

Spirochetes

What has the Center for Disease Control (CDC) most concerned right now? Mycobacterium, the class of germs the trombone player from Chapter One fought. MRSA belongs to it. So does tuberculosis.

Many bacteria in this class have a characteristic receiving renewed attention – they have several life phases, an adaptation that gives them powerful survival strategies.

As described in the last chapter, current antibiotics target individual bacteria not protected by germs organized into biofilms. Antibiotics and the ultrasonics used in dentistry, kill by disrupting a bacteria's cell walls. What if a microorganism has no cell wall?

At least twenty kinds of bacteria have life phases during which they do not. They shrink from their typically large size to form a spores or cysts about the size of a virus – so small our immune systems cannot detect them. In these dormant forms, they do not cause symptoms; yet similar to bacteria in biofilms, most survive starvation, pH changes, temperature variations, and attempts at oxidation with hydrogen peroxide.^{xv}

Spirochetes are a primary concern. Lyme Disease and Syphilis are familiar diseases caused by spirochetes. There are fifty-three known strains of oral spirochetes. Their corkscrew-shaped active forms easily drill into cell walls of dense tissues like bone that other organisms can't enter. They arrive and infect via the circulatory system. Their active forms regularly release neurotoxins. Brains and blood of Alzheimer's patients often contain a too-common spirochete of oral origin called *Treponema denticola*.^{xvi} The outer membrane of *Treponema* strains contribute to their ability to penetrate blood vessel walls and cause virulence.

Remember when I suggested inflammatory diseases are essentially diseases of blood vessel walls? Blood vessel walls in diseased gum pockets match blood vessel walls described in atherosclerotic plaques.

One of the ways bacteria resist our control efforts is their ability to exchange genes asexually between species. Species thriving close together, such as those in oral biofilms, have ample opportunity to gain diversity and resistance within plaques. *Treponema* organisms are particularly good at asexual gene swapping

Active spirochetes go dormant when threatened or when the immune system is strong. When conditions become more favorable for

them, they convert back to their active drill bit form. When spirochetes are cultured in a lab, carefully matched antibiotics create a kill zone in their immediate vicinity, but off to the edge of the medium, dormant cystic forms proliferate. This is consistent with retrospective research by Dr. Nordquest, a leading dentist and researcher. Over many years he took electronic recordings of the microscopic sessions he had with his clients. When he realized spirochetes have a dormant phase, he reviewed his archived data and saw spirochetal spores everywhere, particularly prevalent in those just finishing antibiotic therapy.^{xvii} It could be said that antibiotics encourage the non-motile dormant phase/proliferation of these bacteria.

H. pylori, an oral organism previously mentioned as being associated with ulcers and stomach cancers, is said to be hard to eradicate without treating gum disease at the same time. *H. pylori* is a spirochete. Could it be that treating gum disease concurrently is not enough for long-term success?

Dr. Nordquist surmises oral spirochetes may be the “smoking gun” connecting gum and heart disease. He believes the dormant forms reactivate in the lining of the blood vessels of the heart in particular, “causing a final inflammatory response that results in a heart attack”. He believes spore activation in blood vessels results in blood clots and that these events affect people in their later, more vulnerable years.^{xviii} Spores can also activate when the immune system is challenged by extreme stress.

There are a few high-level dentists interested in eradicating oral spirochetes. They are evaluating treatments developed for Lyme disease. While laser, chemical curettage, or ozone therapy may work well within the mouth and are important adjuncts, remember they are localized, temporary therapy. Keeping the body chemically balanced is part of keeping your whole body strong and resistant.

To kill off the spore forms, alternative therapies with promise utilize *pure, medical grade* ozone, autohemotherapy with ozone and complicated multi-year courses of pulsed very low dose antibiotics in conjunction with olmesartan (the Marshall Protocol) and glutathione. (See Resources section.)

Fun Facts: Those Incredible Survivors!*

- Live bacteria survive in the petrified gut of a forty million year old bee.
- The most amazing thing ever brought back from the moon was a live bacterial colony. It survived a space launch, the vacuum of space, continual radiation exposure, frigid space temperatures, and a lack of food, energy, or water for three years.
- *D. Radiodurans* (What humorists scientists can be!) can survive almost 10,000 times the dose of radiation lethal to humans.
- Bacteria are the oldest life form on earth – more than 3.5 billion years old.
- Your body has ten times more bacterial cells than human cells.
- Scientists have trained *E. coli* bugs, the most numerous bacteria found in the colon, to assemble into glowing bull's eyes shapes on command.
- *R. matallicurans* can turn dissolved gold into solid nuggets.
- Hydrothermal vent bacteria, never considered to be able to survive in humans, has been found on prosthetic hip joints.

*Thank you Betsy Reynolds, RDH, MS, oral biologist, for these insights into an unseen world.

What will you do with all this information?

Pause here and remember: I did not write this book to scare you. Fear has nothing to recommend it. “Living with fear” is an oxymoron.

