

Born to Be Healthy

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We were born to be healthy. Hopefully this is not a difficult concept to wrap your head around.

Since I am a periodontist, I am going to take a dental perspective about this concept in this paper. However, the health of our bodies and the health of our mouths are intimately and intricately connected. What happens in any human cell eventually affects every other cell to some extent.

This article outlines the prevalence of gum disease in the US population today and discusses the science that sheds light on the foods we eat, what we absorb, how our bodies react to substances, and the importance of gut bacteria. It also addresses how I treat gum disease in my progressive office, the natural supplements I suggest to enhance the immune system's function in health, and a preventive medicine protocol based on my belief that we were born to be healthy.

Let's get on with the task of being the healthy specimens we were designed to be.

My enlightenment

For the first sixty-six years of my life, I was an unhealthy guy. I thought I was healthy, but I wasn't. As a matter of fact, in 2006, at age sixty, I had a stroke. From 2006 to 2013, I actively pursued a new course to get healthy. I began exercising aerobically five days a week for about an hour a day. I ate low-fat, high-carbohydrate, high-fiber foods because my physicians told me that was what I should do. But, I wondered, if that was supposed to be making me healthier, why was I gaining weight?

Then I took a remarkable five-day continuing education program in 2013 called *Nutrition Intensive for Healthcare Professionals*. I thought this would hone my skills and confirm that what I was doing was on track. It had a slant different from what I had previously learned: it was based on ancestral nutrition. To my surprise, in those five days I learned that what I was doing nutritionally was essentially wrong. My foundation was rocked.

I went on to get educated about nutrition. I eventually became a Certified Functional Medicine Practitioner and a Certified Primal Blueprint Expert, an intensive ancestral health certification program by one of the leaders of the Paleo/Primal community. Concepts began to gel, and I then knew we were born to be healthy.

I am now the *poster boy* for a Primal lifestyle. It has changed my entire life and my total body health. Over the last two-and-a-half years my blood chemistries have improved significantly, and I have lost more than thirty pounds without dieting. I am a work in progress, and I am healthier today than I have ever been. I have now incorporated what I learned into treatments for my periodontal patients who want to know more about the Primal lifestyle.

Things to think about

- We were not born with a Lipitor deficiency.
- We were not born with a fluoride deficiency.
- We were born to be healthy, but disease is rampant.

Disease happens for a reason. There must be cellular damage that eventually manifests into some type of definable disease. For example:

- Something happens to our cellular function to create cardiovascular disease.
- Something happens to our biological chemistry to create tooth decay.
- Something happens to our immune system to create gum disease.

The underlying questions are, what happens? and why?

Facts

In 2012 the Centers for Disease Control and Prevention reported that 47.2 percent of the US adult population had periodontitis, and the prevalence jumped to 70.1 percent for adults sixty-five years old and beyond. Periodontitis is the more advanced stage of gum disease in which jawbone is being destroyed, and the infection can spread throughout the body. The population percentage is even greater for gingivitis, which is a reversible, more common, and early stage of gum disease. The published study was the most complete periodontal evaluation ever reported on a national scale.¹

However, periodontitis, gingivitis, and tooth decay have not always been a problem. A look back to our primal ancestors shows a much clearer picture.

The human species has been evolving for about 2.5 million years. Our primal ancestors did not have toothbrushes or dental floss or added fluoride in their water supply. They did not see a dentist every six months. Yet they hardly ever had gum disease or tooth decay—until about 10,000 years ago. What caused the prevalence of periodontitis to jump from practically zero over 10,000 years ago to 70 percent today?²

Researchers have not only uncovered skeletal remains of our primal ancestors, but they also have developed DNA tests that can identify the types of bacteria in the ancient remnants of the dental calculus.³ The dental remains from between 20,000 and 10,000 years ago that the researchers studied demonstrated minimal decay and minimal periodontitis, and there was significant bacterial diversity in the dental calculus. Interestingly, these bacteria were not virulent and were in a state of homeostasis. The dental remains from 10,000 years ago showed increasing signs of decay and loss of bone supporting the teeth in the jaw. The bacteria became more virulent. About 170 years ago, the prevalence of these diseases exploded and the bacteria became skewed to very unhealthy types. Again, the fundamental questions are, what happened? and why?

Questioning what we think we know

We really don't know the entire etiology of tooth decay or periodontal disease or cardiovascular disease. Actually, we don't know the entire etiology for any chronic disease. We may have some ideas, but are they correct?

