The Secrets in Saliva:
Root-Cause Insights with Oral Microbiome Testing

Oral Microbiome Masterclass

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The Oral Microbiome & Disease

Our Mouth’s Ecosystem

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Our mouths are like a garden

- A healthy garden has a diverse number of good plants, living in harmony and providing us benefit

Our mouths are like a garden

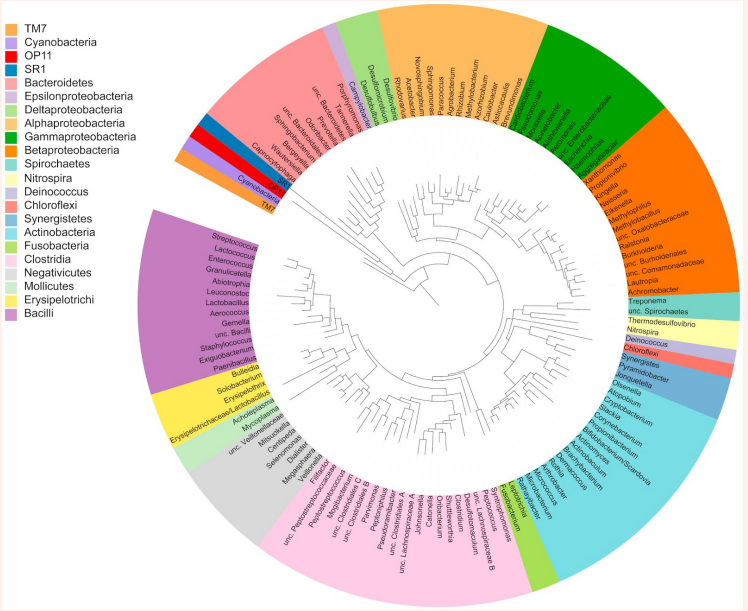
- A healthy garden has a diverse number of good plants, living in harmony and providing us benefit
- Healthy gardens require:
  - Optimal environment
  - Regular maintenance and nurturing
  - Nutrients

Our mouths are like a garden

- Environmental changes can kill this balance, causing the good plants to die and weeds to take their place. Devastating the garden.

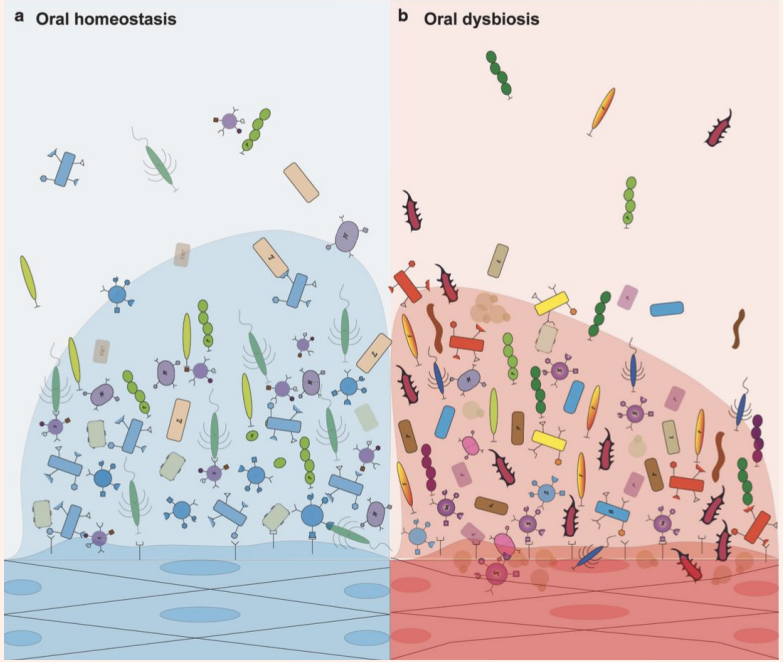
Instead of plants, we have microbes

- 800+ unique bacterial species make up part of the oral microbiome
- Oral diseases are driven by a dysbiosis or imbalance of the microbiome



Symbiosis and Dysbiosis

- **Symbiosis (balance):** a stable community where both beneficial & harmful microbes live in harmony (homeostasis).
- **Dysbiosis (imbalance):** a community dominated by harmful microbes, leading to disease.

