The big question: CT, MRI or nuclear for coronary artery disease diagnosis?

Faced with a choice of CT, MRI, and hybrid nuclear imaging for the diagnosis of coronary artery disease, which modality is most suitable for any one patient type and why? This question and others will be addressed at the State of the Art symposium to be held today.

Speaking in favour of hybrid imaging, Dr. Sami Kajander, a radiologist at Turku University Hospital, Finland, succinctly states his reasons for believing a combination of modalities is the best way forward: “Hybrid imaging combines the anatomical detail of CT with the excellent sensitivity of nuclear imaging – therefore it is more than the sum of its parts.”

Comparing CT coronary angiography (CTCA) with myocardial perfusion imaging techniques – single photon emission computed tomography (SPECT) and PET – for the non-invasive diagnosis of coronary artery disease, he pointed out that both methods have unique strengths and weaknesses. Firstly, CTCA shows epicardial plaques and stenoses, and normal or near normal CTCA effectively rules out significant coronary artery disease with excellent negative predictive value, but is generally unable to provide information about blood flow at the myocardial level. In contrast, nuclear imaging is the gold standard in assessing the myocardial flow and perfusion, but it fails to visualise the epicardial arteries themselves.

Kajander aims to present a convincing argument for the considerable diagnostic benefits of using information gleaned from both imaging modalities. “The main advantage of using hybrid imaging, in the setting of coronary artery disease, is the possibility of obtaining information on both the anatomy and function of the heart in one non-invasive study,” he remarked.

Prof. Anne G. Osborn is Distinguished Professor of Radiology at the University of Utah School of Medicine in Salt Lake City. She also holds the William H. and Patricia W. Child Presidential Chair in Radiology at the University of Utah.

Prof. Osborn received her Bachelor’s degree and her Medical degree from Stanford University in California, where she also completed her residency. She later worked at the University of Utah School of Medicine and also served as a visiting professor at many prestigious medical institutions.

A renowned neuroradiologist and the first woman to be elected president of the American Society of Neuroradiology, Prof. Osborn has authored several texts considered to be definitive references in her field. Her latest comprehensive textbook, Osborn’s Brain, won the 2013 American Medical Writers Association award for Best Book Written by a Physician.

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DONT MISS TODAY’S HONORARY LECTURE ON BRAIN TUMOURS
NIKOLA TESLA HONORARY LECTURE
Saturday, March 7 12:15–12:45, Room A
Brain tumour update 2015:
What’s new and why you should care
Anne G. Osborn; Salt Lake City, UT/US

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In combination, the data from both modalities provide an estimation of the coronary anatomy and the functional consequences of its disease. By way of example, he explained that in coronary artery disease, hybrid imaging overcomes the inability of anatomical imaging to accurately assess the impact of coronary artery stenosis on the function of the myocardium. For instance, it is often not possible to judge on anatomical grounds alone whether the patient will benefit from a coronary bypass operation or coronary stenting – functional assessment is required to make such a judgement in many cases, he said.

However, Kajander balanced this with the need for anatomical imaging too, in particular how CTC can visualize early plaques that may still be non-flow limiting but already in the remodeling stage of coronary wall disease. “When the disease is evaluated on the grounds of the myocardial function only, even extensive coronary artery wall changes may be unnoticed if they do not limit coronary flow. This has an impact on secondary prevention, for example medication,” he noted, adding that CT gives information about the calcium burden of the coronary tree and as such is valuable in risk stratification and patient management.

Kajander plans to discuss the most suitable patients for hybrid imaging in his talk. He recommends that patients with intermediate risk for coronary artery disease are the most likely to benefit from hybrid imaging. In this group of patients, CT is non-invasively able to detect both the coronary artery wall changes, including the degree of anatomical stenosis and their position in the coronary plaques, while the nuclear medicine part (PET or SPECT) is able to determine how the related myocardium is affected.

Specifically, a patient with risk factors for coronary artery disease but only expressing atypical chest pains with a specific change in stress test would be a prime candidate for hybrid imaging. To determine whether the patient has coronary artery disease, his or her clinician might order a cardiac PET/CT.

“In the case of a coronary stenosis detected with CT stress testing with cardiac MRI should follow. However, when there is no stenosis and no plaque on CT, there is no need for stress cardiac MR because no ischemia/infarction is expected,” he stated. “Firstly, myocardial perfusion imaging with PET or SPECT is currently the gold standard for the functional assessment of the myocardium, which may have an impact on a patient’s management and outcome.”

Finally, he turned to findings from recent literature that influenced his opinion of nuclear imaging: “These data convincingly showed cardiac MRI imaging to be the superior stress test in terms of diagnostic accuracy. In addition, it is not associated with ionizing radiation.”

Dr. Marco Francone, associate professor of radiology at Sapienza University of Rome, will present the case for MRI and pointed out that imaging needed to focus on the identification of ischaemic/non-viable myocardium, which may have an impact on a patient’s management and outcome.

“CT depicts the coronaries, whereas cardiac MR imaging characterizes the myocardium,” Akshat explained. “So CT and MR imaging are complementary tools. Each coronary stenosis should be valued for its haemodynamic relevance in terms of myocardial ischemia/infarction prior to revascularization.”

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Regarding which patients were most suitable for MRI as opposed to other modalities, there is a series of clinical indications in which the exam has been recognized as appropriate and may be used as a first-line technique, and Francone outlined some of the clinical indications: “In asymptomatic stable coronary artery disease, stress cardiac MR is highly recommended in intermediate to high-risk patients mostly in the presence of preceding discordant or a not interpretable stress test.”

In chronic coronary artery disease, viable and non-viable segments can be discriminated with cardiac MR, and this represents a unique tool to correctly categorize patients who might benefit from coronary revascularisation, he concluded.

The availability of 3D volume-rendered techniques has enhanced the clinical value of coronary CT angiography examinations. (Provided by Prof. Hazem Akshat)

State of the Art Symposium
Saturday, March 7, 18:00–17:30, Room F1
ECR TODAY | SATURDAY, MARCH 7, 2015
Hot Shots from Day 3
CIRSE 2015 is the perfect platform for sharing the science behind image-guided medicine. Over 6,400 delegates from around the globe make it the world’s premier interventional radiological congress.

THINK BIG!
Since the discovery of the x-ray, radiology and radiation oncology have been sister disciplines. Recent progress has brought increasing points of interaction between the two and this is no better exemplified than by the close relationship between the ESR and the European Society for Radiotherapy and Oncology (ESTRO). The two societies will host a joint session at ECR 2015 focusing on this partnership and opportunities for future collaboration. To find out more about the session, ECR Today spoke to session co-chairman and ESTRO president, Prof. Philip Poortmans, of the Radboud University Medical Center, Nijmegen, Netherlands.

ECRT: How was this joint session between the ESR and ESTRO first initiated?

PP: The medical specialties working on radiation oncology have a long history of cooperation and multidisciplinary work. Often when we talk about multidisciplinary teamwork, people talk only about doctors who are directly involved in treating the patient. In the case of breast cancer, for example, this would then be the surgeon, the radiation oncologist, the medical oncologist and in several countries also the gynaecologist. People often forget about diagnostic specialists like the pathologist and the radiologist. Radiation oncology is very closely linked to imaging in general, both to radiology and to nuclear medicine. So it is a field that is very important for us and a specialty with which it is essential for us to cooperate closely. For several years, ESTRO has run courses with contributions from radiologists and nuclear medicine specialists to teach our young colleagues, or colleagues who want to change, about the contribution of the diagnostic specialties. So this is not new at all. ESTRO and the ESR have an especially close relationship, with the former president of ESTRO, Prof. Vincenzo Valentini, and the ESR president, Prof. Lorenzo Bonomo, working in the same hospital. People who work in radiology who know each other very well can facilitate this process of close collaboration which then benefits all of us. Often, this means that last year we already had a joint meeting at the ECR. This collaboration is based on a Memorandum of Understanding signed by both societies, which includes agreements about education, guidelines and cross discipline. A Congress is of course always a mixture of both scientific dissemination, bringing new findings to the community, and education, so this nicely fits our mutual commitment.

ECRT: The development of radiology and radiation oncology have always been very closely linked. What are the ‘new chances for a partnership’ referred to in the title of this session, and how was this theme chosen?

PP: The theme was chosen because many radiologists work in hospitals where there is a radiation oncology department. However, radiation oncology is spread, not just in such a way that every hospital in the future will have its own department, but it is likely that more institutions will have connections with a radiation oncology department within a local or regional network. So, in the future, more and more radiologists will need to know how to collaborate effectively with radiation oncologists. Until quite recently, radiation oncologists have not needed radiologists a great deal, because we were trained in doing treatment preparation using imaging ourselves. This is changing rapidly. We are no longer just using plain diagnostic images, but we are more and more using functional imaging using PET and MRI, as well as the new developments in CT and 3D ultrasound. We are also increasingly adapting our treatments to changing aspects of the tumour. For example, when a tumour shrinks, the radiation fields need to be adapted, which can be made smaller. We are used to working with CT on a daily basis, but in the near future we will progressively use MRI. Treatment machines with integrated CT have been around for nearly ten years now, but machines with integrated MRI are new and very exciting developments. And the final point is that the whole field of oncology is changing. We are moving at quite a speed from the traditional clinical approach of taking as much of the tumour out as possible. That’s the basic approach, which is still successful for many patients. But more and more patients are being treated with a combination of therapies and this sometimes leads to an excess of treatment. For example, we know now, based on results from patients with inoperable lung cancer, that other therapies can also be successful. This can be radiation therapy but there are others. If you have a small tumour, you can treat it fairly efficiently with radiation therapy, but you can also introduce a probe into it and heat the tumour to 100 degrees. This is not radiation oncology, but interventional oncology, so there are areas where we overlap. It is sometimes said that we are in competition, but this is simply because we don’t know each other well enough. Working in partnership, with a better understanding of our partner disciplines, we can offer the best approach for the patient community.

ECRT: What are the boundaries and opportunities for this year’s joint session? Why are these areas particularly worthy of focus?

PP: First we have a presentation called Imaging in oncology: achievements and limitations and this is to show clearly what the contribution of diagnostic imaging can bring to radiation oncology. We are at a radiology congress, so this is to inform radiologists how they can contribute to the optimal functioning of the radiation oncology department, especially in terms of functional imaging. Next, we have Interventional radiology in oncology: achievements and limitations which is the same idea, but specific to interventional radiologists. We want to illustrate how complementary each other and collaboration is the best way to improve the outcome for the patient, not competition. There are certainly indications with a low risk of complications, where radiation oncology is the obvious option, but there are others where the risk of complications is higher and where interventional oncology can do a better job, and the other way around. So we have to learn from each other. If you have a certain tumour, on which aspects to base the selection of the most appropriate treatment. The final talk, on Interventional radiology and radiation oncology: working together is about exactly that.

ECRT: Can you tell us something about the speakers and how they were chosen?

PP: As a joint session, there is a mixture of expertise among the speakers, with two having been proposed by the ESR and the third speaker being chosen by ESTRO. Dr. Vicky Goh, from London, U.K., is president of the European Society of Oncologic Imaging, and a consultant oncological radiologist, so her insight will be extremely valuable. Then we have Prof. José Bilbao, from Pamplona, Spain, who is vastly experienced in the field of interventional radiation and will be well-known to many attendees as the ECR 2013 Congress President. Finally, Dirk Verellen is not a radiation oncologist, but an extremely high level medical physicist who is also an exceptional presenter. He knows a huge amount about new developments, and has contributed to many of them himself, so he can show the radiology community how far we can go and what he expects in the future.

