WF 1 – LEADING BY EXAMPLE
Thursday, February 28, 12:30–14:00, The Church

CHAIRPERSON
H. Hricak; New York, NY/US

SPEAKERS & PANELLISTS
D. Akata; Ankara/TR, L.E. Derchi; Genoa/IT, C. Estrampes; Paris/FR, M.H. Fuchsjaeger; Graz/AT, H. Hricak; New York, NY/US, L. Leong; Hong Kong/CN, C. Palmer; London/UK

WF 2 – CHANGING THE IMAGE OF WOMEN IN LEADERSHIP: GENERATIONAL DIFFERENCES AND SIMILARITIES
Thursday, February 28, 15:45–17:00, The Church

MODERATOR
R.A. Kubik-Huch; Baden/CH

SPEAKERS & PANELLISTS

WF 3 – WOMEN IN CHALLENGING ENVIRONMENTS
Friday, March 1, 14:00–15:15, The Church

MODERATOR
R.G.H. Beets-Tan; Amsterdam/NL

SPEAKERS & PANELLISTS
Ş. Bahar Özvarış; Ankara/TR, E. Balogun; Lagos/NG, R.G.H. Beets-Tan; Amsterdam/NL, D. Husseiny Salama; Cairo/EG, S.F. Khan; Islamabad/PK, L. O’Riordan; Ipswich/UK

WF 4 – LEADERSHIP AND MENTORSHIP
Friday, March 1, 16:00–17:25, The Church

MODERATOR
J.E. Husband; London/UK

SPEAKERS & PANELLISTS

All sessions will have dedicated rooms for remote viewing and will be streamed live online. More info at myESR.org/wif.
Knowing your differentials will unlock migration-related diagnoses

Migration has created new challenges for clinical radiology, largely due to the number of imported diseases that it generates.

This trend necessitates the use of novel imaging strategies and different approaches to interpreting images. At today’s session, Radiology and migrations, ECR 2019 delegates will hear about the latest thinking from specialists in the field and learn how to tackle migration-related cases.

The total number of asylum seekers in countries across the European Union has increased from around 55,000 to almost 1.4 million annually in the last two decades, stated Prof. Okaan Akhan, who will moderate the session. These people are fleeing from violence, torture, persecution, and political or ethnic oppression, and are unable to return to their country of origin. In addition, the number of economic migrants seeking a better life has also increased, he noted.

Whatever the reason for migration, the health of these individuals is crucial for their social inclusion and integration in society, which in turn has an impact on the sociopolitical and economic outcomes for this population, according to Akhan, professor of radiology and chief of interventional radiology and abdominal imaging at Hacettepe University Hospital in Ankara, Turkey. Besides generating discussion about the reasons for migration and its humanitarian consequences, he hopes speakers will provide analysis of the importance of migration-related diseases and how to recognize them clinically and radiologically.

He added that it was important to keep discussing the phenomenon of migration-related diseases, and crucially to raise awareness of them among radiologists and other health professionals.

“The health issues of immigrants are manifold and in many situations they are very challenging to physicians. Awareness of these conditions is mandatory to assure good clinical practice for these patient populations that carry a huge burden in chronic, infectious, mental, and neurological diseases,” Akhan said.

Radiologists need to be aware of the types of infectious diseases immigrants suffer from, such as tuberculosis, HIV, viral hepatitis, malaria, schistosomiasis, echinococcosis, neurocysticercosis or similar diseases that reflect epidemiology in the country of origin. Additionally, immigrants may present with psychological problems, chronic diseases resulting in poly morbidity—cancer, and neurological diseases and acute or chronic malnutrition. These conditions may result in anemia, growth disorders, mental and physical development disorders, immunocompromisation, neuropathy, bone disorders and other organ dysfunction, and it is easy to overlook these aspects during daily clinical work, he explained.

Radiological examination of these patients is crucial because imaging plays an important role in the diagnosis and differential diagnosis of most of these diseases, but many radiologists in western European countries are not familiar with them. For instance, the incidence of cystic echinococcosis (CE), otherwise known as hydatid cysts, is spreading across Europe, mainly due to migration. CE has a prevalence of 1% in rural Turkey and it is also endemic in southern Europe, including the Balkan countries, southern Italy, France, Spain, and Portugal. Case numbers are also growing in other parts of Europe due to immigration and travel to and from endemic regions. This means that diagnostic imaging and interventional procedures for CE treatment is becoming an important topic for western and northern European radiologists, who increasingly will encounter this disease in their daily practice, and they must remember that what they think is a simple cyst may in reality be more complex and dangerous for the patient, Akhan said.

A success story with new challenges:

European radiologists call for more cooperation with the ESR

African radiologists call for more cooperation with the ESR

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We dare you to solve a very difficult EDiR question. This is your chance to sit the examination and attend the ECR 2020 for free. Solve the question posted at the EBR blog before 13:30h. The question right answer and the winner will be announced at the EBR blog at 14:00h today.

The European Board of Radiology will raffle amongst the winners a free examination fee for the examination that will take place within the ECR 2020 frame. ECR 2020 free registration will be also included!

Go to the EBR blog at blog.myeb.org to find the EDiR Question of the Day, and further interesting resources to prepare for the examination.
African radiologists call for more cooperation with the ESR in radiation protection

African radiologists will share their knowledge and experience of medical imaging practice in their respective countries, today during the ‘ESR meets Africa’ session. Examples of cooperation with the European Society of Radiology will be presented, notably in radiation protection, a field where efforts between Europe and Africa are starting to pay off.

Africa is big, diverse and full of possibilities. Its myriad of countries (its), languages, cultures and economic scenarios offers unmatched potential, but it can also complicate the organisation of radiation.

Equipment and workforce tend to vary considerably from one country to another. For example, the radiologists’ ratio ranges from 1 to 80 per million population, depending on the country.

“Many main challenges are in training and the implementation of national legislation that can help organise the field, especially regarding radiation protection,” said Prof. Hassen Gharbi from Tunis, Tunisia, who will co-chair the session with ESR President Lorenzo Derchi from Genoa, Italy. Technological advances have opened new horizons for the application of ionising radiation in healthcare all around the world and this has led to an increase in medical imaging procedures using radiation also in Africa.

Unlike most of the continent, Tunisia, Algeria and Morocco have dedicated guidelines on ionising radiation. But even there, rules must be implemented to help healthcare professionals prescribe examinations adequately.

Professional Challenges Session

Thursday, February 28, 15.30–18.00, Room 8

PC’s Radiology and migrations

- Chairperson’s introduction
  O. Akban; Ankara/TR

- Impact of migration on health: WHO perspective
  S. Severini; Copenhagen/DK

- Importance of migration for neglected tropical diseases: WHO perspective
  B. Abela-Ridder; Geneva/CH

- Clinical importance of the diseases related to migration
  T. Junghanss; Heidelberg/DE

- Radiology of the diseases related to migration
  T. Weber; Heidelberg/DE

- Panel discussion: How do we raise awareness among health professionals to recognise diseases related to migration? How can we adapt migration and migration related diseases into our education?

continued from page 1

With increasing levels of conflict, civil unrest, poverty, and persecution, there are an estimated 68.5 million people currently forcibly displaced worldwide. Malnourished people with poor housing and sanitation and restricted access to healthcare results in populations at a high risk of disease, especially NTDs, stated Abela-Ridder.

Global migration is changing the epidemiology of many of these diseases with the emergence and re-emergence of NTDs in non-or low-endemic countries. The lack of awareness, diagnostics and treatment in host countries poses a challenge to appropriately diagnose and treating affected individuals, and to establishing the endemic focus of disease, she said.

Outbreaks of dengue, Leishmaniasis and schistosomiasis have been recorded in low prevalence areas where intermediate hosts could allow for local transmission. The prevalence of Chagas disease (also known as American trypanosomiasis), strongyloidiasis and schistosomiasis in migrant populations ranges from 4.2% to 48.9%, 1% to 59.7%, and 5.8% to 44% respectively.

Picking up on the issue of hydatid cysts, Abela-Ridder noted that cases of CE and neurocysticercosis have also been detected in Europe, with 53% of neurocysticercosis cases attributed to immigrants.

Systematically screening migrant populations on arrival to a host country to reduce disease progression and severity should be considered, but she cautioned that effort was needed to ensure that individuals are not discriminated against because of health problems. Better data on disease prevalence and burden in migrant populations remain key to increased awareness in host countries, and timely access to appropriate care for migrants, she continued.

Providing radiology tips during the session, Dr. Tim Weber, senior physician at Heidelberg University Hospital in Germany, will shed light on the patterns to look for and how to evaluate unusual radiological conditions, after combing patients’ radiological and epidemiological features for differential diagnosis.

Finally, the panel discussion will focus not only on raising awareness among health professionals but also on how future education programmes might adopt migration-related disease imaging into the curriculum.

continued on page 4

HIGHLIGHTS 3

ECR TODAY | THURSDAY, FEBRUARY 28, 2019

BY MÉLISANDE ROUGER

African radiologists call for more cooperation with the ESR in radiation protection
"There is a growing need for structured strategies and a holistic approach towards the full integration of radiation safety and clinical imaging guidelines in Africa," said Prof. Dina Husseiny Salama from Cairo, Egypt.

Prof. Husseiny Salama, who will talk about radiation protection during the session, will highlight the role of strategic planning for more cooperation between the ESR and African radiology societies.

"There have been proactive actions in Africa to improve the situation and enhance the implementation of radiation protection in several countries, however further actions and joint activities are needed to enhance the process. Local initiatives work, but we need to accelerate things through cooperation with the ESR. Africa needs free, evidence-based tools which a global player like the ESR can provide," she said.

The ESR launched the EuroSafe Imaging campaign three years ago to promote the safe use of ionising radiation in medicine, and is now developing a EuroSafe Imaging Star assessment scheme for low and middle-income countries (LMICs), to recognise imaging departments that embody best practice in radiation protection.

Justification of examinations is another key aspect of radiation protection and the ESR is supporting the use and uptake of imaging referral guidelines, especially in LMICs. The ESR iGuide web portal is free to use for ESR radiologist members, and a model with unrestricted access for LMICs is currently under development.

"The ESR iGuide is an excellent online tool to help clinicians justify examinations, and it’s already showing results in Egypt. Cooperation with the ESR works on our side, so why not in the rest of Africa?" Prof. Husseiny Salama said.

The process for a stepwise implementation of the ESR iGuide was started last year at four centres of excellence in Cairo. A recently performed audit showed that the number of inappropriate referrals declined significantly, especially in the emergency setting. So far, we’ve had 10% fewer inappropriate referrals, which is quite important for patient radiation protection and the financial budget of the radiology department," Prof. Husseiny Salama said.

The ESR is also supporting African radiologists by offering the opportunity for non-European radiological national societies to become Associate Institutional Members. The ESR has ten Associate Institutional Members from Africa, including Algeria, Egypt, Ivory Coast, Mauritania, Morocco, Nigeria, South Africa, Tanzania, Tunisia and Uganda.

Professionals in the field outside of Europe can also become corresponding members of the ESR. Corresponding members are entitled to a wide range of benefits, including reduced registration fees for ECR 2020, free access to all contents of the ESR e-learning platform, a complete list of all guidelines and ESR meetings and many more.

Both memberships are completely free of charge.

A 3% increase in abstracts from Africa was registered for ECR 2019, as a result of inviting Africa to the ESR meets’ programme. The number of African ESR members also rose from 3% to 5% just over a year. The benefits of joining the ESR must be made even clearer for LMICs, including reduced registration fees for ECR 2020, free access to all contents of the ESR e-learning platform, the option to participate in the European Diploma in Radiology (EDiR) and all the activities of the European School of Radiology (ESOR), and many more.

Both memberships are completely free of charge.

"We hope this is just the start. It is only a matter of making us visible and making the advantages of ESR membership known. We hope that ‘ESR meets Africa’ will be the right place and moment to get to know each other better," he said.

African radiologists have high hopes regarding their cooperation with Europeans, according to Prof. Gharbi.

"Medical imaging is advancing rapidly in Africa but we want things to develop in the utmost safety conditions and in respect with our guidelines. Africa hopes the ESR can help with radiation protection, and also to help promote, advance and homogenise training," he said.

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"European vs. African radiology: how do we approach and manage differentials in radiation protection?"

Prof. Dina Husseiny Salama from Cairo, Egypt will highlight the role of strategic planning for more cooperation between the ESR and African radiology societies in today’s ESR meets’ Africa session.

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A new beginning in cancer imaging has just begun, says Beets-Tan

Professor Regina Beets-Tan is chair of the department of radiology at The Netherlands Cancer Institute in Amsterdam, full professor of radiology at the University of Maastricht and adjunct professor of abdominal and oncological radiology at the University of Southern Denmark. She will present the Wilhelm Conrad Röntgen Honorary Lecture, entitled ‘Oncologic imaging: a new beginning has just begun’ at ECR 2019.

The world of cancer medicine is changing rapidly. Major steps forward have been taken. Advanced imaging and computing technology, screening programmes; these all will result in the early detection of more tumours. Minimal inva-
sive treatment, including inter-
vventional therapy, will have an increasingly important role. Tar-
geted therapy, which specifically hits the cancer genes, and immu-
notherapy which uses the patient’s own immune system to kill can-
cer cells, will result in prolonged survival of patients who are in the final stage of metastatic dis-
ease. It will be ‘precision medicine’. We do not want to give the wrong treatment to the wrong patient. As advocated by Prof René Bernards, a respected leader in cancer research at the Netherlands Cancer Institute: ‘Within 15 years, cancer will become a chronic dis-
ease. And I believe this is true. This transformation will change the way we practice oncologic imaging. This will require us to rein-
vent our discipline. With this lec-
ture, I would like to take my young colleagues on a 20-minute journey towards their future.

ECRT: Your field of research is abdominal and oncologic imaging, especially MRI of rectal cancer. What are the latest developments in rectal cancer medicine?

Regina Beets-Tan: Colonoscopic cancer screening programmes and modern technology in imaging and endoscopy have resulted in the detection of early and smaller rec-
tal tumours. Multimodality treat-
ment of advanced rectal cancer that combines radiotherapy with che-
motherapy and even with immuno-
therapy, has resulted in more com-
plete responses, which brings the need for surgery in these cases into question. The focus will be on qual-
ity of life. It is going to be more min-
imal invasive treatment and local tumour excision rather than rectal amputation. We are going for active surveilla-
ce (Watch and Wait) for complete responders after treat-
ment. It will be paramount to per-
form accurate selection and fol-
low-up of patients, and accurately predict who will truly benefit from organ preservation. Modern imag-
ing technology (functional MRI, molecular imaging) together with endoscopy brings us very far. Yet some problems remain unsolved, like the accurate assessment of nodal disease. There is still a lot of work to do and investment in research investigating the role of modern imaging and computing imaging in colorectal cancer man-
agement is much needed.

