Abstract

Substances of natural or synthetic origin, capable of activating or inhibiting the functions of cellular receptors and thus contributing to the modulation of the neuroendocrine system through the pathways of hormonal signaling ("disrupting" the endocrine system) are referred to in the literature as "endocrine disruptors" (ED). Endocrine disruption as a form of mild systemic toxicity of chemicals and their mixtures is intensively addressed at both scientific and legislative levels. In 2018, progress has been made towards the introduction of a comprehensive European Union legislative framework for ED when a consensus was reached on the scientific criteria for their assessment and identification. ED research is supported by the European Union as a significant task of preventive medicine. Under the various Framework Programs for Research and Innovation, the EU has provided funding to dozens of projects and has supported projects under Horizon 2020 to develop appropriate methods for testing ED. The legislation on e.g. pesticides and biocides, chemicals (REACH), medical devices, cosmetics, food contact materials, water, toys, and workplace protection has been updated. Due to legislative developments, new intervention or preventive measures aimed at consumer protection can be expected, especially for substances which may be used or are present in consumer products or enter the food chain. *In vitro* toxicological methods for early identification of ED potential have been used predominantly to obtain data on the toxicity of chemicals, but may have potential for wider use in preventive medicine, e.g. in identifying ED sources, testing mixtures (or extracts from consumer products), biological samples for prevention and monitoring of ED exposure, in obtaining mechanistic data demonstrating potency of samples at specific concentrations, as compared to substances with known pharmacokinetic parameters. The general population is exposed to mixtures of many substances at very low concentrations, coming from all environmental sectors, various industries, food and consumer products. There are still unanswered questions whether the individual activity of particular substances at a certain concentration or even the combined effects of multiple substances at low concentrations are responsible for the development of adverse effects. Human risk assessment approaches are still evolving, particularly in the context of realistic levels of ED exposure, bioavailability, metabolic (de) activation and elimination. The main trend in EU legislation and regulation is the precautionary principle, where human exposure to EDs should be preventively reduced. For this purpose, all available methods that can provide relevant data on the basis of which preventive and intervention measures can be taken should be used. Given the broad scope of this issue, there is an urgent need for closer links of many biomedical disciplines to preventive medicine. This dissertation thesis brings data from the use of newly introduced methods for rapid prediction and identification of the potential of ED (with a focus on steroid signaling) of chemicals and from the optimization of the methods for wider use to identify ED potential in consumer products. In addition, it provides experimental data on the incidence of some EDs in the urine of the general population and data from an additional study in a limited set of volunteers focusing on possible intervention measures to reduce ED exposure. Based on experimental results and a thorough search of more than 200 research articles and literature sources, an informative material was prepared containing recommendations for potential preventive reduction of ED exposure, suitable for preventive counseling in clinical practice to address both the professional public and sensitive population groups.