

YOUR DIGESTIVE ECOSYSTEM

Discover the Connection Between Your Inner Ecology and Your Immune System, Brain Function and Risk for Chronic Disease

INSIDE:

*Natural Solutions
For Digestive
Health*



www.HealingGourmet.com

Your Digestive Ecosystem

By Kelley Herring & the Editors of Healing Gourmet®

© 2007-2011. Copyright Health-e Enterprises, LLC.

ALL RIGHTS RESERVED. IT IS ILLEGAL TO COPY OR FORWARD THIS E-BOOK TO OTHERS

DISCLAIMER: This publication does not provide medical advice. Always consult your doctor.

Contents

Health Begins In The Gut	4
From the Mouth...South	6
Your Stomach: The Daily Grind	6
Your Not-So-Small Intestine	7
Absorption: Feeding Your Cells	7
Flora Food & Healthy Elimination	8
The Digestion Connection	9
Enzymes: Dissolving Your Way to Wellness.....	10
Symptoms Are Signs!	10
Enzymes 101.....	11
Digestive Dynamos	12
Your Miraculous Microflora.....	14
The "Forgotten" Organ.....	15
Key Microflora	17
Feeding Your Flora	19
When Digestion Goes Bad	20
pH: Getting Back to Basics	21
Test Your pH	24
pH of Foods.....	25
The Problem with Permeability	26
Controlling Candida	31
Your Candida Cleanse	32
Fungus-Fighting Foods.....	34
Reforestation: Returning to Balance	36
Making Sense of Supplements	36
Clean Up Your Internal Ecosystem.....	37

Health Begins In the Gut

In 1908 Nobel Prize winner Dr. Eli Metchnikoff said that “death begins in the gut”.

With more than 90 million people suffering from digestive disorders ranging from Celiac disease to diverticulitis and IBS, clearly, he was right.

But here at *Healing Gourmet*, we prefer to look on the brighter side. We believe that health begins in the gut.

Sadly, our modern diet is polluting our internal ecosystem and robbing us of natural state of digestive harmony.

You see, our internal ecosystem is quite similar to the ecosystems found on earth—where different species live in close proximity and create a community (called *symbiosis*). The relationships among species can be mutually beneficial (*mutualism*), can benefit one without causing harm to another (*commensalism*) or can benefit one at the expense of another (*parasitism*).

On our planet we’re slowly learning the importance of the interdependence of organisms in an ecosystem. For example, we rely on the busy bee to pollinate crops—including fruits, vegetables and nuts. In recent years, bee populations have declined significantly posing a threat to our food supply and much more. It’s a biological truth that we cannot alter the survival of one species without impacting many, and therefore the ecosystem as a whole.

Our internal ecosystem is no different. The organisms inside our GI tract live in unique states of *symbiosis*. Given proper conditions, they carry out the functions for which they were designed. But given the wrong conditions, a state of imbalance (or *dysbiosis*) occurs. When it comes to our internal ecosystem, we control the conditions through our diet and lifestyle.

But, the health and impact of your internal ecosystem isn’t confined to your “guts”. In fact, your digestive health influences every other system in your body as well as your risk for *nearly every chronic disease*.

In this book, you'll learn all about the world within including:

- How your digestive system impacts your immunity
- Why leaky pipes lead to a diseased life
- A surprising cause of arthritis
- The "good" bugs that boost your immune system
- The acids produced when you eat this food that are powerful protection against cancer
- The foods that cause putrefaction...and those that promote purification
- The importance of pH balance
- How your liver is taxed by an unhealthy digestive system
- The avoidable compounds that cause your body to contaminate itself (auto-intoxication)
- How to get more nutrition from your food with enzymes
- The protein that could be destroying your digestive system and even causing malnutrition
- The over the counter drugs to avoid for better digestion
- The foods that promote healthy digestive tract
- How to improve your problem with lactose intolerance—by eating dairy products
- The special kinds of fiber that protect your GI tract from inflammation and injury
- The compound that fuels and supports your GI tract
- How to power up your "forgotten organ"
- The fungus-fighters in your fridge (and spice rack!)

***"Diseases are crises of purification,
of toxic elimination."***

-Hippocrates (500 B.C.)

From the Mouth...South

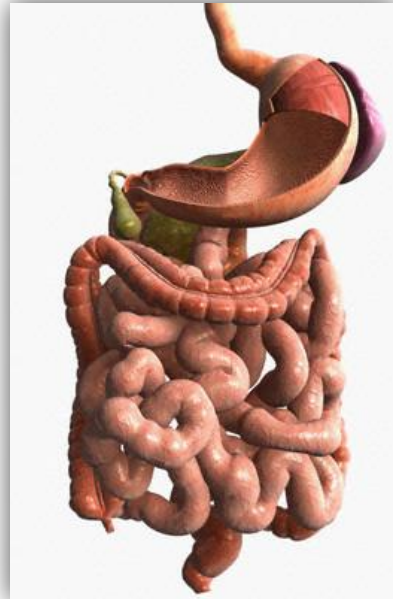
The idea that we eat first with our eyes is true. While no calories or nutrients are absorbed when we savor the aroma of a piping hot plate of *Grilled Wild Salmon with Lemony Picatta Sauce*, our senses trigger a cascade of signals from the brain to the gastrointestinal tract.

These chemical signals flip the digestive switch to the “on” position. Your mouth begins to water, the stomach starts to contract as it prepares to receive the food, and the pancreas, a glandular organ that releases enzymes essential to digestion, starts to secrete chemicals that will break down the food.

In the mouth, food is broken down by the teeth as well as an enzyme in the saliva called *amylase*. Amylase breaks down carbohydrates. This is why breads and crackers taste sweeter as you chew them— they are breaking down into sugars from the action of the amylase.

Swallowing propels the food into the food pipe, or the esophagus. The esophagus pushes the food downward by an action called peristalsis—or wave-like motions.

The peristaltic contractions are so strong that we are able to swallow even if lying down — or upside down. Between the esophagus and the stomach a sphincter ensures that the passage normally opens only one way — from the esophagus into the stomach.



Your Stomach: The Daily Grind

For the next 60 minutes or so in the stomach, food is broken down primarily by mechanical means—the powerful muscular contractions of the stomach muscle. It is also broken down chemically through the action of *hydrochloric acid* (HCL) as well as by the enzyme *pepsin*. Other accessory enzymes in the stomach include gelatinase, gastric amylase and gastric *lipase*.

Before the food leaves the stomach for the small intestine it passes through another sphincter, called the *pylorus*. The pylorus ensures that the small intestine does not get over-filled and that there is enough time for the digestive enzymes in the small intestine to break down the food chemically.

Your Not-So-Small Intestine

The contractions of the small intestine (all 15 feet of it!) continue to break down the food physically. But more importantly, the small intestine secretes powerful enzymes to break the food down chemically and then absorb the resulting nutrients.

In the duodenum, the first part of the small intestine, the food is mixed with large amounts of digestive enzymes secreted by the pancreas—including *lipase*, *trypsin* and *amylase*—as well as *bile* manufactured by the liver.

Protein, fats and starch are broken down into smaller molecules. But the process is not yet complete, triggering another series of enzymes.

The small intestines releases enzymes—include several peptidases—which break down peptides into amino acids and the enzyme maltase which breaks down maltose to produce glucose.

Finally, our food has been transformed into its nutrient constituents and is ready to be put to use!

Absorption: Feeding Your Cells

As the molecules travel through the small intestine, they are absorbed by small, finger-like projections called *villi*. The villi might be tiny, but they are essential to healthy digestion. That's because they increase the surface area of the intestine by a factor of 600, exposing more nutrients to more cells for better absorption.

Along the rugged surface of the villi, the component nutrients are transferred to the blood stream and throughout the body.



Are Food Villains Killing Your Villi? As you just learned, our villi have a very important role in our body. Without them, we couldn't absorb vital nutrients leading to deficiencies... and eventually disease. What you may not know is that food allergies damage your villi. One of the most common and dangerous we face today is an autoimmune response to gluten — the protein found in wheat, barley, rye and oats. Once the body recognizes gluten as a foreign invading molecule, the villi can be damaged through the immune response. Learn more in ***20 Tests Your Doctor Hasn't Performed (And Should!)***

Flora Food & Healthy Elimination

But digestion doesn't end there. In fact, some of the most important functions are carried out in the large intestine, or colon.

That's because not all of the components of the food we eat can be completely broken down and absorbed. Dietary fiber, fluid and minerals (including sodium, calcium and zinc) are utilized in the colon.

While the minerals and fluids are absorbed, the indigestible material serves as a substrate for the billions of organisms—called *microflora*—that reside in the intestine. You'll learn about the many essential functions these healthy "bugs" perform in *Your Miraculous Microflora* on p. 13.

By the end of the passage through the colon — which measures about 5 feet — only a small amount of what you originally consumed remains, which constitutes the feces. The bulk of the feces — about 75 %— is water and the remainder is solids made up of bacteria, undigested organic matter, and dead cells that are shed from the lining of the intestines. The feces travels to the very end of the colon, the rectum, where it is then excreted.



Are You Plagued By Digestive Woes? This book is only a fraction of the information that we provide on healthy digestion. Visit our website and browse our [Digestive Health Center](#) offering informative articles, recipes tailored to your unique health needs and resources to help you naturally heal:

- ✓ IBS
- ✓ IBD
- ✓ Celiac disease
- ✓ Diverticulosis
- ✓ Candida

The Digestion Connection

While digestion does in fact go from the mouth...south, the entire process is interlinked.

And when one process gets off track, the result is a downward spiral of digestive health.

Here's a simple example with serious health effects. (Don't try this at home!)



Eat sugar. This increases the acidity in the intestine which promotes the growth of some of the "unfriendly" bugs to grow, while crowding out the "friendly" bugs. At the same time, that sugar you just ate is feeding millions of opportunistic yeast in your GI tract called *Candida* which are responsible for a whole host of health issues.

But it doesn't end there. *Candida* further crowds out the "friendly" bugs and at the same time releases *mycotoxins* (fungus toxins) and *neurotoxins* (toxins that affect the nervous system), causing systemic problems and requiring the liver to work harder to detoxify these substances.

Now many of the "friendly" bugs have been killed off and crowded out. But not without further consequence. Our body relies on those bacteria to help assimilate nutrients, produce vitamins, train the immune system, produce cancer-fighting compounds and more.

And so it goes.

No matter which path your GI tract takes to lead to imbalance, the result is the same: a vicious cycle and an unhealthy digestive system that saps vitality and contributes to disorders and diseases.

In this next section you'll learn quite a bit about your digestive tract. Perhaps even more than you'd like to know. But having a good grasp on the interrelational aspects of your world within is crucial to your health, comfort and well-being.

Remember, all of these principles are applied at *Healing Gourmet*, offering you delicious dishes that promote healthy digestion.

Let's get started!

Enzymes: Dissolving Your Way to Wellness



Much of the dilemma with digestion is very simple—it is the inability to break down the foods we eat. And if we cannot break down and assimilate nutrients, even the healthiest diet will go to waste. *Literally*.

The bonds in proteins, fats, fibers and carbohydrates act like “glue”. When we are unable to dissolve those bonds in one part of the digestive system, the food material is passed to the next section for processing in an “incomplete” state, causing uncomfortable and unhealthy symptoms to occur.

According to Dr. Lawrence Cheskin, M.D., director of the gastroenterology division at Johns Hopkins in Baltimore, many of the 90 million digestive problems experienced by Americans every year are linked to poorly digested foods.

Unfortunately, we take our process of digestion for granted. We just expect it to work, but without the proper enzymes it won't. The result is a barrage of health problems ranging from constipation, skin rashes, headaches, joint pain and fatigue –with more serious health consequences as the digestive damage continues. What's more, our body's production of enzymes steadily decreases as we age.

Symptoms Are Signs!

Initially, there may be general symptoms (which are often regarded or dismissed as “normal”) like heartburn, gas and bloating. But chronically, these small maladies deprive your body of nutrients and in the long run can cause much larger problems.

