



ORAMED 2011

International Workshop on
Optimization of Radiation
Protection of Medical Staff

First announcement
Barcelona, 20-22 January 2011



Organised by
Universitat Politècnica de Catalunya

<http://www.upc.edu/inte/oramed/>

ICRP and radiation protection of medical staff

Overview ICRP C3
11:40-12:00; Thursday 20 Jan 2011

Eliseo Vano (C3 Chairman) eliseov@med.ucm.es



INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

- **Committee 1: Radiation Effects**
- **Committee 2: Doses from Radiation Exposures**
- **Committee 3: Protection in Medicine**
- **Committee 4: Application of ICRP Recommendations.**
- **Committee 5: Protection of the Environment**

- **Committee 3: Protection in Medicine**
 - **C3 is concerned with protection of persons and unborn children when ionising radiation is used for medical diagnosis, therapy, or for biomedical research; also, assessment of the medical consequences of accidental exposures.**

- **Committee 4: Application of ICRP Recommendations.**
 - **C4 is concerned with providing advice on the application of the recommended system of protection in all its facets for occupational and public exposure. It also acts as the major point of contact with other international organisations and professional societies concerned with protection against ionising radiation.**

ICRP C3 (January 2011) (Protection in Medicine)

16 members (MP=Med.Phys. RT=Radiotherapy NM=Nucl.Med. DR=Diag. Radiol.)

- Vano ELISEO Prof (Spain) MP
Chairman
- Cosset JEAN-MARC Prof (France)
RT Vice-Chairman
- Rehani MADAN M. Prof (IAEA) MP
Secretary
- Åhlström Riklund KATRINE Prof DR,
NM (Sweden) **2009**
- Baeza MARIO Prof RT (Chile) **2009**
- Dauer LAWRENCE Dr MP (USA)
2010
- Gusev IGOR A. Dr Phys, Dr Biology
(Russia)
- Hopewell JOHN W Prof Radiobiology
(UK)
- Mattsson SÖREN Prof MP (Sweden)
- Miller DONALD Prof DR (USA) **2010**
- Ortiz Lopez PEDRO Dr MP Spain)
- Khong PEK-LAN Prof DR (Hong Kong)
2009
- Ringertz HANS Prof DR (Sweden)
- Rosenstein MARVIN Dr Nucl Eng
(USA)
- Yonekura YOSHIHARU Dr NM (Japan)
- Yue BAORONG Prof (China) **2009**
- *2 permanent observers (WHO, IEC).*

ICRP C3 (January 2011) (Protection in Medicine)

16 members (MP=Med.Phys. RT=Radiotherapy NM=Nucl.Med. DR=Diag. Radiol.)

More observers for 2011 ...

- During the last years we had 2 permanent observers: World Health Organization (WHO) and International Electrotechnical Commission (IEC).
- For the coming meetings we will also have:
 - European Commission (EC)
 - International Agency for Research on Cancer (IARC)
 - International Commission on Radiation Units and Measurements (ICRU)
 - International Labour Office (ILO)
 - International Organization for Standardization (ISO)



ICRP C3. Annual meeting Hong,Kong 2010 (some members are missing)

Relevant ICRP C3 publications during the last years (12 in 10 years)

- P112. Preventing accidental exp. from **new external beam radiation therapy** technologies (2010).
- P106. **Dose to Patients from radiopharmaceuticals.** 2008.
- P105. Radiological **Protection in Medicine.** 2007.
- P102. Dose in **Multi-Detector CT.** 2007.
- P98. **Brachytherapy for prostate cancer.** 2005.
- P97. **High-dose-rate brachytherapy accidents.** 2005

Relevant ICRP C3 publications during the last years (12 in 10 years)

- P94. Release of Patients after **Therapy with Unsealed Radionuclides**, 2004.
- P93. Patient dose in **digital radiology**. 2004.
- P87. Patient Dose in **Computed Tomography**. 2000.
- P86. **Accidental exposures in radiation therapy**. 2000
- P85. Avoidance of **Radiation Injuries** from medical interventional procedures. 2000.
- P84. **Pregnancy** and Medical Radiation. 2000.



ICRP Publication 106



Radiation Dose to Patients from Radiopharmaceuticals

Addendum 3 to ICRP Publication 53

ICRP Publication 106

Approved by the Commission in October 2007

ICRP Publication 106

ANNEX E. RADIATION EXPOSURE OF HANDS IN RADIOPHARMACIES:
MONITORING OF DOSES AND OPTIMISATION OF PROTECTION..... 167

ICRP-106; Annex E (p167-p194)

28 pages for Hands Exposure

- **Finger doses for staff in larger radiopharmacies may approach or exceed dose limits.**
- **Recommendations on:**
 - Dispensing protocol and the use of shielding devices.
 - All staff should undergo a period of intense training.
 - Finger dose monitoring, etc.

