Overview of ICRP Committee 2

The Mandate and Work of Committee 2 on Doses from Radiation Exposure

John Harrison

4th International Symposium on the System of Radiological Protection /
2nd European Radiological Protection Week, 20th October 2017

Committee 2 Remit

Committee 2 *develops dosimetric methodology for the assessment of internal and external radiation exposures, including reference biokinetic and dosimetric models and reference data and dose coefficients, for use in the protection of people and the environment*

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Membership 2017-21

John Harrison (Chairman) UK
François Paquet (Vice-Chairman) France
Wesley Bolch (Secretary) USA

Vladimir Berkovski Ukraine
Eric Blanchardon France
Augusto Giussani Germany
Derek Jokisch USA
Chan Hyeong Kim Korea
Rich Leggett USA

Junli Li China
Maria Lopez Spain
Nina Petoussi-Henss Germany
Tatsuhiko Sato Japan
Tracy Smith UK
Alexander Ulanovski Germany
Frank Wissmann Germany

Membership 2013 - 17

John Harrison (Chairman) UK
François Paquet (Vice-Chairman) France
Wesley Bolch (Secretary) USA

Mike Bailey UK
Vladimir Berkovski Ukraine
Luiz Bertelli USA
Doug Chambers Canada
Marina Degteva Russia
Akira Endo Japan

John Hunt Brazil
Chan Hyeong Kim Korea
Rich Leggett USA
Jizeng Ma China
Dietmar Noßke Germany
Nina Petoussi-Henss Germany
Frank Wissmann Germany

Dose coefficients

Effective dose

Equivalent dose to organs and tissues

Internal: **Sv per Bq intake**

External: **Sv per fluence or air kerma**

Task Groups of Committee 2

- TG 36 – Radiopharmaceuticals (C2/C3)
  Augusto Giussani + Sören Mattsson
- TG 79 – Effective Dose
  John Harrison
- TG 90 – Dose Coefficients for External Environmental Exposures
  Nina Petoussi-Henss
- TG 95 – Internal Dose Coefficients (IDC)
  François Paquet
- TG 96 – Computational Phantoms and Radiation Transport (CPRT)
  Wesley Bolch
- TG 103 – Mesh-type Computational Phantoms
  Chan Hyeong Kim

Reports published / in press

Publication 110 Adult Reference Computational Models. Ann ICRP 39 (2) 2009

Publication 116 Conversion Coefficients for Radiological Protection Quantities for External Radiation Exposures. Ann ICRP 40 (2-5) 2010

Publication 119 Compendium of Dose Coefficients based on ICRP Publication 60. Ann ICRP 41 (Supp1) 2012

Publication 128 Radiation Dose to Patients from Radiopharmaceuticals: Compendium of Current Information Related to Frequently Used Substances. Ann ICRP 44 (2S) 2015

Publication 130 Occupational Intakes of Radionuclides: Part 1 Ann ICRP 44 (2) 2015

Publication 133 The ICRP Computational Framework for Internal Dose Assessment for Reference Workers: Specific Absorbed Fractions. Ann ICRP 45 (2/3) 2016

Publication 134 Occupational Intakes of Radionuclides: Part 2. Ann ICRP 45 (3-4) 2017

Publication 137 Occupational Intakes of Radionuclides: Part 3. Ann ICRP 46 (3-4) In press

Planned publications

Phantoms and radiations transport calculations

- Pediatric Phantoms + SAFs
- Pregnant Female and Fetus Phantoms + SAFs
- Mesh-type Adult Phantoms

Internal dose coefficients

- Occupational Intakes of Radionuclides, Parts 4 & 5
- Internal Dose Coefficients for the Public, Pts 1 & 2
- *In utero* Internal Dose Coefficients for Maternal Intakes
- Breast-feeding Infant Internal Dose Coefficients for Maternal Intakes

