, not just of the many mobile applications and resources that can potentially aid their work, but of the associated risks and best practices concerning the use of tablet technology.

“When it comes to the iPad, it’s the same for radiologists as it is for everyone else, everyone wants to use them,” said Dr. Erik Ranschaert, staff radiologist at the Jeroen Bosch Ziekenhuis teaching hospital in ’s-Hertogenbosch, the Netherlands. “I use mine to keep up with literature and store important articles, to take notes and integrate with literature and store important items in approximately 81 percent of healthcare organisations.” are using mobile devices to collect, store and/or transmit some form of protected health information, 49 percent admit their organisations are not doing anything to protect these devices. One concern is that mobile devices are easily lost, and if confidential patient data is stored on board or within applications, it can potentially be accessed by anyone.

Ideas to deal with such risks include management from a central location, so that a stray device can be locked down or even wiped at a certain distance. So far, no such model, in which employees use their personal devices for work, has been examined, and as a result, no standards have been set. However mobile technology develops, these issues are clearly in need of greater consideration, so that when guidelines are created in future, more attention is paid to the very specific safety aspects of mobile ‘teleradiology’ inside and outside the hospital. Aside from the risks, all medical staff using mobile technology need to be familiar with the consequences of data breaches, which as well as the violation of patient privacy, may extend to fines, lawsuits or negative publicity. As with any other kind of security issues, until firm recommendations or directives are in place, the key to heading off potential problems is awareness.

“These things need to be discussed and brought to the attention of everyone, and that’s one of the many reasons for a session like this one. People have to start thinking about it; they have to not only consider the advantages but also the disadvantages, because there is an initial enthusiasm about these mobile applications and devices, which is fantastic, but there is also a downside and we have to take that into account,” noted Ranschaert.

However mobile technology develops, these issues are clearly in need of greater consideration, so that when guidelines are created in future, more attention is paid to the very specific safety aspects of mobile ‘teleradiology’ inside and outside the hospital. Aside from the risks, all medical staff using mobile technology need to be familiar with the consequences of data breaches, which as well as the violation of patient privacy, may extend to fines, lawsuits or negative publicity. As with any other kind of security issues, until firm recommendations or directives are in place, the key to heading off potential problems is awareness.

“These things need to be discussed and brought to the attention of everyone, and that’s one of the many reasons for a session like this one. People have to start thinking about it; they have to not only consider the advantages but also the disadvantages, because there is an initial enthusiasm about these mobile applications and devices, which is fantastic, but there is also a downside and we have to take that into account,” noted Ranschaert.

Dr. Erik Ranschaert (left – pictured here with Dr. Jan Schillebeeckx) from ’s-Hertogenbosch, the Netherlands, will speak on mobile teleradiology with tablet computers in this Special Focus Session.

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Efficient visual image search in clinical radiology

By Georg Langs

Imagine the following: you’re looking at a high resolution CT and see a pattern that catches your eye. You decide to click on the image and within a few seconds get all cases in your department, or region, containing similar patterns, together with the corresponding report, all before you even enter a search keyword. The patterns that match your query are highlighted, and you can quickly browse through them and the attached reports. Wouldn’t that be helpful?

Search and information retrieval is an active area of research. Since the advent of internet search engines we know that they are a driving-force in knowledge acquisition, and have become central to our daily work. We understand that it is only useful if it is able to deliver reliable information efficiently, and if it answers a specific need for information. Recent findings have highlighted the potential of fast, efficient and accurate information retrieval to contribute substantially to improving radiology work flow.

Since 2010, the European Union has been funding the integrated project KHERSMO. It is a joint effort to develop a multilingual and multimodal search system for biomedical information. The central user group which the project focuses on is radiologists and their information needs during daily routine, research, or teaching. Queries in such a search system can be based on a few keywords, an image, or both. The system presents results together with relevant information that facilitates quick browsing, and provides transparency regarding the source and its quality. Sources range from literature databases and secondary sources to image databases (PACS) within hospitals.

