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Looking at the potential of marine macroalgae supplementation to afford neuroprotection against the effects of inorganic mercury in fish (*Diplodus sargus*)

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Abstract

Background: Marine macroalgae have potential as a source of many natural compounds with health benefits [1], but their use to mitigate aquatic contaminants bioaccumulation in fish and resultant toxicity is an underexplored research topic. **Objective:** Asses if a marine macroalgae-enriched diet can provide neuroprotection *Diplodus sargus* when exposed to waterborne inorganic mercury (iHg), namely by reducing bioaccumulation in the brain and mitigating oxidative stress and behavioral impairments. **Methods:** Fish were fed for 3 months with a marine macroalgae enriched-diet (Ma) [total incorporation of 5%, with the species *Ulva rigida*, *Fucus vesiculosus* and *Gracilaria gracilis*], while non-supplemented fish were fed with a standard diet (S). Upon that period, both groups were exposed to inorganic Hg (iHg) (2 μg L^{-1}) for 7 days (E7) (constituting groups MaHg and SHg), followed by a post-exposure period of 14 days (PE14). Control fish (MaC and SC), unexposed to iHg, were maintained over the experiment. At those experimental times, Hg levels in the brain were assessed, together with antioxidants and lipid peroxidation. Motor behavior was also evaluated. **Results:** The brain of MaHg fish had significantly lower levels of Hg than SHg fish, both at E7 and PE14. Interestingly, fish under a macroalgae-enriched diet exhibited a significant decrease of glutathione peroxidase and glutathione reductase activities upon exposure to iHg for 7 days, as well as of total glutathione content. MaHg fish also exhibited a higher velocity in the first run when compared to unexposed fish, as well as a lower time in the first run. Fish fed with macroalgae-diet run faster in the first run than their congeners under a standard diet. **Conclusions:** Current data underpinned potential neurological advantages of macroalgae supplementation to fish, namely by decreasing Hg bioaccumulation and improving motor behavior. Moreover, a decrease of antioxidants was found in supplemented fish when exposed to Hg.

Keywords: inorganic mercury; marine macroalgae; fish brain; behavior

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References

1. Marques, A.; Ferreira, J.; Cerqueda-Pacheco, A.; Pereira, V.; Abreu, H.; Pereira, R.; Pires, M.J.; Seixas, F.; Oliveira, P.; Gaivão, I.; Pacheco, M. Genoprotection and metabolic benefits of marine macroalgae - Insights into the concept of functional foods through direct and indirect consumption. Food Biosci (2022), 47, 101649.