Unfortunately, the damage doesn't end with malnutrition. When the pancreas is constantly required to produce the enzymes that should be present in foods, over time it will wear out and lose function.

In fact, the late Dr. Edward Howell—a pioneer in the field of enzyme research— found that humans and animals on a diet comprised primarily of cooked food develop an enlarged pancreas (indicating inflammation and damage) while other glands and organs, notably the brain, actually shrink in size.

So how do enzymes help? Enzymes allow us to tap into the healing power of food and reap its benefits, while protecting against damage and discomfort.

Let's take a look at the specific enzymes and how they work to turn our food into nutrient fuel.

Enzymes 101

Enzymes are complex proteins that act as catalysts in nearly every biochemical process in the body.

They come from two sources—those our body produces (called metabolic enzymes) and those from the food we eat (called digestive enzymes).



Digestive enzymes, of which there are twenty-two, are quite simple—they are specialists that dissolve the bonds in the fiber, fats, carbohydrates and proteins we eat. Here are the four types of digestive enzymes:

1. **Cellulase:** Breaks down fiber. Cellulase is found only in plant enzymes, and is absent both from the pancreatic enzymes found in animal digestive enzymes, and also from the body's own pancreatic enzymes.
2. **Lipase:** Digests fats. Without lipase, you would not only digest fats poorly, but also all the fat-soluble vitamins, like vitamins A, D, E and K and carotenes. A lipase deficiency can also contribute to the body ineffectively storing fat, encouraging those extra pounds to stay on.
3. **Amylase:** Breaks down carbohydrates. There are several different kinds of amylase. Lactase breaks down lactose, the sugar found in milk. Maltase digests malt sugar (maltose), and invertase breaks down other sugars.
4. **Protease:** Breaks down proteins. Improper protein digestion leads not only to nutritional problems, but also to a whole host of health problems from food allergies, to leaky gut and putrefaction (which you'll learn more about on p 24).



Are You Superglued? Chances are, the answer is yes. That's because 97% of people with sensitivity to a protein called gluten don't know it. As you learned earlier, gluten is found in grains including wheat, barley and rye.

Innocuous as it may sound, sensitivity to gluten damages the villi in your intestine, reducing the absorption of essential nutrients. Researchers believe that gluten intolerance stems from our evolutionary development. You see, our genes haven't changed much since the days of the Hunter-Gatherer, but our diet has.

Learn more about how grains can negatively affect our digestive system in *pH: Getting Back to Basics* on p. 20 and also see **Your Guide to Living a Low-Glycemic Lifestyle** to learn why you're better off going against the grain.

Digestive Dynamos



Your body cannot produce all the enzymes it needs for healthy digestion. That's why it is imperative you help by enjoying foods that are naturally enzyme-rich.

Along with enhancing our enzymatic processes, there are other things you can do to help get the most from your food...without letting it get the best of you:

Rely on Raw: Raw foods are packed with life. But as we add heat (starting at in to break down. At 118° F, those essential digestive components are completely destroyed. You needn't be a strict "raw foodist" to get

the digestive benefits of enzyme-rich raw foods. Here are some tips to kick up your enzyme catalysts:

- **Savor Sprouts:** While all raw foods contain enzymes, the most potent are sprouts. Sprouting increases the enzyme content in these foods enormously.
- **Add Some Zing:** Ginger contains a proteolytic enzyme called *zingibain*. That's why it works so well as a meat tenderizer. It's also a powerful anti-inflammatory agent and has antioxidant activity.
- **Choose Crucifers:** This group of cancer-fighting veggies (including broccoli, cabbage, Brussels sprouts and others) boasts a number of powerful enzymes that help detoxify the body (learn more in ***Your Guide to Antioxidant Superfoods***). NOTE: Eating crucifers in excess may pose thyroid problems due to compounds called *goitrogens*.
- **Try a Taste of the Tropics:** Several tropical foods are naturally rich in enzymes like pineapple (most noted for the proteolytic enzyme *bromelain*), papaya (most noted for the proteolytic enzyme *papain*) and bananas. Remember, these fruits have a high sugar content and glycemic impact (see ***Your Guide to Living a Low Glycemic Lifestyle***), so be sure to enjoy in moderation or opt for an enzyme supplement.

Favor Fermentation: Natural fermented foods like sauerkraut, kimchi, yogurt, kefir, kombucha, soy sauce, tempeh, miso, horseradish and others offer enzymes to the diet. They also offer important *probiotics* (which you'll learn about on p 16) and beneficial pH level.

Use Your Pearly Whites: The first step of digestion begins in the mouth. The better you chew your food, the more surface area becomes exposed to the enzymes in your saliva, starting off the process and making the rest of the digestive journey easier.

Don't Dilute Your Digestion: Liquids consumed with foods will dilute the hydrochloric acid (HCL) in your stomach and reduce its ability to "attack" your food and begin digesting it. To get the most out of the foods you eat, avoid drinking lots of liquids 20-30 minutes before and after your meals.

Practice Hara Hachi Bu: This ancient Japanese principle says "eat only until you are 80% full...then stop". *What a great idea!* Not only will it prevent overeating, but it will also benefit your digestive system—and the rest of the body for that matter. That's because the human stomach has a limited capacity for digestion and overeating decreases the effectiveness of hydrochloric acid and enzymes.

Pass on Pasteurization: Pasteurized dairy products have been heated beyond the "enzyme-safe" zone. Opt for raw milk products and go to the *Weston A. Price*, *EatWild* and *RealMilk* websites to find local farmers offering "real" milk. For the same reason, avoid irradiation and microwaving (see **Organics: Beyond Green** for more).

Can the Chemicals: Pesticides, as well as chlorinated and fluoridated water are enzyme killers. More importantly, they are altogether health robbers. Avoid them.

Benefit from Bitters: Our tastes have become "refined" due to the bland, processed foods that have become an unfortunate mainstay in our diet in the last century. Because of this, bitter foods— like collard greens and unripe fruits— have disappeared from our tables with the appearance of something else— digestive distress. Bitter foods activate the "bitter" sensors on your tongue, which signals a cascade of digestive processes. This "missing" taste is an important piece of the digestion puzzle. In addition to adding more bitter foods to your diet, consider a bitters supplement (try Flor Essence). Always talk with your doctor.

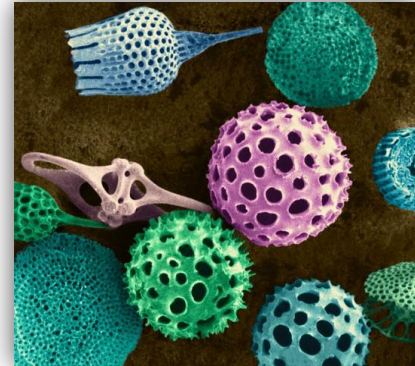
Enhance Your Enzymes...Naturally: A number of common foods drugs affect our enzymes, our HCL levels and ultimately our digestion.

- **Get Some Vim & Vinegar:** If you have tummy troubles after eating, try drinking one teaspoon of raw apple cider vinegar mixed with 2-4 ounces of water with your meals. Raw apple cider vinegar is packed with enzymes and offers an acid environment for healthy digestion.
- **Take Stock:** A homemade organic chicken stock is an excellent digestive tonic. Try sipping a small amount (4 ounces) with meals. Consider adding fresh ginger for more enzymatic action.
- **Ax the Antacids:** The acid in your stomach wasn't put there by mistake. In fact, it is absolutely essential for proper digestion. Stomach acid helps us assimilate protein. And if protein is not fully digested, it will putrefy in the gut (see p. 19). What's more, HCL is necessary for the absorption of important nutrients like calcium, iron, and B vitamins, as well as to fend off attacks from bacteria, viruses, and parasites.

Your Miraculous Microflora

Your gastrointestinal tract is lush with life. And as you traverse its course, you'll find an internal world of organisms flourishing in colonies, not unlike human civilizations.

And similar to our physical world, the microflora in your gut varies according to the location, population size and requirements for survival. For example, there are orders of magnitude fewer bacteria in the small intestine than the colon. And the primary organisms found in the duodenum are yeasts and *Lactobacilli*, whereas *Bifidobacterium*, *Bacterioides* and *Eubacterium* primarily populate the colon.



Each organism has a place and a purpose.

So how do these colonies live together in this unique way?

In a healthy body, the intestine is in a state of balance, or homeostasis. The bacteria, yeasts and other organisms live in a delicate equilibrium, supporting the survival of one another, while also keeping neighboring populations in check.

When our collective microflora is "getting along", things are good in the world within. Digestion and assimilation are effective, transporting viable nutrients to the organs and tissues of the body. Elimination is aided, helping to speed the transit through the colon and remove waste. And the lining of the gut is smooth, with little to no signs of irritation or inflammation.

But the outside world takes a toll on our internal ecology. Processed foods, sugars, chemicals, drugs, and alcohol (to name a few) shift the pH inside of our delicate digestive system, alter the body's process of peristalsis, compromise the immune system and tip the scales in favor of the "bad guys".

This imbalance is called *dysbiosis*. And when this happens, it doesn't just kill off the helpful bacteria in your tract... it is also harmful to your health.

Here's why.

Certain microbes in the digestive tract release poisonous chemicals (exotoxins) such as amines, ammonia, hydrogen sulfide and other compounds that can damage the microvilli in the intestine and be passed into the bloodstream.

If the unfriendly bacteria overwhelm the intestines, the immune system can be compromised. This is because the immune system relies on the substances that the friendly bacteria produce to operate effectively.

As your liver fights to clean up the toxic byproducts of the unhealthy bacteria, and your immune system takes a dive, your body is wide open to the destruction and damage that spur disease.

In fact, researchers believe intestinal dysbiosis is a key factor in promoting chronic inflammatory, gastrointestinal and autoimmune disorders, food allergy and intolerance, breast and colon cancer, unexplained fatigue, nutritional deficiencies or neuropsychiatric symptoms.

The “Forgotten” Organ

The microflora in your intestine are involved in dozens of critical functions that are vital to your health and well-being.

In fact, your microflora participates in so many biological processes (with such little credit!) that some researchers call it “the forgotten organ”.

Some of the ways microflora benefit health includes:

- Synthesis of vitamins (B vitamins and vitamin K)
- Aiding in gastrointestinal tract motility, promoting regularity
- Absorption of nutrients
- Producing short chain fatty acids (SCFAs)
- Inhibiting pathogens and preventing the growth of harmful bacterial species
- Training the immune system to selectively respond to pathogens
- Preventing allergies by modulating the overreaction of the immunesystem to non-harmful substances
- Regulating hormones
- Improving lactose tolerance by generating the enzyme lactase which breaks down lactose
- Regulating the development of the gut tissues
- Boosting the expression of Toll-like receptors (TLRs) in the intestine which help repair damage and assist the body in differentiating between “good” and “bad” bacteria
- Disarming dietary carcinogens like heterocyclic amines (learn more about these & how to avoid them in ***Smart Cooks Age Better***)
- Modulating weight – people who are obese have a higher ratio of *Clostridium* to *Bacteroides*. After losing weight the balance shifts in favor of *Bacteroides*. *Clostridium* promotes the storage of energy as fat.

Let's take a closer look at just how these tiny 'bugs' work for our health.

In the first part of the colon, carbohydrates are fermented. Without microflora, we wouldn't be able to utilize many of the undigested carbohydrates. That's because certain microflora have enzymes that humans lack.

