

# Eating More Pulses and Vegetables Lowers Stress by Boosting Beneficial Gut Bacteria

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## STORY AT-A-GLANCE

- › A poor-quality diet is linked to higher stress levels and fewer beneficial gut bacteria, making it harder for your body to stay calm and resilient
- › Eating more vegetables, beans, and specific foods like natto, tomatoes, and green peppers boosts gut bacteria that produce anti-inflammatory compounds and improve mood – but only when your gut lining and metabolism are already functioning well
- › Beans feed beneficial microbes that strengthen your gut lining, lower inflammation, and help regulate appetite and hunger hormones – though in sensitive individuals, they increase bloating, endotoxin, and stress hormones unless carefully prepared and well-tolerated
- › Gut bacteria produce short-chain fatty acids that support your colon, calm your nervous system, and reduce overactivation of the stress response, but excess fermentation in a compromised gut worsens symptoms instead of improving them
- › Rebuilding your gut means addressing the fiber paradox – too much fiber too soon backfires – so it's key to first reduce inflammation, cut out vegetable oils, focus on easy-to-digest carbs, and then gradually reintroduce fermentable fibers only after your gut starts to heal

Americans are more stressed than ever – and your gut is likely part of the reason. It's easy to think of stress as something that lives in your head, but your gut plays a major role in how well, or how poorly, you handle it. When your internal ecosystem is out of

balance, even small stressors hit harder. You might find yourself snapping more easily, not sleeping well, or feeling foggy and inflamed without knowing why.

What's going on inside your gut isn't just about digestion. It shapes how your body regulates inflammation, hormones, and even your nervous system. And one of the most important factors influencing your gut health is what you eat. The quality of your daily meals affects which microbes thrive, which ones die off, and how effectively your gut communicates with your brain.

If your stress tolerance has dropped or your moods feel unpredictable, consider if your gut is working against you. Fortunately, research is now uncovering which foods help restore microbial balance and which gut bacteria are most closely tied to resilience, calm, and mental clarity. Let's look at what the latest science reveals about this gut-stress connection and how your food choices could be the missing piece.

## **High Stress? Your Gut Bacteria Could Be to Blame**

A study published in *Clinical Nutrition ESPEN* analyzed 1,268 healthy Japanese adults to explore how diet, gut microbiota, and stress are interconnected.<sup>1</sup> The researchers wanted to understand if the quality of what you eat — not just individual nutrients — has the power to reshape your internal stress response. Using stress questionnaires, food frequency data, and stool sample analysis, the team linked what people ate to what was living in their gut, and how their bodies responded to daily stress.

- **Participants were healthy adults, but their stress and diets varied widely** — The population included individuals aged 20 to 80, all considered healthy by conventional standards. But when grouped by stress response scores, big differences emerged in gut composition and diet quality.

Those with the highest stress levels consistently ate fewer vegetables and pulses and scored lower on a metric called the Nutrient Rich Food Index 9.3 (NRF9.3). This index rewards diets that are rich in fiber, vitamins, and minerals — and penalizes those with excess sugar and fat.

- **The highest-stress group had the worst diet scores and weakest gut defenses –** People with the **highest stress** response had much lower NRF9.3 scores and significantly less Lachnospira, a genus of bacteria linked to **short-chain fatty acid** (SCFA) production and reduced inflammation. They also had less Ruminococcus\_E, another SCFA-producing genus, and more Collinsella, a bacterial genus linked to anxiety and chronic stress.

However, from the perspective of the late Dr. Ray Peat, a biologist and pioneer in bioenergetic medicine and human metabolism, and bioenergetic researcher Georgi Dinkov, whose work is heavily influenced by Peat's principles, this bacterial profile is less of a cause and more of a consequence of systemic stress.

Rather than trying to boost Lachnospira by eating more fiber, Peat and Dinkov focus on restoring balance in your body – like improving thyroid function and digestion – so harmful bacteria don't have the chance to grow in the first place.

## **Beneficial Bacterial Help Your Gut Make Anti-Inflammatory Compounds**

Lachnospira ferments fibers and resistant starches to produce SCFAs like **butyrate** and acetate. These substances feed the cells lining your colon, seal up leaky gut junctions, reduce immune system overactivation, and calm inflammation, especially the kind that worsens under chronic stress.

