

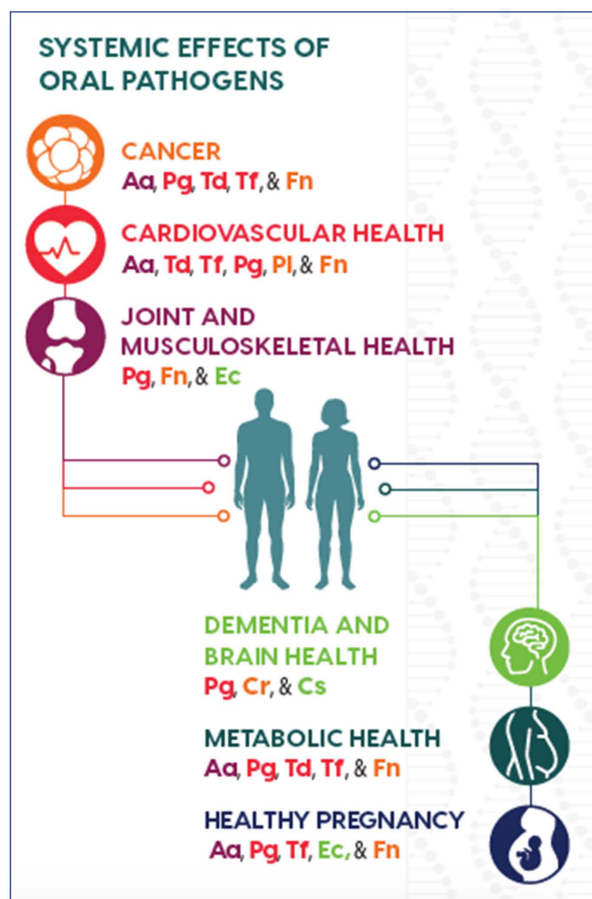
The Consequences of Oral Bacteria and Gum Disease Go Far Beyond the Mouth



ORALDNA[®] LABS

Innovations in Salivary Diagnostics

OralDNA® Labs offers MyPerioPath testing for the profile of oral bacteria that cause periodontal disease. These bacteria, especially at high levels, and in combination with an individual's genetics inflammatory response, result in bad breath, painful bleeding gums, loss of bone, and eventually tooth loss. But the consequences of these same bacteria, present for years and decades, add significantly to the risk of a wide range of life threatening diseases beyond the mouth. Below are some of those diseases and the measurable risk of those diseases becoming serious if these oral pathogens are not treated.



Cardiovascular Disease:

Aa Pg Tf Td Fn Pi

There is consensus within the medical and dental professional organizations that periodontal bacteria contribute to the initiation, progression and prognosis of cardiovascular disease. From key meta-analysis studies, persons with untreated periodontal infections have up to a 20% increase in their risk of coronary vascular disease¹. The multiple of risk for stroke (1.74-2.85 fold) and peripheral vascular disease (1.41-2.27 fold) is equal or greater¹. More specifically, the risk of a first myocardial infarction is associated with periodontal disease (OR of 1.49) even after adjustment for a history of smoking, obesity, diabetes and selected socioeconomic factors². But equally important is the concern for specific bacteria that are a basis for this risk including A.a., P.g., T.f., T.d., F.n. and P.i.³⁻⁷. Specifically, F.n. carries a series of virulence factors that can contribute to inflammation of the arterial wall⁸. Toward the interest to prevent heart and vascular disease, testing

your patients for which types and what levels of these dangerous bacteria are present will provide them better care.

