Effects of dietary microplastic exposure on the organ toxicity of a mixture of chemical contaminants in zebrafish

Rainieri, Sandra; Conlledo, Nadia; Larsen, Bodil Katrine; Granby, Kit; Barranco, Alejandro

Publication date: 2016

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Rainieri, S., Conlledo, N., Larsen, B. K., Granby, K., & Barranco, A. (2016). Effects of dietary microplastic exposure on the organ toxicity of a mixture of chemical contaminants in zebrafish. Poster session presented at 52nd European Congress of the European Societies of Toxicology (EUROTOX2016), Seville, Spain.
Effects of dietary microplastic exposure on the organ toxicity of a mixture of chemical contaminants in zebrafish

Sandra Rainieri, Nadia Conlledo, Bodil K. Larsen, Kit Granby, Alejandro Barranco

1AZTI, Parque Tecnologico de Bizkaia, Astondo Bidea, Ed. 609, Derio, 48160, Spain
2National Institute of Aquatic Resources, Technical University of Denmark, Nordsøen Forskerpark, Postboks 101, 9850, Hirtshals, Denmark
3National Food Institute, Technical University of Denmark, Mørkhøj Bygade 19, 2860, Søborg, Denmark

E-mail: srainieri@azti.es

INTRODUCTION

Microplastic contamination of the aquatic environment is considered a growing problem. The ingestion of microplastic has been documented for a variety of aquatic animals. Studies have shown the potential of microplastic to affect the bioavailability and uptake route of sorbed co-contaminants such as persistent organic pollutants and metals. The effect of the dietary uptake of microplastic and sorbed co-contaminants in aquatic organisms still needs to be properly understood.

OBJECTIVE

To evaluate the biological effect at organ level of the dietary uptake of microplastic and sorbed co-contaminants in an aquatic model organism.

METHODOLOGY

Experimental design approved by the competent Ethical Committee.

FEED CONTENT DETAILS OF CONTENT
A Not contaminated feed Normal feed
B Feed with microplastic 2% LPDE 125-250 µm diameter
C Feed with microplastic and contaminants As B with contaminant of Table 2
D Feed with chemical contaminants Contaminants of Table 2 (x 2)

DIFFERENTIAL EXPRESSION OF THE SELECTED GENES IN DIFFERENT ORGANS

Liver gene expression
- Feed A: control
- Feed B Microplastic alone = no differential expression
- Feed C Microplastic + contaminants = highest levels of induction for all the genes tested.

Brain gene expression
- Feed A: control
- Feed B Microplastic alone = no differential expression
- Feed C Microplastic + contaminants = induction of genes CHRNA2 and ngn1.

Intestine gene expression
- Only cyp1a1 is downregulated in fish fed with feed B.
- No other effects were detected.

RESULTS

MICROSCOPY OBSERVATION OF THE LIVER

Liver of fish fed with feed B and C
Liver of fish fed with feed A and C

60% of the livers of fish fed with C showed some rice shaped formation not observed in other livers.

HISTOLOGICAL SECTION OF LIVER OF FISH FED WITH FEED A AND C

CONCLUSIONS

Microplastic alone showed no effects on the exposed fish. Effects of microplastic + contaminants were detected in the liver. Microplastic affects the effect of chemical contaminants.

ACKNOWLEDGEMENTS

We are grateful to Michail Kotterman (VHIAES Wageningen University) for providing microplastic and advice on this work.

Project funded by the European Commission (Project ECsafeSEAFOOD) and the Spanish Ministry of economy and competitiveness (Project CTQ2014-55711-R).