

## DIMENSION 2: MICROBIOME DISTRIBUTION

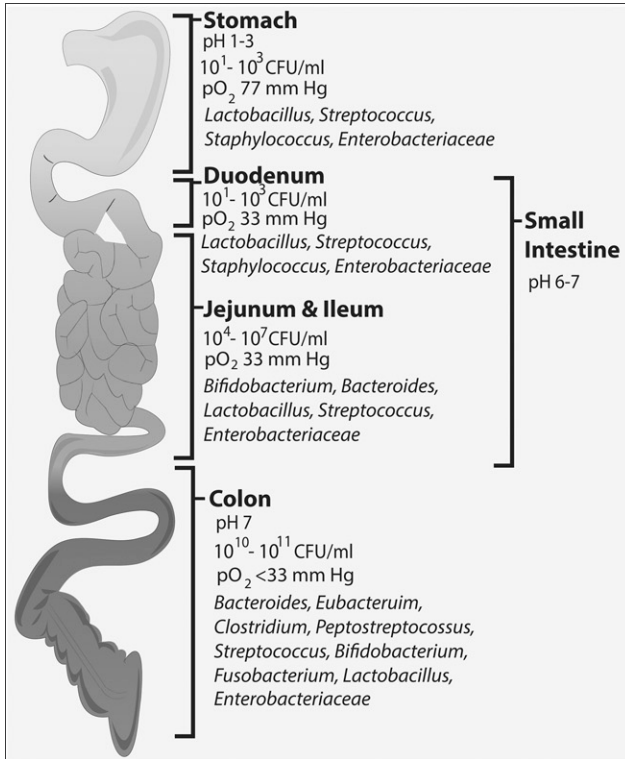
We've explored the "Who" of the microbiome; now let's focus on the equally important "Where." Bacterial concentration and diversity vary significantly across different parts of the gastrointestinal tract.

The stomach, despite regular exposure to germs in the food we eat, hosts very few bacteria. As we journey down the gastrointestinal tract, we observe increasing varieties and quantities of bacteria. The number quickly surpasses that of our own gut cells, growing denser as you approach the large intestine. The colon, the lowermost segment of the intestine, is a bustling metropolis of microorganisms, teeming with hundreds of billions of bacteria per gram of intestinal contents, home to approximately 1,000 species.

This uneven *Distribution* of bacteria in the human gut influences overall health and is tied to the *Microbiome Composition*. Any imbalance in this delicate setup can set off a domino effect, impacting multiple aspects of gut health. Fortunately, your body has several regulation mechanisms to maintain this balance.

See also:

- Appendix 1 > Figure 3.8



Appendix 1: Figure 3.8. Concentration of bacteria, oxygenation, and acidity across the digestive tract. Source: <https://pharmrev.aspetjournals.org/content/71/2/198>

## KEY FACTORS FOR OPTIMAL MICROBIOME DISTRIBUTION

The human body employs various mechanisms to ensure the proper distribution of the gut microbiome. They include managing metabolic microniches, maintaining pH levels, dynamic microbe-tissue interactions, and regulating oxygen concentration.

In this book, I discuss the following key factors that support and enhance these natural mechanisms:

1. Food ingredients and eating habits.
2. Stomach acid.
3. Bile.

4. Overall healthy digestion: This includes everything from chewing and salivating to the role of digestive juices.
5. Healthy gut epithelium: This involves how the cells lining your intestine interact with bacteria, encouraging some while controlling or eliminating others. The epithelium repair is covered in *Key 3. Leaky Gut: Repair*.
6. Healthy gut motility: Essential for preventing bacterial overgrowth in localized areas by actively moving digestive contents consistently in a single direction. Normalizing motility is addressed in *Key 4. Lazy Gut: Reawaken*.
7. Oral microbiome health: Often overlooked, this is the second most crucial microbiome in the human body, as it constantly sends migrating microbes down to your digestive tract. This is covered in the *Eliminate Other Autoimmune Triggers* chapter in *Key 5*.

We'll cover points 1 to 4 in more detail in this *Key 1* section of the book.

## **CONSEQUENCES OF WRONG MICROBIOME DISTRIBUTION**

The microbiome's distribution can sometimes become disrupted, even with the numerous regulatory mechanisms. This imbalance often leads to an overabundance of bacteria in early segments of the digestive tract, like the stomach and upper intestines, triggering a series of issues.

