Title of Research:

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Study on the contribution of microplastics to bioaccumulation and biological magnification towards fish

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Summary of Research:

The microplastics (MPs) are detected from sewage treated water or sea water, and harmful chemical substances are known to adsorbed to those MPs. And there is a concern about those adsorbed chemicals may be taken more efficiently to organisms intermediated by MP and that biological concentration or biological magnification is accelerated. However, there are many unclarified questions such as abundance in the water, transfer ratio to organisms or sediment, lifetime and the mass balance of those chemical substances related with MPs in the environment. Our study will try to clarify whether the chemical substances adhered to MP are eluted, and absorbed / transferred / accumulated in the body of organisms.

In this fiscal year, we conducted quantitative analysis of the chemicals (13 kinds of polycyclic aromatic hydrocarbon) preparedly adhered to MP. The result showed that the concentration of forcibly adhered PAH to MP were correlated to molecular weight and hydrophobicity of PAH. The adhered concentration were different between the materials of MP. Also, the materials of MP differentiated the elution characteristics of water and seawater. Acute toxicity test of MP and the consideration of feeding condition to fish as preliminary examinations for the biological accumulation study were conducted. The medaka was not able to eat the MP which diameter was more than 1.5mm, but they preferably ate the MP covered with feed which diameter was around 1.0mm. Further examination is needed for the acute toxicity testing.

From next fiscal year, we will conduct the quantitative analysis of organisms, which have taken MPs and accumulated PAHs preparedly adhered to MP. The transition efficiency will be calculated when the concentration of internal chemical substance and the amount of total chemical intake is provided by this study.

Timeline:

June 1, 2018 – February 28, 2019

Topics:

Publications:

・Norihisa Tatarazako, Yukiyo Okazaki, etc, 39th SETAC North America, Nov. 2018, Sacramento