Japan shows the way with new clinical breakthroughs in neuroimaging

Japan has a particularly rich heritage in the field of neuroradiology. The importance of neuroimaging, especially involving the use of MRI, will become greater as the clinical requirements increase, according to Prof. Shigeki Aoki, chairman of the Radiology Department of Juntendo University in Tokyo.

“While MRI and MR sequencing will continue to develop, we are anticipating a lot of development in terms of quantitative analysis and post-processing,” he told ECR Today. Aoki said, Japanese manufacturers are breaking new ground when it comes to the development of CT. “I use multislice CT (320-slice) for paediatric cases and cerebrovascular diseases. CT angiography with perfusion data and metallic artefact delineation are especially useful for evaluation after neurointervention such as flow diverter (pipeline) implantation,” Aoki said.

The founding fathers of Japanese neuroradiology—Prof. Makoto Saito and Prof. Kentaro Shimizu, who both trained at Tokyo University Hospital in the 1910s and 1920s—are still held in high regard in this island country. The pair were credited for the development of pioneering neuroimaging techniques and inspired many of Japan’s current radiologists to specialise in neuroimaging.

Japan continues in this tradition of contributing in neuroradiology with a host of practices and technologies, including the so-called Brain Dock brain scanning health check and the early clinical application of diffusion tensor imaging (DTI). These are just two of the areas of neuroradiology where Japanese researchers have had a significant influence on a global scale.

At today’s ESR meets Japan session, Aoki will discuss some of the country’s most recent neuroimaging techniques, including the fundamentals of advanced diffusion analysis beyond DTI. Also, delegates will learn about improving treatment decisions in advanced liver imaging, the use of multimodality fusion imaging of ultrasound, CT and MRI for treatment of liver tumours, as well as how to use CT, MRI and PET in the diagnosis of thymic tumours.

The Brain Dock system, part of the larger ‘Ningen Dock’ system, has evolved as a service provided by a range of medical facilities. The voluntary health-check system of using MRI and MR angiography for detecting non-ruptured cerebral aneurysms and asymptomatic cerebral infarction, microbleeds and ischaemic changes, is thought to be unique to Japan. The Japan Society of Ningen Dock reported that brain lesions are found in about 2% of patients, and as brain disease often develops suddenly, before patients have subjective symptoms, detecting signs at an early stage makes proper prevention possible.

The early clinical application of diffusion tensor imaging (DTI) has been developed in Japan and neuroradiologists across the country are working hard on the evolution of the technique. Aoki and colleagues reported on the use of DTI and transcranial magnetic stimulation (TMS) for the evaluation of amyotrophic lateral sclerosis (ALS) as long ago as 2005 in the journal Neurology. The purpose of their study was to assess the clinical feasibility of region-of-interest

continued on page 2
The Japanese Radiology Board programme is developing a new programme to deliver honorary lecture on Stockholm, Sweden, will be giving the Sven-Ivar Seldinger Honorary Lecture ‘Imaging and micronavigation: time to redraw the map?’ at ECR 2016.

Distinguished Swedish neuroradiologist to deliver honorary lecture

Professor Staffan Holmin from Stockholm, Sweden, is a leading expert in interventional neuroradiology. In recognition of his significant expertise in the field of neurointervention and his great achievements in research, Professor Holmin has been invited to give the Sven-Ivar Seldinger Honorary Lecture ‘Imaging and micronavigation – time to redraw the map?’ at ECR 2016.

Staffan Holmin is the Söderbergh professor of clinical neuroradiology at Karolinska Institutet. He is also a consultant in endovascular neurointervention and vice chairman of the neuroradiology department at Karolinska University Hospital in Stockholm, Sweden.

Prof. Holmin leads the research group in neuroradiology at Karolinska Institutet, working on clinical and experimental projects in stroke management and endovascular technique development, and is responsible for the imaging research facilities in the planning of the new Karolinska Hospital. After graduating with a medical degree from Karolinska Institutet in 1999, Prof. Holmin obtained his doctoral degree in 2005 and his physician certification from the same institution in 1999. In 2005 he did a post-doc and fellowship training at Bicêtre Hospital in Paris, France, under the supervision of Professor Pierre Laussy.

In 2005 he passed the Swedish and European specialist neuroradiology examinations and two years later the Swedish specialist neuroradiology examination.

“During my specialist training in neuroradiology, I became increasingly interested in minimally invasive image-guided therapy,” he said. “Thus when I received an offer to begin training in neuroradiology, I decided to accept it. I was also offered a one-year fellowship in neurointervention with Prof. Laussy in Paris and since then my field of subspecialization has been endovascular neurointervention. I have always been interested in the enormous potential of endovascular techniques.”

Prof. Holmin is the main inventor of an endovascular device for transvascular passage (Extraducer), a project that has developed together with Karolinska Institutet Innovations AB between 2008 and 2010. The project resulted in granted patents in USA, Japan, and Europe.

He has been responsible for human and animal imaging facilities in the research building of the New Karolinska Hospital since March 2011. He is also one of the representatives for neuroradiology in the preparation for the New Karolinska Hospital of the endovascular treatment and co-principal investigator for a number of different national and international research projects.

“In my opinion, the best way to develop our clinic is by participating in national and international research projects,” he said.

Teleradiology, which is one way to accelerate the gap, should be encouraged,” he said. “Teleradiology will be a great help in the future.”

Due to the relatively high number of MRI scanners per unit population, Japan is in a good position when it comes to using imaging technology to conduct research. Akiki is optimistic that Japanese neuroradiologists will continue to offer an important contribution to this field in the future.
Role of radiography in imaging small and large airways disorders

While cystic fibrosis is the congenital form of obstructive airway disease, chronic obstructive pulmonary disease (COPD) is the acquired form, affecting more than 600 million people worldwide, with an increasing prevalence. Chronic bronchitis and bronchiolitis manifest in early stages of COPD. Wall thickening, inflammation, muscular hypertrophy, and mucus within the lumen are visible in imaging.

In today’s joint scientific session of the European Society of Radiology and the European Respiratory Society (ESRS), Prof. Hans-Ulrich Kauczor, director of the diagnostic and interventional radiology department at the University Hospital Heidelberg, Germany, and chair of the ESR Research Committee, will discuss the concept of the COPD airway phenotype in imaging and illustrate the potential of MRI to differentiate mucus and inflammation. “We have learned that the airway phenotype is more common in lower than in higher stages of COPD, which also leads to the perception that it is reversable in most cases,” said Kauczor. “Emphysema on the other hand represents an irreversible parenchyma, which most likely is irreversible. The representation of emphysema on CT as a low attenuation area is well known, understood and reported by radiologists. Quantitative assessment using dedicated software would be an important step to improve radiological reports for respiratory specialists, as it allows better planning of drug, device-based, and surgical treatment options.”

To differentiate between mucus and wall thickening, MRI is more useful than CT. “Due to their almost identical density, CT is not useful for differentiating mucus within the airway lumen from active inflammation and oedema in the airway wall. In contrast, MRI T2 weighted sequences and postcontrast T1 weighted sequences are helpful for identifying fluid, mucus and oedema, as well as contrast enhancement with high permeability of vascular walls in active wall inflammation, while contrast enhancement is low in fibrotic remodelling. The knowledg in this field comes from cystic fibrosis, and still needs to be proven for different types and stages of COPD,” explained Kauczor, adding that radiologists should appreciate the value of assessing and reporting abnormalities of the airway walls and structures within the airway lumen — as they are often still not aware that this information is relevant for respiratory specialists. “Just the simple knowledge that thickened bronchial walls usually reflect mucus, inflammation and remodelling in obstructive airway disease, which is at least partially eligible for therapy and warrants reporting, is important for improving the quality of radiological reports,” he said.

As therapy guidelines for COPD are currently based on the different categories of the severity of airflow obstruction, minor airflow obstruction is not treated with anti-inflammatory or bronchospasmolytic drugs. CT however is useful for visualising the winding and irregularly shaped opacities and points of view with therapeutic intervention, who might benefit from treatment. Also in this session, Dr. Stefano Alliberti, from the school of medicine and surgery at the University of Milan Bocconi, Milan, Italy, and Prof. Philippe A. Grenier, from the department of radiology at the Hospital de la Pitié-Salpêtrière Paris, France, will speak about classification and treatment options of bronchiectasis, and methods for imaging, reporting, and differentiating airway diseases. Furthermore, Prof. Ian Adcock, from the airways disease section at the Imperial College London, United Kingdom, will inform participants about pathophysiology of chronic bronchitis and airway obstruction. Since first being described in 1819, there have been major advances in diagnosing and treating bronchiectasis. In most cases, the focal or diffuse irreversible dilatation of bronchi occurs with associated inflammation, and in a variety of pathologic processes. The complex pathogenesis of the disease is characterised by bronchial wall weakness and wall inflammation. Recent infection and inflammation, which accompany bronchiectasis, result in cellular cascade and irreversible changes in the airways. Although both affect the bronchi and bronchioles, and are accurately detected by CT, bronchiectasis is more sensitive than bronchitis, which is still needs to be proven for different types and stages of COPD. The complexity of the disease is characterised by bronchial wall weakness and wall inflammation. Recent infection and inflammation, which accompany bronchiectasis, result in cellular cascade and irreversible changes in the airways. Although both affect the bronchi and bronchioles, and are accurately detected by CT, bronchiectasis is more sensitive than bronchitis. “Emphysema is a nonreversible condition that is usually diagnosed before the age of two and is associated with substantial morbidity and mortality. The same applies for bronchiectasis and cystic fibrosis.” Treatment of bronchiectasis aims to improve airway clearance, to suppress chronic infections of the airways, and to reduce airway inflammation and exacerbations. Treatment options include chest physiotherapy, nasal oxygen therapy, inhaled steroids, antibiotics for superimposed infections, and bronchodilators. Nowadays, imaging is the cornerstone of the diagnosis of bronchiectasis and of great importance for monitoring the disease. Spatial distribution, morphologic features, and airway findings can guide the radiologist in formulating a rational differential diagnosis from the large number of potential causes. Chest radiography can be used as an initial screening tool, but as it is relatively insensitive and unspecific, many cases of bronchiectasis are difficult to perceive. Routine chest CT with larger section thicknesses can be used for diagnosis, but thin-section CT is more sensitive and therefore the reference standard for identifying the disease. Basic morphologic types that can be recognised on CT are cylindrical, varicose, and cystic. Also, many patients show a combination of these types. Recently, volumetric thin-section CT has become widespread in the diagnosis of lung diseases. It can be reformatted in any projection and is useful for visualising the spatial distribution of abnormality. By highlighting air-filled structures and elucidating morphologic features, post-processing projections with minimum intensity can help to detect bronchiectasis, and are useful for visualising winded connected tubular structures. To detect additional findings such as bronchomalacia, expiratory imaging should also be performed.

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Hot Shots
from Day 3

Photography: A. Rinkhy, S. Kreuzberger
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Hitachi Medical Systems Europe Holding AG, Switzerland
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Founding a European Society for Hybrid Medical Imaging (ESHI)

In Austria you frequently hear people say “Jessas” [yessas] when they are presented with unexpected news or are met by surprise. This is a slang exclamation for calling upon a well-known spiritual being in an attempt to gain forgiveness and strength in sight of such an unexpected event. The reason this is mentioned here is manifold. First, a new society was founded and registered as an association in Austria in late 2015. Second, the founding of this society is not likely to move many people instantly; rather they will yawn “YAS!” which could be seen as short for Jessas or as the abbreviation for ‘Yet Another Society’. And third this society referred to as ESHI or the European Society for Hybrid Medical Imaging, should indeed come to many people engaged in imaging as a surprise. Why is that?

For decades imaging has been part of medical practice and diagnostic pathways. There are specialists in x-ray imaging, in nuclear medicine imaging, in optical imaging, or, if categorised by application, in cardiac imaging, imaging of the brain, imaging of the lungs and so on. Imaging has helped assess the status of patients throughout the course of a disease, from the time of the diagnosis via treatment planning to post-treatment follow-up. Imaging has also helped us gain an in-depth understanding of diseases, for instance in a range of cancers and neurodegenerative diseases, that can help us tailor treatment and develop new probes to also help reveal the early stages of a disease, to become more effective in treating our patients.

In 1991, a Swiss surgeon walked into the department of Nuclear Medicine at the University Hospital in Geneva and while having a coffee with his friends there gazed at the PET system with its gantry open for maintenance. At the time, this was an entry-level PET based on a rotating partial detector arc concept. When the surgeon saw the free space around the PET components he turned to the PET people, saying “Jessas!” You ought to put a CT inside this PET system. The concept of the prototype PET/CT took a little while to develop but was first presented in 1998, only to storm the stage of imaging with over 5,000 systems installed today worldwide. Similarly, in the early 1990s, a Japanese physicist working in the department of radiology at the University of California was doing workshop experiments with his physics students to assess the ability of various detectors to measure gamma rays. At one point he, together with a collaborating vendor, set out to test a single detector for a fully-integrated SPECT/CT concept, first presented in 1994. Shortly after that, combined SPECT/CT imaging systems became available and have broadened the horizon of medical imaging ever since.

