

**EU Scientific Seminar 2014**  
**Fukushima – Lessons learned and issues**  
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**Ethical issues debated after Fukushima**

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# Issues mainly highlighted

- Need for global approach, not limited to RP but **enlarged to all PH aspects**, and to **societal aspects** (as disrupting countermeasures, ...)
- need for taking better into account **long term**, return to « **normality** »
- recognizing the importance of **psycho – (social)** consequences, incl stigmatization
- « **misunderstanding** » of risks by population with critics on media, on NGO's, on « anxiety-provoking experts »

# Challenging issues

- Collusion between authorities and companies; lack of **independency** of safety agencies
- **Reluctance of nat. authorities to disclose information:** official info too late, sometimes incorrect or modified after non official measurements; lack of info on doses in first days and on internal exposures; lack of dose distributions
- **Conflicts of interest** of international organ. (mandates; conventions) and of many « official » experts (job; grants); lack of mechanisms trying to guarantee independency : **threat for credibility**
- **Downplaying** of the health effects by nat. authorities and by UNSCEAR and IAEA: minimization of or denying risks

**An insidious issue  
(frequently underlying):**

**« science-based information »**

# « Who » tells the « scientific truth »?

- « Reassuring » experts and « anxiety-provoking » experts all claim being following only « science »
- Both groups are demonizing each other
- Political reasons or conflicts of interest play a role but there are also deep epistemological and ethical issues hidden
- Need for respect and listening to each other
- Defensive « pseudo-consensus » is counterproductive

# ***Epistemological/ethical questions: challenges for the Radiological Protection for the next 50 years***

- Use and misuse of the « **evidence-based approach** »
- Adequacy and legitimacy of **precautionary attitude within scientific evaluation**
- **Fairness of risk communication** allowing informed decision-making, incl. by members of the affected population

# Evidence-based approach

This is the current dominant scientific paradigm in the medical field (drugs, treatment) and by many radiation experts, incl within UNSCEAR

The almost only concern is to avoid concluding that a **causal** relationship exists before it is **firmly proved** (**hard evidence** required).

The main concern is:

**Avoiding the false positives**

## Misuse of evidence-based approaches

In (the currently frequent) new situations with potential long term effects.

decisions are to be made while strong evidence is lacking.

Such decisions must be based on

**« available » evidence,**

even if there persists uncertainties.

Informed decision-making requires then science-based balanced information including:

**Avoiding the false negatives!**

# A **blameworthy** use of the evidence-based approach: Strategy of doubt

The (hard) evidence-based approach is frequently misused as a strategy for delaying unpleasant decisions as long as « some doubt » exists.

(cfr tobacco)

# UNSCEAR 2012: agreed on the principle .....

The **strategic objective** for the period 2009-2013, endorsed by the General Assembly, is “to increase awareness and deepen understanding among authorities, the scientific community and civil society with regard to levels of ionizing radiation and the related health and environmental effects as **a sound basis for informed decision-making on radiation related issues**”.

As underlined **in a recent report to the General Assembly** , “that strategic objective highlighted the need for the Committee to provide information on the strengths and limitations of its evaluations, which are often not fully appreciated. **This involves avoiding unjustified causal associations (false positives) as well as unjustified dismissal of real health effects (false negatives).**”

# ...but the culture did not change!

In many parts of the UNSCEAR documents , too much importance is given to the avoidance of false positives (by highlighting all possible bias for an association between effect and exposure) in comparison with the avoidance of false negatives, while possible dismissal of real health effect of radiation is a major concern for responsible decision-makers.

- **Good illustrated by the exclusively critical reaction about the new low dose reports (Pearce, Kendall, ...) in the UNSCEAR « children » report**
- **And by the.... comeback of the 100 mSv magic number**

# Coming back of the « 100 mSv » in UNSCEAR

- At stake in the (still not approved) attributability report and lying at the basis of the conclusions of the Fukushima report
- There is « no compelling epidemiological evidence of radiation-induction of cancer in a mixed population under 100 mSV »
- As a consequence no effect could be « attributed » to radiation under 100 Sv and even inference of risk for the future under this dose would be « non-scientific » .....