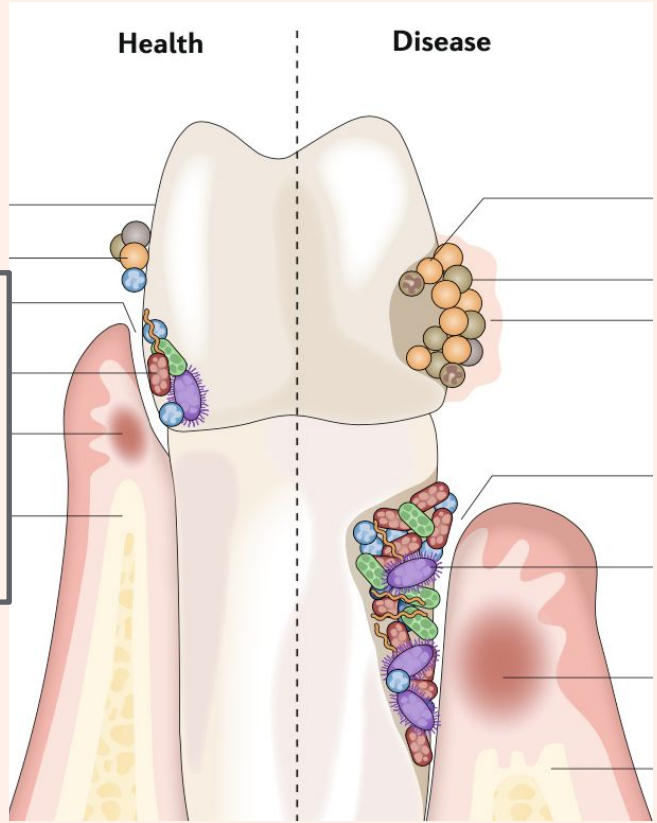


Homeostasis vs. Dysbiosis

Symbiosis

Beneficial – HIGH

Pathogenic – LOW



Dysbiosis

Beneficial – LOW

Pathogenic – HIGH

Source: Lamont 2018 Nature Reviews

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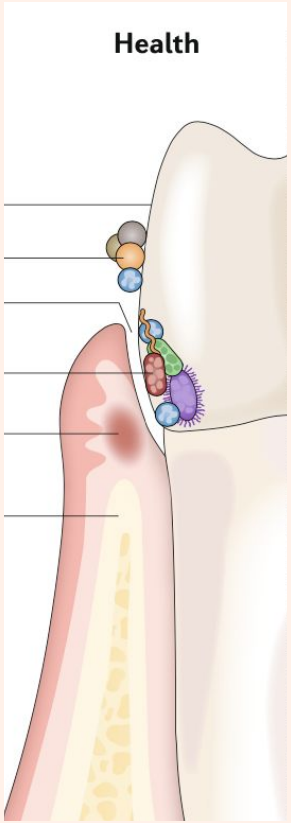
Health & Homeostasis

Symbiosis

Beneficial – HIGH

Pathogenic – LOW



- **High beneficial bacteria** balancing pH, remineralizing teeth, and actively suppressing pathogens
- **Low levels of pathogens** "train" the immune system to keep the community stable

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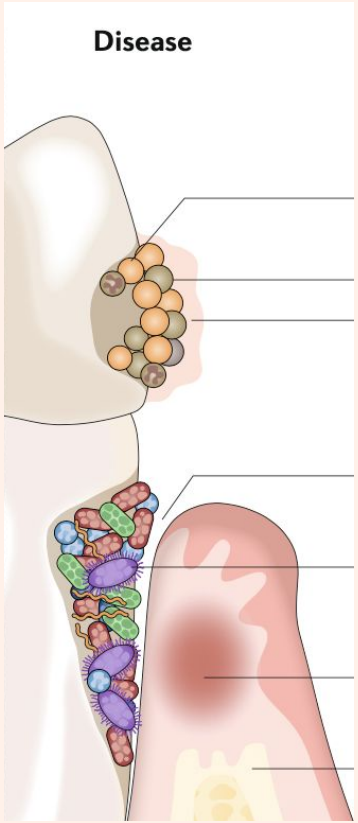
Disease & Dysbiosis

- **Low beneficial bacteria** allow pathogen takeover
- **High pathogens** drive chronic disease:
  - Inflammation
  - Acid (decay)



