



N-Acetyl Cysteine

Stock #509-7 (60 tablets)

N-Acetylcysteine (NAC), a specially modified form of the amino acid cysteine, is a powerful antioxidant and immune stimulant. Unlike pure cysteine, which can be neurotoxic (toxic to nerve cells) in high doses, NAC is very safe. The *acetyl* part of the name *N-acetylcysteine* denotes that the cysteine component is acetylated, meaning it is bonded to molecules called an "acetyl group"—these molecules are similar to the molecules that make up acetic acid, the chemical compound responsible for the characteristic odor and sour taste of vinegar. The end result is that NAC is better absorbed, more stable and safer than cysteine.¹⁻⁹

One of the most important attributes of NAC is that it is a precursor to glutathione, a key antioxidant for promoting liver detoxification. NAC stimulates glutathione synthesis in the body and oral supplementation with NAC has been shown in both animal and human studies to raise glutathione levels. In fact, many of the studies concerning glutathione's benefits have used oral NAC. The most prevalent and well-accepted clinical use of NAC has been as an antidote for acetaminophen (Tylenol, paracetamol) poisoning. Large

supplemental doses of NAC have been used successfully to treat hepatic (liver) and renal (kidney) failure caused by glutathione depletion resulting from acetaminophen overdose—NAC restores liver glutathione levels and helps the liver break down acetaminophen.^{1,3,5,6,10-12}

In addition, NAC helps break up mucus and has been used since the 1960's in conventional medicine for respiratory illnesses, including chronic asthma and bronchitis, emphysema (a chronic lung disorder marked by difficult breathing), fibrosing alveolitis (an inflammatory lung disorder) and tuberculosis. NAC is a mucolytic or mucus-thinning agent that inhibits bacterial adhesion to mucous membranes—bacterial adherence is important to the persistence of bacteria in the airways. NAC may also act as an expectorant to clear mucus from the airways. Double-blind research has found that NAC supplements can improve symptoms in individuals with chronic bronchitis. A systematic review of published randomized trials showed that treatment periods of approximately 12-24 weeks using oral NAC reduced the risk of exacerbations (an increase in the severity of the disease or its symptoms) and improved symptoms in patients with chronic bronchitis compared to placebo, without increasing the risk of adverse effects. Research indicates that improvement in respiratory conditions is due, in part, to the ability of NAC to restore reduced and total glutathione levels in lung cell fluid.^{1,3,5,7,9-11,13-17}

Animal and human studies further indicate that NAC can potentially benefit disease conditions characterized by decreased glutathione levels or oxidative stress, including heart disease, heavy metal toxicity, HIV infection, influenza and cancer. NAC has also been shown to be of some value in treating cigarette smoking, hepatitis and myoclonus epilepsy (a clinically diverse group of epilepsy syndromes).^{1,3,18-23}

In the treatment of heart disease, studies show that NAC helps lower homocysteine, potentiates the activity of nitroglycerin, and protects against ischemic and reperfusion damage, which can accompany stroke, myocardial infarction (heart attack), and surgery or transplantation. One study showed that oral NAC induced a quick and significant reduction in plasma homocysteine levels, as well as an increase in whole blood concentration of glutathione. Elevated levels of homocysteine are a risk factor for cardiovascular disease.^{1,3,24-27}

NAC also appears to have some clinical benefit as a chelating agent in the treatment of acute heavy metal poisoning. NAC has been shown to promote the elimination of toxic metals, as well as protect the liver and kidneys against damage from proinflammatory immune factors called cytokines and chemokines, which are released by the liver in response to heavy metal exposure—these substances are involved in the pathology (disease development) of many liver diseases. In one study, oral administration of NAC produced a profound acceleration of urinary methylmercury excretion in mice compared to the control group. Methylmercury is a ubiquitous (being everywhere) environmental pollutant and potent neurotoxin (a substance, often extremely toxic, that inhibits nerve cell function). Studies have also shown that NAC chelates the minerals boron, copper and zinc.^{3,5,28-30}