ECRT: What would your message to ECR participants who might consider attending this session be?

PP: Everybody can profit from this session because it will be of general interest to all, but the level of presentations is such that it is especially attractive to people who are at least partially involved in the field of oncology. Particularly for younger colleagues who want to have a really visionary view of what the future can offer, this will really be a fantastic opportunity. The main takeaway message is to meet your radiation oncologist, whether they are in your hospital or in a network of hospitals; explore where you can work together to improve the joint multidisciplinary approach, and contribute in a more active way to joint activities like multidisciplinary tumour boards.

HIGHLIGHTS

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Joint Session of the ESTRO and ESR (European Society for Radiotherapy and Oncology)

Saturday, March 7, 16:00–17:30, Room Z

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New horizons shape the future of optical molecular imaging

Powerful new methods of optical imaging capable of visualising activity on the molecular level – including Cerenkov (blue light) radiation, reporter gene imaging and opto-acoustics – herald a new era in optical imaging.

“In our case we use gene reporters that express fluorescent or bioluminescent proteins that can be imaged by fluorescence imaging (FLI) or bioluminescent imaging (BLI),” he told ECP Today. “You then transfect this gene reporter construct into the genome of cells.”

When the gene promoter is activated, for example by signal transduction, drugs, or other biological stimuli, the reporter gene is expressed and emits an optical signal, in this case light of a certain wavelength. The strength of the luminescent light generated is a measure of the level of a chosen gene’s expression. The particular gene being assessed might relate to a tumour, for example.

“In the case of sensitive cell tracking and imaging, we use strong constitutive gene promoters that will lead to continuous high expression of the optical reporter gene,” he noted. Currently, reporter gene technology cannot be used in humans due to the unknown risks associated with genetic engineering of cells. However, this technology is important for the optimisation of new clinical protocols in pre-clinical animal models, for example, stem cell transplantation for ischemic diseases or rapid drug screening for cancer treatments.

As the highlight of his talk, Löwik will show how reporter gene imaging can follow tumour progression. T-cell migration towards the tumour, activation of T-cells after vaccination with a tumour antigen, and eradication of the tumour by T-cells using multi-colour luciferases (a class of oxidative enzymes active in bioluminescence). He intends to provide an overview of some of his group’s most recent advances. “We have developed a transgenic mouse in which all T-cells express CFP, at a peptide vaccine expression (from the Institute for Biological and Medical Imaging at the Heil- holzt Zentrum in Munich, Germany, will describe current progress with methods and applications for in vitro imaging techniques transform quantitative measures and practice.

Edward Long, PhD, from the School of Medicine and Dentistry at the University of New York, will speak on Cerenkov radiation at today’s New Horizons session.

”This shows that we can optimise tumour vaccination protocols and study their efficacy to eradicate tumours by this kind of immuno- therapeutic approaches,” concluded Löwik.

Prof. Dr. Vasilis Ntziachristos, from the Institute for Biological and Medical Imaging at the Heil- holzt Zentrum in Munich, Germany, will describe current progress with methods and applications for in-vitro and in-vivo imaging techniques transform quantitative measures and practice.

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Why Europe must play catch-up on MR safety measures and practice

One seemingly small mistake while performing an MR study can result in a serious accident that may injure patients and staff or damage equipment. While the delegation of an MR safety officer at each site is strongly recommended, few centres have as yet implemented this in practice. The situation looks set to change with the emergence of formal national and international guidelines that seek to minimise the risks for patients and professionals.

“MRI safety is just as important as radiation protection in other imaging modalities. Everyone has to appreciate the power of the magnet field and associated risks,” said Csaba Vandulek, radiography services manager, Kapossvar University Health Centre, Hungary and also president of the European Federation of Radiographer Societies. “The fact that medical devices, such as respirators or patient monitors, are labelled as MR compatible does not mean that they can be taken close to the MR scanner. Manuals must be checked for every device.”

Furthermore, not all medical devices are currently tested and classified as safe in 1.5 Tesla (T) or safe in 3T or higher field strengths. He added. More tests are required to prove safety for such items, but limited resources and time restrictions often prevent these tests from being carried out.

Another common misconception stems from the idea that 3T scanners now have better shielding than they used to, and safety issues are therefore of less concern than before, he pointed out. Only certain professionals who spend the majority of their time working with high field scanners can work around the many risks and safety hazards associated with low field when they suddenly swap to high field,

Vandulek illustrated this point with a personal anecdote from a large hospital outside of Hungary, where he was training staff on a 1.5T scanner. On one occasion, the nurse who had administered the contrast agent approached a patient lying on a table near the scanner to prepare him for the injection. The nurse’s scissors flew straight out of her pocket, only centimetres away from the patient’s head and into the bore of the magnet.

“What she did not understand was how this could happen to a member of staff who was working in the MRI department for some time. It was not her first time there. She was a regular,” he explained, noting that the mistake was probably not the patient’s fault but rather the technician’s, “yet she was not too careful, and nor should she underestimate MR.”

To avoid complacency, Vandulek advocates regular compulsory MRI safety training and the delegation of an MRI safety officer at each MRI unit. This officer should be responsible for staff training, awareness of the current safety rules and guidelines, and having the time and resources to keep up-to-date with MRI safety issues.

While the role of these officers is accepted and endorsed in the EU, there are yet no European requirements or official guidelines for a member of staff to fulfil this role at MRI sites. The MRI Safety Working Group, which comprises key stakeholders, points to regional and international MRI associations, is drawing up recommendations for maintaining MRI safety across the European Union. Part of this guidance includes safer working conditions for MRI staff, as many MRI sites remain as yet without such an element in their MRI staff team.

Vandulek believes that the safety officer should be actively involved in patient scanning and be well versed in the 2013 updated guidelines from the American College of Radiology (ACR), the International Electrotechnical Commission (IEC) guidelines, as well as other national guidelines where they exist.

“It would be a mistake to specify one set of MRI safety guidelines for the whole MRI community. It is best for the officer to develop internal protocols based on international guidelines, but in line with local practice and adapted to the equipment used at the site,” he noted. “I believe that in future, MRI radiographers will have a key role in ensuring a safe environment and practice at MR imaging facilities across Europe.”

While safety is an ever-present concern and patient cooperation. Cine imaging is usually made with steady-state free precession (SSFP) pulse sequences, which are prone to susceptibility effects arising from lung-heart interfaces, or in patients with pleural effusion. The heterogeneity of the main field leads to local variations of the SSFP signal and dark band artefacts.

“There are possible solutions to this problem. These include ensuring the lowest possible repetition time, transforming localised high-order shimming to reduce those steady-state signal dropouts, and performing the frequency scout to identify the frequency offset to further minimise these artefacts. That said, the use of spoiled gradient-recalled echo (GRE) sequences instead of SSFP may be the ultimate alternative to get good quality images,” she said.
Cardiac CT has made great strides displacing conventional invasive coronary angiography, but its potential is still being tested, as new technologies are implemented and myriad of clinical trials get underway to boost understanding and improve their clinical utility. Today’s session will explore this entire area.

There are two approaches to stress CTP: static, in which images are acquired during a predefined single time point, and dynamic, in which images are acquired over a predetermined period of time to characterise the wash-in and wash-out of contrast medium in the myocardium. However, dynamic stress CTP is usually performed for routine clinical purpose due to the rapid progress in hardware and software for dose reduction, according to Dr. Kiyohito Tsumura, an assistant professor in the department of radiology at Meiji University Hospital in Tokyo, Japan.

At today’s session, he will describe state-of-the-art techniques for image acquisition and discuss the advantages and limitations of dynamic stress CTP and myocardial delayed enhancement (CTDE).

A key dilemma is whether stress CTP is ready for prime time.

Professor G. Bastarrika, Pamplona/ES

A rapidly emerging technique is FFR (fractional flow reserve) CT, which offers new insights into the evaluation of coronary stenosis significance, according to Dr. Gorika Bastarrika, a cardiac thoracic radiologist at Clinica Universidad de Navarra in Pamplona, Spain.

“The main advantage of FFR-CT is that it provides functional information of coronary artery stenosis, which is particularly important in intermediate lesions,” he noted. “The addition of FFR-CT may increase the specificity and positive predictive value of CCTA (coronary angiography) and help reliably false positive patients as true negative.”

The technique also adds the benefit of obtaining functional information without added radiation, as opposed to myocardial CT perfusion, for example. It also has potential for planning and estimating the effect of coronary intervention before the procedure.

There are limitations, however, Bastarrika said; these include the fact that FFR-CT is very dependent on the image-quality of CCTA. Accuracy of the results depends on adequate contrast opacification of the coronary vasculature and absence of artifacts. The coronary flow is based on mathematical algorithms being developed by industry. Supervascular power is required for the analysis from proprietary software, and CCTA images need to be transmitted to the company for processing.

Although less expensive than conventional FFR, the cost of FFR-CT is set by the manufacturer; he explained. Several companies are currently developing software that can generate FFR data online, and when these products are approved for clinical use, the main hurdle for widespread adoption of this technology will be eliminated.

FFR-CT applies computation fluidodynamic modelling to an anatomical model of the coronary artery tree segmented from CCTA. A mathematical model is created to establish coronary artery physiology. Blood flow is modelled using specific equations for fluid flow. Specifically, fractional flow reserve from CT enables calculation of rest and hyperemic pressure fields of coronary arteries.

Three large multicentre clinical trials (DISCOVER-FLOW, DEFACTO and NXT) have validated the only product received U.S. FDA clearance in 2011, European regulators approved the product for clinical use, but only a handful of hospitals in Europe are currently using the technology. The product received U.S. FDA clearance in November 2014.

Also, CT stress myocardial perfusion (CTP) has emerged as a promising method, when combined with CCTA, can improve the evaluation of coronary artery stenosis in high-risk patients. Like FFR-CT, its use can help improve diagnostic accuracy by combining the anatomic aspect of CCTA with a physiologic assessment. The combined use of CCTA and stress CTP also has been shown to reduce the number of false positives. This may reduce the number of unnecessary invasive procedures and in many cases, offers a less expensive alternative.

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A key dilemma is whether stress CTP is ready for prime time.

Professor G. Bastarrika, Pamplona/ES

A rapidly emerging technique is FFR (fractional flow reserve) CT, which offers new insights into the evaluation of coronary stenosis significance, according to Dr. Gorika Bastarrika, a cardiac thoracic radiologist at Clinica Universidad de Navarra in Pamplona, Spain.

“The main advantage of FFR-CT is that it provides functional information of coronary artery stenosis, which is particularly important in intermediate lesions,” he noted. “The addition of FFR-CT may increase the specificity and positive predictive value of CCTA (coronary angiography) and help reliably false positive patients as true negative.”

The technique also adds the benefit of obtaining functional information without added radiation, as opposed to myocardial CT perfusion, for example. It also has potential for planning and estimating the effect of coronary intervention before the procedure.

There are limitations, however, Bastarrika said; these include the fact that FFR-CT is very dependent on the image-quality of CCTA. Accuracy of the results depends on adequate contrast opacification of the coronary vasculature and absence of artifacts. The coronary flow is based on mathematical algorithms being developed by industry. Supervascular power is required for the analysis from proprietary software, and CCTA images need to be transmitted to the company for processing.

