Biomonitoring of human population exposed to micro- and nanoplastics in clear aligner orthodontic treatment. Novel approach using MinION sequencing to detect effects on the oral microbiota

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Clear aligners (CAs) are a widely used therapeutic option for the treatment of dental malocclusion. These appliances are manufactured from various thermoformed materials, which are susceptible to degradation into micro- and nanoplastics (MNPLs), particularly in the harsh environment of the oral cavity. Contributing factors include pH fluctuations, temperature changes, mechanical attrition, and the presence of saliva, among others. The use of CAs and its associated MNPLs release may influence oral bacterial communities and potentially impact oral health. Currently, only a limited number of studies have investigated the oral microbiota using the MinION device (*Oxford Nanopore Technologies*), and none have done so within the specific context of CA treatment and MNPLs exposure.

The objective of our study is to assess the changes in the oral microbiota of individuals undergoing CA orthodontic treatment, as well as after treatment completion, in order to assess the reversibility of any observed changes. Understanding how CAs affect oral microbial communities will help clarify their potential role in the development of caries and periodontal disease. To address this, we are conducting a prospective longitudinal study.

At present, we have fully developed and optimized a protocol to extract bacterial DNA from buccal swabs using PureLink Microbiome DNA Purification Kit (*Invitrogen, Thermo Fisher Scientific),* followed by sequencing with the MinION system. All samples have been successfully sequenced, confirming the reliability of MinION for detecting and characterizing microbial changes in the oral microbiota.

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