Adaptability should guide evolution of cancer imaging

By Paula Gould

Prof. Hedvig Hricak told delegates during Friday’s opening lecture that they must learn from the words of Charles Darwin: embrace change and adapt.

Hricak, chair of the department of radiology at New York’s Memorial Sloan-Kettering Cancer Center, quoted directly from the 19th century naturalist, who caused a storm with his theory of natural selection. Darwin wrote in the Origin of Species that: “It is not the strongest of the species that survives, nor the most intelligent that survives, it is the one that is most adaptable to change.” He also observed: “In the long history of humankind those who have learned to collaborate and improvise have prevailed.”

Radiology has evolved considerably over the past 50 years, and the result of this evolution has been oncologic imaging, a field that has endless horizons, Hricak noted. But as this process of evolution continues, radiologists must broaden their focus beyond gross anatomy.

“It is no longer enough to be knowledgeable about all the imaging modalities that we have,” she said. “It is equally essential to understand that imaging is just one element in the integrated diagnostic approach to the management of cancer. We have no choice but to learn about the importance of serum screening, proteomics and molecular pathways.”

Hricak outlined how molecular imaging and intervention are moving closer together in oncology with the emergence of a new field, Theranostics. Essentially combines targeted imaging using a specific tracer with treatment that is directed at the same target.

To illustrate the power of targeted imaging, she showed three nuclear scans of a patient with metastatic prostate cancer. A standard bone scan showed few bony lesions, whilst FDG-PET imaging revealed lesions in different locations. Only PET imaging with the radiotracer FDG-PET (fluoro-dihydro-testosterone), which homes in on androgen receptors, picked up the full extent of metastatic disease.

“As we improve and we have targeted imaging, it is sometimes frightening to see how little we knew,” Hricak said.

Targeted imaging could also have an important role in the management of breast cancer. For example, imaging with a tracer that targeted oestrogen receptors would indicate which patients were likely to benefit from the drug Letrozole. Similarly, a method of imaging that highlighted HER2 receptors should show which patients would benefit from the drug Herceptin.

“Herceptin is an excellent drug, but 40% of patients do not have HER2 receptors within their metastatic lesion,” she commented. “Is targeted imaging too expensive to use in cancer treatment, or is it more expensive to keep patients on a course of chemotherapy or androgen or hormonal therapy, and bring up their hopes while the cancer grows?”

The future evolution of contrast agents and imaging hardware was also discussed. Hricak raised the prospect of MRI/PET replacing CT and PET/CT in oncologic imaging – if only a way could be found of making the technology cost-effective.

She concluded by setting out her ‘matrix for success’ in oncologic imaging for the benefit of ECR delegates:

“We need to change from a technology-centred specialty to embrace physics, chemistry and biology. We need to collaborate. An interdisciplinary and multidisciplinary team of clinicians and basic scientists is a must. And we need to continuously evolve, anticipate opportunities, love change, develop new procedures and applications and adapt to new environments,” she noted.

Modality choice proves vital in head and neck trauma

By Philip Ward

CT and MRI have an essential part to play in cases of head and neck trauma, but it is important to know which modality to use under the clinical circumstances, according to speakers at Friday’s opening session of the mini course on major trauma.

CT has high sensitivity for mass effects, venousicular configuration, bone injuries, and acute haemorrhage, and it is rapid, compatible with life-support equipment, and necessary for directing immediate neurosurgical intervention, noted Dr. Ulrich Linsenmaier, from the department of clinical radiology, Ludwig Maximilians University, Munich, Germany.

But it cannot detect small non-haemorrhagic lesions, and is insensitive for diffuse axial injury (DAI), increased intracranial pressure, oedema, and ischaemia.

“The symptoms of head trauma can be masked by concomitant injuries, including blood loss, hypovolaemia, and intubation,” he explained. “Presentation varies according to the injury. Some patients stabilise, but others deteriorate.”

The incidence of head trauma is around 300 per 100,000 per year (0.3%) in the United States. The mortality rate is about 21/100,000 (0.02%) in the US, and 9/100,000 (0.009%) in the EU. Common causes are traffic accidents, accidents at home and work, falls, and assaults.

Linsenmaier recommends follow-up CT in cases of confirmed patient deterioration and if...
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Changing paradigms for tumour response sparks lively debate at Focus Session

By Paula Gould

Yes, size does matter, but it is certainly not the only way of monitoring the efficacy of cancer treatment. The way in which lesions are measured is extremely important too, ECR delegates were told at yesterday’s Special Focus Session on the assessment of tumour response.

For the past 50 years, imaging has been regarded as a substitute or surrogate marker to assess tumour response. However, with the most widely used criterion being a change in size, this has led to questions about the universal suitability of this strategy.

“It has become apparent that size may not be the most sensible or reliable criteria to assess tumour response. For this reason, other biomarkers are being used, one of which is functional imaging,” he said.

Of course, size is not being abandoned alto-gether: The problem is that the correlation between tumour shrinkage as measured on CT and patient survival is not quite as strong as might be expected, said Dr. Larry Schwartz, chief of MRI at New York’s Memorial Sloan-Kettering Cancer Center.

“So while we are doing okay, we really haven’t yet optimised tumour response assessment,” he noted.

The size-based criteria that are used to decide how cancer patients in clinical trials have responded completely to their treatment have recently been changed. This, said Prof. Wolfgang Weber, chair of the Radiological Society of North America, is because size may not be the most sensible or reliable criteria to assess tumour response at the end of post-therapy imaging.

What is different, however, is the selection of target lesions. RECIST 1.1 states that up to five lesions should be measured, with a limit of two per organ. This replaces the previous RECIST guidance to measure 10 lesions (five per organ). Another change is that the criteria for ‘progression’ is now defined as a 20% increase in size, but also that this change should be greater than 5 mm.

All ongoing clinical trials should stick with the original version of RECIST, Schwartz said. This means that the revised criteria will not actually be used for several more months yet.

Moving to functional imaging for therapy response, the main modality in the frame is PET/CT. For some cancers, such as lymphomas, FDG-PET/CT has become a standard way of measuring tumour response at the end of treatment, said Prof. Wolfgang Weber, chair of nuclear medicine at the University of Freiburg, Germany. This is achieved by simply comparing a pre-therapy baseline scan against the results of post-therapy imaging.

FDG-PET/CT is also being investigated as a predictive tool. With so many different drugs becoming available, it would be helpful for oncologists to know sooner rather than later whether or not their chosen drug is likely to work. Research is underway to see whether the results of an FDG-PET/CT scan after the first cycle of chemotherapy could be a good indicator of patient outcome.

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Comprehensive CT use revolutionises trauma care

By Mélisande Rouger

Computed tomography has brought about a revolution in trauma care, but it must be used as part of a comprehensive approach, experts told the ECR 2009 press conference on Friday.

CT has become a central tool in polytrauma patient care, especially during the critical first few minutes a patient spends in the emergency room (ER). Whole-body multidetector CT (MDCT), which allows the detection of all relevant injuries in one procedure, has replaced conventional radiographs and ultrasound in this regard, explained Dr. Michael Rieger, a radiologist at Innsbruck University Hospital, Austria.

"CT has really brought about a revolution in emergency diagnostics. It allows very fast scanning and high resolution. And most importantly for polytraumatised patients, it can scan up to two metres, so it can basically scan the patient lying on the table from head to toe," he said.

With whole-body CT, radiologists can visualise bleeding in the head, lungs, abdomen or kidneys, and identify fractures of the ribs or pelvis. MDCT angiography enables the detection of specific artery injuries, such as carotid injury, a common consequence of skiing accidents. MDCT angiography of the aorta helps recognise injuries such as traumatic aneurysm, which can happen after a high-speed car accident. CT's precision also makes it possible to image ruptured arteries in the extremities, for instance in a broken index finger.

"To recognise such injuries can be very important for the outcome of the patient," Rieger stressed.

European radiologists have become more and more aware of the value of CT over x-ray or ultrasound. Studies in head trauma and spinal injuries have shown that the use of CT as a standard method is cost-effective. But it is also a matter of common sense, Rieger said.

"It is known that CT is more effective for examining polytrauma patients. After conventional x-ray, it can happen that the patient's state worsens, his haemodynamics can become unstable, and then we need to make more CT examinations later, which eventually costs more to the hospital," he said.

This does not mean that CT should be performed in every case. A comprehensive approach towards its use is needed to guarantee efficiency.

"Comprehensive care has become a clinical necessity, and I think this approach has become very common in Europe," said Prof. Wolfgang Vorkohl from the department of anaesthesiology and intensive care, Salzburg Emergency Hospital, Austria.

"The role of the radiologist in emergency care is becoming more and more important, especially with interventions such as embolisation. Radiologists are increasingly becoming involved in acute medicine and life-saving procedures.

The set up of an effective trauma team further improves care. At Innsbruck University Hospital, a "CT trauma team" was set up.

English soccer star David Beckham looks set to remain at AC Milan until the end of the season. He will return to the Los Angeles Galaxy side from July to October, before rejoining the Serie A club for the rest of next season, according to news reports on Friday.

The deal means that 33-year-old Beckham is likely to have an opportunity to make it into his country’s squad for the World Cup qualifiers and the finals in South Africa next year.

The deal is expected to be officially confirmed by the clubs over the weekend.

This development follows weeks of negotiations between the two clubs, during which Milan objected to the size of the transfer fee demanded by Galaxy – thought to be more than 12 million euros.

In motor racing, the future of the former Honda Formula One team has been secured after the Japanese manufacturer agreed to pass ownership of the team to Ross Brawn, who becomes team principal of the new Brawn GP. The arrangement secures the future of veteran Brazilian Rubens Barrichello, who saw off the challenge of fellow Brazilian Bruno Senna, UK driver Jenson Button will also compete for the new operation.

In cricket, a hard-hitting half-century from opening batsman Phillip Hughes helped Australia to a flying start against South Africa. The visitors reached lunch on the first day of the Second Test in Durban at 419 without losing a wicket.

Further sports round-ups will appear in the Sunday and Monday/Tuesday editions of ECR Today. Look out for more reports throughout the congress.
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Dave BECKER
Chief of the GE R&V Research Team
Wauwatosa, United States

▶ “Agile Ultrasound”- turning technology into diagnostic confidence
Cynthia OWEN
GE Ultrasound Global Luminary
Accounts Manager
Wauwatosa, United States

▶ The latest advances in musculoskeletal imaging
Dr. P. O’CONNOR
Leeds, United Kingdom

▶ Volume navigation from clinical to interventional applications
Pr. Med. Dr. E. LEEN
London, United Kingdom

GE imagination at work
Harry’s Hot Shots from Day One

ECR Today’s intrepid and multi-talented photographer Harry Schiffer arrived in Vienna on Thursday evening from his home town of Graz. On this page is a selection of what he saw through the lens of his camera.

Alphorn player brings the X-factor to ECR

Alphorn player Eliana Burki from Switzerland enthralled the packed audience at Friday’s Opening Ceremony. She works as a part-time music therapist at the children’s hospital in Davos, helping children with mucoviscidosis, or cystic fibrosis. She has played the instrument since she was six, and at the age of nine she was playing alphorn at a Swiss yodeling festival.

Carty and Chiesa strike gold

During Friday’s Opening Ceremony, shiny new gold medals were presented to two former ECR presidents: Prof. Helen Carty from Liverpool, UK, and Antonio Chiesa from Vicenza, Italy. Carty received the gold medal for her work in paediatric and orthopaedic radiology. Chiesa’s award was for his achievements in head and neck radiology.

Vendors unveil new products and services

At 14:00 on Friday, the eagerly awaited opening of the technical exhibition took place. Booth traffic remained busy throughout the afternoon. The exhibition will remain open from 10:00 to 18:00 on Saturday, Sunday, and Monday.

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The weather outside was dull, grey and wet, but the mood and atmosphere inside the Austria Center was bright and upbeat.
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New developments in ultrasound and MRI mean that peripheral nerve imaging is easier than ever to perform and may bring higher sensitivity to lesion detection.

Because peripheral nerve disorders are relatively common in daily medical practice and they can mimic a variety of musculoskeletal disorders, clinical evaluation (including a detailed history and physical examination) are critical to a successful diagnosis. This morning’s Special Focus Session on peripheral nerve imaging aims to demonstrate the potential usefulness and recent advances of ultrasound and MRI in the assessment of nerve lesions.

Prof. Anne Cotten, head of the musculoskeletal radiology department at Lille University Hospital, France, will focus on tumoural, pseudotumoural, and inflammatory disorders of peripheral nerves. She underlines the need for surgeons to know in advance about the source of tumour development and whether or not lesions are malignant or benign.

“These lesions are unusual, but imaging is fundamental as it may represent the sole way to confirm the diagnosis, location and extent of these nerve lesions. Differentiation between schwannomas, neurofibromas, malignant peripheral nerve sheath tumours and pseudotumoural nerve lesions are of high importance for the treatment and prognosis of these patients,” she explained.

For the assessment of such lesions, ultrasound and MRI can be used in a complementary manner. Ultrasound can be used for a dynamic examination, which is fundamental for the assessment of entrapment syndromes, in contrast to MRI. Entrapment neuropathies are common disorders resulting in pain, paresthesia, numbness, weakness and muscle wasting. Symptoms can become debilitating and chronic over time.

“Ultrasound has excellent resolution, allowing the detection of very small nerve lesions, and may provide quick, detailed imaging of the entire length of the major peripheral nerves, which is very useful for comparison between both limbs and for the assessment of patients with multiple nerve lesions, such as in neurofibromatosis,” Cotten said.

MRI can depict abnormal signal intensities, enhancement, margins and the shape of the peripheral nerves. More recent innovations include diffusion tensor imaging (DTI) with tractography (fibre tracking). DTI and tractography have found clinical applications in neuroradiology, but their use in the musculoskeletal field is still emerging. DTI can provide valuable information about tissue microstructure and architectural organisation by monitoring in vivo random microscopic motion of water protons and measuring fraction anisotropy and apparent diffusion coefficient values. The potential usefulness of such measurements for the differentiation between benign and malignant peripheral nerve tumours or for the assessment of Watanabe degeneration has been proposed.

Moreover, tissue orientation and the course of the nerve can be visualised with tractography. Peripheral nerves have anisotropic diffusion properties and the orientation of the nerve fibres can be followed to trace specific neural pathways, which may be useful for the detection of nerve lesions.

