



Can bacteria in your gut make you want to exercise?

Have you ever wondered why some people enjoy exercise while others find it unbearable? New research hints at a surprising connection: the gut [microbiome](#)! You read that right—the trillions of tiny organisms, or [microbes](#), that live in our digestive system may play a role in whether we feel like exercising.

We know that the bacteria in our guts are important for our digestion and overall health. Recent research suggests that our guts also communicate with our brains. This “gut-brain axis” is linked to mood, stress, and maybe even our motivation to exercise.

Mice, microbes, and motivation

How exactly might gut microbes influence our motivation to exercise? To answer that question, [NIH-funded researchers studied exercise performance in mice](#). They found that mice ran less on their exercise wheel when they had depleted gut microbiomes (meaning fewer microbes). They also got tired faster. This suggests these microbes might have a say in how much the mice wanted to exercise...and how much exercise they were physically able to tolerate.

Exercise increases dopamine, a brain chemical associated with pleasure, motivation, and reward (if you’ve ever experienced a “runner’s high,” that’s because of dopamine). As expected, exercise increased dopamine in the mice with healthy gut

microbiomes, which motivated them to keep moving. But this increase in dopamine didn’t happen when the mice’s microbiomes were depleted.

The gut talks to the brain

Digging deeper, the researchers learned that bacteria in the gut produce a certain chemical that communicates with the brain. During exercise, these chemicals tell the brain to release more dopamine. The extra dopamine makes exercise feel more rewarding and energizing. When this communication pathway was interrupted, the mice lost their motivation to move.

What does this mean for human health?

It’s hard to say for sure. While motivation is important, there’s more to the story for people than for these furry research subjects. This research happened in a controlled setting to allow researchers to isolate the effects of gut bacteria. Our lives are more complex, and scientists are still exploring how our gut bacteria might influence our exercise choices.

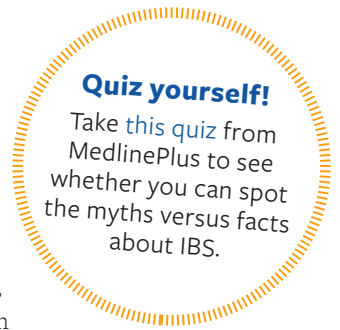
We’ll need more research to understand the relationship between our own gut microbes and why, when, and how we choose to move our bodies. But if it does work the same for humans, we could find new ways to make getting active more enjoyable, rewarding, and achievable for everyone. ■

In this issue

- 02 [IBS: What you need to know](#)
- 03 [Genetic and Rare Diseases Information Center](#)
- 05 [Fibromyalgia: What you need to know](#)

- 06 [6 ways to manage your fibromyalgia](#)
- 07 [Recipe: Baked zucchini with tomato sauce](#)
- 07 [Contact us](#)

IBS: What you need to know



No one knows the exact cause of IBS, but your health care provider may run different tests to rule out other conditions.

Irritable bowel syndrome (IBS) refers to a group of symptoms that occur together and cause pain in the abdomen. They also cause changes in your bowel movements. The type of IBS you have depends on whether you have constipation, diarrhea, or both. Other symptoms may include abdominal cramping, bloating, or whitish mucus in your stool. You also may feel like you haven't finished a bowel movement.

[The condition](#) can be different for everyone who has it. People with IBS may experience symptoms on some days and feel fine on others. While IBS affects the digestive tract, it does not cause damage or disease.

What causes IBS, and who is most at risk?

IBS is considered a “functional gastrointestinal (GI) disorder.” That means there’s a problem with how [your brain and your gut work together](#). This can cause your gut to be more sensitive, which can lead to more bloating or abdominal pain. It can also change how the muscles in your bowel contract.

An estimated 12% of people in the United States have IBS. It affects about twice as many women as men, and IBS symptoms may be worse during menstruation. IBS is most often found in people younger than 50. You may be at greater risk for IBS if you have:

- A family member with the condition
- A history of stressful or difficult life events, including physical or sexual abuse
- Certain mental disorders, including [depression](#), [anxiety](#), and [somatic symptom disorder](#)
- A bacterial infection in your digestive tract
- Specific [food sensitivities](#) or intolerances



FAST FACT

An estimated **12%** of people in the United States have IBS. It affects about **twice as many women as men**, and IBS symptoms may be worse during menstruation. IBS is most often found in people **younger than 50**.

SOURCE: NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

Diagnosis

No one knows the exact cause of IBS, but your health care provider may run different tests to rule out other conditions or diseases. They will ask about your medical and family health history and do a physical exam. They may order blood tests, stool tests, and other tests to check for different health problems. Most of the time, your doctor can diagnose IBS based on your symptoms. Your provider may also perform a [sigmoidoscopy](#) or [colonoscopy](#) to check for colon cancer because some symptoms are similar to IBS.

