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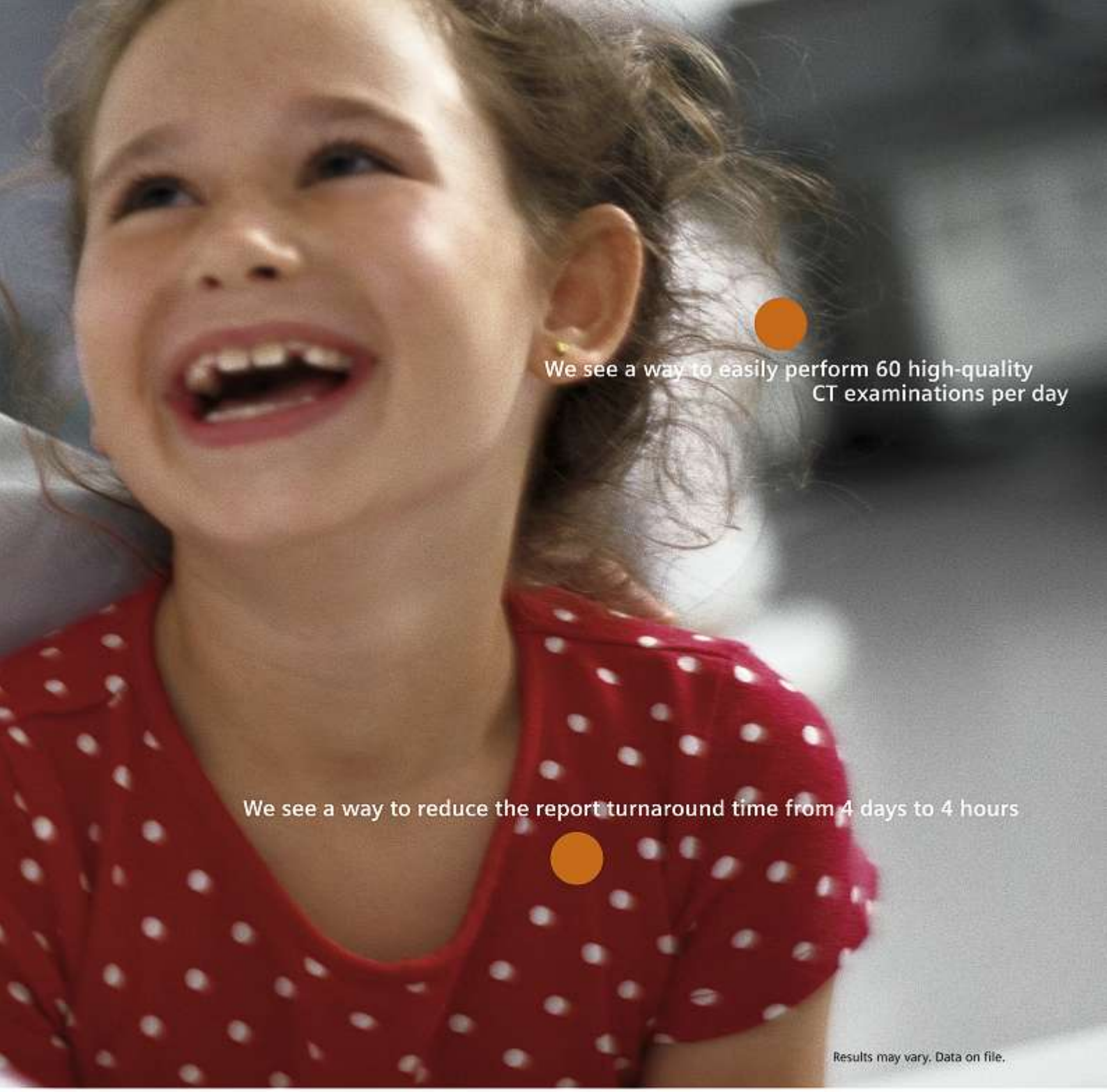

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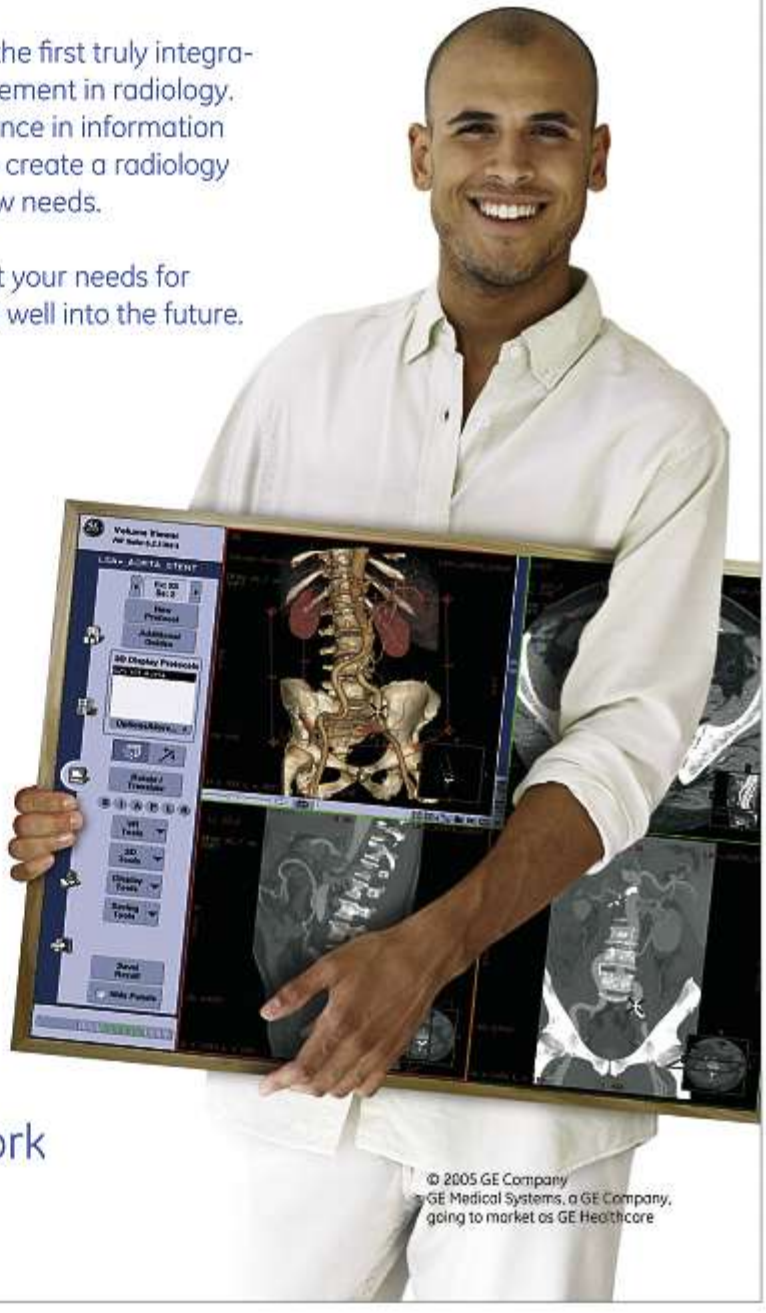

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Editorial

This edition of IMAGING Management focuses on a subject, which is close to the hearts of radiologists all across Europe – teleradiology. There are a myriad of changes and challenges that the introduction of teleradiology has brought, and our cover story addresses this issue from a number of angles. The first, by Prof. Johan Blickman, focuses on how the EU is working to iron out the numerous obstacles that stand in the way of the future of European teleradiology. This is followed by a cogent argument by Prof. Peter Pattynama on why radiologists must adapt to the changes that teleradiology is already bringing, with issues such as data security, quality control and the multi-disciplinary approach we must take as imaging professionals in order to re-define our value.

There are many leading medical institutions within Europe who are already providing a not inconsiderable level of teleradiology services to less well-equipped facilities. Having seen how our US counterparts have taken advantage of the growing telemedicine industry in India, experts Dr JR Raja and Kasi Viswanathan, provide an overview of the technical and management issues that come into play. This edition's features are led by an article from Dutch radiologist Aad Van Der Lugt, working as Project Leader for Europe's largest population-based study, examining the role imaging plays in preventative care for at-risk groups such as the elderly. This is followed by a look at the growing contrast media segment, and how costs can be saved in radiopharmaceutical R&D. There is no doubt that large pharma companies can learn from the examples provided by small- to mid-sized companies engaged in the same activities, in terms of cost-efficiency and staff management.

Denmark is the subject of our country focus section, a timely one now that its government have decided to reduce the number of counties, and enact a major revision of where and how services will be provided. The Danish Society of Radiology play a key role in advising the National Health Board in Denmark, on where imaging services need to be housed, and how improvements can be made that will increase efficiency. We have also focused on imaging research activities in Denmark, to show what significant projects are underway and how they are managed.

As usual, we welcome your thoughts and feedback. Please send your comments to editorial@imagingmanagement.org

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Programme Topics MIR 2006

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The 9th Annual MIR (Management In Radiology) meeting will be held this year in Budapest, Hungary from October 5 - 7, 2006. The scientific programme, which includes refresher courses and symposia with CME accreditation are continuously updated. The main topics are as follows:

- Radiology Department Organisation;
- Teleradiology;
- RIS-PACS Interaction;
- Electronic Management of Radiological Data;
- Academic Radiology: Teaching and Research;
- Leadership;
- Turf Battles and Partnership Strategies;
- Emergency Radiology;
- Standards;
- Medico-Legal Issues;
- Quality Issues;
- Change Management;
- General Management: Teaching and Reflections.

The deadline for submission of abstracts will be August 20, 2006. Electronic submission is required.

News Update for IHE Europe

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More than 70 companies responded to the call for participation in the next IHE European connectathon to be held in Barcelona next April. During this connectathon IHE Europe will test the interoperability of the more than 100 systems registered and rehearse the IHE demonstrations planned for the six following European events:

- Hopital Expo, Paris, France, May, 16 - 19 2006, www.hopitalexpo-intermedica.com;
- SIRM42 Convegno Nazionale SIRM, Milano, Italy 23 - 27 June 2006, www.sirm.org;

24th Annual EuroPACS Conference

Dr. Jarmo Reponen
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www.europacs.org

EuroPACS have announced the 24th edition of their Annual International Conference.

The EuroPACS conference, one of the world's largest gatherings of PACS specialists, has also announced their call for papers for 2006. This year's annual edition will take place June 15 - 17, 2006 in Trondheim, Norway, including between 400 to 600 delegates from different countries. The conference programme will offer information on the latest and most significant developments in clinical practice, research and education within digital radiology. Norway has a long tradition in telemedicine, pioneering the field of teleradiology services since 18 years ago. Today, nearly 100% of the hospitals in Norway have RIS and PACS. During the conference delegates will have the chance to visit the new University Hospital in Trondheim and have an inside look at their PACS system.
They are inviting submissions of abstracts within different aspects of medical imaging and PACS: Integration Strategies, Health Network, Image Distributions, the Electronic Patient Record and PACS, Workflow, Cost Benefit and PACS, Security, Standards and more. A local and an international programme committee will review the abstracts.

Relevant dates

January 10, 2006: Workshop and Special Arrangements Proposal Deadline
March 15, 2006: Abstract Submission Deadline
April 5, 2006: Notification of Acceptance
May 2, 2006: Camera Ready Paper

- Medmatic@, Vicenza, Italy, September 29 - 30 2006, www.medmatica.it;
- WCC World Congress of Cardiology 2006, September 2 - 6 in Barcelona, Spain www.escardio.org/congresses/World_Congress_Cardiology_2006;
- World of Health IT 2006 Conference and Exhibition, October 10 - 13, 2006 in Geneva, Switzerland, www.worldofhealthit.org;
- Journées Françaises de Radiologie, Paris, France, October 21- 25 2006.

Meanwhile IHE Europe continues its contribution to the development of new Integration Profiles with a contribution on a profile for medical document exchange via email or portable media (CDROM, DVD, USB stick, etc.)

Finally, since January 1st, Nicole Denjoy, the new COCIR General Secretary, is acting as IHE Europe's new contact person.

Call for Abstracts for Forthcoming Conference

Nina Greve

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www.cirse.org

CIRSE (Cardiovascular and Interventional Radiological Society of Europe) has announced a call for abstract submissions for their forthcoming annual society meeting, which will take place September 9-13, 2006 in Rome, Italy. CIRSE 2006, who last year celebrated their 20th anniversary, will cater for young and old interventionalists, and with approximately 38 special sessions and 45 workshops. Similar to the past two years, the emphasis of the programme planning committee was to provide a quality programme with quality speakers. For novices, there are many basic workshops to choose from as well as two foundation courses. The theme of the first foundation course will be Biliary Intervention and the theme of the second foundation course will be Angioplasty of the SFA.

For the practicing interventionalist, CIRSE 2006 will cover procedures including Vascular Imaging, Uterine Artery Embolisation, Endovenous Ablation, Clinical Practice Development and Tumour Ablation.

Conference Date Announced

Petra Jäche

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www.esmrmb.org

The European Society for Magnetic Resonance in Medicine and Biology (ESMRMB) 23rd Annual Meeting will take place this year in Warsaw, Poland, September 21 – 23, 2006.

The aim of the ESMRMB Annual Meeting is to exchange scientific information and provide an update of the newest developments in biomedical MR by plenary lectures, categorical courses, scientific and clinical focus sessions as well as an intense teaching programme. One of the highlights of the conference takes place on Wednesday afternoon when there will be a scientific meeting of the Polish Medical Society for Magnetic Resonance where recent achievements in biomedical MR will be presented.

The sessions will take place in the Gromada Conference Centre, which is situated close to Warsaw Airport, connected by bus with the city centre. Warsaw Airport has direct connections all over Europe, Canada and the U.S. Hotels are available at the conference centre and in the city centre.

EU News

This is the third part in a series that covers the structure and operations of the EU institutions. In the first series (Autumn 2005) we introduced the European Commission (EC).

In the second part (Winter 2006) we focused on the European Parliament – its composition, functioning and main role. In this issue, we cover the role of the Council of the European Union. It is the main decision-making body of the EU.

It has the primary role in agreeing legislation – in most cases together with the European Parliament. Sonja Planitzer describes the key responsibilities of the Council, its functioning and organisation.

Also, Rory Watson focuses on the current Austrian and coming Finnish presidency.

The final part in this series, for Summer 2005, will cover the Court of Justice.

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THE COUNCIL OF THE EUROPEAN UNION

THE MAIN DECISION-MAKING BODY OF THE EU

The Key Role of the Council

The European Parliament as well as the Council of the European Union were set up by the founding treaties in the 1950s. The Council of the EU is the main decision-making body. It represents the member states, and its meetings are attended by one minister from each of the EU´s national governments.

The Council of the EU has the main role in agreeing legislation, although in recent years this has been shared more and more with the Parliament under the co-decision procedure. When the Council acts as a legislator, in principle it is the European Commission that makes proposals. The Council can modify the proposals before adopting them.

The Council consists of one government minister from each Member State. Although there is just one Council, different groups of ministers meet depending on what the topic is being discussed at the weekly meeting. Each minister is empowered to commit his or her government and is accountable to their own national parliaments for decisions taken in the Council.

The Nine Council Configurations

Depending on the matter under discussion, the Council meets in different configurations, within which each country is represented by the minister responsible for that subject. If the Council, for example, is to discuss environmental issues, the meeting will be attended by the environment minister from each country and it will be known as the "Environment Council". The nine Council configurations are:

- General Affairs and External Relations;
- Economic and Financial Affairs (ECOFIN);
- Justice and Home Affairs (JHA);
- Employment, Social Policy, Health and Consumer Affairs;
- Competitiveness (Internal Market, Industry and Research);
- Transport, Telecommunications and Energy;
- Agriculture and Fisheries;
- Environment;
- Education, Youth and Culture.

Each minister in the Council is empowered to commit his or her government. That means the minis-

ter´s signature is the signature of the whole government. Moreover, each minister in the Council is answerable to his or her national parliament and to the citizens that parliament represents, which ensures the democratic legitimacy of the Council´s decisions.

Six Key Responsibilities of the Council

The Council has the following six key responsibilities:

- To pass European laws. As above-mentioned the Council legislates jointly with the European Parliament;
- To coordinate the broad economic policies of the member states. This coordination is carried out by the economic and finance ministers, who collectively form the ECOFIN Council;
- To conclude international agreements between the EU and one or more states or international organisations;
- To approve the EU budget, jointly with the European Parliament;
- To develop the EU Common Foreign and Security Policy (CFSP);
- To coordinate cooperation between the national courts and police forces in criminal matters.

Most of these responsibilities relate to the "Community" domain – for example: areas of action where the member states have decided to pool their sovereignty and delegate decision-making powers to the EU institutions. This domain is the "first pillar" of the European Union. However, the last two responsibilities relate largely to areas in which the member states have not delegated their powers but are simply working together. This is called, "intergovernmental cooperation" and it covers the second and third "pillars" of the European Union.

THE EUROPEAN COUNCIL

THE EU COUNCIL DEFINES POLITICAL GUIDELINES OF THE EUROPEAN UNION

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The European Council brings together the heads of state or government of the European Union and the President of the Commission. It defines the general political guidelines of the European Union. The European Council meets at least twice yearly (in practice, four times yearly, and sometimes if necessary more), usually in Brussels.

The European Council provides the impetus for the major political issues relating to European integration: amendments to the Treaties and changes to the institutions, declarations on external relations in the context of the common foreign policy and security, etc. But its guidelines and declarations are not legally binding. To be put into effect, they must follow the routine procedure through the European Parliament and the Council of the European Union – followed where necessary by implementation at a national level.

Article 4 of the Treaty on the European Union says: "The European Council shall provide the Union with necessary impetus for its development and shall define the general political guidelines thereof."

Organisation of Work in the Council : The COREPER

In Brussels, each EU member state has a permanent representation to the European Community. This representation represents and defends its national interest at EU level. The head of each representation is, in effect, his or her country's ambassador to the EU.

