



**Scientific Sessions for  
Medical Students  
(H)**

Friday, March 4, 12:30 - 13:30

Room L/M

## MS SS 1

### Session 1

Moderator:

H. Ringl; Vienna/AT

#### H-1

##### Fascinating imaging and promising researches of the brain

A. Rácz; Budapest/HU

**Purpose:** Magnetic resonance imaging (MR) has undergone rapid development over the last two decades and has become the leading tool of imaging brain structures and functions. Of the non-conventional MR techniques diffusion tensor imaging (DTI) and MR spectroscopy (MRS) are providing new perspectives in understanding underlying mechanisms in neurological diseases, giving wide prospects in research and therapy, especially in neuro-oncology.

**Methods and Materials:** DTI is a diffusion-weighted imaging technique which shows the directionality of the diffusion of water molecules voxel by voxel, hence creating the fractional anisotropy (FA) map. With this diffusion properties can be observed. Tractography is based on FA map and is to image the intact or injured white matter connections. MR spectroscopy enables us to show certain metabolites in the brain tissue and to measure their quantity in the normal tissue and in lesions. The most widely used MRS technique is proton spectroscopy.

**Results:** DTI and tractography allow us to show not only structural but functional changes in the brain. Therefore, with the help of FA maps, we are able to describe the properties of different pathological processes. This possibility has the most important role in the field of neuro-oncology. Beside this, tractography has a strong potential in surgery planning with its ability to show the intact white matter connections. By showing metabolic changes MRS also has an implication in oncology, but it can be very useful in many other processes too, like inherited or acquired metabolic diseases.

**Conclusion:** With the use of DTI, tractography and MRS we can widen differential diagnostic tools and in the future not just our diagnostic capabilities might be stronger but with the help of these techniques we can also reveal the exact etiology of many, still undiscovered diseases.

#### H-2

##### Intuitive updating of post-test probabilities in the light of new evidence - application and pitfall

M. Benndorf; Jena/DE

**Purpose:** To demonstrate that naïve updating of post-test probabilities according to new evidence may be flawed.

**Methods and Materials:** For the interpretation of a diagnostic test, the positive and negative predictive values (PPV, NPV) must be known. These values can be obtained by using Bayes' theorem  $[PPV = SE \times \pi / (SE \times \pi + (1 - SP) \times (1 - \pi))]$ , which employs sensitivity (SE), specificity (SP) and estimated prior-probability ( $\pi$ ) of the target disease.

Most radiologic examinations do not convey only a singular information, but a huge amount of image features ( $X_1 \dots X_n$ ) is observable. The sensitivity of the combination of  $X_1 \dots X_n$  is  $P(X_1 \dots X_n | D)$ , where "D" denotes "diseased". If  $X_1 \dots X_n$  are conditionally independent,  $P(X_1 \dots X_n | D) = P(X_1 | D) \times P(X_2 | D) \times \dots$ . It is possible to calculate sensitivity and specificity for each of  $X_1 \dots X_n$  separately.

However, in clinical image interpretation the independence assumption seldom holds. The "mammographic mass" dataset from the UCI machine-learning repository is used to illustrate the flaw introduced into derivation of post-test probabilities by erroneously assuming independence of successively observed signs. The dataset comprises classification of margin and shape of 892 mammographic lesions (424 malignant, 468 benign).

**Results:** Lesion feature  $X_1$  "irregular shape" had sensitivity=73.3%, specificity=81.8% and PPV=78.5% ( $\pi \approx 0.48$ ). Lesions feature  $X_2$  "ill-defined/spiculated margin" had sensitivity=69.8%, specificity=77.8% and PPV=74.0% ( $\pi \approx 0.48$ ). If PPV for  $X_2$  was calculated with  $\pi = PPV(X_1) = 78.5\%$ , sensitivity=69.8% and specificity=77.8%, a value of 92.0% was achieved. This procedure is only valid if  $X_1$  and  $X_2$  are conditionally independent. However, if  $X_1$  was positive in the dataset ( $n=396$ ), sensitivity and specificity of  $X_2$  changed to 77.8% and 25.9%, respectively. PPV( $X_2$ ) now was 79.3%, being significantly lower than the PPV under assumed conditional independence ( $P < 0.05$ ).

