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

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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.

RESULTS

MICROSCOPY OBSERVATION OF THE LIVER

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.

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

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.

CONCLUSIONS

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