Dysbiosis

Beneficial – LOW

Pathogenic – HIGH

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Testing Overview

Decoding the Oral Microbiome

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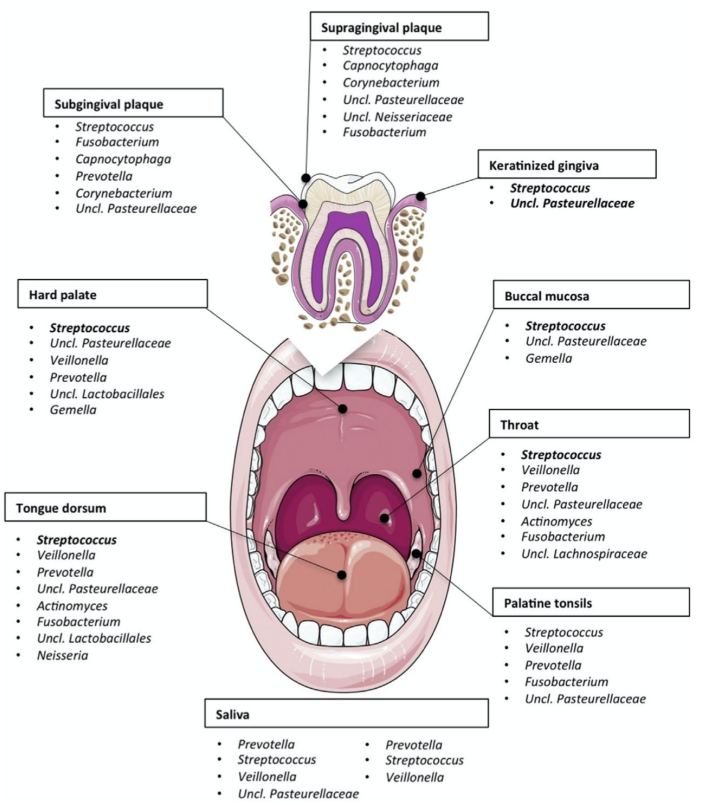
Overview of Salivary Testing

- Saliva testing technology lets us to measure the different species of bacteria and fungi in a patient's mouth
- **Gives us insight into how oral bacteria impact our oral AND overall health**

Oral Diseases are Microbially Driven



Conditions & diseases including:

- ✔ Tooth Decay (Caries)
- ✔ Gingivitis / Periodontal Disease
- ✔ Chronic Halitosis (Bad Breath)
- ✔ Oral Thrush

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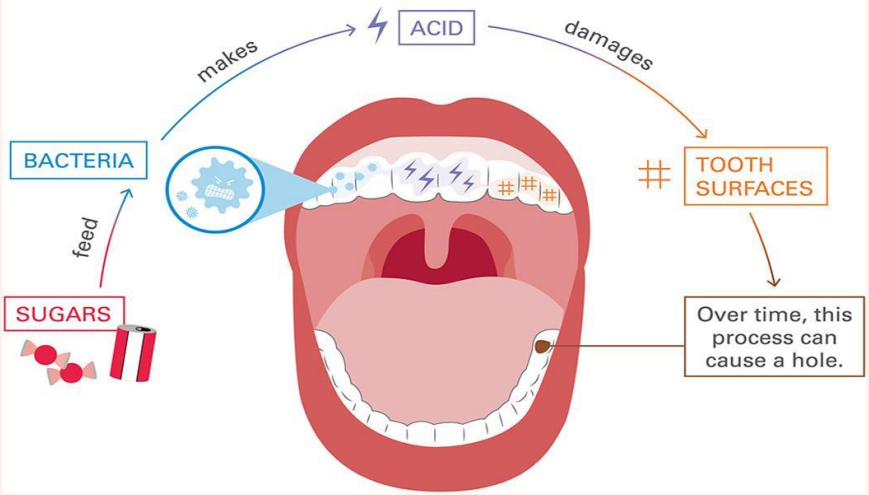
Tooth Decay & Cavities



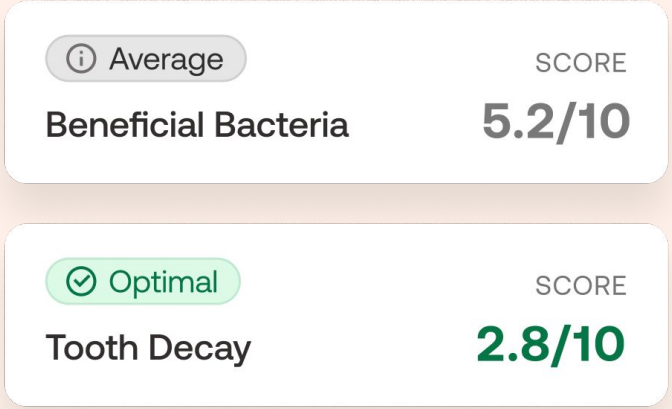
Pathogens produce acids that can cause tooth decay

Beneficials produce:

