

Evaluation of cellular stress biomarkers responses to three common pharmaceuticals in the boreal crustacean *Gammarus oceanicus* from Svalbard (Norway)

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Pharmaceutical residues are continuously found in natural environments worldwide. Densely populated coastal areas are most susceptible to release and prevalence of these emerging pollutants in the marine environment components. However, the presence of common therapeutical agents has recently been recorded in relatively remote and pristine areas, including the European Arctic, where human population is expanding. A study in the Svalbard archipelago revealed the presence of several human pharmaceuticals in the coastal waters around relatively small human settlements. They were also found in marine biota – non-target organisms, in which pharmaceuticals even at low concentrations may pose a potentially serious source of disturbance to their biological functions due to the potency and unknown specificity of their mechanism of action in marine invertebrates. Therefore, ecotoxicological risks must be urgently assessed and addressed in the organisms subject to aleatory exposure.

Boreal amphipods *Gammarus oceanicus* collected in the coastal waters of Kongsfjorden (Svalbard, Norway) were selected as the study object to evaluate the potential of adverse effects of exposure to common pharmaceuticals representing different therapeutical classes: antiepileptic carbamazepine (CBZ), non-steroidal anti-inflammatory ibuprofen (IBU) and antibiotic ciprofloxacin (CPX). Organisms were exposed to CBZ, IBU and CPX at various concentrations (0-10000 ng/l) in three parallel laboratory experiments. Crustaceans' responses to pharmaceutical exposure were assessed at subcellular cellular level by means of biomarkers of oxidative and hyperglycemic stress. Preliminary results suggest significant impact of these pharmaceuticals on the crustaceans' cellular biomarkers upon exposure to low concentrations of selected pharmaceuticals.