These ambassadors (also known as "permanent representatives") meet weekly within the Permanent Representatives Committees – the "COREPER". The role of this committee is to prepare the work of the Council, with the exception of most agricultural issues, which are handled by the Special Committee on Agriculture. "COREPER" is assisted by a number of working groups, made up of officials from the national administrations.

The 'Presidency of the Council' rotates every six months. In other words, each EU country in turn takes charge of the Council agenda and chairs all the meetings for a six-month period, promoting legislative and political decisions and brokering compromises between the member states. Currently Austria chairs the EU. In July, Finland will take over the EU Presidency until December 2006.

The Presidency is assisted by the General Secretariat, which prepares and ensures the smooth functioning of the Council's work at all levels.

In 2004, Javier Solana was re-appointed Secretary-General of the Council. He is also High Representative for the Common Foreign and Security Policy (CFSP), and in this capacity he helps coordinate the EU's actions on the world stage. Under the new constitutional treaty, the High Representative would be replaced by an EU Foreign Affairs minister. The Secretary General is assisted by a Deputy Secretary-General, in charge of managing the General Secretariat.

Summary

We now have an overview of the "European Council", the "Council of the European Union" and last but not least the "Council of Europe". Three ⏭

⏭ different institutions whose roles should not be mixed up: The European Council is, as above mentioned, the Heads of State or government of the European Union and the President of the Commission. The role of the European Council is crucial, but differs to that of the Council of the European Union, whose members are ministers from the Member States. The Council of the European Union exercises the power conferred on it by the Treaty, subject to review by the European Court of Justice, and it adopts Community legal instruments. Finally, the Council of Europe, which is described on page twelve, is distinct from the European Council, an international organisation outside the European Union, which deals with education, culture and above all the protection of human rights. It currently has 46 members.

AUSTRIA ASSUMES EU PRESIDENCY

SERVICES AND WORKING-TIME DIRECTIVES POSE CHALLENGES FOR THE RED-AND-WHITE STRIPED EU PRESIDENCY

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On January 1, 2006, Austria succeeded Britain as President of the European Council, with the Finns set to take the helm when the six-month term expires. During the Presidency, Austrian ministers and civil servants will lead roughly 2,000 meetings both at home and in Brussels. Federal Chancellor Wolfgang Schüssel, his Foreign Minister, Ursula Plassnik, and other ministerial colleagues will become the public face of the EU in International Affairs. In conjunction with the Commission, the Parliament and the other 24 Member States, Austria must try to find compromise solutions to outstanding issues.

Despite these challenges, the Presidency will have fewer tasks to master than initially anticipated due to the success of the British Presidency in hammering out a financial framework for the period from 2007 to 2013 and a forged agreement on the chemicals directive known as "Reach", a source of long-standing controversy.

Notwithstanding these positive developments, Austria will have to lead some negotiations on the details of the financial framework. The Presidency must also address the outstanding issue of the draft Constitution for Europe. Other major obstacles include the working time directive and the proposed directive on the provision of cross-border services. Solving the ongoing dispute about the working time directive should prove difficult. Under the directive, which dates back to 1993, weekly working times, when averaged out over a four-month period may not exceed 48 hours. The European Parliament and several Member States are now pressing for the removal of a series of derogations which have been in place since the directive's introduction. In return, it is expected that the four-month calculation period will be extended to 12 months. Although opposition to the proposal is led by Britain and the new Member States, it also includes Austria.

Health Policy Goals

The proposed services directive is likely to present an even greater challenge. The main bone of contention as regards this directive, which proposes to regulate cross-border competition in services, is the country of origin principle. Under the proposal, it is envisaged that companies offering their services across the European Union would be subject to the laws operating in their country of origin. Many critics, including a significant number of Member States and MEPs, reject this principle on the grounds that it will increase competition from low-wage economies and intensify the practice of social dumping.

In the area of health policy Austria's priorities will be women's health and the fight against type-2 diabetes. The dramatic increase in the incidence of diabetes, specifically type-2, has pushed the issue to the top of the medical and health policy agendas. A conference on diabetes in Vienna will declare war on the disease. The priorities in the area of women's health are to improve public awareness of endometriosis and to focus on the issue of osteoporosis. In addition, the Austrian Presidency has made a commitment to draw up a comprehensive EU alcohol strategy and adopt the WHO framework convention on tobacco control. More information on the Austrian EU Presidency is available at: http://www.eu2006.at/en/

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PRIORITIES OF THE AUSTRIAN AND FINNISH PRESIDENCIES

The Austrian and Finnish governments have already established the priorities for their two Presidencies as they steer European Union business throughout the year. Whether they manage to achieve their objectives will depend not just on their diplomatic skills, but also on the willingness of the European Parliament and EU governments to strike compromises, particularly on legislative proposals. Vienna will have its work cut out if it is to reach agreement on the provisions of an updated working time directive. As negotiations between employment ministers in Brussels shortly before Christmas demonstrated, there is a huge gulf between those countries who wish to retain the opt-out from the 48-hour week and those that wish to phase it out eventually.

Surprisingly, a large part of the complex negotiations were filmed and broadcast live to media and the public, sitting elsewhere in the building, and provided a fascinating insight into the way deals are normally put together behind closed doors. But, even with the evident goodwill that existed on all sides, the gap proved too wide to bridge. If that remains the case, then behaviour in this area, particularly on on-call time, will be determined more by rulings from the European Court of Justice, as in the past, than by legislation agreed by Europe's politicians.

The two governments may have greater success on the services directive, an ambitious piece of legislation that aims to liberalise the cross-border market in this area. The probable outcome should become clearer in mid-February when the European Parliament will vote on the draft text. At stake, from the medical point of view, is whether health services should be excluded from the scope of the legislation. The Parliament is split over the issue. The Left basically supports exclusion. The Right accepts such a solution for public health services, but believes that private services should be covered.

The results, either way, will have implications for the health sector. The European Commission, which has drawn up its own public health priorities programme for 2006, will have to take this into account as it finalises a wide-ranging strategy paper. Due to be completed by the end of the year, this aims to set the framework and provide a more coherent approach to EU public health activities.

While fully accepting that the provision and management of healthcare remains a national responsibility, this will emphasise where Union activity can bring added value. This is notably the case in developing the EU's capacity to respond to health emergencies. Here, the recently established European Centre for Disease Prevention and Control based in Stockholm, which is helping to put in place a structure for handling pandemics, will have a key role to play. The strategy paper will also examine how to tackle inequalities in health treatment and how to strengthen the Union's role in international health organisations and its relations with national health systems.

Further measures to highlight the dangers of tobacco loom large on the Commission's agenda. It will launch a new awareness programme aimed at the young, deglamourising the practice of smoking, and is considering setting up a European Youth Parliament to discuss tobacco control.

Member states which have failed to fully implement EU legislation banning tobacco advertising, that came into effect last August, face legal action. The main culprit is Germany. Berlin tried unsuccessfully to persuade the European Court of Justice to declare the legislation illegal and has still not transposed the EU directive into national law. But some countries – Italy, Spain and Hungary – are believed to be flouting the new rules by allowing advertising at Formula One racing events. Others, such as the Czech Republic and Portugal, have still not notified the Commission of the measures they have taken to implement the legislation. Organ transplantation is another area where the Commission is exploring the possibility of further EU action. Union rules already cover blood, human tissue and cells. The Commission is now examining issues such as the donation and trafficking of organs and intends to table a legislative proposal later this year to guarantee their quality and safety.

POWER OF LEGISLATION

PRIORITIES OF THE AUSTRIAN AND FINNISH PRESIDENCIES

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The power to legislate is shared by the Council and the European Parliament. In most situations, European laws are made by a co-decision procedure. This means that the Council and the Parliament jointly adopt proposals for legislation that have come from the European Commission. The Council and the Parliament can make amendments to the legislation under this procedure. However, there are certain important areas, for example, tax legislation, where the Parliament may only give an opinion as to whether a proposed piece of legislation can become law. Also, the Council only acts, as a rule, on a proposal from the Commission, and the Commission normally has responsibility for ensuring that EU legislation, once adopted, is correctly applied.

How the EU Makes Decisions

In general, it is the European Commission that proposes new legislation, but it is the Council and Parliament that pass the laws. Other institutions and bodies also have roles to play.

The rules and procedures for EU decision-making are laid down in the treaties. Every proposal for a new European law is based on a specific treaty article, referred to as the "legal basis" of the proposal. This determines which legislative procedure most be followed. The three main procedures are "consultations", "assent" and "co-decision".

Under the consultation procedure, the Council consults the Parliament as well as the European Economic and Social Committee (EESC) and the Committee of the Regions (CoR). The Parliament has three opportunities:

1. To approve the Commission proposal;
2. To reject it, or;
3. To request amendments.

If the Parliament asks for amendments, the Commission will consider all the changes the Parliament suggests. If it accepts any of these suggestions, it will send the Council an amended proposal. The Council examines the amended proposal and either adopts it or amends it further. In this procedure, as in all others, if the Council amends a Commission proposal it must do so unanimously.

The assent procedure means that the Council has to obtain the European Parliament's assent before certain very important decisions are taken. In this case the Parliament cannot amend a proposal – it must either accept or reject it. Acceptance ("assent") requires an absolute majority of the vote cast.

Finally, co-decision is now used for most EU law-making. In the co-decision procedure, Parliament does not merely give its opinion; it shares legislative power equally with the Council. If the Council and the Parliament cannot agree on a piece of proposed legislation, it is put before a conciliation committee, composed of equal numbers of Council and Parliament representatives. Once this committee has reached an agreement, the text is sent once again to Parliament and the Council so that they can finally adopt it as law.

Different Ways the Council Makes Decisions

There are different ways that the Council makes its decisions. A unanimous decision is required in important areas, for example, common foreign and security policies and taxation. Each member state has a vote in those areas.

In other fields the Council makes its decisions by Qualified Majority Voting. Each Member State has a specific number of votes (see below), which is related to the size of its population. A qualified majority will be reached, if a majority of member states approve and if a minimum of 72.3 % of votes are cast in favour.

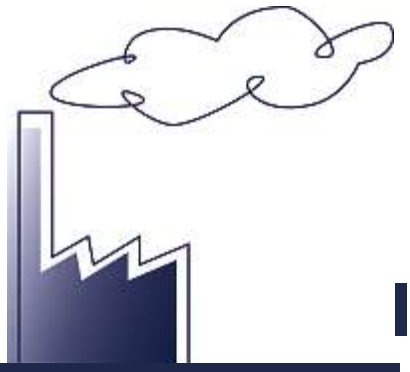
From November 1, 2004, the total number of votes is 321. The number of votes each country can cast is as follows:

- Germany, France, Italy and the UK 29
- Spain and Poland 27
- Netherlands 13
- Belgium, Czech Republic, Greece, Hungary and Portugal 12
- Austria and Sweden 10
- Denmark, Ireland, Lithuania, Slovakia and Finland 7
- Cyprus, Estonia, Latvia, Luxembourg and Slovenia 4
- Malta 3

Modernising the System with the Constitution

The EU is growing bigger and bigger. But the decision-making system has evolved over the course of half a century and was originally designated for a community of just six nations. The EU now has 25 member states and its membership will increase further in the years ahead. The decision-making system therefore needs simplifying and streamlining. To avoid paralysis, most decisions will have to be taken by "qualified majority voting" rather than requiring each individual country to agree.

The proposed Constitution agreed by the European Council in 2004 tackles these questions head on. It spells out much more clearly than in previous treaties what the European Union is and where it is going. It lays down the new rules for more streamlined decision-making. It is due to come into force in 2006, but first it has to be approved by all 25 member countries – in some cases by referendum. Meanwhile the situation is at a standstill. While some member states approved the Constitution, the referenda in some countries – as in France or in the Netherlands - ended with a negative result. There will now be a period of reflection, as some politicians have stated.



Industry News

PHILIPS

Philips iSite PACS "Best in KLAS: PACS Category"

Philips Medical Systems, a division of Royal Philips Electronics, announced that Philips iSite PACS was named "Best in KLAS PACS" in the 2005 Top 20 Year-End Best in KLAS Awards report from KLAS Enterprises. This is the third consecutive "Best in KLAS" ranking for iSite.

The report categorises each vendor product into a market segment where like products are compared and ranked based on data collected between October 15, 2004 and November 15, 2005 as reported by professionals from integrated delivery networks, clinics, and acute care facilities. KLAS evaluates vendors by collecting a series of product and vendor evaluations covering 40 performance areas from these healthcare provider organisations.

SIEMENS

Siemens Launch New Radiography System

Siemens Medical Solutions recently launched Axiom Aristos FX Plus, the new radiography system with integrated flat detector (FD) technology.

The new radiography system covers a wide range of examinations including the head, thorax, abdomen, pelvis and extremities or in the trauma room. Benefits of the new system allow the user to control all system movements via wireless remote control, allowing them to control collimator settings, patient table movements as well as X-ray tube and detector positions.

Moreover, the remote control is equipped with a safety feature that produces an audible warning if it is more than 15 metres away from the system – ensuring safe return of the device. Another user-friendly feature is the new detector housing for easy grid management.

Industry News

Agfa HealthCare Awarded Extensions on Two Contracts

Agfa HealthCare announced that it has been awarded a two-year extension on two multi-source contracts by the group purchasing division of Premier, Inc., Premier Purchasing Partners, L.P., to provide film and medical imagers to the alliance's nearly 1,500 member hospitals.

With a combined value of approximately $150 million a year, the contracts mean that Agfa Corporation will act as a provider of a comprehensive assortment of medical film and imagers.

Rogan-Delft Appoints RAD Systems as Distributor

Rogan-Delft has announced the appointment of RAD Systems as official distributor of Rogan-Delft OnLine XS PACS solution in the California and Nevada territory.

Commenting on this appointment, Bart Hendriks, Vice President of Rogan-Delft said "We are happy to be working with RAD Systems, a supplier of fully integrated workflow solutions. The combination of our PACS systems, designed to meet the workflow requirements of the most demanding radiology centres, with the distribution network of RAD Systems will strengthen our presence and reputation in these important regions."

Hologic Announce Quarterly Results

Hologic have announced the following financial highlights of the quarter:

- Revenues of $88 million
- Backlog of $140 million

First quarter fiscal 2006 revenues totaled $87,956,000, a 33% increase when compared to revenues of $66,176,000 in the first quarter of fiscal 2005. For the first quarter of fiscal 2006, Hologic reported net income of $5,716,000, or $0.12 per diluted share, compared with net income of $4,574,000, or $0.11 per diluted share, in the first quarter of fiscal 2005. The improvement in quarterly earnings primarily reflects the increase in product sales of Selenia digital mammography systems in the current quarter as compared to the first quarter of fiscal 2005.

Barco Launches 2MP Colour Display System for PACS

Barco has introduced a new member to its family of PACS display systems. Nio Color 2MP is a flexible display system that offers clinical confidence and dependable performance for a multitude of medical imaging applications, including 3D PACS, ultrasound, orthopaedic imaging, cardiology, ophthalmology, nuclear medicine and PET.

It features improved grayscale image quality, colour and 3D rendering performance. Barco's Nio Color 2MP display system has recently received FDA 510 (k) clearance from the U.S. Food and Drug Administration (FDA).

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9TH ANNUAL MEETING

October 5 – 7, 2006
Budapest, Hungary
Venue: Hotel Sofitel****
Local Organiser:
Prof. Andras Palko, HU
Prof. Adam Mester, HU
Organising Secretariat:
Antonio Santoro, IT

Submission of abstracts invited before August 20, 2006

Visit www.ewgmr.org

Registration fee waived for participants with accepted abstracts.
Junior Radiologists (under 35): no fee required.

MIR represents a dedicated arena for the discussion of service delivery and management issues specifically tailored to the needs of radiologists in Europe.

This annual meeting is a crucial date in the schedule of any radiologist, in charge of running a department and interested in management issues.

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In cooperation with AUR-E Association of University Radiologists in Europe.

Topics include:

- Radiology Department Organisation
- Teleradiology, RIS-PACS Interaction
- Electronic Management of Radiological Data
- Academic Radiology: Teaching & Research
- Leadership
- Turf Battles & Partnership Strategies
- Emergency Radiology
- Standards
- Medico Legal
- Quality Issues
- Change Management
- General Management: Teaching & Reflection

TELERADIOLOGY
THE WAY FORWARD

DEFINING OUR NEW ROLE

Teleradiology is now widely used for the transfer of images, and for providing reports and secondary advice. It has the potential to profoundly change the way radiology is practiced and may well alter not only the established structure of radiology, but also the training of radiologists. The traditional model of the radiologist working in a practice or hospital and dealing with the cases requested by local clinical specialist colleagues is being partly replaced by reporting undertaken in distant centres with communication between radiologist and clinician by email or telephone. Work undertaken out of the normal working day is reported by teleradiology services, which may be provided in the US, Europe, or beyond.

AUTHOR

Prof. Iain McCall

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A substantial network of reporting is now established in Scandinavia, providing specialist reporting to small centres that do not have a radiologist or who require second opinions. In the UK, the government has directly contracted and purchased MR imaging and reporting services that are being provided from outside the country without any involvement of local radiologists, thus changing dramatically the consultation process and relationship with local clinical colleagues.

The potential for the development of large reporting centres with groups of radiologists undertaking and being trained in a limited range of examinations is real and will completely remove the clinical involvement and broad knowledge and flexibility of the present generation of radiologists.

Changing Working Practices

The present view that radiology is best practiced close to the patient and that radiologists provide a much wider function than simply reporting, is being challenged. Analysis of radiologists' time and work in the Netherlands has shown that reporting occupies less than 50% of the workload, with many other roles including justification of the examination, choosing the most appropriate imaging, comparing previous examinations with the present test, discussing results with the referring clinicians who are usually well known to them, participating in multidisciplinary meetings and advising on follow-up investigations being some of many additional roles. Radiologists must also work together to research new technologies and to apply them appropriately in the clinical setting.

