# European Medical Physics News

Summer 2009

## A new EFOMP is rising up!

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# Editorial

Dear Reader,

Finishing the summer issue of the news we hear and read about the financial crisis hitting the bottom of the pit. There is only one way now - up!

We are not sure about all this business but we do know that Medical Physics has to get out of a kind of crisis, too. You will read about the situation of Medical Physics in this and the coming issues. The reports from different parts of Europe seem to carry through one common thread: That Medical Physics is being sold under value and has to fight for reputation beside a seemingly overpowering medical faculty at the hospitals.

This status quo needs to be changed and besides political activities, we should start in our back yard and have a look at our field in the ever changing world of what is being expected from science in general and the application of it all in our daily business in particular. EFOMP is trying to give some guidance in this by tackling issues such as the definition of the Medical Physics profession on a European level, being actively involved in pertinent work groups established by the European Union. Only when harmonized on a European level Medical Physics as a small number profession can be put in a position that holds up in the national struggles over resources - be it social reputation, status in the job environment or simply money.

EFOMP is also convinced that continuous professional education is - besides political lobbying - one of the keys in achieving the above goals. EFOMP has recently set up the European Network of Medical Physics Schools (ENMPS). The aim of this network is to assure that the Continuous Professional Development (CPD) courses held in the various National Member countries are at the same level so assuring the same opportunity for lifelong professional development for Medical Physicists. But as Stelios Christofides, our President, reports in his vision about EFOMP's evolution (see the following pages), this needs to be supported by ourselves, i.e. by our national member organizations. Speak up in your society, if you are convinced of this European idea to strengthen this network towards the recognition of our profession by the European Union.

What can happen when Medical Physicists are being left alone with sometime overwhelming problems can be seen from the Epinal accident that is being reported on in this issue. We thank Alainn Noel for his open and emotional contribution even if we already smoothed it out a bit.

EFOMP understands its mission as being one lead in the processes sketched out above. Its evolution should, therefore, only be leading one way - up.

Can we do it? You know the answer!

PS: Many thanks to J. Chavaudra, France, W. Seelentag, Switzerland and P. Schneider, Germany, in helping to identify persons in the historic photo of the last issue and providing a copy of the original publication!

Also thanks to W. Roser, Switzerland for corrections of the Europe map of female medical physicists. We will continue this topic!

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# The Evolution of EFOMP

EFOMP was founded in 1980 focused on clear objectives and since then it has set a brilliant example for other international scientific organisations. But science and technology is rapidly evolving in our field and our professional environment needs to change accordingly. This year we celebrate the bicentennial of Darwin's birth, and what better message can we take from this than the need for us to evolve. To do this we need the ingredients of influence and strength and these must come from you, the Medical Physicists.

One of the biggest challenges is the recognition of Medical Physics as a regulated profession in accordance with Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications. This recognition is mainly based on the educational qualifications of a profession that is harmonised in all the Member States of the European Union and on a formal mechanism of registration of the professionals based on competencies. So to get the European Union to accept Medical Physics as a Profession we need to harmonise our Education and Training and set up registration schemes. For many years EFOMP has worked hard to encourage its NMOs to lobby their governments to harmonise the Education and Training in Medical Physics and also to set up registration schemes. This can be seen in the various EFOMP Policy Statements. But the production and dissemination of Policy Statements is not enough, we need to develop a common strategy on how to achieve the required level of harmonisation.

EFOMP has recently set up the European Network of Medical Physics Schools (ENMPS). The aim of this network is to assure that the Continuous Professional Development (CPD) courses held in the various National Member countries are at the same level so assuring the same opportunity for lifelong professional development for Medical Physicists. So far this has not being implemented due to a lack of willingness from the NMOs to participate in this network. The functionality and acceptance of this network is another step towards the recognition of our profession by the European Union.

The second challenge is the revision of the radiation protection directives of the European Union. These are the Council Directive 96/29/Euratom of 13 May 1996, that lays down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation, and Council Directive 97/43/Euratopm of 30 June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposure. The definitions of the Medical Physics Expert and the Qualified Expert in Radiation Protection as applied in the hospital environment are in conflict and the interest of our profession, at least in the European Union, needs to be safeguarded. Although EFOMP has been very active these past few years in this area, in order to be effective we need to formulate a common strategy, giving the correct advice to our government's representatives to the European Union bodies that deal with this revision.

Last year EFOMP was registered as a company limited by guarantee in England and Wales. This move allows EFOMP to participate in European Union funded projects. Already EFOMP has participated as a prospective partner in two such project proposals, albeit unsuccessfully. With your help EFOMP needs to develop a network of institutions willing to participate in joint project proposals. On the same note, EFOMP has became a shareholder of the European Institute of Biomedical Imaging Research (EIBIR) in an effort to enhance the knowledge required for preparing project proposals as well as to acquire the secretariat support for the preparation and submission of project proposals. So far we have not taken advantage of this. EFOMP requires your support to set up the necessary network of research.

We need to put serious effort not only to keep up with the developments in science and technology but also to be ahead of them. We need to take advantage of the opportunities that arise almost daily and be able to address the challenges facing us today and in the future.

A short document on the evolution of EFOMP was approved by the EFOMP National Member Organisations through a postal ballot in January 2009. A number of changes will be made in the way the EFOMP committees operate to make them more efficient and effective. The Education, Training and Professional Committee will be renamed as the Education and Training Committee and the professional part will be taken up by the Standing Committee on Registration, renamed

the Professional Committee. A new committee will be created, the Project Committee, which will be taking care of new project proposals. The role and terms of the Science Committee will also be changed. The new terms of reference, as well as the role of the NMO delegates to these committees, will be prepared and submitted for approval at the next EFOMP Council meeting.

It was also decided to start with the creation of the first three Special Interest Groups (SIGs) Radiotherapy, Diagnostic Radiology and Nuclear Medicine. These will be managed by the Science Committee. The terms of reference for these SIGs will also be submitted for approval at the next EFOMP Council meeting.

**Recommendations**

EFOMP is a federation of medical physics societies. Together we have a strength that will allow us to evolve, a strength that we don't possess as individuals. But we also look to you for help; to come forward with suggestions and advice and give a helping hand in the evolution of our Federation for a better (European) future for all the (European) Medical Physicists through a strong and dynamic EFOMP.