Visual queries: searching the PACS for patterns in image data

A particularly relevant area of radiological research is content-based image retrieval (CBIR). The aim is to use image data itself – for instance a region of interest in a CT volume marked by the user – to query large image databases for similar patterns, and to provide the user with quick access to the corresponding data, such as images, reports, or event outcomes.

The key to successful content-based image retrieval is the extraction of visual features that capture relevant characteristics of the imaged structure, together with fast matching and ranking algorithms that robustly identify similarities across millions of samples. CBIR, in the context of radiology, raises additional challenges compared to similarities across organs. The variability of anatomical appearance, even in a healthy population, renders the learning of models challenging.

Nevertheless, search results from hundreds of data examples of several terabytes of medical imaging data have proved promising. The automatic identification of anatomical structures and the location of images work accurately. Initial results on the retrieval of anomalies suggest that methodology developed at the interface of machine learning, computer vision and medical imaging can provide clinically relevant search results. Current research is focusing on further improving the accuracy of the search.

Scaling methods to make use of large data

A central insight is that transitioning from hundreds of data examples to millions changes many established paradigms. On the one hand, it makes efficient algorithms for matching and representation essential. On the other hand, the enormous amount of variability represented in the data allows for more comprehensive models to be learned, while at the same time attracting attention to unsupervised modelling approaches. The methodological challenges touch on interesting mathematical problems ranging from basics such as graph theory, or algebra, to machine learning and pattern recognition.

While methodological research continues, there is agreement regarding the goal. The knowledge that can be gained from millions of radiological imaging data, which have only been examined once so far, is tremendous. Make it more accessible, and gaining structure from this data is key to helping clinicians, researchers and teachers take full advantage of it.

Georg Langs works at the CIR Lab at the Medical University of Vienna, Austria.
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ESR set to tackle personalised medicine and face economic realities in 2013

By Méliane Roquer

In an interview with ECR Today, incoming ESR President, Professor Guy Frija explained how the ESR should address the challenges raised by the explosion of ‘omics’ data and the advent of personalised medicine, as well as how it should assess the impact of the financial crisis on the specialty.

ECR Today: What are your plans and ambitions regarding your presidency?

GF: The development of the ESR since its establishment in 2005 has been amazing: the ESR is now the biggest radiological society in the world, and its annual meeting, the European Congress of Radiology (ECR), is one of the best radiology congresses worldwide. All of this is the result of intense activity in several fields, such as education, research, professional challenges and publications, for the development of which the role of my predecessors was instrumental, along with the dedication of many of our colleagues. Therefore my first goal is to keep up this momentum and run the specialty. The establishment of imaging biobanks should be promoted along with adapted data privacy regulation. I would say that we are facing huge scientific challenges, and I will propose to the ESR Executive Council that a scientific advisory board be set up in order to help better define ESR strategies.

Apart from this, we can’t ignore the fact that several European countries are facing a severe economic crisis which we hadn’t considered until now. I will ask the Executive Council to set up a working group on economics, in order to estimate the impact of the crisis on our specialty. The national societies will be solicited for this task.

As you can see, if our specialty needs to take a more scientific approach in order to prepare for the future, then we also have to look at the situation in our specialty across Europe.

ECRT: The ESR launched the International Day of Radiology on November 8, 2012, to build awareness about imaging. What do you think of this initiative?

GF: The International Day of Radiology was very successful, the ESR played a key role in it and has to be congratulated. I think that this day has to be considered as a first step on the path towards awareness. Talking about the benefits is certainly important; but we also have to promote better use of imaging, not only for safety reasons, but also, very simply, for improving quality of care. Previous campaigns conducted in America have shown their usefulness, and I think we have to learn from these experiences. The development of such public campaigns in Europe could be beneficial; however we have to consider European diversity and adapt campaigns.

ECRT: You are a former chairman of the National Societies Committee of the ESR. Do you think the level of cooperation between the ESR and these societies has been good enough? How could it be improved?

