



Update on ICRP Activities including the Statement on Tissue Reactions

For IACRS

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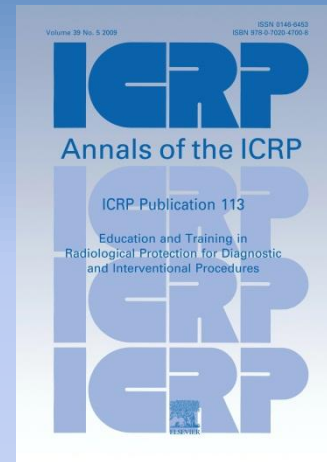


Overview

- Current efforts
- Fukushima
- Tissue Reactions
- ICRP 2011 Meeting & Symposium

Publication in 2011

- *Publication 113*: Education and Training in Radiological Protection for Diagnostic and Interventional Procedures
- Dose Conversion Coefficients for External Radiation Sources (joint ICRP/ICRU)
- Lung Cancer Risk from Radon and Progeny
- Tissue Reactions and Other Non-cancer Effects of Radiation
- Transfer Factor Values for Estimating Exposures of Reference Animals and Plants in Environmental Modeling Contexts



Upcoming Consultation

- Radiological Protection in Paediatric Diagnostic and Interventional Radiology (now)
- Radiological Protection in Fluoroscopically Guided Procedures Performed Outside the Imaging Department
- Patient and Staff Radiation Protection in Cardiology
- Radiological Protection in Geological Disposal of Long Lived Solid Radioactive Waste

Watch www.icrp.org ... or register for e-mail or Twitter notification

Other Current and Near-Future Efforts

Specific Circumstances

- Radon
- NORM
- Air and space crew
- Security & legal exposures
- Diagnostic imaging in asymptomatic individuals
- Ion beam radiotherapy
- Secondary cancers in radiotherapy
- Environmental protection

Technical Information

- SAF values
- Computational phantoms
- Dose coefficients
- Non-human biota: dosimetry, w_R ,

Advances in Epistemology (Science)

- Stem cell biology
- Cancer risk from α emitters
- Non-targeted effects

Radon Reports

- Report on Lung Cancer Risk from Radon approved for publication
- Continued Main Commission discussion on important considerations e.g. dosimetric approach, exposure situations, smoking
- C4 Task Group on protection of public and the workers against radon
 - JF Lecomte (Chair), T Jung, S Kiselev, C Murith, S Salomon, P Strand, J Takala, B Long, R Czarwinski, A Janssens, S Niu, F Shannoun



神奈川沖浪裏, Kanagawa Oki Nami Ura (Under a Wave off Kanagawa) or “The Wave”, Hokusai ca 1830

Fukushima Daiichi NPP

- ICRP has been doing what it can to support those in Japan dealing with the Fukushima NPP accident
 - Using the ICRP community as a way to rapidly share information with our Japanese colleagues
 - Making available and discussing our recommendations and relevant experience
- Many ICRP members have been doing much more as individuals and within their organisations

March 21, 2011

Fukushima Nuclear Power Plant Accident

The International Commission on Radiological Protection (ICRP) does not normally comment on events in individual countries. However, we wish to express our deepest sympathy to those in Japan affected by the recent tragic events there. Our thoughts are with them.

Throughout we have kept and continue to keep abreast of events as they unfold, particularly those at the Fukushima Nuclear Power plant, through some of our Japanese colleagues and information being provided by national and international organisations and professional societies.

We hope that the current effort to regain control of the situation will soon be successful and that our recent recommendations on radiological protection in emergency situations and for contaminated territories have and will prove helpful in dealing with the present and future circumstances.

The Commission continues to recommend optimisation and the use of reference levels to ensure an adequate degree of protection with respect to exposure to ionising radiation in emergency and existing exposure situations.

For the protection of the public during emergencies the Commission continues to recommend that national authorities set reference levels for the highest planned residual dose in the band of 20 to 100 millisieverts (mSv) (ICRP 2007, Table 8).

When the radiation source is under control contaminated areas may remain. Authorities will often implement all necessary protective measures to allow people to continue to live there rather than abandoning these areas. In this case the Commission continues to recommend choosing reference levels in the band of 1 to 20 mSv per year, with the long-term goal of reducing reference levels to 1 mSv per year (ICRP 2009b, paragraphs 48-50).

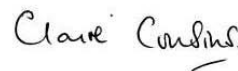
The Commission continues to recommend reference levels of 500 to 1000 mSv to avoid the occurrence of severe deterministic injuries for rescue workers involved in an emergency exposure situation. This means that it will be justified to expend

significant resources, both at the planning stage and during the response, if required, in order to reduce expected exposures to below these levels (ICRP 2007, Table 8 and ICRP 2009a, paragraph e).

