

Identification and Quantification of Microplastics and Nanoplastics in U.S. Tap Water

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With the ever-increasing production of plastic products, plastic pollution has become a prominent concern for public health. Microplastics (MPs), 1-5 μ m, and nanoplastics (NPs), < 1 μ m, can be ingested or inhaled by humans, and are toxic to human health. As particle size decreases, the possibility of crossing biological barriers causes an increased health risk. In our previous study on MP and NP levels in bottled water, it was estimated there are $2.4 \pm 1.3 \times 10^5$ particles per liter of bottled water, of which 90% were nanoplastics. This study is concerned with MPs and NPs in tap water samples from across the United States. Samples were collected from homes across the United States, filtered through filter membranes, and then analyzed using Scanning Electron Microscopy (SEM) and stimulated Raman Spectroscopy (SRS). Preliminary results from a New York City tap water sample analyzed with SRS suggest an exponential increase in particle counts as the diameter (in μ m) decreases, as well as high counts per liter of polystyrene (PS), a plastic commonly used in materials such as Styrofoam. While these results are preliminary, they highlight the ubiquity of plastics in the environment and the potentially high levels of MPs and NPs humans are exposed to. The continuation of this project is integral to understanding how MP and NP levels in tap water vary across different locations, as well as identifying the sources of contamination to decrease human exposure.