

Top 9 Benefits of NAC (N-Acetyl Cysteine)

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N-acetyl cysteine (NAC) is a supplement form of cysteine, a semi-essential amino acid. NAC has many health benefits, including replenishing antioxidants and nourishing your brain.



NAC is considered semi-essential because your body can produce it from other amino acids, namely methionine and serine. It becomes essential only when dietary intake of methionine and serine is low.

Cysteine is found in most high protein foods, such as chicken, turkey, yogurt, cheese, eggs, sunflower seeds, and legumes.

Consuming adequate cysteine and NAC is important for a variety of health reasons, including for replenishing the most powerful antioxidant in your body, glutathione. These amino acids also help with chronic respiratory conditions, fertility, and brain health.

Here are the top 9 health benefits of NAC.

1. Essential for making the powerful antioxidant glutathione



NAC is valued primarily for its role in antioxidant production.

Along with two other amino acids — glutamine and glycine — NAC is necessary to make and replenish glutathione.

Glutathione is one of your body's most important [antioxidants](#) — compounds that help neutralize free radicals that can damage cells and tissues in your body.

It's essential for immune health and for fighting cellular damage. Some researchers believe it may even contribute to longevity ([1Trusted Source](#)).

Its antioxidant properties be beneficial for numerous other ailments caused by oxidative stress, such as heart disease, infertility, and some mental health conditions ([2Trusted Source](#)).

Keep in mind that these findings come from animal studies, and more research is needed.

SUMMARY

NAC helps replenish glutathione, arguably your body's most powerful antioxidant. Therefore, it may help improve a variety of health conditions.

2. Helps with detoxification to prevent or diminish kidney and liver damage

NAC plays an important role in your body's detoxification process.

It can help prevent side effects of drugs and environmental toxins ([3Trusted Source, 4](#)).

In fact, doctors regularly give intravenous NAC to people with an acetaminophen overdose to prevent or reduce kidney and liver damage ([5Trusted Source](#)).

Thanks to its antioxidant and [anti-inflammatory](#) benefits, NAC also has applications for other liver diseases ([6Trusted Source](#)).

SUMMARY

NAC helps detoxify your body and can treat acetaminophen overdoses.

3. May improve mental health conditions and substance use disorder

NAC helps regulate levels of glutamate, the most important neurotransmitter in your brain ([7Trusted Source](#)).

While glutamate is required for normal brain activity, excess glutamate paired with glutathione depletion can cause brain damage.

This may contribute to mental health conditions such as bipolar disorder, schizophrenia, obsessive-compulsive disorder (OCD), and substance use disorder ([8Trusted Source](#), [9](#), [10](#)).

For people with bipolar disorder and depression, NAC may help decrease symptoms and improve overall ability to function. What's more, research suggests that it may play a role in treating moderate to severe OCD ([11Trusted Source](#), [12Trusted Source](#)).

Likewise, an animal study suggested that NAC may minimize negative effects of schizophrenia, such as social withdrawal, apathy, and reduced attention spans ([13Trusted Source](#)).

NAC supplements can also help decrease withdrawal symptoms and prevent relapse in people with cocaine addiction ([14Trusted Source](#), [15Trusted Source](#)).

Additionally, preliminary studies show that NAC may decrease marijuana and nicotine use and cravings ([16Trusted Source](#), [17](#)).

Many of these conditions have limited or currently ineffective treatment options. NAC may be an effective aid for people with these conditions ([18Trusted Source](#)).

However, all these studies are relatively old, and more research is needed.

SUMMARY

By regulating glutamate levels in your brain, NAC may alleviate symptoms of mental health conditions and reduce substance use and cravings.

4. Helps relieve symptoms of respiratory conditions

NAC can relieve symptoms of respiratory conditions by acting as an antioxidant and expectorant, loosening mucus in your air passageways.

As an antioxidant, NAC helps [replenish glutathione levels](#) in your lungs and reduces inflammation in your bronchial tubes and lung tissue.

People with chronic obstructive pulmonary disease (COPD) experience long-term oxidative damage and inflammation of lung tissue, which causes airways to constrict, leading to shortness of breath and coughing.