The beneficial bacteria transform fiber into powerful compounds called **short chain fatty acids (or SCFAs)** that offer a myriad of health benefits which include:

- ✓ Providing a major source of useful energy and nutrients
- ✓ Increasing the gut's absorption of water
- ✓ Reducing counts of damaging bacteria
- ✓ Increasing the growth of healthy gut cells while keeping proliferation and differentiation in check (two factors that affect the cancer process)
- ✓ Promoting the growth of healthy bacteria
- ✓ Boosting growth of lymph tissue – your secondary immune organ
- ✓ Helping to prevent damage to intestinal epithelial cells which causes a "leaky gut"

But that's not all! As these SCFAs are produced, they create healthy byproducts including:

- **Acetic acid:** Used by muscles as fuel
- **Propionic acid:** Helps the liver produce our energy currency, ATP
- **Butyric acid (Butyrate):** Serves as the primary energy source for gut cells, decreases inflammation, and decreases stool pH which helps to protect against cancer

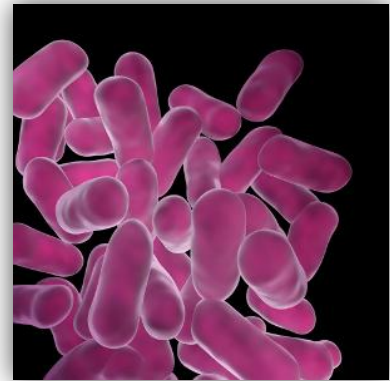


Are You Feeding Your Flora the Fats It Needs? Omega-3 fatty acids — specifically EPA and DHA — are integral parts of cell membranes. And stronger cell membranes means less damage to intestinal cells, faster healing and less issues with "leaky gut" (learn more on p. 25). In addition to essential fatty acids boosting the integrity of the intestine, they also reduce inflammation and support the colonization of the digestive tract with healthy bacteria.

Get more EPA and DHA by eating wild salmon and taking a high quality fish oil supplement like Carlson's. And visit our website and use our [Personalized Recipe Search](#) to find recipes naturally high in cell-protecting, flora-feeding EPA and DHA.

Key Microflora

The human body has approximately ten trillion cells. And while that might seem like a lot, the number of microorganisms in the human gut are ten times that! And of those microorganisms, it's estimated that there are about 500 different species.



Here are the main microflora and what they do.

- **Bifidobacterium** - one of the major types of healthy bacteria that make up the microflora. Bifidobacteria aid in digestion, are associated with a lower incidence of allergies and also prevent some forms of tumor growth (including colon cancer)
- **Lactobacillus** - a group of healthy bacteria that convert lactose and other sugars to lactic acid. Lactic acid inhibits the growth of some harmful bacteria and decreases gut putrefaction. Lactobacillus also helps to reduce inflammation, and have been found to guard against several cancers including liver, bladder, colon and breast.
- **Bacteroides** - normally "mutualistic", these bacteria play a role in processing complex molecules to simpler ones; an overgrowth (due to putrefaction) is associated with an increase risk for colon cancer.
- **Clostridium** - considered a harmful bacteria species; four main species responsible for disease in humans: *C. botulinum* - causes botulism; *C. difficile* - causes colitis; *C. perfringens* - produces a wide range of symptoms, from food poisoning to gas gangrene; *C. tetani* - causative organism of tetanus.
- **Escheria** - a group of bacteria that are commensalsharmless to the host. These bacteria provide vitamin K for their host. *E. coli* are the most numerous aerobic commensal inhabitants of the large intestine in humans. Particular strains of Escheria are pathogens, and are known as the most common cause of urinary tract infections as well as gastrointestinal disease, ranging from simple diarrhea to dysentery-like conditions.
- **Candida** - a yeast found throughout the body with the most common strain being *C. albicans*. While *Candida* is a normal constituent of the human flora, it is opportunistic—meaning it will overgrow, given the proper conditions and be a detriment to the host.

When not kept in check, *Candida* can cause a wide range of problems including gastrointestinal distress, rashes, yeast infections, thrush, reduced immune function and "brain fog". You'll learn more about how to control *Candida* naturally on p. 30.

- **Saccharomyces** - a group of fungi that includes many species of yeast. Saccharomyces is derived from the Latin meaning "sugar fungi".

Saccharomyces might be considered a two-faced fungus. That's because some *Saccharomyces* promote the growth of beneficial bacteria in the gut, while others promote harmful *Candida*.

Saccharomyces cerevisiae (used in making wine, bread and beer) and *Saccharomyces bayanus* (used in making wine) can promote *Candida* overgrowth.

Saccharomyces boulardii, however, is one of the most beneficial and is often called "a yeast against yeast". It has been shown to maintain and restore the natural flora in the large and small intestine and boost the production of the important immune substance IgA. You'll find *S. boulardii* in kombucha, ginger beer and kefir.



Quick Candida Test: When you awake in the morning, before you put anything into your mouth, work up some saliva and deposit it into a clear glass of water. After about 15 to 30 minutes, look through the side of the glass. If there are strings coming down from your saliva, if the water turned cloudy, or if your saliva sank to the bottom... you may have a yeast or fungal concern. Learn more about the many health problems *Candida* can cause and how to get it under control on p. 30-31.

Feeding Your Flora



Eating foods containing “live and active cultures” or taking probiotic (friendly bacteria) supplements is a good way to boost gastrointestinal health.

But adding probiotics to your diet without adding *prebiotics* is like planting a seed in the desert and expecting it to flourish.

In order to thrive, our healthy bacteria need prebiotics—fiber in foods that provide a substrate and stimulate the activity and growth of probiotics.

While fiber in general promotes gut health, specific types of fiber have been found to be most helpful in creating those healthy short chain fatty acids (SCFAs) and their associated beneficial byproducts.

Here are the fibers and foods that help boost your friendly flora:

- **Soluble Fiber:** Boosts beneficial bacterial concentration and enzyme activity, raises level of short chain fatty acids (SCFAs). Pectin (from citrus and apples) has been found to have some of the most beneficial prebiotic effects. Other good sources of soluble fiber include oats and oat bran, beans, flax seed, acacia fibernuts and psyllium husk.
- **Resistant Starch:** This ingredient dramatically increases short chain fatty acids (SCFA) and butyrate (which you learned about on p. 15). Resistant starch reduces inflammation in the cells of the colon, creates an environment where cancer cells can't thrive, protects colon cells from DNA damage and promotes the body's natural process of "cell suicide" for the cancer cells that do exist. It's found in unprocessed whole grains, green bananas and sushi rice, as well as in new functional foods like those from our sister company, [Wellness Bakeries](#).
- **Inulin:** Acts as a prebiotic fiber and also boosts the immune system by stoking the immune cells in the gut-associated lymph tissue (GALT). Inulin also boosts the production of SCFA, benefits the pH in the digestive tract and helps your body absorb more nutrients – especially calcium and magnesium. Found in onions, garlic, agave, jícama and artichokes, as well as in supplement form.
- **Oligosaccharides:** Like inulin, oligosaccharides stoke the immune cells in the gut-associated lymph tissue. Oligosaccharides also boost *Bifidobacteria* and reduce stool pH. Found in vegetables like onions, carrots, asparagus, bananas, onions, chicory root, garlic, jícama, tomatoes, leeks, with Jerusalem artichoke and yacón having the highest concentration. Also found in supplement form labeled as fructooligosaccharide (FOS).

When Digestion Goes Bad

In ***Your Guide to Antioxidant Superfoods*** we explored the preventive plate. And if you remember, only 30% of that plate was comprised of animal products with most of the meal coming from fresh, organic whole food, plant sources.

Here's one of the many reasons we advocate this: *putrefaction*—the splitting of proteins by bacteria and fungi with the formation of incompletely oxidized products.



Fermentation, as we just learned, can be a very beneficial process. But while fermenting one food can create a “healer”, fermenting another creates a “harmer”.

Proteolytic fermentation (“proteo” meaning protein, “lytic” meaning to break) breaks down proteins like enzymes and dead cells, as well as proteins like collagen and elastin found in food.

But unlike fermentation of fibers which creates healthy byproducts protein fermentation can produce toxins and carcinogens. This is called *putrefaction dysbiosis* and is associated with:

- Low butyrate concentration
- Low Bifidobacterium
- High Bacterioides
- High stool pH – associated with prevalence of colon cancer

Some of these toxins include:

- Uric acid
- Lactic acid
- Ammonia – increases stool pH which is associated with colon cancer
- Lipid hydroperoxides (LOOH) – free radicals that damage DNA
- Malonaldehydes (MDA) - carcinogenic



Fend off Faulty Fermentation: It's not necessary to cut meat out of your diet. Just be smart about it and follow these rules:

1. **Focus on Fresh:** Enjoy a high fiber diet, with the focus of your meals on plant foods and use meat as a “condiment”.
2. **Sip Wine with Your Steak:** Recent research published in the *Journal of Agricultural Food Chemistry* found that wine polyphenols significantly reduce the formation of harmful byproducts and the generation of free radicals associated with digesting meat.

pH: Getting Back to Basics



As you've learned through this series, the human body carries out thousands of biochemical processes that generate antioxidants, metabolize fats, neutralize toxins, fend off invaders and much more.

One of the most "basic" requirements for keeping your body in balance, and completing these essential tasks has to do with pH—a measure of the relative acidity or alkalinity of a substance. A pH of 7.0 is neutral. A pH below 7.0 is acidic. A pH above 7.0 is alkaline.

The pH of our internal fluids affects every living cell in our body. Without the proper acid/alkaline balance, enzymes can't function properly, oxygen delivery to cells suffers, and our body struggles to complete its vital biochemical processes in a hostile environment. The result is poor health.

In the grand scheme of humanity, the problem of pH imbalance is relatively new.

You see, our genes haven't changed much since our hunter-gatherer ancestors roamed the planet. *But our diet has.*

The Paleolithic "plate" was full of fresh vegetables, lots of greens and berries with small game, fish, and eggs making an appearance as they could find or catch them. There were no grains or sugars. In fact, it is estimated that hunter-gatherers consumed the equivalent of 20 teaspoons of sugar in a year. Compare that to the average 158 pounds of sugar per year we consume today.

But with the advent of agriculture and then the Industrial Revolution, our diet took a major turn... in the wrong direction.

- Stone tools were used, and grains were introduced into the diet
- Refined grains then took their place with the invention of rolling and sifting devices
- Livestock were domesticated, increasing the amount of dairy products in the diet
- Salt consumption increased when mining technology advanced
- Animal husbandry caused an increase in meat consumption
- Inexpensive grain milling led to feeding livestock grains in order to fatten them quickly and speed to market
- Sugar became cheap and ubiquitous, annual consumption rises to 158 lbs/person annually

As you can see, this “progress” led to an increased consumption of sugar, grains, dairy products and meats – all of which are “acid-forming” foods. And at the same time, consumption of fresh fruits and vegetables – alkaline foods—decreased.

The result: an acid-forming diet.

So how does a food become acid-forming or alkaline-forming?

When we metabolize food, not all of it is used up. A residue remains which is called ash. Digestion oxidizes foods using enzymes that operate at low temperatures. Each food is broken down into its unique constituents.

A lemon, for example, will break down into carbohydrates that further break down into carbon dioxide and water leaving a residual alkaline ash consisting of minerals salts such as sodium, potassium and calcium. So although a lemon will taste acidic and have an acid pH when tested raw, its ash will be alkaline and so will its effect on the body.

Proteins, on the other hand, leave an ash consisting of phosphates, sulfates and nitrates which are all acidic and increase acidity in the body.

An alkalizing diet can help reduce the acid load that many practitioners believe is associated with chronic disease. Here are some of the dangers of an acid-forming diet:

- **Bone Loss:** The body relies on calcium and magnesium for critical functions like heartbeat and muscle contraction. These alkaline minerals are “buffering” agents which are stored in the bone matrix. When the acid level of the blood gets too high, the body sequesters calcium and magnesium from the bones, demineralizing them and contributing to osteoporosis.
- **Kidney Stones:** As the body demineralizes bone, the calcium must be metabolized and excreted. Higher levels of calcium in the kidneys increases the risk of kidney stones.
- **Impaired Detoxification:** Alkalinization helps to enhance toxin elimination by “ion trapping”. This includes detoxification of heavy metals.
- **Growth of Bacteria, Yeast, Fungi & Parasites:** These invisible health thieves thrive in an acidic environment, contributing to leaky gut, *Candida* and overall poor health.
- **Cancer Promotion:** Cancer cells are very different from normal, healthy cells. They grow and divide unchecked, and invade nearby tissues and organs by growing new blood vessels (*angiogenesis*) and cannot survive in the presence of high levels of oxygen. Because an acidic pH level in the body deprives cells of oxygen, this is thought to be a contributing factor to the cancer process.

