# European Medical Physics News

EFOMP

Winter 2007/2008

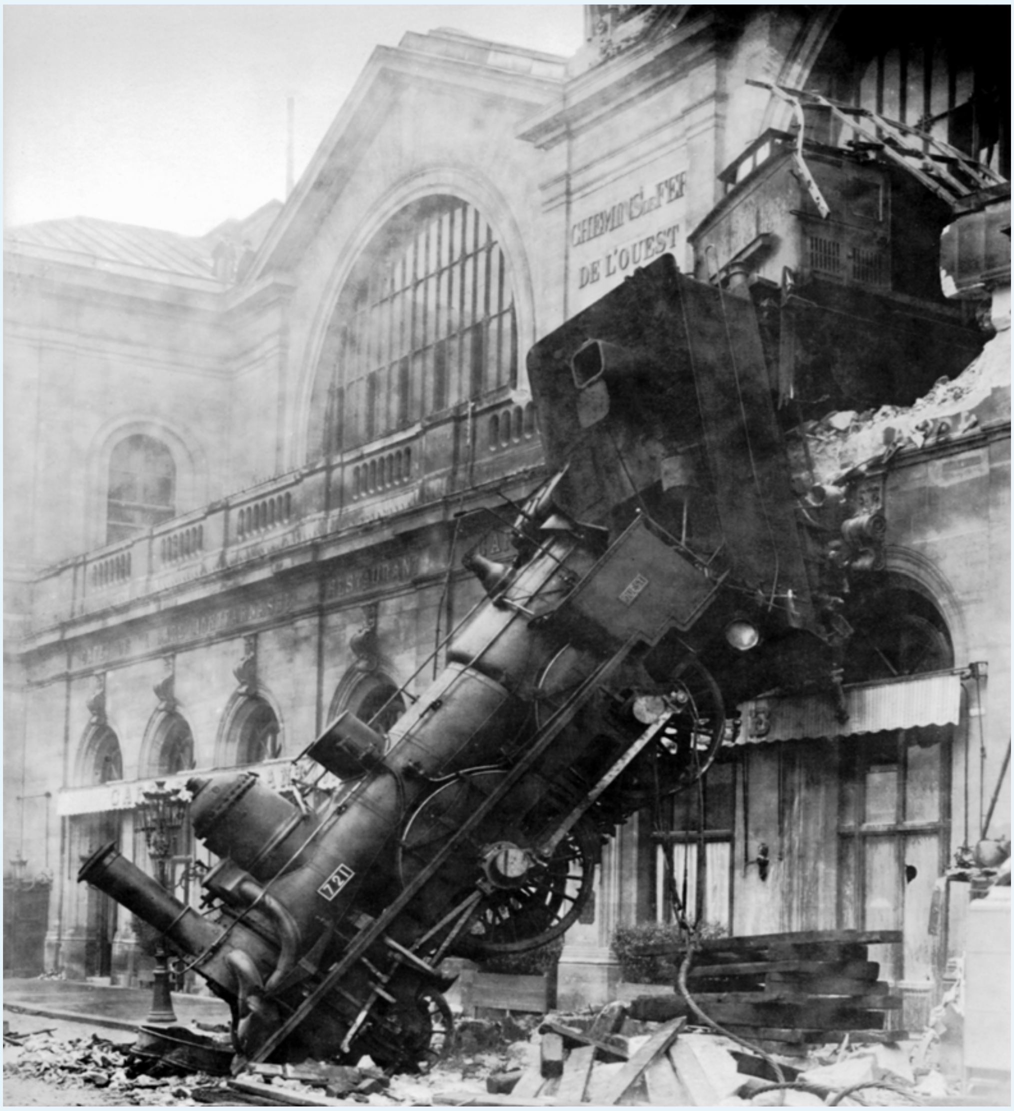
## Contents:



## News from EFOMP:



## Accidents can happen



## *Learning from the past*

## The role of Medical Physics in ensuring safety in healthcare

# Editorial

The safety in healthcare and radiation oncology is of increasing interest to the broad public. Economic pressure on the healthcare system must not interfere with safety issues. Medical physicists due to their broad technical and scientific background can be of great importance in this general matter. Two papers by Herman von Kleffens and the ROSIS group inform us on ongoing projects.

The scientific paper of this issue comes from Italy, a paper by Bisi on the use of a special radiopharmaceutical in neurology in the diagnosis of Parkinson disease.

Stelios Christofides gives a personal opinion on the abstract reviewing process at a large congress like ECR. There will be a follow up statement by Hakan Nyström, chairman of the ESTRO 2007 Congress Scientific Committee, in the next issue of EMP News. What are your thoughts on the peer-reviewing process of abstracts? Let us know!

Medical physics needs exchange. An offer by the Medical Physics Department at Malaga/Spain is accompanied by an interview with its leader Pedro Galan.

Buying new equipment is always an important task. You want to spend the money on the best available instruments. There is a very interesting centre for evidence based purchasing by the NHS/UK comparing various kind of medical equipment in an increasing database on the web.

Medical Physics needs more publicity, good publicity. And it needs to be known already from school age on. There are very nice projects in European countries. Two examples named in a short are a CD with teaching material for schools in the UK and the German PIKO project. If you are aware of initiatives and projects in your country, bring it to our knowledge! What about translating the existing material to your language? Good things should not have to be reinvented but distributed through EFOMP as the central contact for Medical Physics in Europe!

A general hint for publications in European Medical Physics News: all contributions can be in your national language, if they include an English abstract and the permission of reprint if it had been already published. It should include a photo of the author and be sent to either of the editors.

**Change in the editorial team:**

Dear Colleagues,
I have very much enjoyed my time working with Markus on European Medical Physics News. However, I will be taking on a new role with IPEM in the UK, and so I must give up this editorial position. I look forward to reading future issues, and would like to wish the new editorial team best wishes for the future,

Chris Gibson

It is both a pleasure and a challenge to join the editorial team. With the participation and contributions from our members in many different countries this electronic publication should keep us up to date with the activities, expectations and concerns of medical physicists across Europe. I would like to take this opportunity, on behalf of us all, to thank Chris and Markus for all the hard work and time they have put into launching the first issues of European Medical Physics News.

***Nuria Jornet***

***Markus Buchgeister***

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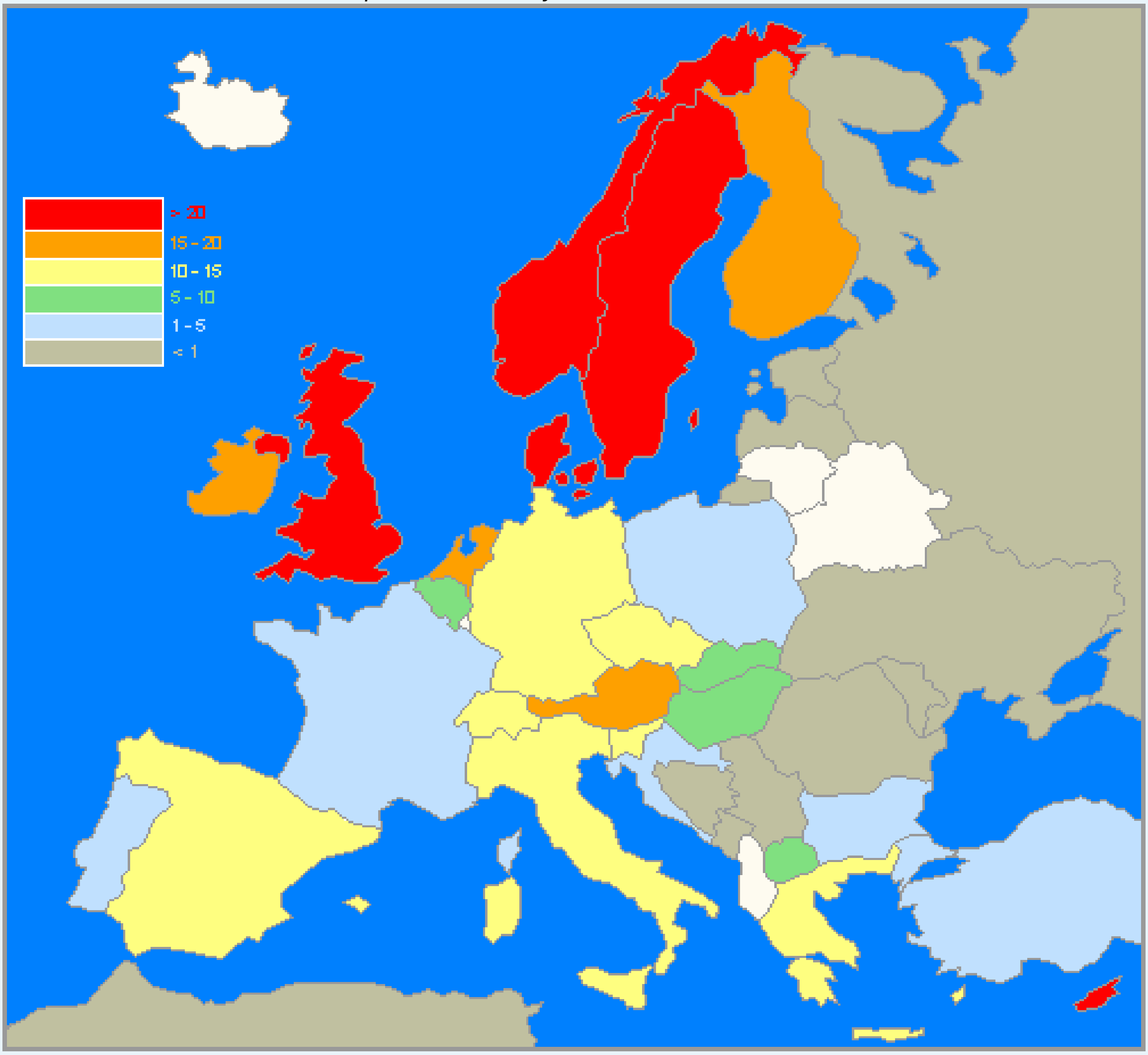



*Corrected figure of Medical Physicists per million population (data from EFOMP membership statistics 2007)*

# Don't trust any statistics…

Dear Editors

Thank you very much for the 2nd edition of the European Medical Physics News. The front page of the newsletter is dominated by a big figure showing different European countries in different colors. Unfortunately, the figure legend is misleading. Not all members of EFOMP are medical physicists!

