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Fixing This Vitamin Deficiency Can Help You Sleep Better

Analysis by Dr. Joseph Mercola ✔ Fact Checked | November 08, 2022

STORY AT-A-GLANCE

- Vitamin D deficiency has become epidemic in many parts of the world as we've been taught to avoid the sun. Lower vitamin D levels have produced two unexpected consequences: poor sleep and a dangerous change in the intestinal microbiome
- Vitamin D is needed to produce acetylcholine, a neurotransmitter that helps you get into the deeper, healing phases of sleep, and controls your normal paralysis during deep sleep
- Certain B vitamins also play an important role in sleep. For example, B5 — pantothenic acid — makes coenzyme A, which you use to make acetylcholine
- If you're healthy you have four types of gut bacteria living inside you. Those bacteria need your vitamin D to grow properly, and in return they make eight B vitamins that you need. Without enough vitamin D the healthy bacteria are replaced by others that don't require vitamin D but are unable to make the B vitamins that you need to sleep normally
- Ideally, you need to normalize your gut microbiome so that your gut bacteria make all the B vitamins your body and brain need
- To normalize your gut microbiome, maintain a vitamin D level over 40 ng/mL and take B50 or B100 (all eight B's at 100 mg each) for three months

In this interview, Dr. Stasha Gominak,[1] a neurologist and sleep coach, explains the curious synergy between vitamin D deficiency, a changed microbiome and poor sleep.

I met Gominak at the American College for the Advancement in Medicine's annual meeting in 2019 in Nashville. Her lecture was about ways to improve your sleep. I

thought I was aware of most of them, but the connection between vitamin D and sleep surprised me.

Gominak's research suggests lack of vitamin D causes impairment in your brain stem's ability to produce normal sleep. So far, she's treated more than 7,000 patients with her innovative "sleep repair" approach. She's also published scientific papers on her theories.

Vitamin D Deficiency Linked to Sleep Disorders

Gominak had no interest in vitamin D, initially. She was fascinated by sleep, and was trying to figure out why so many young and otherwise healthy patients were having such trouble sleeping. Many also had sleep apnea. Over time, it became clear that most of them didn't have enough rapid eye movement (REM) sleep, yet there was no medical hypothesis to explain why.

> *"I did a lot of sleep studies in teenagers and kids, the great majority of them relatively healthy people,"* Gominak says. *"They didn't have terrible sleep apnea, but they all had much less deep sleep than normal, and it's deep sleep that allows us to heal and feel rested.*
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> *They're complaining of being tired. They have epilepsy. They have daily headache. They have things that are linked to our ability to repair our brain every night.'*
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> *Once finding that they had no deep sleep, I wanted to fix their sleep AND their neurologic problem. Unfortunately, I was pretty much stuck with using what we had at the time: continuous positive airway pressure (CPAP) devices for those who had apnea and sleeping pills for those with insomnia.*
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> *That was very unsatisfying for myself and the patients. Then, pretty much by accident, I found that one of my young headache patients who was extremely tired and had absolutely no deep sleep in her sleep study … had a B12 deficiency.*

> *I began to check B12 levels in all the patients who had abnormal sleep. Eventually I measured vitamin D levels also. Over a period of time, it became clear that everybody's vitamin D was low. That, by itself, was not enough to get excited about, but what was exciting was that there were numerous articles showing vitamin D receptors in the brain stem areas that control our ability to flip in and out of the phases of sleep.*
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> *The part of the brain called the brainstem contains our sleep clock and the cells that paralyze us so we can heal. These areas are covered with vitamin D receptors. That was published in the 1980s, but no one paid attention."*

Vitamin D has also been shown to modulate hibernation in animals, Gominak notes, yet vitamin D is not recognized for its impact on human sleep.

Adding to the work of Walter Stumpf, the scientist who published the original articles on vitamin D's impact on hibernation, sleep and metabolism, Gominak performed a two-year study, concluding that sleep disorders of many kinds, not just sleep apnea, are linked to **vitamin D deficiency** and can be improved by careful supplementation. She explains that we track sleep at home by measuring paralysis in sleep:

> *"What we're using now to measure sleep with sleep trackers is, 'When are we paralyzed?' Because the only time we get paralyzed is when we're in deep sleep, slow-wave sleep or REM sleep.*
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> *The most important part of using vitamin D is vitamin D and other components come together to make acetylcholine. Acetylcholine is the neurotransmitter that allows us to get paralyzed correctly."*

Using a Fitness Tracker to Track Your Sleep Cycle

Today, many of her patients will use fitness trackers that track sleep, such as Fitbit or the Oura ring, both of which can measure slow-wave deep sleep, which is one of the sleep phases during which your body is paralyzed.

