IMAGING Management

Promoting Management and Leadership in Medical Imaging

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RADIOLOGY ¥ CARDIOLOGY ¥ INTERVENTION ¥ SURGERY ¥ IT ¥ MANAGEMENT ¥ EUROPE ¥ ECONOMY ¥

the job market

for Radiologists

INSIDE

- IMAGING Management's Guide to ECR Highlights
- Exposure to Ionizing Radiation and Pregnancy
- Risk Management in MRI
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The Job Market for Radiologists

Dear readers,

As radiologists we chose our vocation for many individual reasons – a love of medicine, radiology's key role in diagnosis, the ever-developing technology, the chance to make a difference. Qualifying as a radiologist takes many years, but what if there is not a job at the end? Planning the radiology workforce is a complex issue for any country. Factors affecting demand include not only the changing scope of radiology practice in the public sector and the private sector, but also the availability and role of radiology technicians, what equipment there is, and much more.

Back in 2009 (Vol. 9(2)), IMAGING Management asked, "Is your department recession proof?" We examined the likely impact of the global recession on medical imaging and provided tools to assist those thinking about taking preventive measures in their department. Three years on and the global financial crisis persists. Now we look at the job prospects for radiologists in different economic regions. What has been the impact of the global financial crisis, and how do we ensure a stable level of radiologists to see us through to the future in this difficult time? What are the trends in supply and demand in the medical imaging workforce across the globe? Inevitably this is a snapshot, but it is possible to see patterns. While demand for radiology is increasing, it is not always possible to fund the number of radiology posts needed. Young radiologists can and do benefit from spending part of their career in another country, but the risk may be that they never return to the country which trained them. In many countries there is a shortage of radiologists. How do we provide a top quality service if there are not enough radiologists? Might teleradiology fill the gap in some countries, with all that implies?

Our country round-up takes in diverse parts of the world. There are interviews with senior radiologists in Russia (Prof. Valentin Sinitsyn), the UK (Dr. Peter Cavanagh) and Spain (Prof. Pablo Valdés Solís). The situation in Argentina is explained by Prof. Ricardo García-Mónaco, and Editorial Board Member Prof. David Koff describes Canadian circumstances. Next Nick Bradshaw writes about the situation down under in Australia and New Zealand. There are many changes happening in healthcare the U.S., and Editorial Board Member Prof. Stephen Baker writes about job prospects for radiologists there, acknowledging that the golden age of radiology (employment-wise) is coming to an end.

Next, we look at risk management in radiology. Dr. Hubert Ducon Le Pointe writes about the risks in pregnancy, while Dr. Daniel Vetter considers risk management for MRI.

What interests current radiology residents, at the start of the careers? The French Society of Residents recently undertook a survey of residents' training and career interests, which Dr. Nadya Pyatigorskaya and Dr. Mickaël Ohana describe.

Migrating to another country for employment is certainly easier with a recognised qualification. The European Society of Radiology (ESR) took the initiative to produce a training curriculum in radiology, and since 2011 radiologists have been able to take the European Diploma in Radiology (EDiR). Dr. Éamann Breatnach, Scientific Director of the European Board of Radiology, is interviewed in this issue about the diploma and the next steps towards harmonisation of radiological standards.

Continuing with the theme of qualifications, interventional radiology now has a common syllabus. Maria Zoidl of the Cardiovascular and Interventional Society of Europe (CIRSE) explains the background and aims of this development, which will assist interventional radiologists with a qualification recognised across Europe.

Also in this issue, Professor Antonio Orlacchio, Drs. Chegai, Del Guidice and Tosti and Professor Simonetti provide an overview of radiology and management issues in Italy for our Country Focus. Like other countries in Europe, Italy faces health budget cuts, and the challenge is to make imaging relevant while reducing unnecessary radiological exams.

Also in this issue, Professor Antonio Orlacchio, Drs. Chegai, Del Guidice and Tosti and Professor Simonetti provide an overview of radiology and management issues in Italy for our Country Focus. Like other countries in Europe, Italy faces health budget cuts, and the challenge is to make imaging relevant while reducing unnecessary radiological exams.

The European Congress of Radiology 2013 is almost here. We include IMAGING Management's guide to ECR highlights, which include the Management in Radiology (MIR) sessions on topical management issues. This is the second time MIR has held special sessions at ECR and I hope to see you there.

I welcome your feedback on any of the papers in this issue and your ideas for future issues. Please email me on im-ed@healthmanagement.org

Sincerely,

Prof. Lluís Donoso Bach

Editor-in-Chief
editorial
im-ed@healthmanagement.org

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The Job Market for Radiologists

As the global financial crisis continues, IMAGING Management looks at the employment situation for radiologists in different parts of the world. What are the recruitment challenges? How do these countries attract the best radiologists? Are there sufficient recruits to academic radiology?

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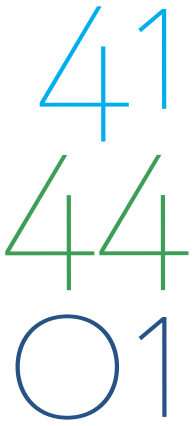


INMEDICA PREDICTS GROWTH OF WIRELESS X-RAY AND PACS IN 2013

Wireless to Become Integral to X-ray Technology

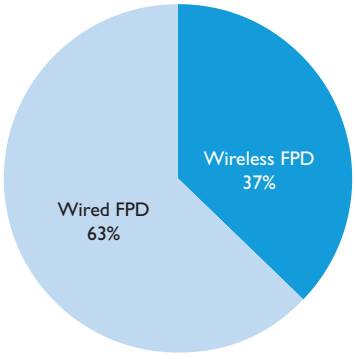
InMedica predicts that wireless flat panel detector (FPD) general radiography X-ray equipment will make up over 30 percent of unit shipments in 2013.

The global general radiography X-ray equipment market has seen a shift towards wireless FPD technology, in particular in mobile X-ray. The ability to place panels directly under or around critically ill patients at the bedside provides significant gains for workflow and patient care. Wireless FPD panels also allow equipment to be shared across different radiography rooms.

X-ray is also forecast to become more modular. Wireless retrofit upgrade systems and purchasing additional panels allows hospitals to purchase X-ray equipment solutions to fit their individual needs.

Wireless will become integral in other parts of the system, with some new systems including wireless foot switches to control bucky table movement. This will improve hygiene with fewer cables, less risk of tripping and more manoeuvrability. Wireless is also emerging in other medical imaging modalities, notably ultrasound.

Forecast Global General Radiography FPD Unit shipments for 2013



Includes mobile, retrofit and fixed general radiography X-ray systems

Source: InMedica. Oct 2012

Increased adoption of PACS & VNA Managed Services

Managed service models accounted for around 8 percent of total radiology PACS revenues in 2011 worldwide. InMedica forecasts that revenues from managed service models will grow to around 12 percent of the total in 2013, with almost a quarter of those involving a model where the vendor hosts images in an off-site datacentre.

With decreasing healthcare budgets and hospitals under increasing pressure to reduce storage costs, enhance access to data and improve productivity, managed services (a model where a vendor owns the IT infrastructure and is responsible for managing and hosting the software and data centre), are increasing in demand. These models are being adopted as a method of increasing the level of vendor services, whilst reducing storage and application costs.

Hybrid and hosted managed service models can offer significant reductions in storage and maintenance costs users only pay for storage used and the vendor is responsible for the majority of service provisioning. However, these models are restricted by concerns over performance and security, as well as by poor bandwidth to transmit data to off-site locations in less developed geographies. Concerns over performance include the ability of the application to provide continuous uptime and instant access to data that is located off-site, without compromising image quality.

There are regional variations in demand, with the US and UK having more open vendor-hosted models, while Germany and many Asia Pacific countries enforce stricter data security regimes.

Even higher adoption is projected in the vendor neutral archive (VNA) market, with managed service models projected to grow to 24 percent of worldwide revenues in 2013. Most of these revenues will be from hybrid models where one instance of each image is remotely hosted.

European Medical Device Market Performance To Worsen in 2013

InMedica predicts that the performance of European (EU) medical device markets will worsen in 2013 as the impact of widespread spending cuts, austerity measures and healthcare saving targets is realised. Investment in new technology will be subdued, with healthcare providers unwilling to invest without evidence of guaranteed clinical and financial benefits.

Obama Care to Have Mixed Effects on Healthcare Markets

Obama Care aims to expand access to affordable health coverage to millions of Americans while increasing protection against exclusionary insurance practices. It also will bring a series of incentives designed to increase preventive care while curbing the growth in healthcare expenditure, currently over $2.7 trillion, 18 percent of GDP. With 35 million additional patients InMedica projects that Obama Care will have a varied effect on US healthcare markets from 2013.

Positive Effects

- Healthcare IT is projected to strongly benefit from increased adoption of electronic medical records (EMR), clinical information systems (CIS) and hospital information systems (HIS) to effectively manage patient throughput, reduce duplication costs and achieve meaningful use.
- Solutions that facilitate data access sharing and exchange between facilities, such as Health Information Exchanges (HIE), Patient Portals and Vendor-Neutral Archives (VNA) are also projected to achieve strong growth.
- The telehealth market is projected to benefit as hospitals and Accountable Care Organizations (ACOs) seek to manage their increased patient populations, reduce inpatient costs and readmission penalties.
- As the importance of integrating patient data into the EMR increases, it is becoming a key factor in new purchases of clinical care devices.

Negative Effects

- Imaging utilisation rates for advanced imaging modalities (CT and MRI) will increase substantially with reimbursement penalties for those that do not adhere.
- Increased patient load and burden on existing services.
- Per-capita healthcare expenses will slowly increase throughout the year.
- The likely introduction of a 2.3 percent medical device tax is projected to drive up prices and negatively affect of hospital spend on medical devices. Manufacturers have also indicated its potential adverse effect on the total costs to bring devices to market.

For more information see InMedica 10 Predictions for 2013 in the Medical Electronics Industry **http://bit.ly/13a95qE** ■

Management in Radiology

ESR MIR

European Society of Radiology

ANNUAL SCIENTIFIC MEETING

Management in Radiology

Annual Scientific Meeting

October 10–11, 2013, Barcelona/ES

- **Appropriateness and Decision Support**
- **Quality Issues**
- **eHealth and Teleradiology**
- **Communication**
- **Leadership**
- **Innovation Management**
- **Education**
- **Knowledge Repositories and Analytics**

mir-online.org

MIR is a subcommittee of the ESR Professional Organisation Committee

ASSOCIATION NEWS

MIR Future Events

MIR will once again present a half day symposium at ECR. Please see page 25 for full details.

Save the Dates
Please note the changed location.

MIR Annual Scientific Meeting
October 10-11, 2013
Barcelona, Spain

Junior Course on Management
October 9, 2013
Barcelona, Spain

More information and registration details are on the MIR website: **www.mir-online.org**

CIRSE 2013 – Registration now open!

Registration is now open for CIRSE 2013, the most comprehensive forum for minimally invasive image-guided therapy – Interventional Radiology. Held this year from September 14-18 in Barcelona, Spain, CIRSE 2013 showcases a field of innovation and cutting-edge medical advances, providing a truly unique and valuable educational experience.

Innovative Lectures and Seminars

In keeping with the innovative nature of the discipline, CIRSE 2013 will offer more than 250 hours of educational and scientific presentations, including hands-on workshops, foundation courses, learning centres, industry symposia, and an all-electronic poster display, not to mention the largest ever CIRSE exhibition.

The programme for the congress is based around six main themes – Vascular Interventions, Transcatheter Embolisation, Interventional Oncology, Neuro Interventions, Non-Vascular Interventions and IR Management – extensively covering all aspects of Interventional Radiology.

For more information on registration and to view the interactive Preliminary Programme, please visit **www.cirse.org**

ECIO 2013, the fourth European Conference on Interventional Oncology

Europe's premier Interventional Oncology meeting, ECIO 2013, takes place in Budapest, Hungary, June 19-22, 2013.

In recent years, Interventional Oncology has emerged as a new discipline offering effective treatment of many malignant tumours with image-guided minimally invasive techniques. In numerous cases, Interventional Oncology achieves the destruction of tumours with fewer complications and more rapid recovery than traditional surgical methods. It also greatly contributes to the palliation of cancers, making it the fourth pillar of modern cancer care alongside radiation oncology, surgical oncology and medical oncology.

CIRSE supports the "Referring Physician" programme with € 100,000!

The ECIO Incentive Programme allows radiologists with a full registration for ECIO 2013 in Budapest to invite their referring physician to the conference for free. The first 100 referring physicians registered by May 31, 2013 will receive complimentary registration and up to € 1,000 travel support.

This allows the guest colleagues to familiarise themselves with what Interventional Oncology can offer their patients, and how different treatment modalities can be best combined for maximum efficacy. It also gives colleagues the opportunity to strengthen their working relationships and discuss collaboration away from the busy hospital environment.

So far, the programme has attracted clinicians from departments as diverse as surgery, medical oncology, hepatology, radiation oncology, nephrology and gastroenterology.

For more information, please refer to **www.ecio.org**.

CARS 2013 Invites you to Heidelberg

The Computer Assisted Radiology and Surgery (CARS) congress is the yearly event for scientists, engineers and physicians to present and discuss the key innovations that shape modern medicine on a worldwide basis.

The 27th International Congress and Exhibition on Computer Assisted Radiology Congress Organizing Committee will be held in Heidelberg, Germany from 26 - 29 June 2013. This annual event enables scientists, engineers and physicians to present and discuss the key innovations that shape modern medicine.

At CARS you will have the opportunity to meet scholars and practising experts in the fields of radiology, surgery, engineering, informatics and healthcare management. The preliminary programme is now available.

For more information please visit **www.cars-int.org**

Cardiovascular and Interventional Radiological Society of Europe

ECIO 2013

Fourth European Conference on Interventional Oncology

June 19-22
Budapest | Hungary

www.ecio.org

CIRSE

Regulation and Policy Updates from Brussels

The European Commission's proposal for a new Medical Device Regulation is now going through the European Parliament and EU member states for consideration. In January, COCIR – the trade association representing the European Medical Imaging, Electromedical and Healthcare ICT Industry - published its High-Level Contribution on Medical Device Regulation as an input to the debate.

The future of medical device regulation could potentially have a significant impact on COCIR member companies' technologies and their ability to continue to provide highly innovative products and services. In the paper, COCIR considers the regulatory compliance costs at a time of economic crisis when we are all being asked to do 'more with less' and examines the role of the EU Notified Bodies among other concerns.

COCIR believes that the current regulatory framework for its technologies is adequate and calls on the EU institutions to ensure that these existing regulations are properly enforced, particularly in the post-market surveillance area. However, there is a need to modernise and strengthen legislation to enhance the traceability of products and their critical components, harmonising EU member states' engagement and allowing better coordination of the future regulatory framework.

It is essential that the regulation matches the specificities of the medical technology sector, while continuously improving but also avoiding an increase in the time to market or creating an unnecessary administrative burden. We need to ensure that future regulations do not hamper innovation. Europe should maintain the highest level of safety for citizens and ensure support for European healthcare and ICT-related technologies. The High-Level Contribution is available on the COCIR website under Position Papers.

The EC has published its EU eHealth Action Plan 2012-2020, entitled 'Innovative healthcare for the 21st century'. As the European leading voice of the healthcare ICT industry, COCIR welcomed the eHealth Action Plan as it provides a comprehensive roadmap for smart and sustainable healthcare in Europe. The four pillars of the eHealth Action Plan are fully aligned with COCIR's own vision and efforts developed to accelerate the deployment of eHealth.

COCIR and other stakeholders are actively participating in providing eHealth solutions through the European Innovation Partnership and the Active and Healthy Ageing Initiative. EU investment in Research is key particularly in interoperable patient records and for demonstrating best practice in the widespread deployment of telemedicine.

Our industry has worked hard over the last years to improve systems interoperability in partnership with user organisations and authorities and to supply the technologies required to make eHealth a reality. COCIR feels that the new eHealth Action Plan takes the right steps in supporting the sustainability of these efforts. The support of the EU Member States is now crucial if such an EU-wide interoperability framework is to be deployed.Adoption of eHealth by healthcare providers is another challenge to deployment and realising the full benefits of eHealth.

For more information please visit
www.cocir.org

IHE-Europe Connects More Nations, More Systems

The arrival of the European Connectathon in Istanbul April 15 marks a significant milestone for Integrating the Healthcare Enterprise (IHE).

The critical mass powerfully demonstrates the scope and reach of the IHE movement towards interoperability in healthcare.

