How a Healthy Gut Makes for a Healthier You

Why is the gut important?

When talking about your health, the word "gut" means the stomach and intestines. The medical word for the gut is the gastrointestinal, or GI, system. Food first must pass through the esophagus to get to the stomach, then the small intestine, the large intestine, and finally the rectum. The large intestine is also called the colon. We often think of the gut as a long, hollow tube for food to pass through, but it is much more than that. The gut plays an important role in the body. Science continues to make new discoveries about all of the important things it does, such as the following:

- Break down food into digestible parts
- Absorb nutrients like vitamins, minerals, carbohydrates, protein, and fat
- Absorb water
- Get rid of waste products, including toxins
- Serve as a "gateway" for the immune system to
    - Keep out bacteria, viruses, fungi, and parasites that can cause disease
    - Help our immune system learn to tell the difference between what is dangerous and what is safe
- Receive signals from the brain through the nervous system
- Send signals back to the brain through the nervous system

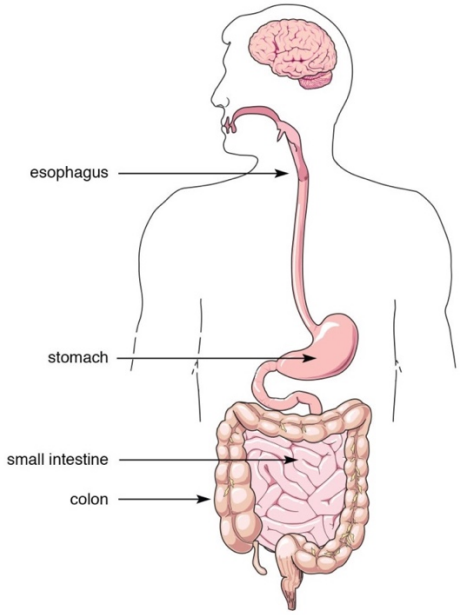

Figure 1. Diagram of the gastrointestinal (GI) system.

The gut can't do all of this on its own. It needs the help of the *microbes* that live in the gut. These microbes are mostly bacteria and a few yeast. Altogether, they are called the "*gut microbiota."* Believe it or not, there are trillions of microbes that live in the gut. This is more than the number of cells in the entire human body! We as human beings evolved a complex relationship with these microbes. We now depend on each other to live. It's true – your life actually depends on the microbes in your gut!

How does my gut health connect to other parts of my whole health?

There are obvious ways in which the gut is connected to your health and wellbeing. For example, if you get a "stomachache" and have nausea or abdominal pain, or you get severe heartburn, this can interfere with your daily life. Diseases such as celiac disease, Crohn's disease, or cancer can have an even bigger impact. They may even become quite serious. Science continues to discover other ways in which gut health relates to practically all systems of the body. For example, what happens in your gut may be directly related to all of the following:[1]

- Autoimmune diseases (where the body attacks itself), such as rheumatoid arthritis
- Bone health and osteoporosis (disease resulting in weak bones)
- Metabolic diseases (diseases that involve chemical changes in the body that support life) such as diabetes and obesity
- Heart disease
- Mental health, including depression and anxiety.

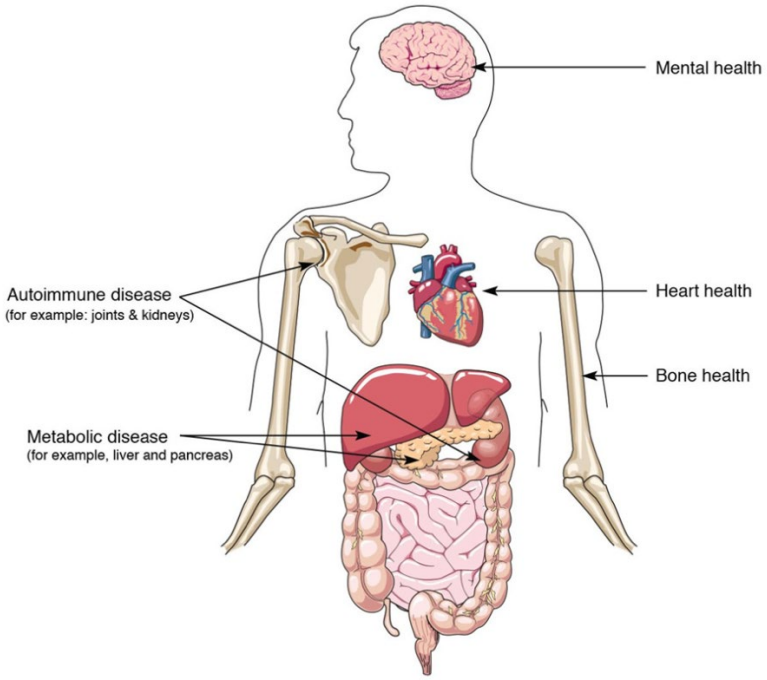

Figure 2. Examples of parts of the body that can be affected by the health of the gut. (Autoimmune disease affects many parts of the body. The joints and kidneys are shown here as examples. The liver is shown as an example of an organ affected by metabolic disease.)