Conclusion

It is therefore vital for the patient that their images do not become a commodity and that radiology as a clinical specialty, does not disintegrate. The European Association of Radiologists (EAR) in conjunction with the radiology section of the Union of European Medical Specialists has produced a series of guidelines for the use of teleradiology, to ensure that the patient receives the best quality of service from radiology. These emphasise the importance of the relationship of the radiologist with the patient and the treating clinician. They also stress the importance of the local radiologists being closely involved with the teleradiology service so that patients' imaging care is managed in a coordinated way and that previous tests can be compared and the overall results discussed with the patient and the clinician. It is vital that hospital managers integrate teleradiology fully into their onsite imaging services for patient management, film storage and long term care and use such services to enhance their own services where necessary and not as a cost cutting measure bypassing and undercutting the core local services.

Teleradiology is becoming an important tool in the practice and quality-management of healthcare worldwide, in part due to the ever-increasing shortage of radiologists, to the number of areas sparsely populated by radiologists, and because of a lack of locally available second opinions and expertise. Given the fact that the European Commission views radiology as a service industry, it is evident that a goal of the EU is that medical diagnostic services should be available without restrictions throughout the entire EU at a similar level. Teleradiology has been technically restricted by point-to-point connections and manual sending of patient information between participating organisations. This can now be replaced by regional solutions for PACS covering the whole community, link directories (healthcare record summaries) which are the 'glue' between enabling the viewing of images from another organisation or region and electronic marketplaces, where you can deliver consultation services flexibly. Thus, resources and patient information can be shared nation- and Europe-wide and the processes or care pathways can be integrated in a seamless and secure way.

NEW EU FRONTIERS FOR TELERADIOLOGY

The Golden Rules: Guaranteeing Good Practice

The new service environment or digital workplace will be cemented by:

- Co-operation between radiologists in different EU countries;
- Establishment of commercial agreements for consulting, providing, and sub-contracting services within the EU and with centres outside the EU;
- Differentiation between the physical spaces where radiological diagnostic examinations are performed and those in which the examinations are evaluated and reported on;
- Guaranteed service without territorial constraints, recognising the mobility of the population in the world today;
- Elimination of language barriers that limit the offer/purchase of services;
- Legal compatibility between interregional or trans-national services to ensure sharing, security, and confidentiality of data related to the healthcare process;
- Nudging the EU to not only establish but also enforce standards for training and maintaining competence.

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In Europe, the advantages of teleradiology are different to those enjoyed in the US; off-hour service provision is not such an attraction, and also because the threat of malpractice is all but non-existent here. The real opportunity for teleradiology in Europe is the way it addresses the overflow phenomenon. Additionally, the growing EU has now incorporated members that have medical diagnostic levels nowhere near as large, modern and efficient as in the "Western" world. The benefits of teleradiology can be summarised as the timely interpretation of emergencies 24/7, from any location and any hospital, increased flexibility of radiologists, functioning as a virtual extra radiologist, sub- specialist interpretation options and new opportunities for continuing medical education.

Challenges to Come for Teleradiology in Europe

How can we achieve this 'utopian' vision for the future of imaging services in Europe? Firstly, a number of practical issues need to be reviewed. Legal issues abound, particularly in the security and confidentiality realm, for example; guarding against misdiagnosis; the legality of having a digital signature on both request forms and the final report in all member states; secure licensing of the interpreting radiologist and training management; different legal structures in every European country; privacy issues, and data security while in transfer.

Also, there are varying levels of radiological training as well as experience with advanced modalities in Europe, and varying levels of standardisation and registration. This, contrary to the situation in the USA, does not allow for a universal standard of care with resultant levels of expectations between clinicians and radiologists. Other disadvantages include the fact that multiple languages exist in Europe that could lead to difficulties with interpretations of nuances and intent in any form of communication. ⏭

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New EU Frontiers for Teleradiology

⏭ How the EU is Advancing Teleradiology in Europe

Everything that makes Europe the unique alliance that it is; differences in language, culture, education, etc, are also reflected in the barriers that stand in the way of full implementation of teleradiology for everyone. These issues have the attention of the governing bodies in Brussels, but answers are not yet clear and further attempts to create a more comprehensive standard of training and care is under way. One of these is the eTen project, an initiative to bring new EU members into parity with regards to healthcare delivery.

This future teleradiology service portfolio, which delivers imaging-related services in a new way, will consist of e-Consultation and second opinion, and e-Image processing, analysis and support services (e-Archiving and e-Training). The final goal in the EU is to offer patients in Europe an e-Marketplace where they have access to optimal medical care through state-of-the-art pan-European imaging services. Users can request teleradiology services by completing a structured, multilingual electronic request form and then provide the image data through secure and trusted networks. Providers will log in to respond to these requests and will deliver a report, accompanied by processed/analysed key images. With the aid of e-Image processing, interpreting radiologists and referring physicians are better able to maximize information from CT and MRI exams and can readily apply that knowledge to diagnoses, treatment and surgical planning. While such a vision may seem to be a long way from becoming the new 'standard', the rising uptake of teleradiology across Europe, and the obvious benefits for patients and carers alike, means that teleradiology has guaranteed a place for itself in the future of healthcare in Europe and beyond. It remains for those with the power to do so, to ensure that everything is done to resolve the variety of issues that remain in its path.

THE FUTURE OF TELERADIOLOGY

WHY OUTSOURCING WILL BECOME BIG BUSINESS

Information technology has revolutionised the profession of radiology and nuclear medicine. It has made a filmless department and the viewing of radiological examinations from remote computers anywhere in the hospital or even at home a possibility. In fact, we can now send out imaging studies that are made during out-of-office hours to night-hawk services, located inside or outside of the country, expecting to find the full written radiology reports the next morning. Information technology, in short, is behind the genesis of teleradiology. In this article I will focus on how teleradiology will profoundly change the way we practice our profession, evolving into an almost complete outsourcing of radiology services.

Globalisation: Changing the Way We Work

Because radiology examinations can so easily be sent over high-speed broadband connections to anywhere in the world at ever reducing costs, there is no longer any obligation for the radiology report to be written by the in-house radiologist in the hospital where the images have been acquired. In a global economy, the in-house radiologist is in direct competition with all other suppliers of radiology services worldwide. Economic law dictates that this competition will be won by radiologists in countries that offer cheapest labour. In these countries, teleradiology hubs will rise, handling the bulk of radiology examinations made worldwide. Because of their high-volume throughput, these centres will develop unmatched concentration of expertise and industry-level quality controls (e.g., by using double or triple readings in every examination). Teleradiology hubs will become leading centres for scientific excellence.

Cost Benefits in Outsourcing

There are sound economic laws that predict the rise of the outsourcing model of radiology services, envisaging a time when these will be outsourced to countries where this can be done in a more cost-effective way. Thus, if radiology services are outsourced to intelligent, motivated and well-trained

radiologists in low-wage developing countries who do the work at a fraction of the cost, from the macro-economic point of view, all will benefit. After all, this means that wealthier countries now have access to cheaper radiology services. The advantages of outsourcing radiology have been recognised by analysts and policy-makers alike. To quote Dan Griswold, a trade analyst from the Cato Institute, in Washington DC "Hospitals can send radiology exams to India and cut the cost in half and control spiraling health costs."

In low-wage countries, entrepreneurs are carefully weighing business opportunities, making careful analyses of the market and their own strengths and weaknesses. Some have already decided to take the leap, as for example Dr Arjun Kalyanpur, CEO of Teleradiology Solutions and Dr. Ashis Dhawad, COO of TeleDiagnosys Services, both based in India, who provide night-hawk services mainly to US hospitals. Others are likely to follow suit. These examples show that the business concept is a viable one and also prove that patients, insurers and governments in the developed world accept the principles of radiology outsourcing. The main factors that limit outsourcing are licensing issues and a relative lack of well-trained radiologists in low-wage countries.

Future of Radiology Outsourcing

It is time for radiologists to take the issue of outsourcing seriously and deal with the relevant issues. For example: How much of our work will be influenced? How should we define our role in "new" radiology? How will practices change? Consider these points in turn. Data indicates that more than 90% of all radiology examinations could be outsourced. Take, as an example, the average radiology practice in The Netherlands. CT, MRI and conventional radiographs, that can be readily sent for remote reporting, make up 23, 16 and 35% of total production, respectively, when expressed in a time-related production parameter. Ultrasound examinations, accounting for 19% of production, could be sent out for remote reporting in practices where technicians perform the examinations and images are reviewed at a later time by the radiologist, as is custom in the United States. In fact, only 6% of radiology production in vascular and interventional radiology are exempt from potential outsourcing.

When defining our role in light of radiology outsourcing, it should be clarified that a radiologist's job entails more than making the radiology report. An entire chain of processes has taken place before the radiology exam is actually ready for reporting. Also, the relevance of findings in the radiology report must be carefully analysed. These tasks are the responsibility of the radiologist and are part of his "imaging consultant" function (see table below).
In patient care, radiologists guard the patients' individual diagnostic work-up in its entirety and tailor the examination to the specific clinical needs. Radiologists check whether an examination is justified and as such, protect the medical system against self-referrals and manage workflow and quality assurance of imaging departments. Being the imaging consultant to the other clinicians in the hospital identifies the "added value" of the radiologist.

IMAGING CONSULTANCY: TASKS OUTSIDE OF REPORT WRITING

- Advising on optimal diagnostic work-up
- Justification of examinations in individual patient
- Optimising and tailoring individual examinations
- Ad-hoc problem solving e.g. proximity/accountability/responsibility
- Conferencing in multidisciplinary teams: assessing diagnostic impact of radiology report and its therapeutic impact
- Organising workflow in the department
- Quality control

Diversifying Our Role

It has been estimated that radiologists spend on average 70% of their working time on imaging consultancy activities and 30% on reading examinations and writing radiology reports. Although exact data on time expenditure is lacking, clearly, when the task of writing the radiology report is being outsourced, radiologists should stress their role as imaging consultants. In fact, strengthening our role as clinical doctors with a greater input in the management of individual patient care will make our work more challenging, interesting and rewarding. Assuming responsibility for the quality of the entire diagnostic imaging process also implies that the in-house radiologist should control the quality of the outsourcing radiology service. Therefore, it is critically important that outsourcing is a service between the in-house radiologist and the remote radiologists writing the reports.

IT is behind the genesis of teleradiology

Inevitably, problems in coding and billing will occur. Most reimbursement systems are based on a fee-per-report basis, and do not take into account consultancy activities. Historically, this made sense because radiology reporting and clinical activities involved in a report were done by an individual radiologist/group. Outsourcing physically separates these activities – but reimbursement is still given for writing the report only. It is therefore urgent to adapt the coding and billing system, to take into account the activities of radiologists outside of writing reports. It is in our interest and to make our added value visible to our colleagues, patients, the general public, and to reimbursement agencies.

We must expect resistance to these changes, which have in general served the interest of radiologists well. Especially now, we witness a shortage of radiologists against a back- ⏭

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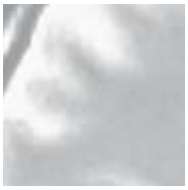

CONTINUED
The Future of teleradiology

⏭ ground of steadily rising consumption of radiology services in many countries. At a fixed high price per radiology report, these factors tend to increase the income of individual radiologists. But the very same elements of rising demand for radiology, rising costs and shortage of radiologists will favour radiology outsourcing. When outsourcing really takes off, the price of a radiology report will fall sharply and the radiologist depending on a fee-per-report scheme will be hurt by a double whammy: he is allowed to produce only a limited number of radiology reports, and this at a sharply decreased unit price.

Conclusion

In summary, we as radiologists should first and foremost accept the idea that radiology outsourcing will likely become a real issue in the near future. We should accept that most of our radiology reports may be produced by outside contractors in low-wage countries. To address this, we need to emphasise our added value to patient care by strengthening our role as imaging consultants. We should safeguard the quality of the entire diagnostic imaging process, which includes controlling the quality of the outsourced reporting. Outsourcing should be a service between radiologists. We should reconsider the appropriateness of the fee-per-report reimbursement scheme. This is a responsibility shared between individual radiologists, national radiology societies and supra-national organisations such as the ESR and the UEMS in Europe, and the ACR in the US.

TELERADIOLOGY IN INDIA

INDIA AT THE FOREFRONT OF IMAGING OUTSOURCING

The potential to use technology to deliver medical services across large distances has always excited visionaries and technology-oriented healthcare professionals. The diverse nature of medical data, from records to images and live teleconsultations amongst others, results in a wide range of volume that must be managed. In addition, remote handling and transmission of medical data must face challenges such as medico-legal implications, data security, quality and turnaround time. This article focuses on these issues and how they have resulted in the growth of telemedicine and in turn e-Radiology services in India.

Conventional imaging modalities like Ultrasonography (USG), Computed Axial Tomography (CT), and Magnetic Resonance Imaging (MRI) produce data of the order of 50 Megabytes (MB) per study. Of late there has been an explosion of 3D imaging modalities like Angiographies, Multi Planar Reconstruction, Maximum Intensity Projections (MPR/MIP) and 3D Reconstruction for Anatomical Evaluation. The storage requirements for archiving and transmitting these images are currently in tetrabytes and will eventually grow to petabytes (1024*1024*1024*1024 bytes). Users are also seeking storage solutions that provide faster response and increased data availability across networks. Producing a system that fulfils user requirements and data handling constitutes a major challenge.

Security Issues

In the US and Europe, guidelines such as HIPAA and IHE are in place to protect patient healthcare information. In addition, patient data is also protected in terms of procedures such as audits and security plans, disaster recovery and backup, and security in the form of authentication and encryption. DICOM standards are a boon to data management. Commands between DICOM systems are first associated, negotiated, acknowledged and only then transferred to routable destinations. Guidelines regulate conformance statements from each vendor of medical equipment on supported functionalities, SOP-classes and transfer syntax. DICOM takes care of local network compliance and dictates security over the internet with further measures, for example, Public Key Infrastructure (PKI), Secure Sockets Layer (SSL) protocol and 128-bit encryption, and the Virtual Private Network (VPN). The following table gives some of the commonly available networks and time taken to transfer the same 25MB study over the network.

NETWORK NAME	SPEED (BITS/SEC)	STUDY TIME
Local Area Network (LAN)		
Gigabit/Fiber optic	1,024 M	2 seconds
ATM	155 M	12 seconds
Fast Ethernet	100 M	20 seconds
Wide Area Network (Internet)		
T1	1.5 M	22 minutes
Broadband/ISDN	256 K	2.15 hours
Modem	56 K	10.0 hours

Background

Since the early to mid 1990s, outsourcing has been developing at a rapid rate. The next decade witnessed an explosion of IT enabled services that had an impact on the healthcare industry. The Indian space research organisation, by leasing its communication satellites, heralded a new era in telemedicine. This positive trend in IT and healthcare allowed US-based radiologists to outsource work to India due to a shortage of radiologists in the US and perceived cost and time benefits. Hence most teleradiology services presently provided in India are for US counterparts. Also some Indian hospitals provide teleradiology as a preliminary reporting service for emergency scans, referred to as a night-hawk service.

Why outsource teleradiology to India?

Apart from the availability of trained radiologists in sufficient numbers and IT firms, the time zone advantage for US-based firms has put India on the global map for the outsourcing industry. This guarantees good turnaround time, which in turn translates into cost-effectiveness. Many leading teleradiology firms have US board-certified radiologists as their angel investors or CEOs. This ensures HIPAA compliance and takes care of medico-legal aspects of outsourced work. The experience gained from the US market has resulted in many firms expanding their services to Europe, Africa and the Middle East. On the other hand Indian hospitals who could not source US-certified radiologists are doing pre-processing for their US counterparts.

Indian Teleradiology: Fantasy Vs. Reality

The foremost challenge is to have US board-certified radiologists in the reporting panel to address medico-legal implications, which ensures confidence in the offshore radiologist who comes up with the report. Without this, the role of reporting centres is reduced to that of merely a night-hawk service, which is not productive in terms of money or growth prospects in the long-term.

Though the Indian training system produces approximately 120 radiologists a year, to motivate an Indian radiologist to moonlight in the outsourcing industry requires a financial and stable career path compared to working in the private sector or engaging in independent practice. To ensure this, teleradiology businesses need to mature into credible and lasting models with the necessary checkpoints built in to meet changing industry and market trends. Apart from HIPAA regulations, the US healthcare industry faces numerous other regulations. The American College of Radiology has come up with the recommendation that only radiologists with malpractice insurance should be in the growing teleradiology business. Also, there is a move to limit the number of reports a radiologist can generate per day. All these regulations impact teleradiology.

Finally, the availability of manpower and IT infrastructure is concentrated in few major cities developing as IT hubs on the global map. Bangalore is now known as the IT capital of Asia. This means growth of the outsourcing industry is confined to these cities only. To disseminate business, there should be matching growth in other parts of India as well. This calls for coordinated efforts between various departments and professionals ranging from political governing bodies in the states, IT and telecom sectors and healthcare professionals.

Conclusion

The path ahead, though riddled with obstacles, is heading in the right direction. Due to growth in private healthcare, the advent of medical tourism and international health insurance, alternative business models relying on local needs and demands are appearing in the horizon which offers a way out with the infrastructure if the outsourcing business slows. In our opinion the wider availability of WIFI, broadband services, mass storage solutions and affordability will remarkably alter the business of clinical process outsourcing in India within the next two to three years.

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'There are many issues yet to be addressed to facilitate growth and good practice in teleradiology. The ECR offers the opportunity to learn more about these issues and to promote the dissemination of information, by holding a special session on teleradiology at their forthcoming conference in Vienna, Austria. As Chair of this session, I will provide an overview of how teleradiology has changed the face of imaging workflow in Europe. This session is a valuable source of information and advice for all practising radiologists who inevitably are going to be involved in teleradiology',

Prof. Iain McCall.