Launched 13 years ago in Europe with the first 'connectivity marathon' in France, the drive to a standard-based exchange of patient information has steadily gathered more national initiatives to finally reach the very eastern edge of the continent.

The momentum continues at this year's Connectathon with visits of delegations from the Middle East, reinforcing the theme "Connecting Where The Continents Meet."

The third annual Projectathon for the large-scale project Smart Open Services for European Patients (epSOS) with 24 participating nations will be run concurrent with Connectathon on the testing floor.

Testing for both the Projectathon and the European Connectathon will be managed by IHE-Services that recently began offering customised testing for interoperability to vendors and regional health IT programs.

The first-ever IHE World Summit, to be held April 16-19 in Istanbul, represents a crowning achievement in the IHE mission to drive the adoption of interoperability by building industry consensus and educating developers and users. The summit offers three concurrent tracks aimed at specific levels of interest in IHE deployments: the high-level Panel track, the Management track and the Developer track.

According to Prof. Dr. Utku Senol from the Akdeniz University School of Medicine, who organized the ambitious program, the mix of scientific sessions, panel discussions and how-to instruction brings together people from different fields to create unexpected opportunities for interaction.

The core testing activity among 300 software engineers at Connectathon shows how far IHE has grown beyond its roots in radiology to include technical frameworks and integration profiles for nine healthcare domains, including lab, pharmacy and even ophthalmology. Radiology continues to make up almost half of the tests performed at Connectathon. This year validation to the IHE Mammography integration profile will be a highlight in this large domain.

Today testing of cross-enterprise sharing, which facilitates management of electronic health records, accounts for the greatest number of tests at Connectathon. Cross-enterprise Document Workflow (XDW) will be the hot area for testing activity this year.

For more information on Connectathon 2013, please visit **www.cat2013.org** ■

Registration Deadline May 3, 2013

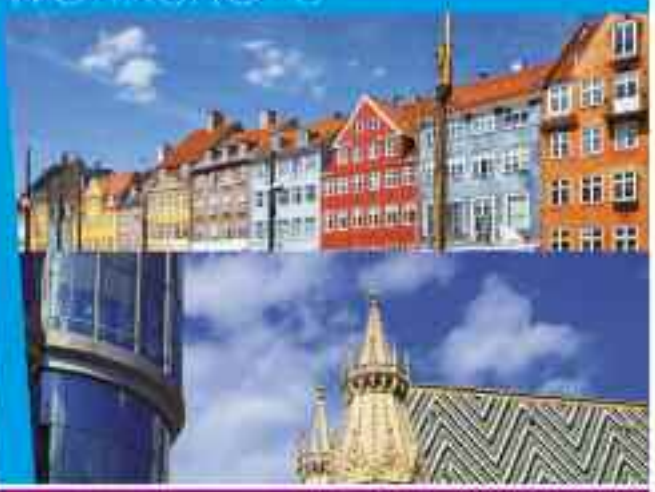
CT COLONOGRAPHY HANDS-ON WORKSHOPS

18th Hands-on Workshop on CT Colonography
April 18 - 20, 2013, Copenhagen, Denmark

Workshop organisers
Philippe Lefere, Carsten Lauritsen

19th Hands-on Workshop on CT Colonography
October 2 - 4, 2013, Vienna, Austria

Workshop organiser
Thomas Mang



LIVER IMAGING WORKSHOP

13th Liver Imaging Workshop
September 19 - 20, 2013, Stockholm, Sweden

Workshop organiser
Lennart Blomqvist

PANCREAS WORKSHOP

May 10 – 11, 2013, Lisbon, Portugal

Workshop organiser
Celso Matos

ESGAR/ESGAR BOWEL IMAGING WORKSHOP

ueg

October 24 - 25, 2013, Amsterdam, The Netherlands

Workshop organisers
Regina Beets-Tan, Najib Haboubi, Jaap Stoker

Information on all ESGAR Activities can be found on **www.esgar.org**

24th EAHM Congress
24e Congrès de l'AEDH
24. Kongress EVKD
LUXEMBOURG 2013

HOSPITAL MANAGEMENT IN TIMES OF CRISIS:

CONSTRAINTS, CHALLENGES AND OPPORTUNITIES

28 - 30 NOVEMBER 2013
LUXEMBOURG

OVERVIEW

Luxembourg2013 is the forum in which more than 600 CEOs, Hospital managers from all over Europe will share their experiences and best practices in healthcare management. **Take advantage of this opportunity to position yourself among the key decision makers from European hospitals.**

This year, the congress will focus on how to deal with economic constraints and transform them into opportunities. Many people strongly believe that funding is the crucial factor to the effectiveness. When the economy is weakened and the hospital budget reduced, what can a hospital manager undertake to continue to deliver better care? This is what the congress will try to address.

CONFERENCE

Sessions will focus on practical means to preserve or enhance quality of care even in the face of static budgets.
Roundtables will give the opportunity to share best practice and discuss their added-value.
Posters sessions will be dedicated to **Improvement of patient outcomes with static budget.** The best posters will be rewarded and published on the congress website.

HOSPITAL VISITS

Healthcare developments in Luxembourg will also be addressed. You will have the opportunity to visit hospital and discuss with professional the innovations set.

EXHIBITORS

At the exhibition, healthcare professionals will provide in-depth insight into the latest developments in healthcare.

UNIQUE NETWORKING OPPORTUNITY IN THE HEALTH SECTOR

The congress will offer networking opportunities with key decision makers from the major hospitals in Europe, the healthcare industry representatives in an informal, effective business setting.

contact@eahm-luxembourg2013.lu **www.eahm-luxembourg2013.lu**

SITE UNDER CONSTRUCTION

PRELIMINARY PROGRAMME

WEDNESDAY, 27 NOVEMBER 2013

PRE-CONGRESS PROGRAMME
- Hospitals visits
- Presidential dinner for sponsors

THURSDAY, 28 NOVEMBER 2013

OPENING CEREMONY
The official speakers and the keynote speaker "Patient Value in Hospital Management"
(10.30 - 12.30)

GOLDEN HELIX AWARD
(12.30 - 14.00)

STRATEGIC GUIDELINES IN CRISIS
(MERGERS, JOINT VENTURES, OUTSOURCING, HUMAN RESOURCE MANAGEMENT, FINANCIAL RESOURCES)
- Two 30-minute lectures (14.00 - 15.00)
- Poster Session - presentation (15.00 - 15.30)
- Break (15.30 - 16.00)
- Two 30-minute lectures (16.00 - 17.00)
- 45-minute roundtable (17.00 - 17.45)

RECEPTION HOSTED BY THE CITY OF LUXEMBOURG
(Evening)

FRIDAY, 29 NOVEMBER 2013

BUSINESS PROCESS RE-ENGINEERING
(LEAN MANAGEMENT, PURCHASING, USE OF IT)
- Two 30-minute lectures (09.00 - 10.00)
- Break (10.00 - 10.30)
- Two 30-minute lectures (10.30 - 11.30)
- 45-minute roundtable (11.30 - 12.15)

NEW BUILDINGS, NEW LOGISTICS, NEW TECHNOLOGIES
- Two 30-minute lectures (14.00 - 15.00)
- Poster Session: awards ceremony (15.00 - 15.15)
- Break (15.15 - 15.45)
- Two 30-minute lectures (15.45 - 16.45)
- 45-minute roundtable (16.45 - 17.30)

GALA DINNER AT CASINO 2000, Mondorf-les-Bains (L)
(Evening)

INFORMATION

VENUE
The Congress will be held in Luxembourg business centre, at the prestigious Conference Centre (Luxembourg/ Kirchberg). The building is located 5 min from downtown Luxembourg and is well connected by public transport.

OFFICIAL LANGUAGES
The official congress languages will be English/German/ French. All presentations will be in one of these three languages.

SIMULTANEOUS INTERPRETING
All presentations will be simultaneously interpreted into English/German/French.

REGISTRATION
Online registration for attendees and accompanying persons will begin on 1 March 2013 via the congress website:
www.eahm-luxembourg2013.lu

ACCOMMODATION
Participants can book their hotel rooms online from 1 March 2013, plan your trip with a few clics:
www.eahm-luxembourg2013.lu

JOB PROSPECTS FOR RADIOLOGISTS IN THE UNITED STATES

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The golden age of radiology in the United States has drawn to a close. Perhaps after a period of adjustment, a new resplendent silver age might occur but for the present and medium term the prospects are guarded.

Why the gloomy assessment? In order to offer an incisive analysis we need to understand the peculiarities of radiology in the United States including its predominant current means of reimbursement as well as the history of its demography over the past twenty years.

Unlike in most other developed countries, in the U.S. the dominant employment mode for radiologists is membership in a group private practice. The group may service only one hospital or just one outpatient imaging centre, but the larger ones often cover at least several clinical sites. Over the past 40 years such groups have continued to grow, expanding from a characteristic size of five or six practitioners in the 1970s to much larger associations of radiologists today, sometimes consisting of 50 or more members. Nowadays an assemblage of ten or fewer is considered small.

The way American radiologists earn their money is to do imaging - the more the better. They will endeavour to increase their volume of studies encompassing more modalities, especially the more highly rewarded ones like CT, MR or PET. The upside of this arrangement (and it has been 'up' for a long time), is that our fee for service system rewards demand.

Yet, to a great extent radiologists continue to create that demand through recommendations for further studies in their reports to referrers. But external forces that restrict that demand are strengthening in many ways. Among the countervailing impingements are:

- denials of imaging examinations by insurance companies;
- lower reimbursement per studies performed;
- fear of radiation by patients and clinicians alike;
- generally unfavourable economic considerations which hinder discretionary spending;
- competition for imaging from other specialists;
- and prospective further government limitations through more intrusive regulation.

In the face of these sanctions, to preserve the income of partners, group private practices have tended to become reluctant to take on new staff, lessening opportunities for those seeking entrance into the pool of employed radiologists.

The 'golden age' reached its zenith in the first few years of this century. In the 1990s when President Clinton floated his ill-fated healthcare proposal, the conventional wisdom was that the constraints of managed care would induce behavioural changes regarding imaging utilisation among referrers, and would perforce clamp down on urgings for radiologic services.

Therefore it was thought that we should reduce the number of residency slots. Many programs did just that. In 1996, radiology training positions had been decreased from about a thousand a year in 1990 to 850 just at the time that the Medicare cap on reimbursement for radiology positions for all specialties was introduced which further restricted payment. The cap remains intact unchanged since 16 years ago.

But coincidentally, and insidiously at first, CT volume increased because of advances in speed and clarity of image generation and definition and to a lesser extent by similar innovations with MR. So the combination of fewer radiologists being produced and much more work being done – the standard supply and demand disjunction- raised the income of radiologists. At the same time, cap or no cap, many radiology residency programs soon decided to take on more trainees bearing the costs locally. So by 2004 there were 1150 radiology residents per year in the pipeline.

These newly minted radiologists are now out of the pipeline, looking for jobs. Meanwhile imaging growth has slowed and Medicare reimbursement has been selectively cut. For example, until recently if you did a CT of the 'belly' you could have billed fully for both the abdomen and the pelvis portions of the exam. Now you receive only one full payment for one body region and only half for an extension of images to one contiguous one.

Well, where are we now? It must be understood that today for the most part, prospective hirers are not looking for radiologists per se. They are rather seeking subspecialty-trained radiologists who in the main in large academic practices will focus on their particular subspecialty at all times. In contrast, in private practice groups, even in large ones, you can expect to do what your fellowship trained you for during the day. But after hours and on weekends and holidays you will be assigned to imaging areas outside your subspecialty focus.

In the U.S. 95 percent of graduating residents take a fellowship year right after completing their four year residency. The board exams have been restructured not only to get rid of the terrifying multipartite oral test but more importantly to both acknowledge and foster the pursuit of subspecialisation.

The major fellowship choices are: abdominal imaging, neuroradiology, musculoskeletal imaging, paediatric radiology, interventional radiology and breast radiology. Far fewer young radiologists choose fellowships in chest, cardiac, emergency radiology or nuclear medicine, while some opt for MR only training pro-

The IHE world celebrates the world's first CENTURIAN

Tiani-Spirit has achieved what no other company in the history of IHE has... over 100 actor/profiles dedicated to global interoperability

Tiani-Spirit is the worldwide leader in the use of IHE and Standards-based Healthcare Interoperability. Our hybrid federated, highly scalable architecture, is globally reconized as the most comprehensive, stable and mature use of the IHE-based framework of standards.

As a recognized global leader, Tiani-Spirit has accomplished what no other vendor globally has ever accomplished in the history of IHE (Integrating the Healthcare Enterprise). Over 100 IHE actor/pofiles compliant, focused soley upon interoperability in the IHE ITI (IT Infrastructure Technical Framework).

TIANI SPIRIT

"There is SPIRIT in everyone, but it needs to be free!"

COMPANY: Fusangasse 12, 2102 Bisamberg, Austria / Europe. ***OFFICE:*** Guglgasse 6, Geomeiler A (2nd floor), 1110 Vienna, Austria / Europe
e-mail: office@tiani-spirit.com ***Fax:*** +43 (0) 11 235 11 85 99 ***Phone:*** +43 (0) 11 235 11 85 11 ***Hotline:*** +43 (0) 11 235 11 85 13
www.tiani-spirit.com

grammes or combinations like women's imaging consisting of breast imaging studies and abdominal and pelvic ultrasound examinations over a one year term. There now are more fellowship positions nationally than there are graduating residents to fill them. Annually there are numerous vacancies in programs in paediatric radiology, neuroradiology and interventional radiology.

Among all subspecialities, at present, newly trained abdominal radiologists are now experiencing the most difficulty in finding employment or at least being chosen for a practice experience they like in a location they want. It should be presumed that the surfeit of abdominal imagers will persist. Already the starting salaries of those radiologists have declined.

On the other hand prospects remain brighter for breast imagers. The steady supply of middle-aged women, the tacit national agreement to reimburse for breast imaging studies and the public demand for ready availability of that service together are important sustaining factors as is the growth of highly compensated imaging modalities and procedures exclusively placed within the domain of breast radiology.

Paediatric radiologists tend to aggregate in big hospitals, both academic and non-academic, where their patient population is centred. For them there is still a balance between job offers and job seekers.

Overall there has not been even a meagre reduction in residency slots, so about eleven hundred young radiologists are entering the job market every year, more than offsetting those who are retiring. Hence for the foreseeable future, the job market for most junior subspecialists in radiology will likely tighten even more.

But one thing more should be remembered. Today average salaries for radiologists in general are over $400,000 per annum and somewhat higher for interventional radiologists. That puts them in fifth or sixth place among all specialists in the United States in terms of annual income. Average starting salaries for those just out of fellowships used to be about $300,000. Most radiologists are (through payment for their work alone) in the bottom part of the top one percent of American income earners.

So some may bemoan the loss of the pot of gold they may think they are entitled to after a decade or more of strenuous preparation, debt accretion and general denial of leisure that accompanies the training interval from medical school through residency. Yet if they get a job, and most all eventually will, they will not starve and probably will not scrimp too much either. ■

THE JOB MARKET FOR RADIOLOGISTS **IN CANADA**

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There are 2100 radiologists in Canada. Approximately 90 residents graduate each year in Canada. The number of Canadian Resident Matching Service (CarMS) spots in the country is around 55. This does not include additional routes to training such as re-entry funding or externally funded residents. So the number graduating to jobs each year is between 50 and 60.

Public radiology in Canada is stronger than the private sector, as private clinics are not allowed to operate CTs or MRs. Still, 50 percent of imaging (CR, US, breast, BMD) is performed in private clinics. Radiologists are all fee for service and not on salary. The government cannot cut radiology positions in hospitals. There is a strong country based teleradiology structure and nothing is outsourced out of country.

Most new graduates stay in the country. A few used to go to the US to do a fellowship, but with the current economic situation, they try to stay in Canada, and a number of Canadian radiologists who are in the US are trying to come back. In general there is very little economic migration of radiologists from Canada. Free circulation between Québec and France has not translated into significant movement.

Unfortunately, there are currently more graduates than jobs. Factors include the impact of the economic downturn, radiologists not retiring, PACS and teleradiology filling previous locum requirements and the drop in the government cap, resulting in radiologists working more and for more money rather than hiring young graduates.

Healthcare budget cuts have had a limited effect so far, but this will change, as the government is aiming at reducing radiologists' income by 15 percent. In Ontario there is a plan to decrease professional fees by 11.5 percent over 4 years, which started this year with a five percent cut, and also delisting of imaging for isolated low back pain, and a 50 percent cut in reimbursement for 3D images.