And finally, an English physicist in London, having had extensive experience in imaging small animals, initiated a set-up of a small animal PET imaging system inside a clinical 1T MRI to prove the worth of such an image combination for future applications.

What are these three anecdotes in common? They tell us of people who crossed a line. They were looking beyond their personal comfort zone by proposing high-risk projects. In the case of PET/CT and SPECT/CT there may have been a more clearly defined vision for applications in humans, while the onset of PET/EMR was driven by the intent to perform as well as, or better than, PET/CT, albeit with much reduced patient exposure levels and drawing from a very high soft tissue contrast and improved tissue characterisation that EMR can provide. In general, the origins of hybrid imaging are found in multi-disciplinary environments: a surgeon mingling with nuclear medicine geeks, a medical physicist with degrees in mathematics, physics and radiological science working in radiology and a medical physicist with a degree from a cancer research institute working in a clinical MR facility.

Two decades have passed since then, with millions of dual-modality imaging studies performed and hundreds of research articles published that review the benefits and best practices in great detail. Without a doubt, Time Magazine toned PET/CT as the one of the inventions of the millennium in late 2000. It is at this congress in Vienna that a new society is founded; the European Society for Hybrid Medical Imaging (ESHI). ESHI is a non-profit organization dedicated to creating and coordinating the scientific, philanthropic, intellectual and professional activities of hybrid medical imaging specialists and users. Thereby, ESHI is open to all disciplines and partnerships. ESHI will reinforce the presence of hybrid imaging in clinical practice by bringing together a community of multi-disciplinary and cross-specialty experts and scientists, including physicists and computer engineers, as well as technologists and clinicians, in an effort to help develop and harmonize the protocols and practices of hybrid imaging as part of diagnostic and therapeutic procedures. This multidisciplinary approach is also a key factor that will support research applications that extend from target identification for new therapeutic approaches to validating new biomarkers for various diseases and pathological pathways.

As one founding member said, “ESHI membership is open to any professional interested in hybrid imaging. In particular, by integrating both radiologists and nuclear medicine specialists, ESHI will strengthen the collaboration between the ESR and EANM, and the hybrid imaging field in general.” As such, ESHI will help us move forward with joint imaging by bringing together the best of the established imaging worlds while preparing us to bring imaging into domains yet unexplored. Come and visit us at www. esi-society.org. And don’t miss tomorrow’s Joint Session of the ESR and ESHI at 28.30 in Room C.

Thomas Beyer, PhD is Professor of Physics of Medical Imaging at the Medical University Vienna, Austria, and ESHI Treasurer.
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Cardiovascular and Interventional Radiological Society of Europe
Support grows for PET/MR, but the jury is still out on its clinical value

It remains to be seen whether the combination of MRI and positron emission tomography (PET) will overtake the more established PET/CT, but specialists at King’s College London (KCL) see the emerging hybrid imaging system as a powerful new tool in evaluating disease. They think the coupling of the two techniques could be part of a ‘paradigm shift’ in cancer imaging, and in future it may play a central role in diagnosing and treating neurological and cardiac diseases.

“Support grows for PET/MR, but the jury is still out on its clinical value.

‘It remains unclear how important PET/MR will be as a clinical diagnostic tool,’ Prof. Gary Cook, professor of Clinical PET Imaging and head of cancer imaging at KCL. “However, the evidence is already accumulating that in some clinical applications it gives better diagnostic accuracy than PET/CT or MRI alone.”

Cook and his colleague point to other promising cases for PET/MRI for patients, including a significant reduction in radiation dose and the convenience of a single appointment to replace the need for separate MRI and PET/CT scans. Long-term, the hybrid examination is also seen as a possible cost-saving counterweight to the higher machinery costs.

The combination of advantages bodes well for a gradual shift from PET/CT to PET/MRI in the diagnosis and treatment of prostate, brain and gynaecological cancers, according to Cook, who is based at the joint KCL and Guy’s and St Thomas’ Hospital PET Centre, which had its formal opening in September 2014 in London.

“There may well be some new indications that are currently not routine with PET/CT that become adopted by PET/MRI,” he explained, adding that these are likely to include novel tracers such as galium 68 (68Ga) tracer, binding to prostate-specific membrane antigen (PSMA), as well as more conventional ones like fluorodeoxyglucose (18F-FDG). “With regards to research, there is a great opportunity to exploit the synergistic potential of having molecular, functional and anatomical data acquired simultaneously, especially for biological processes that may vary over time and where both PET and MRI signals can contribute, e.g. tumour hypoxia.”

At today’s session, ECR delegates will learn that the fusion of PET and MRI can produce an arsenal of simultaneous data for diagnosing and treating certain cancers. Yet for all its potential, PET/MRI is relatively untested in clinical settings and requires different, high-machinery costs, problems with artefacts, an absence of guidelines, and turf battles between nuclear medicine and radiology.

Beyond oncology, PET/MRI holds considerable promise in the diagnosis and care of neurological and cardiac patients, providing key data on what is taking place within organs that PET or MRI therapies are working. Hybrid PET/MRI technology is still a recent development, coming a decade after PET/CT systems hit the market in 2001. PET/CT revolutionised the ability to get a hybrid reading of both the molecular information provided by PET and the anatomical and morphological details offered through CT, using complementary data superior to what could be provided by fusing information from separate procedures. Results so far show the marriage of PET and MRI produces more quantitative data on the density and perfusion of tumours.

Cook and colleagues at the PET Centre, Prof. Vicky Goh, believes that PET/MRI represents a breakthrough, giving physicians the possibility to exploit the contrasts and resolution of an MRI with the molecular imaging power of PET. The resulting comprehensive evaluation can be used to tailor care to an individual patient’s needs.

“This is where we are seeing a paradigm shift in patient care,” said Goh, who is chair of Clinical Cancer Imaging at KCL. “Days are the days of simple size measurements, seeing whether a cancer is growing or shrinking, to evaluate if a treatment is working or not working. We now have a powerful imaging tool to assess cancer biology.”

MRI provided better soft tissue information, while PET provides the physiological data that can be particularly important in managing cancers such as in the prostate and the brain. PET/MRI cannot provide such detail, she noted.

Yet Goh acknowledges that PET/MRI is still in a honeymoon period and there are drawbacks to PET/MRI for clinical use, at least at this juncture. For instance, there is a need to improve software to reduce artefacts and other distortions. There are also some remaining issues of affordability. A PET/MRI system cost up to 5.5 million euros, more than double the price of a PET/CT scanner. Manufacturers are already addressing these deficiencies, however.

“A great deal of work is being carried out on methods to reduce artefacts and quantitative inaccuracies and I am confident that most of the major problems will be overcome relatively quickly,” Cook said.

Meanwhile, Goh dismisses criticism that PET is a very expensive research tool, or a very expensive toy. She points out that the hybrid system can save staff time, money and patient stress by replacing two or more scans with a single operation. KCL has also taken steps to train across disciplines to encourage the development of PET/MRI and improve the professional skills of physicians and technologists. This has helped ease some of the interdisciplinary conflicts that also emerged in the early development of PET/CT.

“Certainly it has been a learning experience for us, bringing together our nuclear medicine colleagues and our radiology colleagues and that may be easier in some places than others,” she pointed out. “While you are really seeing the adoption of PET/CT in where they have a good relationship.”

Left: 18F-choline PET/CT (CT top and fused PET/CT bottom). Centre: 18F-choline PET/CT (CT top and fused PET/CT bottom). These images show an enlarged choline-avid left pelvis lymph node in a man with high-risk Gleason 4+3 prostate cancer. This is clearly seen (arrow) on the PET/CT images, as well as on all the MRI sequences (high signal on b400 and restricted diffusion on ADC map). These sequences confirm a small lymph node with high signal on b400 DWI and restricted diffusion on ADC map (arrow). This case shows how the superior tissue contrast and anatomical resolution of MRI sequences allow a better definition of the cause of the right-sided pelvis PET activity and a much more confident diagnosis of right as well as left lymph node involvement. (Provided by Prof. Gary Cook)

Special Focus Session
Saturday, March 5, 08:30–10:00, Room Z
SF 13a MR/PET: role in oncology

» Chairman’s introduction
G. Cook; London/UK

» Principles and possibilities of MR/PET
A. Ryken; Copenhagen/DK

» MR/PET: imaging head and neck cancer
S. Bisdas; London/UK

» MR/PET: imaging prostate cancer
A.J. Beer; Ulm/DE

» MR/PET: imaging GI cancer
V.Z. Goh; London/UK

» Panel discussion: Which clinical indications have enough evidence for routine MR/PET rather than PET/CT?
When time is gold: correct use of CT proves vital in severe trauma cases

A specific set of CT protocols for trauma patients should be in place in every emergency department. That’s the recommendation of Dr. Raffaella Basilico, emergency radiologist at the University Hospital of Chieti, Italy.

“This will be useful for general on-call radiologists and residents who don’t face trauma patients routinely,” she told ECR Today, adding that radiologists should opt for multislice CT when evaluating a severe blunt abdominal trauma or polytrauma with a minor mechanism of injury.

The main cause of missed injuries, such as pancreatic and diaphragmatic lesions, bladder rupture and pseudocysts, is the presence of multiple more evident injuries, such as solid organ lesions, that become the focus of attention.

“Bowel injuries, for example, are often missed in CT examinations because in polytrauma patients some specific bowel findings can be misdiagnosed, such as the presence of free small air collections misinterpreted as normal intraluminal air,” Basilico noted.

Radiologists can overcome misdiagnosis by routinely using lung or bone window settings which help differentiate fat from air or multiplanar reconstructions, useful in vascular injuries and skeletal lesions. Moreover, a specific CT protocol for trauma patients including unenhanced and multiphasic contrast-enhanced CT and, when necessary, a CT cystogram, will help radiologists detect an intra- and extraperitoneal bladder rupture in a case of multiple pelvic fractures, for example.

The management of trauma patients mainly depends on the mechanism and severity of the trauma, and getting it right first time can be a matter of life and death. Occasionally fatal injuries are not detected within as to 48 hours from the first ‘hit’ report.

Because the population is aging, general radiologists are likely to come across geriatric trauma patients in regular routine practice. In the recent past, geriatric patients were often ‘under-imaged’, and the severity of injuries was likewise underestimated. Older patients don’t always complain even when they are in pain or significant, explain trauma experts. Furthermore, mechanisms that would cause bruising in younger, healthier adults, such as falling from a chair or from standing, can cause fractures and dislocations in geriatric patients.

“We must bear in mind that seemingly minor mechanisms may result in major injury, therefore we should have a low imaging threshold for whole-body CT in the elderly,” said Dr. Elizabeth Dick, consultant radiologist and lead for emergency radiology at London’s Imperial College NHS Trust. “Trauma teams should avoid piecemeal CT, focusing only on the injured area. If the patient is stable, a whole-body CT should be performed whenever there is suspicion of significant injury and don’t delay.

At her hospital, the target is for all stable trauma patients to be imaged within 30 minutes of admission. “We often find numerous fractures from seemingly minor accidents. Despite a high scan rate in older patients, false-positive rates are low,” noted Dick, who is also president of the British Society of Emergency Radiology.

Besides maintaining a high index of suspicion in elderly trauma patients, a deep knowledge of their injuries and syndromes can help radiologists avoid errors: there may be degenerative changes in the spine, such as central cord syndrome (CCS), bruising of the cord caused by compression of the canal space, usually undetectable on CT and requiring MRI.

Known as the ‘golden hour’, the first 60 minutes after severe trauma represents the time frame within which definitive treatment should have started, and this includes the time span between injury occurrence and hospital admission, according to Prof. Stefan Wirth, vice chair for clinical radiology, Ludwig Maximilian University Hospital of Munich, and president elect of the European Society of Emergency Radiology.

“The faster you act, the more survivors you have. Thus why time is a critical issue. Every institution should aim to provide CT scanning within 30 minutes. The processes of image reconstruction, reading, reporting and distributing should also not exceed another 30 minutes,” he said.

Radiologists also need to include treatment planning with the surgeon and anaesthetist when optimising processes in polytrauma management.

“Find ways to measure quality in your institution. The most common problem is time. Measure it, detect reasons for delay and categorise them in terms of ‘avoidable’ and ‘unavoidable’, then for the former, deliver strategies to avoid repeat occurrences. This optimisation should be ongoing,” Wirth stated.

He pointed to how the literature shows that prompt deployment of whole-body CT decreases death rates of treatable patients at high risk of death in the first two hours post trauma by about 25%, in effect saving every fourth life in that particular group.

Due to its many advantages that include a two-phase coverage of the upper abdomen, potentially yielding information about bleeding activity, Wirth personal choice of protocol is positioning patients feet first with arms crossed over the abdomen. He then favours performing an unenhanced head scan and an aortal triggered arterial phase scan of the neck, chest, and upper abdomen, followed by a standard delay of 50 seconds portal-venous CT imaging of abdomen and pelvis. A first read report can be provided few minutes after finishing the procedure.