Although less expensive than conventional FFR, the cost of FFR-CT is set by the manufacturer; he explained. Several companies are currently developing software that can generate FFR data online, and when these products are approved for clinical use, the main hurdle for widespread adoption of this technology will be eliminated.

FFR-CT applies computation fluidodynamic modelling to an anatomical model of the coronary artery tree segmented from CCTA. A mathematical model is created to establish coronary artery physiology. Blood flow is modelled using specific equations for fluid flow. Specifically, fractional flow reserve from CT enables calculation of rest and hyperemic pressure fields of coronary arteries.

Three large multicentre clinical trials (DISCOVER-FLOW, DEFACTO and NXT) have validated the only product received U.S. FDA clearance in 2011, European regulators approved the product for clinical use, but only a handful of hospitals in Europe are currently using the technology. The product received U.S. FDA clearance in November 2014.

Also, CT stress myocardial perfusion (CTP) has emerged as a promising method, when combined with CCTA, can improve the evaluation of coronary artery stenosis in high-risk patients. Like FFR-CT, its use can help improve diagnostic accuracy by combining the anatomic aspect of CCTA with a physiologic assessment. The combined use of CCTA and stress CTP also has been shown to reduce the number of false positives. This may reduce the number of unnecessary invasive procedures and in many cases, offers a less expensive alternative.
Today’s modalities are equipped to export digital data to PACS or to dose analysis software. Increasingly sophisticated radiation exposure monitoring systems (REMS) that capture, track, analyse, and report radiation dose metrics are feeding the commercial marketplace. Early adopters have shown that these systems can be a powerful tool to optimise imaging protocols and technique and to identify outliers.

REMS have made radiation dosimetry feasible and provide a measure of cumulative data about a patient’s radiation dose exposure history. But do these systems provide diagnostic information to patients about the effective radiation dose received from a specific examination and the risk to health it may represent? The answer is no. So is patient dose tracking a hospital radiology department gimmick? Or is it a fail-safe that acknowledges public, patient, and healthcare agency concerns?

Radiation dose tracking is needed and it has value, and diagnostic imaging departments should implement a programme, delegates will discover at today’s session. Speakers will present case histories relating to clinical REMS implementation and discuss the appropriate utilisation of radiation dose tracking. Attendees will also be updated about the DICOM initiative underway to develop a patient radiation dose structured report.

OVERSEEING A REMS

David Zamora, a clinical medical physicist at the University of Washington in Seattle, is a proponent of the hospital’s REMS. He discussed with ECR Today some of the work to be done when implementing a REMS and maintaining functionality.

Newer imaging equipment can efficiently provide radiation dose data to a REMS. Challenges may arise when integrating older equipment—mobile C-arms, for example—that do not have modality-performed procedure step (MPPS) or radiation dose structured reporting (RDRS) functionality. They may display radiation dose metrics, but transferring that information to the REMS by using optical character recognition, or other methods can be very difficult, time-consuming, and sometimes impossible, he explained.

When a REMS is being implemented, it is imperative to understand and verify that the radiation indicators of each modality and each piece of equipment are producing accurate data. Generation of inaccurate data should be identified and addressed by the vendor during equipment acceptance testing and annual physics tests, but it should be done when a REMS is installed. This exercise is often overlooked, but its importance when installing a REMS cannot be overstated. No data should enter a database that may be used for clinical decision making unless it is proven to be accurate, according to Zamora.

Normal changes in the clinic, such as equipment software updates, can easily affect information flow to any REMS. Medical physicists cannot assume that all the data transferred to a REMS will continue without error. He cautioned that it is imperative for radiology departments, and everybody in the information pipeline, to alert the medical physics personnel in advance of a scheduled software update or upgrade. In his years of experience working with a REMS, he has found that there is some downstream component of the integration that will need to be modified.

There is always an opportunity for a calibration step to be overlooked or done incorrectly that can affect the source data, he said. “It is a balance to ensure that scheduled maintenance of modalities does not affect the data coming from their individual system. Verifying this and ensuring that the communications pipeline stays intact is the most effort and requires the most oversight. It requires constant management.”

Medical physicists who are positioned to be the bridge linking traditionally disparate groups—technologists/放射 technologists, radiologists, supervisors in the radiology department, HIS/PACS team, hospital IT team, and hospital administration.

A surprisingly large number of staff will be affected by the REMS. Their individual usage and communication requirements need to be coordinated and met. Medical physicists can play a major role in explaining what the looming issue is, how to best analyse it, and to help educate radiologists with respect to interpreting the data within its limitations.

Having a radiologist champion helps, especially for the process of obtaining the necessary budget to maintain REMS operations.

DICOM PATIENT STRUCTURED REPORT INITIATIVE

For at least five years, many modalities have MPPS and RDRS functionality allowing information about radiation output of an examination to be stored. Each individual diagnostic image has a header that may contain some of this information, while the RDRS acquires all radiation output information from the equipment, such as a study and places it into a single structured template form. This transfers to a REMS or the patient’s file in a RIS/PACS. But what does such data mean?

A 2012 information paper (https://www.ncbi.nlm.nih.gov/books/NBK214177/) from the U.K. Royal College of Radiologists on purchasing a REMS advised:

• The values submitted to the system will be a mixture of dose indicators, making comparisons difficult or impossible. These are measured or calculated doses/dose-length product/dose-area product per or of organs, or calculated estimates of dose to skin or organs.

• It is inappropriate and meaningless to add dose indicators from different modalities or parts of the body into a single cumulative value.

• Estimating effective dose to a patient requires knowledge of the characteristics of the specific modality involved, the ray beam quality and the x-ray projections, the size of the patient and knowledge of the organs exposed, alongside the information submitted in the DICOM RDRS.

Donald Peck, Ph.D., is vice chairman of radiology at Henry Ford Health System in Detroit, Michigan, co-chair of the DICOM Working Group 15, and a member of the Executive Committee of Image Wisely. He agrees with these points, explaining: “People are utilising radiation output parameters from data that are in DICOM images and structured reports to extrapolate a patient’s effective dose. They are using accurate information incorrectly. The DICOM Patient Radiation Dose Structured Report (P-DRS) is being developed to take all of the structured data about output and put it into a form that will enable clinicians to talk about an individual patient dose; they will have the information. It is to be understood.”

The question is: how much radiation and absorbed energy from a modality was deposited in a patient’s body? “To do this, you need to know the age, the weight, and the body habitus of the patient, because radiation absorption for a 7-year-old 15-pound woman and a 250 pound 40 year old man will be substantially different. Once this is calculated, deterministc effects like skin damage or foetal effects from this radiation dose can be estimated,” Peck stated.

The use of individual absorbed doses to estimate stochastic effects (such as cancer induction) requires the use of weighting factors that have been developed for broad publications. These would need to be modified from the patient population they represent and recalculated to match the characteristics of the specific patient. This is very complex, he pointed out. The method to do this has not been proven, so these estimates should not be done for the individual patient. But using the estimated organ absorbed dose determined for many patients can provide a much greater understanding of the radiation burden from a specific modality or exam compared to the current use of the RDRS data alone.

The DICOM P-DRS is in the final stages of a four-year-long development process. Peck said that he and his committee colleagues hope to present the first draft in 2015. It will contain all the concepts of how much radiation hit the patient, what parts of the body it hit, and the methodology used to estimate the absorbed dose in the organs. Once finalised, an IHE profile can be developed so that this new standard can be utilised by vendors in a uniform manner.

“Having uniform data about radiation dose will ultimately make radiology safer. It may drive new innovations such as iterative reconstruction software for CT imaging—that can further reduce radiation exposure to patients. And it will enable radiologists to discuss radiation risk with fellow clinicians with more facts and greater certainty.”

The automated transfer of data from PACS to a REMS is making this process feasible,” he concluded.
Targeted imaging of immune cell activity can serve as a surrogate marker for tumour-mediated immunomodulation in metastatic breast cancer in mice.

Aside from tumour localisation and size at the time of diagnosis, the presence, grade or likelihood and size at the time of diagnosis, and molecular imaging is significantly higher in metastatic than non-metastatic tumours.

In vivo imaging of immune cell activity within tumour lesions with different metastatic capabilities as depicted by S100A9-specific imaging. Overlay of x-ray and fluorescence image 24 hours after tracer application (scale: mean photon counts in arbitrary units). Breast cancer (BC) bearing mice with different tumours of common genetic background (white arrow): Metastatic BC forming distant metastasis (4T1, top) or local lymph node metastasis (67NR, middle) and non-metastatic BC (675NR, bottom). Immune cell activity as reflected by optical molecular imaging is significantly higher in metastatic than non-metastatic tumours.

(Provided by Nils Große Hokamp)
During drug eluting bead (DEB) transarterial chemoembolisation (TACE), DEBs are mixed with iodinated contrast to aid visualisation during treatment. Tumour staining is confirmed using fluoroscopy after DEB administration and a follow-up CT or MRI is performed in 1–6 months to determine treatment response. However, the fluoroscopic staining patterns are not an accurate depiction of total DEB uptake by the tumour. Most modern interventional suites are equipped with the technology to perform cone-beam computed tomography (CBCT). At the expense of a nominal amount of additional procedure time and radiation, a CBCT can be performed to determine the tumour's volumetric staining pattern prior to the patient leaving the interventional suite. We have found these staining patterns on CBCT are predictive of treatment outcome.

Five staining patterns have been characterised: Minimal (<25% tumour staining), Mild (25–50% tumour staining), Moderate (50–90% tumour staining), Robust (>90% tumour staining), and Circumferential tumour staining. Based on mRESIST criteria, increased tumour staining correlates to improved treatment response and tumours with submaximal staining are at higher risk of progression. We found that all patients with Robust staining had at least stable disease with 90% demonstrating complete tumour response. On the other side of the spectrum, 18% of patients with minimal staining had at least stable disease with only 9% demonstrating complete response.

The utility of performing a CBCT after DEB-TACE is to aid the interventional radiologist in determining the likelihood of success at the time of treatment. Those patients whose treatments will likely fail may be offered additional therapeutic interventions prior to tumour progression.

**Utility of intra-procedural cone-beam CT in predicting treatment outcome for drug-eluting bead (DEB) transarterial chemoembolisation (TACE)**

**Minimal Staining**

**Mild Staining**

**Moderate Staining**

**Robust Staining**

**Circumferential Staining**

(All images provided by Dr. Benjamin H. Ge)

BY BENJAMIN H. GE
Pulmonary thin-section MRI with ultra-short TE

Comparison of capability for lung and mediastinal radiological finding assessments with thin-section MDCT in patients with various pulmonary diseases

Since magnetic resonance (MR) imaging was first introduced, many investigators have been interested in this technique, not only for the brain, but also other areas including the chest. Although there were efforts to use MR imaging for evaluating different pulmonary diseases in the early 1990s, adequate image quality within an appropriate examination time could not be achieved then. In the 2000s, technical advancement, the utilisation of contrast media and the development of better post-processing tools were reported, and state-of-the-art MR imaging of the lung was therefore thought to be a viable alternative, along with a complementary approach to managing pulmonary and cardiopulmonary diseases with morphological and functional information. However, unlike MDCT, visualisation of lung structures and assessment of radiological findings in MR imaging were not achieved.

Therefore, pulmonary MR imaging is still one of the most challenging fields in MR imaging.