“Sometimes pain is related to a nerve disorder, but with usual imaging on ultrasound or MRI, nothing is visualised. Functional imaging might detect early abnormalities and help in the diagnosis of inflammatory or tumour-related disorders. However, future research has to be performed to assess the diagnostic performance of such techniques,” Cotten said.

General and musculoskeletal radiologists should be aware of the usefulness and MRI in the assessment of nerve lesions and of the new developments that may provide complementary information, she added.

Co-speaker Dr. Xavier Montet, specialist in oncological imaging at Geneva University Hospital, Switzerland, points out that in Europe ultrasound costs six to eight times less than MRI.

With ultrasound you can follow the nerve to where it ruptures or to where there is a quantity of fluid or a haematoma. This will be quicker and cheaper than using other techniques,” he said. “While there are no huge advances in ultrasound technique, the availability of high frequency probes, with high definition and resolution, means that small details within nerves can now be visualised”.

Compared to five or ten years ago, smaller lesions can now be visualised with ultrasound, making operation on lesions of 3 to 4 mm, for example, easier and quicker for surgeons than it would have been previously. This also reduces the length of hospital stay for patients, having an additional positive impact on budgets.

“Everyone seems to think peripheral nerve imaging is difficult to do, so the subject is neglected, but effective peripheral nerve imaging can really improve quality of life for a patient,” Montet said. “If more radiologists are involved in it, then it means more patients can be seen. Also, if a patient presents with pain in the leg suggestive of neural origin in general radiology, it only takes an extra two or three minutes to look at the nerves with ultrasound, which isn’t done systematically at present.”
Important unanswered questions remain in uterine fibroid embolisation

By Paula Gould

Uterine fibroid embolisation (UFE) was the subject of a high-profile special-focus session at ECR 2008. This year the topic is to be covered in an afternoon refresher course. The subtle change in status reflects the growing acceptance of UFE as a robust interventional technique, but as speakers at today’s session will explain, UFE is still evolving and interventional radiologists have plenty more to learn.

“There is still a lot happening and developing with UFE. We are still evaluating the technique and working our way through it,” said Prof. Anna-Maria Belli, professor of interventional radiology at St. George’s Hospital, London. “No matter how experienced you are, you can always get tips from somebody else because we all do it in a slightly different way.”

The session will cover the principles of UFE and indications for its use. Although the procedure allows women to retain their uterus, it is not necessarily the right choice for those who are seeking to become pregnant. The thorny issue of fertility after UFE will be addressed directly, and speakers will present evidence on UFE versus surgical uterine-sparing options.

An initial diagnosis of fibroids should be made on either ultrasound or MRI before any therapy is considered. The choice of modality may be dictated by access issues, though growing experience indicates that MRI should be performed where possible, said Prof. Belli. For example, ultrasound may not be able to determine the presence of adenomyosis, a condition that can co-exist with uterine fibroids.

UFE can be achieved using a number of different approaches, though all require selective catheterisation of both uterine arteries. Practitioners will also have their favourite embolic agent. Some interventional radiologists prefer spherical particles, whilst others opt for non-spherical particles. Tendency agents, such as gelatin sponge, are used at a few institutions. Evidence in the literature is not yet strong enough to make definite recommendations, Belli said. The cost of different embolic agents may influence practitioners’ choice too.

The procedure is not pain-free, and patients should be advised what to expect in terms of discomfort. Belli said. Women undergoing UFE should also be told of the possible complications and what signs to watch out for. Imaging follow-up can be performed on other ultrasound or MRI, though as before, the latter modality is recommended. Ultrasound may not show whether 100% infusion of the fibroids has been achieved.

Women requesting UFE should also be advised of the other surgical options available to them, according to Belli. For example, patients who will be starting infertility treatment once their fibroids have been removed may be better off having a myomectomy.

“On most occasions, you would say ‘no’ to somebody in that position because we really still do not understand the implication of fibroids with infertility,” she said. “There are times when UFE might be appropriate for them, but you have to weigh it up on an individual basis.”

Few studies have been published comparing UFE and myomectomy, and there is a real lack of prospective research, according to Dr. Jana Maskova, an interventional radiologist at Aberdeen Royal Infirmary, UK. The limited available data indicate that patients undergoing UFE have shorter hospital stays and return to daily activities more quickly. Myomectomy appears to have superior reproductive outcomes in the first two years after treatment. Both methods are associated with significant re-intervention and recurrence rates.

The average cost of UFE is typically lower than that for myomectomy, even after follow-up procedures to resolve recurrent symptoms have been taken into account. Pros and cons of UFE to prospective patients, and then monitor their progress as a clinician would do.

Interventional radiologists should monitor the clinical outcomes of their patients closely and keep up with published literature comparing UFE to surgical strategies, Maskova said.

“Gynaecologists have admitted that they should inform patients about fibroid embolisation as a possible treatment option. Similarly, we should tell patients about myomectomy if that appears to be the best option. We should know the best way to treat individual patients,” she said.

Belli agrees that interventional radiologists have a responsibility to explain clearly the pros and cons of UFE to prospective patients, and then monitor their progress as a clinician would do.

“Interventional radiologists are not just technicians who do the procedure and then wash their hands of it, particularly with fibroid embolisation. They have got to see the women beforehand and then follow them up,” she said.

Refresher Course: Interventional Radiology

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

RC 809 Uterine fibroid embolisation

Moderator:

J.-P. Pelage; Boulogne/FR

A. Principles of UFE

A.-M. Belli; London/UK

B. UFE versus myomectomy: What is the evidence?

J. Maskova; Turnov/CZ

C. Fertility after UFE

S.A. Kapranov; Moscow/RU

UFE can be achieved using a number of different approaches. These include percutaneous unilateral or bilateral fibroid artery puncture with selective catheterisation of each uterine artery in turn (A), as well as percutaneous bilateral fibroid artery puncture with selective catheterisation of each uterine artery and simultaneous embolisation (B). (Provided by A-M Belli.)
Cardiac course organisers concentrate on myocardial perfusion and viability

By Karen Sandrick

The popular categorical course on cardiac imaging will address hot topics within myocardial perfusion and viability during this afternoon’s session. Presenters from Switzerland and the UK will discuss the pros and cons of a range of techniques, including MR perfusion, SPECT and PET.

Patients with coronary artery disease die because of hypoperfusion, not because of stenosis. Patients often, in fact, have stenoses that do not severely compromise haemodynamics. Clinicians nevertheless tend to focus on stenosis because they can treat it with balloon angioplasty or bypass surgery rather than giving a static snapshot in time that indicates overall reduced blood flow because of stenoses. Imaging to assess stress-induced hyperperfusion provides a dynamic portrait of the consequences of reduced blood flow. Stress-induced hyperperfusion is an early indication of the effect of significant coronary artery disease on the ischaemic cascade. The technique is particularly helpful in identifying the lesion in patients with multiple stenoses.

Cardiac stress MRI also evaluates myocarditis, and it may be useful for showing myocardial damage from infarction or inflammation in the emergency department.

“Today, cardiac stress MRI is a second-line modality for assessing the haemodynamic relevance of coronary artery stenosis or for determining the severity of dysynchrony. But cardiac stress MRI has the potential to become a first-line modality because it provides, better than any other imaging modality, an excellent overview of the heart and detailed insight into specific aspects of cardiac function and anatomy,” said Prof. Dr. Jena Bremerich, from the department of radiology, University of Basel, Switzerland.

“In the near future, stress perfusion MRI may be used to exclude coronary artery disease because of its strong negative predictive power. Stress MRI cannot only exclude coronary artery disease but also identify infarct, myocarditis, and valvular disease,” he noted.

Attendees at this afternoon’s session will learn about the role of MRI in the assessment of myocardial ischaemia, the indications for performing stress MRI perfusion imaging and the value as well as the limitations of stress MRI.

Myocardial perfusion imaging is still a cutting-edge application of cardiac MRI that requires optimal hardware, software and user skills. Perfusion imaging is highly demanding on both hardware and software because it requires imaging a moving organ with optimal temporal, spatial and contrast resolution. In the past, cardiac MRI was hampered by susceptibility artefacts from the surrounding lungs. Current MRI systems are overcoming this limitation with dedicated coils, parallel imaging and high magnetic fields, Bremerich said.

While other imaging techniques can be used to assess myocardial ischaemia, MRI is the standard of reference for evaluating myocardial viability. Nuclear techniques, such as PET or SPECT, are not widely available and have low spatial resolution. Stress echocardiography suffers from low reproducibility and strong observer bias. Both MRI and PET/SPECT have strong negative predictive value for major adverse cardiac events. However, MRI does not require radiation, and it has better spatial resolution than nuclear imaging. MRI also provides information on function and tissue structure, which allows radiologists to identify valvular heart disease or cardiomyopathy, Bremerich said.

Prof. Richard Underwood, director of nuclear medicine at London’s Royal Brompton Hospital, will review the current applications for cardiac SPECT and PET imaging and highlight the strengths and limitations of the two nuclear medicine procedures. Dr. Richard Coulton, consultant radiologist, University of Leicester, UK, will discuss the roles for stress echocardiography and MRI myocardial viability. Bremerich will explain how MRI is used to evaluate myocardial perfusion by means of cardiac stress imaging.

Cardiac stress MRI is indicated in patients who have suspected or known coronary artery disease to detect ischaemia. Adenosine is the preferred stress agent because it is safer and more convenient for patients. Adenosine stress perfusion imaging is a robust tool. It is more sensitive and specific than scintigraphy; adenosine stress perfusion imaging has a sensitivity of 91% and specificity of 81% in assessing coronary artery disease. Adenosine MRI also stratifies risk for patients with suspected coronary artery disease and predicts major cardiac events.

Dobutamine, which is used when adenosine is contraindicated or clinicians need to evaluate dysynchrony, has a sensitivity of 73% and specificity of 83% in assessing myocardial viability. Dobutamine also evaluates functional reserve after treatment for tetralogy of Fallot. These stress agents allow MRI to capture information on cardiac function and perfusion that help determine whether patients are at risk of a major adverse cardiac event, said Bremerich.
Emergency medicine involves being prepared for both the expected and the unexpected

By Mélisande Rouger

Ahead of the ESR meets Emergency Physician programme presented today at ECR, ECR Today met the President of the European Society for Emergency Medicine (EuSEM), Dr Gunnar Öhlén from Stockholm, Sweden, to learn more about the life of an emergency department and the importance of collaboration with radiology.

ECRT: Today: How would you describe the daily life of an emergency department? Gunnar Öhlén: You always have to be prepared to receive both the expected and the unexpected.

ECRT: When is the busiest period in an emergency department? Gunnar Öhlén: Normally the number of patients builds up from 9–10am to be at the maximum between 1–3pm. The number of patients is often somewhat higher during the first three months of the year, depending on the number of infectious.

ECRT: How many patients do you treat in an average year? Gunnar Öhlén: About 80,000 patients per year.

ECRT: The emergency department divided into different sections in your hospital? Gunnar Öhlén: In the Karolinska University hospital, we have eight different specialties represented in the emergency department: internal medicine, surgery, orthopaedic, infection, neurology, ENT, paediatrics and gynaecology.

ECRT: How many people work in your department? Gunnar Öhlén: 175 nurses and, during the course of a year, several hundred doctors.

ECRT: What are the cases you see most often? Gunnar Öhlén: A large number of patients are elderly patients with different kinds of diseases and younger patients with more surgical and orthopaedic problems. In addition, we treat about 15,000 children per year.

ECRT: How do you diagnose those cases? What procedures do you follow? Please, can you give me some examples? Gunnar Öhlén: All patients have a physical examination, a large number have laboratory, blood and urinary analysis, and different types of examinations at the radiology department.

ECRT: Do you have regular meetings with the radiology department? Gunnar Öhlén: Yes, we are right now starting a very close process analysis of the interface between the ED and the department of radiology, in order to save time in the process steps and hopefully also get better quality!

ECRT: How often do you discuss the performance of your radiology department with the treating physicians? Gunnar Öhlén: To improve our collaboration and work flow, we work in a structured way, with process mapping, brainstorming for improvements, re-designing processes and continuing step-by-step improvements.

ECRT: Have you developed a new cooperation with radiologists? Gunnar Öhlén: In Parisian hospital La Pitié-Salpêtrière, the radiology and emergency departments have signed a contract to regulate their cooperation. What do you think of such an idea? Gunnar Öhlén: I am very much in favour of this, structure and standardisation is always a good thing so the ‘wheel is not invented again’ during late night hours.

ECRT: Do you think the ‘ESR meets Emergency Physician’ initiative will be useful in your cooperation with radiologists? Gunnar Öhlén: You always have to think multidisciplinary meetings will help your cooperation with other specialties.

ECRT: I think this is a good way to increase collaboration. Radiology’s contribution to the EuSEM 2008-conference was very much appreciated by delegates.

ECRT: In your opinion, what are the challenges faced by emergency medicine today and in the future? Gunnar Öhlén: The biggest challenge is to have emergency medicine recognised as a basic specialty in its own right in all European countries. At the present time, it is recognised as a basic specialty in 17 countries. As far as the collaboration with radiology, I think the biggest challenge during the coming 10 years is around the development of the use of US in the emergency medicine setting.

News from ESHNR - European Society of Head and Neck Radiology

The European Society of Head and Neck Radiology (ESHNR), Europe’s premier head and neck imaging society, welcomes anyone with an interest in head and neck imaging.

Current scientific topics and future developments in head and neck radiology

Where staging imaging of the head and neck go from here? It is hard to imagine further advances in anatomy, although the continued improvement of dedicated head and neck imaging will improve our ability to detect recurrent cancer earlier. Advanced 3D workstations and new imaging systems combining CT and PET or CT and SPECT are a reality today.

The integration of imaging technology into the therapeutic arena is also a reality today and will only improve with time. Neuronavigation using preoperative imaging has improved the surgeon’s ability to find and resect smaller lesions in the head and neck area. The same technology is applied to sinus and skull base surgery. Intraoperative imaging with MR imaging, CT, and sonography will increase. Through the use of image guidance systems, we will see further integration of imaging technology, not only in the operating room but also in the radiation therapy department.

The fusion of CT and MR imaging and the integration of these into the treatment-planning environment will surely improve the precision of radiation therapy treatment, which is long overdue. We are now entering an era when these advanced technologies will be combined in a cohesive way to treat a patient.

No longer will it be acceptable to have patients travel from the MR scanner, in which both high-resolution anatomic images and water and metabolic signals of this anatomy are rendered, has just started.

The molecular biological profile of patients may be used in the future to stratify individuals into risk categories. Imaging may then be used in a screening mode for those at high risk of disease, provided that early detection is accompanied by treatment options.