Glutathione deficiency is common in HIV-positive individuals and is associated with impaired T-cell function. Research indicates that oxidative stress and glutathione deficiency appear to play a major role in the development of HIV infection. In fact, clinical studies directly demonstrate that low glutathione levels predict poor survival in otherwise indistinguishable HIV-infected subjects. Some scientists have suggested that NAC treatment in the early stages of the disease may help to prevent the progression to AIDS. A randomized, 8-week double-blind, placebo-controlled trial found that oral NAC safely replenished whole blood glutathione and T-cell glutathione in HIV-infected participants with low glutathione levels. Results confirm that NAC may be a useful adjunct therapy to increase protection against oxidative stress, improve immune system function and increase detoxification of acetaminophen, alcohol or other drugs.^{3,31,32}

Administration of NAC appears to reduce the combined symptoms associated with flu and flu-like episodes. A 6-month randomized, double-blind trial involving 262 elderly participants showed that NAC reduced influenza (flu) symptoms by two-thirds. Subjects were given either NAC (600mg twice daily) or placebo. Individuals in the NAC group experienced a significant decrease in the frequency and severity of flu-like symptoms (i.e. fever, headache, achiness, nasal discharge, cough and sore throat), as well as a remarkably shorter length of time confined to bed. In addition, only 25% of laboratory-confirmed influenza virus-infected subjects receiving NAC developed a symptomatic form compared to 79% in the placebo group. Researchers concluded that administration of NAC during the winter flu season appears to provide a significant reduction of flu and flu-like episodes, especially in elderly high-risk individuals. In addition, NAC has been shown to block influenza virus-induced damage to pulmonary (lung) tissue in vitro, caused by the proinflammatory cytokine interleukin-8 (IL-8).^{2,33,34}

Researchers have studied NAC for many years as a natural cancer-preventive compound, particularly since glutathione levels are typically lower than normal in cancer patients. A number of studies performed since 1984 indicate that NAC has the potential to prevent cancer and other mutation-related diseases. In these studies, NAC has demonstrated an impressive array of mechanisms and protective effects against DNA damage and carcinogenesis (the formation of cancer from normal cells).^{1-3,9,35}

NAC is generally safe and well-tolerated even at high doses. The most common side-effects associated with large oral doses of NAC (typically given to counteract acetaminophen overdose) include nausea, vomiting and other gastrointestinal disturbances. In rare instances, anaphylactic reactions due to histamine release occur and can consist of rash, pruritis (severe itching), angioedema, bronchospasm, tachycardia (rapid heartbeat), and changes in blood pressure.^{1,3,36}

Although NAC has been safely administered during pregnancy, most of the evidence for its safety is a result of acetaminophen overdose. As there are no adequate studies of NAC administration during pregnancy, it should only be used when clearly indicated and with caution. Furthermore, since NAC at therapeutic doses (even as low as 1.2 grams daily), has the potential to elicit pro-oxidant activity, long-term daily supplementation at therapeutic levels by healthy individuals is not recommended in the absence of significant oxidative stress.^{1,3,37}

Each tablet provides 250mg of N-Acetyl Cysteine, combined with turmeric root.

Turmeric contains antioxidants known as curcuminoids, which have been shown to provide potent antioxidant, anti-inflammatory and anti-cancer properties. Curcumin, the primary curcuminoid, is more than 5 times as powerful of an antioxidant as vitamin E. Curcumin has been found to chelate and neutralize the free-radical attributes of minerals such as iron, inhibit oxidative enzymes, quench singlet oxygen free-radicals, and block formation of carcinogenic (cancer-causing) nitrosamines. One study showed that participants receiving 500mg of curcumin daily for one week experienced a significant reduction in the free radicals that damage arterial walls. In addition, extensive research over the last 50 years has indicated that curcumin can both prevent and treat cancer. Evidence also suggests that curcumin can suppress tumor initiation, promotion and metastasis. Furthermore, curcumin has been found to be extremely safe, with human clinical trials indicating no dose-limiting toxicity when administered at doses up to 10 grams (10,000mg) per day.^{4,38-40}

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