

Impact of Textile-Derived Micro- and Nanoplastics on Brain Health: An Emerging Environmental Risk

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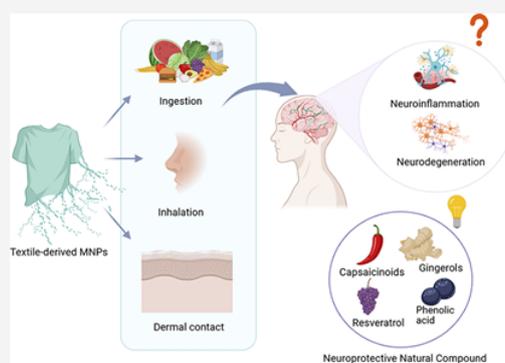
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ABSTRACT: Textile-derived micro- and nanoplastics (MNPs), primarily shed from synthetic fibers, such as polyester, acrylic, polyethylene, and nylon, constitute a widespread yet underexplored class of environmental pollutants. Despite their pervasive presence in indoor air, household dust, and the human body, these fibrous MNPs have received considerably less attention than polystyrene-based particles, resulting in a critical gap in our understanding of their potential health impacts. This review examines the growing evidence that textile-derived MNPs can translocate across biological barriers following inhalation or ingestion, reaching the brain via both direct olfactory pathways and systemic circulation through the blood–brain barrier. Experimental studies increasingly implicate MNPs in oxidative stress, neuroinflammation, and protein aggregation, processes central to the pathogenesis of neurodegenerative disorders such as Alzheimer’s and Parkinson’s disease. We also explore the therapeutic potential of natural bioactive compounds, including polyphenols and omega-3 fatty acids, in mitigating MNP-induced neurotoxicity. By consolidating current findings, this review highlights the urgency of advancing mechanistic studies, exposure assessment, and regulatory oversight to address the emerging threat of textile-derived MNPs to neurological health.



KEYWORDS: *textile-derived microplastics, synthetic fibers, brain health, neurotoxicity, blood–brain barrier, environmental pollution*

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