However, in some subspecialties such as paediatrics and Interventional radiology, we are still recruiting international graduates after a fellowship in Canada.

Academic positions are less remunerative than in community hospitals, but offer more interesting career perspectives with education and research opportunities appealing enough to retain good radiologists. Currently there are more applicants for academic radiology positions than places. ■

THE JOB MARKET **IN ARGENTINA**

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In Argentina there are approximately 4000 radiologists. However, not all of them are board-certified. To work as a radiologist it is not compulsory to be board-certified. In certain medical colleges and in the ministry of health you may be employed as a radiologist if you can prove practice in a radiology department during 5 consecutive years (even half day work). In this way, radiologists obtain their specialisation without certification. Any radiologist may sit the examination for the certification by the Sociedad Argentina de Radiología (SAR) if they wish, but it is not compulsory by law to practise as a radiologist in Argentina. However, certification demonstrates an excellent level and quality.

Every year, around 80 radiologists graduate in Argentina. To graduate the MD should do a residency of 4 years and pass approved exams in an official institute (Sociedad Argentina de Radiología, public or private universities, province medical associations, and so on). Half of them graduate in Buenos Aires from the Sociedad Argentina de Radiología (SAR) which has the most recognised programme.

All graduates find employment in our country. There are not enough graduates to fill the demand, and now there is a shortage of radiologists. Vacancies will increase in the next few years.

Very few radiologists move abroad, and if they do so this is not because they do not have offers in Argentina, but because they would like to explore other possibilities. However, it has happened in times of crisis in the country (e.g. in 2001 when there was economic turmoil in Argentina) that young radiologists emigrated to find new and better horizons, especially to Spain.

Most radiologists who seek education and further training overseas are young and well trained. It is common that they go abroad, mainly to Europe, and are retained by the site or country where they went for training. To avoid this problem, some institutions sign agreements with physicians that if they go for further education in Europe sponsored by the institution, they are required to return and work for a reasonable amount of years before departing. If that does not occur then the sponsored radiologist has to pay back a given amount of money to the institution that supported his/her education and granted his training overseas.

My own hospital has hi-tech facilities, an excellent teaching and research programme and continuous medical education. In addition salaries are good so it is not difficult for us to retain the best radiologists. However, this is not the case in every hospital or private centre, and strategies are overall oriented to economic revenues.

Few radiologists enter an academic career, which is why the opportunities for training of radiologists are very heterogeneous because well trained highly equipped academic hospitals are rather few.

Most radiologists will go into private practice. The public sector is under-developed in terms of technology and facilities. Private university hospitals and some private outpatient clinics tend to be better resourced. There are no full-time radiologists in the public sector. Radiologists work only part-time in the public sector.

There are not enough radiologists to fill the posts available. Currently this gap is filled by radiologists from other Latin America countries (such as Ecuador, Colombia, Bolivia, etc.) Most of them are young and have performed a fellowship or residency in Argentina, and are not willing to go back to their country in the near future. Other specialists also perform radiology as a subspeciality, e.g. neurologists perform neuroradiology, paediatricians perform paediatric ultrasound or radiology.

The global crisis has not caused serious problems so far in our country. There have been no cuts so far, because the crisis has affected mainly the USA and Europe. However, it would not be surprising that if the crisis continues in the near future it would affect medical imaging, mainly in terms of technology updating.

> "There are not enough radiologists in Argentina to fill the posts available. Currently this gap is filled by radiologists from other Latin American countries or by some clinicians that will perform radiology in a subspeciality"

However, when there have been economic crises in Argentina, the impact on medical imaging was huge. The biggest problem would affect not only medical revenues but especially in the inability to buy new equipment and renovate obsolete technology. ■

RADIOLOGY **DOWN UNDER**

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Australia and New Zealand are facing similar demographic challenges to many other countries, with an ageing population placing more strain on health resources. The health workforce in Australia is growing fast. Hospitals are struggling to find internships for what has been coined a 'tsunami' of medical graduates. Training programmes in all specialties are producing more doctors than ever before as national and state governments commit funds to medical training initiatives. Immigration also remains strong in radiology, though inflows have fallen since 2009.

The Royal Australian and New Zealand College of Radiologists (RANZCR) estimates that in 2012 in Australia, 1761 radiologists service a population of 22.68 million. New Zealand has 319 active radiologists serving a population of approximately 4.4 million.

The number of Australian radiologists in training has increased from 200 in the year 2000 to almost 400 in 2012, whilst New Zealand has increased from 58 to 95 in the same period. Many of these graduates will be needed to meet growing demand. Others will replace older radiologists as baby boomers approach retirement age. For example, in New South Wales, the most populous Australian state, one quarter of practising radiologists are over the age of 60. There is a developing trend towards later retirement beyond the traditional age of 65. It is unclear whether this is a temporary (perhaps partly due to the global financial crisis) or permanent trend as many doctors remain healthy and active into their late 60s and 70s.

Recruitment

Higher local supply, continued international migration, and later retirements mean that the radiology job market in Australia has become highly competitive in many urban centres, with few vacancies and generally high workloads, which are perhaps also partially the result of budget restrictions. Public sector budgets are tight, and the ability of many private practices to hire new staff is affected by static Medicare reimbursement levels for examinations, which may drive margins down.

New Zealand in general appears to be in shortage, with many radiologists reporting staffing below required levels. As in Australia, there may be areas which are more adequately served, and there are opportunities to work in some rural centres.

Recruitment of radiologists in Australia and New Zealand is done largely through word of mouth, by advertising in local and national media, through medical recruitment agencies and through the RANZCR website. Many international radiologists use employment agencies to help search for jobs, especially positions in areas of workforce shortage where traditional recruitment tools have been unsuccessful. Rural areas are largely reliant on international recruits.

Practices in Australia which cannot recruit locally can apply for Area of Need status, a state government designation which enables them to recruit internationally. This in turn is reliant on the federal government denoting an area as a District of Workforce Shortage, which calculates doctor to population ratios relative to other areas. There have been calls for both processes to be reviewed, harmonised and made more transparent. Rural practices also rely on networked teleradiology and visiting specialists to cover workforce shortages.

Retention

Retention of trained specialists in New Zealand is often difficult. There is a significant income disparity with Australia, prompting many graduates to seek employment there soon after graduation. RANZCR data shows that up to one quarter of NZ trained radiologists migrate to Australia for at least a few years after qualifying as a specialist. New Zealanders also have a general tendency to seek experience overseas during their early career. As a result, New Zealand relies on internationally trained radiologists for over 40 percent of its workforce.

Retention does not appear to be a major problem in Australia, though this undoubtedly varies. Most international medical graduates who accept Area of Need positions in Australia demonstrate their intention to stay in the longer term by seeking recognition as a specialist with the Australian Medical Council.

Rural Workforce Initiatives

Many areas in both countries, mostly regional and rural, but often in less fashionable metropolitan suburbs, are still dependent upon internationally trained specialists to fill vacancies. Initiatives to bolster the rural workforce are aimed at attracting international specialists to fill positions and also at generating local supply through bonded schemes and establishing rural clinical schools to encourage rural origin doctors to train and enter the workforce in their home region.

In Australia there are a number of state and federal level bonded student initiatives, despite a lack of evidence for their effectiveness. For example, the federal government operates the Bonded Medical Places Scheme and Medical Rural Bonded Scholarships. The schemes provide funding for

*The opinions expressed in this article are those of the author and may not represent RANZCR policy.

medical school in return for service commitments in rural areas once a student qualifies as a specialist. The duration of the commitment varies and can be scaled back by training in rural areas prior to graduation.

It is hoped that, with the establishment of rural clinical schools, these schemes will be seen less as a 'bonding' exercise and more of an enabler for rural origin medical students to return to their hometowns when they qualify as specialists. Efforts to establish specialist training positions in rural areas are gaining momentum.

In New Zealand the government operates the Voluntary Bonding Scheme, which is an incentive-based payment initiative, rather than a return of service commitment. Graduates who are part of the scheme are eligible for incentive payments, intended to help repay their student loans, for up to five years. Incentives are also offered to those without a student loan.

A Future of Workforce Reform

Growing health service demand and tighter budgets have prompted governments to think seriously about strategic workforce planning. Health Workforce Australia and Health Workforce New Zealand have been established to look at how many doctors may be needed in the next 15-20 years, and to help governments at national and state levels identify professions most in need and apportion limited resources as appropriately as possible. Of critical importance is the need to look at innovative ways to get the most out of the health workforce, improve patient outcomes, and save money. Smart use of technology is central to both agencies' plans.

The Australian government has expressed a desire to be self-sufficient in workforce professionals by 2025, which may have an impact on immigration policy. However, there are practical limitations to this policy (particularly training capacity), which means that the health sector will continue to rely on overseas professionals for some years. ■

FURTHER READING

Australian Medical Council. International medical graduate (IMG) guides.
http://www.amc.org.au/index.php/pub/downloads
HealthCareers New Zealand
http://www.healthcareers.org.nz/
Health Workforce Australia
http://www.hwa.gov.au
Health Workforce New Zealand
www.healthworkforce.govt.nz
RANZCR international medical graduates information
http://www.ranzcr.edu.au/img-a-aon/overview
RANZCR workforce reports
http://www.ranzcr.edu.au/advocacy/workforce

THE JOB MARKET FOR RADIOLOGISTS IN THE UK

Interviewee
Dr. Peter Cavanagh

Vice President
Royal College of Radiologists
London, UK

How many new radiologists graduate each year in the UK?
The Royal College of Radiologists (RCR) will recommend around 190 clinical radiologists per annum for their Certificate of Completion of Training (CCT), although there are natural fluctuations in this figure. The numbers of clinical radiologists receiving their CCT is rarely the same year on year. This is due to factors such as trainees taking extra time to pursue additional study, undertake a research project or taking maternity leave.

How many radiologists are working in the UK?
The RCR's 2011 annual census showed that there are 2,964 whole time equivalent (WTE) consultant clinical radiologist posts in the United Kingdom. In addition there are 1,207 Specialist Registrars; these are radiologists who have not yet reached consultant level.

Which is stronger in your country: public or private radiology? Are radiologists interested in a career in the public sector?
The National Health Service (NHS), which is the government-funded health service provided across the UK, is the main employer of medical professionals in England so the vast majority of clinical radiologists work for the public sector for a large proportion of their time.

In terms of supply and demand, are there sufficient numbers of graduates and experienced radiologists in your country to fill the available posts? Does this fluctuate, and if so, has it been affected by any cuts in healthcare spending or availability of workers?
The RCR has long been concerned about the relative shortage of radiologists in the UK when compared with figures available from other nations. In recent years there has been a sustained rise in demand for imaging within the NHS, and the need for additional radiologists has intensified despite huge efficiency gains through new technology such as the introduction of picture archiving and communication systems (PACS).

The 2011 RCR census shows that there are 210 WTE consultant clinical radiologist posts currently unfilled in the UK although this number has gone down from 235 in 2010. This equates to around eight percent of radiologist posts unfilled.

The figure of 2,964 WTE consultant clinical radiologists works out as around 47 WTE consultant clinical radiologists per million population, which is an increase of 3 per million population from 2010. Although this increase is welcome it still places the UK well below the average number of radiologists for population compared with Europe, and does not cover the reported increase in workload being experienced by radiology departments. Feedback from the workforce shows a significant increase in the number of examinations conducted over recent years, with MRI and CT increasing by over a third since 2008 and interventional radiology activity also increasing by almost a third.

In addition, the frequency of multidisciplinary team (MDT) meetings between 2008 and 2011 shows a rise of nearly two-thirds, and their average length has almost doubled. These meetings are an essential part of the radiology workload and ensure that imaging is at the heart of diagnosis and treatment, but the additional work must be accounted for.

Is the resource to fill the demand likely to come from more trainees or recruiting from overseas? What does the College see as a sustainable solution to meeting demand?
The RCR has recently been informed that an extra 30 training places per annum for clinical radiology will be made available over the next three years. Although there has been approval in principle and the capacity is there in existing schemes, the funding still has to be found at regional level. Whilst this is not the full 60 places per annum recommended by the College it is a very encouraging start. However, the College will continue to work on increasing the number of training places to ensure that there are enough trained clinical radiologists to manage the workload.

Currently, radiology is not one of the professions on the government shortage occupation list, and there is no nationally organised scheme to recruit from overseas. In practice, jobs will be advertised in the BMJ, for example, which has an international readership. Some hospital Trusts have proactively set up links abroad, usually using local contacts.

Ideally there should be a balance between UK trained radiologists going to work overseas and overseas trained radiologists coming to the UK, as we do not want to be a net exporter of radiologists. In addition, employers have to be careful not to upset the balance in other countries by recruiting radiologists from those countries that already have a shortage.

Has the government made any cuts that directly affect the medical imaging workforce, in the face of the financial crisis? For example cutting the number of posts in the public sector or hiring more external contractors?
Until recently redundancies were very rare in the NHS. However,

» CONTINUES ON PAGE 22

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ZEBRA TECHNOLOGIES

VACANCIES IN THE MIDDLE EAST

Physicians

Qualifications/Requirements for Consultant Posts:

Board certified in the hospital field with three years' post board hospital experience. Fluent in English.

- Consultant Adult Emergency Medicine
- Consultant Cardiology
- Consultant Cardiology Interventional
- Consultant Endocrinology
- Consultant ENT
- Consultant Gastroenterology
- Consultant Neonatologist
- Consultant Neurology
- Consultant OBGYN
- Consultant Orthopaedic Surgeon
- Consultant Paediatrics
- Consultant Paediatric Neurology
- Consultant Paediatric Pulmonology
- Consultant Paediatric Cardiology
- Consultant Paediatric Cardiology Interventional
- Consultant Paediatric Orthopaedic
- Consultant Paediatric Cardiac Surgery
- Consultant Radiology
- Consultant Thoracic Surgeon

Benefits

- Salary paid tax free
- Salaries from 9,000 to 20,000 euros (dependant on CV) with a lot of opportunities for very well paid extra shifts and overtime
- Severance pay
- Free furnished accommodation with free recreation, sports and cultural facilities
- Free transportation service
- Up to 7,5 weeks paid annual leave per contract year
- Up to two return airline tickets per contract year (including agreed dependents)
- Free medical care & emergency dental care (including agreed dependents)
- Educational allowance per child (Maximum of three children, four -18 years old)
- Study leave of 10 working days per contract year and CPD courses

Nurses

UNIT MANAGER IN NURSING

Qualifications/Requirements:

Minimum of four years' practice in a nursing managerial position or a Charge Nurse in a hospital with a bed capacity of more than 100. Minimum of eight years nursing experience. Fluent in English.

NURSING SERVICE MANAGER

Qualifications/Requirements:

Minimum of two years' practice in a nursing managerial position or a Charge Nurse in a hospital with a bed capacity of more than 100. Minimum of five years nursing experience. Fluent in English.

HEAD NURSE

Qualifications/Requirements:

Minimum of three years' practice as Head Nurse in one of the areas mentioned below, in a hospital with a bed capacity of over 100. Fluent in English.

- Head Nurse OBGYN/MATERNITY
- Head Nurse Paediatrics Ward
- Head Nurse OR/RR
- Head Nurse Surgical Ward
- Head Nurse Medical Ward
- Head Nurse ICU
- Head Nurse ER
- Head Nurse Nursing Education
- Head Nurse Cardiac Ward
- Head Nurse CCU

Benefits

- Salary paid tax free
- Salaries from 4,000 to 6,000 euros (dependant on CV) with a lot of opportunities for very well paid extra shifts and overtime
- Severance pay
- Free furnished accommodation with free recreation, sports and cultural facilities
- Free transportation service
- Up to 7,5 weeks paid annual leave per contract year
- Up to two return airline tickets per contract year (including agreed dependents)
- Free medical care & emergency dental care (including agreed dependents)
- Educational Allowance per child (Maximum of three children, four -18 years old)
- Study Leave of 10 working days per contract year and CPD courses

CHARGE NURSE

Qualifications/Requirements:

Minimum of three years' practice as Head Nurse in the areas below, in a hospital with a bed capacity of more than 100. Fluent in English.

- Charge Nurse OB/Gynecology ward
- Charge Nurse Surgical ward
- Charge Nurse Cardiac Ward
- Charge Nurse Medical Ward
- Charge Nurse ICU
- Charge Nurse OPD
- Charge Nurse OR
- Charge Nurse Cardiology
- Charge Nurse ENT
- Charge Nurse Orthopaedics
- Charge Nurse Paediatrics

STAFF NURSE

Qualifications/Requirements:

Minimum of two years' practice as a Registered Nurse in a hospital with a bed capacity of more than 100. Fluent in English.