In the 1920's, Dr. Max Gerson pioneered the concept that a potassium/sodium imbalance was to blame for many chronic diseases. According to Gerson, we should opt for a potassium to sodium intake of about 4:1. But our modern diet is extremely high in sodium and critically devoid of potassium due to processed foods and high meat consumption.

Cancer researcher Dr Lai Chiu-Nan, PhD. notes:

"For cells to perform normally, they need to concentrate potassium and expel sodium. In the cells, potassium to sodium ratio is about 10 times. When cell membranes are damaged, potassium is leaked and the cells start to divide. Dividing cells and cancer cells have a lower ratio of potassium to sodium compared to normal cells. That cancer cells grow in an uncontrolled manner is probably related to the lowered potassium-sodium ratio".

While the subject of pH levels is still considered an "alternative" concept in modern medicine, the end result of alkalizing your diet is irrefutably healthy. By eating more fresh vegetables and greens (plus some fruits) your body will get more disease-fighting, age-defying nutrients (including the important alkalizing minerals potassium, calcium and magnesium) more cell-protecting enzymes, better detoxification and more effective elimination.



Get Back to Basics! Alkalize your body by following these simple guidelines:

- Make spring or purified water with a squeeze of fresh organic lemon your drink of choice.
- Avoid all sugars and refined carbohydrates.
- Increase vegetables and greens (with some fruits) to comprise 60-70% of your diet.
- Enjoy potent alkaline-forming foods (see p. 24 for the table), especially organic greens, sprouts, lemon juice, wheat grass juice, grapefruit, and fermented veggies (like real sauerkraut).
- Eat more cruciferous veggies which contain natural detoxifiers like sulforaphane (see ***Your Guide to Antioxidant Superfoods***). A recent study found that eating 200 g of cooked broccoli, carrots and cauliflower can alkalize urine for 4 hours.
- Balance animal protein intake with alkalizing foods.
- Reduce salt and increase potassium in your diet. Potassium-rich foods include avocados, bananas, and beans. Potassium citrate has been found to be an effective alkalizer and detoxifier.
- Avoid all artificial sweeteners, not only are they potent acidifiers, they are also poison (see ***Organics: Beyond Green***)
- Balance your (organic!) coffee intake with caffeine-free, antioxidant-rich herbal spice teas (try Yogi Detox Tea or other organic herbal teas)
- Test your pH regularly (see how on the next page).

Test Your pH

To perform this simple test, all you need is a roll of testing pH paper (preferably pHDrion test paper), a plastic spoon and some fresh saliva.

Here's how:

1. Do not eat, drink, or brush your teeth for 30 minutes prior to the test.
2. Swallow a couple of times to clear the mouth and stimulate new saliva.
3. Discharge some saliva into a plastic spoon (do NOT touch the pH paper to your tongue due to the chemicals in the paper).
4. Tear off a one-inch strip of pH paper, place into saliva and compare the color of your immersed pH paper with the color chart provided on the pH testing roll.
5. Compare your saliva pH to the test strip legend.



The lower your pH value below 7.0, the greater your degree of acid stress.

Continue testing and recording your pH for a few weeks first thing in the morning, afternoon and at bedtime to show your body pH trend. The optimal pH for saliva is above 7 pH.

A reading consistently lower than 6.8 is indicative of possible insufficient alkaline reserves. After eating, the saliva pH should rise to 7.8 or higher. Unless this occurs, the body has alkaline mineral deficiencies (mainly calcium and magnesium) and will not assimilate food very well.

If your saliva stays between 6.8 and 7.2+ pH all day, your body is functioning within a healthy range.

pH of Foods

Food	High Alkaline	Alkaline	Low Alkaline	Low Acid	Acid	High Acid
Vegetables & Legumes	Greens, Vegetable Juices, Parsley, Water cress, Sea weeds, Celery, Garlic, Fermented Veggies	Carrots, Green Beans, Lima Beans, Beets, Lettuce, Zucchini, Ginger, Peas, Sprouts	Squash, Asparagus, Tomato, Rhubarb, Fresh Corn, Mush rooms, Onions, Cabbage, Peas, Cauliflower, Turnip, Beetroot, Potato, Olives, Soy beans, Tofu	Sweet Potato, Cooked Spinach, Kidney Beans	Pinto Beans, Navy Beans	Pickled Vegetables
Fruit	Lemons	Dates, Blackcurrant, Grapes, Papaya, Kiwi, Berries, Apples, Pears	Coconut, Sour Cherries, Oranges, Cherries, Pineapple, Peaches, Avocados, Grapefruit, Mangoes, Strawberries, Papayas, Water melon, Limes	Blueberries, Cranberries, Bananas, Plums, Fruit Juices	Canned Fruit	
Grains			Amaranth, Lentils, Corn, Wild Rice, Quinoa, Millet, Buckwheat	Rye Bread, Whole Grain Bread, Oats, Brown Rice	White Rice, White Bread, Pastries, Biscuits, Pasta	
Meat			Liver, Oysters, Organ Meat	Fish, Turkey, Chicken, Lamb	Beef, Pork, Veal, Shellfish, Canned Fish	
Eggs & Dairy		Breast Milk	Soy Cheese, Soy Milk, Goat Milk, Goat Cheese, Buttermilk, Whey	Whole Milk, Butter, Yogurt, Cottage Cheese, Cream, Ice Cream	Eggs, Hard Cheese	Parmesan, Processed Cheese
Nuts & Seeds		Hazelnuts, Almonds	Chestnuts, Brazils, Coconut	Pumpkin, Sesame, Sunflower Seeds	Pecans, Cashews, Pistachios	Peanuts, Walnuts
Oils		Flax Seed Oil, Olive Oil, Coconut Oil, Canola Oil	Corn Oil, Sunflower Oil, Margarine, Lard			
Beverages	Herb Teas, Lemon Water	Green Tea		Cocoa	Wine, Soda	Black Tea, Coffee, Beer, Liquor
Sweeteners & Condiments	Stevia	Maple Syrup, Rice Syrup	Raw Honey, Raw Agave Raw Sugar	White Sugar, Processed Honey	Milk Chocolate, Brown Sugar, Molasses, Jam, Ketchup, Mayonnaise, Mustard, Vinegar	Artificial Sweeteners

The Problem with Permeability



Imagine filling a water balloon with red-colored solution. Tie a knot. Now, put that balloon in a bathtub full of fresh, clear water. What happens?

Nothing, right?

Now, use a needle to poke tiny holes in the balloon. Now what happens?

Your clear tub of water begins turning red as the solution inside the balloon leaks out.

You have just been introduced to one of the most important aspects of digestive health: *permeability*.

As you may have gathered, the balloon represents your digestive tract, the red-colored solution represents the material inside of your digestive tract and the bathtub represents your body external to the walls of your digestive system.

While the material contained inside the digestive tract is safe and harmless to your gastrointestinal system, its leakage is toxic to the rest of the body. The intestine is supposed to act as a barrier. When it doesn't do its job, a series of destructive processes follow.

As the semi-digested foods and other organisms in the gut leak out, your immune cells rush to the rescue. They recognize the foods you ate (and other digestive components) as "invaders". Antibodies are created in response to these "invaders" and stand ready to attack. Eventually this causes a hypersensitivity to the foods in your diet. It makes sense then that many auto-immune disorders are a result of a bad gut.

But the effects of leaky pipes out don't end there. The septic seepage also taxes the liver, which must rush to mop up the mess using substances like *glutathione* — "*the master antioxidant and detoxifier*". And when this happens, it reduces the glutathione that needs to be used elsewhere in the body to fight free radicals, eliminate rogue cells and disarm toxins. Learn more about glutathione and how you can boost it with the power of your plate in ***Your Guide to Antioxidant Superfoods***.

Before we talk about stopping the leaks, let's take a quick look at the many conditions a leaky gut has been associated with:

- ✓ Inflammatory bowel disease
- ✓ Infectious bowel disease
- ✓ Arthritis
- ✓ Acne, psoriasis and dermatitis herpetiformis
- ✓ Eczema
- ✓ Urticaria
- ✓ Irritable Bowel Syndrome
- ✓ Chronic hepatitis
- ✓ Chronic pancreatitis
- ✓ Cystic fibrosis
- ✓ Celiac disease
- ✓ Chronic Fatigue Syndrome
- ✓ Rheumatoid Arthritis
- ✓ Asthma
- ✓ Multiple Sclerosis
- ✓ Fibromyalgia
- ✓ Crohn's Disease
- ✓ Addison's Disease
- ✓ Lupus
- ✓ Thyroiditis
- ✓ Chemical sensitivities
- ✓ Allergies

While you may not be diagnosed with any of these disorders, you may already know what a leaky gut feels like – abdominal pain, bloating, gas, diarrhea, headaches, nerve pain, skin rashes and joint aches.

What's more, you may be frustrated that your doctor is missing the vital link between your health issues and a leaky gut.

So, how does our gut get leaky?

Our digestive tract is very dynamic. In fact, our intestinal lining replaces itself every 24 hours. It heals quickly, but it can be damaged quickly too.

Certain foods, drugs and organisms that increase inflammation cause perforations that make our gut leaky:

Sugar – Sugar in any form, whether it is table sugar or carbohydrates that are metabolized into sugar, damages the gastrointestinal tract.

- Suppresses the immune system. Studies show that consuming just 100 g of simple sugars decreases the activity of white blood cells for at least 5 hours
- Increases the acidity (pH) of the digestive tract
- Promotes excretion of vital vitamins and minerals
- Feeds *Candida*
- Promotes a leaky gut

Low Stomach Acid (Hypochlorhydria) – A deficiency in hydrochloric acid (HCL) can contribute to a leaky gut. Low acid in the stomach reduces the body's ability to digest. Undigested proteins pass into the intestine and are decomposed, releasing toxic substances including *cadaverine* and hydrogen sulfide gas. Low stomach acid is caused by:

- Refined carbohydrates and sugars
- Antacids
- Anti-ulcer medications

Candida – An overgrowth of a fungus, *Candida albicans*, can promote leaky gut. In a healthy digestive system, *Candida* is kept in check by the beneficial bacteria (like *Bifidobacteria*). While a healthy person has millions of *Candida* yeast living in the tract, when its growth is not kept in check, it becomes invasive and produces roots (or rhizomes). These roots can permeate the mucous membrane allowing food particles, toxins and bacteria to move through the lining and into the bloodstream. In the next section, you'll learn about what you can do to keep *Candida* under control.

Bacteria – Bacteria make up most of the flora in the colon. Some bacteria are good – they help to synthesize vitamins and break down undigested material. Other bacteria can be harmful when their population gets out of control and kills off the friendly flora.



Are GMOs Linked to GI Problems? Many of the “problem foods” that promote permeability have specific food proteins or lectins (i.e- gluten, casein) that are difficult to digest and potentially toxic. And genetically modified foods, due to an increased expression of such proteins, may be even more toxic. Avoiding GMOs is a good idea for many reasons. See ***Organics: Beyond Green*** for more on why you should opt for the foods Mother Nature (not Monsanto!) designed.

Parasites – Our immune system typically protects us from parasites (as well as invasive bacteria, fungi and viruses). But when our immune system becomes compromised due to a poor diet, stress or infection– or when our healthy bacteria get “crowded out, these opportunistic invaders will take hold. When they do, they damage the intestinal wall (contributing to leaky gut), as well as siphon off valuable nutrients and excrete toxic waste material. The most common parasites found in humans are amoebas, helminthes, *Giardia*, *Trichina* and *Cryptosporidium*.

NSAIDS – Nonsteroidal anti-inflammatory drugs (NSAIDS) like acetaminophen, ibuprofen and others perforate the gastrointestinal lining. When permeability increases, damage to the villi in the intestine can occur from outside invaders coming in. And because NSAIDs block the prostaglandins that modulate inflammation as well as those that stimulate tissue repair, the damaged intestine cannot heal itself. Among people using NSAIDs, it is believed that 65% will develop intestinal inflammation and up to 30% will develop gastroduodenal ulceration.

