SUNDAY, MARCH 3

ECR TODAY

5
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AI could help to manage, predict and even reduce patient exposure to ionising radiation

Every field of imaging is looking at the opportunities offered by artificial intelligence to advance imaging’s contribution to healthcare.

So what is it that AI can do to improve radiation protection and safety? From dose reduction to managing dose during diagnostic and therapeutic procedures that use ionising radiation, AI has a lot to offer. A panel of experts will look at the likely developments in a dedicated session today at the ECR.

When it comes to radiation protection, artificial intelligence (AI) is sure to make a notable contribution. “We will have a chance to reduce dose even further with AI – this is certain,” said Prof. Christoph Hoeschen from Magdeburg, Germany.

Prof. Guy Frija from Paris, France, who will co-moderate the session with Hoeschen, agrees. “AI could help to reduce ionising radiation dose by further improving imaging quality, using existing reconstruction and scatter reduction methods. We could achieve a significant reduction in dose in CT, PET or SPECT scans,” Frija said.

Most patients would benefit from such new developments. Research on AI for scatter reduction and image reconstruction is going on all around the world.

A second interesting working track for AI development in radiation protection focuses on managing and adjusting dose to individual patients. The idea is to use AI methodologies to quantify image acquisition parameters and optimise procedures before or during each examination.

“We are just at the beginning of something there. We are starting to build systems, based on computer systems, to determine image quality directly from existing patient images. This would be a prerequisite for the learning process of an AI tool,” said Hoeschen. “For example, for a dedicated task in a CT or SPECT application, you start acquiring images and during the generation of those images, you find out what is your already achieved image quality acquisition and just stop the examination altogether. During an interventional procedure, one could also give an indication of how to perform irradiation, in which direction or from which angle,” he said.

AI could also be used to predict rather than measure dose during an intervention, which would improve the safety of said intervention. This might be applicable to any interventional diagnostic procedure or angiographic CT.

There is a third path to enable radiation protection by means of AI, using radiogenomics to derive aspects of susceptibility of patients to ionising radiation and modulate dose accordingly. This development might influence diagnostic and therapeutic procedures in radiation oncology.

This session is part of the EuroSafe Imaging campaign.

EuroSafe Imaging Session

Sunday, March 3, 08:30–10:00, Room N EU 7 Artificial intelligence and radiation protection

- Chairpersons’ introduction
  G. Frija, Paris/FR
  C. Hoeschen, Magdeburg/DE

- Artificial intelligence: a tool for quality and safety improvement in radiation protection
  G. Frija, Paris/FR

- Artificial intelligence for scatter reduction and optimising imaging procedures
  C. Hoeschen, Magdeburg/DE

- Artificial intelligence for intelligent reconstruction methods for radiation protection measures
  C.T. Whitlow, Winston-Salem, NC/US

- Using artificial intelligence for optimising procedures reflecting radiosusceptibility of patients
  C. Hoeschen, Magdeburg/DE

- Discussion

This session is part of the EuroSafe Imaging campaign.
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A session presented by a panel of experts from the General University Hospital, Athens, aims to provide a practical, comprehensive, and timely update about the application of ionising radiation in everyday clinical practice. More specifically, the size of which depends on the question to be addressed. Image quality descriptors need large data sets and so does scatter reduction. For scatter reduction, Hoachman suggested, one could use CT data sets that already exist and try to mimic them by Monte Carlo simulation methods, i.e. a broad class of computational algorithms that use randomness to solve problems that might be very hard to solve generally. One needs to be careful at the time of using data sets and also in clinical applications, especially to differentiate data used for training and testing. Hoachman warned: "There are always studies in AI that use the same data for training and testing the contrary: "It is very critical." And Frija added "We hope that AI will be tested in the clinical setting in order to have machines make suggestions, we have to be scientifically precise and we have to be careful from testing to a large extent."

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Optimising the management of the diabetic foot

A session presented by a panel of experts from the General University Hospital, Athens, aims to provide a practical, comprehensive, and timely update about how to manage diabetic foot complications, a significant cause of morbidity and mortality in diabetic patients. Diabetes mellitus (DM) is a chronic metabolic disorder and a growing health problem worldwide. At present, the world is facing an epidemic of both type 1 and type 2 DM, according to the World Health Organisation (WHO), with DM currently affecting more than 422 million people worldwide, a number that is rising. As a multi-systemic disease, DM affects the body in a comprehensive way resulting in a variety of complications involving multiple end-organ failures. Complications are common among both patients with type 1 and type 2 diabetes and are responsible for significant morbidity and mortality. Chronic DM complications can be broadly divided into microvascular complications, including neuropathy, nephropathy, retinopathy, while macrovascular complications comprise cardio-vascular disease, stroke, and peripheral arterial disease (PAD). In this session, a panel of experts will take a multidisciplinary look at the diabetic foot, defined as the presence of foot ulcers associated with neuropathy, PAD, and infection, which particularly affects the soft tissue and bones, and its complications.

The diabetic foot is a significant cause of morbidity and mortality in patients with DM. Early diagnosis is of crucial importance, as it allows early treatment. With delayed treatment, progression toward a not only limb-threatening, but also life-threatening stage is often simply inevitable.

"Approximately ten percent of people with diabetes have a foot ulcer, meaning that more than one million people are suffering from diabetic foot disease. It has been estimated that following an ulcer, one leg is amputated due to diabetes. Amongst diabetics, diabe- tes is responsible for more than one million limb amputations per year, while following an amputation, up to 50 percent of people with diabetes will die within the next two years," said Prof Dr. Ilia Spiliopoulos, who will chair today’s session.

Foot ulcers and infections are among the most frequently occurring complications in the diabetic foot. Sensory neuropathy in the distal regions of the extremities predisposes many patients to traumatic injuries, which in further consequence may lead to skin breakdown, ulceration, and infection. Impaired perfusion as a result of PAD and microvascular abnormalities reduces wound healing capacity and the ability to recover from infection. A vicious circle that must be broken in the earliest stage possible, according to Brountzos.

"Prompt diagnosis and revascu- larisation should be offered in sub- jects with diabetes and PAD, in order to prevent wound healing and avoid infections. PAD and neuropathy are responsible for approximately 45 percent of diabetic amputations and such patients are at high risk of infection. Patients with PAD and a foot infec- tion are at very high risk for major amputation, for which emergency treatment is required. These patients should be assessed by a multidisci- plinary team as soon as possible in centres of excellence, in which rapid diagnosis and endovascular intervention, surgical treatment options or surgical treatment are available.”

Endovascular treatment options will be one of the key topics of the presentation by Prof. Stavros Spili- opoulos. "Today, endovascular revascu- larisation is an established treat- ment with excellent results and should be offered to all subjects with diabetes and PAD, while for a sub- stantial proportion of patients with non-healing foot ulcers, endovascular revascularisation might be the only treatment option in order to solve wound healing and avoid major amputation. Endovascular tech- niques have developed over recent years to become first-line treatment options in everyday clinical practice. More- over, techniques and endovascular procedures performed over recent years have greatly increased to even more open surgical procedures for PAD, both in the US and in Europe, while in experienced centres the endovascular-first approach has achieved excellent outcome.

After familiarising ECR delegates with the key areas of inter- ventional treatment, Spiliopoulos plans to thoroughly discuss endovascular devices, methods, and techniques used to promote wound healing and avoid limb amputation, including below-knee angioplasty and novel drug-elution technologies such as drug-eluting stents (DES) and drug-coated balloons (DCBs), among others.

"Today, various endovascular methods and techniques are performed in experienced vascular centres, including infrapopliteal angioplasty and DES, pedal arch reconstruction, revascularisation of long iliac and femoropopliteal chronic total occlusions, and ulcer- guided revascularisation,” noted Spiliopoulos. "Moreover, tissue per- fusion methodologies can be used in order to accurately quantify tis- sue perfusion following endovas- cular procedures such as intra-op- erative 2D perfusion angiography, microwave radiotherapy and near-in- frared spectroscopy (NIRS).” Spili- opoulos also plans to specifically address the results of IR treat- ment outcomes in diabetic ulcers and weaknesses of endovascular treatment, technical and limb sal- vage rates, and data demonstrating improved patency rates following endovascular revascularisation.

"A technical successful interven- tion should achieve a primary patency rate at least of one of the foot arteries. Very satisfactory long-term limb salvage rates have been reported for sub- jects with diabetes and critical limb ischaemia. The Achilles heel of endovascular treatment is restenosis leading to loss of patency clinical relapse and re-intervention. Recent advancements in IR trials and their meta-analyses demonstrate that DCBs and DES achieve superior patency rates com- pared to plain balloon angioplasty and bare metal stenting in femoro- popliteal and infrapopliteal arterial disease. Most important, however, is that foot ulcerations should be treated by a multidisciplinary team including vascular surgeons, diabetologists, podiatrists, and interventional radiologists. Furthermore, close monitoring and strict follow up schemes are crucial keys to clinical success,” he concluded.

Another central topic of this ses- sion will be the magnitude of the diabetic foot as a societal problem. "The societal and economic impact of diabetic foot ulceration or major amputation is remarkable. Peo- ple with diabetic foot ulcerations experience a significant reduction in their quality of life, are unable to work, receive chronic treatment and require frequent medical visits and hospitalisations, while patients who suffer a major limb amputation experience a complete change in their lifestyle, in social and psychological support," said Brountzos, speaking to ECR Today.

"In the end, AI will be crucial to any discussion of amputation: we need to move from a patient-oriented approach to a goal-oriented approach, from considering amputation as the end of the road to considering amputation as the beginning of the road. From this perspective, AI will play a crucial role in any discussion of amputation: we need to move from a patient-oriented approach to a goal-oriented approach, from considering amputation as the end of the road to considering amputation as the beginning of the road. From this perspective, AI will play a crucial role.

Dr. Vaia Lambadiari will report in detail on this complex issue, while Dr. Olympia Papakonstantinou and Prof. George Gerasoulis will cover imaging evaluation and the sur- gical management of the diabetic foot, respectively. The session will be followed by a multidisciplinary case presentation and discussion, focusing on the role of imaging and the selection of patients for medical, interventional radiological, and sur- gical treatment.

Multidisciplinary Session Saturday March 3, 0830-1000, Room A 5 MS1 Multidisciplinary approach to the diabetic foot • Chairperson’s introduction E.N. Brountzos Athens/GR • Diabetic foot: a societal problem V. Lambadiari, Athens/GR • Imaging evaluation of the diabetic foot O. Papakonstantinou, Athens/GR • Interventional and radiological treatment (IR) S.C. Spiliopoulos, Athens/GR • Surgical management of the diabetic foot G. Gerasoulis, Athens/GR • Multidisciplinary case presentation and discussion E.N. Brountzos Athens/GR
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- Cardiovascular
- Everyday challenges

Details at ipp.myESR.org
Type of session: MyT3
Acceptance of gadolinium-free techniques increases steadily in clinical MRI

Can MRI function effectively without gadolinium? This question is more relevant than ever now, as the safety of gadolinium-based MRI contrast agents has become a hot topic and knowledge and awareness of gadolinium deposition have grown over recent years.

“1 sometimes any radiologists have grown addicted to gadolinium,” said Prof. Matthias van Osch, a professor in the radiology department at Leiden University. “We’ve introduced sequences at a time when gadolinium was supposed to be an absolutely safe contrast agent, and we’ve also got used to giving certain doses of contrast agent when, as a community, we’ve not tested whether those concentrations are really needed.”

Against this background, three experts will discuss today whether gadolinium-based agents are ready now for clinical practice.

“Especially among patients, fear of contrast agents has increased considerably and there’s quite a bit of worry in society about their effects,” noted van Osch, who is co-moderator of the session.

He emphasised that gadolinium-based agents are not dangerous to use in healthy patients, as they aid diagnosis and any serious health risks have not yet been demonstrated. However, he also expressed concern that radiology is often slow to adopt alternatives to widely used techniques, and he hoped the session will help radiologists find new ways to reduce their gadolinium use.

Gadolinium-based contrast agents are a known trigger of nephrogenic systemic fibrosis, a rare disease that causes thickening of the skin and tissue of internal organs in patients with kidney disease. It is for this reason that these patients are in general not given gadolinium for MRI, van Osch explained.

His co-moderator, Prof. Dominique Suppê-Marinier, professor in biophysics, medical imaging and neuroscience at the University of Lyon, France, noted that the main aim of the session is to explore all MRI techniques that allow the examination of the brain, heart, and other organs without using gadolinium-based contrast agents.

Prof. Rolf Jäger, professor of neuroradiology at the UCL Institute of Neurology, London, will focus on gadolinium-free perfusion and angiography methods for imaging the brain. He plans to cover arterial spin labelling (ASL), which magnetically labels protons in the patient’s inflowing blood, thereby removing the need for injection of a contrast agent.

“With this method, we can look at blood flow in the large and medium-sized arteries of the brain and measure tissue perfusion at the capillary level. Emerging clinical applications are cerebrovascular disease, brain tumours, as well as dementia and epilepsy,” he said.

With 4D ASL, angiography radiologists can now obtain angiographic images of the cerebral vessels with high spatial and temporal resolution without using gadolinium. ASL perfusion imaging can measure cerebral blood flow and is likely to replace first-pass gadolinium bolus perfusion in many instances, but Jäger added that gadolinium is still needed for assessing a defective blood-brain barrier, which is important for imaging brain tumours.

