**Enantioselective determination of chiral pharmaceuticals and veterinary medicines in environmental samples with an α1- acid glycoprotein column and liquid chromatography-tandem mass spectrometry**

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The issue of drug chirality is attracting increasing attention among the scientific community. If we consider that approximately 56% of the pharmacologically active compounds (PACs) in use are chiral it is surprising that this phenomenon has been overlooked in environmental research (environmental, occurrence, fate and toxicity). Chiral PACs can exist as two non-superimposable mirror-image isomers called enantiomers. Enantiomers show idential physicochemical properties but they differ in their interactions with other chiral molecules. As a consequence of this stereoselectivity, enantiomers of the same chiral PAC can differ in their biological properties such as distribution, metabolism and excretion. Despite the fact that usually one enantiomer is responsible for the desired activity, whereas the other may be inactive or have high toxicity, many drugs have been and still are marketed as racemic mixtures (equimolar mixture of two enantiomers). Furthermore, the relative concentration of enantiomers of a chiral PAC, so called “enantiomeric fraction” EF, can change significantly following intake, by human or animal metabolism, during biological wastewater treatment and/or during biological processes in the environment (KASPRZYK-HORDERN, 2010), leading to an excess of one of the enantiomers. Enantiomers can also undergo chiral inversion to form an enantiomer of potentially higher toxicity.

The aim of this study was to develop and validate an enantioselective method for the simultaneous determination of human and veterinary chiral PACs and their metabolites in surface water and effluent wastewater by chiral liquid chromatography using a chiral α1-acid glycoprotein column (Chiral AGP) and tandem mass spectrometry. Excellent chromatographic separation of enantiomers (Rs ≥ 1.0) was achieved for fexofenadine (antihistamine), chloramphenicol (antibacterial), ifosfamide (anticancer), naproxen, ibuprofen and the metabolite dihydroketoprofen (antiinflammatories), tetramisole and its metabolite aminorex (anthelmintic); and partial enantioseparation (Rs = 0.7-1.0) for ketoprofen (antiinflammatory) and praziquantel (anthelmintic) and the metabolites 3-N-dechloroethylifosfamide and 10,11-dihydroxycarbamazepine. The overall performance of the method was satisfactory for most of the compounds targeted. Method detection limits were at low ng/L for surface water and effluent wastewater. Method intra-day precision was on average under 20 % for both matrices. Sample pre-concentration using solid phase extraction yielded recoveries above 70 % for most of the analytes. The developed method was applied, for the first time, in the analysis of chiral pharmaceuticals in surface water and effluent wastewater.

To the authors’ knowledge, this method is the first to report enantioseparation of chloramphenicol, fexofenadine, ibuprofen, ifosfamide, ketoprofen, naproxen, praziquantel, tetramisole and the metabolites aminorex, 3-N-dechloroethylifosfamide, 10,11-dihydro-10-hydroxycarbamazepine and dihydroketoprofen with the AGP chiral stationary phase in environmental samples.