GF: An important characteristic of the ESR is its institutional membership, i.e. the national societies, subspecialties and allied sciences societies. Let me remind you that the foundation of the ESR was the result of the political action of five national societies in 2002. Institutional Member Societies represent the political pillar of the society, and therefore should be considered in accordance. The relationship with national societies can be described as rather good, but it is a fact that it should be improved. I will invite some of them to the top management meetings, and set up an e-newsletter specifically dedicated to Institutional Member Societies. I also hope that the economics working group will help improve our relations.

ECRT: One of your interests is to make teleradiology an interesting field? How could this be achieved?

GF: This is a very critical issue. The best approach is probably through the early introduction of imaging into medical training. Focused public campaigns using social networks should also be used. Invitations for students to attend national society annual meetings could also be useful. Finally, showing that radiology is not only a full clinical specialty, but also a key specialty for diagnosis and treatment through intervention techniques, should be used to promote our specialty. In my country, radiology is chosen by the best residents, so I am not worried about the future.

ECRT: How would you encourage medical students to choose radiology as their specialty? Why is radiology an interesting field?

GF: This is a very critical issue. The best approach is probably through the early introduction of imaging into medical training. Focused public campaigns using social networks should also be used. Invitations for students to attend national society annual meetings could also be useful. Finally, showing that radiology is not only a full clinical specialty, but also a key specialty for diagnosis and treatment through intervention techniques, should be used to promote our specialty. In my country, radiology is chosen by the best residents, so I am not worried about the future.
Proposed European data protection regulation puts the EU’s eHealth vision at risk

By Javenn Hemetsberger

Previous editions of ECR Today have mentioned the ESR’s engagement in EU politics, such as its involvement in European legislation on electromagnetic fields (Alliance for MRI), the European Commission’s proposal on the modernisation of the Professional Qualifications Directive 2005/36/EC, and the European Union’s research framework programme Horizon 2020.

Apart from the activities mentioned above, the ESR’s EU Affairs Subcommittee is closely monitoring several other policy areas such as the European Commission’s proposals on medical devices and clinical trials. It is actively involved in the EU’s eHealth initiatives, and it has developed a statement on the proposed European data protection regulation.

Since February 2012, the ESR has been a member of the European Commission’s eHealth Stakeholder Group, an expert group aiming to bring together the EU’s health stakeholders, notably patients, health professionals, citizens, and industry with eHealth experts and public health organisations to exchange views and develop recommendations on policies and projects.

The ESR’s EU Affairs Department (eu-affairs@myESR.org) and its website (www.myESR.org) provide regular updates on the eHealth Action Plan 2012-2015. The ESR is actively involved in several other policy areas such as the European Commission’s proposals on medical devices and clinical trials. It is actively involved in the EU’s eHealth initiatives, and it has developed a statement on the proposed European data protection regulation.

The eHealth Action Plan’s objective is to foster cross-border healthcare, health security, solidarity, universality and equity. The key targets of the eHealth Action Plan include improving chronic disease and multimorbidity management, strengthening prevention and health promotion practices, as well as increasing the sustainability and efficiency of health systems by facilitating innovation and achieving wider interoperability of eHealth services.

The Staff Working Paper (SWP) on the legal aspects of telemedicine aims to clarify the legal situation of telemedicine at European level, particularly cross-border situations. The following legal issues are addressed by the white paper: licensing/registration of healthcare professionals performing telemedicine services, reimbursement policies, data protection (e.g. processing health-related data), legal liability, relevant jurisdiction, and applicable laws in cases of injury.

The European Commission’s proposal aims to develop evidence-based clinical practice guidelines for telemedicine services, with a particular emphasis on nursing and social care workers. It plans to start policy discussions on eHealth at a global level and foster international cooperation to improve and achieve wider interoperability of eHealth services.

In January 2012, the European Commission adopted a proposal for regulating the processing of personal data and the free movement of such data. Since Directive 95/46/EC on the processing of data and the free movement of such data was adopted in 1995, this new proposal aims to revise the existing Directive and thus enhance enforcement and address the fragmentation of national data protection legislation, legal uncertainty due to the increased scale of data sharing, as well as development of new technologies.