Recently, in collaboration with Toshiba Medical Systems Corporation, we developed a new clinically utilisable UTE thin-section approach to managing pulmonary and cardiopulmonary diseases in patients with pulmonary parenchyma diseases.

We hypothesised that pulmonary thin-section UTE MR imaging could be used to assess radiological abnormalities in various pulmonary diseases similar to thin-section MDCT. The purpose of this study was to determine the capability of pulmonary thin-section UTE MR imaging for radiological findings assessment by comparing it to thin-section MDCT in patients with various pulmonary diseases.

Thirty-two consecutive patients with various pulmonary diseases underwent pulmonary thin-section UTE MR imaging and thin-section MDCT examinations. All pulmonary thin-section UTE MR imaging examinations were performed using a respiratory-gated 3D radial UTE pulse sequence (TR 150μs, flip angle 5 degree, 1×1×1mm 3 voxel size). The probabilities of the presence of chest abnormal findings were assessed by means of a five-point visual scoring system on both modalities, and the inter-modality agreement between pulmonary thin-section UTE MR imaging and thin-section MDCT on each finding was evaluated by kappa statistics and an y2 test.

According to our study results, inter-modality agreements were determined to be significant, and evaluated as moderate, substantial or almost perfect (0.45<k<1.00, p<0.0001). Therefore, we concluded that pulmonary thin-section UTE MR imaging could be used to assess radiological abnormalities in patients with various pulmonary diseases as well as thin-section MDCT.

We believe that pulmonary thin-section UTE MR imaging may be one of the most important MR sequences for the management of various pulmonary diseases in the near future, although further basic, as well as clinical, studies are still required to validate the real significance of this technique as a substitute to thin-section MDCT.
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TURKRAD, Antalya, Turkey: November
(exclusive for members of the Turkish Society of Radiology)

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PACS providers seek inspiration from up above

Clouds are gathering around the technical exhibition at ECR 2015, but this isn’t a sign of bad weather on the way. Instead it could possibly mean a brighter future for those radiology departments across Europe that are trying to cope with the pressures of a constantly expanding workload on either a static or shrinking budget.

Distributed or cloud-based data storage systems may have been around for a while, but this year they have become a much more prominent feature of the PACS technologies displayed by vendors. Manufacturers see this approach as a vital component in a strategy to deal more efficiently with the huge volumes of imaging data being generated by hospitals and to help them provide a better service for their patients at a lower cost.

Improve efficiency by eliminating waste is the idea behind Siemens Healthcare’s Teamplay cloud-based network linking up to 100,000 customers around the world that are using the company’s imaging systems. “Globally, we estimate that our technologies are used in the diagnosis for 200,000 patients every hour. That generates information to answer clinical questions and for planning therapy but a tremendous amount of data is never used. This would include utilisation data, dose information and details of the actual protocols being used,” explained Dr. Marc Lautenbach, vice president of marketing with the company’s Syngo business. “Teamplay will connect our entire customer base, allowing them to exchange information, pool their knowledge and even compare their performance against internal and external benchmarks.”

Although primarily designed to help radiologists to share information with their colleagues and referring physicians, it will also provide data on utilisation rates for the different systems and to demonstrate compliance with safety regulations. The data can be readily accessed on a desktop or mobile device through a DICOM application, and the company has invested heavily to ensure high security standards and the patient’s personal data are encrypted and anonymised for transmission, he noted.

The products aim to serve as the universal connector to different data sources for anyone with the appropriate authorisation, whether they are radiologists, clinicians from other specialties or departmental managers.

“What is special about the cloud is that once software is loaded on it, it is accessible to everyone, there is no need to constantly upload the cloud system. We are also aware that many users are not IT experts. We don’t want them to have to provide applications training for thousands of people, so the Teamplay system is intuitive and exceptionally easy to learn.”

One of the first healthcare IT companies to identify the value of a cloud-based system was GE Healthcare, which introduced its Centricity 360 PACS technology at ECR 2014. This year it is back with an update containing additional post-processing software that significantly extends customers’ diagnostic capabilities and saves them valuable time. The system incorporates advanced cardiology tools formerly housed in a separate PACS, along with additional features for mammography and urology investigations.

“If you want radiologists to work faster and more effectively then it’s vital for the system to encompass all the tools that they need. Previously, this may have been fragmented with some tools on different workstations with different log-ins and licensing arrangements. Bringing them together in a single user interface on one desktop will eliminate those complications and it can drive a 20 to 30 per cent improvement in productivity,” said Olivier Croly, vice president and general manager of GE’s European healthcare IT unit.

With hospitals aiming to provide affordable care by creating collaborative care networks, radiologists are increasingly required to interact with colleagues in centres some distance away. Centricity 360 helps make this a reality by creating an efficient vendor neutral archive (VNA) and the technology to align different RIS platforms to allow cross-enterprise reporting.

At ECR 2015, GE is unveiling its next big idea: the technology behind creating a cloud-based service to facilitate multidisciplinary team meetings on particularly challenging cases. Such events may involve more than 10 participants with different professional backgrounds based at various centres, and the time and expense of bringing them together can be considerable, Croly says. So the company is working with clinicians and managers in a network of seven acute care hospitals around Nottingham in the U.K. to overcome these difficulties by developing the PACS, VNA and RIS technologies needed to support the service.

Creating a VNA to allow physicians to share relevant clinical data on a patient has been the focus of many vendors’ efforts over the past few years, but what really matters is the workflow that it generates and the quality of the radiologist’s report, according to Saskia van den Doel, worldwide marketing manager with Carestream’s health information systems business.

In the latest version of its Vue PACS technology, the company is providing radiologists with the option to insert interactive hyperlinks to key images, along with quantitative analysis tools in the form of tables for vessel analysis or lesion management.

We are moving away from text reporting towards multimedia reporting. Any material DICOM, non-DICOM and even photographs will be accessible from the electronic medical record via one single point of entry. This will improve our customers’ diagnostic capability by bringing everything together via a single viewer which is zero footprint and can be accessed anywhere, even from mobile devices,” she explained.

Sectra has adopted a collaborative approach to healthcare IT innovation by integrating software developed by third party companies within its PACS. Recognising that PET/CT imaging is attracting increasing interest, it has teamed up with Mirada Medical to develop fusion software that will be on show in the technical exhibition.

The company says it will be demonstrating as a work-in-progress a tool that fuses PET and CT images from hybrid modalities. The tool includes support for triangulation, standard uptake value measurements, multi-plan layout, colours, etc. continued on page 18
On the Philips booth, the latest version of the IntelliSpace Portal can be viewed. The product offers advanced analytics, visualisation and data sharing across multiple systems and imaging scan types. Version 7.0 also offers a broad set of clinical applications covering cardiology, vascular, oncology and neurology. These include new cardiovascular applications like Advanced Vessel Analysis, which can reduce time to results by up to 77%, as well as introducing applications to help measure and track chronic obstructive pulmonary disease and workflows designed to speed the detection of pulmonary emboli.

Meanwhile, Barco staff are keen to demonstrate their new diagnostic display, Coronis Uniti, which the company says is the first explicitly designed for both PACS and breast imaging. Its reported benefits include exceptional image quality, inventive productivity features, and a commitment to ergonomics in response to the specific challenges facing modern radiology departments, notably increasing image volumes, growing complexity, and ergonomic stress. According to a company statement, “By supporting both PACS and breast imaging, calibrated colour and grayscale, 2D and 3D, and static as well as dynamic images, Coronis Uniti eliminates the need for multi-head display setups or moving to another workstation, thus increasing workflow efficiency while saving costs.”

Agfa Healthcare is also displaying a product for the first time in Europe. Called the Consolidated Enterprise Imaging platform, it combines a VNA, viewer, radiology suite, cardiology suite, image transfer software, along with new functionalities like chat and image share, to support greater communication and collaboration along the patient care continuum.

“This consolidates imaging data, image-enables the EHR (electronic health record) and provides secure access to all images in one view, accessible anywhere, anytime. It brings the benefits of the imaging workflow to the entire hospital and a single, completely unified imaging platform provides PACS, reporting, advanced image processing and integration of clinical information,” said James Jay, Agfa’s global vice president for imaging IT solutions.
EIBIR continues its path of progress and growth

The European Institute for Biomedical Imaging Research looks back on a period of continued success.

Commitment to supporting cutting-edge research in the field of biomedical imaging, the European Institute for Biomedical Imaging Research (EIBIR) is delighted to look back on a period of substantial progress and steady growth. When the thought of a European institute for biomedical imaging research was born in 2005, it quickly developed into a European action plan, and EIBIR was established a year later. Soon, with financial support from a core group of industry partners, EIBIR started initiating projects at a research level and by 2010, EIBIR’s network had grown to a point where there was a need for guidance of the various bodies and a strategic plan to ensure efficiency, viability, well-structured activities and a focussed use of resources.

Since then, the EIBIR network has grown further and the number of member institutions has increased significantly over the past years alone saw a rise in membership applications of more than 40%. There are currently over 100 Network Members representing 26 countries, with strong indications that the network will continue to expand. In the course of the past years, the number of EIBIR shareholders has increased significantly over the past years. 2014 represented growth further and the number of shareholder organisations, having joined only recently during the last General Meeting. EIBIR has also been able to further strengthen its partnership with the industry. The industry-initiated investigational study on MRI (MIPA) continues to pursue a successful path, and EIBIR has productively collaborated with its industry partners on numerous project proposals over the course of recent years. The funding opportunities presented under Horizon 2020 also allowed for EIBIR and its industry partners to successfully collate and pursue project proposals under the Future and Emerging Technologies call, as well as under Societal Challenges 1: Health, demographic change and wellbeing.

Moreover, EIBIR has recently put an emphasis on offering services especially targeted towards SMEs (small and medium-sized enterprises) to support them in taking advantage of the new funding opportunities. As a result of these efforts, EIBIR was delighted to welcome seven new SME partners to the EIBIR Industry Panel in 2014 and anticipates fruitful future collaborations. In addition, EIBIR sees its continuing growth and success to the last initiative and the fruitful activities in the field of biomedical imaging. The achievements of the past successful years have established EIBIR as the most efficient and effective research support organisation in Europe. EIBIR looks forward to continuing this successful path over the coming years.

Please feel most welcome to visit the EIBIR booth at ECR 2015 (located in Hall D3, Stand L006). An active engagement most recently resulted in the introduction of the EIBIR booth at ECR 2015 for EIBIR members. The active engagement of EIBIR members will continue to make a valuable input for the development process of the Horizon 2020 Work Programme 2016-2017. EIBIR and its Scientific Advisory Board will continue to emphasise the importance of including biomedical imaging in future European research agendas.

Since the beginning of 2015, EIBIR has pursued its work on Horizon 2020 further, extended its activities and continued promoting common initiatives and interoperability in the field of biomedical imaging. The achievements of the past successful years have established EIBIR as the most efficient and effective research support organisation in Europe. EIBIR looks forward to continuing this successful path over the coming years.

Please feel most welcome to visit the EIBIR booth at ECR 2015 located in the entrance hall to learn more about EIBIR, its activities and services, and to find out what is in it for you. We hope that you will feel encouraged to join EIBIR and its activities in the field of biomedical imaging research.
Enterprise IT to enable new generation of ‘modular’ radiology IT

As an early-adopter of healthcare IT, radiology has tightly controlled selection and use of IT systems such as PACS and RIS. Yet, with the rapid advance of IT systems spreading across the hospital, the control of radiology IT is increasingly being dictated by hospital IT departments and executive leadership.

