Education and training of health professionals in occupational radiation protection

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VP and President-elect EFOMP

II

(Non-legislative acts)

DIRECTIVES

COUNCIL DIRECTIVE 2013/59/EURATOM

of 5 December 2013

laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom

Article 18

Education, information and training in the field of medical exposure

1. Member States shall ensure that practitioners and the individuals involved in the practical aspects of medical radiological procedures have adequate education, information and theoretical and practical training for the purpose of medical radiological practices, as well as relevant competence in radiation protection.

For this purpose Member States shall ensure that appropriate curricula are established and shall recognise the corresponding diplomas, certificates or formal qualifications.

2. Individuals undergoing relevant training programmes may participate in practical aspects of medical radiological procedures as set out in Article 57(2).

3. Member States shall ensure that continuing education and training after qualification is provided and, in the special case of the clinical use of new techniques, training is provided on these techniques and the relevant radiation protection requirements.

4. Member States shall encourage the introduction of a course on radiation protection in the basic curriculum of medical and dental schools.

Member States shall ensure that depending on the medical radiological practice, the medical physics expert takes responsibility for dosimetry, including physical measurements for evaluation of the dose delivered to the patient and other individuals subject to medical exposure, give advice on medical radiological equipment, and contribute in particular to the following:

(a) optimisation of the radiation protection of patients and other individuals subjected to medical exposure, including the application and use of diagnostic reference levels;

(b) the definition and performance of quality assurance of the medical radiological equipment;

(c) acceptance testing of medical radiological equipment;

(d) the preparation of technical specifications for medical radiological equipment and installation design;

(e) the surveillance of the medical radiological installations;

(f) the analysis of events involving, or potentially involving, accidental or unintended medical exposures;

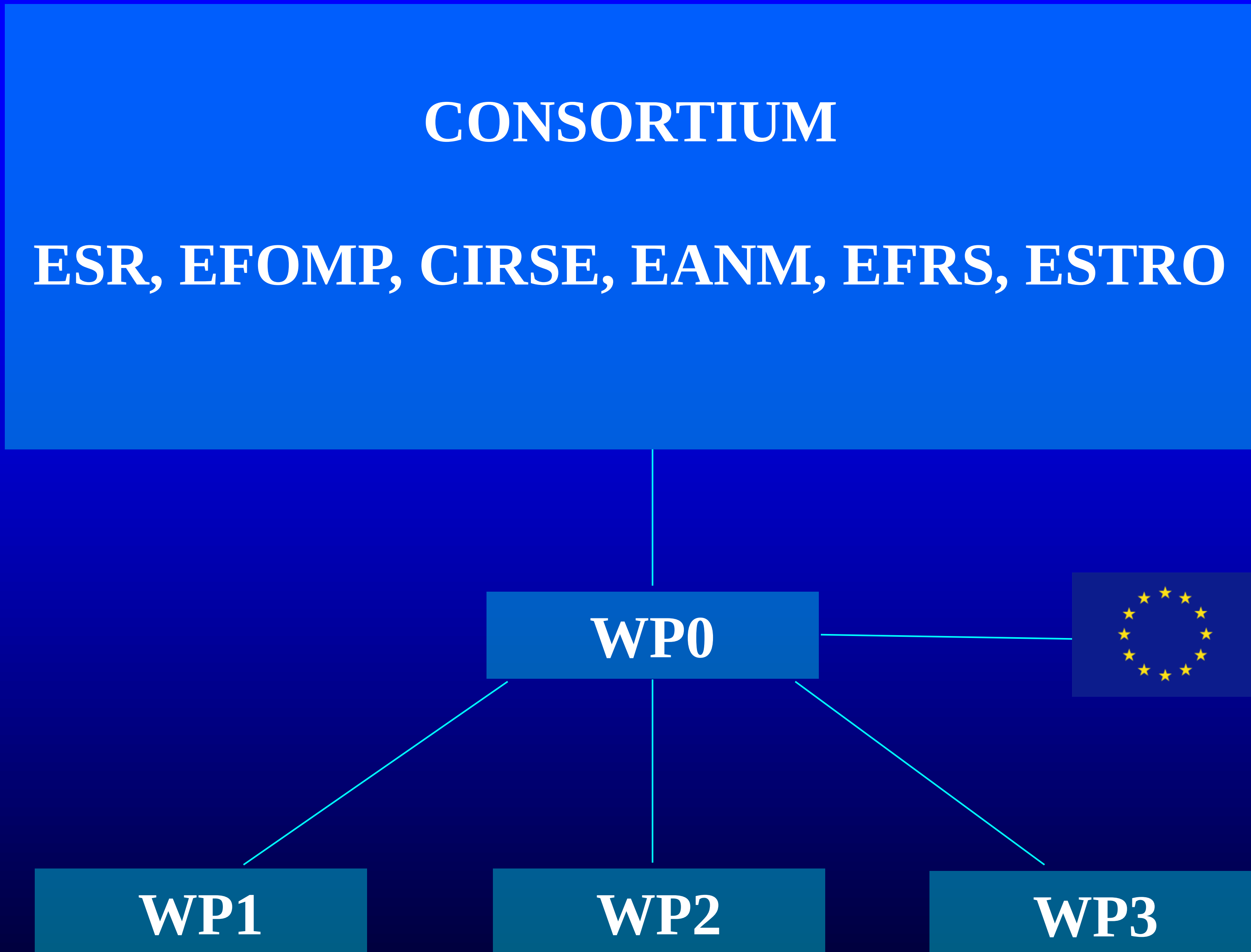
(g) the selection of equipment required to perform radiation protection measurements;