Dr. Bettina Baessler, an associate professor of radiology at the University Medical Center Mannheim, Germany, will be presenting on alternatives to gadolinium-based contrast agents for cardiac and prostate applications. Replacing gadolinium in these areas can be harder than in the brain.

“The heart moves, so acquisition of images is technically much more challenging than in the brain,” she said. “For prostate imaging, movement is not as important as the heart, but also the bowel and the rectal wall are more or less moving.”

Movement of the rectal wall can sometimes lead to distortions of diffusion-weighted MR images, and the presence of air within the rectum can also degrade image quality, which makes it harder to replace gadolinium-based contrast agents, she explained.

Multimetric MRI in combination with artificial intelligence (AI) is a very promising alternative to gadolinium-based agents and Baessler noted that some multiparametric MRI methods are already widely used in clinical practice.

A combination of imaging and radiomics has huge potential as an alternative to gadolinium, she continued. Mapping techniques (i.e. MR relaxometry) yield absolute quantitative T1, T2 or T2* relaxation times, are already a good alternative to using gadolinium-based contrast agents for the assessment of the pattern of iron deposition in the myocardium or in Fabry disease, for instance. However, they need to overcome several hurdles before they can replace gadolinium when assessing other conditions, such as myocarditis and myocardial fibrosis.

“The major hurdle, Baessler argued, is standardisation of quantitative imaging techniques, including mapping and diffusion-weighted imaging (DWI). Values of myocardial T1/T2 or apparent diffusion coefficient (ADC) can vary between MRI sequences, instrument manufacturers, and field strengths. There is also a large natural variation in T1 and T2 relaxation times in the hearts of healthy individuals, which makes it hard to set a cut-off for distinguishing healthy and diseased tissue.

To get around this problem, Baessler suggested using radiomics in conjunction with quantitatively MRI techniques. Radiomics can identify tissue inhomogeneity and other features in MRI, but it also faces issues with standardisation. Radiomics-derived, or even AI-derived, features currently depend on factors like MR signal intensity. “The work on standardisation of radiomic feature extraction is the most important point for radiomists right now, before it will become a real alternative to gadolinium in clinical practice,” she concluded.
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How to deal with common diseases in Pakistan: the radiologist’s perspective

Each country has its own special healthcare challenges to shoulder. In Pakistan, a densely populated country located in South Asia, with an estimated population of more than 200 million, major healthcare challenges include exceptionally high prevalence rates for certain diseases. During today’s ‘ESR meets Pakistan’ session, some of the country’s top radiologists will discuss the role radiology plays in managing three of the most common ones: oral cancer, chronic hepatitis and tuberculosis.

Many diseases are common in Pakistan, among them endemic and epidemic infectious diseases, emerging infections, and an increasing burden of non-communicable diseases. The actual burden of infections with the hepatitis B and C virus (HBV, HCV) is approximately seven percent, making Pakistan a country with one of the highest prevalence rates for viral hepatitis in the world. Approximately ten million people in Pakistan are infected with HCV alone. Following the acquisition of the virus, acute HCV infection can progress to chronic infection, which in turn is associated with several morbidities, such as liver cirrhosis and cancer. Besides hepatitis, also malaria, the polo virus (which still circulates in core-reservoirs across Pakistan, although with lesser intensity), dengue outbreaks, and other infectious diseases pose a serious threat to public health security. Over the past few decades, Pakistan has suffered a great deal from these and other infectious diseases. Global warming, changing climate conditions, and the degradation of biodiversity, and other ecological determinants have a direct effect on these diseases and result in the emergence or re-emergence of infectious entities. The causes of such disease outbreaks are complex and often not well understood.

Another big health issue in Pakistan is tuberculosis (TB) – more than 110,000 people are newly infected and about 70,000 die from the disease every year. Globally, Pakistan ranks fifth among the 22 high TB burden countries and has the fourth highest prevalence rate of multidrug-resistant TB.

Issues like these and their management test the already stretched health system on a regular basis and challenge physicians and other health professionals throughout the country, as experts of today’s ESR ‘meets’ session entitled ‘The role of radiology in major healthcare challenges faced by Pakistan’. Presenting:

M. H. Akram; Islamabad/PK
L. E. Derchi; Genoa/IT
M. H. Akram; Islamabad/PK
Sunday, March 3, 10:30–12:00, Room B
EM 3 The role of radiology in major healthcare challenges faced by Pakistan

• Introduction

M. H. Akram; Islamabad/PK

• Imaging of oral cancer

N. Ud Din, Lahore/PK

• Interface: Beautiful Pakistan: from sea to sky-high mountains

A. Majeed; Peshawar/PK

• Role of radiology in developing a living donor liver transplant programme

A. I. Rana; Islamabad/PK

• Interface: Philanthropic cyber-knife facility in Pakistan

T. Mahmood; Karachi/PK

• Many faces of tuberculosis

U. Siddique; Peshawar/PK

• Panel discussion: Why are oral cancer, chronic hepatitis and tuberculosis more common in Pakistan, and in which scenarios is the role of radiology crucial in the management of these diseases?

In light of the significantly high prevalence of viral hepatitis in Pakistan, it was imperative to implement an indigenous liver transplantation (LT) programme. At our centre, living donor liver transplant was initiated in 2012, and so far, more than 650 transplants have been performed,” he noted. Rana makes it clear that radiology has been at the forefront in this endeavour: “Our contribution includes preoperative CT-based donor work-up to calculate the liver attenuation index, liver volumetric analysis, and the delineation of vascular anatomy for surgical planning. Also, all patients undergo an MR-cholangiopancreatography. In the post-operative period, both recipient and donor may require imaging to look for complications such as vascularity or biliary structures, which are the most common recipient complication in our patients, occurring in about 22 percent of all cases. Our interventional radiologists play an important part in treating these and other complications.”

Ul Din and Rana will be joined by Prof. Dr. Tariq Mahmood, from the department of radiology at the Jinnah Postgraduate Medical Centre, Karachi, who plans to provide an insight into a cyber-knife facility in Pakistan, and Prof. Dr. Umma Sena Siddique, from the Rehman Medical Institute in Peshawar, who will speak about the different faces of tuberculosis, focusing especially on the variety of radiological findings in tuberculosis, its diagnosis and complications.
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Imaging in oncology: moving from familiar paths to new terrain

Radiology needs to constantly align itself to the continually changing requirements of modern medicine. One important challenge for radiologists and medical scientists is to determine how clinical images can be used optimally to guide therapeutic decision-making. Medical imaging can now leverage quantitative techniques in order to support a wide range of clinical and research goals. Quantitative imaging refers to the deriving of measurements from medical images. If these measurements are objectively obtained and evaluated as indicators of normal biological or pathological processes, or responses to therapeutic interventions, then they can be termed ‘biomarkers’.

In today’s session, Prof. Horst K. Hahn from the Institute for Medical Image Computing, Bremen, Germany, will discuss, among other things, the concepts behind quantification and how to optimise the acquisition of images for quantitative imaging.

Specifically, quantitative imaging can be used to track changes induced by targeted tumour therapies, as Prof. Roberto García Figueiras, from the department of radiology, Complexo Hospitalario Universitario, Santiago de Compostela, Spain, plans to show in his presentation. According to García Figueiras, clinical imaging systems are a significant source of non-invasive imaging biomarkers that may reflect important biological properties of cancers. “They can provide quantitative information on tumour hallmarks and be used to evaluate tumour heterogeneity.”

Also, they may help to improve the understanding of the mechanism of action of therapies and their effects on tumour microenvironment, offering objective measures of change in response to therapy.” he said.

Heterogeneity is a common feature of tumours. “Malignant tumours are biologically complex systems with spatially variable gene expression patterns, consecutively variable biochemistry, histopathology, and macroscopically variable structure. In the tumour microenvironment, genetic variability of tumour cells meets external stresses and the host immune system, which results in a regional heterogeneity of stromal architecture, biological activity and expression of, among other things, chemokines and growth factors,” said Dr. Michael Eisenblätter, from the Department of Clinical Radiology, University Hospital Münster, Germany.

“Consecutively, the development of tumour vasculature, nutrient supply, cell growth, and death, exhibit significant regional variation, which occurs within a single tumour lesion, between a primary and metastatic tumour and metastases, and of course between tumour lesions, even of the same tumour type, in different individuals,” he added.

Tumour heterogeneity can be assessed by using genomics, histologic or imaging data. However, it is difficult to assess intratumoral heterogeneity with random sampling or biopsy as this does not represent the full extent of phenotypic or genotypic variation within a tumour. Prof. Dr. Evis Sala, from the Department of Radiology, University of Cambridge, will consider the importance of quantifying the heterogeneity and genotypic variability in ovarian cancer subjects.

Collectively these talks will evaluate the possible clinical benefits of imaging methods providing non-invasive ways to assess the heterogeneity within a tumour. Generally, tumours with high intratumoral heterogeneity have been shown to have poorer prognosis. At the same time, a high degree of heterogeneity is increasingly relevant for therapy selection and monitoring, due to ever more specific therapy approaches. “Various imaging approaches allow for visualisation of spatial heterogeneity in tumours. However, recorded and documented information is often limited to lesion size and macroscopic heterogeneity. In this context, radiomics and deep learning promise to discover hidden information in this hidden layer of information. Our approach aims to deliver radiomics software packages that offer true-to-life imaging data. It may help to discover hidden information and provide additive information on tumour biology. In particular, functional imaging approaches allow for visualisation of spatial heterogeneity in tumours. However, recorded and documented information is often limited to lesion size and macroscopic heterogeneity,” said Eisenblätter. He suggests that part of the answer lies in a rigorous analysis of all radiological imaging data. “What quantitative features of the tumour microenvironment can we quantify, and when is it essential?”
Why accreditation of MRI holds the key to the future of prostate cancer management

Quality in imaging is never guaranteed – that is why working towards European-wide accreditation for prostate MRI is the way forward, expert speakers will explain at this morning’s ECR Master Class. Benchmarking quality in acquisition and reporting must be set within clear clinical pathways, and is a vital part of the accreditation process.

Radiologists need to benchmark themselves against good quality standards, and he urged ECR 2019 delegates to get involved in the process because they have a vested interest in doing this. He hopes today’s session will stimulate mature discourse to a wide audience and boost acceptance of quality checking towards establishing an accredited programme. The most important contribution towards accreditation is face-to-face discussions in a multidisciplinary team. This is highly valued because it brings the benefits of timely feedback, which is a vital component of improved care, he added.

Richenberg is also keen to encourage mentorship schemes in any new training curricula, noting that the value of learning from one and other is most important in skill acquisition sets. He also supports engaging in e-learning schemes for continuing medical education and organising workshops within departments for experiential learning situations.

There is an intrinsic need among radiologists to improve, and he suggested that the first cohort of radiologists to make it through an accredited programme would need to become the future mentors, he cautioned that there may still be a skill gap between implementation and roll out of such schemes. In the U.K., having the Royal College of Radiologists on board has been essential in terms of quality-assured benchmarking of programmes.

Looking to the future, Richenberg, who is an honorary senior lecturer at Brighton and Sussex University Hospitals NHS Trust, warned that radiologists must “be careful not to be seen as elitists, self-appointed experts, and judge and jury when making the case for the accreditation process.”

Radiologists have worked tirelessly to improve prostate imaging, yet there still remains much to do, noted Dr. Vibeke Logager, associate professor of radiology at Herlev Hospital in Copenhagen, Denmark. She points out that one of the most important aspects for specialist prostate centres is that interactive radiology can guide referring clinicians to the most appropriate imaging modality.

“High-end specialist prostate centres that are involved in international research is the way to go,” said Logager. Cooperation with other clinicians, pathologists and oncologists, together with state-of-the-art equipment, will mean that these units will gain substantial specialist experience, but cooperation is central to the realisation of this goal across Europe. It is vital to raise the basic level of knowledge in the radiological community and beyond, especially for those working with prostate cancer patients, she continued. Also, imaging quality must be benchmarked against standards, and radiologists should compare their work against that of others.

Logager made specific reference to the importance of a well-educated team of radiographers in order to provide correct angulation of the scans to ensure that radiologists have the best reproducible high-quality images to interpret. She added that joined-up thinking is critical, especially when accessing data from other hospitals.

“Don’t be afraid of comparing your stats regarding numbers of false negative and false positive biopsies with well-known state of the art institutions,” she said, stating that speed is not always the top priority.

Multidisciplinary team meetings play a central role in the management of prostate cancer. (Provided by Dr. Vibeke Logager)
Experts to discuss the costs of cure for long-term survivors of childhood cancer

With advanced oncotherapy and better supportive care, survival for many children with cancer has improved significantly over the past few decades and today overall survival rates for childhood malignancy have reached approximately 80 percent. However, this remarkable achievement comes at a price.

Therapies responsible for improved survival are often accompanied by adverse long-term effects and health-related outcomes that can manifest months to years after completion of treatment, and represent the ultimate cost of cure for long-term cancer survivors. The increasingly efficacious therapies available for cancer treatment have produced cohorts of children who survive their initial cancer and live to adulthood, but who at the same time have a significant chance of developing late systemic effects," said Dr. Catherine Owens, from the department of imaging, Great Ormond Street Hospital for Children NHS Trust, London, who will chair today’s session. Cancer and its treatment may result in a wide range of life-altering effects, including impaired growth and development, neurocognitive deficits, neurological diseases, cardiovascular and pulmonary problems, endocrine organ dysfunction and metabolic disorders, gastrointestinal problems, musculoskeletal disorders, psychosocial sequelae and many others. These late effects may also even include acquired malignancies and premature aging.

