


Work of ICRP in relation to activities of medical physicists

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Disclosures

- None




Educational Objectives

1. To understand the international system of radiation protection and learn about the International Commission on Radiological Protection (ICRP)
2. To understand the recommendations that ICRP has provided over the years and how it develops its recommendations
3. To learn about the ICRP's ongoing and recent activities of interest to medical physicists and health physicists




International Commission on Radiological Protection (ICRP)

- Since 1928, the ICRP has developed, maintained, and elaborated the **International System of Radiological Protection**
- The system has been **used world-wide** as the common basis for radiological protection standards, legislation, guidelines, programs, and practice.
- For nearly a century it has played a major and global role in radiation protection.




ICRP has been instrumental in establishing

- the **principles** of radiation protection
- providing and periodically revising **radiation and tissue weighing factors**,
- developing the dose quantity "**effective dose**",
- providing and updating the recommended **dose limits** for occupational and public exposures,
- Concept of DRL
- recommending dose levels for termination of pregnancy,
- estimating **threshold** doses for tissue reactions (deterministic effects).



Official position of ICRP

- Unlike WHO and the IAEA, which are United Nations international organizations, ICRP is an **independent charitable organization**, registered in the United Kingdom.
- Nonetheless, its reputation is such that most countries adhere to its recommendations.
- ICRP has **no enforcement powers**, but its recommendations form the basis for **international safety standards and for many national regulations**.



ICRP INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION



Chairperson
Dr. Claire Cousins, UK



Chris Clement
Sec Secretary

Main Commission Chair + 12 members

- C1- Radiation Effects** *Dr Werner Ruehm, DE*
- C2- Doses from Radiation Exposure** *Dr J Harrison, UK*
- C3- Protection in Medicine** *Dr Eliseo Vano, Spain*
- C4- Application of ICRP Recommend.** *Dr D Cool, US*
- C5- Protection of the Environment** *Dr. Kathryn Higley, US*

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Committee 3

The mandate of Committee 3 is

- to develop recommendations and guidance for protection of patients, staff, and the public against radiation exposure when ionizing radiation is used for **medical diagnosis, therapy, or biomedical research.**

Medical Physicist

- For more than half a century every medical physicist in the world has used ICRP's work in some way.
- The radiation protection component of the work of medical physicists has been increasing in recent years.
- Earlier radiation protection was dominated by occupational protection but in recent years it is patient protection that has taken centre stage.

Medical Physicists

- Further there has been shift from equipment focus to patient focus.
- During the last 15 years QC testing of equipment and dosimetry in phantoms

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- Important place to survey of patient doses in particular in CT and interventional procedures, dose management actions and optimization of protection.

- Work of organizations like ICRP and IAEA has created importance shift
- This coupled by need arising from increasing doses to individual and population,

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- Many areas where guidance by ICRP becomes important.

Limits on Occupational Doses (ICRP)*

	Annual Dose Limit (mSv)
Effective dose, worker	20 averaged over 5 years (Max 50 in any year)
Equivalent dose to lens of eye	150 20
Equivalent dose to skin	500
Equivalent dose to hands and feet	500
Effective dose to embryo or fetus	1
Effective dose, public	1

*Please follow the recommendations as prescribed by your national authority

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Limits on Occupational Doses (USA, NRC)*

	Annual Dose Limit mSv
Effective dose, worker (average)	50 (5 rem)
Equivalent dose to lens of eye	150 (15 rem)
Equivalent dose to skin	500 (50 rem)
Equivalent dose to hands and feet	500 (50 rem)
Effective dose to embryo or fetus	5 (0.5 rem)
Effective dose, public	1 (0.1 rem)

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/>

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ICRP C3 Protection in Medicine from 2000

- The ICRP reports on radiological protection (RP) in medicine from 2000, (in 20 publications), cover topics on
 - Pregnancy (P84) and Radiological Prot. in Medicine (P105);
 - Release of patients after therapy with unsealed radionuclides (P94);
 - Preventing accidental exp. in rad. therapy (P86, P97, P112);
 - Radiation safety aspects of brachytherapy (P98) and ion beam radiotherapy (P127);
 - Doses to patients from radiopharmaceuticals (P116, P128 and others);
 - Education and training in RP (113);
 - Managing rad. dose in Interv. Rad. (P85), Digital Rad. (P93), CT (P87, P102), paediatrics (P121), cardiology (P120), CBCT (P129), and other medical specialties (P117).

ICRP Committee 3: The most recent documents

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Radiological Protection in Cone Beam Computed Tomography (CBCT)

ICRP Publication 129
Ann. ICRP 44(1), 2015

M.M. Rehani, R. Gupta, S. Barling, G.C. Sharp, R. Pauwels, T. Berns, J.M. Boone

Abstract - The objective of this publication is to provide guidance on radiological protection in the new technology of cone beam computed tomography (CBCT). Publications 87 and 102 deal with patient dose management in computed tomography (CT) and multi-detector CT. The new applications of CBCT and the associated radiological protection issues are substantially different from those of conventional CT. The perception that CBCT involves lower doses was only true in initial applications. CBCT is now used widely by specialists who have little or no training in radiological protection. This publication provides recommendations on radiation dose management directed at different stakeholders, and covers principles of radiological protection, training, and quality assurance aspects. Advice on appropriate use of CBCT needs to be made widely available. Advice on

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Eye Lens

- ICRP does not have an exclusive Annals on Eye lens dose or Radiological Protection of Eye Lens
- There is statement on Tissue Reaction that gave new values of dose limits and threshold dose

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ICRP INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION
ICRP Ref 4823-2003-1464

