



# Gut Health

## Part 1- The Microbiome

*“The gut microbiota play an enormous role in many different biological functions, but perhaps their most important role is establishing and developing our immune system and protecting the integrity of the gut lining.”*

-Dr. Josh Axe

There are approximately 40 trillion bacteria living in our body which are collectively known as our gut microbiome. This microbiome is hugely important for overall health, and when it becomes imbalanced, can cause an array of health issues. Research over the past two decades has revealed that an imbalanced gut microbiota can contribute to a wide range of diseases including diabetes, obesity, rheumatoid arthritis, autism spectrum disorder, depression, and chronic fatigue syndrome.

We obtain the foundation of our microbiome at birth – mostly through the birth canal and later in our mother’s breast milk. As humans, approximately one third of our gut microbiota is common to most people, while two thirds are specific to each one of us. This means that our microbiome is unique to each of us...like a fingerprint. While our microbiome is thought to be established by the age of 3, it continues to be shaped based on our diets, as well as our environment and our exposure to toxins and medications. Even though we each have a unique microbiota, it always fulfills the same physiological functions and has a direct impact on our overall health.

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## The Microbiome

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When you hear the word microbiome, chances are you think of your gut. It is true that our gut is part of our microbiome, but our microbiome is much more important to our health than you might realize. The microbiome is made up of a vast array of microbes that help us control our weight, fight infection, regulate our sleep, manage our mood and so much more!

The Human Microbiome Project is a research initiative which launched in 2007 with a goal to improve the understanding of the microbial flora involved in human health and disease. This, and other microbiome projects worldwide, have laid an important foundation for understanding the trillions of microbes that inhabit each of our bodies.

"Just like any other environment on the planet, our bodies have their own ecosystems -- made up of 100 trillion microorganisms, or microbes, that live in and on our bodies," says Rachael Buck, PhD. Recent research estimates that the ratio of microbial to human cells is around about 3:1. <sup>1</sup> These microbes are found everywhere on our body, but in larger quantities around hair (like your head and armpits) and in moist areas (like the digestive tract from the mouth to the anus).

Within the last decade, research on the human microbiome has exploded, but there is still so much we do not know about it. Until recently, only about 20% of the bacteria in and on our body had ever been cultured. Partly because the focus of medicine and microbiology has been on organisms that were identified to trigger disease and have the potential to kill us. This means that we still have a tremendous amount to learn about the microbiome. What we have already learned is that the microbiome carries out

activities essential to our well-being. So much so, that many professionals in this field of research are now considering the microbiome as its own distinct organ.

Here are just a few ways in which our microbiome can impact the rest of our body and our mind:

**Stress** When our body is under stress (either real or perceived), we release stress hormones which can signal less important functions to be put on hold, while focusing on survival. Our digestive system is one of these functions that slows down. All of the processes that occur including our transit time, digestive juice production and blood flow to the gut are all decreased. When this happens, unfavorable pathogens can pass through our digestive tract and into our blood stream without being killed. The stress hormones will also reduce the amount of good bacteria, which increase susceptibility to pathogens, further deteriorating the gut microbiome.

**Mood** Our guts are connected to our brain by the vagus nerve, which travels from our brain stem to our colon. Information from our gut microbiome is directly delivered to our brain via this nerve. Neurotransmitters that respond to stress, such as dopamine, norepinephrine and epinephrine negatively influence our gut bacteria. The more these neurotransmitters are released, the higher the imbalance between our good and bad bacteria become. If we can keep our good bacteria flourishing, they aid in increasing the production of relaxing, anti-inflammatory and anti-anxiety neurotransmitters (which also improve sleep), such as serotonin and GABA.

**Digestion** Gut bacteria play an important role in digestion by supplying essential nutrients (such as short chain fatty acids in the large intestines), synthesizing vitamin K and aiding in the digestion of cellulose. More specifically, *Bacteroidetes* and *Firmicutes* are the main bacteria responsible for the metabolism of undigested food.

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## Leaky Gut

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Have you ever considered the contents that you swallow into the gut are technically outside of the body? The gut is a hollow tube that passes from the mouth to the anus. The lining of this tube is made up of epithelial cells that are one layer thick. This cell layer creates the physical barrier between the outside world and the inside of the body. Anything that goes in the mouth and is not absorbed through the gut lining into the blood will pass right out the other end.

In addition to the physical layer of epithelial cells that creates our gut, there is also a layer of mucus and bacteria. The bacteria and mucus are vital components of the gut because they add a layer of immunity which helps protect the body from pathogenic organisms. Between the bacteria, mucus and epithelial layer, this barrier is extremely selective. It is designed to let the good things in, and keep the bad things out.

Sometimes the cells ability to differentiate between what belongs and what does not is compromised. When the things that do not belong inside our body (such as undigested food, parasites, unfavorable bacteria, virus or any other toxin) begin to penetrate this membrane, it creates leaky gut. Leaky gut is most commonly caused by inflammation from a poor diet, chronic stress, toxic overload and/or bacterial imbalances. This can lead to a compromised immune system which can lead to a number of other health conditions, including autoimmune disease.