Radiopharmaceutical administrations

External dose coefficients

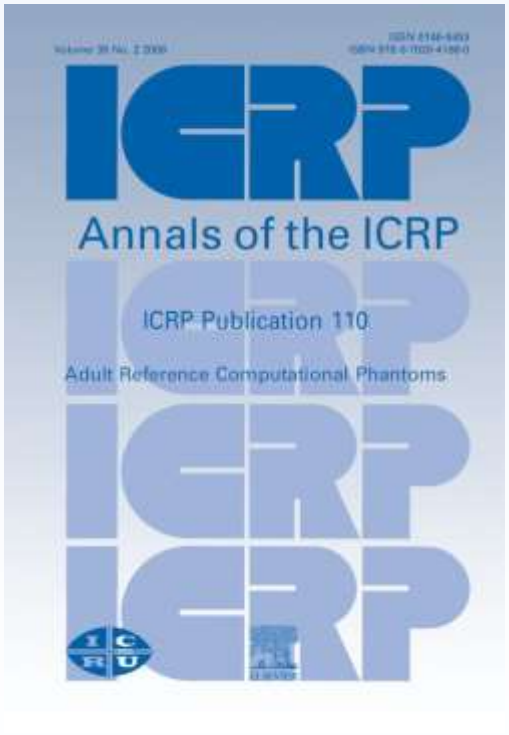
- Members of the Public

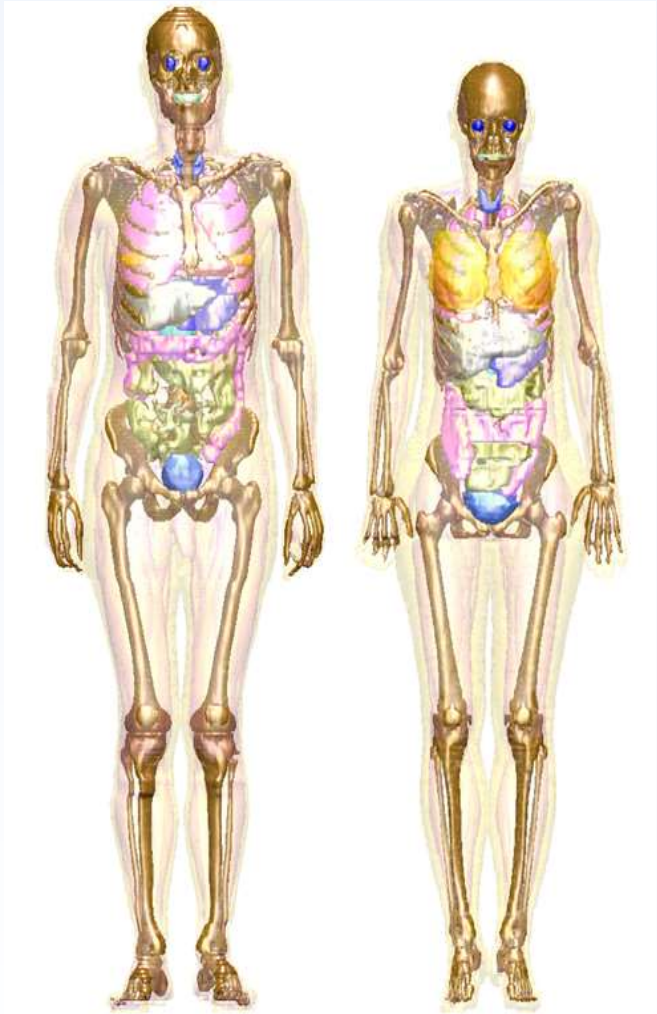
Use of Effective Dose

ICRP Adult Reference Computational Phantoms – Voxel Based

ICRP Publication 110

Ann ICRP 39 (2) 2009



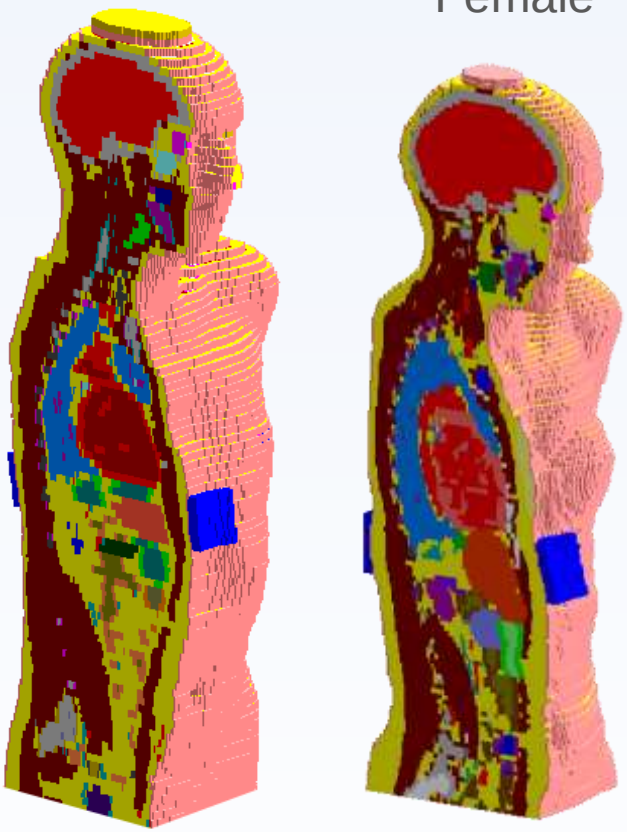


Maria Zankl

TG 103 Phantom Conversion

Male

Female



Male

Female

Publication 110 phantoms
(voxel geometry)

Polygon-mesh versions
(polygon-mesh geometry)

Chan Hyeong Kim

Occupational Intakes of Radionuclides

OIR Part 1 : Publication 130	Introduction
OIR Part 2 : Publication 134	H, C, P, S, Ca, Fe, Co, Zn, Sr, Y, Zr, Nb, Mo, Tc
OIR Part 3 : Publication 137	Ru, Sb, Te, I, Cs, Ba, Ir, Pb, Bi, Po, Rn, Ra, Th, U
OIR Part 4	Lanthanides and Actinides
OIR Part 5	F, Na, Mg, K, Mg, Ni, Se, Mo, Tc, Ag

François Paquet

OIR 3 dose coefficients for radon

Inhalation or ingestion

Radon-222 (Radon)
Radon-220 (Thoron)
Radon-219 (Actinon)

Effective dose
Organ equivalent doses

- BUT for inhaled Rn-222 + progeny –
  3 mSv per mJ h m^{-3} (about 10 mSv per WLM)
  in most circumstances,
  6 mSv per mJ h m^{-3} (about 20 mSv per WLM)
  for tourist caves, work involving physical activity

- Information provided so that account can be taken of
  specific information on exposure conditions
  – aerosol characteristics, equilibrium factor

James Marsh

Task Group 79 : Use of Effective Dose as a Protection Quantity

John Harrison C2
Mikhail Balonov formerly C2
Colin Martin C3
Hans-Georg Menzel formerly C2, MC
Pedro Ortiz-Lopez formerly C3
Rebecca Smith-Bindman
Jane Simmonds formerly C4
Richard Wakeford C1

