

Abstract

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Title of diploma thesis: The occurrence of pharmaceuticals in the environment I.

Drugs are biologically active substances used for treatment and prophylaxis of human and animal illnesses. Some drugs, however, remain biologically active even after they are excreted from the organism. By various means these substances can appear in the environment and can be detected in wastewater, surface water, seawater, groundwater, drinking water, sediments and soil. Chronic presence of low concentrations of drugs in the environment can negatively affect non-target organisms. Aim of this diploma thesis is to study presence of SSRI, statins and hypoglycemic drugs in the environment. Drugs from these pharmacodynamic groups were detected in the environment in concentrations ranging from ng/l to µg/l. Selected drugs from SSRI group were fluoxetine, citalopram, fluvoxamine, sertraline, paroxetine and escitalopram. In water samples they were detected in concentration ranging from tens to hundreds ng/l, they were also detected in soils and sediments. Toxicity for water biota was also proven. Fluoxetine caused changes in secondary sexual characteristics of fish and influenced their reproduction. The most often detected HMG CoA reductase inhibitors were atorvastatine and simvastatine. On WWTP influent was simvastatine detected up to the concentration 2 652,1 ng/l. Statins were proven to be toxic for water biota. Studied organisms showed higher mortality rate, changes in coloring and activity, slower growth and changes in reproduction. The most often detected hypoglycemic drug was metformin. Metformin and its metabolite guanilurea were detected in almost all of studied water samples in concentrations ranging from tens to hundreds ng/l. Metformin was

evaluated as low-risk drug for water ecosystems. Other hypoglycemic drugs were rarely detected.

Key words: pharmaceuticals, environment, Selective serotonin reuptake inhibitors, statins, hypoglycemic drugs