People with IBS often have other conditions, including:

- Chronic pain
- [Fibromyalgia](#)
- [Chronic fatigue syndrome](#)
- Chronic pelvic pain
- [Indigestion](#)
- [Gastroesophageal reflux disease](#) (GERD)

Treatment

You may be able to manage IBS symptoms by changing your diet, managing your stress, or taking medicine for diarrhea or constipation. Your health care provider may suggest taking [probiotics](#). These are live microorganisms like the ones you naturally have in your digestive tract.

Your provider may also recommend eating more fiber, eating less gluten (or avoiding it altogether), or following a [low FODMAP diet](#). This diet avoids foods that are hard for some to digest, including beans, dairy, wheat, and certain fruits and vegetables. No specific diet works for everyone with IBS, though. Keeping a food diary can help you figure out which foods make your symptoms worse.

Increasing physical activity and getting enough sleep can help IBS symptoms. Mental health and relaxation therapies may help manage the condition as well. There are even medications to help treat some symptoms such as stomach pain, diarrhea, and constipation. It's important to talk to your health care provider before beginning any treatment.

The National Center for Complementary and Integrative Health has [helpful information](#) on different IBS treatment methods, including probiotics, acupuncture, peppermint oil, and hypnotherapy. ■

Know the difference

Probiotics

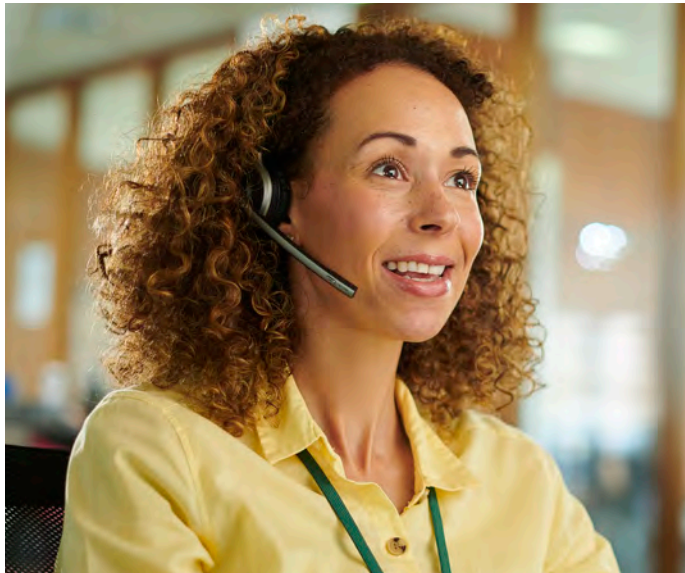
- Live microorganisms that are intended to have health benefits when consumed or applied to the body
- Can be found in yogurt and other fermented foods, dietary supplements, and beauty products

Prebiotics

- Specialized plant fibers that beneficially nourish the good bacteria already in the large bowel or colon
- Nondigestible food ingredient not affected by heat, cold, acid, or time

SOURCE: NATIONAL CENTER FOR COMPLEMENTARY AND INTEGRATIVE HEALTH

Navigating a rare disease? The Genetic and Rare Diseases Information Center can help!



GARD Information Specialists can help you find information and resources for your rare disease.

Millions of people in the United States live with a rare disease. While each individual disease may be uncommon, the people they affect often face similar challenges. Finding reliable information, getting a diagnosis, and locating resources can feel overwhelming.

That's where NIH's [Genetic and Rare Diseases \(GARD\) Information Center](#) can help.

Easy-to-understand information at your fingertips

GARD is a comprehensive resource for anyone affected by a rare disease. On their website, you'll find current, reliable, and easy-to-understand information on thousands of [rare diseases](#). Information is available in both English and Spanish. It is presented in a clear and actionable way, giving you the information you may need to get a diagnosis, manage your care, or find a supportive community.

Browse by Disease
Explore GARD's list of rare diseases. Filter by category or search by disease name, acronym, or synonym. Rare diseases found on GARD should not be listed as policy statements.

