It is time to develop ecological thresholds of toxicological concern to assist environmental hazard assessment

Abstract:
The Threshold of Toxicological Concern (TTC) concept is well established for assessing human safety of indirect food additives and has been reapplied for a variety of endpoints including carcinogenicity, teratogenicity, and reproductive toxicity. TTC approaches have benefits for screening-level risk assessments, including the potential for rapid decision-making, fully utilizing existing knowledge, reasonable conservativeness for chemicals used in lower volumes (Low Production Volume Chemicals (LPCVs – e.g. < 1 t/yr), and reduction or elimination of unnecessary animal tests. Higher Production Volume Chemicals (HPVCs - > 1t/yr) would in principle always require specific information. TTC has found particular favor in the assessment of chemicals used in cosmetics and personal care products as well as other chemicals traditionally used in low volumes. Use of the TTC in environmental safety is just beginning and initial attempts are being published. Key questions focus on hazard extrapolation of diverse taxa across trophic levels, importance of mode of action, and whether safe concentrations for ecosystems estimated from acute or chronic toxicity data are equally useful and in what contexts. This paper will provide an overview of the theoretical basis for developing an eco-TTC with an initial exploration for chemical assessment and boundary conditions for use. An international collaboration under the ILSI Health and Environmental Sciences Institute has been established to address challenges related to developing and applying useful eco-TTC concepts.

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