“Multi-organ disorders are highly prevalent among childhood cancer survivors, relating to previous surgery, chemotherapy, and radiation. The various types of therapies administered will dictate which organ systems will be affected in the longer term,” said Owens. During her talk, she plans to discuss therapy-related pathways that are sequelae of cancer treatment during childhood and possible approaches to allow early diagnosis in order to minimise long-term sequelae. She will also highlight the human cost of cancer survival and the effects on the daily lives of survivors of childhood cancer.

The main objectives of monitoring after childhood cancer are to confirm continued remission and to monitor for late effects of cancer and related therapy. Targeted surveillance for late therapy-related complications allows early detection and the implementation of health-preserving interventions. For radiologists involved in follow-up surveillance, it is fundamentally important to receive information on initial diagnosis, age at which the patient was treated, available evidence on potential chemotherapy-related organ toxicity, presence of underlying genetic conditions and other illnesses and treatment-related aspects,” she noted.

During today’s special focus session, Owens will be joined by five experts who will discuss different late or long-term effects of childhood cancer and their treatment, focusing on management from a clinical radiological perspective. Dr. Aurelio Secinaro, from the department of imaging at the Bambino Gesù Children’s Hospital in Rome, will begin the session by discussing cardiotoxicity complications in childhood cancer following his presentation, Dr. Iris-Melanie Noebe-Huhmann, from the clinic for radiodiagnostic at the AKH Vienna, will discuss late effects on the musculoskeletal system. She plans to illustrate methods of radiological follow-up with case studies and to present clear imaging strategies and systematic evaluation algorithms, which, according to Noebe-Huhmann, can help radiologists to reliably assess the late post-therapeutic sequela and to detect potential complications in survivors of childhood cancer. Also in this session, Dr. Roxana Gunu\v\v, from the department of neuroradiology at St. George’s Hospital in London, will pursue the question of how brain development may be affected by central nervous system malignancies and therapies used to treat them.

Last but not least, Dr. Laurence Rocher from the department of radiology, Hôpital Du Kremlin-Bicêtre, and Dr. Claire Berger, from the paediatric haematology and oncology department at CHU Saint-Etienne, France, will speak about fertility issues, focusing on the potential effects that chemotherapy has on fertility in males and females, and the question of how radiology can help with diagnosis and monitoring of potential therapies.

Many survivors of childhood cancer go on to have children. However, infertility remains one of the most common life-altering treatment effects experienced by long-term childhood survivors, which is not surprising, as gonadal injury is a well-established consequence of modern chemotherapies and radiation therapy. Due to the nature of the treatment they receive, some childhood cancer survivors are at high risk of infertility. Additionally, sex, age at treatment, and genetic factors influence the risk of permanent infertility. Berger: “In women, decreased fecundity is a late effect that arises after chemotherapy. It has been shown that pregnancy is less likely to occur in survivors who have received hypotensive/irradiative ovarian/interstitium, ovarian/interstitial nerve, or treatment with high doses of alkylating agents. Furthermore, the number of eggs in their ovaries may be reduced to such an extent that they will reach menopause much earlier than the average age of 51 years. In males, these treatments may damage spermatogenesis, leading to impaired fertility. According to Berger, all patients deserve an informed consultation about their potential fertility and methods for fertility preservation before treatment.”

In pre-pubertal children, testicular or ovarian tissue cryopreservation may be performed, whereas results are more promising in girls than in boys. Regarding post-pubertal children, oocyte cryopreservation is preferable, while sperm conservation is the simplest method in boys,” said Rocher. “In men, reduced testicular volume with coarse or strictured or even nodular (because of Leydig cell hyperplasia) echo texture may be shown in ultrasound. First of all, colour Doppler should be performed as usual to find out, or associated, or curable causes of infertility like varicocele or epididymal occlusion. In women, fertility imaging screening should be conducted as for any other infertile woman, especially if the chemotherapy type or dose is not consistent with the infertility status. It is important that the presence of the ovaries is assessed, as well as their volume and egg count.” she added.

Today’s session will close with a panel discussion addressing the question of how paediatric radiologists may recognise, monitor, and help to minimise the late effects in survivors of childhood cancer.
Case-based training proves its clinical value

It already seems to have become a tradition that one of the last sessions at the ECR is the popular Case-Based Diagnosis Training. We see this a little bit like gleaning from the kitchen of radiology, amuse gueule of the subspecialties, or if you prefer, a plate of imaging antipasti, lovingly decorated by our enthusiastic teachers. Ten renowned specialists show two cases each, exactly like you would encounter them in your own daily routine.

In the beginning, you will hear about a patient’s symptoms with relevant medical history, and then turn out to be (partly) cystic lymph node metastases from papillary thyroid cancer. A 27-year-old woman suffered from recurrent episodes of pharyngitis and sore throat. Her ENT doctor asked for an MR examination, which revealed a roundish hyperintensity in the left middle jugular group on coronal fat suppressed images from the fields of liver, neuro, maxillofacial, musculoskeletal, breast, head and neck, chest, gastrointestinal, and genitourinary imaging.

Based on our interactive multi-choice questions, you then have the chance to come up with your own ideas on the work-up of the cases, either concerning the description of findings or considerations related to the final diagnosis. Some answers will come very easily, others are bound to surprise you, and no matter whether you are a beginner, already quite advanced or even a distinct expert in a particular area, rest assured that we will have a couple of interesting comments for you, since various options will subsequently be explained in detail.

At the end of the conference, after all the fancy sequences, new contrast agents, information on the latest laboratory parameters and new therapeutically relevant diagnostic algorithms, the cases were discussed in detail, together with some introductory remarks and of course the final diagnosis with a concise introductory remarks and of course the final diagnosis with a concise explanation.

This year, we have gone for “just a cyst?” We all use the term ‘cyst’ a great many times every day. It comes to our mind when we are dealing with a cyst, a cyst? We all use the term ‘cyst’ a great many times every day. It comes to our mind when we are dealing with a cyst, are they ‘true’ or ‘false’? We all use the term ‘cyst’ a great many times every day. It comes to our mind when we are dealing with a cyst? Do we always scrutinise brain cysts for the mural nodule to exclude plexic astrocytoma? What are the implications of a perineural cyst? Are dangerous cysts just holes in the bone or do we watch out for scalloped borders to rule out progressive keratoctyes? What are the connections between thyroid cancer and cystic lymph nodes? When do you warn your rheumatologist that a Baker’s cyst might impede with venous flow? When do you recommend sticking a needle into renal cysts? When you start to think about it, you might run into the risk of seeing danger everywhere.

Professor Soraya Robinson works as a general radiologist in a big diagnostic centre in Vienna. She trained at Vienna General Hospital – MedUni Vienna’s university hospital – and worked as a consultant at the University Hospital in Helsinki, Finland, for four years. She was a subspecialty chairperson for ECR 2009, and a member of the ECR Programme Planning Committee for 2013 and 2015. She has been leading the working group for head and neck radiology in Austria since 2013 and has served on the Executive Board of the ESHNR since 2014.

The ESOR GALEN Courses have been designed to familiarise young radiologists with the established approaches and most recent achievements in diagnostic imaging, related to topics across the specialties. The courses are aimed at residents and board-certified radiologists from all over Europe.

For further information on the extended programmes and registration, please visit ecr.org

ECR TODAY | SUNDAY, MARCH 3, 2019

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Iterative reconstruction algorithms in CT images have become a part of our daily routine, allowing us to obtain CT images with less noise while at the same time giving the patient a lower radiation dose. Radiologists agree that there is less perceived noise in CT images when using iterative reconstruction, but at what cost? The question remains: do iterative reconstruction algorithms improve, degrade or preserve diagnostic quality in our CT images? And can we use traditional metrics to quantify the perceived diagnostic image quality?

Ever since the development of the first CT in the early 1970s, the quest has been to get as much information as possible in as short an amount of time as possible. Reconstructed time per image was limited by computer power and the effectiveness of reconstruction algorithms. Iterative reconstruction algorithms have been available since the early days of CT, but were too computationally intensive to be clinically applicable. Filtered back projection algorithms were a compromise between reconstruction speed and image noise. After more than 40 years of experience with traditional filtered back projection algorithms, there is a well-known relationship between radiation dose, measured noise and perceived diagnostic image quality.

Iterative reconstruction algorithms take into account a mathematical assumption of the entire CT system, which results in less image noise but with a longer reconstruction time compared to filtered back projection algorithms. Today, with more powerful and faster computers, iterative reconstruction is available on all modern CT scanners from all vendors and has become a part of the daily routine. The first speaker of today’s refresher course on iterative reconstruction, Prof. Mika Kortesniemi, from the University of Helsinki, Finland, will present the history and physics behind iterative image reconstruction in CT.

The noise reduction obtained by using iterative reconstruction can either be used to improve image quality at the same dose or maintain similar image quality at a lower dose. The vendor advertises a dose saving potential up to as much as 80% when using iterative reconstruction compared to filtered back projection, without losing any image information. So does this mean that we can go ahead and reduce the dose as suggested by the vendor? Does our choice affect the diagnostic quality or even the diagnostic accuracy?

The second speaker of the session, Prof. Haitem Alkahdi from University Hospital Zurich, Switzerland, will present the radiologist’s perspective on the clinical use of iterative reconstruction. Radiologists agree that there is less image noise in the CT images when using iterative reconstruction, but at what cost? Is low image noise always better? Radiologists often claim that the appearance of CT images changes when using iterative reconstruction. Phrases like “the CT looks artificial”, “the organs look borderless” or “even it looks like someone has painted my CT images using water colours” are common. What happens to the image quality in terms of image noise and level of detail? What level of image quality is needed? When looking into image quality in general, it is important to stress that the required level of image quality is highly dependent on the clinical indication and the task at hand. Is the CT study looking into kidney stones or small liver lesions? Studies have shown that an increased level of iterative reconstruction does not necessarily correlate with increased perceived diagnostic quality. Moreover, reduced radiation dose in combination with increasing iterative level has actually shown a decrease in perceived diagnostic quality. This does not necessarily mean that the image quality is degraded, but that the image quality is too different from what the radiologists are used to looking at after decades of filtered back projection images.

Medical physicists want to measure and quantity image quality. Do the traditional metrics such as contrast-noise ratio correlate with diagnostic image quality as perceived by the radiologist? How about noise as a standard deviation of HU values? It turns out that improved traditional image quality metrics are not necessarily equivalent to improved diagnostic quality. Also, traditional metrics are often based on homogenous phantoms. Several recent studies on anthropomorphic phantoms have shown that the iterative reconstruction result in a heterogeneous noise reduction, i.e. the noise in homogenous areas is significantly reduced, while the noise near organ edges is less affected, as shown in Figure 1. Are there new image quality metrics available that can quantify this heterogeneous noise reduction? And is it possible to correlate the objective image quality and diagnostic accuracy? The last speaker of the session, Prof. Colin Walsh from St. James’s Hospital in Dublin, Ireland, will talk about how to assess image quality when using iterative reconstruction.

Every physicist, radiographer and radiologist should have a basic understanding of how dose reduction and iterative reconstruction are related. In a time where reconstruction algorithms are rapidly advancing, we need tools, solutions and workflows to evaluate image quality and dose saving potential in a multi-vendor environment. The degree of radiation dose reduction and level of iterative reconstruction should be tailored to the specific CT scanner, iterative reconstruction technique, and also the patient’s body region and body habitus. The session will end with a panel debate addressing the potential dose reduction when using iterative reconstruction.

The session will present the origins of dose reduction using iterative image reconstruction in CT and explain how to achieve dose reduction using iterative reconstruction in CT. Potential solutions and workarounds will also be presented.
The accuracy of contrast-enhanced mammography: a retrospective multireader study

Recent incorporation of titanium contrast-enhanced mammography (TiCEM) adds functional information value to digital mammography (DM), which is a purely morphological technique. We will show our initial and promising results of this multireader study, in which we compare the accuracy between TiCEM and DM, this afternoon at ECR 2019.

DM is the only breast imaging technique that has been shown to reduce breast cancer mortality, being the technique of choice for initial evaluation in screening for breast cancer. However, DM has a variable sensitivity (50–85%), especially low in dense breasts, and the use of complementary techniques such as ultrasound and digital breast tomosynthesis is very common.

The recent incorporation of contrast-enhanced mammography opens a new horizon in breast imaging, combining the excellent spatial resolution of mammography with a functional study based on neovascularization.

ECR attendees can expect to learn more about this technique in scientific session 1902a, this afternoon. TiCEM uses two different spectra of x-ray photons, high and low energy. Initially, a bolus of iodinated contrast medium is injected into a peripheral vein. After a delay of 120 seconds, the breast is compressed and an image is acquired at low energy (28–32 kV – similar to conventional mammography), followed by a high-energy image in the range of 49 kV. This last image is not shown for diagnostic purposes, but the system automatically generates a recombined or subtracted image. Additional views can be obtained.

The use of a unique titanium filter, as opposed to a copper filter, reduces the tube current for equal image quality.

Dr González-Huebra will present the results of our study in which we retrospectively evaluated the diagnostic accuracy of this novel technique, TiCEM, versus DM. In total, 120 histologically confirmed lesions were recruited (41 benign, 79 malignant). Three readers, blinded to the final diagnosis, retrospectively evaluated the lesions and classified them into the BI-RADS categories. The three readers had different levels of experience: reader one was an expert, reader two was a resident and reader three had intermediate experience.