The proposed regulation has several new elements such as new definitions (e.g., genetic data or data concerning health), data minimisation (data should be limited to the minimum necessary), ‘right to be forgotten’ (data subjects can obtain the destruction of his personal data) and ‘one-stop-shop’ (one set of rules applies throughout all Member States with no transposition period or national law applicable) points in each Member State). Moreover, the proposed legislation seeks to clarify issues regarding the international transfer of such data, and it proposes sanctions for the misuse of personal data and the abuse of data subjects’ rights.

The ESR has therefore developed a statement on the proposed General Data Protection Regulation outlining its position. The full ESR statement on the European Commission’s proposal for a regulation on the protection of individuals with regard to the processing of personal data and the free movement of such data can be found on the ESR website (www.myESR.org) or on the European Data Protection Regulation.

For further information please contact the ESR Department of EU and Public Affairs at eu-affairs@myESR.org.
Ukraine aims for European radiological standards

By Volodymyr Ragozhyn

Ukraine is Europe’s second largest country by area and has a population of 46 million, as of 2009, which is 12 percent smaller than in 1991 when the country gained independence from the USSR. Heavy industry and manufacturing is concentrated to the east and south of the country, whereas the west is more agricultural. There is a political split along similar geographical lines. The population in western regions shows stronger support for candidates advocating EU and NATO accession, while the population in the eastern and southern regions (where more Russian-speakers live) supports candidates looking to maintain closer ties with the Russian Federation. In 1991, Ukraine inherited an extensive and highly centralised Soviet health system, which could not be maintained during the economic downturn that followed independence; the system was considerably decentralised. The level of general government expenditure on health as a proportion of GDP was considerably decentralised. The system was considered to be far more effective in providing primary care than in the more centralised Soviet health system, which could not be maintained during the economic downturn that followed independence; the system was considerably decentralised. The level of general government expenditure on health as a proportion of GDP was considerably decentralised. The system was considered to be far more effective in providing primary care than in the

Officially, Ukraine has a comprehensive, guaranteed package of healthcare services provided free of charge at the point of use, as a constitutional right. Nevertheless ‘charitable donations’ are widely levied in the Ukrainian health system. Modern Ukrainian radiology is not an exception in this process. One of the main problems for Ukrainian radiology is its ageing equipment. Seventy percent of all radiological units were installed during the soviet era. Over the last few years there has been a positive trend in the purchasing of modern systems for digital radiography. Recently, 50–60 percent of modern equipment has been purchased through private investment.

The second problem for Ukrainian radiology is the training of Ukrainian radiologists. We have a lot of talented specialists, but postgraduate training in Ukraine is not equal to that in the European Union. In Ukraine, a radiologist can be qualified after one and a half years of internship work and six months of specialisation. Specialists in ultrasound diagnostics only train for six months. The European Training Charter for Clinical Radiology has not yet been introduced in Ukraine.

General practitioners and family physicians, who send patients for radiological diagnosis, are mostly unaware of the possibilities of modern radiology and do not know the basic indications and contraindications for certain radiological procedures. They are not familiar with the criteria of adequacy for radiological methods in the differential diagnosis of disease.

The Association of Radiologists of Ukraine (ARU) is a non-profit, non-governmental public organisation and was established in 1991. It is the official successor to the Ukrainian Society of Roentgenologists, founded in 1936. More than 8,200 radiologists, including specialists in x-ray, CT, MRI, US diagnostics, interventional radiology, nuclear medicine, radiation oncology and medical physics work within the field of radiology in different medical institutions around Ukraine. Nearly 51 percent of them are members of the Association of Radiologists of Ukraine.

The main aims of the ARU are the development and improvement of radiology in Ukraine, education and training of its members and young radiologists, cooperation with other national radiological societies, and integration into European and international radiology.

The ARU is an institutional member of the European Society of Radiology. But only 100 radiologists from Ukraine are individual members of the ESR.

Each year, the ARU organises and holds several scientific conferences on the most current issues in x-ray, CT, MRI, US diagnostics, nuclear medicine, interventional radiology, and medical physics. The congress of the ARU, with participation from leading radiological authorities from other countries, is held once every five years and is the most important radiological event in Ukraine.