- **SCFAs help calm your brain and gut at the same time –** SCFAs don't just work locally. They travel through your bloodstream, reaching your brain and gut-brain signaling centers. They help regulate your vagus nerve, influence feel-good neurotransmitters like dopamine, and reduce overactivation of the HPA axis – your stress command center.

This process only works well if your gut is already healthy. In a damaged gut, the same fiber fermentation increases toxins, triggers inflammation, and sends the wrong signals to your nervous system – making stress worse, not better. Peat and

Dinkov recommend focusing on healing your body first with supportive foods instead of feeding gut bacteria.

- **The foods that mattered most weren't exotic, just overlooked** – Researchers identified three key foods that separated low-stress and high-stress individuals: natto, tomatoes, and green peppers. People with the lowest stress scores consistently ate more of these foods, which boosted their NRF9.3 scores and were linked directly to increases in Lachnospira. **Natto** had the strongest effect, followed by tomatoes and green peppers.

## **Beans Reprogram Your Gut to Fight Inflammation and Hunger**

A 2023 narrative review published in Obesity Reviews looked at how common beans – especially navy, black, and pinto beans – affect your gut microbiome, hunger hormones, and chronic inflammation in both animal and human studies.<sup>2</sup> Researchers focused on how beans work inside your gut to change appetite signals and reduce markers linked to metabolic disease.

- **Bean-fed animals had better gut bacteria, more gut-friendly compounds, and less inflammation** – In multiple mouse studies, adding beans to a high-fat diet boosted microbial diversity and raised populations of beneficial species like Akkermansia and Prevotella. These microbes are known for producing SCFAs, which protect your gut lining and help control inflammation. At the same time, harmful bacteria that thrive on junk food diets dropped in abundance.
- **SCFAs increased significantly after bean consumption** – SCFAs like acetate, propionate, and butyrate surged in the intestines of animals eating beans. These compounds support colon cells, lower gut permeability, and improve hormone signaling between your gut and brain.
- **Appetite hormones shifted in a favorable direction** – Mice eating navy or black beans had lower ghrelin (the hunger hormone) and better **glucagon-like peptide-1 (GLP-1)** responses, which helps you feel full sooner.

Inflammatory markers also dropped across the board. Animals on bean-rich diets had lower levels of inflammatory proteins. Their fat tissues also had less immune cell infiltration, which usually signals metabolic distress. The result: less inflammation, especially in the tissues most affected by obesity.

While these changes might look helpful on the surface, Peat warns they often show up in people with low metabolism and high stress. For example, **drugs that raise GLP-1** slow digestion and lower thyroid function. From this view, the effects of beans may not mean your body is healing – they may just be dampening your appetite and stress signals.

- **Human data shows similar gut and inflammation benefits** – A small study giving 130 grams (g) a day – about 3/4 cup – of pinto beans increased a beneficial SCFA-producing bacteria and led to higher SCFA levels in stool.

Another trial with 35 g per day of navy bean powder in overweight colorectal cancer survivors improved overall gut diversity and decreased a bacterium linked to inflammation. Participants in a mixed-pulse diet trial also had reduced levels of two blood markers tied to chronic disease.

- **Beans work by feeding good bacteria and improving gut signaling** – Beans are rich in prebiotic fibers and polyphenols – compounds that microbes ferment into SCFAs. These SCFAs strengthen your gut wall, calm immune overactivation, and enhance the release of hormones that tell your brain you're full.

While some people tolerate small amounts of pressure-cooked beans, resistant starches and fermentable oligosaccharides in beans often increase intestinal gas, **raise serotonin**, and generate LPS in individuals with sluggish digestion or low bile flow. In that context, beans don't “heal” your microbiome – they overstimulate it.

For sensitive individuals, Peat and Dinkov recommend alternatives like gelatin, saturated fat, orange juice with salt, and grated raw carrot to nourish the gut barrier without bacterial fermentation.

