Ghirga G, Ghirga P, Orchi C. Microplastics and Nanoplastics in Atheromas. N Engl J Med. 2024;390(18):1726-1727. doi:10.1056/NEJMc2404154

Dear Editor

We read the article of Marfella et Coll. with great interest; they found that microplastics and nanoplastics (MNPs) in atherosclerotic plaques are associated with rupture and subsequent thrombotic events leading to stroke, myocardial infarction, or death (1). Still, could these risks vary with specific environmental factors or the local air quality?

Food and water were thought to be the major sources of MNP exposure, with more than 100.000 particles in each liter of bottled water, the majority of which are nanoplastics (2,3). Furthermore, we are exposed to MNPs in the atmosphere through the air we inhale. In a 2021 study, a team of scientists estimated that people in ﬁve Chinese megacities inhale 1–2 million MNPs annually; therefore, air exposure is important and concerning because after inhaling, MNPs can rapidly reach every organ and tissue (4).

MNPs take various forms, are primary or secondary, and can have wildly diﬀerent sizes, shapes, and chemical formulations—all of which can impact their toxicity. Plastic polymers, typically considered to be chemically inactive, can impact biological processes through their physical presence alone. MNPs may contain or come in contact with biologically active chemicals. Once released into the environment, MNPs can attract and accumulate a variety of other contaminants. Due to their physical properties, such as hydrophobicity and large surface area in relation to their volume, MNPs can act as sponges for toxic metals, polycyclic aromatic hydrocarbons, and other hazardous chemicals. This absorption can lead to the bioaccumulation of these contaminants in organisms that ingest, inhale, or come into contact with MNPs, potentially detrimental to human well-being and ecosystem health.

Depending on the location and source of the MNPs, the composition and toxicity of these absorbed chemicals can vary significantly. For example, in areas with high levels of industrial pollution, MNPs may become coated with a range of toxic chemicals, including heavy metals, pesticides, polycyclic aromatic hydrocarbons, and other industrial byproducts. In contrast, the absorbed chemicals may be less harmful or minimal in quantity in more pristine environments.

This variation in composition and toxicity of absorbed chemicals onto the surfaces of MNPs means that the health risk from exposure could significantly differ from one area to another. The potential health hazards related to the ingestion or inhalation of MNPs are still under investigation. However, it is evident that hazardous chemicals on their surfaces contribute to the concern. While the authors did not find differences in the incidence of MNPs according to geographic areas, the potential presence of other toxic chemicals in atherosclerotic plaque cannot be excluded and would have suggested their potential links to specific environmental factors or air quality and remain important areas for future research.

Finally, this hypothesis could suggest the potential inferior toxicity of the vast amount of MNPs formed in commonly used water bottles compared to those inhaled by residents in areas with low air quality.

References

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