

Preliminary assessment of POPs in *Grampus griseus* (Cuvier, 1812) specimens stranded along the Italian coasts

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1. Introduction

In literature, there are scarce information on biology and toxicology of Risso's dolphin (*Grampus griseus*, Cuvier, 1812). According to the IUCN the Mediterranean subpopulation is classified "Data Deficient" [1]. The biggest threats to this species are noise pollution, bycatch, and pollution from toxic substances [1,2]. This latter can affect reproduction and health at the individual and population level [3]. Moreover, cetaceans are sensitives to environmental contaminants, especially organochlorine compounds (OCs) [4]. The aim of this study is to expand knowledge on OCs, known as endocrine-immune disruptors, including dichlorodiphenyl trichloroethane (DDTs) and its metabolites, polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB) [5,6] which induce adverse health effects such as reproductive dysfunctions [3,7] and immunosuppression [8,9]. The main objective was to determine the levels of OCs in *Grampus griseus*' biological samples stranded along the Italian coast between 1998 and 2021, extending the interest in this species still scarcely studied as well as the knowledge of contamination impact on them.

2. Materials and methods

The samples (blubber, liver, muscle and brain) were collected from 20 stranded *Grampus griseus* specimens along the Italian coast between 1998 and 2021.

Determination of HCB, DDTs and PCBs were performed according to the U.S. environmental Protection Agency (EPA) 8081/8082 method modified [10]. Briefly, samples were freeze-dried and extracted in a Soxhlet apparatus. Then purified with sulfuric acid and then they underwent liquid chromatography on a column containing Florisil. High resolution capillary gas chromatography was performed with an Agilent 6890N coupled to 63Ni ECD. Statistical analyses were carried out with STATA 14 software [11].

3. Results and discussion

3.1. OCs analysis for each tissue

Blubber was analysed in 20 individuals while, liver and muscle in 10 and brain in 6. The toxicological analyses revealed the presence of HCB, 30 congeners of PCBs and the op' and pp' forms of DDT, DDE and DDD in all the animals. In addition, the percentage of extracted organic material (EOM%) has been calculated. HCB was the compound with the lowest levels in every tissue, while PCBs were the class of contaminants with the highest mean followed by DDTs (Fig.1). The Kruskal-Wallis test showed statistically significant differences ($p < 0.0553$) between tissues for HCB. The results of multiple pairwise comparison tests were significant for brain-blubber, liver-blubber, and muscle-blubber. The same was performed for DDTs, highlighting comparison for blubber-brain, blubber-liver, and blubber-muscle.

Using also for PCBs the multiple pairwise comparison, it was suggested comparison for blubber-brain, liver-blubber, and blubber-muscle.

Using the tissue variable and considering the levels of the 3 contaminants, we went statistically elaborate the results with the non-parametric ANOVA test for Kruskal-Wallis ranks, noting that there were statistically significant differences for HCB ($p=0.0552$), PCBs ($p=0.0572$) and DDTs ($p=0.0798$).

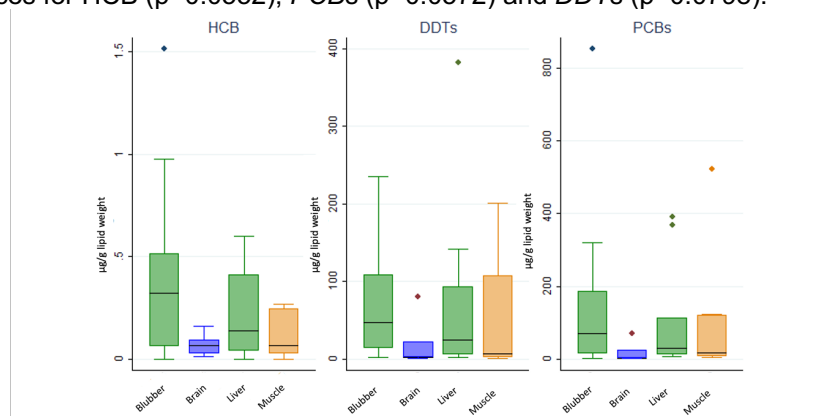


Figure 1. Box Plots of organochlorine compounds for each tissue and organ expressed in $\mu\text{g/g l.w.}$

4. Conclusions

The results showed the presence of all the three OCs classes ($\text{HCB} < \text{DDTs} < \text{PCBs}$) which continue to be priority contaminants in the Mediterranean basin despite their regulation in production and use in most areas of the world.

In the literature until now there is little information, not only on the species' ecotoxicology and biology, but also on the distribution and use of the habitat, which still have not allowed to fully understand the ecological and biological aspects of the species.

Considering that Risso's dolphin has been ranked on the IUCN Red List as "Data Deficient" in the Mediterranean Sea, it would be essential to expand knowledge regarding the toxicological status and encourage conservation measures that also take this threat into account.

5. References

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