***Stelios Christofides, EFOMP President***

# EFOMP and ESMRMB cooperation

## General cooperation and joint ESMRMB-EFOMP session during the Annual ESMRMB Meeting at Antalya (2009)

During the ECR (European Congress of Radiology) in Vienna taking place in March 6-10, 2009 our ongoing joint activities between ESMRMB (European Society for Magnetic Resonance in Medicine and Biology ) and the European Federation of Organizations for Medical Physics (EFOMP) reached a new level: A "Memorandum of Understanding" has been signed by the presidents (Prof. Isabel Berry and Prof. Stelios Christofides) of both societies. Following commitments are covered by the memorandum:

EFOMP and ESMRMB desire to engage in cooperation to promote each other's educational and scientific activities and events, for the mutual benefit of both organisations.

The Parties have agreed upon the following:

1. To mutually promote their educational and scientific activities on their websites and in their newsletters and other relevant publications
2. To consider each other in the scientific/educational programmes of each organisation's congresses, as far as applicable and feasible
3. The terms of cooperation for each activity implemented under this agreement shall be mutually discussed and agreed upon by the two organisations on a case by case basis.
4. Each organisation will be responsible for funding its involvement in the cooperative activities contemplated under this agreement.
5. All activities shall be in accordance with the regulations and policies of EFOMP and ESMRMB.
6. This agreement becomes effective from the day the representatives of both organisations affix their signatures and continue for an initial period of one year, subject to review from time to time. At the end of one year, the agreement will automatically be renewed for three years unless otherwise determined. This agreement may be revised through the mutual agreement of both organisations and may be terminated by either party upon giving four months written notice signed by the presiding office of the notifiying party.
7. All modifications to this agreement must be in writing and signed by both parties.

The first joint ESMRMB-EFOMP scientific event took place at the EFOMP meeting on September 2007 near Pisa, Italy. Four invited speakers from ESMRMB offered their perspective on

current MR topics in a guest symposium embedded in the EFOMP conference.

The speakers and topics for the second joint ESMRMB-EFOMP Symposium during the ESMRMB Annual Meeting in Antalya were selected by Alberto Torresin and Fritz Schick . Following presentations are planned in this session, which is planned to start at 11.10 on October 2nd:

A) MR images for treatment: advantages and disadvantages. *Philip M Evans, UK*

B) Magnetic resonance imaging in radiosurgery and in image-guided neurosurgery. *Carlo Cavedon - Italy*

C) MRI and focused ultrasound: physical aspects and future prospective.
Part I: *Philippe Degreze – France*
Part 2: *Thomas Andreae – Finland*

We are looking forward to a very interesting symposium which allows insights in new fields of research.

Alberto Torresin
*EFOMP Chairman of the Science Committee*

Fritz Schick
*ESMRMB Secretary*

# Modernising Scientific Careers in the UK

The Department of Health in England has just published a consultation document on proposals to change the way in which training and education is carried out for healthcare scientists. Healthcare scientists are a group of over 50 different professions ranging from Audiologists to Virologists, including medical physicists and bioengineers, with the common feature that they use science or engineering in healthcare.

The proposal is to set up a common structure to cover education and training throughout a person's career. For medical physicists this involves competitive entry for science graduates to a fully funded 3 year Scientific Training Programme. This will be largely work-based and involve 6-month blocks of training in Radiotherapy Physics, Radiation Safety, Imaging with Ionising radiation and Imaging with Non-ionising Radiation. For the third year trainees will work in one of these 4 areas. The training will also include an MSc.

On completion of training, trainees will be eligible to apply to be registered as a Healthcare Scientist.

There then follows opportunity for further training either by competitive entry to a Higher Specialist Scientific Training Programme, with guaranteed training and employment throughout the programme, or by obtaining employment as a Senior Healthcare Scientist with the opportunity to undertake training in specific areas of advanced specialist practice. Both routes will lead to entry to a Higher Specialist Register for Scientists and the opportunity to apply for consultant level scientist appointments.

Similar training programmes are planned for technologists.

Currently the proposal is out for consultation and further details can be found at:

*www.dh.gov.uk/en/Consultations/Liveconsultations/DH_091137*.

This proposal represents a very significant development in the way in which scientists and technologists will be trained to work in the health service in the UK.

Peter Sharp, UK

# National Measures For Radiotherapy In France

## Introduction

Radiotherapy has always been heavily regulated but currently an even stricter approach can be noticed. While in the past being restricted to the technical aspects, regulations today also include the human factor. Besides this, radioprotection is coming with a new weight on the patient side.

The new approach is a direct consequence of the radiotherapy accidents in France of which the Epinal incident was the most prominent one. The Ministry for Health has launched a national action plan to reinforce safety standards as well as monitoring procedures to early pick up indications that might be leading to events such as the ones below.

## Review of the Hospital Jean Monnet d' Epinal incidences

Here nearly 5000 patients were over-exposed. According to the three main problems later identified to have lead to that over-exposure, three groups have been identified:

***Epinal I***: 24 patients treated for prostate cancer between May 2004 and August 2005 received a radiation over-dose of 20% to 30% due to the mix-up of wedge types during treatment planning assuming a physical wedge and the subsequent irradiation with a dynamic wedge.

***Epinal II***: 409 patients treated for prostate cancer between October 2000 and October 2006 received an excess dose ranging from 0,17 to 0,34Gy (8 to 10%) as a consequence of overusing portal imaging.

***Epinal III***: An in-house treatment planning software used on isocentric techniques between 1987 and July 2000 lead to over dosages of 3% for 1100 patients, 5,5% for 3600 patients and 7,1% for 306 patients treated at 6MV, 12 MV and 25 MV photons, respectively.

It cannot be excluded that some of the above over-exposures cumulated for certain patients.

For a smaller group of breast cancer patients two further problems were identified:

·In July 1993 eight patients were overdosed by 20% to 70% due to an error in the used wedge factor (taking into account the correct one twice). Between February 1999 and June 1999 due to linac maintenance, 36 mamma patients planned for an electron/ photon irradiation protocol were switched to exclusive photon beams leading to a substantial radiation burden to the heart with a suspected increase of cardiac complications.