- pH neutralizing (ammonia)
- Bacteriocins
- Hydrogen peroxide

Tooth Decay & Caries

- High pathogens increased risk for decay progression. **Do you have termites or old damage?**
- **Low pathogens** in patients with **chronic decay** may point to another root-cause: mouth breathing, nutrient deficiency, acidic diet



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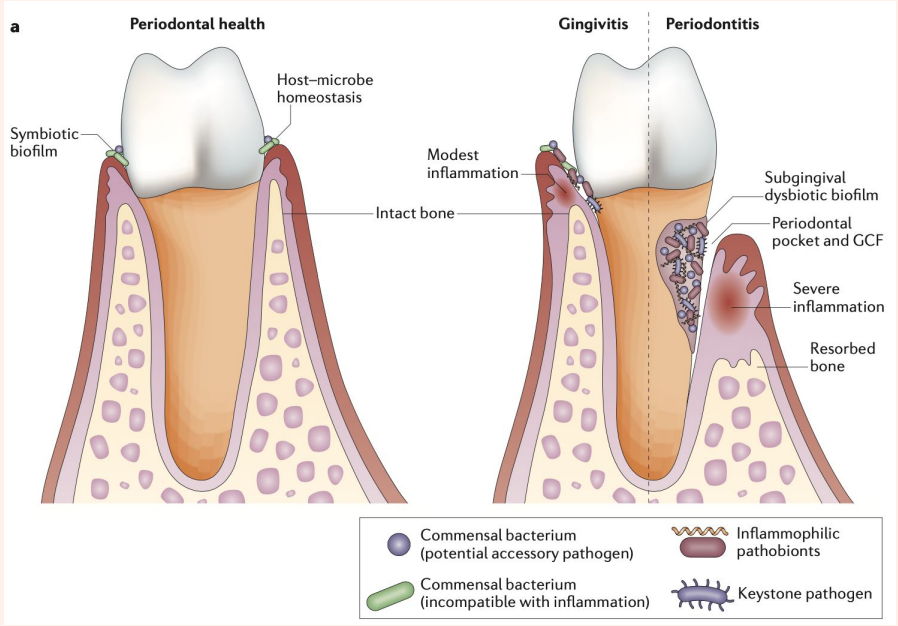
Gum Inflammation & Periodontal Disease



Pathogens release byproducts that drive inflammation below the gum line

Beneficial microbes can prevent disease via:

- Colonization competition
- Bacteriocin production

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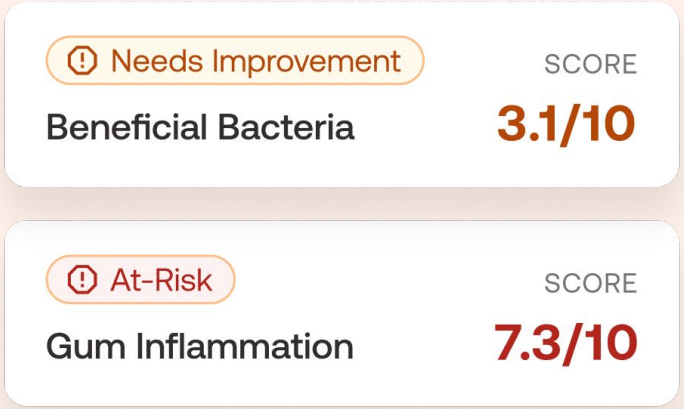
Gum Inflammation & Periodontal Disease

- High pathogens indicate increased risk for gum disease progression
- **A high score** in patients without symptoms may signify an increased future risk – **optimal time for intervention**



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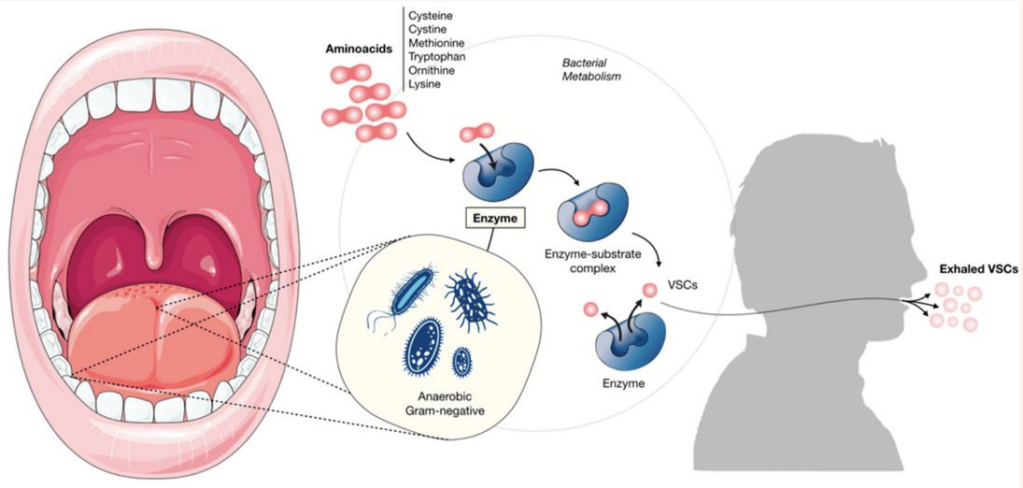
Halitosis (Bad Breath)