However, very early stages of bleeding, especially in the brain, may be hard to detect, he cautions. Radiologists should be aware of possible hypeoxic intracranial bleeding without tremendous density above the surrounding parenchyma.

“If in doubt, repeat the scan. In most cases when a second scan seems appropriate, limiting the procedure to particular organs is sufficient,” he said.

ECR TODAY | SATURDAY, MARCH 5, 2016

BY FRANCES RYLANDS-MONK
Success in sports injuries relies on defining technical and clinical approach

Sports injuries pose unique challenges that set them apart in the world of radiology, particularly when highly driven patients are keen to return to their discipline. Against this demand backstop, sports radiologists have to draw on their knowledge, their experience, and their colleagues from other specialties to correctly define the nature of the injury and expedite swift and effective therapy.

"Firstly, a radiologist needs to fully understand the possibilities of imaging with each different modality and associated instruments," said Prof. Carlo Faletti, who is past president of the Italian Society of Radiology and was chair of the imaging and interventional radiology department at the Orthopaedic-Therapy Hospital and Sport Medicine Institute, Turin, Italy, for 18 years. "Secondly, it is important to fully understand the clinical problem and this is only possible if one is a musculoskeletal radiologist, with specific experience in sports medicine. And one has an orthopaedic and physiotherapeutic point of view in different musculoskeletal pathologies."

Furthermore, the clinical decision needs to be made jointly with other relevant specialties. Only by working together can we correctly interpret imaging results and take the right approach to managing the injury, he said, adding that the approach chosen was dependent on whether it was an acute injury or a lesion relating to over-use.

Faletti is keen to see constructive teamwork between the different specialties involved in treating sports injuries, noting that it was essential for a sports doctor to request the right images from the radiologist before an accurate definition can be made. "The radiologist plays a key role in the protocol from defining the lesion to therapy," he asserted.

Faletti, who is the official radiologist for some of the Italian premier and second league football clubs, pointed out that radiologists face immediate challenges on two levels: defining the correct technical approach to an injury; and also defining the nature of the clinical problem. "I have to know a strain from stiffness of a muscle or tendon, as well as activate and characterize a lesion because the lesion might be either an acute or a degenerative lesion."

He also noted that during the acute phase it was not always easy to define the degree of the lesion. He added that protocols were available to help with this and that radiologists needed to adhere to the right sequence of images to precisely define the nature of lesions.

"It is also important to use the high performance ultrasound machine and correct sequences in MRI to define the site of the lesion, the entry of the lesion and if other lesions exist," Faletti said. "The high quality of the images and correct sequences will define exactly which lesion it is."

On this note, he added that the first stage for all joint injuries was x-ray. For muscle tendon lesions, he suggested using ultrasound initially and then MRI for muscle tendon and joint lesions. For follow-up of a muscle tendon injury, he pointed out that ultrasound was sufficient, but for the joint, it was preferable to use MRI, especially if a bone fracture was present. "When further follow-up MRI of muscle tendon lesions, MRI should be used for the final examination prior to an athlete returning to action."

But essentially, and of relevance across all specialties treating the patient, Faletti noted that seeking and obtaining valuable information was of primary importance to determine the right therapeutic approach. "Know the problem, use the correct technical approach, and carefully consider the interpretation to ensure a good report."

At today’s session, he plans to highlight the importance of gaining technical experience in using different modalities including a high-performance ultrasound, MRI and CT, in line with guidelines. He will also discuss interventional radiology and consider how radiologists need to work with sports medicine doctors or orthopaedic doctors in providing imaging guidelines to treat lesions. A typical case might involve using ultrasound or CT guidance to treat a lesion of the joint or cartilage or synovial sheath with local therapy.

"This imaging guide helps us determine where we need to introduce the needle for the correct application and what type of therapy is better to use."

Moderating today’s session will be Dr. Mario Padron, who is chair of the department of radiology at Clinica Cemtro, Orthopaedic Institute, Madrid. As radiology expert of the Spanish Olympic Committee and senior consultant in imaging of the Spanish Royal Federation of Athletics, he takes an active role in the management of some of Spain’s foremost sportswomen and sportmen. Asked what core message he would offer relating to the diagnosis and management of sports injuries, he said: “Sports injuries do not just require a prescription requesting MRI or ultrasound, but these injuries must be dealt with by multiple actors, with all opinions and what type of therapy is better to use.”

Reflecting Faletti’s thoughts, Padron also noted that a sports physician must be up to date on all new imaging modalities, including a good knowledge of the correct and most appropriate use for each, depending on the environment in which the radiologist is working. He also highlighted that physiotherapists were required to know the correct terminology of the imaging modalities, and likewise the surgeon must be knowledgeable about how to source relevant information from an imaging report. "The radiologist must be involved in a team that speak the same language and have the same ideas of how to deal with a sport injury," he said.

Multidisciplinary Session

Saturday, March 5, 16:00–17:30, Room E1
MS 16b Sports injuries: diagnosis and management

• Chairman’s introduction
  M. Padron, Madrid/ES
• What does the radiologist offer?
  C. Faletti, Turin/IT
• How I face a sport injury: the sport physician’s approach
  J. M. Alonso, Doha/QA
• The physiotherapist’s view
  A. Zerolo, Madrid/ES
• The surgeon’s perspective
  M. Layes, Madrid/ES
• Multidisciplinary case presentation and discussion: Which practice help and which hinder the team approach to managing the injured athlete? How can we improve on this?
Debate continues over multiparametric MRI's precise role in prostate cancer

Despite the growing interest in multiparametric MRI, radiologists must still overcome scepticism about its potential for reducing the need for transrectal biopsies in high-risk patients, believes Prof. Bernd Hamm, president of ECR 2015 and medical director of the radiology department at the Charité Universitätsmedizin in Berlin. He conceives that the case for multiparametric MRI is far from bullet-proof.

“Despite the growing interest in multiparametric MRI, radiologists must still overcome scepticism about its potential for reducing the need for transrectal biopsies in high-risk patients,” believes Prof. Bernd Hamm, president of ECR 2015 and medical director of the radiology department at the Charité Universitätsmedizin in Berlin. He conceives that the case for multiparametric MRI is far from bullet-proof. Hamm, however, admits multiparametric MRI has limitations. For example, in instances where no suspicious lesions are detected but the patient has an elevated prostate-specific antigen (PSA) level, there’s still a debate about whether the patient should have a biopsy. “We don’t see every cancer; but we see the bigger ones and the more aggressive ones, which are the most dangerous,” he said.

He contends that detection with MRI is significantly inconsidered compared to transrectal biopsies, and in cases where patients have a negative biopsy and there is still a high suspicion of cancer, 40% are shown to have cancer, meaning that MRI can play a role in reducing the need for additional procedures for the majority of patients. In spite of such evidence, radiologists have overcome some previous mistakes in their attempts to stage prostate cancer that have left treating physicians more cautious about MRI. “We said we were good but we were not good. In the meantime, multiparametric MRI significantly increased our performance in the detection of prostate cancer,” Hamm said.

Against this background, ESUR’s approval of the Prostate Imaging and Reporting Data System (PI-RADS) in October 2015 can help both imaging and clinical practitioners. He sees two important advantages: the guidelines encourage radiologists to be more precise, and they help improve communication between specialists. The guidelines clarify how images are acquired and interpreted, while also creating a five-point scale of potential malignancy. Stages 1 and 2 suggest very low or low risk, while stages 3–5 suggest an intermediate, high or very high risk of cancer and merit a procedure to obtain samples. “In general, I think the urologists recognised that multiparametric MRI is a problem-solving method, or at least helpful,” said Hamm, adding that the promise of multiparametric MRI doesn’t end with its role in diagnosis. Information contained in the images could feed into the evolving field of radiomics, with the potential to provide physicians with valuable predictive information. But the jury is still out on MRI. Last year, a study showed that the modality missed significant tumors – those with a Gleason score of 7 or higher – in 36% of the 1524 patients studied (C. Vilanova et al. MP60-11). Should a normal multiparametric MRI (pre)clude prostate biopsy? Jour- nal of Urology April 2015, Volume 193, Issue 4, Suppl., Page E270. The authors said the results were significant enough to continue to recommend that biopsies be performed even when scans are negative. Dr. Joa C. Vilanova, director of magnetic resonance at the Clínica Girona in Spain, acknowledges there are still challenges to convincing clinical colleagues that a biopsy may be unnecessary. For example, he sees a need for more performance data and close communication between radiologists and clinical practitioners to identify candidates who could be excluded from biopsy. Yet he’s convinced that MRI is an increasingly precise tool that can help patients. “This is a complete change in the management of prostate biopsy,” he noted, adding there have been rapid improvements in precision in the nearly 20 years he has been doing MRIs during patient surveillance. In his own experience, there were initial problems with accuracy and there was a sharp learning curve to achieve today’s performance. He estimates that the negative predictive value of multiparametric MRI in prostate screenings is now “more than” 95% accurate. Furthermore, Vilanova foresees a big change in patient care and expanded acceptance of MRI as a diagnostic and clinical tool with the advent of the ESUR guidelines. In addition to ruling out the need for transrectal biopsy in some cases, multiparametric MRI also can help guide the application of needles during biopsy and detect suspicious lesions in the prostate that might otherwise go undetected.”

“Without an image, it is like performing in a blind biopsy,” explained Vilanova, who was among the earliest proponents of the technique in Spain and works closely with urologists to identify patients suitable for MRI rather than a sampling procedure. However, advocates of MRI also need to convince insurance providers that the procedure is worth the money and can reduce costs by helping to rule out the need for further procedures. The method is still largely uncovered by European insurance programmes, despite growing demand from patients keen on getting an accurate assessment of their cancer risk but wanting to avoid unnecessary biopsies.

Special Focus Session
Saturday, March 5, 16:00–17:30, Room E2
SF 16 Prostate MRI: increasing need?

Chairman’s introduction
J.C. Vilanova Girona/ES

MRI before the first prostate biopsy: has the time come?
A.R. Padhani; London/UK

The role of prostate MRI in active surveillance
A.B. Radhakrishna; London/UK

Is prostate MRI accurate enough for focal treatment planning?
V. Farahbakhsh; Rome/IT

Panel discussion: Does the use of MRI improve the outcome in prostate cancer?
In recent years, technological innovations have resulted in major improvements in radiotherapy planning, delivery, and verification. Today’s joint session with the European Society for Radiotherapy and Oncology (ESTRO) will show just how useful multimodality, hybrid imaging and in-room imaging has become for defining tumour extension and improving optimisation in radiation oncology treatment, with speakers highlighting current and future challenges of these modalities.

Advances in imaging technology and improved treatment delivery enable soft-tissue localisation of tumours. The integration of different imaging modalities within the treatment room to guide radiation delivery has substantially improved the management of geometric uncertainties in contemporary radiotherapy practice, ushering in the paradigm of image-guided radiotherapy (IGRT), which not only provides accurate information on the patient and the tumour’s position on a daily basis, but also enables verification of the consistency of planned treatment geometry. But as IGRT is a very complex modality it requires a thorough planned approach and involves plenty of questions (What is the optimal imaging modality? What will be imaged and what will be the frequency of imaging? What should be the level of action?) that need to be answered prior to implementation into clinical practice.

In today’s session, Dr. Nicola Dinapoli, from the department of radiology at the Agostino Gemelli University Polyclinic of Rome, Italy, will demonstrate the challenge of in-room MRI for treatment delivery and point out the constraints when performing radiation oncology treatment.

The adoption of MRI is the last frontier for in-room monitoring processes and over the years great accomplishments have been made in optimising the integration of MRI into radiation oncology. Due to its easy conversion to nuclear medicine departments.

We would like to invite you to come to our session today and find out more about our department’s research, including application of the introduction of clinical PET, the clinical management of cancer patients has improved dramatically. The method has also added the spectrum of imaging of many common cancers, as it provides accurate information regarding the tumour extent and distribution of different cancer types, including lymphomas and epithelial malignancies of the lung, cervix, head and neck.

Recently, simultaneous MR/PET hybrid imaging has become clinically available. One of the major potential advantages of integrated MR/PET imaging systems is the ability to provide improved clinical assessment of cancers such as those of the brain, head and neck, liver, pancreas, and breast.

As it delivers a sensitive whole-body survey, combining molecular, functional, and anatomical data in one examination, MR/PET is a promising new tool, which may contribute to target volume delineation and biological individualisation in radiation therapy planning. But, however, in order to increase its clinical use, there are still several obstacles to overcome. A better understanding of the biological implications of the different imaging findings, and close multidisciplinary collaboration, with the involvement of radiologists, are needed in order to perform accurate multi-modality based delineation.

**Clinical Corner**

**Clínical Corner**

**Patient perceptions of radiographers’ communication skills**

Our study was developed within the Medical Imaging and Radiotherapy Applied Research I and II which is part of the syllabus of the Medical Imaging and Radiotherapy graduate programme at the Health School of the University of Algarve. Located in the heart of the Algarve region of southern Portugal, the city of Faro, we have been developing several research projects focused on improving patient communication skills and relationship strategies for radiographers in order to improve patient satisfaction and the quality of healthcare service provided.

