Workshop on Science and Values in Radiological Protection

Breakout Session 3: Cardiovascular disease

summary report

Q1: Why do we care about the problem?

1. Existence of clear epidemiological evidence above 0.5 Gy for the radiation induced cardiovascular diseases (CD), at lower doses the evidence is inconclusive
2. Radiation induced CD may have significant impact on the morbidity and mortality
3. CD are currently not specifically addressed by the system
4. Public and trade unions concerns are increasing

ICRP position

- Statistical evidence
  - Induction of effects around 1 Sv
  - Association with dose
- Uncertainties on the shape of the dose-response at low doses
  - Data consistent with there being:
    - No threshold
    - Threshold at 0.5 Sv
- Judgement
  - *"Data available do not allow for their inclusion in the estimation of detriment following low radiation doses less than 100 mSv. This agrees with the conclusion of UNSCEAR 2008 which found little evidence of any excess of risk below 1 Gy" (ICRP)*

Pros & Cons to address this issue within RP now

- **Pros**
  - existing evidence above 0.5 Gy
  - coherence with philosophy of RP
  - ethical and moral aspects
  - public concern, RP is responding and aware of the problem
  - incentive to improve some practices and technologies causing high exposure
- **Cons**
  - below 0.5 Gy see nothing, lack of knowledge (mechanisms (cellular, molecular, …?)
  - magnitude of rad. effects on CD is small compared to other causes considered in public health
  - unable to quantify cost/benefit associated with potential decrease of dose limits, the benefit may be nil if there is a threshold
  - lack of efficiency in specific area concerned (CT)
  - new epidemiological studies coming fairly soon
  - public concern: potential distrust for not having identified the problem earlier

Q2: What further do we need to know?

1. Mechanism: elucidation on possible mechanism (inflammatory / micro vascular, mutation, others?)
   - Inflammatory is more plausible (experiments ongoing)
   - Different mechanisms at high and low doses?

2. Are these mechanisms consistent with stochastic or deterministic dose response
   - Inflammatory consistent with deterministic
   - If the threshold is low, there may be a need for change in RP

3. Epidemiological data below 0.5 – results of ongoing studies and need for launching further studies (e.g. CT)

4. Does the relative risk depend on type of CD

5. How does the spectrum of radiation induced CDs depends on dose

6. Dose and dose-rate effect and radiation quality

7. Age, gender, population and temporal effects

8. Synergistic effects, interactive effects with other agents

9. What is the target tissue

Q3: RP Implications with current knowledge?

- If change is made based on Japanese risk estimates and LNT, the detriment would increase 50-100%
- This might lead to decrease of current dose limits by 30-50% and emphasis on optimization
- Application of precautionary principle should include not only the change in detriment but also the cost and other consequences associated with this change
- Medical exposures (CT) are at least 100 times higher than occupational ones, and are typically excluded from the limits
- Any regulation currently applied is unlikely to have an observable benefit

Q4: What are we doing now?

- reinforcing scientific studies on the given subjects
- Increasing professional awareness of the issue
- critically reviewing existing data/literature
- challenging features of the current RP system in light of evolving science and value judgements