- Oral bacteria contribute to halitosis symptoms (90% of cases from the mouth)
- Bacteria digest amino acids into volatile sulfur compounds (VSC's) and other malodorous compounds

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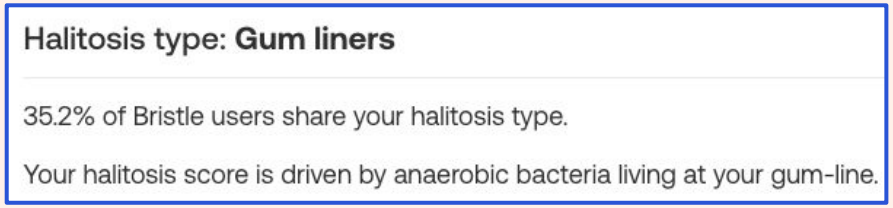
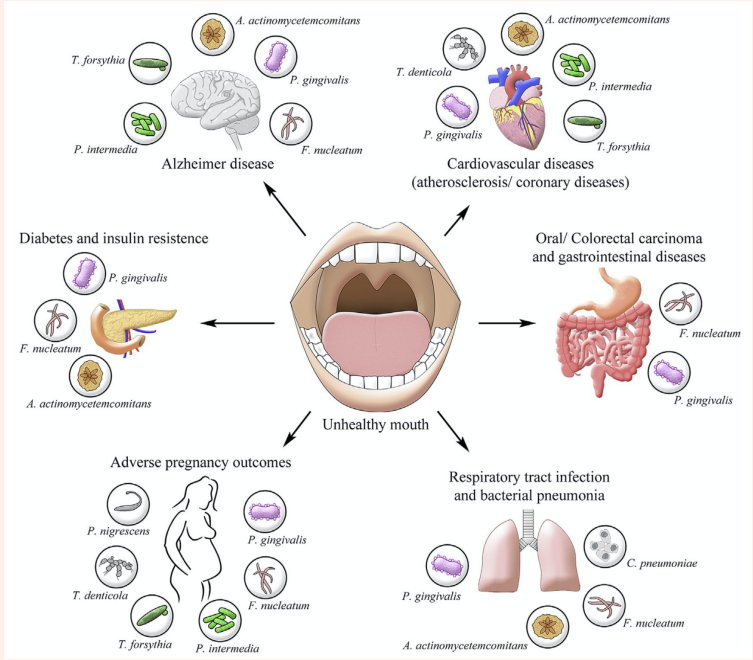
Treating Root-Cause of Halitosis

6 different types of halitosis have been identified based on one's oral microbiome make-up

1. Inflammatory gum bacteria
2. Non-inflammatory gum bacteria
3. Tongue coating species
4. Fungal
5. Tonsillar / intermittent bad breath
6. Opportunistic Enterobacteriaceae



Oral Microbiome and Overall Health



Oral health & bacteria have been **linked to over 60+ systemic diseases and overall health conditions**

- Diabetes
- Heart disease
- Cancers
- Adverse pregnancy outcomes
- Alzheimer's disease & cognitive decline

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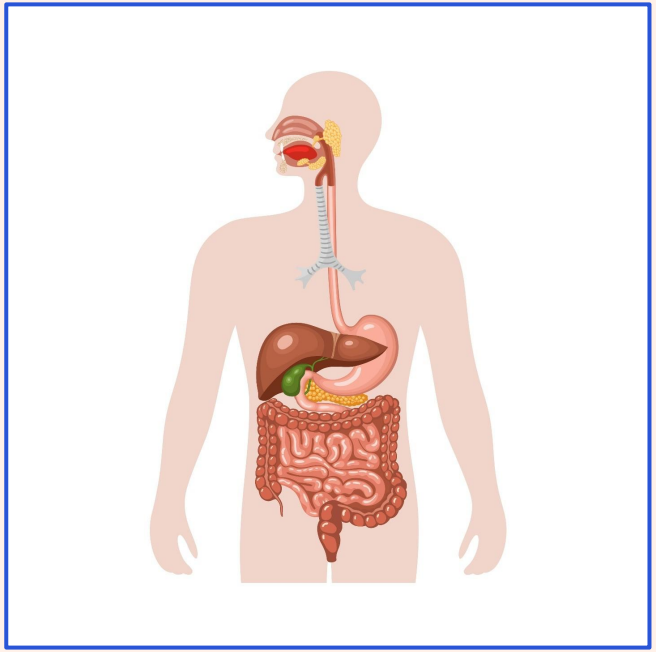
Oral - Gut Connection