Steroids – Steroids like cortisone and prednisone suppress the immune system, kill off friendly bacteria and promote fungal infections by way of hormonal changes.

Cytotoxic Drugs – Drugs like melphalan, chlorambucil and cyclophosphamide are designed to kill cells. Cytotoxic drugs are toxic to anything in the body they come across – including the cells in the digestive tract.

Alcohol – As you learned earlier, alcohol is an acid-forming substance. Imbalanced pH levels, coupled with the yeast in alcohol, encourage the growth of *Candida* and other opportunistic species. Overuse of alcohol can also suppress the production of prostaglandins—hormone-like substances that module inflammation and stimulate tissue repair. Alcohol also damages the liver.

Caffeine– Coffee, sodas and other caffeinated foods and drinks tend to irritate the mucosal lining, causing irritation, inflammation and perforation.

Antibiotics – Antibiotics eradicate any bacteria they come across, including the healthy bacteria in the GI tract. This creates a state of “dysbiosis” – allowing pathogenic bacteria, fungi, viruses, etc to proliferate.

Pesticides, herbicides, fungicides and insectides – These toxic substances are unselective with regard to the organisms they kill. As such, they contribute to dysbiosis in the intestines. Learn more about how these substances act as endocrine disruptors in ***Organics: Beyond Green***.

Chlorine & Fluoride – These compounds are meant to kill biological organisms, and they do this unselectively killing your “good bacteria” too and contributing to dysbiosis. For the health of your GI tract, it’s time to get a filter or switch to safe bottled water (see ***Smart Cooks Age Better*** for safe plastics).

Foods Containing Antibiotics or Hormones – Just as antibiotics kill off the healthy flora in your tract, so too do animal products that have been hormone treated. Hormone-pumped animal meats affect hormone levels in our bodies, further throwing off the balance. Choose only wild fish (not farmed) and organic, grass-fed meats and dairy products that have not been administered hormones or antibiotics (see ***Organics: Beyond Green***)

Trans Fats – Hydrogenated oils are made by heating vegetable oils in the presence of hydrogen with a metal catalyst. Trans fats damage cell membranes — including those in our gut — allowing toxic chemicals to enter and damage our cells. Learn more about these dangerous fake fats in ***Fats that Heal, Fats that Harm***.

Stress – Stress triggers the release of hormones (like cortisol) which increase inflammation in the body, promote a leaky gut and increase the adherence of harmful bacteria to the cells lining the gut wall.



Time to Detox! Clear your cupboards of the ingredients that are damaging your gut and robbing you of your health. ***Your Kitchen Makeover*** will teach you about the “Toxic Twelve” the most prevalent and dangerous additives in foods and how to spot them on ingredient labels.

Controlling Candida



It is estimated that one in three people in the U.S. have an overgrowth of *Candida*.

Some go through life feeling as if they're in a fog, others experience recurrent sinus infections or yeast infections, and almost all complain of fatigue.

The range of symptoms of *Candida* overgrowth are vast (numbering more than 100), but the contributing factors are relatively few and include:

- ✓ Refined carbohydrates and sugar
- ✓ Food allergies/intolerances
- ✓ Alcohol
- ✓ Hormones— oral contraceptives, steroids and pregnancy-related hormones, as well as hormones in non-organic meats
- ✓ Antibiotics—taken for medical purposes as well as those in foods
- ✓ Pesticides and other cell-killing chemicals (like chlorine)
- ✓ Antacids and anti-ulcer medications
- ✓ Certain pharmaceutical drugs (cytotoxic drugs)
- ✓ Preexisting conditions that weaken immunity (AIDS, diabetes, etc)

While *Candida* is normally harmless, it responds quickly and can grow out of control given any one or combination of the above "contributors". Here's a short list of symptoms *Candida* can produce:

- Oral thrush, vaginal yeast infections and jock itch
- Skin and nail infections
- Rectal itching
- Gas and belching
- Sinus infections
- Fatigue
- Headaches
- Hives and rashes
- Diarrhea and constipation
- Asthma and allergies
- Joint pain
- Impaired immunity
- Hyperactivity in children ("ADHD")
- Many more

The good news is that you can get *Candida* under control with simple modifications in diet and lifestyle. In the next section, we'll explore the foods to avoid and the foods to include to bring you back to symbiosis.

Your Candida Cleanse

The first step to eliminating a *Candida* overgrowth is to stop feeding it!

Most holistic practitioners recommend a strict initial “candida cleanse” coupled with “reforestation efforts” for *one month*. This allows the body time to restore and strengthen its colonies of “friendly” bugs which act as natural protection against *Candida*.

After the *Candida* has been put in check, maintaining a diet and lifestyle to reduce the risk for recurrent infection is essential.



Because everybody is different, and the level of *Candida* overgrowth and risk of recurrence will vary among individuals, it’s important to be patient and take the time to learn and document those foods that are triggers including:

Sugar: Sugar is the favorite food of yeast. You can see it in action when making bread—the dough rises because the yeast grow from consuming the sugars in the flour. Avoid ALL sugars—refined or whole, from fruits, juices or other natural foods. Look for hidden sugar on labels too. Watch out for anything with an -ose at the end (i.e.-lactose) as well as molasses, turbinado, demerrara, rice syrup, sorghum, mannitol, sorbitol, monosaccharides, polysaccharides. If it has more than 5 grams of sugar per serving—*don’t eat it*.

Fruit: While fruit provides a plethora of nutrients and alkalizing properties that benefit the body, it’s also a source of sugar—fructose. It’s important to eliminate fruit initially when working to reduce *Candida*. Once you’ve got it in check, low-sugar fruits like berries, apples and pears can be enjoyed *in moderation*.

Starchy Vegetables & Grains: As you learned earlier, all digestible carbohydrates are eventually broken down into sugars. Avoiding grains—even whole grains—is a good idea initially. Later, some grains (like brown rice) may be added back to the diet (in moderation) if they are tolerated well.

Alcohol: Alcohol is composed of yeast’s favorite foods -fermented and refined sugar. Alcohol suppresses the immune system, further exacerbating the *Candida* problem and health in general. Eliminate alcohol during your *Candida* cleanse. If you choose to reintroduce alcohol later, do so in moderation, and opt for lower carb alcohols.

Vinegar: All types of vinegar, as well as products made with vinegar (like mayonnaise, salad dressings, ketchup, Worcestershire sauce, BBQ sauce, soy sauce, mustard, pickles and pickled vegetables, olives, relishes) should be avoided initially. Many of these foods are also high in sugar. Reintroduce the low-sugar, whole foods sources of vinegar (like organic apple cider vinegar) back into the diet slowly after the cleanse and monitor how you feel.

Yeast: There is controversy as to whether yeast in foods promotes *Candida*. However, one thing's for sure— if it has yeast in it, it's a grain product providing sugars to the diet and should be avoided.

Gluten: Products containing gluten should be avoided as well. In addition to the sugars in gluten-containing foods, gluten is also a common allergen causing sensitivity in 1 in 133 people. See p. 6 and 10 for how gluten may damage your gut, and also visit our Gluten-Free Living center online.

Mushrooms: As a fungus, some people experience a "crossover" reaction to mushrooms. Avoid them initially, then reintroduce with caution after balance has been achieved.

Dairy: Milk products contain the sugar lactose, and should be avoided initially. Molded cheese, like blue cheese, and aged cheeses may increase the growth of *Candida* and should be avoided for anyone with a history of yeast issues.

Soy Foods: Soy foods contain potent enzyme inhibitors that block the action of trypsin and other enzymes needed for protein digestion. Soy foods are also rich in phytoestrogens—hormone mimics which can encourage *Candida* growth. Finally, soy is a common allergen and 99% of soy is genetically modified. Go to our website to learn more about the dangers of soy.

Hormones, Antibiotics & Pesticides: Earlier, we discussed how these substances can contribute to a state of *dysbiosis*. Avoiding chemicals in your food won't just assist with clearing *Candida*, but will also improve your overall health. See **Organics: Beyond Green** for more on the health benefits of choosing foods grown naturally.



Are You Overrun with Candida? Chances are, your doctor hasn't tested your active antibody subclass titers. These tests are performed using ELISA (enzyme-linked immunosorbent assay) for the detection of IgG antibodies to *Candida albicans*. If you suspect *Candida* is plaguing you, ask your doctor for a Candida Immune Complexes Test or the combination of Ig tests.

These tests must be ordered by a physician and range in price from \$100 to \$250. If your doctor thinks the problem is "all in your head" and refuses to test you for this common and chronic health problem, you may need to find a qualified doctor that believes in alternative medicine. You can search for qualified doctors in your area at: American College for Advancement in Medicine (ACAM) or American Holistic Medical Association (AHMA).

Fungus-Fighting Foods



Now you've learned how to starve out the yeast in your gut. That's half the battle.

But there's more you can do to eliminate this health-sapping parasite: feed it fungus-fighting foods!

Here they are:

Garlic: Garlic is one of the most potent anti-fungal foods thanks to a phytonutrient called *allicin*. Be sure to enjoy garlic fresh—allicin is destroyed by cooking.

Cruciferous Vegetables: The family of crucifers—including broccoli, Brussels sprouts, arugula, watercress, cabbage and others—contain potent fungus fighting phytonutrients. But that's not all. They're also practically devoid of carbohydrate, and provide fiber to act as a prebiotic for "reforestation".

Oregano & Other Herbs: Culinary herbs don't just offer flavor, but also antioxidants and anti-fungal phytonutrients. Oregano seems to be of special importance containing two antimicrobial agents called *carvacrol* and *thymol* that fight *Candida* and other pathogens. Liberally add organic herbs to your food and consider an oregano supplement, like *Oreganol*.

Cloves: Cloves contain a powerful anti-fungal agent called eugenol that has been found to kill *Candida* and other yeasts. This pungent spice also ranks #1 in antioxidants (see **Your Guide to Antioxidant Superfoods**). Try organic spice teas containing cloves like Yogi Detox Tea.

Insoluble Fiber: Ensuring you get sufficient insoluble fiber in your diet will help speed the elimination of toxins (including the yeast that are dying off) from your colon. Stagnant waste material is a breeding ground for *Candida* and other gut-harmers.

Raw Cultured Dairy: While dairy should initially be avoided, raw, cultured organic dairy products like kefir, plain yogurt and buttermilk can be beneficial. That's because they contain probiotics and enzymes not found in pasteurized dairy.

"Real" Fermented Veggies: Most fermented veggies—like sauerkraut, pickles, horseradish, etc.—use vinegar (a yeast promoter) and are heat-processed. But "real" fermented veggies are made simply by adding salt and are "magically" inoculated with atmospheric bacteria. The process produces probiotics like *Lactobacillus plantarum*, which crowd out *Candida* and help to restore balance. Buy fresh-fermented foods from your local farm or try *Bubbies Sauerkraut*.

Tea: True teas, like white tea, green tea, black tea and oolong tea, contain tannins which are powerful anti-fungal agents. But tea is also high in fluoride. For this reason, we recommend using a tea tincture like that from Body Ecology or herbal teas containing the fungus-fighting spices like cloves and cinnamon.

Cinnamon: This spice is a powerful anti-inflammatory, anti-fungal and antimicrobial agent. In laboratory tests, growth of yeasts that were resistant to the commonly used anti-fungal medication fluconazole was often stopped by cinnamon extracts. Cinnamon is also packed with antioxidants, ranking #2 of all of the foods tested (see ***Your Guide to Antioxidant Superfoods*** for more).