ECR EXPLORES ISSUES & CHALLENGES OF IMPLEMENTING TELERADIOLOGY

ECR 'CHALLENGES FOR TELERADIOLOGY' SESSION PREVIEW

SUNDAY, MARCH 5, 8:30 - 10:00AM

Teleradiology: Pacesetter for telemedicine and the health infrastructure of tomorrow

Prof. Matthias Matzko

The rapidly changing European healthcare environment faces a lack of financial resources due to increasing innovations in therapy and diagnostic methods with dramatically increasing costs. IT solutions offer the opportunity to create new economical pathways of patient care. But it is a struggle for the European radiology community to meet the challenge of changing old structures and to provide modern diagnostic pathways for the healthcare system of tomorrow. The building of medical expert networks via telemedicine will not solve all problems but lead to a higher availability of expert knowledge in hospitals and increased diagnostic quality in patient care with reduced costs. In my presentation I will introduce teleradiology as pacesetter for the continuous process of cross-linking in healthcare.

Teleradiology and e-learning

Prof. Davide Caramelle

The distribution of radiological images is no longer confined to the hospital, since in many instances regional PACS systems are emerging as the best solution for a rapidly consolidating healthcare sector. This trend will make the term "teleradiology" obsolete, since teleradiology is progressively becoming just another PACS function. Moreover, hospitals that have a PACS system have experienced its ability to improve the quality of teaching, due to the availability of images and clinical data allowing access to pathological

examples, facilitating the construction of multimedia teaching files, and preparing physicians to use the resources of e-learning. Presently there are many radiological resources available on the Internet. EURORAD, the e-learning initiative of the EAR has made over 1,500 peer-reviewed teaching files available on the web. In my presentation I will discuss how local radiological archives have turned into an active repository of professional knowledge updated and enriched at every encounter with any correctly diagnosed pathology.

Workload and Teleradiological Services

Prof. Lluis Donoso Bach

Across Europe, there is a huge increase in demand for radiology services. However, as our workload increases in tandem with the rising shortage of radiological staff in Europe, we need to examine each element of this workload in order to ensure that it is managed in the most efficient way. In my forthcoming presentation, I will discuss the elements of workload management, to generate a new approach that will take full advantage of this situation.

Teleradiology is not merely a service that produces diagnostic reports. Other elements such as prioritising exams, audit procedures, liaising with colleagues to decide which type of treatment will be necessary, and reviewing imaging procedures to determine report accuracy and overall therapeutic and clinical impact, are equally significant.

The use of teleradiology proposed by my presentation will centre on the holistic management of medical information rather than simple transmission of images from one site to another.

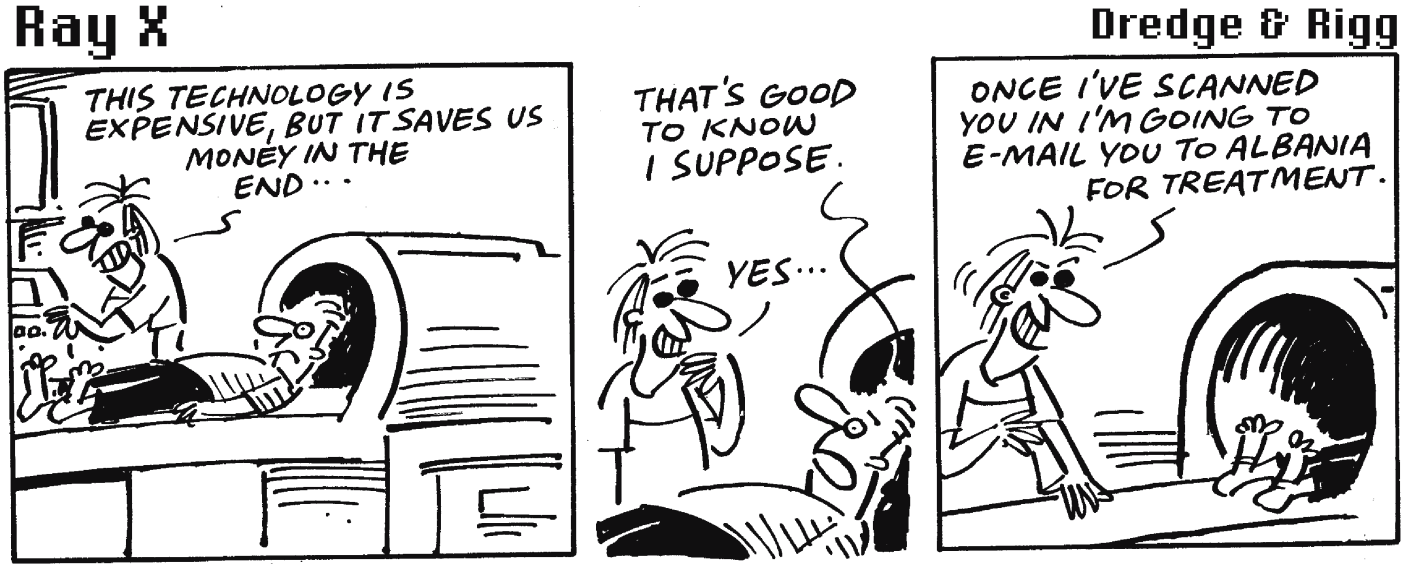
Teleradiology - bane or boon?

Dr Paul Dubbins

The UK Government has introduced a raft of policies to address the need to increase imaging investigations in the face of a severe shortage of radiologists. Government coordinated teleradiology has the potential to respond to peaks and troughs in demand, to allow rapid service expansion and to provide improved efficiency. However, potential problems related to the outsourcing of imaging exist such as patient consent, quality assurance, communication, effect on existing workforce and cost not explicitly addressed within the proposals. Although technology can ensure data protection, it does not address patient permission to transmit images abroad.

Uniformity of CPD requirements, appraisal and in the UK revalidation are unresolved and the assessment of language skills is not subject to close scrutiny. The initial work developed by the UK allows us to audit the value of teleradiology and to develop a model for optimising care.

For further details, please visit www.ecr.org



Feature

MANAGING LARGE-SCALE RESEARCH PROJECTS

A RADIOLOGIST'S PERSPECTIVE ON THE ROTTERDAM STUDY

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Over fifteen years ago, the Department of Epidemiology and Biostatistics of the Erasmus MC University Hospital, Rotterdam, established the Rotterdam Study, one of the world's largest ongoing population-based studies. The Rotterdam Study is a prospective, population-based study aimed at investigating chronic disease in the elderly. These diseases constitute a major societal burden, both in terms of monetary costs and suffering of patients and their relatives. The findings from the Rotterdam Study will undoubtedly contribute to improved prevention and treatment of chronic disease in the elderly. In this article, I will discuss the role of the radiology department in contributing to the success of this long-term research project, and how this is managed.

Structure of the Rotterdam Study

Inhabitants of the Ommoord suburb of Rotterdam aged 55 years or older at the time of initiation were invited to participate. The cohort now comprises more than 10,000 participants, who were examined at baseline and every two to three years thereafter. Each participant is continuously monitored for major morbidity and mortality through linkage of the study database with records from the general practitioner and the municipality. Complete information about exposure status of participants is available for the entire fifteen years including vascular risk factors and markers of vascular disease, lifestyle factors including dietary information, medication use, inflammatory markers and endocrine factors, as well as a variety of other laboratory assessments, stored blood samples and DNA. Two of the major themes within the Rotterdam Study are Neuroepidemiology and Cardiovascular Epidemiology focussing on neurodegenerative, cerebrovascular and cardiovascular disease.

Imaging Brings Added Value

Using imaging, it is possible to identify the presence of structural and functional changes and disease before the onset of clinical symptoms. This presents major prospects for epidemiological research. Firstly, imaging characteristics that reflect disease-specific pathology - especially if measurable in an early phase - provide better outcome measures in etiologic studies of neurodegenerative and vascular disease. Secondly, imaging may allow early identification of people at risk for clinical disease that may benefit from preventive interventions.

Imaging allows early identification of people at risk

Due to the ongoing Rotterdam Study and the available expertise obtained in pilot projects in both brain imaging and vascular imaging, the research environment at Erasmus MC was optimal to initiate a large-scale, prospective, population-based neuro-imaging and cardiovascular imaging study. In 2002 the Departments of Epidemiology and Biostatistics and Radiology of Erasmus MC therefore decided to collaborate by acquiring MR and Multislice CT (MSCT) images with state-of-the-art equipment from the participants in the Rotterdam Study.

My role in the study is as Project Leader for Radiology in both the MRI and MSCT aspects of the study. In order to fulfil my obligations, my clinical workload has been reduced, with half my working time spent on research.

To ensure high participation rates in the imaging portion of the study, a dedicated MR 1.5T scanner was installed in the suburb of Ommoord in connection with the existing research facilities. This set-up allows us to keep stringent quality control over upgrades, imaging procedures and maintenance changes and guarantees that the same scanner will be used

for repeated imaging. Practical and financial issues precluded placement of a multislice CT scanner in Ommoord. Therefore, participants were invited to visit Erasmus MC, where a 16-row MSCT scanner was allocated for research purposes.

Challenges of Collaboration

Any collaboration between such a large number of departments involves inherent conflicts in terms of input, both financial and personnel-related, and output, such as credits. Participating departments realise that high-quality research can only be performed when all departments bring the best of their experience to the table. Therefore, a business plan was made in which the responsibilities, obligations and rights of the different research groups were formulated. One of the specifications of this plan means that PhD students from the different departments, including Radiology, are employed directly by the Rotterdam Study.

What is the Role of the Department of Radiology?

Our department contributes a state-of-the-art MRI and MSCT scanner that were installed under the guidance of our physicist and are operated by technicians appointed and trained by our department. Secondly, scan protocols were developed by CT and MRI physicists of the Department of Radiology. The development of MRI protocol was preceded by extensive discussion between the involved neuro-epidemiologist, radiologist, physicist and scientists of the image-processing department.

Our collective goal was to acquire imaging data that could provide extensive, high-quality information and insight on the aforementioned biomarkers of pre-clinical disease processes, and to ensure that imaging data were eligible for automated image processing. All of the image acquisition had to take place within 30 minutes. Also, a protocol was developed to prevent subjects with contra-indications for MRI-exams to participate in the MR imaging study. Lastly, procedures for the handling of incidental findings that may have important health consequences for the participants, were assessed.

Conclusion

In closure, it is my experience that large-scale research studies bring their own special challenges and demands for involved imaging professionals. In my opinion, the best and only approach is to enter into such a project with a spirit of teamwork and collaboration, in order to ensure the best possible blend of expertise and experience, and of course the most enlightening outcome. It remains to be seen where the results of this study can potentially lead healthcare in the future, but no doubt it will have consequences more far-reaching than even present collaborators have envisioned.

The widely-held view that neuroimaging has little or no impact on treatment of disease in the elderly, combined with a lack of formal training in this area, mean that many question the place of neuroimaging in treating patients with dementia. However, when we examine the challenges in treating and managing this particular disease, can we really ignore the role imaging could potentially play in providing clinically essential information?

NEUROIMAGING IN GERIATRICS

Currently, neuroimaging can be divided, in broad terms, into structural imaging i.e. what the brain physically looks like and functional imaging, i.e. how the brain is working. It could be argued that application of these techniques to the clinical practice of old age psychiatry has lagged behind their use in other medical specialties. This is due to a number of reasons, such as limited access, availability and cost. In addition, there has been a tendency to shy away possibly because of limited formal training in interpretation of brain scans, and for radiologists to produce scan reports which may lack relevance to clinical psychiatry.

When should a scan be performed? The threshold for performing a scan is difficult to determine and no clear consensus exists. Nevertheless, there is a general shift towards the view that all patients with dementia should be scanned at least once during their illness. If scanning is combined with accurate clinical information, it offers the highest standard of diagnostic accuracy currently available. Ultimately, techniques such as MRI and CT have an unassailable role in the diagnosis of dementia because no combination of first line clinical and laboratory findings (which exclude imaging) can identify all causes, particularly those which may be reversible or treatable. Traditionally, the use of structural imaging in the primary degenerative dementias has been used to exclude other conditions. Recently the emphasis has shifted to identifying changes consistent with the underlying type of dementia.

Functional imaging now offers essential complementary information in exploring age-related diseases. In the future, combined structural and functional imaging may well be shown to improve diagnostic discrimination and provide further insights into the biological basis of dementias, the nature of their symptoms and the relative contribution of different pathological processes that underpin cognitive impairment. Increasingly, as further therapeutic options become available and imaging techniques become more able to provide useful diagnostic and prognostic information, structural and functional neuroimaging will become an important part of the clinical work-up in psychiatry.

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DIGITAL VS. COMPUTED RADIOGRAPHY

ISSUES INVOLVED IN CHOOSING WHICH SYSTEM TO IMPLEMENT

The ongoing contest between digital radiography and computed radiography for first place in the digital imaging market continues to throw up new issues. Although both CR and DR improve workflow and productivity when compared to their non-digital predecessor, both have their own specific advantages and disadvantages and the main factor in choosing one system over another seems to come down to cost. Here we present a snapshot of some of the key pros and cons when choosing which system to implement, affecting areas such as productivity, cost-effectiveness, image quality and technologist productivity. Are the initial cost-savings of choosing CR over DR sensible when looking at a long-term productivity model? Is it even feasible for medical facilities, who suffer increasingly tight budgets and lower levels of public financing, as well as staff shortages and an exponential increase in the number of imaging procedures carried out, to consider investing in DR? Here we take a brief look at the main issues.

COMPUTED RADIOGRAPHY (CR)

Refers to a system by which storage phosphor cassette-based systems replace the traditional film-screen cassette.

- CR has significantly lower start-up costs than DR, because of the potential for radiography rooms to adapt their existing system more easily, by replacing the traditional film cassette with a CR cassette.
- Although DR is generally accepted to be the speedier technology, in fact reducing the number of steps in the CR workflow process could reap similar benefits. Cassette handling is still a productivity issue in CR but there are emerging technologies that may challenge DR in this aspect.
- Despite initial cost savings in choosing a CR system over DR particularly when considering start-up cost, higher overheads in terms of investment in maintenance and staff productivity must be taken into account. Because a CR system necessitates workflow steps such as taking the cassette to the reader, medical facilities with a higher throughput may find that long-term, a DR system leads to higher cost-effectiveness

DIGITAL RADIOGRAPHY (DR)

Refers to technologies using an electronic, non-cassette detector, for example amorphous selenium, amorphous silicon and charge-coupled devices (CCDs).

- Current research confirms that DR is significantly faster and more efficient than CR. A typical CR exam can take up to three times the average time taken by a DR exam. Service providers such as Canon have led scientific studies that prove that a DR chest-examination in two directions, using DICOM modality WorkList can be done in 100 seconds, compared to 300 seconds with film screen technology. This saving in terms of time is directly related to reduction in the number of post-processing workflow steps, rather than time taken in acquiring the image. While a DR preview appears within moments, a CR image can be judged in 90 seconds.
- DR not only incurs a prohibitively higher start-up cost than CR, it also requires some level of costly maintenance, and users must take into account factors such as the eventual replacement cost for DR detectors. However, detectors can last on average more than six years, with an estimated economic life cycle of around twelve years, so the associated risk of detector failure is relatively low. Also, many service providers offer to cover this risk with an insurance of a percentage per order per year that is well accepted in the market place.
- DR is considered to be speedier in producing a readable image, as images are sent straight to the PACS system. Not only this, but DR systems produce better quality diagnostic images.
- As DR emerges, there is an early emphasis being placed on this technology as a complete system, as it has the potential for room add-ons. Direct DICOM output associated with DR goes some way in addressing productivity issues.
- Hospitals are slower to choose DR systems, partly because of price and partly because the equipment's size and relative immobility limits its use. In practice, hospitals tend to use a mix of devices so DICOM-standard software must be able to handle images from multiple sources.

Conclusion

Although many agree that DR is the 'wave of the future', it can be prohibitively expensive. However, there is reluctance in imaging departments to invest in CR, knowing that in the future they may have to convert to DR. One argument sees DR as becoming the standard of the future, as it eliminates the need for film storage space, speeding delivery of images. Whether used on its own or as part of a mix of technologies, many healthcare facilities are deciding that initial high outlay in choosing DR over CR is worth it. Dr Eddy Van Hedent, Head of Radiology at the ASZ Community Hospital in Aalst, Belgium, has recently completely digitised the department, except for mammography. His move to CR was mainly inspired by the need to optimise workflow of medical staff, and to cope with the approximately 250 patients per day who are examined in the department. Says Van Hedent; 'Technology is changing at a rapid rate. We need to take into account that this will also affect the growth of CR, which I believe will become obsolete in the future, only maintained for bedside Rx in intensive care units where patients can not be moved to imaging departments or centres. However, in the long run, bedside DR will also no doubt become a possibility. Once DR becomes less expensive, I too will consider taking the next step in implementing this technology.'

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you can

Canon

CXDI-31

Whatever situation you encounter as a Radiographer or Radiologist, with Canon Digital Radiography (DR) solutions you can create your images instantly, right where you need them. The world's first portable flat panel detector - the Canon CXDI-31 produces exceptional image quality and combines this with unsurpassed versatility in trauma situations. Patients that are of restricted mobility in wheel chairs, trolleys or beds can also benefit from the special projections that suddenly become possible.

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The need for clearer, sharper image quality is paramount in order to aid in the improved detection of diseases. There is no doubt that the contrast media segment is growing, as part of the overall rise in the consumption of imaging services across Europe, and the increasing drive by medical facilities to improve and expand imaging equipment installations, helping promote the growth of the overall market. Both CT and MRI comprise the main segments where contrast media is utilised. Frost & Sullivan estimate that sales in the overall European contrast media market will reach up to $915 million by 2008.

COST-EFFECTIVENESS
IN RADIOPHARMACEUTICAL R&D

STREAMLINING MANAGEMENT PRACTICE IN SMALL- TO MID-SIZED COMPANIES

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It is common knowledge that the development of a new pharmaceutical is prohibitively expensive. Blue-chip pharma companies have quoted figures in the range of hundreds of millions of US dollars, costs that are rising year by year. In today's market, even larger, more established companies hesitate to engage themselves in new pharmaceutical development projects unless the product is considered to be low risk. As a result of this, the number of approved 'New Chemical Entities' has decreased in recent years. This cost explosion is driven by the increased requirements from regulatory authorities, and ultimately, of course, serves the patients' need for safe and efficacious pharmaceuticals, and society's need for cost-effective drugs. When even big companies have difficulties in financing new projects, it is easy to understand that small- and medium-sized companies are facing an even more onerous task to get a radiopharmaceutical project off the ground. As CEO of such an enterprise, we have had to engage new strategies in order to offset and reduce the considerable costs for this R&D process.