**Conclusion:** Thoughtful image interpretation requires dedicated knowledge of observable signs and their diagnostic performance. The naïve updating of post-test probabilities with assumed fixed sensitivity and specificity therefore may be flawed.

#### H-3

##### Scintigraphy of neuroendocrine tumours using 99mTc-Tektrotyd

M. Stojkovic; Belgrade/RS

**Purpose:** 99mTc-Tektrotyd is a radiopharmaceutical for diagnosis of tumours with overexpression of somatostatin receptors. The aim of the study is detection of primary and metastatic neuroendocrine tumours (NET).

**Methods and Materials:** In 33 patients with different NET, whole body scintigraphy, SPECT and particular views were performed 2h and 24h after i.v. administration of 740MBq 99mTc-Tektrotyd.

**Results:** In the group of 9 patients with NET of unknown origin, there were 7 true positive (TP), and 2 false negative findings (FN). Diagnosis was made according to SPECT findings in 6 patients of this group. In the group of 8 patients with gut carcinoids, there were 4 TP, two true negative (TN), one FN, and one false positive (FP) finding. Diagnosis was made according to SPECT findings in 2 patients of this group. In the group of 7 patients with neuroendocrine pancreatic carcinomas there were 4 TP, and 3 TN findings. Diagnosis was made according to SPECT findings in 2 patients of this group. In the group of 6 patients with lung carcinoids there were 4 TP, one TN, and one FN. Diagnosis was made according to SPECT findings in two patients of the group. In the group of 3 patients with gastrinomas there were 2 TP findings, and one TN. Diagnosis was made according to SPECT findings in two patients of the group. According to our results, overall sensitivity of the method is 84%, specificity 88%, positive predictive value 95%, negative predictive value 64% and accuracy 85%.

**Conclusion:** Our preliminary results show that scintigraphy with 99mTc-Tektrotyd is useful for diagnosis, staging and follow up of the patients suspected to have NETs. SPECT had an important role in diagnosis.

#### H-4

##### Paracingulate sulcus morphology and neuropsychological characteristics in people with a genetic susceptibility to bipolar disorder: a neuroradiological study emphasising the potential for prediction of development of psychosis by radiological methods

C. Carstairs; Edinburgh/UK

**Purpose:** This study explores the fascinating potential for using neuroradiological methods to predict the onset of bipolar disorder (BD). Neuroradiological studies show that bipolar subjects display morphological differences in the paracingulate sulcus (PCS), a brain-fold within the anterior cingulate cortex. It is unknown whether these differences are genetically determined. Neuropsychological studies indicate that some individuals at high genetic risk of BD display subclinical features of the illness, but it is unknown what determines which high-risk individuals are affected. This study aimed to determine whether: 1. individuals at high genetic risk of BD exhibit abnormalities in PCS morphology; 2. there is an association between any differing aspects of PCS morphology and the presence of psychopathological symptoms.

**Methods and Materials:** In this unique study PCS morphology was rated on MRI scans, using previously established methods, in 117 individuals at high familial risk of BD and 75 controls aged between 16 and 25. Results from neuropsychological assessment by TEMPS-A, RISC and Ekman 60 Faces tests were also analysed PCS morphology.

**Results:** Morphological differences between high-risk and healthy control subjects included: statistically significant greater incidence of a continuous left PCS in high-risk subjects; a trend approaching significance for greater incidence of PCS in high-risk subjects across hemispheres; qualitative differences between groups in patterns of PCS asymmetry. Continuous left PCS correlated significantly with neuropsychological test scores.

**Conclusion:** These novel findings provide an excellent basis for further work in determining neuroradiological predictive factors in BD onset. The study adds to our knowledge of anatomical differences in individuals genetically susceptible to BD, as well as morphological associations between the PCS and cognitive and emotional function. This highlights the fascinating challenge of eventually using radiological methods to help predict onset of BD.

