People With Anxiety Have 8% Less Of This Nutrient In Their Brains

5 MIN READ

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Omega-3s and B12 get most of the attention in the brain health space, but experts say it’s time to stop overlooking an under-the-radar nutrient: choline.

Scientists already knew that **choline**, an essential nutrient found in eggs, fish, meat, cruciferous veggies, and some beans, is important for metabolism and early brain development. Now, newer research is exploring a more specific link between choline levels and anxiety.

People with anxiety disorders — a group representing roughly **one fifth of the U.S. population** — had 8% less choline in their brains compared to those without these disorders, according to a **2025 study** published in the journal *Molecular Psychiatry*.

This systematic review and meta-analysis included data from 370 people with anxiety disorders and 342 without. People with anxiety had especially low levels of choline in their prefrontal cortex, a part of the brain involved in emotions, thoughts, and behavior.

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The findings came as unexpected: “As a psychiatrist and researcher, I was surprised to find that brain levels of visible choline-containing compounds were reduced in people with anxiety disorders, since they have more often been found to be elevated in other psychiatric disorders,” **Richard J. Maddock, MD, MS**, senior author of the study and professor emeritus and a research professor in the department of psychiatry and behavioral sciences at UC Davis Health, told Super Age in an email.

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There’s More to Learn About Choline’s Anxiety Connection

Let’s take a minute to clarify what this study actually tells about choline and anxiety: there’s an *association* between lower choline levels in the brain and anxiety disorders. While establishing this is an important step in learning about how the nutrient and the condition are linked, it does not prove that low choline actually *causes* anxiety, or vice versa.

“Researchers suspect that the ongoing state of heightened arousal associated with anxiety may change how the brain uses or metabolizes choline-containing compounds, potentially increasing demand. However, we don’t yet have enough information to tell us whether lower levels contribute to anxiety, result from anxiety, or reflect some combination of the two,” **Alicia “Chacha” Miller, MS, RD, LDN**, a Washington DC-based maternal and pediatric registered dietitian, nutrition educator, and founder of The Cardamom Nutrition, who was not involved with the research, told Super Age.

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We also don't yet know why low choline might have a connection with anxiety but not with other psychiatric disorders. **Research** published this May in the journal *Schizophrenia Bulletin* found that choline levels were actually elevated in people with treatment-resistant schizophrenia.

The **National Institutes of Health** (NIH) says that a healthy range of choline in plasma ranges from 7 to 20 mcmol/L, but adds that choline status is not routinely checked in healthy people. **One study** notes that it's notoriously difficult to measure, "because it has no native absorbance or fluorescence and only relatively unreactive functional groups."

"You can think of the total supply of choline in the brain as like an iceberg. MRI only measures the part that is above the water, which is just a tiny fraction of the total. Low visible brain choline has not been clearly linked to depression. High visible choline has been linked to schizophrenia. But it is not known if the visible part of the choline iceberg in anxiety or other conditions tells us anything useful about the total supply of choline in the brain," Maddock said.

Overall, Choline Is Good for Your Cells, Brain, and Liver

Since both high and low levels are linked to different brain disorders, you may, understandably, be unclear on whether or not the nutrient is broadly beneficial. According to the NIH, the answer is yes: choline is an essential nutrient that every

plant and animal cell needs in order to preserve their structural integrity and regulate metabolism.

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Looking more specifically at the brain: "**Choline is needed to produce acetylcholine**, an important neurotransmitter for memory, mood, muscle control, and other brain and nervous system functions," the health authority writes. "Choline also plays important roles in modulating gene expression, cell membrane signaling, lipid transport and metabolism, and early brain development."

Some research has linked a loss of cholinergic neurons to impaired cognitive function, particularly memory loss and Alzheimer disease.

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Since the liver is the primary organ responsible for choline metabolism, choline also impacts liver health. **One study** notes that people following low choline diets are more likely to develop non-alcoholic fatty liver disease (NAFLD) and liver damage, as well as hepatocarcinomas — the most common form of liver cancer.

How to Eat More Choline

Scientists say that while true deficiency is rare, choline is routinely "

underconsumed and underappreciated." While there's still more to learn about the connection between anxiety and choline, it's worth getting enough of this nutrient for its other known benefits: cellular health, liver function, and acetylcholine production being chief among them.

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Recommended choline intakes vary by age and life stage. Adult men need 550 mg/day and adult women need 425 mg/day, except if they are pregnant (450 mg/day) or lactating (550 mg/day).

Miller said it is possible to get enough choline in your diet. Here's what she recommends:

- Eggs (147 mg of choline per egg)
- Soybeans (107 mg per ½ cup)
- Beef liver (356 mg per 3 oz)
- Red potatoes (57 mg per large potato)
- Cruciferous veggies (31 mg per ½ cup)
- Quinoa (43 mg per 1 cup cooked)
- Sunflower seeds (19 mg per ¼ cup)
- Roasted chicken breast (72 mg per 3 ounces)
- Canned tuna fish (25 mg per 3 ounces)

“This research is super exciting because it gives us another clue about the relationship between nutrition and brain health, but it is important to note that it is still an early clue and not a reason to panic or rush out and buy a high-dose choline supplement,” Miller said.

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