Healthy Fats: Enjoying healthy fat is a cornerstone of good health (as you'll learn in ***Fats that Heal, Fats that Harm***). There are several types of healthy fat that have been found to specifically support a healthy digestive system:

- **Omega-3s:** These essential fats make up cell membranes, and as such, support the integrity of the intestinal wall. They also aid in flora balance. Boost your omega-3's by enjoying wild salmon and taking a fish oil supplement like Carlson's.
- **Saturated Fats:** Also essential for the integrity of the intestinal mucosa, choose "clean" saturated fats including:
 - **Raw, Grass-Fed Butter** is known to be highest in butyric acid—the primary energy source for the gut that helps to reduce inflammation. It also contains *lauric acid*—a potent antimicrobial and antifungal substance.
 - **Raw Organic Coconut oil** contains three potent fungus-fighting compounds: *lauric acid, caprylic and capric acid*.
- **Omega-9s:** Found in olive oil, flax oil, borage oil, and evening primrose oil, these fats help boost immunity and prevent Candida from becoming systemically invasive. Olive oil seems to be of special importance due to anti-fungal compounds called phenols.

"Clean" Proteins: In times of illness or repair, the body requires more protein. Be sure you are choosing clean protein sources to rebuild your cells and guard against hidden fungal-promoters. Opt for wild-caught fish, grass-fed beef, cage-free organic omega-3 eggs, organic free-range poultry and organic pork. Also be sure your meat is additive and preservative-free.

Pure, Contaminant-Free Water: Keeping well hydrated with pure water that's free of chemicals is essential to flush the tract and maintain regularity. Aim for 8-8 ounce glasses a day and add lemon to benefit your pH balance.

Reforestation: Returning to Balance

Now that you've learned how to cleanse and flush your tract of Candida, it's time to build the native, healthy flora back into your internal ecosystem.

It's important to note that the deeper the Candida issue, the more patient and persistent you will need to be with the program.

If the fungi have rooted into the intestinal walls, they will continue to re-inoculate the fecal stream. But supporting the ecology long enough for the intestinal epithelial cells to desquamate (shed, slough off, turn over) will help to ensure the fungi buried within them will be expelled and your "reforestation" efforts will be successful.



Also, be conscious of your environment and the origin of your food.

Yeast thrives in wet, warm places, so be sure to disinfect your bathroom on a regular basis and clean your air filters.

Because mold spores are present on the outside of fruits and vegetables, it's important to wash them well.

Some crops—like grains and peanuts— are contaminated with *mycotoxins* (fungal toxins). While you will be eliminating grains initially during the cleanse, keep this in mind when you're ready to reintroduce them. As for peanuts, choose those grown in the dry arid climate of New Mexico and other parts of the Southwest which are less susceptible to cancer-causing mycotoxin called *aflatoxin* (We like MaraNatha organic peanut butter— each batch is tested for aflatoxin contamination).



Making Sense of Supplements: There are many supplements you many want to consider on your *Candida Cleanse*. Here are the most popular:

- Probiotics: Lactobacillus, Bifobacterium and Acidodophilus
- Colostrum
- Grapefruit seed extract
- Oregano oil
- Bentonite
- Pau d'arco
- Bitters
- Black walnut
- Jerusalem artichoke
- Goldenseal

Clean Up Your Internal Ecosystem



In this book, we've explored the gamut of how to get a good gut.

Now you know how to guard against damaging permeations, achieve a healthy balance of beneficial microflora, ensure the food you eat gets absorbed with the help of enzymes and keep your pH within a healthy range.

On these next two pages, we'll do a quick review of the foods and food components that benefit your internal ecosystem, boost digestive health and promote wellness...from the inside, out!



Having a Healing Crisis? When yeast dies off quickly, a temporary worsening of symptoms called a Herxheimer reaction can occur. This is because Candida release protein fragments and toxins that trigger an antibody response from the immune system. Be sure to drink lots of purified or spring water and include daily physical activity (preferably vigorous!) to speed detoxification and healing.

Food or Nutrient	Action
Greens (Spinach, Beet Greens, Collard Greens, etc)	<ul style="list-style-type: none"> • Alkalizing—reduces pH • Add the “missing taste” (bitter) that promotes healthy digestion
Cruciferous Veggies (Arugula, Cabbage, Broccoli, Cauliflower, Kale, etc)	<ul style="list-style-type: none"> • Source of soluble fiber (prebiotic) • Boost enzymes — specifically phase 2 detoxifying enzymes • Kill H. pylori • Alkalizing—reduces pH
Sprouts	<ul style="list-style-type: none"> • Alkalizing—reduces pH • Potent source of enzymes
Garlic & Onions	<ul style="list-style-type: none"> • Boost enzymes — specifically phase 2 detoxifying enzymes
Ginger	<ul style="list-style-type: none"> • Natural anti-fungal and anti-bacterial • Boost enzymes — specifically phase 2 detoxifying enzymes • Alkalizing—reduces pH Source of inulin (prebiotic)
Oregano	<ul style="list-style-type: none"> • Potent anti-fungal
Cloves & Cinnamon	<ul style="list-style-type: none"> • Potent anti-fungal
Beets	<ul style="list-style-type: none"> • Source of soluble fiber (prebiotic) • Boost enzymes — specifically phase 2 detoxifying enzymes
“Real” Fermented Vegetables (Horseradish, Sauerkraut made without vinegar)	<ul style="list-style-type: none"> • Source of soluble fiber (prebiotic) • Contains Lactobacillus (probiotic) • Alkalizing—reduces pH • Boost enzymes — specifically phase 2 detoxifying enzymes
Raw Cultured Milk Products (Kefir, Yogurt)	<ul style="list-style-type: none"> • Contains Lactobacillus (probiotic) • Raw milk products contain powerful enzymes (see Organics: Beyond Green)

Food or Nutrient	Action
Omega-3 Fats (Wild salmon, “clean” fish oil supplements, sardines)	<ul style="list-style-type: none"> • Anti-fungal • Reduce inflammation • Essential for healthy cell membranes, boost GI tract integrity • Promote colonization with the beneficial microflora
Monounsaturated Fats (primarily Extra Virgin Olive Oil)	<ul style="list-style-type: none"> • Contain phenols—natural anti-fungal agents • Reduces inflammation
Saturated Fats (Grass-fed butter, extra virgin coconut oil)	<ul style="list-style-type: none"> • Coconut oil contains potent anti-fungals including <i>lauric acid</i> • Grass-fed butter contains potent anti-fungals including <i>butyric acid</i>
Soluble Fiber	<ul style="list-style-type: none"> • The “food” source for healthy bacteria in the gut • Increases butyrate and short chain fatty acids which increase the important <i>Bifidobacteria</i> • Reduces inflammation • Improves integrity of cells lining the colon • Reduces stool ph, reducing colon cancer risk • Best Sources: Organic citrus fruits, apples, pears, oats, beans, nuts, psyllium
Insoluble Fiber	<ul style="list-style-type: none"> • Mother Nature’s Broom — sweeps the intestine, prevents constipation • Best Sources: Skins of organic fruits and root veggies, psyllium, seeds, nuts, dark leafy veggies
Inulin	<ul style="list-style-type: none"> • Increases butyrate and short chain fatty acids which increase the important <i>Bifidobacteria</i> • Boosts the immune cells in the gut • Reduces stool ph, reducing colon cancer risk • Increases the absorption of nutrients — calcium and magnesium • Best Sources: Supplement form, onions, garlic, agave, jicama and artichokes
Oligosaccharides (or fructooligosaccharides FOS)	<ul style="list-style-type: none"> • Increases butyrate and short chain fatty acids which increase the important <i>Bifidobacteria</i> • Boosts the immune cells in the gut • Best Sources: Supplement form, onions, garlic, celery, asparagus, bananas, jicama

References

1. Braly, J, 1992, Dr Braly's Food Allergy and Nutritional Revolution Keats Publishing
2. Gibbons, D, 1992 Colitis and Other IBS Conditions Keats Publishing Murray, M, Pizzorno, J, 1991 Encyclopedia of Natural Medicine' Prima Publishing
3. The Merck Manual, 1992,16th edition, Rahway, Sharpe & Dohme Research Labs
4. Lopez, DA, Williams, RM, Miehlike, K, 1994, Enzymes, The Fountain Of Youth, The Neville Press.
5. Guyton, AC, 1985, Textbook of Medical Physiology, WB Saunders
6. Lipski E Leaky Gut Syndrome, 1998, "What to do about a health threat that can cause arthritis, allergies and a host of other illnesses" p18 Keats Mitsuoaka T, 1992, "Intestinal Flora and Aging" Nutrition Research Reviews 50 (12) pp 438-460
7. Holzapfel WH, Haberer P, Snel J, et al, 1998, "Overview of gut flora and probiotics". International Journal of Food Microbiology 41 pp 88-101
8. Noack J, Kleessen B, Proll J, et al, 1998 "Dietary guar gum and pectin stimulate intestinal microbial polyamine synthesis in rats", Journal of Nutrition, 128 pp1385-1391
9. Gibson GR, Roberfroid MB, 1995, "Dietary modulation of the human colonic microbiota: introducing the concept of prebiotics" Journal Of Nutrition, 125, pp1401-1412
10. Koontz D, Hinze, J et al 1999, "Leaky Gut Syndrome, Origins, Effects and Therapies, The Medical Link Between Dysbiosis and Many Major Ailments' The Herbal Pharm 19, pp 8
11. Bjarnason I et al, Jan 28th 1984, "The Leaky Gut of Alcoholism: Possible Route of Entry for Toxic Compounds" The Lancet.
12. Horrobin DF,1980, "A Biochemical Basis for Alcoholism and Alcohol Induced Damage, Including the Fetal Alcohol Syndrome and Cirrhosis: Inferences with Essential Fatty Acid and Prostaglandin Metabolism." Medical Hypothesis 6 pp 949-42.
13. Blakesless S, August 14th 1984 "Scientists Find Biological Causes of Alcoholism" The New York Times
14. Senerchia D, 1990, Silent Menace, 20th Century Epidemic Candidiasis, Strawberry Hill Press.
15. Schwartz, George R, 1988, In Bad Taste: The MSG Syndrome, Santa Fe, New Mexico, Health Press, pp 9-10
16. Katan MB, Mensink RP, Zock PL, 1995, "Trans fatty acids and their effect on lipoproteins in humans". Annual Review of Nutrition; 15 pp 473-493.)
17. Willett WC, Ascherio A, 1994, "Trans Fatty Acids. Are The Effects Only Marginal?" American Journal of Public Health, 84: pp 722-724
18. Sanchez A et al, 1973, "Role of Sugars in Human Neutrophilic Phagocytosis" American Journal Of Clinical Nutrition, November, pp 1180-1184
19. Lechin, F et al, 1992 "Effects of an Oral Glucose Load on Plasma Neurotransmitters in Humans" Neurophychobiology, 26 (1-2) pp 4-11
20. Appleton, N, 1988, Lick the Sugar Habit, Avery Penguin Putnam
21. Lee, A, Cerami, A, 1992, "The Role of Glycation in Aging", Annals of the New York Academy of Science, 663, pp 63-70.
22. Yudkin, J, 1974, Sweet and Dangerous, Bantam Books, pp 129
23. Cornee J et al "A Case Control Study of Gastric Cancer and Nutritional Factors in Marseille, France" European Journal of Epidemiology, pp 11
24. Jones TW et al, 1995, "Enhanced Adrenomedullary Response and Increased Susceptibility to Neuroglycopenia: Mechanisms Underlying the adverse effect of Sugar Ingestion in Children" Journal of Pediatrics, 126, pp 171-177
25. Koontz D, Hinze, J et al 1999, "Leaky Gut Syndrome, Origins, Effects and Therapies, The Medical Link Between Dysbiosis and Many Major Ailments' The Herbal Pharm 19, pp 6
26. Gilbere, G, 2004 I Was Poisoned By My Body "The Odyssey of a Doctor Who Reversed Fibromyalgia, Leaky Gut Syndrome and Multiple Chemical Sensitivity Naturally." Lucky Press, 89
27. Bjarnason I, Macpherson AJ, 1994, "NSAIDs cause small intestinal inflammation in 65% of patients receiving the drugs long-term." Intestinal toxicity of non-steroidal anti-inflammatory drugs. Pharmacology Therapy Apr-May;62(1-2) pp145-57
28. Blower AL, 1996, "Endoscopic studies indicate that up to 30% of chronic NSAID users will develop gastroduodenal ulceration." Considerations for nonsteroidal anti-inflammatory drug therapy: safety Scandinavian Journal of Rheumatology Supplement 105 pp13-24
29. Gilbere G, 2004 I Was Poisoned By My Body "The Odyssey of a Doctor Who Reversed Fibromyalgia, Leaky Gut Syndrome and Multiple Chemical Sensitivity Naturally." Lucky Press, pp 77

