Ethical Consideration in Radiological Protection

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Elements of Ethical Consideration

- Dose & Effect
- Risk & Benefits
- Protection Approach

Soundness
Uncertainty
Variability
Inference
Precautionary principle

Health care
Job
Compensation
Happiness

Size of risk/benefit
Distribution of risk/benefit
Collective vs. individual
Risk perception
Acceptability

Different individuals
Different practices
Pragmatism

Virtue, Individual right, Freedom, Dignity, Justice,
Equity, Fairness, Prudence, Integrity

Consequentialism
Utilitarian
Egalitarian
Prioritarian
Deontology
Teleology

Ethical background
Trivial risk is not necessary Acceptable risk, and vice versa

Acceptability may differ after who imposes the risk

Stakeholders’ voice in judgment
Protection System

Elements involving Judgment

- Appraise Health Effect
  - Nominal risk
    - LNT model, DDREF

- Set Dosimetric System
  - Equivalent dose/Effective dose
    - Reference person

- Set Protection Objectives
  - Appropriate level of protection without unduly limiting desirable activities

- Frame Protection Principles
  - Justification
    - Optimization
    - Dose/risk limitation

- Scope Protection Task
  - Exclusion/Exemption
    - Separation of exposure situations/types

- Provide Numerical Guides
  - Limits/Constraints/Reference levels
    - Representative individuals
What should be considered in line with contemporary ethical thought?

What in the system of RP can be ethically challenged?

Issues first, Answers later
Health Effects

- Sufficient knowledge?
- LNT model
  - Prudent enough?
- Nominal risk approach: sound?
  - Genetic susceptibility
  - Smoker/non-smoker (Rn risk)
  - Conceptus/children
- DDREF: Still needed?
Dosimetry

- Macrodosimetry (mean absorbed dose)
- Radiation weighting factors
  - $w_R$ of low energy beta: sound?
- Tissue weighting factors
- Reference person: higher percentile?
  - Physiology
  - Nutrition data
- Operational quantities: conservative?
Objective of Protection

- The proviso ‘without unduly limiting desirable activities’ is needed?
- What is ‘appropriate’?
  - Do we need a quantitative risk objective?
- Commission vs. Omission
  - Is moral reprehensibility different?
Principles

- **Justification**
  - Who does justify?
  - On what ground?

- **Optimization**
  - Optimize what? How?
  - Indirect cost? E.g. ethical cost

- **Dose/Risk Limitation**
  - Who decide ‘acceptable’?
  - Size of acceptable risk?
Scope & Approach

- Exclusion
  - Natural vs. Artificial?

- Exemption
  - Utilitarian approach?

- Different approach is reasonable?
  - Natural vs. Artificial
  - Creating exposure (practice) vs. Reducing exposure (intervention)
Separate Approach

- Exposure situations
  - Prudent enough?
- Exposure types
- Exposed persons
  - How well respect right of individuals?
  - Informed consent
    - Full free consent?
    - Consent from *members of the public*?
Numerical Guidance

- What is a special (emergency) exposure?
- Consensus on the limits?
- Adequate protection of minors?
- What is the activity criteria for foodstuffs?
Others

- Any other areas involving ethical decision?
- Lessons learned from Fukushima?
- Opportunity of individual control over risk?
On Acceptable Risk
Acceptable risk

Acceptable risk in literature: $10^{-6} \sim 10^{-4}/y$

Base risk: $10^{-4} \sim 10^{-1}/y$

0.1% of base risk: $10^{-7} \sim 10^{-4}/y$

Given that a risk less than $10^{-6}/y$ is trivial, the acceptable risk is in $10^{-6} \sim 10^{-4}/y$
Acceptable risk vs. Attributable risk

- Acceptable level for informed risk
- Upper bound of generally Acceptable risk
- Generally acceptable level

Specific level depends on value judgment

Adjusted ICRP 60 risk projection, female
Informed Consent

- Conditions of free IC
  - Disclosure
  - Understanding
  - Voluntariness
  - Competence

- IC of Public
  - Neither practical nor possible
  - Implied IC can be considered? Or what?
Thanks