A Cost–Efficient Team

Most small- and medium-sized companies meet the cost containment challenge by hiring a staff that is small enough to be cost-effective, but large enough to at least cover the need for people with the required expertise for the specific project they are running. This usually means that the company has a small management team consisting of a General Manager, Financial Officer, Scientific Director and a Technical Development Officer. The management team is supported by a limited staff of experts including a Manufacturing Officer, Regulatory Officer, Preclinical Expert, and experts in Clinical Development and Patent Management. Though some by necessity serve multiple responsibilities, the payroll can easily have to cover a team of over fifteen to twenty individuals who, with extensive education, experience and professional background, demand fairly high salaries. However experienced staff may be, a certain number of their tasks will involve work where they have limited experience, since it is impossible to hire staff with every required competence, and different types of bottlenecks usually occur. To meet the challenges of cost containment, our company has chosen a more advanced strategy.

Optimal Organisational Structure

Our organisational structure enables us to engage the best possible competence for each specific task. All procedures in the development process are done at the highest possible quality level according to existing regulations. The management of the development project must strive to be effective, competent and with quick throughput. The permanent staff of our enterprise numbers only three persons, a Managing Director, a Scientific Director and a part-time Financial Director. These people all have extensive experience in running pharmaceutical development projects with special focus on contrast media. Two members of staff are qualified medical doctors, one who is both M.D. and Pharmacist. This means that our permanent staff is highly competent in the area of radiological pharmaceuticals. We have initiated a project management structure for our team as we have found it more cost-effective than the traditional line officer

approach, and all the special functions for which our team are not responsible, are outsourced to subcontractors with expertise in those areas. The complete pharmaceutical development, including analytical development, manufacturing, packaging development, documentation and filing is done in co-operation with a GMP-certified pharmaceutical contract manufacturer.

On one hand, of course, outsourcing highly specialised services can also be quite costly, in fact substantially more costly than a regular employee with the same competence. On the other hand, a subcontractor will only bill for actual time spent engaged in the required service. In pharmaceutical research and development projects, the need for different competencies varies a lot over time, and in my experience, this extensive use of subcontracting has turned out to be extremely cost effective in the long-term.

Development of Contrast Media: Specific Requirements

Contrast media are legally classified as pharmaceuticals. In our case, we are developing a manganese-based, orally administered contrast medium for enhancement of the liver and bile ducts in MRI. However, the development of radiological contrast agents is less complicated compared to other pharmaceutical development. This is mainly due to the fact that contrast media are administered to patients in some cases over a few individual sessions. Therefore, no extended periods of monitored follow-up are needed, reducing the need for complicated toxicological investigations. In this way, costs associated with bringing a contrast media product to market are lower than for other pharmaceuticals.

One important aspect of pharmaceutical research and development, is the gathering and systematic filing of total competence and specialised knowledge. Outsourcing and subcontracting present unique problems. As competence and knowledge are spread among different persons and groups, and various subcontracting companies, we must avoid dilution of expertise, and maintain very well-managed, interactive business relationships to keep up continuity with each subcontractor, and ensure that competence remains in as few hands as possible. In our case, we have made one person who is a very experienced toxicologist, responsible for following the whole project through.

This person serves as head of preclinical development and toxicology on a subcontracting basis. In this way, we can save costs through efficient staff management and organisation without losing knowledge or expertise.

TECHNOLOGY FORECAST – IMAGING SERVICES

ECRI Europe
A NONPROFIT AGENCY

Medical imaging plays a significant role in the diagnosis and management of disease. Technological developments have significant implications on how imaging equipment is used. Knowledge of the ongoing developments being made in medical imaging technology is essential for healthcare planning.

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Computed Tomography

What are the technical limitations with a 16-slice scanner compared to one with 64-slices? The answer depends on what the application is. For non-cardiac applications, 16 slices is usually sufficient. Cardiac imaging has gained a lot of attention because it is the most technically challenging anatomy to image. Limitations such as high x-ray dose and high heartrates remain, so the push is for more speed. The latest commercially available development is the addition of a second x-ray tube. The second tube could have significant benefits, in terms of speed, dose and more clinical utility. Another development, though not yet commercially available, is the increase in slices to 256. While the issue of radiation dose is a growing concern, it seems inevitable that the use of CT will increase.

Magnetic Resonance Imaging

MR imaging has two advantages over CT; soft tissue contrast and absence of ionising radiation. However, it is associated with long exam times, significant patient discomfort and considerable complexity. Three developments in MR imaging are evident today: higher field strength, more open magnets, and simplified image acquisition. Higher fields strengths enable faster and higher resolution imaging. This is particularly important in exams that attempt to detect small and transient changes. High field strength (3T) systems are becoming widely used despite additional costs. However, for routine patient exams there is little data to show concomitant benefits. As more clinical experience is gained 3T will continue to grow. Patient comfort was the main reason for the popularity of open MR systems. In Europe, open MR never found widespread use. Today, 1.5T MR systems are becoming increasingly "open", with shorter and wider bores coupled with acoustic noise reduction. MR is the most complex imaging tool in routine use. Manufacturers now provide a number of software packages that help the users acquire MR images ⏭

CONTINUED
Technology Forecast – Imaging Services

⏭ more reliably. These packages can be expensive, so users need to carefully determine which tools they need.

Ultrasound

As digital signal processing becomes smaller and cheaper, the amount you can do with ultrasound is increasing. Portable once meant the device could be wheeled around, now you can fit it in your pocket. With the development of small imaging devices healthcare facilities are being forced to reconsider how ultrasound is used. However, large, full feature ultrasound units remain important diagnostic tools. In particular, 3D imaging has proved to be more than a gimmick as it helps reduce variation between users.

Mammography

In 2005 the results of the long awaited ACRIN digital mammography study were released, showing that for women under the age of fifty, with radiographically denser breasts, digital mammography improved cancer detection. So, despite higher costs, there is now increased patient demand. A number of alternative technologies are either available or under development for breast cancer detection. None of them are promising to replace mammography as the primary screening tool. Instead, they are being developed to screen high-risk groups or reduce the number of breast biopsies. Breast MR imaging is probably the most widely used technology. However, until alternative technologies demonstrate sensitivities and specificities approaching that of minimally invasive biopsies, it is hard to justify their widespread adoption.

Radiography

Now that digital image storage and review is indispensable, it is necessary for non-digital technologies to become integrated. Hence growing demand for digital radiography. The technology used in flat panel detectors (DR) appears to be mature now, with no recent technological developments as far as the detector is concerned. In contrast, the technology used in reusable phosphor plates (CR) is continuing to develop. Image quality is improving and image-processing times are reducing. The result is that what was once a clear distinction between DR and CR is not so clear-cut today. One interesting development for both CR and DR is the integration of both technologies into a portable x-ray unit that can be used around the hospital.

Fluoroscopy

The ubiquitous image intensifier is gradually being replaced by the smaller and more expensive flat panels (similar to DR). A significant amount of diagnostic work being done in radiology departments with fluoroscopy moved to CT. More recently flat panels are becoming more common on angiographic equipment and now are beginning to appear on general-purpose radiographic/fluorography equipment. The interesting aspect is what manufacturers can do with the technology to justify additional expense. Fluoroscopy equipment is now being used more for interventional procedures as CT becomes the predominant tool. Flat panel technology together with fast computing power is allowing CT-like images to be produced with fluoroscopic equipment. While images do not match those from CT they allow much improved guidance for interventional procedures.

Nuclear Medicine (SPECT and PET)

While gamma camera technology used in nuclear medicine has not really changed, the increasing interest in hybrid scanners has. The combination of PET and CT was one of the factors that dramatically affected growth of PET. Now, higher specification CT scanners are being combined with SPECT. While the clinical benefits are not clear compared to PET, it is likely that SPECT CT will become increasingly common. A lot depends on the development of radiotracers. The same is true for PET, the main issue being that new tracers being developed have very short half-lives, limiting availability and increasing costs. Perhaps the most significant development in PET imaging is not technology but the much stronger evidence being sought to demonstrate its effectiveness.

Computer Aided Detection

Historically computer aided detection has focused on the needs of mammography. Mammography CAD is generally accepted as improving detection, particularly when only one radiologist views images. As more users move to digital mammography it is likely that CAD will become a standard tool. Interest is moving to other areas that would benefit from CAD. Early results of CAD are promising. If such screening is to become common then it is very likely that CAD will be an essential part for the viability of such exams. In addition to pure CAD, i.e., detection, automated computer analysis of images is becoming increasingly important. Much of this is driven by the vast increase in the number of CT images being generated. The resulting 3D datasets cannot reasonably be reviewed by human observers. But computers can rapidly measure and analyse datasets, often with human interaction, to produce quantitative results. Problems include how to fit CAD into the workflow so that disparate systems and humans can work effectively together.

Most technological changes are the result of faster computer processors. Faster image acquisition, regardless of modality, means that diagnostic information is less dependent on patient's conformance. 3D data sets are becoming increasingly common. The most likely result of this is that more referring physicians and patients will demand more advanced imaging. Tempering this will be the growing demand from payers (i.e., governments) for evidence based research. These changes will require new equipment, different skill sets, and very different models for workflow within radiology departments.

COMPUTED TOMOGRAPHY SCANNING SYSTEMS

HEALTHCARE PRODUCT COMPARISON CHART

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ECRI is a totally independent non profit research agency designated as a Collaborating Centre of the World Health Organization (WHO). Such organizations are appointed to contribute to WHO's public health mission by providing specialized knowledge, expertise, and support in the health field to the WHO and its member nations. ECRI is widely recognized as one of the world's leading independent organizations committed to advancing the quality of healthcare with over 240 employees globally.

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ECRI's focus is medical device technology, healthcare risk and quality management, and health technology assessment. It provides information services and technical assistance to more than 5,000 hospitals, healthcare organizations, ministries of health, government and planning agencies, voluntary sector organizations and accrediting agencies worldwide. Its databases (over 30), publications, information services and technical assistance services set the standard for the healthcare community.

Amongst its many products and services ECRI is pleased to provide readers of IMAGING Management with sample information on Computed Tomography Scanning Systems designed for use in medical imaging from its Healthcare Product Comparison Chart System (HPCS), which contains over 280 reports. The HPCS reports contain extensive information about the technology, its purpose, its principles of operation, stage of development and reported problems.

This extract from our database contains model by model specifications for easy assessment and review. The Computed Tomography Scanning Systems comparison chart includes ECRI's 'Recommended specifications' (generic templates) which can be used for comparison and tendering purposes.

All of ECRI's products and services are available through the European Office, addressing the special requirements of Europe and the UK. Utilising some of the world's largest health related databases, help, support and guidance can be given to our European clients at a local level.

Publication of all submitted data is not possible: for further information please contact ECRI or editorial@imagingmanagement.org.

FOOTNOTES TO THE PRODUCT COMPARISON CHART ON PAGES 32 - 34

ECRI	*E1*	These recommendations are the opinions of ECRI's technology experts. ECRI assumes no liability for decisions made based on this data.
GE Healthcare	*G1*	1.375:1, 1.75:1 (16)
	G2	50/60 Hz, 3-phase delta or Wye
PHILIPS	*P1*	(32,256 effective with DFS)
	P2	optional 768 x 768, 1024 x 1024
	P3	with 3-D cone beam
	P4	3-phase
SIEMENS	*S1*	dissipation
	S2	with Dual Pentium Xenon
TOSHIBA	*T1*	0.5,1,2,3,4,5, 8 (all x4)
	T2	(IEC standard)
	T3	50-500 mA in 10 mA steps

	ECRI [E1]	PHILIPS MEDICAL	PHILIPS MEDICAL	GE HEALTHCARE
MODEL	**High Cardiac**	**Brilliance 16 Power (Gemini 16 Power)**	**Brilliance 16-slice**	**LightSpeed 16**
WHERE MARKETED		Worldwide	Worldwide	Worldwide
FDA CLEARANCE		Yes	Yes	Yes
CE MARK (MDD)		Yes	Yes	Yes
TYPE	Multislice	Multislice	Multislice delete helical	Multislice
Nr slices acquired simultaneously	64	16	16	16
GANTRY				
Geometry	Rotate-rotate, slip ring	Rotate-rotate	Rotate-rotate	Rotate-rotate, slip ring
Detectors, type	Ceramic, solid-state	24 mm z-axis coverage solid-state GOS	24 mm z-axis coverage solid-state GOS	HiLight ceramic
- Number of rows	64	Not specified	Not specified	24
- Elements per row	Approx1,000	672	672	912
Number of detection channels	64 x 1,000	16,128 elements [P1]	16,128 elements [P1]	16 x 912
Scan times, sec 360°	0.4-2	0.5,0.75,1,1.5, 2; optional 0.4	0.5,0.75,1,1.5, 2; optional 0.4	0.5,0.6,0.7,0.8,0.9,1,2,3,4
- Partial	0.25	0.33; opt 0.28	0.33, 0.49; opt 0.28	NA
Slice thickness, mm	0.4	0.6-12 variable	0.6-12 variable	0.63,1.25,2.5,3.75,5,7.5,10
X-ray fan beam angle, °		54.4	54.4	55
Gantry tilt, °	±30	±30	±30	±30
Gantry dimensions, H x W x D, cm		203 x 239 x 94	205 x 229 x 98	188.2 x 222.3 x 100.6
Gantry weight, kg	<2,000	1,764	2,100	1,269
Gantry aperture, cm	70	70	70	70
Scan localizer	Laser	Laser	Laser	Laser
X-RAY TUBE				
X-ray tube anode				
- Heat storage, HU	7,0,000	8,0,000 (MRC technology)	8,0,000 (MRC technology)	6,300,000
- Heat dissipation rate, HU/min	700,000	1,610,000	1,610,000	840,000
Tube cooling	Oil or water	Oil/air	Oil/air	Oil/air
Tube focal spot, mm	0.5 x 0.7	0.5 x 1 small, 1 x 1 large	0.5 x 1 small, 1 x 1 large	0.7 x 0.6, 0.9 x 0.7
Optional tubes	NA	Conventional 5.2 MHU	Conventional 5.2 MHU	NA
X-RAY GENERATOR				
kW output	60	60	60	53.2
kVp range	80-140	90,120, 140	90,120, 140	80,100,120, 140
mA range	20-500	20-500 in 1 mA increments	20-500 in 1 mA increments	10-440
HELICAL SCANNING		Yes	Yes	Yes
Max scan time, sec	100	100	100	120
Max scan volume, cm	150	162	162	170
Spatial resolution, lp/cm	20	24	24	Same as axial
Pitch	NA	0.13 to 1.7, user selectable	0.13 to 1.7, user selectable	0.5625:1, 0.9375:1, [G1]
Reconstruction time per image, sec	0.2	0.025, 3-D cone beam	0.17, 3-D cone beam; optional 0.05	0.17
PATIENT TABLE				
Range of movement				
- Vertical, cm	40-100	52-104	52-100	51-107
- Longitudinal, cm	150	190	190	170
Scannable range, cm	150	162	162	170
Max load capacity, (accuracy), kg	200 (not specified)	204 (±0.25 mm)	204 (±0.25 mm)	180 (±0.25 mm), 205 (±1 mm)
IMAGE PROCESSING				
Computer CPU		Intel, Windows OS	Intel, Windows OS	Open architecture/ LINUX
Scan FOVs, cm	50	Up to 50	Up to 50	25, 50
Reconstruction matrixes	512 x 512	256 x 256, 512 x 512; [P2]	256 x 256, 512 x 512; [P2]	512 x 512
Reconstruction time				
- Per slice, sec	0.2	Up to 40 images/sec [P3]	Up to 6 images/sec [P3]	6 frames/sec
- For localization scan, sec	Real time	5	5	Real time
DISPLAY				
Monitor size	20"	18" flat LCD; also 21" CRT	18" flat LCD; also 21" CRT	20" (2), opt flat
Matrixes, pixels	1024 x 1024	1280 x 1024	1280 x 1024	1280 x 1024
Range of CT numbers	-1,000 to +3,000	-1,000 to +3,095	-1,000 to +3,095	-1,024 to +3,071
Image enlargement	10x	Up to 10x; real time	Up to 10x; real time	Up to 8x
Max no. slices displayed at once	16	Not specified	Not specified	16
IMAGE STORAGE				
Hard disk, GB	100	292	292	146
No. online images	75,000	514,242 uncompressed (512 x 512)	514,242 uncompressed (512 x 512)	250,000
Archival storage	MOD, CD, DVD	9.1 GB rewritable EOD, 620 MB CD	9.1 GB rewritable EOD, 620 MB CD	2.3 GB MOD, DICOM 3.0
PERFORMANCE				
Minimum interscan time, sec	0	None	None	1
Dynamic scan rate		Not specified	Not specified	960 scans/min
High-contrast spatial resolution				
- 0% MTF, lp/cm	20	24	24	15.4
- 50% MTF, lp/cm	10	Not specified	Not specified	8.5
Low-contrast res,				
- mm at % at <=4 rads	4 at 0.3% at 2 rads	4 at 0.3%	4 at 0.3%	5 at 0.3% at 1.8 mGy 8" CATPHAN
Noise, % at <=2.5 rads	0.3 at 3 rads	0.27	0.27	0.32 at 2.85 rads
CORONARY ARTERY CALCIFICATION SCORING	Yes	Yes	Yes	Optional
DICOM 3.0 INTERFACE	Yes	Yes	Yes	Yes
RECOMMENDED ROOM SIZE, m²	25	25.9	25.9	28 minimum
POWER REQUIREMENTS	3-phase	200-500 VAC, 50/60 Hz, 100 kVA [P4]	200-500 VAC, 50/60 Hz, 100 kVA [P4]	460/480 VAC nominal, [G2]