Unsurprisingly, this is causing issues for radiologists, forcing re-training on new PACS and RIS software, or even increasing apathy and disinterest in the broad digitalisation of healthcare amongst radiology professionals. While this trend is a clear cause for concern, new enterprise healthcare IT also has the opportunity to re-enable radiologist control of their IT systems through ‘modularisation’ of departmental IT applications. Before we take a look at how this is predicted to happen, and why short-term enterprise IT pain should mean long-term gains for radiologists.

Adoption of enterprise IT systems has been spurred recently by major initiatives to digitalise patient records with electronic medical records (EMR) in a bid to increase efficiency, improve the quality of care and ultimately save money. While conceptually an adoption process relatively simple, the complexity of healthcare shifting from paper to digital is rife with challenges. The sheer number of stakeholders, specialties, disparate data silos and networks within one hospital is staggering. Add the complexity of local, regional and state legislation, ill-defined and patchy data standards and healthcare spending cuts, the challenge becomes far greater. Therefore, we should not be surprised that so many different approaches to enterprise IT have been adopted with a varied range of success.

Despite the initial pain of enterprise IT implementation, there will be some clear benefits for radiologists in the mid- and long-term outlook. Enterprise IT systems can form consistent platforms on which ‘modular’ application software can be ‘plugged-in’, especially if cloud architecture is being used. Radiology could be one such application, laid on top of the EMR, hospital information systems and enterprise storage add-on. This could then hand back control of radiology IT software to those that use it the most, rather than being dictated by the enterprise hospital IT network.

Radiologists could choose applications that best suit their clinical, research or unique departmental need, while still conforming to the core interoperability of wider hospital IT system. Moreover, radiologists could also benefit from a far greater pool of ‘longitudinal’ patient data, tracking the complete history of the patient through the care pathway. This will not only drive greater clinical collaboration between radiology and other clinical departments, but should also drive better diagnoses.

Of course, this is a broad and simplified view, overlooking some of the complex challenges that exist to get to the point of modular radiology IT applications. Vendor compatibility, both from enterprise IT and specialist ‘ology’ IT solutions must improve, ideally under harmonised universal standards. Use of cloud architecture is still immature, hindered by security concerns, lack of infrastructure and an over-reliance on capital intensive investment rather than more cost-effective operational service approaches. In addition, many other clinical specialities are only just going digital. Oncology, pathology and a whole host of ‘unstructured’ health data must also understand how they fit into the enterprise architecture of modern healthcare.

Despite these challenges, the resolve of many healthcare providers has already been displayed in adoption of EMR systems and in pushing aggressive healthcare IT targets. Our recent research on a variety of healthcare IT types has shown a shift in focus in spending from departmental to enterprise IT over the last 3 years, led by the US shift to EMR as part of major healthcare overhaul. Vendors of radiology IT have quickly either had to provide enterprise architecture and compatibility, or partnered and are now working with IT specialists from outside of the healthcare space. In Europe, transition has been slow, abrupt, but is certainly well underway, led by the Nordic regions and pockets of regional trailblazers across the continent.

Of course the widespread adoption of such systems is some way off and a myriad of challenges remain unsolved, but the benefits of such capabilities are surely worth some patience and short-term pain?

Undoubtedly this transition has and will cause challenges for radiologists, both in loss of control of radiology IT and in adapting to a new era of hospital IT. For many in radiology and other clinical disciplines, this has led to discontentment and resistance, slowing and stalling enterprise IT integration. However, what should be clearly communicated across the radiologist community is the purpose and promise of enterprise IT.

Already, small-scale trials of enterprise networked hospitals and administration have shown that efficient collection, storage and analysis of patient data can help to define new clinical care pathways, departmental collaboration and ultimately improve clinical outcomes. More impressive again is the use of population analytics to accurately predict future demand for health services, helping healthcare providers to ensure adequate resources and better manage healthcare spending.

Stephen Holloway is Associate Director, Medical Technology, IHS. IHS Medical Technology provides high-quality and in-depth market research and consultancy services to the medical device industry. Coverage includes medical imaging equipment, clinical care devices, healthcare IT, consumer medical devices, medical displays and wearable technologies.
Activities relating to implementation of the European Basic Safety Standards (BSS) Directive

**HERCA as an Organisation**

**Participation:**
55 Radiation Protection Authorities & Agencies from 31 European countries (incl. the 28 EU members)

**Structure:**

- Board of HERCA
  - Technical Secretariat
  - New Terms of Reference & HERCA Policies (Approved October 2014)
  
- Working Groups (WG):
  - Emergencies
  - Medical Applications
  - Non medical sources & practices
  - Radiation passbook & Outside workers
  - Veterinary

- Task Forces (TF):
  - Technical level & senior experts
  - Ongoing/Dormant
  - Update HERCA’s policies
  - Transposition of the Euratom BSS
  - Education & Training in RP

**Chairmanship:**
Mr MAGNÚSSON, IRS, Iceland 2012 - 2018
Mr HARBAITZ, NRPA, Norway 2008 – 2011
Mr LACOSTE, ASN, France 2007-2008

Heads of European Radiological protection Competent Authorities (HERCA) was founded in 2007 on the initiative of the French Autorité de sûreté nucléaire (ASN). It is a voluntary association in which the heads of the Radiation Protection Authorities work together in order to identify common interests in significant regulatory issues and provide practical solutions for these issues. The HERCA Working Group on Medical Applications (WG MA) covers all radiation protection issues concerning medical applications of ionising radiation and, in particular, is committed to improving the safety of all individuals involved in medical exposure, taking into consideration the rapid changes in equipment capability and health-care delivery. For the radiological community, the publication on January 17, 2015, of the latest European Basic Safety Standards Directive (2013/59/EU) Euratom will have an impact, as it will require changes of national legislation and regulation across Europe. HERCA as an organisation had no role in negotiation of the Directive, or its transposition into national legislation; these are matters for individual Member States. In most cases, however, members of HERCA will be responsible for producing new legislation and regulations and in all cases will be responsible for enforcement of the Directive. It is therefore clear that HERCA as a whole can be a positive requirement on transposition and implementation by:

- acting as a platform for the identification and discussion of practical and technical regulatory problems
- exploring a common understanding of new requirements and common approaches including providing guidance where appropriate and feasible
- informing the transposition process by being a resource for Competent Authorities
- acting as an interested stakeholder with the European Commission
- adding value on areas involving trans-boundary processes

Within this context, HERCA WG MA has identified five thematic areas, which include additional or new requirements. Two of these – the process of justification and the notification of significant events to Competent Authorities following accidental and unintended exposures – have already been addressed by HERCA WG MA in the last few years.

Thus, HERCA WG MA has published on justification, including a position paper and addendum on individual justification (IA) under current (IEC level III), addressing conceptual and practical matters and a separate paper addressing issues relating to individual health assessment of asymptomatic people. Both papers address concepts and frameworks, which are pivotal to the latest European Basic Safety Standards Directive. HERCA continues to work in this area with key stakeholders, under a formally constituted work package to develop an approach centered on voluntary self-commitments. It is intended to improve justification processes for diagnostic medical exposure through collaborative and coordinated initiatives, with appropriate engagement of referring clinicians and specialist practitioners. The goal is that patients will receive the most appropriate examination and that the justification processes will stand-up to scrutiny.

In June, the HERCA Board of Heads agreed a second work package on the notification of significant events to Competent Authorities following accidental and unintended exposure. The Directive identifies that different requirements exist for these events which may be considered clinically significant and those which are considered significant by the Competent Authority and therefore reportable. This is an area where stakeholder engagement is essential if common understanding is to be achieved by professionals and regulators alike. To aid this process, HERCA WG MA is considering holding a workshop in 2016, involving a range of medical, clinical and scientific societies, where different views can be debated.

The other areas relevant to the Directive and medical equipment (Article 10), procedures relating to incorporation of information relating to patient exposure in the report of the medical radiological procedure (Article 58a), and education and training relating to continuing education on radiological practice as well as radiation protection (Article 18). These areas will be considered in 2015 and beyond.

**EuroSafe Imaging Session 3**
Saturday, March 7, 16:00–17:30, Room L1

Dose-tracking leads the way to dose reduction

- Chairman’s introduction: dose-tracking leads to dose-reduction: why radiologists MUST get involved
- PM: Portrait, Antwerp/BE
- The legislative environment in Europe: the new EU Directive and the goals of EuroSafe Imaging
  - J. Grabol, Neuberg/DE
- Implementing a dose management solution in your department: where to start and what to expect?
  - D. Weselhoff, Zurich/CH
- Developing a multi-disciplinary team in dose management (CT example)
  - L. Marti-Benmat, Valencia/ES
- EuroR - European Commission Tender Project on diagnostic reference levels in paediatric imaging
  - J. Damilakis, Iraklion/GR
- Deploying a dose management strategy across multiple sites
  - K. Kasas, Athens/GR
- Panel discussion

**EuroSafe Imaging Session 4**
Saturday, March 7, 18:00–19:30, Room L1

How can clinical audit enhance patient safety?

- Chairman’s introduction
  - E.J. Adam, London/UK
- A new approach to clinical audit and safety by the ESR
  - P. Cavanagh, Taunton/UK
- Models of external audit in the Netherlands
  - S. Geerts-van Gemert, Utrecht/NL
- Clinical audit in cardict CT: the UK experience
  - S. Harden, Southampton/UK
- The European Radiation Protection Regulator’s perspective on audit
  - E. Castellano, London/UK
- The legislative environment in Europe: the new EU Directive
  - P.M. Parizel, Antwerp/BE
- How clinical audit enhances patient safety?
  - J. Griebel, Neuherberg/DE
- Dose-tracking leads to dose-reduction: why radiologists MUST get involved
  - K. Katsari, Athens/GR
- Panel discussion

**RTF MEET & GREET SESSIONS**
Today, at the RTF Booth in the Rising Stars Lounge you will be able to meet the following Radiology Trainees Forum (RTF) representatives:

- E. Castellano; London/UK
- S. Harden; Southampton/UK
- P. Cavanagh; Taunton/UK
- J. Griebel; Neuherberg/DE
- K. Katsari; Athens/GR
- E.J. Adam; London/UK
- S. Geerts-van Gemert, Utrecht/NL
- S. Harden; Southampton/UK
- S. Geerts-van Gemert, Utrecht/NL

**Technology Focus**
Mammographic screening and radiation risk

Several imaging techniques have been developed for breast cancer diagnosis. X-ray mammography is the most widely used modality for early detection and follow-up of lesions. Ultrasound examination, magnetic resonance imaging, magnetic resonance spectroscopy and positron emission tomography can provide additional information for the early diagnosis and characterisation of breast tumours.