ALL AREAS OF NURSING

Benefits

- Salary paid tax free
- Salaries from 3,000 to 4,500 euros (dependant on CV), with a lot of opportunities for very well paid extra shifts and overtime
- Free furnished accommodation with free recreation, sports and cultural facilities
- Free transportation service
- Up to six weeks paid annual leave per contract year
- Up to two return airline tickets per contract year
- Free medical care & emergency dental care
- Study leave of 10 working days per contract year and CPD courses

Paramedical professionals

Qualifications/Requirements:

Minimum of two years' practice as a Registered Paramedic in one of the following areas, in a hospital with a bed capacity of more than 200, or in an outpatient clinic:

- Audiologist
- Catheterization laboratory technician
- Catheterization laboratory radiographer
- Cardiovascular technologist
- Clinical engineer
- Computed tomography technologist
- Coordinator infection control
- Emergency medical services educator
- Laboratory technologist
- Medical technologist
- Occupational therapy
- Occupational health specialist
- Oral surgery technician
- Paramedic team leader
- Physiotherapist
- Radiology technologist
- Respiratory therapist
- Special procedure technologist
- Transplant coordinator
- Tumor registry technician
- Ultrasound technologist

Benefits

- Salary paid tax free
- Salaries from 3,000 to 4,500 euros (dependant on CV) with a lot of opportunities for very well paid extra shifts and overtime
- Free furnished accommodation with free recreation, sports and cultural facilities
- Free transportation service
- Up to six weeks paid annual leave per contract year
- Up to one return airline ticket per contract year
- Free medical care & emergency dental care
- Study leave of ten working days per contract year and CPD courses

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Managers

EXECUTIVE CONSULTANT, ORGANISATION & MANAGEMENT (O&M)
Qualifications/Requirements:

PhD, Master's or Bachelor's Degree in Hospital/Healthcare Administration, Management, Business Administration or any other related fields is required. Five years of progressive and senior professional experience in a large hospital, healthcare institution, government institution, corporation or organisation, with at least five years' experience in a managerial field, is required from holders of a PhD. Eight years is required from holders of a Master's Degree, and 12 years from holders of a Bachelor's Degree.

Benefits

- Salary paid tax free
- Salaries from 8,000 till 15,000 euros (dependant on CV*))
- Severance pay
- Free furnished accommodation with free recreation, sports and cultural facilities
- Free transportation service
- Up to 7,5 weeks paid annual leave per contract year
- Up to two return airline tickets per contract year (including agreed dependents)
- Free medical care & emergency dental care (including agreed dependents)
- Educational allowance per child (Maximum of three children, four -18 years old)
- Study leave of 10 working days per contract year and CPD courses

* depending on degrees, certifications and years of experience

VACANCIES IN GERMANY

Physicians

Qualifications/Requirements for Consultant Posts:

Board certified in the field with two years' post-board Hospital experience. German language (B2 - Mittelstufe).

- Consultant Anaesthesiology
- Consultant Adult Emergency Medicine
- Consultant Cardiology
- Consultant Cardiology Interventional
- Consultant Cardiac Anaesthesia and Critical Care
- Consultant Intensivist
- Consultant Neurology
- Consultant Paediatric Neurology
- Consultant Paediatric Pulmonology
- Consultant Paediatric cardiology
- Consultant Paediatric cardiology Interventional
- Consultant Paediatric ER
- Consultant Paediatric Cardiac Surgery
- Consultant Pulmonary
- Consultant Radiology
- Consultant Thoracic Surgeon

Benefits

- Salaries from 5,000 to 10,000 euros (dependant on CV* and position)
- Up to six weeks paid annual leave per contract year
- Educational Leave
- Medical insurance (includin agreed dependents)

Nurses

UNIT MANAGER IN NURSING
Qualifications/Requirements:

Minimum of two years' practice in a managerial nursing position or as a Charge Nurse in a hospital with a bed capacity of more than 100. Minimum of six years' nursing experience. German language (B2 - Mittelstufe).

NURSING SERVICE MANAGER
Qualifications/Requirements:

Minimum of one year's practice in a managerial nursing position or as a Charge Nurse in a hospital with a bed capacity of more than 100. Minimum of three years' nursing experience. German language (B2 - Mittelstufe).

HEAD NURSE
Qualifications/Requirements:

Minimum of two years' practice as Head Nurse in one of the following areas, in a hospital with a bed capacity of more than 100. German language (B2 - Mittelstufe).

- Head Nurse OR/RR
- Head Nurse Surgical Ward
- Head Nurse Medical Ward
- Head Nurse ICU
- Head Nurse NICU
- Head Nurse ER
- Head Nurse Infection Control
- Head Nurse Nursing Education
- Head Nurse Cardiac Ward
- Head Nurse CCU

Benefits

- Salaries from up to 3,200 (dependant on CV* and position).
- Up to four weeks paid annual leave per contract year
- Educational leave
- Medical insurance (including agreed dependents)

CHARGE NURSE
Qualifications/Requirements:

Minimum of two years' practice as a Head nurse in one of the following areas, in a hospital with a bed capacity of more than 100. German language (B2 - Mittelstufe):

- Charge Nurse Emergency
- Charge Nurse Surgical ward
- Charge Nurse Cardiac Ward
- Charge Nurse Medical Ward
- Charge Nurse Pediatric Ward
- Charge Nurse ICU
- Charge Nurse NICU
- Charge Nurse CCU
- Charge Nurse OR
- Charge Nurse Cardiology
- Charge Nurse Internal Medicine

STAFF NURSE
Qualifications/Requirements:

Minimum of two years' practice as a Registered Nurse in a hospital with a bed capacity of more than 100.

ALL AREAS OF NURSING
Benefits

- Salaries from 2.300 euros (depends on the CV* and the position).
- Up to four weeks paid annual leave per contract year
- Educational leave
- Medical insurance

* depending on degrees, certifications and years of experience

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» CONTINUES FROM PAGE 18

the College is aware of radiologists leaving or retiring and the posts not being filled. The figure for unfilled radiology posts is an underestimate of the true position as some hospitals would have been agreeing new consultant radiology posts, but the climate is not right now, partly due to the financial crisis, and partly due to the lack of applicants for the existing posts. The change in health service pensions combined with the increased workload is causing radiologists to consider retirement at a younger age than previously.

What is your strategy to attract and retain the best radiologists?
Recruitment and selection into clinical radiology training posts in England, Scotland and Wales is carried out through a nationally coordinated process, which is governed by the Department of Health and run on behalf of the College by the London Deanery. As radiologists are at the heart of diagnostics and treatment, recruitment and selection to these positions is competitive. Applicants must meet a set of essential criteria to be eligible to apply for Specialty and Academic training, and undergo a rigorous application and interview process to ensure that we attract high quality candidates for the training programme.

Do sufficient numbers of radiologists enter a career in academic radiology in your country?
The RCR believes there are insufficient numbers of academic radiologists. Our Clinical Radiology Academic Committee is working to increase the number of research-active radiologists and the quality of imaging research in the UK. The committee explores and develops methods for the RCR to encourage and foster research in clinical radiology by actively supporting trainees and consultant radiologists commencing research or developing their research interests as well as running joint Fellowship schemes with organisations such as the Medical Research Council and Cancer Research UK. ■

FURTHER READING

Centre for Workforce Intelligence (2012).
Securing the future workforce supply: clinical radiology stocktake. London: Centre for Workforce Intelligence.
Royal College of Radiologists (2012).
Investing in the clinical radiology workforce – the quality and efficiency case. London: Royal College of Radiologists.

PROSPECTS IN SPAIN

Interviewee
Prof. Pablo Valdés Solís

Area Director
Costa del Sol Health Agency
Marbella, Spain

Is there a shortage of radiologists in Spain?
There used to be a shortage of radiologists for the last few years. However, lately, and due to the economic crisis, many radiologists are unemployed, even though there are enough vacancies. The situation is not even in Spain. Health competencies are transferred to the regional governments, and the impact of the crisis is uneven too.

Do enough radiologists enter a career in academic radiology in your country?
The presence of radiologists at our universities is increasing, but we consider that it should improve. We think that academic radiology should be reinforced, but it is difficult to fulfill this goal.

Which is stronger in your country: public or private radiology? Are radiologists interested in a career in the public sector?
Public radiology is still stronger. However, we are mindful of important political and organisational changes in some of our communities, where their corresponding governments are reinforcing private practice.

Are Spanish radiologists going to work overseas at all?
They are beginning to consider it. Unemployment was an unknown term in our profession but, unfortunately, it is something we are more and more familiar with.

What has been the impact of the global financial recession on medical imaging in Spain?
We think that the impact of the global financial recession on medical imaging in our country is similar to many other activities: shortage of employment, decrease in salaries and huge decrease in private reimbursement for services. Besides this, no new hospitals are being opened and investment in equipment is close to zero in some regions.

Has the government made any cuts that directly affect the medical imaging workforce, in the face of the financial crisis? For example cutting the number of posts in the public sector or hiring more external contractors?
As noted before, this is the situation in Spain: fewer posts in the public sector; more investment in private practice. However, globally, investment in health has been severely decreased.

Looking to the future, please tell us about your project to measure the competency of radiologists.
The project we are working on can be considered a quite innovative one, as it focuses on the actual abilities and performance of ra-

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RADIOLOGISTS IN RUSSIA

Interviewee
Prof. Valentin Sinitsyn

Chief of Radiology Department
Federal Centre of Medicine and Rehabilitation
Moscow

How many new radiologists graduate each year in Russia and what is the total number of radiologists already working there?
There are no official statistics for the number of new radiologists graduating each year. However, according to the number of teaching sites we can estimate that there are around 400-500 new radiologists annually.

Officially we have 14,000 radiologists (Ministry of Health, 2012) and about 1000 nuclear medicine specialists. Radiologists make up about six per cent of medical doctors in the country.

How many of the new graduates go on to find employment in Russia compared to the number that move abroad?
The number of radiologists moving abroad is not substantial, as due to our system of medical training Russian doctors need to enter a residency programme in order to become a radiologist in Western countries. Emigration of trained radiologists abroad is not a problem - only around 20-30 leave each year.

In terms of supply and demand, are there sufficient numbers of graduates and experienced radiologists in your country to fill the available posts? Does this fluctuate, and if so, has it been affected by cuts in healthcare spending?
Russia lacks radiologists who have been trained in multimodality imaging. Russian Ministry of Health reports list radiology as a medical specialty with a deficit of specialists. The ministry estimates that Russian healthcare lacks about 153,000 medical doctors. If six percent of doctors are radiologists, we can estimate that we need another 9000 radiology specialists. The lack of radiologists is mostly a problem for outpatient clinics and small hospitals in towns and villages. The main reason is the low salaries of radiologists and radiographers.

What is your strategy to attract and retain the best radiologists?
There is no state policy to attract and retain best specialists. Each hospital tries to solve this problem individually. Usually the most effective way is bonuses on top of the official salary for extra work. Most hospitals are permitted to perform examinations of patients from private insurance companies. Hospitals with modern and better diagnostic equipment have better chances to keep specialists.

Do sufficient numbers of radiologists enter a career in academic radiology in your country?
The number of radiologists entering academic radiology is low. Again, the main reason is low salaries.

Which is stronger in your country: public or private radiology? Are radiologists interested in a career in the public sector?
Russia has a state system of healthcare. Private medicine also exists. But public radiology is dominant. Most radiologists consider work in a private imaging centre as a second part-time job; they may not be sure that the position of full-time radiologist in a private centre is stable enough in the long run. Salaries in private imaging centres are usually higher than in the public sector.

Would you say there are sufficient numbers of native radiologists for the number of posts available (both public and private)? Are workers actively sought from abroad to fill empty posts?
Russia has a deficit of radiologists with modern training. The state healthcare system has bought a substantial number (in the hundreds) of new CT and MRI systems and lack of staff in radiology departments is an actual problem for many hospitals (in spite of the relatively large number of radiologists – over 14,000). In spite of this migration of radiologists from neighbouring countries (like Belorussia, Ukraine, Kazakhstan) is negligible. It is probably related to the high costs of apartments, living in big cities and relatively low salaries.

How widespread is economic migration of radiological workers from Russia? Is it common that radiologists go abroad for educational opportunities and stay in their new host country for work?
Economic migration of radiologists to Western Europe and USA exists but it is not widespread. Mostly it is migration of young graduates from medical universities who are entering residency in radiology in the country chosen. Migration of trained and certified radiologists today is quite rare as they are required to enter a new five year programme of residency and be fluent in the local language.

What has been the impact of the global financial recession on medical imaging in Russia?
We have not been feeling the effects of the global financial

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ECR 2013

IMAGING Management's Guide to the European Congress of Radiology (ECR) Highlights

Europe's premier radiology congress offers radiologists, radiographers and students a wealth of opportunities to increase their knowledge, network with colleagues from around the world and catch up with the latest technical developments in the industry show.

IMAGING Management asked European Society of Radiology President, Professor Gabriel Krestin and Congress President Professor José Ignacio Bilbao for their perspectives as the society prepares for this major event.

Professor Gabriel Krestin,
ESR President

What has been your involvement with ECR?

I have been a regular attendee of ECR since its development in the 1990s under Prof. Dr. Josef Lissner into the major radiological event in Europe and one of the most important scientific meetings in medical imaging. I have been actively involved as a presenter, moderator and co-organiser, and have witnessed the growth and quality improvement of the meeting. It has become the best scientific event for radiologists in Europe and probably the most innovative and pleasant professional gathering worldwide.

What are you particularly looking forward to at ECR 2013?

As President of ESR my responsibilities are less related to the scientific content and organisation of the congress. This has been in the skilled hands of the Congress President Prof. Ignacio Bilbao, who, together with his programme planning team, has done a tremendous job for an ECR that promises to be even more successful than the meetings of the past years. I will mainly be taking part in a number of very enjoyable events such as the opening ceremony, the award ceremonies for our honorary members and gold medallists, and in the "ESR Meets…" sessions. Behind the scenes my duties relate to the numerous parallel professional activities in committees, working groups and other bodies of our large society and to meetings with many other organisations also present in Vienna. Plenty of important events take place during these days at ECR, culminating in the annual General Assembly of our Society where I will have the honour to hand over the responsibilities of the ESR to my successor Prof. Guy Frija.

Professor José Ignacio Bilbao
ECR Congress President

How long has the 2013 congress been in the planning?

The official process started in February/March 2011 when we organised the Programme Planning Committee (PPC) and the subspecialty societies sent their proposals for Chairmanship of each Subcommitte. The team includes 55 representatives from 22 different European countries. The first PPC meeting was held in Vienna in June 2011. Unofficially the process starts much earlier. During previous months and years there have been many conversations, meetings, reviews of programmes and hours of careful analysis of the evaluation of previous ECRs.

What does ECR have to offer radiologists coming from beyond Europe?

ECR is, in its variety and tradition, Europe. The congress offers not only an attractive scientific programme, but also a unique place for exchanging experience between attendees. We have tried to keep attention to every small detail in order to achieve a familiar and elegant atmosphere in which everybody, from every part of the world, feels comfortable and willing to participate and come again to ECR. The number of delegates from non-European countries is always increasing, reflecting not only the high interest in ECR but also as a consequence of the fact that ESR is the world's largest radiological society that delivers unique services to each of its 54.000 members. ESR has also established some activities with which the scientific ties with different radiological societies have been consolidated.

Do you have any advice for first-time presenters?

This year we will have 104 scientific sessions in which the attendees will have the possibility to learn from 1040 short presentations. The rejection rate is around 60 percent reflecting the fact that the quality of the information that will be given by the presen-

ters is high. The presenters will receive from the office a complete set of information about how should they proceed. The process is easy, and every member of the technical staff will facilitate every step to the presenters. My personal recommendations are two: keep attention to the time of your presentation and be ready for questions from the moderator and the floor.

With so many excellent courses and sessions, do you have any advice for radiologists / radiographers attending ECR for the first time?

Every delegate should be familiar with the programme before coming to Vienna. I strongly recommend they have a detailed look at the programme and select the many alternatives on offer. The preliminary programme is available at *http://www.myesr.org* and the interactive programme planner will be online from February. Delegates can then make their own personal path through the different alternatives. We have tried to avoid any overlapping and also have labelled some recommendations to facilitate the selection of the sessions.

The "ESR Meets…" sessions feature EAHPBA, Chile, Spain and South Africa this year. As well as scientific presentations, there are 'interludes'. Could you explain what these are about?