## The roadmap

As a consequence of the above (and several other, though less severe) incidents the Ministry of Health stepped in. At the end of June 2007, a roadmap consisting of 32 check points was put forward as a result of the collaborative effort of the principal Institutes and Agencies:

- National Institute of Cancer (INCA, “http://www.e-cancer.fr”) which coordinates the implementation of the program,
- Nuclear Safety Authority (ASN, “http://www.asn.fr”),
- French Agency of Health Security and Health Products (AFSSAPS, “http://www.afssaps.fr”),
- National Sanitary Surveillance Institute (INVS, “http://www.invs.sante.fr”),
- French Society of Radiotherapy Oncology (SFRO, “http://www.sfro.org”),
- French Society of Medical Physics (SFPM, http://www.sfpm.asso.fr”),

The roadmap is grouped into several sub-programs. Here only the for the Medical Physicist most important points shall be introduced.

## Procedure Quality and Safety

New accreditation criteria for external radiotherapy will be set up by INCA.

Throughout the entire treatment, a Radiation Oncologist and a Medical Physicist must be present in the centre and the treatment console must be manned with 2 Radiation Therapists.

The treatment parameters are to be recorded and controlled by a dedicated computer system, a double check of the number of “monitors units” is mandatory. If technically possible, an in-vivo

dosimetry is performed at the time of the first or second treatment session as well as for each modification of treatment.

A reference frame of quality assurance in radiotherapy adapted to the standard ISO 9001 version 2000 should come into effect by the year 2011. This point is very controversial among all the professionals in the field since its implementation and execution will be time-consuming and with no compensation on the already strained staff situation among Radiation Oncologists, Medical Physicists and Radiation Therapists.

### To set up a system of "radio-alarm"

Based on a combination of safety instructions for nuclear installations in general and aeronautical models of hazard prevention, the ASN set up a system of declarations of so called precursory events of potentially serious incidents.

By July 1, 2009 all radiotherapy facilities must have set up a list of possible precursory events as well as their analysis within a cell of experience feedback (CREX). Consequently, actions will have to be taken in order to improve quality and safety of treatment procedures.

The ASN published a guide of declaration of undesirable (i.e. precursory) events, mainly addressing the delivered amount of dose or the irradiated volume. In dialogue with the SFRO, the ASN proposed a classification of these events compatible with the international scales of the INES nuclear events (International Nuclear Events Scale) but also in comparison with classifications already used by experts (CTAE, Criteria for Adverse Vents).

### Human resources

The shortage of Medical Physicists as well as Radiation Oncologists and Radiation Therapists and the subsequent stress in the clinical routine has been identified as one of the main factors in the above incidents. The reasons for the shortage are multifaceted; for Medical Physicist one of the main reasons is certainly the lack of recognition of Medical Physics in France leading to an inferior status of MP in the public health sector. This results in France being one of the European countries with the lowest number of Medical Physicists per million inhabitants (according to EFOMP, 2007).

IIt is envisaged to increase the number of trained Medical Physicists but it will certainly need more than 5 years, even 10 years, for reaching a sufficient number that matches the level of the French radiotherapy equipment. In the mean time, Medical Physicists of other European countries are invited to work in France with an un-bureaucratic recognition of degrees.

### Installation safety

Besides the reinforcement of existing rules, it is recommended to abandon in-house software and to secure not only parts of the treatment chain but the entire treatment process, starting with treatment planning systems (TPS) and reaching through to the portal imaging.

### Inspection and controls

Since 2007 the programmes of inspection of the Nuclear Safety Authority were reinforced with an annual inspection of all radiotherapy departments (what was not the case before). The first inspections confirmed the lack of manpower for Radiation Oncologists, Medical Physicists and Radiation Therapists. Quality assurance seems to be sufficient but little formalized in most centres. However, there are still centres with discrepancies between procedures performed and the quality assurance coming along with it. The annual reports of ASN and other related documents can be found on the ASN website, http://www.asn.fr under 'current events'.

### Conclusion

Radiotherapy incidents such as those in Epinal cast a sharp light on the situation in radiotherapy. It is a complex treatment modality with a necessity of high safety standards. Unfortunate in this situation is the almost catastrophic state of Medical physics in France today. Here it has to be pushed for the increase in trained workforce, the recognition of the medical physicists with the creation of a true attractive status. But will the French authorities learn from the catastrophic accident of Epinal?

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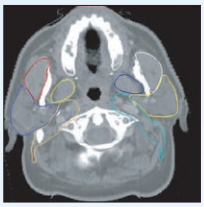

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**Literature reviewed:**

# Lessons From Recent Accidents In Radiation Therapy In France

S. Derreumaux, C. Etard, C. Huet, F. Trompier, I. Clairand, J.-F. Bottollier-Depois, B. Aubert and P. Gourmelon; Radiation Protection Dosimetry (2008) **131** 130-135.

The paper reports on 5 accidents in Radiation Therapy in France since 2003. These accidents have affected between 1 and 397 patients. For the analysis, only technical and dosimetric aspects have been evaluated. Human and organisational aspects have not been addressed.

Case 1: Misinterpretation of the transferred monitor units (MUs)calculated by an in-house software for wedged beams by the R&V system.

Case 2: Misunderstanding in setting the collimated field size for stereotactic cone beam treatment to 40x40 $cm^2$ instead of 40x40 $mm^2$.

Case 3: Junction of orthogonal fields wer matched at the patient's skin leading to overdosage due to field overlap in depth.

Case 4 subdivides into 3 additional accidents:

1. MUs calculated for mechanical wedge were administered with virtual wedge,
2. MUs given for daily MV portal imaging were not taken into account for the total dose of the patient,
3. Reference dose rate for MU calculation at the treatment planning system was not changed when the reference point was shifted from SSD=100 cm+$d_{max}$ to SSK=100 cm.

Case 5: Measurement of output factors for stereotactic treatment with a too large ionization chamber resulting in overdosage of patients.

Most cases would have been detected by an independent in-vivo dosimetry system or double independent MU checks. Also external audits may help to identify such problems.

Markus Buchgeister, Germany

# Professional Situation Of Medical Physicists In Spain

When the profession of medical physicist started in Spain in the sixties there were very few physicists working in hospitals and their work was related to radiotherapy. The career had not yet been regulated, and professional status was negotiated between the head of the radiotherapy department and the hospital manager. There were no specific rules or regulations and the employment contract varied from centre to centre. While some physicists were contracted at the same status as medical doctors, others were contracted as university graduates or even as technicians. Hospital managers had little knowledge of the scope of medical physicists within a hospital, even though new machines were being installed in radiotherapy centres and the role of medical physicists was becoming more and more accepted in these departments.

