**Implementing the ERE-CALUX screening technique to assess the biodegradation of endocrine disrupting compounds by natural bacterial communities in the Zenne river water (Belgium)**

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Among the various substances that can be categorized as EPs (Emerging Pollutants), EDCs (Endocrine Disrupting Chemicals) are of special concern because they interfere with hormone biosynthesis, metabolism or action, resulting in a deviation from normal homeostatic control or reproduction. Recently, the European Commission added 15 chemicals to the watch list of the Environmental Quality Standards Directive (2008/105/EC and 2013/39/EU). Pharmaceuticals are proposed for the first time and include, amongst others, EE2 (17 α-ethinylestradiol, the synthetic steroidal hormone from the contraceptive pills) and E2 (17 β-estradiol, the endogenous female sex hormone).

Although instrumental analysis can be used to identify and quantify known EDCs, hazard assessment based on chemical monitoring is complicated, because EDCs are structurally highly distinct compounds and mixture interactions have to be taken into account. The ERE-CALUX (Estrogen Responsive Elements-Chemical Activated Luciferase Gene Expression) was recently developed as a mechanism-based, sensitive in vitro reporter gene bioassay to measure estrogenic activity. It provides useful information about the total estrogenic potency of complex mixtures of chemicals in environmental samples and is thus able to account for both (un)known active compounds and mixture interactions in a sample.

The objective of this study was to evaluate the potency of the microbial community of the Zenne river (Belgium) to degrade EDCs. The samples were taken downstream the release of effluents of Brussels North WWTP (Waste Water Treatment Plant) during winter, when the richness and evenness of the bacterial community composition were optimal and thus high metabolic potential was present. To consume most of the biodegradable organic matter, naturally present in the samples, a pre-incubation step of 72 hours was carried out. The samples were then spiked with 20 µg/L of EE2 and incubated in the dark at 20°C during one month. Regular sub-samples were taken at days 0, 2, 6, 9, 14, 22 and 29. Each sub-sample was analysed for the estrogenic activity, both in the dissolved and particulate phases.

The results suggested that ligand molecules other than EE2 were generated during the incubation, resulting in an apparent cooperative binding. The concomitant increase of the EC50-values may indicate that the new generated compounds have a lower affinity for the receptor than EE2 or that there has been a process of degradation, with these two possibilities being not mutually exclusive. As a consequence the BEQ (Bioanalytical EQuivalent concentration or estogenic potency) was decreasing over time and these trends were obtained in both the dissolved and particulate phases.

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