It ain't so much the things we don't know that get us into trouble. It's the things we know that just ain't so.

—Josh Billings (Henry Wheeler Shaw), nineteenth century humorist

It is difficult to arrive at accurate answers because there is so much we don't know. Sometimes what we think we know gets redefined and proven wrong. Science is not an exact science. And there is a vast amount that we don't know we don't know!

It is not just in our genes

A science called *epigenetics* is the study of environmental factors influencing our genetic expression.⁴ **More than 90 percent of all chronic disease today is related to either what we put into our bodies that should not be ingested or what we need to put into our bodies that we don't.**⁵ This is a strong statement, yet most of the medical profession does not know this or does not know its implications.⁶ The answers to the original questions, what happens and why, lie in this concept.

Unraveling the answers

In 2012 Ian Spreadbury wrote a seminal paper that reviewed 112 peer-reviewed articles,⁷ which helped me gain a clearer perspective of what it means to be healthy. The answers to what happens and why begin to take shape at the dawn of civilization.

The age of civilization began about 10,000 years ago and with it emerged grain agriculture. The seeds of grasses were cultivated and then processed into flour. Flour, an *acellular carbohydrate*, could feed the masses.

What is the big deal with acellular carbohydrates?

All plants are made up of cells that are surrounded by cell walls. When we eat plants, our digestive systems naturally break down these cell walls and utilize the cells' entire nutrients. Processing imposes unnaturally high pressure and heat on the plant cells. The cell walls are destroyed, and the resulting product is a highly condensed substance without cell walls. These are acellular carbohydrates, and this is what happens to grains to make flour. Many of the original nutrients within the natural cells are lost. Sugary foods are also processed into acellular carbohydrates.

As these processed carbohydrates became commercialized, many varieties of carbohydrate-dense foods were created. These dense acellular carbohydrates have played havoc on our digestive systems ever since.

Today, most Americans eat acellular carbohydrates at every meal and for every snack. Spreadbury recognized that the foods that contained 23 percent or less *carbohydrate density* were more easily handled by our digestive systems; foods that contained more than that were implicated in chronic inflammation and chronic disease.

The foods we eat are part of the answer to what happens and why. (See Appendix 1 for a list of some common foods with their carbohydrate densities as well as a government-sponsored website and instructions for calculating the carbohydrate density for almost any food.)

Following are summaries of two papers that demonstrate how food can be our best medicine.

Scientific Paper #1

In 2009 the *Journal of Periodontology* published the results of an experiment in which ten individuals were allowed to eat whatever they could fish, forage, and cook over a period of four weeks. They were given some basic, whole, unprocessed foods to begin with. They could not practice any oral hygiene. At the beginning of the study, bacterial cultures were taken from their tongues, dental plaque, and gum pockets, along with recordings of pocket depths and points of gum bleeding. At the end of the four weeks, the researchers discovered that the plaque levels had increased in both volume and varieties of bacterial species. However, they were surprised that the species of bacteria were not virulent and that pocket depths as well as bleeding points decreased significantly. In essence, these individuals ate nutrient-dense whole foods, didn't practice any oral hygiene, and signs of gum infection decreased.⁸

Scientific Paper #2

In the second paper, researchers summarized the results of thirty-seven clinical studies to determine the actual nutrients that assisted in periodontal healing after surgery or assisted in overall periodontal health.⁹ Here are the nutrients most often associated with gum health:

- Vitamin D (Primary source: the sun; dietary sources: fatty fish, pastured eggs)
- DHA (Dietary sources: oily fish such as salmon, sardines, and anchovies)
- Low ratios of omega-6 fatty acids to omega-3 fatty acids (In the United States the ratio is about 30:1, but in healthy societies it is closer to 1:1. Dietary sources: high levels of omega-6 fatty acids are in processed vegetable oils; high levels of omega-3 fatty acids are in oily fish.)
- Low-processed carbs and high fibers (Dietary sources: fruits and vegetables)
- Calcium (Dietary sources: bones and bone broth, dark leafy greens, canned salmon with bones)
- Magnesium (Dietary sources: Swiss chard, spinach, pumpkin seeds, Brazil nuts, raw cocoa)
- Vitamin C (Dietary sources: broccoli, citrus)

Is there a diet that incorporates an abundance of these nutrients in its base of food choices?