Metabolic Health and Diabetes:

Aa Pg Tf Td Fn

Elevated levels of periodontal bacteria can directly cause hyperglycemia⁹. Long term, the inflammation associated with increased pathogen burden can affect the health of the pancreas, and specifically, there is the risk of the loss of beta cells that produce insulin and respond to elevated blood glucose¹⁰. Correspondingly, persons with elevated blood glucose are at risk for progressive periodontal infection and inflammation¹¹. So, by these opposing mechanisms, the relationship of periodontal disease and pre-diabetes and diabetes is viewed as a two-way street¹². Early detection of periodontal infection and proactive management to reduce bacterial loads can improve blood sugar control and lessen the complications of diabetes as well as the consequence of periodontitis¹³.



Health During Pregnancy: Aa Pg Tf Fn Ec Pi

The oral microbiota changes when women become pregnant, and levels of periodontal pathogens increase¹⁴. During pregnancy, periodontal inflammation worsens, mostly due to increased levels of A.a., P.g., F.n. and P.i.¹⁵. Among these oral pathogens, there is a marked risk of infection of the maternal blood and the placenta, which leads to an increase in pre-term labor, lower birth weight and even the chance of fetal loss due specifically to the bacteria P.g. and F.n.^{16,17}. Further, the long-term risk for systemic disease in mothers with periodontitis is evident in the progression of atherosclerosis and the increased risk of venous thrombosis due to F.n., P.g., T.f. and A.a.^{16,18}. For these reasons, consider testing all women who are planning a pregnancy with the goal of reducing these bad bacteria.

Development of Cancer & Risk of Progression: Aa Pg Fn Td Tf

Advanced periodontal disease is associated with a 2.5 fold increase in smoking related cancers¹⁹. Breast cancer is common, and persons with elevated levels of the bacteria A.a. and P.g. have a greater chance of recurrence or failed response to treatment. In another prospective study, persons with periodontal P.g. showed a 59% increased risk of pancreatic cancer. There are also reports of oral A.a. and T.d. linked to pancreatic tumors²⁰. P.g., T.d. and T.f. are also linked to risk of esophageal cancers^{21,22}. Reducing your patient's risk of developing cancer by treating periodontal infection is another reason to visit your dentist and request a MyPerioPath® test. A role for the oral bacteria F.n. in the progression of colorectal cancer is provocative. Several recent studies show that F.n. can be identified within the primary cancer cells from colonic tumors, and are carried to metastatic sites involving regional lymph nodes^{23,24}. This is a newly observed phenomenon that will affect how cancer treatment protocols will be developed in the future.

Joint & Musculoskeletal Health: Pg Fn Ec

Rheumatoid arthritis is a chronic inflammatory condition. In a recent meta-analysis of 21 separate studies, there was a significantly increased risk of periodontitis in people with RA compared to healthy controls (relative risk: 1.13; 95% CI: 1.04, 1.23; p = 0.006; N = 153,277)²⁵. The most prevalent pathogens found were P.g. and F.n. Importantly, the

bacteria are typically found before the onset of symptoms²⁶. The good news is that therapeutic reduction of bacterial load, as determined by molecular tests such as MyPerioPath[®], may reduce symptoms and improve the prognosis of the arthritis²⁷.

Dementia and Brain Health: Pg Cr Cs

Recent medical studies point to poor oral health, and high levels of the bacteria in our gums with the increased risk to develop Alzheimer's and other types of dementia²⁸⁻³⁰. Specifically, there is now evidence that P.g. present in brain tissue and cerebrospinal fluid may be involved in the production of the abnormal proteins that are characteristic of Alzheimer's disease³¹. Additionally, the direct effects of those oral bacteria to cause atherosclerosis in the vessels within the brain impart significant risk for stroke and vascular types of dementia³².