#### H-5

##### Coronary CTA: input of prospective cardiac gating to reduction of radiation dose

M.A. Glatzkova; Moscow/RU

**Purpose:** New methods for CTA radiation exposure reduction remain one of the fascinating challenges for the future. The purpose of the study was to compare the patient radiation dose and image quality of coronary CTA examinations, performed with retrospective and prospective ECG-gating.

**Methods and Materials:** 59 CTA studies of patients with coronary artery disease

were selected retrospectively from the database. 29 patients were examined with prospective and 30 patients – with retrospective ECG-gated protocols, respectively. All examinations were performed with 64-row MDCT. Image quality of coronary arteries was evaluated using a four-point grading scale (4 - nondiagnostic images; 1 - excellent quality). Effective radiation doses of prospective and retrospective CT angiography were calculated using volume CT dose index (CTDIvol) and dose-length product (DLP) with a conversion coefficient 0,014 mSv/ mGy\*cm. Data regarding image quality and radiation exposure for prospective and retrospective CTA were compared.

**Results:** Age, heart rate and scan parameters (tube voltage, tube current and scan range) were not statistically different between the two groups. Image quality in coronary artery branches was similar between the retrospective and prospective gating protocols (1,5±0,7 vs 1,45±0,6, respectively, n.s; P= 0,47). CTDIvol and DLP in the prospective ECG-gating group were 19,7±4,2 mGy and 273,9±64,9 mGy/cm, which were significantly lower (P<0.05) than those values in the retrospective ECG-gating group (38,3±7,7 mGy and 665,7±180 mGy/cm). Calculated effective dose for prospective CT angiography was 59% lower than that for retrospective CT angiography (3,8±0,9 mSv vs 9,3±2.5 mSv; P < 0,001).

**Conclusion:** Prospective ECG-gating can substantially reduce radiation dose during CT angiography without decrease of image quality.

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## MS SS 2

### Session 2

Moderators:

A.K. Dixon; Cambridge/UK

B.J. Hillmann; Charlottesville, VA/US

### H-6

#### To be or not to be a radiologist - radiology through the eyes of medical students

G.Ungureanu, V. Barbus; Cluj Napoca/RP

**Purpose:** Choosing a medical specialty has always been a challenge for any student. Our purpose was to determine the factors which influence them in making this choice and the degree to which students consider radiology as a possible career.

**Methods and Materials:** Cross-sectional study on 849 students attending the Faculty of Medicine in Cluj, conducted by applying a questionnaire containing 27 closed ended questions. The questionnaire was tailored for this study and addressed the following issues: aspects considered when choosing a medical specialty; perspective on the ideal means of studying radiology; radiology as a career. There were three groups: G1- students that had already studied radiology (525); G2- questioned both before and after taking the Radiology classes (120); G3 - hadn't studied radiology (204 students).

**Results:** In G1, 16% of the respondents considered it one of their top three career options. In G2, 6% added radiology among their top three choices (6% vs. 12%). 84% of the respondents considered passion as the main criteria while 43% referred to the financial aspect as being very important in choosing a career. 72% of respondents considered the teacher as a great influence over their specialty choice. Speech skills (66%) and grading correctness (50%) were the most important traits of a professor. 67% of students in G1 and 3 consider clinical work more instructive while 33% consider theoretical activity more important for learning Radiology. Regarding reasons for choosing radiology as a career, 40% of G1 and 3 referred to the work amount/wage ratio, 37% considered the importance of the specialty. Insufficient interaction with patients deters them from choosing radiology (66%).

**Conclusion:** Adequate teaching skills and work in a clinic could increase the attractiveness of radiology as a medical specialty.

### H-7

#### Improving the clinical supervision of undergraduate students in CT

E. Zaloni, V. Diakatou; Athens/GR

**Purpose:** The purpose of this study was to measure student perceptions of the clinical learning environment in CT.

**Methods and Materials:** A Likert-scale questionnaire was developed, including 33 forced-choice items subdivided into five attitude scales: communication and feedback, learning opportunities, learning support and assistance, department atmosphere and supervisory relationship. The questionnaire was administered to 45 radiography students that attended their 11 weeks clinical education in CT during the winter semester of 2010 in 12 hospitals.