Why are these bacteria in my gut so important?

Science is discovering that the gut microbiota play a central role in how gut health affects the rest of the body. How does this happen, you might ask? The action happens with the cells of the gut and their "neighborhood."

1. **Healthy competition.** There are "helpful bacteria" that live in your gut. These bacteria support healthy gut functioning and whole health. There are also "harmful bacteria." They can cause disease when there are too many of them. It is not necessary to have 100% helpful bacteria. The important thing is to have diversity and a good balance. Competition between different types of bacteria living in the gut is happening all the time.[2]
2. **Intestinal barrier.** The cells that line the intestine need to let some things into the bloodstream and keep some things out. This barrier changes based on signals that the bacteria send to the intestine cells. The signals tell the cells to either tighten up the spaces in between or loosen them. When these spaces are too loose, they become "leaky" and can let too many things into the blood. Helpful bacteria tell the intestines to keep the cells nice and tight, so it's not too leaky.[3]
3. **Mucus layer.** On top of the intestinal cells is the mucus layer. This mucus layer is very important and also works as a kind of barrier. It is also where the bacteria live and a lot of digestion happens. Helpful bacteria help to keep this mucus layer nice and thick.[3]
4. **Immune system.** Your own immune cells move throughout your whole body. There are special areas that line the intestine where they gather in large numbers. In these areas, the immune system interacts with the different bacteria in the gut, together with the things we eat. The immune system then produces signals that are then passed on throughout your body.
5. **Nutrition.** The bacteria in your gut help break down food into nutrients that can be absorbed. They can also even use these breakdown products to build new nutrients, such as vitamins, that we would otherwise not be able to get enough of.
6. **Metabolism.** Bacteria in our gut also make products that then turn on or off signals in our hormone system. These hormone signals then affect our metabolism – including appetite, hunger, and whether we store or burn fat.[4]
7. **Mind and emotions.** The gut has its own branch of the nervous system, called the enteric nervous system. This system is so large that it's sometimes called our "second brain." Bacteria directly make signals or stimulate the intestinal cells to make signals that the enteric nervous system uses. These signals talk to the central nervous system, including the brain. This connection is called the gut-brain axis. This means that the bacteria in your gut can actually affect your mind and emotions, such as depression and anxiety.[5,6]
8. **Repair.** The bacteria in your gut also affect how your body repairs damaged cells. When damaged cells are not repaired well, it may, in some people, lead to cancer. For example, certain types of bacteria are more common in people who get colon cancer.[1]

What can happen when the bacteria in the gut are out of balance?

When you have a good balance of helpful bacteria in the gut, the eight areas above are also in better balance. On the other hand, when you have more of certain types of bacteria and fewer helpful bacteria in the gut, there is more chance of having health problems. In that case, one or more of these eight areas might not work well. Also, when these areas are not working well, there is more inflammation. That's because there is more stress that the body has to deal with. Inflammation is a part of many diseases. (If you want to learn more about inflammation, see the Integrative Whole Health handout "The Anti-Inflammatory Lifestyle.") This is how the bacteria in your gut may play a role in whether you gain too much weight, have high blood pressure, get diabetes, have a fatty liver, or are more at risk for a heart attack.[1, 7]

Is there actually research showing that the bacteria in the gut can affect the brain and mental health?

Yes, a growing field of research shows how closely connected the gut and the brain are. So far, it looks like bacteria, along with the cells in the intestine, help to make chemicals that communicate with nerves and the brain. These chemicals are actually the same type that medications for depression and anxiety (such as *Prozac)* affect. This seems to be one way in which gut bacteria may affect depression and anxiety. A very interesting research study used a fermented milk drink containing healthy bacteria. The study compared brain scans of women who drank this milk to women who did not drink it. The women who drank the fermented milk had changes in an area of the brain that handles emotions.[5,6,8]

What can I do to support a healthy gut?

A healthy gut is sort of like a well-functioning city, and the bacteria in our gut are sort of like people or residents of the city. A healthy city has good roads, buildings, schools, and parks. Its residents are friendly to one another. They cooperate for the sake of the whole community. They have jobs that help others. This is a two-way relationship. The community is only good as long as the residents help prevent and fix problems. And the residents can only continue to live in the city if it supports their needs. The residents also need to be provided with things that keep them happy and that help them want to stay in the city. These are things like entertainment, recreation, and food. When the city is doing well, it helps the state as well as the entire country.

In order to have a healthy gut, you need to support the community (your intestines). You need to attract friendly residents (helpful bacteria and yeast) and keep those residents happy (feed them good food and decrease stress). When all of these things happen, the healthy city (healthy gut) can then support the state and country (heathy body and mind).