ECRT: What are the challenges facing radiologists today and tomorrow?

Regina Beets-Tan: Radiology surely has challenges lying ahead, but challenges create new oppor-
tunities. Imaging technology and computational imaging are used not only in our own discipline but also in the clinical specialties around us. We should not be pro-
tective. Fear should not dictate our actions. As much as we learn from cli-
nicians, we need to be willing to teach back. We cannot monopo-
lise knowledge. We can invent and investigate, but after that we need to share. By sharing our knowl-
edge we gain respect. It is with-
out doubt that imaging technology and diagnosis remain the main-
stay of radiology. These skills that are truly ours, for which our clinical colleagues really need us and, above all, respect us. I am con-
vinced that by combining the tech-

nological and digital progress with a thorough understanding of the disease and treatment options, we will strengthen our role in the mul-
derdisciplinary team. There could not be a more excit-
ing time for the oncological radiol-
gist, because a new beginning in cancer imaging has just begun.

Dive into interventional radiology at the Cube 2.0

Open 8:30-17:30
February 27 – March 2
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The latest addition to the CIRSE conference family focusing exclusively on a key area of interventional radiology: embolisation in all its applications.

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**Case Remedy Sessions**
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**Morbidity and Mortality Conferences**
Looking at the “bad days” as well as the “good days” in the angiosuite.

www.ETconference.org
3D printing makes steady transition from laboratory bench to patient bedside

Three-dimensional printing has spread from craniomaxillofacial surgery to a wide range of medical disciplines, and can help demonstrate the value of radiologists in a future with artificial intelligence and machine learning. That’s the view of Dr. Philipp Brantner, joint head of the 3D Printing Lab at the University Hospital of Basel, Switzerland.

“We don’t know what the future will look like, but I think we will be faced with a very different way of working,” he said. “3D printing might be a useful extension to add value to existing imaging techniques.”

His talk today will cover established and emerging surgical applications of 3D printing. These include creating a 3D model of a fractured bone or kidney to help plan minimally invasive procedures.

“3D prints help surgeons get a better understanding of the anatomical situation they’re about to see,” Brantner noted. “In the operating theatre they don’t have the field of view like radiologists do with cross-sectional imaging, so a 3D representation can give a better roadmap to a tumour, for example.”

The future role of radiology might be to expand existing imaging services to include the creation of 3D models, and radiology is perfectly positioned to incorporate this technology into clinical routines because it lies at the crossroads of many disciplines and takes the technological lead within hospitals. Surgeons need radiologists to advise them on the limits of 3D printing and to choose the correct imaging protocols for 3D printing because the accuracy of the underlying image controls the fidelity of the resulting anatomical representation, he commented.

Advising surgeons on the applications of 3D printing is part of Dr. Francesco Moscato’s work at the Medical University of Vienna. Moscato, who is an associate professor at the Center for Medical Physics and Biomedical Engineering, co-ordinates with a wide variety of surgeons and specialist radiologists to apply 3D printing to medical problems.

“Unusual the clinician comes with a very diverse set of wishes and thinks the technology can solve everything, and we have to spend a couple of meetings to understand what they want and what we can offer,” he explained.

Moscato, who is primarily a university researcher, usually deals with difficult cases where a surgeon has a problem with a specific procedure or a desire to improve it. He has obtained a research grant to study patients at risk of thromboembolic complications by using CT scans to create transparent silicon casts that can be used to visualise and study intracardiac flow. Among his cases was a patient with a hard-to-find para-auricular leak around the mitral valve. The hole was hard to find and the patient had an unsuccessful procedure to close it. “We printed a model and it turned out there were three possible holes, the largest of which was not a straight hole from the atrium to the ventricle,” Moscato noted. “The interventional cardiologists could then plan the procedure and finally successfully treat the patient.”

He is also helping a colleague who works in hybrid multimodal imaging, by creating anatomical phantoms to help them find and quantify distortions and artefacts in CT and PET. However, one of the biggest challenges to implementing a 3D printing lab is securing funding, he continues.

“We rely on research grants to have staff, we don’t have the hospital pay somebody to do the 3D printing process, because 3D printing in our centre is not institutionalised yet,” he explained, adding that he is trying to establish 3D printing as part of the clinical routine.

The challenge of ongoing funding also affects Dr. Karen Eley, a clinical lecturer in radiology and lead on the project to establish a centralised 3D printing lab located in the media studio at Addenbrooke’s Hospital, Cambridge, U.K.

“We were funded entirely by charitable money, which included the initial salary costs of our dedicated 3D printing technician. Ongoing salary costs are now having to be supplemented by him taking on additional roles in the media studio,” she explained.

At today’s session, Eley will discuss the benefits of setting up a centralised 3D printing lab. Avoiding the high cost of duplicate equipment and consumables is the biggest benefit, especially in the U.K’s National Health Service. Another advantage of a centralised facility is having a dedicated technician who specialises in 3D printing.

“The 3D printing technician is the most valuable person in the lab,” she said. “If we lost him, the service would be lost, because no one has any spare capacity to take on these additional tasks.”

The technician saves radiologists the time doing routine image segmentations, allowing them to focus on the more specialist and complex parts of their job. He also ensures the equipment is maintained to a high standard and keeps abreast of U.K. regulations.

Other benefits include information sharing and easy communication of services. The lab is a hub in the hospital where clinicians from multiple specialties can discuss ideas and get feedback on projects. Because the lab is integrated into the hospital PACS, surgeons can easily commission a 3D print job for work – or for training purposes – via a centralised form.

Yet, despite the benefits, Eley said some people in the hospital are still unaware of the 3D lab and its services. In addition, some clinicians feel it would be faster to implement their own cheap printer rather than using the centralised lab.

In general, the benefits of 3D printing still need to be proven in some specialties, according to Brantner. He is running trials to see whether the technology brings quantifiable benefits to surgery – an important step to securing acceptance and funding. He is also looking at whether, for example, a 3D model can reduce the time taken for orbital fracture surgery. Early results look promising. Printing an orbital mesh before surgery can reduce by 30% the time spent in the operating room.
The Artificial Intelligence Exhibition (AIX)

Making its grand debut at ECR 2019, the AIX brings the hottest topic in radiology to the heart of the technical exhibition.

Meet the innovators applying machine learning, deep learning and big data to medical imaging, and take in illuminating sessions at the AIX Theatre. You can even start your own deep learning adventure thanks to self-paced training provided by Nvidia’s Deep Learning Institute in partnership with the ESR.

Whether you’re exploring AI for the first time, researching it, or just want to chat about the future over a free juice at Algorithms Bar, the AIX is a must visit at ECR 2019!

The AIX is located in the X1 hall. For more details, and the full AIX Theatre programme, visit www.myESR.org/ai
Can you do more to improve communication of critical information to patients?

The radiological community has done a great deal to quash the idea of ‘the invisible radiologist’ who has little or no contact with patients, but some uncomfortable truths remain. Anecdotally at least, some patients perceive radiologist presence to lag well behind that of other specialists, and many medical universities still don’t incorporate communication training into their curricula.

Nobody knows better about the importance of effective communication when receiving critical information than patients themselves. Austrian-born Caroline Justich was diagnosed with two tumours: a plexus papilloma and a pituitary adenoma, in 2009, at the age of 27, and she underwent drastic surgery. She resumed her job in institutional banking until she started a family in 2013, returning to work after each maternity leave. Her back problems began during her third pregnancy, and when the baby was seven months old in the summer of 2016, Justich broke a lumbar vertebra while water-skiiing. She had a myriad of different pain and fatigue down to repeated pregnancies, but two months later she was diagnosed with a breast tumour and she was diagnosed in the October with breast cancer, which had metastasized to liver, lungs, lymph nodes, and femur. Furthermore, there were two types of cancer present.

She believes that without positive and clear messages from her radiologist and other healthcare professionals, she would have been far less optimistic and more fearful when starting her therapy.

Speaking to delegates at today’s session, Justich, who recently became a member of the ESR’s Patient Advisory Group (ESR-PAG), will emphasise that radiologists need to be mindful of their nonverbal communication.

‘As a patient, you always try to read the radiologist’s face, or study how they talk to colleagues while your examination takes place. These nonverbal clues lead to uncertainty and misinterpretation that result in distress for the patient. This needs to stop,’ she told ECR Today.

She believes that some doctors are overwhelmed by the fate of their patients and may react strangely because they are trying to protect themselves or simply do not know what to say. As a case in point, she revealed how the professional performing her lumbar CT had been friendly before the exam, but during the process, she allowed what she saw on the screen to show in her face. She looked deeply worried, stopped talking to Justich, and didn’t even come back later to say goodbye.

With the increasing focus on early detection, demand for radiologist communication skills will also grow, she suggested. Therefore, certain techniques that don’t take too much time will be useful. She pointed to the ‘BATHE’ technique, developed in 1999 by U.S. psychiatrists Dr. Joseph A. Lieberman and Dr. Marian Stuart. This psychotherapeutic method involves asking about patients’ current situation, expressing empathy, summarizing what they said, and coping strategies (Handling), while being Empathetic.

Her own studies in industrial psychology in the U.S. and her subsequent career in risk management and corporate finance, as well as her direct experience as a patient, have taught Justich that a person can say the same thing in many different ways, with varying impact.

‘How information is transmitted plays a major role in a patient’s medical pathway. My situation was very bad, but I had a smart oncologist. He told me that they were already able to completely cure 3% of patients at the same clinical stage as myself, and that in many cases they could transform the cancer into a chronic disease with patients living well for five to 15 years. There and then I decided I would be a part of the 3%,’ she noted.

She pointed to the flipside of how the scenario could have played out. ‘Imagine if he had told me that 50% of diagnosed patients die within the first five years? My willpower would not have been so strong. I might not have started therapy at all but rather spent the remaining time with my loved ones,’ Justich said.

Another problem patients face is the delay between diagnostic findings until finally getting an appointment with the specialist. Patients should not be sent home with incomprehensible examination results, or receive a letter which they might open at a time when they can’t contact anyone who could explain its contents, she recommended. Instead, wherever possible a radiologist needs to be present to discuss results and to prepare patients positively for further steps, and they should give hope, show empathy, and deal with this first stage of shock.

Justich advocates establishing one radiologist in each institute to provide patients with clarity and support immediately after results, though she admits that cost implications needed to be weighed against the increase in patient well-being.

‘In my case, it was my two radiologists who gave me the hope and certainty that I could make it. In my mind I thank them both every day for their empathy during my first stage of shock and the way they stopped me feeling so powerless,’ she said.

Justich believes that for trainee radiologists, education programmes should focus on communication, and in hospitals, there should be a nocie review of communication techniques every other year. Crucially when radiologists deliver critical information, patients shouldn’t be sent away or left to deal with it alone.

No doubt many of Justich’s comments will resonate with the panel at today’s session. The continuous transformation of radiologists towards their role as clinically involved doctors has changed patients’ expectations – and those of other specialists, according to Prof. Christian Loewe, co-Chair of the session, along with Prof. Michael Fuchsjäger.

‘The shortage of clinicians in many countries is leading to even heavier workloads in usual outpatient services, and increasingly higher numbers of oncology patients asking for direct communication with the radiologist right after staging CT. Consequently, radiologists need to find the right empathetic words,’ Loewe said.

In his introduction today, he aims to remind delegates about the need to communicate directly with patients as well as highlight the potential gap that may arise in some cases between what is said by radiologists and what is heard by patients.

Radiologists helped Caroline Justich find the courage to choose to take the plunge into therapy rather than stand hesitant and fearful on the sidelines. (Provided by Diego Artioli www.escapista.net)
Fierce debate continues over artificial intelligence’s future impact on radiology

Whether artificial intelligence (AI) will replace radiologists or make their jobs easier continues to be a source of intense discussion, but is the speed of technological development keeping pace with the hype surrounding AI, and what does the future hold? Today's Special Focus session will examine the evidence.

In late 2018, Geoffrey Hinton was famously quoted as saying it was obvious 'we should stop training radiologists' because they'll soon be replaced by AI. His words spurred fierce debate among radiologists and academics, which shows no sign of disappearing today. That's according to Prof. Bram van Ginneken, a professor from the Department of Radiology, Radboud University, the Netherlands, who will explain the basics of deep and machine learning in today's session.

AI promises to automate simple, repetitive tasks. Some work, such as screening routine mammograms, won't need radiologists, unless an abnormality is found – which happens in 1–2% of cases, noted Van Ginneken. Thirona, a company he co-founded, is widely known to have a product on the market that analyses CT scans to check if patients are eligible for certain treatments for chronic obstructive pulmonary disease (COPD).

"We have hundreds of hospitals worldwide sending us CT scans," he explained. "Our customers are pulmonry physicians, and they used to ask a radiologist to look at certain things, but now they send the scan to an external company and the radiologist is out of the loop."

Algorithms might help radiologists make predictions about the likely survival of a disease or the effect of a treatment by exploiting information beyond known markers, according to Dr. Georg Langs, an associate professor heading the Computational Imaging Research Lab at the Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna. The data generated by unsupervised learning might then be used to create hypotheses for medical research, or to enable the delivery of personalised medicine.

"The role of radiologists will change and I'll speculate that they'll become more of a comprehensive collector, integrator and interpreter of information – and not just imaging information," he told ECR Today. "AI is helpful because this role wouldn't be possible without it."

Another participant at today's session is Prof. Polina Golland, the Henry Ellis Warren (1985) professor of electrical engineering and computer science at the Massachusetts Institute of Technology in Cambridge, U.S. "Machine learning will free radiologists from tedious work, so they can do more cerebral tasks," she said. "You could ask the question 'how would a PC change how people do accounting in business?' Looking back, the answer is people stopped doing arithmetic by hand or on a calculator – everything is done automatically by a spreadsheet."

Although specific tasks can be done with software, AI has not delivered on all its early promise, according to some observers. "You can see Google Health, etc. struggling in medicine, whereas they've been successful in other fields," says Dr. Bram Stieltjes, head of research at University Hospital Basel, Switzerland.

Some technologies, such as deep learning, haven't made much progress after initial breakthroughs, says Van Ginneken, and hospital IT departments are often slow to install the software that is available. He anticipates that in 5–10 years, radiologists will be able to buy 10–30 software packages that, if they're optimistic, will replace 30–50% of their most tedious tasks. The hype around AI is being driven by companies trying to secure money from investors, he argues. "They promise fantastic things and make strong promises, but you can already see they're not delivering," van Ginneken said.