Effective communication with patients should be an essential part of the medical imaging and radiotherapy curriculum, as nurses and radiographers are on the front line of patient care. Patients often have more interaction with radiographers than with physicians or other medical specialists.

Considering that one of the many responsibilities of radiographers is to communicate with patients, radiographer-patient relationships can be strengthened and patient outcomes improved through improved communication. Proper communication plays a large role in successful imaging interactions; patients who have been well versed in what to expect from their imaging sessions are in better position to cooperate with the radiographer. This increases the chances of producing optimal results from an examination at the first attempt, thus reducing radiation exposure, patient discomfort, and the overall cost of conducting the procedure.

Nonetheless, our work suggests that there is still a need to improve radiographers’ communication skills in the radiology department.

We would like to invite you to come to our session today and find out more about our department’s research, including application of this work to the radiotherapy and nuclear medicine departments.

**Scientific Session: Radiographers**

Saturday, March 5, 10:30–12:00, Room G SS 144 Safety and patient care in medical imaging

Moderators: A. Mener, Odense/DE

D. Mårtin, Rijeka/HR

- Patient perceptions of radiographers’ communication skills
Head and neck radiology: from symptoms to diagnosis

Early diagnosis and correct management of neck infections, inflammatory processes, and tumours in the ENT area are common challenges for neck, ear and throat physicians, as well as for radiologists, and make good interdisciplinary teamwork indispensable. While mild head and neck conditions very often do not require imaging, CT, MRI, and ultrasound play crucial roles in the correct diagnosis of severe or potentially life-threatening conditions.

In a Special Focus session today, Dr. Steve Colley, from the radiology department at the University Hospital Birmingham, United Kingdom, will inform ECR participants about sinonasal infections and imaging indications in cases of rhinitis, nasal obstruction, and naso-sinusonal hypertrophy, using acoustic rhinometry to help make a correct diagnosis. Nasal obstruction or nasal congestion with rhinitis is a common symptom of upper respiratory tract infections, and may range from a transient annoyance to life-threatening conditions. Nasal obstruction, which is a major symptom of upper respiratory tract disorders and can range from a mild annoyance to life-threatening conditions, can be caused by a wide variety of problems, including inferior turbinates hypertrophy, deviated turbinate hypertrophy, large adenoids, choanal atresia, pyriform aperture stenosis, allergic reactions, nasal polyps, empty nose syndrome, and sinus infections.

Assessment of nasal symptoms and patient history are the cornerstones of diagnosis, and various techniques are available. While endoscopy is a mainstay for the evaluation of nasal blockage, and peak nasal inspiratory flow and acoustic rhinometry are used to measure clinically important abnormalities, imaging is especially important for examining severe or unusual cases. But it is not only nasal obstruction that can be attributed to so many different causes, as Dr. Davide Farina, from the department of radiology at the University of Brescia, Italy will show today in his presentation about sore throat. Sore throat is a very common complaint among children and adolescents. It can be caused by infectious processes, allergic reactions, irritant inhalants, dryness, or traumatic injuries such as those caused by hot liquids, caustic agents, chemicals, and inhale toxic gases.

Imaging of the infrathyroid neck can differentiate the visceral space, the carotid space, the parapharyngeal space, the posterior cervical space, and the pterygopalatine space, thus detailed knowledge of the location of the spaces, their normal content and the different pathologies is essential for a systematic approach. Both CT and MRI play an important role in the evaluation of infrathyroid neck lesions. Today’s session is rounded off by a presentation about tonsillectomy. Prof. Marc Lemmerling, from the department of radiology at the St. Lucas Hospital and the University Hospital in Ghent, Belgium, will give an overview of the clinical presentation of tonsillitis and explain the imaging algorithm for the evaluation of the sepsis of bearing ring stenosis, hissing, churping, whistling or other sounds. "Patients with tonsillar pericardium in the ear in the absence of a corresponding external sound. Tonsillitis can be classified as palatal (synchronous with the heartbeat) or non-palatal (continual). In case of palatal tonsillitis, CT is the imaging method of choice. MRI should be performed in case of non-palatal tonsillitis. In case of palatal tonsillitis one must first exclude vascular neoplasms, other vascular anomalies, and osteosarcoma. In patients with non-palatal tonsillectomy, unilateral schwannomas is the most important pathologic condition to consider.”
Multiple sclerosis (MS) has been seen as a classic white matter disease for a long time. However, the latest data and publications on MS have shown that the disease is not purely a white matter disease. Cortical lesions are common, present in a substantial proportion of MS patients, and contribute to functional impairment. Sensitivity to cortical lesion detection remains low. Being able to detect cortical lesions is important as they are key to understanding disease burden and progression.

The ESR believes that there are two essential components to such a quality improvement approach. The first is having a framework that prioritises the important areas and processes that are key to safe, efficient, and effective care. The second is for staff to have a working knowledge of how to carry out clinical audit.

In the post-mortem study that will be presented today, the researchers have shown that sensitivity to cortical lesion detection remains low. Being able to detect cortical lesions is important, as they are key to understanding disease burden and progression.

**Increased cortical grey matter lesion detection in multiple sclerosis with 7T MRI**

By Pete Cavanagh

Radiology departments are continually trying to improve the quality and safety of the services they provide to patients, but with the ever-increasing activity and complexity of the investigations we carry out, it is difficult to know where to start.

The ESR Audit and Standards Committee has produced a set of templates which will help radiologists and radiographers to assess their compliance with each of the standards.

Prof. Luis Donoso, ESR President, said: “Clinical audit is now required under the European Directive and is therefore mandatory. It is important to realise that audit is not just about knowing how well you perform against the standards but taking action to improve the department’s performance whenever possible. To this end, the templates offer suggestions as to what might be important to consider, as well as reference material that the user can consult.”

Dr. E. Jane Adam, Chair of the ESR Quality, Safety and Standards Committee, said: “Clinical audit is an essential process to assure and improve safety and quality in an imaging service. The ESR Audit Tool will be incredibly valuable to all imaging departments, particularly those that are in the early stages of developing an audit programme.”

The Audit Tool is available on the myESR website for free, and can be downloaded as a complete file or as an individual separate audit. The ESR Audit Tool document fully explains the motivation, aim and basic ideas of clinical audit and how such audits work.

**Joint Session**

Saturday, March 5, 16:00–17:30, Room L8

EuroSafe Imaging Session 4

You too can definitely do audits

- Chairman’s introduction
- E.J. Adam; London/UK
- Experience from an established national programme
  - D. Remes, Harrow/UK
- The challenges of introducing a national audit programme
  - A. Varga; Hidegseg/HU
- How to make audit easy: the ESR Audit Tool
  - P. Cavanagh; Taunton/UK
- Panel discussion

This session is part of the EuroSafe Imaging campaign.
Lowering radiation exposure in cardiac imaging

Our report reveals that coronary computed tomography angiography (CCTA) has the potential to guide invasive coronary angiography (ICA) directly to the diseased vessels with substantial exposure reduction for the invasive procedure.

Non-invasive imaging by CCTA has become an established method and frequently utilized primary test in patients with intermediate risk profile for suspected coronary artery disease (CAD). Significant technical developments have lowered patient exposure to constant values of 1–2 mSv. When CCTA identifies a moderate or severe stenosis, ICA is the method of choice to verify stenosis, to determine its haemodynamic significance and to treat it. Although CT is very accurate in excluding >50% significance and to treat it. Although the method of choice to verify stenosis, in the cath lab it is still important to perform digital subtraction angiography of all coronary arteries and not to primarily direct the intervention to the vessel that was identified as diseased on CCTA only.

The aim of our study was to evaluate a potential reduction of radiation exposure during ICA for patients with CAD, as diagnosed on CT by using information from previously performed CCTA to guide the invasive procedure. Therefore we retrospectively analysed 47 consecutive patients who underwent prospectively ECG-triggered CCTA in our department and subsequent ICA. CCTA was applied for patients meeting the following medical indications: exclusion of CAD, triple assessments caused overestimation of the degree of stenosis on CCTA in a total of 14 coronary arteries (14.6%), highlighting the existing major limitation of CCT.

We differentiated between whether percutaneous coronary intervention (PCI) was performed only in LCA (55.5%) or RCA (27.6%) or in both vessels (17%). In addition, we investigated patients with proposed surgical bypass treatment (6.0%) and with no specific therapy (4.9%) following the ICA. The reports of patient radiation exposure from ICA were examined and, in particular, measurements of dose area product (DAP) of each catheterised main coronary artery were regarded separately.

In our retrospective analysis we were able to see a potential radiation exposure reduction in slightly more than half of the patients (51.7%). A total of 34 minimal or mild stenoses out of 84 examined main vessels (40.5%) were detected on CCTA. In every single case, ICA confirmed no flow-limiting stenoses with consecutively no further therapeutic intervention. In detail, we determined a potential reduction of DAP by 18.72% for patients with single-vascular disease if ICA had not verified the already known minimal or mild stenosis in the non-diseased coronary artery. No decrease in radiation dose could be recorded for patients with severe multi-vessel CAD because of subsequent PCI of both coronary arteries or the obligation of verification for surgical treatment by ICA, respectively. In the patient group with no follow-up, ICA but due to identification of non-significant stenoses in both coronary vessels, a radiation dose reduction of 26.8% could be accomplished. However, blooming artifacts from heavy calcifications caused overestimation of the degree of stenosis on CCTA in a total of 14 coronary arteries (14.6%), highlighting the existing major limitation of CT.

Using pre-procedural planning CT or MR angiography has been the standard of case in vascular interventional radiology for years, CCTA, with its very high negative predictive value to exclude >50% stenosis is an excellent tool for guiding intervention, resulting in lower procedural exposure and making it faster and safer for the patient. We therefore conclude that interventional cardiologists should at least consider catheterising only the moderately or severely obstructed coronary arteries without confirming minimal or mild stenoses already diagnosed by CCTA.
Healthcare IT suppliers display innovations in ECR 2016 exhibition halls

When healthcare equipment companies created the first PACS more than 20 years ago, they provided radiologists with equipment that ensured they would occupy a central role in most clinical decision-making processes. At ECR 2016, technology is on show that is designed to enhance the position of radiologists and improve workflow, efficiency and multidisciplinary teamwork within hospitals and clinics.

Sectra, for example, is demonstrating its digital pathology system that allows biopsy images to be fully integrated with those from the various imaging modalities. Key information from tissue specimens no longer has to be stored on bulky and fragile slides but can be displayed, distributed and manipulated through a shared IT infrastructure.

ECR Today reported two years ago on the first steps in a project undertaken by Sectra in collaboration with academic groups in Europe and the U.S. Together they have addressed the technical challenges faced when accommodating enormous numbers of histological and immunohistological images into the existing structure, and the first system outside Sweden went live at Utrecht University Hospital in the Netherlands in January 2017.

Marie Ekström Trägårdh, president of Sectra’s Imaging IT Solutions, admits that when the project started, she was shocked at seeing glass slides still being used in a 21st-century pathology department. But with the fast and efficient technology now available for imaging the specimens and to store and display those images, pathologists can contribute and manipulate through a shared IT infrastructure. When radiologists and pathologists start working together, I think they will both hugely improve their professional skills. They will learn to read and interpret the images used by their colleagues and better understand what is happening in the patient, which means higher standards in cancer diagnosis,” said Ekström Trägårdh.

GE Healthcare is promoting cloud-based technologies for storing and distributing the data previously held on departmental systems. At ECR 2016, it is highlighting the next stage in this process with the GE Health Cloud, which is described as a new cloud ecosystem with applications for connecting radiologists and clinicians and helping to facilitate collaboration across care pathways and multidisciplinary teams.

Four new applications include an advanced visualisation app for managing image post-processing and allowing radiologists and clinicians to view advanced 3-D images anytime, anywhere. There is also a virtual meeting app to help multidisciplinary teams in their collaborative care planning and reducing preparation time for such meetings by up to 20%. The company is also presenting a case exchange app allowing affiliated and non-affiliated users to share images and reports and to confer quickly on patient cases and treatment plans. Finally, there is an image access portal for distributing longitudinal patient imaging data, offering potential improvements in turnaround times for patient reports.

“Healthcare devices are generating enormous amounts of data, and that data is expected to increase by 50-fold by 2020,” said John Flannery, chief executive officer and president of GE Healthcare. “Our technology can help unlock the value of this data quickly and seamlessly for better patient care. This will help clinicians turn data into insights, and insights into tangible actions for decision-makers to drive better outcomes.”

Philips is presenting IntelliSpace Portal 8.0, the latest edition of its advanced data sharing, analytics and visualisation platform that helps radiologists detect, diagnose and follow up on treatment of diseases. This technology helps address the changing demands in radiology that result from an increasing prevalence of cancer and its rising economic toll. The latest system offers a number of new features such as fast 3-D quantitative renderings of tumours, in a fully integrated oncology suite to improve diagnostic confidence and patient care.

