
Consequences of tire particles and associated-chemicals on the health of adult Pacific oyster (*Crassostrea gigas*) and on the reproduction

Ilaria Bernardini^{*†1}, Kevin Tallec², Ika Paul-Pont³, Luca Peruzza¹, Matthias Huber², Carole Di Poi², Clementine Ely², Camille Detree², Tomaso Patarnello¹, Arnaud Huvet², and Massimo Milan¹

¹University of Padova – V.le dell’Università, 16, 35020, Legnaro (PD), Italy

²Ifremer – Institut Français de Recherche pour l’Exploitation de la Mer (IFREMER) – 1625 Rte de Sainte-Anne, 29280 Plouzané, France

³CNRS – Laboratory IUEM LEMAR Technopole Brest – 1625 Rte de Sainte-Anne, 29280 Plouzané, Francia, France

Abstract

The presence of plastic contamination is known to impact all waters worldwide. Tire particles (TP) potentially represent the 93% by mass of the aquatic plastic contamination by 2040. This might have physical consequences on organisms and repercussions due to chemical risk following the leaching of tires-associated chemicals. The present study proposes the evaluation of potential effects of tire particles and related leachates on physiology and reproduction of the Pacific oyster *Crassostrea gigas*, a bivalve mollusk species inhabiting and farmed in coastal zones. Following the exposures to different concentrations of tire particles and leachates, chemical, eco-physiological and molecular analyses (RNA-sequencing, 16S) were performed in adult oysters and gametes. Treated adult oysters highlighted no particular changes in the hemocytes features and growth compared to the controls. Regarding microbiota characterization, despite few changes in microbial composition have been detected, the over representation of a potential pathogenic species was observed. Transcriptional analysis evidenced modifications in oysters treated with the high concentration of tire particles and leachates, with the disruption of molecular pathways involved in immune response, neurotransmission, energy metabolism, detoxification processes and DNA repair. Regarding possible effects on reproductive effects following parental exposure, the exposures to leachates significantly reduced the percentage of motile spermatozoa compared to the controls. Transcriptomic study performed in oocytes showed the major transcriptional responses following the exposure to the low concentration of TP like the disruption of pathways involved in cancer and apoptosis processes, as well as the impairment of signaling pathway and immune response in all treatments. This pilot study provides information on the hazard of TPs and associated-chemicals that need to be deepened in a future scenario.

Keywords: Oyster, Tire microplastics, Leachates, Toxicity, Gene expression, 16S

*Speaker

†Corresponding author: ilaria.bernardini.1@phd.unipd.it