NAC supplements have been used to improve COPD symptoms, exacerbations, and lung decline ([19Trusted Source](#), [20Trusted Source](#), [21](#)).

A review of multiple studies found that 600 mg of NAC twice a day significantly improved lung function and symptoms in those with stable COPD and that higher doses were more effective than lower ones ([22Trusted Source](#)).

People with chronic bronchitis can also benefit from NAC.

Bronchitis occurs when the mucous membranes in your lungs' bronchial passageways become inflamed, swell, and shut off airways to your lungs ([23Trusted Source](#)).

By thinning mucus in your bronchial tubes and boosting glutathione levels, NAC may help decrease the severity and frequency of wheezing, coughing, and respiratory attacks ([24](#)).

In addition to relieving COPD and bronchitis, NAC may improve other lung and respiratory tract conditions — such as cystic fibrosis, asthma, and

pulmonary fibrosis — as well as symptoms of nasal and sinus congestion due to allergies or infections ([23Trusted Source](#), [25](#)).

SUMMARY

NAC's antioxidant and expectorant capacity can improve lung function by decreasing inflammation and breaking up mucus.

5. Boosts brain health by regulating glutamate and replenishing glutathione

NAC's ability to replenish glutathione and regulate brain glutamate levels can boost brain health.

The neurotransmitter glutamate is involved in a broad range of learning, behavior, and memory functions, while the antioxidant glutathione helps reduce brain cell oxidative damage that is associated with aging ([7Trusted Source](#)).

Because NAC helps regulate glutamate levels and replenish glutathione, it may benefit those with health conditions affecting the brain and memory ([5Trusted Source](#)).

The neurological disorder Alzheimer's disease slows down learning and memory capacity. Animal studies suggest that NAC may slow the loss of thinking ability in people with Alzheimer's disease ([5Trusted Source](#), [26Trusted Source](#)).

Another brain condition, Parkinson's disease, is characterized by the deterioration of cells that generate the neurotransmitter dopamine. Both oxidative damage to cells and a decrease in antioxidant ability contribute to this disease.

NAC supplements appear to improve both dopamine function and disease symptoms such as tremors ([5Trusted Source](#)).

While NAC may improve [brain health](#), more human research is needed to make strong conclusions.

SUMMARY

By helping replenish the antioxidant glutathione and regulate glutamate, NAC has the potential to treat conditions such as Alzheimer's disease and Parkinson's disease.

6. May improve fertility in both men and women

Approximately 15% of all couples trying to conceive are affected by infertility. In almost half of these cases, [male infertility](#) is the main contributing factor ([27Trusted Source](#), [28Trusted Source](#)).

Many male infertility issues increase when antioxidant levels are insufficient to address free radical formation in the reproductive system. The oxidative stress can cause cell death and reduced fertility ([28Trusted Source](#)).

In some cases, NAC has been shown to improve male fertility.

One condition that contributes to male infertility is varicocele — when veins inside the scrotum become enlarged as a result of free radical damage. Surgery is the primary treatment.

In one study, 35 men with varicocele received 600 mg of NAC per day for 3 months after surgery. The combination of surgery and NAC supplementation improved semen integrity and partner pregnancy rate by 22% compared with the control group ([29Trusted Source](#)).

An older study in 468 men with infertility found that supplementing with 600 mg of NAC and 200 mcg of [selenium](#) for 26 weeks improved semen quality ([30Trusted Source](#)).

Researchers suggested that this combined supplement should be considered as a treatment option for male infertility.

In addition, NAC may improve [fertility in women](#) with polycystic ovary syndrome (PCOS) by inducing or augmenting the ovulation cycle, although more research is needed ([31Trusted Source](#)).

SUMMARY

NAC may help improve fertility in men by reducing oxidative stress that damages or kills reproductive cells. It may also aid fertility in women with PCOS.

7. May stabilize blood sugar by decreasing inflammation in fat cells

High blood sugar and obesity contribute to inflammation in fat tissue.

This can lead to damage or destruction of insulin receptors and increase the risk of type 2 diabetes ([32Trusted Source](#)).

Animal studies show that NAC may stabilize blood sugar by decreasing inflammation in fat cells and thereby improving [insulin resistance](#) ([33](#), [34](#)[Trusted Source](#)).

