

A QUANTITATIVE WEIGHT OF EVIDENCE METHODOLOGY (QWoE)

Application to DINP, DCHP and DnHP

The weight of evidence approach means that you use a combination of information from several independent sources¹ taking into consideration strengths, limitations, and relevance of each study to reach a conclusion concerning a property of a substance.

A quantitative method to sieve through this evidence is crucial for hazard and risk assessments in toxicology. The methodology² developed by Professors **W. Dekant** and **J. Bridges** aims to make scientific evaluations more consistent when testing a hypothesis, using predefined criteria.

The resulting methodology represents an asset when taking decisions by providing transparency in the conclusions and identifying uncertainties.

DEFINITION OF QWoE

The testing of a hypothesis based on the application of **predefined and scientifically justified** criteria for both **quality and relevance** in order to assess the **overall strength of the evidence** taking into account **all** the existing relevant data sources.

QWoE reliability score = Quality × Σ (Relevance × Weighting factor)

SCORING SYSTEM FOR QUALITY OF DATA

The quality assessment score represents how appropriate the methods used to collect data are. That includes the statistical approach and reporting based on best practice and the suitability of the measurement procedure in terms of specificity and reliability.

Scores range from 0-4

Average score between 0 and 4 for the whole paper (Q), based on 14 variables.

SCORING SYSTEM FOR RELEVANCE OF EFFECTS

The relevance score shows the strength of the evidence gathered when assessing adverse effects of chemicals. The score looks at the study conditions and how appropriate they are, if the relationship to exposure levels is established and if any extrapolations of the data are justified.

Scores are assigned from 0 to 4 across 5 criteria.

WEIGHTING FACTOR

The weighting factor weights an observation based on the nature of the effect and its relevance to adversity. The higher the score, the more severe the effect ranging from minor biochemical effects to major pathological ones.

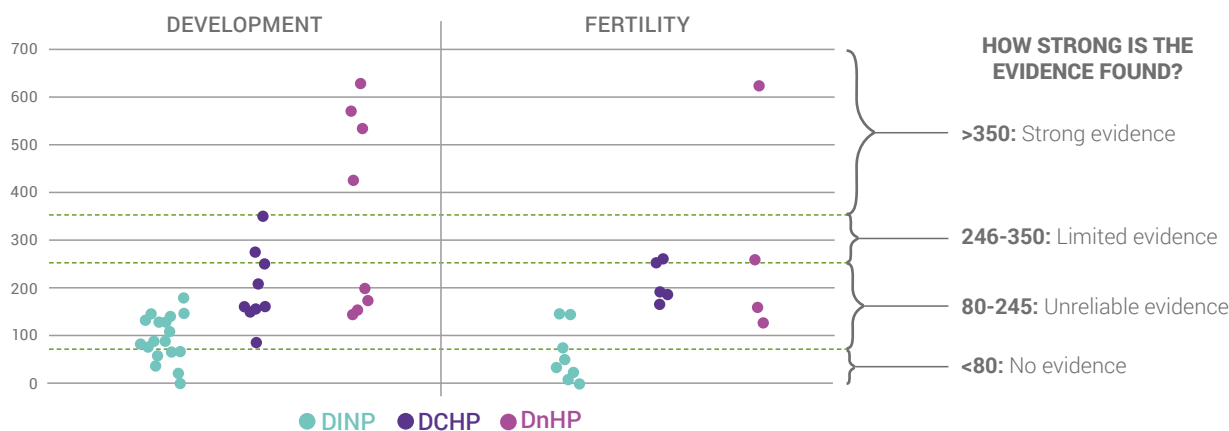
Weights (w) range between 1 and 4 depending on the effect.

WEIGHTED RELEVANCE SCORES ARE SUMMED ACROSS ALL ENDPOINTS IN 8 DIFFERENT CATEGORIES FOR FERTILITY AND DEVELOPMENTAL EFFECTS.

$$QWoE = Q \times \sum_{e=1}^8 (r_e \times w_e)$$

APPLYING THE QWoE

Results for studies on DINP, DCHP and DnHP assessing developmental and fertility endpoints³



For DINP no developmental and fertility effects warranting any classification are detected.

¹ - echa.europa.eu/support/registration/how-to-avoid-unnecessary-testing-on-animals/weight-of-evidence

² - "Assessment of reproductive and developmental effects of DINP, DnHP and DCHP using quantitative weight of evidence". W. Dekant, J. Bridges. Regulatory Toxicology and Pharmacology, Volume 81, November 2016, Pages 397–406

³ - "A quantitative weight of evidence methodology for the assessment of reproductive and developmental toxicity and its application for classification and labeling of chemicals". W. Dekant, J. Bridges. Regulatory Toxicology and Pharmacology, Volume 82, December 2016, Pages 173–185