**Evaluation of quantitative structure-activity relationship (QSAR) models for reducing chronic fish toxicity tests in the environmental risk assessment of chemicals**

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The European chemicals legislation (REACH Regulation) aims at reducing animal testing for chemical risk assessment. With respect to this alternative assessment methods like quantitative structure-activity relationship (QSAR) modelling are increasingly applied to substitute acute toxicity tests (e.g. fish toxicity). Within the presented work the feasibility of the QSAR tool ECOSAR (EPI Suite TM, US-EPA) for chronic fish toxicity estimation was evaluated.

A dataset of 156 QSAR amendable chemicals and pesticides with their experimentally determined chronic fish toxicity was supplemented with QSAR chronic fish toxicity predictions to allow for comparison of experimental and modelled chronic fish toxicity values. The data set comprised compounds for which an ecotoxicological concern had been determined and which were previously used in a study on sensitivity comparison1. For all compounds no effect concentrations (NOEC) of fish early life stage experiments (OECD 210 or comparable) were available. QSAR chronic fish values (ChV) were calculated according to baseline (neutral narcosis) and specific ECOSAR class equations, which all use the octanol-water partition coefficient (log Kow) as model descriptor.

Results show that there are ECOSAR classes like e.g. ‘Esters’, ‘Anilines’, ‘Phenols’ and ‘Neutral Organics’ (baseline toxicity) for which chronic fish toxicity was satisfactorily (same level of uncertainty than using the standard approach with certain assessment factors) modelled for the majority (90 %) of the dataset. Hints for more specific mode of actions, e.g. endocrine active structural moieties, were identified to give notice of chemicals for which the use of QSAR estimations will underestimate chronic fish toxicity severely in 20 % of the cases. Hence, science based suspicion of possibly endocrine activity was determined as one criterion of exclusion for ECOSAR QSAR of chronic fish toxicity of chemicals. On the contrary, compounds for which no possible endocrine activity would be found chronic fish toxicity was sufficiently modelled in 98 % of the cases with respect to the chemicals of the used data set.

Those findings indicate that QSAR estimations instead of chronic fish tests could appropriately assess chemical hazards in certain cases and that further chronic QSAR development, validation and application should be promoted to reduce animal testing.

1 May, M.; Hahn, S. Report UBA-FB 27448 2014, ‘Comparison of species sensitivity of *Daphnia* and fish in acute and chronic testing’