These advances will certainly keep us in business for the next 5 to 10 years. After that, who knows? In the field of head and neck imaging, higher resolution imaging, metabolic information, and the leverage that faster and more powerful computing will bring will certainly make for a bright future for our field.

Education in head and neck radiology

To improve knowledge in head and neck radiology the ESHNR will participate in the ESR fellowship programme and, together with the ESR, will finance a certain number of applicants for 3-month visits of one to our reference centres.

In addition ESHNR is offering a fellowship certificate to everybody who has received special training in head and neck radiology. Candidates can apply after a well-defined training cycle.
PR in the ER? Radiologists and emergency physicians settle their differences

By Paula Gould

A significant proportion of all diagnostic imaging studies performed in hospitals now originate in the emergency department. Although radiology has always figured prominently in the triage of emergency cases, this role is growing. Good working relationships between radiologists and emergency physicians are consequently more important than ever.

This afternoon’s ESR meets’ session will bring the two sides together for 90 minutes of interdisciplinary dialogue. Such a meeting offers a valuable public relations opportunity and a chance to break down common misconceptions about each other’s roles and priorities.

“Dialogue is mutually beneficial,” said Prof. Paul Parizel, chair of radiology at Antwerp University Hospital, Edegem, Belgium. “Radiologists sometimes think that emergency physicians ask for too many imaging studies or make inappropriate requests, even before having examined the patient. Clinically, emergency physicians generally have the perception that radiologists don’t really understand the kind of patients and stress situations that are being handled in the emergency room.”

Parizel will be tackling the daunting topic of patient triage with imaging: should ultrasound, CT, or MRI be used? The question of when to use ultrasound in the emergency setting and when to use CT is an ongoing debate, said Prof. Dr. Gerhard Mostbeck, professor of radiology at the Wilhelminenspital and Otto Wagner Hospital and Medical Centres, Vienna. Ultrasound can visualize abdominal, pleural and pericardial fluid, and identify cases of pneumothorax. Multislice CT, on the other hand, is more sensitive than ultrasound for the vast majority of abdominal, retroperitoneal, and thoracic trauma injuries. A CT scan can also provide diagnostic information on brain, facial and spinal injuries that cannot be acquired from ultrasound.

“In my experience, the role for ultrasound is quite small in the case of polytrauma patients if you have a dedicated ultrasound unit in the emergency department. If it is going to take 20 minutes to take the patient to a CT scanner in another building, then things will probably look quite different,” he said.

One of the best approaches in theory may not always be practical. For example, what if a patient living in a remote area suffers multiple injuries at night when the weather is bad and rapid helicopter transfer to hospital is out of the question? The issue of time then becomes more critical. Should the patient be driven to the nearest hospital that does not have a dedicated ultrasound unit? Or should the journey be extended and the patient taken to a larger hospital that offers an out-of-hours MSCT trauma service? It all comes down to optimal patient management, Mostbeck said.

Radiology services need to adapt to the needs of patients, said Prof. Borut Marincek, President of the Institute of Diagnostic Radiology at Zurich University Hospital, Switzerland, who will be co-presenting at the session. He would like to see satellite radiology units in the emergency department, where possible.

“If the patient is entering the hospital at the emergency department, then that’s where radiology has to be,” he said.

Emergency departments in major urban areas in the United States are often much larger than their European counterparts. It is not uncommon to have one or more dedicated senior staff radiologists available around-the-clock at these U.S. sites, in addition to radiology residents and/or fellows. Staffing levels are typically lower in European hospitals, and this type of coverage is rarely feasible. Telediagnosis solutions can help to some extent, but ultimately radiologists must realize that if they cannot provide the imaging services desired by emergency physicians, then the discussions will find a way to do it themselves, Parizel stated.

“Radiology is not just about sitting behind a PACS monitor with some soft music on in the background and a cup of good coffee within easy reach,” he said. “Radiology sometimes means going down to the emergency room and providing services to those patients who are in dire need of imaging, where imaging can really make a difference in deciding what management strategy to follow.”

ECR TODAY 2009 Saturday, March 7, 2009

CLINICAL CORNER

ESR meets Emergency Physicians

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

EM 2 Time is life

Presiding
B. Marincek; Zurich/CH
I.W. McCall; Oswestry/UK
G. Olsen; Stockholm/SE

• Introduction
B. Marincek; Zurich/CH
G. Olsen; Stockholm/SE

• Ultrasound as a time-critical diagnostic tool for the emergency department
P.K. Thompson, Rushkhampton, QLD/AU

• The ultrasound issue: Radiologist’s view
G.H. Mostbeck, Vienna/AU

• Overcrowding flow in the emergency department
M. Cooke; Warwick/UK

• Image triage: Ultrasound, CT or MRI?
P.M. Parizel; Antwerp/BE

• Panel discussion

myESR.org
Tracking cells and new professional perspectives

By Melisande Rouger

What if radiologists could play an active part in curing Parkinson’s disease or cancer? Thanks to cell imaging, this possibility no longer seems quite so remote. As cell therapy has been refining itself over the past six years, researchers now want to be able to see transplanted cells evolving in the body to understand their action. A dedicated session at ECR 2009 will let radiologists foresee how they can get involved in the process by providing an update on the latest trends in cell imaging.

Brains, hearts and livers damaged after a stroke or in the course of a degenerative pathology are currently being repaired in pre-clinical research by transplanting stem cells, which can renew themselves and replenish specialized cells. Although their benefit is undeniable, it is still unclear how they really act in the repair process. This is where imaging could play a key role, researchers believe. “We don’t understand the mechanisms yet; exactly how cells act,” said Olivia Clément, Professor of Radiology at the Hospital européen Georges Pompidou, Paris, and chairman of the ECR session.

Cell imaging could even be useful in monitoring whether there is an inflammatory response occurring in certain diseases, and if anti-inflammatory drugs are successful, according to Dr. Mike Modo, a neuroscientist at Kings’ College, London. “In multiple sclerosis for instance, we have the case of infiltrating macrophages, and if you use an anti-inflammatory drug, you want to reduce the infiltration, so to be able to visualize macrophages would be of great value,” he said.

Combined with adapted contrast agents, MRI offers the possibility of tracking transplanted cells and macrophages in the human body. This modality, but also others such as optical imaging, will be presented during the session. Applications rather than specific details on the compounds of the physics will enable participants to grasp the basics of cell imaging. In his presentation “Imaging cell transplants with MRI”, Modo will show how to follow transplanted stem cells from their point of injection in the body to where they really effect repair in stroke. “The aim is to demonstrate how we can use MRI to understand that,” he explained.

MRI is currently the most appropriate tool for visualising transplant cells in the brain. Three kinds of MRI contrast agents exist. Iron-based contrast agents are by far the most popular, being used in 99% of all experiments. But they provide a negative signal – a hypointensity in T2-weighted scans – that might lead to confusion with other signals such as air or blood. Gadolinium, which offers a positive signal – a hyperintensity in T1-weighted scans – avoids potential misinterpretation, but generally provides a weak signal. Finally, fluorex contrast agents could be a significant alternative, since the region is naturally poor in this element, thus allowing very specific imaging of transplanted cells. Unfortunately, none of these approaches is really ideal, conceded Modo, who hopes for new developments in contrast agents.

Optical cell imaging will also constitute a chapter in the ECR session. But it is far less developed than MRI for human applications, mainly because it uses fluorescent contrast agents that colour the body. Speakers will also talk of the interest in PET and SPECT in cell imaging, and explain how to label cells with ultrasmall superparamagnetic iron oxide (USPIO) markers using MRI.

If most of the pre-clinical work has been done in neuro imaging so far, research has also been gathering pace in heart and liver imaging. Cell imaging is also progressing in anti cancer vaccines, using dendritic cells removed from the cancer once it is extracted from the body, to fight the disease in case of resurgence. Transplanted pancreatic cells in diabetes, which produce insulin, should also be made visible in the human body within three to four years. The potential to go on to the clinical stage is here, but a number of regulatory questions must be answered first. Issues such as the toxicity contained in contrast agents and their long term effect inside the cells, but also whether or not agents need to be cleared from the body, will be at ECR, Clément promised.

In the end, cell therapy itself needs to be more developed to move forward. It is still a very young field, and no one knows exactly how it will evolve. For instance stem cell lines can theoretically be developed indefinitely, but problems might still arise in the process. More research in this area is needed to be able to define what is really going to work and what isn’t. “Things will change over time but the only way to find out is to do the work,” concluded Modo.

CLINICAL CORNER

New Horizons Session

Saturday, March 7, 09:00–10:00, Room C

NH 5 Cell imaging: Can the radiologist see the cell?

• Chairman’s introduction
  D. Clément, Paris/FR

• Labelling and manipulating the cell with USPIO
  F. Gazeau, Paris/FR

• Imaging cell transplants with MRI
  M. Modo, London/UK

• Dynamic cell imaging of cancer invasion with optical
  P. Friedl, Nijmegen/NL

• Panel discussion:
  Cell imaging: Is it ready for clinical use?

Liver cell transplantation: Transverse MRI image of the liver in a mouse 8 days after intraperitoneal injection of 8x10⁵ labelled hepatocytes, showing multiple foci of low signal intensity (arrow), in the right side of the liver. Reprinted from 14-2009, 58:59 ESR.

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ESR Today is published 4x during ECR 2009.
Circulation: 20,000
Printed by Angerer & Göschl, Vienna 2009

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Nowadays, a number of options are open to women with breast cancer, depending on the nature and stage of their malignancy. As masters of a range of imaging modalities, radiologists can help not only to diagnose patients accurately but also to get them on the best treatment path and chart their progress over time.

“The radiologist’s role in treatment planning has changed dramatically over the last five years. If you know what the surgeon requires for planning, then you can speed up the process by organising subsequent steps,” said Dr. Karen Kinkel, associate professor of radiology at the University Hospital Geneva in Switzerland.

Along with Dr. Julia Camps-Herrero, a radiologist at the Hospital de la Ribera in Valencia, Spain, Kinkel will be co-lecturing at a Saturday afternoon session on breast cancer diagnosis, staging and follow-up. The duo will review the use of various modalities in making the initial diagnosis, determining response to non-adjuvant chemotherapy, following patients after surgery and confirming suspected recurrence.

Using real-life case studies, Kinkel and Camps-Herrero will take turns testing competence during the session, which forms part of a series of European Excellence in Education Interactive Teaching Sessions. Other sessions in the series cover imaging indicated bifocal breast cancer in two different quadrants. (Provided by K. Kinkel)

conserving surgery with negative tumour margins, although preoperative diagnostic and interventional breast imaging indicated bilateral breast cancer in two different quadrants. (Provided by K. Kinkel)

providing important information about lesion size, lymph node status and extensive intraductal component extension to the nipple-areola complex, the pectoralis muscle or the skin.

Lymphadenectomy used to be routinely performed in breast cancer patients after surgical biopsy, but the preferred technique today is sentinel lymph node biopsy to determine cancer spread. Unaffected lymph nodes can be left in place.

“This reduces the side effects of swelling and limited movement of the arms associated with extensive axilla surgery,” Kinkel said.

However, sentinel lymph node procedures are only suitable for some patients, such as those who have unilateral cancer, and other women may still need to undergo traditional lymphadenectomy. Many factors guide the decision about appropriateness of sentinel lymph node biopsy.

“These rules are not well known by radiologists,” she pointed out. “But a radiologist working in a multidisciplinary team should know them to help the surgeon to plan surgery.”

MRI is viewed as the most accurate imaging modality for local staging, aside from lymph node assessment. In particular, the modality has proven to be superior for determining the size of a specific lesion and helping to show whether cancer is present in the contralateral breast.

Use of breast MRI prior to surgery has increased dramatically during the past five or six years. If you know what the surgeon requires for planning, then you can speed up the process by organising subsequent steps, “ she said. “But a radiologist working in a multidisciplinary team should know them to help the surgeon to plan surgery.”

In Switzerland, among other countries, breast MRI is now routinely performed before surgery, said Kinkel, who is a co-author of the recently published breast MRI guidelines from the European Society of Breast Imaging (Eur Radiol. 2008 Jul;18(7):1307-18).

If breast MRI indicates additional suspicious findings, radiology departments can anticipate what other follow-up studies and procedures will be needed and can schedule them in advance, instead of waiting to be instructed to do so, she noted.

Kinkel will devote considerable lecture time to ultrasound and mammography, both commonly used in interventional breast procedures. In Europe, practice tends to be organised by organ systems and less by technique, so radiologists are expected to have a good grounding in all modalities used in guiding biopsies, she said.

Whereas surgical biopsies were standard in the past, image-guided biopsies using either ultrason or mammography are now the procedure of choice for assessing suspicious breast lesions. Use of 9-gauge to 14-gauge needles and vacuum-assisted systems helps cut down on the number of false negative results.

Thanks to diagnostic improvements and greater participation in mammography programmes, radiologists are detecting more lesions before they are palpable, and these findings should be thoroughly documented.

After a malignancy is detected, the first thing a surgeon wants to know is whether the cancer is in situ or invasive. Imaging studies also
MR imaging and ultrasound can reveal early signs of rheumatoid arthritis in patients

By Paula Gould

Rheumatoid arthritis (RA) affects approximately 2.9 million people in Europe, and it can be difficult to differentiate from other degenerative arthritic conditions. Without an early diagnosis, however, it is impossible to assess the true effect of promising early intervention strategies. Could an alternative diagnostic strategy be the answer?

Speakers at this morning’s special focus session will address the value of ultrasound and MRI in diagnosing RA and monitoring the effects of therapy. Both of these modalities are used in the research setting to characterise inflammatory arthropathies, detect changes in disease progression, and improve efficacy in treatment before such changes become clinically apparent. Routine implementation is now just a matter of time, according to the session’s chair, Dr. Andrew Grainger, musculoskeletal radiologist at the Leeds Teaching Hospitals NHS Trust, UK.

Studies have shown that ultrasound can dem- onstrate the hallmarks of inflammatory arthropathy with good sensitivity and specificity, said Dr. Philip O’Connor, who is also a musculoskeletal radiologist at the Leeds Teaching Hospitals NHS Trust. A definitive diagnosis of RA is typically made when these imaging findings are combined with clinical signs, a patient’s history, and biochemical information.

“I have been using ultrasound in rheumatoid arthritis since 1996,” he said. “It adds to the clinical examination and it adds a lot to clinical management and decision-making in these patients. If you had a close relative with early inflammatory arthritis, you would want them to have an ultrasound scan to determine what was going on inside those joints.”