The "ESR Meets…" sessions are a very interesting part of the programme. The invited societies select the main scientific topics in which they are specially interested experts. By including short "interludes" in between the scientific lectures, the representatives will show some local sociocultural peculiarities of special interest. As an example I will not miss "Chile, land of wine and poets" or "South Africa: the country, its people, its diversity and its attactions" or "Radiology and Spanish arts".

ECR is well-known for its technical innovations, with Electronic Presentation Online System (EPOS) and broadcasting of the "ESR Meets…" sessions. Are there innovations for 2013 attendees should know about?

We have paid a lot of attention to increasing all the tools needed in order to facilitate interactivity between delegates. ESR (and consequently ECR) is looking forward to not only 'inviting and meeting' the different radiological societies of the world but also 'going' to every place in the globe via 'ECR Live'. The number of sessions that will be broadcast will significantly increase.

What are you most looking forward to at ECR 2013?

I am looking forward to seeing everybody, to thank everyone who has participated in the organisation of ECR 2013, and to welcome all the attendees.

MIR @ ECR

Saturday 9 March 13.00-17.30, Room Q

MIR (Management in Radiology) is a subcommittee under ESR´s Professional Organisations Committee (Chair: Prof. Yves Menu, France). MIR is dedicated to issues related with management, new developments in eHealth and strategic aspects of radiology.

This year´s MIR@ECR sessions highlight two main tracks. In the first session, Prof. Bruce Hillman (Editor of JACR) will present a key lecture on "Imaging innovation and the future practice of radiology". This will be followed by short statements of renowned radiologists discussing residents' training, research, health technology assessment, leadership and new imaging methods in radiology.

The second session at MIR@ECR will be focused on new aspects in teleradiology, eHealth, appropriateness and safety in radiology. Dr. Eric Ranschaert will present first results of the new ESR white paper on teleradiology. The European context and patient´s perspective will be discussed with a speaker from the European Commission. The fragmented situation in Europe regarding appropriateness, referral guidelines, safety aspects and evidence based radiology will be presented and discussed by Drs. Remedios, FitzGerald and Senol.

MIR@ECR is an excellent opportunity to learn from leaders in radiology on strategic aspects of radiology, how to be prepared for upcoming developments and how to interact with referring physicians and also with patients. There will be enough time for discussion during the session, and even to meet the speakers during the coffee break.

Programme

13:00 - 14:45

Innovation Management and the Future of Radiology and Radiologists

Chairs: Yves Menu (France), Peter Mildenberger (Germany)

- Imaging innovation and the future practice of radiology (Bruce Hillman, U.S.)
- Resident training: preparing young radiologists for the future (Birgit Ertl-Wagner, Germany)
- Research, EIBIR, HTA (Lluís Donoso, Spain)
- Health technology assessment, can we show that radiology is value for money? (Jane Adam, UK)
- Leadership and personal development (Yves Menu, France)
- New imaging methods (Moshe Graif, Israel)
- Radiology 2020 - resident and fellow´s perspective (M. Edjlali-Goujon)
- Debate on innovation management and requirements of radiology

14:45 - 15:15 Coffee Break

Radiology in Modern Times: challenges by telemedicine, eHealth, appropriateness and safety

Chairs: Guy Frija (France), Jan Schillebeeckx (Belgium)

- The radiologist´s perspective - report on the development of an ESR White Paper for Teleradiology (Eric Ranschaert, Netherlands)
- The requirements of citizens and the role of patients using telemedicine (K. Berkouk, Belgium)

- Imaging referral guidelines in Europe: impetus, innovations and initiatives (Denis Remedios, UK)
- Factors affecting safety of patients: workload, reporting speed, etc. (R. FitzGerald, UK)
- Evidence based radiology - the math of decision in radiology (Utku Senol, Turkey)
- Discussion & closing remarks

Plenary Sessions

Thursday 7 March, 17:45–19:15
Opening Ceremony
Presentation of Honorary Members
Opening Lecture
Jesús Prieto (Spain) / Promises and facts of liver-directed gene therapy

Friday 8 March, 12:15-13:15
Gold Medal Awards
Josef Lissner Honorary Lecture
Carlo Catalano (Italy) / MR-guided focused ultrasound: a new string to the radiologist's bow

Saturday 9 March, 12:15-12:45
Wilhelm Conrad Röntgen Honorary Lecture
Jean-François Geschwind (U.S.) / Interventional oncology: the era of molecular targeted therapy

Sunday 10 March, 12:15-12:45
Santiago Ramón y Cajal Honorary Lecture
Luis Martí-Bonmat (Spain) / Research and science: from individuals to societies – the Ramón y Cajal background

ESR Meets…

The popular ESR Meets sessions focus on the state of radiology in invited countries as well as their imaging topics of expertise. For the first time, the European Federation of Radiographer Societies host their own 'meets' sessions welcoming the Spanish Association of Radiological Technicians on Saturday 9 March, 14.00-15.30. In addition, ECR meets the European-African Hepato-Pancreato-Biliary Association (E-HPBCA) on Friday 8 March, 16.00-17.30.

Friday 8 March, 10.30 – 12.00
ESR Meets Spain
Professor Carmen Ayuso, president of the Spanish Society of Medical Radiology (SERAM) welcomes delegates to a session on imaging as an essential tool from diagnosis and treatment, including presentations on ischaemic stroke, aortic aneurisms and hepatocellular carcinoma, rounded off by a panel discussion on whether the multidisciplinary environment is the natural way to develop excellence and leadership in clinical imaging.

Saturday, March 9, 10:25–12:00
ESR Meets South Africa
Dr Clive Sperryn, President of the Radiological Society of South Africa will co-host a session focusing on experiences and expertise in imaging HIV and TB, concluding with a discussion on what impact HIV and TB have on health workers.

Saturday 10 March, 10.30 – 12.00
ESR Meets Chile
The session will look at topics of ongoing radiological research, which include a US classification of thyroid nodules relating to cancer risk, neuroimaging in epilepsy and MDCT images in mesenteric ischaemia. Professor Miguel Ángel Pinochet, president of the Chilean Society of Radiology, welcomes delegates to the session.

New Horizons

These sessions look at new and emerging developments and discuss the implications for radiology practice:

Friday 8 March, 16.00 – 17.30
Cartilage imaging

Saturday 9 March, 08.30 – 10.00
MR/PET: a marriage made in heaven or hell?

Sunday 10 March, 14.00 – 15.30
Imaging of the Mind

Professional Challenges

These sessions focus on professional issues such as management, training, and research networking.

Thursday 7 March, 16:00–17:30
PC 3: Bringing radiology to medical undergraduates

Friday 8 March, 08:30–10:00
PC 4: The visibility of the radiologist
Presentations include optimising the visibility of the department, starting early with visibility, taking over clinical responsibility and radiology in the 21st century.

Saturday 9 March 9, 16:00–17:30
PC 11: Personalised radiology

Sunday 10 March 10, 08:30–10:00
PC 12: Legal matters related to multimodality techniques

Sunday, March 10, 10:30–12:00
PC 13: The radiologist, the clinician and the patient: an impossible trio?
This session will discuss the current role of the radiologist in relation to the patient, other clinicians and the public, asking which procedures are efficient, which inefficient, what should be changed in future and what is manageable during clinical routine?

European Congress of Radiology

ECR 2013

Vienna

March 7–11

Register online now!

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The annual meeting of ESR myESR.org

EXPOSURE TO **IONISING RADIATION AND PREGNANCY**

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The exposure of pregnant women to ionising radiation is often a source of concern and provokes many questions. This anxiety is often unjustified and the questions are asked too late. Ignorance of the subject is likely to harm the woman who requires investigative imaging (chest CT scan or lung scan should be performed even in early pregnancy with suspected pulmonary embolism) or lead to inappropriate attitudes to accept or offer a medical termination of pregnancy after low-level exposure to ionising radiation. It is important to review the key elements of the effects of ionising radiation on the embryo and foetus, the doses received during diagnostic investigations and the attitude to adopt in the main clinical situations.

The Effects of Ionising Radiation on the Embryo and Foetus

The deterministic and stochastic effects should be discussed. The deterministic effect to consider is the teratogenic risk and the stochastic effect is the risk of cancer for an unborn child.

1. Teratogenic Risk

Like any deterministic effect, it only appears if a threshold is crossed. The peculiarity of the exhibition is the variable sensitivity of the embryo and foetus during pregnancy. During the first week post-conception effect responds to the law of all or nothing because, at this stage, all the cells are not yet differentiated and are totipotent. Either too many cells die and the embryo will not develop, or there are some cells destroyed and the embryo will develop normally.

During the phase of organogenesis (day nine to the ninth week after conception), the death of cells undergoing differentiation will not stop pregnancy, but will stop the development of an organ or a limb. The threshold is set at 100 mGy. Beyond the ninth week, the risk of malformation is gradually reduced as most of the tissue is then differentiated. The organ most sensitive at this age is the brain. Indeed, the process of neuronal migration continues until the 15th week. Disruption of neuronal migration may be responsible for malformation or mental retardation. The threshold for mental retardation is 200 mGy. Accountability of exposure to ionising radiation on the risk of malformation or mental retardation associated with exposure is in practice difficult to assess as the risk for spontaneous malformation or mental retardation is high, estimated at three percent of pregnancies.

2. The Risk of Developing Cancer After Exposure to Ionising Radiation

It is a stochastic risk related to changes in DNA without cell death. Like any stochastic risk, it is random without threshold and increases with dose. Prenatal carcinogenic effects of radiation are assumed to be the same as are children. The increased risk of cancer is estimated at 0.05 percent for 10 mGy received in utero. This figure should be compared to the spontaneous incidence of cancer risk in children, which is 0.25 percent (between birth and 15 years). Monitoring populations exposed to radiation in utero in Hiroshima and Nagasaki did not show an increase in the incidence of cancer. Data from the literature is often contradictory. In 1988 Bithell performed a meta-analysis and found an increased risk of cancer by 40% after exposure to ionising radiation (Bithell 1988). A meta-analysis published in 2008 did not find an increased risk of leukaemia or cancer associated with exposure to ionising radiation for prenatal diagnosis (Schulze-Rath et al. 2008). Cautiously, the authors concluded that their results do not invalidate the previous findings.

From scientific uncertainty derives a rule of prudence, which is limited to what is medically necessary and to optimise the technique of the medical examination to allow for high-quality diagnostic radiation at the lowest cost.

What to Know and Do in Practice

The International Commission on Radiological Protection (ICRP) 103(3) states that the prenatal doses from most correctly performed diagnostic procedures do not cause a measurable increase in the risk of prenatal or postnatal death or damage during development, including malformations or mental retardation compared with normal incidence of these diseases (IRSN 2009). The risk of cancer on life after in utero exposure is assumed to be similar to that after radiation exposure in infancy. Higher doses, especially those involved in therapeutic procedures may cause a poor development. It also specifies the rules to be followed in case of pregnancy.

French law is also very clear. Article R.1333-61 of the Code of Public Health says: "When the exposure to ionising radiation concerns a woman of childbearing age, the requesting physician and the physician performing the procedure must investigate possible pregnancy. If the woman is pregnant or nursing, or if the possibility of pregnancy cannot be excluded, special attention should be paid by each of them on the justification of the act. This must be ensured taking into account the urgency of the situation and the exposure for the woman and her unborn child. If, after justification, exposure by radionuclides occurs in a woman while pregnant or breastfeeding, or if the possibility of pregnancy cannot be excluded, the optimisation of the act reflects this condition."

Concerning radiotherapy and interventional procedures on the abdomen, ICRP 103 states that with pregnant patients, cancers unrelated to the pelvis can usually be treated with radiotherapy: "This, how-

Table 1 : Approximate foetal doses from common diagnostic procedures in the United Kingdom. (Adapted from Sharp, Shrimpton, and Bury, 1998).

Source: IAEA. Pregnancy and Radiation Protection in Diagnostic Radiology
http://rpop.iaea.org/RPOP/RPoP/Content/SpecialGroups/1_PregnantWomen/PregnancyAndRadiology.htm

Conventional X ray examinations	Mean (mGy)	Maximum (mGy)
Abdomen	1.4	4.2
Chest	< 0.01	< 0.01
Intravenous urogram	1.7	10
Lumbar spine	1.7	10
Pelvis	1.1	4
Skull	< 0.01	< 0.01
Thoracic spine	< 0.01	< 0.01
Fluoroscopic examinations	**Mean (mGy)**	**Maximum (mGy)**
Barium meal (UGI)	1.1	5.8
Barium enema	6.8	24
Computed tomography	**Mean (mGy)**	**Maximum (mGy)**
Abdomen	8.0	49
Chest	0.06	0.96
Head	< 0.005	< 0.005
Lumbar spine	2.4	8.6
Pelvis	25	79

ever, requires special attention to treatment planning. The expected radiation dose to the embryo / foetus, including the component of scattered radiation, must be estimated. Cancer in the pelvis can rarely be properly treated by radiotherapy during pregnancy without serious or lethal consequences for the embryo / foetus" (IRSN 2009).

In current practice, in the absence of the late rule, examinations can be performed after checking the justification of the act. The ten-day rule is clearly abandoned. If the woman is pregnant, you should check that the act is justified, cannot be postponed until after pregnancy and cannot be substituted by a non-radiating technique. The examination will be conducted using the least radiating technique as possible to establish a reliable diagnosis. If an examination was performed in a pregnant woman without knowing her condition, the radiologist or nuclear physician must meet with the parents and give them all the information. It should be reassuring if the examination did not involve the abdomen because the dose to the foetus is probably less than 100 mGy and usually less than 1 mGy. However, it is necessary to explain to parents that there is a natural exposure to ionising radiation, and the incidence of spontaneous malformations in the population, in the absence of radiation exposure other than natural exposure, is about three percent. Mental retardation (IQ <70) was also observed spontaneously in three percent of children.

If the examination concerns the abdomen, the dose to the foetus is usually less than 10 mGy if the review did not include more than four effects and less than a minute of fluoroscopy. A dose calculation is not deemed necessary. There is no increased risk of malformation and a very slight increase in cancer risk. It must be noted that in 1000 children born to unexposed pregnancies, 997 children will not be affected by cancer before the age of 19. In case of exposure of 10 mGy, this number is 996. This excess risk is very low and does not warrant medical termination of pregnancy.

For contrast radiology and CT examinations concerning the abdomen and pelvis, the dose received by the foetus in a single pass is less than 50 mGy. However, it is highly recommended to request an assessment of the dose received by the foetus from the medical radiophysics specialist at the establishment or the national institute for radiological protection and nuclear safety (in France, the IRSN –Institut de Radioprotection et de Sûrête Nucléaire -Institute for Radiological Protection and Nuclear Safety). The risk of malformations is not increased and in 1000 children, 994 will not be affected by cancer before the age of 19. The ICRP reminds that a dose absorbed by the embryo or foetus below 100 mGy should not be considered a reason to terminate the pregnancy.

Table 2 : Foetal whole body dose from common nuclear medicine examinations in early pregnacy and at term. (Dose includes maternal and foetal self-dose contributions. Adapted from Russell, Stabin, Sparks et al., 1997, ICRP 53, and ICRP 80.

Source: IAEA. Pregnancy and Radiation Protection in Nuclear Medicine.
https://rpop.iaea.org/RPOP/RPoP/Content/SpecialGroups/1_PregnantWomen/PregnancyNuclearMedicine.htm

Radiopharmaceutical	Procedure	Administered activity (MBq)	Early pregnancy (mGy)	Nine months (mGy)
^{99m}Tc	Bone scan (phosphate)	750	4.6-4.7	1.8
^{99m}Tc	Lung perfusion (MAA)	200	0.4-0.6	0.8
^{99m}Tc	Lung ventilation (aerosol)	40	0.1-0.3	0.1
^{99m}Tc	Thyroid scan (pertechnetate)	400	3.2-4.4	3.7
^{99m}	Red blood cell	930	3.6-6.0	2.5
^{99m}Tc	Liver colloid	300	0.5-0.6	1.1
^{99m}Tc	Renal DTPA	750	5.9-9.0	3.5
^{67}Ga	Abscess/tumour	190	14-18	25
^{123}I	Thyroid uptake[1)]	30	0.4-0.6	0.3
^{123}I	Thyroid uptake[1)]	0.55	0.03-0.04	0.15
^{123}I	Metastases imaging[1)]	40	2.0-2.9	11.0

[1)] Foetal thyroid doses are much higher than foetal whole body dose, viz. 5-15 mGy/MBq for ^{123}I and 0.5-1.1 Gy/MBq for ^{131}I.