Let's take Switzerland, displayed in red, as an example. The Swiss Society for Radiation Biology and Medical Physics (SSRMP) is representing Switzerland within EFOMP. But only about 50 % of SSRMP's membership are medical physicists! The remaining 50 % is a mixture of MDs, (radiation) biologists, other physicists, engineers, radiographers, and companies. And ca. 10 % of our membership lives abroad. In other words, taking only the medical physicists per million population, Switzerland should be colored in orange. And if only the active-working SSRMP-certified medical Physicists were counted, the color should be green! Switzerland might be an extreme example, but I am sure that also in other EFOMP countries the membership may contain a significant contribution of other professions or retired medical physicists, thus making the large figure on the frontpage of the last European Medical Physics News useless, as long as the data base is unadjusted.

It's like in medical statistics. Before one is creating statistical figures, it should be clarified that the data base does not contain apples and oranges in a mixture.

Werner Roser, Paul Scherrer Institute, Villigen PSI, Switzerland

Editor's Note: EFOMP membership statistics are already adjusted (e.g. for the UK) where the NMO membership is known to contain a large number of non-physicists. Other NMOs may wish to clarify their medical physics membership.

# News from Member Countries

## Current Status of Medical Physics in the Czech Republic

In recent years, the status of Medical Physics as a profession has undergone substantial changes within the Czech Republic, primarily due to the 2004 directive which lawfully recognizes medical (radiological) physics as a regulated health profession. Although this has had an immediate positive impact upon the profession in general, e.g. significantly higher basic salaries, the system as a whole is regrettably far from satisfactory.

The new legislation was successful in creating a relatively robust framework for the education and training (E&T) system, including CPD. The positive outcomes of this new E&T system are the increased number of graduates joining medical physics teams in hospitals (approx. 10 within the past 2 years) and the fact that the only accredited university MSc degree program is remarkably attractive to new students. On the other hand, the increase in student and trainee numbers is putting pressure on experienced lecturers/supervisors. Most of the senior physicists in hospitals are very busy with routine work and have limited capacity to systematically train their younger colleagues. The fact that the legislation does not define any system of funding in-hospital training has a direct impact on this situation and practically cancels out the positive changes brought by new legislation with regards to postgraduate in-hospital training. Research opportunities and salaries, in spite of the mentioned increase in 2004, are substantially worse than those countries with a traditionally recognized medical physics profession, such as in North America or Western Europe. This situation naturally encourages fresh physicists to further their career abroad.

The E&T starts with a regulated university MSc degree program in radiological physics, following the general physics degree (bachelor) program. The program is accredited by both the Ministry of Health and the Ministry of Education. There is only one program available in the country. As an alternative to this, the qualification course in radiological physics for graduates from general master programs in physics has been recently accredited. This brings about the issue of how to make the latter course equivalent to the regular MSc degree program. Graduates from either branch are recognized as radiological physicists and are allowed to work under supervision by Specialist/Qualified/registered Medical Physicists in hospitals until they finish the next "specialized education" (postgraduate in-hospital training) in either radiotherapy, nuclear medicine or diagnostic radiology. This stage lasts a minimum of 2 years and is terminated by in-specialization exam/attestation and state registration. At the moment, there is still no newly accredited program for this training part of the system. The absence of a systematic source of funding is one of the major reasons.

Limited access to state of art technology in radiotherapy, has been reported as one of the major problems of radiation oncology as one of core medical fields for radiological physics. Nevertheless, thirteen new linacs have been installed in the country within the past 2 years. Insufficient staffing, inadequate salaries and not yet fully established (in-hospital) training can be highlighted as major current problems of Czech radiological physics. Very limited research activity is simply a natural consequence of the above mentioned conditions.

An important outcome of joining international standards has been reflected in international accreditation of Hospital Na Homolce, Prague (Joint Commission International) including operational procedures for Leksell gamma knife, nuclear medicine and diagnostic radiology. These Standards have been found very useful and, among other benefits, have improved communication with physicians. Masaryk Memorial Cancer Institute, Brno has undertaken IAEA QUATRO audit in September 2007. There were no essential physics-related problems and the institute has been found capable of becoming Centre of Competence in the future.

The Czech Association of Medical Physicists (CAMP) was created in 2004. Its major (>70%) activity consists in commenting on newly issued legislation documents and promoting the interests of physicists. The CAMP also takes a relevant part in the project of "National Radiological Standards – Radiotherapy/Nuclear Medicine/Diagnostic Radiology/Radiological Physics" which has been driven by the Ministry of Health since 2005. The project formulates guidelines for creating local standards in accordance with CD 97/43/EURATOM. With a limited budget, the CAMP also supports young physicists by organizing an annual awarded competition and by contributing to cover their travel costs abroad.

**Pavel Dvorák,** (currently at Oxford, UK)

**References**:

http://csfm.cz
http://www.jointcommissioninternational.org
RER/6/013 (QUATRO project), IAEA

# Ankara University Institute of Nuclear Science Department of Medical Physics

Training programs for medical physicists in Turkey began in 1970 at some hospitals but only on a voluntary basis. The first Medical Physics Department in the country was established in July 2007 under the umbrella of Ankara University Institute of Nuclear Science which was founded in the previous year (16 November, 2006). The medical physics training program that had begun at the Engineering Physics Department of Ankara University in 1998 is now under the control of this Department and the content of the MSc and PhD programs have been expanded to all the fields of medical physics (Nuclear medicine, Diagnostic Radiology, Radiation Therapy) as well as Health Physics and Radiation Protection areas. Three professors, two Assoc. Professors, two senior scientists, three research assistants are the members of the academic faculty. A total of three years is required for the MSc program for the students who have graduated from the physics and biomedical departments of other universities, but this program takes only 2 years for the undergraduate students of the Engineering Physics Department of Ankara University since all the first year courses can be taken during the last year of their undergraduate program.

The subjects covered are Physics of Diagnostic Radiology (3h/w), Physics of Radiation Therapy (3h/w), Physics of Nuclear Medicine (3h/w), Mathematical Techniques for Physicists, General Aspects of Radiation Detection and Measurement (3h/w), and its Laboratory (5h/w) in the first year, and Imaging Techniques-One (3h/w) and Two (3h/w), Radiation Biology, Advanced Radiation Therapy (3h/w), Radiation Protection (3h/w), Laboratories for Imaging Technique-One (5h/w) and Two (5 h/w) are the mandatory courses and practicals in the second year. Depending upon their specific fields, MSc students can also take some other courses such as Anatomy, Physiology and Pathology, Advance Radiation Detection Techniques, Non-ionising Imaging, Digital Techniques, Biomedical Instrumentation etc.). The last year of the program is reserved for more practical studies and MSc thesis work. The students studying in radiation therapy spend all their time in the Radiation Therapy Department of the Hospitals. Others, work in the Institute laboratories and as well as at the related departments of hospitals according to their thesis subjects. A minimum of 4 years is required for the Ph.D training for the students who have graduated from the MSc program of the Institute. A total of 25 students graduated from the MSc program between 2001 and 2007. Currently 10 students are taking the courses or studying for their PhD. thesis. Applications from more than 25 students are expected for the spring of 2009.

An agreement between the Institute and the Turkish Atomic Energy Authority has been made to organize short term training courses and workshops for “Radiation Protection Officers” working at the Hospitals through out the country. This Authority donated 1500 square meter of physical space to the Institute in order to carry out these tasks. The Institute is also acting as a consultatory body to

Prof. Dogan Bor among some of his students at the celebration of the first anniversary of his new medical physics department at the XI. Ulusal Medikal Fizik Kongresi of the Turkish Medical Physics Society at Antalya 2007.

nuclear medicine, diagnostic radiology and radiation therapy departments for Turkish hospitals for their quality control and dosimetric activities. The Turkish Government supported the establishment of this Institute with an initial budget of more than 1.5 million Euro and advance laboratories were set up for training and research activities. The Radiation Detection and Spectroscopy Laboratory is equipped with different types of detectors and associated tools for gamma spectroscopy analysis as well as radiation measurements. An X-ray calibration facility for 50-150 keV energy range is already being installed and will be serving as a secondary laboratory in the near future. An imaging laboratory with conventional X-ray and fluoroscopic units, digital radiography system and a digital gamma camera together with all the supplementary equipment will provide almost all the needs of practical training for medical physics. All the necessary phantoms, detectors and other tools for the quality control of imaging systems and dosimetry of different modalities are also available.
The department actively joined a Coordinated Research Project organized by IAEA and has also participated to the SENTINEL EU project in the last years. The main research activities of the group during the last 5-7 years are related to patient and staff dosimetry in conventional radiology, interventional angiography, cardiology and mammography. Some work also had been done in nuclear medicine related to the image quality aspects in single photon emission computerized tomography. Some of the results of these activities have been published in scientific journals and also presented in many international meetings in recent years.
Lately, the group has started to work in digital radiology and will be more involved with PET imaging in the near future. A new project on retrospective dosimetry using luminescence methods will be started in 2008.

**Dogan Bor, Ankara**

## Just English humour?!

***A doctor and a lawyer are talking at a party but their conversation keeps being interrupted by people asking the doctor for free medical advice. After an hour of this the doctor is really fed up and asks the lawyer, "How do you stop people from asking your for legal advice when you're out of the office?"***
***"I give it to them," replies the lawyer. "Then I charge them for it."***
***The doctor is impressed. "Does that really work?"***
***"Certainly does", replies the lawyer. "And that'll be 200 pounds, thank you."***

## First Central & Eastern European Workshop on Quality Control, Patient Dosimetry and Radiation Protection in Diagnostic and Interventional Radiology and Nuclear Medicine

Budapest, Hungary, April 25-28, 2007

The Idea of organizing such a regional workshop arose during the ICMP meeting in Nuremberg, 2005, during personal discussions between the Hungarian participant and the Serbian, Polish, Bulgarian and Slovakian colleagues. The President of the workshop was Dr.*Sándor Pelle*t, general director of NRIRR.
About 60 participants from more than 20 countries, including some delegates from India, Iran, Kenya and Qatar took part in this workshop. There were four invited: *B. Michael Moores* (UK) presented a paper about history and current status of quality control in diagnostic radiology, *Stelios Christofides* (Cyprus) about EFOMP, *Renato Padovani* (Italy) about the SENTINEL project and *Rémy Klausz* (France) about physical foundations and quality control in digital mammography.
Further sessions dealt with dosimetry, optimization, quality control and testing, radiation protection and standardization, computed tomography and nuclear medicine. The Scientific program was completed with a visit to the Diagnostic Radiology Department of the National Institute of Oncology, guided by its head Dr.*Mária Gődény*.
The meeting organisers invited also four European manufacturers of QA equipment: PTW Freiburg, Scanditronix-Wellhöfer, Unfors Instruments and RTI Electronics. This gave the participants the opportunity not only to visit the exhibition but also to attend presentations by these companies.
Both the exhibitors and many Hungarian firms supported the workshop so it was held without participation fee, moreover, organizers were able to support hotel costs of many and travel costs of some.
According to the general opinion of the participants the meeting was very useful and well-organized. *Marta Wasilewska-Radwańska* (Poland) and *Stelios Christofides* concluded in the closing roundtable discussion that such small regional meetings – with limited number of participants and without parallel sessions – make it possible to build and strengthen personal contacts between the participants. Therefore, they are recommended and will always be supported by EFOMP. *Jenia Vassileva* (Bulgaria) volunteered to organise the second edition of this workshop in Sofia in 2009.