**Results:** Forty-three out of 45 students (95.5%) filled out the questionnaire. The mean age of the group was 22 years. The students generally rated as "positive" the learning environment, with the mean range of questions being between 3.23 and 4.67, and the mean range of scales being between 3.60 and 4.07 (on a 1 to 5 scale, with higher values corresponding to more positive learning situations). The between-hospital differences as for the students' responses in the 5 scales were significant for all the scales (p < .01), while the differences in students' responses in relation to the percentage of supervision was statistically significant only for the supervisory relationship scale (p = .000).

**Conclusion:** The differences between the hospitals were important and the questionnaire, once refined, can be used to audit the clinical supervision of students in CT. In half of the hospitals, only 20% of students were assigned a clinical instructor, whilst 80% of students were assigned a staff resource. This study indicates the need of developing a new model for the clinical practice based on the introduction of mentoring.

### H-8

#### Parents' views of paediatric care concerning their child's conventional x-ray examination

C.G. Stanica; Arlöv/SE

**Purpose:** Studies indicate that conventional x-ray examinations can be stressful to children and have a great impact upon them. One coping strategy that children use is to have their parents nearby. Parents can also experience stress during their child's hospital visit and it can be difficult for them to watch their child undergo treatments or examinations. Worried parents lead to worried children and it is therefore important to support parents in their child's health care.

The aim of this survey is to measure the degree of parent satisfaction/dissatisfaction of their child's care in connection with a conventional x-ray examination.

**Methods and Materials:** A questionnaire survey was used. The participants were consecutively selected from patients referred to the x-ray department of paediatrics at Lund and Malmö University Hospital, Sweden. An adjusted version of the questionnaire "Healthcare Satisfaction Module specific for Hematology/Oncology" (Varni, Quiggins, Ayala 2000) was used. The modified version of the questionnaire contains 20 questions divided into 6 domains (information, communication, emotional needs, technical skills, inclusion of family, general satisfaction).

**Results and Conclusion:** We are in the process of writing this report and right now we have collected half of our data. The report will be completed and examined in January 2011 at Lund University, Sweden.

### H-9

#### Radiology as a career: what do students and interns think

N.M. Hughes; Dublin/IE

**Purpose:** The purpose of this study is to examine the factors that influence students and interns when considering the possibility of Radiology as a career and how clinical rotations through the department impact on their perception of the specialty.

**Methods and Materials:** A cross-sectional, attitudinal survey was distributed to 4th year medical students, final year medical students and interns working in 2 teaching hospitals affiliated with the university. 99 of 417 (=23.7%) surveys were returned. 24 4th year students, 70 final year students and 5 interns completed the survey. The survey asked students/interns if they would consider a career in radiology and to rate the most attractive and unappealing areas of the specialty. Respondents were also asked about their clinical rotation through the department and if it influenced their perception of the specialty.

**Results:** 14% of respondents said they would consider a career in radiology, rating lifestyle, working hours and a more flexible working schedule highly. 43 of 78 students who had completed a rotation in the department listed interventional radiology as the most appealing subspecialty because of more patient interaction and a therapeutic element. 53% of respondents would not consider radiology as a career largely because of a perceived lack of patient contact and concern over their status amongst colleagues. The remaining 33% were undecided. 78% reported an improved perception of radiology after completing a week long rotation and indicated that they had a greater understanding of the specialty as a result.

**Conclusion:** This study highlights the importance of a clinical rotation through the radiology department for medical students as it improved the perception of the specialty in the majority of respondents.

## H-10

### How radiology is changing: three unavoidable challenges for the future

C. Messina; Milan/AT

**Purpose:** My purpose is to discuss three relevant challenges for radiology in the present time and for the next future.

**Methods and Materials:** Radiology is considered the most rapidly evolving speciality in medicine. However, many challenges are still to be faced.