Contrast-enhanced MRI has the potential to speed-up definitive diagnosis of RA, according to Dr. Christian Glaser, radiologist at the University Hospital of Munich-Großhadern, Germany. Patients attending the Munich hospital are already sent an ultrasound scan to determine what was going on inside those joints.

The earliest indication of RA is the appearance of synovitis. This finding is seen in osteoarthritis too, though it is much less common and severe. Contrast-enhanced MRI can detect synovitis as early as two months after the onset of symptoms.

Another early stage in disease progress is inflammatory invasion of the bone marrow, or bone marrow edema pattern (BMEP). This appears as regions of “fluffy” hyperintensity in the affected areas of bone. Glaser said. BMEP typically precedes structural changes to the bone known as erosions. These bony erosions are very slow to heal, if they heal at all. If you have many erosions and cartilage defects in the bone, you are likely to proceed to joint destruction,” he noted.

Dynamic contrast-enhanced MRI can be especially helpful. Studies suggest that a rapid rise in enhancement in affected joints, shortly after contrast is administered, can be taken to indicate the presence of an active inflammatory process. A steadier increase in enhancement over a longer period of time is suggestive of chronic disease or a reduction in inflammatory activity.

Scoring criteria based on MRI observations are being developed so that disease progression and therapy response can be assessed more objectively. Measurements may include the thickness of the inflamed synovium, the brightness of synovial contrast enhancement, and the area affected by BMEP.

Glaser regards MRI and ultrasound as complementary tools rather than rivals for the diagnosis and follow-up of RA. Ultrasound has unparalleled spatial resolution when applied to small joints, though its value depends on the experience of the user. MRI results are far less dependent on operator expertise.

“It would be very practical for a doctor diagnosing or treating a rheumatology patient to use ultrasound to examine a specific small joint, perhaps in a finger or toe, to assess a pattern of destruction or inflammatory activity,” he said. “With MRI, you can get a complete overview of the hand, wrist or ankle area, and you can visualise regions deeper in the body not readily accessible to ultrasound.”

O’Connor agrees that ultrasound and MRI can work well together. Software packages are now available that allow 3D MRI datasets to be registered to an ultrasound examination in real time. As the ultrasound probe is moved across the patient, the MR images shown will re-orientate to the same position. Findings from each modality can be correlated with one another and new techniques validated.

Ultrasound is likely to make the transition from research tool to clinical practice more easily than MRI, O’Connor said. The modality is cheaper, and examinations are more comfortable for patients. Concerns over reproducibility may be eased by the introduction of 4D techniques where blocks of data are acquired. However, ultrasound remains a hands-on modality, and advances in technology will not obviate the need for good training.

“The problem is that there is no real training programme in radiology built around inflammatory arthritis scanning with ultrasound,” he noted. “It is my belief that this will become a rheumatological procedure. Rheumatologists are developing their own training schemes and courses. I don’t think radiologists have the time or manpower to offer this service.”

CLAASIFICATION CORNER

MR-ultrasound fusion. Axial section of a metacarpophalangeal joint affected by erosion and synovitis in a patient with RA. (Provided by P. O’Connor)

MR-ultrasound fusion. Axial section of a metacarpophalangeal joint affected by erosion and synovitis in a patient with RA. (Provided by P. O’Connor)
Emergence of elastography gives renewed impetus and vigour to ultrasound market

By John Bonner

Elastography is one of the emerging technologies on display at ECR 2009, reflecting the growing importance of imaging techniques that compare the inherent stiffness of healthy and abnormal tissues in advancing the diagnostic value of ultrasound. Elastography’s clinical applications will be discussed at two separate lunchtime satellite symposia on Saturday and Sunday, and they look certain to be popular events.

The principles behind elastography may date back to the earliest days of medicine, when Hippocrates and his followers used manual palpation to help characterise tumours, but there is nothing old-fashioned about the technologies for further developing these concepts. They are visible to all ECR delegates in the technical exhibition.

Established in 2005, SuperSonic Imagine is based in Aix-en-Provence, France, and is making its first appearance at the congress. Its Aixplorer scanner incorporates ideas from a surprising source to meet the demand for ever faster processing of ultrasound data—the video games industry.

"Companies that make these games have very similar requirements to our own. They need to process a huge amount of data very quickly if the movement of figures on the screen is to appear life-like," says the vendor’s founder and CEO Jacques Souquet. "So we have adapted some of the key hardware elements—microprocessors, graphics boards—to be part of our software-driven technology. The result is that we are able to acquire data at a rate of 10,000 frames per second. Conventional cardiac ultrasound machines can capture 200 to 500 images per second, so our produce is more than 10 times faster."

The Aixplorer scanner provides quantitative measurements of tissue stiffness. The transducer sends the pulses necessary to generate tissue deformation. A disadvantage of previous systems is that they require the operator to compress the tissue, and so the results may depend on that person’s skills and training, he explains.

SuperSonic’s technology was developed initially for use in breast imaging, but there are plans to develop a number of other clinical applications, including the detection of thyroideal nodules, liver fibrosis and prostate disease. The company’s satellite symposium will take place tomorrow from 12:30 to 13:30, and it will follow on from today’s lunchtime symposium about real-time tissue elastography organised by Hitachi Medical Systems.

Hitachi has 25 years’ experience in designing ultrasound systems and ECR 2009 will be unveiling its latest platform, HI VISION Pristula, which features a new system architecture developed through collaboration between the company’s imaging division and its central research laboratory. Two of the key benefits of the new product are its flexibility and user-friendliness, and it has a unique ergonomic design that adapts to any scanning environment, style of examination and operator position, according to Hitachi.

"Ultrasound has always stood apart from the rest of the work in the department, and it has been seen as something of a side-line," said Pierre Radzikowski, marketing manager for the company’s European ultrasound business. "But with our system’s fusion imaging tool, we can provide information that can be combined with previously acquired information from CT, MR or any other DICOM data source. Ultrasound can be repositioned as a key modality in the diagnosis, treatment planning and monitoring of interventions."

By combining high technical specifications with a range of advanced applications, GE is hoping to change the way that ultrasound is used within a typical hospital radiology department. "Ultrasound has always stood apart from the rest of the work in the department, and it has been seen as something of a side-line," said Pierre Radzikowski, marketing manager for the company’s European ultrasound business. "But with our system’s fusion imaging tool, we can provide information that can be combined with previously acquired information from CT, MR or any other DICOM data source. Ultrasound can be repositioned as a key modality in the diagnosis, treatment planning and monitoring of interventions."

The product’s V Nerve package offers the Gvs function. This tool allows the clinician to track markers in the patient’s body placed on lesions, erosions or other anatomical features. The positional information can be stored on the unit’s hard-drive and compared with the images obtained on follow up to check the efficacy of treatment.

"I believe AVEA can make a significant contribution in diagnostic confidence for women with dense breast tissue and incompressible mammograms. Examinations performed with this new technology generally take less than 15 minutes, which is time well spent if you consider the extended diagnostic capabilities of ultrasound in dense breasts," observed Bernd Montag, CEO of Siemens’ imaging and IT division.

The technical exhibition area is open today from 10:00 to 18:00.

ZONARE Medical Systems, based in Mountain View, California, has also been investigating new solutions for imaging challenging patients. At ECR, it is demonstrating technology designed to provide better quality imaging of patients who are overweight, elderly, very muscular, or who have a thick body wall. The company has created new proprietary software for its ZONARE Sonography technology.

When combined with our new C3-8S transducer, clinicians have an important new tool for imaging their most technically difficult patients with advanced image clarity,” said Lars Shaw, ZONARE’s vice-president for marketing.

Finally, Philips has announced the Vision 2009 upgrade, a fourth major enhancement of its iU22 product. The iU22 ultrasound unit now offers tissue aberration correction on breast transducers to compensate for speed of sound variations of dense tissue, improving detailed resolution and conspicuity of lesion details.
ECR’s new Technology Highlight Area hosts full scale model of Siemens’ latest innovation

By Simon Lee

In keeping with the character of the European Congress of Radiology and its trend for breaking new ground, this year’s congress will see another first. On the first day of the congress in the Austria Center, you will find the newly established Technology Highlight Area. This island of technology in an area predominantly populated by publishers will be the temporary home of the first full-scale model CT scanner ever to be displayed at the ECR. We have opened up this zone of the congress venue to Siemens Healthcare, who will bring with them a one-to-one model of their brand new SOMATOM Definition Flash, a new dual-source CT scanner that boasts not only the fastest scanning speed in CT but also extremely reduced radiation doses.

The unit features a gantry that rotates around its own axis in just 0.28 seconds, providing a scan speed of 43 cm per second with a temporal resolution of 75 milliseconds, which for example enables a thoracic examination to be carried out in 0.6 seconds, eliminating the need for breath holds. Due to this high speed, the SOMATOM Definition Flash also enables the heart to be examined in impressively low radiation doses, including the possibility of performing heart examinations in the sub-mSv range.

We are proud to help Siemens Healthcare show off their latest development and delighted they have chosen to demonstrate a full size model of this product at the European Congress of Radiology. Visit the Technology Highlight Area and see it in action!

Reconstruction of flow dynamics by combining 2D and 3D angiography data: A feasibility study

By Guoyan Zheng1, Jan Grailla2, Gerhard Schroth1, Andreas Raabe1, Lutz-Peter Nolte1, Stefan Weber2; Bern/CH

Intracranial aneurysms are relatively common. A recent review reported a prevalence of 0.4% and 3.6% in retrospective and prospective autopsy studies, respectively, and 3.7% and 6.0% in retrospective and prospective angiographic studies, respectively. Most aneurysms are asymptomatic and will not rupture, but they grow unpredictably and even small aneurysms carry a risk of rupture.

In neuroradiology, three-dimensional rotational angiography (3D-RA) and 2D digital subtraction angiography (DSA) are two imaging techniques among others for the diagnosis and monitoring of intracranial aneurysms. These two imaging means provide complementary information about intracranial aneurysms. On the one hand, 3D-RA provides highly accurate images of the vessel geometry, which are essential for making a diagnosis and the planning of interventions. On the other hand, additional insight about the vascular disease can be gained if the flow dynamics and the effective blood volume flow to the brain are precisely measured. To date, such information has been obtained from digital subtraction angiography with a high spatial and temporal resolution. However, DSA as a 2D imaging means lacks depth information. Thus, it is clinically difficult to precisely estimate flow dynamics in intracranial DSA imaging. The goal of this work is to investigate the feasibility of mapping the blood flow information offered by 2D biplanar angiography into 3D vessel models that are extracted from a reconstructed rotational angiography data set.

Data preparation: A surface model of the visible vessel structures was interactively segmented from the 3D-RA data using Amira (Mercury Computer Systems GmbH, Berlin, Germany) and then registered to the biplanar angiography data.

Reconstruction of flow dynamics: Flow information was then reconstructed by means of a forward projection of all vessels’ surface segments to both biplanar projections series capturing the propagation of the contrast agent. In more detail, due to the fact that the 3D surface model is aligned with the biplanar angiography data, for each surface segment we can always find the corresponding two pixels in AP and LM images, respectively. Subsequently, the corresponding grey values of the two pixels (one in the AP image and the other in the LM image) at each time frame are projected to the 3D vessel surface segment. The mean value of these two pixel values is taken as the concentration of the contrast agent at the surface segment. Combining all time frames, we can obtain a reconstruction of the flow dynamics along the 3D vessel surface model. To better visualise the flow dynamics, the reconstructed concentration of the contrast agent along the 3D vessel model at each time frame was colour-coded. More quantitative information about the flow dynamics can be obtained from the reconstructed dynamic models.

Our first results demonstrate that it is feasible to reconstruct 3D blood flow information on 3D rotational X-ray angiography from 2D biplanar angiography, which provides additional information for clinical decision making.

1 ARTORG Center – ISTB, University of Bern
2 Department of Interventional and Diagnostic Neuroradiology, Inseldiaklinik, University of Bern
3 Department of Neurosurgery, Inseldiaklinik, University of Bern

**Figure A:** Initial example of available digital subtraction angiography data with overlay of 3D vessel model of Carotis interna. **B:** Registered 3D vessel model with colour coded flow (i.e. contrast) information. (Provided by ARTORG Center)
The objective of this subproject is to provide new imaging methods to improve the spatio-temporal tracking of labelled cells, to develop new methods for quantitative assessment to generate reliable biomarkers of the cell fate and therapeutic effects as well as novel image pre-processing techniques to allow stable and reproducible evaluation of experimental results. This includes tools for visualisation and co-registration, as well as algorithms for quantitative evaluation.

After just half a year since the official start of the project ENCITE, its scientific activities are now in full swing. We are pleased to provide you with information on the state and fate of the delivered novel candidate reporters. In addition, this subproject will significantly expand the utilisation of MRI reporter genes, applying them for monitoring the constitutive expression of genes, as well as detection of changes in gene expression and imaging of cell differentiation.

So far no imaging approach has been reported for direct detection of cell proliferation, luminescence imaging has been used for determination of increases in cell number. By combining strategies for simultaneous image of cell proliferation, bioluminescence imaging has been used for determination of increases in cell number. By combining strategies for simultaneous imaging of cell proliferation and software packages for use by the application groups.

With respect to the aim of developing advanced methods and protocols for cell characterisation, measurement techniques for characterisation of tumour neoangiogenesis by dynamic contrast enhancement (DCE-MRI) based on an IR-inversion FISP sequence for direct quantitative T1-measurement has been implemented and tested on mice.

Currently, we are about to assess the specificity for new methods is under preparation as a first step towards implementing the work plan. This will be used to develop specifications for method and software packages for use by the application groups.

The aim is to establish a technique that will enable capture of intra-cellular protein interactions known to occur during apoptosis. Such a method would be valuable for in vivo imaging and for identifying new proteins involved in the apoptotic process using siRNA screens. This work is a collaboration between the labs of Profs. Michal Neeman and Atan Gross, both from the Department of Biological Regulation at the Weizmann Institute.

This subproject is led by the University of Freiburg, Germany, with the aim to increase the number of cases which are in progress, as is the case in the field of diabetes.

With regard to dendritic cell therapy, studies relevant to in vivo visualisation of DC cell interaction have been initiated according to schedule and are in progress.

As far as cancer T-cell therapy is concerned, studies relevant to the migration and homing efficiency of adoptively transferred T cells, activation of adaptively transferred T cells, activation of appropriately matured and activated. However, many questions still remain. One of the concerns related to ex-vivo generated DC is how to ensure effective migration to the T cell areas in the lymph node.