**Tamás Porubszky**, PhD
Medical physicist, NRIRR; secretary, HAMP

# XI. Ulusal Medikal Fizik Kongresi

14-18.11.2007, Antalya, Turkey.

The bi-annual medical physics congress of the Turkish Medical Physics of 2007 was organized by (see photo below, from left to right) Dr. Nina Tunçel, Dr. M. Gazem Aksu and Dr. Aylin F. Korcum of the Akdeniz University, school of medicine, department of radiation oncology at Antalya.


The program consisted of sessions covering all aspects of medical physics in radiological diagnostics, nuclear medicine and radiotherapy. Special panel discussions were dedicated to the situation of medical physicists in Turkey, where recommendations of EFOMP policy statements were compared to the current staffing levels in the national clinics and institutes for medical physics and the situation 20 years past the accident at Chernobyl.

Renato Padovani speaking at a session on dosimetry in diagnostic radiology chaired by Dogan Bor.

Sessions in English of invited speakers as Alan Nahum, Nesirn Dogan, Carlo Maccia, Renato Padovani and Markus Buchgeister were interweaved with sessions in Turkish on a high scientific level.

The congress was very well organized by the local team. Most impressive to us visitors from outside Turkey were the many young students among the congress participants. They were specially supported by national authorities, which underlines the investment in a high education of the upcoming next generation of medical physicists in Turkey. Their active role in the congress manifested itself also in the fabulous gala dinner with much dancing that concluded this impressive meeting.

Markus Buchgeister and Renato Padovani

Audience at the special EFOMP session at the XI. Ulusal Medikal Fizik Kongresi

# Parkinson Syndrome and Essential Tremor: Differential Diagnosis using SPECT with DaTSCAN

Dr. F. Bisi, MOD Fisica Sanitaria, A.O. Villa Scassi, Genoa (Italy)

**Abstract**

The application of Nuclear Medicine in Neurology has increased with the introduction of a new radio-pharmaceutical called DaTSCAN available in Italy since 2002. This new compound allows to perform differential diagnosis among Parkinson disease, parkinsonisms and essential tremor. Parkinson disease is the most common extrapyramidal system pathology and is characterised, as parkinsonisms as well, by a severe loss of nigrostriatal dopamine neurons. On the contrary, essential tremor is an "action tremor", that is caused by voluntary muscular contraction and is absent at rest.

The ioflupane is an $I^{123}$ compound that binds with dopamine carriers (DAT) and can be considered as a good dopaminergic system degeneration marker.

Since in Italian legislation, the DaTSCAN SPECT is not yet included, the value of the Diagnostic Reference Level (DRL) comes from clinical studies and is in the range of 111—185 MBq.

The effective dose is about 4,35 mSv for the reference man, calculated for a 185 MBq administered activity. The more exposed organs are bladder, lungs and the large lower intestine, if a thyroid blocking therapy is performed.

The acquisition parameters are almost the same for every type of equipment: 128x128 pixel acquisition matrix, 3° angular step. A pixel dimension of 3 mm is achieved with an appropriate zoom and 40 seconds acquisition time for each angular view, corresponding to 3000 kcounts totals.

Both, filtered back-projection and iterative methods can be used for tomographic reconstructions. Usually a low-pass filter like the Butterworth filter is recommended. The evaluation of the tomographic reconstruction can be quantitative or semi-quantitative. The normal range of values is defined from a volunteers population for quantitative analysis.

The evaluation procedures, that are based on mathematical operations on well defined regions of interest (ROI), can be implemented in the usual commercial Nuclear Medicine software. At the University of Genoa (Italy) Dr. Calvini recently developed a dedicated tool, based on DICOM images, that allows ROI automatic matching and evaluation and is presented in this paper.

**Introduzione**

Le applicazioni della Medicina Nucleare in Neurologia si sono arricchite negli ultimi anni di un nuovo radiofarmaco denominato DaTSCAN. Dal 2002 questo preparato è disponibile in commercio in Italia e permette di effettuare diagnosi differenziale tra morbo di Parkinson, parkinsonismi e tremore essenziale, patologie che, attraverso una diagnosi esclusivamente clinica, possono essere confuse tra loro. Questo lavoro cerca di fare una ricognizione dei vari aspetti clinici e diagnostici della diagnosi differenziale tramite SPECT cerebrale con ioflupane.

**Patologie principali**

Il morbo di Parkinson fu descritto per la prima volta nel 1817 dal medico inglese James Parkinson (1755-1824) nel suo trattato "An Essay on the Shaking Palsy". L'alterazione biochimica che ne causa i sintomi è stata identificata negli anni sessanta. Il morbo di Parkinson è la più comune malattia del sistema extrapiramidale; esso è una patologia dovuta alla degenerazione cronica e progressiva che interessa soprattutto alcune strutture del sistema extrapiramidale, cioè un'area ridotta del sistema nervoso centrale, detta sostanza nera o "substantia nigra", un nucleo situato a livello del mesencefalo in cui viene prodotta la dopamina, un neurotrasmettitore essenziale per il controllo dei movimenti corporei. Nell'organismo si crea perciò uno squilibrio fra i meccanismi inibitori e quelli eccitatori, a favore di questi ultimi, provocando progressivamente tremore a riposo, ipertonia con rigidità, incapacità al movimento senza riduzione della forza muscolare (acinesia), instabilità posturale, disturbi della parola e della scrittura, turbe vegetative e spesso sintomi ansioso-depressivi. Sebbene il deterioramento intellettivo non rappresenti un elemento tipico del quadro clinico delle fasi precoci della malattia, la demenza appare come uno degli esiti più frequentemente riscontrabili nelle fasi tardive in circa il 30% dei casi.

E' stato osservato uno stretto legame tra la perdita di cellule dopaminergiche e la sintomatologia clinica, anche se è presente una fase di malattia preclinica, in cui la perdita neuronale non è ancora tale da determinare sintomi. L'esordio clinico della patologia si ha quando il numero di neuroni dopaminergici scende a circa il 25% dei livelli normali. Ma le alterazioni alla base della malattia di Parkinson sono molto più vaste. I neuroni ricevono, oltre ad una innervazione dopaminergica, anche una stimolazione colinergica che nella malattia sembra essere aumentata. Lo squilibrio tra sistemi neurotrasmettitoriali sembra dunque essere alla base della malattia, anche se il ruolo della dopamina è

chiaramente centrale.
Il tremore essenziale è invece la forma più comune di tremore, si presenta in percentuali che oscillano dallo 0,4% al 4%. Esso è monosintomatico, spesso a carattere familiare (20-50% dei casi) e può insorgere a tutte le età, anche se è più frequente dai 60-70 anni. Può permanere moderato per tutta la vita, ma in alcuni casi può essere lentamente progressivo. È un tremore d'azione, cioè prodotto dalla contrazione muscolare volontaria. Si caratterizza per la comparsa di tremore tipicamente alle mani (nel 10-15% dei soggetti compare prima alla mano dominante), posturale (nel mantenere una posizione anti-gravitaria, per esempio le braccia stese) o cinetico (durante ogni movimento volontario o alla fine di un movimento finalizzato ad un obiettivo). A differenza del tremore parkinsoniano, è prevalentemente assente a riposo. In una minima percentuale dei casi può evolvere in morbo di Parkinson.

**Caratteristiche del prodotto: aspetti farmacocinetici e dosimetrici**

Lo ioflupane è un composto iodato derivato dalla cocaina la cui caratteristica è legarsi ai trasportatori della dopamina (DAT) nello striato presenti nelle terminazioni presinaptiche dei neuroni dopaminergici e può essere considerato come un indicatore di degenerazione del sistema dopaminergico. Lo ioflupane utilizzato per l'esame scintigrafico viene marcato con l'isotopo radioattivo $I^{123}$ e indicato con la sigla ($I^{123}$)FP-CIT.
Lo $I^{123}$ ha un'emivita fisica di 13,2 ore e decade, con un'intensità del 97%, per cattura elettronica in $Te^{123}$ principalmente verso lo stato eccitato a 159 keV; lo schema di decadimento è assai complesso, presenta numerose energie tra cui sono presenti raggi X, le cui componenti principali sono a 27 keV, ed elettroni Auger.
L'esame DaTSCAN è di recente introduzione e, pertanto, non esistono nella legislazione attuale livelli diagnostici di riferimento. Gli studi che hanno preceduto l'utilizzo clinico del radiofarmaco ne hanno però individuato l'efficacia nell'intervallo 111-185 MBq. Essendo, come si è detto, il radiofarmaco marcato con $I^{123}$ è necessario somministrare al paziente che deve essere sottoposto ad indagine scintigrafia il trattamento bloccante della tiroide. Tale trattamento consiste nella somministrazione di potassio ioduro prima (da 1 a 4 ore) e dopo (da 12 a 24 ore) l'iniezione dello ioflupane. Gli studi preclinici hanno dimostrato, sia su volontari sani che su pazienti patologici, una captazione di putamen, caudati e regione occipitale che presenta un plateau dalle 3 alle 6 ore dopo la somministrazione. L'impiego di DaTSCAN, come quello di tutti i radiofarmaci, è sconsigliato in gravidanza e durante l'allattamento. E' stato stimato che la somministrazione di 185 MBq di ioflupane marcato con $I^{123}$ implichi una dose all'utero di circa 3,0 mGy.
La dose efficace per un adulto standard cui vengono somministrati 185 MBq di ioflupane è stimata essere 4,35 mSv; gli organi maggiormente esposti sono, come si evince dalla tabella 1, la vescica, i polmoni e l'intestino crasso, in condizioni di comportamento farmacocinetico normale e nel caso sia stata somministrata la terapia bloccante della tiroide. I calcoli sono stati eseguiti supponendo uno svuotamento della vescica ad intervalli regolari di 4,8 ore. Lo ioflupane viene eliminato nelle prime 48 ore per via urinaria (circa il 60% della radioattività iniettata) e per via fecale (circa il 14%).