Statement on Tissue Reactions
Approved by the Commission on April 21, 2011

- Lens of the eye, threshold in absorbed dose is now considered to be **0.5 Gy (against 0.5 to 2 for detectable opacities and 5 for visual impairment)**
- Occupational Exposure Lens of Eye Limit
 - 20 mSv in a y (against 150)**, averaged over defined periods of 5 y, with no single y exceeding 50 mSv

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ICRP Lens of Eye

- Threshold dose: 0.5 Gy (50 rads)**
- Occupational dose limit: 20 mSv (2000 m rem) averaged over 5 years.**
- NCRP is soon finalizing its recommendations**

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Current Work Plan of Committee 3 (a)

- TG 36 (with C2): Radiation dose to patients from radiopharmaceuticals (D. Nosske and S. Mattsson).
- WP on Diagnostic reference levels (DRLs) in Medical Imaging. *Final draft completed* (E. Vano).
- TG 89: Occupational Radiological Protection in Brachytherapy (L. Dauer).
- WP on Occupational protection issues in intervent. fluoroscopically-guided and CT-guided procedures. *Final draft to be approved by C3* (P. Ortiz).

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Current Work Plan of Committee 3 (b)

- WP on Justification (K. Åhlström-Riklund).
- WP on Radiological Protection in Therapy with Radiopharmaceuticals (Y. Yonekura and S. Mattsson).
- WP (with C1) on Radiological Protection in Medicine Related to Individual Radiosusceptibility (M. Bourguignon).
- WP on Radiation and Patient Protection (educational document) (S. Demeter).

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Educational Slides

<http://www.icrp.org/page.asp?id=35>

ICRP INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION

Free Educational Downloads

- ICRP-103: Conversion of Units (2007)
- ICRP-102: Occupational Radiation Protection (2007)
- ICRP-101: Diagnostic Reference Levels in Medical Imaging (2007)
- ICRP-100: Occupational Radiation Protection in Brachytherapy (2007)
- ICRP-99: Occupational Radiation Protection in Interventional Fluoroscopically-Guided and CT-Guided Procedures (2007)
- ICRP-98: Occupational Radiation Protection in Medical Imaging (2007)
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- ICRP-12: Occupational Radiation Protection in Interventional Fluoroscopically-Guided and CT-Guided Procedures (2007)
- ICRP-11: Occupational Radiation Protection in Medical Imaging (2007)
- ICRP-10: Occupational Radiation Protection in Brachytherapy (2007)
- ICRP-9: Occupational Radiation Protection in Interventional Fluoroscopically-Guided and CT-Guided Procedures (2007)
- ICRP-8: Occupational Radiation Protection in Medical Imaging (2007)
- ICRP-7: Occupational Radiation Protection in Brachytherapy (2007)
- ICRP-6: Occupational Radiation Protection in Interventional Fluoroscopically-Guided and CT-Guided Procedures (2007)
- ICRP-5: Occupational Radiation Protection in Medical Imaging (2007)
- ICRP-4: Occupational Radiation Protection in Brachytherapy (2007)
- ICRP-3: Occupational Radiation Protection in Interventional Fluoroscopically-Guided and CT-Guided Procedures (2007)
- ICRP-2: Occupational Radiation Protection in Medical Imaging (2007)
- ICRP-1: Occupational Radiation Protection in Brachytherapy (2007)

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International Symposium

- ICRP started International Symposia on the System of Radiological Protection in 2011 and the proceedings of these symposia are made available FREE from ICRP website.

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Publication	Title
ICRP Publication 132	Radical Protection Data Centre: Reflections in Action
ICRP 2013 Proceedings	Proceedings of the Third International Symposium on the System of Radiological Protection (ISRP 2013)
ICRP Publication 131	Item Cost: Balance with Progress to Comprehensive Aspects of Radiological Protection
ICRP Publication 130	Quantitative Issues of Radionuclides: ICRP
ICRP Publication 129	Radical Protection in Core Based Computer Simulations (ICRP)
ICRP Publication 128	Radical Protection in Core Based Computer Simulations: A Comparison of Current Methods: Towards a Framework Using Radicals
ICRP 2013 Proceedings	Proceedings of the Second International Symposium on the System of Radiological Protection (ISRP 2013)
ICRP Publication 127	Radical Protection in Core Based Radicals
ICRP Publication 126	Radical Protection against Radon Diseases

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To be more Open

- International organizations and stakeholders are encouraged to propose topics of interest for new reports.
- In addition, a new mechanism, introduced at the second ICRP symposium, provides opportunities for symposium participants to provide input on suggested topics to the Commission's committees.

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Nominations to ICRP

- ICRP has introduced since 2012, a new open system for nomination for its membership every 4 years.
- Anyone can apply and go through process to be member of ICRP.
- The members of Task Groups and Working Party are selected by Chairs in meeting of Committee and thus in consultation with Committee.

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ICRP STRATEGIC PLAN 2011-2017

STRUCTURE

- ICRP Main Commission
- Scientific Secretariat
- Committee 1: Effects
- Committee 2: Doses
- Committee 3: Medicine
- Committee 4: Application
- Committee 5: Environment
- Task Groups

Committee 3, Protection in Medicine: develops recommendations and guidance on the protection of patients, staff, and the public against radiation exposure in medicine.

ICRP STRATEGIC OBJECTIVES, 2011 – 2017

Patients, Staff, Public (radiation exposure in medicine)

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CT Virtual Clinical Trial Grand Challenge

What if ground truth is known?

Test the precision and accuracy of your algorithm to quantify lesion volume.

<http://qibchallenges.cloudapp.net>

NIH National Institute of Biomedical Imaging and Bioengineering
Quantitative Imaging Biomarkers Alliance
DukeHealth
FDA
MGH
Harvard Medical School

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Thank You

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