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ID# 1124 Poster Board 342
Location: Exhibit Hall
Time of Presentation: Mar 17 1:00 PM - 1:00 PM
Category: Bioinformatics/Computational Toxicology, (Risk Assessment)

Quantitative Structure Toxicity Relationships (QSTR) models for predicting acute/sub-acute and sub-chronic/chronic adverse effect levels

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An important step in dose-response assessment is the identification of a critical effect level. The measure of critical effect often is presented as a no-observed-adverse-effect level (NOAEL), or a lowest-observed-adverse-effect level (LOAEL). Quantitative Structure Toxicity Relationships (QSTR) models are mathematical models that may be used to predict toxicity from physical characteristics of a chemical structure. In this research, QSTR models were developed to estimate critical effect levels from chemical structure. The modeling focus was on machine learning methods, Random Forest, k-Nearest Neighbor, and Support Vector Machine, as well as models using Partial Least Squares. The models were built using over 2700 toxicity values and 472 unique chemicals. Models were built with three commercial descriptor sets (Dragon, MOE, Molconnz) and one descriptor set from the US EPA. The performance of each model was assessed using a validation set not used in model development. These models show that it is very reasonable to predict critical effect values from chemical structure based on predictions of the validation set. The mean absolute error of the log scaled LOAEL and NOAEL values was close to 0.5 across models, giving confidence in the order of magnitude of the predictions. In addition, the applicability domains of these models were also evaluated Among the fours modeling methods used, all methods, with the exception of PLS, performed equally well. The models can be used as an additional tool for dose-response assessment when experimental data pertaining to critical effect levels do not exist.

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