+ François Bochud (C4), John Cooper, Christian Streffer

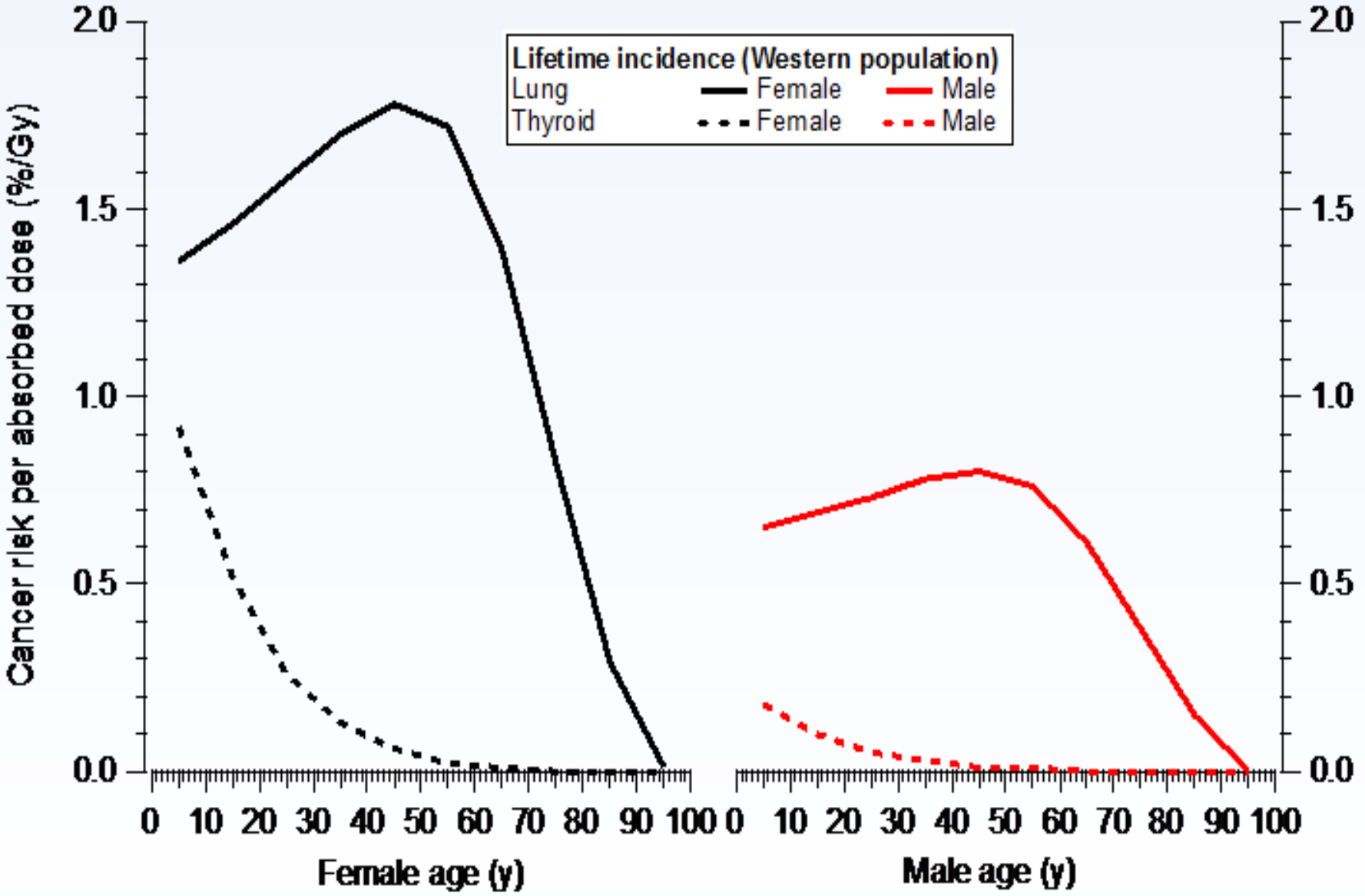
Task Group 79 : Use of Effective Dose

- Absorbed dose, Gy, should be used for limits to prevent tissue reactions
- Equivalent dose, Sv, is an intermediate step in the calculation of effective dose : radiation weighting factors relate to stochastic effects
- Effective dose, Sv, is calculated for adults, children and fetus using one set of tissue weighting factors and relates to age-, sex-, and population- averaged risk coefficients.

