**MYPERIOPATH MOLECULAR ANALYSIS OF PERIODONTAL AND SYSTEMIC PATHOGENS**

### Results

#### High Risk Pathogens

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aa</td>
<td>10^7</td>
</tr>
<tr>
<td>Pg</td>
<td>10^6</td>
</tr>
<tr>
<td>Tf</td>
<td>10^5</td>
</tr>
<tr>
<td>Td</td>
<td>10^4</td>
</tr>
</tbody>
</table>

#### Moderate Risk Pathogens

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>En</td>
<td>10^7</td>
</tr>
<tr>
<td>Fn</td>
<td>10^6</td>
</tr>
<tr>
<td>Pi</td>
<td>10^5</td>
</tr>
<tr>
<td>Cr</td>
<td>10^4</td>
</tr>
<tr>
<td>Pm</td>
<td>10^3</td>
</tr>
</tbody>
</table>

#### Low Risk Pathogens

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ec</td>
<td>10^7</td>
</tr>
<tr>
<td>Cs</td>
<td>10^6</td>
</tr>
</tbody>
</table>

**Legend:** The result graphic (above) shows the bacterial level for each of the assayed species. The vertical axis displays bacterial genome copies/milliliter in log10. The limit of quantification (LQ) is the lowest bacteria level that can be repeatedly measured. The black lines across each colored bar are the Therapeutic Threshold.

### Interpretation of Results

1. This result shows 3 high risk (Aa, Pg, Td) and 2 moderate risk (En, Fn) pathogens above the therapeutic threshold.
2. The bacterial species Aa, Pg, and/or Td are strongly associated with chronic periodontitis, are transmissible and tissue invasive even at low amounts of these organisms. Moreover, Tf is present in 20-25% of cases of periodontitis and is often symbiotic with other pathogens such as Pg and Td. Note: the bacterial species Tf is commonly resistant to various treatments, and may be a reservoir of antibiotic resistance.
3. The detected pathogens are also risk factors for various systemic diseases, including atherosclerosis, type 2 diabetes, arthritis, dementia and several types of cancer. Recently, Pg has been isolated from the abnormal proteins seen in Alzheimer’s disease, and is thought to be one of the causes of dementia.

### Treatment Considerations: to be determined by the healthcare professional

1. **Mechanical/Debridement:** Scaling and root planing (SRP) is a mainstay of therapy to disrupt biofilm, remove plaque and debride compromised tissue. This patient harbors a series of pathogens (Aa, Pg, Tf, Td) that may be refractory to this treatment.
2. **Systemic Antibiotics:** This patient has indicated no allergies.
   - **C**lindamycin 150 mg or 300 mg tid for 8-10 days
   - As always, use antibiotics with care
   - **If your patient has a history of intolerance to the first choice consider:**
     - **2 C**iprofloxacin 500 mg bid for 8-10 days
     - **3 C**larithromycin 500 mg bid for 8-10 days

3. **Local Antibiotics and Chemical Hygiene:** As an adjunct to SRP, sub-antimicrobial doses of doxycycline hyclate lower collagenase activity and reduce periodontal pocket depth. Alternatively, locally delivered antimicrobial agents (LDA) including minocycline microspheres, doxycycline hyclate in an absorbable polymer, or chlorhexidine in a gelatin matrix have been shown to decrease pocket depth modestly.
4. **Pocket or Field Decontamination:** Various lasers based protocols show equivalence to SRP in reducing probing depth and bacterial levels. There is less evidence that lasers improve clinical attachment levels.
5. **Chemical and Gaseous antiseptics:** Chlorhexidine or Povidone iodine rinses can reduce periodontal pocket depth. Prescription tray application of peroxide gel, as an adjunct to frequent periodontal maintenance appointments for refractory patients, demonstrated significant reductions in bleeding on probing. Ozone is a volatile antiseptic that can disrupt microbial membranes. Aqueous ozone is less cytotoxic than gaseous ozone and has comparable effect to improve inflammation and pocket depth as compared to various chemical antiseptics such as chlorhexidine digluconate, sodium hypochlorite or hydrogen peroxide.
6. **Probiotics and Prebiotics:** Probiotics are live, beneficial bacteria, typically administered as a food or dietary supplement. Prebiotics are non-digestible ingredients, including inulin, fructo-oligosaccharides, galacto-oligosaccharides and Lactulose, that promote growth of commensal bacteria. Research shows that probiotics and prebiotics control the growth of pathogens and reverse tissue destruction caused by periodontitis.

