



# Understanding Chronic Digestive Illnesses

# Understanding chronic digestive illnesses from the perspective of dysfunctional digestive ecosystems

The following is the story of Caroline, a patient who came into the office with chronic multisystem complaints.

## Caroline's history

Caroline is a 30 year old legal secretary. She has a five year history of multisystem complaints including nausea, chronic fatigue, abdominal fullness after meals, abdominal bloating, belching, abdominal distention, flatulence, migraine headaches, muscle aches, anxiety, depression, insomnia, irregular bowel habits and a recent weight gain of 20 pounds.

She had been evaluated by several functional and integrative medicine specialists, two gastroenterologists and a nutritionist. She was recently referred to an intestinal specialty clinic at a nearby medical center. The last medical provider she had contact with was a psychiatrist who prescribed antianxiety and antidepressant medications.

Her evaluations have included multiple blood tests, stool examinations, gallbladder x-rays, stomach emptying tests, CT scans of the abdomen, esophagus/stomach and colon endoscopies. All her studies were reported to be normal.

Caroline repeatedly commented, *"If all my tests are normal, why do I feel so terrible?"*

Caroline had tried lactose free diets, low-fat diets, low FODMAP diets, sugar free diets, gluten-free diets, nightshade free diets, high protein diets, bone broth diets, keto diets, and intermittent fasting. She had been treated with several rounds of antibiotics to cover the possibility of bacterial overgrowth in her small intestines, small bowel bacterial overgrowth (SIBO).

When first evaluated, Caroline was taking four prescription medications, seven minerals and vitamins, a probiotic and multiple "nutritional" supplements. Most of the non-prescription items that she was taking came from advice gained from the Internet from those who shared similar symptoms.

Caroline's story is not unique. Every medical care provider has evaluated many patients like Caroline in their practices. Most of these patients have been diagnosed with "irritable bowel syndrome", "functional gastrointestinal disorder", or a "nervous stomach". Most often, Caroline had been told that her symptoms were due to the stresses in her life. Many, like Caroline, have left the offices of their providers still feeling ill, confused, frustrated and despondent.

Dr. Will Bulsiewicz, a gastroenterologist, writes in his book, *Fiber Fueled*, about his encounter with a patient like Caroline in his practice who told him, "This isn't the life I envisioned for myself. I am way too young to be feeling this old."

### **Caroline's symptoms can be attributed to dysfunctional digestive ecosystems**

A way to understand Caroline's many symptoms is by considering the digestive tract as a constellation of ecosystems—a group of interacting and interdependent parts. The components of the digestive ecosystems include the following:

- Microorganisms— bacteria, viruses, fungi, protozoa and archaea made up of thousands of different species.
- Nutrients—compounds in foods that provide energy essential for growth or repair.
- Non-nutrients— substances that are not essential for growth and repair of the body such as food additives, tobacco, toxins, pesticides, pharmaceuticals, and inorganic debris (dust, dander, wood, soil, gases, and metals).
- Digestive tract secretions— those substances produced by the body that sustain bodily functions such as saliva, stomach acid, bile, pancreatic secretions, enzymes, and mucus, so called *eobiotics*.
- Intestinal lining cells (enterocytes)-- the single layer of cells that coats the interior digestive tract and carries out the functions of digestion, water and nutrient absorption and forms a protective barrier against the entry of pathogens and other toxins.
- Intestinal immune system— a combination of antibodies and activated white blood cells that protect the integrity of the digestive tract from invasion by pathogens, food antigens, and toxins.
- Intestinal endocrine cells (enteroendocrine system)—cells that secrete a variety of hormones that control hunger, satiety, sugar metabolism, secretions and motility.

- Intestinal nervous system—millions of nerve cells lining the intestinal tract that communicate between the gut and the brain and form a part of the gut-brain axis.

The harmonious interaction between these eight components is necessary for a stable equilibrium, the hallmark of intestinal wellness. Without this harmonious interaction, the digestive ecosystem becomes dysfunctional which may result in the decline of overall health—as in the case of Caroline.