Bacteria that increase in these areas can absorb significant amounts of nutrients as they multiply, affecting both your health and the beneficial microbiome further downstream. They also interfere with normal digestion by harming the gut epithelium and altering the environment's chemistry. Additionally, these microbes produce toxins during food fermentation, causing a range of issues, from irritating and damaging the gut cells to overburdening the liver with a toxic load. Depending on the severity of the problem, this chronic poisoning can have extensive effects on the entire body, including the brain. Conse-

quently, both you and your lower gut microbiome end up with more toxins and fewer nutrients.

This changes the whole gut ecosystem. The colon and lower intestine microbiota are robbed of their nutrients, and the toxins released by the excessive bacteria upstream harm the beneficial bacteria, reducing their numbers and diversity. In such conditions, many beneficial bacteria struggle to thrive, often leading to the survival of only the most aggressive strains. This negatively affects the quantity and variety of the microbiome, further aggravating the imbalance and causing the *Microbiome Composition* to shift in an unfavorable direction.

This pathological microbial growth directly impacts the immune system within the gut, leading to chronic inflammation that exhausts the entire immune system. This can result in issues like allergies, autoimmune diseases, and a weakened immune response. Over time, it might even increase the risk of cancer development.

The most noticeable manifestation of this kind of skewed *Microbiome Distribution* is what's known as SIBO, or *Small Intestinal Bacterial Overgrowth*.

## THE MANY FACES OF MICROBIOME MALDISTRIBUTION: SIBO, IBS, IBD, AND ULCERS

### SMALL INTESTINAL BACTERIAL OVERGROWTH (SIBO)

You may have heard of SIBO from your healthcare provider, particularly if gut-related symptoms have become severe enough to need attention. It stands for *Small Intestinal Bacterial Overgrowth* and involves an abnormal increase in bacteria—usually the unhealthy kind—in the upper part of the small intestine. We went over the mechanisms and consequences of SIBO in the previous chapter.

Let's take it a step further. My concept of *Disrupted Microbiome Distribution* covers more than just the small intestine. It also includes harmful stomach bacteria, changes in the oral microbiome, and issues

in the colon microbiome. It's all connected. I'm introducing this broader term to highlight that:

“ *Microbiome Distribution and Microbiome Composition are two interconnected, synergistic aspects of the microbiome that can be disrupted and should be addressed in tandem.* ”

#### SIBO SYMPTOMS

While SIBO initially affects the gut, its effects often go beyond the gastrointestinal (GI) system. Some of these include:

- Abdominal pain, particularly after meals
- Bloating and abdominal distension
- Cramps and indigestion (dyspepsia)
- Constant feeling of fullness
- Gas, flatulence, and mucus in stool
- Constipation or chronic diarrhea/loose stools
- Increased bloating after consuming carbs, fiber, and sugar
- Nausea and vomiting
- Foul-smelling, sticky stools
- Unintentional weight loss, despite supplement use
- Anemia
- Nutrient malabsorption, including iron and other minerals
- Vitamin deficiencies, such as B<sub>12</sub>, K
- Fatigue, depression, and neurological issues
- Bone density reduction

#### BELOW THE WATERLINE: SUBCLINICAL SIBO

When medically diagnosed, various previously mentioned symptoms can point to a disrupted microbiome distribution, including SIBO. Unfortunately, a substantial number of cases go undetected.

Studies suggest that 13% to 35% of seemingly healthy individuals may have subclinical, symptomless SIBO, with people experiencing discomfort only in certain situations. In other words, up to a third of the population is likely mildly affected by this condition, not seriously enough for diagnosis and treatment, but it still lingers below the waterline. This underlying issue can gradually undermine the intricate balance between the microbiome, gut, and immune system. Over time, the resulting imbalance can compromise the immune system, potentially leading to autoimmune diseases.

For years, some might experience mild fleeting symptoms. For instance, many people feel bloated after eating prebiotic foods like cabbage, onions, or legumes; or probiotic foods such as naturally fermented sauerkraut. This is due to an imbalance in the *microbiota distribution*. In a healthy gut, these foods don't cause bloating, cramps, or gas. Instead of tackling the root cause, people often choose to avoid eating large quantities of raw vegetables, essentially sweeping the issue under the rug. This is like hiding dumbbells to conceal muscle weakness. You can live with this condition for years by avoiding things that trigger symptoms. Yet, even the low-level chronic inflammation caused by subclinical SIBO can, in the long run, lead to severe health problems, including autoimmune diseases or even cancer.