When insulin receptors are intact and healthy, they properly remove sugar from your blood, keeping levels within normal limits.

However, keep in mind that human research on NAC is needed to confirm these effects on blood sugar control.

SUMMARY

By decreasing inflammation in fat tissue, NAC may reduce insulin resistance and improve blood sugar regulation, but human-based research is lacking.

8. May reduce heart disease risk by preventing oxidative damage

Oxidative damage to heart tissue often leads to heart disease, causing strokes, heart attacks, and other serious conditions.

NAC may reduce heart disease risk by reducing oxidative damage to tissues in your heart ([35](#)[Trusted Source](#)).

It has also been shown to increase nitric oxide production, which helps veins dilate and improves blood flow. This expedites blood transit back to your heart and can lower your risk of heart attacks ([36](#)[Trusted Source](#)).

Interestingly, in an older test-tube study, when combined with [green tea](#), NAC appeared to reduce damage from oxidized LDL (bad) cholesterol, another contributor to heart disease ([37](#)[Trusted Source](#)).

SUMMARY

NAC can reduce oxidative damage to your heart, which can, in turn, decrease your risk of heart disease.

9. Ability to boost glutathione levels may improve immune function

NAC and glutathione also benefit immune health.

Research on certain diseases associated with NAC and glutathione deficiency suggests that supplementing with NAC might improve — and potentially restore — immune function ([38](#), [39](#)).

This factor has been studied most in people with HIV.

In two studies, supplementing with NAC resulted in a significant increase in immune function, with an almost complete restoration of natural killer cells ([40Trusted Source](#), [41Trusted Source](#)).

High levels of NAC in the body may also suppress HIV-1 reproduction ([42Trusted Source](#)).

A test-tube study indicated that in other immune-compromised situations, such as the flu, NAC may hamper the virus's ability to replicate. This could potentially reduce the symptoms and duration of the illness ([43Trusted Source](#)).

Similarly, older test-tube studies have linked NAC to [cancer cell death](#) and blocked cancer cell replication ([44Trusted Source](#), [45Trusted Source](#)).

Overall, more human studies are needed. Therefore, be sure to talk with your doctor before taking NAC during cancer treatment ([46Trusted Source](#)).

SUMMARY

NAC's ability to boost glutathione levels may improve immune function in a variety of diseases.

Dosage

There is no specific dietary recommendation for cysteine because your body can produce small amounts.

For your body to make the amino acid cysteine, you need adequate amounts of folate, vitamin B6, and [vitamin B12](#). These nutrients can be found in beans, lentils, spinach, bananas, salmon, and tuna.

While most protein-rich foods — such as chicken, turkey, yogurt, cheese, [eggs](#), sunflower seeds, and legumes — contain cysteine, some people choose to supplement with NAC to increase their cysteine intake.

NAC has low bioavailability as an oral supplement, meaning that your body does not absorb it well. The accepted daily supplement recommendation is 600–1,800 mg of NAC ([47](#)).

NAC can be administered intravenously or taken orally, as an aerosol spray or in liquid or powder form.

SUMMARY

Eating high protein foods can provide your body with the amino acid cysteine, but you can also take NAC as a supplement to help treat certain conditions.

Side effects

NAC is likely safe for adults when provided as a prescription medication.

However, high amounts may cause [nausea](#), vomiting, diarrhea, and constipation ([48Trusted Source](#)).

When inhaled, it can cause swelling in the mouth, runny nose, drowsiness, and chest tightness.

People who have bleeding disorders or take blood thinning medications should not take NAC, because it may slow blood clotting ([49Trusted Source](#)).

NAC has an unpleasant smell that makes it hard to consume. If you choose to take it, consult your doctor first.

SUMMARY

While NAC is considered safe as a prescription medication, it can cause nausea, vomiting, and gastrointestinal disturbances, as well as mouth issues if inhaled.

The bottom line

NAC plays several important roles in human health.

Renowned for its ability to replenish levels of the antioxidant glutathione, it also regulates the important neurotransmitter glutamate. Additionally, NAC helps your body's detoxification system.

These functions make NAC supplements a viable treatment option for multiple health conditions.

Consult your doctor to find out whether NAC may be beneficial for your health.