### **Defining the digestive tract--form and function**

The digestive tract is a twenty-eight foot long muscular tube that extends from the tip of the tongue to the anal opening. It is composed of five digestive organs, the mouth, esophagus, stomach, small intestine, and large intestine (colon). There are also four accessory digestive organs, the salivary glands, liver, gallbladder and pancreas.

**Mouth:** The mouth is the headwater to the digestive tract. As nutrients enter the mouth, the chemical process of digestion begins. Salivary glands initiate digestion of sugars and fat metabolizing enzymes are released in the mouth that begin the digestion of fats. Oral fat digestion is limited in the adult but significant in the newborn.

Dental procedures and restorations like cavities, caps, implants, extractions, bridges, dentures, root canals, etc., provide a telling clue to the dysfunction of the oral ecosystem. Symptoms of mouth burning, tingling, numbness and/or recurrent mouth erosions and/or ulcerations (canker sores) may be reflective of a dysfunctional oral ecosystem.

**Esophagus:** The esophagus is the tubular conduit that runs from the mouth to the stomach. Symptoms of heartburn, difficulty swallowing, and signs of esophageal precancerous changes in the lining cells may all be reflections of a dysfunctional esophageal ecosystem.

Esophageal symptoms may not totally be caused by backflow of strong chemicals from the stomach (GERD) as so often is diagnosed but may, in fact, have its origins in the faulty adjoining ecosystems “upstream” in the gums, mouth, lungs, nose, ears, eyes and sinuses.

**Stomach:** The stomach is an organ that primarily mixes and grinds foodstuffs into a consistency that can be best utilized by the digestive processes that follow. A

key property of the stomach's lining cells is its ability to secrete concentrated hydrochloric acid that assists in the destruction of microbes that have been swallowed.

Although highly beneficial in patients when used judiciously for acid related problems, the chronic overuse of acid reducing medications may permit microbes that are not destroyed by acid to proceed downstream contributing to symptoms of loss of appetite, recurrent nausea, vomiting, abdominal pains, feeling of uncomfortable fullness, abdominal bloating and distention.

**Small intestines:** The harvesting of energy from foodstuffs is carried out by the small intestine aided by enzyme secretions from the pancreas and bile from the liver. The small intestine, however, has a limited toolbox of digestive enzymes so that certain food products escape the small intestines' digestive efforts and pass undigested into the large intestine (colon) where microbes that have thousands of enzymes exist to complete the digestive process.

**Large intestines (colon):** The colon is more than a conduit for the exodus of waste products. The colon is a beehive of chemical activity where microbes convert the "leftovers" from the small intestine into components critical for the body to function. Humans provide microbes with "bed and breakfast" and microbes, in turn, carry out numerous metabolic functions that humans are unable to perform.

In addition to its digestive function, the digestive tract serves as a drainage site for the transport and disposal of secretions and metabolites produced in five nearby organs:

- Tears from the eyes
- Mucus from the nasal cavity
- Secretions from the facial sinuses
- Fluid from the middle ears
- Mucus from the lungs (phlegm)

The contributions of the accessory organs and the release of fluids from these 5 adjoining organs must all be considered to fully understand symptoms in patients with digestive complaints.

## **A closer look at some of the other components of the digestive tract ecosystem**

### **The microbiome**

In addition to the known 78 body organs that anatomists have described over the last 300 years, there is now a new appreciation for a vast community of organisms that live in and on the body made up of bacteria, viruses, fungi, protozoa, and archaea and their genes collectively known as the microbiome.

By cell count, microbes far outnumber body cells by trillions and their genes are as much as 10,000 times more plentiful than those in the human genome meaning that over 99% of gene activity carried out within the body is done by microbes.

Humans harbor microorganisms that participate in every facet of human health and disease. The health of the human gut cannot be fully understood without considering these resident microbes and the part they play in the digestive ecosystem. Microbes have come to be known in some medical circles as "the 79th organ".