GE HEALTHCARE	GE HEALTHCARE	SIEMENS	SIEMENS	
LightSpeed PRO 16	**LightSpeed PRO 32**	**SOMATOM Sensation 64 Cardiac**	**SOMATOM Sensation Cardiac**	**MODEL**
Worldwide	Worldwide	Worldwide	Worldwide	WHERE MARKETED
Yes	Yes	Yes	Yes	FDA CLEARANCE
Yes	Yes	Yes	Yes	CE MARK (MDD)
Multislice	Multislice	Multislice spiral	Multislice spiral	TYPE
16	32	64	16	Nr slices acquired simultaneously
				GANTRY
Rotate-rotate, slip ring	Rotate-rotate, slip ring	Continuous rotate, low-voltage slip ring	Continuous rotate, low-voltage slip ring	Geometry
HiLight ceramic	HiLight ceramic	UltraFast Ceramic with adaptive array detector	UltraFast Ceramic with adaptive array detector	Detectors, type
24	64	64	16	- Number of rows
912	912	672	672	- Elements per row
16 x 912	32 x 912	64 x 1,344	64 x 1,344	Number of detection channels
0.4,0.5,0.6,0.7,0.8,0.9,1,2,3,4	0.4,0.5,0.6,0.7,0.8,0.9,1,2,3,4	0.33,0.37,0.42,0.5,0.75,1, 1.5	0.37,0.42,0.5,0.75,1, 1.5	Scan times, sec 360°
NA	NA	0.25,0.28, 0.33; also 0.5,0.67, and 1	0.25,0.28, 0.33; also 0.5,0.67, and 1	- Partial
0.63,1.25,2.5,3.75,5,7.5,10	0.63,1.25,2.5,3.75,5,7.5,10	0.6,0.75,1,1.5,2,3,4,5,6,9, 10	0.6,0.75,1,1.5,2,3,4,5,6,9, 10	Slice thickness, mm
55	56	54.4	54.4	X-ray fan beam angle, °
±30	±30	±30	±30	Gantry tilt, °
188.2 x 222.5 x 100.6	188.2 x 222.5 x 100.6	199 x 89 x 222	199 x 89 x 222	Gantry dimensions, H x W x D, cm
1,269	1,269	2,100	2,100	Gantry weight, kg
70	70	70	70	Gantry aperture, cm
Laser	Laser	Laser	Laser	Scan localizer
				X-RAY TUBE
				X-ray tube anode
8,0,000	8,0,000	0.6 MHU with 5 MHU/min heat *S1*	0.6 MHU with 5 MHU/ min heat *S1*	- Heat storage, HU
1,782,000	1,782,000	5,0,000	5,0,000	- Heat dissipation rate, HU/min
Oil/air	Oil/air	Chilled water	Chilled water	Tube cooling
0.7 x 0.6, 0.9 x 0.9	0.7 x 0.6, 0.9 x 0.9	0.6 x 0.7, 0.8 x 0.8, 0.8 x 1.2	0.6 x 0.7, 0.8 x 0.8, 0.8 x 1.2	Tube focal spot, mm
NA	NA	No	No	Optional tubes
				X-RAY GENERATOR
100	100	80	60	kW output
80,100,120, 140	80,100,120, 140	80,100,120, 140	80,100,120, 140	kVp range
10-835	10-835	28-670	28-500	mA range
Yes	Yes	Yes	Yes	HELICAL SCANNING
120	120	100	100	Max scan time, sec
170	170	157	157	Max scan volume, cm
Same as axial	Same as axial	30	30	Spatial resolution, lp/cm
0.5625:1, 0.9375:1, *G1*	0.5625:1, 0.9375:1, *G1*	28.2-128 freely selectable	8-32 freely selectable	Pitch
0.17	0.063	0.06	0.1	Reconstruction time per image, sec
				PATIENT TABLE
				Range of movement
51-107	51-107	48-102	48-102	- Vertical, cm
170	170	200	200	- Longitudinal, cm
170	170	157	157	Scannable range, cm
180 (±0.25 mm), 205 (±1 mm)	180 (±0.25 mm), 205 (±1 mm)	200 (not specified)	200 (not specified)	Max load capacity, (accuracy), kg
				IMAGE PROCESSING
Open architecture/ LINUX	Open architecture/ LINUX	Multiple Intel-based servers *S2*	Multiple Intel-based servers *S2*	Computer CPU
25, 50	25, 50	50; optional 70	50; optional 70	Scan FOVs, cm
512 x 512	512 x 512	512 x 512	512 x 512	Reconstruction matrixes
				Reconstruction time
6 frames/sec	Up to 16 frames/sec	0.06	0.1	- Per slice, sec
Real time	Real time	Real time	Real time	- For localization scan, sec
				DISPLAY
20" (2), opt flat	20" (2), opt flat	18" LCD	18" LCD	Monitor size
1280 x 1024	1280 x 1024	1024 x 1024	1024 x 1024	Matrixes, pixels
-1,024 to +3,071	-1,024 to +3,071	-1,024 to +3,071	-1,024 to +3,071	Range of CT numbers
Up to 8x	Up to 8x	Yes	Yes	Image enlargement
16	16	64	64	Max no. slices displayed at once
				IMAGE STORAGE
146	146	446	376	Hard disk, GB
250,000	250,000	260,000	260,000	No. online images
2.3 GB MOD, DICOM 3.0	2.3 GB MOD, DICOM 3.0	CD-R, MOD	CD-R, MOD	Archival storage
				PERFORMANCE
1	1	0.25	0.25	Minimum interscan time, sec
960 scans/min	960 scans/min	Not specified	Not specified	Dynamic scan rate
Not specified	Not specified			High-contrast spatial resolution
		30	30	- o% MTF, lp/cm
15.4, 19.6-Z	15.4, 19.6-Z	15	15	- 50% MTF, lp/cm
10.2, 19.6-Z	10.2, 19.6-Z	5 at 0.3% at 2 rads		Low-contrast res,
5 at 0.3% at 1.3 mGy 8" CATPHAN	5 at 0.3% at 1.3 mGy 8" CATPHAN	0.29	5 at 0.3% at 1.7 rads	- mm at % at <=4 rads
0.32 at 2.85 rads	0.32 at 2.85 rads	Yes	0.29	Noise, % at <=2.5 rads
Optional	Optional		Yes	CORONARY ARTERY
		Yes		CALCIFICATION SCORING
Yes	Yes		Yes	DICOM 3.0 INTERFACE
		24		RECOMMENDED ROOM
28 minimum	28 minimum	380-480 VAC, 3-phase, 63-111 kVA	24	SIZE, m²
460/480 VAC nominal, *G2*	460/480 VAC nominal, *G2*		380-480 VAC, 3-phase, 66-83 kVA	POWER REQUIREMENTS

	SIEMENS	TOSHIBA	TOSHIBA	TOSHIBA
MODEL	**SOMATOM Sensation Open**	**Aquilion 16**	**Aquilion 16 CFX**	**Aquilion 32**
WHERE MARKETED	Worldwide	Worldwide	Worldwide	Worldwide
FDA CLEARANCE	Yes	Yes	Yes	Yes
CE MARK (MDD)	Yes	Yes	Yes	Yes
TYPE	Multislice spiral	Multislice helicall	Multislice helicall	Multislice helicall
Nr slices acquired simultaneously	16	16	16	32
GANTRY				
Geometry	Continuous rotate, low-voltage slip ring	Rotate-rotate, slip ring, multislice	Rotate-rotate, slip ring, multislice	Rotate-rotate, slip ring, multislice
Detectors, type	UltraFast Ceramic with adaptive array detector	Solid-state	Solid-state	Solid-state
- Number of rows	16	16	16	32
- Elements per row	672	40 x 896	40 x 896	64 x 896
Number of detection channels	64 x 1,344	16 x 896	16 x 896	32 x 896
Scan times, sec 360°	1; optional 0.5	0.5,0.75,1,1.5,2, 3; optional 0.4	0.4,0.5,0.75,1,2, 3	0.5,0.75,1,1.5,2, 3; optional 0.4
- Partial	0.67; optional 0.33	0.32; optional 0.25	0.25, 0.32	0.32; optional 0.25
Slice thickness, mm	1.5,2,3,4,5,6,7,8, 10	0.5,1, 2 (all x 16); T1	0.5,1, 2 (all x 16); T1	0.5, 1 (all x 32); 2 x 16; T1
X-ray fan beam angle, °	54.4	49.2	49.2	49.2
Gantry tilt, °	±30	±30	±30	±30
Gantry dimensions, H x W x D, cm	199 x 89 x 222	195 x 233 x 96	195 x 233 x 96	195 x 233 x 96
Gantry weight, kg	2,100	1,750	1,750	1,750
Gantry aperture, cm	82	72	72	72
Scan localizer	Laser	Laser	Laser	Laser
X-RAY TUBE				
X-ray tube anode				
- Heat storage, HU	0.6 MHU with 5 MHU/ min heat S1	7,500,000	7,500,000	7,500,000
- Heat dissipation rate, HU/min	5,0,000	1,386,000 max	1,386,000 max	1,386,000 max
Tube cooling	Chilled water	Oil/air	Oil/air	Oil/air
Tube focal spot, mm	0.6 x 0.7, 0.8 x 0.8, 0.8 x 1.2	1.6 x 1.4, 0.9 x 0.8 T2	1.6 x 1.4, 0.9 x 0.8 T2	1.6 x 1.4, 0.9 x 0.8 T2
Optional tubes	No	Not specified	Not specified	Not specified
X-RAY GENERATOR				
kW output	50	60	60	60
kVp range	80,100,120, 140	80,100,120, 135	80,100,120, 135	80,100,120, 135
mA range	28-420	10-500; 10-50 in 5 mA steps T3	10-500; 10-50 in 5 mA steps T3	10-500; 10-50 in 5 mA steps T3
HELICAL SCANNING	Yes	Yes	Yes	Yes
Max scan time, sec	100	100	100	100
Max scan volume, cm	157	175	175	175
Spatial resolution, lp/cm	16.3	18 at 0% MTF	18 at 0% MTF	18 at 0% MTF
Pitch	7.2-32 freely selectable	0.8-96 mm/sec, couchtop speed	0.8-120 mm/sec couchtop speed	0.8-96 mm/sec couchtop speed
Reconstruction time per image, sec	0.06	0.17	0.17	0.1
PATIENT TABLE				
Range of movement				
- Vertical, cm	48-102	31-94.4	31-94.4	31-94.4
- Longitudinal, cm	200	219	219	219
Scannable range, cm	157	180	180	180
Max load capacity, (accuracy), kg	200 (not specified)	205 (±0.25 mm)	205 (±0.25 mm)	205 (±0.25 mm)
IMAGE PROCESSING				
Computer CPU	Multiple Intel-based servers S2	32-bit processor x 2	32-bit processor x 2	32-bit processor x 2
Scan FOVs, cm	50, 82	18,24,32,40, 50	18,24,32,40, 50	18,24,32,40, 50
Reconstruction matrixes	512 x 512	512 x 512	512 x 512	512 x 512
Reconstruction time				
- Per slice, sec	0.06	0.17	0.17	0.17
- For localization scan, sec	Real time	Real time	Real time	Real time
DISPLAY				
Monitor size	18" LCD	18" LCD color x 2	18" LCD color x 2	18" LCD color x 2
Matrixes, pixels	1024 x 1024	1280 x 1024	1280 x 1024	1280 x 1024
Range of CT numbers	-1,024 to +3,071	-1,536 to +8,191	-1,536 to +8,191	-1,536 to +8,191
Image enlargement	Yes	Up to 20x	Up to 20x	Up to 20x
Max no. slices displayed at once	64	16	16	16
IMAGE STORAGE				
Hard disk, GB	446	146, 144 raw data, T4	146, 144 raw data, T4	180, 720 raw data, T4
No. online images	260,000	200,000	200,000	160,000
Archival storage	CD-R, MOD	4.8 GB MOD	4.8 GB MOD	9.4 GB DVD-RAM
PERFORMANCE				
Minimum interscan time, sec	0.25	0	0	0
Dynamic scan rate	Not specified	200 scans/100 sec	200 scans/100 sec	200 scans/100 sec
High-contrast spatial resolution				
- 0% MTF, lp/cm	16.3	18	18	18
- 50% MTF, lp/cm	Not specified	8	8	8
Low-contrast res,				
- mm at % at <=4 rads	5 at 0.3% at 2 rads	2 at 0.3%	2 at 0.3%	2 at 0.3%
Noise, % at <=2.5 rads	0.29	<0.5	<0.5	<0.5
CORONARY ARTERY CALCIFICATION SCORING	No	Optional	Optional	Optional
DICOM 3.0 INTERFACE	Yes	Yes	Yes	Yes
RECOMMENDED ROOM SIZE, m²	24	27 (25 short couch)	27 (25 short couch)	27 (25 short couch)
POWER REQUIREMENTS	380-480 VAC, 3-phase, 66-87 kVA	200 VAC, 50/60 Hz, 3- phase	200 VAC, 50/60 Hz, 3- phase	200 VAC, 50/60 Hz, 3- phase

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TECHNOLOGY OF THE 21ST CENTURY

Reliability and advanced technology add value and increase safe diagnosis

In 1896, just a few months after Wilhelm Conrad Roentgen's discovery of X-rays, Genzo Shimadzu Jr. and Professor Muraoka of Kyoto University succeeded in taking the first X-ray images in Japan. This was the starting point for a 110 year long tradition in medical technology. Since then, the list of success stories especially in X-ray technology is extensive. Together with analytical instruments, medical technology has turned *Shimadzu* into one of the leading suppliers world-wide. The systems are at home equally in medical practices and hospitals.

Today, *Shimadzu* develops, manufactures and distributes a broad range of diagnostic systems in all areas of clinical application – computer tomography, Digital Subtraction Angiography (DSA), cardiovascular systems, digital radiography & fluoroscopy systems, ultrasound and general radiography equipment. The latest developments include

Heartspeed with direct- conversion Flat Panel Detector "Safire".

angiography systems with C-arm rotation speeds of up to 60 degrees/second, two digital color Doppler ultrasound units and mobile X-ray systems.

The next milestone in *Shimadzu*'s X-ray technology is the so-called "Safire" flat-panel detector, the world's first FPD which converts X-rays directly into electronic signals using amorphous Selenium.
The direct-conversion technology offers distinct advantages in image quality and dose efficiency in comparison with indirect-conversion flat panel. The current image amplifier technology, inferior in image quality and dose efficiency, will soon become obsolete.

Mobile X-ray system "MobileArt". Frost & Sullivan award in 2004.

"Safire" merges economic with diagnostic benefits

Introducing the "Safire direct-conversion FPD" to the medical sector enables digitizing of all X-ray related diagnostic imaging. This allows faster diagnosis, improved diagnostic capabilities and accelerated remote medical diagnostics. In Japan, over 100 "Safire" systems are already in use. The 23 x 23 cm (9-inch-square) or 43 x 43 cm (17-inch-square) "Safire" FPD can be used both for still images and fluoroscopy.
Historically, for medical diagnostics, X-ray film has been used. But recently, with increasing implementation of digital and information technology in the medical field, the need for a high-resolution, high-sensitivity direct-conversion flat-panel detector has been keenly awaited as an appropriate X-ray detector for high-tech medical practices.

How does the "Safire" flat-panel technology work?

Compared with the indirect-conversion flat panel, the new direct-conversion technology now creates clearer high-resolution images with less signal deterioration and reduced noise. The top layer of the flat-panel detector, an X-ray conversion film, converts X-rays passing through the patient's body directly into electric signals using amorphous Selenium. A TFT (thin-film transistor) array then collects the signal from each pixel and transfers the data immediately to the processing system.
The direct-conversion flat-panel detector is far more sensitive than conventional X-ray films. It produces still images as well as fluoroscopic images which are qualitatively equal to or better than film, even when the X-ray radiation emitted is reduced from one half to one third of conventional X-ray examination. This dramatically reduces the dosage exposure to the patient.

Shimadzu has traditionally invested heavily in research and development. The company has always followed a simple yet vital concept: offering the best diagnostic system possible, combined with high patient- and user-friendliness.

Shimadzu medical systems are being used on every continent. The experience gained all over the world is integrated into the design of new systems. Hence, every single user can benefit from the know-how gathered world-wide.

INTERVIEW WITH JONATHAN ELION

INTERVIEWEE

Jonathan Elion

Newly appointed Chief Medical Officer (CMO), AGFA Healthcare

Co-founder and Medical Advisor, Heartlab

jle@Heartlab.com

Tell us about your professional background.

I went to Brown University for college and Medical School, trained in Internal Medicine at the University of Wisconsin, and in Cardiology at Duke University. I have been involved in computers since 1968, and continued to be active in the field during my medical training. I began my research in medical image processing in 1983, developing techniques for Digital Subtraction Angiography, Digital Echocardiography, and "parametric imaging" (encoding physiologic information into images as color overlays). I have been actively involved in developing and applying standards to cardiac imaging and information, serving as co-chair of several key committees including DICOM Working Group 1 for Cardiovascular Information, Integrating the Healthcare Enterprise (IHE) Cardiology Planning Committee, and HL7's Special Interest Group in Cardiology Coding. I co-founded Heartlab in 1994 along with Bob Petrocelli, an engineer who was working in my research lab.

What led you to pursue a career in healthcare?

I always wanted to be a doctor, and never wavered from that path. When I began college, I added an interest in computers, and have continued to pursue both interests ever since. I continue my clinical activities as a Cardiologist on a limited basis, and have had the good fortune to be able to combine my clinical and technological interests. As part of my work on the DICOM standard, Bob Petrocelli and I recognised an opportunity to establish a commercial presence to fill a much-needed niche in the market (PC-based image review), and that launched our efforts into industry.

If you had to choose a different career, what would that be?

Well, if I had it to do all over again, I would pick the same career! But I confess that I love music, especially playing the guitar, and would probably pursue that path if I had to choose a different career.

Who has inspired you most in your career?