**Results:** First, "personalised medicine" is promising to revolutionise the approach to disease. The link between genetic and clinical profile will permit to abandon the concept of "patient" for the newer one of "individual". The right diagnosis and treatment at the right time could be offered to each patient. In this scenario, radiology should play an important role, introducing the personalised screening programmes, taking into account the individual risk of the disease. A first example is the use of MRI for screening women with a high genetic-familial predisposition to breast cancer. Second, radiology was traditionally based on image acquisition and visual interpretation. Although qualitative analysis remains essential, more and more we need to obtain numerical data to work on. In other words, radiologists should be able to measure and give interpretation of parameters based on numeric quantification. This would allow for establishing objective thresholds to understand whether a parameter is normal, also producing results as less affected as possible by human and instrumental variability. The third challenge is intimately connected to the previous ones. Evidence-based radiology is a clinical practice based on the critical evaluation of the results obtained from scientific research. Radiologists should demonstrate that new imaging discoveries are directed to provide significant gain in patient outcome, rather than increase ability to see more and better.

**Conclusion:** In conclusion, winning these challenges, radiology will produce enormous benefits in terms of patients' care and cost reduction.

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## MS SS 3

### Session 3

Moderator:

A.P. Toms; Norwich/UK

## H-11

### Changing radiology teaching within the undergraduate curriculum in a single centre within the United Kingdom

J.-R. Angus; Dundee/UK

**Purpose:** Radiology can help to develop students' knowledge of human morphology, physiology and disease processes during early undergraduate (UG) education and further enhances understanding of patient management during clinical placements. The advent of digital imaging using picture archive and communication systems (PACS) and adoption of problem-based learning (PBL) allow radiology teaching to be conducted out with the radiology department within an integrated teaching model. However, radiology remains under-represented within the UG curriculum, despite its integral role in modern patient management.

The Royal College of Radiologists (RCR), United Kingdom, has highlighted the need for change in radiology teaching within medical school curricula. The RCR has proposed a core syllabus, which comprises basic radiograph interpretation, an understanding of the role of imaging within clinical investigation, knowledge of the Ionizing Radiation (Medical Exposure) Regulations (2000) and developing communication skills to better prepare patients for investigation. This would enable students to understand the strengths and limitations of key investigations and to adopt appropriate attitudes towards justifiable referrals. Investment in teaching radiology at an early stage may benefit both the patient and the hospital, due to a reduction in inappropriate referrals that are costly and expose the patient to unnecessary ionizing radiation.

**Conclusion:** The relative lack of formal radiology teaching content in the University of Dundee UG medical curriculum has triggered the incentive to set up a curriculum development group within the National Health Service (NHS) Tayside Radiology Department, the purpose being to review the curriculum framework proposed by the RCR with a view of incorporating it into the University of Dundee medical UG curriculum. This paper describes the extent and challenges posed to developing such a curriculum and integrating radiology teaching in Dundee.

## H-12

### Sono4You: ultrasound tutorials for students by students

A. Sachs; Vienna/AT

**Purpose:** Medical Students at the Medical University of Vienna lack education in basic ultrasound skills such as standard techniques and patterns. Furthermore, there are few possibilities to practice these skills during their studies. Therefore, we established the project "Sono4You", which provides students with the possibility to practice sonographic skills on a regular basis.

**Methods and Materials:** Ultrasound courses, divided between "Ultrasound Basics and Standard Patterns" and "Practicing Tutorials" are held by experienced students (tutors) who are in advanced stages of their studies (4th to 6th year). They have all been educated by radiologists and cardiologists. Students in their 3rd and 4th years are the target audience.

Tutorials are provided for groups of six participants, the duration ranging between two and four hours depending on the experience of the group as well as the availability and dedication of the tutor.

It has never been the intention to pay these tutors, as they are all providing the tutorials on a voluntary basis, solely to educate themselves and other colleagues. Participants do not receive any confirmation of participation.

**Results:** Beginning in 2007, the project averaged 30 to 40 courses per semester, thereby giving a huge number of students an additional possibility to practice ultrasound techniques regardless of their year of studies.