For all the readers, the accuracy of TiCEM was significantly better than DM, in both dense and non-dense breasts. The accuracy of the resident reading a TiCEM study was even better than that of an expert radiologist reading DM.

"TiCEM can be used as a problem-solving technique, for instance in the assessment of palpable lesions, asymmetries, or masses not visible on ultrasound. It can also be useful for other indications previously reserved for MRI, such as ruling out multifocality/multicentricity in newly diagnosed patients, or evaluating treatment response to neoadjuvant chemotherapy. It is currently being studied for screening of medium-risk patients because it could be more efficient and less expensive than MRI due to shorter examination times and reduced equipment costs," says Dr. González-Huebra.

Dr. Ignacio González-Huebra and Dr. Marta Calvo Imirizaldu are radiology residents at Clínica Universidad de Navarra, and collaborating teachers of the University of Navarra in Pamplona, Spain.
Musculoskeletal ultrasound elastography: can we pave the way towards standardisation?

Nowadays, ultrasound elastography is an established method for evaluating the stiffness of the liver and tumours of the breast. In contrast to these application fields, numerous confounders have prevented the widespread use of this modality for musculoskeletal diseases in a standardised fashion. The Ultrasound Research and Translation group of the Institute of Diagnostic and Interventional Radiology in Zurich has been successful in formulating steps towards better standardisation, broadening the application fields of musculoskeletal elastography.

The Institute of Diagnostic and Interventional Radiology is a leading research institute in the field of radiology. The Ultrasound Research and Translation group, under the supervision of Prof. Marga Rominger, focuses on the investigation of novel ultrasound elastography methods, multi-parametric quantitative biomarkers and artificial intelligence. Their vision is to improve ultrasound technology through objectivisation of examinations and diagnoses (Ultrasound 4.0).

### Investigation and standardisation steps

I have been investigating the contributions of multiple confounders in elastography of the muscles. I performed shear wave elastography examinations on elasticity phantoms, ex-vivo porcine muscle, and the gastrocnemius muscles (Figure 1A) of healthy volunteers. The results indicate that the location and size of the region of interest (ROI), software choice, muscle fibre orientation and muscle tension significantly influence shear wave velocity, and the reproducibility of shear wave elastography is affected by these factors.

In addition, I elaborated a clinical roadmap, highlighting major confounders and providing advice on how to perform more reproducible shear wave elastography examinations. The application of controlled, reproducible, low-force muscle loading states and probe force control present further ways to reduce the influence of confounders. Moreover, it is advisable to carry out repeated measurements and maintain the same measurement settings during a complete study.

My colleagues and I are certain that a controlled clinical protocol can significantly reduce the variability observed today, paving the way towards better standardisation in musculoskeletal elastography.

Examination set-up (Figure 1A) with a 2D-D linear probe (GE Healthcare, USA) placed on the posterior lower leg of a 28-year-old volunteer. Shear wave velocity (SWV) colour maps for muscle loading force states of 150 N (Figure 1B) and 350 N (Figure 1C) are shown. The displayed SWV image is homogeneous at 150 N, while higher and more heterogeneous SWV patterns are found at 350 N, exceeding the measurable SWV scale (black arrow).

(Images provided by Dr. Lisa Ruby)

### Scientific Session: Musculoskeletal

Sunday, March 3, 10:30–12:00, Room O

SS 1810 Knee and muscle imaging

Moderators: M. Nevalainen; Oulu/FI; E. Springer; Vienna/AU

Musculoskeletal elastography: exploration of confounders in a challenging field

L. Ruby, S.J. Sarabri, T. Mutschler, K. Martini, T. Frauenfelder, V. Klingmüller, M. Rominger; Zurich/CH, Marburg/DE

Dr. Lisa Ruby is a Research Fellow of the Ultrasound Research and Translation group of the Institute of Diagnostic and Interventional Radiology at the University Hospital Zurich, Switzerland.
Solving the discrepancies in light of tumour markers

F-18 FDG PET/CT versus Tc-99m MDP bone scan in breast cancer metastatic to bone

BY HATEM NASR

Early detection and follow-up of metastatic osteo-osseous disease is crucial for effective management of breast cancer patients. Bone scans have always been a sensitive tool for detection of bone metastases, though with uncertainty regarding specificity. F-18 Fluorodeoxyglucose (FDG), on the other hand, is the most widely used PET radiotracer, with a growing role in imaging of breast cancer patients. It allows for quantitative evaluation of glucose metabolism that is supposed to reflect the actual disease activity.

We wanted to compare the metastatic osteo-osseous burden on F-18 FDG-PET/CT versus Tc-99m MDP bone scans and to test their correlation with serum levels of CA15-3 as a tumour marker and alkaline phosphatase as a bone turnover marker.

We reviewed the data for 37 patients with breast cancer metastatic to bone for whom FDG PET/CT and MDP bone scans were performed within less than 30 days. Data collected included patients' demographics, clinical findings, prior therapy, serum Ca15-3, serum alkaline phosphatase, as well as histopathology of primary and occasionally metastatic lesions. For each patient, a semi-quantitative metastatic osteo-osseous score based on both extent and intensity of lesions was calculated. Patients' metastatic skeletal lesions were matched regarding number and intensity in 20 patients (54.1%). More lesions or higher intensity lesions on PET/CT were detected in 13 patients (35.1%), of which six (30.2%) had apparently normal bone scans. In four patients (10.8%), more intense lesions were detected on bone scans. Most of the additional lesions detected on PET/CT were osteolytic and predominantly medullary, suggesting early-developing/moving lesions, while lesions with higher uptake on bone scans showed more sclerotic changes with low FDG activity on PET/CT, suggesting non-active healed/healing lesions. One patient had a mucinous histopathological variant with inherently poor FDG avid lesions that are better visualised on bone scans. Eight patients (21.6%) had better visualisation of skull lesions on bone scans compared to PET/CT, likely due to masking by the high physiological brain activity on PET/CT. One patient had bilateral tibial metastases that were not included in the PET/CT imaging field.

Interestingly, CA15-3 was positively correlated to both PM score (r=0.363; p=0.027) and BM score (r=0.386; p=0.018), contrary, alkaline phosphatase was positively correlated to both PM score (r=0.386; p=0.018) but not to BM score (p=0.874). A cut-off value of CA15-3 >47U/ml best predicted additional findings on PET/CT compared to bone scans (sensitivity, specificity, PPV, NPV and accuracy of 61.5%, 79.2%, 61.5%, 79.2% and 73% respectively (p=0.033)).

FDG-PET/CT is more sensitive and specific in detecting active metastatic osseous lesions and tends to better identify new osteo-osseous lesions. Bone scans tend to be less specific due to ongoing osteoblastic activity in healing sclerotic lesions that could persist for several months, rendering it suboptimal for short-term follow-up. The metastatic osseous burden of PET/CT is correlated to CA15-3 serum level and a higher level of CA15-3 could predict more lesions on PET/CT as compared to bone scan. Nevertheless, bone scans can still detect lesions in areas not covered by the PET/CT imaging field, skull lesions that are masked by the high brain metabolic activity on PET/CT or metastatic lesions from histopathological variants with inherently low FDG avidity.

Scatter plot showing positive correlation between CA15-3 and PET/CT metastatic score (PMS) but not between CA15-3 and bone scan metastatic score (BMS).

A 60-year-old female with invasive duct carcinoma, metastatic to bones, lungs, and liver. Baseline FDG PET/CT (upper panel A & B) revealed more extensive hypermetabolic osteo-osseous involvement compared to same week MDP bone scan (upper panel C & D). Follow-up PET/CT (lower panel A & B) after seven months demonstrates marked metabolic regression/resolution but minimal change on bone scan performed eight days earlier.

Scientific Session: Oncologic Imaging
Sunday, March 3, 08:30–10:00, Room M 3
SS 1216 Which whole-body exam should I choose?
Moderators: N. Bogveradze; Thulis/GE
G. Cook; London/UK

* Keynote Lecture:
  H.E. Mayerhöfer; Vienna/AT
  F-18 FDG PET/CT compared to Tc-99m MDP bone scintigraphy in assessment of metastatic osteo-osseous disease in patients with breast cancer and the relation to serum CA15-3 and alkaline phosphatase

H. Naar; N. Alnajashi; A. Alqarni; H. Farghaly; Cairo/EG, Riyadh/SA, Assuit/EG
Ultrasound equipment manufacturers put renewed emphasis on versatility and usability at ECR 2019

Ultrasound users have had a clear message for the imaging industry: make the modality easier to use and develop tools that optimise particular applications.

The companies have listened, and at this year’s ECR, they are presenting new or upgraded devices that address these demands with software geared towards specific applications such as carotid, liver, chemoembolisation and gynaecology (ob/gyn), and vascular imaging, as well as tools that help users to get the best image during the first scan, improve contrast ultrasound, and fuse ultrasound images with those from other modalities.

Canon Medical Systems is showing advances in its portfolio, including the Apio i-series, Apio a-series, Xario g-series, and the Viamo point-of-care systems.

The company’s Apio i800 now features a 13-MHz linear-array transducer that is designed to offer better spatial resolution below 50 microns and improved resolution and detail for B-mode and colour flow imaging. Its Smart Senor 3D allows users to take 3D volumes with a standard linear or convex transducer. The system is particularly suitable for superficial subcutaneous imaging and examinations of small joints and superficial nerves, as well as for vascular evaluations.

Canon is also showcasing its Xario G-series, Xario 200G, and Xario 200C, which offer up to eight hours of battery-powered, cordless function, allowing the equipment to be used across a variety of locations in a hospital or clinic.

In its booth, GE Healthcare is exhibiting its Logiq E10 ultrasound scanner, which incorporates clinical Architecture using artificial intelligence technology similar to that used to power driverless cars and for 3D video gaming. The scanner acquires and reconstructs data much like MR and CT systems do, and it eliminates the need for focal zones. It also includes cloud connectivity and advanced reconstruction algorithms.

The vendor is also promoting three Logiq E10 features that address the ergonomic challenges ultrasound users face due to repetitive examination steps, one of which is the Automated Lesion Segmentation, powered by Edafico, which eliminates the need to measure lesions manually by providing a trace of the lesion and corresponding insight.

Philips Healthcare is launching a new version of the Epiq system, Epiq Elite, with two software packages, one for vascular imaging and another for ob/gyn applications. Epiq Elite includes an HD display for improved off-angle viewing on the vascular imaging side, it features the X2MIX linear transducer as well as an upgraded 3D transducer; for ob/gyn applications, it features the V24 high-frequency pure wave transducer that allows clinicians to take detailed images as easily as possible in pregnancy.

"Clinicians are under continued pressure to image more patients faster, and to be able to accurately reproduce exam results," said Jeff Cohen, VP of general imaging and women’s healthcare ultrasound. "The tools we have developed for Epiq Elite address those challenges."

Siemens Healthcare is highlighting the Acuson Sequoia and Juniper scanners. Acuson Sequoia features a deep abdominal transducer, a 12–3.5-MHz ultrasound probe that produces penetration of up to 60 cm. It also boasts the company’s BioAcoustic technology, which improves contrast-enhanced ultrasound (CEUS) bubble longevity, allowing for longer view time of contrast agents.

Acuson-Juniper’s small footprint allows it to be used in a variety of settings, and it features 16 transducers and an LED monitor and touch panel, as well as a protective sheet for its keypads to facilitate its use in sterile environments.

Esaote is promoting a portable ultrasound series called MyLab X. It includes three devices: MyLab X5, MyLab X6, and MyLab X7. The series covers applications ranging from abdominal, endocrinological, and cardiovascular to women’s health and general imaging, and each offers an increasing mix of features: MyLab X5’s tools include stress echo and needle visualization, while MyLab X6 uses ElA20 for measuring tissue elasticity and XLight for volumetric rendering, and MyLab X7 adds X-Pack for multimodality quantification of curve analysis of contrast perfusion, scope for low/high frequency modulation, microV for haemodynamic evaluation, and contrast tuned imaging for improving the diagnostic performance.

The company is showcasing two more highly portable devices: MyLab Omnia, a general imaging scanner that features XView, a tool for reducing artefacts; and MyLab Sigma, a laptop-sized scanner designed for ob/gyn applications.

Hitachi is exhibiting three ultrasound scanners: Artessa 950 SE, Artetta 55, and Artetta 65. Artetta 950 SE is an upgraded version of Artetta 850, and features a 23-inch LCD monitor, shear-wave measurement, and real-time tissue elastography for the assessment of liver stiffness, and Real-time Virtual Sonography for image fusion for interventional procedures. Artetta 65 features Smooth Workflow and Superb Imaging tools and is useful for real-time elastography and auto image-processing (aMIP) measurement, while Artetta 950, the most compact model of the series, features a 21-inch monitor and can be used across various applications.

The company is also demonstrating Futura, another compact system that supports auto DMT and elastography, as well as ob/gyn applications.

Hologic is featuring its Viera port-able ultrasound system, a wireless, handheld device. The scanner delivers high-resolution images directly to a smart device from the point of care, and can transmit images to smart devices and PACS networks in office, examination rooms, and surgical suites.

Visitors to Mindray Medical’s booth can learn about upgrades to the Reina 7 ultrasound platform, which is based on the company’s CONNECTivity, and smart devices and PACS networks in office, examination rooms, and surgical suites.