The official journal of the ARU is Radiodiagnostika, Radiotherapy (ISSN 1993–1698), with four issues per year. The Association of Specialists in x-ray, CT and MRI publishes the quarterly Radiology Bulletin (ISSN 1993–1743).

The ARU constantly strives to widen its professional contacts and its communication with colleagues in other countries in order to exchange experiences in the application of new modern radiological methods.

More information about the Association of Radiologists of Ukraine can be found at www.aruk.org

Professor Volodymyr Ragozhyn from Kiev, Ukraine, is President of the Association of Radiologists of Ukraine.

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Norwegian Society improves research opportunities for radiologists

By Gaute Hagen

The Norwegian Society of Radiology is a member of the Norwegian Medical Association and includes more than 900 members. Recruitment to radiology is good. Since 2010 there has been an increase in the number of certified practising radiologists from 565 to 615, and radiologists in training from 157 to 170. Currently 41 percent are women, and this number increases to 51 percent for those younger than 50 years of age. With a population of five million there is one certified radiologist per 8,100 inhabitants. The economy in our country is strong and CT examinations are performed annually. In 2008, 195 CT examinations per 1,000 inhabitants were carried out, much higher than in neighbouring countries. However, the distribution of the population, the low availability of other specialties such as PET-CT, and other factors may have influenced this figure.

Currently medical students are automatically offered a year and a half of clinical practice before they qualify as medical doctors and begin their specialisation in radiology.

There are three other major cities, each with a population of one million, and five cities with 300,000 to 400,000 people. The remaining population of eight million is distributed over a territory of 2,724,900 square kilometres, with two-thirds of the country living west and one-third east of the Urals, which are often considered the boundary between Europe and Asia.

Apart from these issues, Kazakhstan is suffering the effects of radioactive fallout in the region of Semipalatinsk, causing a very high rate of oncologic diseases like breast carcinoma, congenital diseases and an extremely high rate of tuberculosis.

To achieve this goal, the Radiological Society of Kazakhstan has been active in the field of research. The Norwegian Society of Radiology, as well as the ESR, is an important partner in this field.

On May 21–24, 2013 the 60th Congress of the Nordic Society of Radiology will be held in the lovely city of Bergen, on the west coast of Norway.

More information about the Norwegian Society of Radiology can be found at www.radiologforeningen.no

Professor Gaute Hagen from Oslo, Norway, is President of the Norwegian Society of Radiology.

Professor Zhangali Khamzabaev is President of the Radiological Society of Kazakhstan.

Kazakhstani radiology strengthens links with Europe

By Zhangali Khamzabaev

After the collapse of the Soviet Union in 1991, Kazakhstan came under the leadership of its current president, N. Nazarbayev and became the independent Republic of Kazakhstan, with a population of 16 million people, of whom one million live in the new capital Astana and two million in the old capital of Almaty.

There are three other major cities, each with a population of one million, and five cities with 300,000 to 400,000 people. The remaining population of eight million is distributed over a territory of 2,727,700 square kilometres, with two-thirds of the country living west and one-third east of the Urals, which are often considered the boundary between Europe and Asia.

The population of the independent country was, and still does, involve a tremendous amount of economic, social and cultural change.

It has also become necessary to revitalize the healthcare system and adapt it to the new demands and requirements of a young country, which has a responsibility towards its fast growing population.

Apart from these issues, Kazakhstan is suffering the effects of radioactive fallout in the region of Semipalatinsk, causing a very high rate of oncologic diseases like breast carcinoma, congenital diseases and an extremely high rate of tuberculosis. As a result of the rapidly improving standard of living there is also an increasing number of lifestyle-related diseases like hypertension, coronary heart disease, diabetes mellitus, etc.

Therefore, it is necessary to build new hospitals, clinics, and new hospitals for medical and non-medical organisations, including new medical universities and post-graduate national programmes for physicians and medical staff.

Based on the great progress in medical imaging technologies such as CT, MR, ultrasound, and radiouclide imaging methods like SPECT and PET (PET-CT, PET-MR), as well as interventional radiology, it is evident that the medical specialty of radiology will play an essential role in Kazakhstan’s new healthcare system.