30. Brown A, Hairfield M, Richards D, McMillin D, Mein, E, Nelson C, September 2004, "Medical Nutrition Therapy As A Potential Complementary Treatment For PsoriasisFive Case Reports" *Alternative Medicine Review*
31. Björkstén B, Sepp E, Julge K, Voor T, and Mikelsaar and M. 2001. Allergy development and the intestinal microflora during the first year of life. *Journal of Allergy and Clinical Immunology*, Volume 108, Issue 4, Pages 516-520.
32. Guarner F and Malagelada JR. 2003. Gut flora in health and disease. *The Lancet*, Volume 361, Issue 9356, 8 February 2003, Pages 512-519. PMID 12583961.
33. Sears CL. 2005. A dynamic partnership: Celebrating our gut flora. *Anaerobe*, Volume 11, Issue 5, Pages 247-251. PMID 16701579.
34. Steinhoff U. 2005. Who controls the crowd? New findings and old questions about the intestinal microflora. *Immunology Letters*, Volume 99, Issue 1, June , Pages 12-16. PMID 15894105. doi:10.1016/j.imlet.2004.12.013
35. Ann M O'Hara, Fergus Shanahan The gut flora as a forgotten organ. *EMBO reports* 7, 688 693 (01 Jul 2006)
36. University of Glasgow. 2005. The normal gut flora. Available through web archive.
37. Gibson RG. 2004. Fibre and effects on probiotics (the prebiotic concept). *Clinical Nutrition Supplements*, Volume 1, Issue 2, Pages 25-31.
38. Beaugerie L and Petit JC. 2004. Microbial-gut interactions in health and disease. Antibiotic- associated diarrhoea. *Best Practice & Research Clinical Gastroenterology*, Volume 18, Issue 2, Pages 337-352. PMID 15123074.
39. Riordan SM, McIver CJ, Wakefield D, Duncombe VM, Thomas MC, and Bolin TD. 2001. Small intestinal mucosal immunity and morphometry in luminal overgrowth of indigenous gut flora. *The American Journal of Gastroenterology*, Volume 96, Issue 2, Pages 494-500. PMID 11232696.
40. Vedantam G and Hecht DW. 2003. Antibiotics and anaerobes of gut origin. *Current Opinion in Microbiology*, Volume 6, Issue 5, Pages 457-461. PMID 14572537.
41. Shanahan F. 2002. The host-microbe interface within the gut. *Best Practice & Research Clinical Gastroenterology*, Volume 16, Issue 6, Pages 915-931. PMID 12473298.
42. Nordgård L, Traavik T, and Nielsen KM. 2005. Nucleic acid isolation from ecological samples—vertebrate gut flora. *Methods in Enzymology*, Volume 395, Pages 38-48. PMID 15865959.
43. Bettelheim KA, Breadon A, Faiers MC, O'Farrell SM, Shooter RA. 1974. The origin of O serotypes of *Escherichia coli* in babies after normal delivery. *Journal of Hygiene*, Volume 72, Issue 1, Pages 67-70. PMID 4593741.
44. Schwiertz A, Gruhl B, Lobnitz M, Michel P, Radke M, Blaut M. 2003. Development of the intestinal bacterial composition in hospitalized preterm infants in comparison with breast-fed, full-term infants. *Pediatric Research*, Volume 54, Issue 3, Pages 393-399. PMID 12788986.
45. Mackie RI, Sghir A, Gaskins HR. 1999. Developmental microbial ecology of the neonatal gastrointestinal tract. *American Journal of Clinical Nutrition*, Volume 69, Issue 5, Pages 1035S-1045S. PMID 10232646.
46. Favier CF, Vaughan EE, De Vos WM, Akkermans AD. 2002. Molecular monitoring of succession of bacterial communities in human neonates. *Applied and Environmental Microbiology*, Volume 68, Issue 1, Pages 219-226. PMID 11772630.
47. Coppa GV, Bruni S, Morelli L, Soldi S, Gabrielli O. 2004. The first prebiotics in humans: human milk oligosaccharides. *Journal of Clinical Gastroenterology*, Volume 38, Supplement 6, Pages S80-S83. PMID 15220665.
48. Harmsen HJ, Wildeboer-Veloo AC, Raangs GC, Wagendorp AA, Klijn N, Bindels JG, Welling GW. 2000. Analysis of intestinal flora development in breast-fed and formula-fed infants by using molecular identification and detection methods. *Journal of Pediatric Gastroenterology and Nutrition*, Volume 30, Issue 1, Pages 61-67. PMID 10630441.
49. Fanaro S, Chierici R, Guerrini P, Vigi V. 2003. Intestinal microflora in early infancy: composition and development. *Acta Paediatrica*, Volume 91, Issue 441, Pages 48-55. PMID 14599042.
50. Wynne AG, McCartney AL, Brostoff J, Hudspith BN, Glenn GR and Gibson G. 2004. An in vitro assessment of the effects of broad-spectrum antibiotics on the human gut microflora and concomitant isolation of a *Lactobacillus plantarum* with anti-*Candida* activities. *Anaerobe*, Volume 10, Issue 3, Pages 165-169. PMID 16701514.
51. Keeley J. 2004. Good bacteria trigger proteins to protect the gut. *Howard Hughes Medical Institute. EurekAlert.*
52. Jewell AP. 2005. Is the liver an important site for the development of immune tolerance to tumours? *Medical Hypotheses*, Volume 64, Issue 4, Pages 751-754. PMID 15694692.

53. Knight DJW and Girling KJ. 2003. Gut flora in health and disease. *The Lancet*, Volume 361, Issue 9371, Page 1831.
54. Suenart P, Bulteel V, Lemmens L, Noman M, Geypens B, Assche GV, Geboes K, Ceuppens JL and Rutgeert P. 2002. Anti-tumor necrosis factor treatment restores the gut barrier in Crohn's disease. *The American Journal of Gastroenterology*, Volume 97, Issue 8, Pages 2000-2004. PMID 12190167.
55. Garcia-Tsao G and Wiest R. 2004. Gut microflora in the pathogenesis of the complications of cirrhosis. *Best Practice & Research Clinical Gastroenterology*, Volume 18, Issue 2, Pages 353-372. PMID 15123075.
56. Veltkamp C, Tonkonogy SL, De Jong YP, Albright C, Grenther WB, Balish E, Terhorst C, and Sartor RB. 2001. Continuous stimulation by normal luminal bacteria is essential for the development and perpetuation of colitis in Tg(epsilon26) mice. *Gastroenterology*, Volume 120, Issue 4, Pages 900-913.
57. Ley RE, Turnbaugh PJ, Klein S, Gordon JI. Microbial ecology: human gut microbes associated with obesity. *Nature*, 2006 Volume 444, Issue 7122, Pages 1022-1023. PMID 17183309.
58. Turnbaugh PJ, Ley RE, Mahowald MA, Magrini V, Mardis ER, Gordon JI. 2006. An obesity-associated gut microbiome with increased capacity for energy harvest. *Nature*, Volume 444, Issue 7122, Pages 1027-1031. PMID 17183312.
59. Bäckhed F, Manchester JK, Semenkovich CF, Gordon JI. 2007. Mechanisms underlying the resistance to diet-induced obesity in germ-free mice. *Proceedings of the National Academy of Sciences of the USA*, Volume 104, Issue 3, Pages 979-984. PMID 17210919.
60. Bäckhed F, Ding H, Wang T, Hooper LV, Koh GY, Nagy A, Semenkovich CF, Gordon JI. The gut microbiota as an environmental factor that regulates fat storage. *Proceedings of the National Academy of Sciences of the USA*, Volume 101, Issue 44, Pages 15718-15723. PMID 15505215.
61. Ryan KJ; Ray CG (editors) (2004). *Sherris Medical Microbiology* (4th ed. ed.). McGraw Hill. p.370. ISBN 0838585299.
62. Podschun R, Ullmann U (1998). "Klebsiella spp. as nosocomial pathogens: epidemiology, taxonomy, typing methods, and pathogenicity factors". *Clin Microbiol Rev* 11 (4): 589-603. PMID 9767057.
63. Sugimura, Takashi. "Nutrition and Dietary Carcinogenesis." *Carcinogenesis*. 21 (2000): 387-395.
64. Guarner F and Malagelada JR. 2003. Role of bacteria in experimental colitis. *Best Practice & Research Clinical Gastroenterology*, Volume 17, Issue 5, October 2003, Pages 793-804. PMID 14507589.
65. Carman RJ, Simon MA, Fernández H, Miller MA, and Bartholomew MJ. 2004. Ciprofloxacin at low levels disrupts colonization resistance of human fecal microflora growing in chemostats. *Regulatory Toxicology and Pharmacology*, Volume 40, Issue 3, December, Pages 319-326. PMID 15546686.
66. Bagley S (1985). "Habitat association of Klebsiella species". *Infect Control* 6 (2): 52-8. PMID 3882590
67. Ashwell M. *Concepts of Functional Foods* (ILSI Europe Concise Monograph Series Ed Walker, R) 2002.
68. Joint FAO/WHO Working Group Report on Drafting Guidelines for the Evaluation of Probiotics in Food, London, Ontario, Canada, April 30 and May 1, 2002. Available at: <ftp://ftp.fao.org/es/esn/food/wgreport2.pdf>.
69. Sanders ME. Probiotics: A Publication of The Institute of Food Technologists Expert Panel on Food Safety and Nutrition, *Food Technol.* 1999;53:67-77.
70. Adolfsson O. Yogurt and gut function. *Am J of Clin Nutr.* 2004;80:245-56.
71. Saikali J. Fermented milks, probiotic cultures, and colon cancer. *Nutr and Cancer.* 2004;49:14-24.
72. Picard C. Review article: Bifidobacteria as probiotic agents-physiological effects and clinical benefits. *Aliment Pharmacol Ther.* 2005;22:495-512.
73. Gibson GR. Dietary Modulation of the Human Gut Microflora Using the Prebiotics Oligofructose and Inulin. *Am Society Nutr Sci.* 1999;129:1438S-1441S.
74. Rosenfeldt V, Michaelsen KF, Jakobsen M, Larsen CN, Moller PL, Pedersen P, Tvede M, Weyrehter H, Valerius NH, Paerregaard A. Effect of probiotic Lactobacillus strains in young children hospitalized with acute diarrhea. *Pediatr Infect Dis J.* 2002;21:411-416.
75. Pedone CA, Bernabeu AO, Postaire ER, Bouley CF, Reinert P, Cirde. The effect of supplementation with milk fermented by Lactobacillus casei (Strain DN-114 001) on acute diarrhea in children attending day care centers. *Intl J Clin Pract.* 1999;53:179-184.
76. Isolauri, E. Probiotics: Effects on immunity. *Am J Clin Nutr.* 2001;73(suppl):444S-450S.