Furthermore, the Commission continues to recommend no dose restrictions for life-saving efforts by informed volunteers if the benefit to others outweighs rescuer's risk (ICRP 2007, Table 8).

We are closely following the tremendous efforts of the professionals in Japan dealing with this difficult situation and, during our upcoming meeting in Seoul, are planning to review lessons learned in relation to our recommendations on emergency exposure situations.

On behalf of the International Commission on Radiological Protection,



Claire Cousins
ICRP Chair



Christopher Clement
ICRP Scientific Secretary

References

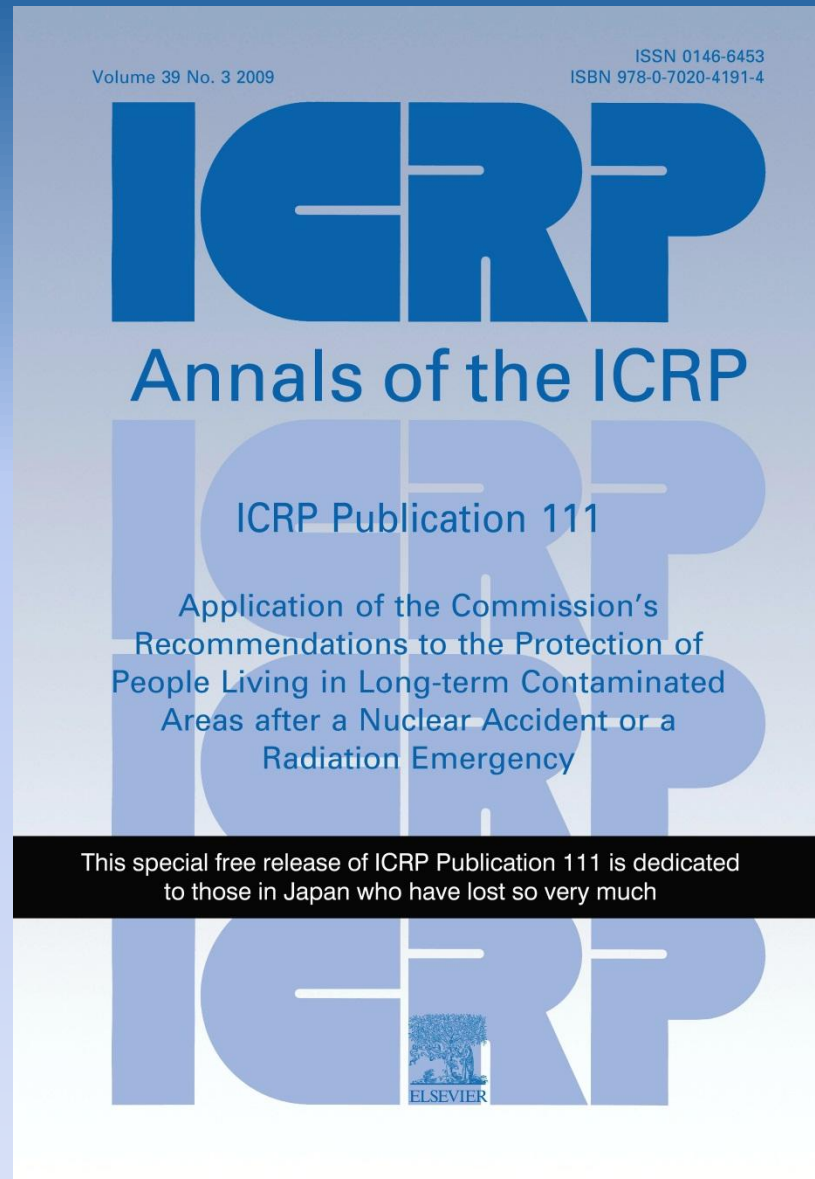
ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. ICRP Publication 103, Ann ICRP 37 (2-4).

ICRP, 2009a. Application of the Commission's Recommendations for the Protection of People in Emergency Exposure Situations. ICRP Publication 109, Ann ICRP 39 (1).

ICRP, 2009b. Application of the Commission's Recommendations to the Protection of People Living in Long-term Contaminated Areas after a Nuclear Accident or a Radiation Emergency. ICRP Publication 111, Ann ICRP 39 (3).

