



All About Nitric Oxide (NO)

What Is it? What does it help with? How to increase it?

Nitric oxide
is a critical
component
for our health
and wellness.

Nitric Oxide (NO) helps the body and brain communicate at a cellular level. It's a gas that is made/ synthesized in our blood vessels ("endothelium").

It is **important for:**

- The **immune system**
- **Blood pressure & heart** function as it helps dilate & constrict blood vessels and helps prevent clots
- Brain cell communication in the **central nervous system** (at the synapse)
- Helping the hippocampus absorb enough oxygen for proper functioning (optimizing **mood, and working memory**)
- Delivering oxygen to muscles to support **healing and recovery**
- Adequate **oxygen absorption, temperature regulation, vision** and more!

Some reasons people may have low nitric oxide production include:

- illness (particularly a virus that impacts the endothelial lining, such as COVID)
- diets high in saturated fats
- high stress
- chronic use of products that decrease NO such as: antibiotics, medications (like PPIs), mouthwash and fluoride toothpaste
- disruptions in the endothelial lining (surgery, illness, chronic inflammation, high oxidative stress)
- mouth breathing and chronic dry, congested, or inaccessible nose (we make NO in the endothelial lining of our nose)
- poor sleep
- high intake of foods high in saturated fat

Some of the symptoms that may indicate chronic low nitric oxide production:

- getting sick more often than typical
- high blood pressure
- high cholesterol (and endothelial dysfunction)
- FATIGUE and slow recovery after exercise
- brain fog, trouble concentrating, low mood
- vision problems
- difficulties with temperature regulation

NO can be produced in different ways throughout the body (though how we breath, the breakdown and absorption of certain foods we eat, and though having healthy mucous membranes along with healthy blood vessels/ endothelium). Nitric oxide is a gaseous molecule, and the half-life is incredibly short; thus, it's important for the body to regularly produce nitric oxide.

To get back on track with nitric oxide production in the body, it's important to address any dis'ease and/or habits that are causing low nitric oxide production levels.

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Considering Increasing Nitric Oxide?

Nitric oxide is a critical component for our health and wellness.

There are many ways to increase nitric oxide production, from how we breathe to what we eat. Foods rich in the building blocks L-arginine, and L-citrulline can be quite helpful. Generally speaking, L-citrulline converts to L-arginine which combines with vitamins B and C to help the body produce nitric oxide. When the endothelial cells are working well, nitric oxide levels can also be boosted by exercise, exposure to sunlight on the skin, and increased nose breathing. In a healthy body, nasal humming (at a low pitch and at a relatively quick flow rate can increase nitric oxide by 15x as compared to nasal breathing alone).

Nitric oxide is produced naturally by the human body and is one of the most important molecules for blood vessel health. Since it relaxes blood vessels and helps them widen, it increases blood flow and thus can lower blood pressure. If you already have low blood pressure, increasing Nitric Oxide can further lower blood pressure. Talk with your doctor to better understand what's best for you.

The research has been mixed on how much people benefit from taking supplements of L-arginine and/or L-citrulline (along with having adequate vitamin C and Bs). One study (the Lincoln study) showed some improvement in Long COVID symptoms with a 2:1 ratio of L-arginine and Vitamin C (individuals with Long COVID are showing to have lower levels of Nitric Oxide due to endothelial damage). There have been other studies showing some success in diets high in fatty acids and antioxidants diet (i.e. a Mediterranean diet), combined with walnuts (high in L-arginine) to help improve endothelial health.

When deciding what's best for you, do your own research, journal your habits and symptoms, and talk to medical providers you trust. Understanding endothelial health and nitric oxide levels is not yet common practice among all medical providers so you may need to look for specialists. Flow-mediated dilation (FMD) is said to be the most widely used method to test endothelial function, as it's non-invasive and uses ultrasound. Some researchers have advocated for this to be a more widely used test for individuals with conditions that are commonly linked to endothelial dysfunction, such as long COVID.



One way, at home, to measure and monitor your salivary nitric oxide levels is using test strips such as Nitric Oxide Indicator Strips (human N).

The same company that makes these test strips (Human N) has developed products to increase N.O. production (Neo 40 and Neo 40 Professional). These have higher levels of vitamin Bs (or methylated Bs as in the Neo 40 Professional) + L-arginine and L-citrulline as well as vitamin C. Before taking any supplements, talk to your doctor about pros and cons based on your health and/or any medical conditions you may have.

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What could a daily routine to increase nitric oxide look like?

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In the morning...

(Consider spot checking your NO levels in your saliva by using a test strip)

- Clean (saline) AND moisturize (with a lubricating spray or nose oil) the nasal sinuses
- Nasal breathing practice (nasal humming) (you could test your NO before and after 2, 5, 10, or 20 minutes of nasal humming to see what amt of time is helpful for you to see a notable boost)
- Spoonful of honey or some lemon water
- Beet or spinach juice or beet root powder mixed into a smoothie or yogurt
- Exercise (as tolerated)
- Swap out fluoride toothpaste and fluoride-based mouthwash with non-fluoride
- Be mindful of any PPIs or other medications that may be causing lower NO levels (for reflux: have you heard of Inspiratory Muscle Training? www.vitaltherapeuticsllc.com; <https://doi.org/10.1152/ajpgi.00054.2013>)

Midday....

- Get some sunlight on the skin
- Eat a leafy-green citrus salad or include nitrate-rich foods (beets, celery, greens, walnuts, honey, etc.)
- Exercise (as tolerated)

In the evening...

- Add a nitrate-rich side to your dinner (arugula, spinach)
- Deep breathing practice (through the nose)
- A good hearty laugh (yes, laughter can increase nitric oxide)
- Cleaning AND lubricating the nose (before bed)
- Can you support nasal breathing while you sleep? (Would taping the lips with a gentle surgical tape help?)

And throughout your day/ week, address any habits you have that may be decreasing Nitric Oxide:

- Instead of chronic use of reflux medications/PPIs... could alginates be an option? What about chewing bicarbonate gum? And you could use IMT (see links above) to tone your anti-reflux sphincter?
- Instead of mouthwash...what about natural alternatives to mouthwash and fluoride toothpaste? Does your dentist have a suggestion for an alternative? Could Xylimelts be helpful for decreasing dry mouth and/or excess oral bacteria?
- Instead of a diet high in saturated fat could you swap it for a less processed diet with lean meats, fish and more fresh fruits and vegetables?
- Are you chronically mouth breathing? Do you have any underlying conditions (e.g. obstructive sleep apnea) to address and/or can you add more humidity to the air you breathe or more lubrication to your sinuses to help function? Xlear is one such product that can help lubricate the sinuses to improve nasal breathing.

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