There is. It is the Paleo-type diet.

Studies have shown that a Paleo-type diet embraces those nutrients that allow individual cells to survive and thrive, and it has been the way of eating throughout the course of human evolution.^{10,11,12} Before addressing a full description of this way of eating, let's discuss the connections and underlying causes of chronic inflammation and chronic disease, of which periodontal disease is one.

The connection—the vicious cycle

What goes into our mouths affects the good bacteria in our bodies and our overall health. Gut bacteria are the major players in health and disease.

Guts did not evolve to effectively deal with acellular carbohydrates. These carbohydrates change the gut bacteria (known as the gut microbiome) and increase the harmful types of microbes.

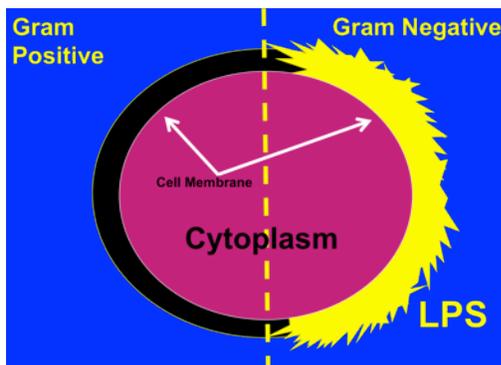
Harmful bacteria and lipopolysaccharides (LPS), which are cell membrane remnants of dead gram-negative bacteria^A, begin to proliferate in the gut, causing irritation and an imbalance of bacteria. This is an unhealthy development.¹³

Lipopolysaccharides (LPS)

The graphic below illustrates an imaginary bacterium, half of which represents a gram-positive bacterium and the other half a gram-negative bacterium. The cytoplasm, the liquid center of the cell, is noted in the center, and the cell membrane is identified with white arrows.

The most distinguishing difference between the two halves is the outer layer of the cell membrane. The outer layer of the gram-positive side is smooth; the outer layer of the gram-negative side is extremely jagged. This rough surface is known as the *lipopolysaccharide* outer layer, and it occurs only on gram-negative bacteria.

After gram-negative bacteria die, the LPS remnants can act like spurs. They can cause serious problems involving chronic inflammation and damage to various biological systems if they get into the bloodstream.



Other problems

An accumulation of unhealthy bacteria in the gut is not the only problem humans experience as a result of the foods they eat. Ingested toxins can also irritate the intestinal lining. In addition, the digestive system did not evolve to completely break down the proteins in grains.

Leaky gut

Undigested proteins from grains, ingested toxins, and unhealthy levels of microbes can damage the one-cell-layer-thick lining of the intestines, creating small holes in the lining. This is called *intestinal permeability* or *leaky gut*. With constant exposure to indigestible peptides, toxins, and

^A Gram-negative bacteria relate to a specific group of bacteria that take on a *pink color* under the microscope following a *gram staining* procedure. Other bacteria take on a *violet color* after *gram staining* and are called gram-positive. Gram-negative bacteria are often pathogenic in the body.

unhealthy bacteria, damage to the gut lining becomes more serious. Just like tears in cheesecloth, an opening or pathway is created for unwanted stuff to leak into the blood system.¹⁴

Damage to the gut lining sets up a critical situation. Specific biological insults can occur.

- Undigested peptides from grains and other undigested food particles can leak through these holes into the bloodstream.
- Toxins and lipopolysaccharides, which are very irritating, can leak through these holes, creating severe systemic inflammation.

The initial results to the body can be substantial. The immune system reacts by creating a cascade of inflammatory reactions within the lumen of the intestines as well as in the bloodstream and throughout the rest of the body.

Complicating this process, some of these invading peptides might look like normal proteins in other tissues of the body. After enough insult to the body through the leaky gut, the immune system can become confused and begin attacking the normal cells of various organs that look like the invading peptides, a phenomenon called *molecular mimicry*. The tissues and organs with the weakest genetic predispositions can become affected—beta cells in the pancreas, resulting in type 1 diabetes; skin cells, resulting in psoriasis; thyroid cells, resulting in hypothyroidism or Hashimoto’s thyroiditis; joint cells, resulting in rheumatic arthritis; or periodontal tissues, resulting in periodontitis.¹⁵

We are more bacteria than human

The human body is made up of 10 trillion cells, yet the body is host to 100 trillion microbial cells. Most of these live within the digestive system, and the great majority of them reside in the colon. We are healthy when these microbes are in a state of homeostasis. We are unhealthy when this delicate balance goes astray.

