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Oral Microbiome and Systemic Health

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The oral cavity is a mirror of systemic health and acts as a gateway for many systemic diseases. More than 700 bacterial species in oral cavity. Bacterial Species belongs to genera *Gemella*, *Granulicatella*, *Streptococcus salivarius*, *S. mitis, Actinomyces, Neisseria, Corynebacterium, Haemophilus* and *Veillonella.* There are approximately 10^{13} cells per gram of germs present from the mouth to the anus, indicating that the oral cavity is an important entry point of the gut system. Around 2 billion germs are present in the oral cavity.

The oral microbiome consists of a diverse group of species, including bacteria, viruses, fungi, and archaea, with bacteria being the most predominant. Oral bacterial pathogenic commensals includes *Streptococcus* species (*S. mitis, S. sanguinis*), *Prevotella, Veillonella, Actinomyces*, and *Porphyromonas*.

An altered oral microbiota, known as dysbiosis, occurs during stressful conditions such as chronic psychological stress, tobacco use, alcohol consumption, altered diet (adulterated and processed foods), and drug usage such as antibiotics and chemotherapeutic agents.

These factors result in changes in microbial species within the oral cavity, leading to their transformation into pathogenic microorganisms. The pathogen-associated molecular patterns (PAMPs) of these microorganisms are recognized by pattern recognition receptors (PRRs), particularly Toll-like receptors (TLRs). This interaction activates NF-κB, a key transcription factor, which induces the release of inflammatory mediators.

Chronic activation of these inflammatory pathways results in dysregulation and continuous release of inflammatory mediators such as cytokines such as IL-4, IL-5, IL-13, proteolytic enzymes such as MMP's2,9, UPA, chemokines such as CXCl8, CCl2, CXCl12, CXCL3 and transcription factors such as NF-KB, STAT-3, HIF-1α. These chronic inflammatory mechanisms play a role in the development of various diseases, including diabetes mellitus by inducing insulin resistance, cancer by inducing cell proliferation, cell survival, vascular proliferation, genomic instability, immunomodulation, cell invasion and metastasis, Alzheimer's disease by inducing cerebral atrophy and plaque deposition, autoimmune disorders by altering cellular, vascular and immune modulation, depression by suppression of serotonin secretion, Parkinson's disease by suppression of dopamine release, endocrine disturbances by suppression of hormonal mediated response and cardiovascular diseases by cellular injury, tissue and organ damage.

Hence, the oral microbiome is linked to most systemic diseases.