The professional status of medical physicists started to change in the eighties when a regulatory body for radiation protection issues, the *Consejo de Seguridad Nuclear, CSN,* was established in Spain. This body established legislation (1) concerning the need for any institution with radiological risks to dispose of a radiation protection department under the direct responsibility of the managing director. The objective was to incorporate all the aspects of ionizing radiation related to radiation protection for workers and public in a single department. As of this moment, although hospital management in public hospitals then began to create such departments in centres with radiology, nuclear medicine and radiotherapy departments, each hospital could decide whether physicists were grouped in a single department and covered all areas (radiology, nuclear medicine, radiotherapy and radiation protection), or whether they were assigned to one specific department. The result of this option was similarly divided.

In the nineties, the Spanish Ministry of Health created new legislation following the accident with the linear accelerator in Zaragoza (2) and the establishment of European Directives (3, 4). The specialty of Medical Physics (*Radiofisica*

*Hospitalaria*) was regulated (5) and criteria on quality assurance in radiology (6), nuclear medicine (7) and radiotherapy (8) were also introduced.

Since the recognition of the specialty, the profession has made great progress. It is based on the same model as the medical specialties through the resident programme system. This implies that entrance requirements, training, status and salary are similar to those of medical specialists in the National Health Service.

Medical physicists have the necessary knowledge to plan and apply all radiation physics techniques used in diagnosis and treatments in which patients are exposed to ionizing radiation. They are also trained to perform quality control of installations and equipment used in such tests and treatments, ensure radiation protection for anyone who may be exposed to radiation in medical settings, and to carry out research in all related areas. The head of any Radiation Protection Department in a National Health Service hospital must be a medical physicist.

The medical physicist training programme is only conducted in hospitals with official teaching accreditation. To date, there are 33 accredited teaching units in Spain and over 450 officially registered medical physicists. Each year around 30 physics graduates enter the training programme.

It should also be pointed out that the Royal Decree on quality assurance in radiotherapy (8) stipulates that all hospitals with a radiotherapy department must have a Radiophysics Unit (*Unidad de Radiofísica)* with human and material resources in accordance with recommendations of accredited bodies, institutions or societies.

The establishment of Medical Physics Departments has not only fulfilled the legislation of both the CSN and the Spanish Ministry of Health but has also contributed to improving quality assurance in ionizing radiation fields. There are currently 66 (75 %) Medical Physics Departments in the country. Results in recent years clearly illustrate the practical value and efficiency of this system.

A recent Royal Decree (9) determines and classifies the health sciences specialties and develops certain aspects of specialized health system training, replacing the anterior Decree (5) and adding:

- The qualification of Medical Physics (*Radiofisica Hospitalaria*) is considered equivalent to Medical Physics Expert, as defined in (4).
- The head of Radiation Protection Department in private centres, as well as in public institutions, must be a medical physicist specialist.

In short, we have come a long way in recent years thanks to the effort invested and the role played by all those concerned: regulatory bodies, institutions, scientific societies and professionals. Today we can say that medical physics in Spain is a consolidated profession. However, we must keep the long-term aim in mind, that is, to achieve continued improvement not only in quality training but also in professional practice.

Montserrat Ribas
Chairman of National Commission of Radiofísica Hospitalaria

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(3) Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the danger arising from ionizing radiation. Official Journal of the European Communities No L 159, 29.6.1996; p.55-83

(4) Directive 97/43/Euratom of 30 June 1997 on health protection of individuals against the dangers of ionising radiation in relation to medical exposure, and repealing Directive 84/466/Euratom. Official Journal of the European Communities No. L 180, 9.7.1997; p.22-27

(5) Royal Decree nº 29 /1997 which creates the degree of Specialist in Hospital Radiophysics and regulates its acquisition. Official Gazette of the Spanish State [B.O.E. nº 52, 1 March 1997].

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(7) Royal Decree nº 1841 /1997, on Quality Assurance in Nuclear Medicine Official Gazette of the Spanish State [B.O.E. nº 303, 19 December 1997].

(8) Royal Decree nº 1566 / 1998 on Quality Assurance in Radiotherapy. Official Gazette of the Spanish State [B.O.E. nº 206, 28 August 1998].

(9) Royal Decree nº 183 / 2008 Official Gazette of the Spanish State [B.O.E. nº 45, 21 February 2008].

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* Van Esch et al: "On-line quality assurance of rotational radio-therapy treatment delivery by means of a 2D ion chamber array and the Octavius phantom" Med. Phys. 34 (10), October 2007

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KNOWING WHAT RESPONSIBILITY MEANS

# Medical Physicists Education Training And Status In Romania

## Introduction

Medical Physics was developed in Romania many years ago, without having any official recognition as a profession.

Starting January 2006 the medical physics was recognized as a profession and was introduced in the official list of Classification of Occupations in Romania. As a consequence of this act, regulations regarding the medical physicists have been issued by the National Commission for Nuclear Activities Control (i.e. Romanian Regulatory Body), jointly with the Ministry of Public Health, in what concerns the medical practices using ionizing radiation. Besides the Romanian Regulatory Body, the Ministry of Health as well has the responsibility to issue regulations for the medical physicists involved in all the medical acts, whether it is about medical practices using ionizing or non ionizing radiation. The EU directives and recommendations in this field have already been adopted and now a project has been started, regarding setting-up a national register of medical physicists.

In what concerns the new regulation for the medical physics expert, this is part of the implementation of the 97/43 EURATOM Directive, and it generally follows also the recommendations of the EFOMP (European Federation of Organizations of Medical Physicists). This regulation refers to the medical physicists involved in the medical practices using ionizing radiations. It contains requirements regarding the educations and training of the medical physicist, and also requirements for the accreditation of the medical physicist as an expert in one or more of the three main fields of activity: radiotherapy physics, nuclear medicine physics and physics of diagnostic radiology and interventional radiology.

Until recent, the medical physics education and training were done mainly on-the-job, under the supervision of a qualified person (not always a medical physicist) and also by attending several training courses abroad (particularly, with the occasion of acquisition of new installations).