Individuals with IBD, Ulcerative Colitis, or Crohn's Disease are **~2x more likely to have periodontitis**.

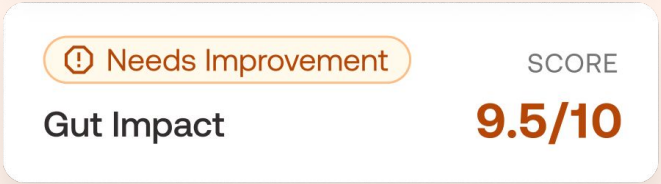


How does the oral microbiome impact the gut?

- Direct colonization: Species can be found in both the mouth and gut, increasing inflammation
- Immune training: Immune cells travel between the colon and mouth

Optimize Digestive Health

- Get insight into how a patient's oral microbiome may be affecting their gut
- Useful for patients dealing with chronic gut health issues
- High scores can indicate the issue originates from the mouth



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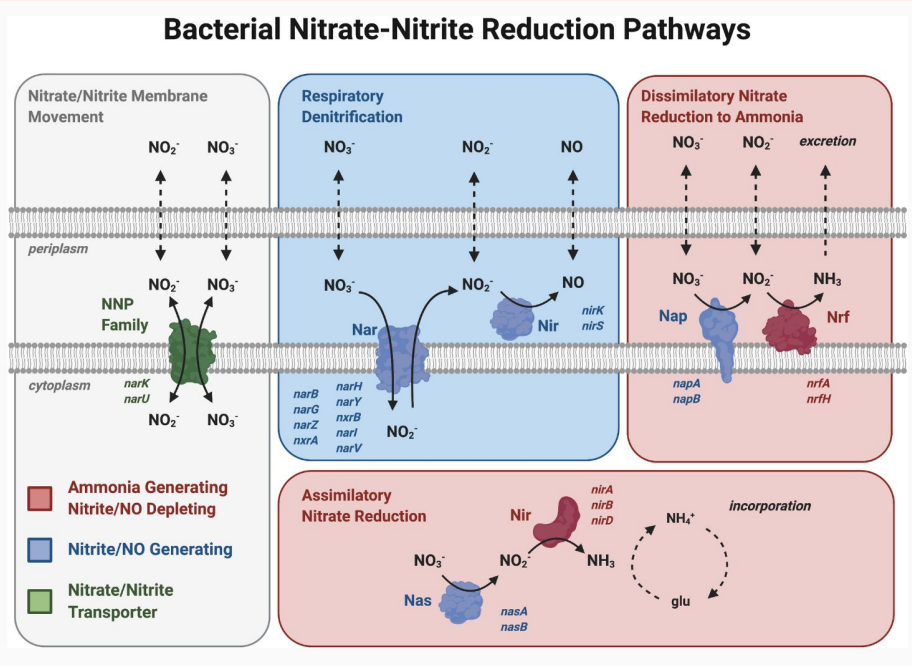
Nitric Oxide Originates in the Oral Cavity

- Nitric oxide is **critical for cardiovascular & cognitive health**
- Specific communities in the oral microbiome create nitric oxide from nitrate in our diets



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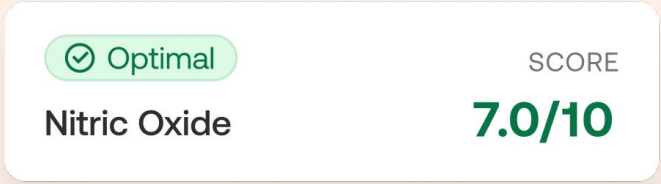
Nitric Oxide Capacity via Testing

- Bacteria play a key role in nitric oxide production
- With testing, we can measure the abundance of genes that contribute to nitric oxide production



Measures the capacity of a patient's oral microbiome to convert nitrate from diet into nitric oxide

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Oral-Systemic Associations

- **Autoimmunity:** People with autoimmune diseases have distinct oral microbiomes

Rheumatoid Arthritis-Associated Mechanisms of *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans*

by Eduardo Gómez-Bañuelos, Amarshi Mukherjee, Erika Darrah and Felipe Andrade *

Division of Rheumatology, The Johns Hopkins University School of Medicine, Baltimore, MD 21224, USA
* Author to whom correspondence should be addressed.