There are probably 35,000 or more microbial species in the gut, most of which cannot be cultured through normal means.¹⁶ Gut bacteria affect the entire body, including the mouth.

Studies have shown that patients with inflammatory bowel disease have unhealthy bacterial changes in their saliva.¹⁷ Research has also shown that some species of gut bacteria go dormant, live intracellularly in red blood cells without detection, and then migrate to distant organs of the body, resulting in infections of apparently unknown origin.¹⁸ In a randomized controlled trial involving a population of school children, healthy bacteria in fermented foods were shown to improve the bacterial components in the children’s dental plaque.¹⁹

All of this research demonstrates how bacteria from the gut influence the entire body.

Returning the gut bacteria to a healthy balance is proving to be a promising approach for various diseases. Some cutting-edge procedures such as fecal microbiota transplants (FMT) have successfully replaced bad bacteria in the gut with healthy populations to cure *Clostridium difficile*, an otherwise difficult infection to treat.^{20,21} These procedures are currently being investigated for the treatment of obesity, Alzheimer’s, autism, multiple sclerosis, and even ALS—all of which have been shown to have chronic inflammation as their underlying cause. Periodontal disease is also a chronic inflammatory disease, which may very well respond to reestablishment of healthy gut bacteria.

How I treat advanced gum disease

Although I strongly believe we were born to be healthy, most of us are not. I see patients in my office who are not healthy, and my goal is to get them into a state of oral health. My ultimate goal is to show those who are interested a path their bodies were designed to travel to survive and thrive.

I first address the acute problem of gum disease—swelling, abscess, and pain. Other dental procedures that need to be treated are then completed. Next, I perform specific gum treatment, usually using the PerioLase laser with the LANAP[®] (laser-assisted new attachment procedure). A two-minute animated video on this exciting technique is available on YouTube.²²

Following active gum treatment, I establish a maintenance program based on the needs of each patient. Then I go a step further; I incorporate my knowledge of primal nutrition and my appreciation for gut health. I provide nutrition and immune support for my patients who are interested in improving their health for the rest of their lives.

Nutrient-dense foods

The science clearly shows that nutrient-dense foods are medicine. They allow every cell in the body to survive and thrive. The trick is knowing what these foods are *and what they are not*.

It is important to understand that any nutrient isolated in a synthetic supplement form does not produce the same health effects, as does a whole food containing that nutrient. Real food contains much more nutrient synergism than we understand or comprehend. Our knowledge about nutrition is not as advanced as we might think it is.

The picture below is a typical meal of the Standard American Diet:



This picture shows the obvious result of years of ingestion of the Standard American Diet:

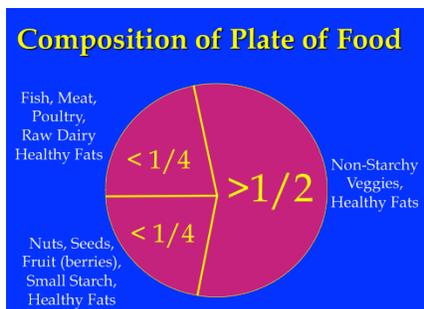


Cellular damage actually occurs and begins to compound decades before clinical signs and symptoms become evident.

Here is a summary of information on some of the best nutrient-dense foods:

Animal proteins should be pastured and wild caught, not grain fed or farmed. Organ meats are one of the most nutrient-dense foods on the planet—liver, brain, heart, and kidney. (Some people may need to acquire a taste for them.) Contrary to popular belief, healthy fats are your friends. Saturated fats from grass-fed beef and pastured pork are healthy; so are coconut oil, avocados, and butter from grass-fed cattle. All non-starchy and deeply colored veggies are healthy, as are seaweeds like kelp and wakame. All dark-colored fruits such as berries are healthy in moderation. Nuts and seeds, herbs and spices, and fermented foods are healthy, and homemade bone broth is extremely healthy for the gut. And remember to drink plenty of clean, filtered water.