| Organo bersaglio | Dose assorbita (mGy/MBq) | Organo bersaglio | Dose assorbita (mGy/MBq) |
|---|---|---|---|
| Surrenali | 13,1 | Ovaie | 17,0 |
| Cervello | 18,1 | Pancreas | 13,2 |
| Mammella | 8,0 | Midollo osseo | 9,8 |
| Parete della colecisti | 25,7 | Superfici ossee | 17,4 |
| Parete dell'intestino crasso inferiore | 42,4 | Pelle | 6,3 |
| Intestino tenue | 20,6 | Milza | 10,6 |
| Stomaco | 11,4 | Testicoli | 8,8 |
| Parete dell'intestino crasso superiore | 38,1 | Timo | 10,3 |
| Parete del cuore | 13,1 | Tiroide | 9,2 |
| Reni | 11,1 | Parete della vescica | 53,5 |
| Fegato | 28,3 | Utero | 16,3 |
| Polmoni | 42,5 | Totale corpo | 11,5 |
| Muscoli | 9,6 | **Dose efficace** | **23,5 μSv/MBq** |

Tabella 1

**Tecniche di acquisizione e di ricostruzione**

L'acquisizione di un esame SPECT con DaTSCAN risulta essere simile agli esami di perfusione cerebrale. E' richiesta alta risoluzione, pertanto si consiglia l'utilizzo di appositi collimatori (bassa energia e alta risoluzione, LEHR) preferibilmente fan beam. Il posizionamento del paziente richiede molta cura, in quanto si consiglia di impostare il raggio delle teste della gamma camera il più basso possibile, compatibilmente con le dimensioni

e la postura del paziente; si indica comunque come raggio ottimale un valore inferiore a 13 cm e di evitare raggi superiori a 18 cm; con queste impostazioni le testate ruotano molto vicino alla testa del paziente che può essere intimorito o provare sensazioni di claustrofobia, pertanto si consiglia sempre di descrivere dettagliatamente al paziente le operazioni che si andranno ad eseguire e tranquillizzarlo sull'assenza di pericolo. Si consiglia inoltre di evitare rumori e di abbassare le luci nella sala dove si effettua l'esame, al fine di limitare, durante l'acquisizione, gli stimoli esterni e gli eventuali movimenti del paziente che da essi possono essere indotti.
I parametri di acquisizione sono in genere gli stessi per tutte le apparecchiature e sono i seguenti:

- matrice di acquisizione: 128x128 pixel
- step angolare: 3°
- zoom: adeguato al fine di avere la dimensione del pixel di circa 3 mm
- tempo di acquisizione per vista angolare: circa 40 s, tale comunque da garantire l'acquisizione di circa 3000 kcounts totali.

Con questi parametri un'acquisizione, in assenza di imprevisti che richiedano di interrompere e ripetere la procedura, dura circa un'ora e mezza, se si utilizza una gammacamera monotesta, ma si riducono a 45 minuti nel caso di gammacamera a due teste.
Alla fine dell'acquisizione dell'esame, prima di far muovere il paziente, è buona norma verificare la bontà dei dati tramite la visualizzazione cinematografica delle acquisizioni statiche e l'analisi di sinogramma e linogramma.

**Tecniche di elaborazione SPECT**
La ricostruzione delle immagini tomografiche può essere effettuata sia mediante retroproiezione filtrata che con metodo iterativo. La Ditta produttrice del radiofarmaco fornisce indicazioni utili sui metodi di ricostruzione in funzione dell'apparecchiatura utilizzata (in merito si può consultare la pagina: [http://www.datscan.com/imaging%20protocols/imaging_protocols.shtml](http://www.datscan.com/imaging%20protocols/imaging_protocols.shtml)).
In genere si consiglia l'utilizzo di un filtro passa basso tipo Butterworth, evitando filtrazioni troppo pesanti o troppo rumorose che potrebbero far perdere di risoluzione o introdurre artefatti nella ricostruzione. Si consiglia di prestare attenzione se si procede alla rilevazione automatica dei contorni, in quanto lo scarso numero di conteggi potrebbe introdurre degli errori nell'individuazione della teca cranica. Inoltre si suggerisce di utilizzare il metodo di Chang per la correzione dell'attenuazione con un valore di m pari a 0,10 $cm^{-1}$.
E' infine necessario procedere ad un corretto riorientamento lungo i tre assi coordinati, al fine di correggere eventuali inclinazioni della testa del paziente in fase di acquisizione. Tale riorientamento non è sempre facile e banale; talora si consiglia l'utilizzo di reperi esterni da posizionare in fase di acquisizione per agevolare questa operazione.

**Valutazione quantitativa delle immagini SPECT**
La possibilità di eseguire valutazioni quantitative sulle immagini SPECT, come si è detto, rende questo esame unico nella diagnosi differenziata del morbo di Parkinson e dei parkinsonismi.
La Ditta che produce il radiofarmaco consiglia di procedere come segue, sottolineando che una valutazione quantitativa deve discendere dalla definizione di una popolazione "normale" che ogni Centro dovrebbe poter approntare, al fine di tenere conto delle differenze introdotte dalle particolari tecniche di acquisizione ed elaborazione implementate. In mancanza della possibilità di effettuare questa ricognizione si consiglia di considerare la valutazione come "semi-quantitativa", integrando i risultati quantitativi con una valutazione qualitativa basata sull'esperienza del Medico refertante e sull'anamnesi del paziente.
Per valutare la simmetria complessiva dei gangli si consiglia di sommare le sezioni che comprendono caudati e putamen in un'unica fetta che, solitamente, risulta essere di uno spessore di circa 2,5 cm (le sezioni utili sono in genere circa 8). Per procedere invece alla valutazione semi-quantitativa di caudati e putamen si suggerisce di implementare la seguente procedura:

- sommare tre fette trasversali centrate sulla fetta che presenta il maggior numero di conteggi (le fette trasversali devono essere state ricostruite

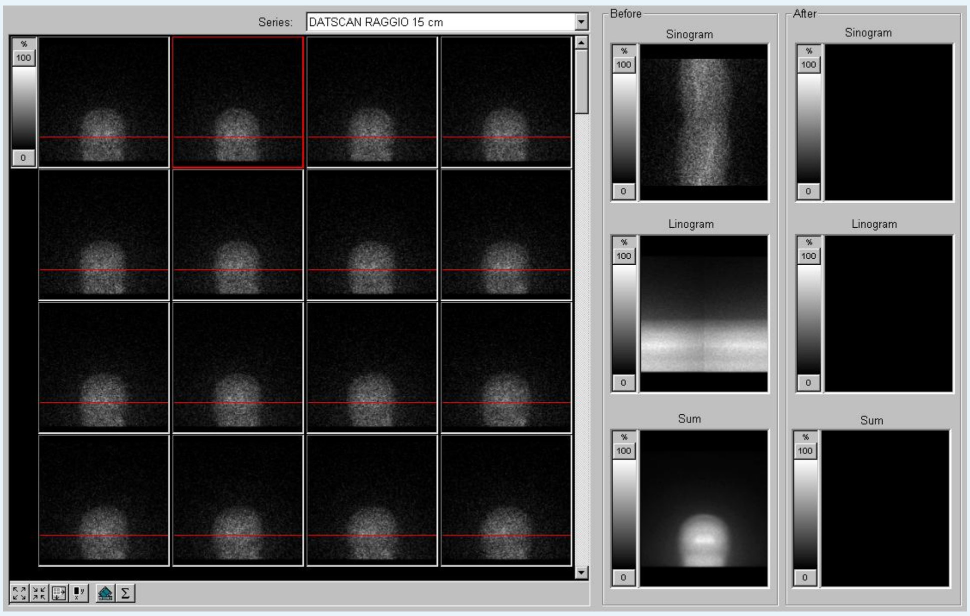
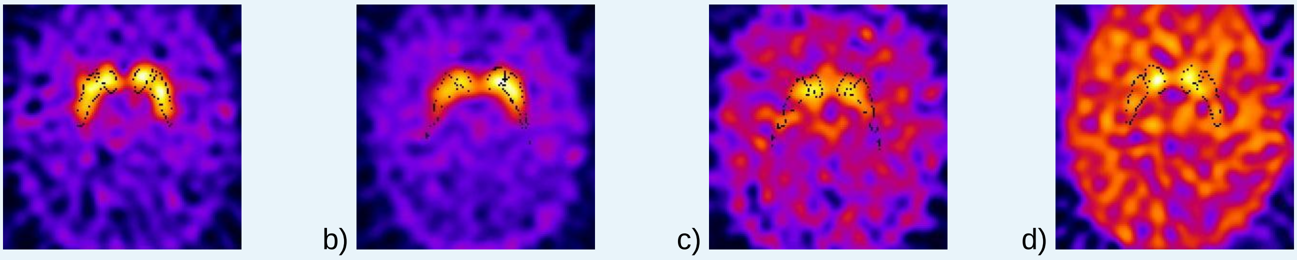


FIGURA 1 - Elaborazione di un esame DaTSCAN con software E-soft (Siemens)



a) b) c) d)

FIGURA 2 – Esempi di esami normali (a e b) e patologici (c e d) elaborati con software automatico di posizionamento delle ROI.

sull'asse orbitomeatale);

- posizionare ROI circolari di piccole dimensioni (area di circa 20 pixel) al centro dei caudati e dei putamen;
- sulla stessa fetta precedentemente ricostruita circoscrivere con una ROI irregolare la zona occipitale per la valutazione del fondo, rappresentativo del legame aspecifico del radiofarmaco;
- valutare la concentrazione media di caudati e putamen sottraendo al valore medio delle ROI circolari il valore del fondo e normalizzando al valore del fondo stesso.

Fermo restando che la variabilità dei valori normali dipende fortemente dai metodi di ricostruzione impiegati, oltre che dall'età del soggetto, viene indicato come valore di normalità un valore superiore a 3,5 per il caudato e superiore a 3,0 per il putamen.

Questa procedura può facilmente essere implementata nelle workstation di elaborazione presenti nei Centri di Medicina Nucleare, ma può ulteriormente essere migliorata qualora sia possibile utilizzare software di fusione di immagini. L'acquisizione di immagini morfologiche RM sulle quali disegnare delle ROI sui putamen e caudati permetterebbe una più precisa valutazione delle concentrazioni, superando le incertezze dovute al posizionamento manuale di ROI su regioni che, in caso di pazienti fortemente patologici, non presentano concentrazioni significative.

La procedura descritta richiede particolare attenzione e perizia nell'esecuzione dei singoli passaggi, come la scelta delle fette da sommare o il posizionamento delle ROI. L'Università di Genova ha sviluppato un software di elaborazione automatica per l'individuazione dei caudati e dei putamen che permette di ovviare a queste difficoltà fornendo, in modo veloce e riproducibile, la quantificazione delle concentrazioni nei putamen e nei caudati e la simmetria della distribuzione.

Il software è disponibile in rete all'indirizzo riportato in bibliografia. Esso è costituito, in sintesi, da una serie di interfacce grafiche che permettono di eseguire le seguenti operazioni:

- caricamento dei dati;
- riorientamento degli volumi caricati, in modo diretto e sequenziale;
- riorientamento assistito per mezzo di una procedura 'esperta';
- posizionamento delle maschere: automatico o manuale;
- visualizzazione dei risultati;
- modifica dei parametri di posizionamento delle ROI;
- esportazione dei risultati degli esami già processati.