We would like to point out, that some of the medical physicists from Romania succeeded to become experts in their field, with national or international recognition.

## Medical Physics Education Today

A specific education program in Medical Physics in Romania had started in the academic year 1995/1996. As a result of the Romanian Government decision from July 1995, two similar (but not identical) programmes of education in Medical Physics were implemented at the Physics Faculties from the University of Bucharest and University of Iasi. This programmes included groups of about 20 undergraduate students per year and each university. After three years a similar programme was created as well at the University “Babes – Bolyai” of Cluj-Napoca. Following four years of education (8 semesters) in 1999, the first promotion of about 40 students graduated (B.Sc.) with the specialization in Medical Physics.

At the University of Bucharest from a group of about 20 graduate students, two thirds of them (about 14 persons) are selected each year for a further Master Degree (M.Sc.) study in Medical Physics, including 3 semesters (i.e., one year and a half).

Now, after the Bologna decision concerning the European unitary education programs, a reorganization of the education and training program was necessary. Thus, Medical Physics is becoming a direction of specialization (three years), followed by a Master Degree in Biophysics and Medical Physics (two years) and potentially continued with a PhD programme (three years).

In the first three years a background in Physics, Mathematics and General Chemistry is created. The direction of specialisation in Medical Physics includes only five specific courses and laboratories: General Chemistry, Biochemistry, Fundamentals of Biophysics, Bioinformatics, Human Anatomy and Physiology.

## Further Medical Physics Training

The Medical Physics Training is performed today in the main medical research institutes and large hospitals within the cities where the universities are located (e.g.: Oncological Institutes from Bucharest and Cluj-Napoca, Institute of Public Health-Bucharest, etc.). This is done by practical work or one week training course, with-

out having, however, a national institutional system.

**Medical Physicists and Radiation Medicine Facilities**

In Romania there are now about 80 medical physicists working, mainly in hospitals, in activities involving radiation medicine, or in companies performing maintenance, repair, servicing, testing and control of radiological equipment along with specialized engineers, (36 medical physicists working in radiotherapy, 22 medical physicists working in nuclear medicine, 5 medical physicists working in X-ray diagnostic and 15 medical physicists working in servicing and maintenance activities). Moreover it has to be mentioned that besides the medical physicists from hospitals an important role in the Romanian medical system it is played by the radiation hygiene laboratories network of the Ministry of Public Health including sanitary physicists (approximately 30 persons) working within the divisions of the Authority for Public Health (located in 19 counties including Bucharest) and in the Institutes of Public health from Bucharest, Iasi, Cluj-Napoca and Timisoara..

It is important to point out that in Romania we now also have experts in radiological protection for different fields of activities involving ionizing radiations, like the use of radiological equipments in medicine. At this moment a number of about 35 persons have been accredited as experts in radiation protection regarding the use of radiological equipments in medicine by the Romanian Regulatory Body.

In what concerns the equipment used in radiation medicine in Romania today, we can give an approximation of their number according to the 2006 annual report of the Romanian Regulatory Body. Therefore, in the table below is presented the situation of radiological equipment in use in Romania at the end of 2006.

Also it is important to mention that at the Faculty of Physics from the University of Bucharest there is a fully operational laboratory of Non-Destructive Control provided with an X-ray dual-energy Computer Tomograph (CT) that can be used also as a Digital Radiography (DR) instrument able to generate both CT and DR images with a resolution of about 0.5 mm. This laboratory is available free of taxes for both Master and PhD students from any University.

We have to point out also the fact that the Secondary Standard Radiation Dosimetry Laboratory within the Institute of Public Health – Bucharest ( which is full member of the IAEA/WHO SSDLs Network , since 1970) , is the national Laboratory responsible for the quality audit in X-ray diagnosis and radiotherapy and an important training center for medical physicists from Romania.

**Future Perspectives and Problems**

The medical physics expert according to the 97/43 EURATOM Directive is: an expert in radiation physics or radiation technology applied to exposure, whose training and competence to act is recognized by the competent authorities, and who, as appropriate, acts or gives advice on patient dosimetry, on the development and use of complex techniques and equipment, on optimization, on quality assurance, including quality control, and on other matters relating to radiation protection, concerning exposure within the scope of this Directive.

This definition of the medical physics expert was translated and introduced in the regulations issued by the Romanian Regulatory Body. The aim was to try to make aware all the competent authorities about the importance of the medical physicist in the medical acts involving ionizing

| Radiological Equipment | No. of equipments in use in 2006 |
|---|---|
| Dental Radiology | 803 |
| Mammography | 116 |
| Angiography | 26 |
| CT Scanners | 110 |
| X-ray Bone Densitometry | 40 |
| Diagnostic Radiology – including, general radiology (conventional and digital), general fluoroscopy and interventional radiology | 1543 |
| Nuclear Medicine – including gamma cameras and rectilinear scanners | 55 |
| Teletherapy units – including Low energy X ray (< 250 KeV) and $^{60}$Co units | 53 |
| Linear accelerators | 4 |
| Stereotactic (using gamma sources) | 1 |
| Brachytherapy afterloading units | 6 |

radiations. Also this definition can give us a general idea about how the educational and training programmes should be organized. According to the provisions of the regulation regarding the medical physics expert an important issue in the near future will be the optimization and re-evaluation of the educational and training programmes that exist at this moment.

Another important matter, for which measures should be taken as soon as possible, is the training of the medical physicists. At the moment the practical work is done very poorly and most of the time the students are attending just one week training course. This is absolutely insufficient and it will not help them to become good professionals.

It will be absolutely necessary to establish an institutional and well organized system for continuous professional education and training for all medical physicists from Romania. For this purpose an important role should be played both by the Universities and by the professional associations of medical physicists (i.e., Romanian Association of Medical Physicists and the Romanian Society for Radiological Protection). A key aspect is the bilateral cooperation and agreement between local professional societies, or collaboration with professional societies from other countries, the individual mobility (either in the country or abroad) of the Romanian medical physicists and the advantages offered by the existing international programmes in this field or in connected ones (e.g. ERASMUS).

The medical physics in Romania has evolved significantly from 1995. We can remark that now the profession of medical physics is an accredited one, we have four universities with Medical Physics programmes and also specific regulations have been issued for medical physicists involved in medical acts using ionizing radiations.