# Diet and the Microbiota-Gut-Brain Axis Sow the Seeds of Good Mental Health

A related review in *Advances in Nutrition* emphasizes that your gut microbes aren't just passive bystanders.<sup>3</sup> They help regulate inflammation, hormone release, and neurotransmitter production in response to what you eat. These microbes act as middlemen, translating your food choices into signals that either support or sabotage your mental well-being.

- **Animal studies show nutrient-driven gut alterations influence behavior and neurochemistry** – High-fiber diets or supplementation with prebiotics and fermented foods altered gut bacterial composition and increased beneficial compounds like SCFAs. These shifts boosted brain-derived neurotrophic factor (BDNF), which supports brain plasticity, while lowering inflammation in areas like the hippocampus, helping reduce anxiety and improve memory.

While gut integrity impacts your brain, reducing endotoxin is key to lowering brain inflammation. This again highlights why high-fiber diets often backfire, leading to increased endotoxin unless your gut is healthy. Rather than promoting fermentation to increase BDNF, Peat would recommend reducing endotoxin to protect your brain.

- **Human evidence supports the link between stress and your gut** – Preliminary trials show that probiotic and prebiotic intake **lower cortisol** and improve mood and stress perception, particularly in people under chronic stress. However, many of these studies are small, and few have established whether gut microbiota changes are truly driving the improvements or merely occurring alongside them.
- **Individual differences matter** – What works for one person doesn't always work for another, because people differ widely in their baseline gut profiles. For example, someone with low microbial diversity could see big changes from a Mediterranean-style diet, while someone with more balanced flora might need more targeted interventions to see mental health benefits.

- **Microbiota as mediator vs. moderator** — The authors explain two models: in some cases, microbes directly mediate your diet's impact on your brain, meaning no change happens without them; in others, they moderate the effects — shaping how strongly your body reacts to a food or nutrient. In germ-free mice, for example, certain diets fail to improve behavior at all, proving the microbiota are a required link in that chain.
- **Precision nutrition and multi-omics are the future** — The review calls for large-scale studies that integrate diet records, gut microbiota analysis, blood metabolite data, and brain imaging to understand how personalized food strategies could support mental health. This could lead to individualized diet prescriptions based on your microbiome's specific makeup and how it interacts with your nervous system.

## **How to Rebuild a Healthier Gut and Lower Your Stress Response**

If you're stuck in stress mode and feel bloated, foggy, or inflamed, your gut is a large part of the problem — and the solution. What you eat doesn't just feed you. It feeds the trillions of microbes inside you, and they play a direct role in how well your body manages stress.

But if your gut is damaged or overrun by the wrong bacteria, even healthy foods backfire. The goal is to rebuild your internal terrain so that the right microbes thrive, inflammation quiets down, and your stress response becomes more resilient. Here's how I recommend you start taking back control:

1. **Start feeding the right bacteria — but don't rush the fiber** — If you've got gas, bloating, food intolerances, or loose stools, your gut isn't just irritated — it's imbalanced. One of the key stress-fighting bacteria, *Lachnospira*, thrives on fermentable fibers. But here's the paradox: fiber is essential, but eating too much too soon when your gut is already inflamed will make symptoms worse.

Start with gentle foods like white rice and fruit. Once your gut stabilizes, slowly add in root vegetables, then green bananas, cooked-and-cooled potatoes, and other fiber-rich options. Only after bowel movements normalize and endotoxin load drops should you consider experimenting with high-fiber foods – and even then, pay attention to your body and back off if bloating or other digestive effects occur.

- 2. Add foods that grow your gut's protective shield** – Your gut lining has a protective mucus layer, and the bacteria *Akkermansia muciniphila* helps keep it strong. This species supports the growth of butyrate producers by fortifying your gut's first line of defense. However, promoting *Akkermansia* at the expense of metabolic function offers a short-term win with long-term costs.

To nurture it while also supporting your metabolic health, cut out inflammatory vegetable oils, which are high in **linoleic acid (LA)**, and processed foods that break down your barrier, and include polyphenol-rich options like pomegranate, cranberries, and green tea.