The relatively slow pace of development can be attributed to the difference between general image recognition and medical imaging. Langs pointed out that radiologists and machine learning researchers must work closely together to overcome these problems and create truly novel approaches.

"When an algorithm for general visual recognition is applied to medical imaging as it is, it struggles to deliver clinically meaningful results since the dominant variability it sees is just natural variability – everyone's liver and lung are different – and most of the variability isn't linked to disease," he explained.

Another challenge is what Stieltjes describes as the 'dirtiness' of medical data. Data to feed into an algorithm may be of low quality compared to other non-medical fields, and are often mixed with free text that needs interpretation. This is an issue that hospitals and technological partners can face quite often.

The technology to develop algorithms also faces challenges. In his talk, Stieltjes will discuss his two-year study to develop an algorithm to classify tumours. The study annotated 4,000 lesions for supervised learning, where an algorithm is trained using images where the lesion is manually labelled.

"I think this is one of the largest studies ever done, but it's far from good enough to do the job, basically from a technical point of view," he says.

Even with 4,000 labelled images, the group dataset wasn't big enough to train the algorithm. Meanwhile, unsupervised learning, where the algorithm learns about tumours from random images, wasn't good enough to carry out tasks as complex as staging tumours.

To increase the images available to train an algorithm, Stieltjes and his colleagues are currently working to include annotation for AI as part of the radiological workflow. Another take-home message from his talk will be that projects to develop supervised learning algorithms need to use images from multiple sites. Langs, on the other hand, will discuss weakly supervised learning, which has more images available to train an algorithm because it uses imaging data and linked information generated during clinical routines to train AI software.

Given these challenges for AI, van Ginneken expects radiology to survive at least another 30 years. Long-term predictions, however, are always hard to make, he said. The invention of deep learning was a surprise in his field, and nobody can ever be sure when the next unexpected breakthrough might be.
Deep learning and radiomics: could future lie in combining best of both?

In an exciting multidisciplinary session today, a panel of experts will highlight the powerful potential of deep learning in medical imaging and introduce promising solutions, such as distributed learning, which uses radiomics.

Artificial intelligence (AI) will profoundly change medicine within the next ten years, and radiologists and medical physicists have a role to play in this process, according to Prof. Marco Brambilla from Novara, Italy, and Prof. John Damilakis from Iraklion, Greece, both medical physicists who will co-chair the session at ECR today.

Algorithms used in AI are based and trained on huge amounts of data to be able to distinguish whether a tumour is malignant or benign. This is especially true with deep learning (DL), which uses more processing power than radiomics, but we would need to check the consistency of the results. Prospective studies are sometimes also required.

Collecting millions of images from different countries remains an issue, since data confidentiality legislation can affect data sharing. To overcome that challenge, Lambin and his team propose to distribute learning from federated databases, i.e. to send the learning modules to each hospital database instead of having the hospital send their data in a centralised system.

“The benefits is that hospitals keep their databanks within their systems, which are protected by firewalls, rather than centralising the multiple databases from different countries,” he said.

Researchers already tested the solution in various hospitals around the world with results just as good as when data is centralised.

Implementing a radiomics solution into clinical practice is a long and winding road. Quality research must be used and evaluated. A quality score for assessing studies is available on the radiomics world website, which makes sure there are enough patients involved and no external validation.

The TRIPOD classification is another resource for assessing the quality of the biomarkers that are used in a trial. Radiomics signatures must meet the TRIPD level 4 criteria to be deemed worthy. Prospective studies are sometimes also required.

Maastricht, the Netherlands, now advises the university spinoff Onceradomics.

“Radiomics can generate 15,000 to 20,000 quantitative image characteristics which may indicate gene mutations, and enable the differentiation of aggressive from non-aggressive tumours, or whether a tumour responds to immunotherapy or radiotherapy. Not all of these tasks can be done without using a single drop of contrast and one can determine the histological type of the tumour by mining the biological information from a CT scan,” said Brambilla.

DL is a pretty much the same applications as radiomics – automated tumour segmentation, patient classification, etc. – but it uses a radically different method. While in radiomics one selects image characteristics with an already known image signature, such as heterogeneity, this process is not transparent with DL, which also requires huge horsepower.

“We don’t know what the image characteristics are that can differentiate between a malignant and a benign tumour with DL. DL is a super computer. It is powerful but needs at least 20,000 images to work. But if it is a black box, we do not really know how this works and this is annoying because doctors don’t like to understand the process,” Lambin said.

DL demands a lot of data to create learning databases and sometimes this means using synthetic data. “If we can have a million data, I would bet that DL would be better than traditional radiomics, but we would still have the issue of an uninterpretable algorithm,” he said.

Current research combines the best of DL – particularly automated segmentation, which is very useful in clinical trials – with radiomics, by enforcing robust image characteristics on DL. “This looks like a promising approach for the future,” he said.

Many conditions must be met for this alliance to work. Data is required for both approaches, so AI modules would need to be constantly updated, as new machines and treatments emerge continually.

These sessions are part of the EuroSafe Imaging campaign.
Is 7 Tesla MRI ready yet to go clinical? And how can it make a difference?

Clinical 7 Tesla (7T) MRI is no longer a distant pipedream for researchers and is gaining ground in routine scenarios, advocates of the technique state. Its growing pertinence for diseases such as multiple sclerosis (MS), epilepsy, and dementia means that radiologists need to know about the latest 7T practice and its potential, but some practical issues still remain.

The possibility of 7T revealing increased anatomical detail and achieving better contrast-to-noise ratio (CNR) of brain structures and brain pathology can help to increase the confidence in several diagnoses, including microinfarcts, pituitary microadenomas and cortical dysplasia in epilepsy patients, according to the technique’s supporters. “At the end of the day, the CNR of 7T is more important than the increased signal-to-noise ratio (SNR), compared to 3T and 1.5T MRI. This means that ‘7T can better detect pathologies, including small lesions,’” noted Prof. Jeroen Hendrikse, chair of the Radiology Department at the University Medical Center (UMC) in Utrecht, the Netherlands. Furthermore, methods to improve CNR at 7T can also be exploited for better diagnosis at 3T and 1.5T, as has been shown for the detection of cortical microinfarcts.”

Specifically, he plans to discuss how recent work showed that 7T detects small pituitary adenomas in patients with Cushings’s syndrome, where no pituitary lesion was detected at lower MRI field strengths. Furthermore, 7T vessel wall imaging can depict the burden of intracranial atherosclerosis, including small intracranial plaques. However, he conceded a note of caution. “Detailed imaging at 7T will result in the visibility of more vascular and parenchymal lesions and care should be taken to use the modality for diagnostic imaging only in patients with a high risk of disease to avoid false positive diagnosis,” Hendrikse told ECR Today ahead of the congress.

Nevertheless, it’s an exciting time for 7T application, with potential for its use in the assessment of the total burden of disease and in clinical neurodegenerative disease research, allowing the quantification of flow in the small perfusing arteries, which is crucial in the development of small vessel disease (SVD) such as white matter lesions of presumed vascular origin. “In clinical research, 7T not only allows these perfusing arteries to become visible with detailed time-of-flight MR angiography (MRA) methods, but also quantifies the flow velocity profiles of these perfusing arteries in the deep grey matter and the deep white matter with phase-contrast MRA methods. Until now only the parenchyma correlates, or white matter lesion, could be seen with MRI, the underlying vascular disease was presumed, but could not be quantified or investigated, he noted. “So just how soon will 7T be seen in the routine clinical arena? The jury is still out, but it may be coming fairly soon, according to Hendrikse. In fact, it already is here for specific indications, particularly patients with a high prior risk of a pituitary adenoma with undetected lesions at lower MRI field strengths, and patients for whom an important clinical decision has to be made, such as for neurosurgery, he added. Aiming to enlighten ECR delegates about the power and plurality of perfusion and diffusion imaging during today’s session, Prof. Jeannette Schulz-Menger, director of the Cardiovascular MR Working Group at Charité University Hospital in Berlin, will highlight 7T MRI’s potential as a multidisciplinary modality.

“I hope to convince radiologists at the session that clinical 7T is not crazy or un-doable, but also that it is not always the solution,” she told ECR Today. “She said that at the Erwin L. Hahn Institute for Magnetic Resonance Imaging in Essen, 7T MRI is already guiding therapeutic decision-making ahead of brain surgery for differentiation of dissection, plaque formation and stenosis. Translating the power of 7T to cardiology brings hitherto unseen benefits, according to cardiologist Schulz-Menger. ‘7T can identify small structures, potentially highlighting which patients will go into heart failure, and while it is not ready for deployment tomorrow, nor is this application too far off. Clinicians need to be aware of 7T’s dual capacity to show tissue contrast and movement, she noted. Furthermore, in the abdomen, 7T can detect renal artery steno-sis without the need for contrast agents, which has advantages for patients. Despite the challenges of abdominal imaging, 7T offers a means to quantify pathophysiology, detect perfusion, and potentially measure deoxygenation of the kidneys. ‘Without doubt, 7T is a motor that is enhancing understanding, guiding therapy decisions, and creating new possibilities for depicting static anatomy and pathophysiology without the use of contrast. The question is do radiologists want to follow it or drive it?” she noted.

While work across the 7T cardiac community used to be focused on developing a stable gating device to reduce ‘7T black holes’ and motion artefacts, now the biggest challenge is the capacity to generate fast homogenous images regardless of different coil structures, Schulz-Menger said. She also stressed that deployment of 7T in clinical routine must be vendor-driven and for that, there needs to be approval by the regulatory authorities.

Several centres are already using 7T for imaging MS. In Berlin, group collaborations are also working on how to deploy 7T to measure sodium and potassium in the heart as a means to explain arterial hypertension, using dedicated coils for quantification, while others are exploring non-invasive haemodynamics. With such clinical information, doctors can edge nearer to providing personalised medicine to their patients, according to Schulz-Menger. She added that it is important for radiologists and cardiologists to work together with other users of 7T to reduce turf friction and put patients first. “I personally train both radiologists and cardiologists in CMR. Those who do it best should take it forward,” she concluded.
Discussion centres on imaging’s role in cases of pregnancy-associated breast cancer

The physiological changes that occur within the breast during pregnancy result in increased breast volume and associated palpable nodularity, which makes the clinical and radiological evaluation of the breast difficult. Attendees at today’s Special Focus session on breast imaging in pre-menopausal women can learn about the pathology and techniques used during pregnancy and breastfeeding and up to one year postpartum, as well as other topics.

Ultrasound is the first-line modality when a pregnant woman presents at the radiology department with a palpable breast mass. It allows good differentiation between a solid tumour lesion and a simple fluid-filled cyst. For further local staging of tumour, ultrasound of the breast and axilla should be performed, according to Prof. Chantal Van Ongeval, a radiologist at Leuven University Hospital in Belgium.

However, a concern is that many radiologists are unsure what may be the next step for a radiological examination of a patient in whom malignancy is strongly suspected during pregnancy or breastfeeding, and she advises delegates that once a suspicious mass is found on ultrasound, then it is best to go straight to core needle biopsy. If histology confirms malignancy, additional two-view mammography of each breast should be performed.

Van Ongeval recommends mammography in such cases because local staging includes evaluation for microcalcifications, reflecting the presence of in situ cancer, and two-view mammography is acceptable because the dose to the foetus is negligible.

Performing radiological examinations on a pregnant patient can pose particular challenges, especially as gestation increases and the physiological changes associated with pregnancy make optimal positioning difficult. Should a tumour be diagnosed, then she recommends that a whole-body diffusion-weighted MRI (DWI) is performed for tumour staging and systemic metastases. She advises that MRI examinations of pregnant patients should not use gadolinium-based contrast agents.

“The rules of admission of intermediate and low-risk gadolinium contrast media are described in the contrast-medium safety protocol of the European Society of Urogenital Radiology” she noted. “An alternative for gadolinium is the use of diffusion-weighted breast imaging. For systemic staging, whole-body DWI-MRI scanning is very promising.”

The expertise of multidisciplinary teams can be important in complex cases. Should mammography be required, Van Ongeval said it can be useful to seek the advice of a medical physician or radiation safety expert, who is an insusceptible part of the team when important decisions about radiological procedures need to be made.

Breast imaging in pre-menopausal women can present a range of difficulties, according to fellow speaker Dr. Fleur Kilburn-Toppin, consultant radiologist at Addenbrooke’s Hospital, Cambridge, UK. Many studies have confirmed the relationship between high mammographic density and reduced sensitivity in younger women with dense breasts, and high mammographic density in pre-menopausal women may also increase the risk of radiation-induced malignancy. Furthermore, hormonal fluctuations during the menstrual cycle and subsequent increased fluid component of the breast tissue may also influence image quality on ultrasound, she added.

Menstrual changes cause more background parenchymal contrast enhancement in breast tissue during MRI, making examinations tricky to interpret due to false-positive findings, Kilburn-Toppin commented. Additionally, the risk of radiation-induced malignancy is higher in the young glandular breast, and on ultrasound, a higher proportion of hyperdense glandular tissue versus hypoechoic fatty tissue can provide problems for the interpreting clinician.

“A limitation of breast MRI in pre-menopausal women is that hormonal fluctuations during the menstrual cycle affect gadolinium uptake in normal breast tissue, which can make MRI examinations challenging to interpret due to false-positive findings, or risk masking malignancy,” she stated. “Studies have suggested performing scans during the follicular phase (day 3–14) to minimise tissue enhancement, and for this reason scheduling of the MRI examination in premenopausal women is recommended during the second week of the menstrual cycle.”

Particular patterns and degree of non-mass enhancement may be associated with benign breast parenchymal enhancement, but repeat short interval imaging can be necessary in certain circumstances if there is diagnostic uncertainty.

Kilburn-Toppin noted that the role of mammography in women under the age of 40 is controversial and guidelines are often conflicting, while only slightly decreasing specificity. The high sensitivity and negative predictive value of ultrasound also make it a suitable imaging technique for younger women with focal breast concerns.

Overall, her main take-home message is to be bear in mind that dense breast parenchyma and variable enhancement of normal breast tissue secondary to hormonal changes make imaging a challenge in pre-menopausal women.

Digital mammography generally performs better than conventional mammography, but is less sensitive in women with denser breasts, and there is significant evidence to support the use of ultrasound as the initial imaging technique in younger women because it tends to have greater sensitivity than mammography, she continued. Combining mammography and ultrasound in symptomatic women under the age of 35 years improves sensitivity.

