Treatment and expression of uncertainty in risk assessment : Introduction to the issue

Prof Gérard Lasfargues, PhD, MD Deputy Director General for Scientific Affairs



French Agency for Food, Environmental and Occupational Health and Safety

2nd International Conference on Risk Assessment Brussels 26 January 2011



Uncertainties and risk assessment : a large number of works and reports...

- Recent publications on the characterization of uncertainties
 - International Programme on Chemical Safety, IPCS, Uncertainty and Data Quality in Exposure Assessment, Genève, WHO, 2008
 - NRC, Science and Decisions : Advancing Risk Assessment, 2009
 - EFSA, Opinion of the Scientific Committee related to Uncertainties in Dietary Exposure Assessment, 2007
 - Etc.
- Objectives
 - To better clarify the modes of uncertainty
 - To characterize uncertainties during the course of expertise
 - To allow scientific projections





Uncertainty : what are we talking about?

- Broad definition
 - Uncertainty not only characterized by lack of knowledge
- Several classes
 - Epistemological uncertainties
 - Related to lack of knowledge
 - Methodological uncertainties
 - Theoretical uncertainties
 - Political and regulatory uncertainties



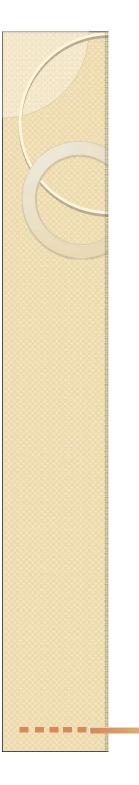


Uncertainty : what are we talking about?

- Uncertainties related to ambiguity, complexity, ignorance or lack of data
- Deep uncertainties, not quantifiable or statistically describable
 - relevant studies not published (e.g. in case of negative results)
 - values, implicitly or explicitly expressed, that influence the choices in the research design etc.
 - Etc.
- More readily quantifiable uncertainties

• Measurement, sampling etc.



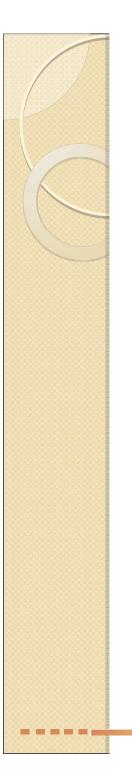


Uncertainty / variability

<u>Variability</u>

- between species
- gender-related
- age-related
- health inequalities
- conditions of exposure
- behavioral variability
- Etc.





Uncertainty and risk assessment : current state of practice

- Lack of attention to uncertainty at preassessment phase
- More attention given to the more readily quantifiable variables
- Different types of uncertainty not adequately differentiated in risk assessment reports
 - Guidance inconsistently applied
- Minority views rarely reported
 - Missed opportunities to share methods between disciplines





Uncertainty and risk assessment : current state of practice

- Uncertainty, communication and risk management
 - Difficulty in communicating uncertainties and their impact on the need for action
 - Ambiguity about level of knowledge : Receptivity and flexibility / information on uncertainty and knowledge



Various trends with respect to uncertainty

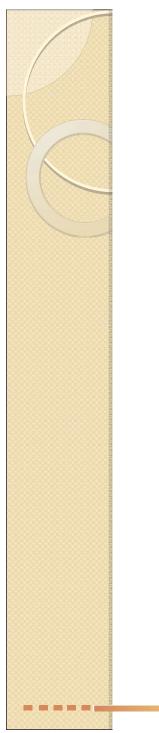
(Van der Sluijs JP, Water Science and technology, 2005; Ravetz and Strand, 2005)

Exorcism

- To reduce uncertainties
- To exorcise "junk science"
 « rectify false concepts in order to establish scientific validation »

Adaptation → to quantify

- Bayesian analysis etc.
- Hypothesis, scenario



- Assimilation
 - To give up our search for a single unquestionable truth
 - To aim for the transparency of the various positions
 - ➔ Ambiguity of risks
 - Incertitude surrounding facts
 - Controversial values
 - Political, economic stakes

etc.





- Evidence-based approach
 - To eliminate uncertainty
 - To aim at a high degree of accuracy
- Precautionary-based risk assessment
 - To incorporate and learn from uncertainty Grandjean P, Annu. Rev. Public Health (2004)

Quantification

- Variability

 probabilistic analysis / safety factors
- Epistemic uncertainties

 quantification and prevention: safety factors





- To clarify the various dimensions of uncertainty
 - Technical : accuracy/ inaccuracy
 - Methodological : reliability
 - Epistemological : ignorance
 - Societal : social robustness





Judgments of experts

- Hypothesis/presumptions about mechanisms of action
- Relevance of data obtained with not standardized methods
- Interpretation of conflicting data
- Quality of studies
- Critical effect selected
- Interpretation of causality

Multidisciplinary expertise

- Comparison of various models of uncertainty management
- Various visions of the elements of certainty and uncertainty





Areas for improvement

- Systematic identification and evaluation
- Uncertainty analysis
 - Proportionate to the needs of the problem
- Evaluation of uncertainty relevant to other aspects of overall process
 - Socio-economic analysis etc.
- Review
 - Availability, review





Areas for improvement

- To be more explicit about variability and its effect on risk and uncertainty
- Inclusion/exclusion of data
 - Transparency, justification
- Review
 - Independent committees or experts
 - External parties



Areas for improvement

- Better communication
 - ➔ Decision-making
- To indicate the impact of he uncertainty on the assessment of risk
- Information on the types, sources and reducibility of uncertainties etc.
- Need for harmonized guidance on approaches for communicating uncertainty etc.



Conclusion

- Culture change
 - Risk assessors, risk managers
- Interactions between parties
 - Experts, managers, stakeholders etc.

"Knowledge is an unending adventure at the edge of uncertainty" (Jacob Bronowski) This paper was produced for a meeting organized by Health & Consumers DG and represents the views of its author on the subject. These views have not been adopted or in any way approved by the Commission and should not be relied upon as a statement of the Commission's or Health & Consumers DG's views. The European Commission does not guarantee the accuracy of the data included in this paper, nor does it accept responsibility for any use made thereof.