"As far as I can tell, the movement measurements used in most of those tracking devices are pretty accurate," she says. That said, I discourage the use of Fitbit for two primary reasons.

First of all, it emits a green light, which can interfere with your sleep quality. Second, Fitbit was bought by Google, which is siphoning your personal health and fitness data from these devices for their own gain. I think the Oura ring is a superior device overall, and it won't steal your personal data.

B Vitamins and Sleep

Vitamin D and B12 aren't the only nutrients capable of influencing your sleep, however. Toward the end of the two-year study Gominak led, in which vitamin D and B12 were used, most patients began getting worse again. Their sleep started deteriorating, and they were experiencing more pain.

A patient gave her a book detailing the use of vitamin B5 (pantothenic acid) for rheumatoid arthritis pain. "I was not very interested in vitamins," Gominak admits, but she eventually read the book. What finally caught her interest was the fact that B5 supplementation helped improve rheumatic patients' sleep.

Research has shown that when B5 is blocked, patients will develop four distinct symptoms within two weeks: burning in the hands and feet, an odd puppet-like gait, gastrointestinal issues and insomnia. However, as Gominak and dozens of her patients discovered, too much can also cause problems.

When taking 400 milligrams (mg) of pantothenic acid and one daily capsule of B100 (a B supplement that contains all eight B vitamins), pain scores and sleep disturbances skyrocketed. Many complained of feeling "revved" up and unable to fall asleep again.

> *"I realized that I had just made everything about my sleep worse, taking the recommended dose of pantothenic acid,"* Gominak says, *"so I stopped the 400 mg [of B5] and [took] just B100, which has 100 mg pantothenic acid."*

Overnight, she noticed a distinct change. Her pain disappeared and her sleep improved. Patients that made the same switch reported similar results. All of this suggests there's a lot we don't know about the proper dosage of many vitamins. What's more, further research led her to form the hypothesis that **B vitamins** really should be produced in your gut, by intestinal bacteria.

> *"If you think about animals that lie in the ground for four or six months, like bears, clearly … they're not eating every day, [yet] they need a source of B [vitamins] every day. That implies the microbiome [is] an important … source of Bs …*
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> *Before the 1980s, there was very good science about the B vitamins … It turns out there are body stores of B's. There are body sources of B6, B5, thiamin and vitamin C.*
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> *I was struggling to explain why we got better then worse again. Maybe when giving vitamin D, I made their sleep better and helped them make more repairs. But as they made more repairs, they used up their stores of the B vitamins."*

The All-Important Role of Gut Bacteria

Part of the problem, Gominak surmised, was that, for some reason, her patients' gut bacteria were not properly making B vitamins, resulting in a deficiency. Merely adding vitamin D doesn't fix that. "I had assumed vitamin D was a growth factor for the bacteria, and when I gave it, they would come back," she said, "but they didn't."

As explained by Gominak, there are four species of intestinal bacteria that make the eight B vitamins, and they appear to work symbiotically, feeding each other these B vitamins back and forth. When they work optimally, you're getting all the B vitamins your body needs, and when you have just the right dose, your sleep will be optimized as well.

Unfortunately, while we now know that a blood level of vitamin D between 60 nanograms per milliliter (ng/mL) and 80 ng/mL is ideal, we still do not know what an ideal level of

B5 is. Blood measurements also appear to be rather inaccurate, as they do not reflect your stores.

> *"There's also something extremely peculiar and interesting about B5,"* Gominak says. *"We now have a huge amount of knowledge about the absorption of B5. There is a pump, [which] pumps in alpha lipoic acid, biotin and pantothenic acid from the gut. The exact same pump is used to pump B5 into the cerebrospinal fluid.*
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> *The interesting part about that [when] it goes into the head, it becomes coenzyme A, which then helps to make acetylcholine. One of the things that was mysterious to me was, 'Why would my patients need 100 mg when ... every publication says 400 mg is the right dose of pantothenic acid?'*
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> *Clearly, I and my clients are in a different place. Now, that would suggest that having vitamin D around in the brain somehow changes what happens [to the B5 vitamin]."*

The Importance of Acetylcholine

As explained by Gominak, in the adrenal, B5 makes cortisol. In the brain, it makes acetylcholine — first by being incorporated into coenzyme A, which is the donor for the acetyl group that makes "acetyl" choline. When the enzyme choline acetyl transferase is added to the mix, you get acetylcholine, and this is where vitamin D comes in.