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Esaote is promoting a portable ultrasound series called MyLab X. It includes three devices: MyLab X5, MyLab X6, and MyLab X7. The series covers applications ranging from abdominal, endocrinological, and cardiovascular to women’s health and general imaging, and each offers an increasing mix of features: MyLab X5’s tools include stress echo and needle visualization, while MyLab X6 uses ElA20 for measuring tissue elasticity and XLight for volumetric rendering, and MyLab X7 adds X-Pack for multimodality quantification of curve analysis of contrast perfusion, scope for low/high frequency modulation, microV for haemodynamic evaluation, and contrast tuned imaging for improving the diagnostic performance.

The company is showcasing two more highly portable devices: MyLab Omnia, a general imaging scanner that features XView, a tool for reducing artefacts; and MyLab Sigma, a laptop-sized scanner designed for ob/gyn applications.

Hitachi is exhibiting three ultrasound scanners: Artessa 950 SE, Artetta 55, and Artetta 65. Artetta 950 SE is an upgraded version of Artetta 850, and features a 23-inch LCD monitor, shear-wave measurement, and real-time tissue elastography for the assessment of liver stiffness, and Real-time Virtual Sonography for image fusion for interventional procedures. Artetta 65 features Smooth Workflow and Superb Imaging tools and is useful for real-time elastography and auto image-processing (aMIP) measurement, while Artetta 950, the most compact model of the series, features a 21-inch monitor and can be used across various applications.

The company is also demonstrating Futura, another compact system that supports auto DMT and elastography, as well as ob/gyn applications.

Hologic is featuring its Viera port-able ultrasound system, a wireless, handheld device. The scanner delivers high-resolution images directly to a smart device from the point of care, and can transmit images to smart devices and PACS networks in office, examination rooms, and surgical suites.

Visitors to Mindray Medical’s booth can learn about upgrades to the Reina 7 ultrasound platform, which is based on the company’s CONNECTivity, and smart devices and PACS networks in office, examination rooms, and surgical suites.
Is Europe missing out on premium ultrasound?

The European market for new ultrasound equipment continued to grow steadily in 2017, with overall sales increases by 4%. This was driven by higher growth from the Polish and Nordic markets which was offset by contractions and lower growth from the German, Italian, French and UK markets. The total European market reached $1.4bn in 2017 with Germany, France and Italy the largest markets.

The opportunity for long-term growth in equipment sales remains, however, cyclical tender activity and healthcare budgets continue to drive short-term fluctuations. While the European market is expected to continue investing in new ultrasound equipment, there are some significant regional purchasing trends. One of the lower levels of premium ultrasound purchases by European healthcare institutions. As a proportion of overall expenditure on ultrasound equipment, the European countries purchase significantly fewer premium systems relative to international counterparts such as North America and China. Premium systems account for 20% of the Western European market in 2017. 18% lower than North America and 19% less China.

In Eastern Europe, premium systems accounted for 18% of the ultrasound market which is 2.5 times less than North America and 22.7 times less China. The Eastern European region has the lowest expenditure on premium systems against all metrics, despite having some of the fastest growing markets on a global basis.

This is an important trend, because the latest advances in ultrasound technology and product development are typically found on premium and high-end systems. These advances include image quality, greater processing power, advanced clinical applications, integration of artificial intelligence (AI) as well as improvements to ergonomics and workflow. For example, improved hardware architectures with increased processing power; coupled with advances in probe technology, have enabled systems to deliver greater image resolution as well as deeper tissue penetration, without compromising on diagnostic quality. Fusion imaging is now typically fully available on premium and high-end systems. So, are European ultrasound users losing out? Some of the implications of Europe’s lower access to premium ultrasound may include:

- Longer-exam times?
- Premium ultrasound systems typically have the latest workflow and automation capabilities, helping to reduce exam times, particularly for more complex exams.
- Lower diagnostic accuracy?
- Premium ultrasound systems offer the highest image quality and the most advanced diagnostic tools.
- Greater diagnostic inconsistency?
- Premium ultrasound systems have advanced clinical applications, such as tools for automated quantification of imaging features, helping to reduce inter and intra-observer variation.
- Poorer user experience?
- Premium ultrasound systems feature the latest ergonomic and user interface designs to reduce user-fatigue and repetitive motions.
- Less use of ultrasound?
- Premium ultrasound systems have the best image quality and the latest features, enabling them to be used in an expanding range of clinical applications that have previously used other imaging modalities.

- Less use of multi-modality imaging?
- Fusion imaging is typically only available on premium ultrasound systems.

Some of the reasons behind this subdued purchasing activity for premium ultrasound include pricing pressures from group purchasing arrangements, product attractiveness due to feature migration, tighter government healthcare budgets and cost containment. Product feature migration has been a characteristic of the ultrasound market for many years. This is where the latest advances in product development are initially launched in premium systems and subsequently made available on mid-range and lower cost systems in the following years. This has successfully made affordable ultrasound machines more appealing, although has somewhat cannibalised the upper end of the market. OEMS need to continuously innovate and add new functionalities to ensure their premium systems remain attractive in order to support premium sales. While there have been relatively few new introductions for premium ultrasound systems in recent years, we are observing an increasing pace of product advances, particularly through introducing AI and improving clinical workflows. This will tell of these developments are enough to tempt European ultrasound users losing out? Some of the implications of Europe’s lower access to premium ultrasound may include:

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European Alliance fosters research in medical radiation protection and welcomes medical research centres and university hospitals

The European Alliance for Medical Radiation Protection Research (EURAMED) was established by five medical associations involved in the application of ionising radiation in medicine, namely the European Association of Nuclear Medicine (EANM), the European Federation of Organisations for Medical Physics (EFOMP), the European Federation of Radiographer Societies (EFRS), the European Society of Radiology (ESR), and the European Society for Radiotherapy and Oncology (ESTRO).

EURAMED’s goal is to improve medical care and promote medical radiation protection through research efforts. Since October 1, 2017 EURAMED has been a non-profit organisation registered in Austria. EURAMED is currently presided over by Prof. John Damalakis from Ira Klion, Greece, who took over leadership from Prof. Christoph Hoehsen from Magdeburg, Germany who established the development of EURAMED prior to its establishment as legal entity. EURAMED’s management is conducted by the European Institute for Biomedical Imaging Research (EIBIR). EURAMED complements existing European platforms in several other fields of radiation protection, such as:

- the Multidisciplinary European Low Dose Initiative (MELDO)
- the European Radiation Dosimetry Group (EURADOR)
- the European Platform for Nuclear and Radiological Emergency Response and Recovery (NERS)
- the European Radiation and Allied Health Sciences Alliance (EARHAS)

EURAMED seeks to achieve this by promoting research and teaching and by publication of scientific and professional information, especially its strategic research agenda for the field of medical radiation protection research. Through this work, EURAMED is increasing the scientific basis for medical radiation protection. EURAMED cooperates with relevant national, European and international scientific organisations and, in particular, with national and international bodies promoting medical radiation protection research. Additionally, EURAMED intends to work with patient organisations and the public at large.

EURAMED’s activities

Since becoming a legal entity on October 1, 2017, EURAMED’s work has included participation in the ICRP-ERPW 2017 (International Symposium on the System of Radiological Protection European Radiological Protection Research Week) in Paris and participation in the European Radiation Protection Week in Rovinj, Croatia in October 2018, including several sessions dedicated to the medical field.

EURAMED also engaged in a joint road mapping exercise led by the CONCERT Project, which EURAMED joined as a project partner in 2016, and initiated its own roadmap development, for which a working group has been established with representatives from EURAMED’s five founding societies, whose input is in the process of being collected. The joint roadmap led by the CONCERT project is seen as a guide for future strategies and funding in this field. The mapping exercise showed four contexts for which radiation protection may be required:

1. Human activities related to medical and diagnostic imaging or industrial applications of ionising radiation;
2. Human activities related to nuclear energy applications and other industrial applications for ionising radiation not related to medical applications;
3. Human activities related to use of natural resources, containing naturally occurring radionuclides (NORM / TECROM);
4. Natural radiation as source of ionising radiation.

The exercise defined optimised radiation protection in medical applications of ionising radiation as one of the major challenges in radiation protection research and development. Furthermore, EURAMED has been approved as an International Commission on Radiological Protection (ICRP) Special Liaison Organisation and presented its mission and activities at an ICP meeting in October.

EURAMED has encouraged the medical community to develop research proposals for the Euratom 2019 calls and has itself participated in the SERENADE project proposal addressing the call ‘Strategy for the Exploitation of Research Results Funded under Euratom Research and Training Programmes in the Field of Radiation Protection’.

In 2019, EURAMED will participate in the IAEO International Symposium on, Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (IDOS 2019). IDOS 2019 aims to provide a forum at which advances in radiation dosimetry, radiation medicine, radiation protection and associated standards made over the last decade can be disseminated and scientific knowledge exchanged. It will take an active role in the 2019 European Radiation Protection Week to be held in Stockholm and aims to publish its research roadmap in the course of the year.

Join EURAMED

One of EURAMED’s key goals for this year is certainly to expand its membership and thus strengthen the activities of its committees and working groups. Membership is available in the following categories:

- Full member (institutions or organisations active in the field of medical radiation protection research)
- Associate member (institutions or organisations that do not actively practice medical radiation protection research, but that have a considerable interest in the area of radiation protection)
- Corporate member (enterprises interested in the activities and aims of the Society)
- Individual member (any health professional or other scientist committed to the objectives of EURAMED with a completed university or equivalent education who may apply for individual membership of EURAMED provided that they are mainly engaged in radiology, nuclear medicine, radiation oncology, medical physics, radiography or related fields).

Member recruitment has started and is a current priority. Membership is designed to be particularly attractive to medical institutions, radiation protection institutions, and authorities interested in medical radiation protection. The focus of EURAMED is necessarily on the medical aspects of radiation protection, which is why medical research centres and university hospitals should be especially encouraged to become full members.

More information and membership application at www.euramed.eu. Additionally, you may find information on EURAMED at the EIBIR booth, which is located in the ACV Business Centre, next to Café Motto at the main entrance.

Interested in radiation protection research?

We aim to advance medical radiation protection in Europe through sustainable research

Join EURAMED as a member

www.euramed.eu

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**BY JOHN DAMALAKIS AND CHRISTOPH HOESCHEN**

**EURAMED**

**European Alliance for Medical Radiation Protection Research**

**myESR.org**

**#ECR2019**
Comparative phantom tests of digital mammograms, breast tomosynthesis and synthetic mammograms

We carried out a study to run a first technical performance analysis of synthetic mammograms in comparison to digital mammography and digital breast tomosynthesis, using a 3D structured test object.

Digital mammography (DM) has proven to be an effective screening modality. However, a substantial fraction of cancers remains undetected. A major factor is the superposition of breast tissue that is hiding lesions in DM. Digital breast tomosynthesis (DBT) was developed to overcome the tissue superposition problem and is a promising candidate for breast cancer screening. DBT can be used in clinical practice as a stand-alone technique or as an adjunct to DM. To eliminate the need for double exposure, manufacturers are creating synthetic mammograms (SM) from the DBT data set. This new type of image is sorely promising, yet very different from classical imaging. There is not yet a well-established technical performance test and that is one of the reasons why screening programmes hesitate to start with breast tomosynthesis. In our talk today, we will present the application of a new 3D structured phantom with calcifications and mass-like lesions. Human observers were asked to score the detectability of these inserts for DM, DBT and SM in a comparative study. The test determines the minimal diameter that is required for the different objects to be visible.

Twelve combined DM-DBT images of the phantom were acquired at automatic exposure controlled dose levels on the GE HC Senographe Pristina, Hologic Selenia Dimensions, and Siemens Mammomat Inspiration systems. The detectability was assessed via human reading and the (threshold) diameters to see the different objects were obtained. For microcalcifications, the threshold diameter from DM to SM increased by 23 µm, 17 µm and 33 µm for the GE, Hologic and Siemens systems, respectively. This implies a better detectability for DM and DBT compared to SM for all systems.

Detection of both spiculated and non-spiculated masses was significantly better in DBT mode compared to SM, while SM in turn outperformed DM. For the three vendors, threshold diameter for mass-like lesions increased from DBT to SM by 2.06 mm, 1.42 mm and 1.11 mm for the non-spiculated masses and by 1.50 mm, 0.05 mm and 1.46 mm for the spiculated masses for GE, Hologic and Siemens respectively.

We conclude that for microcalcification detection, significantly better scores were obtained for DM than for SM, while DBT was significantly better than SM for masses, suggesting that SM, in its current stage of development, cannot be recommended as a stand-alone modality for any of these devices. The results also show that DBT and SM definitely outperform 2D mammography for the detection of masses.

Our study was supported by the KULeuven Medical Physics group. As the method is universal, the study can easily be extended to more systems. Tests on other systems that also have synthetic mammography, namely IMS Giotto Class and Fuji Innovality, are ongoing. Hopefully we can share these results with you soon!

Liesbeth Vancoillie is a PhD student at Leuven University, Belgium.
Head and neck in neuroradiology: education, innovation and clinical interaction

The objective of the Head & Neck Subcommittee of the European Society of Neuroradiology is to promote education and research in the field of head and neck radiology among neuroradiologists and radiologists. Further objectives are to strongly collaborate with other societies such as the European Society of Head and Neck Radiology, with ophthalmology, ENT, maxillofacial, dental and skull base societies.

