

Editorial

Micro–Nanoplastics as Potential Carriers of Dioxins and *Toxoplasma gondii* in Patients with Carotid Atheromas

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A recent major study has shown that there is an increased risk of myocardial infarction, stroke and lethal outcomes in patients affected by carotid atheromas that contain micro-nanoplastics (MNPs) compared to subjects that do not have MNPs in their lesions [1]. Indeed, measurable levels of polyethylene and, to a lesser extent, polyvinyl chloride, were detected in individuals diagnosed with MNP-containing carotid atheromatous plaques. Furthermore, ultrastructural investigations revealed the presence of foreign particles among the plaque-infiltrating macrophages [1], with these findings also raising the possibility of an MNP-mediated entry of microbial pathogens and environmental pollutants into the body.

Notwithstanding this, while additional knowledge could be reasonably provided through ad hoc animal models of cardiovascular disease (CVD) [2], a number of endogenous and exogenous factors which the individuals under study may have been exposed to throughout their lives could also justify their aforementioned differences in terms of CVD-associated/related morbidity and mortality. Furthermore, the possibility of carotid atheromas becoming contaminated with MNPs from the external environment, albeit remote, cannot be completely ruled out [1].

Aside from these objective limitations, better attention should be also paid, in my opinion, to the proven ability of MNPs to act as powerful “attractors and concentrators” for a large number of persistent environmental pollutants, such as dioxins, and several microbial pathogens including *Toxoplasma gondii* [3], a cosmopolitan and zoonotic protozoan agent that closely interacts with polyethylene microbeads and polyester microfibers [4].

Indeed, while dioxin exposure has been linked to CVD mortality [5], *T. gondii* infection may be also associated with myocarditis, constrictive pericarditis, pericardial effusion, arrhythmias (both atrial and ventricular) and congestive/acute heart failure [6].

Therefore, additional work that particularly takes into account the highly complex and multifaceted “chemico-microbiological profile” of MNPs should be strongly encouraged in the near future, with the results originating from this research hopefully allowing us to assess “who does what” in the exacerbation of a preexisting CVD condition.

Additionally, cumulative evidence has shown that the inappropriate disposal of face masks and plastic gloves, used in the fight against the SARS-CoV-2 betacoronavirus pandemic, has resulted in an exceedingly fast-growing MNP contamination of terrestrial, sea, and ocean ecosystems on a global scale [7].

Therefore, I would recommend an integrated multidisciplinary, holistic, and One Health-based approach in dealing with the still largely unknown effects of MNPs on human, animal and environmental health.

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