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Bioaccumulation of pharmaceuticals in molluscs and fishes from a Mediterranean coastal lagoon (Mar Menor SE Spain)

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Abstract

The use of pharmaceuticals is increasing every year for human and veterinary applications, and consequently their occurrence in the environment is being confirmed in many environmental matrices in the last decades. Not only few data are available about their presence in the marine environment but also bioaccumulation and seasonal variations on wild biota in marine ecosystems are rather sparse. In this study 20 pharmaceuticals (β -blockers, psychiatric drugs, analgesics/anti-inflammatories, antiplatelet agent, diuretic, to treat asthma and antihelmintic) were analyzed in fishes and molluscs from the Mar Menor lagoon (SE Spain). The fish species considered were golden grey mullet (*Liza aurata*) and black goby (*Gobius niger*) meanwhile the mollusc species were cockle (*Cerastodema glaucum*), noble pen shell (*Pinna nobilis*) and sea snail (*Murex trunculus*). In golden grey mullet two matrices were considered, muscle and liver, however whole body was used in the rest of species. Their spatial distribution throughout this lagoon was characterized considering 9 sampling areas and two different sampling periods, spring and autumn in 2010. The extraction of pharmaceuticals from biota was carried out by pressurised liquid extraction (PLE) step prior to gel permeation chromatography (GPC). Ultra-high-performance liquid chromatography coupled to tandem mass spectrometry (UHPLC–MS/MS) was used for their analysis (Huerta et al., 2013).

Under our knowledge this is the first study about pharmaceuticals in marine biota in Spanish seawaters. Eighteen pharmaceuticals were detected in muscle in golden grey mullet, eight ones in black goby (8 analytes) and nine ones in molluscs. However less pharmaceuticals were detected in liver than in muscle. The highest concentration detected in golden grey mullet was reached by carbamazepine. In molluscs the pharmaceuticals were detected at low ng g⁻¹ reaching the highest concentration in sea snail.

Seasonal variations were also assessed considering spring and autumn samples. Bioaccumulation factors of pharmaceuticals from water and sediments were determined, and only in the case of sea snail biomagnification factors from cockle were also estimated because cockle is the common prey of sea snail in this lagoon.

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References

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