Microplastic and an associated metal contaminant (Palladium) impair the immune response against pathogenic bacteria of the marine bivalve *Mytilus galloprovincialis*

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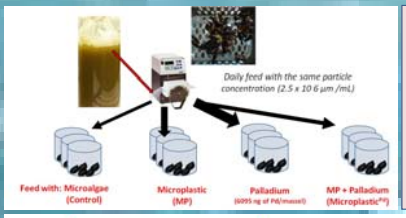
Microplastics (MPs) are widely distributed in marine environments and have been reported to cause harmful physiological effects in marine bivalves including immune modulation (Anbumani and Kakkar, 2018). While *Mytilus galloprovincialis* is a model species in environmental monitoring studies, little is known regarding the effects of MPs and palladium (Pd), an emerging contaminant, on the immune system of this species.

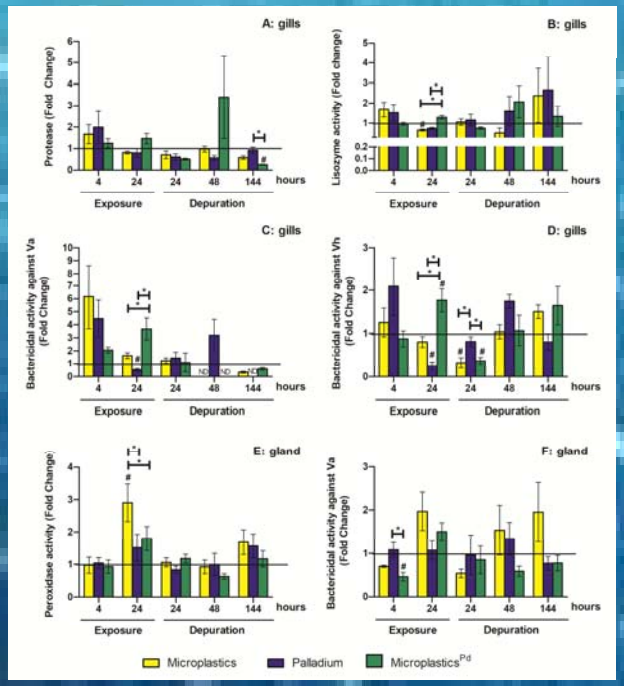
Material and Methods



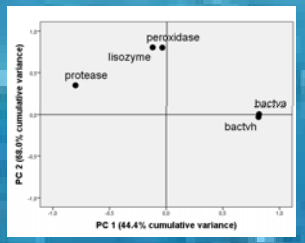
Innate immune activities analyzed in gills and gland: Peroxidase, protease, lisozyme, and antibactericidal against *Vibrio anguillarum* (Va) and *Vibrio harveyi* (Vh) activities (Valero *et al.*, 2020a)

A principal component analysis (PCA) was performed to integrate the innate immune activities and help to understand the effects of MP associated to Palladium

Results



The activities in which differences between treatment were observed. Protease activity (A), lisozyme (B), bactericidal activity against Va (C) and against Vh (D) activities in gills and peroxidase (E) and bactericidal against Va (F) activities in gland. Data are represented in fold change of the control values. Black line represents the control levels. # denotes differences between treated groups and control. * denotes differences between treated groups.



The interaction between PC1 vs PC2 of PCA analysis, allowed a discrimination of the bactericidal activity between the other parameters analyzed.

The bactericidal activity might be a good parameter to monitories the immune impairment upon emerging contaminant exposures for mussels

The main alterations were observed after 24 h of exposure in gills in the lytic capability against bacteria, in which the lysozime and bactericidal activities were mostly altered by MP and MP spike with Palladium.
After 24 hours of removing the pollutants from the water, most of the activity levels in both tissues, gills and gland, were recovered to control levels, but not the bactericidal activity.

Considering the alteration of the bactericidal activity observed even during the beginning of the depuration, a potential threat to mussels population in a polluted scenario is highly plausible.

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References

Anbumani, S. and Kakkar, P. 2018. Environmental Science and Pollution Research. https://doi.org/10.1007/s11356-018-1999-x
Valero, Y. et al. 2020. Scientific Report. http://www.nature.com/articles/s41598-020-64522-2