There are vitamin D receptors in the reticular nucleus of the thalamus and vitamin D is related to the reticular activation — the sleep-wake portion of your brain. When vitamin D enters the nucleus, it expresses choline acetyl transferase. In other words, vitamin D is one of three components that must come together to make acetylcholine.

You will also need the raw material, choline, to produce sufficient amounts of acetylcholine. Choline is typically obtained from animal foods. The highest concentration is in egg yolks, which is one of the reasons I eat five eggs a day. It is

important to obtain the eggs from high-quality organically raised chickens. I raise my own chickens but if you don't, get them from someone locally who does.

Acetylcholine has many important functions. For starters, your parasympathetic nervous system runs on it, and many publications have shown that people with sleep disorders, or who are otherwise ill, have excessive sympathetic tone, which in turn results in elevated epinephrine and norepinephrine, which are indicative of stress.

According to Gominak, having an elevated sympathetic tone may actually be the result of an acetylcholine deficiency. What's more, acetylcholine is instrumental in maintaining alertness during the day and allowing you to fall asleep and transition through the various sleep stages at night. It's also part of what allows your body to be paralyzed during deep sleep. Yet no one ever takes acetylcholine into account when investigating sleep disturbances.

> *"It turns out that we don't have any drugs for acetylcholine. There aren't any, except nicotine,"* she says. *"Acetylcholine has nicotinic receptors or muscarinic receptors [and] there are a lot of connections between the acetylcholine nicotinic receptors and neurologic illness."*

Attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD) have become epidemic in the past decade, and research shows that acetylcholine nicotinic receptors in the frontal lobes are responsible for directing our attention and focus during the day.

Then, at night, a "switch" flips and we fall asleep. Interestingly, this switch into paralyzed sleep involves the same chemical that allows us to remain awake and focused, namely acetylcholine. According to Gominak, once your vitamin D and B levels normalize, your brain is finally able to start repairing damage that has been incurred during years of poor sleep.

As a result of increased repairs, patients will often find themselves sleeping longer than eight hours, and remain in deep REM sleep longer than normal, as this is the phase during which cellular repair and regeneration is done.

Without deep sleep, your body simply cannot perform the needed cellular repair to maintain health, which is part of why sleep dysfunction can have such wide-ranging health effects.

What Constitutes a Healthy Microbiome?

Interestingly, Gominak discovered that as you sleep more, you need more B vitamins. Which brings us back to the microbiome in your gut. Gominak cites one 2015 paper that postulates that having a healthy microbiome is all about having a microbiome that produces the eight B vitamins.

To optimize your gut microbiome, Gominak recommends having a vitamin D level above 40 ng/mL, and taking a B50 or B100 supplement for three months. This will help your microbiome "grow back" so that it's producing the ideal amount of B vitamins on its own.

"If you never let your D fall below 40, you'll never lose them again. That's my belief," she says. What's more, normalizing your microbiome will also allow your body to protect itself against foreign invaders by producing natural antibiotics. Gominak explains:

> *"One of the really important concepts of having a normal microbiome is, it is not just in your small intestine and your colon. I actually smell different since my microbiome came back. It covers all parts in your body. The literature is really strong to make the argument that we are actually like the Charles Schultz character "Pig-Pen".*
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> *We walk around in this cloud of bacteria, viruses and fungi that cover us — in our nose, in our mouth, in our skin, in our hair, all over us — and that those organisms are the ones that protect us from infections. They make chemicals that kill their competitors. They keep the clostridium difficile under control in our body.*
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> *One of the things that I've been able to see happen is my clients can still take antibiotics. They actually will reconstitute their microbiome normally as long as*

they keep their [vitamin] D over 40 ng/mL, they will grow back. I personally believe the appendix is designed the way it is to be a little library of all the bacteria.

It's not that I don't believe that antibiotics change what's going on in there. They absolutely do. However, I don't think we have to be as afraid of them. There are two things that are being proposed now to improve the microbiome:

One is probiotics. I personally have used them … I think they're kind of worthless. If they would work, you would eat them for one month, and then you'd be self-sustaining for the rest of your life.

[The second is] about feeding your bacteria … Once you have a normal foursome [the four types of bacteria that produce the eight B vitamins], what we're really doing is feeding the bacteria.

We feed the bacteria, and then the bacteria feed us. That's not the way we've been looking at it. I would say all the literature that's talking about the effect diet has on what lives inside us is absolutely pivotal. It's not like, 'You just take these vitamins and everything gets fixed.' It's not that simple by a long shot."

