



I remember our pediatrician describing our newborn as "a gut with a pretty face". We are like an earthworm, a tube within a tube, just with lots more bells and whistles! By definition, the contents of the gut are outside the body. While the gut can be simply viewed as a filter, letting the good stuff in and keeping the bad stuff out, older systems such as Chinese Medicine and Ayurveda place the Gastro-Intestinal System ("GIS") in a pivotal role for health that extends far more than food processing. According to these philosophies, and backed by recent research, the GIS has a powerful effect on the immune, neurological, hormonal, detoxification and other systems of the body. Before explaining leaky gut syndrome ("LGS"), which involves the complex interaction between these systems, it is important to understand some basic points about the GIS and how it functions.

The GIS, which also includes the salivary glands, liver, gallbladder, pancreas, spleen, and omentum (the fatty tissue around the intestines) occupies a large part of our internal real estate, and utilizes 25% of our energy.

The Gut-Brain and the Mind

Within its circular wall, the gut has a complex nervous system, sometimes called "the second brain" or the "gut-brain". This nervous sub-system which contains billions of cells, as many as that of the spinal cord, controls how the gut's muscles push food along its length, as well as how secretions such as enzymes, bile, and immune complexes are released into the contents.

More dramatically, modern research has shown that these nerve cells in the gut also secrete neuro-transmitters and neuro-hormones, the same chemicals made by the brain. Certain neuro-chemicals are mainly manufactured in the gut, including the liver, and then transport to the brain and other parts of the nervous system. These neuro-chemicals can affect the way we function, think and feel. When the GIS is dysfunctional it can create conditions which we name autism, ADHD, anxiety, panic, depression, brain fog, insomnia and others.

The Gut Farm

We have a complex ecology of organisms that naturally live in the gut--as much as three pounds of bacteria and yeast, representing up to 400 species, 10 times greater in number than us on a cellular basis. However, since our cells are 100 times larger, we consume 99% of the volume of our body.

Humans build farms to harness the benefits of the creatures. Likewise, evolution determined that it was more

efficient to host these creatures within our body, rather than to re-create what they do. Since they evolved billions of years before us, they learned how to produce important

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nutrients, such as vitamin K, vitamin B12, biotin, butyric acid (which nourishes the intestinal lining) and others. Equally important, they have the means to defend them-selves (and us) from bad critters that are ever seeking to dominate our real estate like invasive plants. The gut's fence is its lining, the "tight junctions" between its cells that prevent these critters from entering the body

In the event the fence is breached, the second line of defense, similar to the farmer, is the immune system. Its job is to monitor its ecology and all molecules that pass through the tube and through the lining into the body. Up to 60% of our immune system resides within the gut.

Dysbiosis

In dysbiosis, the normal ecology of the gut is disrupted, and bad organisms (bacteria, yeast, parasites) dominate, similar to when invasive weeds take over a garden. This imbalance can be caused by antibiotics, NSAIDs, chlorine in drinking water, toxins, stress, etc. These organisms directly damage the lining of the gut, changing it from a tight filter to an open sieve or "leaky gut".

When this happens, the immune can become overwhelmed trying to defend against these invading toxins and organisms. It then becomes both over-reactive and under-reactive at the same time. Over-reactivity can manifest as **multiple allergies**, to food, environment (pets, trees) and chemicals. In **auto-immune disease**, the immune system begins attacking the body itself, including the thyroid, the pancreas (diabetes), nervous system (multiple sclerosis), blood vessels (lupus), joints (rheumatoid arthritis) the pigment in the skin (vitiligo), to name a few. At the same time, the confused immune system becomes under-reactive to bacteria, viruses, and yeast, allowing for **recurrent infections** of the skin, sinuses, urinary tract, and respiratory system. Such under-reactivity can contribute to **cancer**, as we are always producing cancer cells, and it is the immune system's job to identify and destroy such cells before they grow into a viable tumor.

Consequences of Leaky Gut Syndrome

Toxicity: in LGS, the load of toxins escaping from within the walls of the bowels can easily overwhelm the liver. In mild toxicity, it might manifest as a headache,

fatigue or irritability after eating certain foods. In more advanced leaky gut, a simple glass of wine can debilitate a person for a few days, cause elevated liver enzymes on blood testing, and be at the center of any chronic disease.

Hormones: LGS can cause chronic stress, even if not perceived. The adrenal glands can become exhausted (see prior article), with secondary effects on the other hormonal systems of the body (thyroid, sex hormones, sugar-modulating hormones), as well as the immune and nervous system. The hormonal repercussions of LGS may last months to years and require comprehensive treatment to get back to balance.