Key Support	Explanation/Examples
Healthy diet	Eat brightly colored foods from plants, such as fruits and vegetables, beans, nuts, and healthy oils such as olive oil; fatty fish such as salmon that is high in omega-3 fatty acids; dairy products in moderation, especially fermented dairy such as yogurt and kefir; and meat in small amounts. High-fiber, plant-based foods help create a healthy mucus layer and support good bacteria in the gut. Processed foods, refined grains, and added sugars wear down the mucus layer and grow unhealthy bacteria. See Whole Health handouts in the **Nutrition** section for more information.
Regular physical activity/exercise	The body's movement also helps the gut to move regularly and healthfully. Regular exercise decreases inflammation in the body and balances the way in which the body handles sugars, fats, and other nutrients. Exercise also helps to manage stress and improve mood. These systems are all communicating with the gut. See Whole Health handouts in the **Physical Activity** section for more information.
Adequate rest	Like the brain, the gut works best when it has time to rest. Healthy sleep helps to set a regular sleep-wake cycle. The gut then adjusts what it does, based on whether it is day or night. See Whole Health handouts in the **Recharge** section for more information.
Stress management	The part of your brain that responds to stress is connected to your "second brain" in the gut. When there is too much stress, the gut cells may be more "leaky." Stress may also change the way the gut moves, causing diarrhea or constipation. Practicing relaxation techniques, mindfulness meditation, yoga, tai chi, and other mind-body practices can help manage stress and keep your gut working in a healthy way. See the **Mind & Emotions** Whole Health handouts for more information.

How do probiotics and prebiotics support a healthy gut?

The word *probiotic* means actual living microbes. These are usually bacteria but sometimes certain yeast. You can eat or drink them to help create a better balance between helpful and harmful bacteria in your gut. Probiotic bacteria and yeast use fermentation. This is a process used in making certain foods, such as sauerkraut or yogurt. Beer also uses fermentation by yeast. A healthy gut has bacteria and yeast that use this process of fermentation. Probiotic

foods, such as sauerkraut, contain these healthy bacteria. Thus, they can boost the gut's own balance. Similarly, you can also add certain healthy bacteria to your gut by taking probiotic supplements.

The word *prebiotic* means foods that feed the good bacteria in your gut. Prebiotics encourage the good bacteria to grow. This creates a healthier balance in the gut.[9]

You can use a combination of prebiotic foods and probiotics supplements or probiotic foods to help your gut be healthy. The goal is not to take probiotics continuously for the rest of your life. Instead, it is best to support your gut with good prebiotic food, which will help it remain healthy on its own. Some examples are below.

Category	Examples
Prebiotic foods	In general, eating a lot of plant-based foods is the foundation for a good prebiotic diet. Some foods are especially helpful to good bacteria. These include asparagus, artichokes, onions, garlic, leeks, oatmeal, bananas, chicory root, honey, and beans.
Probiotic foods	Probiotic foods are foods that are fermented with probiotic bacteria and/or yeast. Examples of these foods include sauerkraut, miso, tempeh, kimchi, kefir, and kombucha. Note that some yogurt products have probiotics, but many do not. It is important to choose yogurt and kefir that do not have added sugar.
Probiotic supplements	There are many types, or strains, of probiotics being sold. Not all of these have been researched or shown to be helpful. Also, not all brands are of the same quality. It is important to take the correct strain and the right amount, or dose, of a probiotic product for a specific condition. Ask your health care provider for specific recommendations. See the Whole Health handout "Probiotics for Specific Conditions" for more information.

For you to consider:

- In general, do you feel that you have a healthy gut?
- Do you have symptoms that suggest the bacteria in your gut may be out of balance? What are they?
- How are you doing in the key areas of support (healthy diet, regular physical activity/exercise, adequate rest, stress management)? Is there one that feels right for you to focus on right now?

- Do you want to try eating more prebiotic or probiotic foods? What will you try or eat more of? Have fun with this. Consider trying something you've never eaten before.

The information in this handout is general. **Please work with your health care team to use the information in the best way possible to promote your health and happiness.**

For more information:

ORGANIZATION	RESOURCES	WEBSITE
University of Wisconsin Integrative Health Program	A variety of Integrative Whole Health handouts on your surroundings	https://www.fammed.wisc.edu/integrative/resources/modules/

This handout was adapted for the University of Wisconsin Integrative Health Program from the original written for the Veterans Health Administration (VHA) by Jonathan Takahashi MD, MPH, Academic Integrative Health Fellow, Integrative Health Program, University of Wisconsin Department of Family Medicine and Community Health. It is based on the book chapter co-authored by him and J. Adam Rindfleisch, MD, MPhil, titled "Prescribing Probiotics," in Integrative Medicine, 4th edition, edited by David Rakel MD, published in 2017. The handout was reviewed and edited by Veterans and VHA subject matter experts.

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