For CT scans with several passes on the pelvis, a precise calculation of dose is necessary because the dose received by the foetus can exceed 100 mGy. The ICRP recalls that terminating a pregnancy because of radiation exposure is an individual decision that takes into account many factors. The pregnant patient should receive sufficient information to make a decision knowingly based on individual conditions, which include the estimated level of the dose to the embryo or foetus and the risk of serious harm that results to the embryo/foetus and the risk of cancer in later life.

Special Provisions for Pregnant or Breastfeeding Women and Working Conditions

Concerning occupational radiation protection, the regulations state that the exposure to the unborn child should be as low as possible (Article D. 4152-5 of the French Labour Code). The unborn child is considered by regulators as a member of the public. Its exposure should not reach 1 millisievert (mSv) for the period between the declaration of pregnancy and childbirth. Pregnant women cannot be assigned to positions requiring classification in Category A (they should receive doses below 6 mSv/a). Finally, breastfeeding women cannot be assigned to a position involving the risk of internal exposure.

Conclusion

In conclusion, the rules of good practice are systematic questioning of women of childbearing age, justification and optimisation to help avoid difficult situations. Good knowledge of the effects of ionising radiation allows medical professionals to act professionally and responsibly. We must never forget to provide parents with fair and reliable information. ■

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MRI **RISK MANAGEMENT**

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Risk management in MRI is, like the imaging technique itself, a multilayered problem. If we take into account an MRI superconducting magnet (the majority of installed equipment), four components of the device may cause a risk to the patient, staff, or both: the magnet (main magnetic field), the cryostat (liquid helium), the magnetic field gradients (low-frequency electromagnetic field, acoustic noise) and, finally, the transmit RF coil (radio frequency pulses).

Risks Related to the Static Magnetic Field

The principle of magnetic resonance imaging requires the use of an intense magnetic field. Most commonly installed imaging devices include a 1.5 Tesla magnet, which is about 30,000 times the earth's magnetic field! Consequently, when a ferromagnetic metal object enters the magnetic field, it undergoes a violent attraction and its speed can reach several metres per second. This is called the missile (or projectile) effect of metal objects.

This is certainly the major risk related to MRI installation and relates to both patients and staff. Small objects such as scissors or a reflex hammer, for example, can pose a real threat if they reach a patient lying in the MRI bore. But the accident can be even more dramatic when large masses of metal, unstoppable near a strong magnetic field, are involved. In 2001, in the United States, a six year old child died as a result of head trauma caused by the projection of an oxygen cylinder in the magnet during the MRI examination. Personnel are exposed to the same dangers: being in the path of a small metal object or becoming stuck against the magnet by a large mass of metal (stretcher, bed, etc.).

The second risk relates to metal implants and implantable medical devices or metallic foreign bodies. In this case, the threat comes with displacements or rotations of these implants or foreign bodies resulting in sometimes dramatic, haemorrhage (ferromagnetic intracranial aneurysm clips, intraocular metallic foreign bodies, bullets or shrapnel, etc.) or the malfunction of certain implanted devices (pacemakers, nerve stimulators, cochlear implants, insulin pumps, etc.).

Prevention of these risks has several components:

Prevention and control by restricting access

Access to the examination room should be limited to those aware of the constraints of magnetic fields. The danger is always evidenced by panels located on the door of the examination room or surrounding rooms. The limit of the magnetic field of 0.5 milliTesla (mT) is considered a prohibited zone to people with certain active devices (e.g. pacemaker), ferromagnetic objects and certain electronic equipment. This limit is generally contained in the magnet room through the advances in shielding: active shields at the magnet (additional magnetic field coils) and passive shielding attached to the walls, floor or ceiling if necessary (metal plates). If this is not the case (very high magnetic fields), the limit must be marked on the ground.

Access is normally controlled by radiologic technologists. It is just as important for staff (paramedical, medical, maintenance personnel etc.) as it is for patients. Any person entering the examination room must be removed of any ferromagnetic metal object, especially in pockets. Radiologic technologists must verify that those entering the room are not wearing a medical device prohibited in the area of 0.5 mT and all damageable goods (watches, credit cards, mobile phone, etc.) must be set aside. A metal detection gate at the entrance of the room can be useful for additional safety. For patients, it is advisable to completely undress them and ask them to wear a hospital gown without metallic buttons. They also need to remove jewellery, dentures and anything else that could be detrimental to the quality of the exploration (artefacts). A thorough search of the contraindications, by a verbal interview or by a printed safety screening form, is a prerequisite.

> "A metal detection gate at the entrance of the room can be useful for additional safety"

For implanted material, a compatibility check with the manufacturer is often necessary. Some devices normally prohibited (e.g. pacemakers) can evolve to a possible use in MRI but with significant constraints for both staff and patients. In case of doubt about the presence of an implant, an active implantable medical device or metallic foreign bodies, the region of interest can be radiographed. Finally, for those accompanying patients in the exam room (which is common in paediatric MRI), they should take the same precautions as staff.

Prevention by use of specific equipment

Any material or object entering the examination room must

be non-magnetic and clearly identified as such to avoid the risks associated with the missile effect. This includes stretchers, wheelchairs, infusion stand rods, bins, pedestal preparation, etc. If there is still uncertainty of the ferromagnetic character of a device or object, simply do a test on the object with a small magnet.

Risks of the Cooling Agent

To achieve the superconducting properties of the coil which produces the magnetic field, the latter is placed in an insulating container (cryostat) containing liquid helium at a temperature of - 269°C. The risk of such an installation is sudden and accidental loss of superconductivity, making the magnet become resistive: this is called the 'quench'. The heating of the coil then transforms the liquid helium into a very large amount of helium gas. Normally, this gas is discharged to the outside of the building through a pipe called a 'quench pipe'. In case of malfunction of the system, the risks to staff and patients are essentially cold burns and asphyxiation, because the sudden evaporation of helium will displace oxygen from the ambient air and thus reduce concentration.

"Prevention is primarily the correct care and management of the patient"

Prevention in this area is primarily to periodically check the existing installation for leaks or blockage of the quench pipe. In addition, training of staff in emergency procedures is also important. Indeed, in case of partial or total failure of the quench pipe, and therefore release of helium gas in the examination room, staff must first evacuate the patient and then start the ventilation extraction to expel the gas in the room. Finally, the quench can be provoked deliberately (by pressing the switch to stop the magnet) in case of an accident with the risk of the projection of metallic elements in the magnet, in case of injury or blockage of the patient or staff, but also in case of fire in the room. However, this procedure that brutally stops the magnetic field should only be used as a last resort.

Risks associated with magnetic field gradients

The magnetic field gradients are the cause of two effects for the patient:

Peripheral nerve stimulation

This is manifested by tingling or slight muscular tremors in certain regions of the body. This effect is a consequence of certain sequences (especially echo planar imaging or EPI) during which the gradients switch extremely fast, which leads to low frequency electromagnetic fields and can generate currents in tissues (where the nerve stimulation occurs).

The prevention of this phenomenon requires compliance with the procedures for installing the patient. It is particularly important to avoid contact with the hands, knees or feet because it leads to a closed conductive loop favouring the induction of an electric current in the nerve fibres (and hence stimulation). It must also be ensured that the patient carries no metal objects or conductive material promoting the induction of electric current. In general, the devices offer also power management of the gradients at two levels; the lower level reduces the risk of generating peripheral nerve stimulation. In all cases, the operator must remain attentive to the sensations felt by the patient so that he can stop the examination if necessary.

The acoustic noise

Characteristic of the operation of the gradient coils, this noise is caused by the vibration of the gradient coils as a result of the injection of electric current. The noise is proportional to the intensity of the electric current and magnetic field strength, resulting in a higher noise when the main magnetic field increases.

Again, prevention is primarily the correct care and management of the patient. Using earplugs or noise cancelling headphones (or both!) can, in general, reduce noise by around 30 to 35 dB. From a technological perspective, the manufacturers also offer different methods of noise reduction or hardware or software (sequences).

The risks associated with transmit RF coils

The application of radiofrequency pulses during the acquisition sequences, that is to say, high-frequency electromagnetic fields generated by the transmit coil, causes power transmission in the tissues, which can lead to overheating. This energy deposition is measured in SAR (Specific Absorption Rate) which is calculated in W / kg. International Standard IEC 60601-2-33 sets limits on power transmission to not exceed an increase in body temperature of 1°C. In practice, the SAR depends on the sequences parameters used, particularly the number of radio frequency pulses (e.g. in fast spin echo sequences) or also on the flip angle of the pulses.

The transmit coil may be the cause of another risk: in fact,

the concentration of the radiofrequency field on the skin can cause second or third degree burns. This danger is enhanced by the presence of electrical cables forming a loop on the skin (receive coil cables, ECG cables, etc.), the contact between a metal conductor and the skin (e.g. skin patches containing a metal sheet or body piercings) and skin-to-skin contact forming a conductor loop (for example on limbs or crossed arms).

Prevention of tissue heating is provided primarily by software equipping each device to continuously calculate the SAR according to the sequences parameters used. The operator is alerted in case of exceeding the threshold. As for nerve stimulation management, it also has two levels of use, the low level allowing less energy transmission. Another security measure is to clearly indicate the patient's weight because it contributes to the precise calculation of SAR. Also avoid switching to high power transmission with young children and patients with hyperthermia or those with alterations in thermoregulation. We must also be careful not to cover patients too much and ensure good ventilation of the magnet bore.

To avoid the risk of skin burns, do not let a receive coil cable come into contact with the patient's skin. The operator must also ensure that there is a minimum distance of 5mm between the patient and the sides of the magnet bore, confirm the absence of any conductive metal in contact with the skin and avoid skin-to-skin contact (risk of burns at certain contact points). As always, the operator must remain attentive to the patient (call button), asking him or her to report any abnormal sensation of heat.

Conclusion

MRI safety is an important issue, with risks for the patient and the staff. This is a daily concern for the operator, mostly the radiologic technologists, which should ensure the smooth running of the MRI examinations and the patients' safety. ■

MANAGEMENT IN RADIOLOGY **SEMINAR IN TEHRAN**

Image:
L-R: Dr. Mansoor Fatehi, Prof. Peter Mildenberger, Prof. Utku Senol

The first Iranian seminar on Management in Radiology was held in Tehran on 2-3 February 2013. The meeting was aimed at providing update training on the hot topics in radiology management. The major themes of the meeting were safety and protection, quality management, strategic management and imaging economics.

The Iranian society of radiology (ISR) invited Prof. Peter Mildenberger as the honorary president of the meeting together with Prof. Utku Senol from Turkey as guest speaker. The chairman of the seminar was Dr. Mansoor Fatehi, the general secretary of ISR and director of Medical Imaging Informatics Research and Education Centre (MIIREC) in Tehran. Although management issues have been part of the programme of the annual meeting of the Iranian society of radiology, this was the first dedicated meeting to cover only radiology management topics.

The meeting was supported by local vendors of mostly informatics solutions as exhibitors and Shimaparto Company (distributor of Shimadzo, Infinitt & few other company products in Iran) was the main sponsor. In total 163 people attended.

As an outcome of this meeting, it was decided to establish IHE Iran with the technical support of IHE Turkey (as part of the agreement signed between the Iranian and Turkish Societies of Radiology for local and regional collaborations). In addition, research on appropriateness in radiology and controlled terminology of radiology will be part of a joint local effort in MIIREC. ■

EUROPEAN DIPLOMA **IN RADIOLOGY**

Interviewee
Dr. Éamann Breatnach

Scientific Director
European Board of Radiology

Interviewed by
Claire Pillar

Managing Editor

An initiative of the European Society of Radiology (ESR), the European Diploma in Radiology (EDiR) examines candidates on the knowledge outlined in the ESR's training curriculum. The EDiR is now administered and issued by the European Board of Radiology (EBR) and consists of a written and an oral examination. The first candidates took the exam at the European Congress of Radiology in Vienna in 2011. Candidates have also been able to take the exam in conjunction with the major radiology congresses in France and Spain.

Why was the Diploma developed?

The Diploma was developed for a number of reasons:

- To support the ESR in its promotion of standardised and high levels of radiologic care to patients throughout Europe;
- To provide an objective standard of radiologic knowledge for radiologists who have trained in various countrie throughout Europe;
- To evaluate knowledge of radiology for ESR members as outlined in the ESR training curriculum;
- To validate an acceptable knowledgebase as outlined in the ESR training curriculum for corresponding members of the ESR;
- To enable employing authorities or departments to evaluate the knowledge base of a candidate about whom acquaintance with their training base is limited;
- For individual radiologists to provide a challenge and objective mechanism for self-evaluation and career development;
- By providing an ESR endorsed qualification, to facilitate procedures in the context of medical migration.

Nowadays a number of other specialties operate a Pan-European examination. For certain subjects this has become recognised as equivalent to national exit specialty examinations. It was seen as time that radiology would join this movement.

Aren't educational standards for radiologists across Europe already quite similar?

Though the overall standard is good, significant variability remains.

How does the EDiR fit with subspecialty diplomas?
The EDiR examination tests general radiology. It is the ESR view that subspecialisation in radiology should be built upon a good and adequate general radiology background. Thus the relationship between EDiR and subspecialty diplomas is viewed in the context of a step-wised progress from general to subspecialty radiology training.

What are the advantages to the radiologist who has just completed his/her national training in taking an additional qualification?
The advantages are many. Taking the EDiR enhances the radiologist's career path and demonstrates a career profile of self-improvement through a voluntary self-assessment. The diploma provides the individual radiologist with the opportunity to compare his or her radiologic knowledge with that as set down by the EBR and based on the curriculum of the ESR. In the context of migration it provides confirmation of an EBR provided and ESR/ European Union of Medical Specialists (UEMS) endorsed standard of knowledge in general radiology.

Recently, the oral examination has been made available in languages other than English. Which languages?
So far the oral examination has been available in Spanish and French. EBR anticipates roll-out of the oral component of the examination to be made available in other European languages, the venue coinciding with national congresses in European countries. Poland and Turkey are the next venues for this roll-out. The written component will continue to be held in English reflecting its status as the international language of medicine.

What are the next steps?
The next steps are geared to increasing the acceptance of EDiR as a robust, European standard of radiological knowledge with acceptance at national registration level, and a global influence as a radiologic qualification. ■

The European Diploma in Radiology so far

- Average pass-rate: > 80%
- 172 candidates from 30 countries, including:
  126 candidates from Europe: Austria, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, Turkey, UK.
  46 candidates from outside Europe: Azerbaijan, Canada, Chile, Egypt, India, Iran, Iraq, Jordan, Kuwait, Pakistan, Russia, Saudi Arabia, Singapore, USA.
- 40 examiners

FURTHER INFORMATION

Web
http://www.myesr.org/diploma
Facebook
https://www.facebook.com/EuropeanDiplomainRadiology
Next Confirmed Dates
March 2013, ECR – Vienna
June 2013, Polish Congress of Radiology - Wroclaw
October 2013, JFR - Paris
November 2013, TURKRAD - Turkey

THE INTERVENTIONAL RADIOLOGY **CURRICULUM**

Harmonising Standards, Ensuring Quality

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Interventional radiology (IR) is steadily on the rise as the discipline of choice to treat a vast array of medical conditions – be they vascular, non-vascular, oncological or neurological. When compared with open surgery, the shorter hospital stays, quicker recovery periods and the minimally invasive nature of these image-guided interventions speak for themselves.

Widespread availability and acceptance amongst patients contribute to the increasing demand for these procedures, and consequently for skilled doctors to perform them. To respond to these trends and avoid facing a shortage of well-trained IR doctors, training pathways need to be reconsidered and harmonised throughout Europe. IR's position as a subspecialty of diagnostic radiology accounts for country-specific training pathways and differing perceptions of what knowledge and technical skills ought to be acquired by a professional interventional radiologist. Compounding this, radiology training at both undergraduate and resident level still has a disproportionate focus on diagnostic radiology.

To start redressing this imbalance, the Cardiovascular and Interventional Radiological Society of Europe (CIRSE) is putting strong emphasis on IR education. In 2012, a curriculum for undergraduate medical students was published on the society's website. Aiming to impart a solid understanding of IR and make medical students aware of this career option, this concise document concentrates on the crucial learning outcomes required for their residency years and subsequent IR training.

A common European curriculum and syllabus for interventional radiology is much needed and will be available soon, thanks to the voluntary work of Prof. Anna-Maria Belli [Image 2] and her task force. Together, the group of renowned interventional radiologists revised and updated the former syllabus to reflect current practice and incorporate developments and new procedures. A curriculum has been established for the first time and together, these comprehensive documents form the basis of the European Board of Interventional Radiology (EBIR).