Keyword: Showing 1 - 6 of 6

Filter by:

Browse by Letter: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Browse by Disease Category: Birth Defects, Blood Disorders, Cancer, Endocrine Disorders, Gastrointestinal Disorders

B-cell lymphoma

B-cell chronic lymphocytic leukemia
Other names: B-cell chronic lymphoid leukemia

B-cell polymphocytic leukemia

BENTA disease
Other names: B-cell expansion with NF4B and T-cell anergy disease

B-cell lymphoma

About the Disease | Getting a Diagnosis | Resources and Support

Disease at a Glance | Symptoms | Causes | Find Your Community | Participating in Clinical Studies

Disease at a Glance

Summary
"B-cell lymphoma refers to types of non-Hodgkin lymphoma that are characterized by abnormalities of the "B-cells" (a type of white blood cell that makes antibodies to help fight infection). The condition may grow and spread slowly with few symptoms (also known as indolent lymphoma) or may be very aggressive with severe symptoms. When present, signs and symptoms may include swollen lymph nodes in the neck, armpit, or groin; abdominal pain; fatigue; fever; night sweats; and/or weight loss. The underlying cause of B-cell lymphoma is poorly understood. However, the condition can be associated with genetic abnormalities, environmental factors, viruses, immunodeficiency states, and connective-tissue disorders."

About B-cell lymphoma
Many rare diseases have limited information. Current following information for this disease:

- Population Estimate:** This section is currently in development.
- Symptoms:** This section is currently in development.
- Cause:** GARD does not currently have information on the cause of this disease.
- Organizations:** Patient organizations are available for advocacy and support for this specific disease.

Resource(s) for Medical Professionals and Scientists on This Disease:
This section is currently in development.

Explore thousands of rare diseases in GARD's online directory.

Each disease page has information about the disease, diagnosis, clinical research, patient organizations, and other resources.

GARD is a comprehensive resource for anyone affected by a rare disease.

Connect with a GARD Information Specialist

Getting a diagnosis for a rare disease can be challenging and, for some patients, may take months to years. GARD offers free support through its team of dedicated Information Specialists.

GARD Information Specialists can provide individualized help with:

- Finding or understanding information about a rare disease
- Navigating the process of getting a rare disease diagnosis
- Finding resources, disease experts, and clinical trials
- Connecting with patient communities

While GARD Information Specialists can't give you medical advice or make a diagnosis, they can help you find someone to answer your questions.

We can help! Contact GARD today.

Please complete and submit this inquiry form to connect with a Genetic and Rare Diseases (GARD) Information Specialist. GARD Specialists can help find:

1. Information about rare diseases in English and Spanish.
2. Organizations to help you connect with others.
3. Resources to help build your medical team.
4. Organizations that provide financial, disability, or travel support.
5. Resources to help you obtain a diagnosis.

If you have complex needs or difficulty submitting your question, we invite you to call toll free 1-888-205-2311 to speak with an Information Specialist directly. Please be aware that our Information Specialists are not medical professionals. If you need medical advice, please speak with your healthcare provider. Information Specialists are available Monday through Friday 12 p.m. to 6 p.m. Eastern Time (Except: Federal Holidays).

All personal information collected by GARD specialists is only used to respond to your questions and is removed from our system after 90 days.

About You | Required fields are marked with an asterisk (*)

* Name * Email

* Country State City Phone

* Which best describes you?

Tell Us More | Required fields are marked with an asterisk (*)

* How can we help?

Disease name

Alternate disease name

More details about your request

To ensure a prompt response, please confirm your email address is correct and active before submitting this form. Please allow 2 to 10 business days for us to respond.

Submit Form

After filling out the GARD contact form, an information Specialist will reach out to you.



FAST FACT

A rare disease is a disease or condition that impacts **fewer than 200,000** people in the United States. However, there are **more than 10,000 known rare diseases** that together affect millions of people in the United States.

SOURCE: [THE GENETIC AND RARE DISEASES INFORMATION CENTER](#)



Contacting GARD

GARD Information Specialists are available Monday through Friday from 12 p.m. to 6 p.m. Eastern Time (except federal holidays).

Get in touch by calling toll-free at 888-205-2311 or by filling out a [contact form](#) on their website.

With GARD's support, you won't have to face a rare disease alone. ■



Be as specific as possible when describing your information needs to a GARD Information Specialist. It's a good idea to have some questions prepared ahead of time.

Fibromyalgia: What you need to know

This painful and often misunderstood condition has frustrated health care providers and patients for decades

Fibromyalgia is a chronic (long-term) condition that causes muscle pain and tenderness all over the body. It can also cause extreme exhaustion and other symptoms. There is no cure for [fibromyalgia](#), but it does not usually get worse over time. More information about the condition has also come out in recent years, including treatment options and ways to manage symptoms.

What are the symptoms of fibromyalgia?