### Follow up Recommendations

- Good periodontal health depends on compliance of a home care regimen as detailed by your healthcare provider. Daily brushing, flossing, as well as attention to nutrition, proper rest and cessation of smoking are essential.
- Follow-up testing between 6-12 weeks with MyPerioPath is recommended. Persistence of bleeding on probing is often indicative of unresolved infection. Retesting will identify residual or refractory bacteria. Currently there is not a cure for periodontal disease, only periods of remission.
- Assessment of a patient’s level of inflammation with Celsus One is valuable in deciding the frequency of patient recall and treatment.
Systemic Effects of Oral Pathogens

Cancer

Chronic gum disease, involving Aa, Pg, Tf, and Pm is a risk factor for the development of certain cancers including ones involving the pancreas, esophagus, colon, lungs, and the head and neck. Additionally, untreated gum disease is a cause of ongoing inflammation, which may promote the advancing growth of tumors.

Cardiovascular Health

Select bacteria such as Aa, Pg, Tf, and Pm can leak from blood vessels in the gums and travel to the heart, where cholesterol and other lipids deposit. These bacteria can incite inflammation in arteries, and if occluded, cause a heart attack. A goal of treatment is to minimize the levels of these bacteria as much and as long as possible.

Joint and Musculoskeletal Health

The periodontal bacteria Aa, Pg, Tf, and Pm are a cause of arthritis. The oral inflammation caused by these bacteria also leads to total body inflammation which, combined with changes in a person's immunity, may result in chronic joint diseases like rheumatoid arthritis.

Dementia and Brain Health

Recent medical studies point to poor oral health, and high levels of the bacteria Pg, Tf, and Pm in our gums, increasing the risk of developing dementias such as Alzheimer's.

Metabolic Health

Obesity, lack of exercise and chronic gum disease involving the bacteria Aa, Pg, Tf, and Pm cause chronic inflammation. Inflammation can damage the pancreas where insulin is produced, possibly leading to diabetes. Also, diabetes worsens oral health by increasing the level of harmful bacteria in the gums.

Healthy Pregnancy

Bacteria associated with gum disease, especially Aa, Pg, Tf, and Pm, are known to put a pregnancy at risk for pre-term birth, decreased birth weight and even blood infection in the placenta or newborn. Every pregnant woman should be tested for these harmful bacteria.

Methodology: Genomic DNA is extracted from the submitted sample and tested for 10 species-specific bacteria [Aa: Aggregatibacter actinomycetemcomitans, Pg: Porphyromonas gingivalis, Tf: Tannerella forsythia, Td: Treponema denticola, En: Eubacterium nodatum, Fn: Fusobacterium nucleatum/periodontium, Pi: Prevotella intermedia, Cr: Campylobacter rectus, Pm: Peptostreptococcus (Mesorhizobium) micros, Ec: Eikenella corrodens] and 1 genus of bacteria [Cs: Capnocytophaga species (gingivalis, ochracea, sputigena)] known to cause periodontal disease. The bacteria are assayed by real-time quantitative polymerase chain reaction (qPCR). Bacterial levels are reported in log 10 copies per mL of sample (e.g. 1×10^3 = 1000 bacteria copies per mL of collection). Cross-reactivity is possible with Leptotrichia buccalis, Fusobacterium hwasooki, Capnocytophaga granulosa and Capnocytophaga leadbetteri. This test was developed, and its performance characteristics determined by OralDNA Labs pursuant to CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration. The FDA has determined that such clearance or approval is not necessary.

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