Quantitative Weight of Evidence

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Decision making

- Common place
- Intuitive versus Rational
- Trust in decisions
- Strength versus Weight
Quantitative Weight of Evidence (QWoE) - working definition

The testing of a hypothesis (problem formulation) by the critical weighting of all the suitable, available studies using predefined, scientifically justified, scored criteria for both quality and relevance to characterise quantitatively the strength of evidence.
QWoE and Systematic Review (SR)

- QWoE and SR have a lot in common
- SR uses “systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies”
- QWoE assumes SR and provides greater focus on the process of weighing of different Lines of Evidence (LoE)
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. **Hypothesis and data collection**
   Hypothesis /problem formulation and data identification and collection

2. Quality assessment

3. Relevance assessment

4. Criticality of endpoints

5. Intra-LoE Concordance assessment

6. Inter LoE Concordance assessment

7. Bench marking/Read-across

8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
   Reliability of study design including the identification and characterisation of effect(s)
3. Relevance assessment
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. **Relevance assessment**
   For each finding (model used, exposure conditions dose response, statistical significance of change, historical controls, benchmark comparison, reversibility, consistency between endpoints).
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
   Criticality to the development of disease/toxicity in species of concern
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
5. **Intra-LoE Concordance assessment** Concordance of findings within a single Line of Evidence. Justification of non-concordant information
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
   Concordance of findings between all studies for different Lines of Evidence and plausibility: further evaluation based on effects of known modifiers, AOP support, SAR, other factors. Justification of non-concordant information
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
   Comparison with findings for related chemicals (reference/bench mark chemicals)
8. Conclusions and characterization of uncertainties
QWoE Framework

1. Hypothesis and data collection
2. Quality assessment
3. Relevance assessment
4. Criticality of endpoints
5. Intra-LoE Concordance assessment
6. Inter LoE Concordance assessment
7. Bench marking/Read-across
8. Conclusions and characterization of uncertainties
   Conclusions on assessment outcomes (risk/hazard) and characterization of uncertainties
Summary

The Quantitative Weight of Evidence (QWoE) framework being proposed

- Is generic in its applicability to any hypothesis
- Provides transparency of process thereby minimising opportunity for bias and providing a basis for dialog between stakeholders
- Can be quantitative with tailored score cards developed by subject matter experts