Le ROI sono definite sulla base dell'atlante anatomico di Talairach e Tournoux e vengono posizionate non più su una singola fetta, seppur ricostruita dalla somma di tre fette successive, ma sull'intero volume SPECT. La procedura risulta essere molto veloce e estremamente riproducibile, non essendo affetta da incertezze operatore-dipendenti durante il posizionamento delle ROI.

La validazione del software è stata anche oggetto di una tesi di laurea svolta presso l'Università degli Studi di Torino che ha evidenziato come, nonostante il numero non troppo elevato di casi esaminati, le due metodiche siano, con un livello di confidenza del 99%, equivalenti.

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# Safety in Health Care: can a Medical Physicist help?

The safe application of radiation in radiology, nuclear medicine and radiation therapy are familiar areas in the profession of a medical physicist. Since the discovery of X-rays in 1895, they have played an active role in analyzing unexpected effects or accidents related to their application. Especially in radiotherapy medical physicists have taken up an important role in analyzing accidents by reporting on the chain of errors made that finally led to the death of patients. Examples are:

Case (1) deals with a Therac 25 linear accelerator between June 1985 and January 1987 and is well described by Leveson and Turner[1)]. Case (2) concerns an accident with a Sagittaire linear accelerator in Zaragoza, Spain, resulting in 18 fatalities and nine serious injuries, as archived by Johnston[2)]. Case (3) is the so-called North Staffordshire accident, that affected 1045 patients of which 401 died, as reported by Baldwin, Joslin and Williams[3)]. Case (4), the Exeter accident, was related to a calibration error of a new Co60 source and affected 205 patients as reported by Thwaites, Burlin, and Joslin[4)].

The accidents in case (3) and case(4) in the UK have led to the implementation of quality systems in radiotherapy departments, as it became clear that these accidents were not to be blamed on a single person but could happen due to a various number of causes including failures in organization and work procedures. In spite of what has been learned from these sad accidents, nowadays accidents still occur in health care and will continue to occur without further improvements. Recent examples in 2006 in The Netherlands and Belgium prove this statement. Case(5), a patient in Rotterdam suffered an overdose of approximately 100 % and died shortly thereafter. Case (6) concerns the period between December 2005 and September 2006, when in Gent 17 patients have been wrongly irradiated which could have resulted in 9 deaths. For both accidents case(5) and case (6) investigations are still in progress to determine the cause(s) and consequence(s). On the positive side it should be noted that the number of accidents and casualties has probably diminished and could still be further reduced.

At the end of 1999 the report "To Err Is Human" was published[5)]. This report was the result of two large studies in the USA looking for adverse events in health care. It was reported that 2.9% and 3.7% adverse events of all hospitalizations were found and that 6.6% and 13.6%, respectively, of these adverse events led to death. This implies that on the order of 44,000 to 98,000 patients die each year in the USA due to causes that could have been avoided. This conclusion created a shock in the USA and in other countries. The casualties were higher than those caused by traffic, breast cancer, HIV, etc.. Investigations in the UK, Denmark and other countries revealed figures on the same order of magnitude. It was clear that not only in radiotherapy but in all other disciplines in health care, the safety of a patient should be considerably improved. Not only in the USA but in several countries in Europe efforts are being made to improve patient safety.

In The Netherlands a lot of activities related to patient safety are going on now. By law, on January 1st, 2008, each hospital should have a Safety Management System (SMS) operational to report and analyze incidents and to take preventive and corrective measures to improve patient safety. Such a SMS is actually part of a Total Quality System and guarantees an ongoing effort for improvement. Medical physicists are not challenged to fulfill the job of safety officer in a hospital. However, especially where safety is related to Medical Technology, a medical physicist should be involved. De Mol, cardio-thoracic surgeon, asked the provocative question "Who makes safety acceptable?" at a recent symposium on safety in health care in The Netherlands[6)]. He has given the following answer:

- Somebody who knows the subject;
- Somebody who knows technology;
- Somebody who knows the human / user factor;
- Somebody standing between disciplines;
- Somebody who can be formal and honest.

His conclusion was that a medical physicist is the right person to fulfill these requirements. The Dutch Society of Hospitals (NVZ) has installed a work group to realize a practical guide for Risk Management in Medical Technology. From a total

of eight work group members, five are medical physicists. The report will be finished at the end of this year and addresses (in Dutch) the following aspects: risk management, a model for a safety management system, preventions and corrections to reduce risk, organizational requirements, blame free incident reporting, control of medical devices, how to improve a safety culture and finally the relation to a quality system with continuous improvement efforts.
From the above one can recognize the necessity to learn trainees in Medical Physics how to manage Safety and Risk Analysis, as has been done in The Netherlands for over seven years now. The School for Medical Physics and Engineering Eindhoven (SMPE/e) takes care of this education and is willing to help implementing this education in other countries and the European School of Medical Physics (ESMP) at Archamps as well.

Herman van Kleffens.

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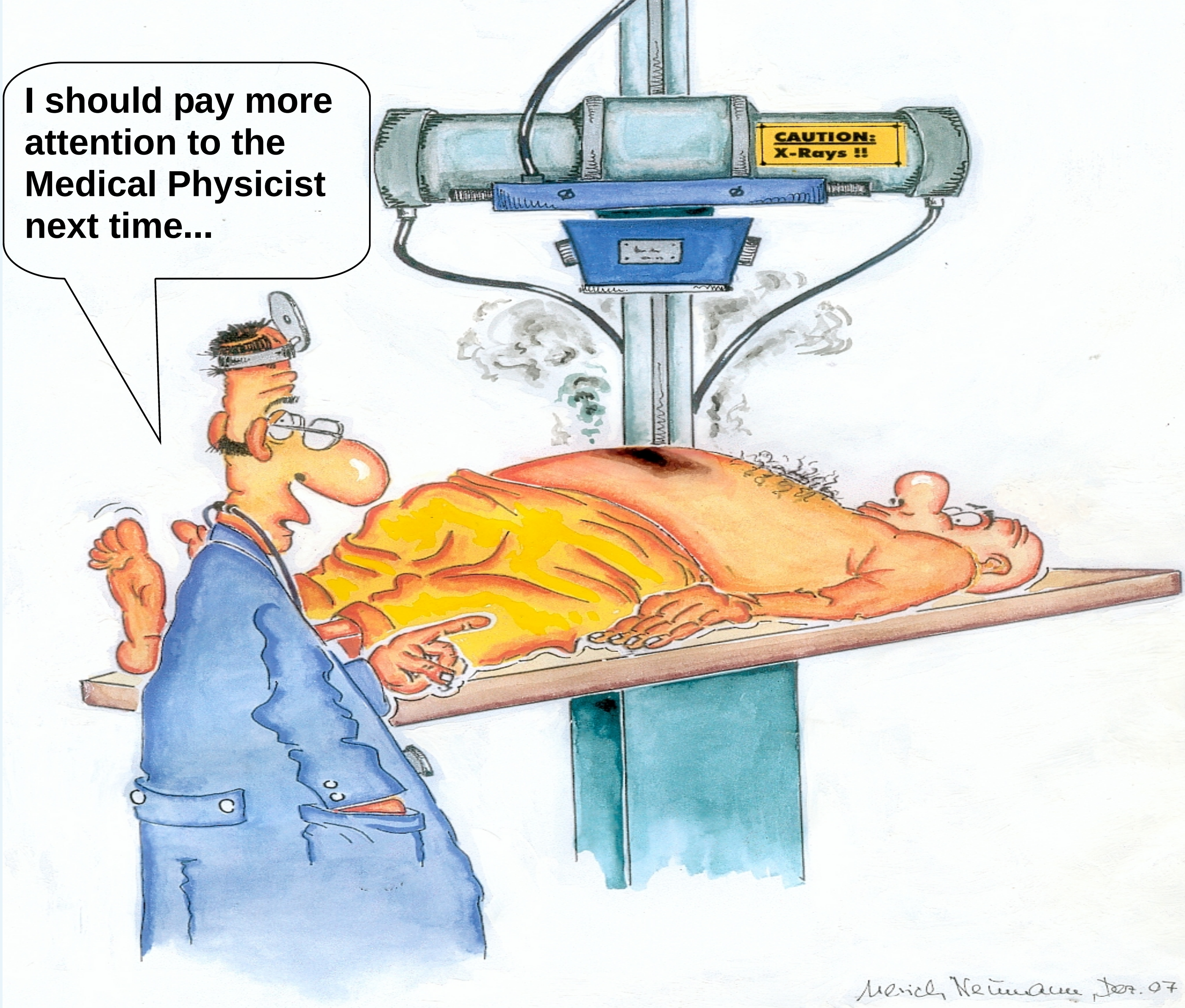
## Cartoon



# ROSIS – Radiation Oncology Safety Information System

Dr. Ola Holmberg

Mary Coffey

Prof. Tommy Knöös

Joanne Cunningham

Early 2001 it was suggested by Ms Mary Coffey, Dublin and Dr Ola Holmberg (then Dublin now Copenhagen) to the ESQUIRE/ESTRO (European Society of Therapeutic Radiology and Oncology) project group that a risk management project within the field of radiation oncology would have the potential of improving safety and care of patients. The ROSIS group was formed in Brussels 2001 where Prof Tommy Knöös (Lund) was invited. The group was later on joined by Ms Joanne Cunningham from Dublin. The first steps were taken to form a group of professionals from several clinics throughout Europe as a discussion group. The goals of ROSIS group were set already at this initial meeting which are still the main topics for the group. The major objectives were defined as:

- To establish a web-based system whereby radiotherapy incidents can be analysed in a systematic and objective way and the information shared around the radiotherapy community through web-access to a centralised database.
- To enable radiotherapy clinics to address safety issues before an accidental exposure occurs and to create a general culture of safety awareness by making information available on details of incidents, near-incidents and corrective actions, submitted on-line by other radiotherapy clinics.
- To define a hazard classification system and perform frequency analysis, leading to the identification of safety-critical steps in the radiotherapy treatment process where errors are likely to occur or be detected.
- To allow current best practice in incident reporting within medical as well as non-medical settings to be utilised in radiotherapy by identifying high-reliability organisations outside radiotherapy and the methods used within these organisations for incident and near-incident reporting, evaluation and feedback.