Although the changes in this field are very important, there are still a lot of steps that have to be taken in order to have better professionals in this domain and better legislation and educational and training programs.

Daniela Iulia Andrei[1], Octavian Duliu[3] Constantin Milu[2], and Aurel Popescu[#3]

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[2] Institute of Public Health – Bucharest, Romania
[3] Faculty of Physics, University of Bucharest, Romania
[#]Corresponding author: aurel.popescu.46@gmail.com

## References

1. Constantin Milu and Aurel Popescu, Medical physicist education and training in Romania, 2001.
2. Faculty of Physics, University of Bucharest. The new Study Programme for Medical Physics, 2006.
3. 2006 Annual Report of the Ionizing Radiation Department, National Commission for Nuclear Activities Control, December 2006.
4. Norms for Medical Physics Expert, National Commission for Nuclear Activities Control and Ministry of Public Health, 07.11.2006.

# Medical Physics Workshop 2009 "Where Is Portugal In The Medical Physics World?"

The workshop "Medical Physics Workshop – Where is Portugal in the Medical Physics World?" jointly organized by I3N from the University of Aveiro and by the Medical Physics Division from the Portuguese Physics Society, in the city of Aveiro, on May 8th and 9th 2009 (www.i3n.org/mpw09), had around 230 participants from all over Portugal, besides foreign invited speakers and a small number of participants from other countries, clearly showing the undisputable interest originated by the theme – Medical Physics in Portugal.

Around half of the workshop participants were undergraduate students from several physics-related subjects – physics, technological physics, physics engineering and biomedical engineering. This strong and undeniable participation shows the enormous interest of physics undergraduates in this field, considering it a possible and attractive professional career path.

The quality of the presentations and the excellence of the speakers were a clear demonstration of the high level of responsibilities and specialization required in this field of knowledge – the Medical Physics –, whether in the clinical setting, whether in research, at the universities or at the industry.

It is urgent and crucial to establish, at a national level, a well-structured educational program, which is consistent with the European recommendations. This must be done in coordination with the Portuguese health authorities bodies for the proper qualification, recognition and professional certification, or else the well being and safety of patients and health professionals might be put in jeopardy.

The continuous development and installation of equipments, techniques and new diagnostic and treatment technologies, every day more and more complex, have been steadily increasing in our country. However, all this has been done without the needed considerations in terms of number of health professionals required, or regarding a structured, coherent and effective training and education program, namely in the area of Medical Physics. Clearly, this is a dangerous strategy and a possible source of serious risks.

The Medical Physics Division from the Portuguese Physics Society, as the national representative of the European Federation of Medical Physics (EFOMP, www.efomp.org) must, and accordingly with the responsibilities taken from EFOMP, promote the development and standardization of the Medical Physics practice. As such, it must also alert the competent authorities that the lessons taken from serious accidents in other countries – France, United Kingdom, Panama – allow us to be aware and alert of the fundamental role of Qualified Medical Physicists in all health services with high level of standard of care, with particular emphasis in the diagnostic and treatment techniques that use ionizing radiation.

Maria do Carmo Lopes
Coordinator of the Medical Physics Division from the Portuguese Physics Society
Member of the Scientific Committee of the Medical Physics Workshop 2009

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## ImSimQA*4d*

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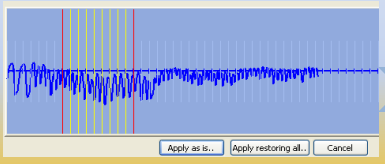
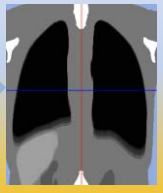



Import RPM signal & apply to phantom



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Move individual structures or whole

## ImSimQA*dform*

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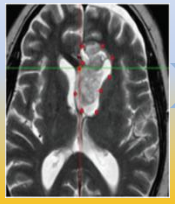

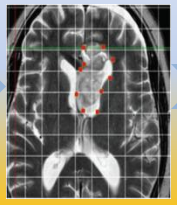

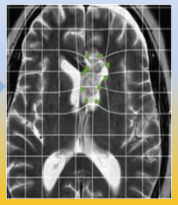

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# EFOMP Policy Statement no. 12: New EFOMP Recommendations On Education And Training

The first EFOMP policy statement PS1 was published in 1984 on the same subject as in PS12.The need to update PS1 was recognized several years ago and it was decided to collect new information on the status for education and training in medical physics.

A questionnaire was sent to all NMOs in 2005 and we got response from 25 out of the 35 NMOs. The results of the survey have been published in Eur. J. Med.Phys/Physica Medica 2008, 24(1)3-20.

On basis of this survey new EFOMP recommendations have been proposed and accepted by NMOs after a postal ballot.
The main points are:

1. EFOMP strongly encourage NMOs to strive to make a university master degree in Medical Physics available at their universities. This master should include the theoretical curriculum contents recommended by EFOMP in their Policy Statements and in other documents that EFOMP has produced in collaboration with other relevant societies.

2. From EFOMP's point of view, holding a university Master's Degree in Medical Physics, is not a sufficient qualification to work as a Medical Physicist in a hospital environment. To manage patients without supervision, EFOMP recommends a second part in the post-graduate training: at least 2 years' training experience on the job. Only after completion of this training can a physicist be considered a Medical Physicist and able to work independently as a Qualified Medical Physicist. (QMP). The on-the-job training is essential to achieve the competencies to work as QMP.

3. EFOMP recognises and values the important role that NMO's have played until now in setting up and managing the education and training programmes for Medical Physicists in most countries. In the future, EFOMP recommends that the NMO's efforts be aimed at involving Health Authorities in the education and training programmes in order to obtain official recognition as a health profession. EFOMP considers it an essential requirement that the Ministry of Health or National Health Authorities be involved in the recognition/accreditation of the post-graduate training (mainly the second part: "on-the job training").

4. EFOMP strongly encourages NMO's to set up a formal CPD programme for Medical Physicists, credit point based, according to EFOMP recommendations. Medical Physicists enrolled in a CPD programme can become Specialist Medical Physicists (SMP) by gaining advanced clinical experience and undergoing specialist training, mostly in one sub-speciality. In Policy Statement no 10 the duration of this experience and training was stated as a minimum of 2 years. The duration of a full CPD cycle is 5 years. EFOMP recommends that the minimum of two years should only be used for an interim period. With the rapid increase in complexity of diagnostic and therapeutic procedures and equipment the full length of five years advanced clinical experience and specialist training should be used to become accepted as Specialist Medical Physicist.