- Chronic pain all over the body (people often describe it as aching, burning, or throbbing)
- Extreme tiredness
- Headaches or [migraine](#)
- Stiff muscles and joints
- Numbness or tingling in the arms and legs
- Sensitivity to light, noise, smells, touch, and temperature

People who have fibromyalgia are also more likely to have [anxiety](#), [depression](#), and [face or jaw pain](#).

Who is more likely to have fibromyalgia?

Anyone can have fibromyalgia, but it often runs in families. It's more common in women than men, and it usually starts in middle age.

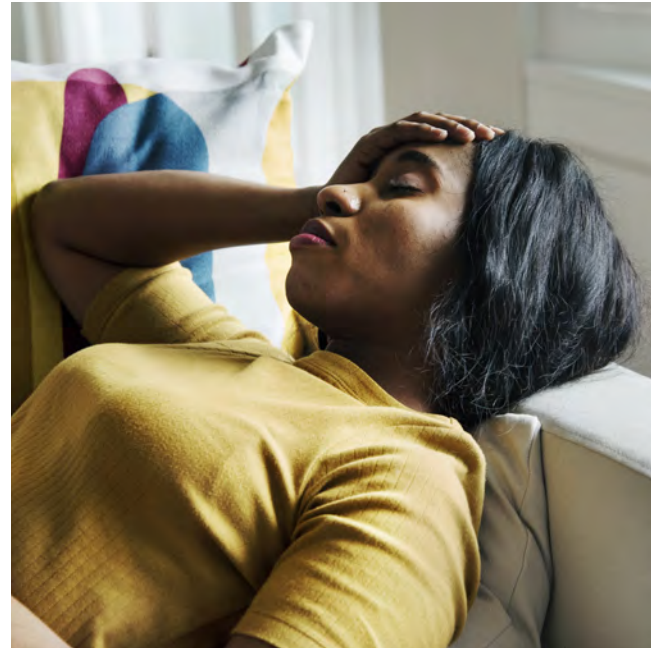
We don't know the exact cause. NIH research suggests it might be an issue with how the brain processes body pain. Other conditions that [may increase](#) your chances for having fibromyalgia include:

- Certain kinds of arthritis
- Lupus
- Chronic back pain
- [Irritable bowel syndrome \(IBS\)](#)

How is fibromyalgia diagnosed?

There is no single test that can diagnose fibromyalgia. You may need to see different health care providers to rule out other conditions with similar symptoms. This is sometimes called a “differential diagnosis.”

A provider will ask patients whether they have had widespread body pain and tenderness lasting more than three months. They will also ask about fatigue, stiffness, trouble sleeping, or problems with memory and thinking.



Extreme tiredness, headaches, and migraines are some examples of fibromyalgia symptoms.

How is fibromyalgia treated?

Fibromyalgia treatment plans often take a team of health care providers to tackle the physical and psychological sides of the condition.

Pain medicines and [antidepressants](#) can relieve fibromyalgia symptoms. Some antiseizure medications such as [pregabalin](#) have also been shown to target pain messages from the brain. This can reduce pain and improve sleep.

Some people seek [complementary medicine](#) such as acupuncture and massage. But these approaches have not been well-tested in people with fibromyalgia. It's also important to exercise, get enough sleep, and rest when needed. Mental health treatments like cognitive behavioral therapy can also help people cope with the condition. ■

**This article was originally published in September 2018. It has been updated.*

Anyone can have fibromyalgia, but it often runs in families. It's more common in women than men, and it usually starts in middle age.

6 ways to manage your fibromyalgia

NIH-supported experts explain how you can help relieve symptoms

If you're living with [fibromyalgia](#), it's important to make time for self-care. It's a chronic (long-lasting) condition that causes muscle pain and tenderness all over the body. This can make it hard to move, relax, or sleep, and it can cause mood and memory problems, too. NIH MedlinePlus Magazine asked two top fibromyalgia experts (and NIH grantees!) for tips on how to support your physical and mental well-being.

1. Exercise regularly

It may hurt to move at first, but research shows that gradually increasing exercise can reduce pain. Start with gentle movements such as tai chi or yoga, said [Leslie Crofford, M.D.](#), Division Director for Rheumatology and Immunology at Vanderbilt University Medical Center. Low-impact aerobic activities such as swimming, walking, and biking are great options, too.

Communication between the brain and body is altered in fibromyalgia. But regular exercise helps the brain become more accustomed to your body's movements, Dr. Crofford explained. A physical therapist or exercise physiologist (a professional who creates fitness programs) can provide you with more personalized exercise plans.



Gentle movement exercises such as tai chi or yoga can help with fibromyalgia-related pain.