This chart illustrates a healthy plate of food:



In order to get the combination of micronutrients and macronutrients your body requires and craves, visualize every meal or snack you eat as a plate of food divided like this:

- More than half of the plate should be non-starchy veggies with healthy fat such as olive oil or melted butter from grass-fed cattle.
- Up to one quarter should be a protein such as salmon, pastured chicken, or grass fed beef, each with its own healthy fats.
- Less than one quarter should be, for example, some nuts, a few blueberries, or a small sweet potato—again, with some healthy fats.

Avoid grains, processed foods (including pasteurized milk products), sugars, industrial oils, and legumes (because of antinutrients and high carbohydrates). Animal products from concentrated animal feeding operations (CAFO) should definitely be avoided. CAFOs are cluttered, unhealthy factories where antibiotics, hormones, chemicals, and other toxic substances are often administered to the livestock. These meats are then processed for sale.

These pictures show examples of CAFOs:



Natural supplements for immune support

Some of my patients are interested in a natural way to support their immune systems. I offer them four specific products that may enhance their immune systems and gut microbiome during the healing process.

These products are available from healthcare professionals:



Andrographis Complex and Gotu Kola Complex support healing, and ProSynbiotic²³ and Prescript-Assist²⁴ support the gut microbiome.

Andrographis Complex contains Echinacea root and the herbs holy basil and Andrographis. This herbal combination assists the immune system in fighting infection.

Gotu Kola Complex contains gotu kola herb, grape seed, and ginkgo leaf. This herbal combination assists in the regeneration of connective tissue and supports circulation.

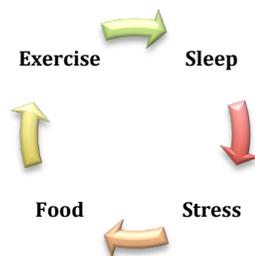
ProSynbiotic is a probiotic/prebiotic. It is a blend of four strains of research-supported probiotic microbes and two types of prebiotic fibers that help support a healthy gut microbiome.

Prescript-Assist is a probiotic/prebiotic. It is a blend of twenty-nine soil-based microbial strains that, research has shown, assist intestinal flora. It also contains a prebiotic composition of humic and fulvic acids.

Preventive medicine

My maintenance program is actually a preventive medicine program. In addition to an effective oral hygiene protocol (see Appendix 2), I recommend appropriate visits to a total-health-oriented dental office, a Paleo-type diet (see Appendix 3), and incorporation of other elements for health, including restorative sleep, efficient exercise, and stress reduction (see Appendix 4).

My bottom line is to enhance the potential for *quality of life*.



In summary, what we take in through our mouths has a profound influence on our overall health. All chronic disease, of which periodontal disease is one, is improved or worsened based on diet and lifestyle. A Paleo-type diet and lifestyle will put in place the epigenetics that our genes require to function in a healthy state, as we evolved to function. We were born to be healthy.

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24. Prescript-Assist is available at *Prescript-Assist*: <http://www.prescript-assist.com/>.

Appendix 1

Carbohydrate Density & How To Calculate It

The term “carbohydrate density” means the percent of the food mass that is carbohydrate minus the fiber component. It is easy to calculate the carbohydrate density of any food. Just divide the grams of carbohydrate in a particular food (excluding the grams of fiber it contains) by the total gram weight of the food to get a percentage. The carbohydrate density increases as more non-fibrous carbs are packed into a given quantity of food. A healthy carbohydrate density is about 23% or less.^B Eating foods that have a higher density than 23%, would put more stress on your metabolism and potentially lead to the degenerative diseases of societies eating processed foods. A government website where you can find grams of carbohydrates and grams of fiber in a specific weight of food is <http://ndb.nal.usda.gov/ndb/foods>.^C Here is how to use this website:

- Go to website page.
- Enter the specific food you are calculating in the space provided on the top of the web page and click “GO”.
- Various preparations for this food will appear. Click on the preparation you desire.
- Note the Grams of Carbohydrate per 100 grams of food, and note the Grams of Fiber per 100 grams of food.
- Subtract the grams of fiber from the grams of carbohydrates to get the non-fibrous grams of carbohydrate per 100 grams of the food. That will be the carbohydrate density of that particular food.

Modern food processing is, unfortunately, very good at boosting carbohydrate density. Here is a list of some foods from low-density to high-density carbohydrates:

Sampling of foods with carbohydrate density \leq 23% (from lowest to about 23% excluding fiber):

- Chicken, roasted thigh and skin = 0.0%
- Beef = 0.0%
- Lamb = 0.0%
- Pork = 0.0%

^B Spreadbury, Ian. Comparison with ancestral diets suggests dense acellular carbohydrates promote an inflammatory microbiota, and may be the primary dietary cause of leptin resistance and obesity. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*. 2012:5 175-189.

