

# Journal of Food and Nutrition

## Review Article

### What Do You Know About the Gut Microbiome? Its Benefits, Causes, and Risks of Imbalance?

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#### Abstract

The human body is composed of six main chemical elements, making up about 99% of its mass. The gut microbiome plays a vital role in producing chemicals that regulate bodily functions, digestion, and overall health.

**Keywords:** Oxygen, Carbon, Hydrogen, Nitrogen, Calcium, and phosphorus.

#### We All Know That The Body's Elements Are:

- **Essential Elements:** Oxygen, carbon, hydrogen, nitrogen, calcium, and phosphorus make up 99% of the human body.
- **Trace Elements:** Elements such as sodium, potassium, and magnesium exist in precise proportions and are essential for life.

The gut microbiome, on the other hand, produces beneficial bacteria that synthesize vitamins and transmit chemical signals between the gut and the brain.

The gut microbiome is a complex community of trillions of microorganisms, such as bacteria, fungi, and viruses, that live in the digestive tract.

These organisms play a central role in digesting complex foods, supporting immunity, and producing vitamins. The health of the gut microbiome and its role in ulcerative colitis are also linked to overall health and mood.

#### What is The Microbiome?

- It comprises more than 100 trillion microorganisms.
- Most of them are concentrated in the large intestine, or colon.

- It consists of a thousand different types of bacteria.

#### Benefits of the Gut Microbiome

##### 1. Food Digestion:

The gut microbiome helps promote digestion by breaking down fiber and complex food residues that the body cannot digest on its own. It also stimulates the secretion of vital enzymes, produces essential vitamins such as B vitamins and vitamin K, supports proper nutrient absorption, and boosts immunity.

#### Mechanisms of Digestion and Vital Support

- **Breaking Down Complex Fibers:** Gut bacteria metabolize dietary fiber and convert it into short-chain fatty acids.
- **Enzyme Stimulation:** Microbes help secrete the enzymes necessary to break down complex food components into simpler, more easily absorbed parts.
- **Vitamin Production:** Beneficial bacteria produce essential nutrients for energy metabolism and overall health.

## 2. Immune Support:

Production of fatty acids that help regulate inflammation. The gut microbiome plays a crucial role in supporting the immune system, as approximately 70% of immune cells reside in the gut. Beneficial bacteria stimulate immune cells, produce short-chain fatty acids that regulate inflammation, and direct cells to produce antiviral proteins.

### Mechanisms of Microbiome Influence on Immunity

- **Immune cell stimulation:** Activating defense cells to increase their ability to fight germs.
- **Fatty acid production:** Secreting compounds that help regulate inflammation in the body.
- **Antiviral protein production:** Directing specialized cells to produce substances that eliminate viruses.

### Ways to Promote Microbiome Health and Immunity

- **Fiber Intake:** Such as whole grains, oats, and legumes like lentils and chickpeas.
- **Probiotic-Rich foods:** Such as yogurt and fermented foods.
- **Sugar Intake:** To prevent the growth of harmful bacteria and increase beneficial bacteria.

## 3. Protecting Vital Secrets:

Strengthening the intestinal lining to prevent bacterial infiltration. The gut microbiome helps strengthen and protect the intestinal lining by producing short-chain fatty acids and supporting protective cells to prevent harmful germs and toxins from leaking into the bloodstream and triggering inflammation. It also plays a key role in food digestion, boosting immunity, and regulating the body's metabolism.

## 4. Mental Health:

The gut microbiome influences mental health through the "gut-brain axis." Beneficial gut bacteria produce neurotransmitters such as serotonin and dopamine. These chemicals regulate mood, reduce symptoms of depression and anxiety, and help control the body's response to stress.

### Benefits of the Microbiome for Mental Health:

- **Neurotransmitter Production:** Gut bacteria produce substances like serotonin and dopamine that regulate mood.

- **Anxiety and Depression Reduction:** A balanced gut microbiome helps stabilize mood and alleviate feelings of sadness or fear.
- **Stress Management:** The microbiome regulates stress hormones like cortisol in the body.
- **Immune System Support:** A balanced gut microbiome helps prevent chronic inflammation that can negatively affect the brain. Causes and Risks of Gut Microbiome Imbalance:

Gut microbiome imbalance refers to an imbalance of beneficial and harmful microorganisms within the digestive system. This can lead to numerous health problems, such as digestive disorders, weakened immunity, and an increased risk of chronic infections and metabolic diseases.

### Causes of Gut Microbiome Imbalance:

- **Excessive Use of Antibiotics:** Kills both beneficial and harmful bacteria.
- **Unhealthy Diet:** High intake of sugars and saturated fats.
- **Psychological Stress:** Negatively affects the gut-nerve balance.
- **Low Fiber Intake:** Deprives beneficial bacteria of essential nutrients.

### Symptoms and Risks of Imbalance:

- **Digestive problems:** Diarrhea, constipation, and abdominal bloating.
- **Bacterial overgrowth:** Such as in SIBO (small intestinal bacterial overgrowth).
- **Weakened immunity:** Increased susceptibility to infections and inflammations.
- **Mood disturbances:** Sleep disturbances and anxiety due to decreased serotonin production. To maintain a healthy and balanced gut microbiome, it's essential to consume fiber-rich foods and limit sugars and processed foods, while avoiding the overuse of over-the-counter antibiotics.

### A Supportive Diet Includes:

- **Natural Fiber:** Consume vegetables, fruits, legumes such as lentils, and whole grains such as oats to nourish beneficial bacteria.

- **Fermented Foods:** Incorporate yogurt, buttermilk, pickles, and kimchi to increase probiotics.
- **Dietary Variety:** Diversify your plant-based food sources to ensure the growth of different types of bacteria.

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