Among the many excellent role models and mentors I have encountered, my greatest inspiration came from my father's sister, Gertrude Elion, who won the Nobel Prize in Medicine in 1988 (see http://nobelprize.org/medicine/laureates/1988/index.html). A gentle lady with an insightful mind, she helped me see my way through difficult scientific, technical, moral, and ethical concerns. She was always gracious in acknowledging the contributions of others, and was apt to say, "It's amazing how much you can accomplish if you don't care who gets the credit".

What has been your biggest career success?

DICOM Working Group 1 worked to adapt the DICOM standard to cardiac imaging, bringing order to the chaos that existed at that time with regard to the variety of proprietary formats that were being used for image storage. We sponsored the first demonstration of the use of the DICOM for cardiac imaging in March 1995. I wrote software that was later put into the public domain and created the set of reference images and CD-ROM that were used by 29 vendors to exchange and display images from cardiac catheterisation and echocardiography. In a very real sense my work on this demonstration project began the DICOM era in cardiac imaging, and created the market into which Heartlab sells.

What are your predictions for improvement of clinical management of cardiovascular disease?

Hospitals are under great pressure these days to reduce costs and improve quality. There are at least three emerging trends that will help in these areas: clinical pathways that help to formalise our approach to clinical care, performance measures that help quantify the effectiveness of our treatments and Computerised Physician Order Entry (CPOE) systems that assist in managing the orders that implement care plans. Together, these approaches can be applied to developing disease management programmes. The areas that are being addressed most commonly in Cardiology include Acute Coronary Syndrome (ACS) because of the seriousness of the clinical condition, and Congestive Heart Failure (CHF) because of expense associated with caring for this population.

What areas of medical IT will impact on the imaging industry in years to come?

I believe we will continue to see the elimination of artificial barriers that exist between digital images and the rest of clinical data. Imaging will continue to be managed and merged with clinical data rather than being in a separate system.

How can efficiency be increased in Cardiology departments?

It is a great challenge to collect and report on all of the information related to a study such as cardiac catheterisation. Heartlab's suite of products allows a hospital to implement more efficient workflows of patients and information. In some cases, it is possible to get a finished and signed report completed within minutes after completion of the cardiac cath. By feeding reports directly into a Hospital Information System, results can be quickly disseminated to everyone involved in the care of the patient. On the imaging side, our high-quality digital storage and review, together with our ability to provide this capability on low-cost personal computers and workstations helped to move coronary angiography from film to digital. We are seeing a similar transformation as echocardiography moves from videotape to digital. We hope to see a similar shift in EKG management as we move from paper-based to digital workflow.

2006

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Programme Preview

Wednesday 30 August 2006 - Pre Congress

EAHM Meetings
Hospital Visits
Department of Health and Children Briefing Session
Pre Congress Tours - by arrangement with Organising Committee

Thursday 31 August 2006 - Congress

09.00 - 11.00	General Assembly of EAHM
11.00 - 12.30	Opening Ceremony
14.00 - 16.00	Session 1: Innovation in Hospital Practice and Organisation
16.30 - 17.45	Session 2a : Developing Best Practice in Service Development and Quality
19.00	State Reception – Dublin Castle

Friday 1 September 2006 - Congress

09.30 - 10.00	Ministerial Address
10.00 - 11.00	Session 2b : Developing Best Practice in Service Development and Quality
11.30 - 12.30	Session 3a: Human Resource Strategies
14.00 - 15.00	Session 3b: Human Resource Strategies
15.30 - 16.30	Session 4: EU Perspective
16.30 - 17.00	Session 5: Close of Congress
19.00	Gala Dinner

Saturday 2 September 2006 - Post Congress

09.30 - 14.30	Post Congress Tour

Preliminary Programme will be available early 2006
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THE DANISH HEALTHCARE SYSTEM

In Denmark there is free and equal access to most healthcare services, the provision and financing of which is mainly public. The Danish healthcare sector is decentralised, with the counties being responsible for hospitals, general practitioners, practising specialists, etc.

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Healthcare Reforms: Implementing Changes

The Danish government believes that there is a need to reform the framework for public tasks and public services, including the healthcare system. Therefore, from the expected commencement of the reform in 2007, the present healthcare services will also be affected. Most current initiatives focus on hospitals and inpatient care. While further structural changes, possibly associated with the greater role of the private sector, are discussed, according to general political consensus, the Danish healthcare system will remain committed to the welfare ideals of tax financing and universal access to high quality healthcare. In 2004, the Danish Government proposed a new structure of the Danish public sector, including the healthcare services. At the beginning of 2005 the Government put forward a proposal for such a reform, scheduled to take effect from 1st January 2007. The proposed reform is to replace the local government reform of 1970.

It is the ambition of the Government to devise the best public sector for the solution of tasks as close to the citizen as possible, and ensure the best value for taxpayers' money. The Government wishes to not only reduce the number of regions and municipalities but to carry through a visionary and future-oriented reform of the tasks themselves. The aim is to devise a public sector that will solve the tasks in Denmark in a superb manner for many years ahead.

To do this, the Government is set on a one-tier public sector close to the citizen characterised by:

- more quality for the money
- a simplified and efficient public sector
- clearly defined responsibilities and no "grey zones" between the public actors
- increased citizen's involvement and improved local democracy
- less red tape, fewer barriers and more options

The public hospital and healthcare services are still to offer equal, open and free access to the citizen and ensure optimal treatment of people, independent of residential municipality. Professional expertise is to be concentrated, course of treatment is to be coherent and extra work is to be rewarded.
The Government's proposal contains the following main lines for hospital and healthcare services: The present regional level (14 counties and Copenhagen Hospital Corporation) are to be abolished and replaced by 5 healthcare service regions with direct election of political representatives for 4 years, who are responsible for hospitals, general practitioners and other health insurance schemes as well as psychiatric treatment. The governmental body for each region will be called The Regional Council and the number of members is fixed at 41. Each region will include about one million citizens.
The regions will have uniform conditions for the solution of tasks within the healthcare sector. Healthcare services will primarily be financed through a state block grant based on objective criteria for expenditure need (approx. 75%), a smaller state activity pool (5%), and local financing that is a basic contribution (10%) and an activity-related grant (10%). The number of direct personnel taxation levels will therefore in the future be reduced from three to two (state and municipalities). In order to finance the main part of the regional

and local healthcare expenditure, the state imposes a healthcare contribution of 8% based on the local tax base. The proceeds are paid to the state, which distributes the funds to the regions and municipalities.

The proposal also includes an enlarged responsibility of healthcare for the state. The National Board of Health will be responsible for providing strong national co-ordination and improved concentration of the most specialised treatment and the central healthcare authorities will be responsible for ensuring systematic follow-up on quality, efficiency and IT applications in the healthcare service based on common standards. The approximately 100 new municipalities will be responsible for prevention, care and rehabilitation that do not take place during hospitalisation. The municipalities should be able to find new solutions especially within prevention and rehabilitation, e.g. in the form of health centres. Due to co-financing, the municipalities will become more interested in initiating prevention and encouraged to relieve the pressure on the healthcare service. Reducing unnecessary hospitalisation and ensuring that the treated patients are discharged as quickly as possible will be accomplished by making the current care rate, which the counties charge the municipalities for treated patients, obligatory both for somatic and psychiatric patients.

The Danish Society of Radiology has been in operation since 1921, and counts over 500 active members. Approximately every certified radiologist in the country belongs to the society. The aim of the society is to promote science, education and collaboration inside the radiology profession. Our society is active in all areas of radiology, with a special emphasis not only on the education of radiologists but also on continual post-graduate education. We are members of the European Society of Radiology (ESR), International Society of Radiology and the Nordic Society of Medical Radiology. I have occupied the position of President of the society for the last three years, and will come to the end of my term in January 2007. I have been active in radiology since I obtained my specialist competence in 1989, and presently work as a consultant radiologist in Department of Radiology in the Musculoskeletal Radiology section at Rigshospitalet, Copenhagen.

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DANISH SOCIETY OF RADIOLOGY

PROMOTING RADIOLOGY THROUGHOUT DENMARK

Probably our most significant responsibility is our role as advisory consultant to the National Board of Health. We collaborate with them in many ways, and one of the main tasks in the year to come, is to provide evidence-based recommendations of the placement of various imaging procedures, for example special interventional procedures considering the number of steps that are needed to perform a safe procedure. This issue is a current one now that Denmark is reorganising the health system, reducing the number of its counties. The National Health Board is to decide which hospital should provide specialised procedures. We will be making our recommendations on how to centralise each of the specialised modalities and interventional procedures and where these should be housed. This will no doubt continue to have implications for the provision of healthcare in Denmark for a long time to come, and our society aims to monitor the situation closely in order to assure that we are organised in the best possible way to meet the coming challenges.

Another way in which we collaborate with the National Health Board is in an advisory capacity on such issues as the education of radiologists. Our society provides theoretical training courses and advises on the curriculum. About 24 new radiologists are certified every year.

Each resident follows a course that lasts 6.5 years, the first 18 months of which is spent in general medical and surgical training (basic education). This is followed by a year in which they are introduced to their specialty area. They then pick their 'major', or main subject, and out of each group of trainees, and more than 20 every year will choose radiology as their subject. The emphasis in Denmark, in radiology training, is of course on clinical work. However, over the course of that education, over 210 hours will also be spent involved in theoretical training to back this up, in each of the different subspecialties. As with many countries in Europe, we have no final exams for trainees in radiology. Rather, we use the records of their clinical work in the radiological departments and of their centralised theory tests to get an overall picture of how each trainee is progressing. The National Board of Health has established a system with inspectors who have the task of evaluating the departments in respect to educational standards.

We are also actively involved in post-graduate, continuous education in defined subspecialties. Once a year a course is held over two and a half days on different subspecialties. ⏭

CONTINUED

DANISH SOCIETY OF RADIOLOGY

⏭ *Working Groups*

One of our various working groups that actively focus on the different hot topics that are affecting imaging professionals both in Denmark and across Europe is our special working group on teleradiology. Here at the Rigshospitalet we are providing teleradiology facilities for hospitals across the country including Greenland and the Faroe islands that have need of our services in order to produce reports on imaging exams. We generally receive images related to difficult or specialised problems that require our services. In this way, we have a good idea on a practical level, of the types of issues and conflicts that come into play in running this kind of service. For example, problems with standardisation, legal problems, image quality etc. Some of the main questions our working group addresses, such as what contract we should have with the referring doctor, and security issues, urgently need to be resolved. Other working groups within the Society are making recommendations for diagnosis of different diseases, for example how to choose the appropriate diagnostic modality and treatment for each patient.

The Society holds an Annual General Meeting in order to unite its members and discuss the most pressing issues of the day. The last meeting, which was held in Odense, 25-27 January 2006, covered the activities of each of these groups, as well as the main areas of radiology, film reading sessions, especially for the younger radiologists, a scientific session and a session focused on the political issues raised by Denmark's political reorganisation of the health system.

In this article, I will present one of Copenhagen's largest and busiest diagnostic radiology departments, and discuss the problematic situation regarding financial administration of healthcare in Denmark as it affects diagnostic radiology. Firstly, the University Hospital at Herlev itself is one of the major hospitals in the Copenhagen area, with approximately 800 beds. It offers oncologic treatment to more than 1.2million inhabitants. All abdominal specialties (Surgical and Medical Gastroenterology, Urology, Nephrology and Gynaecology) are facilitated. As well as orthopaedic surgery, rheumatology, endocrinology and plastic surgery, the hospital provides services within cardiology, pulmonology, infectious diseases and geriatrics as part of internal medicine services.

COPING WITH INCREASED DEMAND

DEPARTMENT OF DIAGNOSTIC RADIOLOGY AT COPENHAGEN UNIVERSITY HOSPITAL

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The Department of Diagnostic Radiology is the third largest department in Denmark with regards to number of examinations, with the majority of the workload consisting of scanning. Over the last three to four years, the number of CT scans performed has almost tripled; the department has three scanners (one 4-slice, two 16-slice) and in 2006 two 64-slice scanners will be installed. MR in particular has seen an exponential increase in number of exams performed. A new MR centre (the largest in Denmark) was built in 2001. A total of 5 MR scanners, including one dedicated extremity (0.2T) MR scanner, two open MR scanners (0.23T and 0.6T) and two closed MR scanners (1.5T), were installed and a 3T scanner is expected to be installed by the end of 2006. These installations have led to an almost five times increase in the number of examinations performed since 2001. However, despite this increase, waiting times have not been reduced.

The Department has thirty-one examination rooms. As a result of late modernisation, the department has jumped directly to Digital Radiology (DR) from analogue films. A total of eight DR rooms are available for conventional radiography and a further four fluoroscopy rooms. The breast imaging team, with three double rooms with a mammography and an ultrasound unit respectively are the only analog part of the department, being built in 2000, when digital mammography was not yet considered adequate and with a budget that was a political compromise. At the University Hospital the PET/CT-scanner is run as a joint venture with the department of Clinical Physiology and Nuclear Medicine, which are independent specialties in Denmark.

In Denmark, the government has issued a guarantee to all patients with signs of or confirmed life-threatening disease that they have the right to be examined with two weeks of their referral. Other patients must be examined within eight weeks. Otherwise the patient can choose any private clinic or hospital, which has a contract with the union of counties who must fund the examination. The end result is that guarantees have been unfulfilled in most areas, made worse by

the fact that oncologic patients are obliged to have their disease controlled by a particular scanner according to recommendations from the World Health Organisation (WHO).

Medical Training in Denmark

Both teaching and research are taken very seriously. In Denmark, universities are only responsible for pre-graduate training. Postgraduate or specialist training is taken care of by the Ministry of Health and National Health Authorities. The University of Copenhagen has one of the biggest medical faculties in Europe regarding training of medical doctors. Yearly, 700 to 800 students are immatriculated. Access is not free, with uptake based on grades in high school. After six years training, two mandatory clinical years (psychiatry, general practitioner, surgery and medicine) are followed. In Copenhagen the first two years are allocated to theoretical teaching (anatomy, physiology, biochemistry etc.) whereas the following three years are mainly clinical. Postgraduate training in radiology takes five years. Two applications must be submitted: one for the first year and one for the last four years. There are no board examinations, but a checkbook for skills/competences has recently been introduced.

Imaging in Denmark

The population of Denmark is approximately 5.5m inhabitants. Denmark has a low level of imaging procedures per inhabitant, independent of age, with only 0.7 examinations per year. The number of examinations is presently increasing by approximately 5%. However, within the field of oncologic imaging the growth rate is approximately double this. 98% of the hospital service in Denmark is socialised, paid through high taxes. All citizens have the right to access to treatment. General practitioners working in private clinics are reimbursed for patient service by the public sector. An increasing number of Danes take out health insurance policies or are covered by their employers. With regards to radiology, general practitioners refer their patients to the radiology department at the local hospital. However, there are two exceptions:

1) In central Åarhus there is a single private clinic with a contract with the county
2) In the central communes of Copenhagen all radiology exams done for general practitioners are provided by twelve to fourteen private clinics, consisting mainly of conventional radiology and ultrasonography.

Recently an agreement between the commune and private clinics has been reached regarding reimbursement for MRI and CT. No commune or county outside central Copenhagen has an agreement with these clinics. Some independent imaging centres have appeared during the last few years, taking care of patients with health care insurance and those who the public radiology department are obliged to facilitate within the guaranteed eight week period. There are approximately eight private MR units and two CT scanners. In the public sector there were eleven MR scanners and thirteen CT scanners per one million inhabitants. The current government has allowed public hospital owners to invest a total figure of 40million Euro both in 2005 and 2006 in new CT, MR and PET/CT scanners. The money has been used to replace outdated scanners, but also installation of more capacity has taken place.

Reforming Healthcare

For decades now, Denmark has operated within three political levels. The Counties (second level) have been largely responsible for healthcare since 1970. In 2005 the parliament decided to reform the structure, meaning that communes will be divided into larger segments of more or less 30,000 inhabitants and will be involved in a minor portion of healthcare and can issue taxes. Instead of the fourteen counties and central Copenhagen (the current hospital owners) there will be five regions on January 1st 2007, who are not entitled to issue taxes. 80-90% of their income will come from the government with the rest made up by the communes. This is a clear confirmation of the tendency of the government and the parliament to intervene more and more in healthcare issues. Regulations regarding hospital law thirty to forty years ago were very limited: the county took care of hospital care. To date it is more detailed and through financial control from the government the new regions have limited freedom to prioritise. Only time will show whether the reform results in an improvement in healthcare.

The current situation has not been adequate. Too many decisions were taken due to local interests rather than to the benefit of patients. The horizon for planning has only been four years (the election period). Major reforms (e.g. closing a small hospital or merger of departments) were generally decided upon right after elections. During the recent years it has been obvious that the close connection between voters and politicians in small counties did not result in much-needed decisions for example, cancer surgery was allowed in too small units, and CT-scanners were installed in small hospitals, but not used daily.

Conclusion

In conclusion, it is my opinion that the larger regions should limit the influence of local interests and concentrate on the bigger picture. In 2000 the government gave all counties an extra 26million Euro to invest in scanning capacity for oncologic patients, despite the fact that only six of the fourteen counties and central Copenhagen have oncologic centres for treatment of cancers (radiation therapy and chemotherapy). No money was invested in scanners for oncologic patients, but rather in particular for MR scanners at small local hospitals. A close watch should be kept to ensure that new healthcare reforms allow for the increase in the number of radiologic scans and examinations performed, particularly in oncology, to be met by public healthcare facilities, and to ensure that decisions benefit not just smaller areas but the nation as a whole.

The Aarhus University Hospital is responsible for the clinical education of more than 250 medical students per year. It covers basic and clinical research in more than fifty local or central laboratories spread over seven hospitals. 323 PhD students were registered at the Faculty of Health Sciences in 2004. A strong partnership with national and European institutions enables us to pursue cutting-edge research activities. In fact, over 1,100 peer-reviewed publications are produced annually by the University of Aarhus, comprising 1.5-2% of the world's publications in health science. Due to the fact that in Denmark, it is planned that clinical departments and research activities will be housed in one enlarged hospital facility, we now face the challenge of managing our widespread activities in an innovative way. The University Hospital is managed by a Board of Directors from the University of Aarhus and by regional county governments. The education/research budget includes 15m Euro, with about 7m Euro allocated to research and developmental activities. 45m Euro per year is granted for research from private organisations.