5. The official registers of professionals managed by the authorities are usually very static and renewal mechanisms are usually not planned. EFOMP therefore recommends that NMO's start their own register of professionals, managed by their own registration board, and including some CPD-based renewal mechanism.

Kjeld Olsen, Denmark

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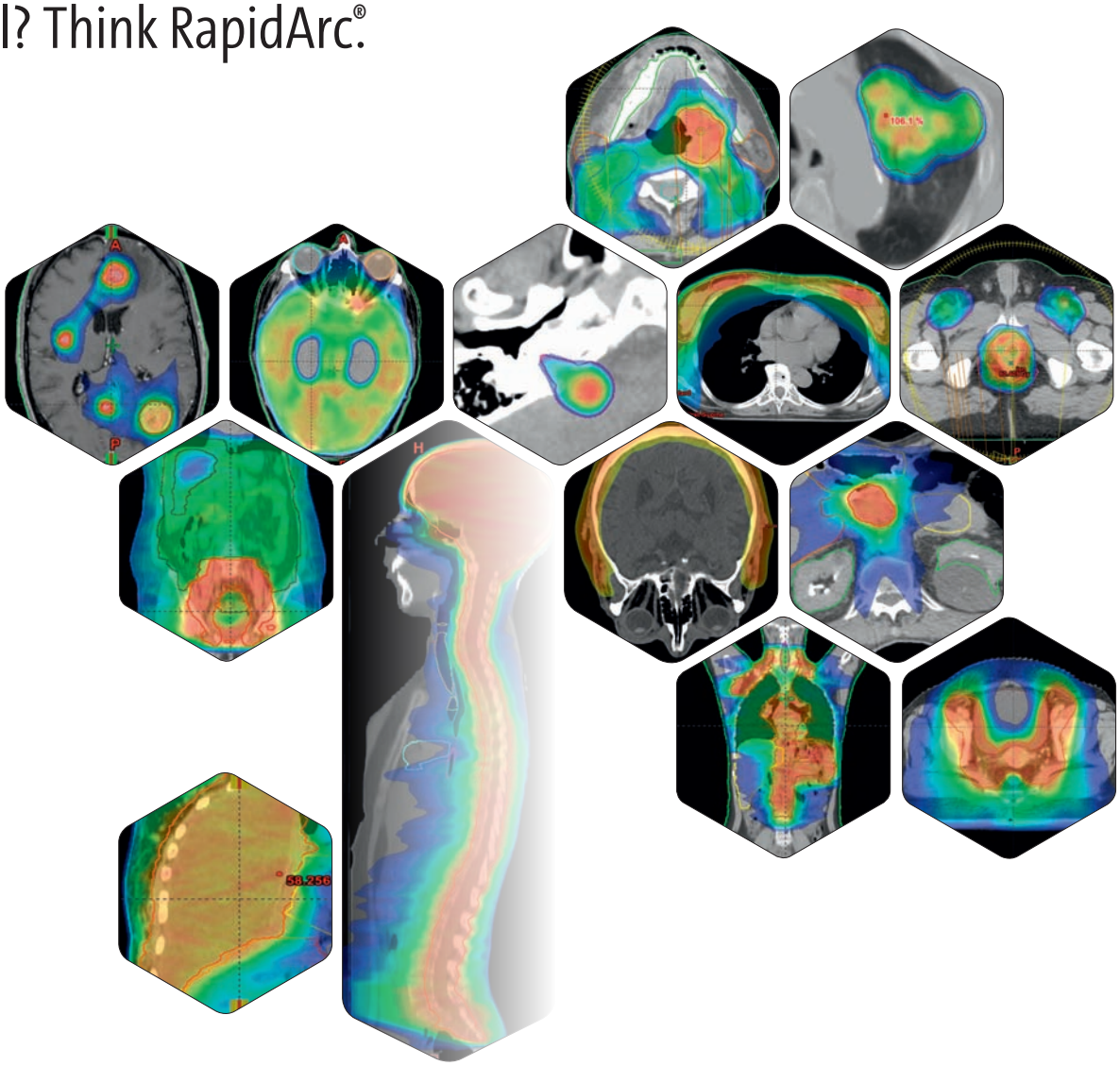

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# EMITEL e-Encyclopaedia for medical physics with multilingual dictionary

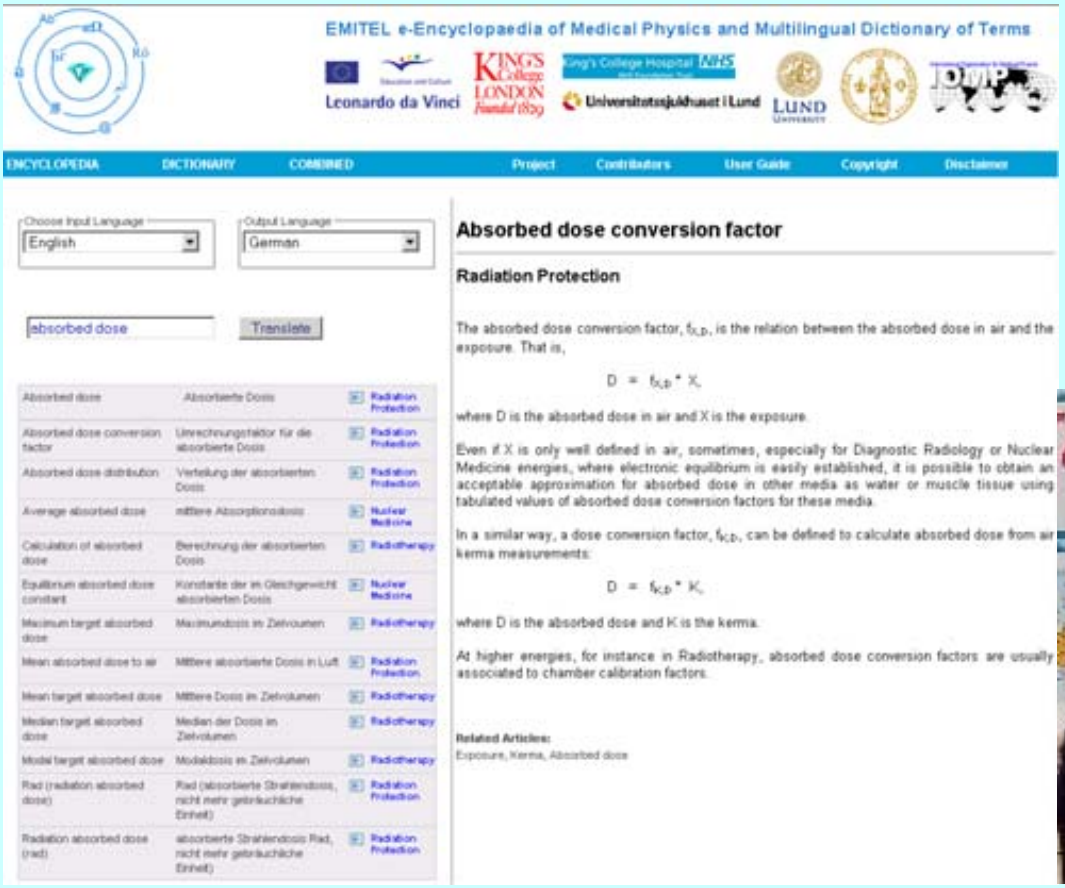
The international EU Leonardo project EMITEL, including partners from King's College London and King's College Hospital, University of Lund and Lund University Hospital, University of Florence, AM Studio Plovdiv, the International Organisation for Medical Physics (IOMP) and a supporting International Network has developed an e-Encyclopaedia for Medical Physics with Multilingual Dictionary which will be free to use over the Internet.