Bacteria are clearly intelligent survivalists. And they are fascinating. I hope you gain a sense of wonder – wonder at the intricacies of the biology and wonder that we live as well as we do. We humans are quite ingenious and resilient ourselves. If we pay attention – if we keep our minds and hearts open – we experience a far richer and likely longer life.

Learn about the fascinating connections, then enjoy learning about how to implement solutions. We are all just beginning to appreciate the miraculous world of the unseen.

Genetics Is Not Destiny

CLAIRE: “Do you think I’m genetically coded for this? Must I be more meticulous than my friends because my father has heart disease and high blood pressure?”

CAROL: “Genes influence everything. A simple PST test, a one-time screening tool based on circulating levels of the inflammatory messenger Interleukin-1, measures genetic susceptibility. I recommend this test to smokers because a genetic tendency for an exaggerated immune response combined with smoking yield a grim outlook for those trying to avoid serious gum disease. Smokers are seven times more likely to suffer severe gum disease.^{xviii} Because your family and personal health history is riddled with inflammatory diseases, it may help us determine how aggressive we need to be to keep you healthy. It is quite frequent that people without a genetic predisposition have advanced gum disease largely due to lifestyle.

“We should consult with your rheumatologist, because arthritis also elevates Interleukin levels. Researchers have long guessed these two diseases are closely related through common underlying dysfunction of inflammatory mechanisms.^{xxi} I know you don’t take a prescription to control your arthritis so if Interleukin levels were low it could be because you already boost your immune system to keep symptoms bearable. You walk daily and chase your kids for exercise. You minimize stress through yoga, meditation, and positive thinking. You don’t smoke, your diet is excellent except for your recent infractions, and you don’t carry excess abdominal fat.

“Between now and your next visit, why don’t you try to limit your desserts and develop sound hygiene practices, what I call ‘daily wound management.’ Your gums will likely improve, and you might have fewer arthritis flare-ups! It’s a win-win deal. Try to floss in front of your children. They don’t listen to us; they mimic us!

“If your gums don’t improve, we can order a PST test and consider diabetes screening, because the disease runs in your family. You may want to relay this information to your father. I sense he has a casual attitude about his gum disease, which he ignores it at his peril. If he treated his gum disease, he will likely reduce his cardiovascular risk gain better control of his diabetes. We’ll discuss that next time, because gum disease plays a role in blood sugar control.

“To summarize, your mouth is your body’s gateway. Poor dental health and heart disease are strongly linked and the odds of having a heart attack increase in proportion to the severity of the gum disease

While this is clear, remember smoking, obesity, diabetes, arthritis, and stress, are shared risk factors. But isn't it wonderful to know you can control a significant risk factor for many diseases with a few attentive minutes every day?"

Interleukin-1 (IL-1) Genetic Test

Interleukin-1s recruit so many other inflammatory messengers they are considered the “master mediator” of the inflammatory response. IL-1s stimulate bone loss throughout the body. The jawbone, which supports the teeth, is not spared. High levels of IL-1s represent a strong immune system challenge. In the absence of an obvious infection, high levels could indicate a predisposition to gum disease.^{xix} The theory is that some people with periodontal disease show an Interleukin-1 level that is two to six times higher than others with similar disease levels because of a genetic susceptibility. The enhanced inflammatory response for genetically susceptible individuals would initiate more body damage compared to those with a muted response.

There are other reasons for elevated IL-1 levels beyond bacterial stimulus, genetic predisposition and smoking. For example, some diabetics show an IL-1 level thirty times that of a healthy person.^{xx} See Chapter Five to learn why diabetics have serious immune system challenges.

In determining how aggressively to treat gum disease, it is helpful to determine risk. Oral DNA Labs (Quest Labs subsidiary: 877-577-9055) offers a test called “MyPeriodID PST” that looks at the DNA of genes that control IL-1 production to determine the genetic risk for accelerated bone loss. A non-invasive test, a saliva sample is sent to a lab for molecular analysis. If someone is at genetic risk and has other complicating factors like smoking, diabetes, or heart disease, aggressive therapy might include assessing the disease-causing bacteria present. This analysis is also derived from saliva. Some dentists target them with matched antibiotics during *active* periodontal therapy. This is because ultrasonic instrumentation breaks up biofilm, therefore some bacteria become susceptible to antibiotics. Because I believe gum disease should always be treated aggressively for reasons that will become clear, I avoid antibiotics and use more certain therapies you will read about later.

Note: A person must fast for 12 hours prior to testing. Results are returned in five to seven working days.

My PerioPath Test

The same company that does the genetic testing described in the previous box has another interesting test. Knowing risk factors and knowing what is in the gum pocket is important. From a saliva sample, MyPerioPath shows the DNA signature of about 13 organisms.

I resisted this test for awhile because it was presented to me as a way to design antibiotic therapy. Learning about spirochetes, knowing most researchers think antibiotics will become a thing of the past for many reasons, and knowing there are far more pathogens than this test looks for, it is obvious why I did not use it. But I find something that can be measured – knowing the identity of some of their flora* and their characteristics – powerfully motivates some clients. They work harder to change their terrain, the substrate** they make of their bodies through lifestyle choices.

