

## Investigation on Microplastic Pollution in Commercial Salts and Evaluation for Their Exposure Risk in Human

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### Summary

In recent years, there have been an increasing number of reports for the occurrence of microplastics in beverages and foods, and more than 30,000 microplastics were detected in 1 kg of commercial salt obtained from European country. However, little information is available on the microplastic pollution in salt samples in Japan. In this study, we tried to understand the present status of microplastic contamination and estimate the amount of exposure to humans from commercial salt. In addition, the concentration of microplastics in indoor dust was examined to estimate the human exposure, and a comparative analysis was performed with the value obtained with commercial salts.

Salt samples ( $n=26$ ) were obtained from domestic supermarket and specific salt stores in Japan. Salt samples were dissolved in ultrapure water and filtered through a nylon sheet of 100  $\mu\text{m}$  mesh. The small pieces on the sheet were observed with a microscope and collected with tweezers, and the component was identified by a Fourier transform infrared spectrophotometer (FT-IR) or a microscopic FT-IR. In addition, the microplastics were extracted with an organic solvent and then chemicals containing in the samples were qualitatively analyzed with a gas chromatograph mass spectrometer (GC-MS). Further, we collected an indoor dust and analyzed microplastics.

As the results, particulate solids were detected in a wide variety of salt samples. The FT-IR analysis suggested that these were natural components, such as calcium sulfate ( $\text{CaSO}_4$ ) and silicate. A blue particle with a length of 0.124 mm were confirmed from a domestic salt, and microscope FT-IR suggested the material as urethane. The average concentration of microplastics in Japanese salts was 0.38 pieces/kg, and the average number of microplastics consumed by Japanese from salt was estimated to be 1.4 piece/year. These values were apparently lower than those of other countries, suggesting that microplastic contamination in Japanese salt was considered to be minor. On the other hand, the concentration of microplastic in indoor dust was extremely high, 302,000 pieces/kg, and the annual exposure to humans was estimated to be 4,927 for children and 2,007 for adult. Several harmful compounds, especially for phthalates, were identified in microplastics of polyvinyl chloride in indoor dust. Investigation on risk assessment of human exposure to microplastic is an important issue to understand their potential risks. Overall, it is considered that the risk of microplastic contamination and human exposure in Japanese salts is minor and smaller than that of indoor dust.