**Study of pharmaceuticals in municipal wastewater, in the recipient water and sedimented particles of northern Lake Päijänne**

Petra Lindholm-Lehto1, Heidi Ahkola2, Juha Knuutinen1, Sirpa Herve2

1 University of Jyväskylä, Department of Chemistry, P.O.Box 35, FI-40014 University of Jyväskylä, Finland, [petra.c.lindholm-lehto@jyu.fi](mailto:petra.c.lindholm-lehto@jyu.fi)

2 Finnish Environment Institute (SYKE), Laboratory Centre, Ecotoxicology and Risk Assessment, Survontie 9A, FI 40500 Jyväskylä, Finland

Chemicals from anthropogenic origin have been detected in surface and groundwater both in industrialized areas and also in remote areas (Comoretto & Chiron 2005; Loos et al. 2008). The wastewater effluents have been identified as the most important source of pharmaceuticals because they often remain stable even after advanced wastewater treatment processes (Gebhardt & Schröder 2007). In this study, the occurrence of five pharmaceuticals, consisting of four anti-inflammatory drugs (diclofenac, ibuprofen, ketoprofen and naproxen) and one antiepileptic drug (carbamazepine), was determined in influent and effluent of a municipal wastewater treatment plant (WWTP) near the city of Jyväskylä, Finland and in the receiving water, northern Lake Päijänne. In addition to lake water, samples of sedimented particles were collected from four locations near the discharge point of the treated wastewater. The solid phase extracted (SPE) water samples and the extracts of sedimented particles were analyzed by liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS) in the multiple reaction monitoring (MRM) mode.

The selected pharmaceuticals were detected in influent, effluent and lake water but also in the sedimented particles. The concentrations of selected pharmaceuticals in the effluent were at the µg L-1 level. In the Lake Päijänne, it ranged from hundreds of ng L-1 (diclofenac, ibuprofen, ketoprofen and naproxen) to a few nanograms of carbamazepine, respectively. In the sedimented particles, approximately hundred ng g-1 of ketoprofen was detected while only trace amounts of other selected pharmaceuticals were found. The results show that the concentrations of pharmaceuticals are affected by the biological and chemical reactions occurring in the wastewater treatment processes but also by the UV light in the photic layer of Lake Päijänne. It can be concluded that considerable amounts of selected pharmaceuticals are present in the influent and effluent of municipal WWTP but also in the water phase and sedimented particles. Based on the results of this study, further analysis of pharmaceuticals in the lake water but also in sediments can be recommended in order to receive valuable information about the condition of the Lake Päijänne, one of the most important fresh water sources in Finland.

References:

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