On the other hand, clinicians skilled at using Darkfield microscopes can use them to identify spores or cysts of spirochetes.

*This tests includes one spirochetal organism, *Treponema denticola*.

****Substrate:** the base on which an organism lives.

Bacterial Showers/Damaged Heart Valves

Did you ever have a sore throat that you neglected or waited too long to treat, only to have it develop into a massive case of strep throat? Many of us have done so without knowing it can devolve into rheumatic fever. Rheumatic fever is dangerous because it can permanently damage heart valves. It can result in immediate heart failure or put you at risk of heart failure for a lifetime. Damaged heart valves can also result from open-heart surgery or congestive heart failure. Sometimes one is born with faulty valves.

Bacterial showers, like those that gum disease induces, become an every day risk.

The list on the following page is not an enviable list. These are well-known people who have died suddenly because of endocarditis, an uncommon, but serious infection occurring on heart valves or the lining of the heart's blood vessels:

- Gustav Mahler, composer, 1860–1911
- Robert Burns, poet, 1759–1796
- Alois Alzheimer, physician, 1864–1915
- Orville Gibson, guitar manufacturer, 1856–1918
- Rudolph Valentino, actor, 1895–1926;
- Jack Glascock, bass player for Jethro Tull, 1951–1997

When a surge of adherent bacteria like oral biofilms shower the circulatory system, these bacteria can attach to and colonize damaged heart structures. Endocarditis from bacterial showers can result from any infection. Oral infections are a frequent culprit, but past wisdom suggested this occurred only during certain dental procedures. Research has changed what we know of this phenomenon; infective endocarditis can be a serious complication of daily dental neglect.

Imagine a waterfall. Downstream from its churning base, leaves and other debris swirl in tranquil side eddies. Metaphorically, this is a quiet location downstream from an ineffective heart valve. Faulty valves disrupt the normally smooth blood flow. These eddies are the hospitable locations where adherent biofilms grow to become potentially life-threatening infections.

Where do these bacterial showers originate? Certainly any infection in the body can flood the bloodstream with bacterial culprits known to trigger endocarditis. Urinary tract infections, pneumonia, and cellulitis are examples.

Surgical and dental procedures involving contaminated tissues have been especially blamed in the past. This has kept the American Heart Association and dentists struggling for decades to manage these risks.

The American Heart Association continually evaluates and revises guidelines for antibiotic coverage during dental procedures. Thirty years ago, they recommended at-risk clients to take antibiotics for four days. Since then, the recommended antibiotic dosage and frequency has downgraded several times. By the late 1990s, the recommendation was for one sizeable antibiotic dose an hour prior to dental procedures.

This sounds sensible and reduces the risk of already rare cases of endocarditis. Consider what you now know about the health implications of raw oral tissues teeming with morphed bacteria in biofilms, which are specialized to adhere to blood vessel walls. This unhealthy state is common in many adults. It is easy to understand how toxins from a pocket can shower the bloodstream when highly inflamed, fragile tissues are manipulated to remove biofilm and mineralized deposits.

This is one reason many dental professionals begin immune system support therapy for clients prior to therapy.⁵

Finally, in 2007, the American Heart Association released new dental antibiotic coverage guidelines. These guidelines strictly curtail antibiotic coverage, reflecting a subtle, yet important reality.

Infected Gums are Not a Casual Concern

A casual attitude towards infected gums is a dangerous attitude for everyone. For those at high risk, it is more dangerous. As oral-systemic infection links become clearer, it seems odd to curtail antibiotic coverage, yet these guidelines implicate an interesting reality. Dental procedures are a transient event. An average extraction subjects patients to a six-minute intense bacterial shower. A “cleaning” is a more serious and lengthy procedure, yet still low risk, all things considered.

Bacteremia, the presence of a high bacterial load in the bloodstream, of oral cause is an everyday risk. Daily chewing represents the biggest risk. Blood levels of endotoxins (toxic bacterial end products) and inflammatory messengers quadrupled in circulating blood after subjects gently chewed gum lightly for 50 times on each side of the mouth.^{xxii} Informed estimates suggest eating rough foods like corn chips, tooth brushing (especially with a hard or rough, natural brush), flossing (particularly incorrectly), and other oral habits subject a person to bacteremias for over ninety hours a month!^{xxiii} That is roughly three hours every day. So there is a chronic release of bacteria, their endotoxins, and the mediators that combat them into the bloodstream.

Both the incidence and the magnitude of bacteremias of oral origin are proportional to the degree of oral inflammation and infection.^{xxiv} ^{xxv} Active inflammation matters more than the surface area of the “oral wound.” People with healthy mouths are at far less daily risk of life-threatening bacteremias.

The implications are enormous and are compounded when one learns the risk of infective endocarditis⁶ and chronic inflammatory diseases are on the rise.

5 I always use ozone gel in pockets before I work to help avoid the shower. Nonetheless, I want their immune systems strong also. An example of pre-treatment immune support therapy can be found at: <http://www.pharmaden.net>. Explore other options at: www.mouthmattersbook.com.

6 Currently reported at 3.3 cases/100,000 population/year in the U.S. and the U.K.