This objective meets a growing interest in temporal bone, skull base, orbit and neck imaging by radiologists and clinical disciplines. Increasing demand for radiological competence is driven by rapid evolution of therapies for patients affected by diseases related to the skull base, head and neck in general.

Non-invasive and navigation-driven endoscopic and robotic surgeries require a closer imaging and surgical interaction and dedicated 3D-based MR and CT morphologic examinations. This goes parallel with the search for improved visualization of lesion and normal tissue boundaries and identification of vital structures to provide the safety necessary for advanced surgery (Figure 1).

A growing body of knowledge in pathology, with new disease entities united under one roof, such as IgG4 related diseases, increased understanding of molecular factors and virus influence in carcinogenesis, such as HPV, require more expertise in imaging assessment and strongly depend on pathologic-clinical-imaging interaction.

Profound knowledge of pathophysiology and delayed imaging after iv contrast administration have enabled the visualization of diseases such as Morbus Meniere and vestibular neuritis, which in the past were dependent on clinical diagnosis and without an imaging correlate. Clarifying and follow-up after therapy and even preclinical diagnosis have become possible.

A growing issue therefore is to integrate functional information provided by dynamic contrast applications such as perfusion, diffusion and IVIM-based imaging into the diagnostic armamentarium in order to improve understanding of predictors of therapy response, particularly in oncology, and extend the information provided by imaging beyond morphological limits.

In the head and neck, PET has progressively gained a gold standard position in the primary staging – beyond TNM T2 neoplasms – and treatment assessment of head and neck cancer. This requires integrated knowledge and application of nuclear medicine and morphologic imaging.

The vision of a ‘universal’ but problem-solving imaging specialist is of particular relevance in head and neck imaging due to the diversity of the field both in imaging and clinical specialization. Encouraging young colleagues to become involved in head and neck imaging – considered as difficult – comprehensive education, nourishing the seed of innovation, and research, are the best means to meet the demand of a competent imaging partner with their feet on the ground in the clinical world.

Figure 1A–D: 3D MRA (A) and CT-MR image fusion (B) in a patient with a lesion causing acute VI palsy: fusion TOF and CT depict cavernous sinus haemangioma with acute haematoma (and not an aneurysm). Figures C and D show complete endoscopic extirpation by a transnasal approach while maintaining vessel integrity leading to complete clinical recovery within subsequent months.

Dr. Bernhard Schuknecht is Chair of the Head and Neck Subcommittee and ExCom member of the European Society of Neuroradiology, as well as cofounder and member of the European Society of Neuroradiology, as well as cofounder and member of the head and neck board and board of neurooncology at the University of Zurich. He has been a partner of the Medical Radiologic Institute in Zurich, Switzerland since 2005.
Wondering where to go? ESHNR is the answer!

Your residency is coming to an end and, out of the vast field of interesting possibilities in radiology, you can’t decide which path to take? The prestigious tumour boards are in firm hands and the rheumatologists only want to see the same face they have grown to know over the years? You are not keen on wearing the lead apron all day and your hospital does not have a paediatric ward?

Why not join the European Society of Head and Neck Radiology (ESHNR) and focus on head and neck radiology? This is not just the grey zone between sacred chant imaging and prestigious neuroscience, occasionally traversed by interventionists. Even if you already left the hospital environment long ago and are working as a general consultant in an institute, we promise to make you stand out amongst your colleagues. We invite you to start a whole new experience, interacting with dentists, ENT and facial surgeons, oncologists and radiotherapists. They are experts in their fields and hopefully know exactly what to expect from imaging.

Let us take you by the hand and guide you through all the fascinating nooks and corners of the facial and temporal skeleton. Let us unwind the labyrinth of compartments, nerves and vessels together. We will show you the shortest path to reach the end of the tunnel when it comes to deciphering first anatomy and then disease, with a short detour via developmental anomalies. By and by, you will become a reliable support in the chain of handling head and neck patients in the best possible way. You will be rewarded by the satisfaction of having made a substantial contribution to the most efficient usage of resources and the feeling that you have been able to guide both patients and clinicians according to the best of current knowledge.

Maybe some of you now start to have doubts? A 6-month fellowship is not exactly what you are currently aiming at and your ESHNR diploma is way too ambitious to consider at the moment? Relax and take it easy! To get started, attend one of our head and neck lectures at the ECR. If you like them, browse through our EPOS section and consider attending our next annual conference, which will be organized by Professor Antonio LoCasto and will take place in Cinisi, near Palermo, in Sicily on October 3–5. And if all this sounds far too time consuming, just do a couple of stretching exercises for your neck and shoulders, then grab your favourite nibble (why not wholegrain this time?) and a drink of your choice (beer, wine, green smoothie), make yourself comfortable on the sofa (with or without your cat or dog) and join our monthly webinar session. Changes are that you will be hooked and already looking forward to the subsequent session. We bet that you will be more relaxed reading your next head and neck study in a year’s time. Give it a try!

We from the ESHNR will be happy to accompany you on this trip. Pertinent anatomic landmarks featured in all relevant modalities will be a special focus. Characteristic signs in different entities are continuously highlighted. Our endeavour is to acquaint you with pathognomonic features of various diseases and familiarize you with somewhat rarer conditions. You will learn the most common pathways of illnesses and hence be best equipped to look for early signs. We will also alert you to common therapeutic and diagnostic questions, thus preparing you to spot post-therapeutic conditions and differentiate them from recurrences. While our aim is to provide each patient with the best possible imaging algorithm, we also try to avoid redundancies, to keep anxiety and costs down and save machine and human resources and the feeling that you have been able to guide both patients and clinicians according to the best of current knowledge.

We are looking forward to welcoming you among us and, who knows, maybe some of you will be so enthusiastic that you will teach the next generation of radiologists yourselves!
Six-fold growth of EuSoMII and the first book on AI in medical imaging

Artificial intelligence in medical imaging (AIMI) became radiology’s hottest topic in 2017. According to Ángel Alberich Bayarri, CEO of Quibim (Quantitative Imaging Biomarkers in Medicine, a Spain-based company dedicated to medical image processing and extraction of imaging biomarkers for medical imaging workflows), start-ups in AI for medical imaging raised more than $500m (€438m) in 2017. Nevertheless, the results of these investments still have limited practical utility.

The major remaining problems of AIMI are the standardisation in designing clinical use cases, the necessity for labelling data (for training of the algorithm), the clinical validation of algorithms, the protection of patient privacy, and the regulation of ethical issues. All of these elements are indispensable chains in the creation of a well-structured and balanced AI ecosystem.

The current AIMI market is divided into four major categories:
1. AI-developer platforms (e.g. Kaggle, Jupyter, Nvidia, etc.)
2. Single AI start-ups offering AI-based tools for image analysis (e.g. Aidoc, Zebra, Quantrax, Aidence and many other newcomers)
3. AI marketplace or platforms offering a wide range of AI-based analytic tools (EnvoyAI, Blackford, etc.)
4. Established PACS-vendors and modality vendors offering AI services and solutions, including both image analysis and workflow optimisation tools.

The economics of investing in AI should be found in those applications improving the radiological workflow, e.g. by shortening the turnaround time for reporting urgent examinations, reducing the number of no-shows and facilitating the business intelligence and analytics functions. Radiologists are mostly interested in new tools that allow them to spend less time on burdensome and low-level routine tasks, and thus focus on the interpretation of more complex examinations and communication with referring physicians and patients. Country-wide screening projects for lung and breast cancer might also benefit from AI tools, especially in those countries dealing with a significant shortage of radiologists, such as in the UK.

In general, AI is able to reduce the amount of time that a radiologist spends being ineffective by approximately 30 minutes each day, which according to Contactflow data equals a cost saving of €7200 per radiologist per year and a total of €384m per year in Europe. This prospect is equally attractive for physicians, researchers and start-ups.

From EuroPACS to EuSoMII

EuroPACS was founded in 1982, a period branded as the beginning of the digitisation of radiology, including the introduction of PACS. In 2013, Prof. Emanuele Neri initiated a major change in the society’s scope, orienting it more towards imaging informatics. In 2016 the society was renamed the European Society of Medical Imaging Informatics and the EuSoMII board defined a new specialty track, which for the first time also included abstracts on artificial intelligence in medical imaging (AIMI) was initiated by Erik Ranschaert and supported by Paul Algra and Sergey Morozov as co-editors. Its publication is scheduled for early 2019 and the final version will be available at the ECR.

The ECR 2019 Scientific Subcommittee on Imaging Informatics is chaired by EuSoMII Vice-President Professor Elmaz Kotter and has delivered an outstanding programme for this year’s congress. According to Kotter, and based on internal ESR statistics, more than 400 abstracts were submitted for the Imaging Informatics specialty track, which for the first time also included abstracts on artificial intelligence and machine learning.

The newly elected EuSoMII executive board 2018–2020 at the EuSoMII Annual Meeting in Rotterdam, the Netherlands, on November 3, 2018.

On November 3, 2018, EuSoMII organised its annual meeting in Rotterdam, the Netherlands, which was attended by more than 150 participants. The 2018–2019 EuSoMII board did a tremendous job of developing the society and were able to compose an excellent programme.

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Prof. Sergey Morozov, M.D., Ph.D., MPH, CTIP from Moscow is EuSoMII President 2016–2018, CEO of the Radiology Research and Practice Center in Moscow and Chair of the Moscow chapter of the Russian Society of Radiology.

Dr. Erik Ranschaert, M.D., Ph.D., CTIP from Turnhout, Belgium, is EuSoMII President 2018–2020.
A Clear Vision for Radiology

VIENNA
MARCH 11-15
Incoming ESR President lays out clear vision for ECR 2020

It is a well-established tradition that on the final day of the congress, ECR Today looks ahead to next year’s ECR. We therefore spoke with Professor Boris Brkljačić from Zagreb, Croatia, the incoming ESR President, who is in charge of ECR 2020. He shared with us some of his ideas and plans for the next European Congress of Radiology.

ECR Today: Professor Brkljačić, the first thing that comes to mind the next congress is always the congress poster. For ECR 2020 you chose artwork by the award-winning Canadian illustrator Peter Diamond, depicting a young woman looking at a small object floating just above her cupped hand. Can you tell us a little about how this particular design came about?

Brkljačić: The ESR Office provided several options for the congress poster, created by professional designers, and the Congress President and PPC members select one. The selected solution was the best among the proposed options. It resembles Rembrandt’s artwork, with sharp light and dark contrast, and in good accordance with the slogans for ECR 2020: A Clear Vision for Radiology. The small floating object represents artificial intelligence, the clear vision for ECR 2020, and the young woman represents the next generation of radiologists. The woman is looking at a small object, which is a reference to the reactions and feedback from the junior quiz at ECR 2019.

ECR Today: It has been a long-standing ECR tradition to invite some guest countries for the ‘ECR meets’ sessions. Which countries will be featured next year and what can we expect from their presentations?

Brkljačić: Canada will be one ‘ECR meets’ country in 2020, for the first time ever. Canada has a very strong and well organised national radiology society and many excellent radiologists. I am convinced that the programme that the Canadian Association of Radiologists will provide will be very interesting for ECR participants, who will have the opportunity to find out more about radiology in Canada and learn more about this huge and beautiful country.

For the second time, after twelve years, Israel will be an ‘ECR meets’ country. Israel has been somewhat underrepresented so far at the ECR, it is a land of scientific inventions, sometimes referred to as the start-up nation, and many things that we use in everyday radiological practice of radiology in Canada and medical practice were invented in Israel. It has a very active and well organised radiology association who have already created a very attractive programme. Both Canadian and Israeli presentations will deal with innovations, technol-

ECR Today: The programme has already been greatly expanded for ECR 2019. Can we expect it to be back again in 2020?

Brkljačić: Absolutely. The Cube was very successful in 2019, and it will be kept and refined even more at ECR 2020. Interventional radiology has a great future; it is one of the few areas where radiologists are directly and actively involved in the treatment of patients, so IR has to be well represented at every ECR. I hope that the Cube will attract many students to go into radiology, and many residents to become involved in interventional radiology.

ECR Today: The ‘regular’ version for ECR 2020, which has already been working on preparing the scientific programme for a few months. Can you tell us something about the highlights of the 2020 programme or any specific focus we can expect?

Brkljačić: I am very fortunate to have selected excellent Programme Planning Committee members, who are hard-working and dedicated experts in their fields. Planning has already been running at full speed for a few months in order to create a well-balanced programme of very high-quality professional, educational and scientific content. New Horizons Sessions, State of the Art, Special Focal Sessions have already been selected and mostly created; they are very relevant and balanced, as they young radiologists and experts in particular radiological fields will have interesting sessions to choose from in all areas of radiology. Emerging and hot topics will be covered, like lung cancer screening, artificial intelligence, stroke diagnosis, and treatment, and many others. I expect that the plenary/honorary sessions should be the highlight of the congress, as they are interesting for all participants, regardless of their age and expertise.

ECR Today: Your own special areas of interest are breast and interventional radiology; will these interests be reflected in the scientific programme?

Brkljačić: Breast imaging and interventional radiology will have important places in the programme, but I will take special care to create a balanced programme, attractive for all participants, so that all areas of radiology will be represented without preference for special areas of interest.