Specific Medical Physics terms have been included from the main topics of the profession (X-ray Diagnostic Radiology, Nuclear Medicine; Radiotherapy, Ultrasound Imaging, MR Imaging, Radiation Protection). Most terms are covered by an article with accompanying images and diagrams, where necessary. The materials form a large web database, served by two search engines. The articles have been refereed by experts in the above fields and tested by students for their suitability for MSc level teaching.

The EMITEL e-Encyclopaedia and Dictionary Web tool includes Display Interface and a Content Management System for continuing update. The project created an International Network with more than 200 specialists from 35 countries who will support the future updates and inclusion of new articles.

The terms (titles of the articles) are translated into 25 languages. The Dictionary cross-translates between any two languages. Currently the following languages are included: English, French, German, Swedish, Italian, Spanish, Portuguese, Polish, Thai, Hungarian, Estonian, Lithuanian, Romanian, Turkish, Arabic, Greek, Latvian, Persian, Czech, Bulgarian, Chinese, Malay, Persian, Slovenian, Bengali. These can be seen at *www.emitdictionary.co.uk*.

The overall volume of the EMITEL explanatory articles (in English) is more than 2000 pages. The EMITEL web site *www.emitel2.eu* (including both the e-Encyclopaedia and Dictionary) will be opened for free use by all colleagues during the World Congress in Munich, September 2009.




S. Tabakov (Photo below), S Keevil, C. Lewis, London/GB,
P. Smith, York/GB,
F. Milano, Florence/IT,
I.-L. Lamm,
S.-E. Strand, Lund/SE
M. Stoeva, Plovdiv/BG

# MCTP2009

The homepage of the Second European Workshop on Monte Carlo Treatment Planning is:

http://mctp2009.org

# Scientific Meetings

**September 7-12, 2009:**
The 3rd European Conference on Medical Physics by EFOMP will be held in conjuction with the World Congress 2009 on Medical Physics in September 2009 at Munich, Germany.
Info: www.wc2009.org

**September 16 - 18 September, 2009:**
OFMC 2009
Organised by the National Physical Laboratory
OFMC is Europe's leading conference on measurements for optical fibres and optoelectronics.
Info: conferences.npl.co.uk/ofmc2009/

**October 1-3, 2009:**
ESMRMB Congress 2009
26th Annual Meeting of the Society of Magnetic Resonance in Medicine and Biology
Antalya, Turkey
Info: www.ESMRMB.org

**October 12-16, 2009:**
11th NEUTRON AND ION DOSIMETRY SYMPOSIUM (NEUDOS-11)
Cape Town, South Africa
Contact: Neudos11@tlabs.ac.za
Info: www.med.lu.se/msf

**October 19-21, 2009:**
MCTP2009: Second European Workshop on Monte Carlo Treatment Planning
Cardiff, Wales, UK
Contact: workshop@mctp2009.org
Info: www.mctp2009.org

**October 22-24, 2009:**
9th Asia Oceania Congress of Medical Physics and the 7th South East Asia Congress Of Medical Physics
Chiang Mai, Thailand.
Info:www.tmps.or.th

**October 22-24, 2009:**
3rd Langendorff Symposium: Imaging in Radiation Oncology
Freiburg, Germany
Contact: hirschle@kongress-und-kommunikation.de
Info: www.langendorff-symposium.de

**October 25-31, 2009:**
2009 IEEE Nuclear Science Symposium and Medical Imaging Conference
Hilton Hotel – Walt Disney World Resort
Orlando, Forida, USA
Conference e-mail: nssmic2009@mit.edu
Info: www.nss-mic.org/2009

**November 2-6, 2009:**
Hands-on course Intensity-Modulated Radiation Therapy Treatment Planning (IMRT TP)
INHolland University of Applied Sciences
Contact: Dr. I.A.D. Bruinvis,
iain.bruinvis@inholland.nl
00-31-647462133 (mobile)

**November 8-12, 2009:**
ETRAP 2009
4th International Conference on Education and Training in Radiation
Protection, Lisbon, Portugal
Info: www.euronulear.org/events/etrap

**December 2-4, 2009:**
Advances and Challenges in Radation Protection of Patients
Versailles, France
organized by EC, IAEA and WHO.
Info: www.conference-radiotherapy-asn.com

**March 4-8, 2010:**
European Congress of Radiology
Vienna, Austria
Info: www.myESR.org

**March 8-12, 2010:**
European Conference on Individual Monitoring of Ionizing Radiation
Athens, Greece
Contact: im2010@gaec.gr
Info: www.gaec.gr/im2010

**9-12 November 2010:**
International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry
Vienna, Austria
Organized by the International Atomic Energy Agency
Info:
www.pub.iaea.org/MTCD/Meetings/Announcements.asp?ConfID=38093