**As formulated by a participant: « They forget decades of biological research »**

**(as well as results of epi studies after children and foetus exposure)**

# Misunderstanding of the precautionary principle: Precaution in Science is relevant!

Although frequently limited to the decision-making processes in situations of uncertainty, the precautionary approach is also relevant and appropriate in science.

As underlined in the COMEST report from UNESCO, the precaution approach in science includes:

- a focus on risk plausibility rather than on hard evidence
- a responsiveness to the first signals (“early warnings”)
  - a systematic search for surprises (“thinking the unthinkable”), particularly for possible long term effects

# Missed early warnings

Recent developments regarding the late recognized radiation effects of low to moderate doses on the **lens of the eye** and on the **circulatory system** are good illustrations of a lack of vigilance and responsiveness regarding early warnings that were described **many years ago.**

# Thinking the unthinkable

**Recent scientific findings and publications on  
the health effects of Chernobyl**

**RADIATION PROTECTION NO 170**

**2011**

# Children's morbidity

- **Many claims** concerning the health of children in the contaminated territories around Chernobyl, which seem to suffer from **multiple diseases and co-morbidities**
- **Reports from international organizations did not give until now much interest: “psycho-social”**
- **But most studies not available in English and not translated!**

# Children's morbidity: recent initiatives

- Series of **IRSN studies**:
  - **Rats** exposed to  $^{137}\text{Caesium}$  contamination during several months through drinking water (150 Bq/day/animal: comparable with a typical **low intake** in the contaminated territories)
  - *Although the animals tested in these studies did not show induced clinical diseases, a **number of important biological effects** were observed on various systems: increase of CK and CK-MG, decrease of mean blood pressure and disappearance of its circadian rhythm; EEG modifications, perturbations of the sleep-wake cycle, neuro-inflammatory response, particularly in the hippocampus, etc*
- Series of longitudinal studies initiated recently in Ukraine in conjunction with the **US University of South Carolina**
- Concerning results (references not quoted in the UNSCEAR documents although asked for)

# Children's morbidity and internal exposures: thinking the unthinkable

General assumption: equivalence of risk for external and internal exposures.

These new results suggest that for

**(chronic) internal exposures,**

a major underlying issue could be

**the inadequacy of the equivalent/effective dose as risk indicator for all types of effects.**

This issue is a major societal concern and asks for adequate research.

# Precaution in Science: other epistemic uncertainties

- Irradiation **in utero**: there are still many uncertainties: radiation effects on gene expression, long term effects of NCS irradiation, chronic internal expos. (OBT,..), genetic susceptib.
- Long term **hereditary** effects and **non-cancer** effects: also large uncertainties
- Science-based balanced information after Fukushima should have included discussion of these epistemic uncertainties

UNSCEAR reports (Fukushima, children) are based only on “hard” evidence and fail to consider epistemic uncertainties and possible false negatives.

# Fairness of risk communication

- Informed decision requires science-based **balanced** information (as well for decision-makers as for population)
- Communication such as “no detectable (or discernible) effect is expected” or “safe under 100 mSv” is **misleading**
- Unbalanced reassuring information is not only misleading but also **counterproductive** as it provokes contesting reactions, distrust in experts and finally more anxiety

The right way to communicate about risks  
should be discussed with  
**human science specialists** (not only in commu)  
but also with stakeholders ,  
Including representatives of the **affected  
population**

# Conclusions

- Communication and its rightness was one of the main disputed ethical issue after Fukushima
- A frequently underlying issue in these disputes was the understanding of « science-based information »
- Science-based information should be balanced; this requires attention for false + and – ; attention for false - includes precautionary lecture of available evidence
- Fair communication should allow for responsible and autonomous decision-making (as well for decision-makers as for population)