ICRP Mission

Advance for the public benefit the science of radiological protection, in particular by providing recommendations and guidance on all aspects of protection against ionising radiation.
>250 members from 35 countries, experts who volunteer their time

Independent

Non-governmental

Non-profit
SYSTEM OF RADIOLOGICAL PROTECTION
Contribute to an **appropriate level of protection for people and the environment** against the detrimental effects of radiation exposure without unduly limiting the desirable human actions that may be associated with such exposure.
Protection Goal for Human Health

Manage and control exposures so that:

- Harmful tissue reactions (deterministic effects) are prevented
- Risks of cancer or heritable effects (stochastic effects) are reduced to the extent reasonably achievable
Cancer & Heritable Effects
(Stochastic Effects)

Harmful Tissue Reactions
(Deterministic Effects)

Additional Dose → Probability → Additional Dose

Additional Dose → Severity → Additional Dose
Cancer & Heritable Effects (Stochastic Effects)

Mechanism
Mutation of individual cells

Model for Protection
Probability of effect increases with dose without threshold

Protection Aim
Reduce risk to the extent reasonably achievable

→ Keep doses As Low As Reasonably Achievable
**Mechanism**
Injury to populations of cells

**Model for Protection**
Severity of effect increases with dose above a threshold

**Protection Aim**
Prevent harmful reactions

→ Keep doses below threshold

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**Harmful Tissue Reactions**
(Deterministic Effects)

e.g. necrosis, cataract induction, circulatory disease

Additional Dose → Severity →
ICRP Statement on Tissue Reactions & Early and Late Effects of Radiation in Normal Tissues and Organs – Threshold Doses for Tissue Reactions in a Radiation Protection Context
Publication 118 Chronology

- Initial plan to review tissue reactions
- ICRP Task Group 63 formed
- Report in development
- Consultation on report
- Report approved

- Initial discussions at MC meeting
- Extensive discussions at MC meeting
- Active drafting of the statement
- Statement issued
Tissues and Organs Considered

- Haematopoietic and immune systems
- Digestive system
- Reproductive system
- Skin
- Cardiovascular and cerebrovascular system
- Eye
- Respiratory system
- Urinary tract
- Musculoskeletal system
- Endocrine system
- Nervous system
Cataract Induction: Conclusions

• Threshold for acute exposure: ~0.5 Gy with 95% CI including zero

• Threshold for protracted exposure: ~0.5 Gy
  • Evidence mainly on opacities rather than cataracts because follow-up times were generally shorter
  • Later study* from RERF:
    • At 1 Gy, 20-30% excess of cataract surgery
    • Threshold of 0 to 0.8 Gy, if one exists

Cancer & Heritable Effect (Stochastic Effect)
Mutation of individual cells
No threshold

⇒ Keep doses As Low As Reasonably Achievable

Harmful Tissue Reaction (Deterministic Effect)
Injury to populations of cells
Threshold

⇒ Keep doses below threshold
Why?

Previously considered tissue reaction

Protection based on assumption of a threshold still the best principle of protection for cataracts

Therefore, aim to keep doses below threshold

Harmful Tissue Reaction (Deterministic Effect)

Injury to populations of cells

Threshold

→ Keep doses below threshold
Keeping Doses Below a Threshold

Dose Limits

+ Optimisation of Protection
Dose Limit for Lens of the Eye: Occupational Exposures

“(3) For occupational exposure in planned exposure situations … 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.”

– Publication 118 Statement on Tissue Reactions

• Given the threshold, a higher limit would not be adequately protective

• Alignment with the effective dose limit facilitates implementation
“(5) ... protection should be optimised not only for whole body exposures, but also for exposures to specific tissues, particularly the lens of the eye ...”

– Publication 118 Statement on Tissue Reactions

• Helps keep lifetime doses below threshold (annual limits alone do not guarantee this)

• Reflects uncertainty in setting threshold

• Accounts for the possibility of the lack of threshold
Dose Limit for Lens of the Eye: Public Exposures

No change is recommended to the public dose limit for the lens of the eye (15 mSv per year)

Existing limit remains adequately protective considering:

- the effective dose limit of 1 mSv/year
- low likelihood of protracted preferential exposure of the lens
- optimisation for exposures to the lens

Although many options were considered, a change is not justified based on improvements to protection
No change to principles or concepts in the system of radiological protection

- Numerical change to the dose limit in response to clear evidence of a significantly lower threshold

Explicit recommendation to optimise protection for exposures to the lens of the eye:

- Helps keep lifetime doses below threshold
- Reflects uncertainty in setting threshold
- Accounts for the possibility of the lack of threshold