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Use of benchmark doses for reprotoxic chemicals

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Objective: To test the construction of Benchmark doses (BMDL) for 3 reprotoxic chemicals: di-n-Butyl phthalate (DnBP), linuron, 2-ethoxyethanol (EGEE).

Methods: The toxicological profile and the choice of the critical effect/ study for each substance was identified. Data were adjusted for the derivation of benchmark doses (BMDLs), using BMDS Software from US Environmental Protection Agency. Several mathematical models were tested each time.

Results: The main issue reveals frequent uncertainties in the use of BMDL for the derivation of human toxicity values (HTVs). It questions on: data availability (the approach taking into account the issue of 'litter effect' couldn't be used), data quality (an experimental point for linuron has to be deleted because no model adjusted suitably with the data), uncertainty (BMDL10 for DnBP and EGEE are several orders of magnitude less than the BMD10 and reveal a low confidence level), and BMDL interpretation (the BMDL05 for linuron is similar to the LOAEL, but if we are confident that at 95% the BMDL05 produces 5% of effect or less, the LOAEL produces an effect, without precise quantification).

Conclusion: This work reveals the difficulty to derive a BMDL independently from the statistical considerations. BMDL values could not be systematically used and we note the problem in the use of other critical doses with low confidence level in this context. However, BMDLs allows us to criticize the experimental protocol and the critical effect analysed in the context of HTVs derivation, and their interpretation are more satisfying for the establishment of HTVs in public health.