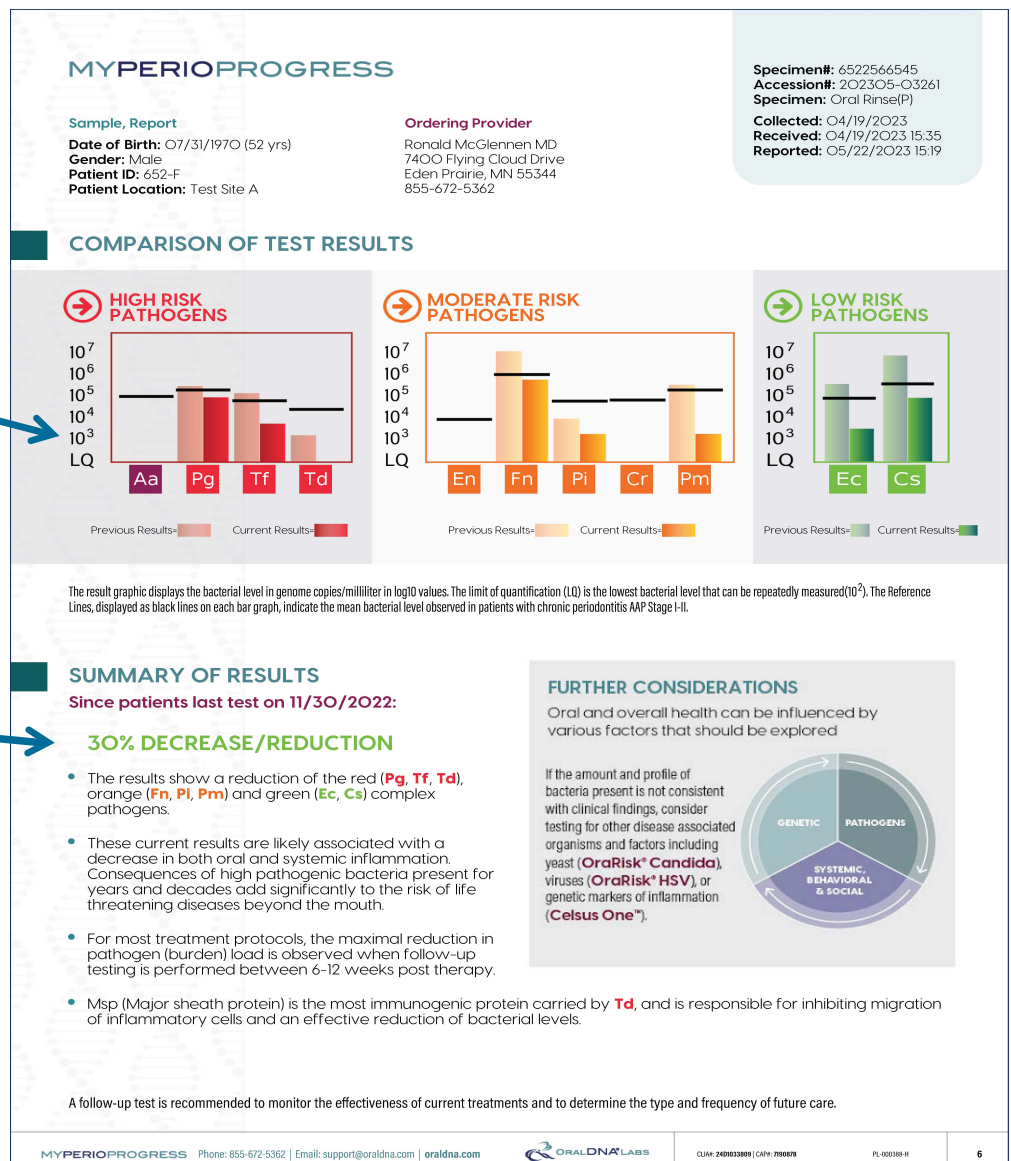
Test...Treat...Test

When a follow up MyPerioPath[®] is performed, you receive a supplemental MyPerioProgress[®] report comparing pre and post test results

PLUS a \$20 discount on follow up testing

Visual comparison graphs of previous and current bacterial levels

Total Bacterial Load Percentage Reduction



Advantages of Partnering with OralDNA® Labs:



Experience You Can Trust

With OralDNA® Labs you can rely on the services and support you need to deliver the best patient care possible! With over 30 years experience in salivary diagnostics, our teams of highly trained healthcare experts are here to help!