(h) the training of practitioners and other staff in relevant aspects of radiation protection;

MEDical RAdiation Protection Education & Training Project

Project leader: J. Damilakis

Duration: 27 months, started Dec. 2010


CONSORTIUM
ESR, EFOMP, CIRSE, EANM, EFRS, ESTRO
WP0
WP1
WP2
WP3

WP1 - Conclusion

The main conclusion of the survey is that radiation protection education and training is far from being harmonized and in some instances not even implemented in EU countries despite the MED Directive requirements.

European Qualification Framework:

An instrument for the promotion of lifelong learning

Knowledge Skills Competences

EUROPEAN COMMISSION

RADIATION PROTECTION NO 175

GUIDELINES ON RADIATION PROTECTION EDUCATION AND TRAINING OF MEDICAL PROFESSIONALS IN THE EUROPEAN UNION

Directorate-General for Energy
Directorate D — Nuclear Safety & Fuel Cycle
Unit D.3 — Radiation Protection
2014

Table 3.1: Learning outcomes in radiation protection for referrers

	Knowledge (facts, principles, theories, practices)	Skills (cognitive and practical)	Competence (responsibility and autonomy)
Patient safety/risk management	K1. Explain the principle of justification and its application at different levels including for asymptomatic individuals and on a case by case basis K2. List the diagnostic and therapeutic practices that are formally approved through legislative or administrative acts at the national or state level. K3. Explain why certain groups are more susceptible to harmful effects of ionising radiation (e.g. children, pregnant patients) K4. Explain the joint responsibility of referrers and imaging specialists in the justification process of a radiological examination as specified by European and national legislation. K5. List approximate values of radiation doses for common diagnostic examinations K6. Explain the importance of the utilisation of clinical and radiological information from previous examinations in the process of justification K7. Discuss some clinical situations where a test with non-ionising radiation is better than one using ionising radiation K8. List and describe available appropriateness criteria and guidelines applicable in your area of practice K9. Discuss the information to be provided to patients with respect to benefits and radiation risk and risk of procedures in own area of practice K10. Explain principles governing the use of ionising radiation in woman of child-bearing age K11. Discuss the pros and cons of an examination involving the use of a radiopharmaceutical for breastfeeding women and action warranted to protect the child K12. Explain circumstances in your practice where use of ionising radiation on a child is justified	S1. Apply the principle of justification to specific groups of patients and individuals including the exposure of asymptomatic individuals, comforters and carers S2. Identify situations in which the use of ionising radiation is justified in the case of pregnant women, women of reproductive age, children or breast feeding mothers S3. Assess the cumulative effective dose for a series of exams for a given individual patient S4. Carry out a review of the literature to aid justification in cases for which appropriateness criteria are not yet available S5. Explain benefits and risks of particular procedures to specific patients S6. Inform patients of their health problems and the planned procedure S7. Communicate the radiation risk to the patient at an understandable level, whenever there is a significant deterministic or stochastic risk, or when the patient has a question	C1. Take responsibility for justification in accordance with requirements in European and national legislation and guidelines of professional bodies C2. Implement published appropriateness criteria in own practice C3. Provide necessary information in referral for imaging facility to aid in optimisation of an examination C4. Advise actions in case of inadvertent radiation exposure of a pregnant patient C5. Be competent to diagnose radiation induced skin injury and other potential radiation effects in a patient or a worker in a radiation facility and avoid unnecessary referral C6. Act as a role model for junior colleagues to support the processes of justification and optimisation of radiation protection

