An ontological representation of oral dysbiosis - Abstract

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Abstract

The human microbiome is the collection of microbial organisms (bacteria, viruses, fungi, etc.) that inhabit the various sites in the body, such as the skin, gut, mouth, respiratory tract, etc. These microbes interact with the host's genetics, tissues, habits, immune system, and other microbes. This complex interaction creates micro-environments in the body where the populations of the different microbial organisms are in a state of equilibrium.

Under certain environmental conditions, an imbalance occurs in the microbiome such that a resident population of harmful microorganisms increases its relative proportion and acquires pathogenic properties. This phenomenon is commonly described as dysbiosis and is linked to many healthcare conditions such as dental caries, periodontitis, cancers, etc. Dysbiosis in one part of the body is often associated with diseases elsewhere. The oral microbiome is one of the most complex microbiomes in the human body. An outgrowth of harmful microorganisms linked to diseases such as periodontitis has been associated with systemic inflammatory diseases like Alzheimer's and atherosclerosis.

Current ontologies vary in their representation of dysbiosis including representing dysbiosis as an adverse event, an abnormal phenotype, or a pathological process. There is a need for an ontological representation of dysbiosis that factors in the homeostatic and dysbiotic states of the microbiome. We propose representing dysbiosis as a type of disorder, where the homeostatic nature of the microbiome is disrupted following changes in the environment. When the microbiome reaches a dysbiotic state it can trigger additional pathological processes that lead to further disorders. We use the example of oral dysbiosis to illustrate how the relationship between dysbiosis and pathological processes can result in dental caries and periodontitis. We also explore the link between other dysbiosis-related diseases and oral dysbiosis

Keywords

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