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*Multiple dose pharmacokinetic models predict bioavailability of toxins in vertebrate herbivores*

A compartmental pharmacokinetic model is built to predict the concentration of toxic phytochemical in the gastrointestinal tract and blood following orally intake by an individual vertebrate herbivore. The existing single and multiple dose pharmacokinetic models are extended to incorporate the physiological factor that toxins can be excreted unchanged in feces due to gastrointestinal motility by impulsive differential equations. An index is defined to be the fraction of the toxin in the blood (i.e., bioavailability) attributed to the excretion effect. Sensitivity analysis is conducted and it is found that for any toxin, the coefficient of bioavailability which is attributed to the elimination effect of gastrointestinal motility depends mostly on absorption rate of toxin from GIT into the blood, frequency of elimination due to gastrointestinal motility, and the frequency of toxin intake.