Table 7.1: Learning outcomes in radiation protection for medical physicists/medical physics experts

	Knowledge (facts, principles, theories, practices)	Skills (cognitive and practical)	Competence (responsibility and autonomy)
	For a comprehensive list of learning outcomes in radiation protection for medical physicists/medical physics experts, please refer to the EC's publication RP174, 'Guidelines on Medical Physics Expert', Directorate-General Energy, Luxembourg (in Press).		

EUROPEAN COMMISSION

RADIATION PROTECTION

No. 174

EUROPEAN GUIDELINES ON MEDICAL PHYSICS EXPERT

Eutempe - RX project

The EUTEMPE-RX consortium will develop, put into practice and evaluate new training schemes for the MPE in Diagnostic and Interventional Radiology, which includes both face-to-face and on-line teaching.

The aim is to provide the best possible training opportunities to European Medical Physics professionals to become MPEs working in Diagnostic and Interventional Radiology.

Eutempe - RX project

SEVENTH FRAMEWORK PROGRAMME

THEME [Fission-2013-5.1.1]
[Euratom Fission Training Schemes (EFTS) in
'Nuclear Fission, Safety and Radiation Protection']

Grant agreement for: Coordination and support action*

Annex I - "Description of Work"

Project acronym: EUTEMPE-RX

Project full title: " EUropean Training and Education for Medical Physics Experts in Radiology "

Grant agreement no: 605298

Version date: 2013-05-07

- **Call identifier: FP7-FISSION-2013 (EURATOM)**
- **Aug. 1, 2013 – Jul 31, 2016**

Course Modules

1. Developments of the profession and the challenges of the MPE: Legal aspects, professional matters, communication and risk assessment, today and tomorrow. Raising the public profile of the profession.

2. Radiation biology for MPEs

3. Monte Carlo simulation of the complete X-ray imaging chain

4. Fundamental physics of X-rays: energy, absorption and their phase

5. Antropomorphic phantoms

6. From routine QA to observer performance

Course Modules

7. Advanced measurements of the performance of X-ray imaging systems

8. CT imaging and dose optimized with objective means

9. Achieving quality in the medical physics aspect of breast cancer screening

10. High dose X-ray procedures in Interventional radiology and cardiology

11. Dosimetry, from conceptus to the adolescent

12. Personnel dosimetry

Knowledge:

Define operational quantities (including units and inter-relationships) used in personal dosimetry e.g., ambient H*(10), directional H'(0.07, angle) and personal dose equivalents i.e., depth dose equivalent HP(10) and skin dose equivalent HP(0.07) for external photon radiation and explain the method used for their measurement / calculation. (K11)

Describe and explain in detail and quantitatively the structure, operation and advantages / disadvantages of the various types of personal dosimeters and area monitors available for the various types of ionising radiation including criteria for selection (e.g., accuracy, precision, uncertainties, linearity, any dose rate / energy / directional dependence, spatial resolution, physical size, read out convenience and convenience of use), management, calibration, traceability (including international traceability framework) and user protocols (in the case of ionizing radiation dosimetry include cavity theory). (K12)