- 3. Upgrade your diet quality – think nutrient density, not calorie counts** – The Japanese study found that higher nutrition scores correlated with lower stress levels and better gut balance.<sup>4</sup> Your goal isn't just fiber. It's total nourishment. That means regularly eating the three foods that stood out in the study: natto (fermented soybeans), tomatoes, and green peppers.

If you've never tried natto, it's sticky and strong-smelling, but packed with fiber, **vitamin K2**, and resistant starches that feed beneficial microbes. Tomatoes are rich in **lycopene** and polyphenols, and green peppers offer prebiotic fibers and antioxidants. Rotate these into your meals several times a week.

- 4. Reset the internal conditions that let harmful microbes take over** – Bacterial overgrowth doesn't just happen – it's allowed by the terrain. Pathogens thrive when your environment favors them. Factors like **estrogen-dominant environments**, **excess iron**, **low thyroid function**, and constant exposure to vegetable oils and xenoestrogens from plastics create the perfect breeding ground.

These factors weaken your defenses and invite invaders. To create lasting change, start by cleaning up your environment, balancing your iron and hormones, and supporting your thyroid. A healthy environment makes it harder for pathogens to thrive. This is Peat's terrain theory in action. Rather than "fighting" bad microbes, you outcompete them by restoring metabolic function. The cleaner your environment, the less food you need to fight with.

**5. Go slow and track your results** — This process is about healing, not rushing. Use a food and symptom journal to track what works and what doesn't. Look for signs like less bloating, more regular bowel movements, deeper sleep, and a calmer mood. These are your green lights. The more your system calms, the more you'll be able to reintroduce higher-fiber foods without discomfort. Long term, the goal is microbial diversity and a strong gut lining, but you have to earn it by going at your body's pace.

When your microbiome is balanced, your brain feels clearer, your stress responses become less extreme, and your whole system works more efficiently. You're not broken. You're just out of balance. And balance can be rebuilt, one smart step at a time.

## **FAQs About Gut Bacteria and Stress**

**Q: How do gut bacteria affect stress levels?**

**A:** Certain gut bacteria help produce SCFAs, which reduce inflammation, seal your gut lining, and regulate brain chemistry. People with more Lachnospira and other SCFA-producing bacteria show lower stress levels and better emotional resilience. However, making too many SCFAs can give the illusion of healing while actually raising stress chemicals like serotonin and cortisol. In this view, a healthy gut comes from fixing your metabolism — not by trying to change your gut bacteria directly.

**Q: Which foods help grow stress-lowering gut bacteria?**

**A:** Foods high in fermentable fiber and polyphenols, such as natto, tomatoes, green peppers, beans, and root vegetables, help feed beneficial microbes like *Lachnospira* and *Akkermansia*, but only if your gut is already healthy. If your digestion is compromised, these foods trigger gas, bloating, and stress reactions until your gut barrier is restored.

**Q: What is the fiber paradox, and why does it matter?**

**A:** The fiber paradox refers to the fact that while fiber is essential for feeding good bacteria, people with gut imbalances feel worse if they eat too much too soon. Starting slowly with easily digestible carbs like fruit and white rice and gradually increasing fiber allows your gut to heal first.

**Q: How do beans improve gut health and reduce inflammation?**

**A:** Beans are rich in prebiotic fibers and polyphenols that fuel SCFA production. In a healthy gut, this supports colon health, improves hunger signals, reduces inflammation, and helps regulate stress-related hormones and immune activity in your gut. However, in an unhealthy gut, beans raise endotoxin and suppress thyroid function. Only eat beans if your gut is healthy and digestion is robust – and even then, eat pressure-cooked beans only.

**Q: What lifestyle factors make gut imbalances and stress worse?**

**A:** Diets high in vegetable oils, refined sugar, and processed foods promote harmful bacteria. Environmental factors like hormone imbalance, excess iron, and exposure to xenoestrogens in plastics also weaken gut defenses. Cleaning up these variables

helps restore microbial balance and stress resilience.

## Sources and References

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- [1, 4 Clinical Nutrition ESPEN](#)
- [2 Obesity Reviews July 3, 2023](#)
- [3 Advances in Nutrition. 2021 Mar 9;12\(4\):1239–1285](#)