Ultrasound of the palpable mass (2A) and a suspicious lymph node (2B) shows an irregular hypoechogenic lesion, with a second lesion more lateral. A suspicious central thickening of a suspicious lymph node can be seen in the axilla. (Provided by Prof. Chantal Van Ongeval)

CLINICAL CORNER

ECR TODAY | THURSDAY, FEBRUARY 28, 2019

BY EDNA ASTBURY-WARD

Whole body MRI (30000 image) shows a mass in the left breast. (Provided by Prof. Chantal van Ongeval)

Mammography of the left breast of a 30-week pregnant woman who presented with a palpable mass. Left breast craniocaudal view (1A) and oblique view (1B) show spiculated mass with distortion of the parenchyma in the upper outer quadrant of the left breast. In the dense part of the tumour and caudal to the tumour, suspicious microcalcifications are present.

Pathology showed an oestrogen receptor-positive, progesterone receptor-positive, human epidermal growth factor receptor-2-positive, and HER2-negative invasive ductal carcinoma with ductal carcinoma in situ. (Provided by Prof. Chantal van Ongeval)

Whole body MRI (30000 image) shows a mass in the left breast. (Provided by Prof. Chantal van Ongeval)
Experts to provide insights into percutaneous biopsy procedures

Image-guided percutaneous biopsy (PB) plays a crucial role in the management of cancer patients.

Percutaneous biopsy procedures, which include both fine needle aspiration biopsy (FNA) and core needle biopsy (CNB), are often necessary to get confirmation of a diagnosis of malignancy, without which a treatment plan cannot be established, as well as to characterise locoregional spread, possible lymph node involvement, and distant metastases. In oncological patients who are undergoing treatment, repeated biopsies can be necessary to evaluate the response to therapy, to characterise residual disease or to confirm recurrent cancer. In the past few years, different techniques have been developed that allow appropriate tissue samples to be obtained from different parts of the body to establish a firm pathological diagnosis, as well as various needle and devices for the respective applications.

PB can be performed using a variety of imaging modalities for guidance, including CT, MR, and fluoros-CT. Improvements in needle designs, the development of new biopsy techniques, and continuous advances within the field of imaging-guided pathology have contributed to improving the procedure. It is generally a safe method with high performance that can be used for cancer diagnosis and treatment; the efficacy and safety results of percutaneous needle biopsy depend on the technique, choice of indication, and patient monitoring.

“Despite some concerns related to its safety and yield, PB allows the detailed analysis of heterogeneous tumours, which paves the way for a personalised therapeu- tic approach. This is particularly relevant, for example, in cases in which a non-therapeutic imaging such as PET/CT, shows a non-uniform pattern of suspicion, making it necessary to gain more information about the different parts of a tumour,” said Prof. José Ribian, from the department of radiology Clinica Universidad de Navarra, Pamplona, Spain, who will chair this special focus session today.

He also pointed out the importance of a close interdisciplinary collaboration and the important role of radiologists within an inter- 

disciplinary team. “The radiologist performing PB needs to be a part of the multidisciplinary tumour board (MIDT) deciding on the individualised management of each patient, which is essential to facilitate decision-making, accelerate and improve procedures, extend treat- 

ment options offering cross-speciality knowledge, and to sequence therapies after the identification of all available options. Within the MIDT, radiologists should progress from skilled technicians performing procedures to clinical consultants who treat patients and participate actively in continuity of care and the follow-up process,” he said.

The latter will also be the key topic of the presentation by Prof. Max Seidensticker, from the depart- 

ment of radiology at the Univer-

sity Hospital in Munich, Germany. Although, his talk will refer in particular to follow-up of patients in the immediate post-procedure. “To know the specific risks of biopsies and to be aware of the patient’s individual risk is fundamentally important when checking patients in the immediate post-procedure and making decisions regarding the appropriate post-procedure follow-up,” he said. “Regardless of the specific imaging after a biopsy monitoring of vital signs periprocedural and immediately after a procedure is mandatory, especially after biopsies of parenchymal and well vascularised structures,” he added.

Seidensticker: “It is important to always bear in mind that early identified complications are easier to handle than late ones, as in cases of late complications, important time might be lost and you usually have to handle an unstable patient in addition to the treatment of the complication.” During his presentation, Seiden- 

sticker plans not only to discuss how to check patients in the imme-

diate post-procedure and how to handle the follow-up process, but also to provide an insight into the management of post-procedure complications. “Not all of them are avoidable,” he said, suggesting that when it comes to the handling of complications, a part of the answer lies in “being optimally prepared for everything” and not forgetting the “obvious”. “Making sure, prior to the procedure, that all material needed to handle specific compli- 

cations is available in the room, and knowing which number to call in case of major complications is just as important as being aware of standard procedures covering complication management. Last but not least, knowledge about potential complications and proper patient monitoring are the keys to identifying complications early and to reacting accordingly, as you can only ever realise what you know and expect,” he concluded.

However, Seidensticker is not the only person providing guidance during the course. Other radiolo- 

gists will share their suggestions as well, including Dr. Peter Popovic, from the clinical radiology institute at the University Medical Center Ljubljana, Slovenia, who will familiarise ECR delegates with indica- 
tions for percutaneous biopsy and pre-treatment evaluation.

Furthermore, Dr. Laura Croc- 

etti, from the division of diagnos- 
tic imaging and intervention, Pisa University School of Medicine, Italy, will discuss how to guide pro- 
cedures and the pros and cons of different imaging modalities, for guidance, while Dr. Paulo Manuel Vilares Morgado from the Hospita- 

l S. João Alameda Prof. H. Mon- 

teiro in Porto, Portugal, will pursue the question of how to carry out a procedure, focusing especially on needles and the handling of biopsy specimens.
Vertebral haemangiomas (VHs) are the most common benign vertebral tumours, accounting for 2-5% of all spine tumours. Their incidence is estimated between 0.029% and 0.12% in the general population. They are actually slow flow vascular malformations, without any mitotic activity. The large majority of VHs are quiescent and asymptomatic, usually discovered incidentally on diagnostic imaging. Only 1% of all VHs are symptomatic, responsible for vertebral pain and may cause neurological symptoms due to medullary or nerve root compression secondary to vertebral fracture or extraspinal extension. VHs become aggressive when they show specific features on imaging studies including significant bone expansion, rupture of the cortical bone, extension of intravertebral elements, extraspinal extension or compressive fractures. The ratio of vertebral and extramediastinal components on MRI directly correlates with the imaging features of evolvement and aggressiveness. Aggressive VHs are usually symptomatic.

In the past, symptomatic aggressive VHs (SAVHs) used to be treated with 'en-bloc' surgery and radiotherapy. Recently other therapeutic options such as percutaneous vertebroplasty (PVP), percutaneous ethanol instillation (sclerotherapy), and vertebroplasty have been developed to avoid the use of invasive surgical techniques, although it is recommended to avoid any radiation because of the potential risk of secondary malignancies.
Prognostic role of feature tracking in suspected MINOCA: sensitive or senseless?

Assume you are being faced with a patient who presents with symptoms of acute myocardial infarction in the emergency department. Typically, these patients are transferred to a cardiac catheter laboratory for invasive coronary angiography. But how should you proceed if the angiography shows non-obstructed coronary arteries? Recently, the term Myocardial Infarction with Non-Obstructed Coronary Arteries (MINOCA) has been established for this situation. Cardiac MR (CMR) represents the state-of-the-art imaging technique for this clinical problem as it can easily differentiate between ischemic and non-ischemic features of the myocardial injury (myocarditis, Takos Tsubo cardiomyopathy or true myocardial infarction). Previous studies have shown that nine out of ten patients with acute chest pain are correctly diagnosed by means of CMR.

Besides powerful diagnostic information, CMR can be used to determine relevant prognostic features about the patient’s future. The aim of the work we are presenting today is to investigate the prognostic role of strain parameters by CMR feature tracking (in comparison to established CMR risk parameters like end-systolic volume (ESV) in a cohort of suspected MINOCA patients. Strain parameters allow for non-invasive and repeatable measurements in different cardiac phases. Our latest study, which aimed to determine the prognostic role of feature tracking might have in suspected MINOCA, included CMR of 145 patients in comparison to a cohort of 62 healthy volunteers. Patients in the trial group showed symptoms of acute chest pain, elevated cardiac enzymes and unobstructed coronary arteries in coronary angiography. All patients were followed over a period of 12 months after infarction. The primary endpoints were defined as MACE (death, stroke, congestive heart failure, recurrent hospitalisation or the need for an interventional or surgical cardiac procedure). A dedicated feature tracking software programme enabled tracking of the movement of endocardial and epicardial contours of the left and right ventricle and calculation of strain values (Figure 2). As a major result, significantly higher rates of primary endpoints were observed for patients with reduced strain parameters, independent of the type of strain (Figure 2).

After adjusting to known prognostic parameters like end-diastolic volume, only global left ventricular strain and global right ventricular longitudinal strain remained as independent predictors of future cardiovascular events in suspected MINOCA. If you want to learn more about the independent prognostic implications of strain parameters in suspected MINOCA and discuss the latest advances in CMR feature tracking, visit the session ‘Cardiac MR myocardial feature tracking’ today at 10:30 in Room M 20.
New MRI scanners and patient-centered accessories target productivity and better clinical outcomes

It’s more than 40 years since the introduction of clinical MRI, but judged on the product enhancements on display in the technical exhibition at ECR 2019, the pace of change shows no sign of slowing down. The modality continues to evolve with sharper image quality, less time-consuming scans, and expanding value for a variety of applications. The emphasis is on improving diagnoses, patient outcomes and comfort, while simultaneously providing greater productivity for imaging facilities.

With the addition of the 3.0 Tesla Lumina and 15 Tesla Altea to the Magnetom range, Siemens Healthineers is seeking to create more affordable price points for scanners with 70cm magnet bore. Both systems also follow the company’s BioMatrix concept involving the use of secondary software to automatically adapt protocols to patient anatomy. Sensors embedded in the table, for example, track a patient’s breathing, which helps clinicians select an optimal, personalised scan protocol.

The two systems also feature the Turbo Suite MR acceleration package to help reduce the time required for new-in-bore patient examination system, Innovation, so clinicians can plan efficiently and comfortably, the vendor says. The systems also feature the 72 cm bore MRI scanner available in some international markets. The company also has a blanket Contour coil available in 24 or 32 elements, as well as two new BioMatrix sen-

ors for its Magnetom Amira, a 60cm bore MRI scanner. It is fitted with a 1.2 Tesla superconducting system for reduced examination time. Smart-Comfort for a quieter patient experi-

ence; SmartEco to reduce electricity consumption and decrease operating costs; and SmartSpace to provide the smallest possible install-

ation footprint. The scanner’s 50cm field-of-view is suited for a number of clinical applications that include macculoskeletal, brain C-spine, L-space, whole spine, and abdomi-

nal imaging. Hitachi is promoting its Oasis MRI scanner. It is fitted with a 1.2 Tesla vertical-field superconduct-

ing magnet for high signal-to-noise ratio. The device’s open architecture has a two-pilar asymmetric design with full panoramic view for patients who deal with claustro-

phobia and anxiety. The Oasis fully motorised, extra-wide, 82cm patient table with lateral table top motion can accommodate larger patients. Meanwhile, SoftS-

ound technology helps to silence gradients and scanner noise, while fast imaging with Rapid parallel imaging and Zenith coils support scanning for every patient.

Philips Healthcare’s spotlight shines on its 1.5 Tesla Ingenia Ambition MRI scanner, which the company launched in late 2018. Most notably, Ingenia Ambition’s features are a variety of features, including SmartQual-

ity for enhanced clinical images. Other advanced applications include SmartSpeed technology 1.5 Tesla superconducting system for reduced examination time. Smart-Comfort for a quieter patient exper-

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features a fully sealed magnet for halal-free operations. BioSeal is designed to nearly reduce the amount of liquid halal needed to cool the magnet to less than 0.5% of conventional scanner require-

ments. The fully sealed magnet does not require a vent pipe and is approximately 100 kg lighter than its predecessor, which in turn sig-

ificantly reduces the shipping chal-

lenges of conventional magnets and lowers construction costs. The company noted in a statement.

The Easy Switch feature allows for quick deactivation of the Blue-

Seal magnetic field, if something should be struck in the bore. Once the problem is resolved, an in-house Philips technician can begin an automated start to bring the mag-

net back online. In addition, the Ingenia Ambition’s SmartExam analy-

tics allows for automatic planning, scanning, and processing, which is designed a single operator to manage the full MRI scan from the patient’s side with the touch of one button.

GE Healthcare continues to refine and develop the adaptive imaging receive (AIR) coil technol-

ogy. The flexible, lightweight com-
ponents can be incorporated into blankets that conveniently wrap more closely around regions of interest to enhance image quality, and the coils are much less of a bur-

den to frail patients and neonates, according to the vendor.

Among its available features are advanced applications, such as eKP metallic artefact reduc-

tion (MAR) and high-resolution 3D image acquisition, along with dedicated dual-phased array coils. Dynamic MRI can detect abnormalities that are difficult or impossible to find on standard MRI scanners. The application can be particularly beneficial in sports imaging.

Finally, Canon Medical Systems is again highlighting the Vantage Orian, a wide-bore 1.5 Tesla scanner that the company first intro-

duced at ECR 2018. To develop Orian, the vendor redesigned its MRI digital architecture by mov-

ing the electronics in the scanner gantry, enabling the use of an independent analogue-to-digital converter for each of the system’s16 1.5 Tesla scanner. The machine also fea-

tures a dockable, removable table, while supporting Pianissimo noise reduction technology and MAR. The new patient entertainment system found on other Canon magnets, according to the company.

Abdominal MR scan taken on the 1.5 Tesla Altea system using Caipirinha, a parallel imaging acquisition technique (Provided by Siemens Healthineers).

Ingenia Ambition MRI with 3D NerveView can help visualise the brachial and lumborum plexus with a high-resolution T2-weighted, turbo spine echo acquisition with reduced remaining intro-lumen signal of the veins (Provided by Philips Healthcare).

By conforming to a patient’s body, AIR technology coils can be placed closer to the patient’s interest and allow for greater detail of the chest, spine, lungs, and other body parts. Left: Coronal T2-weighted PROPELLER MRI image. Right: Sagittal proton density (fast spin-echo) image of humerus (2019 x 523, 383.3 minutes, 1.4 mm slice thickness by Siemens Healthcare).
Quantitative imaging to drive uptake of AI in MRI

As the use of artificial intelligence (AI) in medical imaging gains pace, specific use-cases are emerging where AI-enabled image analysis tools are delivering clear clinical and/or commercial benefits. For x-ray and CT imaging, these can be broadly categorised as productivity tools. For example, algorithms that detect and classify lung nodules or breast lesions, and triage solutions that route incoming studies to the most appropriate specialist and prioritise urgent cases in the reading list findings.