Define and measure or calculate the operational quantities used in personal dosimetry (e.g., ambient, directional and personal dose equivalents at recommended depth). (K44)

Explain the possible impact of human factors with regard to occupational / public safety in use of medical devices and associated ionizing radiations and other physical agents. (K45)

Describe the requirements for, and the practical implementation of, appropriate systems for the monitoring of radiation dose to the worker, including extremity doses and dose limits for pregnant and lactating workers, and young workers; and for the public; including selection, management and calibration of devices used to measure such doses, dose records and techniques for dose measurement. (K54)

Explain why the holistic development of a service depends on the quality assurance of the parts. (K105)

Describe the general role of the MPE as consultant in own area of medical physics practice. (K117)

Skills:

Interpret the results of dosimetry measurements. (S10)

Maintain calibration of dosimetry instruments. (S11)

Implement cross-calibration procedures for dosimetry instruments. (S12)

Convert dosimetry quantities measured in air or other medium to relevant dosimetric quantities in tissue. (S13)

Assess occupational risk from given procedures in own area of medical physics practice from ionizing radiations and other physical agents using measured occupational dose data and dose-effect relationships. (S25)

Carry out a risk audit with respect to occupational / public safety from ionizing radiations and other physical agents in own area of medical physics practice. (S26)

Participate in development of service quality and cost-effectiveness in own area of medical physics practice. (S55)

Apply MPE consultancy skills to specific scenarios in own area of medical physics practice. (S65)

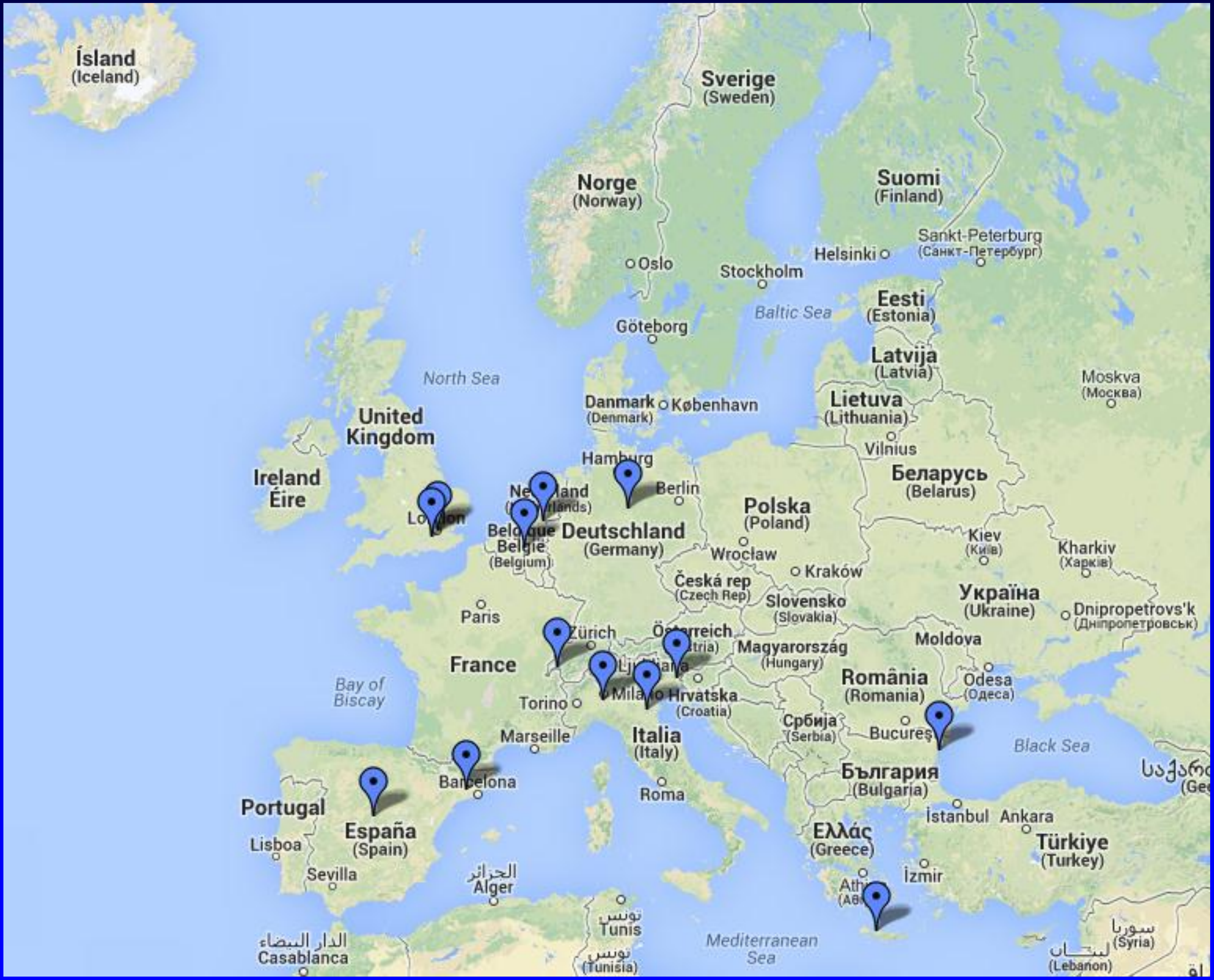
Competence:

Take responsibility for dosimetric investigations and the supervision of dosimetry measurements. (C11)

Take responsibility for statutory and institutional requirements for Medical Physics Services with respect to Development of Service Quality and Cost-Effectiveness in own area of medical physics practice, whilst being aware that improvement of the service as a whole depends on the inputs of other healthcare professionals. (C55)

Take responsibility for the education of healthcare professionals (including Medical Physics trainees) regarding protection from ionizing radiations and other physical agents including the use of personal dose monitors and personal protection equipment. (C69)

Partners



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Suomi
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Sankt-Peterburg
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Helsinki
Oslo
Stockholm
Eesti
(Estonia)
Baltic Sea
Göteborg
Latvija
(Latvia)
North Sea
Moskva
(Москва)
Danmark
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København
Lietuva
(Lithuania)
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Tunis
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الدار البيضاء
Casablanca
Mediterranean
Sea
(Tunisia)
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Switzerland
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EFOMP

EUROPEAN

NETWORKING

Radiation dose management of pregnant patients, pregnant staff and paediatric patients in diagnostic and interventional radiology

Teaching method: Blended learning
(online and face-to-face learning).

Module duration: approx. 10 working days online teaching + 5 working days face-to-face teaching

Venue (face-to-face teaching): University of Crete, Faculty of Medicine, Heraklion, Crete, Greece

Teaching objectives: By the end of this module the participants would be able to:

1. Assess and evaluate conceptus doses and radiogenic risks associated with diagnostic and interventional examinations performed on the mother
2. Assess, evaluate and minimize conceptus dose for pregnant staff working in an interventional suite
3. Assess and evaluate paediatric patient doses and radiogenic risks from diagnostic and interventional radiology procedures
4. Manage exposure of pregnant patients requiring diagnostic and interventional procedures
5. Develop new optimized diagnostic and interventional radiology protocols for pregnant patients
6. Develop new optimized diagnostic and interventional radiology protocols for paediatric patients
7. Develop research protocols focused on conceptus and paediatric dosimetry using TLDs and anthropomorphic physical phantoms or Monte Carlo simulation and mathematical phantoms

Teaching staff: John Damilakis, Kostas Perisinakis, John Stratakis, Antonios Papadakis, Virginia Tsapaki, Georgia Solomou, invited speakers (tba)

LEADER OF THE MODULE

John Damilakis, A full professor and chairman in the Department of Medical Physics of the University of Crete, Greece, John Damilakis has focused his research interests on radiation protection in diagnostic and interventional radiology. He has published more than 200 publications in leading peer-reviewed journals and conference proceedings. He is a leader in the application of medical radiation protection in clinical everyday practice with about 30 years of clinical experience. John Damilakis is vice president and president elect of EFOMP and chairman of the Education and Training Committee of IOMP

John Stratakis, received his BSc in Physics from the University of Crete in 1997, his MSc in Medical Physics from the University of Surrey, UK, in 1998 and his PhD in Medical Physics from the Medical School of the University of Crete. He is a research associate of the Laboratory of Medical Physics at University of Crete. His research interests include Monte Carlo dosimetry applied to radiographic and interventional procedures.