Some common conditions that are associated with leaky gut are:

- Food allergies or intolerances
- Asthma

- Eczema
- All autoimmune diseases (including autism, Rheumatoid arthritis, IBS and celiac disease)

If you suspect that you have leaky gut, and you want to know to what extent your gut membrane is permeable, there are currently three generally accepted laboratory tests for leaky gut:

**1. Intestinal Permeability Test (Lactulose/Mannitol Test)-**

The Intestinal Permeability Test directly measures the ability of two non-metabolized sugar molecules to permeate the intestinal mucosa. The patient drinks a pre-measured amount of lactulose and mannitol. The degree of intestinal permeability or mal-absorption is reflected in the levels of the two sugars recovered in a urine sample collected over the next 6 hours.

**2. Food Sensitivities Test (Food Intolerance Test)-**

Most Food Sensitivity tests measure your body's IgG immune response to foods that are commonly found in western diets. Ignoring food sensitivities can make leaky gut even worse.

**3. Zonulin-**

is a protein that was discovered in 2000 that modulates the permeability of tight junctions between cells of the wall of the digestive tract. Elevated levels of serum zonulin have been associated with metabolic syndrome, obesity, and several autoimmune, inflammatory and neoplastic diseases. Such diseases include Celiac disease, type I diabetes, juvenile nonalcoholic fatty liver disease, and evidence is accumulating for multiple sclerosis, rheumatoid arthritis, asthma, and inflammatory bowel disease. The test may be used as a clinically

equivalent alternative for those who do not want to use the "sugar" load test.

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## The 4R Program

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The 4R Program was developed by Jeffrey Bland, Ph.D., and his associates at the Functional Medicine Institute, and is an extremely effective way to address and treat leaky gut. It is a simple four-step program. Depending on the severity of your condition, it can take up to six months to fully repair your gut.

### **REMOVE**

The first step is to remove any unfavorable gut microflora (bacteria, yeast and/or parasites), along with any foods and/or lifestyle factors that contribute to their growth. Removal of the unfavorable microflora may require supplements or medications. If you are not sure if you have an abundance of unfavorable gut flora, a comprehensive stool analysis can help you determine if you have a gut infection. A practitioner trained in how to read a stool analysis can help you with targeted herbs, medications and/or supplements to treat gut infections. Stress, inflammatory foods (such as corn, soy, sugar, gluten, dairy, and alcohol), caffeine, and many medications can all contribute to the growth of unfavorable gut microflora and their removal should be considered when trying to heal your gut.

### **REPLACE**

Once the bad lifestyle factors and foods have been removed, replacing them with good habits and quality nutrients is the second step. Look for nutrient dense foods that include essential vitamins and minerals that promote proper gut function. Foods like: beets (to promote proper liver and gall bladder function), raw

apple cider vinegar before meals (to promote proper acidity levels in the stomach), grass fed liver or sardines (to supply B12), and bone broth (to promote healing the lining of the stomach and small intestine) can all be helpful during the replacement process. Additionally, supplementing with digestive enzymes and hydrochloric acid can help kick start the path to a healthy gut.

### **REINOCULATE**

Reintroducing beneficial bacteria into the gut is the third step in the 4R program. You can use fermented foods such as Kombucha or Jun tea, kefir and raw sauerkraut, or a probiotic supplement. When reinoculating your gut with beneficial bacteria, you want to consider taking 3 types of probiotics: *lactobacillus* and *bifidobacteria*; *Saccharomyces boulardii*; and a soil based probiotic. Eating a therapeutic dose of prebiotics, such as soluble fiber, will ensure you are “feeding” the probiotics.

### **REPAIR**

The last step is to repair the lining of your gut. This can be accomplished with good nutrition, avoiding allergens, inflammatory foods, and lifestyle choices. Some supplements can also help repair the gut lining such as: fish oil (omega 3 fatty acids), L-glutamine, and zinc.

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### **Antibiotic Use**

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The use of antibiotics has markedly diminished mortality from infectious diseases, reduced the burden of tuberculosis in the modern world, improved survival after trauma, and allowed the development of therapies that intentionally or incidentally suppress the

immune system for the treatment of autoimmune diseases and cancer<sup>2</sup>. “While the development of antibiotics has lengthened our lifespans, our excessive and inappropriate use of these drugs may be causing serious long-term consequences we are only now becoming fully aware of” says Dr. Josh Axe. Antibiotics destroy or slow down the growth of bacteria (both good and bad), but cannot treat viral infections, such as cold, flu, and most coughs. Far too often, antibiotics are being prescribed for these very things. Because of this over prescribing of antibiotics in situations where they may not be useful, we are starting to see an increased growth of antibiotic resistant bacteria. Antibiotic resistance happens when bacteria and fungi develop the ability to defeat the drugs designed to kill them. That means the germs are not killed and continue to grow. According to the CDC, antibiotic resistance is one of the most urgent threats to the public’s health.

Take for example *Clostridium difficile* (*C. diff*). According to the CDC, *C. diff* caused nearly half a million infections among patients in the United States in 2014. *C. diff* is a bacteria that causes inflammation in the colon and deadly diarrhea. “These infections can be prevented by improving antibiotic prescribing and by improving infection control in the health care system” says Tom Frieden, the director of the CDC.