The oncology suite complements the range of applications offered by the existing platform. It will help clinicians to visualise, diagnose, and measure disease states and commu—
Researchers at Siemens have focussed on the health economic aspects of the various imaging technologies, as well as on their diagnostic efficiency. At ECR 2016, the company is demonstrating the next phase in the development of its Teamplay IT solution for analysing and optimising the myriad work processes that are part of the routine daily work of all large hospital radiology departments.

Teamplay is a cloud-based network allowing hospital managers to access anonymised data from thousands of Siemens scanners installed across the globe, to benchmark the department’s performance, and identify areas where there is scope for improving efficiency. The technology is easy to install, simple to operate and can even allow comparisons with scans carried out on other vendors’ equipment, according to Dr. Marc Lauterbach, vice-president for IT business.

“We introduced Teamplay last year with two functions which analyse utilisation levels – how efficiently a particular scanner was being used – and the dose level involved for each modality that uses electromagnetic radiation,” he said. “This year we have added a function that analyses the protocols being employed. This is closing the loop, giving our customers the means to understand the current situation in their imaging fleet and showing what needs to be done to operate that equipment more cost-effectively.”

Agfa HealthCare is unveiling its Enterprise Imaging solution, developed to simplify the creation of a single, comprehensive patient imaging record. The technology provides access to relevant clinical images from multiple departments, allowing caregivers to create, collaborate, exchange, and manage patient data.

It is offered with a range of eight integrated software packages, including enterprise imaging for radiology, enterprise imaging for cardiology, enterprise electronic health record imaging, regional health, a vendor neutral archive (VNA), image exchange, universal view, and business analytics.

“Fujifilm is showcasing its evolving portfolio of Synapse integrated solutions. Synapse VNA, from the company’s recently acquired U.S. subsidiary TeraMedica, enables the management, distribution, and visualisation of DCIOM and non-DICOM images and standards-based documents from any departmental system. The next generation Synapse VNA version 6.0 on show this year includes a completely re-designed demographics quality assurance, user interface and support for VNA role-based dashboards.

Synapse PACS offers new user interface with fast image display. Synapse CommonView sharing capability for outside and cloud study transfers, and integration capabilities with other radiology and healthcare IT vendors to optimise workflow, the company said.

Cineangiographic image displayed on Philips Intellispace Portal 8.0 showing quantitative tumour viability (qEASL*) before and after transarterial chemoembolisation (TACE). Much of the viable tumour (coloured) becomes less enhanced (transparent) after the treatment.
EU project aims to provide earlier dementia diagnosis

The development of three new computer platforms for researchers, clinicians and patients will improve our understanding of dementia and enable earlier diagnosis.

Investigating the link between stroke and Alzheimer’s disease

The Horizon 2020 project CoSTREAM is looking for common mechanisms and pathways in Stroke and Alzheimer’s disease.

Stroke and Alzheimer’s disease are major diseases imposing a huge burden on ageing societies. It has long been recognised that stroke and Alzheimer’s disease often co-occur and have an overlapping pathogenesis. One in four patients develops dementia within 10 years of suffering from a stroke, with a substantial proportion developing Alzheimer’s disease. Similarly, many elderly patients with Alzheimer’s disease suffer from comorbid cardiovascular disease, type-2 diabetes mellitus, hypertension, hypercholesterolaemia or obesity – all of which are strong risk factors for stroke. As such, these two diseases are not just considered to be fellow travellers, but rather partners in crime. The Horizon 2020 project CoSTREAM aims to improve our understanding of the co-occurrence of stroke and Alzheimer’s disease. The consortium builds upon an extensive infrastructure of longitudinal follow-up studies. These studies have data on both diseases as separate clinical outcomes, and contain information on a broad range of aetiological factors ranging from genetics and metabolomics to brain structure and function.

An essential concept of the CoSTREAM project is that stroke and Alzheimer’s disease are sequential diseases with overlapping pathological mechanisms and shared risk factors. The project will particularly focus on these common mechanisms and disentangle when and how these mechanisms diverge to cause either stroke or Alzheimer’s disease, or both.

Various blood vessel affecting diseases, such as atherosclerosis and ischaemic small-vessel disease, can lead to the disruption of the neurovascular unit – the site of anatomical blood-brain barrier; made up of the capillary endothelial cells, neurons, microvascular smooth muscle cells, and the perivascular astrocyte. A recent study suggests that coexisting Alzheimer’s disease and ischaemic brain lesions in the same area can increase the risk of stroke. Some members of the CoSTREAM consortium believe that there are similarities between stroke and Alzheimer’s pathogenesis. As such, the CoSTREAM project is exploring the potential to generate accurate and patient-specific models of dementia progression. “We believe that such a hybrid approach is unique and may render more principled answers to the problem of earlier differential diagnosis of dementia,” said Prof. Frangi.

This hybrid approach, as well as employing modern technology, uses another source of skills and data that has been overlooked: the public. ‘Using a portal with games and questions, data can be collected from those who have a risk of developing dementia and those who have an interest in learning more.’ The technological aim is to create a viable series of platforms that can be applied and used throughout the EU. The first is a research platform that has been designed to allow researchers to access large amounts of information such as MRI scans and patient histories. ‘Big Data. This Big Data is a powerful research tool that through interconnected IT technology can interact with the clinical platform. This lets the clinician input patient data and take advantage of the knowledge generated by the research platform and the clinicians experience to provide better patient-specific care. This is based around an advanced interactive and user-friendly platform that provides all relevant data to clinicians, supporting them with diagnosis and communication. The clinical platform will help clinicians to evaluate cognitive and motor skills, as well as lifestyle and environmental factors. This then feeds back into the integrated system, in turn helping to design further clinical studies. The project took part in the ICT 2015 Conference (Innovate, Connect, Transform), the European Commission’s main information technology event, in Lisbon, Portugal, where they exhibited all three of the VPH-DAREeIT platforms. In addition to learning more about the project, attendees got the chance to try the research platform, see how the project records lifestyle factors such as gait using an insole recorder, and interact with the clinical platform as clinicians explore memory tests used in the citizen platform.

At ECR 2016, attendees also have the opportunity of learning more about this major research project at the VPH-DAREeIT Session: Delivering a clinical decision support platform for earlier dementia diagnosis.

Joint Session
Saturday, March 5, 13:30–15:30, Room Z
EIBIR Session 4 (European Institute for Biomedical Imaging Research)  
The VPH-DAREeIT Project: delivering a clinical decision support platform for earlier dementia diagnosis

Moderator Z.A. Taylor; Sheffield/UK

• VPH-DAREeIT: towards early, differential diagnosis of dementia
  A. Frangi; Sheffield/UK
  Clinical platform for data-driven differential diagnostics of cognitive disorders
  A. Frangi; Sheffield/UK
  A. Vrijlandt; London/UK
  Fluid transport in the ageing brain: an integrative modelling approach
  V. Herich; London/UK
  Phenomenological modelling and the RSS
  W.J. Niessen, Rotterdam/NL

Discussion
and non-neuronal cells such as pericytes or astrocytes. This disruption is one of the pathways implicated in the comorbidity of stroke and Alzheimer’s disease.

The other main pathway involves cerebral amyloid angiopathy. This condition is characterised by the accumulation of amyloid in the walls of brain vessels and is implicated in Alzheimer’s disease, but also in haemorrhagic stroke. As well as extending the current knowledge of these pathways, CoSTREAM will look further to explore and unravel novel mechanisms linking stroke and Alzheimer’s disease by exploiting and linking various large international datasets, generating new data sets and by incorporating novel analytical strategies with emerging technologies in the field of genomics, metabolomics, and brain imaging. CoSTREAM will feature a strong brain imaging component. Novel imaging techniques and markers will be used to study pathophysiological mechanisms underlying both stroke and Aβ. These studies will make use of novel PET ligands for amyloid and tau PET (quantum emission tomography) and ultra-high field 7T MRI imaging (7T Tesla MRI) to examine cerebral perfusion and cognition in order to compare patients with mild to moderate cognitive impairment and stroke patients. PET and MRI imaging data will also be combined with genetic and metabolic information to investigate the variation in occurrence of stroke and Alzheimer’s disease, and how compensatory mechanisms can modify the co-occurrence of stroke and cognitive impairment. Additionally, CoSTREAM will develop a promising organ-on-a-chip in vitro model of the neurovascular unit using commercially available cell lines and patient-derived induced pluripotent stem cells. An in vitro model like this can potentially revolutionise the development of targeted therapeutic strategies against stroke or Alzheimer’s disease by providing a model to rapidly investigate molecular pathways, such as the ones identified during in vitro setting. The project recently started in December 2015 with a successful kick-off meeting in Rotterdam, the Netherlands and will conclude in November 2020. Over the course of the next five years, CoSTREAM aims to drastically improve our understanding of the co-occurrence of stroke and Alzheimer’s disease and identify possible targets for future therapeutic intervention. CoSTREAM’s highly multidisciplinary consortium consists of 11 institutions from seven countries and is coordinated by Erasmus Medical Center in Rotterdam, the Netherlands. It includes epidemiologists, geneticists, radiologists and neurologists with a longstanding track record on the aetiology of both stroke and Alzheimer’s disease. EIBIR, based in Venna, Austria is leading the project management and dissemination activities of the project. Visit the EIBIR booth or the EIBIR website at www.eibir.org for more information about the project.

By Rowland Illing, Chief Medical Officer, Affidea

Affidea: clinical improvement programmes

Affidea is the largest independent provider of diagnostic medical imaging services in Europe. It operates 171 dedicated centres providing high quality, multidisciplinary imaging across 19 countries. Unlike other independent sector providers, Affidea controls the whole diagnostic pathway—managing the centres and the equipment. It employs the clinical and non-clinical staff (over 3,000 employees), provides a common IT platform and has responsibility for the clinical outcomes. The scale of the service convey benefits—despite widely differing geography, culture and languages, there are many core themes that are transferable, allowing Affidea to be a learning organisation, sharing best practice and delivering pan-European initiatives such as the Lean Management, Dose Excellence and MRI Excellence programmes. In this short article I will focus on these three programmes, which serve to improve clinical quality.

**LEAN MANAGEMENT** (Lead: Dr. Rowland Illing)

A critical element of the company is the use of Lean Management to drive continuous clinical optimisation. By putting the patient at the core of all processes, and focusing just on those areas that add value, a truly quality-driven, patient-centric culture has been developed. An example of this can be given from the team in Affidea Ireland, where we managed to provide 7,000 more MRI examinations per annum on six scanners by implementing solutions such as grouping patients undergoing similar examinations to save time on changing coils, cannulating patients before they entered the MRI room, and improving patient movement through the department. Over the last six years, there have been 28 training sessions in two countries with more than 300 employees’ participation. More than 1,500 Kaizen solutions from employees have been implemented, resulting in an estimated 4,500+ working hours saved.

**DOSE EXCELLENCE** (Lead: Katia Kalaee)

In March 2014, Affidea, in collaboration with the team from GEHC, launched Dose Excellence, a management strategy of dose optimisation and good practice in CT, utilising the GEHC DoseWatch platform. By January 2016 it had been implemented in 53 departments in nine countries. DoseWatch allows the real-time analysis of radiation dose received by patients, with an online MRI Academy for clinical staff to access.

The common theme between these programmes is that each is led by an expert, backed up by a core team and local champions. These programmes only work if the local teams are fully engaged and working toward the same goals. Once a critical number of clinical staff are engaged in quality improvement, and can see the results, then the process becomes self-perpetuating and the risk of losing ‘institutional memory’ is significantly reduced.

For more information on Affidea, the company history and clinical scope, please see www.affidea.com. For any specific questions, I would be more than happy to discuss at rowland.illing@affidea.com.
Eurosaf Imaging Stars: a new initiative by the ESR

An interview with EuroSafe Imaging Steering committee chair Prof. Guy Frija

Earlier this year, the ESR and EuroSafe Imaging launched EuroSafe Imaging Stars, an initiative to recruit imaging departments across Europe as role models for best practice radiation protection and to support ESR projects such as clinical audit and patient safety standards or data collection on CT doses. ECR Today sat down with EuroSafe Imaging Steering Committee Chair Prof. Guy Frija from Paris, France, to find out more about the initiative.

ECR Today: What is the main purpose and aim of the EuroSafe Imaging Stars initiative?

Prof. Frija: Since its launch at ECR 2014, EuroSafe Imaging has succeeded in giving greater visibility to the ESR’s radiation protection efforts. Several projects were started as a result of the EuroSafe Imaging Call for Action, including a series of surveys on CT doses for frequent exploratory examinations. This initiative has been important as the clinical audit tool that are supported by EuroSafe Imaging. EuroSafe Imaging Stars is essentially a way to strengthen the implementation of these projects and make sure that our concepts created in the research become best practice to their patients. We will have a real impact on quality and safety in these facilities, and hopefully create momentum so that more and more imaging departments will follow the EuroSafe Imaging Stars’ lead.

ECS: What, in your mind, constitutes the ideal EuroSafe Imaging Star?