However, for MR imaging, the value of AI will be to accelerate the use of quantitative imaging in daily clinical practice, by automating the time-consuming and often imprecise task of manually taking measurements of imaging features. This extends from automated size measurements, such as the long and short measurements of tumours, to more advanced quantitative characterisation of tumour phenotypes, including texture, position in the organ and heterogeneity. The factors driving the move to quantitative imaging and image-based phenotyping include:

- Ability to compare changes and disease progression between prior and current imaging studies
- More personalised treatment planning
- Ability to predict a patient’s response to treatment

By 2023, the world market for AI-enabled MRI analysis software is forecast to exceed $500 million, with brain imaging expected to be the largest sub-sector. While neurological imaging biomarkers have been used in research projects and clinical trials for many years, they have only recently started to gain acceptance in daily clinical practice. There is a growing interest in the use of imaging biomarkers for the diagnostic, treatment planning and management of a variety of neurological disorders, including Alzheimer’s disease, multiple sclerosis and traumatic brain injury (TBI).

Beyond neurology, quantitative imaging will gradually be applied across all MRI subspecialties, with imaging will be driven by growing interest in the use of multiparametric MRI as a first-line investigation for patients with suspected prostate cancer. Multiparametric MRI exams can be difficult and time consuming to interpret and suffer from high inter-reader variability. As such, machine learning-based image analysis will play an increasingly important role, both in terms of helping radiologists cope with increasing scan volumes as multiparametric MRI becomes more widely used to detect prostate cancer and to generate the quantitative imaging data to improve diagnostic and treatment decision making.

Barriers to market adoption

The trend to quantitative imaging is at an early stage and several market barriers need to be addressed. None of these are considered roadblocks and they are expected to be overcome gradually in the following years:

- Market awareness and education on the benefits of quantitative imaging
- Lack of reproducibility between the results obtained from different vendors’ quantitative imaging software
- Integration into radiologists’ workflows; quantitative imaging results need to be presented at the time of the primary read, rather than post-processing
- Most PACS systems do not allow for the searching and mining of quantitative imaging data

The rapid rise of AI in medical imaging has been met with a mixture of fear, scepticism and enthusiasm by radiologists, with the initial anxiety over job security now giving way to a general acceptance that AI will augment rather than replace radiologists. This holds particularly true for quantitative imaging, as enriching radiology reports with quantitative imaging data adds value for referring specialists, strengthening the role of radiology. In the coming years, referrals for medical imaging exams will increasingly request quantitative results rather than purely text-based reports.

Moreover, radiologists who are skilled in quantitative imaging will strengthen their role in multidisciplinary decision-making, particularly as the move to precision medicine gains pace. For private radiology practices, offering quantitative imaging will differentiate their services from their competitors, helping to retain customers and win new ones from practices who are slow to react. As radiology continues to evolve in today’s era of value-based care and AI-enabled care delivery, quantitative imaging will help radiologists to remain both relevant and valued.
The ESR’s position on value-based trends in healthcare in general, and radiology in particular, was set out in a concept paper on value-based radiology published by the ESR in Insights into Imaging in August 2017. Within radiology, the issue of volume vs value-based practice had been debated for a number of years. In recognition of the importance of this emerging paradigm, the ESR’s working group on value-based imaging formally became the ESR’s Value-Based Radiology Subcommit- tee in 2018. The new subcommit- tee continues with the working group’s task of leading the ESR’s response to trends within health- care that increasingly emphasise value for money, related to quality of care, patient safety and reimbursement systems. The subcommittee reports to the ESR Board of Directors.

The study conducts a systematic evaluation of pre-operative breast MRI, examining individual patient data in a multicentre setting with the aim of clarifying matters regarding the ongoing uncertainty in the application of pre-operative MRI in breast cancer patients.

MIPA collects data on recent first- time breast cancer diagnoses and compares surgical outcomes for those who undergo pre-operative MRI with those who do not. Data is being collected from 35 centres in Europe and beyond. The results will be vital for a better understanding of the effect pre-operative breast MRI has on clinical decision-making.

In 2018, MIPA completed its recruitment of the target sample size of 1,000 patients. Prof. Santanelli will present results of the MIPA study at ECR 2019 in the RC 01 session: MRI for early detection, staging and management of breast cancer today at 08:30–09:00 in room E2.

MIPA acts as the contracting partner for all participating cen- tres, provides management and administrative support, handles all finances, and leads dissemination efforts.

**SPECIFIC**

The SPECIFIC study is an inter- national clinical study investigat- ing myocardial perfusion imaging, which is funded by Siemens and Bayer with Erasmus University Medical Centre (Rotterdam, the Netherlands) as the study sponsor, and the University Hospital Tilburg (the Netherlands).

Cardiac CT provides accurate assessment of the coronary arteries and detects significant coronary ste- nosis with high diagnostic accuracy. This information is highly relevant, but ignores the haemodynamic relevance of lesions detected this way, which is essential for clinical decision-making. The recent develop- ment of third-generation, dual- source CT allows for the assess- ment of myocardial perfusion, and may determine the haemodynamic relevance of coronary lesions.

The objective of the SPECIFIC study is to determine the diag- nostic accuracy of CT myocardial perfusion imaging for the detec- tion of haemodynamically rele- vant coronary stenosis, as deter- mined by invasive fractional flow reserve as a reference standard in patients with suspected or known coronary artery disease who have been clinically referred for invasive angiography.

**ECR 2019**

**Friday, March 1, 08:30–09:30, Coffee & Talk 3**

**C 13 Value in radiology in theory and practice**

- Chairperson’s introduction
  M.H. Fuchspäger; Graz/AT
- Artificial intelligence and value-based healthcare
  P.R. Algra; Alkmaar/NL
- What do patients value?
  J. Birch; Poole, Dorset/UK
- Value-based pay models for radiology
  V.M. Rao; Langley, BC/CA
- Quantity vs quality? Different aspects of the value equation
  L. Lavelle; Wellington/NZ
- Value of radiology: the Canadian perspective
  E. Lee; Langley, BC/CA
- VBR concepts around the globe: similarities and contrasts
  P. Smith; Boston, MA/US
- Open forum discussion: International perspectives on value in radiology

**EIBIR helps clinical studies stay on track and manage their data**

Setting up and running multicentre clinical studies is time-consuming and comes with many administrative tasks. The European Institute for Biomedical Imaging Research (EIBIR) provides support services to clinical studies investigating or evaluating imaging methods.

The MIPA study is led by EIBIR and Prof. Francesco Santanelli (University of Milan, Italy) and past pres- ident of EUSOBI).

The objective of the SPECIFIC study is to determine the diag- nostic accuracy of CT myocardial perfusion imaging for the detec- tion of haemodynamically rele- vant coronary stenosis, as deter- mined by invasive fractional flow reserve as a reference standard in patients with suspected or known coronary artery disease who have been clinically referred for invasive angiography.

**EIBIR launches its Electronic data capture platform**

EIBIR launched its Electronic data capture platform in 2018. This platform can be used to collect and manage almost any type of digital data which is part of a clinical study, including DICOM images. The platform uses a secure web application for building and managing study databases with great flexibility and ease-of-use. EIBIR can also assist in setting up the data collection forms for your study.

**EIBIR’s Electronic Data Capture Platform**

EIBIR’s Electronic Data Capture Platform allows researchers to col- lect a wide range of data for their studies in an easy-to-use system. Among others, the platform is currently in use by the EUCILID project, a European Commission Tender project on clinical diagnos- tic reference levels for a ray med- ical imaging led by the European Society of Radiology and a large multicentre study on a machine learning CT-derived FFR application under the lead of Erasmus Medical Centre.

If you’d like to learn more about EIBIR’s support to clinical studies, stop by the EIBIR Lounge on the entrance level, or visit the website at www.eibr.org.

**Gathering perspectives on shifting paradigms: value as a basis for practice in radiology**

The ESR sees value-based radiol- ogy as a paradigm that comple- ments and enhances its existing approach to quality and safety, while focusing on what actually matters most to professionals, patients and payers: value. However, coming to a clear definition of what value actually means to different groups is not as straight- forward as it may seem. Thus, influ- enced by the survey conducted by the University of Utah, ‘The State of Value in US Healthcare’, the Val- ue-Based Radiology Subcommittee has been working with the ESR’s Patient Advisory Group to under- take a survey of patients across Europe in order to come to a better understanding of what this key term means to the key stakeholder in radiology: the patient.

Additionally, over the last year, the Value-Based Radiology Sub- committee has been collaborat- ing with representatives from the American College of Radiology (ACR), Canadian Association of Radiologists (CAR), International Society for Strategic Studies in Radiology (IS3R), Royal Austral- ian and New Zealand College of Radiologists (RANZCR), and the Radiological Society of North America (RSNA) to produce a joint paper aiming to both locate radiol- ogy firmly within the wider val- ue-based healthcare concept, and to set out ways in which radiolo- gists can seek to improve the value that they contribute to outcomes.

Various aspects of implementing value-based radiology in clinical practice will be discussed during the Value in radiology in theory and practice Coffee & Talk session on Friday morning from 08:30–09:30 in room C5. This session, led by an ‘all-star’ panel of international experts representing the ACR, CAR, IS3R, RANZCR and RSNA, is one you definitely shouldn’t miss!
Peristaltic contrast media injector provides improvements for liver CT

The rapid increase in technological advancement in computed tomography has provided radiologists with submillimetre images with improved quality of the liver parenchyma and vascular system, while being cost-effective and accessible. However, the chief focus of CT liver protocols has been overlooked when it comes to contrast media enhancement performance of the liver parenchyma with different types of injection systems. There are currently two types of delivery systems (Figure 1).

The first is direct drive, which is made of a piston plunger that has a ram, which is moved by a drive motor; an elastic head, a stretcher rod, and a syringe. The second is peristaltic drive, which employs compression and relaxation of the tube to deliver the contents into the delivery tube, which creates a seal between the suction and the discharge side of the pump, eliminating product slip and reducing delivery pressure of the contrast media. The magnitude of liver parenchymal opacification depends on patient-related factors such as body weight, cardiac output, contrast media concentration, injection rate and arterial pressure of the contrast media. Therefore, optimal liver enhancement was 74.7 ± 23.1 HU when compared to different iodine concentrations during split bolus injection protocol. Also, studies have demonstrated that different injection protocols result in variable liver parenchymal enhancement. Saline has a pivotal role in the enhancement of the liver parenchyma, with the lowest recorded enhancement of the liver of 71.5 ± 19.6 HU when a saline flush was injected at a rate of 2 mL/s post-contrast administration, and the highest of 75.1 ± 27.5 HU when the saline flush was injected at 8 mL/s. When no saline flush was administered after contrast injection, the liver enhancement was 77.7 ± 23.1 HU, therefore, optimal liver parenchymal opacification varies significantly in literature, with limitations in the clinical setting due to contrast media injection parameters, patient selection and scanner parameters during liver CT. In our study we demonstrated that there was no significant difference in total liver, functional or segmental parenchymal opacification between each contrast media injection system with mean opacification from 93–96 HU (which was higher than reported in literature for all liver segments). For the total number of patients being scanned, group A and group B were the same population but underwent two injection techniques with a time duration of approximately one year apart. The study showed that peristaltic drive had increased quantitative image quality, pathology detection, cost saving with lower radiation doses, and contrast volume compared to direct drive injection systems. Finally, the overall workflow and cost analysis demonstrated a significant saving of $5252.87 (98% saving) for the 182 patients who underwent contrast injection from the peristaltic injector. This cost saving increased revenue for the institution without sacrificing image quality, radiation dose or pathology detection. Employing a peristaltic pump can provide radiology departments a value-based approach to imaging without sacrificing patient outcomes.

Moderators: A. Blachar; Tel Aviv, IL

C. Sofia Messina; IT

Multidetector liver CT: improved image quality, decreased radiation and contrast media dose with peristaltic contrast media injection system

C. Saade, S. Khalifeh, L. Karout, L. Naffaa; Beirut, Lebanon.

Figure 1: Left: direct drive, which is made of a piston plunger that has a ram, which is moved by a drive motor; an elastic head, a stretcher rod, and a syringe. Right: peristaltic drive contrast injector, which employs compression and relaxation of the tube, drawing the contents into the delivery tube which creates a seal between the suction and the discharge side of the pump, eliminating product slip and reducing delivery pressure of the contrast media.

For a complete overview of our educational program, please visit https://eu.medical.cannon/ecr2019

Missed our Lunch Symposium? Watch the presentations on our YouTube channel: www.youtube.com/CanonMedicalEU
ESR iGuide – clinical decision support for the ESR’s referral guidelines

Supporting referral workflows for more appropriate imaging

The appropriate utilisation of medical imaging is a hot topic in most European healthcare systems as well as at the EU level. As one of the most innovative medical societies in the world, the European Society of Radiology (ESR) is proud to be able to offer a state-of-the-art solution to support referral workflows to ensure better utilisation of radiology resources and provide better value for patients.

ESR iGuide is a clinical decision support (CDS) system utilising imaging referral guidelines developed by the ESR, based on the American College of Radiology Appropriateness Criteria (ACR AC). The ESR advocates the use of CDS integrated into existing imaging referral workflows to support referring doctors with evidence-based guidance in selecting the most appropriate procedure for their patients the first time. Delivered by the ESR’s Quality and Safety in Imaging (QSI) GmbH, ESR iGuide enhances healthcare professional interaction with order entry systems by providing actionable, tailored information at the right steps in the workflow. The combined expertise of the ACR and the ESR ensures that referrers and patients can be confident of receiving evidence-based, expert-developed guidance.

An integration-ready solution, ESR iGuide is fully configurable to deliver optimal results, tightly embedded in existing electronic referral workflows. Depending on healthcare organisations’ needs, simpler options for adopting electronic decision support are available through different integration options, or even by using the user-friendly, stand-alone ESR iGuide web-portal, for which licensing options are available for all user types, from individual physicians to country-wide licences, for example in the context of compliance with the EURATOM Basic Safety Standards Directive (2013/59).

ESR iGuide enhances referral workflows for better medical imaging utilisation.

Discover ESR iGuide at ECR 2019

Enabling radiologists and other healthcare professionals to deliver appropriate medical imaging services is central to the ESR’s mission, and the European Congress of Radiology is the ideal venue to showcase how ESR iGuide can help achieve this mission in clinical practice. For a demonstration of ESR iGuide, we invite congress delegates to visit the ESR iGuide booth, located within the ESR EuroSafe Imaging Lounge on the first floor of the congress venue, near Foyer N. The ESR iGuide team is available to explain workflow and integration options, and to discuss options for implementing ESR iGuide in different settings.