At present, additional courses (head and neck region, basic echocardiography) are provided by these tutors.

**Conclusion:** Since 2007 the range of courses has improved. At the moment, courses are available on a regular basis in upper abdominal sonography, echocardiography and sonography of the head and neck region.

Participants gain the ability to understand anatomical structures in three dimensions which improves the educational effects of dissection courses, medical clerkships, and practical work in the 3rd part of medical studies.

## H-13

### A medical student's journey in research and radiology

S. Oberoi; Charleston, SC/US

**Purpose:** Even before I began a career in medicine, my first encounter in the foreign milieu of research had implanted the notion of scientific inquiry in my mind. My commitment to the study of medicine has only reinforced my conviction to become a lifelong scientist. Research is the driving force of technological progress in radiology. It demands persistence, dedication and fortitude, the same defining characteristics of a physician. I believe that we would not be effective physicians without considering the important medical breakthroughs that research offers and I am resolute to a lifetime of contribution to this growing body of knowledge. With a field as dynamic as radiology, it is challenging to predict what the future of diagnostic radiology will entail. By being on the forefront of scientific discovery now, I hope to be equipped with the skills necessary to tackle the problems radiology will face.

**Results:** I acknowledge that such research is valid only when carried out in the interest of the patient. Medical knowledge is best used to provide a connection between clinical research and treatment, while always keeping the needs of the patient in mind.

**Conclusion:** The process of scientific inquiry, the active search for knowledge, is a humbling one. The journey may sometimes manifest in the form of an epiphany but more often than not, will send me back to the white board, in search of answers. Despite these frustrations, I am driven by my thirst for the unknown.

## H-14

### A day in the life of a radiology resident

M. Magbbool; Dublin/IE

**Purpose:** Radiology is an exciting and evolving speciality that presents unique challenges to the radiologist-in-training in terms of gaining knowledge, acquiring skills, and communicating effectively within the department, with referring physicians, and with staff and patients.

As with all training posts in medicine and surgery, personal education must coincide with maintaining workflow, which for the radiologist necessitates effective multitasking in the form of manipulating multiple computer workstations, using dictation software, responding to queries both by phone and in person, and looking up information relevant to the case at hand all while serving two potentially contradictory interests: those of the patient and those of the referring physician.

The incredible diversity of and rapid advances in radiology means that there is always a study, technique, presentation, or diagnosis that one doesn't know, and dedicated study must be balanced with practical hands-on experience in the reading

room and in the procedure room. The radiology resident needs both confidence and humility when approaching any given case – the confidence to make the call or to capably perform the procedure, and the humility to know that something may be missed or that the procedure may not succeed. The key is to recognise one's limitations and to ask for help when appropriate without compromising patient safety and with minimal interruption to others in the department.

**Conclusion:** I hope to illustrate the challenges and opportunities involved in radiology training by outlining a "typical" day in the life of a radiology resident, describing the caseload, the conferences, the procedures and the interruptions that are part and parcel of learning radiology on the job while providing a vital service to patients and physicians as part of modern medical practice.

## H-15

### Problems in undergraduate education in Brazil

D.B.D.Z. Dalke; Curitiba/BR

**Purpose:** Higher education in radiology in Brazil is not so recent, however, its structure still presents serious problems. The regulation of the profession of radiology technologist has not happened yet; the graduates in this mode have to submit tenders and the technical level of wages. The counsel representing the class is also the technical level.

**Methods and Materials:** Some universities offer the course recognized technologist in radiology and has high concept before the MEC, however there are many universities offering such low-quality course without even the recognition of the MEC, which worsens the situation in the labour market, because with so many professionals have shown that higher education was worse than the technical level, justifying the salary you end up getting.

**Results:** This situation urgently needs to change, it is extremely important that the professional working with ionizing radiation has a top quality course that offers both theoretical and practical physics and medicine. It is unacceptable for a professional in this area do not know how the x-rays are produced, and unfortunately this is the reality in Brazil.