GF: Ideally, EuroSafe Imaging Stars — and, for that matter, any healthcare provider — should have the highest standards of quality and safety as firmly imbedded in daily practice that they become almost second nature to all the healthcare professionals involved: Providing the best care with the utmost safety for patients should not just be a bureaucratic exercise, but part of an imaging department’s culture and professional attitude. This is, of course, easier said than done, which is why EuroSafe Imaging Stars provide facilities with a blueprint of the most important elements that constitute a best practice environment, and support participating organizations in using tools developed by the ESR to improve their performance.

ECR: What effects and contributions are EuroSafe Imaging Stars expected to make, and what do they get in return?

GF: We envisage a win-win relationship in that the ESR hopes to learn from EuroSafe Imaging Stars’ experience while supporting them in improving quality and safety and giving them recognition and visibility through the ESR’s channels and events. We are also planning to give Stars a certification depending on the provisions of Directive 2013/59/UE, and the list of criteria that is part of the EuroSafe Imaging Stars initiative, with stars awarded on a scale of one to five. One requirement for EuroSafe Imaging Stars is to participate in the Your Imaging EuroSafe surveys on CT doses. The results of these surveys will be used for benchmarking, which in turn will be helpful for imaging departments in assessing how their dose levels compare.

Secondly, participating facilities will conduct a simple self-assessment test every two years to determine how many criteria they fulfil and to keep track of their progress. More information on EuroSafe Imaging Stars, and all you need to know about EuroSafe Imaging campaign itself, is available at www.eurosafeimaging.org.

ECR: Finally, could you please briefly explain the application process and criteria, and inform our readers where they can sign up their institutions?

GF: There are several ways to take part in the initiative. Imaging departments may be nominated by the national radiology society in their country and some institutions will be recruited by invitation from the ESR. In addition, imaging departments can simply apply online by filling out an application form on the EuroSafe Imaging website.

As part of the evaluation process, applicants have to submit their first self-evaluation. This is a straightforward assessment of how many of the EuroSafe Imaging Stars criteria they fulfil. The list of criteria is divided into five sections, and facilities will be awarded anywhere from one to five stars depending on how many criteria they can meet. The criteria include elements like the use of CT protocols and automatic dose recording, dose optimisation, justification, equipment quality control policies, clinical audit, or the use of clinical decision support for imaging referral guidelines.

More information on EuroSafe Imaging Stars, and all you need to know about EuroSafe Imaging campaign itself, is available at www.eurosafeimaging.org.

Spanish society outlines its position on radiation safety

HARMFUL EFFECTS OF RADIATION USED IN MEDICAL DIAGNOSTICS

Many radiological exams use ionising radiation. Most of these scans use relatively low doses (<200 mSv). It is known that these doses of radiation can increase the risk of cancer. The main radiological societies, including the European Society of Radiology (ESR), the American College of Radiology (ACR), and the Radiological Society of North America (RSNA), have launched campaigns following the joint position taken by World Health Organisation (WHO) and the International Atomic Energy Agency (IAEA) in the Bonn Document’s call for action to reduce doses in medical imaging as much as possible. In this context, the Spanish Society of Radiology (SERAM) has also published a list of recommendations to advise radiologists to reduce risks associated with ionising radiation used in radiology, especially in the paediatric population.

1 - An appropriate practice

- Never perform a non-justified radiological examination. Replace imaging radiation techniques with non-ionising ones whenever possible, especially in children.
- Follow clinical guidelines or decision support systems whenever possible.
- Use protocols for the exploration of a sufficient quality of exploration, especially on CT. Avoid obtaining series that are not necessary.
- Adjust the scan protocols to patient volume, especially when examining a child.
- Use radiation protection clothing or shields when appropriate.
- Upgrade the technology when possible.
- Inform patients clearly of the estimated risk from medical diagnostic tests and the benefits expected from them in each case, as required by law, to avoid a potential source of distrust that eventually drives the patient to the dangerous Dr. Google.
- Make information available to the patient on the dose received and their document history following the provisions of Directive 2013/59/Euratom.
- Use state-of-the-art equipment that enables a further reduction of the dose to the patient.
- Implement use of protocols and automatic dose recording, dose optimisation, and also make it accessible for audits and research.
- Optimise equipment and protocols for the exploration supervised by a medical physicist and periodically audited by the authority.

All these recommendations are important as they all have a cumulative effect and none of them should be ignored. The harmful effects of radiation used for medical purposes, especially the exploratory ones, are often underestimated by health professionals. Radiologists must develop strategies to minimise the risk of such effects, especially in the most sensitive patient groups such as children and pregnant women. These measures should involve prescribing physicians, radiologists, technologists, health authorities, industry and the patients.
Imaging is an essential tool in cancer care. Together with advances in treatment, it has contributed to the decline in death rates from all types of cancer in most European countries during recent years.

Oncologic imaging examinations comprise a significant proportion of a radiologist’s daily caseload. Accurate tumour staging and assessment of response are vital to selecting the appropriate treatment for the cancer patient.

There is a clear need for education and subspecialized knowledge in oncologic imaging. Not only do oncologic radiologists need to be familiar with a variety of tumour entities – their patterns of spread and imaging appearances on various imaging modalities – they also need to have knowledge of an increasing number of newly developed therapies (REF Torrisi) and the differential diagnosis of chemotherapy-related complications of newly developed therapies (REF Tirkes), the imaging appearances of the biological and imaging appearances on various oncologic imaging modalities. In response to the need for a comprehensive and modern approach to the delivery of education in oncologic imaging to radiologists at multiple levels, ESOI has also adopted high-end CT solutions. In 2015, a series of online webinars on oncologic imaging topics by internationally renowned experts were offered for the first time to members of the society. The ESOI educational webinar programme is the first of such initiatives in Europe dedicated solely to oncologic imaging. Due to its success and the excellent feedback received from participants, ESOI will continue this initiative in 2016, with an extended webinar programme from an expert faculty from Europe and the U.S. It will also include for the first time a series of webinars in which a multidisciplinary tumour board of international experts will discuss the management of several cancer types.

To enhance the recognition of oncologic imaging as a radiological subspecialty and promote knowledge of oncologic imaging, the Education Committee of the ESR, in cooperation with ESOI, has included a chapter on oncologic imaging in both the European Training Curriculum for Radiology and the European Training Curriculum for Subspecialisation in Radiology. This should encourage national societies to integrate oncologic imaging into their national radiology training curricula as well.

In order to also educate the general public on the importance of oncologic imaging, a joint webinar by the ESR and ESOI on Oncologic Imaging training was offered for the first time to members of the society.

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The last few years have witnessed an increasing recognition of the role and importance of oncologic imaging in Europe, not only by radiologists but also by other medical and surgical specialties, as well as the general public. Reflecting this is the collaboration in education with the European Society of Medical Oncology (ESMO). ESOI will be present at the ESMO 2016 Annual Meeting with a joint educational session on cancer imaging. In 2017, the first ESOI/ESMO joint educational course for young radiologists and medical oncologists will take place in Amsterdam, the Netherlands. This recognition from our clinical peers will aid in formulating effective cancer policies and overcoming geographical disparities to provide all European citizens with high-quality cancer imaging. This will ultimately help to improve cancer survival across the whole of Europe.

More information about ESOI can be found at www.esoi-society.org.

References:

Dr. Daniele Regge is associate professor at the University of Turin, chair of the department of radiology at Candiolo Cancer Institute, Italy and ESOI president. Dr. Melvin D’Anastasi is a radiologist at the Oncologic Imaging Group, University Hospitals Münich, Campus Grosshadern, in Munich/DE and ESOI representative on the ESR Education Committee.

Dr. Regina G.H. Beets-Tan is professor of radiology at the University Maastricht, chair of the department of radiology at the Netherlands Cancer Institute in Amsterdam/NL and ESOI President-elect.
Paediatric radiology is concerned with the radiological manifestations of disease in children and the unique imaging needs of the child, the key component being patient safety. The importance of a child-specific approach has recently been addressed in a study including nearly 800 radiological examinations, revealing high rates of significant disparity between the interpretations of paediatric imaging studies reported by general radiologists and those of subspeciality radiologists at tertiary care paediatric hospitals (Figure 1). Notably, there was a significant correlation between the second opinion interpretations and the final diagnostic diagnoses, which emphasises the crucial role of subspecialist radiologists in excellent patient management. This study is cause for concern, as most imaging examinations across Europe are reported by radiologists with no specific training within paediatrics or general adult subspecialists, or even non-radiologists, i.e. clinicians. Moreover, child-friendly environments to calm children and thus reduce the need for sedation, and child-specific equipment and protocols to reduce the exposure to ionising radiation are sparse and practice varies. This appears to be most problematic within German-speaking countries.

This is a major concern and has fuelled the ESPR’s efforts to enhance research and education, and produce evidence-based guidelines within our field. A strategic plan is underway to support the ESPR’s overall research goal to become a global leader in the development and implementation of a knowledge-based society in the 21st century. There are strong links and growing partnerships with the ESR, via the ESR EuroSafe Imaging establishment of a Joint Initiative as part of the European Institute for Biomedical Imaging Research (eibir.org/scientific-activities/joint-initiatives), and with other relevant subspecialty societies such as the ESSR and ESNR. Ongoing efforts by the ESPR’s seven taskforce groups further enable research excellence and the production of evidence-based guidelines, available on our website and published in journals. To facilitate translational research a new initiative was established in honour of Professor Guy Sebag (1999–2014), the ESPR Guy Sebag Research Grant for Clinical, Basic or Translational Research in Paediatric Radiology: The first grant will be awarded during the International Paediatric Radiology Meeting to be held in Chicago, May 16–20, 2016 (http://eibir.org). Our scientific programme includes expert speakers, sunrise workshops, keynote lectures, scientific sessions and posters. This year for the first time we have a separate radiographers’ programme targeted at paediatric radiology technologists. Similarly, the ESPR’s internal structure has been revamped and improved. For example, our Education Committee will coordinate and update the ESPR training curricula, establish a new European diploma in paediatric radiology, run ESPR courses in neon, musculoskeletal, cardiosurgical and abdominal radiology, advise the UEMS Radiology section on educational matters and the ESOR committees on new initiatives, and liaise with national authorities and EACME.

Moreover, several excellent textbooks have been published during the past year, amongst them a book produced for the International Day of Radiology 2015 (available at https://doi.org/10.1002/9781119115802), which had paediatric imaging as its main theme (Figure 2). This reflects the active and highly capable ESPR leadership. Another vital issue for the ESPR is liaising with clinical colleagues and working groups, such as the Outcome Measures in Rheumatology (OMERACT) group which is mainly made up of rheumatologists aiming to establish markers, including imaging markers, for active and permanent rheumatic disease. The OMERACT group has been publishing widely for more than a decade. The ESPR’s input during the last couple of years has been warmly welcomed, and a multidisciplinary group is now searching for the truth as to imaging protocols and scoring systems – using an integrated imaging approach. This way through active collaboration, diagnostic errors due to mono-modality malpractice may be reduced. Similar initiatives have been made within other paediatric subspecialties, such as oncology, neuro and cardio-thoracic imaging.

During the past few years, the ESPR has been revamped, modernised, and restructured. This was vital to meet the growing demands of advanced imaging. New bylaws and a detailed set of internal regulations have been established. This was coordinated by the current president, Catherine M. Owens, who during the past decade has done tremendous work for the society, in collaboration with many other dedicated and passionate colleagues within our subspecialty of paediatric radiology for the good of children everywhere. If you would like more information about the ESPR, please visit our website www.espr.org

BY SUKRU MEHMET ERTURK

high standards and structured paediatric radiology society aims to be leader in field

Though the workload of radiologists in Turkey is high, healthcare spending per capita is increasing, allowing for high-quality diagnostic services. The Turkish Society of Radiology has approximately 400 members, which is roughly 95% of all radiologists in the country. The society is made up of active members and they provide radiological services for 71 million people in Turkey. This means a heavy workload for every radiologist. The Turkish government is currently focusing on eliminating waiting times for patients. If you want an MRI exam, there is only a one-day wait. This puts pressure on doctors and our healthcare system. Turkey is already one of the top countries for radiology practice in Europe, but we also need to consider the importance of research. With our current workload, the time available for academic study is decreasing. We do not yet have an optimal environment to develop innovation, and it will take approximately 10 years to reach this goal.

About 20 million people live in Istanbul and they get excellent healthcare. But unfortunately there is some disparity between regions.

The east and the south of Turkey are less attractive to most doctors. The government has introduced an obligatory one-year duty for all doctors following their medical training. So the quality of healthcare is rather different in the whole country. Our healthcare system could be described as something between the German and the U.S. systems; everybody is insured, but the

23

TECHNOLOGY & RESEARCH

ECR TODAY | SATURDAY, MARCH 5, 2016

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Paediatric radiology society aims to be leader in field

High standards and heavy workload for radiologists in Turkey

References:
The Nordic countries are the home of several radiological pioneers, where the Swedish are the home of several radiological pioneers, having led the way for the rest of interventional radiology in particular. Activities Control (CNCAN) in all National Commission for Nuclear institutions. The SRIM collaborates with other educational and research activities Control (CNCAN) in all National Commission for Nuclear institutions. The SRIM collaborates with other educational and research institutions. The SRIM will also advise and follow up on the training of resident doctors, encouraging them to carry out and publish research. It aims to refresh and upgrade theoretical and practical novelties in medical imaging for specialties by developing a Roma...
Distinguished Swiss radiologist to receive Gold Medal at ECR

In recognition of his lifelong commitment to the field of radiology, Professor Peter Vock from Bern, Switzerland, will be awarded the Gold Medal of the European Society of Radiology (ESR) at ECR 2016.