The Case for Organic Food

With respect to your diet, it's important to eat organic for two primary reasons. One is that most of the antibiotics are not given to humans. They're given to animals, and the use of antibiotics in food production is a primary driver of antibiotic-resistant bacteria.

Most nonorganic food is also contaminated with glyphosate, which can decimate your gut bacteria and impact your mitochondrial function. There's emerging evidence that mitochondrial function is really the core of health and chronic degenerative disease.

Mitochondria are primitive bacteria inside your cells that are affected by antibiotics, and glyphosate has antibiotic activity too. While there are many strategies you can use to

upregulate mitochondrial biogenesis, it's important to minimize the damage to begin with.

An interesting paper[2] published online January 16, 2020 in The Journal of Steroid Biochemistry and Molecular Biology also sheds light on how vitamin D and melatonin work synergistically to protect mitochondrial health and ensure proper function. As noted in this paper:

> *"The biosynthetic pathways of vitamin D and melatonin are inversely related relative to sun exposure. A deficiency of these molecules has been associated with the pathogenesis of cardiovascular diseases, including arterial hypertension, neurodegenerative diseases, sleep disorders, kidney diseases, cancer, psychiatric disorders, bone diseases, metabolic syndrome, and diabetes, among others.*
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> *During aging, the intake and cutaneous synthesis of vitamin D, as well as the endogenous synthesis of melatonin are remarkably depleted, therefore, producing a state characterized by an increase of oxidative stress, inflammation, and mitochondrial dysfunction.*
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> *Both molecules are involved in the homeostatic functioning of the mitochondria. Given the presence of specific receptors in the organelle, the antagonism of the renin-angiotensin-aldosterone system (RAAS), the decrease of reactive species of oxygen (ROS), in conjunction with modifications in autophagy and apoptosis, anti-inflammatory properties inter alia, mitochondria emerge as the final common target for melatonin and vitamin D."*

Optimize Your Sleep to Improve Your Health

Let's be clear: We're not saying vitamin D and B supplements are magic bullets that will fix any sleep problem you may have. Your sleep hygiene is dependent on several other basic factors as well, such as limiting blue light exposure at night and making sure you get sunlight exposure during the brightest part of the day.

That said, vitamin D and pantothenic acid insufficiency can play significant roles if you're still having trouble sleeping after addressing more foundational factors.

> *"The stuff that I have on my site are things that were overlooked … There are hundreds of sites that will tell you about circadian rhythms, taking away the electromagnetic forces in your bedroom and the blue light.*
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> *It's not that what I have is the be all, end all. It's that it's a really important little piece that you need to set in there. I also happen to think that it connects the epidemics of sleep disorders to the weight gain and the IBS."*

In her practice, Gominak has seen patients recover from a variety of problems, from gastrointestinal problems to anemia, once their gut microbiome was normalized with the help of vitamin D and the temporary use of B vitamins.

Again, keep in mind that once your gut microbiome has been restored, taking high doses of B vitamins can backfire and trigger insomnia, as your body is now making the appropriate amount by itself. At that point, the excess ends up having an amphetamine-like effect that keeps you awake.

> *"I personally think that getting the microbiome back in most people who are pretty sick is [step] one. And then they need to have some supplementation, not huge doses, but some supplementation for a year or two after that. And then keep an open mind about the fact that eventually, you'll get to a place where you don't need to supplement most things, unless you have a particular genetic weakness."*

More Information

To learn more, see Gominak's website, **drgominak.com**. Under "**Quick Start Basics**," you'll find the general outline of her RightSleep protocol. Also on the homepage you can purchase a workbook that helps you to work through her protocol during the course of a year.

"The website is dedicated to the why," she says. *"I'm very invested in the why. I saw these things happen to my patients. They can't be making it up. They don't know each other. They don't even have the same disease, yet they all tell me the same thing.*

That means the basic truth is always what the patient says about their body. And then it's my job to see if I can find a scientific explanation for that, in animals and other humans.

I have lots of written material. I have free videos ... I have a workbook you can buy. I also offer one-on-one sessions … I think many people who are not really very sick and just want to add this to their health regimen can do it easily with the workbook. That's the intention anyway.

I also have to comment that once you get better from this D-microbiome point of view, what we all want is to be healthy and have long lives. Sleep is one of the four basic pillars: Sleep, diet, exercise and spirituality.

You can't really short any of those and be a happy, fully healthy, content person. I don't spend a lot of time talking about the other parts, but they're very important as well."

Sources and References

- [1] DrGominak.com
- [2] The Journal of Steroid Biochemistry and Molecular Biology May 2020; 199: 105595