April 4, 2011

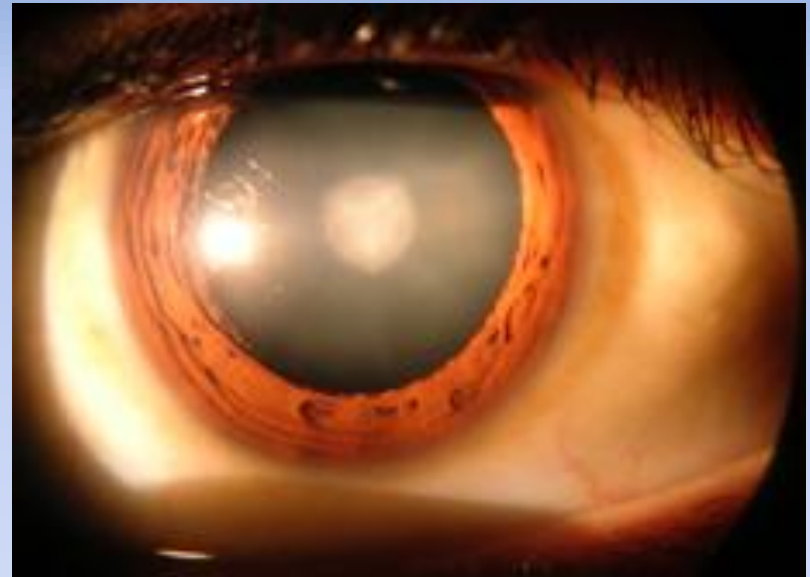
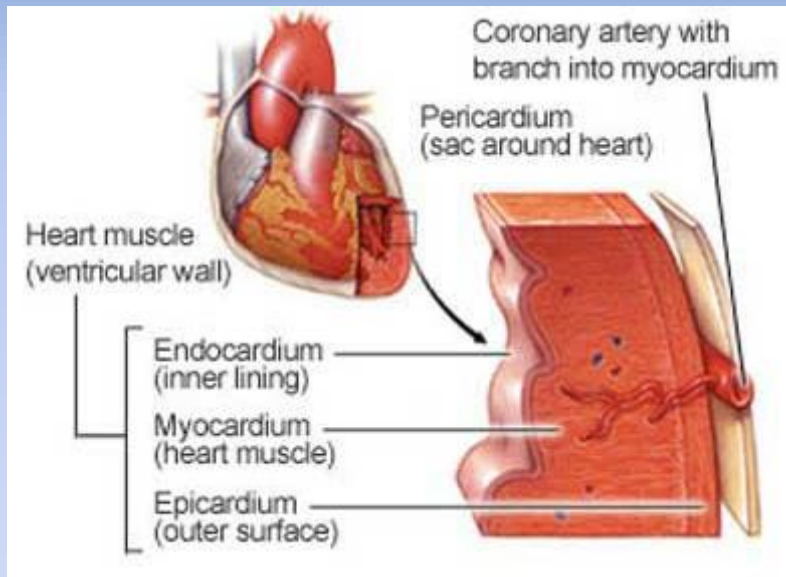
Free release of ICRP Publication 111



MC Meeting April 17-21, Seoul

- Special half-day session on RP implications of the Fukushima Daiichi accident
- Delegates from NSC, JAEA, Kyoto College of Medical Science, Oita University of Nursing and Health Science, and TEPCO
- Received information on the current situation
- Offered advice in relation to its recommendations on emergency and existing exposure situations.
- Focus now on:
 - Continuing to provide requested support
 - Lessons learned

Tissue Reactions



Tissue Reactions and Other Non-cancer Effects of Radiation

- Consultation ended April 1 – should be approved for publication soon
- Update of ICRP *Publication 41*, Non-stochastic Effects of Ionising Radiation (1984)
- Review tissue effects of ionising radiation
 - implications for radiation protection
 - assessing health risks after accidental or therapeutic exposure

Tissues and Organs

- Haematopoietic and immune systems
- Digestive system
- Reproductive system
- Skin
- **Cardiovascular and cerebrovascular system**
- **Eye**
- Respiratory system
- Urinary tract
- Musculoskeletal system
- Endocrine system
- Nervous system

Circulatory Diseases

Cardiovascular and Cerebrovascular

New epidemiological data < 5 Gy

- Japanese A-bomb survivors
- Therapeutic RT for non-cancer diseases
- Occupational exposures (US radiologists & technologists, UK nuclear power workers)
- Accidental exposures (Chernobyl, Mayak)

New epidemiological data > 5 Gy

- Hodgkin's lymphoma survivors
- Breast cancer survivors
- Head & neck cancer
- Childhood leukaemia, brain tumours

Circulatory Diseases

Cardiovascular and Cerebrovascular

- For example, LSS cohort of Japanese atomic bomb survivors show an excess relative risk of mortality from circulatory disease:
 - 0.14 per Gy (95% CI: 0.06 to 0.23) for heart disease
 - 0.09 per Gy (95% CI: 0.01 to 0.17) for cerebrovascular disease
- Nominal threshold dose of 0.5 Gy proposed for cardiovascular and cerebrovascular disease
- **There is considerable uncertainty about the shape of the dose response at doses below 0.5 Gy**