To be able to identify and construct an incident reporting system about 25 local reporting systems/forms were collected containing at total amount of about 950 reports. Based on this and discussions with other professionals in the field, the first reporting form for ROSIS was defined and published on the ESTRO website in 2002. The group released the 1st web based reporting system in 2003 and in connection with the 23rd ESTRO meeting in Amsterdam 2004 the database was published facilitating on-line queries by professionals form the radiotherapy community (http://www.rosis.info). The year after, a course on risk management with the objective of increasing safety culture within the radiotherapy process was given in Dublin and the 4th edition will take place in May 2008. The faculty consist of the ROSIS group expanded with Prof Pierre Scalliet from Brussels and Ken McKenzie (Dublin). These courses have had a great success with a total of more than 110 attendees covering RTT, nurses, physicists, engineers, oncologists, administrators and regulators. At regular intervals compiled reports based on the information in the database are published on the ROSIS website. Figure 1, shows the development of ROSIS since the first discussions in 2001. Today clinics from all continents across the

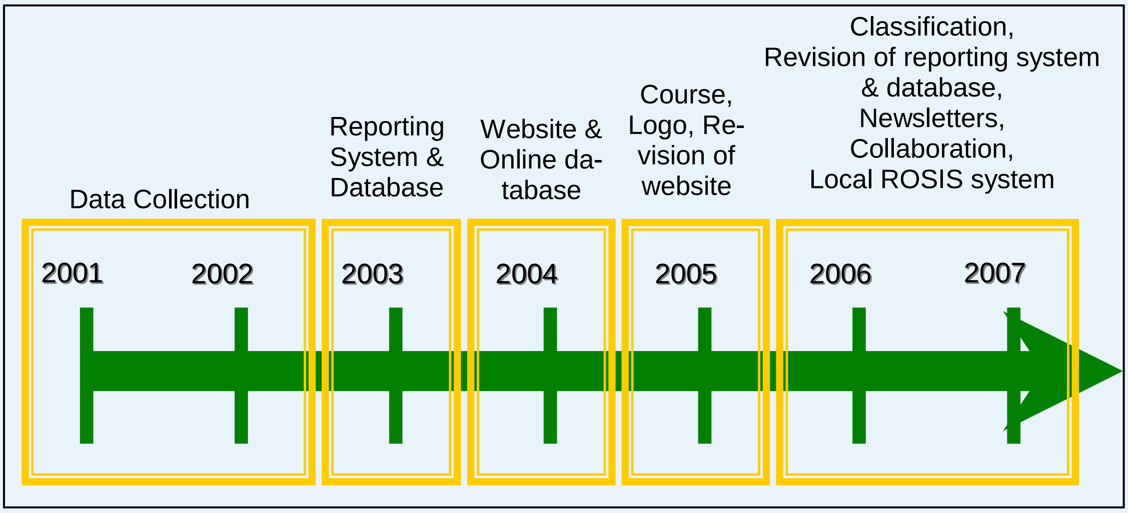



**Figure 1:** Timeline describing the development of ROSIS.

world have registered on the ROSIS website and there are currently approximately 1000 reports in the database.
The next step in the ROSIS development is to launch a more interactive website where we will also have included the results of the hazard identification / classification. This will improve future analysis and will lead to better feedback to the reporting clinics. The hazard classification is divided into four levels where the first level mirrors the radiotherapy process. For each step a deeper differentiation on various topics can be performed. At the moment we have categorised the reports into the different steps at the first level in the chain of radiotherapy. With the new web based form we will be able to further classify the adverse events into more specific topics.
Risk management and awareness of adverse events in the radiotherapy environment is currently of paramount importance and discussion is ongoing within ESTRO as well as in the North American professional groups of ASTRO (American Society of Therapeutic Radiology and Oncology) and the AAPM (American Association of Physics in Medicine). Discussions are also taking place between these groups and hopefully the ROSIS reporting system and the annual Risk Management course can continue to be of benefit for the world wide community.

## Read online on IGRT:

**Wolfgang Schlegel: "Imaging and radiotherapy: getting closer all the time"**
**Medical Physics web 15th June 2007:**
**http://medicalphysicsweb.org/cws/article/opinion/30271**

# Are you involved in the Procurement of Imaging Equipment?

NHS
Purchasing and Supply Agency
Centre for Evidence-based Purchasing

The Centre for Evidence-based Purchasing (CEP) was created on 1st September 2005, when the Device Evaluation Service (DES) transferred from the Medicines and Healthcare products Regulatory Agency (MHRA) to the NHS Purchasing and Supply Agency (NHS PASA).
Within the medical imaging cluster, CEP currently funds four expert evaluation centres that undertake work for us. ImPACT (CT), KCARE (Diagnostic Radiology), MagNET (MRI) and PACSnet (PACS) are familiar names from the MHRA / DES 'blue cover' evaluation reports. However, the CEP remit and our products must now provide a wider range of information for a more diverse readership and to help us achieve this, we have expanded our team to include a health economist.
Our remit is to underpin purchasing decisions by providing objective evidence to support the uptake of useful, safe and innovative products and related procedures in health and social care. We are funded by the Department of Health to provide independent and impartial guidance. The CEP work programme comprises individual projects commissioned in response to proposals submitted through the CEP prioritisation system.
Recent publications in Imaging can be freely downloaded from our website:
www.pasa.nhs.uk/cep .

There is also information on the website on how to join our mailing list for personal notification of any future imaging reports, or how to propose a project to CEP for future work.

Titles available now in imaging include:

- Evaluation report: Medtronic PoleStar. iMRI Navigation System - portable magnetic resonance imaging system for neurosurgery - CEP 07015 (Oct 07)
- Cost effectiveness of direct digital radiography versus computed radiography for chest examinations - CEP 07011 (Aug 07)
- Evaluation report: Eizo Radiforce G33-N 3MP greyscale flat panel liquid crystal display (LCD) - CEP 07003 (Aug 07)

CEP also publishes reports on laboratory medicine / pathology and general medical equipment.
If you would like further information on any aspect of CEP work in the imaging cluster, please contact:

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# Exchange of Medical Physicists Offer: Malaga, Spain

Pedro Galán

Further to the initiative proposed by Markus Buchgeister in the Summer issue of the European Medical Physics News in regards to the interest of promoting and facilitating exchange programmes for medical physics within the European Union, different departments have shown interest in being part of a network of hosts.

Pedro Galán, the former president of the Spanish Society of Medical Physics (SEFM) and Head of the Medical Physics Department at Carlos Haya Hospital in Málaga, such a gorgeous city in Andalucía, south Spain, has volunteered to host medical physicists in these exchange programmes.

**Pedro, why did you decide to be part of this network?**

*The Medical Physics Department, named in Spanish as Radiofisica Hospitalaria, is part of the medical division of a university and regional hospital, Hospital Regional Universitario Carlos Haya, one of the most important in the region. In this hospital there are pregrade and postgrade education programmes.*

*We have hosted for training several visitors of different countries, the last two visitors were from France and Nepal, the latter in collaboration with UICC. We participate in a data base of IAEA to accept visitors from Latinamerican countries.*

*For these reasons and in order to participate in the network propose, we offer our facilities and personal collaboration of department's members.*

**Who do you think will benefit the most from this initiative, young or senior medical physicists?**

*In my opinion, these kinds of initiatives are very useful for any medical physicist regardless of age and experience. It contributes to learn one from another and to get to know how medical physicists in other departments and countries work.*

*However, this initiative seems more interesting for the young medical physicists, because it is an excellent opportunity to know methodologies, procedures and systems of organization different from those of their hospital. They can also enrich their knowledge on different subjects. Of course, this does not exclude the senior medical physicists for the reasons mentioned before.*

**Which is the structure of your department?**

*The Medical Physics Department mainly deals with four different departments, namely Radiation Oncology, Nuclear Medicine, Radiology and Urology. We also work at some hospitals and health centres in the area. Our department could be considered as a central department giving support to all areas within the hospital that use ionising radiation for treatment and diagnosis.*

*To perform all the above-mentioned tasks the department has 5 medical physics experts and 5 radiation technologists. In addition, we also have physicists in training in Medical Physics.*

**In Spain, the education programme for medical physics is through 3 years residence at a physics department at accredited hospitals. You have said that you have physicists in training, so is your department accredited?**

*Yes, the department is accredited by the Ministry of Education and Culture for medical physicist training. The training programme is described in detail in our website..*

*A physicist, after passing an annual national exam, becomes a first year resident of the Medical Physics department. At the end of three training years and after a positive evaluation, the physicist becomes a Medical Physicist., so, there are always three residents in the department: a first year, a second year and a third year resident.*

**In which areas do the staff in your department work?**

*Our responsibilities mainly lie in the areas of radiotherapy and diagnostic imaging. The role we play in radiotherapy includes treatment planning and radiotherapy machine commissioning, quality assurance, calibration and troubleshooting. In diagnostic imaging includes machine purchasing and installation, testing, quality assurance, and operation in x-ray equipment and nuclear medicine. The tasks concerning radiation safety include shielding design and protection analysis on radiation-emitting equipment and radiopharmaceuticals, determination of dose delivered to patients and radiation protection to workers so as any task related to radiophamaceuticals and radioactive waste control.*

*In short, we can say that our task is concerning to: physical dosimetry, clinical dosimetry, quality assurance programmes and radiation protection.*

**How will the visitor interact with the different tasks performed in your department?**

*I think that the best way to take advantage of the visit is to participate as actively as possible in the department everyday jobs. In this way we all would have the opportunity to know how medical physicists from other institutions approach the different jobs.*

**Could you tell us, in few words, which equip-**

Staff of the Medical Physics Department at Carlos Hayah ospital in Málaga

**ment are you using for Radiation Therapy and which techniques are in use or being implemented?**

*In the Radiation Oncology area we have two high energy electron linear accelerators that produce electrons beams of five different energies and two photons beams of 6 and 18 MV. The two accelerators include multileaf collimator and enhanced dynamic wedges.*

*With this equipment it is possible to carry out several techniques such as 3D conformal therapy and total body irradiation.*

*The department also has a cobalt teletherapy unit that will be replaced with a linear accelerator for radiosurgery soon.*

*We also perform high dose rate brachytherapy for different tumour localisations and low dose rate with prostate permanent seeds implants.*

**And what about Diagnostic Radiology and Nuclear Medicine?**

*Medical Physics department has to perform the quality assurance programme of eighty X-ray equipment with digital imaging, including, conventional, portable, mammography and interventional radiology devices, as well as computed tomography of 16 and 64 slices.*

*In the Nuclear Medicine department we carry out the quality assurance of three scintillation cameras.*

**It is usually difficult to have time slots in the treatment/diagnostic units to perform the quality periodic checks. When are you performing them?**

*Our Quality Assurance Programme includes an agreement with the different departments to carry out the quality control plan and also on the hours that are needed to perform it.*

*The QA time slots for accelerators are available from the beginning of the year. Furthermore, in Radiology and Nuclear Medicine we carry out the programme in the same way.*