^C NDL/FNIC Food Composition Database. Agricultural Research Service National Agricultural Library (modified Dec 7, 2011). Available from <http://ndb.nal.usda.gov/ndb/foods>. Accessed August 2015.

- Mackerel = 0.0%
- Eggs, whole poached = 0.7%
- Spinach, raw = 1.4%
- Cauliflower, boiled without salt = 1.8%
- Swiss chard, raw = 2.1%
- Cheese, gouda = 2.2%
- Turnips, raw = 4.6%
- Kale, raw = 5.2%
- Macadamia nuts = 5.2%
- Carrot, raw = 6.8%
- Beets, raw = 6.9%
- Onion, raw = 7.6%
- Honeydew melon, raw = 8.3%
- Orange, raw Florida = 9.1%
- Apple, raw with skin = 11.4%
- Kiwi fruit, raw = 11.7%
- Lentils, boiled = 12.2%
- Leek, raw = 12.4%
- Parsnip, raw = 13.1%
- Black beans, boiled = 15.0%
- Ginger root, raw = 15.8%
- Pistachios, raw = 17.2%
- Buckwheat groats, roasted, cooked = 17.2%
- Sweet potato, baked in skin = 17.4%
- Quinoa, cooked = 18.5%
- White potato, baked in skin = 19.0%
- Brown rice, medium grain cooked = 19.5%
- Wild rice, cooked = 19.5%
- Banana, raw = 20.2%
- 85% Cocoa bar (Alter Eco Dark Blackout) = 22.5%

Sampling of modern foods with carbohydrate density > 23% (from 23% to the highest excluding fiber):

- Cheeseburger, single patty, plain = 26.0%
- Cheese pizza = 26.8%
- White rice, medium grain cooked = 28.3%
- Plantains, raw = 29.6%
- Nachos with cheese = 31.7%
- White bread = 34.7%
- Multigrain bread = 35.9%
- Popcorn, oil-popped microwave = 37.0%
- French fries = 37.6%
- Rye bread = 42.5%
- Bagel, wheat = 44.8%
- Potato chips, plain salted = 50.7%
- Oats = 55.7%
- Granola bar, plain = 59.1%
- Whole wheat hot cereal = 65.7%
- Oat Bran cereal, toasted Quaker Mother's = 66.8%
- Cookies, graham cracker = 74.3%
- Pretzels, hard plain salted = 77.0%
- Rice cakes, plain brown rice = 77.3%

Appendix 2

Too Many Paleo Diets!

First, you must realize that our primal ancestors did not eat the same things. How could they? They lived all over the world in all types of climates with various animals and plants making up their unique environments. Some ate large quantities of protein, some ate large quantities of fats; some ate large quantities of plants. Even today, hunter-gatherer societies around the world enjoy varied diets and exhibit exceptional health. So, how could a Paleo Diet be the same thing for everyone? Impossible.

Second, one thing is certain – a Paleo-type diet did not include processed foods, which are ubiquitous in our modern diets. If you exclude these processed “foods”, then practically everything else could be fair game to eat if you could tolerate them and if they were prepared properly.

A Paleo-type Diet always excludes:

- Processed grains (including all breads, pasta, cereals, crackers, pizza, cookies, muffins, popcorn, rice cakes, etc.)
- Processed sugars, artificial sweeteners, and their aliases (including sodas, candy, anything made with high fructose corn syrup, agave nectar, dextrose, beet sugar, fruit sugar, etc.)
- Commercially bottled vegetable oils (that includes corn oil, soybean oil, safflower oil, sunflower oil, canola oil, and most oils that are liquid at room temperature)
- Fats that are hydrogenated or partially-hydrogenated as well as commercially processed trans fats and margarine
- Processed and package foods containing preservatives, food coloring, artificial ingredients, chemical products, GMO products, grain products, unhealthy fats, and added sugars of any type
- Commercially pasteurized and homogenized milk products

So, what can you eat?

- All animal products that are pastured or wild caught including their organ meats and their wonderful saturated fats
- All vegetables either raw or cooked, ideally organic
- All fruits, ideally organic
- All nuts and seeds, ideally organic and raw

Where to purchase Paleo-friendly foods

- Most can be purchased in any grocery store. You just need to look, read labels, and be discerning.
- Local is better than shipped from several hundreds or thousands of miles away.