CT systems have been developed especially for the three-dimensional high-resolution imaging of the breast. However, x-ray mammography has been considered the gold standard for screening of asymptomatic women. Screening mammograms are associated with low radiation dose and are capable of reducing breast cancer mortality considerably.1 Yearly mammograms are recommended for asymptomatic women starting at age 40. Mammography screening usually involves two views of each breast. The mean glandular dose associated with the two-view examination is about 3 mGy. It is well known that the glandular tissue in the breast is very sensitive to radiation. Yaffe and Mainprize have found that “for a cohort of 200,000 women, each receiving a dose of 3.7 mGy to both breasts and who were screened annually from age 40 to 55 years and biennially thereafter to age 75 years, it is predicted that there will be 86 cancers induced and 11 deaths due to radiation-induced breast cancer.”2

When discussing the potential effects of radiation exposure, however, it is important to note that the true health impact of low-level radiation is unknown. Although mammography is a low-dose technique, optimisation of protection, i.e. reduction of radiation dose without loss of diagnostic information, is of paramount importance. Important factors determining both radiation dose and image quality are the energy spectrum of the x-ray beam, breast composition and thickness, and the characteristics of the x-ray detector. Glandular dose increases with decreasing breast thickness. Scattered photons degrade image quality considerably. The use of an anti-scatter grid reduces scatter, but patient dose is increased. The use of automatic exposure control and proper breast compression are also important measures for reducing dose and improving image quality. Although patient radiation doses associated with most x-ray mammograms are low in comparison with those from other x-ray examinations, every facility should take action to avoid unnecessary patient exposure to radiation.

The new European Basic Safety Standards3 advocate the establishment and use of diagnostic reference levels (DRLs). In mammography, DRLs are expressed in terms of Entrance Surface Air Kerma (ESAK), free-in-air or Entrance Skin Dose (ESD), or in terms of Mean Glandular Dose (MGD) estimated using a standard PMMA phantom. There is not much information on DRLs for mammography. National DRLs set by authoritative bodies in European countries were reviewed in 2010–11. There is a need to establish DRLs for mammography in all European member states to consolidate available information and provide guidance on what actions are needed in using DRLs to further enhance radiation protection of female patients.

References
ESMOFIR working to improve access to quantitative imaging

The European Society for Molecular and Functional Imaging in Radiology (ESMOFIR) is a relatively young society, as it was founded in 2013. The purpose of ESMOFIR is to promote molecular and functional imaging in radiology, including research and training for European radiologists at all levels of their medical education, and to ensure that issues in molecular and functional imaging in radiology are addressed by the ESR in the development of policies within the European Union.

It is a well-accepted fact that the future of radiology lies in a more precise, quantitative evaluation of diseases and their therapies, through the development of specific imaging tracers and validated imaging biomarkers. It is therefore extremely important to promote education and training for these new emerging fields.

Clinical molecular imaging is, at the moment, mainly covered by nuclear medicine and expeditiously by a variety of emerging new PET tracers. At the same time, the number and diversity of functional and quantitative imaging techniques in radiology are increasing exponentially. Diffusion-weighted magnetic resonance imaging, for example, is now a prerequisite not only for standard imaging of the brain, but also for any tumour staging using MRI. Perfusion imaging techniques have been research tools for a long time, developed in imaging research laboratories. Today, they have become routine tools for radiologists, e.g. in brain, breast and prostate imaging. Many of these different methods are competing with each other, also in terms of physiological models and mathematical modelling. Different software solutions are being offered by vendors of radiological equipment as part of a standard post-processing package, but recently, more specialised tools, independent of specific scanning equipment, have been released.

Overall, there is a clear need for systematic and structured education in this complex and rapidly developing field to understand the clinical problem to be solved, the underlying physiological basis of the models used, the value and benefits of competing modalities and techniques, and the limits and limitations of the parameters obtained.

As for educational and coordinating activities, in November 2013, ESMOFIR held a workshop on contrast-enhanced body perfusion at the ESR Learning Centre in Barcelona, with a broad educational spectrum from fundamental lectures to practical case sessions. CT, MRI and US perfusion techniques and image processing were covered by a selection of European radiologists who are opinion leaders in their fields.

This successful event will take place again on March 17, 2015 in Tübingen, Germany. This ESMOFIR workshop attracted 78 participants from 26 countries.

Apart from these educational activities, ESMOFIR will join the European Imaging Biomarker Initiative, working together with the American initiative QB2 to develop and validate imaging biomarkers in clinical practice. While much work has been done on the technical aspects of standardisation of functional techniques, the European initiative should aim at accelerating the clinical validation of functional parameters, which could then become validated imaging biomarkers used in industry trials and, subsequently, in everyday clinical practice.

Being involved in both the educational aspect of functional imaging and the academic aspect of clinical translation of imaging biomarkers, ESMOFIR aims at promoting the future of radiology as part of personalised medicine.

More information about the European Society for Molecular and Functional Imaging in Radiology can be found at www.esmofir.org

Prof. Olivier Clément from Paris, France, is the ESMOFIR President.
VISIT THE EUROSAFE IMAGING POSTER EXHIBITION
ECR LIVE & EPOS LOUNGE FIRST LEVEL

More than 30 posters on radiation protection practices by experts from the ESR, European and international institutions, radiological subspecialty societies, related medical professions and industry partners.

www.eurosafeimaging.org
The ESR Patient Advisory Group: strengthening the dialogue between patients and radiologists

Improving patient safety and quality of care is one of the top priorities of the European Society of Radiology (ESR). Since its launch in 2013, the ESR Patient Advisory Group (ESR-PAG) has aimed to bring together patients, the public and imaging professionals to positively influence advances in the field of medical imaging and to foster a patient-centred approach in the work of ESR.

**SUCCESSFUL COLLABORATION FOR THE INTERNATIONAL DAY OF RADIOLOGY**

Great progress was also made with regard to the International Day of Radiology (IDoR), which takes place on November 8 each year. Following the ESR Patient Advisory Group’s contribution to the book on thoracic imaging for IDoR 2013, further collaboration took place for IDoR 2014. The three societies who organise the day (ESR, ACR, RSNA) chose to adopt brain imaging as the main theme for IDoR 2014 after it was proposed by the ESR-PAG, as 2014 was the European Year of the Brain. ESR-PAG members supported the ESR’s Public Relations & Media department in developing questions for interviews with brain experts all over the world and interviews were conducted with Donna Walsh (EFNA) and Manuela Masner-Wullen (SAFE & EFNA) for the IDoR 2014 book on brain imaging.

**COOPERATION BETWEEN SCIENTIFIC AND PATIENT ORGANIZATIONS VITAL IN EU AFFAIRS**

Another core aim of the group is to improve patients’ knowledge of imaging procedures. The ESR therefore initiated the EuroSafe Imaging Campaign, a holistic and inclusive approach to supporting and strengthening radiation protection across Europe. The ESR patient advisory group supports the EuroSafe Imaging Campaign and Manuela Masner-Wullen (SAFE & EFNA) is a member of its steering committee.

**Regarding European political topics of common interest, the ESR-led Alliance for MRI campaign has shown how vital the collaboration between scientific and patient organisations can be in European dossiers. In November last year the ESR launched the ESR Call for a European Action Plan for Medical Imaging’ at the European Parliament. With this initiative, the ESR calls on the EU institutions to join forces to improve patient safety and quality of care for Europe’s citizens.**

**ESR Patient Advisory Group**

**Saturday, March 7, 10:30–12:00, Room L 1**

**ESR-PAG 1 The challenges of providing true patient-centred care moving forward together**

- Chairmen’s introduction
  N. Bedlington; Vienna/AT
  P. Cavanagh, Taunton/UK
  - Ethics in patient-centred radiology
    C.D. Claasen; Tubingen/DE
  - Lost in radiology: is there a doctor in the department?
    E. Briers; Hasselt/BE
  - An ESR framework for delivering patient-centred care in radiology’s services
    P. Cavanagh, Taunton/UK
  - Panel discussion: on the ‘driver diagram for patient-centred care in clinical radiology’

**Sunday, March 8, 10:30–12:00, Room L 1**

**ESR-PAG 2 Communicating the results of radiological studies to patients: from high-tech to human touch imaging**

- Chairmen’s introduction
  N. Bedlington; Vienna/AT
  B. Brandt; Zagreb/HR
  - Who is the patient of the radiologist?
    L.E. Derchi; Genoa/IT
  - Communicating results of radiological studies to the patient with breast cancer: view of the patient who is also a physician
    A. Balenović; Zagreb/HR
  - Brain disorder – the communication challenge
    P. Walsh; Dublin/IE
  - Panel discussion: From high-tech to human touch – how do we ensure this transition and what are the roles for the ESR and member societies?
Exchanges of ideas through scientific and educational activities and friendship across borders, within and between sister societies, disciplines, ages and mind sets best reflect our driving philosophy. Our society is well known in the scientific world for its guidelines. To take an example, since its foundation in 1994, the Contrast Media Safety Committee (CMSC) has directed a lot of effort towards not only research on contrast media but also on education through the creation of the ‘Contrast media safety guidelines’. Written in a very quick manner and easy to use format, these guidelines have been translated from English into 15 languages so far (Arabic, Chinese, Czech, Danish, Estonian, French, German, Italian, Japanese, Latvian, Lithuanian, Polish, Portuguese, Russian and Spanish). All of us are grateful to have this practicable book available to use in our daily clinical practice. Version 9.0 of these contrast guidelines has been published recently. Furthermore, a group of fellows has taught these guidelines in developing countries all over the globe since 2012 under the name The ESUR Global Educational Programme on the Safe Use of Contrast Media.

This very successful subcommittee has been a motivating example for all the other working groups within ESUR. Currently, we have eight active working groups and ad-hoc committees populated by members and fellows of our society not only from Europe but also from the United States and Asia. The main task of the working groups is to work collaboratively to formulate and promote appropriate guidelines based on available scientific evidence and expert experience and knowledge. These team efforts have cemented friendships, identified knowledge gaps and highlighted areas where consensus exists that could help promote patient care. As to the success of these efforts, we can proudly point to the guidelines on contrast media (version 9.0), paediatric uroradiology, upper urinary tract, female pelvis, including endometrial, ovarian and uterine cervical cancer, and also acute abdominal and pelvic pain in pregnancy.

Our first guideline on prostate MRI was published in European Radiology in 2012. The PIRADS classification system quickly became widely adopted in Europe and abroad, forming the foundation for multiparametric imaging for prostate cancer detection, characterisation and staging. PIRADS has been well accepted by radiologists and urologists, so much so that urologists want to know the PIRADS score for every patient they refer! But we have not stayed; the latest version (PIRADS version 2) was developed in collaboration with the American College of Radiology (ACR) and the AdMeTech Foundation, and was recently announced at the RSNA 2014 meeting. This will form the springboard for a global standard for reporting prostate MRI, which could be instrumental to transforming prostate cancer care.

The working group on female imaging successfully started a multicentre trial on the prospective testing of an advanced DR scoring system with surgical correlation or two years follow-up as the gold standard. In this EURORAD study, 27 European centres, one in the United States of America and another in Japan, are taking part. More than 90% of the 1250 planned patients have been recruited, and we are grateful to the investigators and steering committee for their considerable efforts; the world is waiting for their results.

Some years ago, we started a fruitful and friendly collaboration with ESGAR (the Dubrovnik 2011 meeting was the first to be exact). Common sessions at each ESGAR and ESUR meetings have been identified and established and well attended at both meetings. We intend to further enhance such joint efforts and we are working together to prepare common guidelines for focal liver imaging.

With our American colleagues and friends, we have already had several joint meetings in Europe and America; the most recent was last year in Boca Raton, Florida. Collaboration with the Society of Abdominal Radiology, previously the Society of Uroradiology, was put in writing in 2009, but ties go back to 1998, when Henrik Thomsen was ESUR president. Due to the fact that many members/fellows are unable to travel to the United States, we decided to hold annual ESUR meetings to provide the opportunity to continue to exchange ideas once a year. However, we will continue to provide honorary lectures from both sides at both meetings.