Portraits of dedicated staff as well as more detailed updates on progress reports are available at the ENCITE project website www.encite.org.

By Monika Hierath

The European Institute for Biomedical Imaging Research (EBIR) has taken over the coordination of a European large-scale research project. An international research group from ten countries will develop imaging technologies and methods in the area of cell therapy.

EBIR was founded in January 2006 and is a non-profit, limited liability company with more than 230 member institutions from 27 countries. The mission of EBIR is to co-ordinate and support the development of biomedical imaging technologies and the dissemination of knowledge with the ultimate goal of improving diagnosis, treatment and prevention of disease.

The project ENCITE – European Network for Cell Imaging and Tracking Expertise – was submitted to the call HEALTH-2007-1-2-4 ‘In vivo imaging for cell therapy’ and is funded by the European Commission within the 7th Framework Programme with roughly €1.62m. This large integrated project consists of 21 project partners (listed at www.encite.org) with leading expertise in the field of cell imaging, with EBIR as the coordinating partner. The 4-year project began on June 1, 2008. In order to complement the expertise represented by the 21 project partners, ENCITE will seek additional partners to provide input to certain work packages and specific issues related to cell imaging and cell tracking to be addressed by the project. To this end, a competitive call will be published in 2009.

Currently, there is no single imaging modality that meets the requirements of stem cell therapy. Within the framework of the project, new MRI imaging methods and biomarkers will be developed and tested in order to get a more comprehensive picture of the cell fate and the reaction of the immune system. Eventually, the plan is to apply this understanding in the treatment of cancer, cardiovascular diseases and diabetes.

Subproject 4 Pre Clinical Validation
This subproject is led by the Erasmus Medical Centre Rotterdam, the Netherlands, and will validate the generic tools developed under Subprojects 1 to 3 and develop specific tools relevant to 5 major fields of cell therapy application. Within each of the work packages, staff have been hired and initial studies have been started.

Subproject 5 Translation towards Clinical Applications
This Subproject is led by the Radboud University Nijmegen Medical Centre, the Netherlands. The group exploited dendritic cells (DC) to vaccinate melanoma patients and recently demonstrated a statistically significant correlation between favourable clinical outcome and the presence of vaccine-related tumour antigens specific T cells in delayed type hypersensitivity against the tumour. Therefore, it is obvious that current DC-based protocols need to be improved. For this reason, the fate, interactions and effectiveness of the injected DC are studied in small proof-of-principle trials.

Dendritic cell immunotherapy has been introduced in the clinic. It has proven to be feasible, non-toxic and effective in some cancer patients, particularly if the DC are appropriately matured and activated. However, many questions still remain. One of the concerns related to ex-vivo generated DC is how to ensure effective migration to the T cell areas in the lymph node.

Portraits of dedicated staff as well as more detailed updates on progress reports are available at the ENCITE project website www.encite.org.
The European Institute of Oncology (IEO) is a research and care organisation devoted to the field of oncology, on a basis of full integration between the different areas of the fight against cancer: laboratory, clinical research, prevention, diagnosis, treatment, education. IEO started a new principle in cancer treatment by shifting the focus from the disease to the patient. The immediate transfer of new research results to clinical applications allows abandonment of traditional therapies, based on the heaviest treatment the patient can tolerate, and to replace them with innovative methods if, which, while providing equal effectiveness, ensure minimal harm to the person. Thus, the Institute has introduced into every healthcare action the principle of ‘maximum effective treatment’ in place of the ‘maximum tolerable treatment’ today. 100,000 patients are treated on this principle.

Dr. la Pietra will speak at the Management Session of the symposium. The ECR TODAY 2009 Saturday, March 7, 2009

Dr. la Pietra studied Medicine & Surgery and Hospital Management at the Catholic University in Rome, and holds an MBA (Master in Business Administration) from INSEAD, Fontainebleau, France.

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The Institute invests its funds both in clinical research, to improve the treatments available to patients, and in basic research, carried out in laboratories where researchers try to understand the underlying genetics of cancer and develop new drugs.

IEO’s clinical activities focus on three main areas: Prevention and Diagnosis, Surgery, and Medical Care. All the activities are conducted with a multidisciplinary approach which, through discussion between the different specialists in these three areas, offers patients a treatment path with the support of the best clinical skills.

Continuous improvement of the quality of our services is one of the main objectives in the European Institute of Oncology’s mission. To achieve and maintain its standards of excellence, IEO has developed an improvement process based on a rigorous quality plan, modified on some of the top national and international benchmarks (ISO standards, Joint Commission) now extended to all our departments and services.

IEO is strongly oriented towards developing, experimenting and perfecting innovative processes and original models that can be used to improve clinical performance and, most of all, to become more and more effective levers of governance. The main areas of interest are patient safety and security and clinical risk prevention (in particular related to the surveillance and control of hospital infections and the prevention of pharmaceutical errors), clinical performance monitoring and evaluation, the promotion of generic and specific appropriateness in treatments, the equity of access conditions, the respect of regulations and of deontology, professional growth, humanisation, environmental comfort, etc. In this perspective, the Medical Office has promoted a quality improvement and education path at every level.

All these initiatives are made more explicit in the Documental System of the Institute, which includes plans, programmes, policies, the proceedings of the meetings of the various committees, and the whole institutional documentation; these documents can be accessed both on paper and on the intranet of the Institute.

Among the methodologies used by IEO to reach and maintain high quality standards, some are particularly important, such as the adherence to the philosophy of Clinical Governance, which provides for a strong involvement and responsibility of clinical operators in IEO decision processes.

Clinical Governance in IEO is developed in all its components, as described in the literature: Performance Evaluation, Quality and Safety, Audit, Education, Evidence-Based Medicine, and Customer Satisfaction. Similar to any good maintenance processes, where the activities being performed must be monitored, the Balanced Scorecard (BSC) methodology has been adopted.

BSC aims at supporting: focus and communication of the strategic goals; alignment and convergence of staff actions and behaviours towards these goals, and control of the achievement of the agreed goals. The main element of innovation of Balanced Scorecard is its multidimensional nature. BSC aims at making visible the growth and development abilities and opportunities of IEO, besides spreading its mission and value at the international level.

The analysis and monitoring of patient satisfaction are performed every six months by the Quality and Accreditation Office, in which the trends and the main problem areas of the Units are highlighted. To improve the level and the quality of patient information on topics of paramount importance (e.g. therapies, alimentation, rehabilitation, post-discharge), IEO has published a collection of booklets, the IEO Booklets by the Health Education Committee.

The topic of patient safety, part of the Quality Plan of IEO, has been continuously performed since 2001, with the creation of the Risk Management Office and of the Patient Safety and Risk Management Committee. Since 2002, 17 Root Causes Analyses of particularly significant events have been performed and two analyses are being performed using the FMEA (Failure Mode and Effect Analysis) method; these analyses are focused on two very important processes: the administration of therapies in the ICU and the administration of chemotherapy in the day hospital.

To monitor safety, 23 indicators have been defined which are regularly debated at different levels: Divisional, Clinical Directors Committee, Management Committee, Patient Safety and Clinical Risk Management Committee.

Since 2003 a reporting system of adverse events has been implemented, at present, this system is available in a web version of the IEO intranet. IEO is strongly investing in sensitisation and continuous education, by means of a continuous and capillary diffusion of the culture of safety aimed at getting over the ‘blame culture’ at every level.

Lean architecture that reflects quality of care

David Wormald is the present Integrated Assistant Professor in Applied Health Sciences, holds a diploma with the College of Medical Radiation Technologists of Ontario in Radiography and Magnetic Resonance Imaging. He has also received a diploma in Healthcare Administration from the Ontario Hospital Association and an undergraduate degree in Political Science from the University of Toronto. He is currently working on his Master in Business Administration at McMaster University, DeGroote School of Business.

David Wormald will speak at the Management Session of the symposium.

Today, more and more research is surfacing about how the healthcare environment is directly linked to positive patient outcomes. Evidence-based design helps create an environment in which patients and families feel as safe and comfortable as possible. It also promotes efficiency in staff workflow and helps decrease levels of stress and anxiety in patients, family members and staff.

When the re-development of St. Joseph’s perioperative service resulted in the need to relocate the hospital’s Diagnostic Imaging Department, management of the Diagnostic Services were given the opportunity to take a look at the current departmental design, flow, and utilization, and consider how a new design could improve the quality and efficiency of the healthcare we provide. To ensure that St. Joseph’s Healthcare remains on the cutting edge of diagnostic imaging and continues to provide the highest quality of healthcare in the most timely and efficient way, we decided to take an evidence-based approach to designing the new facility.

Specificially, St. Joseph’s Healthcare used lean thinking to design the new facility. Working with GE Healthcare Hospital of the Future specialists, we were able to design in clinical benefits and clinical efficiencies that will remain with us for the life of the new facility. Workflow patterns, process improvements and the impact of expected future changes in technology were overlaid on architectural drawings for the new facility and studied using lean analytics. This Hospital of the Future methodology allowed us to interpret how performance would change in the new facility (better or worse) and informed our design decisions. This iterative approach resulted in the selection of the best conceptual design, around which we built our new facility.

"Progressive healthcare providers now realize the tremendous benefits of applying lean systems management to improve the effectiveness of healthcare delivery. The lean system enables our frontline teams to focus on value delivery, providing high quality, patient-centred care. It simplifies and builds strong control into our operations to enable the highest standards of patient safety and quality of care; smooth work, information, and patient flows; and effective facility utilization.”

Today, the expanded St. Joseph’s Diagnostic Imaging facility boasts the following:

• A separate inpatient journey from an outpatient journey
• Efficiencies that translate into a more timely and more satisfying patient journey (e.g. patient flow, procedure flow, supply flow, radiologist/technologist/support workflow, information flow)
• Increased patient privacy in the ultrasound rooms, CT prep rooms, and at registration
• Overall noise reduction (e.g. wireless access for radiologists to help decrease frequency of overhead paging)
• Use of lighting, colour and texture for way-finding
• Use of natural products, and visual distractions to decrease patient anxiety
• Improved infection control (e.g. operating room privacy air for interventional rooms, hand washing sinks,auled holding, etc.)

The new Diagnostic Imaging Department at St. Joseph’s Healthcare is now well positioned as a result of employing an innovative approach to designing its new facility. The benefits are far-reaching and to date include a 54.3% increase in clinical efficiency and an 8.5% improvement in patient travel distances. The ability to achieve these efficiencies in an expanded facility were necessary in our environment of staffing shortages, increasing demand for procedures, our aging population and our growing clinical services. This project was conducted with St. Josephs culture of continuous improvement, which fully engages our committed workforce in optimising our patient care environments, our patient outcomes and overall hospital performance.
Teleradiology – moving from ‘black box’ solutions to integrated partnership

Dr. Henrik Agrell is Vice President and co-founder of Telemedicine Clinic (TMC), a leading medical imaging group, based in Barcelona, that supports public and private hospitals across Europe in solving the challenges they may face in medical imaging, partly by offering professional teleradiology solutions. Dr. Agrell completed his medical degree at the Karolinska Institute of Stockholm. He has extensive experience in the areas of e-Health and Telemedicine. Prior to co-founding TMC, Dr. Agrell participated in building up NetDoktor.se, the largest medical web portal in Scandinavia. He has published several scientific articles within these fields.

Dr. Agrell will speak at the IT Session of the symposium.

The major challenges facing national healthcare systems worldwide call for new and innovative solutions for the production and delivery of healthcare services. In the field of medical imaging, there is a problematic imbalance between an increasing demand for imaging services, partly due to an aging population, and a growing shortage of medical staff and funding. In addition to this, more and more advanced imaging processes require access to sub-specialist radiologists for an increasing number of cases. Professional teleradiology services could be one potential solution to these challenges. Centralising sub-specialist competence in a highly-efficient and quality-controlled production environment and distributing this resource via integrated IT solutions at point of need, could give public and private healthcare players access to exactly the resource they need, when they need it.

Teleradiology has been tested for decades in a huge number of more-or-less successful projects. However, some years ago when the first teleradiology service providers entered the market, hospitals started to use this solution on a more continuous basis. In its infancy, teleradiology was a fairly basic service with remote radiologists reporting directly to the hospital’s RIS/PACS environments during their spare time. With growing competition and increased awareness amongst the clients, teleradiology is now rapidly developing from a ‘black box’ outsourced solution to a highly integrated partnership, which requires different structures and new and more sophisticated production processes for teleradiology service providers to be able to meet a different level of demand in the market.

In this presentation, you will be able to follow the development of Telemedicine Clinic (TMC), the largest European teleradiology service provider, with specific focus on efficiency and various challenges related to this area.

More for less – driving up performance in acute care

Niall Dickson joined The King’s Fund in London, UK, as Chief Executive in January 2004. He began his career in teaching before taking up posts in national charities involved with older people. He was Editor of Therapy Weekly for the allied health professions and then of Nursing Times. He moved to the BBC in 1988 as Health Correspondent, became Chief Social Affairs Correspondent and then, in 1995, Social Affairs Editor. Dickson is a member of the Cabinet Office Honours Committee (Health) and ministerial advisory group on social care funding and the NHS National Stakeholder Forum. In 2008 he chaired a cross-party commission on accountability in health for the Local Government Association (LGA). He is a trustee of the Consumers’ Association and of the Leeds Castle Foundation. Among his honorary awards he is a Fellow of the Royal College of Physicians and of the Royal College of General Practitioners.

Niall Dickson will speak at the Management Session of the symposium.

Public spending on health and long-term care is a major source of fiscal pressure in most OECD countries, amounting to, on average, some 9% of GDP in 2006, and reaching as much as 15% in the United States. Spending growth at the rate it has been seen in the last ten years in most countries is unsustainable.

There is no doubt that growing economic pressures will limit growth in healthcare funding. At the same time governments will face sustained demand for investment driven by rising public expectations. While the World Health Organization report of the Commission on the Social Determinants of Health reported that healthcare built on the principle of universal coverage is important, healthcare systems across Europe are under pressure. A sustained economic downturn may result in a move towards a ‘safety net’ of provision only. In any event, the increasing pressure on healthcare resources in the face of growth in demand and in capacity to treat is likely to drive a tighter definition of benefits packages.