The body has outsourced a multitude of critical functions to the microbes including the following:

- Generation of energy which keep the microbes alive but also shared with the human host to keeps the intestinal cells alive.
- Training the immune system to recognize and respond to potentially harmful elements.
- Production of a protective mucus barrier.
- Activation and deactivation of medications.
- Synthesis of antimicrobial peptides which act like antibiotics to repel pathogens.
- Production of vitamins which are shared with the human host and essential for human existence.
- Communication with the intestinal endocrine cells and nerve cells to regulate intestinal hormones, secretions and peristaltic movement of the gut.
- Regulation of permeability of junctions between each intestinal cell to prevent unfettered access of fluids, microbes, food substances and toxins into the body (leaky gut).

- Regulation of the metabolism of insulin, sugar utilization, fat storage, and protein synthesis.
- Control of the feelings of hunger and satiety.
- Stimulation of chemicals known as neurotransmitters like norepinephrine, dopamine and serotonin that help modulate mood and behavior.

Encouraging the survival and proliferation of microbes is key to attaining a functioning and productive digestive tract. Mistreating, damaging or destroying microbes with resultant disruptions of the intestinal ecosystem is one of the prime reasons for humans feeling "unwell".

### **Nutrients**

Perhaps the digestive activity that humans have the most control over is the selection of which nutrients to ingest that will interact within the digestive ecosystems. For most individuals, the opportunity to make that selection occurs three or more times a day.

The human body is capable of digesting and absorbing only a limited number of nutrients. Digestion begins in the mouth, as described before, with further prep work done in the stomach, but it is the small intestine that is the workhouse of the body absorbing sugars, fats, and proteins. Since the small bowel has a limited repertoire of digestive enzymes the completion of digestion must be carried out by microbes in the large intestine.

For example, refined sugars are easily and readily absorbed from the upper intestinal tract but complex sugars contained in most fruits and vegetables are passed undigested and unabsorbed into the large bowel. These sugar products, commonly known as dietary fiber serve as the nutrient of choice to sustain the microbial community allowing it to carry out the beneficial functions listed above.

In the absence of dietary fiber (i.e. non-absorbable sugars), microbes can turn to alternative sources of nutrition and digest the sugar rich protective mucus layer overlying the intestinal cells. Loss of this coating has been shown to increase gut permeability eventually allowing microbes to come into contact with underlying body tissues. Likewise, in the absence of dietary fiber, there are microbes that can also ferment protein as a source of nutrition and energy.

The penetration through a permeable barrier of foreign substances is perceived by the body's immune system as a threat resulting in an inflammatory reaction

with seepage of inflammatory metabolites into the body. These metabolites may cause symptoms to occur not only in the gut but in peripheral tissues including liver, heart, brain, thyroid, kidneys, skin, and bone as well.

### **The immune system—a key player in the intestinal ecosystem**

From the time of birth, all food, fluids, gases, microbes, preservatives, toxins, pharmaceuticals and/or supplements that enter the body are foreign. They are introduced into the body which then must determine whether to tolerate or reject them.

The body has an extensive system of detection and identification of everything it meets and a protective immune system to prevent invasion and destruction by foreign elements.

The immune system, therefore, represents the *Department of Homeland Defense* and is made up of the following:

#### **Physical Barriers**

- The film of mucus that coats the entire surface of the digestive tract from mouth to anus containing antimicrobial chemicals.
- Semipermeable junctions that exist between each lining cell (tight junctions) that protect border crossings and prevent the translocation of toxins, microbes, and food antigens into the body (leaky gut)

#### **First Responders**

- Activated white blood cells (lymphocytes, monocytes, basophils, eosinophils) mast cells and fibroblasts that activate the release of an array of destructive chemicals known as cytokines, of which, at least 40 are known to exist in the human.

#### **Trained Reinforcements (antibodies)**

- Antibodies are chemicals produced and released from the bone marrow that have a memory of past encounters with a specific foreign microbe, antigen or toxin. Since they have encountered the specific foreign element



before they have learned tactics for destroying or neutralizing the element if and when seen again.

## **CAROLINE'S REHABILITATION PLAN**

The following plan was given to Caroline and has been used by other patients as a strategy to help rehabilitate their dysfunctional digestive ecosystems.

