PLASTICS LAND TO SEA

Interplay Between Microplastic Exposure and Age-related Cognitive Decline

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As the global population continues to rise, so too has the consumption of material goods. One of the most common commodities on the market in recent decades is plastics, with their global production reaching 460 million tons in 2019. Despite the societal advancements plastics have allowed, the mismanagement of plastic waste has become a pressing global issue, especially the leakage of microplastics.

Microplastics (plastic particles <5mm in size) have been shown to induce health issues such as oxidative stress, inflammation, and decreased cell viability in marine organisms. Current research suggests that these microplastics may be transported throughout the environment, however research into their health effects, especially in mammals, is still limited.

This has led our group to explore the biological and cognitive consequences of microplastics exposure in a rodent model. Following a three-week exposure to water treated with fluorescently labeled pristine polystyrene beads, C57/BL6J mice were assessed using behavioral assays such as open field, followed by tissue analyses such as Western Blot, qPCR, and immunohistochemistry. Data from these assays suggests that short term exposure to microplastics induces both behavioral changes and alterations to immune markers in liver and brain tissues. Additionally, we noted that these changes seem to differ depending on age, indicating a possible age-dependent effect. Furthermore, preliminary studies in a humanized APOE3/4 knock-in mouse model, which may be used to study genetic predisposition to Alzheimer's disease (AD), suggest that microplastics may be exasperating genetic risk factors of AD in a possibly sex-dependent manner. These findings suggest the need for further research to better understand the mechanisms by which microplastics may induce physiological and cognitive changes.