

DETERMINATION OF PHARMACEUTICALS IN WATER SAMPLES OF THE BELGIAN COASTAL ZONE AND THE SCHELDT ESTUARY USING LC-MS

Wille K.¹, H. Noppe¹, K. Verheyden¹, J. Vanden Bussche¹, L. Vanhaecke¹, E. De Wulf², P. Van Caeter², C.R. Janssen³, and H.F. De Brabander¹

¹ Ghent University, Faculty of Veterinary Medicine, Research Group of Veterinary Public Health and Zoonoses, Laboratory of Chemical Analysis, Salisburylaan 133, 9820 Merelbeke, Belgium (Klaas.wille@UGent.be)

² Flemish Environmental Agency (FEA), Krijgslaan 281, S2, 9000 Gent, Belgium

³ Ghent University, Laboratory of Environmental Toxicology and Aquatic Ecology, J. Plateaustraat 22, 9000 Gent, Belgium

Pharmaceuticals are the active substances of medicinal products used in human and veterinary medicine. They are excreted either in their native form or as a metabolite and are discharged to the sewer system (Fent et al., 2006). Via the sewage water pharmaceuticals reach the waste water treatment plant where they are not completely degraded, resulting in a continuous release of pharmaceuticals in the aquatic environment (Hernando et al., 2006). In recent years, numerous monitoring studies have demonstrated the occurrence of pharmaceuticals in the aquatic system at concentration levels from the low ng.l⁻¹ up to µg.l⁻¹ concentration level (Gros et al., 2006; Ternes, 1998). Based on current evidence, little is known about the occurrence and the persistence of pharmaceuticals in the marine ecosystem (Weigel et al., 2002). The objectives of this study were at first to develop and validate an analytical approach for the determination of 15 pharmaceuticals in surface water, including sea- and freshwater. Secondly, the method was applied to samples of the North Sea and the Scheldt Estuary in order to know more about the presence of pharmaceuticals in the marine environment and their transfer to estuarine and marine ecosystems. This study, which is part of the INRAM project (www.vliz.be/projects/inram), is the first to report the detection of concentrations of pharmaceuticals up to 0.855 µg.l⁻¹ in the marine environment.

References

- Fent K., A.A. Weston and D. Caminada. 2006. Ecotoxicology of human pharmaceuticals. *Aquat. Toxicol.* 76:122-159.
- Hernando M.D., M. Mezcuca, A.R. Fernández-Alba and D. Barceló. 2006. Environmental risk assessment of pharmaceutical residues in wastewater effluents, surface waters and sediments. *Talanta* 69:334-342.
- Gros M., M. Petrovic and D. Barceló. 2006. Development of a multi-residue analytical methodology based on liquid chromatography-tandem mass spectrometry (LC-MS/MS) for screening and trace level determination of pharmaceuticals in surface and wastewaters. *Talanta* 70:678-690.
- Ternes T.A. 1998. Occurrence of drugs in German sewage treatment plants and rivers. *Wat. Res.* 32:3245-3260.
- Weigel S., J. Kuhlmann and H. Hühnerfuss. 2002. Drugs and personal care products as ubiquitous pollutants: occurrence and distribution of clofibric acid, caffeine and DEET in the North Sea. *Sci. Total Environ.* 295:131-141.