**Conclusion:** The college is the best solution to solve these problems, however it is necessary that the MEC does its job and close the universities that are unprepared to teach this profession, and also that the government regulates the profession of radiology technologist with a minimum wage appropriate for professionals to play their role properly and not end up abandoning the profession, leaving this very important tool. But it must be used cautiously in the hands of professionals with less knowledge.

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## MS SS 4

### Session 4

Moderators:

A.K. Dixon; Cambridge/UK

B.J. Hillmann; Charlottesville, VA/US

## H-16

### Radiology: prejudices and hidden fascination

A. Jost; Sulzbach/DE

**Purpose:** A day in a life of a radiologist is presented. The aim is to evaluate the prejudices of radiology and to illuminate its fascination.

**Methods and Materials:** In the morning, the radiologist steps in front of the surgeons, assessing about 100 pictures each in a few seconds. Afterwards, he presents images to the internists. While mentioning differential diagnoses, someone tells clinical information that dispels 2/3 of them. The radiologists workplace can either be at CT, MRT, angiography or x-ray. There he interprets pictures from all parts of the body. When there is an emergency, the radiologist quickly assesses the trauma scan while the surgeons wait impatiently. In case of ongoing bleeding, the radiologist coils the vessel to save the patients life. Due to the emergency, one patient is waiting at CT with a lumbar bone fracture for his radiofrequency kyphoplasty and another one at angiography for chemoembolisation. Later, the radiologist lectures young doctors new radiologic methods like PET-MRT or molecular imaging.

**Results:** The prejudice that radiologists have no contact to patients is refuted. They are not only service providers anymore and though their diagnoses are of high importance, radiologists also treat patients themselves.

Radiology is very interdisciplinary, every part of the human body is assessed. Additionally, radiology is highly innovative and new innovations are implemented quickly, compared to other departments. Research is multifaceted with all the dif-

ferent methods and all possible diseases in all parts of the body.

**Conclusion:** Radiology has the reputation to be a department where images are looked at instead of patients and that radiologists are only service providers for the other departments, but in fact, radiologists treat patients themselves and develop new technologies to improve the insight into the human body.

## H-17

### The x-choice

E. Zagvozdkin; Moscow/RU

**Purpose:** Why radiology? For me, it's no question and I'll explain why. The best radiologists are knowledgeable in a vast swath of the medical terrain with some degree of expertise in practically all fields of medicine. It's remarkable to be trained in such a diversity of pathology. At the same time a good radiologist is an indispensable assistant to the treating physician.

It's easy to lose sight of the technical achievements embodied by an ultrasound or MR scanner, and almost everything that radiologists do is dependent on some of the most sophisticated scientific developments on the planet. The radiologic technology is amazing and approaching to the realm of science fiction. There is tremendous growing potential in the field. Various visualization techniques are used for many medical manipulations and this increases efficiency and safety of treatment. Molecular imaging - the ability to produce maps of physiologic activity on the protein and biochemical level - is fast becoming a reality. Combined with advances in biotechnology and nanotechnology, radiology will remain in the forefront of medical innovation.

There is great variety of opportunities available in radiology. For example, you can do teleradiology from halfway around the world or get a consultation from your colleagues potentially at any time. Fellowship opportunities in radiology are plentiful and everyone can find interesting ones for him/her.

**Conclusion:** Radiologist is a profession that demands commitment, a high level of skill and accuracy. I think it's an adequate price for the opportunity of examination of the human organism. It's difficult to imagine modern medicine without radiology. This science is very interesting and truly absorbing part of medicine. This is my area of interest, my choice.

## H-18

### Magnetic resonance imaging education "down-to-earth"

L.I. Lanczi; Debrecen/HU

**Purpose:** Students of medicine and radiography often find it strikingly hard to interpret MR images not merely because of their small experience in radiology but also due to the fact that understanding images calls for the comprehension of image acquisition technique basics. The necessity of profound imaging physics knowledge becomes evident when students face state-of-the-art MR scans like diffusion-weighted imaging or fMRI. To address this problem more interactive tools and practice-oriented teaching sessions are required. We believe that the optimal education guides students through the entire acquisition procedure and also allows trial-and-error interaction with the MRI device.