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Talk to your gut: the oral–gut microbiome axis and its immunomodulatory role in the etiology of rheumatoid arthritis FREE

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FEMS Microbiology Reviews, Volume 43, Issue 1, January 2019, Pages 1–18, https://doi.org/10.1093/femsre/fuy035

Published: 14 September 2018 **Article history** ▾

Oral-Systemic Associations

- **Cancer:** Distinct changes in the oral microbiome can be found in people with pancreatic cancer and colorectal cancer

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The oral microbiome, pancreatic cancer and human diversity in the age of precision medicine

Kelly M. Herremans, Andrea N. Riner, Miles E. Cameron, Kelley L. McKinley, Eric W. Triplett, Steven J. Hughes & Jose G. Trevino ✉

Oral-Systemic Associations

- **Cognitive Health:** Porphyromonas gingivalis and Campylobacter rectus (two oral harmful species) are associated with Alzheimer's disease

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Association Between Oral Bacteria and Alzheimer's Disease: A Systematic Review and Meta-Analysis

Sixin Liu [1], Stuart G Dashper [2], Rui Zhao [3]

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Optimizing the oral microbiome with personalized care

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Personalizing treatment guidance

Home care Recommendations

- **Brushing** (nanohydroxyapatite, xylitol, arginine, prebiotics)
- **Flossing** (string floss, waterpik, diluted peroxide, xylitol)
- **Oral probiotics** (brands, species, strains)
- **Mouthwash** (which ingredients, when to use?)
- **Tongue scrapin**g (technique, frequency)
- **Diet** (most variation)

Introduction to Bristle

Bristle Products

The Oral Health Probiotic

6 beneficial oral probiotic strains

The Oral Health Test

Comprehensive salivary test

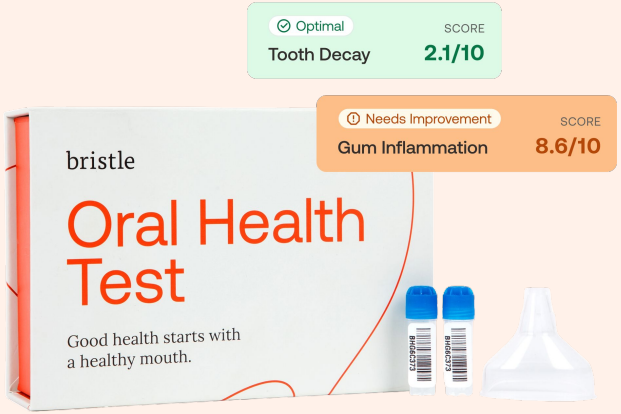
The Bristle Oral Health Probiotic

*A probiotic mint **formulated to rebalance the oral microbiome** and promote better oral health with **6 clinically & scientifically studied probiotic strains***

- Probiotic strains selected to combat bacteria that drive gum inflammation and halitosis
- 6 evidence-backed strains included
- All-natural and clean ingredients

The Bristle Oral Health Test

Analyzes ***all 800+ bacterial and fungal species*** in the oral microbiome, both beneficial and pathogenic



- Oral & systemic insights
- Full breakdown of all species
- Personalized recommendations based on test results

Oral Health & Wellness Insights

User-friendly insights into oral health and wellness based on complete oral microbiome analysis