Collaboration with the Asian Society of Abdominal Radiology (ASAIR) began in 2011 with the formalisation of the collaboration in 2012 in Boca Raton, Florida, and it involves holding honorary lectures during meetings. Such lectures will first be held at the 53rd ACAR meeting, June 19-20, 2015, in Hamamatsu, Japan. ESUR has also been fostering a fruitful collaboration with the European Association of Urology (EAU) since an initial agreement of cooperation in 2008. Since 2008, the EAU has invited 25 fellows and members to hold lectures and chair sessions at their annual meetings. Recently, this collaboration has been expanded to include collaborative reviews on prostate cancer imaging.

Last November the importance of imaging for directing therapy was highlighted during the European Multidisciplinary Urological Congress (EMUC) in Lisbon. Several of our fellows were invited to provide talks on various urological malignancies. These interdisciplinary interactions show that a strong collaboration with urologists, radiation oncologists and endocrinologists is key to successful patient management.

In 2011, we held an autumn meeting in Lisbon dedicated to young uroradiologists. This new initiative was established to help bring fresh blood to the society to reinforce the visibility of urogenital radiology within the radiological community and to actively involve young and promising radiologists in the various activities of our society. Details on the requirements for becoming an ESUR member (young uroradiologist) can be found on our webpage.

We continue to urge all our members to participate in the scientific activities of the society, including the so-called ‘Calls for Scientific Cooperation’ posted on our website. Their aim is to promote multicentre studies within our community through the collection of cases on unusual gastrointestinal diseases, novel therapies or diagnostic procedures. The initiative has already resulted in some publications which, we hope, will further strengthen the role of ESUR in the scientific community.

Whether you are young or old, interested in uroradiology, like to actively promote science or strive to achieve a high level of education, then you should participate in one of our working groups or other activities. You can be assured of a friendly and fun environment; come and join our society and celebrate with us our 25th anniversary during our next annual meeting in Copenhagen (September 16-19, 2015).

See you in Copenhagen!
EURORAD is a goldmine of information, says new Editor-in-Chief

ECR Today spoke with Prof. Olle Ekberg from Malmö, Sweden, about his role as the new Editor-in-Chief of EURORAD and his plans for the future of the ESR's online teaching case database.

ECRT: How many times have you been at ECR?
OE: It feels as if I have been to ECR every time since it started.

ECRT: Since when have you been involved with EURORAD and what was your first impression?
OE: I do not remember since when exactly. My first impression was “just another library of cases”. I soon realised that in fact it was a goldmine of information about all kinds of common and new diseases. I started to search for cases in order to solve problem cases at home.

ECRT: Why do you consider EURORAD important for radiologists?
OE: It is important to see many cases, particularly proven cases with histopathologic correlation. EURORAD has that.

ECRT: Do you have any special focus, or things you would like to work on during your editorship?
OE: EURORAD has been very successful under the leadership of Prof. Bloem and I would like to continue his work. The time given to reviewers to review each case should be kept short. The submitting authors should feel that EURORAD strives to publish their cases without delay.

Prof. Olle Ekberg is Chairman of the Department of Medical Radiology, Department of Clinical Sciences, at Lund University, Malmö, Sweden. A dedicated educator and researcher, he has published over 300 peer-reviewed papers, review articles and book chapters, mainly in the area of gastrointestinal radiology, particularly on the normal anatomy and physiology of swallowing as well as dysphagia. He is an honorary member of The Swedish Society of Radiology, The Nordic Society of Radiology and The European Society of Gastrointestinal and Abdominal Radiology.

EURORAD is the largest peer-reviewed teaching database of radiology on the internet, and offers ESR members access to a wealth of medical information and imaging data, whose accuracy and quality have been validated and peer-reviewed by some of the most experienced radiologists in Europe.

Publishing case reports since 1999, EURORAD also shows a steady rise in submissions over the past few years, and a substantial increase in unique users per month to an average of 17,000 in 2014. For easy retrieval of required cases, the website offers a powerful search engine as well as multi-lingual navigation. All EURORAD cases are registered with a DOI (Digital Object Identifier), which makes all cases citable.

BY LUCIE MOTLOCH

Top radiologists read more than just images

www.european-radiology.org
BY JACOB SOSNA AND MOSHE GRAIF

In Israel, we have a very active radiological community, the Israel Radiological Association, which was founded in 1937 and is one of the oldest medical societies in the country.

Currently, there are about 400 certified active radiologists and about 220 members in training. It is an integral part of the Israel Medical Association, which has been an institutional member of the ESR since 2012. We also have several subcultural societies including neuroradiology, breast imaging, interventional radiology, abdominal imaging, ultrasound and other working groups, paediatric radiology, musculoskeletal radiology.

The training programme for radiology is five years long with a nationwide curriculum. The residency programme includes six months of clinical rotations at a basic science project for six months, which the resident has to complete after the report of the basic science project.

Every trainee radiologist undergoes two national examinations: a written examination when completing half of the residency programme and an oral exam during the last year, which includes nine stations covering each of the subspecialties in radiology. There is also a four-year postgraduate training course that is mandatory for each resident during the five-year residency. In the last five years we have also established a formal one-year fellowship in paediatric radiology, neuroradiology and interventional radiology.

A committee of the Scientific Council of the Israel Medical Association participates in the training facilities with re-accreditation every five years. The depart- ments that provide training must conform to very strict and definite requirements. All training positions must be fully time with a salary, and must include a minimal number of patient hours. The committee closely follows the training process.

The academic activity on an annual level consists of an international annual meeting of the Israel Radiological Association presenting free peer-reviewed scientific publications and invited guest lectures. Since 2012, it is CME accredited both in Europe and the USA. Recently, Prof. Lorenzo Bonomo, ESR President, visited Eilat and shared his vision for the ESR with our members.

Academic positions are possible in departments affiliated with medical schools, and are granted according to very strict criteria based on teaching, research and publishing. The major radiological departments in Tel Aviv University, the Hadassah Hebrew University, Jerusalem, the Technion Institute of Technology in Haifa, the Ben-Gurion University in Beer-Sheva and the Bar-Ilan University.

The standard of radiological prac- tice and training in Israel is very high and similar to those in Europe. We also face the same challenges. Since the workload has increased dramatically in the last decade, every radiologist has also increased. In an analysis we performed, it was found that we need an additional 200 radiologists, an increase of about 25%. The concern is that it is objected by the government that controls most radiology positions.

The economic pressure on the medical system also affects radiology due to the need for new equipment and the capping of expenses. This struggle is a daily basis and our ASR and its members and executives repres- ent our profession in the political arena and with decision makers.

A commi/ttee of the Scientific Council of the Israel Medical Association has launched a project aimed at developing a recommended list of practices that should be avoided. ‘don’ts’, setting out various radiologi- cal recommendations advising against prac- tices with no benefit or insufficient benefits, safety, risk, cost effective- ness, accuracy and sensitivity.

The first phase of the project was coordinated by the Professional Affairs Committee of SERAM, which gathered the documentation in a document that was posted on the website of SERAM. This docu- ment was distributed with great success in the professional media and social networks. Finally, all recommendations were initially published.

SERAM RECOMMENDATIONS

1. Do not carry out imaging exams in patients with symptoms suggestive of idiopathic primary headache
2. Do not use plain radiography for head injuries, except if an ac- cidental cause is suspected
3. Do not use imaging for uncomplicated neck pain without warning signs
4. Do not perform imaging exams in patients with symptoms suggestive of osteoarthritis
5. Do not use the barium enema to assess pathology of the colon
6. Do not use barium studies in inflammatory bowel disease
7. Do not perform prepereptive chest radiographs as routine
8. Do not carry out chest imaging in solid benign pulmonary nodules
9. Avoid initial abdominal CT in paediatric patients with suspected appendicitis
10. Do not administer intravenous contrast without a previous safety check
11. Avoid daily chest radiography in patients admitted to ICU
12. Do not routinely use chest x-ray after thoracotomy
13. Avoid imaging to detect meta- statics in asymptomatic patients with breast cancer
14. Do not use imaging to rule out metastasis in asymptomatic patients with curative surgery for breast cancer
15. Do not carry out breast surgery in suspicious nodules without performing a percutaneous biopsy
16. Do not use breast MRI screening in patients without risk factors
17. Do not use mammography screening in women under 40 years of age without risk factors
18. Avoid imaging techniques in patients with their first episode of non-traumatic shoulder pain
19. Avoid routine plain radiography in ankle trauma
20. Do not use radiographic studies to rule out bone metastasis
21. Avoid surgery as initial treatment of osteoid osteoma. Use percuta- neous techniques
22. Avoid surgery as initial treatment of patients with shoulder calcific tendinitis. Use minimally invasive techniques
23. Avoid imaging with injecting radia- tion to assess the activity of acute saccroilitis. Use US
25. Avoid imaging in the initial diagnosis of lower gastro- intestinal bleeding. Use CT angiography
26. Do not use arteriography in the initial diagnosis and treatment planning in peripheral arterial disease
27. Do not use plain film on suspicion of intussusception in children
28. Avoid radiography of the pelvis for suspected hip dysplasia in neonates
29. Avoid imaging in children with uncomplicated acute bacterial otitis media
30. Do not use lateral skull radio- graph in children with sleep apnea syndrome
31. Avoid neuroimaging in paediatric patients with primary headache
32. Avoid routine initial studies in patients with intussusception
33. Avoid imaging in trauma patients who are to be replaced by CT
34. Avoid abdominal radiography in suspected acute diverticulitis
35. Do not use CT in patients with acute pancreatitis with a clear clinical presentation and elevated amylase and lipase
36. Avoid intravenous urography in acute flank pain and suspected renal colic
37. Avoid abdominal radiography in suspected acute pyelonephritis
38. Avoid abdominal radiography in acute abdomen, except for a foreign body obstruction or perforation is suspected.

More information about the Spanish Society of Radiology can be found at www.seram.es

BY JOSÉ LUIS DEL CURA

Spanish society cell radiosurgery not to do

According to the WHO, 80% of the decisions made in clinical practice today are based on radiology, 30% of them are not justified. There are a growing number of publications describing concerns about the inap- propriate use of radiological tests. These data show that radiologists have an important responsibility to reduce unnecessary imaging, a practice which benefits, safety, risk, cost effective- ness, accuracy and sensitivity.

The Spanish Society of Radiology (SERAM), following an initia- tive from the Spanish Ministry of Health, has launched a project aimed at developing a recommended list of radiological measures to be avoided. The objective is to transmit to the health care systems these recommen- dations in order to eliminate certain practices at our health centres.

METHODOLOGY

This project began in April 2014 through the formation of a panel of expert radiologists with 25 members of SERAM, all with over 15 years of experience and belong- ing to different sections of SERAM. These radiologists were responsi- ble for developing and evaluating a preliminary list that was agreed upon by members of each section. These experts must also complete a declaration of interests before they draw up to a maximum of five recommendations following the GRACE (Grading of Recom- mendations Assessment, Development and Evaluation) methodology. Recent literature, guidelines and reports related to diagnostic tests were reviewed in relation to benefits, safety, risk, cost effective- ness, accuracy and sensitivity.

The first phase of the project was coordinated by the Professional Affairs Committee of SERAM, which gathered the documentation in a document that was posted on the website of SERAM. This docu- ment was distributed with great success in the professional media and social networks. Finally, all recommendations were initially published.
PART 4: Publishing
WHERE CAN I GET MY WORK PUBLISHED?