Teachers confront major problems during practical MRI education: the equipment is expensive, stationary and interaction is limited. Recent developments allow manufacturers to produce MRI devices that lack large superconductors or permanent magnets; the Earth's weak but homogeneous magnetic field can also be exploited to perform basic MR experiments. A portable, Earth-field MRI (efMRI) device is available in our institution; it is envisaged that hands-on MRI practices will be implemented into education, regardless of the training programme: clinical radiology or radiography. In our lecture we would like to demonstrate the feasibility of our efMRI device in undergraduate education.

**Conclusion:** Magnetic resonance imaging (MRI) – a flagship among the state-of-the-art medical imaging techniques – had found widespread use in several clinical subspecialties during the last decades. There is compelling evidence that the integration of the hands-on MRI experience into the undergraduate education is beneficial. The inexpensive and ingenious efMRI is optimal for studying the MR phenomenon: from the setup and optimisation tasks until the first FID signal or 3D images are acquired, students can gain insight into imaging physics and acquisition techniques.

## H-19

### Foetal ultrasound imaging: form of art

B. Rancane; Riga/LV

**Purpose:** The purpose of this study is to prove the duality of the work of a radiologist. A good specialist not only is a medical doctor, but also possesses qualities of an artist. Research highlights the similarities between fetal ultrasound imaging and digital photography.

**Methods and Materials:** The work of an obstetric sonographer and the work of a children's photographer were chosen for the research. Accordingly the fetal ultrasonography was compared to the digital photography. The comparison was based on the following parameters: a) reason for taking images, b) way of creating images, c) equipment used, d) image editing, e) image analysis and f) criteria for a successful image. The information was collected through researcher's personal experience and empirical knowledge.

**Results:** The results showed that 5 out of 6 parameters match proving the similarity between fetal sonography and digital photography.

**Conclusion:** Both, obstetric sonographer and children's photographer, aim to create good-quality real-time images of their models, who are actively moving in their own environment. Both specialists have to find the best angle and wait for the perfect moment to take a successful image. They both use computer software for editing the images, adjusting the colours, contrast and brightness. In both cases evaluation and analysis of the image is present, looking for any disharmony.

Even though the reason behind taking pictures for both of these professionals differ, they certainly share the same artistic way of thinking, they both are looking for the unusual and they need to have talent and certain characteristics to succeed in their profession.

## S-20

### Radiology: a holistic medicine beyond medicine

M. Petrini; San Donato Milanese/IT

**Purpose:** My purpose is to show how radiology can be a holistic approach to medicine, going beyond medicine.

**Methods and Materials:** A patient requiring medical care may find today's medicine fragmented: specialties and subspecialties may seem, and sometimes are, unrelated. Highly specialised doctors may get bored with their job: they have to do the same procedures day after day. I think it is intrinsically unavoidable that modern medicine goes along this way in order to reach the best clinical performance. However, medical doctors should have a holistic view of medicine. Radiology is a way to do that: every image shows a patient, not an organ. However, over the years, radiology has changed and has been divided in subspecialties. Nevertheless, radiologists must have a general view: differential diagnosis and incidental findings are day-by-day challenges. Conversely, radiological scientific research allows to get a deeper and deeper insight of specific preclinical or clinical fields.

**Results:** Many people wrongly think that radiologists spend their time watching at x-ray films to detect bone fractures or pulmonary infections. This could have been true many years ago. Today, the large spectrum of imaging modalities dramatically changed the scenario. Modern radiology won the battle of watching inside body using as little as possible ionizing radiation to investigate both morphology and function. Moreover, interventional radiology permits unique ways for treating diseases using minimally invasive procedures. But radiology can go beyond medicine: fMRI is capable to monitor where our behaviors and intellectual capacities are addressed within the brain, a kind of "soul imaging".

**Conclusion:** In conclusion, for these reasons, I really want to be a radiologist. hands of professionals with less knowledge.