Annals of the ICRP

ICRP PUBLICATION 105

Radiological Protection in Medicine

Editor
J. VALENTIN

PUBLISHED FOR
Commission on Radiological Protection

by



ICRP Publication 105



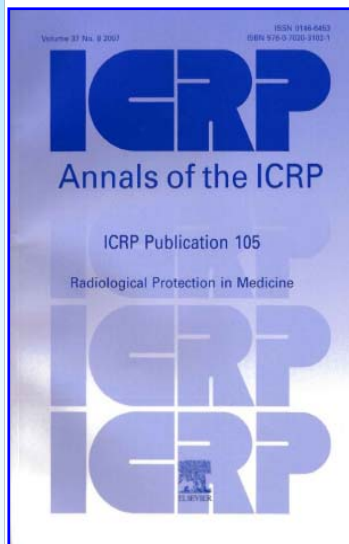
ICRP Publication 105



Radiation Protection in Medicine

ICRP Publication 105

Approved by the Commission in October 2007



ICRP-105; RP in Medicine (I)

- Contains some advices on occupational RP:
 - The possibility of accidental or unintended exposures for staff.
 - During optimisation, **the choice of protection option directly alters the level of exposure of the patient, the staff, and sometimes the public.**
 - The system for protecting staff from the source (e.g. shielding) should be designed to minimise any sense of isolation experienced by the patient.

ICRP-105; RP in Medicine (II)

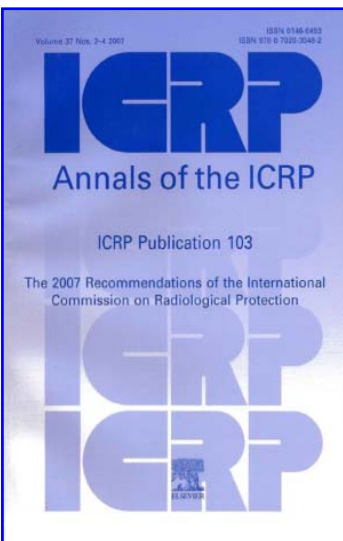
- Areas of medicine, where the control of occupational exposure is of particular importance:
 - Nursing of **brachytherapy** patients when the sources have been implanted, rather than inserted by after-loading techniques.
 - Palpation of patients during procedures utilising **fluoroscopy**.
 - Fluoroscopically guided **interventional procedures**, as in heart catheterisation.
 - **Radiopharmaceutical preparation** by staff in nuclear medicine.

Annals of the ICRP

PUBLICATION 103

The 2007 Recommendations of the International
Commission on Radiological Protection

Editor
J. VALENTIN



PUBLISHED FOR
Commission on Radiological Protection

by



ICRP Publication 103



The 2007 Recommendations of
the International Commission on Radiological
Protection

ICRP Publication 103

Approved by the Commission in March 2007

ICRP Publication 103

ICRP-103 Justification for Medical Exposures (330)

- **Justification and staff doses:**
 - For the justification criteria, it is said that “the principal aim of medical exposures is to do more good than harm to the patient, **subsidiary account being taken of the radiation detriment from the exposure of the radiological staff** and of other individuals”.

ICRP-103 on New 2007 Recommendations

- **Deterministic risks to the eyes:**
 - Concerning deterministic **risks to the eyes**, ICRP stated (paragraph 249) that “Dose limits (to the eyes) remain unchanged. However, new data on the radiosensitivity of the eye with regard to visual impairment are expected.

ICRP-103 on New 2007 Recommendations

- **Deterministic risks to the eyes:**
 - The Commission will consider these data and their **possible significance for the equivalent dose limit for the lens** of the eye when they become available. Because of the uncertainty concerning this risk, there should be particular emphasis on optimisation in situations of exposure of the eyes”.

ICRP Publication 102



ICRP Publication 102



Managing Patient Dose in Multi-Detector Computed Tomography (MDCT)

ICRP Publication 102

Approved by the Commission in March 2007



PERGAMON

ICRP Publication 87



Managing patient dose in computed tomography

ICRP Publication 87

Approved by the Commission in October 2000

ICRP Publication 87

ICRP-102: **CT-guided interventions** pose special issues pertaining to radiation dose to the patient and to the **radiology staff** performing the procedure.

ICRP-87: **CT fluoroscopy**, staff exposures are increased since they have to be present inside the CT room, near the gantry, and their **hands may be in the primary beam**.