MR RESEARCH AT AARHUS UNIVERSITY HOSPITAL

CROSS-DISCIPLINARY MANAGEMENT POLICIES

It is the main strategy of the Centre to provide a broad platform of MR techniques, thus welcoming a broader spectrum of scientific specialists with a common interest in applying MR to their fields of research. Imaging modalities include CT, PET/CT, Ultrasound, Gamma cameras and IR optical imaging. We also have fifteen MR scanners, three to four of which are used daily for research. Being situated in a Hospital, of course, relevant clinical research programmes have high priority, which can be seen in the themes of our research groups: Molecular Imaging in Cancer, Neurophysiology/ Neuropsychology, Cardiovascular MRI, Kidney Functionality, etc. Our cross-institutional organisational model secures a wide variety of disciplines, with the most up-to-date clinical regimes. In the experimental and clinical radiological departments, facilities allow for cross-disciplinary activities for example, engineers, physicists, chemists, psychologists and researchers, who work together under a common goal.

MR Research: Unified Research Strategies

In Denmark, we try to remain on the cutting edge of our scientific research endeavours. For example, within MR research, the main focus is on quantification of organ functionality of the heart, brain, liver, kidneys and musculoskeletal system. In oncology, this includes quantification of viability in tumour cells subjected to various anti-tumour and tumour vasculature-disrupting therapies. The MR area is pursuing unified research strategies. One of these is "Molecular Imaging and Therapy: design of intelligent molecules for combined magnetic resonance imaging and cancer treatment". Based on new interdisciplinary research achievements, molecular imaging and therapy is directed towards focused therapy based on particles designed for targeting specific pathologic tissues. The technique relays the latest achievements within non-invasive in-vivo imaging methods, nano- and gene technology, immunology, molecular biology, oncology and biomedical engineering. New developments in these fields will result in more effective treatment regimes and preventive measures for diseases like cancer, diabetes, obesity, atherosclerosis and degenerative diseases of aging. Thus our cross-departmental approach to our research enables a wider field of possible long-term benefits in a wide range of diseases.

Here at the Research Centre, we are dedicated to developing new chemo- and radiotherapy regimes implementing molecular imaging-guided treatment that specifically targets abnormal cells. Importantly, molecular imaging has the potential for localising all malignant cells of a specific type, including even small remote metastases. When restricting anticancer therapy to malignant cells only, the debilitating side effects of conventional chemo- and radiotherapy will be reduced and a more comprehensive therapy that will improve virtually every clinical and quality-of-life marker becomes available. In addition, molecular imaging and therapy offers navigational assistance for targeted procedures facilitating unique precision in biopsy procedures.

Conclusion

Each of these steps requires a multi-disciplinary approach that results not only in a superior level of research and a wider target group of research subjects, but that attracts the foremost experts in the field, thus enabling the widest possible implications for improving healthcare and disease control in Europe.

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BRAIN RESEARCH
AT AARHUS PET CENTRE

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FOCUS ON PET RESEARCH ACTIVITIES IN DENMARK

The Positron Emission Tomography (PET) Centre of the Aarhus University Hospital was established on October 20th, 1993, as a joint activity supported by the County of Aarhus, the Medical School of Aarhus University, and the Medical Research Council of Denmark. The centre is a department of the Aarhus General Hospital and a laboratory of the institute of Experimental Clinical Research of Aarhus University. The centre was also the seat of an MRC (Denmark) Chair of brain research until the end of 1999. The centre occupies the bottom floor of the neurology house of Aarhus General Hospital, and uses cutting edge imaging equipment awarded by the Karen Elise Jensen Foundation.

Our Research Activities

The theme of brain research at the PET Centre is the neuroplasticity of predictive coding in the brain. By predictive coding we mean the ability of the brain to predict the meaning of present events and the coming of future events and to restructure itself on the basis of the success of these predictions. The research is carried out at the PET Centre's facilities at the Aarhus University Hospital under the dual auspices of the Aarhus University Centre of Functionally Integrative Neuroscience (CFIN), established by a centre of excellence grant from Denmark's National Research Foundation, and the GSK-Aarhus Institute of Molecular Imaging (GAIMI). The research includes both human and animal studies designed to reveal the interactions among neurotransmission, energy metabolism and cognition in the mammalian brain.

The PET Centre conducts investigations of the relation between energy metabolism and consciousness in the mammalian brain by recording the changes of energy metabolism and consciousness under pharmacological and other manipulations. In the last year, the PET Centre conducted a number of PET studies focused on the questions raised above.

Financing Issues: Diversifying our Resources

The centre's mission is to explore the pathophysiology of disease mechanisms by means of experimental tomography in vivo at the highest scientific and clinical level. Our aim remains to conduct physiological and pathophysiological research in animals and human volunteers, and to undertake diagnostic tests whenever PET is likely to give a useful answer. The research component accounts for 80% of the resources of the centre, while the diagnostic procedures are supported by the remaining 20%. Although the centre has five main areas of research: cardiology, neurology, psychiatry, hepatology and oncology, this article aims to present the activities of the centre in relation of neurological research.

We at the Aarhus PET Center are supported by authorities, funding agencies, and colleagues from around the world. Diversifying our sources of support has enabled the centre to expand despite budgetary cuts experienced by other sectors of the Danish healthcare system. More than half of the support arises from the Research Initiative of Aarhus University Hospitals. The rest is collected from numerous sources, including the Medical Research Council of Denmark, the European Union Biomedical Research Program, the Danish Heart Association, the Novo-Nordisk Foundation, the Parkinson society, the Danish Medical Association, and several private funds. This enables us to continue to maintain our cutting-edge research and to ensure that we stay on the forefront of technology.

Collaborative efforts in which our centre plays a valuable role include the Neuronal Xeno-Transplantation (NeXT), Micro-DAB (microvascular dementia), and COST Action B3 projects of the European Union, and the Center of Drug Design and Transport (CD2T) and FREJA projects of the Danish Medical Research Council. Through this we are active on a European level and can work with other leading experts with an active interest in the field.

ECR 2006
Congress Preview

EUROPE'S LEADING RADIOLOGY CONGRESS

This year's European Congress of Radiology (ECR) takes place March 3 – 7 2006, in Vienna, Austria. It will be the first ECR held under the auspices of the European Society of Radiology (ESR), uniting all major organisations in this field of medicine. Therefore, in addition to taking part in a scientific endeavour, attendees will be part of a truly historic development in European radiology.

SCIENTIFIC PROGRAMME

This year's congress attracted the largest number of submitted scientific papers yet. Fewer than half of these submissions were accepted. Due to the exceedingly well-coordinated efforts of eminent radiologists from across Europe in its preparation, the congress reaches greater heights of scientific achievement every year. ECR 2006 will offer excellent reviews of state-of-the-art practice with glimpses of the future. The scientific sessions will be presented by many of the best radiologists in the world, some of them established names, others young and rising stars.

In addition to proffered papers and scientific exhibits, there is a great variety of invited presentations, including new horizons and special focus sessions and hands-on workshops. Two of the highlights are the new comprehensive categorical courses on the staging of cancer and on thermal tumour ablation, as well as a foundation course on musculoskeletal radiology. The latter course will include another 'ECR first' – a self-marking electronic examination that will allow participants to assess what they have learned. In addition, there will be 'ECR meets' sessions with Russia, Singapore and the United Kingdom. Lectures

ON-SITE REGISTRATION AT THE CONGRESS VENUE

Austria Center Vienna
Bruno Kreisky Platz 1
A – 1220 Vienna, Austria

OPENING HOURS REGISTRATION

Thursday	March 2	09:00 – 19:00
Friday	March 3	07:00 – 19:00
Saturday	March 4	07:00 – 19:00
Sunday	March 5	07:00 – 18:00
Monday	March 6	07:00 – 18:00
Tuesday	March 7	07:00 – 14:00

in these sessions are being delivered by world-renowned radiologists and provide a glimpse of current practice in the nations involved.

SOCIAL PROGRAMME

Even though the ECR by now is one of the largest international imaging congresses in this discipline in Europe it not only offers an excellent scientific programme, but also an outstanding social one. Vienna fulfils anew its reputation as cultural capital of the world, providing a boundless variety of artistic endeavours. Of note is a special area dedicated Wolfgang Amadeus Mozart's 250th birthday, celebrated by the city of Vienna, its citizens and guests.

FURTHER INFORMATION

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CARS 2006

Computer assisted Radiology and Surgery

JUNE 28 – JULY 1, 2006, OSAKA, JAPAN
JOIN T CONGRESS OF CAR/ISCAS/CMI/CAD
WWW.CARS-IN T.ORG

The International CARS Congress provides a forum to close the gap between diagnostic and interventional radiology, surgery and informatics and to encourage interdisciplinary research and development activities in an international environment.

To increase the value of healthcare for citizens, the focus of the Congress is on providing balanced and in-depth information on new diagnostic and therapeutic processes. This includes results from multidisciplinary R&D efforts, providers' experiences, patient outcomes, economic and management considerations, as well as scientific/medical validation results. It can be expected that the resulting awareness by users and providers will speed up the acceptance of CARS into clinical practice. The main emphasis of the presentations of the CARS Congress is on information technologies in radiology and surgery for clinical application fields, such as:

- Medical Imaging, e.g. CT, MR, US, SPECT, PET, DR, Molecular Imaging, and Virtual Endoscopy
- Image Processing and Display
- Hospital-wide PACS and Telemedicine
- Computer Applications for e.g. Neurosurgery, Head and Neck, Orthopaedics, Ear Nose and Throat, Cardiovascular and Thoracoabdominal Surgery, and Plastic/Reconstructive Surgery
- Image Guided Therapy
- Surgical Robotics and Instrumentation
- Surgical Navigation and Simulation
- CAD for Breast, Prostate, Chest, Colon, Liver, Brain, Skeletal and Vascular Imaging

The response to the Call for Papers for CARS 2006 in Osaka has been very encouraging. Altogether, 497 abstracts were submitted from 34 countries. With this level of submissions, CARS 2006 will provide a highly professional programme for the participants. The informal federation of societies and congresses of CARS 2006 in Osaka (ISCAS, CMI, CAD, and CAR) continues to provide the necessary cooperative framework for advancing the development and application of modern computer assisted technologies in healthcare. These four organisations with their specific scientific/medical topics complement one another. They give a worldwide lead in interdisciplinary and international cooperation, which will be the foundation of healthcare in the 21st century.

Looking at innovations in the field of CARS as a means to change processes in health care, where can we expect original research to occur in the near future? Examples of R&D areas from which innovations may be derived are:

- Computer assisted imaging methods and associated workflows that match and enhance the skill levels of health care professionals
- Radiological and surgical assist systems in oncology incorporating novel information sources, e.g. molecular imaging
- Surgical workflow peer-to-peer repositories of "good practice" surgical procedures
- Intelligent CAD systems minimizing false-positives, for example by using a comprehensive imaging repository
- IT methods for seamless integration of the EMR into perioperative information handling
- New IHE integration profiles and DICOM information objects and services to enable smooth communication between radiology and surgery
- Surgical PACS in the operating room as part of a hospital IT infrastructure
- Organ preserving image guided ablation procedure

It appears that more and more of the "high impact" innovations are being made in network environments. General IT examples of this trend are the Internet, open source developments such as OsiriX, the Insight Toolkit, Linux as well as standard activities such as DICOM, e.g. DICOM in Surgery.

These networked environments may take the form of inter-institutional project groups or open consortia. They provide a basis for interdisciplinary cooperation or real and/or virtual meeting places that allow their members to cooperate, collaborate and inter-operate. During the past 20 years, the CARS Congress has been established as an open consortium and as a hub in a network of scientific/medical organizations. It encourages and participates in joint events with these organizations in order to prepare the ground for innovative activities. These collaborative partners seek innovation and progress in the field of CARS by bringing together the "right mix" of potential innovators and lead users, selected from an interdisciplinary and international community.

The CARS Congress is closely linked to the International Journal of CARS. The Journal will present results from the CARS fields in selected proffered papers, review articles, short communications and commentaries. The journal is in a fortunate position, as it can draw from the disciplines of CARS from a 20 year tradition of its congress. CARS has also a long standing relationship with the prestigious Journal of Academic Radiology (AR), USA. The tradition of CARS to encourage and invite submission of manuscripts to AR with a high clinical and educational content in radiology will also be followed in the future. The evolution of CARS as a congress and journal and as a facilitator of innovation is an important contribution to medicine and is expected to provide benefit on a worldwide basis to the R&D community and to patients.

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Author Guidelines
for Imaging Management

CONTENT

IMAGING Management, the official voice of the European Imaging Initiative, welcomes submissions from qualified, experienced professionals active in the imaging industry, related technology companies and medical healthcare professionals with an interest in imaging-related topics and themes. We are particularly interested in articles focusing on management or practice issues and therefore accept scientific papers with a clear connection to these areas. Articles must be written by independent authorities, and any sponsors for research named. Our editorial policy means that articles must present an unbiased view, and avoid 'promotional' or biased content from manufacturers.

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Article texts must contain:

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Please use the Harvard reference system. Citations within the text for a single author reference should include the author surname and year of publication; for a citation with two authors include both author surnames and year of publication; for more than two authors, include the first author surname followed by "et al." and the year of publication. Multiple citations should be separated by a semicolon, and listed in alphabetical order.

Example of within text citation: (Sains 2004; Sains and Miller 2002; Miller et al. 2003).

The format for listing references in submitted articles should follow the Harvard reference system. Example of standard journal reference: Sydow Campbell, K. (1999) "Collecting information; qualitative research methods for solving workplace problems", Technical communication, 46 (4) 532-544. Readers will be provided with an e-mail contact for references, which will be kept on file and supplied on request. Authors are responsible for the accuracy of the references they cite.

ACCEPTANCE

It is at the discretion of our editorial board to accept or refuse submissions. We will respond to submissions within four weeks of receipt. We reserve the right to revise the article or request the author to edit the contents, and to publish all texts in any Euromedical Communications journal or related website, and to list them in online literature databases.

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Medical Doctors (respond below)

1. What is your occupation? (check only one)
   ❑ Diagnostic Radiologist
   ❑ Other Physician (please specify)

1a. What is your radiology sub-specialty? (check only one)
   ❑ General Radiology
   ❑ Neuroradiology
   ❑ Nuclear Medicine
   ❑ Vascular & Interventional
   ❑ Nuclear Radiology
   ❑ Cardiovascular Diseases
   ❑ Paediatric Radiology
   ❑ Other (please specify)

1b. I am Chief of my Department
   ❑ Yes
   ❑ No

Non-physician professionals (respond below)

1c. What is your occupation? (check only one)

Administrator/Manager:
❑ Radiology Administrator
❑ Radiology Business Manager
❑ PACS Administrator

Executive
❑ Chief Information Officer / IT Manager
❑ Chairman / Managing Director / Executive Director
❑ Chief Financial Officer / other executive titles

Other
❑ Medical Physicist
❑ Academic
❑ Chief Technologist / Senior Radiographer
❑ Manufacturer
❑ Business Consultant
❑ Distributor / Dealer

All respondents reply to the questions below

2. In what type of facility do you work? (check only one)
   ❑ Private clinic
   ❑ Hospital (check number of beds)
   ❑ More than 500 beds
   ❑ 400-499 beds
   ❑ 300-399 beds

3. With what technologies or disciplines do you work? (check all that apply)
   ❑ Diagnostic X-ray
   ❑ Nuclear Imaging
   ❑ Interventional Radiology
   ❑ CT
   ❑ Ultrasound
   ❑ MRI
   ❑ Mammography
   ❑ Bone Densitometry
   ❑ PACS/Teleradiology
   ❑ Cardiac Imaging
   ❑ PET
   ❑ Echography
   ❑ Angio/Fluoroscopy

MARCH 2006

03-07	European Congress of Radiology (ECR) VIENNA, AUSTRIA *www.ecr.org*
27-29	British Nuclear Medicine Society (BNMS) Spring Meeting 2006 MANCHESTER, UK *www.bnms.org.uk*

JUNE 2006

14-17	15th World Congress in Cardiac Electrophysiology and Cardiac Techniques (CARDIOSTIM) NICE, FRANCE *www.cardiostim.fr*
19-23	European Society of Gastrointestinal and Abdominal Radiology Annual Meeting (ESGAR) CRETE, GREECE *www.esgar.org*

SEPTEMBER 2006

2-6	World Congress of Cardiology BARCELONA, SPAIN *www.escardio.org*
9-13	Cardiovascular and Interventional Radiology Society of Europe Congress (CIRSE) ROME, ITALY *www.cirse.org*
15-19	18th European Congress of Ultrasound in Conjunction with XVIII Congresso Nazionale Siumb (Euroson Siumb 2006) BOLOGNA, ITALY *www.euroson2006.com*
21-23	European Society For Magnetic Resonance in Medicine and Biology (ESMRMB) 23rd Annual Meeting WARSAW, POLAND *www.esmrmb.org*

MAY 2006

15-17	UK Radiological Congress (UKRC) BIRMINGHAM, UK *www.ukrc.org.uk*
24-27	German Radiology Congress BERLIN, GERMANY *www.roentgenkongress.de*

AUGUST 2006

31-2	Congress of the European Association of Hospital Managers 21st in Bi-annual Congress DUBLIN, IRELAND www.eahm2006.ie

OCTOBER 2006

5-7	Management In Radiology 9th Annual Meeting (MIR 2006) BUDAPEST, HUNGARY *www.mir2006.org*

NOVEMBER 2006

05-09	48th Annual Meeting American Society for Therapeutic Radiology & Oncology (ASTRO) PHILADELPHIA, PENNSYLVANIA, US *www.astro.org*
14-18	Medica DÜSSELDORF, GERMANY *www.medica.de*
26-01	Radiological Society of North America CHICAGO, US *www.rsna.org*

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