**Is your department involved in any research projects?**

*At present we are involved in several research projects:*

- *Ionizing radiation effects in membranes characteristic parameters in collaboration with applied physics department of University of Málaga*
- *Nuclear and atomic structure, in collaboration with the Modern Physics department of the University of Granada. Our role in this group relies in Monte Carlo simulation of ionizing radiation interactions in matter.*
- *Clinical trials in collaboration with the Radiation Oncology department.*
- *Several project related to radiation dosimetry in CT multislices techniques comparing to conventional techniques*
- *HDR dosimetry using different procedures to compare measurements and calculation methods.*

*We also participate in teaching and research projects jointly with other institutions inside and outside Spain.*

*In addition, our department has developed a freeware registered software applying radiobiology to radiation therapy, and you can find a link in our website.*

**If you were to choose one of these projects which is the one more challenging?**

*Nowadays the Monte Carlo simulation is at the leading edge in the research areas in the medical physics field, since it allows us to find answers to complex questions that we found in the clinical use of the ionizing radiations, and it has an added value lying on that only are needed relatively few resources to implement it. In this way, our aim is to use Monte Carlo techniques in different situations and experimental data too.*

**Finally, let me please ask you a practical question. Does the hospital have a residence for visitors? If not, is it difficult to find cheap lodgement in Málaga?**
*Although the hospital does not count on a residence for visitors, a few rooms for visitors from developping countries are offered. However, Málaga, being a big city, counts with several hotels with a wide range of room rates. There are also affordable residences near the hospital and Malaga has good and reliable transport network. Málaga is a good place to work and to enjoy yourself.*

For more information about our department you can look at these two web sites:

http://www.carloshaya.net/medicalphysics
and
http://www.carloshaya.net/radiofisica

**Interview by Nuria Jornet, Barcelona, Spain**


**The course provides the background to understand both the basis of radiation treatment for cancer and the use of radiobiological models in the evaluation and optimisation of radiotherapy treatment plans. It is suitable for anyone involved in Radiotherapy.**

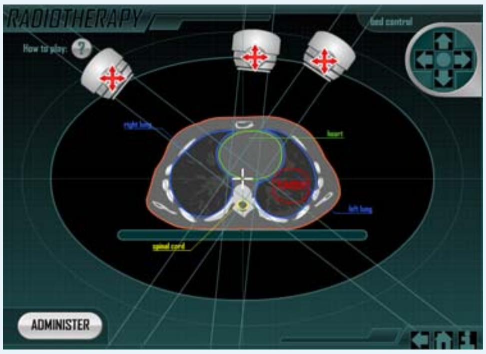
**Information at:**

**http://www.wirral.nhs.uk/uploads/documents/CCORBLGYCOURSEFLYERApril08.pdf**

# Teaching Medical Physics

## *Exchange and translation of teaching material wanted?*

There is interesting teaching material available on the web by the IOP Medical Physics Group at: www.teachingmedicalphysics.org.uk/
The teaching pack which has been circulated to all UK schools contains lessons as Powerpoint presentations and other material aimed at helping teachers to teach science with examples from medical physics. Very nice is an animated website created for the Einstein year 2005 called the "*Inside story*" on medical physics in MR, PET, Colonoscopy and Radiotherapy. Typical tasks like the creation of radiotherapy plan can be interactively performed and administered in Flash animations.




In Germany, a project called PIKO (Physik im Kontext) has produced a teacher handbook with the title: "*Physik in Mensch und Medizin*" (*Physics in man and medicine)*, a German PDF download at: www.uni-kiel.de/piko/downloads/Medizinphysik.pdf.
There is also a webpage with commented links of info material on medical physics in German or English on the PIKO website to be found at : *Materialien – Handreichungen - Handreichungen auf piko-Webseiten - Medizin und Physik*.


I believe, there is more to find of the different specialities in medical physics out on the web or in printed form. What we lack is an exchange of this material to the various languages in Europe as teaching is usually done in one's native language. If there is enough interest, one could approach the EU in funding a exchange of this existing material to the languages in Europe! Please contact the EFOMP Communication and Publications Committee chairman at the e-mail address:
communication_publications@efomp.org

Looking across the ocean, the AAPM Education Committee will hold a special workshop on teaching medical physics: "*Becoming a better teacher of medical physics*" on July 31- August 3, 2008 at League City, Texas, USA.
For more information use the link:

www.aapm.org/meetings/08Workshop/

**Markus Buchgeister**

# Reviewing Abstracts for the Physics Track of the European Congress of Radiology - My Personal Opinion

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**Abstract**

The level of new scientific results reported in abstracts submitted for conferences by Medical Physicists, in my personal opinion, is becoming poorer and poorer with time. This is evident from my recent involvement in the reviewing process for the Physics Track of the European Congress of Radiology for 2006 and 2007. The main subject of these submitted abstracts are results from dose measurements to patients and the staff, or comparisons of the performance of commercially available diagnostic modalities. Such work is part of the routine work of a Medical Physicist working in a hospital environment and in my opinion should not be the topic of work to be presented in scientific meetings.

This article discusses these personal worries and attempts to give suggestions as to the reasons of this phenomenon and suggests ways of improving the scientific content and significance of abstracts submitted by Medical Physicist to be presented in scientific meetings.

**Introduction**

In my capacity as the Chairman of the Scientific Committee of the European Federation for Organisations of Medical Physics (EFOMP), I am asked to review abstracts for Scientific Conferences with EFOMP involvement. In this capacity so far I was one of the reviewers of the abstracts of the Physics Track for the European Congress of Radiology[1] (ECR) for 2006 and 2007 that take place annually in Vienna, Austria.

I have also reviewed some 30 abstracts submitted through EFOMP to the International Conference on Quality Assurance and New Techniques in Radiation Medicine[2] (QANTRM) that was organised by the International Atomic Energy Agency (IAEA) between the 13th and the 15th of November 2006, in Vienna, Austria.

In my capacity as the Chairperson of the Professional Relations Committee (PRC) of the International Organisation of Medical Physics (IOMP), I have reviewed the abstracts for the Education and Training Track for the World Congress on Medical Physics and Biomedical Engineering[3] (WC2006) that took place in Seoul. Korea, between the 28th of August and 1st of September 2006.

During the above reviewing processes, I had some doubts about the quality and/or purpose of the submitted abstracts with respect to their scientific content. Perhaps this is due to my inexperience in the reviewing of such abstracts, although I have been reviewing papers, books and other published articles for a long time.

The intention of this article is to publicly express these personal worries with the hope that if they are not only personal worries but if they are shared by others and are signs of more widely acknowledged concerns, then, we can take measures to rectify the problem before it takes dimensions beyond control.

Firstly I would like to present the standard information of what the conference organisers request from their appointed reviewers so as to set the background of the requested reviewing process and then present my worries that arise from this review process.

**Materials and Methods**

In the current article I will present the reviewing process of the ECR which has a more structured approach and for which there are some statistics available, although my worries apply to the other meetings as well.

The Conference Organisers give some basic instructions to the abstract reviewers of what they wish the reviewers to take into consideration when reviewing their abstracts. The instructions[4] say that the abstract should be structured and should include the Purpose, Methods and Materials, Results and Conclusions. Additional guidance is also given that include:

The purpose is clearly stated:

- Precise description of methods and materials (patients), especially patient recruitment, analysis and statistics
- Precise description of results with numbers and statistics
- Statistics should be appropriate
- Work-in-progress only acceptable for extremely innovative or interesting approaches
- Coherence between stated purpose, methods and materials, results and conclusions (Method and Materials should be suited to address stated purpose, results should reflect Method and Materials, conclusions should address previous sections)

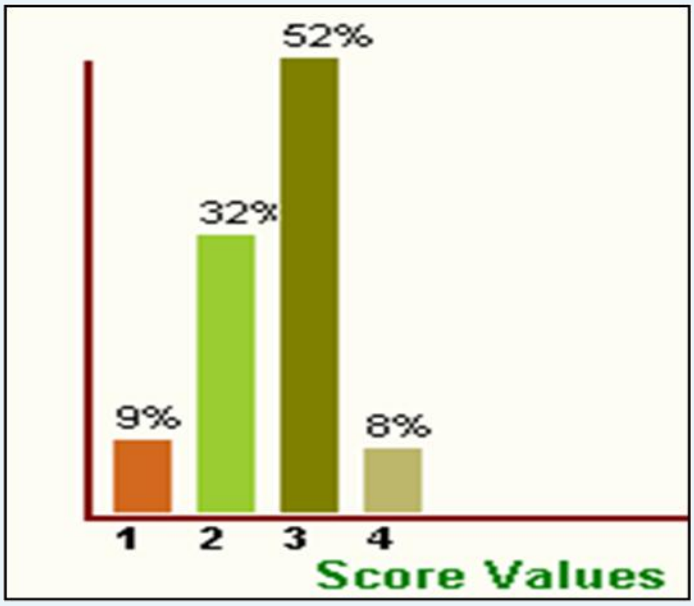


Figure 1: Histogram showing my scores for the reviewing process for all the submitted abstracts for the Physics Track of ECR2007.

Furthermore they specify the following grading scale:

**Score from 1 to 4 as follows:**

**1:** Very Good, **2:** Good, **3:** Fair, **4:** Poor

You are instructed to acknowledge if there is a conflict of interest or if the abstract is from your own department and you are not allowed to review it. The reviewing instructions do not give any guidance as to the level and quality of the content with regards to new scientific knowledge that should be considered during the evaluation of the abstracts.

**Results**

Table 1 shows the abstract statistics for the physics track of the ECR2006 and some unofficial abstract statistics for ECR2007. In total for ECR2007 196 abstracts were submitted from which the 27 were totally outside the scope of the Congress. Only the 169 were judged to be within the scope of the congress and were reviewed. It is evident that the acceptance rate is well below 50%. This may reflect the quality and scientific relevance of the submitted abstracts.

From the 97 submitted oral presentations for ECR2007 35 were on dosimetry, 27 on various aspect of Computed Tomography, 6 on Magnetic Resonance Imaging and only 4 on Mammography. The remaining 25 were on various other topics such as Nuclear medicine, Ultrasound and Interventional Radiology.

Figure 1 shows the statistics of my reviewing scores for the abstracts for oral presentation and Figure 2 shows the reviewing scores for all the eight reviewers for the physics track of ECR2007. For identification purposes I am reviewer H in Figure 2.

**Discussion**

The cut off point of whether an abstract is accepted or not in the above reviewing process it is unknown to me and I could not deduce it by calculating the average score received by each abstract. The variance of the score or other formulations did not reveal this cut off point either. Also it is unknown if the cut off criterion varies from year to year.