ICRP Publication 94



Release of patients after therapy with unsealed radionuclides

ICRP Publication 94

Approved by the Commission in March 2004

ICRP Publication 94

ICRP Publication 94

10.	DECISION TO HOSPITALISE OR RELEASE PATIENTS	41
10.1.	General	41
10.2.	Occupational doses to hospital staff	44
10.3.	Psychological costs of hospitalisation	45
10.4.	Cost-benefit analysis of hospitalisation	45
10.5.	Doses to others during patient travel	46
10.6.	Radiation detectors at borders, airports, etc.	48
10.7.	Exposure in the home environment	48

ICRP-94; Release of patients

- The decision to hospitalise or release a patient should be determined on an individual basis.
- In addition to residual activity in the patient, the decision should **take many other factors into account** including the patients wishes, **occupational and public exposures**, family considerations, the presence of children, cost, and environmental factors.
- Hospitalisation of patients for several days will reduce exposure to the public and relatives, but will **increase occupational exposure**.



ICRP Publication 93



Managing patient dose in digital radiology

ICRP Publication 93

Approved by the Commission in November 2003

ICRP Publication 93

Radiation protection for the **staff is also important during in-room operation of digital fluoroscopy systems.** Scattered radiation dose rates are higher during image acquisition than during fluoroscopy. **If there is a tendency for the number of acquired images to increase, staff doses are also likely to increase.**

ICRP

Annals of the ICRP

PUBLICATION 85

Avoidance of Radiation Injuries from
Medical Interventional Procedures



Pergamon

ICRP Publication 85 2000

**The high
occupational
exposures in
interventional
radiology require the
use of robust and
adequate monitoring
arrangements for
staff**

ICRP-85; Interventional Procedures

- A single dosimeter worn under the lead apron will yield a reasonable estimate of effective dose for most instances.
- **Wearing an additional dosimeter at collar level above the lead apron will provide an indication of head (eye) dose.**
- In addition, it is possible to combine the two dosimeter readings to provide an improved estimate of effective dose.

Document in press

Annals of the ICRP

ICRP PUBLICATION 113

Education and training in radiological
protection for diagnostic and interventional
procedures

Editor
C.H. CLEMENT

AUTHORS

E. Vañó, M. Rosenstein, J. Liniecki, M. Rehani, C.J. Martin, R.J. Vetter

PUBLISHED FOR

The International Commission on Radiological Protection

by

[Elsevier logo]

- **Impact of the training in occupational protection.**
- **Training of occupational health doctors.**
- **Educational objectives on occupational RP (detailed in the document for some medical specialities as interventionists).**
- **Occupational protection versus patient protection.**
- **Some focus on staff working with radionuclides.**

ICRP C3

Work in Progress

(including some occupational aspects)

- **Radiological Protection in Paediatric Diagnostic and Interventional Radiology**
(Pek-Lan Khong and H. Ringertz).

- The patient should only be **held by the radiological staff in exceptional circumstances**
- To gain access to the small child, it is frequently necessary for the interventional radiologist to come **close to or on occasion enter the beam**. The operator's hands may be directly in or immediately adjacent to the beam during a procedure.

- **Avoiding adverse radiation effects to doctors and patients in fluoroscopically guided procedures - practical guidelines (*M. Rehani*).**
 - **Lack of radiation protection training** of staff working with fluoroscopy outside the radiology department
 - **Lack of good data on staff doses** in settings outside radiology departments.
 - Specific **problems to use radiation shielding screens.**
 - **Manufacturers should develop shielding** screens that can be in operation theatres.
 - It is recommended **to use area dosimetry** in these installations (e.g. dosimeters attached to the C-arm).
 - Pregnant medical radiation workers **may work in a radiation environment** as long as foetal dose can be kept below 1 mSv during the course of pregnancy.

- **Patient and staff Radiation Protection in Cardiology** (*C. Cousins and D. Miller*).
 - Chapter 6. Radiation Doses and **Protection of Staff** for Interventional Fluoroscopy.
 - QA: A quality assurance programme (QAP) for interventional cardiology includes all of the aspects of radiological protection (RP) of patients **and staff** in addition to the usual clinical aspects.

Documents to be considered in the next years

- **Occupational** protection in Brachytherapy. P1.
- **Occupational** exposures in fluoroscopically guided interventional procedures, P2.
- **Occupational** exposures in PET /CT, P2.

Personal opinion on priorities for activities in the future related to occupational protection

As suggested in the Varna Int. Conference Sept. 2010

- Improving **RP training** in the health sector.
- **Integrating of patient and staff RP** in medical practices (e.g. interventional radiology).
- Improving the **automatic collection of patient and staff doses and transferring** these data to population and individual data bases).