Are you a young radiologist keen to get your first publication but unsure where to start? Please take a look at the encouraging advice and top tips from the current editor-in-chief of Insights into Imaging, Prof. Robert Hermans, a widely published and very experienced author of more than 150 articles. Here he outlines some possible projects for everybody, explains practical issues like costs involved and the meaning of the Impact Factor, and tells you which common mistakes to avoid. Take note and start planning now and good luck!

Robert Hermans: Case reports are a good way to start scientific writing for young radiologists. Although few journals accept case reports, these may have educational value. Therefore, the ESR has been publishing case reports, after peer review, for several years on its online platform EURORDAD. There are also journals publishing case reports under the form of a letter or under the heading of ‘case of the month’, or something similar. You should check the required structure of such a case report carefully in order to be considered for publication.

ECRT: If I am unable to undertake a large enough research project in my work setting, is there another option to achieve a good quality publication?

RH: A more labour-intensive alternative to a case report is to produce a review article. Such a review article should provide a synthesis of the best published research on an important topic or question. It may, for example, discuss the use of imaging in a specific pathological condition. Some journals, such as the ESR’s Insights into Imaging, consider such articles for publication. Apart from writing a review article, a book can also be presented as an electronic poster. Posters uploaded to EPOS remain accessible and receive a digital object identifier (DOI), making them fully citable publications.

ECRT: What needs to be considered when trying to publish research data?

RH: Obviously, a clearly defined research question is the start of everything. A paper is built around the purpose of the research that it describes. If the research did not have a clear purpose to begin with, it would be extremely difficult to create a convincing paper.

When preparing a manuscript for submission, it is crucially important that the guidelines for authors are read and followed, so that the manuscript is formatted in the correct way. It is equally important to read the additional documents that have to be signed, such as the copyright transfer agreement and the disclosure of conflicts of interest, as these documents contain important information.

ECRT: After completing a scientific research project, which journals could I consider submitting abstracts to? What are realistic choices for small local projects to larger studies?

RH: Choosing a journal for your scientific work largely depends on the target audience, but also on other elements, such as the speed of publication and the journal’s Impact Factor. You should be realistic: a report on a small, local project is unlikely to be accepted for publication in an international journal. Results from a well-conducted original scientific study can be submitted to a highly ranked international journal. Even if not accepted, the reviewer’s assessments may be very helpful for improving the quality of the manuscript: a submission of the revised manuscript to another journal might be successful.

ECRT: What does ‘Impact Factor’ mean? Does it matter?

RH: The Impact Factor reflects how many times articles published in a journal over the last two years are being cited, relative to the number of articles published in that journal. The Impact Factor is published yearly in the Journal Citation Report. Although there is criticism of the actual value of the Impact Factor, it is believed by many to reflect the diffusion and scientific level of a journal. It is important to understand that it represents a journal metric and should not be used to judge the quality of individual articles in that journal.

ECRT: Are there costs involved with open-access journals? What can I do if I don’t have a sponsor or grant?

RH: Traditionally, articles are published in journals published by a publisher, such as Springer, Elsevier and others. These publishers cover their costs and make a profit by charging libraries and individual subscribers a subscription fee. In an open-access journal, a different business model is used. The authors of an article that is accepted for publication pay a certain fee to have the article published. The published article then becomes freely available to everyone. A number of authors have agreements with large publishers to cover the publication fee for authors belonging to the institution; this way the individual authors do not have to pay the fee out of their own pocket. However, authors may have to search for funding themselves if their institution has no agreement with the publisher. In this regard, I would like to mention that for insights into Imaging, the ESR’s open-access journal, the ESR pays the publication fee for all its active members.

ECRT: Would you have any other hints or tips on getting work published? Are there any typical mistakes to look out for?

RH: The structure of a research article is commonly referred to by the acronym IMRAD, which stands for introduction, material and methods, results and discussion; each of these sections has specific content. A common problem observed in manuscripts is that the introduction and the discussion have not been revisited separately. In the introduction, the aims and objectives of the study should be stated, i.e. the problem that the research was intended to solve. The methods section describes the setting, case inclusion, the study population and the statistical analysis. The results section should report the findings and should not be used to judge the quality of individual articles. The discussion should provide a synthesis of the results and should not contain citations. The conclusions should state the results that are new and important for the reader, as well as the limitations of the research and how it can be extended.

Prof. Robert Hermans is professor of radiology at UZ Leuven, specializing in head and neck radiology. He has served as Editor-in-Chief of Insights into Imaging since 2010.
LILLIAN BASSMAN & PAUL HIMMEL

TWO LIVES FOR PHOTOGRAPHY
AN EXHIBITION AT THE KUNST HAUS WIEN
KUNST HAUS WIEN, in cooperation with Haus der Photographie at Deichtorhallen Hamburg, is devoting a comprehensive retrospective to an exceptional American couple, the photographers Lillian Bassman and Paul Himmel. In this exhibition, two lives are united in an extraordinary artistic symbiosis.

Lillian Bassman (1917–2012) and Paul Himmel (1914–2009) were among the great creative personalities of 20th century photography. For about 78 years, the two artists lived together as a couple, developing a photographic œuvre which has lost nothing of its modernism to this day.

Lillian Bassman’s work is compelling in its impressive elegance and stylistic certainty. As the long-time art director of Junior Bazaar, a spinoff of Harper’s Bazaar, she set her distinctive mark upon the magazine’s layout during the 1940s. As a fashion photographer, she developed a unique style: embracing ever-new experimental photographic procedures, she lent her pictures a special kind of aesthetics, allowing the black-and-white images to take on the sensibility of paintings.

“What she does has an almost magical power. In the history of photography, nobody else managed to make this breath-taking moment between the appearance of things and their disappearance visible,” her colleague Richard Avedon once said.

When negatives believed to have been lost were rediscovered, Martin Harrison encouraged Lillian to rework her old photographs. Utilising the possibilities of digital technology, she reinterpreted her images, manipulated them and printed them anew. In the 1990s, when she was over 70 years old, fashion designers such as John Galliano as well as art directors rediscovered her works and commissioned her to do fashion photography for them.

Paul Himmel’s work is marked by the great joy he took in experimenting. At first, he worked for Vogue, Junior Bazaar and many other magazines as a fashion photographer. However, his photographic interest was mainly aroused by movement. He made photographic history with his images of the New York City Ballet taken during the 1950s, in which dance was not captured by static images, but flowing movement studies. During subsequent years, Paul Himmel’s work developed increasingly into that of an independent artist. Soon, his often radical experiments with overexposure and long exposure were so far ahead of their times that he was unable to find commercial work.

Lillian Bassman and Paul Himmel had a unique marriage between artists, full of productive paradoxes and creative tension. Strong independence in the work of both individuals stands next to a close artistic relationship and mutual creative influence.

“My work in the darkroom consisted of exposing my negative on paper, normally on very contrast-rich paper. I did everything intuitively and by feeling. I never systemised anything. Then I placed it in the dish with the developer. There it developed. I would say to almost three quarters. After that I moved it to a stop bath. Then I let it lighten up in the last dish for a few minutes, placed it on a glass plate, took out my bleach, my brushes, my sponge, and cotton, and began to work on it – playing with it, taking away what I didn’t want. You know… my fingers did all of that as if I were painting. And then I put it back in the stop bath in order to complete the process.” – Lillian Bassman


Left: Lillian Bassman, ‘Krönung des Chic’, Jada, Hat by Philipp Treacy, Vogue Germany, 1998 © Estate Lillian Bassman

Above: Paul Himmel, The New York City Ballet is Dancing Swan Lake, 1951–52 © Estate Paul Himmel

Kunst Haus Wien
Untere Weißgerberstr. 13
1030 Vienna

Opening hours:
Daily 10am – 7pm
www.kunsthauswien.com

KUNST HAUS WIEN
Suitable premises for a permanent exhibition of Friedensreich Hundertwasser’s paintings were found in the building of the former furniture factory of the Thonet Brothers built in 1892. The size of the building made it possible not only to establish a Hundertwasser museum, but also to include rooms for alternating exhibitions of international stature in the planning. In 1991 KunstHausWien was officially opened. On the first two upper floors a cross-section of Hundertwasser’s oeuvre is on display, including paintings, graphics, tapestries, and architectural models. The third and fourth floors are dedicated to international exhibitions.
WHAT’S ON TODAY IN VIENNA?

**Theatre & Dance**

Please note that all performances, except at Vienna’s English Theatre, are in German.

**AkaDEMieTheater**
1030 Vienna, Liechtensteinstrasse 1
Phone: +43 1 5844 445
www.burgtheater.at

**Burgtheater**
1010 Vienna, Universitaetsplatz 2
Phone: +43 1 5844 445
www.burgtheater.at

**Rabenhof**
19:30: Das Reich der Tiere
by Roland Schimmelpfennig

**Burgtheater**
19:00: Was ihr wollt
by William Shakespeare

**Rabenhof**
20:00: Bye-bye Österreich!
Brilliant glove puppet show about Austria’s most volatile issues

**Schauspielhaus**
19:30: Bye-bye Österreich!
Brilliant glove puppet show about Austria’s most volatile issues

**Tanzquartier Wien**
20:30: 300 el x 50 el x 30 el
FC Bergman (Belgium)

**Theater in der Josefstadt**
19:30: Eine dunkle Begierde
by Christopher Hampton

**Vienna’s English Theatre**
19:30: Venus in Fur
by David Ives

**Volkstheater**
19:30: Supergute Tage
by Mark Haddon/Simon Stephens

**Concerts & Sounds**

**Konzerthaus (Classical Music)**
19:30: Tonhalle-Orchester Zürich, conductor Lionel Bringuier
Yuja Wang, piano
E.-P. Salonen: Helix for orchestra,
S. Prokofiev: Concert for piano and orchestra No. 2 g minor,
M. Mussorgsky: Pictures at an Exhibition

**Musikverein (Classical Music)**
19:30: Philharmonie Salzburg, conductor Elisabeth Fuchs
Stefan Arnold, piano
F. Mendelssohn Bartholdy: Overture ‘The Hebrides’,
W. A. Mozart: Concert for piano and orchestra es major,
F. Mendelssohn Bartholdy: Symphony No. 3 ‘The Scottish’

**Porgy & Bess (Jazz)**
20:30: Omer Klein Trio (Israel)

**Szene Wien**
19:00: Get Up! Festival 2015

**Opera & Musical Theatre**

**Volksoper**
18:00: Pariser Leben
Operetta by Jacques Offenbach

**Wiener Staatsoper – Vienna State Opera**
18:30: La Juive
by Jacques FromentalHalévy,
conducted by Frédéric Chaslin

**Raimundtheater**
15:00: Mamma Mia!
by Benny Anderson & Björn Ulvaeus

**Ronacher**
15:30: Mary Poppins
by Richard M. Sherman & Robert B. Sherman

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**Gideon Maoz, Nicola Kirsch, Florian von Manteuffel, Martin Vischer, Franziska Hackl in Johnny Breitwieser by Thomas Arzt**

**Martina Ebm and Michael Dangl in Eine dunkle Begierde by Christopher Hampton**

**Claudia Sabitzer, Matthias Mamedov, Patrick O. Beck in Supergute Tage by Mark Haddon/Simon Stephens**

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