As a result, the radiological community of Kazakhstan is very pleased and thankful for the help it received from the former European Association of Radiology, under the leadership of Professor Albert Baert, and later from ESR and its educational director, Professor Nicholas Court-syrianis, who supported the participation of Kazakhstani radiologists in the Graz Tutorials, organised by Professor Rainer Biersack.

Here we received, for the first time, valuable information about a modern work flow in a busy university hospital and the role of modern imaging methods. Of course, we also learned about the role, activities and meaning of the ESR, ECR and ESOR. And last but not least, we learned about life in democratic western European countries.

After adapting the organisational structures of the Radiological Society of Kazakhstan, under the presidency of Professor Zhangali Khamzabaev; to meet the standards of the ESR, we are very pleased to have become a full Institutional Member Society of the ESR. Our goal is to participate actively in the organisational structures of the ESR, and ECR, and hopefully ESOR too.

In our country we are in the process of training young physicians to become fully-qualified radiologists as defined by the ESR. We offer English as the official language in order to better communicate with our international colleagues. We are supporting the participation of our young physicians in international radiological conferences, especially the ECR and ESOR.

And of course, we are actively involved in all areas of diagnostic imaging, as well as the medical and organisational issues related to the main health problems in our country. We are very grateful for all the support we have received from the ESR.
Franz West

Where is my Eight?

Franz West was one of the most important artists in the international art world. The artist, who died in July 2012, achieved worldwide fame with his ‘Passstücke’ (adaptables), his furniture and his sculpture for interior and exterior spaces. It is now six years ago that the mumok organised Franz West’s first comprehensive retrospective. Now, once again, it is dedicating a large-scale exhibition to his work that was initiated and co-developed by him with great enthusiasm.

Combination and Recombination

The focus of the thematically structured presentation is on West’s combi-pieces, predominantly instal-lative works in which the artist combined various individual pieces and subsequently recombined them in different configurations. The combination and recombination of different kinds of work such as adaptables, furniture, sculpture, videos or works on paper, from all different creative periods, means that the exhibition provides an overview of the whole spectrum of his œuvre. Works by artist friends such as Martin Kippenberger, Rudolf Polanszky, Jason Rhoades or Heimo Zobernig are also included in these works.

“Everything we see could also be otherwise,” said Franz West in 1988, quoting philosopher Ludwig Wittgenstein, whom he valued highly, and addressing an essential aspect of his own artistic approach. The principle of combination and recombination also corresponds to his conviction that the meaning of a statement — or a visual element — is never a fixed and clearly defined one but, rather, changes according to context and the reaction of the recipient.

Works in the exhibition

Visitors will be met by one of his ‘Lemurs’ at the entrance to the museum: large-scale head-like forms with oversized openings for mouth and nose. In his writings, West connected these with Heraclite’s famous dictum about things undergoing continuous change: “Every newer waters flow on those who step into the same river, and (even new) souls step from the wetness.” Heraclites Fragment 12 [1]. Thus this work provides an introduction to the subject of the exhibition.

The Genealogie des Ungreifbaren (Genealogy of the Un触able, 1997) that stands right at the beginning of the show is a work which proves that the artist has never changed dogmatically to his own concepts. In a large vitrine-like box he combined three early adaptables with one of his first chairs. Thus works that were originally intended to be used are turned into ‘untouchable’ examples of the development of his early work. Adaptables are also part of a combi-wall which, along with various works on paper, exhibits photos of people interacting with them. When supplemented by furniture, walls of this kind, ‘Kasseler Rippchen’ (Kassel-style Spare Ribs, 1996) or ‘Träumer’ (Dreamey, 1997) for example, become room-filling installations.

One of the central exhibits is ‘Redundanz’ (Redundancy), a three-part paper-mâché sculpture which is held to be a significant early example of West’s practice of combination and recombination. Shown in Vienna for the first time in 1986, the artist considered it necessary to supplement it with another sculpture thus replacing a part that had been sold against his will. The new version was entitled ‘Reduktion’ (Reproduction). Since 2011 both versions of this work are part of the mumok’s holdings.

