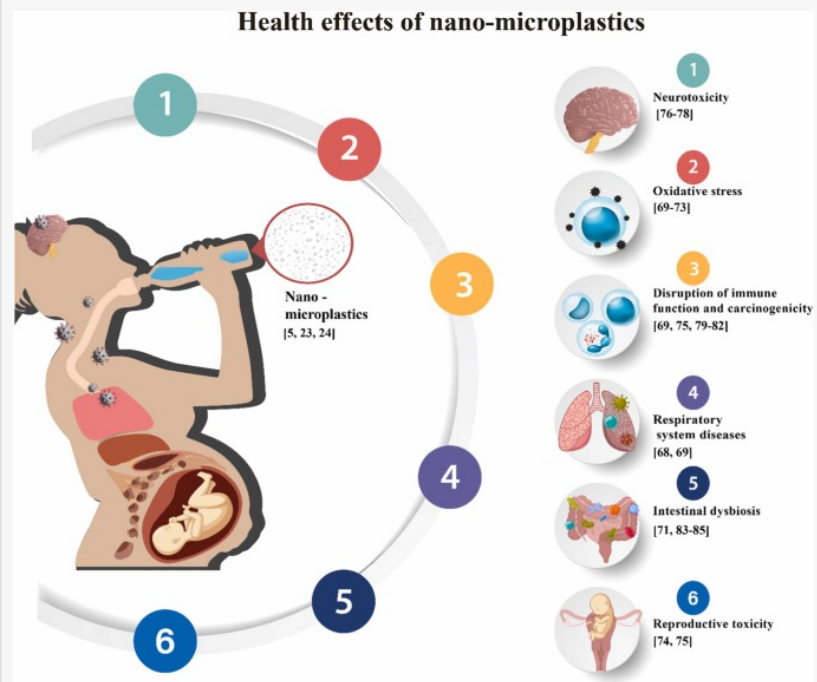
Nano- and Micro-plastics in Our Bodies: A Comprehensive Review of Risks and Research Opportunities

MONTREAL, QUEBEC, CANADA, July 9, 2025 /EINPresswire.com/ -- Ever since they began to be mass-produced in the 1950s, single-use plastic water bottles have spread to virtually every country in the world. Their proliferation has been closely accompanied by the rise of plastic pollution in urban centers, coastal areas, aquatic ecosystems, landfills, and, as we have only learned relatively recently, our own bodies.



Potential chronic health risks of nano- and microplastics on human health

The average individual ingests anywhere between 39,000 and 52,000 particles of microplastics (from 1 µm to 5 mm in size) and nanoplastics (1 µm or smaller) every year. Those who drink out of plastic bottles regularly are estimated to take in up to 90,000 additional particles (compared to tap water consumers).

Studies evaluating the health effects of nano- and micro-plastics in our bodies have been issued frequently since the mid-2000s, but review papers that take an analytical approach to experimental findings in order to determine the interplay between nano- and micro-plastic behavior, degradation, and chronic health risks are few and far between.

It is in this academic context that Sarah Sajedi, alongside two reviewers from the Department of Building, Civil, and Environmental Engineering at Concordia University, produced her most recent research paper: “Unveiling the hidden chronic health risks of nano- and microplastics in single-use plastic water bottles: A review”, published in Volume 495 of the prestigious Journal of Hazardous Materials. You may read and download the full, 19-page paper at https://www.sciencedirect.com/science/article/pii/S0304389425018643.

Sajedi's research compiles a list of frequently observed chronic health effects of nano- and micro-plastic consumption, such as hormonal imbalances and reproductive health issues, chromosomal abnormalities, metabolic disorders, and increased cancer risk. These effects are presented alongside the studies that reported them to highlight how methodological limitations—small sample sizes, inconsistent detection thresholds, inadequate blank controls, and variability across sampling and detection protocols, to name a few—may inadvertently hinder the accurate assessment of health impacts from nano- and micro-plastics, namely as it concerns the underexplored vector that are single-use plastic water bottles.

To counteract these limitations, the paper identifies three gaps in the literature that present the biggest opportunities for knowledge generation. It proposes devoting research efforts into the size-dependent transport mechanism, deposition patterns, and potential uptake rates of nano- and micro-plastics by various organs in the human body, into controlled, real-world simulations to assess their release under different environmental and physical conditions, and into studies of consumer behavioral patterns surrounding the consumption of single-use plastic bottles. As reliance on bottled water increases, addressing these gaps and designing targeted interventions to understand and avoid the human health impacts of nano- and micro-plastics will only become more pressing.

However bleak the results of the reviewed studies may be, Sajedi and her team remain optimistic. They point to several instances of large-scale bans on single-use plastic bags (including a nationwide ban in Canada) as examples of successful interventions that could be replicated going forward.

There is a wealth of social and legislative policies available to us as informed and concerned individuals, businesses, and governments, including mandatory labeling of nano- and micro-plastic-releasing products, extended producer responsibility programs, the expansion of water-refilling stations and reusable water containers, and the promotion of mindful consumption. They may seem like obvious answers to a glaring problem, but these policies will only acquire the necessary momentum to snowball into concrete action if research like Sarah Sajedi's continues to elucidate the current state of plastic contamination and to communicate the urgency with which action is needed.

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