Kostas Perisinakis, BSc, MSc, PhD joined the Medical Physics Department, Medical School, University of Crete in 1996 where he serves ever since. He is author in more than 85 scientific papers published in peer-review journals, which have received more than 1350 citations. He was invited speaker in more than 50 international and domestic congresses. His main research interests relate to quantification of radiogenic risks from medical radiation procedures.

Antonios Papadakis has been a medical physicist and radiation protection consultant with the Medical Physics Department of the University Hospital of Heraklion, Greece, since 2004. He received the PhD degree in medical physics in 2003 from the University of Patras, Greece. From 2003 to 2004 he had been a research fellow with the Massachusetts General Hospital, Boston, USA. He has published several articles in peer-reviewed scientific journals and conference proceedings.

Georgia Solomou received her B.Sc. in Applied Mathematics and Physics from National Technical University of Athens and M.Sc in Medical Physics from the Aristotle University of Thessaloniki. Since 2012 she has been a PhD candidate in Medical Physics with the University of Crete and has been working as a Medical Physicist in the research project entitled "Conceptus Radiation Doses and Risks from Imaging with Ionizing Radiation".

Virginia Tsapaki, more than 25 years experience in Diagnostic and Interventional Radiology, Computed Tomography and Nuclear Medicine. Iinvolved in several missions organised by the IAEA and in multiple European and IAEA research projects. More than 100 publications in various national and international journals and conference proceedings and more than 150 presentations and posters in national and international conferences. President of the Hellenic Association of Medical Physicists. Actively involved in the board of EFOMP and IOMP.

EUTEMPE•RX

Course enrollment is FREE

Minimum entrance requirements are: EQF level 7 = master + 2 years of experience in medical physics for radiological applications

www.eutempe-rx.eu

IAEA activities

- Development of teaching material
- IAEA guidance on clinical training
- IAEA training courses, conferences and symposia
- Fellowships (1-6 months)
- Scientific visits (1-2 weeks)

IAEA Safety Standards

for protecting people and the environment

Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards

Jointly sponsored by
EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO

General Safety Requirements Part 3

No. GSR Part 3

IAEA
International Atomic Energy Agency

International Conference
on RP in Medicine

Organized by the IAEA

Co-sponsored by WHO

Outcome:
Bonn Call for Action
to improve RP in health care

Strengthen radiation protection education and training of health professionals

- Prioritize radiation protection education and training for health professionals globally, targeting professionals using radiation in all medical and dental areas;
- Further develop the use of newer platforms such as specific training applications on the Internet for reaching larger groups for training purposes;
- Integrate radiation protection into the curricula of medical and dental schools, ensuring theestablishment of a core competency in these areas;
- Strengthen collaboration in relation to education and training among education providers in health care settings with limited infrastructure as well as among these providers and international organizations and professional societies;
- Pay particular attention to the training of health professionals in situations of implementing new technology.