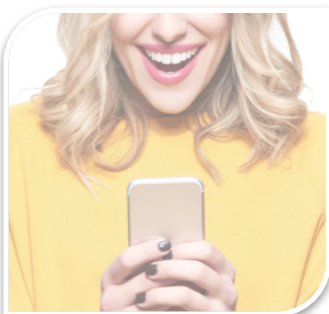
Fast Accurate & Secure Results

Our CLIA & CAP accredited laboratory delivers fast and accurate results you can depend on! Reports are delivered through our state of the art, user-friendly, HIPPA secure online portal.



Increase Therapy Acceptance

Incorporating OralDNA® Labs into your practice protocol has shown to increase patient acceptance of therapy and showcase cutting edge science to better personalize patient care.



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For more information about how to become an OralDNA® Provider and how to get started, simply scan this QR Code:



References

1. Meurman JH, Sanz M, Janket SJ. Oral health, atherosclerosis, and cardiovascular disease. *Crit Rev Oral Biol Med* 2004;15:403-13.
2. Ryden L, Buhlin K, Ekstrand E, et al. Periodontitis Increases the Risk of a First Myocardial Infarction: A Report From the PAROKRANK Study. *Circulation* 2016;133:576-83.
3. Pucar A, Milasin J, Lekovic V, et al. Correlation between atherosclerosis and periodontal putative pathogenic bacterial infections in coronary and internal mammary arteries. *J Periodontol* 2007;78:677-82.
4. Radwan-Oczko M, Jaworski A, Dus I, Plonek T, Szulc M, Kustrzycki W. *Porphyromonas gingivalis* in periodontal pockets and heart valves. *Virulence* 2014;5:575-80.
5. Range H, Labreuche J, Louedec L, et al. Periodontal bacteria in human carotid atherothrombosis as a potential trigger for neutrophil activation. *Atherosclerosis* 2014;236:448-55.
6. Rath SK, Mukherjee M, Kaushik R, Sen S, Kumar M. Periodontal pathogens in atheromatous plaque. *Indian J Pathol Microbiol* 2014;57:259-64.
7. Bale BF, Doneen AL, Vigerust DJ. High-risk periodontal pathogens contribute to the pathogenesis of atherosclerosis. *Postgrad Med J* 2017;93:215-20.
8. Liljestrand JM, Paju S, Pietiainen M, et al. Immunologic burden links periodontitis to acute coronary syndrome. *Atherosclerosis* 2018;268:177-84.
9. Stanko P, Izakovicova Holla L. Bidirectional association between diabetes mellitus and inflammatory periodontal disease. A review. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2014;158:35-8.
10. Janket SJ, Javaheri H, Ackerson LK, Ayilavarapu S, Meurman JH. Oral Infections, Metabolic Inflammation, Genetics, and Cardiometabolic Diseases. *J Dent Res* 2015.
11. Kumar M, Mishra L, Mohanty R, Nayak R. "Diabetes and gum disease: the diabolic duo". *Diabetes Metab Syndr* 2014;8:255-8.
12. Chee B, Park B, Bartold PM. Periodontitis and type II diabetes: a two-way relationship. *Int J Evid Based Healthc* 2013;11:317-29.
13. Kaye EK, Chen N, Cabral HJ, Vokonas P, Garcia RI. Metabolic Syndrome and Periodontal Disease Progression in Men. *J Dent Res* 2016;95:822-8.
14. Persson GR, Hitti J, Paul K, et al. *Tannerella forsythia* and *Pseudomonas aeruginosa* in subgingival bacterial samples from parous women. *J Periodontol* 2008;79:508-16.
15. Carrillo-de-Albornoz A, Figuero E, Herrera D, Bascones-Martinez A. Gingival changes during pregnancy: II. Influence of hormonal variations on the subgingival biofilm. *J Clin Periodontol* 2010;37:230-40.