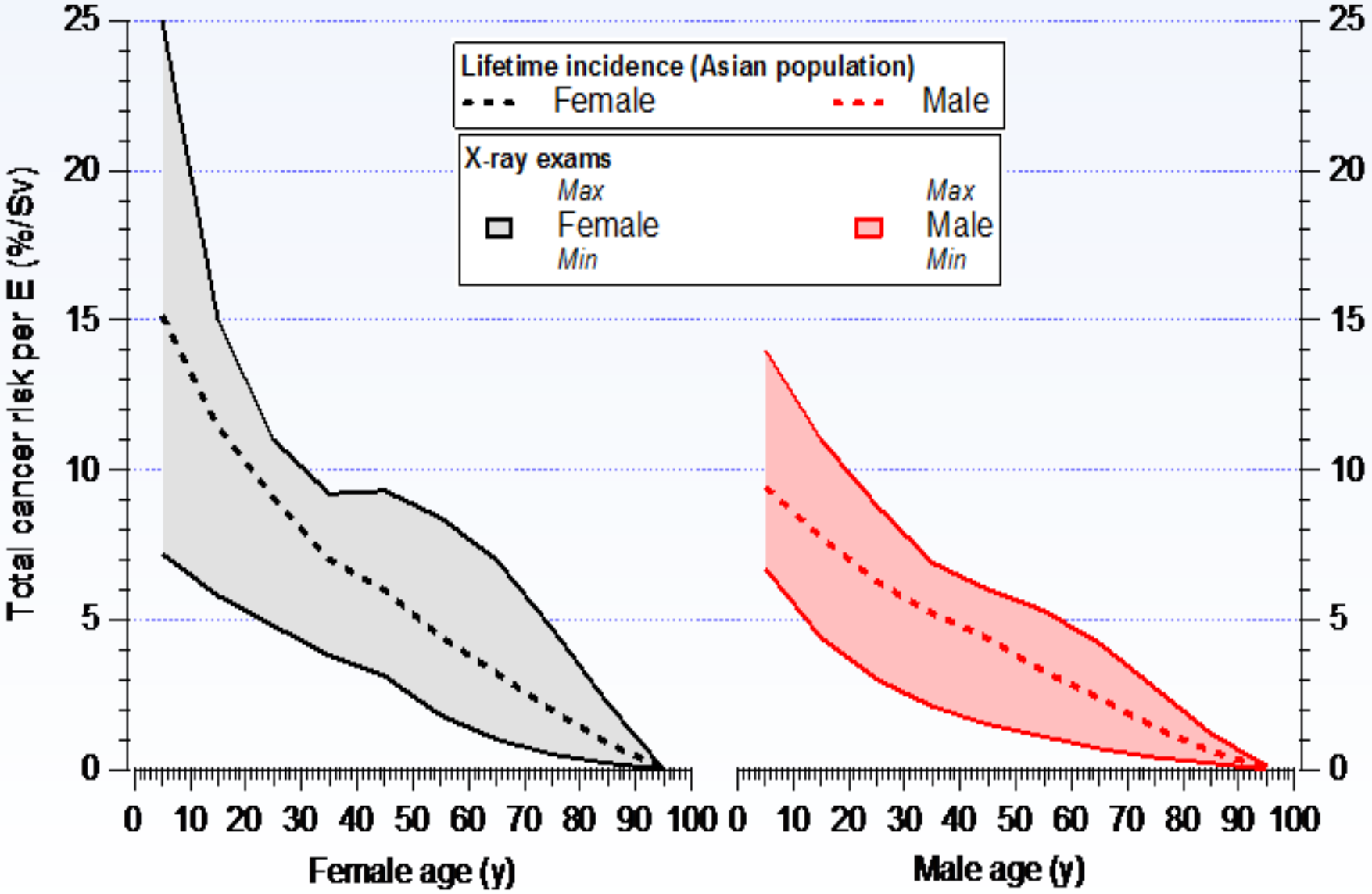
Pub 103: Population stochastic detriment

Tissue	Detriment (x 10^{-4} Gy^{-1})	Relative detriment	Tissue weighting
Oesophagus	13.1	0.023	0.04
Stomach	67.7	0.118	0.12
Colon	47.9	0.083	0.12
Liver	26.6	0.046	0.04
Lung	90.3	0.157	0.12
Bone surface	5.1	0.009	0.01
Skin	4.0	0.007	0.01
Breast	79.8	0.189	0.12
Ovary	9.9	0.017	
Bladder	16.7	0.029	0.04
Thyroid	12.7	0.022	0.04
Bone marrow	61.5	0.107	0.12
Other solid	113.5	0.198	0.12
Gonads (hereditary)	25.4	0.044	0.08*
Total	574	1.000	1.00”

Age and sex – related differences in cancer risks



Risk per Sv for medical X-ray procedures



Task Group 79 : Use of Effective Dose

- Use of effective dose criteria applied to all workers and all members of the public, together with optimisation, provides a pragmatic and workable system of protection
- *E* provides an approximate indication of possible risk, with additional consideration of variations in risk with age, sex, and population group.
- Best estimates of risk using organ doses and specific risk data give similar answers to approximate evaluations using *E*

TGs of other Committees / MC

TG 64 – Cancer Risk from Alpha Particles (C1)

TG 72 – RBE and Reference Animals and Plants (C5)

TG 74 – More Realistic Dosimetry for Non-Human Species (C5)

TG 92 – Terminology and Definitions (MC)

TG 100 – ICRP response to NCRP Council Committee 1 (MC)

TG 101 – Therapy with Radiopharmaceuticals (C3)

TG 102 – Detriment calculation methodology (C1)

TG 104 – Integration of RP for People and Environment


C2 in Seoul