Image 1:
European Curriculum and Syllabus for Interventional Radiology

Image 2:
Professor Anna-Maria Belli, EBIR
St. George's Hospital
London, UK

"It is important to develop an IR curriculum to ensure that every trainee is trained to a set standard and assessed before they are accredited as specialists. This is particularly important when interventional radiologists cross European borders, and a set curriculum offers a means of ensuring quality control and competency," says Anna-Maria Belli. She considers a common European curriculum essential to ensure that doctors practise safely and effectively regardless of the country in which they have received training.

Patient safety is key and has constantly been on the mind of the experts who have thoroughly edited the document. Patients deserve exemplary treatment, and to this end the curriculum makes the trainee aware of the safety concepts that a well-trained interventional radiologist must be familiar with, such as the ALARA (As Low As Reasonably Achievable) principle, effective and safe exposure to ionising radiation, knowledge of hazardous materials and patient safety checklists.

There is also a pan-European aspect to CIRSE's approach. Alongside high standards of medical professional qualifications, EU directives also aim to promote the free movement of doctors and patients throughout the European Union. But within IR, this goal is currently hampered by the prevailing dissimilarity of IR training pathways. A standardised curriculum and a centralised assessment would improve the situation substantially.

Image 3:
Professor Michael J. Lee, EBIR
Beaumont Hospital
Dublin, Ireland

The European Curriculum and Syllabus for Interventional Radiology and the European Board of Interventional Radiology (EBIR) provide just that. Since 2010, a tailor-made exam consisting of written and oral components has allowed interventional radiologists from all over Europe to demonstrate their knowledge to the EBIR Examination Council. Trained examiners and state-of-the-art assessment techniques guarantee objectivity and fair results. On passing the EBIR, the candidate acquires a widely recognised qualification demonstrating their skills and expertise in IR.

The authors of the curriculum also point to the necessity of appropriate IR training institutions that meet certain basic standards and guarantee trainees sufficient exposure to the procedures described in the syllabus. They hope that in the future, an accrediting body for IR training will be instituted to assess IR training centres.

Since interventional radiology is a dynamic and rapidly developing specialty, this curriculum will be subject to continuous review. Based on regular surveys on the effects of its implementation, a dedicated task force will revise the contents of the curriculum every five years.

Prof. Michael Lee [Image 3], current CIRSE President and member of the IR Curriculum Task Force, is confident that, with the upcoming publication of the European Curriculum and Syllabus for Interventional Radiology, "harmonisation of training and accreditation throughout Europe is not just a vision anymore, but may soon become reality, which can only have positive effects for patients". ■

For more information, please refer to **www.cirse.org.**

» CONTINUES FROM PAGE 22

diologists. Competency models are usually focused on knowledge measurement. What we will implement is a model where radiologists can compare what they do with some 'standards' that we define as 'competency elements'. We have designed a 'map' which includes the different competency elements. The certification will be achieved when a radiologist can prove that he or she is able to perform the corresponding competency elements in the proper way. It is voluntary, and we intend that our model will be important not only for radiologists, but also for managers and educators. For the last months we have been working in competencies in interventional radiology and, if it is as successful as we expect, our aim is to expand the model to other subspecialities. ■

» CONTINUES FROM PAGE 23

recession on radiology in Russia. One of the major problems is poor management of radiology (for example, hospitals usually lack funds for maintenance and service of expensive diagnostic equipment, infrastructure of radiological departments in underdeveloped – most departments work without PACS). This results in lower productivity of radiology services. The system of training in radiology and continuous medical education is obsolete. Low salaries of radiologists and radiographers in the public sector are a real problem.

Has the government made any cuts that directly affect the medical imaging workforce, in the face of the financial crisis?
Officially no cuts have been made in the number of radiologists' positions in public hospitals.■

FRENCH RADIOLOGY **RESIDENTS' EXPECTATIONS**

A Demographic Survey

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A demographic survey was conducted amongst French radiology residents in order to investigate their expectations regarding their training, fields of interest, future career, and exercising their profession. This survey was aimed at anticipating reforms in radiology and at foreseeing future demographic changes, so as to adapt medical residents' training and the global medical system to these new realities.

Materials and Methods

A multiple-choice survey of 19 questions was developed in three categories: demography (gender, year of residency, and city of training), training and future practice. The questions about training were aimed at finding out the residents' expectations regarding their residency and fellowship in global radiology training, as well as in subspecialties. The questions about future practice were not only intended to reveal the residents' willingness to practise general radiology or some special field of it, but also their general career goals, type of desired practice, and the technologies the future radiologists wanted to use in their upcoming practice.

612 French residents out of 920 were contacted via email. 160 respondents completed all the survey questions (26 percent response rate).

The residents had the opportunity to justify each answer and could also give their personal opinion at the end of the survey. These comments helped us to better understand the reasons underlying the young radiologists' answers as well as the possible implications for the healthcare system.

Respondents

The proportion of the respondents was equally distributed among the five years of residency. The male versus female distribution followed the current residents' demographic proportions with 38 percent of the respondents being women. This confirms the known trend towards feminisation of radiology (Baker et al. 2006), which is associated with increased interest in part-time practice and in being employed rather than independent.

Residency as Global Initial Training

The respondents considered residency as a global initial training that should include all, or at least most of, the radiology domains and subspecialties. Most residents (50 percent) want to have a comprehensive general training and to acquire two or three areas of expertise, while 35 percent request only general training (see Figure 1). For those willing to get a subspecialisation, the main fields of interest are musculoskeletal (43 percent), gastrointestinal (31 percent), neuroradiological (25 percent), and breast and gynaecological imaging (23 percent).

The desire of the radiologist to be at the centre of patient care is stated as one of the reasons for interest in general radiological training. Young radiologists are willing to be able to respond to questions and work with all clinicians and surgeons in general and emergency cases. Some respondents also justified their choice by the motivation of being competent in the whole field of the speciality, being able to have a varied practice and work in private generalist clinics.

However, the growth of medical knowledge, techniques and investigations makes it impossible to have deep expertise in each organ subspecialisation. Young radiologists are acutely aware of that, and, along with the general radiology education, they want to become experts in a specific couple of domains.

> "Young radiologists are willing to be able to respond to questions and work with all clinicians and surgeons in general and emergency cases"

Fellowship as Extension of Residency

Fellowship, which is not mandatory in France, and usually lasts for two years, is considered an extension of residency aimed at completing general education. Only three percent of respondents are not willing to complete a fellowship. The distribution of subspecialties choices is comparable with the fellowship–residency choice distribution, with the same trend of willingness to get general training and two to three subspecialties. Only 24 percent of the residents would like to have a single-specialty fellowship.

Future Practice

After having completed their fellowship, 83 percent of young radiologists prefer to have a general practice (see Figure 2), with one to three subspecialties, especially in digestive (51 percent), musculoskeletal (49 percent), neuroradiology (34 percent), and breast imaging (30 percent) (see Figure 3). Only five percent of the radiologists would like to have a single subspecialty practice (see Figure 2).

"The strongest trends are the desire for having several career opportunities"

Interventional Radiology

The development of interventional radiology at the interface between diagnosis and treatment has added a new dimension to the specialty. As many as 15 percent of residents want to learn interventional imaging methods during their residency, and three percent would like their residency training to be mostly oriented at interventional practice. Twenty percent of the residents would choose their fellowship in interventional radiology. Regarding their future practice, about 30 percent of the young radiologists would like to use vascular interventional imaging techniques, and 45 percent want to practise non-vascular interventional imaging. The strongest interest is shown in non-vascular interventional radiology such as oncologic interventional radiology, e.g. biopsy, which is usually part of the global patient investigation (O'Neill et al. 2011), while vascular interventional radiology, being a more specialised field, requires more time investment and sometimes leaves no time for any other work.

Paediatric Imaging

While interest in interventional imaging is increasing, there is a strong decrease in interest in paediatric imaging, both in part- and full-time practice. Only seven percent during residency and eight percent during fellowship are interested in training in paediatrics. Only three percent of young radiologists (five percent of the women respondents) want this field to become their only future practice while ten percent would agree to practise it along with other subspecialties.

Imaging Techniques

Imaging techniques are developing fast and interest in new technologies is high (see Figure 4). Interest in MRI (92 percent) and CT (88 percent) is the most significant, followed by ultrasound (77 percent). The interest in conventional radiography is markedly low (59 percent). Women are more interested than men in ultrasound (89 percent).

Career Interests

Interest in an academic career is lower in radiology compared to other specialties. Only 12 percent of respondents are interested in an academic career: of these interest is higher in Paris (20 percent) than in the provinces. The lack of interest in an academic career is justified by the need for great self-investment and by the significant difference between salaries in public hospitals and in private practice, the latter being much higher. The lower fraction of young radiologists in provinces attracted by an academic career can be partly explained by the higher expectations regarding their quality of life (Applegate 2005), or by the lower number of academic opportunities there.

There is increasing interest in the hospital sector: 27 percent of respondents would like to have an exclusive hospital practice, 40 percent would choose a part hospital and part private career, while only 20 percent see themselves working in the private sphere only. Among the latter, only one percent is seeking a small general practice, whereas over 40 percent prefer a large radiology group and 60 percent are willing to work in a private hospital to have everyday access to CT and MRI scanners. These results can be related to several factors such as the technology evolution, accompanied by the loss of interest in small radiology organisations, where only ultrasound and standard radiology can be practised, as well as by the increased complexity of radiology practice, pushing radiologists to group in order to increase their expertise. The higher interest in the hospital sphere is partially related to the growing feminisation of the profession (women prefer a partly hospital and partly private career 20 percent more than men). There is also an increased interest in practising medicine as an employee. This interest is higher in the female population with 60 percent ready to consider this possibility, which can be accounted for by increasingly valued stability, family responsibilities, and personal satisfaction (Cronan 2004).

Conclusions

New trends in practising radiology and the emergence of new radiological techniques affect the expectations of the French residents regarding their current education and the way they see their future career.

We have found that the strongest trends are the desire for having several career opportunities by orienting to mixed private and public practice as well as a great interest in getting a general training and becoming a general radiologist with expertise in one to three subspecialties. As far as subspecialties are concerned the biggest changes in preference are for interventional radiology (IR) (especially non-vascular IR) at the top, and for paediatric radiology at the bottom.

The results of this survey may be of use in implementing changes in training young radiologists (residents and fellows) and in organising hospital- and private-networks practice. These results should be also considered while organising the healthcare system, as the residents of today are going to be the active participants of this system in a couple of years. Thus health policy leaders should take these results into account while evaluating the appropriate number of radiologists needed in the near future. ■

Figure 1 (left): Would you like to have general training during your residency?

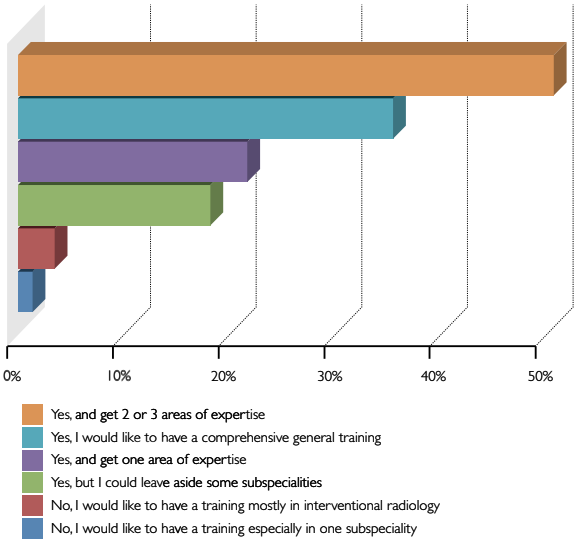


Figure 2 (right): After your training would you like to practise all the subspecialities?

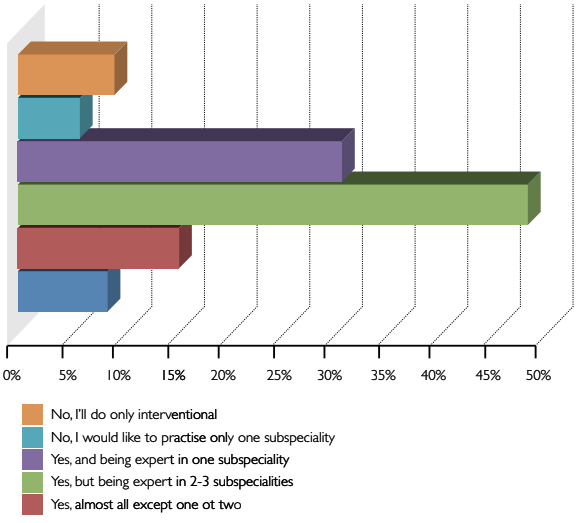


Figure 3 (left): Which specialities would you like to training?

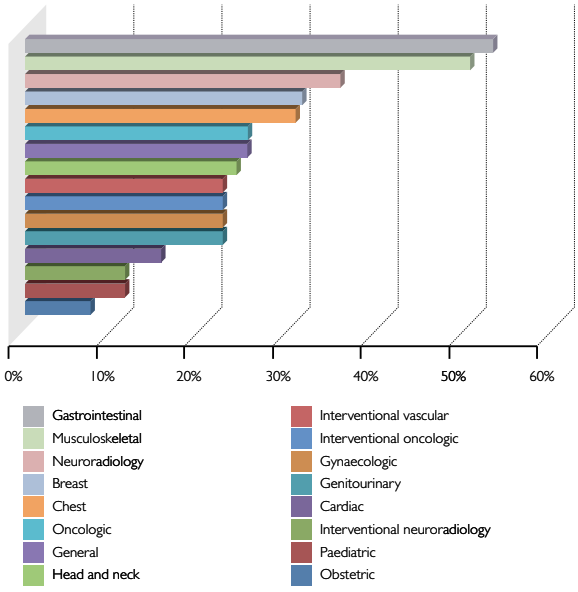
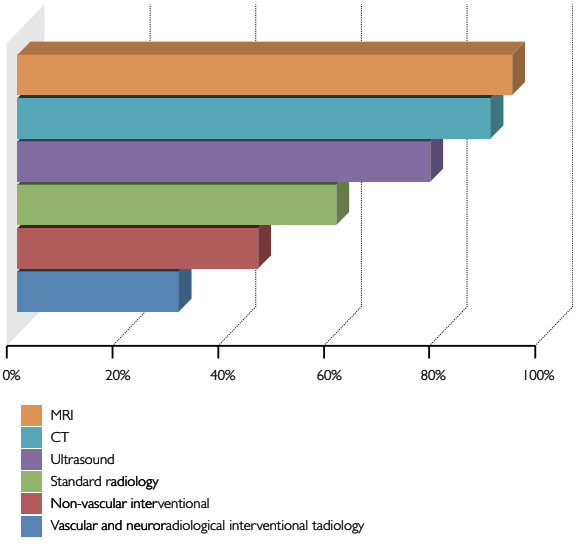


Figure 4 (right): Which imaging techniques would you like to practise after your residency?



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TECHNOLOGY HORIZONS: **MOBILE MEDICAL IMAGING**

On the Eve of a Revolution

Mobile medical imaging technologies are consistently changing the healthcare landscape. With ageing societies and increasing disease incidence on the one hand, and efforts towards cutting down healthcare expenditure and shortage of practitioners on the other, mobile medical imaging solutions are gaining momentum. This is especially because a large proportion of the installed base is already digital, and picture archiving and communications systems (PACS) are becoming routinely implemented and used.

The last bastion of non-digital radiography, analogue X-ray, is slowly becoming extinct, not only because of increasing variable costs (related to silver price increases), but also due to dissatisfying image quality.

There are two aspects of mobile medical imaging that need to be considered. The first is performing diagnostic procedures with mobile imaging units, the second mobile viewing of acquired images.

Benefits of Mobile Imaging

Mobile diagnostic imaging devices offer significant benefits to stakeholders: increased efficiency of healthcare services provision, better accessibility to healthcare and faster reaction time combined with their (usually) lower price. Not surprisingly, vendors are effortlessly launching new versions and types of mobile diagnostic imaging devices.

All major market participants offer mobile diagnostic imaging devices. Virtually every imaging modality, whether it is ultrasound, X-ray, MRI, CT or PET, has its mobile version. These devices are valuable in emergency rooms, as they permit immediate examinations without the necessity to move the patient and therefore allow for significant time saving, which in these cases is crucial. They bring benefits in smaller hospitals with lower throughput and are invaluable in intensive care units.

