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## Letter to EJPD Editor

# Micro and Nanoplastics in orthodontics: should we be concerned?

Dear Editor,

In recent years, increasing attention has been directed toward the presence of micro and nanoplastics in medical and dental devices, raising concerns about their potential biological effects. Orthodontics is particularly relevant in this context, as polymer-based materials such as clear aligners are continuously exposed to mechanical stress, thermal fluctuations, salivary enzymes, and oral biofilms, all of which may promote material degradation and particle release.

A recent spectroscopic investigation provided the first direct evidence of secondary microplastic detachment from orthodontic clear aligners after only seven days of artificial saliva exposure [Quinzi et al., 2023]. This finding supports the hypothesis that aligners may represent a previously underestimated source of micro- and nanoplastic exposure in the oral cavity.

In parallel, a recent narrative review highlighted the relevance of micro- and nanoplastic leaching from dental and orthodontic materials and the current gaps in knowledge regarding their long-term biological effects [Umrai Shariff et al., 2025]. Although definitive conclusions on clinical toxicity cannot yet be drawn, experimental evidence suggests that these particles may induce inflammatory and cellular responses.

Further support is provided by recent in-vitro evidence showing that clinically used and saliva-exposed 3D-printed aligners undergo surface degradation and may exacerbate pro-inflammatory responses in presensitised cells [Choi et al., 2025].

From a clinical point of view, this topic deserves careful consideration, particularly in young patients undergoing long-term orthodontic treatment. It is necessary to obtain stronger evidence, with standardised analytical methods and low risk of bias, on release kinetics, exposure levels, and biological fate of these particles. This issue should not be viewed as alarmist, but as an opportunity to further improve material safety and patient care in modern orthodontics.

Sincerely,

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Quinzi V, Orilisi G, Vitiello F, Notarstefano V, Marzo G, Orsini G. A spectroscopic study on orthodontic aligners: First evidence of secondary microplastic detachment after seven days of artificial saliva exposure. *Sci Total Environ.* 2023;866:161356.

Umrai Shariff K, Le A, Goodwin-Loughton E, Chung M, Ali A, Farella M, Venugopal A. Microplastics and nanoplastics in clinical dentistry and orthodontics: leaching, health implications, and future directions: a narrative review. *Prog Orthod.* 2025;26:49.

Choi EHA, Mangal U, Ryu JH, Kim JH, Hwang G, Kim H, Cha JY, Lee KJ, Choi SH. Changes in the cytocompatibility, surface hardness, and surface topography of 3-dimensional-printed clear aligners after clinical use. *Am J Orthod Dentofacial Orthop.* 2025.