

Single and joint effects of chronic exposure to polyethylene microplastics and chlortoluron on oyster, *Crassostrea gigas*: biomarkers and metabolomics approaches

Arno Bringer^a, Emilien Jamin^b, Emmanuel Dubillot^a, Valérie Huet^a, Jérôme Cachot^c, Hélène Thomas^a

^a Littoral Environnement et Sociétés (LIENSs), UMR 7266, CNRS- La Rochelle Université, F-17042 La Rochelle Cedex 01, France.

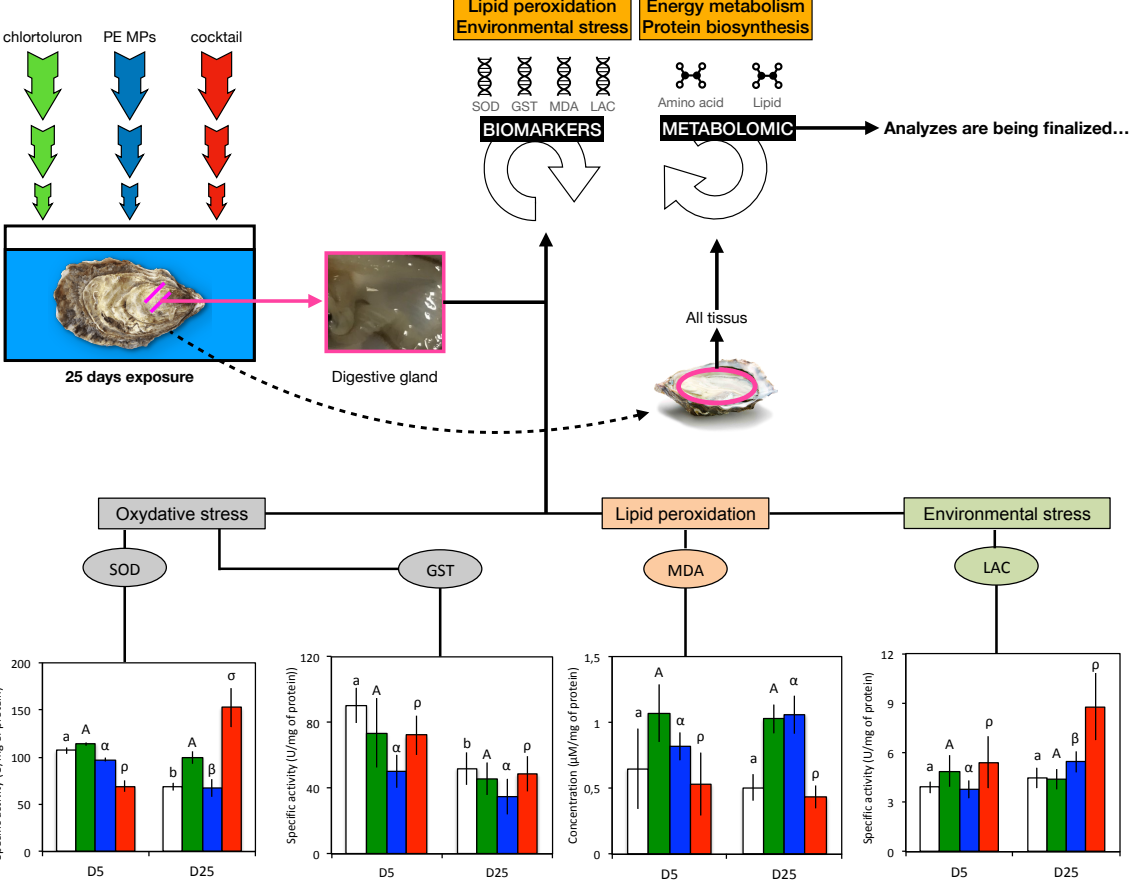
^b MetaToul-MetaboHUB, National infrastructure of metabolomics and Fluxomics, Toulouse, France – MetaToul, France.

^c Laboratoire EPOC, UMR 5805, CNRS Université de Bordeaux, F-33600 Pessac, France.

CONTEXT

In this study, a 25-day exposure was set up on juvenile oysters (*C. gigas*) to various contaminants potentially present in the natural marine environment. Four conditions were tested: control (without pollutants), polyethylene (20-25 μm , 10 $\mu\text{g.L}^{-1}$) microplastics (MPs), chlortoluron (herbicide, 30 $\mu\text{g.L}^{-1}$) and cocktail mixture (MPs + chlortoluron). Two sampling times (D₅ and D₂₅) made it possible to study the metabolic responses in all tissues of oyster and the activities of biomarkers in response to stress, in digestive gland only. Environmental metabolomics is a holistic approach that provides insight into the metabolic status of an organism, while the biomarkers approach is more integrative.

METHODS & RESULTS



CONCLUSIONS & PERSPECTIVES

- SOD and GST : control alterations – no effects
- MDA : no significant effects
- LAC : increase with MPs exposure
- LAC activity is said to correspond to the body's need to increase its defense capacities, in particular the immune system, in response to an aggressive environment.

The cocktail condition (MPs + chlortoluron) appears to have an effect on the Taurine and Hypotaurine networks as well as Alanine, Aspartate and Glutamate metabolism (Krebs cycle).

← The Cysteine and Methionine metabolism network appears to be impacted by exposure to MPs alone. These networks participate in the production of glutathione, essential for the synthesis of Laccase.