Lens of the Eye

Cataract Induction

New evidence for development of lens opacities < 2 Gy

- Japanese A-bomb survivors
- Therapeutic RT (both non-malignant disease and cancer)
- Repeated CAT scans
- Astronauts
- Residents of contaminated buildings
- Victims of the Chernobyl
- Radiation technologists and interventional radiologists
- Interventional cardiologists

Lens of the Eye

Cataract Induction

- New data from both animal models and exposed human populations show that lens opacities occur at doses <1 Gy
- Lower thresholds arise from:
 - More sophisticated methods of scoring damage
 - Longer follow up (incidence increases with latency)
 - More data in low dose region

Lens of the Eye

Cataract Induction

- Threshold for acute exposure: ~0.5 Gy with 95% CI including zero
- Threshold for protracted exposure: ~0.5 Gy with 95% CI excluding zero (but evidence for this pertains mainly to opacities rather than cataracts)

Tissue Reactions

General Conclusions

- Acute doses up to around 100 mGy produce no functional impairment of tissues
- This includes the lens of the eye with the caveat that the use of a threshold model remains uncertain
- For most occupational and public situations the principal risks remain cancer and hereditary effects
- At higher doses the risk of tissue reactions becomes increasingly important, in particular regarding accidents and medical exposures

Statement on Tissue Reactions

- Issued April 21, 2011
- To be published along with the report *Early and Late Effects of Radiation in Normal Tissues and Organs: Threshold Doses for Tissue Reactions and Other Non-cancer Effects of Radiation in a Radiation Protection Context*

Statement on Tissue Reactions

1. Background
2. Evidence of lower thresholds
3. Revised dose limit for lens of the eye
4. Cautionary statement for medical practitioners
5. Optimisation of protection for exposures to tissues

Statement on Tissue Reactions

(2) The Commission has now reviewed recent epidemiological evidence suggesting that there are some tissue reaction effects, particularly those with very late manifestation, where threshold doses are or might be lower than previously considered. For the lens of the eye, the threshold in absorbed dose is now considered to be 0.5 Gy.

Statement on Tissue Reactions

(3) For occupational exposure in planned exposure situations the Commission now recommends an equivalent dose limit for the lens of the eye of 20 mSv in a year, averaged over defined periods of 5 years, with no single year exceeding 50 mSv.

- No change is recommended to the public dose limit

Statement on Tissue Reactions

(4) Although uncertainty remains, medical practitioners should be made aware that the absorbed dose threshold for circulatory disease may be as low as 0.5 Gy to the heart or brain. Doses to patients of this magnitude could be reached during some complex interventional procedures, and therefore particular emphasis should be placed on optimisation in these circumstances.

Statement on Tissue Reactions

(5) The Commission continues to recommend that optimisation of protection be applied in all exposure situations and for all categories of exposure. With the recent evidence, the Commission further emphasises that protection should be optimised not only for whole body exposures, but also for exposures to specific tissues, particularly the lens of the eye, and to the heart and the cerebrovascular system.

ICRP 2011

ICRP
MC & Committees Meeting
October 23-30
2011

ICRP
SYMPOSIUM
October 24-26
2011

ICRP SYMPOSIUM ON THE INTERNATIONAL SYSTEM OF RADIOLOGICAL PROTECTION

- October 24-26, 2011
- North Bethesda, MD, USA
- First ICRP symposium of this kind
- Held concurrently with biennial joint meeting of ICRP MC & Committees
- Focus on the System of Radiological Protection and insight into the ongoing work of ICRP

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ICRP SYMPOSIUM ON THE INTERNATIONAL SYSTEM OF RADIOLOGICAL PROTECTION

Monday October 24 (all sessions in plenary)

- Welcome and Opening Remarks
- ICRP Programme of Work
- The System of Radiological Protection – Is It Fit for Purpose?

The Symposium program is a work in progress

ICRP SYMPOSIUM ON THE INTERNATIONAL SYSTEM OF RADIOLOGICAL PROTECTION

Tuesday October 25 (sessions in parallel)

- Tissue Reactions: Low Dose Risks
- Radiation Effects: Modulating Factors and Risk Assessment
- Radiation Protection in Space
- Applications of Effective Dose
- Radiological Protection in Computed Tomography
- Prevention of Accidents in Radiation Therapy
- The Biological Basis for the System of Environmental Protection
- Radiation Dosimetry for Reference Animals and Plants

ICRP SYMPOSIUM ON THE INTERNATIONAL SYSTEM OF RADIOLOGICAL PROTECTION

Wednesday October 26 (some sessions in parallel)

- Constraints and Reference Levels
- Radiological Protection and NORM
- Radiological Protection and Waste Management
- Protection against Radon in Workplaces
- Experience in Implementing ICRP Recommendations
- Symposium Conclusions

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