Permanence, Change, Participation and Interaction

Franz West’s œuvre is fundamentally participatory; it seeks dialogue with the recipient. Every one of his art products are invitations to interaction. This can take place on the physical level – as in the case of the adaptables which are meant to ‘adapt’ to the body – but also on the mental or intellectual level, as is the case with his sculptures or works on paper. The latter are usually accompanied by texts which offer further stimulus for reactions.

West’s creations are the starting points for experiences, considerations, associations and deliberations, the trigger mechanism for a game with various possibilities of experiencing and viewing the world with an ever-changing result that depends on the recipient, context and atmosphere.

West’s art exhibits uncertain ties in a way that is unpretentious, almost light-footed, and humorous although it is founded on an intense engagement with philosophical writings, an early concern which intensified throughout the artist’s life.

The title chosen by West for the exhibition is a further example of his practice of combination and recombination: the starting point is the goulash ‘Lost Weight’ (2004) which features a woman who, hav- ing dined, shows off her much-too-large trousers. The artist’s omission of the ‘W’ transformed ‘Lost Weight’ to ‘Lost Eight’ which led to the question in the title: Where is my Eight? West leaves the answer to this question open, thus creating a space for us to make various associative connections.

After it has closed in Vienna the Franz West “Where is my Eight?” exhibition will be shown at the MMK Museum für Moderne Kunst Frankfurt am Main, Germany (June 29 – October 13, 2013).

Franz West

Franz West was born in 1947 in Vienna, where he also died in 2012. With no formal training he began to make art at the age of twenty-three. Between 1977 and 1982 West was a student of Bruno Gironcoli at the Academy of Fine Arts in Vienna. Though his work was only known to his circle of friends during the first ten years, the 1980s saw the beginning of his international career. He was represented at the documenta twice (1992 and 1997) and in 1990 provided the Austrian contribution to the Venice Biennial. In 2011 he was awarded a golden lion there for his life’s work, the highest award for a living artist. Despite his world career, Vienna not only remained the centre point of his life, it was rather more, all his life he felt a particular affinity for the city and its culture.
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
  19:30 *Der Talisman* by Johann Nestroy

- **Burgtheater**
  1010 Vienna, Dr. Karl-Lueger-Ring 2
  Phone: +43 1 51444 4145
  www.burgtheater.at
  19:00 *Der 11. März 1938*

  
  An evening of remembrance

- **Theater in der Josefstadt**
  1080 Vienna, Josefstädter Straße 26
  Phone: +43 1 42 700 300
  www.josefstadt.org
  19:30 *Hedda Gabler* by Henrik Ibsen

- **Volkstheater**
  1070 Vienna, Neustiftgasse 1
  Phone: 43 1 52111 400
  www.volkstheater.at
  19:30 *Die Comedian Harmonists* by Franz Wittenbrink

**Concerts & Sounds**

- **Musikverein (Classical Music)**
  1010 Vienna, Bösendorferstraße 12
  www.musikverein.at
  19:30 Münchner Kammerorchester conductor Alexander Liebreich
  Sivan Silver, piano, Gil Garburg, piano
  F. Mendelssohn Bartholdy, L. van Beethoven

- **Porgy & Bess (Jazz)**
  1010 Vienna, Riemergasse 11
  www.porgy.at
  20:30 Anna Lauvergnac Quartet
  ‘Unless there’s Love’ (I/D/GR/US)

- **Arena (Alternative Music)**
  1030 Vienna, Baumgasse 80
  www.arena.co.at
  20:00 Broadway Calls (US)

**Opera & Musical Theatre**

- **Volksoper**
  1090 Vienna, Währingerstraße 78
  www.volksoper.at
  19:00 *Die Fledermaus* by Johann Strauss

- **Wiener Staatsoper – Vienna State Opera**
  1010 Vienna, Opernring 2
  www.wiener-staatsoper.at
  16:00 Masterworks of the 20th Century
  Ballet by Nils Christe, Roland Petit, Serge Lifar