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Fully automated 3D segmentation of liver tumours moves a step further towards clinical reality

By Günter Schmidt, Gerd Binnig, Markus Kietzmann, Johann Kim; Definiens, Munich, Germany

The reliable detection of liver tumours in CT scans and their precise measurement form the basis for effective diagnosis, surgery planning and therapy control in liver cancer. Since manual measurement of 3D structures is extremely time-consuming, cost-intensive and subjective, automated methods offer promise for today's challenging clinical environment. However, due to significant variability in the appearance and shape of liver tumours, reliable automated segmentation represents a nontrivial task.

In this study, Definiens Cognition Network Technology® was utilized to develop an application for the fully automatic segmentation of liver tumours. The results were evaluated on a set of six CT scans containing ten tumours, using the following comparison metrics: volumetric overlap, volume difference, average surface distance, RMS and maximal surface distance.

The data set used in the analysis was provided by the organisers of the Medical Image Computing and Computer Assisted Intervention Society (MICCAI) 2008 workshop. It contained ten annotated tumours from four patients (training set) and ten tumours from six patients without annotations (test set).

The segmentation algorithm was developed in Definiens’ Cognition Network Language (CNL) and contained the following two parts: In the first part, the liver is segmented. The body is separated from the background, while within the body initial Image Objects (e.g. fat tissue, muscle layer, organs, skeleton) are refined based on their volume and intensity. From these distinguished body parts an additional layer of 3D edge information is calculated, which provides a reference for further refinement. After this pre-processing step, the left and right lungs are classified as Image Objects with maximal volume on the left and right sides of the body. Adjacent to the right lung, the gall bladder is segmented. In combination with the skeleton this provides further constraints for the liver. Finally, the liver is located below the right lung and is demarcated by the gall bladder and the skeleton (particularly the ribs). The liver is thus classified as an Image Object with maximal volume.

During the second part, the tumours are segmented. The liver is partitioned into segments with high, medium, and low intensity. Segments with high or low intensity provide the tumour candidates. The surfaces of the tumour candidates are smoothed using a ‘shrink and grow’ strategy and are filtered according to a volume threshold. ‘Normal’ liver parts (i.e. liver segments with medium intensity) that are enclosed by tumour candidates are merged with the latter. The tumour candidates are further refined through comparison to a given surface tension and volume criterion is again used to remove candidates considered too small. Further refinement is performed by growing the tumour candidates and subsequent filtering according to roundness and relative proximal borders to the liver.

The above algorithm was applied to both the training and test sets. The figure shows an example of the segmentation results.

Visual inspection of the segmentation results indicates that the tumour segmentation algorithm tended to identify a superset of the reference segmentations without a smooth surface. This is a consequence of our conservative approach to ensure a guaranteed enclosure for each tumour. Additional smoothing with certain restrictions may improve this method.

In summary, we presented an algorithm based on Definiens Cognition Network Technology® for the segmentation of liver tumours in 3D data using contextual information. Although the current iteration is not considered suitable for clinical use, the results indicate it represents a promising step in the development of a computer-aided diagnosis system for liver tumours.
Three-dimensional presentation of cerebral vasculature facilitates greater understanding

By Wieslaw L. Nowinski, Biomedical Imaging Lab, Agency for Science Technology and Research (A*STAR), Singapore/SG

The human cerebral vasculature is highly complex and variable, and despite the existence of a huge body of knowledge and the availability of numerous textbooks, the current ways of presentation are limited. Presentation is typically restricted to a few traditional views. The complete course of vessels, partly hidden in the sulci, is not shown and the arterial and venous systems are presented separately, without their relationships to each other being shown. The vessel naming is limited to certain locations, information on geometry (such as diameters or distances) is scarce, and the vessels are typically not related to brain structures.

Presentation of cerebrovascular in three dimensions (3D) along with its correlation to the surrounding neuroanatomy greatly facilitates learning and understanding. Advances in angiography imaging, including high field MRI and 3D-detector CTA, facilitate the depiction of vasculature in 3D.

Multiple MR high resolution scans of a healthy subject were acquired on 3T and 7T including MPRAGE, TOF, SWI, and SPGR. Three interactive 3D atlases (continuously enhanced) have been created: cerebrovascular atlas from 3T (summa cum Laude, ASNR 2006), atlas of cerebral arterial variants (summa cum Laude, ASNR 2008), and cerebrovascular atlas from 7T (certificate of Merit, RSNA 2008).

The Cerefy Atlas of Cerebral Vasculature

The Cerefy Atlas of Cerebral Vasculature (CACV) (Nowinski et al, Thieme, New York 2008) correlates the cerebrovasculature with surface and sectional neuroanatomy for a wide use in neuroradiology, neuroscience, neurology, neuroanatomy, neurosciences, and neuroeducation. It provides an intelligent navigation, dynamic scene composition allowing the user to build any vascular network, and self-testing.

At its core is a 3D cerebrovascular model with the arterial and venous systems derived from a 3T 3D TOF (MRA) scan. It was constructed manually by employing a dedicated vascular editor. The cerebrovascular model is co-registered with MRI and MRA scans presented as a triplanar in 3D. All the vessels are labelled at any location with their names and diameters. In addition, 3D surface models of the hemispheres and the ventricular system are extracted from the 3T MRI scan and co-registered with the cerebrovascular model.

The CACV provides aubundant functionality for presentation and exploration of the cerebral vasculature along with the surrounding surface and sectional neuroanatomy, including: model/triplanar display, vessel selection, vessel labeling, model/triplanar manipulation, and quantification (3D coordinates, vessel diameter, and 3D distance measure), as shown in Figure 1.

Interactive 3D Atlas of Cerebral Arterial Variants

The knowledge of cerebrovascular variants is critical in diagnosis and treatment. Numerous textbooks and articles describe these variants and present them in the form of drawings or autopsy photographs. However, there is no interactive atlas providing 3D vascular models and exploration tools enabling a better and faster understanding of vascular variants and their spatial relationships.

We have created such an atlas with 60 cerebral arterial variants along with their incidence rates. They can be explored individually or embedded into the reference vasculature. User friendly tools are developed for variant selection, display manipulation, and labelling as well as saving of composed images.

Conclusion and future developments

The atlases facilitate studying and understanding of cerebral vasculature along with the surrounding anatomy and its variations in 3D. They are useful for medical students, educators to prepare teaching materials, researchers, and clinicians. A light version of the vascular atlas is also publicly available at: www.cerefy.com/dswMedia/iCACVlite.htm

Though the CACV is our sixth brain atlas published by Thieme, this is the first atlas of a new generation. This new generation of atlases is fully 3D, extendible, electronically disseestable, stereotactic, meta-labelled, and with the exportable content that can be employed in the user's applications. Future extended by the community this generation is based on a pyramid concept, meaning that the atlas content will be extended in height and breadth, while preserving its concept and main features.

Figure 1: The Cerefy Atlas of Cerebral Vasculature. The complete vascular model is displayed, along with surface and sectional neuroanatomy.

Figure 2: The atlas of the arterial variants. The variants of the ICA siphon are shown (right).

Figure 3: The cerebrovascular atlas derived from 7T.

Figure 4: Comparison of deep cerebral veins on 3T (left and 7T (right)).
Provision of training is priority in cardiac radiology

By Michael Rees, Gwynedd/UK; ESCR President

The last decade has seen a rapid advancement in the technological ability to image the heart non-invasively. High resolution fast multi-slice CT has made a huge impact on coronary artery disease diagnosis and MRI has developed significantly to challenge nuclear medicine and echo techniques in the diagnosis of myocardial ischaemia and viability. Given that cardiac radiologists now have the tools by which they can make an impact on cardiology diagnosis, what challenges are there for this group of doctors to be recognised for the role they can play in the clinical management of the cardiology patient?

The Technological and Research Challenges

Despite the rapid development of cardiac imaging technology there are still marked technological challenges in cardiac imaging. If asked, all cardiac radiologists would like faster, clearer low radiation technology in CT and faster more reliable MRI. However there are advances that could be achieved in the near future, including software packages that provide a user-friendly interface between the machine, the radiologist and the clinician, which can be translated between imaging environments. This would not only facilitate clinician and patient understanding of the examination, but it would also allow for standardised multi-centred trials, which comprise a vital part of the knowledge base for non-invasive and invasive cardiac trials.

This knowledge base and the ability to conduct trials is one of the major strengths of cardiology and needs to be at least replicated if not surpassed for cardiac radiology to be a serious contender for research funding and the attention of governmental and EU funding.

The Professional Challenges

Trained cardiac radiologists who can provide service reliably and enthusiastically will command the respect and support of their colleagues in clinics and operating theatres. We often refer to these doctors as our clinical colleagues for getting that we do is no less clinical and central to patient management. Radiologists need to be integrated into the clinical team and help with the management of the patient so the question is no longer what ‘can’ we image but how ‘should’ we image so that the welfare and treatment of the patient is optimised to the clinical problem at hand.

The ESCR is helping in this process by publishing guidelines which are meant to be of practical use in clinical practice. Building on this process we will be consulting with other cardiac imaging societies to produce consensus documents to provide guidance on patient management.

The ESCR annual meeting 2008 in Porto/PT proved to be a huge success. The ESCR is helping in this process by publishing guidelines which are meant to be of practical use in clinical practice. Building on this process we will be consulting with other cardiac imaging societies to produce consensus documents to provide guidance on patient management.

The ESCR annual meeting 2008 in Porto/PT proved to be a huge success. The ESCR is helping in this process by publishing guidelines which are meant to be of practical use in clinical practice. Building on this process we will be consulting with other cardiac imaging societies to produce consensus documents to provide guidance on patient management.
ESR awards diplomas to 33 young radiologists

In 2008, 33 radiologists in training participated in the newly established trainee programmes of ESR, namely the Visiting Scholarship Programme and the Exchange Programme for Cardiac Imaging Fellowship, organised through ESOR (European School of Radiology). The programme consisted of at least three months of structured and comprehensive training on a chosen topic and were complemented with tutorials, lectures, and hands-on teaching of routine clinical cases and/or modality techniques and protocols.

The courses were realised in partnership with volunteer reference training centres, subspecialty societies and industry partners (Bracco). ESOR is delighted that all young doctors successfully completed their training and will honour their achievements on the occasion of the first ESOR session ever held at ECR (see info box).

The following trainees completed the three-month Visiting Scholarship Programme.

Congratulations!

Miranda Adriansen, Utrecht/Netherlands
Topic: Musculoskeletal Radiology
Training Centre: Mater Misericordiae Hospital, Dublin/IE

Daniela Bacu, Bucharest/Romania
Topic: Musculoskeletal Radiology
Training Centre: University of Strasbourg/FR

Anvita Bieza, Skopje/Macedonia
Topic: Musculoskeletal Radiology
Training Centre: Medical University of Vienna/AT

Menka Lazareska, Skopje/Macedonia
Topic: Musculoskeletal Radiology
Training Centre: Medical University of Vienna/AT

Dimitra Loggitsi, Matosinhos/Portugal
Topic: Musculoskeletal Radiology
Training Centre: Mater Misericordiae Hospital, Dublin/IE

Teresa Zabrowska, Lublin/PL
Topic: Musculoskeletal Radiology
Training Centre: Medical University of Vienna/AT

Oliver Springer, Aarau/Switzerland
Topic: Musculoskeletal Radiology
Training Centre: University Medical Center, Leiden/NL

Miraude Adriaensen, Utrecht/Netherlands
Topic: Musculoskeletal Radiology
Training Centre: Mater Misericordiae Hospital, Dublin/IE

Ana-Maria Maxim, Timisoara/Romania
Topic: Musculoskeletal CT Protocols
Training Centre: University Hospital of Radiology, Innerbueck/AT

Nikoloz Onashvili, Tbilisi/Georgia
Topic: Cardiac Imaging
Training Centre: Medical University of Vienna/AT

Emel Onur, Izmir/Turkey
Topic: Cardiac Imaging
Training Centre: Training Centre: Erasmus MC, Rotterdam/NL

Raluca Pegza, Bucharest/Romania
Topic: Oncologic Imaging
Training Centre: Pitié-Salpêtrière, Paris/FR

Katja Pinker, Vienna/Austria
Topic: Breast Imaging
Training Centre: Barts and The London NHS Trust, London/UK

Sara Selton, Genoa/Italy
Topic: Breast Imaging
Training Centre: University Hospital of Radiology, Innerbueck/AT

Ana Silva, Matosinhos/Portugal
Topic: Breast Imaging
Training Centre: Addenbrooke’s Hospital, Cambridge/UK

Matjaz Vodov, Ljubljana/Slovenia
Topic: Neuroradiology/Head and Neck
Training Centre: UZ Leuven/BE

Marina Wick, Innsbruck/Austria
Topic: Musculoskeletal Radiology
Training Centre: Barts and The London NHS Trust, London/UK

The following trainees completed the two-month Exchange Programme for Cardiac Imaging Fellowship. Congratulations!

Mustafa Bahta, Izmir/Turkey
Training Centre: Medical University of Vienna/AT

Konstantin Kalugin, Starropol/Russia
Training Centre: Cardiology Research Center, Moscow/RU

Moula Lazarouka, Ioannina/Macedonia
Training Centre: University La Sapienza, Rome/IT

Dimitra Loggitsi, Athens/Greece
Training Centre: University of Banger/UK

Ania Litcheva Guerguieva, Madrid/Spain
Training Centre: University Medical Center, Groningen/NL

Nuno Ribeiro da Costa, Lisbon/Portugal
Training Centre: Leiden Maximilians University, Munich/DE

Milenka Spirovska, Semolina Kamenica/RS
Training Centre: University of Basel/CH

Oliver Springer, Aarau/Switzerland
Training Centre: University of Leipzig/DE

Ajay Varghese, Harrow/United Kingdom
Training Centre: University Medical Center, Leiden/NL

ESOR looks forward to offering more extended educational programmes in 2009 and would like to encourage all young doctors to take the chance to receive training in a pre-selected, highly esteemed reference training centre in Europe. Further information on all activities can be found at the ESOR booth in the entrance hall of the Austria Center or online at myESR.org/esor.

ESOR Session
Saturday, March 7, 14:00–15:30, Room Z

New opportunities for education
At its first session ever held at ECR, ESOR will give an insight into the variety of educational programmes established for young radiologists in training.