A total of **123** bacterial and fungal species detected

Oral Health Insights

Needs Improvement — Commensal (Beneficial) — SCORE 2.3/10

At Risk — Gum Inflammation — SCORE 8.0/10

Optimal — Tooth Decay — SCORE 1.3/10

Additional Health & Wellness Insights

Average — Halitosis — SCORE 6.1/10

Needs Improvement — Gut Impact — SCORE 7.5/10

Average — Nitric Oxide — SCORE 6.3/10

Too High — Diversity — SCORE 9.4/10

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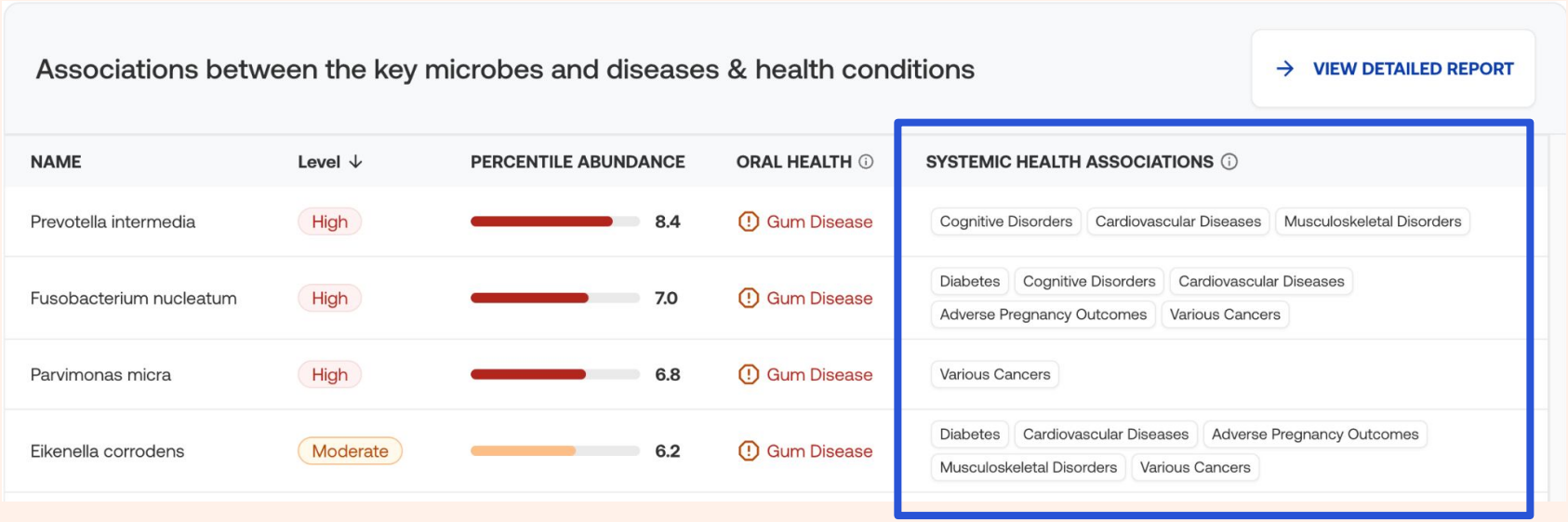
Oral-Systemic Education and Care

Get clear insights into oral pathogens in a patient sample, and the systemic conditions/diseases they've been



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Breakdown of All Species Detected

We detect on average 50 to 150 unique species of microbes in each patient sample

SPECIES	RELATIVE ABUNDANCE	PERCENTILE
Microbacterium sp	0.0215	100%
Prevotella aurantiaca	9.2531	98%
Haemophilus parainfluenzae	11.6883	94%
Fusobacterium periodonticum	4.7449	94%
Prevotella nanceiensis	6.3885	93%
Haemophilus haemolyticus	2.9448	91%
Prevotella fusca	0.2733	91%
Granulicatella adiacens	0.8520	89%
Porphyromonas endodontalis	0.6281	87%
Bulleidia extructa	0.1925	87%
Actinomyces odontolyticus	0.7374	86%
Haemophilus influenzae	0.2479	85%
Streptococcus australis	0.7948	85%
Haemophilus sp	0.3747	85%

Eubacterium sulci	0.5285	67%
Actinomyces sp	4.5998	67%
Prevotella shahii	0.7500	67%
Rothia dentocariosa	1.1985	66%
Filifactor alocis	0.1291	65%
Prevotella nigrescens	0.3254	64%
Bacillus cereus	0.2004	63%
Streptococcus gordonii	0.1301	63%
Granulicatella elegans	0.4415	63%
Eikenella corrodens	0.1077	62%
Treponema medium	0.0557	61%
Prevotella pleuritidis	0.2301	59%
Neisseria elongata	0.2455	57%
Streptococcus pseudopneumoniae	0.4369	56%

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For Clinicians: Benefits of Testing

- ✔ **Get root cause insights** with clear, comprehensive testing
- ✔ **Understand how a patient's oral health** may be impacting their overall wellness
- ✔ **Improve patient health outcomes** by personalizing their treatment plans
- ✔ **Get access to exclusive education and support resources**

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For You: Benefits of Testing

- ✔ **Improve your health** with root-cause insights into active conditions
- ✔ **Avoid future dental problems** with prevention focused
- ✔ Understand the oral-systemic connection and **how your oral bacteria can impact your overall health**
- ✔ Get a **personalized care plan to improve your health**

Thank you!

Brian Maurer

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website: **bristlehealth.com**