SIMPLY TEST®
ORAL HEALTH

CAP ACCREDITED
COLLEGE of AMERICAN PATHOLOGISTS

Oral Microbiome Dysbiosis & PERIODONTAL DISEASE

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White Paper

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Executive Summary

Periodontal disease is a chronic condition driven by dysbiosis of the oral microbiome accompanied by localized inflammation which can, when left untreated, contribute to persistent systemic inflammation. This systemic inflammatory burden is associated with increased risk and progression of multiple systemic diseases, including cardiovascular disease, metabolic disorders, autoimmune conditions, certain malignancies, and adverse pregnancy outcomes. Increasing recognition of the oral–systemic connection underscores the importance of periodontal health as part of comprehensive preventive and integrative medical care. Periodontal disease should be considered a modifiable inflammatory condition that contributes to increased risk for multiple significant systemic diseases.

Background and Pathophysiology

Periodontal disease is a result of dysbiosis of the oral microbiome. The oral microbiome is a community of microorganisms which live in harmony with the host. When that harmony is disrupted, dysbiosis occurs and a pathogenic community evolves which elicits a chronic inflammatory response. This response is characterized by:

- Local production of pro-inflammatory cytokines and proteolytic enzymes
- Progressive destruction of periodontal tissues
- Chronic inflammation characterized by sustained activation of local and systemic immune responses
- Gingival epithelial barrier disruption allowing oral bacteria, bacterial components, and inflammatory mediators, to enter the systemic circulation
- Recurrent bacteremia and sustained cytokine release contributing to chronic low-grade systemic inflammation

Pathway to Elevated Systemic Disease Risk

Multiple biologically plausible mechanisms connect periodontal inflammation to systemic disease processes, including:

- Elevated circulating inflammatory mediators (e.g., C-reactive protein, interleukin-6, tumor necrosis factor-alpha)
- Endothelial dysfunction and impaired vascular homeostasis
- Immune dysregulation and altered host response
- Metabolic effects influencing insulin resistance and lipid metabolism

Collectively, these mechanisms provide a framework by which periodontal disease may contribute to disease initiation, progression, or exacerbation in susceptible individuals.

Systemic Conditions Associated with Periodontal Disease

Robust associations have been reported between periodontal disease and increased risk of:

- Cardiovascular disease (Heart Attack)
- Cerebrovascular events (Stroke)
- Metabolic (Type 2 Diabetes Mellitus, Metabolic Syndrome, Liver and Kidney Disease)
- Autoimmune and Neurological (Rheumatoid Arthritis, Multiple Sclerosis, Alzheimer's Disease)
- Adverse Pregnancy Outcomes (Preterm and Low Birth Weight)
- Malignancy (notably Colorectal, Esophageal, Pancreatic)

These associations are supported by large observational studies and meta-analyses across diverse populations.

Impact of Periodontal Treatment

Interventional studies demonstrate that effective periodontal therapy can reduce systemic inflammatory markers and improve surrogate measures of vascular and metabolic health. While such findings do not establish direct causality for all systemic disease outcomes, they support the concept that periodontal inflammation contributes meaningfully to overall inflammatory burden.

Prevention of Elevated Systemic Disease Risk

Management, the diagnosis of, and prevention and treatment of, asymptomatic and symptomatic periodontal disease, are the cornerstones of reducing systemic disease risk by improving oral health and reducing chronic inflammation. From a clinical and preventive perspective, periodontal disease should be recognized as:

- A chronic inflammatory condition with elevated systemic disease risk
- A modifiable contributor to systemic inflammation

Conclusion

Periodontal disease represents more than an oral health concern; it is a chronic inflammatory condition with far-reaching systemic effects. Recognition of its role as a contributor to systemic inflammation supports its inclusion in comprehensive, preventive, and integrative approaches to healthcare. Addressing periodontal inflammation may help reduce downstream disease risk and improve overall health. Despite growing evidence linking oral and systemic health, medicine and dentistry remain largely siloed. Many physicians receive limited training in recognizing oral conditions that contribute to systemic disease; while many dental professionals lack formal education on the broader medical implications of oral pathology. Oral health is fundamentally interconnected with overall health, and emerging data suggest that enhanced collaboration
between medical and dental providers can meaningfully improve patient outcomes.
(The Medical-Dental Divide is Harming Your Patients. Medscape October 08, 2025)
The availability of the SimplyTest® Oral Health saliva-based assessment, useful in both symptomatic and asymptomatic individuals, supports an evidence-based approach to the identification and management of periodontal disease, enabling earlier intervention and mitigation of associated systemic health risks.

SimplyTest® Oral Health

The SimplyTest® Oral-Systemic panel is a comprehensive, saliva-based test that features multi-organism detection and quantification for 17 periodontal and systemic oral health pathogens. Organisms are amplified and detected using fluorescence-based technology during PCR amplification to measure DNA or RNA targets in real time. The platforms combine precise thermal cycling, high-resolution optical detection, and advanced software algorithms to enable accurate quantification. The SimplyTest "PERIO Oral-Systemic" is more than an oral health test. It's a clinical tool for deeper insight into chronic disease drivers, microbial burden, and inflammation that often begins in the mouth, but doesn't stay there.

Careful analysis of data collected from 50,000 patients has allowed SimplyTest to evaluate the Systemic Disease Risk of individual patients. This risk is reported as the Periodontal Pathogen Load Index which quantifies a patient's pathogen burden relative to the reference population of 50,000 patients. The calculation converts raw pathogen copy numbers into standardized risk scores (0-100%) that indicate whether a patient's bacterial load is low, average, or high compared to the reference population. These data are provided in the systemic health report.

- The systemic health report identifies elevated oral pathogen levels that peer-reviewed research associates with systemic health risks
- The systemic health risk scores (0-100) of each patient tested indicates relative pathogen burden compared to the reference database of 50,000 patients
- Health risk scores are not disease predictions, but identify patients at risk for developing systemic diseases associated with high levels of periodontal pathogens
- Patients are encouraged to work with their dentist to lower oral pathogen levels and reduce the periodontal component of systemic health risk, and with their physician to evaluate the patient's complete systemic health risk profile
- Organisms shown in the report reflect the patient's own unique profile
- Emphasis is placed on the fact that this test reflects risk, does not imply disease
- The utility of this information is to manage patients early in the course of disease particularly when the disease is "silent"
- According to a recent scientific statement from the American Heart Association the association between periodontitis and atherosclerotic cardiovascular disease is stronger than previously recognized and that treatment of periodontal disease can reduce inflammatory factors and improve intermediate risk markers associated with heart disease
  (Treating Gum Disease Improves Markers Associated With Heart Disease Risk. Statement Suggests_ Medscape—December 30, 2025)

Association Versus Causality

Current evidence supports a strong association between periodontal disease and multiple systemic diseases, mediated in part by chronic systemic inflammation, immune dysregulation, and microbial translocation. While periodontal disease should not be considered a sole causal factor, it is widely recognized as a contributing and exacerbating risk factor within multifactorial disease pathways. Reductions in systemic inflammatory markers following periodontal treatment further supports a biologically plausible mechanistic link.

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