- Check out local farmers' markets for fresh produce and animal products.
- Go online to <http://www.localharvest.org/csa/> and enter your ZIP Code to find a community supported agriculture (CSA) market near you.
- Find local sources for raw dairy by entering your ZIP Code at <http://www.localharvest.org/raw-milk.jsp>.
- Another source to find local, sustainable, organic foods is <http://www.eatwellguide.org/i.php?pd=Home>.

Appendix 3

Stinky Breath & Effective Oral Hygiene

Bad breath stinks, and nobody wants stinky breath. But, everybody has had stinky breath or halitosis at times. You may not know that you have stinky breath, but people that come close to you will know. So, what causes it, and what can you do about it? I am going to tell you.

Certain bacteria, certain foods, lack of saliva or dry mouth, infections either in the mouth or elsewhere in the body, or stress may cause bad breath. But, the fact is, if you could correct the causes, then your stinky breath would no longer be an annoying problem.

The first major source of halitosis is the mouth, where 90% of all bad breath originates. 80%-90% of this odor from the mouth originates on the back of the upper side of the tongue. This is where many bacteria reside, and where they breakdown dead cells and food particles to form stinky breath.

The next likely place in the mouth for bad breath is located in the crevices where the gum surrounds the necks of teeth and in spaces between the teeth. Bacteria that cause bad breath can accumulate in these hidden places, but more importantly they can cause gum disease, which can contribute to even worse stinky breath.

Other less common sources creating bad breath in the mouth may originate from dental decay; poorly fitting dental work; abscesses and other mouth infections; tobacco; alcohol; dry mouth frequently as a result of some medications; and volatile foodstuffs like onion, garlic, cabbage, and cauliflower.

The second major source of bad breath is from the nose. This is usually caused by sinus infections and post-nasal drip.

Another source of halitosis can be the odors produced from the metabolism of volatile foodstuffs, which are eventually expelled through the lungs as well as the skin.

Less frequent sources of bad breath are infected tonsils, liver and kidney diseases, carcinoma, lung infections, metabolic disorders, and diabetes.

A likely source that is actively being investigated through peer-reviewed research is the gut bacteria. Healthy bacteria in the gut can be damaged by specific foods, medications, and stress, all of which in turn can affect the bacteria throughout the body. These unhealthy changes in the gut microbiome can affect the healthy bacteria in the saliva, which then can change the bacteria in the mouth.

So, what can you do? Here is a regimen that might work for you:

- Brush your tongue. This is an excellent way to remove odor forming bacteria and food remnants from the back of your tongue. An effective means is to use a teaspoon. Place the inverted teaspoon as far back as is comfortable on the upper side of your tongue. Then, gently glide the teaspoon forward, removing the bacterial film and microscopic food particles. Repeat this 2-3 times, and then wash off the teaspoon. Perform this tongue-cleaning method in the morning and then in the evening before bed.

- Brush and floss your teeth correctly. For most people, I recommend the following for effective tooth and gum cleaning:
 - Have a small jar of coconut oil and baking soda in your bathroom. Coconut oil has antibacterial, antifungal, and antiviral properties; baking soda has very low abrasiveness and helps maintain a healthy pH level in your mouth. The coconut oil is solid at room temperature, but melts at 76 degrees F.
 - Dip your toothbrush bristles into some coconut oil, and then dip them into some baking soda. I like an electric toothbrush because it is more efficient than a regular manual toothbrush. I find that the electric toothbrushes that sit in a cradle that charge from an electrical outlet in the wall are much more effective than battery-operated brushes that don't seem to have much torque.
 - Next, place the toothbrush bristles at a 45-degree angle into the gum margin where the gums meet the teeth. The baking soda will make the *toothpaste* taste salty.
 - Turn the brush "on", close your lips to keep the drool and splatter in your mouth and not all over the bathroom wall and mirror, and let the electric toothbrush do all the wiggling. Just move the brush from one side of your mouth to the other staying in the gum margins. Be sure to clean all the outside surfaces facing the cheeks and lips and then all the inside surfaces facing the roof of your mouth and your tongue.
 - You also want to clean the in-between surfaces of your teeth. Floss is good, but I also like a tiny brush that fits between the teeth. Think about how you would clean the inside of a baby bottle. These little *interdental brushes* are soft, and they gently remove the soft bacteria sticking to the tooth surfaces between the teeth as you slide the brush *in and out* between these teeth. A company called G.U.M. makes a convenient and comfortable brush called *Soft-picks*, which I find perfect for my mouth.
- Have regular dental checkups to make sure your oral health is up to par, and have professional cleanings at your dentist's office to remove any tartar from under the gum tissues.
- Eat a Paleo-type diet to improve the health of both the microbes in your gut and also the lining of your gut. The fiber in veggies that dominate a Paleo-type diet will feed the good bacteria of the colon.
- Eat live-culture fermented foods every day like kimchi, sauerkraut, kombucha, yogurt, and kefir to improve the composition of the good bacteria in your gut.