77. Pujol P, Huguet J, Drobnic F, Banquells M, Ruiz O, Galilea P, Segarra N, Aguilera S, Burnat A, Mateos JA, Postaire. The effect of fermented milk containing *Lactobacillus casei* on the immune response to exercise. *Sports Med. Training and Rehab.* 2000;9:209-223.
78. Gill HS, Rutherford KJ, Cross ML, Gopal PK. Enhancement of immunity in the elderly by dietary supplementation with the probiotic *Bifidobacterium lactis* HNO19. *Am Clin Nutr.* 2001;74:833-839.
79. Rubaltelli FF, Biadaoli R, Pecile P, Nicoletti P. Intestinal flora in breastand bottle-fed infants. *J Perinat Med.* 1998;26:186-191.
80. Duggan C, Gannon J, Walker WA. Protective nutrients and functional foods for the gastrointestinal tract. *Am J Clin Nutr.* 2002;75:789-808.
81. Isolauri E, Kirjavainen PV, Salminen S. Probiotics: A role in the treatment of intestinal infection and inflammation? *Gut.* 2002;50(suppl III):54-59.
82. Saggiro A. Probiotics in the treatment of irritable bowel syndrome. *J Clin Gastroenterol.* 2004;38(supp. II):S104-S106.
83. St-Onge MP, Farnworth ER, Jones P. Consumption of fermented and nonfermented dairy products: Effects on cholesterol concentrations and metabolism. *Am J Clin Nutr.* 2000;71:674-681.
84. Xiao JZ, Kondo S, Takahashi N, Miyaji K, Oshida K, Hiramatsu AK, Iwatsuki K, Kokubo S, Hosono A. Effects of milk products fermented by *Bifidobacterium longum* on blood lipids in rats and healthy adult male volunteers. *J Dairy Sci.* 2003;86:2452-2461.
85. Scholz-Ahrens KE, Schaafsma G, Heuvel E, Schrezenmeir J. Effects of prebiotics on mineral metabolism. *Am J Clin Nutr.* 2001;73(suppl):459S-464S.
86. Saavendra JM, Tschemia A. Human studies with probiotics and prebiotics: clinical implications. *British J Nutr.* 2002;87:S241-S246.
87. Cummings JH, Macfarlane GT. A study of fructo oligosaccharides in the prevention of travelers' diarrhea. *Aliment Pharmacol Ther.* 2001;15(8):1139-1145.
88. Pereira DI, Gibson GR. Effects of consumption of probiotics and prebiotics on serum lipid levels in humans. *Crit Rev Biochem Mol Biol.* 2002;37:259-281.
89. Roberfroid M. Prebiotics and probiotics: Are they functional foods? *Am J Clin Nutr.* 2000;71 (suppl):1682S-1687S.
90. Pedone CA, Arnaud CC, Postaire ER, Bouley CF, Reinert P, Cirde. Multicentric study of the effect of milk fermented by *Lactobacillus casei* on incidence of diarrhea. *Intl J Clin Pract.* 2000;54:568-571.
91. Weizman Z, Asli Ghaleb, Alsheikh A. Effect of a probiotic infant formula on infections in child care centers: Comparison of two probiotic agents. *Pediatrics.* 2005;115:5-9.
92. Huang JS, Bousvaros A, Lee JW, Diaz A, Davidson EJ. Efficacy of probiotic use in acute diarrhea in children. *Dig Dis Sci.* 2002;47:2625-2634.
93. De Roos NM, Katan MB. Effects of probiotic bacteria on diarrhea, lipid metabolism, and carcinogenesis: A review of papers published between 1988 and 1998. *Am J Clin Nutr.* 2000;71:405-411.
94. Brighenti, Furio et al. "Colonic fermentation of indigestible carbohydrates contributes to the second-meal effect." *American Journal of Clinical Nutrition* 83.4 (2006): 817-822.
95. Higgins, Janine. "Resistant Starch: Metabolic Effects and Potential Health Benefits." *Journal of AOAC International* 87 (2004):761-8.
96. Higgins, Janine, et al. "Resistant starch consumption promotes lipid oxidation." *Nutrition and Metabolism* 1.8 (2004): 1743-7075.
97. Le Leu, R.K., Brown I.L., Hu, Y., Morita, T., Esterman, A., Young.G.P. Effect of dietary resistant starch and protein on colonic fermentation and intestinal tumourigenesis in rats. *Carcinogenesis.* Advance On-line Access published Dec 13, 2006.
98. Brown M, Higgins J, Storlien L. Consumption of resistant starch decreases postprandial lipogenesis in white adipose tissue of the rat. *Nutrition Journal* 2006, 5:25.
99. Toden S, Bird AR, Topping DL, Conlon MA. Resistant starch prevents colonic DNA damage induced by high dietary cooked red meat or casein in rats. *Cancer Biol Ther.* 2006 Mar;5(3):267-72.
100. Zhou J, Hegsted M, McCutcheon KL, Keenan MJ, Xi X, Raggio AM, Martin RJ. Peptide YY and Proglucagon mRNA Expression Patterns and Regulation in the Gut. *Obesity (Silver Spring).* 2006 Apr;14(4):683-9.
101. Robertson, M.D., Bickerton, A.S., Dennis, A.L., Vidal, H., Frayn, K.N. Insulin-sensitizing effects of dietary resistant starch and effects on skeletal muscle and adipose tissue metabolism. *American Journal of Clinical Nutrition,* (2005), 82, 559-567.
102. Hernandez-Salazar, M., Agama-Acevedo, E., Sayago-Ayerdi, S.G., Tovar, J., Bello-Perez, L.A. Chemical composition and starch digestibility of tortillas prepared with non-conventional commercial nixtamalized maize flours *International Journal of Food Sciences and Nutrition (February/March 2006)* 57(1/2): 143-150

103. Behall KM, Scholfield DJ, Hallfrisch JG, Liljeberg-Elmstahl HG. Consumption of both resistant starch and beta-glucan improves postprandial plasma glucose and insulin in women. *Diabetes Care*. 2006 May;29(5):976-81.
104. Bauer-Marinovic, M., Florian, S., Muller-Schmehl, K., Glatt, H., Jacobasch, G. Dietary resistant starch type 3 prevents tumor induction by 1,2-dimethylhydrazine and alters proliferation, apoptosis and dedifferentiation in rat colon Carcinogenesis (September 2006) 27(9): 1849-1859.
105. Minich DM, Bland JS. Acid-alkaline balance: role in chronic disease and detoxification. *Altern Ther Health Med*. 2007 Jul-Aug;13(4):62-5.
106. Gibson, G.R. Regulatory effects of bifidobacteria on the growth of other colonic bacteria. *Journal Appl Bacteriol*. 1994 Oct;77(4):412-20.
107. Perdigon, G. Immune system stimulation by probiotics. *J. Dairy Sci*. 1995 Jul;78(7):1597-606. Review.
108. Duffy, L.C. Reduction of virus shedding by *B. bifidum* in experimentally induced MRV infection. Statistical application for ELISA. *Dig Dis Sci*. 1994 Nov;39(11):2334-40.
109. Duffy, L.C. Effectiveness of *Bifidobacterium bifidum* in mediating the clinical course of murine rotavirus diarrhea. *Pediatr Res*. 1994 Jun;35(6):690-5.
110. Yasui, H. Passive protection against rotavirus-induced diarrhea of mouse pups born to and nursed by dams fed *Bifidobacterium breve* YIT4064. *J Infect Dis*. 1995 Aug;172(2):403-9.
111. Brandtzaeg, P. Immunobiology and immunopathology of human gut mucosa: humoral immunity and intraepithelial lymphocytes. *Gastroenterology*. 1989 Dec;97(6):1562-84. Review. No abstract available.
112. Aslan A, Triadafilopoulos G. Fish oil fatty acid supplementation in active ulcerative colitis: a double-blind, placebo-controlled, crossover study. *Am J Gastroenterol* 1992;87:432-7.
113. Belluzi, A, Brignola, C, Campieri, M, Pera, A, Boschi, S, Miglioli, M. Dietary supplementation with fish oil in ulcerative colitis. *New England Journal of Medicine*, 1996, June 13, 334(24), p 1557-60.
114. Belluzzi A, Brignola C, Campieri M, et al. Effect of an enteric-coated fish-oil preparation on relapses in Crohn's disease. *N Engl J Med* 1996;334:1557-60.
115. Le Leu, R.K., Brown, I.L., Hu, Y., Bird, A.R., Jackson, M., Esterman, A., Young, G.P. A symbiotic combination of resistant starch and *Bifidobacterium lactis* facilitates apoptotic deletion of carcinogen-damaged cells in rat colon. *Journal of Nutrition*, (2005), 135, 996-1001.
116. Toden, S., Bird, A.R., Topping, D.L., Conlon, M.A. Differential effects of dietary whey and casein on colonic DNA damage in rats. *The Australian Journal of Dairy Technology*, (2005), 60, 44-46.
117. Yang, C.Z., Shu, X.L., Zhang, L.L., Wang, X.Y., Zhao, H.J., Ma, C.X., Wu, D.X. Starch properties of mutant rice high in resistant starch *J Agric Food Chem* (January 25, 2006) 54(2):523-8.
118. Granfeldt, Y., Wu, X., Bjorck, I. Determination of glycaemic index; some methodological aspects related to the analysis of carbohydrate load and characteristics of the previous evening meal. (January, 2006) *European Journal of Clinical Nutrition* 60(1):104-112.
119. Hawthorne AB, Daneshmend TK, Hawkey CJ, et al. Treatment of ulcerative colitis with fish oil supplementation: a prospective 12 month randomised controlled trial. *Gut* 1992;33:922-8.
120. Mate J, Castanos R, Garcia-Samaniego J, Pajares JM. Does dietary fish oil maintain the remission of Crohn's disease: a case control study. *Gastroenterology* 1991;100:A228 [abstract].
121. Stenson, WF, Cort, D, Rodgers, J, Burakoff, R, DeSchryver-Kecskemeti, K, Gramlich, TL, Beeken, W. Dietary supplementation with fish oil in ulcerative colitis. *Annals of Internal Medicine*, 1992, 116(8), p. 609-14.
122. Salomon P, Kornbluth AA, Janowitz HD. Treatment of ulcerative colitis with fish oil n-3-omegafatty acid: an open trial. *J Clin Gastroenterol* 1990;12:157-61
123. Murcia MA, Egea I, Romojaro F, Parras P, Jimenez AM, Martinez-Tome M. Antioxidant evaluation in dessert spices compared with common food additives. Influence of irradiation procedure. *J Agric Food Chem*. 2004 Apr 7;52(7):1872-81. 2004. PMID:15053523.
124. Otsuka H, Fujioka S, Komiya T, et al. [Studies on anti-inflammatory agents. VI. Antiinflammatory constituents of *Cinnamomum sieboldii* Meissn (author's transl)]. *Yakugaku Zasshi* 1982 Jan;102(2):162-72 1982. PMID:12260.
125. Ouattara B, Simard RE, Holley RA, et al. Antibacterial activity of selected fatty acids and essential oils against six meat spoilage organisms. *Int J Food Microbiol* 1997 Jul 22;37(2-3):155-62 1997. PMID:12270
126. Qin B, Nagasaki M, Ren M, Bajotto G, Oshida Y, Sato Y. Cinnamon extract prevents the insulin resistance induced by a high-fructose diet. *Horm Metab Res*. 2004 Feb;36(2):119-

25. 2004. PMID:15002064. 127. Qin B, Nagasaki M, Ren M, Bajotto G, Oshida Y, Sato Y. Cinnamon extract (traditional herb) potentiates in vivo insulin-regulated glucose utilization via enhancing insulin signaling in rats. *Diabetes Res Clin Pract.* 2003 Dec;62(3):139-48. 2003.
128. Quale JM, Landman D, Zaman MM, et al. In vitro activity of *Cinnamomum zeylanicum* against azole resistant and sensitive *Candida* species and a pilot study of cinnamon for oral candidiasis. *Am J Chin Med* 1996;24(2):103-9 1996. PMID:12530.
129. Tapsell LC, Hemphill I, Cobiac L, Patch CS, Sullivan DR, Fenech M, Roodenrys S, Keogh JB, Clifton PM, Williams PG, Fazio VA, Inge KE. Health benefits of herbs and spices: the past, the present, the future. *Med J Aust.* 2006 Aug 21;185(4 Suppl):S4-24. 2006. PMID:17022438.
130. William G. Crook, M.D., *The Yeast Connection*, Vintage Books, 1986
131. Gudmundur Bergsson, et. al., In Vitro Killing of *Candida albicans* by Fatty Acids and Monoglycerides, *Antimicrobial Agents and Chemotherapy*, November 2001, p. 3209-3212, Vol. 45, No. 11
132. Ogbolu DO, Oni AA, Daini OA, Oloko AP., In vitro antimicrobial properties of coconut oil on *Candida* species in Ibadan, Nigeria. *Journal of Medical Food*, June 2007, 10(2):384-7.