See also:

- Diseases Related to Immune System Disorders

#### IRRITABLE BOWEL SYNDROME (IBS)

SIBO and *Irritable Bowel Syndrome* (IBS) often go hand in hand, with abnormal microbiome distribution potentially leading to irritation and damage to the gut epithelium. The symptoms of IBS are similar to SIBO, including:

- Abdominal pain, cramping, or bloating
- Diarrhea, constipation, or a mix of both
- Changes in bowel movement frequency and appearance
- Flatulence and excess gas
- Mucus in the stool, often appearing whitish

- Urgent need to go to the bathroom
- A feeling of incomplete evacuation after defecation
- Food sensitivities, stress, or hormonal changes
- Unexplained vomiting
- Weight loss
- Iron deficiency anemia

SIBO and IBS often fly under the radar for years. If you've been diagnosed with one of these conditions, it's probably because your symptoms became too severe to ignore. It's believed that around 10-15% of adults in the US might be part of this not-so-exclusive club.

Constant irritation in the gut isn't just a minor annoyance—it can escalate, leading to more severe conditions like *Inflammatory Bowel Disease (IBD): Ulcerative Colitis* and *Crohn's Disease*. In this way, IBS can be seen as a potential precursor to more severe illnesses. Chronic irritation also stresses and exhausts immune cells, potentially leading to issues in the immune system. Studies have shown that IBS is a risk factor for a range of other conditions, including *scleroderma*, *arthritis*, *lupus*, other autoimmune disorders, *allergies*, and, surprisingly, *diabetes* and *Parkinson's* disease.

This underscores the importance of addressing microbiome distribution and gut lining health. The *5R+ System* is designed to target these issues, improving immune health. For more on repairing the gut epithelium, see *Key 3*.

#### ULCERS AND HELICOBACTER PYLORI

In a bold move back in 1984, Australian Dr. Barry Marshall embarked on a risky experiment with the only human subject he could legally use—himself. He ingested a solution containing *Helicobacter pylori*, a recently discovered bacterium, to prove its role in causing stomach and duodenal ulcers. His experiment was a success, albeit a risky one. Luckily, Marshall treated himself effectively and later recounted this adventurous tale while accepting his Nobel Prize. The well-known ulcer disease, which often requires serious surgery, is caused by the same issue we've been exploring: *Disrupted Microbiome*

*Distribution and Composition.* As mentioned previously, the stomach and the initial part of the small intestine should have an almost non-existent bacterial presence. Yet, recent studies show that about 50% to 75% of people today have *Helicobacter pylori* in their stomachs, though often without noticeable symptoms—a situation similar to the subclinical SIBO and IBS we've discussed. Indeed, a disrupted microbiome can manifest in various ways.

## COMMON APPROACHES TO SIBO AND WHY THEY ARE DANGEROUS

There are several tactics for tackling SIBO or, more broadly, the improper distribution of microbiota. Below, I discuss three frequently used methods that, despite their popularity, can lead to adverse side effects, especially with long-term use. Beyond these, there exist natural and safe approaches to managing SIBO, which we will explore in the upcoming chapter.

**Disclaimer:** If your doctor has recommended any of the methods mentioned below, they might have specific reasons based on your health situation. It's advisable to discuss any concerns with your healthcare provider or consider a second opinion from another medical professional if necessary. Always consult your doctor before implementing any strategies mentioned in this book.

See also:

- Key 1 > Healthy Digestion to Fix Microbiota Distribution

### KILL 'EM ALL: ANTIBIOTICS

Faced with excess bacteria, it might seem logical to turn to antibiotics and attempt a 'kill 'em all' approach. Right? Wrong! This method is flawed because antibiotics don't discriminate; they wipe out beneficial bacteria—vital for your gut health—along with the harmful ones. This approach creates a population vacuum, quickly filled by resistant, more aggressive strains, including fungi. So, instead of resolving one issue, you end up with multiple new problems.

The key to reshaping the microbiota lies in transforming the entire ecosystem, which is the central aim of this holistic 5R+ *System*. Unfor-