*C. diff* infections occur when someone is exposed to the pathogen while receiving antibiotic treatment for some other illness. Antibiotics suppress the normal bacteria in the colon, allowing *C. diff* to flourish, producing toxins that cause severe diarrhea and



damage to the colon that can cause bacteria to leak into the bloodstream.

The research we have on antibiotics and the gut microbiome is showing that a single round of antibiotics can wipe out beneficial gut flora for weeks, months, or even years. There is even research that is suggesting that after a heavy dose of antibiotics, the microbiome may never fully recover. Furthermore, recent research released in January 2019 is showing that probiotic use after antibiotic therapy does not aid in re-establishing beneficial gut flora!

So what are we to do when faced with an infection? First- always avoid antibiotic treatment unless absolutely necessary. When it *is* necessary, make sure you take the prescribed antibiotic for the full dose. Taking a partial prescription of antibiotics is the leading cause of antibiotic resistance microbes. Fortunately, a number of studies have shown that taking probiotics and consuming fermented foods while taking antibiotics can reduce the risk of antibiotic-associated diarrhea.

After your antibiotic treatment is complete, the best way to restore your beneficial gut flora is with a whole food diet rich in fresh vegetables and fruits, along with a variety of wild seafood (or omega 3 fatty acids).

## REFERENCES

- 1-** American Academy of Microbiology, FAQ: Human Microbiome, January 2014
- 2-** The Good and the Bad of Antibiotics, *Sci Transl Med.* 2013 Jul 3; 5(192): 192fs25. PMC 2014 Apr 23
- 3-** Magill SS, O'Leary E, Janelle SJ, et al. Changes in Prevalence of Health Care-Associated Infections in U.S. Hospitals. *The New England journal of medicine* 2018;379:1732-44.

# HOMework

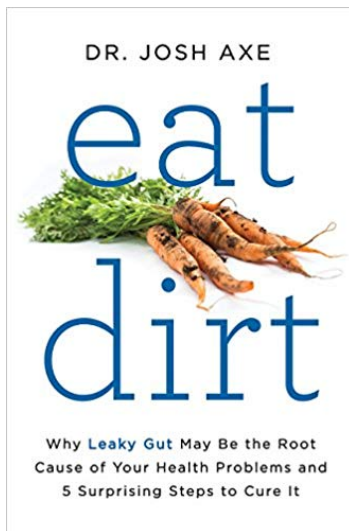
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## Part 1: Book Review

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### Eat Dirt

by Josh Axe



From functional medicine expert and wellness authority Dr. Josh Axe, a groundbreaking guide to diagnosing and treating an often-discussed yet little-understood condition—leaky gut syndrome.

Dr. Axe offers diagnostic quizzes to help readers assess their gut type, then provides simple regimes designed to heal the gut and eliminate digestive and autoimmune problems. From reducing antibiotic use to eating seasonally, spending more time outdoors, managing stress, and incorporating probiotic-rich foods into your diet, Dr. Axe's program can help anyone restore gut health and feel their best.

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## Part 2: Candida Spit Test

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Candida is a yeast that is normally found within your body (typically found in small amounts on the skin, in the mouth, and in the gastrointestinal tract). At normal levels, Candida does not typically cause symptoms. However, when Candida overgrowth occurs, it can lead to numerous health problems and is one of the most common bloodstream infections in the United States.<sup>3</sup> People with Candida overgrowth can experience digestive issues, fatigue, brain fog, recurring fungal infections, skin problems, and/or mood swings.

There are several tests that can help determine whether you have an overgrowth of Candida, to which level is

the overgrowth and the type of Candida that is present. There are at home testing methods that may indicate an overgrowth of Candida such as the spit test, and laboratory tests you can order such as the Comprehensive Organic Acids test or a Food Sensitivity Test with Candida. For our homework, we are going to complete a FREE at home spit test. Like many free at home tests, the spit test is not 100% reliable, so any positive results should be confirmed with a lab test.

The test is assessing how thick your mucus is in the morning. Candida is heavier than saliva and can cause your saliva to sink to the bottom of a glass of water. There are other factors that can affect the results of the test and should be considered when interpreting your test: consumption of dairy products; changes in the weather; airborne allergies; and other infections. To get the most accurate results possible, you should be well hydrated, avoid dairy products and do the test when seasonal allergies are low. Since test results can vary, it is best to complete the test for 7 consecutive days. Here is how it you complete the test:

1. Upon waking, before eating, drinking, or brushing your teeth, gather a pool of saliva in your mouth and spit it into a clear glass cup full of at least 8oz of water.
2. Watch the glass for the next 45 minutes (don't stare at it, just keep checking back every 5-10 minutes). Your saliva should float at the top of the glass in one cohesive blob. If it grows downward forming tentacles, or cloudy specks form and sink to the bottom of the glass, you may have an overgrowth of Candida.

If your test results are positive for 7 days in a row, consider further testing, or talk to your practitioner about starting the 4R program.