### **WHAT TO EAT AND NOT TO EAT**

- Eat a plant-based diet made up primarily of fruits, vegetable, beans, lentils, nuts, berries, seeds, and whole grains. The popular Mediterranean-like diet may be a good starting point (with some modifications) for those seeking dietary advice. Try to ingest 28 grams or more of total fiber in your diet if you are a female and 35 grams, of more, if you are a male.
- Avoid eating grapefruit or drinking grapefruit juice if taking any prescription medications, unless a pharmacist or care provider has approved.
- If affordable and available, select organic fruits and vegetables. Organic food products not only add less contaminants to our food supply, but the agricultural methods required to qualify for the label “organic” are better for sustaining the earth.
- Incorporate a wide variety of fruits and vegetables into the diet. Nutrition experts frequently encourage eating a wide variety of different colored fruits and vegetables. They use the phrase, “eat the rainbow.”
- Reduce eating products that contain high concentrations of refined sugars like cookies, candies, cakes, ice cream, etc.
- Eat animal protein sparingly.
- Avoid eating processed meats (examples include hot dogs, salami, bologna, meat sausages and most deli meats).
- Avoid emulsifiers particularly, polysorbate 80, carboxymethylcellulose, and carrageenan.
- Avoid drinking energy boosting beverages (examples, Red Bull®, Jolt®, Monster®.)
- Avoid drinking cola drinks.
- Avoid drinking carbonated beverages.
- Avoid drinking sugary beverages.
- Avoid using artificial sweeteners except for Stevia.
- Avoid protein powders, protein pills and protein shakes or smoothies.
- Drink no more than two 6-8 ounces cups of coffee per day.

- Include in the diet “resistant starches”. They pass undigested through the intestinal tract into the colon, i.e. resistant to digestion and act chemically like fiber. They are contained in foods like cooked and cold potatoes, cooked and cooled rice, and “greenish” unripe bananas.

### **WHEN TO EAT**

- Consider using a 16/8 schedule for eating food—16 hours of fasting with the exception of water and medications, and 8 hours during which nutrients are ingested.
- Try to eat meals at roughly the same time every day.
- Allow at least 3-4 hours to elapse without eating before going to sleep.

### **VITAMINS, MINERALS, SUPPLEMENTS AND DRUG ADVICE**

- Take a methyl B12 supplement once a week (example, Jarrow Formulas Methyl B12<sup>®</sup> 1000 micrograms).
- Have the blood level of vitamin D checked once a year, ideally in the fall or winter months.
- Take a vitamin D3 supplement to keep the blood level above 30 nanograms/ml. One may safely begin taking Vitamin D 2000 I.U. (50 micrograms) before having a blood level of vitamin D checked.
- Avoid taking vitamins, minerals, probiotics, herbal supplements and homeopathic remedies unless specifically recommended and monitored by a healthcare provider—other than vitamin B12 and vitamin D as listed above. Many over the counter supplements can cause serious side effects when mixed with other supplements or with prescription medications.
- Avoid self-medicating with non-steroidal medications such as Advil<sup>®</sup>, Aleve<sup>®</sup>, Motrin<sup>®</sup>, Bufferin<sup>®</sup>, Excedrin<sup>®</sup> unless directed to do so by a healthcare provider.
- Avoid the prolonged use of cortisone containing nasal sprays and nasal decongestants.
- Avoid the use of acid reducing medications for more than 8 weeks like Prilosec<sup>®</sup>, Nexium<sup>®</sup>, Protonix<sup>®</sup>, Prevacid<sup>®</sup>, Dexilant<sup>®</sup>, AcipHex<sup>®</sup>, and Zegeride<sup>®</sup>, without approval of your healthcare provider.