What you don't want to do is to try to kill off bacteria indiscriminately. Invariably, you may destroy some of the offending bacteria, but you will destroy many healthy microbes thus creating a more serious health problem. Mouthwashes are not the remedy. On the other hand, if you attacked the real causes of stinky breath and not just tried to mask bad odors, you could resolve these issues, and your breath would smell significantly better. You will be happy; your closest friends will be happier; and your partner will be ecstatic! You also will be removing the bacteria and plaque that cause gum disease and tooth decay.

Appendix 4

Longevity is Good; Quality is Better!

Statistically, we are living longer in the US today than ever before, but we are developing chronic diseases that significantly interfere with the quality of our golden years. Some of us are in distress and pain for decades before succumbing to these chronic diseases. This is not the way the human body was designed or evolved to be.

We were not born deficient in prescription drugs. We were not born to have to go to the physician every year to stay healthy or to see a dentist twice a year to prevent and treat gum disease and cavities. We were not born to require supplements of vitamins, minerals, and other nutrients for our bodies to function properly.

We were born to be healthy. We were born to retain our adult teeth throughout our lives until we die. We were born to move and jump and run and exert our bodies. We also were born to have pleasure and relax with nature.

Imagine this: Think of sitting on your four-legged dining room chair, and notice what happens. You are comfortable and stable. Now what would happen if one leg suddenly were removed? You'd topple over. How about two legs? Three Legs? You need all four legs of this four-legged chair to give you the support you need. Your healthy, productive body needs stability too. And, your mouth is just an extension of your functioning body. Your mouth is not an island unto itself; it is intricately and intimately connected to everything that happens to each cell in your body.

Just as there are four legs to this dining room chair, there are four pillars to a healthy "you". Chronic disease occurs when one or more of these are broken. The four pillars are:

- **Nutrient-dense real foods**
- **Restorative sleep**
- **Efficient exercise**
- **Stress reduction**

Here is a brief description of each pillar:

- **Nutrient-dense real foods** provide the energy sources that every cell in your body needs to do its thing. These foods consist of wild-caught and free-range animal products from nose to tail along with their wonderful fats, all veggies, some densely colored fruits, as well as nuts and seeds in moderation. These foods also support your good gut bacteria, which are critical for health.
- **Restorative sleep** allows important systems of your body to replenish themselves. Your body needs at least 7-8 hours of sleep every night ideally in a quiet, cool, dark space. Your body can't function properly if you try to catch up on sleep over the weekend. That's not how it works.
- **Efficient exercise** helps maintain and build your body with the least amount of effort for the maximum effect. A science-based, practical routine could include (1) a 10 to 20 minute workout of high-intensity sprinting once every 7 to 10 days, and (2) a 10 to 20 minute workout of strength-training exercises twice a week including squats, pushups, pull-ups, and planks. Also, science has shown that non-exercise movement throughout

the day may be as important as efficient exercise. Standing as much as possible and sitting as little as possible should become routine. Simple walking is good movement, and a realistic goal to strive for each day should be 10,000 steps. A good tool to record how many steps you take everyday is a pedometer – a good brand is Omron.

- **Stress reduction** includes removal of toxins from internal and external sources as well as removal of psychological stresses. Stresses from any source are toxic to all cells and eventually to all organ systems. As these stressors build up in the body to overload the system, clinical manifestations can appear like the proverbial straw that broke the camel's back. These manifestations of toxic overload frequently are expressed differently for each individual.

Your body was designed to be a finely tuned machine. These four pillars of health assist every cell in your body to perform as it was meant to perform to create longevity and most importantly quality of life.