BROAD OBJECTIVES

• Dose – Effect Modelling to assist Risk Assessments

  • Mathematical Derivation of Screening Level Values / Protection Thresholds

• Reach Consensus; Document Methods; Publish Guidance
First Year Progress Report

1) UPDATE Dose-Effect DATABASE *(Almudena Real; Spain)*
   ( UNSCEAR; post 2006; Russian/Ukrainian)

• References found: English (405), Russian (255), Japanese (7), French (2), Chinese (1)

• References included: 141 (FREDERICA= 1,509 Refs; Aprox 10% increase)

  Wildlife groups: Mammals (36%); Amphibians (11%); Insects (8%); Protozoa (8%), Others (microorganisms, fish, crustacean, mollusc, aq. plants, soil fauna, fungi) (37%)

  Type of exposure: Acute (75%); Chronic (25%)

  Umbrella effects: Mortality (30%); Reproduction (28%); Morbidity (27%); Genetic (11%); Others (4%)

• Quality Control: Dose-Response Analysis

  134 Refs analysed
  41 QC<35

  93 QC>35

  85 Refs analysed

  19 No Dose-Response (single dose)

  66 Potentially useful for Dose-Response
First Year Progress Report

1) UPDATE Dose-Effect DATABASE (A. Real; Spain)
   (UNSCER; post 2006; Russian/Ukrainian)

2) DOSE – RESPONSE Relationships (J. Garnier-Laplace; IRSN)
   Species Sensitivity Distributions

C. Della-Vedova, R. Gilbin, T. Hinton, A. Lorentzon, A. Real, S.
Sundell-Bergman, H. Vandenhove, C. Willrodt, T. Yankovich
DOSE – RESPONSE Relationships

PNEV = HDR\(_{5\%}\) / SF

- PNEV used as the screening value at the ERA should be highly conservative
- SF = 5
- PNEV ≈ 10 µGy/h
DOSE – RESPONSE Relationships  (July 2009)

J. Garnier-Laplace and C. Della Vedova conducted a TRAINING COURSE

how to use FREDERICA data base and develop dose-response curves

• how to determine if data meet appropriate criteria to be included
• how to enter data in a “R-package” statistical software program
• how to use software to derive sigmoidal & hormetric dose-response curves

ERICA and PROTECT: SSDs derived from acute, gamma, laboratory data

EMRAS-ii: SSDs: field vs lab; acute vs chronic; for specific taxonomic groups
First Year Progress Report

1) UPDATE Dose-Effect DATABASE (A. Real; Spain)  
   (UNSCEAR; post 2006; Russian/Ukrainian)

2) DOSE – RESPONSE Relationships (J. Garnier-Laplace; IRSN)  
   Species Sensitivity Distributions (acute vs chronic; field- vs lab-derived;  
   at various taxonomic levels)

3) Incorporate POPULATION MODELS (T. Sazykina; Russia)  
   (Review existing models; life history data; data analyses)

   F. Alonzo, R. Heling, T. Hinton, I. Kawaguchi, A. Kryshev, A. Lorentzon,  
   L. Monte, J. Vives i Batle
Reviewed existing population models appropriate for adaptation to radiation effects assessments for non-human biota

Emphasis was placed on 8 models, that collectively formed the basis for developing a generic population model

- Predator-prey interactions
- Discrete age classes
- Limited environmental resources
- Migration
- Damage, as well as repair from exposure to radiation
First Year Progress Report

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2) DOSE – RESPONSE Relationships (J. Garnier-Laplace; IRSN)
   Species Sensitivity Distributions (acute vs chronic; field- vs lab-derived;
   at various taxonomic levels)

3) Incorporate POPULATION MODELS (T. Sazykina; Russia; Jan. ‘11)
   (Review existing models; life history data; data analyses)

4) Multiples Stressors (H. Vandenhove; Belgium; with IUR)
   (Review literature; chemical industry; report on applicability to IAEA)

   D. Copplestone, R. Gilbin, T. Hinton, N. Horemans, s. Mihok, D. Oughton, K.
   Stark, T. Sazykina, S. Sundell-Bermman, T. Yankovich, S. Yoshida
Established a radiation-multiple-stressor database
57 entries from open literature; 7 organism/ecosystem combinations

Examined methods used for chemicals from the EC-NoMiracle project (Novel Methods for Integrated Risk Assessment of Cumulative Stressors in Europe)

Organising a mixture toxicity workshop at SCK•CEN (in 2010, collaboration with IUR – co-funding)

Output: Review manuscript multiple stressor research with recommendations for IAEA (draft stage)
First Year Progress Report

5) Canadian Benthic Data (S. Mihok; Canada) (Uranium mining; derive dose to benthos; multivariate stats)

- large and diverse data set of sediment cores taken from U mining areas
- includes population abundance / diversity info on benthic invertebrates
- archived data have been retrieved, validated and annotated into Excel.
- discussion on statistical analyses at the current meeting
First Year Progress Report

5) Canadian Benthic Data (S. Mihok; Canada; July ‘09)
   (Uranium mining; derive dose to benthos; multivariate stats)

6) Alternative Approaches (T. Sazykina; Russia; Jan. ’11)
   (will non-parametric and Bayesian methods produce screening levels similar to SSD?)

7) Develop and Publish Guidance Documents (T. Hinton; France; July. ’11; Documentation of methods to derive screening levels; guidance on use of screening levels; guidance in conducting effects type research)

8) Final Reports to IAEA (T. Hinton; France; Jan. ‘12)