• What the school means for ESR
  (W. McColl, Düsseldorf/UK)
• Education in partnership
  (N. Georgiouyiannakis, Vardeni/GR)
• GALEN meets young radiologists
  M. Szczertovits-Toroknai, Lovel/UK
  P. Aapin, Stockholm/SE
• The Radiology Training Forum
  C. Ajham, Sunderland/UK

My experience as an ESOR trainee
A. Hambardzumyan, Yerevan/AM
K. Picker, Vardeni/AT
M. Sippolci, Shnaila Kamenica/RR

ESOR Awards
On the occasion of the session the certificates for successfully completing the Visiting Scholarship Programme and the Exchange Programme for Cardiac Imaging Fellowship will be awarded.
Two months before ECR 2009, ECR Today met Bernhard Allgayer, President of the Swiss Society of Radiology, to learn more about radiology in the European country with the highest ratio of high-field MR units per inhabitant.

ECRT: How is Swiss radiology doing and how does it position itself in Europe? Bernhard Allgayer: Swiss radiology has an increasing role in the medical community with many clinical and scientific connections to other European countries.

ECRT: How many radiologists are currently working in Switzerland? What is the proportion of men, women and young people? What is the ratio of radiologists to inhabitants? BA: Currently 919 radiologists are working in Switzerland, with 193 in private practices, and about 30 to 35 young radiologists per year undergo the board examination. Switzerland has 7.56 million inhabitants, so the ratio is one radiologist per 8,226 inhabitants.

ECRT: How do you see the demography of your profession evolving in the near future? BA: I think the total number of radiologists will increase about 3 to 5% per year.

ECRT: Regarding your introduction to the ‘ESR meets Switzerland’ session, could you please briefly explain: What is the role of 3.0 T in Switzerland? BA: Out of 207 MRI units, 42 of them are 3.0 T units. Switzerland has probably one of the highest densities of MR magnets in Europe and probably worldwide. The number of 3.0T magnets, particularly in private practice, is increasing. 3T has allowed clinical implementation of sequences that were difficult to perform previously such as arterial spin labelling perfusion.

ECRT: What are the demographics of stroke in Switzerland? How does it compare to the rest of Europe? BA: Stroke is one of the three highest causes of mortality in Switzerland, with cardiac diseases and cancer, as it is in other developed countries. It has a major socio-economic impact. In Switzerland there is a trend to aggressively diagnose and treat these patients at early stages. Here, MR technology plays an important role in the management of these patients.

ECRT: What are the advances made in clinical Neuro-MR of stroke? BA: In Neuro-MR, the advent of high field magnets has allowed us to improve the routine acquisition of the following techniques: perfusion imaging, diffusion tensor and diffusion-weighted imaging, susceptibility-weighted imaging, arterial spin labelling perfusion, and conventional functional MRI.

ECRT: What are the main challenges faced by radiology in Switzerland nowadays? What are the strategies developed by your society to cope with them? BA: The main challenges for Swiss radiology in the future are: a shortage of board-certified radiologists, in particular in public hospitals; turf battles in different areas of radiology; and decreasing revenues because of decreasing reimbursement by the healthcare providers.

ECRT: What future trends and challenges do you foresee in radiology? BA: The trends will focus on higher fields and faster imaging. The challenge will be to combine technological changes and clinical excellence. The next step in radiology is imaging of function, cellular and molecular imaging.

ECRT: Is there any competition between Swiss radiologists and the rest of the world? Is Switzerland’s geographical position in Europe an advantage? BA: This exchange is important for us. Therefore we have a longstanding tradition of exchange between Swiss radiologists and others around the world. For many years it has been a tradition, particularly in academic institutions, that young radiologists undertake a fellowship in another country. In addition, there is an increasing number of radiologists who were trained in Switzerland and who now work in faculty positions in leading radiology centres worldwide. Additionally, we also have a long-standing tradition for postgraduate teaching courses, which are performed in collaboration with leading international radiology experts. Finally, we foster international contracts through the annual meeting of our society where we aim to provide leadership for states of the art lectures. Furthermore, the society rewards excellence through various honours and prizes.

ECRT: What are the potential benefits of SSR taking part in the ‘ESR meets’ programme? BA: To learn more about radiology and the work of radiologists in other European countries.

ECRT: What future trends and challenges do you foresee in radiology? BA: The trends will focus on higher fields and faster imaging. The challenge will be to combine technological changes and clinical excellence. The next step in radiology is imaging of function, cellular and molecular imaging.

ECRT: What are the potential benefits of SSR taking part in the ‘ESR meets’ programme? BA: To learn more about radiology and the work of radiologists in other European countries.

ECRT: How would you judge the importance of the exchange of knowledge between Swiss radiologists and the rest of the world? Is Switzerland’s geographical position in Europe an advantage? BA: This exchange is important for us. Therefore we have a longstanding tradition of exchange between Swiss radiologists and others around the world. For many years it has been a tradition, particularly in academic institutions, that young radiologists undertake a fellowship in another country. In addition, there is an increasing number of radiologists who were trained in Switzerland and who now work in faculty positions in leading radiology centres worldwide. Additionally, we also have a long-standing tradition for postgraduate teaching courses, which are performed in collaboration with leading international radiology experts. Finally, we foster international contracts through the annual meeting of our society where we aim to provide leadership for states of the art lectures. Furthermore, the society rewards excellence through various honours and prizes.

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Head & Neck Imaging

“The head and neck imaging sections, cases illustrating pathology of the sinonasal cavities, maxillofacial skeleton, temporal bones, skull base, and soft tissues of the head and neck are published. Cases illustrating the appearance of head and neck cancer, either on CT or MRI, would be especially welcome, as this is a disease with a very heterogeneous presentation on imaging. Also considered for publication are cases showing particular anatomical relationships, important to know in the evaluation of disease. Cases illustrating an anatomical variant, possibly mimicking disease, are also welcome. Potential authors are also encouraged to submit cases describing temporal bone pathology, as relatively few cases on this challenging structure are available in the database. When submitting cases on disease conditions, it is important that the radiological diagnosis has been confirmed by pathological examination, or depending on the condition described, has been well documented in some other way. Cases showing pathology of extranodal structures, unless originating from the skull base, should be submitted to the neuroradiology section.”

Musculoskeletal System

“It is a great honour and pleasure to coordinate the musculoskeletal section of EURORAD. In this section all unusual cases are welcome that are supported by high quality images obtained with different imaging techniques and with a discussion that takes into account all the features introducing the possible criteria of differential diagnosis. Another recommendation is that the reference should be updated and pertinent. I believe that all these aspects are relevant for educational purposes, which is the main goal of the EURORAD initiative. Finally, other criteria to be followed for the selection of the case submissions should be a preliminary overview of cases already submitted and available in the EURORAD database, in order to avoid unnecessary repetition.”

Paediatric Radiology

“The paediatric section of EURORAD is unique in that it is the only one that is defined by the age of the patient rather than anatomical systems within it. All cases that involve children in imaging are welcome, however, greater emphasis and importance are placed on those cases that are unique to paediatrics or have a particular message that is pertinent to paediatric radiologists. Issues relating to radiation protection and avoiding unnecessary irradiation of children are important. The paediatric section contains a large number of interesting and often rare conditions and further additions to these types of cases are encouraged.”

Liver, Biliary System, Pancreas, Spleen

“In accordance with the aims of EURORAD to give medical students, residents in radiology and seminar radiologists the opportunity to increase their awareness of diagnostic and interventional techniques, the liver, biliary system, pancreas and spleen section serves to present cases from authors who have illustrated them with high quality radiological images. A prerequisite for acceptance of a case is proof by surgery, histology, or clinical follow-up. Since the tendency of authors is to submit complex cases, everyday cases are selected as well. Knowledge in abdominal radiology is expanding dramatically and the application of new techniques, especially MDCT, MRI or specific contrast agents, has resulted in amazing breakthroughs with the refinement of sophisticated diagnostic imaging tests and image-guided interventions. It follows that submission of cases with patients not examined by state-of-the-art imaging modalities have to be rejected because of low educational value.”

Neuroradiology

“The neuroradiology section of EURORAD comprises brain and spine cases that have been collected based on their peculiarity and/or educational impact. The first goal of EURORAD is helping non-experienced radiologists in a specific field, thus we encourage submission of all those cases which useful information for the diagnosis, but also treatment and prognosis, can be argued. Pathologic–radiologic correlations are preferred (when available) but not mandatory. Intriguing cases are welcome but well-described short review cases from daily practice can be accepted as well. Anatomic review can be accepted too. Well-described clinical approach to the patient (including therapy and outcome when possible) is important and necessary in most cases. The final diagnosis must be proven either pathologically and/or clinically. Presumptive diagnosis will not be considered. Multi-modality approaches to diagnosis are welcome. A short but comprehensive discussion including recent references will help readers. Quality of images must be outstanding.”

Vascular Imaging

“The vascular imaging section is devoted to pathologies and disorders involving the vascular system, including arteries, veins and lymphatic system. Because of the existence of an interventional radiology section, this database will only include diagnostic cases. Any diagnosis of a pathology or vascular anomaly in which vascular imaging is contributive (including conventional angiography, CT angiography, MR angiography and ultrasound, CT, MRA is welcome.”

The composition of EURORAD: Introducing the sections and editors, part 2

By Stefanie Muzik

Today, we would like to introduce you to EURORAD’s head and neck, liver/biliary system/pancreas/spleen, musculoskeletal, neuro and paediatric sections. We have asked the section editors to introduce their section and themselves to all ECR participants.
ESMRMB looks forward to an exciting annual MR meeting in Turkey

The European Society for Magnetic Resonance in Medicine and Biology (ESMRMB) looks forward to welcoming Europe’s MR community to its Annual Scientific Meeting and to its numerous teaching activities.

It is our great pleasure to invite you to the beautiful location of Belek/Antalya for our 2009 Annual Scientific Meeting. ESMRMAB comes for the first time to Turkey, hosted by Prof. Muhtesem Agildere as Chair of the Local Organising Committee.

ESMRMB, which now has more than 1,000 active members, continues to attract more and more participants to its Annual Scientific Meetings, with a record attendance last year in Valencia of over 1,200. This year ESMRMAB holds its 26th congress in the very same spirit that founded our society in 1984 as a platform for clinicians, physicists and basic scientists with an interest in the field of MR. The society has continuously favoured multidisciplinary interactions and has tried to attract the largest number of students and young researchers, who have been quite numerous from the beginning, to attend ESMRMAB congresses. These events offer a much appreciated forum for integrated European research activities in basic and clinical MR applications and the missions to support educational activities and research in MR encompass an even larger scope with the new Strategic Plan, expanding to other imaging modalities related or comparable to MR.

To do so, the Scientific Programme Committee, chaired by Prof. Bernard Van Beers, has prepared a very attractive programme, starting with the Sir Peter Mansfield Opening Lecture by Prof. Kamil Ugurbil. The plenary, scientific and clinical focus sessions as well as the mini categorical courses will offer a wide range of novelties in the various aspects of magnetic resonance. They excellently complement the teaching programme organised by Prof. Arend Heerschap and the Education and Workshop Committee.

The congress, to be held from October 1–3, 2009, is at the Martin Pine Beach Hotel, situated approximately 40 minutes from the airport. This resort will accommodate every scientific activity, host an industrial exhibition in a compact and convenient manner, and offer an excellent setting for a lively and enjoyable atmosphere.

Student and resident members of ESMRMAB enjoy free registration to the meeting! We hope that many of you will consider coming and joining us in Turkey in early October as the ESMRMAB is proud to invite the worldwide Magnetic Resonance Community to its 26th Annual Scientific Meeting.

ESMRMB School of MRI – Successful as never before

The ESMRMAB School of MRI, focusing on the education of physicians and technicians, was successful as never before in 2008. All 12 courses were fully or nearly fully booked and four courses even had waiting lists and were not able to fulfil all registrations. Certainly, the most important factor in this story of success is the quality and the expertise of the lecturers and teachers. Evaluation of all teachers in every single course enables us to constantly increase quality on the basis of feedback from the participants. Moreover, the long-standing involvement of the course organisers guarantees the constant high quality of the programme. Course organisers and their faculties have established a learning curve that provides the best guarantee of meeting the quality requirements of the School in the various locations where the courses take place. The concept of repetitions classes in small groups with more than 15 participants has become a highly appreciated teaching format.

Over the years the course programme has become increasingly well-established within the radiological community.

Another element of the spirit of the School of MRI is the European approach and the international atmosphere. Following the concept that all courses have to rotate throughout the European countries, the distribution of the total of 77 courses since 2000 has included 18 European countries, 13% from Africa, 5% from Asia and the rest from America and even Australia/New Zealand.

In 2008 the School of MRI of ESMRMAB entered into a cooperation with the European School of Radiology (ESOR) of the ESR. In this way we were able to avoid competition with this organisation and could profit from better visibility within the radiological community by being integrated into the advertising activities of the ESR.

After successful introduction of a new course on Advanced MR imaging in paediatric radiology in 2008, another new course topic will be introduced this year, covering advanced MR imaging of the chest.

The first course will be held in Dubai from March 26–28, 2009 on Advanced MR Imaging of the Abdomen.

Hands-On MRI – A new course programme for technologists

The Hands-On MRI programme will focus on practical applied MRI in the more advanced MR techniques. The courses will be an optimal addition to the current School of MRI courses. The course programme is aimed at radiographers as well as technicians interested in performing advanced MR examinations on their own. In 2009 three courses will take place in the fields of MR Angiography (MRA), Cardiac MRI, and DR & DTI.

Lectures on MRI – A programme tailored to the needs of physicists

Educational courses, exercises, and practical demonstrations on MR physics, spectroscopy and engineering for MR physicists are again on ESMRMAB’s agenda in 2009. Six courses will be offered, including three new courses on IMRI, MRI and Molecular Imaging in Experimental Neuroscience and RF coil design.

Visit the ESMRMAB booth on the entrance level to obtain the latest course programmes and more detailed information!

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Neuroradiology pioneer presents today’s Honorary Lecture about systems radiology

In recognition of his outstanding achievements and pioneering work in neuroradiology, Professor Dieter R. Enzmann from Los Angeles, CA/US, will present the Wilhelm Conrad Röntgen Honorary Lecture ‘Navigating toward systems radiology’ today at ECR 2009.

By Mélisande Rouger

Dieter R. Enzmann was born in 1945 in West Germany. He obtained a bachelor's degree with honours from the University of Wisconsin (Madison) and a medical degree from Stanford University in 1972. He started a residency in diagnostic radiology at Stanford University Medical Center in 1972, which he completed in combination with a fellowship in neuroradiology at the University of California, San Francisco, in 1977.