### **LIFE STYLE MODIFICATIONS**

- Drink no more than one alcoholic beverage per day--a single mixed drink of spirits—1.5 ounces, a 12 ounce bottle or can of beer, or a four ounce glass of wine.
- Drink a minimum of two liters (quarts) of fluid per day unless a healthcare provider advises a fluid restriction. Distilled water is the fluid of choice.
- Try to go to sleep at approximately the same time every day.
- Keep the bedroom cool enough that a light blanket is comfortable.
- Get 7-8 hours of sleep a day.
- Use an air filtration unit in sleeping area that contains a HEPA filter.
- Change air filters in air-conditioning and air purification units at regular intervals as recommended by the manufacturer.
- Eliminate all tobacco products including vaping.
- Avoid using recreational drugs.
- Use a portable air purification machine with a HEPA filter in sleeping areas.

### **GET REGULAR EXERCISE—"SITTING IS THE NEW SMOKING"**

Sedentary activities require low levels of energy expenditure usually when seated at work, while texting, playing video games, or watching TV.

Many individuals have tried to compensate for this lack of activity by participating in vigorous physical activity like exercise classes or jogging in hopes that 30 to 40 minutes will suffice. Bursts of vigorous physical activity provide many health benefits; however, the metabolic consequences of prolonged sitting may still increase the risk of chronic diseases according to a study published by the Cancer Prevention Research Center.

Regular standing and regular movement should be the ultimate goal. A convenient reminder could be to set an alarm on a cellphone or a computer to move about at hourly intervals throughout the day

### **DENTAL HEALTH MEASURES**

- Dental examinations and dental cleanings should be scheduled at least twice a year or more often if multiple dental procedures (cavities filled, dental caps, dental implants, root canals, dentures, bridges, etc.) exist in the mouth.
- Teeth should be brushed at least twice a day for a minimum of two minutes each time.

- Brush with an electronic, rechargeable, oscillating toothbrush (for example, Sonicare® or Oral-B®) that contain a timing device to alert to the time spent brushing.
- Floss after meals and particularly before bedtime.
- Change the brush tip or toothbrush at least every 90 days.
- Use a fluoride containing toothpaste that contains baking soda to neutralize acid in the mouth and to reduce dental cavities. (Examples, Arm & Hammer Advanced White® or Colgate Baking Soda and Peroxide®).

**RECOGNIZING SYMPTOMS THAT MAY REQUIRE  
IMMEDIATE MEDICAL ATTENTION**

Contact your primary medical care provider, or Dr. Kramer (352-331-6736), if any of the following “alarm symptoms” occur:

- Increasing abdominal pain
- Frequent nausea
- Recurrent vomiting
- Passage of large amounts of blood, or repeated passage of blood, in or on the stool
- Fever (temperature above 100 degrees)
- Shaking chills
- Involuntary weight loss
- Repeated episodes of diarrhea
- Passage of fewer than three bowel movements a week
- Repeated passage of hard stools that require exertion to evacuate

New signs or symptoms may arise which may not be directly related to the dysfunctions discussed above. What may have been undetected on previous studies may now become more apparent on further physical exams, X-rays, imaging studies, and/or laboratory tests. Any changes should always be called promptly to the attention of a healthcare provider.

**Patience. . .**

Your health history may be similar to Caroline's. The expectation of reversing your condition with a week or two of modifications will almost certainly be met with disappointment. It may take weeks or months to achieve a more

comfortable state and require multiple adjustments to custom design a program specifically for your body's needs—one size does not fit all!

These recommendations are, therefore, not a “quick fix”. The science behind these recommendations, however, has been well accepted and the long term benefits are potentially huge.

### **Caroline's follow up**

What has happened to Caroline?

Since Caroline started her program, nausea, abdominal fullness, burping, bloating, distention, and irregular bowel function have significantly improved. Her strength and energy have returned. She has been sleeping longer and more soundly.

Caroline is exercising regularly, eating a plant-based diet, and is following the recommended dental hygiene measures. Her anxiety and depression have dissipated. She has stopped taking anti-anxiety and antidepressant medications and no longer takes over-the-counter supplements other than vitamin B-12 and vitamin D. And . . . she has lost 12 pounds.

### **Reading references:**

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**Acknowledgement:** *Dr. Kramer expresses gratitude to Dr. S. Adabi, DDS for providing scientific guidance on dental recommendations.*

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