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EDITORIAL
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Editorial: Omics Research for Pediatric Dentistry in Health and Disease

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Editorial on the Research Topic

Omics Research for Pediatric Dentistry in Health and Disease

Multi-omics research holds great promise to fill our understanding of pediatric oral health and disease in a concerted manner, ranging from the provision of diagnosis, monitoring, and personalized medicine to the identification of prognostic biomarkers and novel therapeutic targets. This Research Topic aimed to employ multi-omics research to highlight the current understanding of the relationship between the oral microbiome composition, activity and interactions, and children's oral and systemic health. This knowledge, combining human genome analysis, oral microbiota omics investigation and conditions in health and disease, will provide valuable information on the functional and metabolic changes in diverse pathological states, as well as the identification of molecular signatures, which could lead to precise therapies considering person-centered care in dentistry and medicine. The articles included in this collection show evidence of the potential predictive relationship between the oral microbiota, biofilm and childhood diseases, suggesting that the oral microbiome can be used as a target for disease diagnosis and novel approaches to maintain children's health.

Elsewhere in medicine and biology, multidimensional omics research has exploded at unprecedented rates of adoption to investigate biological systems. Multidimensional approaches have occurred either through integrated investigative pathways or as a collection of different omics studies that go beyond the genomics of the microbiome. These approaches have revealed previously unthinkable connections in medicine and biology, and it should be emphasized that many studies have not been biased with prior hypotheses but adopted sound experimental approaches that created new connections and generated novel hypotheses. The articles in this Research Topic included not only hypothesis driven work but studies that will guide future approaches to multi-omics research.

Sabella et al. explored the link between the oral microbiome and oral chronic diseases driven by metabolic dysfunction in childhood, all of which have important implications in pediatric dentistry. In a scoping review, the authors discussed how systemic diseases, such as obesity, cardiovascular problems, and type I diabetes mellitus (T1DM) have been shown to be influenced by dental plaque-associated oral diseases, and how these conditions also affect the oral health such as dental caries and gingival inflammation. It highlighted the importance of a multidisciplinary and comprehensive approach, with professionals of different fields and specialties to favor early

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diagnosis, effective preventive strategies, and assertive diagnosis and treatment plan, improving prognosis and patient's quality of life.

Reis et al. used epigenomics to understand the functional relevance of single nucleotide polymorphisms (SNPs) rs6256, rs307247 and rs694 in *PTH* gene, which are associated with modifications of parathyroid hormone (PTH) serum levels. PTH is essential for calcium and phosphate homeostasis in odontogenesis-related cells and influences tooth formation. The study did not find a direct relationship with the studied SNPs and dental caries. These results are in the context of past studies that when examined together do not provide a clear definitive association between PTH serum levels and caries but may influence the remineralization and demineralization equilibrium of the tooth, and, consequently, be involved in a less predictive risk factor for dental caries.

The NMR analyses were the metabolomic approach chosen by Letieri et al. to perform a quantitative and qualitative analysis of the metabolites in saliva from infants in the pre-dental period. The authors aimed to evaluate the influence of hygiene procedures in oral mucosa, to define a protocol to be used prior to saliva collection for metabolomic evaluation by NMR. These findings will allow verifying the feasibility of implementing this methodology in future studies, in an attempt to reduce bias inherent of extrinsic salivary metabolites, especially provided from dietary habits such as breastfeeding milk and from microbial metabolism.

In conclusion, these articles showcase outstanding research studies in the application of genetics, genomics, and multi-omics to better understand the relationship between the oral microbiome composition and activity, and children's oral and systemic health. Their results will guide the diagnosis and treatment of several diseases and bridge the basic science and clinical research.

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All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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