From Figure 2 is evident that that the reviewers are not consistent between them, at least not all of them. Reviewers A, C, E and F show similar reviewing patterns. Reviewers D and H are similar between them and reviewers D and G are completely different from the rest. This shows that the reviewing criteria were not the same for all the reviewers or perhaps they are interested or familiar with different areas (modalities, topics) of physics in radiology. This shows a weakness in the reviewing process and it is not fair to the authors of the submitted abstracts.

The content and level of new scientific information in an abstracts, in my opinion, has more relevance for its acceptance rather than the reporting of measurements taken from the routine work of the Medical Physicist as applied to a radiology department, as this is the present case and it is evident from the 35 submitted oral presentation on dosimetry.

Today the work of a Medical Physicist working in a hospital environment is mainly derived (dictated) from national legislation. In the case of the European Member States, this national legislation is harmonised with the relevant European Union Directives. In my opinion the work that is derived from legal obligations, all though very important, should not be reported in scientific meetings.

Furthermore, modern Health Care Services are met with ever-increasing demands on competence, specialisation and cost effectiveness. The Medical Physics Service in hospital faces the same demands, and Continuing Professional Development (CPD) is vital to the Medical Physics Profes-

| *Abstract type* | *ECR2006* | | | *ECR2007* | | |
|---|---|---|---|---|---|---|
| | Submitted | *Accepted* | *Percentage* | *Submitted* | *Accepted* | *Percentage* |
| *Oral* | 66 | 30 | 45,5 | 97 | 41 | 42,3 |
| *Poster/EE** | 71 | 33 | 46,5 | 72 | N/A | N/A |
| *Total* | 137 | 63 | 46,0 | 169 | N/A | N/A |

**Table 1:** ECR Abstract Statistics * EE = Educational Exhibit

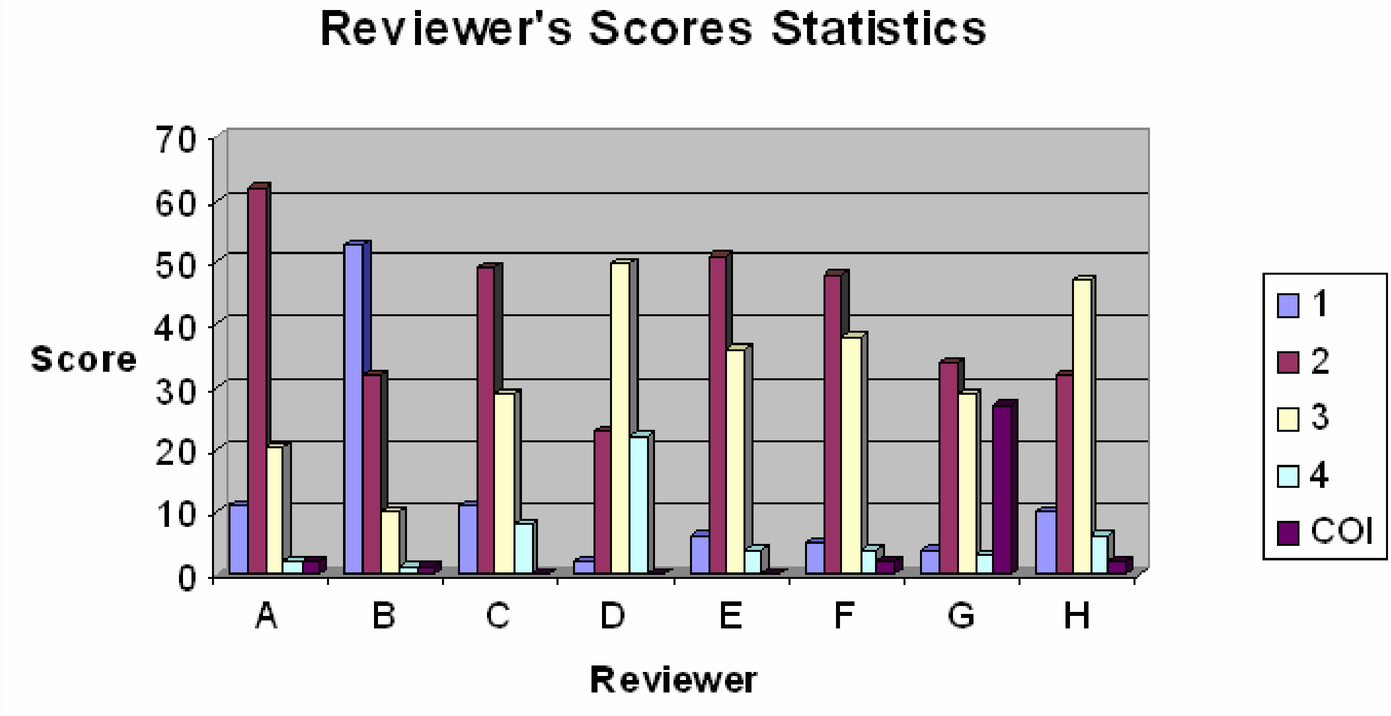


Figure 2: Histogram showing the scores of all the reviewers for the submitted abstracts for oral presentations for the Physics Track of ECR2007 (COI: conflict of interest).

sion to embrace the pace of change occurring in medical practice.

By combining the continuous pressure to prove CPD with the ever increasing workload, may be the main reason that push the Medical Physicist working in the hospital environment to submit abstracts to scientific meetings that are derived from their routine work and without any new scientific content. It is obvious that the ever-increasing workload does not allow for time to be spent on research activities.
The few submitted abstracts with new scientific content are by Medical Physicist working in Universities or University Hospitals where their main work activities are in research on the advancement of existing or the development of new diagnostic modalities.

**Conclusions and Recommendations**

From the above data and the discussion, the following conclusions can be deduced:

- The review process of abstracts does not consider seriously the content of the abstract in relation to new scientific information.
- The reviewers do not review the abstracts in a consistent way. Their criteria differ.
- The rejection rate for the submitted abstracts is unacceptably high.
- The majority of the abstracts are on dosimetry.
- Medical Physicists working in the hospital environment do not have enough time spend on research.
- Medical Physicists working in the hospital environment tend to submit any abstract in an attempt to justify their attendance to a conference.

The following recommendations could be a beginning in solving the problems identified above:

- Organisations such as UNSCEAR should create a database to which dosimetric data can be submitted for the assessment of the exposure burden to the world population. This data should be obtained by using predefined protocols so that the data can be easily and reliable compared. Regional bodies such as the European Union can also create such a database. Medical Physicists should be encouraged to submit their dosimetric data to such databases and not to scientific conferences.
- Organisations such as the EFOMP can lobby the European Union to adopt its policy statement on staffing levels of Medical Physics Departments. In such departments there is a provision for time to spend on research activities.
- Research activities should be recognised as a major activity with respect to CPD. Perhaps the EFOMP policy statements on CPD need to be amended to reflect this.
- The acceptance of an abstract for presentation at a conference should not be regarded as the criterion for employers to support their employees to attend conferences.
- Organisers of conference should state clearly the method used to accept or reject an abstract. The authors of rejected abstracts should be told why their abstract has been rejected so that they can improve their abstract for future conferences.

The author of this article has expressed his own opinion on the subject discussed and does not intend to discredit any organisation or individual. His main intention is to improve the scientific knowledge presented in scientific meetings.

**Stelios Christfides**

### References


1. European Congress of Radiology, www.ecr.org.
2. International Conference on Quality Assurance and New Techniques in Radiation Medicine (QANTRM), 13–15 November 2006, International Atomic Energy Agency, www.iaea.org.
3. World Congress of Medical Physics and Biomedical Engineering, (WC2006), August 27 to September 1, 2006, Seoul, Korea, IUPESM, www.iupesm.org.
4. http://files.abstractsonline.com/SUPT/9/1788gl_review2.pdf


***Note to the readers of this article***

Readers of this article are encouraged to put forward their own opinions, comments and suggestions. These can be collated and published in a future edition of European Medical Physics News.

# Scientific Meetings

## EFOMP Workshop at ECR 2008, Vienna:

***New technology in diagnostic radiology: High field MRI for clinical and preclinical Studies***

Saturday, March 8, 08:30–10:00

***State-of-the-art of high field MRI instrumentation***

*High field clinical MRI: Instrumentation and methods*
R. Turner; Leipzig/DE
*Pre-clinical studies with high field and very high field MRI: What is available, what is needed?*
S. Aime; Turin/IT
*PET-MRI combined modalities for preclinical and clinical studies*
A. Carpenter; Cambridge/UK

Saturday, March 8, 10:30–12:00

***Clinical applications, safety issues and regulations for very high field MRI***

*Safety issues and regulations for high field MRI*
M. Ladd; Essen/DE
*Physical implications of a 7 Tesla MRI installation*
O. Speck, Magdeburg/DE
*Future impact of the 7 Tesla MRI in the clinical applications*
R.W. Bowtell; Nottingham/UK

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**January 21st to 25th, 2008**
**EURADOS Annual Meeting - AM2008**
including 2nd Winter School "Retrospective Dosimetry"
and
Workshop "Dosimetric Issues in the Medical Use of Ionising radiation"
Paris, France
Contact: EURADOS-AM2008@irsn.fr,
Info: www.eurados.org

**March 7th to 11th, 2008**
**ECR 2008 - 20th European Congress of Radiology**
Vienna, Austria
Info: www.myESR.org

**April 14th to 16th, 2008**
**16th International Conference on Medical Physics**
Dubai International Convention and Exhibition Centre (Dubai World Trade Centre)
Dubai, United Arab Emirates
Contact: icmp2008@dwtc.com,
Info: www.icmpdubai.com

**June 16th to 20th, 2008**
**NBC 2008**
14th Nordic Baltic Conference on Biomedical Engineering
Riga, Latvia
Info: http://www.rtu.lv/nbc14/

**June 25th to 28th 2008**
**CARS 2008 - Computer Assisted Radiology and Surgery –**
**22nd International Congress and Exhibition**
together with:

- CAD - 10th International Workshop on Computer-Aided Diagnosis
- ISCAS - 12th Annual Conference of the International Society for Computer Aided Surgery
- CMI - 14th Computed Maxillofacial Imaging Congress
- EuroPACS - 26th International Euro PACS Meeting

Barcelona, Spain
Contact: www.cars-int.org
Info: www.cars-int.org

**June 29th to July 1st, 2008**
**BIOSIGNAL 2008**
19th international EURASIP conference Brno, Czech Republic
Deadline for extended abstracts: 14.1.2008
Contact: bs2008@feec.vutbr.cz,
Info: www.dbme.feec.vutbr.cz/bs2008.html

**Sep 17th to Sep 21st, 2008**
**Medical Physics and Engineering 110 Years After the Discovery of Polonium and Radium —**
***2nd European Conference on Medical Physics***
Krakow, Poland
Info: http://mpekrak08.ftj.agh.edu.pl