ECR Today: Speaking of interventional radiology. In 2018 the ECR introduced a brand new feature: Interventional Radiology at the Cube, a separate programme, offering an innovative, hands-on introduction to IR. That programme has already been greatly expanded for ECR 2019. Can we expect it to be back again in 2020?

Brkljačić: Absolutely. The Cube was very successful in 2019, and it will be kept and refined even more at ECR 2020. Interventional radiology has a great future; it is one of the few areas where radiologists are directly and actively involved in the treatment of patients, so IR has to be well represented at every ECR. I hope that the Cube will attract many students to go into radiology, and many residents to become involved in interventional radiology.

ECR Today: The hot topics of artificial intelligence and machine learning will also be in the spotlight at ECR 2020. Can you give us any hints as to what is planned in terms of the programme?

Brkljačić: Artificial intelligence and machine learning will be represented substantially, since their importance in radiology is very high and all future congresses will have to contain many AI-related sessions. One of the ECR 2020 Academies will be dedicated to artificial intelligence.

ECR Today: The ‘regular’ version for ECR 2020 will be chaired by the ESR Past President, Prof. Paul M. Parizel, and it is well known that Paul is an innovative person with many original ideas, so I am sure that participants will enjoy the quiz a lot. The junior quiz will be chaired by a young cardiologist radiologist from Slovenia, Maja Pirnat. We are still considering ideas for themes and will pay close attention to the reactions and feedback from the junior quiz at ECR 2019.

ECR Today: You are also chairperson of the Programme Planning Committee for ECR 2020, which has already been working on preparing the scientific programme for a few months. Can you tell us something about the highlights of the 2020 programme or any specific focus we can expect?
Portuguese radiological society focuses on international collaboration

Radiology in Portugal is clearly alive and well. Not only do the numbers show increasing levels of attendance among Portuguese delegates at international radiology events, but the specialty is also clearly gaining momentum in Portugal due to the recent hosting of several subspecialty meetings in the country (e.g. Cardiovascular and Interventional Radiological Society of Europe – CIRSE in September 2018), enhancing further the cooperation between Portugal, Europe and the rest of the world.

This year we are hosting the annual meeting of the European Society of Musculoskeletal Radiology (ESMR) in June. The annual meeting of the European Society of Gastro-intestinal and Abdominal Radiology (ESGAR) is scheduled for 2020. The standard of Portuguese radiologists is high and some already work in subspecialty fields, especially in cardio-thoracic imaging and interventional radiology. The Portuguese Society of Radiology e Medicina Nuclear (SPRMN) works in close cooperation with the Portuguese Medical Board, which is responsible for setting the rules of post-graduate education. Some months ago, the new revised curriculum of radiology was approved, meaning that from now on Portugal will deliver the 3+2 concept of residency, something that will ultimately lead to the rearrangement of radiology departments in charge of medical education. This is no more than good news and we do hope that it may also help to foster clinical research within these departments.

The SPRMN has also finished setting up the first programme for certification in interventional radiology, undoubtedly contributing to better and safer patient care encompassing tight links to the IR diplomate delivered by CIRSE. The Portuguese Society of Radiology and Nuclear Medicine was invited to be one of the ESR Meets countries at ECR 2018 and this was the perfect chance to provide the international community with more in-depth information about who we are and what we do. A substantial number of our radiologists serve on various ESR committees and sub-committees and we are also at the forefront of some clinical initiatives, such as the EU-funded MEDIRAD project.

So, the SPRMN strategy is working well, not only in terms of delivering educational content, but mostly in terms of our willingness to expand our scientific horizons in the international community. Protocols of cooperation outside Europe, especially with Brazil, have been established and we see this as a golden opportunity to network and expand our horizons.

BY FILIPE CASEIRO ALVES
The Turkish Society of Radiology: our current challenges

Founded in 1924, the Turkish Society of Radiology is one of the most influential scientific non-governmental organisations of Turkey.

Its mission is to be an important decision-maker that provides a high-level, pioneering scientific contribution to public health. Its vision is to develop the science of radiology to protect the rights and interests of its members and to enhance the professional scientific and social relations between them, considering the higher benefits of the people and the country. Like in many other countries, increasing demand for imaging services is one of the major challenges that our society is currently facing in the hybrid imaging question. In Turkey, nuclear medicine physicians are reporting PET/CT exams typically without a contribution from a radiologist. In fact, nuclear medicine physicians argue that they utilise the CT part of the exam only for attenuation correction and anatomic localisation. Although this claim is highly controversial in its current form, the introduction of MR/PET presents an additional challenge, since the MR part of the exam surely provides more data compared to CT. We still do not have detailed regulations about this issue. The Turkish Society of Radiology, devoted to the benefit of experts and the public in the power of dialogue, is trying to overcome this challenge through cooperation with the Turkish Nuclear Medicine Society. It is a slow process that requires dedication and patience.

The increasing role of artificial intelligence in imaging is another focus of our society and the fourth challenge we are facing. In general, Turkey has a keen interest in artificial intelligence and in the fourth industrial revolution. Accordingly, the Turkish Society of Radiology aims to enhance the creation of multidisciplinary collaboration interfaces regarding artificial intelligence.

We believe that the challenges and problems we face are very similar to those that are faced by our fellow societies in Europe. In this report, we believe that a European cooperation, mediated and enhanced by the ESR, will play a crucial role in overcoming these challenges and problems.

Prof. Sukru Mehmet Erturk, studied medicine at the Cerrahpasa School of Medicine of Istanbul University. He was the president of the Turkish Society of Magnetic Resonance Imaging between 2016 and 2018 and is currently an executive board member of the Turkish Society of Radiology.
The law on informed consent in Italy

Informed consent has become the primary paradigm for protecting the legal rights of patients and guiding the ethical practice of medicine. It may be used for different purposes in different contexts: legal, ethical or administrative1.

In Italy, the law n° 219, entitled Rules on informed consent and advance treatment provision, was published in the Gazzetta Ufficiale della Repubblica Italiana on Jan -uary 30, 2016. Article 1.i of this law is centred on informed consent: the law protects the right to life, health, dignity and self-determi-nation of the patient and establishes that consent can be started or continued without free and informed consent of the person concerned, except in cases expressly provided by law. Treat-ment and care relationships are pro- moted, as well as enhanced trust between patient and doctor, based on an effective decision-making is centred on the patient’s autonomy and the medical doctor’s competence, professional autonomy and responsibility. Every person capable of doing so has the right to refuse, in whole or in part, any diagnostic assessment or medical treatment designated by the medical doctor for his pathol-oagy. The patient has the right to revoke, at any time, the informed consent given, even when such revocation involves the interruption of the medical treatment.

Informed consent is included in the medical record: this is very important because treatment refusal is a com-mon occurrence in clinical prac-tice and the process of deciding to refuse treatment is often complex. Moreover, as indicated by arti-cle 1.i, informed consent is docu-mented in writing or recorded on video, depending on the prefer-ences and condition of the patient.

The doctor is required to respect the will expressed by the patient to refuse treatment and, as a result, the doctor is immune from civil or criminal liability. The patient can-not demand medical treatments contrary to the law, to professional ethics or to good clinical-care practice.

In emergency situations, the doctor and the members of the health team will ensure all the necessary care is provided.

3. Every public or private health facility guarantees the provi-sion of necessary information to patients and the appropriate staff training.

Informed consent underlines that patients become part of the deci-sion-making process about their care by being provided with clear information to enable their partic-ipation, and being involved in the actual decisions. Providing treat-ment without a patient’s consent would thus be a violation of the physical integrity of the patient and on his personal identity.

For each patient it is essential to ensure the following: if the patient has been provided with the right information to make a decision; if the information has been presented in a way that the patient can under-stand; if the patient has shared in the process of decision-making and agrees with the outcome.

The best way to meet the legal requirements of informed consent is to develop a consistent practice of involving patients in decisions, even if that involvement may occa-sionally be limited. Clinicians can develop a system to ensure that the discussion is not limited to the doctor-patient interaction but also includes relevant details about the expected benefits, possible alternatives, and involvement of relevant parties, and proposed medical treatments

BY TAIROKHAN DATOV

Recent history points the way for Radiological Society of Kazakhstan

The Radiological Society of Kazakhstan (RSK) was founded in 1977 and was part of the All-Union Scientific Society of Roentgen-Radiologists until 1991 (before the disintegration of the Soviet Union). We still maintain friendly relations with radiologists in CIS countries. Furthermore, the RSK and the Russian Society of Radiology (RSR), which cooperate particularly closely, organise joint annual meetings to share experiences. As a recent example, the two societies co-hosted a session titled ‘Russia meets Kazakhstan’ at the Annual Congress of the Russian Society of Radiology (November 8–10, 2018).

In 1999, the Radiological Society of Kazakhstan joined the European Association of Radiology (EAR) as an associate member, which was the first step in improving radiol-ogy in Kazakhstan by implementing international experience. This has enabled 76 radiologists to take part in the European School of Radiology (a section of SIRM), which was a great opportunity for radiologists in Kazakhstan to reach a new level of development. Con-sequently, in 2001, on the initia-tive of the Scientific/Educational Director of the European School of Radiology (ESOR), Professor Nicholas Courtouryannis, the two-week ESOR Astana Tutorial was launched, with the support of S-immer Healthineers. This provided a valuable new opportunity for young radiologists, senior resi-dents and board-certified radiolo-gists to gain further experience of daily radiological routine through exchange and intensive training in a Central Asian reference centre. In the five years that the ESOR Astana Tutorial has now been offered, 35 participants from Kazakhstan, 15 from Uzbekistan, 10 from Kyrgyz-stan, 7 from Turkmenistan, 5 from Tajikistan, 1 from Russia and 1 from Mongolia have taken part. The pro grammes of the tutorial have been taught by leading professors from Europe (Paul M. Parizel, Matthias Prekop and Matthias Gutterberk, Panso Prassopoulos, Christosforos Stoupis, Koenraad Verstraete, Małgorzata Szefer-Trojanowska, Valérie Vilignan, Margi Aryanoupol ou, Rusina (Valentino E. Simitsoy, Igor Tyurin and Igor Pronin, Vadim Panov, Tatiana Trofimova, Natalia Rubtsova, Alikhan A. Alikhanov) and local speakers. In 2017 representatives of 25 countries attended the 7th ESOR, and reports from Taiwan were presented for the first time in the framework of the meeting, the Korean Society of Radiology (KSR) and the Radiological Society of Kazakhstan held a KSR-RSK friendship symposium on the theme of cardiovascular radiology. That was just the beginning of a new cooperation in October 2018, another KSR-RSK friendship sym posium took place, this time on the theme of breast Imaging, attracting 130 participants.

In March 2018, the Radiological Society of Kazakhstan became a full member of the Asian Oceanian Society of Radiology (AOSR). We are convinced that any coop-eration with representatives of worldwide radiological societies makes an invaluable contribution to our common cause. The EARB is an indispensable confirmation of that.

The Radiological Society of Kazakhstan would be very pleased to welcome you to our eighth Eur asian Radiological Forum in 2019. We look forward to seeing you at our forum in Astana.

Tarikhhan Datov MD, PhD is Head of the Radiology Department at the National Research Cardiac Surgery Center in Astana, Kazakhstan, Vice-President of the Radiological Society of Kazakhstan, local organiser of the ESOR Astana Tutorial, and President of the 8th EARF.

References

BY ANTONIO PINTO, PALMINO SACCO AND CORRADO BIBBOLINO

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The system of postgraduate education and training of radiologists in Ukraine significantly differs from that existing in Europe and currently requires revision and updating. Therefore, the Association of Radiologists of Ukraine (ARU) is trying to run additional educational activities aimed at improving the professional training of Ukrainian radiologists. The ARU sees this as one of its main priorities. Last year was very intensive and efficient for our professional community. The annual congress ‘Radiology in Ukraine 2018’ was successful and attracted a record number of participants – more than 600. The special basic course for young radiologists and the English-language session received positive assessments and will become regular features.

The Association of Radiologists of Ukraine organised and participated in more than 15 educational events, including conferences of sub-specialities, courses of the Ukrainian School of Continuous Postgraduate Education in Radiology, joint conferences with medical professional organisations in other specialties, seminars dedicated to the International Day of Radiology, etc. The Centre of X-ray Technologies of ARU started the School of X-ray Technologies and together with the Ukrainian Association of Radiographers and Radiological Technologists (established on November 8, 2017) organised special conferences and courses for radiographers and radiological technologists.

For the first time, the special session of the Ukrainian Association of Radiographers and Radiological Technologists was included in the scientific programme of the annual congress ‘Radiology in Ukraine 2018’. Every year, scientific research activity in the field of radiology in Ukraine is growing and it now embraces not only the state research institutes, specialised radiological departments of medical universities, and radiology departments of scientific and research institutions of different subspecialties in medicine, but also new private clinics and centres as well. The Onco Consulting Centre (OCC) is a new modern centre for diagnosing oncological diseases. It was launched on the clinical base of the National Cancer Institute in Kyiv in February 2018. The modern radiology department is the most important component of the OCC. Due to the availability of modern radiological equipment and highly qualified personnel, Ukrainian radiology has gained additional opportunities to use modern oncological research methods. These include MRI and CT perfusography for tumour processes in brain and internal organs, functional MRI of the brain and MR tractography, while-body diffusion-weighted MRI in oncological processes, objective CAD assessment of changes in focal lesions of lungs, as well as CT fluorography-guided biopsy. In the OCC, the method of multiparametric MRI of the prostate gland has been developed and introduced into clinical practice. The obtained MRI data are used to conduct targeted biopsy of the lesions of the prostate gland under ultrasound guidance, using the fusion programme. The introduction of all of the above methods of research has only been carried out following the recent European recommendations.

