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TITLE: Determination of selected pharmaceuticals and caffeine in sewage and seawater from Tromsø/Norway with emphasis on ibuprofen and its metabolites

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ABSTRACT:

Selected pharmaceuticals, among them analgesics, ss-blockers and anti-depressants as well as caffeine, the anti-bacterial triclosan and the insect repellent N,N-diethyl-3-toluamide (DEET) were determined in different sewage samples (sewage treatment plants, hospital effluents) from Tromsø/Norway and in seawater from Tromsø-Sound, into which the sewage is discharged. While caffeine, triclosan, ibuprofen and its major metabolites hydroxy- and carboxy-ibuprofen were present in all sewage samples, additional pharmaceuticals were observed in sewage containing hospital effluents. Concentrations were in the range of 20-293 microg/l (caffeine), 0.2-2.4 microg/l (triclosan) and 0.1-20 microg/l (sum ibuprofen + metabolites). In seawater, only caffeine (7-87 ng/l), DEET (0.4-13 ng/l) and ibuprofen + metabolites (sum concentration < LOQ-7.7 ng/l) were detected. Ibuprofen and its metabolites hydroxy- and carboxy-ibuprofen were quantified individually by use of the respective reference compounds. Relative amounts of the three compounds were determined in different types of water showing characteristic patterns, with hydroxy-ibuprofen being the major component in sewage whereas carboxy-ibuprofen was dominant in seawater samples. The patterns which were compared to those observed in similar samples from Germany indicated different transformation behaviour under limnic and marine conditions.

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