The ESR has also organised two Coffee & Talk sessions on ESR iGuide (see right) which focus on implementation experiences in Europe as well as in the Middle East and Africa.

Coffee & Talk Sessions

**Thursday, February 28, 12:30–13:30, Coffee & Talk 2**

C 9 Dissemination of ESR iGuide in Europe: use cases

Modulators: L. Donoso, Barcelona/ES; G. Frija, Paris/FR

- ESR iGuide adoption in Croatia: B. Brkljačić, Zagreb/HR
- ESR iGuide adoption in Sweden: H. Stahlbrandt, Eksjö/SE
- ESR iGuide adoption in Belgium: G.M. Villeirs, Ghent/BE
- Open forum discussion: National and regional approaches to ESR iGuide implementation

**Thursday, February 28, 14:00–15:00, Coffee & Talk 2**

C 11 Dissemination of ESR iGuide in Africa and the Middle East: use cases

Modulators: G. Frija, Paris/FR; B. Mansouri, Algiers/DZ

- Chairperson’s introduction: B. Mansouri, Algiers/DZ
- ESR iGuide adoption in Egypt: D. Husseiny Salama, Cairo/EG
- ESR iGuide adoption in Uganda: M.G. Kawooya, Kampala/UG
- ESR iGuide adoption in Tunisia: L. Raisi Maroufi, Tunis/TN
- ESR iGuide adoption in Iran: N. Fatehi, Tehran/IR
- Open forum discussion: Use cases in Africa and the Middle East – challenges and solutions

These sessions are part of the EuroSafe Imaging campaign.
IAEA’s actions to make radiology safer for patients around the world

The International Atomic Energy Agency (IAEA) leads the development of international standards for radiation protection and safety and the actions on implementation of these standards in its 170 Member States. The International Action Plan for the Radiological Protection of Patients, approved soon after the first strategic International Conference in 2001 in Malaga, Spain, initiated an international collaboration to strengthen radiation protection of patients in medical uses of ionising radiation.

The next important step was the issuing of the Bonn Call for Action – a joint statement by IAEA and WHO, agreed at the International Conference on Radiation Protection in Medicine – Setting the Scene for the Next Decade, held in 2012 in Bonn, Germany. It highlights ten actions and related sub-actions for strengthening radiation protection in medicine. The Bonn Call for Action is the guiding document for the IAEA activities in the medical field, which include developing guiding documents, information and training resources for health professionals, e-learning, webinars, posters and leaflets in many languages, all freely available from the specialised Radiation Protection of Patients website (http://rpop.iaea.org). The IAEA also offers training and knowledge exchange for health professionals, with a focus on less developed countries.

In response to the Bonn Call for Action, many international organisations launched their own specific actions, including the EuroSafe Imaging Call for Action by the European Society of Radiology (ESR). Developed around the world since the Bonn conference were reviewed in the International Conference – Achieving Change in Practice, held in 2017 in Vienna. Representatives of 27 countries and international organisations agreed that intensified work be conducted in response to the Bonn Call for Action, highlighting the importance of partnerships between national governments, civil society, international agencies, researchers, educators, institutions and professional associations.

An outcome from the 2017 conference was the decision to produce an ‘Implementation toolkit’ for the Bonn Call for Action that is under development by the IAEA. This will be a specialised webpage organised around the 10 actions and will provide links to useful tools and training material developed by different organisations, training materials, and many other resources that will help in implementing each specific call. This will be a living document, updated with the latest available approaches. International and professional societies have an important role to play in the development and promotion of the Bonn Call for Action Implementation Toolkit: A Coffee & Talk session on March 1, 13:30–14:30. Room Coffee & Talk 2, will discuss the importance of taking a team approach and developing a safety culture in the imaging department. The session will involve three radiology teams from Croatia, Bulgaria and Latvia, who will present their good practices in building effective teams for achieving optimum results in medical imaging. The team from Croatia will focus on justification based on shared decision-making by a referring medical practitioner and a radiologist, who use referral guidelines for imaging to select the most appropriate exam for the patient. Patients also need to be informed about the expected benefits, risks and limitations of the proposed radiological procedure, as well as the consequences of not undergoing the procedure. Once the procedure has been deemed necessary, the next step is to perform it with the lowest possible dose to obtain the required diagnostic information.

Optimisation includes selection of equipment and associated software, setting a robust maintenance and quality assurance programme, and performing regular patient dose assessment using diagnostic reference levels (DRLs). Imaging protocols need to be optimised: the team from Bulgaria will describe how the radiologists, radiographers and medical physicists work as a team, each making a unique contribution towards optimised imaging. Finally, the paediatric hospital team from Latvia will explain how they make use of the departmental incident reporting system for learning from errors and improving safety culture and patient care. The IAEA supports the development of team culture by providing training to teams in the framework of the IAEA Technical cooperation programmes, with the aim of making justification and optimisation an integral part of daily medical practice. The cooperation between IAEA, WHO and the professional societies in a good model to be followed at national level. By joining efforts and combining their competence, different stakeholders can improve quality and safety in medical imaging for the benefit of patients.

**Coffee & Talk Session**

**Friday, March 1, 13:30–14:30, Coffee & Talk 2**

C 17 Team approach and safety culture in the imaging department

- **Keynote Lecture:**
  - K.-D. Löblad, Geneva/CH
- **Chairpersons introduction**
  - J. Vassileva, Vienna/AT
- **Performing the appropriate procedure: whose role is it?**
  - B. Bckjac, Zagreb/HR
- **Improving patient safety through learning from errors**
  - L. Sembele; Riga/LV
- **Open forum discussion: How to build an effective team to achieve best results?**

This session is part of the EuroSafe Imaging campaign.

Jenia Vassileva, PhD, is a diagnostic medical physicist working in the Radiation Protection of Patients Unit of the IAEA. She is the technical officer for the IAEA TC projects in the field of medical radiation protection in Europe.

Ola Holmberg, PhD, is the Head of Radiation Protection of Patients Unit of the IAEA. He was the scientific secretary for the International Conferences on Radiation Protection in Medicine in 2012 in Bonn and in 2017 in Vienna.
EUCLID project carries out study to establish clinical DRLs for Europe

It is well known that different image quality is needed for different clinical indications of the same anatomical area. For this reason, diagnostic reference levels (DRLs) should be established for a given clinical indication rather than anatomical area.

John Damilakis is full professor and chairman at the Department of Medical Physics, Faculty of Medicine, University of Crete, Greece. He is president of the EURAMED research platform, vice-president and president-elect of the International Organization for Medical Physics (IOMP) and immediate past-president of the European Federation of Organizations for Medical Physics (EFOMP). He is the project manager of EUCLID.

Guy Frija is Professor Emeritus at Université Paris Descartes (FR), Professor at McMaster University (CA), radiologist consultant at the Paris Georges Pompidou European Hospital (FR), and Chair of EuroSafe Imaging, a multi-stakeholder and holistic approach to radiation protection, an initiative of the ESR. He is the co-project manager of EUCLID.

Clinical task | Anatomical location | Procedure
--- | --- | ---
Stroke | Head | All Phases
Chronic sinusitis | Neck | All Phases
Cervical spine trauma | Spine | All Phases
Pulmonary embolism | Thorax | All Phases
Coronary calcium scoring | Coronary Arteries | All Phases
Coronary angiography | Coronary Arteries | All Phases
Long cancer | Brain | All Phases
Oncological staging | Thorax | Liver
Liver | Liver | All Phases
Hepatocellular carcinoma | Liver | All Phases
Celiac/abdominal pain | Abdomen | All Phases
Appendicitis | Abdomen | All Phases

Table 2: List of CT clinical indications

Table 1: List of interventional radiology procedures

Clinical task | Anatomical location | Procedure
--- | --- | ---
Arterial occlusive disease of iliac arteries | Pelvis | Recanalisation & Stenting
Localisation and treatment of hepatocellular carcinoma | Liver | Transarterial (chemo)embolisation of tumour vascu- lature and feeding hepatic arteries
Arterial occlusive disease of femoropopliteal arteries | Lower-extremity | Recanalisation and angioplasty + stenting
Biliary drainage | Abdomen | Percutaneous transhepatic cholangiography and biliary drainage

Table 2: List of interventional radiology procedures
Five simultaneous data challenges bring competitive buzz to JFR 2018

Global interest in artificial intelligence (AI) is growing rapidly, due to the availability of large and scalable datasets in every industry, advances in computing power, and the never-ending release of new algorithms.

The development of new standards of machine learning, such as deep learning, has a tremendous impact on radiological activities. This major transformation seems to enable radiologists to leverage their value, efficiency and accuracy. The strategic positioning of all actors (patients, radiologists, AI expert, IS/IT department) is crucial for a successful transition. The Canadian Association of Radiologists (CAR) and the French Society of Radiology (Société Française de Radiologie – SFR) published a white paper focused on artificial intelligence in 2018, reflecting both the importance of this topic and probably the impact on radiological activities.

This major transformation seems to bring competitive buzz to JFR 2018 (Journées Francophones de Radiologie) in order to create a structured dynamic on this topic, based on different steps:

1. To teach radiologists the new rules of GDPR while building a large multicentric prospective database of US, CT and MRI images of patients.
2. To build an ecosystem from May to September 2018 including public and private radiologists, researchers, and start-ups, but also large companies and students from engineering schools.
3. To provide all French stakeholders able to work together during the competition with a secure framework, offering a realistic picture of the benefits and concerns in October 2018.

In this context, for the first time, the French Society of Radiology organised five data challenges including three modalities during the JFR 2018 (Journées Francophones de Radiologie) in order to create a structured dynamic on this topic, based on different steps:

1. To teach radiologists the new rules of GDPR while building a large multicentric prospective database of US, CT and MRI images of patients.
2. To build an ecosystem from May to September 2018 including public and private radiologists, researchers, and start-ups, but also large companies and students from engineering schools.
3. To provide all French stakeholders able to work together during the competition with a secure framework, offering a realistic picture of the benefits and concerns in October 2018.

Five clinical questions were selected by the SFR in May. Fifty private and public hospitals included more than 3,000 patients prospectively in the four months up to September:

- Renal cortex segmentation with CT scan (1,574 images from kidney).
- Detection of meniscus fissure with CT scan (511 images from meniscus).
- Detection and characterisation of hepatic lesions with ultrasonography (545 images from liver).
- Tumour invasion of thyroid cartilage with CT scan (91 images from cartilage).
- Detection of breast tumours with MRI (504 images from breast).

Twenty-six teams were created, with a total of 180 people, including radiologists, student engineers, researchers and start-ups or large companies.

This was meant to trigger them to come to the JFR in order to stimulate competition between them. That way, they were also able to meet each other, to grow relationships between research-ers and engineers, but most of all between clinicians and engineers. Thus, after reaching some results, they were offered the chance to use this validation set to compare their AUC values thanks to a leaderboard. Only the ones who had submitted their results were allowed to refer back to it.

At 14:00 on Sunday, October 14, the last remaining part of the initial dataset was released, containing only the data but not the labels. The participants then had one hour to run their model on it and output a file containing their predictions. The results were announced on Monday, October 29 at midday. Five winners, one per challenge, should have been awarded a prize, but as in one challenge two teams had results that were too close, there were six winners, with a prizetotal of €3,000 offered by SFR for each winner.

Obivinautes was the winner of the two challenges: liver and breast; LyPhTe was the winner of two challenges: meniscus and kidney; SynovIA was the winner for cartilage; kidney; and Radioadvisor for meniscus.

The participants then had one hour to run their model on it and output a file containing their predictions. The results were announced on Monday, October 29 at midday. Five winners, one per challenge, should have been awarded a prize, but as in one challenge two teams had results that were too close, there were six winners, with a prize total of €3,000 offered by SFR for each winner.

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A success story with new challenges:
European Radiology, the ESR’s flagship journal, continues to grow

After his first full year in office, we asked Editor-in-Chief Prof. Yves Menu from Paris, France, about challenges and opportunities arising from the increasing submissions and success of European Radiology, the flagship of the ESR’s journal family.

ECR Today: You are about to conclude your first year in office, which has seen a significant increase in submissions. What do you think contributed to this rise and how did it influence your first year as Editor-in-Chief?

Yves Menu: Managing a scientific journal is a matter of time, quantity, and quality. Everybody understands the difficult compromise between these words. I can confirm that in 2018 we have reached the highest number of submissions ever, with an increase of more than 30%.

There is no single explanation. It is true that scientific publication is an increasingly recognised metric for academic activity and recognition. More teams are developing research and this probably broadens the base of potential authors. I am certain that most journals that are referenced with a high impact factor have observed the same phenomenon.

Having said that, European Radiology is not only witnessing this phenomenon, but is probably among the leading titles in terms of the increase in submission numbers. I would like to think that the improved management of manuscripts created a favourable atmosphere – we were able to bring down the time to decision to 25 days on average, which compares very well with other journals. Of course, this is a mean delay and not all manuscripts receive a decision within this period, as some require more attention, need additional expert opinion or create a debate. This is for time and quality.

In terms of quality, authors not only expect a quick answer, they also need it to be detailed and relevant, because it speeds up the revision. We have tried hard to increase the content of our answers. Even a decision of ‘reject’ rarely comes without detailed explanation. Unfortunately, most of the manuscripts we receive will be rejected. Fortunately, many contain useful science and will be published elsewhere. It is my pleasure to think that the reviewing process by European Radiology greatly helps these manuscripts to improve, and to become acceptable submissions for different journals. We, like other journals, certainly have a role in the overall improvement of scientific publication in imaging, beyond the pages of European Radiology.

The role of the reviewers is instrumental and I would like to tell them how much I am impressed with the quality of most reviews. Of course, some comments are controversial, as some reviewers fail to understand the authors’ messages. However, even these ‘fails’ are important, since reviewers, in their diversity, illustrate the spectrum of opinions that the final article will induce within our readership.

Finally, I would like to think that this improved management has probably attracted a significant proportion of additional submissions.

ECRT: When looking at the submissions European Radiology has received throughout 2018, are there specific trends or hot topics that stand out from the crowd?

YM: Papers dealing with artificial intelligence are now on-trend. However, my feeling is that we are only at the beginning of the phenomenon. Nobody is able to predict correctly its exact role in the future, and this allows all fantasies, predicting the disappearance of radiology or, conversely, a mighty development. As usual, the truth is probably not the middle-of-the-road, that would finally mean ‘no-change’.

continued on page 26
but a deep transformation of our profession.