Together with ARU, the OCC is planning to start up a permanent radiology school for training of radiologists in 2019, using the European Training Curriculum for Radiology.

Thanks to ESR support, before the Radiology in Ukraine 2017 congress, the European School of Radiology held a two-day course for Ukrainian radiologists for the first time. The course, titled ‘Virtualisation in Oncology’, took place in March 2017 in Kyiv.

Our ‘Radiology in Ukraine 2017’ congress will be held on March 27–29, 2019 in Kyiv (Oren). This year, the ARU will partner with Friends of Radiology in Ukraine in the 14th edition of Practical Questions in Contemporary Diagnostic Imaging and with the Anne G Osborn International Outreach Professor Program of the American Society of Neuroradiology with a congress and one day of parallel sessions, from March 25–27, 2019. Many partners and sponsors help Ukrainian radiologists to improve their professional knowledge and ARU is grateful to each and every one of them for their generous support.

Our country is in the process of big changes in the medical sphere and Ukrainian radiologists believe that nothing stands still and everything changes for the better.

Andrew Prokopovych, MD is President of the Association of Radiologists of Ukraine (ARU) and Chief of the Radiology Department at the State Institution ‘The Scientific-Practical Children’s Cardiac Center under the Ministry of Health Care of Ukraine’.

By Tetyana Yalynska

Association of Radiologists of Ukraine in the light of changes taking place in the country

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Contrast-enhanced ultrasound on the rise in Latvia

The roots of contrast-enhanced ultrasound (CEUS) in Latvia started in the early 80s with radiation exposure, nephrotoxicity, hepatic sinusoids and the contrast media fails to accumulate within it (PPV of 86.4% and a NPV of 38%). Benign lesions, on the other hand, remain inapparent to hyperenhancing in the portovenous and delayed phase because the contrast is retained in the healthy liver due to slow flow through the sinusoids. Almost 80% to 90% of benign lesions retain contrast and are still hyperenhancing in the late phase. Multiple enhancement patterns are seen in metastases depending upon the primary malignancy – peripheral rim or diffuse enhancement in the arterial phase with rapid washout during portovenous and late phases (in less than 60 secs) is the most common pattern. Arterial phase early hyperenhancement with gradual washout in portovenous and late phase is characteristic of hepatocellular carcinoma (HCC).

CEUS is recommended for examination of abnormal-looking areas that are noticed, but cannot be properly identified using only baseline ultrasound or colour Doppler ultrasound. Currently, ultrasound contrast media (SonoVue, Bracco, Italy) can mostly be recommended if the person cannot have a CT/MRI and is not clearly visible, weak contrast uptake due to the incorrect dosage, or alternating haemodynamics.

It has been used as a tool to assist any ultrasound-guided interventional procedures with intravenous or intracavitary use of contrast agent, as provided in the clinical examples on the right (Figure 2).

Before contrast-enhanced examination, each patient should be assessed individually, considering their history, lesion characteristics, comorbidities, multiparametric imaging findings, technical possibilities and contraindications for each modality that must be decided with multidisciplinary input and performed to the best possible standards by an experienced team of radiologists who are familiar with contrast enhancement patterns in other imaging modalities (Figure 2).

A little more than two decades later, contrast-enhanced ultrasound was used for research purposes in Latvia for prostate cancer detection by Aus. Prof. Arta Majā Radzina, since autumn 2017, when the Radiology Department at Saula Stradiņa Clinical University Hospital became the educational and reference centre for neighboring countries, under the leadership of Aus. Prof. Karla Kupce. The radiologists Petrīks Priedītis, Maris Tirane, Madara Rauda, Andrejs Linovs, Yana Solikayā, Natalija Falts, Viktoris Lēvs, Krista Nītīna and Andris Veiss are part of the CEUS developing team at Saula Stradiņa Clinical University Hospital Diagnostic Radiology Institute.

Intensive professional educational activities were held in Riga in 2012, with a team from Bris, Czech Republic, including their chief Prof. Vladimir Vālē, and again in 2015, with distinguished ultrasound experts and opinion leaders from the European Federation of Ultrasound in Medicine and Biology (EFSUMB) (Prof. V. Cantani, Prof. F. Pieczka, Prof. O.H. Gilja, Prof. C. Holmboe Pedersen Malin, Prof. C.F. Derrich, and Prof. A. Schuler) during the CEUS EUROSON School in Riga, hosted by the current president of the Latvian Radiology Association, Assoc. Prof. Majā Radzina, co-author of several EFSUMB guidelines in this field as well as publications of original research work. Since then, the number of examinations has been rapidly increasing (from 2013:30 to 2018:167).

The main benefits of lesion characterization are real-time imaging in various planes and stored clips that allow evaluation of microbubble arrival within the organ or lesion, assessment of full haemodynamics, and microvascularization of the target and surrounding tissue without radiation exposure, nephrotoxic effects or adverse effects.

It is mainly performed in cases of focal liver lesions and kidney cystic lesions, as well as for thyroid nodules, parathyroid lesions and cardio examinations for research purposes (Figure 1).

It is well described in the studies performed with CT/MRI. CEUS has higher sensitivity (89.3% vs 88.8%) and specificity (98.2% vs 76.6%) and a diagnostic accuracy of 92.6% vs 71.5% in characterizing malignant liver lesions.2 A hypo- and isovascular nodule in the delayed phase is a hallmark of a malignant nodule (78-98%). This is due to the fact that the malignant lesion is devoid of hepatic sinusoids and the contrast media fails to accumulate within it (PPV of 86.4% and a NPV of 38%). Benign lesions, on the other hand, remain inapparent to hyperenhancing in the portovenous and delayed phase because the contrast is retained in the healthy liver due to slow flow through the sinusoids. Almost 80% to 90% of benign lesions retain contrast and are still hyperenhancing in the late phase. Multiple enhancement patterns are seen in metastases depending upon the primary malignancy – peripheral rim or diffuse enhancement in the arterial phase with rapid washout during portovenous and late phases (in less than 60 secs) is the most common pattern. Arterial phase early hyperenhancement with gradual washout in portovenous and late phase is characteristic of hepatocellular carcinoma (HCC). CEUS is recommended for examination of abnormal-looking areas that are noticed, but cannot be properly identified using only baseline ultrasound or colour Doppler ultrasound. Currently, ultrasound contrast media (SonoVue, Bracco, Italy) can mostly be recommended if the person cannot have a CT/MRI and is not clearly visible, weak contrast uptake due to the incorrect dosage, or alternating haemodynamics.

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Special Exhibition: Model Arbus Goldin

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1070 Vienna, Westbahnstraße 40
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Lisette Model, Woman with Veil, San Francisco 1949 © Estate of Lisette Model
WHAT’S ON TODAY IN VIENNA?

SUNDAY, MARCH 3, 2019

**Theatre & Dance**

**Zu der Zeit der Königinmutter**
by Fiston Mwanza Mujila
AKADEMIETHEATER | 19:00
1010 Vienna, Lisztstraße 1
Phone: +43 1 51444 4145 | www.burgtheater.at

**Schöne Bescherungen**
by Alan Ayckbourn
BURGTHEATER | 19:30
1010 Vienna, Universitätsring 2
Phone: +43 1 51444 4145 | www.burgtheater.at

**Ladykillers**
by Elke Körve and Maria Caleita
KAMMERSPIELE DER JOSEFSTADT | 15:00 + 19:30
1010 Vienna, Rotenturmstraße 20
Phone: +43 1 42 700 300 | www.josefstadt.org

**Der Bauer als Millionär**
by Ferdinand Raimund
THEATER IN DER JOSEFSTADT | 15:00 + 19:30
1080 Vienna, Josefstädter Straße 26
Phone: +43 1 42 700 300 | www.josefstadt.org

**Concerts & Sounds**

**Thomas Gansch, trumpet, hornet, vocals**
**Frantíšek Janů, piano**
Jazz
KONZERTHAUS | 19:30 | MOZART-SAAL
1030 Vienna, Lothringerstraße 20
www.konzerthaus.at

**Concentus Musicus Wien**
Stefan Gottfried, conductor and piano
F. Mendelssohn Bartholdy: Ouverture ‘The Hebrides’, op. 26; L. van Beethoven: Concerto for piano and orchestra no. 4 g major; op. 58; symphony no. 6 f major; op. 68 (Sinfonia pastorale)
MUSIKVEREIN | 19:30 | GROSSER SAAL
1010 Vienna, Bösendorferstraße 12
www.musikverein.at

**Patricia Barber Trio (USA)**
PORGY & BESS | 20:30
1010 Vienna, Riemergasse 11
www.porgy.at

**Champian Fulton & Joris Dudli**
Classical Jazz
JAZZLAND | 21:00
1010 Vienna, Franz-Josefs-Kai 29
www.jazzland.at

**Opera & Musical Theatre**

**Wonderful Town**
Musical by Leonard Bernstein
Conductor James Holmes
VOLKSOPER | 19:30
1090 Vienna, Währingerstraße 78
www.volksoper.at

**L’Elisir d’Amore**
by Gaetano Donizetti
Conductor Marco Armiliato
With Andrea Carroll, Francesco Meli, Orhan Yıldız, Adam Plachetka
STAATSOPER | 19:00
1010 Vienna, Opernring 2
www.wiener-staatsoper.at

**I Am From Austria**
Musical with songs by Rainhard Fendrich
RAUMKUNSTHEATER | 18:30
1060 Vienna, Wallgasse 18-20
www.musicalvienna.at

**Bodyguard**
by Lawrence Kasdan & Alexander Dinelaris
RONACHER | 18:30
1010 Vienna, Seilerstätte 9
www.musicalvienna.at

Please note that all performances are in German
People & Places
Spain’s next top radiologists take off at ECR

By Mélisande Rouger

Lauda Motion flight 307 almost never made it to Vienna. The aircraft was supposed to fly from Madrid on Tuesday early afternoon, but was mysteriously unable to take off. Passengers were kindly invited to evacuate the plane 30 minutes after boarding, to hang out at the gate until further notice. Sparingly distributed information revealed next to nothing. Two five-euro vouchers and six hours later, passengers were finally called back to board the plane. Tired and thirsty, they landed shortly before 2am in a ghostly Vienna airport.

That did not alter the spirits of Cesar Urtasun Iriarte, a 24-year-old medical student who was determined to attend ECR 2019. “I am really looking forward to it; it is my second ECR, and the first one was amazing,” he said.

Urtasun is in the final year of his medical degree at the University of Navarra in Pamplona and he has been invited to take part in the Rising Stars programme for a paper he co-wrote with fellow students Inés Albajar Gómez and Marta Chaparro Mirete.

With their work, entitled ‘The winning combination for greatness in education: innovative workshops, simulations and committed students’, the young guns aimed to show students ways to actively engage in educational activities with simulations such as a terrorist attack drill to practice first-aid and emergency medicine, and imaging-test-based virtual and augmented reality for surgical planning.

“Healthcare simulation plays a key role in driving medical education towards a more efficient future,” Albajar said.

Other simulation scenarios included training sessions on the Da Vinci surgical robot, and newly designed bench-models such as 3D printed arterial branches for acquiring skills such as interventional catheterisation, and animal models for dermatology and obstetrics workshops.

The bright young Spanish sparks included most of the existing simulation formats in the curriculum of JOICE, the Interactive Surgical Congress for Students, which was initiated three years ago by first-year medicine residents, to offer a broader view of their field to aspiring surgeons and interventional radiologists. As many as 350 medical students from all over Spain attended the meeting last February, during which they received training in echography and different surgical and interventional procedures.

Urtasun and Albajar, who were congress president and vice president respectively, believe that hands-on workshops are the best way to transmit skills and spark professional interest. “Our goal is to convey knowledge and skills to our fellow students,” Urtasun said.

Opportunities like the Rising Stars programme are a further boost to a blooming career. “ECR is an incredible place to meet experts from all over the world. This is the kind of opportunity that you do not get unless you leave your usual environment,” said Albajar.

Presenting her work to the ECR audience was also extremely gratifying, the aspiring neuroradiologist added. “It was a fantastic experience, and my first time presenting at a scientific meeting.”

Urtasun, who has received training from former ECR president Jose Ignacio Bilbao and SERAM 2018 local organiser Prof. Jesús Pueyo, wants to become an interventional radiologist. He also thinks the ECR is the place to acquire more knowledge in this field.

“At the meeting I can find everything I need in terms of scientific content and company products. Likewise, if you are interested in breast, neuro imaging or MSK, you will find it at the ECR. It has something for both beginners and experts,” he concluded.
After helming the first European Radiology Reviewer Fellowship Workshop, Prof. Yves Menu, European Radiology Editor-in-chief, posed for a picture with the international review fellows.

Prof. Paul S. Sidhu delivered the Luigi Oliva Honorary Lecture entitled ‘Contrast-enhanced ultrasound in paediatrics: ready for clinical practice?’ and received his certificate from the hands of ESR President Lorenzo E. Derchi.

After finishing her three-year-term, Prof. Regina Beets-Tan (right) handed over the chairmanship of the ESR Publications Committee to Prof. Marion Smits from Rotterdam.
ECR 2019

Thank you for being part of the bigger picture

25th ECR IN VIENNA