International Conference on RP in Medicine

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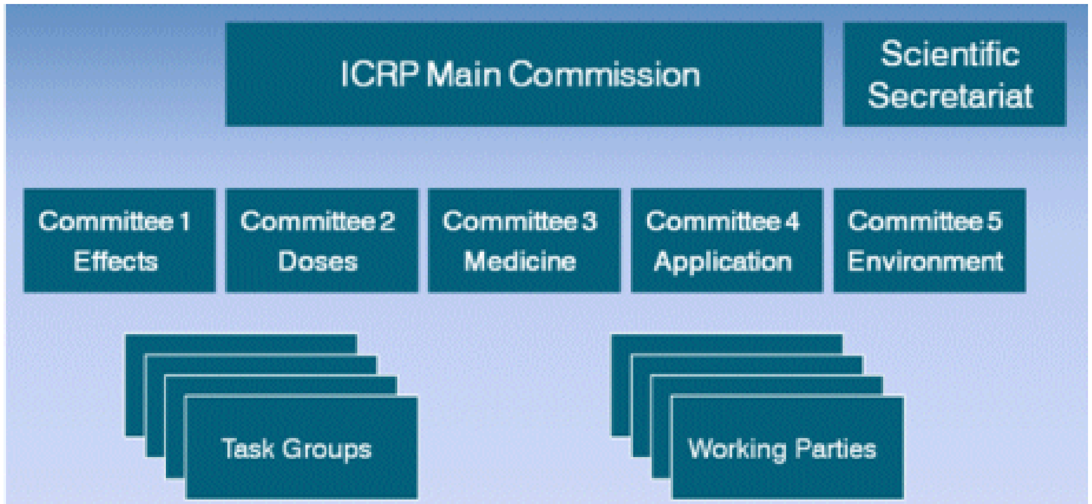
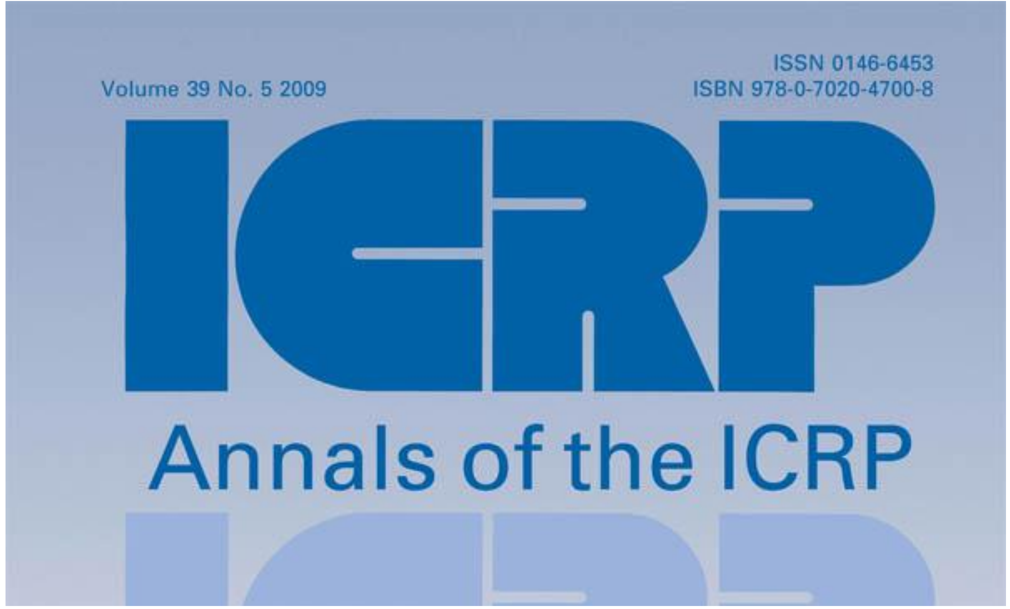
Co-sponsored by WHO

Outcome:
Bonn Call for Action
to improve RP in health care

ICRP

INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION





Training for healthcare professionals in RP will be related to their specific jobs and roles.

Medical Physicists working in RP and diagnostic radiology should have the highest level of training in RP as they have additional responsibilities as trainers in RP for most of the clinicians.

EFOMP

European Federation of Organizations for Medical Physics

ESR
EUROSAFE
IMAGING

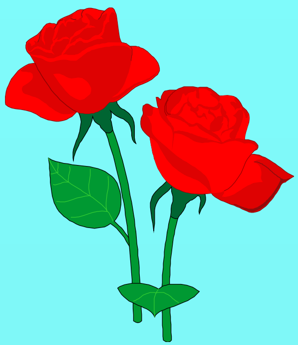
Together for Patient Safety

http://www.efomp-2014.gr

European Society of Radiology

ESR RP session
Bologna
October 1, 2014

Course coordinators:
J. Damilakis, P. Vock



Thank you !