After his residency, Prof. Enzmann started at Stanford University Medical School as Assistant Professor of radiology specialising in neuroradiology. In 1983 he was promoted to Associate Professor and to full Professor in 1989. He was Director of MRI at the Department of Diagnostic Radiology at Stanford University Medical Center, director of the Stanford Radiology Unit, professor and to full Professor in 1990. He was Professor of radiology specialising in neuroradiology at Stanford University Medical School as Assistant Professor, Associate Professor and full Professor in the Department of Radiology at Northwestern University Medical School and Northwestem Memorial Hospital in Chicago.

In January 2001, he assumed the Leo G. Rigler Chair position at the David Geffen School of Medicine at the University of California, Los Angeles (UCLA). He has been responsible for the academic and clinical radiology programmes at the UCLA School of Medicine and at affiliated hospitals since then.

Prof. Enzmann's major interests and research contributions are in the areas of CNS infections, particularly bacterial infections, and cerebro-spinal fluid (CSF) physiology and its relationship to brain motion and cerebrospinal flow. His early interest in CNS infections is reflected in his first book entitled 'Imaging of Infections and Inflammations of the Central Nervous System: Computed Tomography, Ultrasound and Nuclear Magnetic Resonance'. Prof. Enzmann contributed to the basic understanding of imaging cerebral abscesses by relating key imaging features of brain abscesses to histopathology, and more generally by emphasising the interplay between the microorganism and the host response, especially in an immunosuppressed context. He was one of the early investigators to exploit flow-sensitive MR imaging techniques. These techniques help to qualitatively and quantitatively understand CSF flow dynamics to blood flow and its association with brain and spinal cord motion.

A Mellon Foundation Fellow for four years, Prof. Enzmann received the American Society of Neuroradiology's Cornelia G. Dyke Award for outstanding research and was awarded two National Institutes of Health (NIH) grants for central nervous system (CNS) research projects, 'Experimental Brain Abscess and CSF Flow' and 'Pathogenesis of Chiari Uyrogenymnus'.

He has published numerous papers, scores of chapters and two books. His third book, 'Surviving in Health Care', received the American College of Physician Executives Robert A. Henry Literary Achievement Award for its contribution to medical management.

News from the Faculty of Radiologists, Royal College of Surgeons in Ireland

The Faculty of Radiologists, Royal College of Surgeons in Ireland is the body responsible for the regulation of postgraduate training in diagnostic radiology and radiation oncology in the Republic of Ireland. At present, there are 80 Specialist Registrars in Diagnostic Radiology and 13 Specialist Registrars in Radiation Oncology in full time training in these specialties, spread across seven centres in diagnostic radiology and two in radiation oncology, in three major cities in Ireland.

Both programmes are spread over five years of training, with the exam for the Fellowship for the Faculty taken initially in the fourth year. The Primary Fellowship exam, covering elements of basic science relevant to the specialties, is taken at the end of the first year’s training.

After satisfactory completion of five years of training, having passed the Fellowship exam, candidates are eligible for inclusion on the Specialist Register of the Medical Council of Ireland, and are eligible to apply for permanent consultant posts in Ireland and overseas. Notwithstanding, most of our trainees pursue further training abroad after completion of training in Ireland, principally in the United States, Canada and the UK, but increasingly in other European countries.

There are approximately 180 consultant radiologists in full time practice in the Republic of Ireland. The number of consultant and trainee posts in the public sector is controlled by the central health authorities. The ratio of consultants to population is low in comparison to some of our neighbouring countries, and the numbers of studies performed by individual consultants is quite high by international standards. Understandably, this places great pressure on practising radiologists and radiation therapists, but despite this, the research output of our trainees and consultants is consistently very high, as evidenced by the high level of participation in international meetings, including the ECR. The development of Academic Medical Centres on best practice international lines will, it is hoped, help the strategic evolution of imaging research.

A major issue for the Faculty of Radiologists is the need to increase consultant numbers (and to achieve commensurate increase in trainee numbers to keep pace) in order to ensure safe delivery of timely service to patients, and a need to budget for development of departments and replacement of equipment in a more planned fashion.

Current government policy in Ireland is to centralise cancer care in eight regional cancer centres. This policy is presently being implemented for breast cancer care; planning is underway for similar centralisation for management of other cancers. The implications for delivery of first-class diagnostic services are significant; at present, many forms of cancer are managed to a high standard in particular hospitals that have evolved very experienced teams in specific niche areas. Movement of staff and expertise may be required to achieve the political goal of centralisation. It remains to be seen if the resources necessary to implement these changes will be available in recessionary times. Like many western countries, Ireland’s healthcare budget is being cut dramatically in 2009, and major new developments are in doubt at present.

A major issue for the Faculty of Radiologists is to inform the development of uniform, best practice Quality Assurance Programmes across the country. This must obviously be done with patient safety at its core. There is however a parallel process of educating and informing society so as to set realistic expectations. Despite these difficulties, the specialties of radiation therapy and diagnostic radiology are strong and well-respected in Ireland. Our specialties attract some of the brightest graduates every year, and competition for places on our training schemes is very intense. We work closely, where possible, with employment and regulatory authorities to keep our standards high and we look forward to a strong future with our Fellows and trainees remaining at the centre of high quality medical care delivery.

"I find it a true honour to be asked to present the Wilhelm Conrad Röntgen Honorary Lecture, ‘Navigating toward systems radiology’ at the 2009 European Congress of Radiology. This invitation represents a great opportunity to unite and integrate the specialty of radiology on an international scale. We can learn much from each other and better yet, we can accomplish much together."

...
What’s on today in Vienna?

**Theatre**

Please note that all performances are in German!

- **Akademietheater**
  - 1030 Vienna, Lisztstrasse 1
  - phone: +43 1 51444 4145
  - www.burghtheater.at
  - 20:00 Untertagblues by Peter Handke

- **Burgtheater**
  - 1010 Vienna, Dr. Karl-Lueger-Ring 2
  - phone: +43 1 51444 4145
  - www.burghtheater.at
  - 19:00 Trilogie des Wiedersehens by Botho Strauß

- **Rabenhof**
  - 1030 Vienna, Rabengasse 3
  - phone: +43 1 712 82 82
  - www.rabenhof.at
  - 20:00 Die deutsche Kochschau

- **Schauspielhaus**
  - 1090 Vienna, Porzellanstrasse 19
  - phone: +43 1 217 01 01
  - www.schauspielhaus.at
  - 20:00 Zwei arme Polnisch sprechende Rumänen by Dovula Masłowska

- **Theater in der Josefstadt**
  - 1080 Vienna, Josefstadter Straße 26
  - phone: +43 1 42 700 300
  - www.josefstadt.org
  - 19:30 Die Wirtin by Peter Turrini
  - 19:30 Drei Schwestern by Anton Tschechow

- **Volkstheater**
  - 1070 Vienna, Neustiftgasse 1
  - phone: 43 1 52111 400
  - www.volkstheater.at
  - 20:00 Die Hochzeit des Figaro by Wolfgang A. Mozart

**Concerts & Sounds**

- **Konzerthaus (Classical Music)**
  - 1030 Vienna, Lothringerstrasse 20
  - www.konzerthaus.at
  - 19:30 Polina Leschenko, piano
  - J. Haydn, N. Medtner, J. Brahms, P. Tchaikovsky, S. Rachmaninoff

- **Musikverein (Classical Music)**
  - 1010 Vienna, Bösendorferstrasse 12
  - www.musikverein.at
  - 19:30 Vienna Symphony Orchestra
  - conductor Andrey Boreiko
  - R. Buchbinder, piano
  - C. Debussy, M. Ravel, A. Zemlinsky

- **Porgy & Bess (Jazz)**
  - 1010 Vienna, Riegergasse 11
  - www.porgy.at
  - 20:00 JT Lewis / Herve Samb / Melvin Gibbs ‘Middle Passage Squad’

**Opera & Musical Theatre**

- **Volksoper**
  - 1090 Vienna, Währingerstraße 78
  - www.volksoper.at
  - 19:00 Die Hochzeit des Figaro
  - Opera by Wolfgang A. Mozart

- **Wiener Staatsoper – Vienna State Opera**
  - 1010 Vienna, Opernring 2
  - www.wiener-staatsoper.at
  - 19:30 Eugen Onegin
  - by Pyotr I. Tchaikovsky
  - conducted by Seiji Ozawa
  - with: Tamar Iveri, Nadia Krasteva, Simon Kneissle, Kamin Vargas, Ain Anger

- **Wiener Kammeroper**
  - 1010 Vienna, Fleischmarkt 24
  - www.wienerkammeroper.at
  - 19:30 Le Pescatrici – Die Fischerinnen
  - by Joseph Haydn, based on a libretto by Carlo Goldoni
  - conducted by Daniel Hoern-Cavazza
  - with: Alfred Werner, Anna Pirard, Sebastian Happmann, Jennifer Davison, Auxiliadora Toledo

- **Raimundtheater**
  - 1060 Vienna, Wallgasse 18-20
  - www.musicalvienna.at
  - 19:30 Rudolf – The Mayerling Affair
  - Musical by Frank Wildhorn & Jack Murphy
See Vienna’s pictorial treasures

Revel in the abundance of fine arts at Vienna’s numerous outstanding museums. For one, don’t miss Albrecht Dürer’s world-famous Young Hare from 1502, one of the highlights of the world’s largest graphic collections presented at the Albertina.
Introducing the Interpretation Corner and Prof. Robert Hermans

By Stefanie Muzik

The interpretation corner (IC) quiz is an annual competition for European Radiology readers, which consists of 12 monthly parts. In each issue of the journal, a quiz type case report with an open diagnosis is published, and readers are invited to send in their answers. Introduced in 2003 as a new section, IC has become very popular with authors and readers. It provides a shortened history and one or more images from cases that have proved to be diagnostic challenges at the authors’ institution. The authors’ affiliations are not revealed at this stage and the case report does not lead easily to the diagnosis. Each quiz case is followed by the solution case report, which describes exactly the investigations at the host institution, the diagnosis finding and the teaching points of the case. IC cases are of course unique and not routine cases, but pose a diagnostic challenge.

At the end of each calendar year, the reader who has supplied the highest number of correct answers is recognised at the Editorial Board Meeting, which is held annually during ECR. Last year, Dr. Annemie Snoeck from Antwerp, Belgium, again submitted the most correct answers and unbelievably won the Interpretation Corner for the fourth time in a row.

European Radiology is a successful and growing scientific journal, not only because of a strong society and excellent authors, but also because of the people “behind the scenes” who together make up the editorial team supporting Editor-in-Chief Prof. Adrian K. Dunn. The Deputy Editors, of which there are 5, supervise various topics or areas within the spectrum of radiology.

We would like to personally introduce one of them, Prof. Robert Hermans from Leuven, Belgium, who coordinates the IC.

Robert Hermans, born in 1962, studied medicine at the Katholieke Universiteit in Leuven. He spent practical training periods in several hospitals in Belgium and South Africa. He gained his MD with distinction in 1987. After his medical studies, he entered the radiology training programme at the University Hospitals of Leuven, and became a certified radiologist in 1991. He was appointed as a staff member of the Department of Radiology at the same institution one year later. His primary interest is head and neck radiology.

In 1997, he spent a visiting fellowship in the Department of Radiology of Shands’ Hospital in Gainesville (University of Florida). In 1998, he obtained a doctorate in medical sciences (PhD) at the Katholieke Universiteit Leuven, with a thesis on larynx cancer imaging. He was appointed Assistant Professor in 1998, and Associate Professor in 2000, at the faculty of Medicine of the same university. In 2004, he was promoted to Professor.

He is a member of several scientific societies, has served as President of the International Cancer Imaging Society (ICIS), and is a member of the executive committee of the European Society of Head and Neck Radiology (ESHNR).

He has published over 150 articles to date, as author or co-author, and several book chapters on different topics in head and neck imaging, mainly focusing on neoplastic disease. He is editor of the books Imaging of the Larynx, Head and Neck Cancer Imaging, Squamous Cell Cancer of the Neck, and associate editor of the Encyclopaedia of Medical Imaging. He is regularly invited to lecture at national and international radiology meetings.

ECRT: Why did you choose medicine and radiology as your profession? What was so interesting about radiology when you were a young student?

RH: I got involved in 1995, when my chairman at that time, Prof. Baert, became the Editor-in-Chief and asked me to help him as editorial assistant. It was a wonderful experience to see the journal steadily grow under his leadership. When Prof. Dixon took over, he asked me to become deputy editor, with the specific job of taking care of the ‘Interpretation Corner’.

ECRT: What is so special about Interpretation Corner articles and why are they so attractive for readers?

RH: We try to select cases that are more or less unusual, but also have clear educational value. By analysing the images together with the clinical information, it should be possible to reach a specific diagnosis. The ideal case requires careful analysis, the building of a differential diagnosis, and reduction of this list to one most likely diagnosis. Most cases require some detective work, consulting textbooks or searching the internet, and I guess this is one of the aspects radiologists like the most about their job.

ECRT: What should an author consider before submitting his case to European Radiology? What does the case need to be interesting?

RH: The diagnosis should not be straightforward, but it is certainly not required that the presented pathology is extremely rare. Cases for Interpretation Corner are published in two parts. Part A should only contain very concise text and some relevant clinical information, and a few representative images without annotations. These should allow the final diagnosis to be reached. Part B is more like a regular case report, and is published a few months later, after the readers have been able to submit their most likely diagnoses. In part B, the differential diagnosis is very important. It should also contain an explanation of why the other possible diseases in the differential diagnosis are less likely to be the correct ones.

ECRT: How long have you been involved in European Radiology? How did you get into it?

RH: I got involved in 1995, when my chairman at that time, Prof. Baert, became the Editor-in-Chief and asked me to help him as editorial assistant. It was a wonderful experience to see the journal steadily grow under his leadership. When Prof. Dixon took over, he asked me to become deputy editor, with the specific job of taking care of the ‘Interpretation Corner’.

ECRT: What are the developments you are most excited about?

RH: We receive cases from all subdisciplines, and there is no preference for a special topic.

ECRT: When did you come to ECR for the first time? What were your impressions?

RH: The first time was in 1993 and since then I have attended all ECR meetings. I am always impressed by the superb organisation, and I very much like the Viennese atmosphere. Over the years, ECR has evolved to such a high standard that one can not simply skip a meeting without missing important innovations.

ECRT: How do you see radiology in 20 years? What do you think will be the developments and ‘hot topics’?

RH: Let’s hope developments in molecular imaging will become available in daily practice. I also think progress in hardware and software will introduce new possibilities. I refer for example to the possibilities offered by diffusion-weighted MRI in oncology, something hardly heard of a couple of years ago.