Peter Vock is professor emeritus at the University of Bern and senior consultant radiologist at Bern University Hospital Inselspital in Bern, Switzerland. He chaired the Institute of Radiology of Bern University from 1989 to 2001. In 1973 he obtained his medical degree from the University of Bern, and subsequently did a residency in radiation oncology, radiology and nuclear medicine at Inselspital, where he started working as a radiologist after his board certification in 1980. Before that, he also completed a residency in internal medicine and Tiefenauspital in Bern. Between 1980 and 1983, he was a visiting research associate in chest imaging at the department of radiology, Duke University Medical Center, Durham NC, USA.

“I chose radiology mainly because of my fascination for the challenges of differential diagnosis,” he said. “It was an easy decision after having worked in both radiology and internal medicine for a while. My decision to specialise in chest imaging was initially influenced by several brilliant American chest radiologists who were able to systematically and logically derive a lot of morphological and functional information from simple chest radiographs. It was a pleasure to show the key findings and their physiological meaning to medical students. Later on, the development of CT and MRI opened many new approaches to chest imaging with technical advances, new indications and an ever-growing clinical role that gave me a lot of satisfaction in my subspecialisation.”

Prof. Vock’s research interests focus on chest imaging, CT and particularly radiation protection. He has dedicated much of his work to radiation protection on an institutional, professional, national and international level, serving as a member of the Swiss Federal Commission of Radiation Protection for more than twelve years and chairing the commission’s medical subcommittee for six years. He was also responsible for radiation protection within the Swiss Society of Radiology and currently serves as chairman of the ESR’s Radiation Protection Subcommission.

Prof. Vock has also represented the ESR in different radiation protection projects, such as the European Medical ALARA Network (EMAN), Medical Radiation Protection Education and Training (MEDIRAFT) and European Diagnostic Reference Levels for Paediatric Imaging (PDRL). “In my professional life, I mostly teach residents in chest imaging. Since my retirement, I have had more time for projects in radiation protection, and currently it is the PDRL project, sponsored by the European Commission and managed by the ESR, where, through inter-professional cooperation, we try to establish the best methodology for establishing paediatric diagnostic reference levels (DRLs) and to propose DRLs that are appropriate to the size of all children. At our hospital, we are currently drafting a structured reporting system of low-dose CT in individuals occupationally exposed to asbestos,” he said.

Prof. Vock is Deputy Editor of European Radiology and a member of the Steering Committee of the EuroSafe Imaging campaign. He has been attending the ECR ever since its creation in the early 1990s. “Vienna was the right place at the right time back then, and it was most impressive for me to be a member of the European radiological community. I deeply admired how the new ECR succeeded in attracting colleagues from all countries in the early years, it was an essential prerequisite that participants from eastern Europe had a chance to be part of the European congress at modest travel and congress costs, no matter whether their countries were EU members or not. My second unique ECR memory has been the continuous increase of the scientific level and quality of the conferences and posters over the years that are now at an international top level,” he said.

“I feel deeply honoured by this award. Having participated in many different activities of the ECR and the ESR and its precursor the European Association of Radiology, I have had the privilege of participating in the development of our new society and I am very happy about its achievements. Even if I will retire from my current ESR position after the congress, I will support the society in the future whenever I can contribute to its activities and prosperity.”

Prominent European radiologist to be awarded ESR Gold Medal

In recognition of his pioneering work in abdominal and molecular imaging, and his commitment to the development and harmonisation of radiology in Europe, Professor Gabriel P. Krestin from Rotterdam, the Netherlands, will receive the Gold Medal of the European Society of Radiology at ECR 2016.

Gabriel P. Krestin is full professor of radiology and chairman of the Department of Radiology and Nuclear Medicine at Erasmus MC, University Medical Centre Rotterdam, the Netherlands. He graduated in medicine from the University of Cologne in Germany, where he completed his residency in radiology in 1988. After undertaking fellowship training in abdominal imaging and MRI, Prof. Krestin completed a PhD on experimental and clinical applications of fast gradient-echo MRI imaging in the abdomen, in 1990, at the same university.

He was subsequently appointed as a radiologist and head of the MRI centre at Zürich University Hospital, Switzerland, where he later became associate professor of radiology and head of the clinical radiology service. He also served as acting chairman of the diagnostic radiology department before he moved into his present position in the Netherlands.

He was a permanent visiting professor at Stanford University Medical School from 1998 to 2009, and the Couch-Kerley Traveling Professor to the Royal College of Radiologists in the UK.

Interestingly, however, he did not initially envision himself as a radiologist. “I wanted to become a cardiologist, like my father. So during medical school at the University of Cologne, I did an elective in cardiology in Geneva and my dissertation continued on page 26.
on follow-up examinations after heart valve surgery,” he recalled. “However, I realised that I wanted a broader view of medicine and to be involved with more than one organ system. Radiology was becoming very exciting in those years with adoption of the first cross-sectional imaging techniques (ultrasound and CT). So I decided to do a year of training in radiology I immediately got excited about the role of imag- ing in detecting and differentiating diseases. I specialised in abdom- inal imaging, inspired by the principles described in Morton Meyer’s book Dynamic Radiology of the Abdomen, looking at anatomy and function and trying to explain the spread of disease based on imaging features. Later on, with the advent of MRI, I tried to combine my inter- est in MR, mainly to the field of neuroimaging. He also served as Secretary General and 

“During my military service in the mid-sixties in Paris, right after my fellowship in neurology, I had the opportunity to work with René Dyckman, a pioneer in neuroradi- ology who developed super selec- tive neuroangiography and spinal angiography. These new techniques were very innovative at the time and I decided to switch to radiology. I was lucky, a few years later, the first applications of CT and MRI were for the brain. I was fortunate to have mentors who were or are outstanding radiologists in France, such as Hermann Fachgold, Georges Salmon, Auguste Wackenheim and Jeanpierre Vignaud,” he said.

Prof. Manelfe has been awarded many distinctions for his work, including the Schinz medal of the Swiss Society of Radiology and the Schinz Medal of the Swiss Society of Radiology Furthermore he has been awarded honorary membership of numerous national radiology socie- ties and of the ESMRM.

Renowned French neuroradiologist awarded ESR Gold Medal

In recognition of his service to the discipline, French neuroradiologist Professor Claude Manelfe from Toulouse, France, will receive the Gold Medal of the European Society of Radiology at ECR 2016.

“During my military service in the mid-sixties in Paris, right after my fellowship in neurology, I had the opportunity to work with René Dyckman, a pioneer in neuroradiology who developed super selective neuroangiography and spinal angiography. These new techniques were very innovative at the time and I decided to switch to radiology. I was lucky, a few years later, the first applications of CT and MRI were for the brain. I was fortunate to have mentors who were or are outstanding radiologists in France, such as Hermann Fachgold, Georges Salmon, Auguste Wackenheim and Jeanpierre Vignaud,” he said.

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Prof. Claude Manelfe from Toulouse, France, will be awarded the Gold Medal of the European Society of Radiology at tonight’s charity dinner.

Claude Manelfe is professor emer- itus at Paul Sabatier University in Toulouse, France. He was professor and chairman of diagnostic radiology at Paul Sabatier University for thirty years and director of the therapeutic neuroradiology depart- ment at Purpan University Hospital in Toulouse.

In 1989, Prof. Manelfe received his medical degree from Toulouse University, where he subsequently completed fellowships in neurology and psychiatry and a specialization in neuropsychiatry. His main interests were interven- tional neuroradiology and endovas- cular occlusions at the beginning of the 1970s, and MRI and imaging of the spine and spinal cord later.

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ECR Today: You have been the editor of European Radiology for two full years. During this time, have you noticed any major developments?

Maximilian F. Reiser: Even during this relatively short period of time I have witnessed major changes. The number of submissions has steadily increased and European Radiology has become progressively more international, with authors submitting from all over the world, including many from the United States and Asian countries.

ECRT: The ESR Albert L. Baert Editorial Fellowship was also created two years ago. What are the benefits of such a programme for the participants and what was your personal experience with the first two fellows?

MFR: Our first fellow was from Italy and our second from the United Kingdom. They each spent several weeks with us and I think it was a positive experience for both sides. The fellows had the opportunity to familiarise themselves with the technical aspects of handling manuscripts, reviewer recruitment, review evaluation and the criteria of decision making. Furthermore, they completed reviews in and outside of their respective fields. We believe that the Editorial Fellowship equips the fellows with valuable skills beneficial to their academic careers. We hope that the fellows will impart their knowledge to their colleagues thus improving the quality of the scientific research in their respective departments. We were thrilled with our first two fellows and have remained friends with both since the fellowship.

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

MFR: This is a key question. First, the aspiring author needs to consider the novelty aspect while planning the study as well as what the core question is. They need to answer. Furthermore, the methodology needs to be scrutinised and a suitable statistical method needs to be defined. After analysing the results, the authors need to follow basic principles on how to structure the manuscript and how to organise the text for the reader. European Radiology provides valuable tips on these aspects in our ‘instructions for authors’.

I have had the opportunity in the past to give lectures at various conferences of European subspecialists on the topic ‘How to write an excellent scientific paper and to get it accepted’ and I had the impression that the information was considered helpful.

ECRT: This year marks the 25th anniversary of European Radiology. What do you think about the development of the journal so far and where do you think it will be in another 25 years?

MFR: The last 25 years have been a success story for European Radiology, owing to the vision and personal commitment of exceptional personalities in European radiology, who, as editors, have made our journal one of the most highly ranked worldwide. The impact factor has rightly been criticised for various reasons over recent years. However, it still plays a vital role in the academic career of a scientist. For example, it strongly influences the success of grant applications and the reputation of research institutions. Therefore, radiological scientists place great importance on publishing in high impact journals and it is my impression that this aspect has become even more important.