However, all those who, like me, have seen the outbreak of US, CT, MRI, hybrid imaging, or interventional radiology know how our profession is flexible and prone to adaptation. All editors are facing many papers on AI and are still looking for reliable and simple criteria for the evaluation of the scientific robustness. In the developmental period, we have to accept that not all studies fulfill all requirements, as we should not curb the intense intellectual ferment. However, we cannot accept all studies with obvious flaws like very small sample size, biased recruitment, minimal validation that prevents any attempt to generalize.

Other very fertile grounds are hybrid imaging, parametric MRI, dual energy CT, and dosimetry. I also observe a growing interest in some specific fields like communication with the patient and quality assurance.

Overall, we wish to maintain European Radiology as the journal for the whole community and keep a balance between all topics. Also, I greatly insist on the readability of articles. I should say that there is a lot of work ahead. My opinion is that there are no such complicated topics that could not be explained clearly and be understood by the majority of our readers.

ECRT: The Editorial Board of European Radiology has grown and includes representatives from all over the world. Have you been able to identify a trend in certain regions or countries where the specialty of radiology has recently flourished and seen substantial progress?

YM: European Radiology is nowadays a worldwide communication pathway. We have observed a significant increase in submissions from Asia, and notably from China, joining Korea and Japan, as well as ‘traditional’ western countries in the leading groups in terms of submission numbers. Therefore, it was more than fitting that some colleagues from these countries would participate in the daily life of the journal through a position on the Editorial Board. Including people from different countries has a huge benefit, not only for representation purposes, but also — and this may be more important — for the dialogue between people who have different cultures and, therefore, bring mutual intellectual enrichment.

However, beyond the numbers, I would like to highlight two different feelings.

One is that not only numbers increased, but quality of research has improved as well. I now very seldom reject papers for their very poor presentation, absence of clinical relevance and questions about the reality of the results. This makes the Editor’s life more interesting, as we receive a huge quantity of reasonable studies, and more difficult, as the difference between selection and rejection is more and more narrow and the competition is hot.

Another feeling is the satisfaction of seeing that there are countries that seem to have increased their representation after their presence in scientific journals was minimal for different reasons. These countries are from the Middle East, South America, and the Indian subcontinent, for instance. In this world as it is, it is a great pleasure to see that the scientific debate is a powerful factor of peaceful communication, mutual esteem, debate, and, finally, friendship.

ECRT: Your lecture at this year’s Coffee & Talk Session on ethical traps in publication is called ‘Ethical issues during peer review’. Have you experienced any major issues in this regard during your editorship? What do you think authors are most worried about and how do you deal with it as the Editor-in-Chief?

YM: The main potential problems would be plagiarism, duplicate publication, and doubtful methods. I should say that we did not encounter any major ethical problems. We have had no cases of duplicate publication and no real cases of plagiarism. However, as language is still a problem for international authors, some of them are tempted to use significant sentences picked up in already published papers. We use software to detect similarities. Although it is only a ‘syntactic borrowing’ without any scientific plagiarism, I imagine that the original authors could be upset at seeing verbatim copies of entire sentences or even paragraphs.

I encourage the authors to limit the limitation to simple expression, and never more than six to seven words in a row. I would not accept longer copies.

ECRT: In addition to the renowned Albert L. Raett Editor Fellowship, you have introduced the European Radiology Reviewer Fellowships, and rumours are spreading that you will be introducing the role of a Junior Editor. In your own words, what can we expect and what are your plans for the future in your role as Editor-in-Chief?

YM: It is of utmost importance to associate your young colleagues to the journal. They represent the future, and many of them, already the present. What they bring to European Radiology is fresh air, new knowledge and enthusiasm. Conversely, what we could do for them is to teach the editorial process, how to review, how to write, how to communicate. None of these is innate. This is why I promote the idea of a ‘School of European Radiology’, gathering several initiatives dedicated to our younger colleagues. Is this not the best way to prepare them for the future?

I would like to conclude with one single wish that seems obvious, but nevertheless summarises my goal: It is simply to promote the idea that articles are published in the journal to be read, not only to be written. It seems obvious, but behind this oversimplified statement, there is an entire revolution in the authors’, reviewers’ and editors’ daily life. More details will follow in the near future!
ESOR increases commitment to radiological education

The European School of Radiology (ESOR) has completed thirteen years in action; thirteen years of adding value to radiology. From the beginning, Prof. Nicholas Gourtsoyiannis was the Scientific/Educational Director of ESOR and his talents have made ESOR a success story. I took over the position at ECR 2018 and my will is indeed to pursue the investment in radiological education in Europe and beyond.

The three main goals of ESOR, set at its inception in 2005, are still to assist in harmonising radiological education throughout Europe, by supporting the adoption and utilisation of the European Training Curricula (ETC), to build a genuine and firm interest in subspecialisation in radiology, and to raise the scientific profile in radiological education in Europe and around the globe.

During the past thirteen years ESOR has gradually evolved into a major international provider of complementary education in radiology, offering a wide range of modular activities, including foundation and advanced courses, teach-the-teachers and visiting professorship programmes, visiting schools, seminars, tutorials, preparatory courses for the European schools, seminars, tutorials, pre-teach-the-teachers and visiting programmes for fellowships are granted to applicants from Eastern Europe, Asia and South America.

The ESOR ASKLEPIOS course in Bangkok, Thailand, was organised in partnership with the Royal College of Radiologists of Thailand (RCRT) and supported by Guerbet. It attracted 140 participants from south-east Asia, making the ESOR in action through the Kingdom of Thailand and the ESOR ASKLEPIOS course in Bangkok, Thailand. This course, attended by 140 participants from the region, was organised in partnership with the Royal College of Radiologists of Thailand (RCRT) and supported by Guerbet. In addition to this course, ESOR also returned to China for the second day courses in partnership with the Chinese Society of Radiology (CSR) and Guerbet. Due to this great success, ESOR will come back to south-east Asia in 2019, expanding to the Philippines.

Additionally, ESOR is enriching its portfolio in 2019, by offering 21 courses and sessions, as well as 120 scholarships and fellowships. One of the highlights will be the first ESOR course in India, organised jointly with the Indian Radiological and Imaging Association (IRIA). As ESOR is not only concerned with education in radiology but also aims to prepare the new generation with methods that could impact multiple facets of radiology, ESOR is proud to organise the ESR’s first two-day course on Artificial Intelligence, in Barcelona on April 5–6, 2019.

ESOR is instrumental in mobilising resources available for radiological education in Europe and the world, and for creating a long-term educational commitment and a structured network. All of this hugely appreciated use of teaching resources has been implemented with the unlimited support of highly esteemed and renowned lecturers, tutors, mentors, volunteer reference training centres, local organisers, subspecialty and national societies, academic and research institutions, and valued industrial partners. ESOR is greatly indebted to them all.

I am extremely grateful to the ESR for entrusting me with the leadership of ESOR. I am more than happy to work closely with the ESOR Steering and Programme Planning Committee and the ESOR community as a whole and I am confident that ESOR will continue to deliver education successfully, connecting the world of radiology. I encourage all of you to find out what ESOR can offer you.

Prof. Valérie Vilgrain is the Scientific/Educational Director of the European School of Radiology (ESOR) and chairperson of the ESR’s ESOR Committee.

#ESOR2019

The ESOR ASKLEPIOS course in Bangkok, Thailand, was organised in partnership with the Royal College of Radiologists of Thailand (RCRT) and supported by Guerbet. It attracted 140 participants from south-east Asia, making the first ever ESOR activity in the region a huge success (© Guerbet Asia Pacific Ltd.).
The Accreditation Council in Imaging (ACI), created under the EBR umbrella, works in close collaboration with the European Union of Medical Specialists (UEMS) and the European Accreditation Council for Continuing Medical Education (EACCME), its joint parent body. This collaboration has provided added value in the accreditation of imaging events and has led to more events being accredited in radiology than in any other specialty. This achievement reflects the dedication of education providers in the field of radiology and directly benefits many of the live educational events offered, and users of the electronic learning material, by providing more events, and higher-quality events.

To better understand the current status of continuing medical education (CME) and continuing professional development (CPD) in European countries, and to learn more about the wishes and expectations of the European Radiation professionals in this regard, the ACI has been conducting surveys over the last two years. The results of the first surveys indicate marked differences in the accreditation systems between countries and show that the European radiological community has important views on this. Most respondents from all European countries, and would be in favour of recognising the European CME credits (ECSCM) in the universal European CME unit. In acknowledgement of these views, the joint ACI/CME survey called for the need for harmonisation of the accreditation of CME/CPD events, the need for a simple, quick accreditation path for future CME/CPD learning concepts, and the need for digital and further exploitation of data and feedback from educational events by EACCME 2.0.

With the aim of providing better service, according to the current needs of Continuing Medical Education (CME) and Continuing Professional Development (CPD), the ACI has set out to create a new accreditation scheme for webinars and virtual events. This new system, devised by Milos Lucic and by the members of the Policy Committee, was developed to predict where future CME/CPD learning concepts would lead the radiology profession. Although most radiologists still value face-to-face with their colleagues during live educational events, certain discrete tendencies emerge, which could be early indicators of the shift towards enhanced electronic media use in the learning process. This trend, together with heavy workloads and financial restraints, may lead to an impact on future CME acquisition in radiology manifested as an increasing generation-dependent level of radiology professionals. We are all very keen on live events, two, or three-day live events, but e-learning and webinars are easily accessible and far less demanding in terms of time and cost for participants. They also provide an opportunity for the apparently still very important element of human interaction, as any participant can continuously communicate with the speaker or moderator. Unfortunately, webinars are still considered to be live educational events by EACCME 2.0.

Furthermore, very few webinars in radiology are accredited at this time. Based on the ACI survey data and feedback from educators, the new ACI Scientific Director, Paolo Ricci, voiced the need to facilitate the process of webinar accreditation during the EUMS and ACI meeting at the 8th UEMS conference on the future of CME/CPD in Brussels last November. Because of the expected future importance and impact of this educational platform, the ACI will continue to work jointly with the EBR to create a simple, quick accreditation path for webinars that could become a valuable source of CME/CPD learning for radiology and many other fields.

One major challenge is to anticipate and learn more about the wishes of upcoming generations, including members of the next generation (generation 2), who are just entering the radiology profession. This view should particularly take into account future technological advances, including the impact of artificial intelligence and raw data analysis–-based radiology. The ACI will continue to search for relevant information important to radiology professionals by asking for their personal opinions on different topics, as every single voice matters in this regard.

Based on an already robust and vigorous organisational foundation established by the ACI team, an effective and highly competent EBR Office, outstandingly led by Ms. Ljiljana Ivanov, and the firm and trusted partnership with the UEMS, the ACI will have a proactive role in the effort to achieve full harmonisation of future radiology standards, and will face the upcoming challenges with firm confidence.

BY MILOS A. LUCIC

The Accreditation Council in Imaging (ACI) is present and future of CME in radiology

BY PAOLO RICCI

ACI represent and future of CME in radiology

On March 7, 2015, an agreement to create the Accreditation Council in Imaging (ACI) was signed between the European Society of Radiology (ESR) and the Union Europeéenne des Médecins Spécialistes (UEMS). From that date onwards, a fruitful relationship began between these two entities. During the first years and based on the work of Presidents Dragan Negru, former Scientific Director, and Prof. Lucic and Lucic, Chair of the Reviewing Committee and Policy Committee, respectively, a solid foundation for live events and e-learning material in the world of radiology and imaging was laid down and is now accredited by the Accreditation Council in Imaging.

Today, radiology – together with oncology and cardiology – is one of the medical specialties with the largest number of applicants for event accreditation. More than 400 applications have been submitted and accredited since 2010 thanks to the excellent work of the Reviewing Committee, led by my colleague Christian Loewe. A key to this success lies in the work done by members of the Policy and Reviewing Committees, and by the staff, who are in charge of the administrative tasks.

One of the most important aspects of this collaboration is that the incoming ACI Scientific Director will be appointed by the EBR Shareholders’ Board at the European Congress of Radiology (ECR) for a fixed period of two years. Candidates from the two entities (the EBR and UEMS Radiology Section) will hold the position of ACI Scientific Director on an alternating basis. My predecessor, Dragan Negru, carried out a fantastic job setting down the basis and the most important aspects to be considered for effective performance, which have now been established.

In March 2017, when the new European Accreditation Council for Continuing Medical Education (EACCME) 2.0 criteria were implemented, I started my journey as Scientific Director. It was at that point that the EACCME developed and presented several criteria to provide better service, according to the current needs of Continuing Medical Education (CME) and Continuing Professional Development (CPD). It is thanks to the surveys devised by Milos Lucic and by the members of the Policy Committee that the ACI came to vital conclusions in this respect, to offer better service to both providers and physicians who require CME/CPD to accomplish their tasks as professionals.

Through our surveys, we wanted to anticipate future requirements and define the areas that require additional work to offer the service that radiology and imaging deserve. We are all very keen on live events, but e-learning and webinars are the future. Therefore, the ACI is working hand-in-hand with the UEMS and leading a project to create a new accreditation scheme for webinars, which are currently considered live events. The name of the game is that presently in order to accredit a one-hour webinar, the same effort for accrediting a one, two, or three-day live event like the ECR is required. Thus, we would like to offer this not only to radiology and imaging but also to other medical specialties that have shown an interest in this new approach, a new way of accrediting webinars organised by national societies and subspecialties societies and offered to their members.

As I was told at the last conference about CME/CPD in Brussels, the excellent and fruitful relationship between the UEMS and the EBR/EBR is certainly an example that should be emulated by other specialties.

After ECR 2019 and for the following two years, Milos Lucic will be the new ACI Scientific Director.
Lung cancer is the number one cancer killer worldwide, and along with efforts to end the tobacco epidemic, every effort should be made to detect lung cancer at a curable stage in high-risk individuals.

Education and research are at the forefront of the ESSR agenda

Embedded in the origin of the word ‘education’ is the Proto-Indo-European root ‘deuk’- meaning ‘to lead’. Education leads out from the darkness of ignorance and, as the great polyglot of the 18th century, Benjamin Franklin, put it, an investment in knowledge pays the best interest. Education and research, both among the noblest human endeavours, are top priorities for the European Society of Musculoskeletal Radiology (ESSR).

Published in ECR Today, Thursday, February 28, 2019

COMMUNITY NEWS

BY MARIE-PIERRE REVIL

European Society of Thoracic Imaging (ESTI) on lung cancer screening: facing the challenge

Lung cancer is the number one cancer killer worldwide, and along with efforts to end the tobacco epidemic, every effort should be made to detect lung cancer at a curable stage in high-risk individuals.

Volume of part-solid lung nodule, with doubling time measurement. Doubling time of the solid component is 121 days, reflecting its aggressiveness, whereas the whole nodule doubling time is 209 days and that of the non-solid portion is more than 2 years.

