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**Letter to the Editor**

# Targeting dietary microplastic exposure: an emerging frontier in clinical pharmacology

Sir,

Microplastics have quietly entered the human body, yet clinical medicine continues to treat them as a distant environmental issue rather than an immediate biological concern. Emerging evidence suggests that brine water used in kimchi preparation can act as potential source of microplastics contamination particularly when derived from sea salt or contaminated water sources.[1] When ingested microplastics can persist within the gastrointestinal tract and actively interact with the gut ecosystem, challenging the long-held assumption that they are biologically inert.[2]

This shift is not trivial—it compels us to reconsider microplastics within the broader framework of host–microbiome–xenobiotic interactions. Experimental studies have demonstrated that microplastics can be present in brine process water and importantly that filtration of brine significantly reduces microplastic load, thereby lowering the risk of contamination in the final kimchi product.[1]

In addition to raw materials, the processing environment also represents a potential entry point for microplastics. Fermented foods are highly influenced by environmental conditions, including handling, utensils, packaging, and ambient exposure, all of which can introduce particulate contaminants. Notably, studies have shown that sea salt used in fermentation can introduce microplastics, leading to cross-contamination during preparation of products such as watery kimchi (dongchimi).[3]

Hence these findings indicate that microplastics are not only ingested from external sources but may also be introduced during food processing itself, including traditional fermentation practices. However, it is important to note that contamination is not inevitable; appropriate measures such as brine filtration, improved processing hygiene, and control of raw material sources can significantly reduce this risk.

One critical, yet underappreciated, determinant of microplastic behaviour is surface charge. Positively charged microplastics exhibit stronger electrostatic interactions with the negatively charged intestinal epithelium, potentially enhancing cellular uptake and triggering oxidative stress and inflammation.[4] In contrast, negatively charged particles, although less adherent, may adsorb environmental toxins and disturb microbial composition, thereby indirectly contributing to dysbiosis.

These observations suggest that toxicity is not merely exposure-dependent but is significantly shaped by physicochemical characteristics—an aspect that remains largely absent from clinical discussions.

Equally overlooked is the possibility that host factors, particularly diet, may modify these interactions. Fermented foods such as kimchi and sauerkraut (kraut) provide a rich source of lactic acid bacteria and bioactive metabolites that support epithelial integrity and immune balance.[5]

It is plausible that such foods may mitigate microplastic-induced perturbations by reinforcing mucosal defences and stabilizing microbial diversity. This aligns with emerging pharmacological concepts in which the gut microbiota acts as a functional interface influencing the metabolism and toxicity of environmental agents. Yet, despite this biologically coherent rationale, dietary modulation is rarely considered in the discourse on microplastic toxicity.[6]

However, the current evidence base does not yet justify clinical translation. Most available data are derived from experimental models, with limited human validation.[7] In addition, heterogeneity in microplastic size, composition, and surface properties complicates interpretation and reduces comparability across studies.[6]

The long-term consequences of chronic, low-dose exposure—arguably the most clinically relevant scenario—remain insufficiently understood. Importantly, such persistent gut-level disturbances may have downstream implications for chronic inflammatory conditions, including inflammatory bowel disease and metabolic disorders, thereby extending the relevance of microplastics beyond toxicology into mainstream clinical medicine.[8]

Future research must move beyond descriptive toxicology and toward integrative human studies that combine exposure assessment, microbiome analysis, and dietary interventions. Without such efforts, the field risks remaining mechanistically rich but clinically irrelevant. If microplastics represent an unavoidable exposure, then the real question is not how to eliminate them, but how to live with them. Strengthening host resilience—potentially through simple measures such as fermented foods—may be a more realistic and immediately actionable strategy than waiting for environmental control alone.

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## REFERENCES

1. Yoon S, Song H, Dang YM, Ha JH. Elimination microplastic particles in brine process water for ensuring the safety of brined cabbage. Heliyon. 2024;10(4):e25984.
2. Wang YF, Wang XY, Chen BJ, Yang YP, Li H, Wang F. Impact of microplastics on the human digestive system: From basic to clinical. World J Gastroenterol. 2025;31(4):100470.
3. Song H, Ha JH. Inactivation of norovirus attached to brine-dispersed microplastics using ultraviolet-C LED irradiation based on a viability-indicating RT-qPCR assay. LWT. 2025;232:118434.
4. Yong CQY, Valiyaveettil S, Tang BL. Toxicity of Microplastics and Nanoplastics in Mammalian Systems. Int J Environ Res Public Health. 2020;17(5):1509.
5. Leeuwendaal NK, Stanton C, O'Toole PW, Beresford TP. Fermented Foods, Health and the Gut Microbiome. Nutrients. 2022;14(7):1527.
6. Gao B, Chen L, Wu L, Zhang S, Zhao S, Mo Z, et al. Association between microplastics and the functionalities of human gut microbiome. Ecotoxicol Environ Saf. 2025;290:117497.
7. Ren X, Su C, Zhu Y, Fang JKH, Woh PY. Microplastic Toxicity on Gut Microbiota and Intestinal Cells: Evidence from the Simulator of the Human Intestinal Microbial Ecosystem (SHIME). Toxics. 2025;13(12):1045.
8. Bora SS, Gogoi R, Sharma MR, Anshu, Borah MP, Deka P, et al. Microplastics and human health: unveiling the gut microbiome disruption and chronic disease risks. Front Cell Infect Microbiol. 2024;14:1492759.

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