Thus we can assume that high quality journals will remain significant in the future and continue to directly impact the daily work of radiologists. Together with our sister journal Insights into Imaging, we are well prepared for the future.
The European Diploma in Radiology (EDiR) is an international diploma issued and certified by the European Society of Radiology (ESR) and recognised by many national societies of Radiology. Because it provides an objective assessment of general radiology, the diploma aims to harmonise education throughout Europe by setting a standard based on the European Society of Radiology’s (ESR) European Training Curriculum for Radiology (ETCR). Amidst the challenges faced by individual radiologists, it is particularly important for radiologists at the start of their careers, and will surely help them focus on their professional development and to improve their job opportunities in the future. Birgit Ertl-Wagner: The EDiR enables young – and also not so young – radiologists to demonstrate their abilities on an international level. This serves as a distinguishing feature for the individual radiologist both on a national and on an international level. Having passed the EDiR examination is a hallmark feature in unifying national borders, thus facilitating professional migration. It also provides the candidate with an equivalent to the exit training examination in his or her home country. The exam will become an accepted additional qualification, which may eliminate the need for individual national exit examinations. Sue Barter: The EDiR is a uniform platform for demonstrating a radiologist’s level of achievement after completing post-graduate level 1 and 2 training in radiology. A uniform exit examination after the completion of training is a hallmark feature in unifying education and training in radiology throughout Europe. Lorenzo Bonomo: The EDiR serves the interests of patients, medical professionals and healthcare institutions by ensuring a single European standard of radiological training and education. Birgit Ertl-Wagner: It enables candidates to evaluate their abilities on an international level. This is an important preliminary step to improve their job opportunities, to boost their careers by offering an international certificate of excellence in radiology. The EDiR is an important preliminary step to improve their job opportunities, to boost their careers by offering an international certificate of excellence in radiology. Sue Barter: The EDiR certifies that its examinees have reached and demonstrated a standard of knowledge and skill as laid out in the ETCR. The EGR is dedicated to improving and expanding the EDiR, and encouraging continuous education and revision within the discipline of radiology throughout Europe. Luis Donoso Bach: The EDiR is one of the most important tools that should allow us to improve quality standards in the training of radiologists across Europe. Yves Menu: I would say the mission is a) benchmarking and quality control, and b) to help some (maybe not so small) countries to organise their own national certification. ECR: The EDiR is accepted as an official exit training examination in Poland and to the first part of the Turkish Board examination. How do you see this trend continuing in the near future and what are the benefits? Lorenzo Bonomo: I hope that in the near future the EDiR will officially be an internationally recognised certificate of radiological competence. Therefore I consider what has been done in Poland and Turkey to be very positive and we will be very happy if other countries will follow this trend. I would like to share what has been done at my university in Rome. The last year residents who pass the EDiR examination are exempt from their last exam and can go directly to defend their thesis. If this example was followed by other institutions it would be a first step toward achieving a standardised certification in radiology. Luis Donoso Bach: Countries like examples of Poland and Turkey are very important. If we can convince other countries to follow the same concept, this would be the definitive consolidation of the EDiR as an essential tool for the harmonisation of the practice of radiology in Europe. Sue Barter: With the last few years, we envisage that the European Diploma in Radiology will be an internationally recognised certificate of radiological competence. It will become an important step toward achieving official recognition of the skills and competence of radiologists, no matter where they have undergone their training. Birgit Ertl-Wagner: To enhance the acceptance of the EDiR in the various European nations and especially to increasingly establish the equivalence to national exams, it is important to work with all relevant national institutions. The natural first point of contact is the respective national society including their representatives at the ESR. Depending on the national regulations, it is also crucial to work with the regulatory bodies of the individual country, e.g. the ministry of health, especially in order to establish the equivalence to or replacement of national exit examinations. Yves Menu: This is very different from one country to another. We should add medical chambers, as they are responsible for national level certificates. For employers (hospitals, universities), we can only recommend that EDiR is considered when recruiting a foreign doctor. For accreditation bodies, the future is clearly to combine the advantages of the EDiR and national licences. ECR: What challenges does the EDiR face and what do you think should be done to overcome these challenges? Luis Donoso Bach: As with other European examinations, the EDiR faces several challenges. It will be of utmost importance to maintain the highest possible degree of standardisation and objectivity. Therefore, the evaluation needs to be transparent, open to the contents of the ETCR, regular peer-review of the exam questions, and thorough training of the examiners. Moreover, it is very important to regularly review the examination statistics and to benchmark them. In addition, it will be important to maintain the attractiveness of the EDiR by appropriate marketing measures and by enhancing the equivalence to national examinations. Lorenzo Bonomo: To my mind, the biggest challenges the EDiR faces is to significantly increase the number of radiologists who are taking the examination. This will mean more sessions will be required and this will create the need to set up more exam sessions in various countries, as well as electronic formats of the examination. Luis Donoso Bach: The challenges for the EDiR are now to maintain the quality levels and to facilitate accessibility. The new exam format using secure IT tools will allow us to increase the number of people who are able to take the examination each year, while maintaining high standard levels of quality. Yves Menu: The main strength of the EDiR is the organisation, maintenance and quality control of the written examination. My feeling is that we may reach some kind of fusion between European written, certification and native language oral validation. This would be the right compromise between common European tasks and values, and national independence. The full success of the EDiR might therefore paradoxically be to disappear as an entity for European radiologists, and exist independently for non-European radiologists. Sue Barter: The demand for the examination is rapidly outstripping the resources available in some facilities and manpower to provide the written examination, and conducting the oral part of the examination is also a huge drain on resources, both in terms of human and financial costs. The EDiR is piloting a format which may eliminate the need for the oral exam at ECR 2016. It is also exploring a means of conducting the written examination in multiple locations in a secure setting, in order to accommodate the ever-growing number of candidates wishing to take the examination. All of these developments need to be carefully examined and the templates considered. Whether this template is considered as national certification, or if it is the equivalent to the EDiR in itself. The Polish example seems to lead the way towards a combined certification. ECR: How do you think institutional bodies, such as hospitals, national societies and local radiologists, should get involved in the EDiR? Sue Barter: It is important for health ministries, hospitals and national societies to feedback to the EBR on the experiences with EDI-R-certified radiologists, so we can continue to enhance the examination and ensure it is fit for purpose. National societies and subspeciality societies are already involved to variable degrees in supplying material and examiners for the examination. Lorenzo Bonomo: Without doubt, a campaign to raise awareness and to increase the number of candidates wishing to take the examination is crucial to the future of the EDI-R. We can only recommend that EDI-R is considered when recruiting a foreign doctor. For accreditation bodies, the future is clearly to combine the advantages of the EDI-R and national licences.
Have you ever wondered how some speakers just manage to capture everybody’s attention from the start and leave a powerful impression? Would you like to become more confident standing in front of an international audience? Then please read the great top tips from Prof. Regina Beets-Tan; learn how to make the listeners feel your enthusiasm, the importance of simplifying presentation material and that even very experienced speakers prepare lectures meticulously.

Your appearance should be authoritative. Dress appropriately and preferably in formal attire. Do not show any nervousness, even if you are nervous. Allow yourself a few moments on the podium before you start taking. Don’t hide behind the podium. Make sure that your first slide and your microphone are set. Connect with your audience and make eye contact.

Your audience must feel that you are a kind person and pleasant to listen to. If invited to a meeting abroad, address your host organisation: Express your gratitude for the opportunity to lecture at their meeting and to visit their country. You will please the host and also the audience, many of whom will most probably be from the organising country. This will help you to break the ice and get you beyond the first uncomfortable moments.

**ECRT:** How would you advise young presenters to rehearse their oral presentations in front of a small audience, for example, some colleagues in the department? You can learn from their feedback on your performance and on your slides and it will give you more insight into which questions may arise.

**Prof. Regina Beets-Tan:** I advise young presenters that are nervous. Allow yourself a few minutes to collect your thoughts. Make sure that you keep to time limits. What can you do if you are running out of time towards the end?

**RBT:** Running out of time is a frequent pitfall, not only for beginners, but also for experienced lecturers. Plan your presentation carefully. For beginners, learn your text by heart. Keep your sentences short and succinct. Rehearsing multiple times will help you to feel more confident, ensure that you will keep to the allotted time and prevent weakening your presentation at the end because you’re running out of time. The closing of a lecture is very important. You want the audience to remember what you’ve said and what you want them to take home. Make sure you present your final slides with clear, take-home messages, delivered with power and professionalism.

**ECRT:** Do you use humour in your presentations? Which kind of humour is appropriate? When can it go wrong?

**RBT:** I personally am not so keen on using humour during my lecture, especially not with an international audience. What some cultures may think of as funny, others may find inappropriate or even offensive. So be cautious with jokes unless you’re running out of time. The closing of a lecture is very important. You want the audience to remember what you’ve said and what you want them to take home. Make sure you present your final slides with clear, take-home messages, delivered with power and professionalism.

**ECRT:** Do you have any other tips or suggestions?

**RBT:** Each time during the past years that I’ve lectured around the world, I have considered myself privileged to have been given the opportunity to share my work. It was extremely rewarding when I noted during the next visit that my knowledge had been transferred, the message captured and the work implemented in practice for better patient care. This, after all, is what it’s all about. So each time you will have the opportunity to present your work in front of an audience, remember that you are contributing to spreading the message of ‘better imaging for better patient outcome’. And this makes each presentation, even if not perfect, an important one. Good luck!
CHAGALL TO MALEVICH
THE RUSSIAN AVANT-GARDES

AN EXHIBITION AT THE ALBERTINA

Marc Chagall, The Violin Player, 1912
Amsterdam, Stedelijk Museum © Bildrecht, Wien, 2015
The art of the Russian avant-garde numbers among the most diverse and radical chapters of modernism. At no other point in the history of art did artistic schools and artists’ associations emerge at such a breathtaking pace than between 1910 and 1920. Every group was its own programme, every programme its own call to battle – against the past as well as against competing iterations of the present.

The Albertina is devoting a major presentation to the diverse range of art from that era: 130 masterpieces by Mikhail Larionov, Natalia Goncharova, Kazimir Malevich, Wassily Kandinsky, and Marc Chagall illustrate fundamentally different styles and their dynamic development from primitivism to cubo-futurism and on to suprematism, as well as the chronological parallels between figurative expressionism and pure abstraction. In eleven chapters, Chagall to Malevich traces the brief epoch of the Russian avant-garde as a dramatic drama stemming from the diversity of avant-garde movements that were diametrically opposed to one another. Enabling the public to see and experience the visual tensions inherent in this heroic phase of Russian art is the stated goal of this exhibition.

The Albertina houses one of the world’s largest and most precious graphic collections. Presently it contains almost 70,000 drawings and more than one million graphic prints from all of the significant art eras from the late Gothic period to the contemporary. The range of outstanding works spans from Leonardo, Michelangelo and Raphael to Albrecht Dürer, Rembrandt and Rubens, and further to Lorrain, Delacroix, Manet and Cézanne. The Albertina is distinguished for its collections from the 20th century, including the works of Schiele, Klimt and Kokoschka, as well as Warhol, Rauschenberg and Baselitz. The photographic collection contains examples of scientific photography, studio photography, early colour photography and pictorial works. The architecture collection consists of almost 25,000 drafts, sketches and models. The core pieces are the architectural models by Otto Wagner, Le Corbusier, Mies van der Rohe and Alvar Aalto.

Albertina
Albertinaplatz 1
1010 Vienna
Opening hours:
Daily 10 am–6 pm
Wednesday 10 am–9 pm
www.albertina.at

Albertina

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The Russian avant-garde went hand in hand with a phenomenon of comprehensive artistic renewal. Artists draw on differing and occasionally contradictory thematic material and impulses: on the one hand, the Western European avant-garde served as a point of orientation that brought forth such revolutionary expressive forms as fauvism and cubism, after the example of Paris-based artists such as Van Gogh, Matisse, Picasso, and Braque. But on the other hand, the Russian artists were equally keen on making reference to the folkloric pictorial tradition of their homeland.

With their demands for pure painting and abstraction as advanced by suprematism (Kazimir Malevich, Ivan Kliun, Olga Rozanova) and constructivism (El Lissitzky, Alexander Rodchenko) alongside the seemingly more traditional forms preferred by figural artists (Marc Chagall, Boris Grigoriev, Pavel Filonov), what they all had in common was an intent to break with the past – representatives of the one side via that past’s radical negation, those of the other by making reference to it. This era’s artists were also united by the desire to arrive at a synthesis between Western Europe’s modernism and the folkloric idioms of Eastern Europe. This desire gave rise to a number of independent, dynamically developing artistic movements – neo-primitivism, rayonism, cubo-futurism, suprematism and constructivism – that were ultimately smothered by the Stalinist regime or forced into an ideologically charged socialist realism.
THEATRE & DANCE

›  DORIAN GRAY
  by Oscar Wilde
  Akademietheater | 19:00
  1030 Vienna, Lisztstraße 1
  Phone: +43 1 5144 4445
  www.burgtheater.at

›  DIE LETZTEN TAGE DER MENSCHHEIT
  by Karl Kraus
  Burgtheater | 18:30
  1030 Vienna, Universitätsring 2
  Phone: +43 1 5144 4445
  www.burgtheater.at

›  SONNY BOYS
  New interpretation of the American comic classic
  by Christoph Grissemann and Dirk Sterman, the ‘bad guys’ of Austrian entertainment
  Rabenhof | 20:00
  1030 Vienna, Rabengasse 3
  Phone: +43 1 712 82 82
  www.rabenho/ftheater.com

›  IMPERIUM
  by Jan-Christoph Gockel & Tobias Schuster, based on the novel by Christian Kracht
  Schauspielhaus | 20:00
  1010 Vienna, Porzellangasse 19
  Phone: +43 1 317 01 01
  www.schauspielhaus.at

›  AUSLÖSCHUNG
  by Thomas Bernhard
  Theater in der Josefstadt | 19:30
  1080 Vienna, Josefstadter Straße 26
  Phone: +43 1 42 700 300
  www.josefstadt.org

›  NORA²
  by Henrik Ibsen/Elfriede Jelinek
  Volkstheater | 19:30
  1070 Vienna, Neustiftgasse 1
  Phone: 43 1 5211 400
  www.volkstheater.at

Please note that all theatre performances are in German.

CONCERTS & SOUNDS

›  CÉDRIC TIBERGHIEN, PIANO
  L. van Beethoven: Sonata c major op. 53 ‘Waldstein’; B. Bartók: Sonatas, Songs, Burlesques, Dances; J. Brahms: Hungarian Dance
  Konzerthaus (Classical Music) | 19:30
  1030 Vienna, Lothringergasse 20
  www.konzerthaus.at

›  WIENER SYMPHONIKER, conductor BERTRAND DE BILLY
  JEAN-YVES THIBAUDET, PIANO
  H. Dutilleux: Symphony No. 2; C. Saint-Saëns: Concerto for piano and orchestra No. 5 f major op. 103; M. Ravel: Boléro
  Musikverein (Classical Music) | 19:30
  1010 Vienna, Bösendorferstraße 12
  www.musikverein.at

›  40 Years of Smoking Drums
  CAFE DRECHSLER / WOLFGANG MUTHSPIEL TRIO / JAHSON THE SCIENTIST / DOUBLE TROUBLE
  (Austria/France)
  Musikverein (Classical Music) | 19:30
  1010 Vienna, Bösendorferstraße 12
  www.musikverein.at

Entertainment

›  THE BAR AT BUENA VISTA
  The Cuban legends are back! A unique show full of Caribbean lightness and atmosphere of 1940s Havana
  Museumsquartier – Halle E+G (Latin) | 20:00
  1070 Vienna, Museumsplatz 1
  www.halleneg.at

›  BOSSE
  Szene Wien (Pop & Alternative Music) | 20:00
  1110 Vienna, Hauffgasse 26
  www.menewien.com

Please note that all theatre performances are in German.