This is the aim of lung cancer screening (LCS) based on low-dose CT, which started two decades ago. After the Early Lung Cancer Action Project (ELCAP) demonstrated in 1999 that low-dose CT detected early stage lung cancers, in 2011, the randomised National Lung Cancer Screening Trial (NLST) reported a 20% reduction in lung cancer-related mortality in individuals being screened, at the cost of a 25% false positive rate. In September 2018, the NELSON trial, using volumetry-based lung nodule management, reported a 28% mortality reduction with only 21.8% positive screens. With this recent communication, LCS can be expected to move from trial to practice in most European countries. In expectation of this, ESTI considered it a priority to propose dedicated training so that the radiologists involved will be able to reproduce the results of the NELSON trial, with no more than 2%, positive screens, and 35%, of those confirmed to be lung cancer.

In view of the high prevalence of lung nodules, it is essential that only trained certified radiologists are involved in its delivery. If large scale LCS is to be performed, there are not enough specialised thoracic radiologists available to deliver it, so a dedicated training programme is needed to help bridge the gap in expertise.

In this regard, an online meeting with the European Society of Thoracic Imaging (ESTI) executive and strategic committee members was held on January 9, 2019. Participants were asked the following three questions: should ESTI offer dedicated LCS training; should it be distinct from the ESTI diploma; and should a certification test be organised?

All members unanimously answered yes to the three questions.

The decision was taken to organise working groups during 2019 to define the content and delivery of dedicated LCS training. This will probably include registration for a series of webinar–learning sessions on lung nodule management and the technical requirements for screening attendance at volumetry software workshops during ESTI and ECR meetings, and training on LCS cases.

Establishing a common, structured report is one of the mandatory tasks for ESTI. The detected indeterminate solid nodules should be reported in terms of volume, to follow the NELSON management guidelines. The coronary artery calcium score should also be assessed. ESTI working groups will also have to decide whether screening still requires double reading by single reading with CAD as second reader.

Building large datasets to develop algorithms based on artificial intelligence (AI) will be another objective of our society and an intense research field. Some AI-based programmes claim that their results approach radiologists’ performance levels for lung cancer prediction, but they have not yet been sufficiently validated.

However, AI is a rapidly evolving field and it is difficult to predict whether human expertise will still be needed for LCS in the future.

While waiting for AI to potentially replace the need for a radiologist reading, we have an obligation to provide our colleagues with the means to train themselves in screening.

Besides LCS training, ESTI has already organised a Diploma in Thoracic Imaging, endorsed by the ESR, for which the very first examination will take place in Paris during the annual meeting in May this year. Thoracic imaging covers a large variety of topics: emergencies affecting large vessels, malignancies of the lungs, mediastinum and pleura, chronic diseases such as COPD, interstitial lung diseases and vasculitis.

We thought it was important to organise a diploma for radiologists interested in formalizing their knowledge in thoracic imaging, as most European countries do not offer formal certification in subspecialties. The diploma better defines what thoracic imaging is about and what essential knowledge is expected from a chest radiologist. Depending on the number of candidates, the diploma exam will also be offered during future ECRs.

Visit our website at www.myESTI.org for more information.

Marie-Pierre Revel is full professor of radiology at Cochin Hospital Paris Descartes University in Paris, France, and the current president of ESTI.

BY USTUN AYDINGÖZ

Volumetrical analysis of a lung nodule. The coronary artery calcification score is calculated and an intense research field.
Artificially Intelligent Radiologist?

The radiological community is on the verge of a major revolution in medicine. The impact of the radiological application of artificial intelligence (AI) can be regarded in addition to the introduction of a new imaging modality. A digital radiology assistant is knocking at our door persistently. Are you afraid of the uninvited guest?

As with any technology that could be disruptive for your clinical business, a first reflex is to deny the importance and consider it as hype. In the evolution from live fluoroscopy to film reading on a lightbox, to fully digital PACS, and from handwritten impressions to digital radiology reports, it seems a natural evolution to change from eye-ball to automated image interpretation, quantification, and reporting. This can lead to a reduction in the time spent on image reading and reporting, allowing more emphasis on communication with patients and other medical doctors.

An important challenge for radiologists is to maintain a high level of quality, whereas the ever-increasing workload can be facilitated. To guarantee high-quality radiological exams and reports, assistance from AI can be of great value. Pre-processing of radiological imaging and especially image quantification can help to substantially reduce time spent per read. We can thereby create more time for communicating results, for example, in multidisciplinary meetings and in direct contact with patients. Commercial imaging clinics show and explain results to their clients. In routine clinical settings, radiologists do not have enough time to communicate directly with patients. The application of AI may create more time to connect with patients, and present imaging results in an app on a mobile phone, automatically.

AI may serve as a second reader to check consistency with human reports, thereby helping to increase quality of reports and prevent missed or wrong diagnoses. Automated image quantification can further improve the quality of our output, since measurements of tumour size in 3D are tedious and time consuming by hand, but are essential for short-term evaluation of the effects of chemotheraphy. Furthermore, some imaging features cannot easily be recognised by the human eye and brain. For example, every CT shows fat, but usually we are not interested in evaluating and reporting fat distribution and volume. However, quantification of visceral and subcutaneous fat volume and liver fat content provides important prognostic information on cardiovascular health. Quantification of total muscle mass provides important information on the physical activity level of a patient and may help to guide dietary intervention to gain weight in the setting of disease or chemotherapy-induced cachexia. Evaluation of organ hypertrophy or atrophy can be important for prognosis. For example, AI tools are already available for the quantification of brain volume. Therefore, an automated quantitative approach can help to increase the yield of imaging procedures to assess features that are otherwise lost. There are already companies offering AI-based online services to re-evaluate images acquired during routine exams in general hospitals. For example, to generate a cardiovascular risk profile, based on standard CT or MRI acquired for other purposes, to guide (preventive) therapy.

More fundamental application of AI in radiological practice is emerging by separating normal from abnormal exams. For automatically classified normal exams, a standard report can be generated, maybe even without the need for approval by a human radiologist. The next step is to detect and classify disease on abnormal exams. Several exam- ples are already available, such as automated reading and reporting of chest x-rays. These automated analyses are not yet perfect, but they help human radiologists to save time on reading and reporting and serve as quality control for self-assessment. A general consequence of automated image analysis and reporting could be a lack of training opportunities for radiology residents. As they are not the first reader and only learn to check AI-generated reports, however, AI can support radiology training by present- ing new training cases to residents, based on their experience and quality of previous readings. Training can thereby be individualised and the learning curve of a radiology resident can be optimised.

In terms of efficiency and economic reasons, the number of radiologists is at best stabilising. Due to increasing demand from primary patients, and other medical doctors, radiologists have to subspecialise in ever smaller areas of expertise. This high level of expertise has to be available 24 hours per day, 7 days a week. AI can help by spreading workload to other healthcare professionals and by improving workflow. In addition, AI applications can help to support autonomous workflow reading, freeing the emergency ward to deal with increasing workload or a decreasing number of hospital staff during nightshifts. AI can also be incorporated in clinical practice. For example, radiologists can reflect on the quality of their work and improve their performance.

As a consequence, AI can thereby provide potentially increased workload to radiologists. If AI can be trusted, however, radiologists should always be involved in the design of the future of radiology. Therefore, as radiologists we should be involved and integrate AI and other quantitative image analysis techniques into our practice and into the training programmes of radiology residents. We need to open the door wide to AI as a valuable tool, clinical interpretation and autonomy in AI can be strongly involved in shaping our own future and warranted professional development.

For more information, please visit our website.

Professor Umit Apaydin is a radiologist at the Department of Radiology, University of Erciyes, Erciyes University Medical, Ankara, Turkey, and Chairperson of the Musculoskeletal Scientific Subcommittee of ECR 2019.
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Rudolf Ribarz, Apple Tree, 1875 © Leopold Museum Vienna
WHAT’S ON TODAY IN VIENNA?

THURSDAY, FEBRUARY 28, 2019

Theatre & Dance

Die Stühle
by Eugène Ionesco
AKADEMIETHEATER | 19:30
1010 Vienna, Lisztstraße 1
Phone: +43 1 51444 4145 | www.burgtheater.at

Hiob
based on the novel by Joseph Roth
BURGTHEATER | 19:30
1010 Vienna, Universitätsring 2
Phone: +43 1 51444 4145 | www.burgtheater.at

Exorzist
by Dominic Oley
BRONSKI & GRÜNBERG | 19:30
1090 Vienna, Müllnergasse 2
Phone: +43 681 20 67 45 40 | www.bronski-gruenberg.at

Josef und Maria
by Peter Turrini
KAMMERSPIELE DER JOSEFSTADT | 19:30
1010 Vienna, Rotenturmstraße 20
Phone: +43 1 42 700 300 | www.josefstadt.org

Knuckles become clouds
by Anna Prokopová (Czech Republic), Costas Kekis (Greece), Andrea Gunnlaugsdóttir (Iceland)
TANZQUARTIER WIEN | 18:00 | TQW STUDIOS

Concerts & Sounds

Wiener Symphoniker
Conductor Alain Altinoglu
Nora Gubisch, mezzo-soprano
Denis Matsuev, piano
F. Liszt: concerto for piano and orchestra no. 2 a major;
S. Prokofjew: Cantata for mezzo-soprano, choir and orchestra, op. 78
MUSIKVEREIN | 19:30 | GROSSER SAAL
1010 Vienna, Bösendorferstraße 12
www.musikverein.at

Lisa Bassenge ‘Borrowed And Blues’ (Germany)
PORGY & BESS | 20:30
1000 Vienna, Riemergasse 11
www.porgy.at

Coquette Jazzband
Traditional Jazz, Swing
JAZZLAND | 21:00
1010 Vienna, Baumgasse 80
www.jazzland.at

Modeselektor (Germany) • Catnapp (Argentina)
ARENA | 19:00
1030 Vienna, Baumgasse 80
www.arena.wien

The Lemonheads (USA)
CHELSEA
1080 Vienna, Lerchenfelder Gürtel, U-Bahnhöfen 29–30
www.chelsea.co.at

Marsimoto (Germany)
GASOMETER | 20:00
BA-CA Halle Gasometer
1110 Vienna, Guggasse 8 | www.planet.tt

Opera & Musical Theatre

Der Mann von La Mancha
Musical by Mitch Leigh
Conductor: Lorenz C. Aichner
VOLKSOBER | 19:30
1090 Vienna, Währingerstraße 78
www.volksober.at

Vienna Opera Ball
STAATSOPER | 19:30
1010 Vienna, Währingerstraße 78
www.wiener-staatsoper.at

I Am From Austria
Vienna Opera Ball
STAATSOPER | 19:30
1010 Vienna, Währingerstraße 78
www.wiener-staatsoper.at

Bodyguard
by Lawrence Kasdan & Alexander Dinelaris
RONACHER | 19:30
1010 Vienna, Seilerstätte 9
www.musicalvienna.at

Cinema & Film

The Four Horsemen of the Apocalypse (USA 1921)
by Rex Ingram
FILMMUSEUM | 18:30

Buena Vista Social Club (Germany/USA/UK/France/Cuba, 1999)
by Wim Wenders
METRO KINOKULTURHAUS | 18:45

The Four Horsemen of the Apocalypse (USA 1921)
by Rex Ingram
FILMMUSEUM | 18:30

Buena Vista Social Club (Germany/USA/UK/France/Cuba, 1999)
by Wim Wenders
METRO KINOKULTURHAUS | 18:45

Please note that all performances, except at Vienna’s English Theatre, are in German
People & Places
New forum will connect generations, highlighting women’s contribution to medicine

By Aidan Boyd-Thorpe and Mélique Rouger

How can one balance work and personal life? What is the key to academic success? What can experienced radiologists teach their younger peers? Leading experts will address questions that many individuals will have to face throughout their careers, during the Women in Focus programme, a brand new series of ECR sessions that will shine the spotlight on women in healthcare. Prof. Hedvig Hricak, Chair of the Department of Radiology at Memorial Sloan Kettering Cancer Center (MSK), New York, US, explains why she accepted the invitation to chair this programme, how it came to light, and why both women and men should attend the sessions.

ECRT: Why did you take up the challenge of organising ‘Women in Focus’ and what have you learned during your time as chair of the programme?

HH: Through my career as both a physician-scientist and a leader, I have mentored many individuals – both women and men – and have had many valuable opportunities to observe women, as well as men, wrestling with career decisions in academia and in various leadership positions. From that, and from my own life journey, from my successes and my mistakes, I believe I have learned many helpful points that I wish someone had shared with me at the beginning of my career. I took on the challenge of organising this programme because I wanted not only to share my own experience, but also to reach out to other experienced leaders so that we and our fellow ECR participants could learn from others’ perspectives. I am deeply grateful to the ESR President, Professor Lorenzo Persico, and to the ESR Executive Director, Mr. Peter Baierl, for whole-heartedly supporting it. I was so fortunate to be able to attract a diverse and talented group of moderators, speakers, and panelists whose ideas and insights helped shape the programme, and I believe we are in for a memorable event.

I am especially grateful to Prof. Rahul Kulkik, who not only embraced the concept but alsoselfishly offered her input and contributed to the content and planning of the entire programme. I am also very grateful to Dame Janet Husband for her wise contributions and lifelong mentorship, and to Prof. Regina Beets-Tan for ensuring a global perspective and balance of opinions. In addition, my heartfelt thanks go to Aidan Boyd-Thorpe from the ESR Office for skilfully and efficiently overseeing the organisation of the programme. It was such a pleasure to work with the entire group.

Read part 2 of this interview in tomorrow’s issue of ECR Today.
The speakers at the ECR 2019 Opening Press Conference enjoyed some sunrays at the Sky High Stage before their talks. Left to right: Prof. Elmar Kotter, Prof. Jean-Pierre Pruvo, Prof. Regina Beets-Tan, ESR President Lorenzo E. Derchi, Dr. Bernadette Abela-Ridder.

ESR’s EuroSafe Imaging campaign celebrates five years of medical radiation protection. Prof. Guy Frija (fourth from the right), Chair of the EuroSafe Imaging Steering Committee, celebrating with Don Prush (fifth from the right), Chair of Image Gently, and international guests.
THURSDAY, FEBRUARY 28 & FRIDAY, MARCH 1

The Church

Women in Focus

A SERIES OF SPECIAL, NON-SCIENCES SESSIONS DEDICATED TO WOMEN WORKING IN HEALTHCARE

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ORGANISED BY PROF. LORENZO E. DERCHI AND PROF. HEDVIG HRICAK