2. Reduce stress

[Stress](#) can make fibromyalgia worse, so it's important to spot stress triggers in your life. Cognitive behavioral therapy (CBT) can teach you ways to cope with emotional stress and depression. CBT can also teach you how to avoid negative self-talk, organize tasks so they are less tiring, and cope with pain flare-ups.

You may not be able to do all the things you once did or to do them in the same way, but pacing yourself can help you try to conserve your energy each day. [Relaxation techniques](#) such as guided visualizations and breathing exercises can also help. Doing too much can make your symptoms worse, so be kind to yourself!

3. Get enough sleep

In fibromyalgia, fatigue can affect pain, which can worsen fatigue...and the cycle continues. That's because the same neurotransmitters (which carry messages between the brain and the rest of the body) that control pain also control [sleep](#),



mood, and memory, said [Daniel Clauw, M.D.](#), Director of the Chronic Pain and Fatigue Research Center at the University of Michigan. This makes getting enough sleep essential.

Try following [good sleep habits](#): Go to bed and wake at the same time each day, reduce daytime napping, and try to only use your bed for sleep.

4. Incorporate complementary health approaches

In addition to CBT, tai chi, and yoga, [vitamin D](#) or [magnesium supplements](#) may help reduce symptoms, too. But talk to your doctor about how these could interact with medications you're taking—just because something is “natural” doesn't mean it is safe! Some people may seek out [massage therapy](#) and [acupuncture](#) to improve fibromyalgia symptoms including pain, stiffness, fatigue, and depression. However, these approaches have not been well tested in people with fibromyalgia specifically.

5. Learn as much as you can

If you or someone you know has fibromyalgia, check out expert-backed information about the condition at [MedlinePlus](#) and the [National Institute of Arthritis and Musculoskeletal and Skin Diseases](#). The [National Center for Complementary and Integrative Health's](#) website also breaks down research about treatment options for fibromyalgia.

Consider joining an [NIH clinical trial](#) to help advance scientific research on fibromyalgia. This research is what leads to our understanding and treatment of the disease.

6. Understand that, unfortunately, there's no simple solution

“There's no easy fix with chronic pain,” said Dr. Clauw. People with chronic conditions must take an active role in managing their symptoms with lifestyle changes. But remember to always consult your health care provider about what treatment is best for you! ■

**This article was originally published in September 2018. It has been updated.*

Baked zucchini with tomato sauce

Prep time: 5 minutes

Cook time: 45 minutes

Total time: 50 minutes

Number of servings: 8

INGREDIENTS

2 medium zucchini

1 can (14.5 ounces) diced tomatoes, not drained

2 teaspoons garlic powder

1/2 teaspoon salt

1 tablespoon parmesan cheese



NOTES

- Try other seasonings like onion powder, oregano, or basil.
- Use 2 cups finely chopped tomatoes or halved cherry tomatoes instead of canned tomatoes.
- Try adding fresh chopped cilantro on top for more flavor.

DIRECTIONS

1. Wash hands with soap and water.
2. Preheat oven to 375 °F.
3. Slice zucchini into rounds, about 1/2 inch thick. Spread zucchini slices in a pie pan and pour the can of tomatoes over the top.
4. Sprinkle garlic powder, salt, and cheese over zucchini.
5. Bake uncovered for 35 to 40 minutes.
6. Refrigerate leftovers within 2 hours.

WHO WE ARE

The National Institutes of Health (NIH) is the **nation's premier medical research agency**, made up of 27 different Institutes and Centers. The National Library of Medicine (NLM) at NIH is a leader in biomedical informatics and data science research and the world's largest medical library.

[NIH MedlinePlus Magazine](#) is a digital magazine that is compiled into printable monthly issues.

NLM provides **free, trusted health information** in this magazine and at [MedlinePlus.gov](#).

Thanks for reading!

CONTACT US

Email

NLMCommunications@nlm.nih.gov

Phone

301-496-6308

CONNECT WITH US

Follow us on Facebook

www.facebook.com/nationallibraryofmedicine

Follow us on X

www.twitter.com/NLM_NIH

Follow us on LinkedIn

www.linkedin.com/company/national-library-of-medicine-nlm

Follow us on YouTube

www.youtube.com/user/NLMNIH

Subscribe by Email

<https://magazine.medlineplus.gov/subscribe>



Articles in this publication are written by professional journalists. All scientific and medical information is reviewed for accuracy by representatives of the National Institutes of Health. However, personal decisions regarding health, finance, exercise, and other matters should be made only after consultation with the reader's physician or professional advisor. Opinions expressed herein are not necessarily those of the National Institutes of Health or the National Library of Medicine.