Inflammation: can be thought of as a fire within, like the useful fires that we keep in our homes' furnace or stove. It kills invading bacteria, viruses, yeast, and cancer cells and takes apart dysfunctional tissues, such as bone and muscle, which allows them to be rebuilt stronger. A similar fire burns nutrients in each cell to generate energy.

However, like fire, if inflammation is not contained, it can rapidly spread and beget more inflammation. Like the tiny sparks coming from a fire can ignite an inferno, the "free radicals" generated by the inflammatory process can attack virtually every tissue of the body in a domino-like cascade. Such tissues include brain (depression/dementia), blood vessels (hypertension/ cardiovascular disease), endocrine glands (thyroid disease, diabetes), and bone (osteoporosis, arthritis), just to name a few.

Malabsorption & Malnutrition: LGS is almost always associated with malabsorption of certain critical nutrients, causing deficiencies which then limit healing and allow for other problems to arise.

"Mind" or Mental Dysfunction: What we call "mind" is actually not "located" in the brain, but is the totality of function of the brain, gut, and other areas. Mental function, which can be modeled as cognition (thought) and emotion (feeling), can both be dramatically affected by the GIS. There are well-documented studies of autism, dementia, depression, and psychosis both caused and cured by what goes on in the gut.

Evidence that the GI System Is Connected to Chronic Dis-Ease

- 1) Sick creatures lose their appetite
- 2) Rheumatoid arthritis (and other auto-immune diseases) improve during a fast
- 3) If people with Inflammatory Bowel Disease (another auto-immune disease) are fed bacteria from healthy people, they have improvement equal to that of medication
- 4) Pain and other symptoms improve when people are given pro-biotics and pre-biotics (see below)

Symptoms of Leaky Gut Syndrome

LGS can manifest as problems with the GI System itself, including chronic constipation, diarrhea, acid reflux disease, Irritable Bowel Syndrome ("IBS"), colitis, chronic gas, bloat and gallbladder dysfunction. However, even without GI symptoms, LGS can be at the center of many of the chronic diseases that now plague our society. LGS is both a cause and effect. It is best to think of it as a web-like situation which interacts with many other systems of the body, and causes a progressive decline in them all.

Evaluation of GI Dysfunction

Conventional medicine offers many tests of GI dysfunction. While they often fail to reveal the root cause of problems, they should be done first to rule out serious medical conditions that might require acute treatment, such

as active ulcers and cancer.

Holistically, the history and physical exam give lots of information. A patient's lifestyle and symptom pattern provides the most important clues. A comprehensive physical exam, which includes important acupuncture points, gives additional information.

If this information is insufficient, there are no GI symptoms, or a patient does not respond to treatment, then additional tests are available which measure leaky gut and detect pathogens such as parasites, bad yeast (Candida), heavy metals, adrenal fatigue, or other biochemical or hormonal issues.

Holistic Treatment

Treatment of LGS often begins with the digestive system, whether there are symptoms or not. While this must be individualized, it may include changes in diet (eliminating or emphasizing certain foods), correction of deficiencies with supplements, addition of stomach acid and enzymes, the use of "pro-biotic" bacteria and yeast, and "pre-biotic" compounds that help the lining repair, such as licorice, aloe, glutamine, and FOS. Yoga and acupuncture can be extremely effective, **and may be essential to facilitate and continue healing** for some people.

One of the more challenging aspects of this approach is that the results are often subtle. How our GI system functions today reflects the last three days of eating (which is the basis of the four-day rotation diet). The way our diet and GIS then affects our function can take weeks to months to observe. Therefore, it is vitally important to develop and commit to a comprehensive plan and to stick to it for a period of time to evaluate its effectiveness. Making frequent changes out of desperation wastes time, hope and other resources.

It is helpful for patients to keep a log of their symptoms: daily rating, on a scale from 1-10, symptoms such as fatigue, fog, pain, stiffness, diarrhea, gas, etc, and to keep a record of food, sleep and other factors. Sometimes the patterns are not apparent on a day-to-day basis, but become clear when looking back over a few months.

Despite what the TV ads say, many of our chronic illnesses do not require medication for the rest of our lives, and can be substantially healed by working on the gut as a part of the holistic approach.

IMPORTANT NOTE: This general information should not be used to make decisions about medical care without the involvement of an experienced practitioner.

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1. **This educational material may not be used to influence medical care without supervision by a licensed practitioner.**
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