16. Han YW, Houcken W, Loos BG, Schenkein HA, Tezal M. Periodontal disease, atherosclerosis, adverse pregnancy outcomes, and head-and-neck cancer. *Adv Dent Res* 2014;26:47-55.
17. Andonova I, Iliev V, Zivkovic N, Susic E, Bego I, Kotevska V. Can oral anaerobic bacteria cause adverse pregnancy outcomes? *Pril (Makedon Akad Nauk Umet Odd Med Nauki)* 2015;36:137-43.
18. Kurita-Ochiai T, Yamamoto M. Periodontal pathogens and atherosclerosis: implications of inflammation and oxidative modification of LDL. *Biomed Res Int* 2014;2014:595981.
19. Zeng XT, Xia LY, Zhang YG, Li S, Leng WD, Kwong JS. Periodontal Disease and Incident Lung Cancer Risk: A Meta-Analysis of Cohort Studies. *J Periodontol* 2016;1-13.
20. Jacob JA. Study Links Periodontal Disease Bacteria to Pancreatic Cancer Risk. *JAMA* 2016;315:2653-4.
21. Nieminen MT, Listyarifah D, Hagstrom J, et al. *Treponema denticola* chymotrypsin-like proteinase may contribute to orodigestive carcinogenesis through immunomodulation. *Br J Cancer* 2018;118:428-34.
22. Baba Y, Iwatsuki M, Yoshida N, Watanabe M, Baba H. Review of the gut microbiome and esophageal cancer: Pathogenesis and potential clinical implications. *Ann Gastroenterol Surg* 2017;1:99-104.
23. Amitay EL, Werner S, Vital M, et al. *Fusobacterium* and colorectal cancer: causal factor or passenger? Results from a large colorectal cancer screening study. *Carcinogenesis* 2017;38:781-8.
24. Yamamura K, Baba Y, Nakagawa S, et al. Human Microbiome *Fusobacterium Nucleatum* in Esophageal Cancer Tissue Is Associated with Prognosis. *Clin Cancer Res* 2016;22:5574-81.
25. Fuggle NR, Smith TO, Kaul A, Sofat N. Hand to Mouth: A Systematic Review and Meta-Analysis of the Association between Rheumatoid Arthritis and Periodontitis. *Front Immunol* 2016;7:80.
26. Johansson L, Sherina N, Kharlamova N, et al. Concentration of antibodies against *Porphyromonas gingivalis* is increased before the onset of symptoms of rheumatoid arthritis. *Arthritis Res Ther* 2016;18:201.
27. Khare N, Vanza B, Sagar D, Saurav K, Chauhan R, Mishra S. Nonsurgical Periodontal Therapy decreases the Severity of Rheumatoid Arthritis: A Case-control Study. *J Contemp Dent Pract* 2016;17:484-8.
28. Abbayya K, Puthanakar NY, Naduwinmani S, Chidambar YS. Association between Periodontitis and Alzheimer's Disease. *N Am J Med Sci* 2015;7:241-6.
29. Cerajewska TL, Davies M, West NX. Periodontitis: a potential risk factor for Alzheimer's disease. *Br Dent J* 2015;218:29-34.
30. Pritchard AB, Crean S, Olsen I, Singhrao SK. Periodontitis, Microbiomes and their Role in Alzheimer's Disease. *Front Aging Neurosci* 2017;9:336.
31. Dominy SS, Lynch C, Ermini F, et al. *Porphyromonas gingivalis* in Alzheimer's disease brains: Evidence for disease causation and treatment with small-molecule inhibitors. *Sci Adv* 2019;5:eaau3333.
32. Choi S, Kim K, Chang J, et al. Association of Chronic Periodontitis on Alzheimer's Disease or Vascular Dementia. *J Am Geriatr Soc* 2019.