Abstract

A great variety of chemical compounds are released into the environment on a daily basis. Some of these compounds might be dangerous for human health or wildlife and might persist in the environment. In recent years, there has been a growing interest regarding chemical substances which could interfere with hormone biosynthesis and metabolism, cause a deviation from normal homeostatic control or negatively influence reproductive system. These chemicals are called endocrine disruptors. This dissertation thesis studied novel brominated flame retardants and selected pharmaceutical drugs as potential endocrine disruptors, based on their effect on hormonal receptors. Assays for estrogenic activities were also used for the evaluation of biodegradation experiments and for the validation of a novel mathematical model that could predict the effects of a mixture of toxic compounds.

The results indicated that some of the tested chemicals were able to inhibit hormonal response of estradiol and testosterone and act as an anti-estrogens or anti-androgens. In the case of biodegradation experiments, the measured estrogenic activities were in agreement with the analytical concentrations of applied estrogens. Suggested mathematical model for mixture toxicity yielded a good fit with the experimental data from receptor-binding assays and resulted in better predictions than the previously published approaches. This model also provided satisfactory results regarding final partial agonistic dose-response curves with maximum influenced by the inhibitory effect of a partial agonist. This model also leads to a better understanding how the partial agonists interact with the receptor and cause the effect.