Some modalities such as ultrasound or X-ray also have portable versions, which are usually cheaper than their stationary counterparts. Portable units were initially developed with the idea to cater for patients in developing countries with limited access to healthcare services. They also gained popularity in the developed world, primarily for domiciliary use, as they allow for greater flexibility of the physician, due to their compact size and light weight, as well as the fact that they can be used in multiple locations.

Portable units are also a good solution for hospitals or clinics in sparsely populated areas, where the demand for specific type of scans (ultrasonic, X-ray) is low, and therefore there is no economic justification for having the machine permanently sited there.

The quality of mobile and portable diagnostic imaging units is drastically improving. Image resolution, decreasing size, lower weight and better connectivity are just some of the key areas where significant improvements are being observed.

Mobile Image Viewing

Progress made in the area of communication protocols, devices, and archiving systems has enabled image exchange and mobile viewing of diagnostic images. This has been made even easier by employing vendor-neutral archives (VNAs) and standardised archives, which are independent from PACS and enable storing data in interchange formats.

In this way data obtained from diagnostic imaging units of different brands can be stored and shared between users. Today, practitioners can view the images mostly within the PACS environment. However, vendors of PACS systems are taking efforts to enable the use of tablets and smartphones (non-PACS agents) for viewing diagnostic images. This solution would allow for viewing the same image simultaneously in different locations, which can be a tremendous help in diagnosing a patient and providing them with therapy in a timely manner.

> "The quality of mobile and portable diagnostic imaging units is drastically improving"

The quality of images viewed on mobile devices is usually still slightly lower than what can be seen at a stationary unit. Therefore doubts and concerns about the clinical value added offered by mobile devices are arising among some of the end users.

However, there are multiple situations when the advantage of immediate viewing outweighs the image resolution. This is an unprecedented advantage for example in emergency care or emergency situations, when a radiologist is not available at the venue, but their opinion is urgently needed for further diagnosis and therapy.

The speed at which the diagnostic image can be obtained is

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Frost & Sullivan

also crucial, not only for the radiologist's convenience but also for the time of reaction. The best answer to this challenge would be cloud-based data, of course properly protected. Even though the vision of secure accessing of cloud-based data to view medical images at diagnostic quality with a mobile device still seems slightly distant, progress is visible and hopes are high.

Early in 2011 the United States Food and Drug Administration approved a mobile radiology viewer and a smartphone ultrasound probe. The reaction of the market was immediate. Later in 2011, AT&T started offering cloud-based mobile access to medical images, which allows for storing, accessing, viewing and sharing medical images both within and outside a medical facility. At the end of 2011 GE launched Access 2.0, a mobile imaging diagnostics platform, enabling reviewing images on mobile devices with Apple iOS and Android 2.2 and above.

Data protection itself is a great challenge which developers of mobile medical imaging need to face. Confidentiality of data in healthcare is a very sensitive topic and there are a number of security concerns that need to be acknowledged, including strategies for safe accessing, storage and transmission of data.

Current status of development of mobile medical imaging is just the tip of the iceberg of what is actually possible. Focus on portability, decreasing the size and weight of devices, coupled with possibilities of modern information technology and development of telemedicine is bound to bring changes, which all stakeholders, patients, practitioners and payers, will benefit from. There are obviously a few conditions that need to be met in order to make it happen: data needs to be secure, prices need to be affordable and most importantly, stakeholders need to be willing to let the mobile revolution happen. ■

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RADIOLOGY AND MANAGEMENT ISSUES IN **ITALY**

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The Italian Radiological Society (SIRM)

The Italian Radiological Society (SIRM) was founded in 1913, and the first meeting was held in Milan on October 12–14 the same year. SIRM is the largest medical society in Italy today, and in 2013 will commemorate its centenary with the slogan 'The future comes from a solid past'. Approximately 9,600 radiologists are registered with SIRM, including 1900 members under the age of 35 and 359 radiologists over the age of 70.

The aims of SIRM are to:

- Contribute to the progress of science and radiological imaging in their physical and biological basis, radiation protection and medical informatics;
- Promote cultural and scientific updating of members by educational initiatives and conferences;
- Take measures to guarantee the professionalism of members and to participate, to the extent applicable, in health planning.

SIRM organises a national congress every two years, courses, conferences and scientific publications, and funds scholarships and research.

SIRM is structured in subspecialty sections for its scientific activities. These sections are dedicated to clinical topics, imaging techniques, or issues like ethics and forensic radiology and also management in radiology.

The Management in Radiology Section: education and training in health management

The Italian Management in Radiology Section was founded in 1998, and is similar in aims to the Management in Radiology (MIR) section within the European Society of Radiology. The section has a steering committee, including from 2012 an expert in health economics. The section has a website with information on the most important topics in the field of health economics, past and future events, and important documents in English and in Italian, including educational material useful for training and retraining (see http://www.sirm.org/sottositi/management/).

The section's activity is dedicated to the study of issues related to management in radiology, including human resources for regulatory frameworks, the proposal, development and analysis of guidelines or protocols and all modern aspects of clinical governance. This growing interest is due to the critical economic period that the world and Italian health are experiencing.

SIRM and the Management in Radiology Section prepare documents and guidelines to help radiologists in their activities. The main activities are to:

- Indicate common patterns to adapt to different working realities;
- Disseminate behavioural and common quality standards at a national level;
- Provide support to the various professional figures involved;
- And ensure the quality of radiological performances for the patients.

Various important documents have been realised by the Management in Radiology Section and SIRM (see Figure 1). The most recent, approved by the Italian Ministry of Health and the regions, is the document that deals with dematerialisation of clinical documentation (images and reports) in diagnostic imaging (Ministry of Health 2012). It is an important text for radiologic professional aims, and took three years to produce. The document establishes legal requirements and professional best practice to apply to electronic radiological documents. The text establishes the inseparable relationship between the report and images of any radiological exam. The most important part of the radiological exam is the report, and in this way the turf battle with other medical components or technicians can be avoided or reduced.

Imaging Technologies in Italy Today

Technological innovation is another important issue that must be considered for healthcare spending, because it entails increasing costs. The Italian National Health Service (NHS) has limited resources, a context which requires that any healthcare investment should be assessed on the basis of the appropriateness, efficiency and cost-effectiveness ratio. In 2007 SIRM together with the Italian Association of Neuroradiology (AINR) and the National Union of Radiologists (SNR) started a project to create a National Observatory of Human Resources and Technological Structures of Radiology and Neuroradiology (Ernst & Young 2007). The census covered 86.8 percent of public healthcare structures, and excluded outsourced and private healthcare structures. 10,398 diagnostic devices were registered by the census. If computed radiography, printers, contrast medium injectors and workstations were included there were more than 12,100 devices (see Figure 2).

The equipment census related to high profile devices (CT, MRI and angiographic) and their obsolescence. Between 30 to 35 percent of CT-MRI-Digital Subtraction Angiography) equipment

had been installed less than three years before. For low profile equipment, the census showed that 52 percent of traditional X-ray equipment was more than seven years old. Forty eight percent of US devices were less than 5 years old and 13 percent were more than 10 years old. In general outpatients departments low profile equipment is more prevalent than high profile ones (Ernst & Young 2007). The conclusion of this evaluation is that in Italy there are sufficiently high level of radiological technologies, while a high percentage of low level devices are obsolete. This assertion is also certified by the Organization for Economic Cooperation and Development (OECD) (OECD 2012a, 2012b). The number of CT and MRI devices per million of population is higher in Italy than in other European countries (see Figure 3).

The Radiology Workforce

Another topic of radiology management is the number of radiologists and radiological technicians needed for healthcare. In Italy in 2000 there were 6,395 radiologists and more than 10,500 technicians. In 2012 there are about 9600 radiologists and 21,600 technicians, an increase in 12 years of 50 percent for radiologists and 102 percent for technicians (see Figure 4). Between 2000 and 2008 there was an increase in the amount of diagnostic imaging exams of 73 percent (Ministry of Health 2011). According to the UK Royal College of Radiologists it is possible to estimate that 10,000 clinical radiologists are necessary for 60 million imaging and radiodiagnostic exams (Royal College of Radiologists 2012). Based on this evaluation it is possible to assert that in Italy in the future the number of radiologists should increase.

Healthcare in Italy: Spending Review and Unnecessary Radiological Exams

In Italy the National Health Service (NHS) is composed of institutions and authorities of different institutional level, contributing to the achievement of the objectives of protecting the health of citizens. At the head of the NHS is the Ministry of Health, which operates through specialised authorities. However the national government has the unique role of establishing general guidelines and of monitoring and checking the work of the regions. The management of the NHS is delegated to the 21 regional governments. Moreover in each region the practical management of health facilities, divided into local healthcare authorities and hospital trusts, is entrusted to 284 general managers.

This organisation can lead to large differences in the country. There are many stakeholders and administrators with various competencies and often overlapping responsibilities. The presence of multiple interlocutors hindering dialogue between the parties is one of the most important critical situations for the Italian health profession.

Figure 1

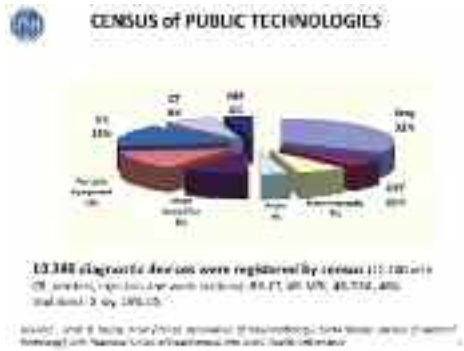

Figure 2

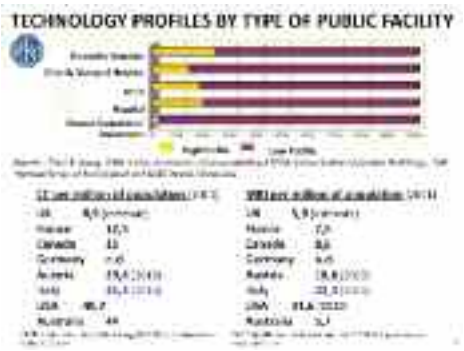

Figure 3

Figure 4

The cost of healthcare in Italy is 75 percent of the total regional budget. Recently the economic crisis has created other problems in the management of health in Italy. The spending review, that during the past year the Italian Government has adopted, has cut resources for healthcare, despite the fact that the funding for the Italian NHS is lower than other OECD countries (OECD 2012c)

Clinical radiology is at the centre of modern medicine. Diagnostic imaging has had a tumultuous development in the last years and it is indispensable for many medical activities. The increase in

Figure 5

Figure 6

expenses for healthcare is mainly due to imaging exams (45 percent increase compared to other activities) (Hendel 2008). Osteoarticular MRI had the largest increase followed by PET and CT scans, techniques of greater technological complexity and cost. So to reduce healthcare costs it is necessary to cut the number of inappropriate imaging examinations, because their improper use leads to a waste of resources, longer waiting lists and improper exposure to ionising radiation. In Italy every year 40-50 million radiological examinations are performed for outpatients, and the average number of radiological exams per 1000 inhabitants is higher than other European and non-European Countries (see Figure 5) (Department of Health 2012).

What Must be Done?

In 2009 SIRM supported the Health Minister to individuate levels of appropriateness for magnetic resonance imaging (MRI) and computed tomography (CT) exams. Using scientific methods each imaging exam is rated from zero to 10 depending on the level of appropriateness related to the clinical requirements. To reduce inappropriate use of radiological resources, the NHS could cover the costs only of the exams with at least five to six points. For example, CT of the shoulder is correct in the case of traumatic injury but is not useful as the first exam in a cancer lesion (see Figure 6). On the contrary MRI of the shoulder with contrast medium is useful in acute traumatic injury and in cancer lesions, but only in specific cases in suspected inflammatory injury (see Figure 6). But until now the Ministry of Health has not enacted the measure.

For these reasons the evolution of the national healthcare system should move towards a more effective and efficient management approach with regard to patients, with the goal of providing appropriate answers to their needs, based on category and timing, while also taking increasing economic pressures and limitations into account. Therefore, organisational models are needed for healthcare facilities that aim at improving the quality and usability of diagnostic imaging services, guaranteeing a high standard of quality for patients. Clinical management could improve healthcare management.

In other words it is necessary to do best what is right and a new responsibility in management can give more quality, effectiveness and appropriateness in diagnostic imaging.

Conclusion

We think that European radiology should cooperate to find common standards trying to influence the European Commission choices. Therefore it will be easier to give support to the European radiological community and to avoid the risk that radiology could become a commodity. We conclude with the slogan of the last MIR annual scientific meeting and we say that Italian Radiology's aim is to help to "make imaging relevant in today's healthcare". ■

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www.cat2013.org

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1 – 4 **Global Embolization Symposium and Technologies (GEST) Europe**
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www.gest2013.eu

2 – 5 **14th World Congress of the World Federation for Ultrasound in Medicine and Biology (WFUMB) including Latin American Foundation for Ultrasound**
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JUNE 2013

4 – 7 **European Society of Gastrointestinal and Abdominal Radiology (ESGAR) Annual Meeting**
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19 – 22 **European Conference on Interventional Oncology (ECIO)**
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26 – 29 **CARS 27th International Congress and Exhibition**
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14 – 18 **CIRSE**
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3 – 5 **European Society for Magnetic Resonance in Medicine and Biology (ESMRMB) Annual Scientific Meeting**
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10 – 11 **Management in Radiology (MIR) Annual Scientific Meeting**
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11 – 12 **European Society of Breast Imaging (EUSOBI) Annual Scientific Meeting**
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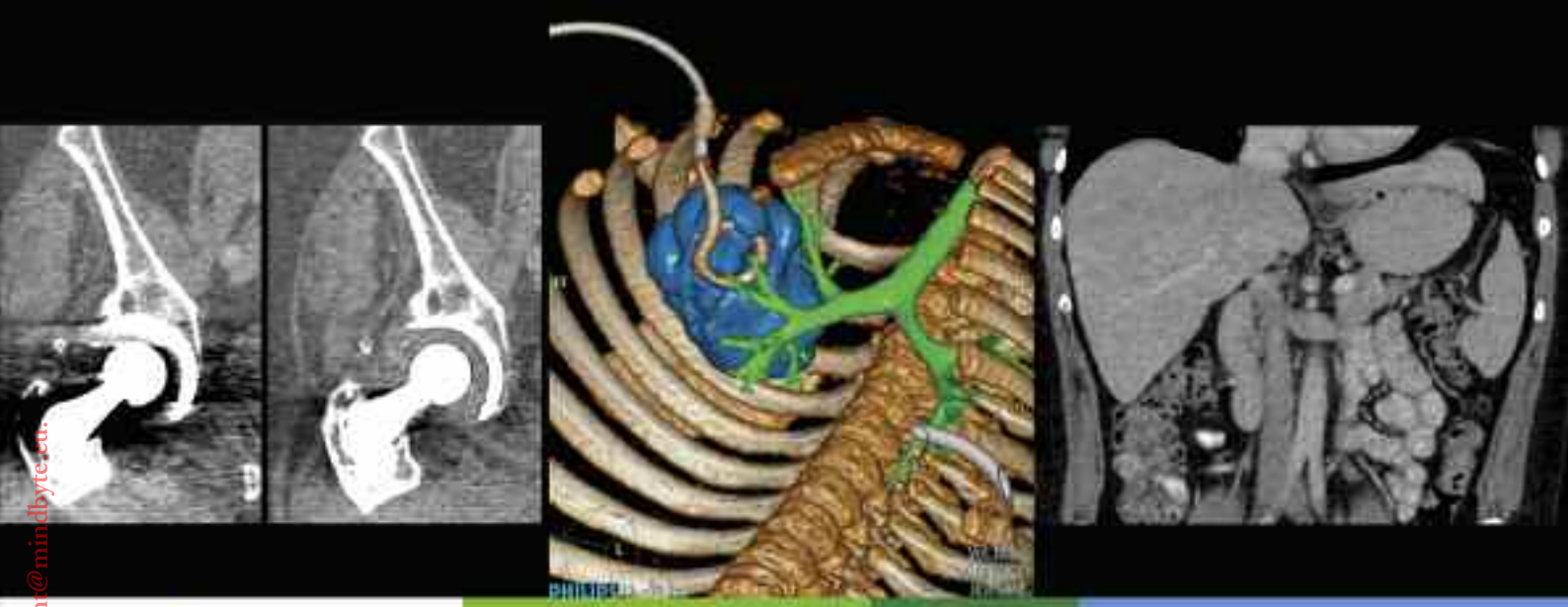

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