C-NAC 500 (Vitamin C + N-Acetyl Cysteine) and NAC 1000

By Barrie Carlsen

For more than three decades, a safe, low-cost compound has provided millions of people relief from the coughing, wheezing, and thick phlegm associated with cold and flu. Of course, pharmaceutical companies long ago co-opted it for profit by incorporating it into various patented drugs. The sad consequence is that most ageing individuals have never heard of it. Even many doctors remain unaware of its potential role as a frontline defense against some of today’s most deadly public health threats, including:

- **Acetaminophen toxicity and acute liver failure**: the number one cause of acute liver failure in the United States.
- **Influenza**: whose victims are primarily ageing individuals—three quarters of all flu-related deaths occur in the elderly.
- **Chronic obstructive pulmonary disease: COPD**, the fourth-leading cause of death in the United States (includes emphysema and chronic bronchitis).
- **Helicobacter pylori**: the bacterial culprit behind stomach ulcers, and a lethal pathogen closely linked to malignant gastric cancer, the second most frequent cause of cancer death worldwide.

Health Canada has approved C-NAC 500 and NAC 1000 for:

- **Helps to relieve symptoms of chronic bronchitis**. (COPD)
- **A supportive therapy in the treatment of inflammation of the respiratory system.**
- **Reduces the severity & frequency of influenza-like symptoms**
- **Antioxidant for the maintenance of good health in individuals under oxidative stress.**

NAC (N-Acetyl Cysteine) is an analogue of the dietary amino acid cysteine. It is known for its mucolytic (mucous breaking) and anti-inflammatory effects. NAC acts as a potent antioxidant (free radical quencher). NAC is a thiol compound thereby providing sulfhydryl groups which act as direct free radical scavengers and also stimulate the production of the endogenous (internal) antioxidant glutathione (γ-glutamylcysteinylglycine; GSH). GSH is a potent antioxidant that maintains vitamins C and E in their antioxidant state, and it also acts as a scavenging antioxidant that removes reactive oxygen species once they are formed. GSH is a critical phase 2 detoxification factor. Essentially it acts to conjugate fat soluble toxins (i.e. heavy metals), thereby converting them to neutral water soluble compounds that can easily be excreted out of the body.

GSH supplementation however is not a viable option as it has negligible systemic availability in man. Oral administration of GSH alone does not adequately restore GSH levels. It is rapidly hydrolyzed by the liver and intestines and penetration through the blood–brain barrier is poor. Similarly, oral administration of L-cysteine has also been shown to have little effect on brain GSH levels owing to first-pass metabolism. Oral NAC administration results in increased plasma cysteine levels, ultimately leading to increases in plasma GSH.

The following abstract illustrates this fact:
Abstract

When the plasma glutathione concentration is low, such as in patients with HIV infection, alcoholics, and patients with cirrhosis, increasing the availability of circulating glutathione by oral administration might be of therapeutic benefit. To assess the feasibility of supplementing oral glutathione we have determined the systemic availability of glutathione in 7 healthy volunteers. The basal concentrations of glutathione, cysteine, and glutamate in plasma were 6.2, 8.3, and 54 mmol.l⁻¹ respectively. During the 270 min after the administration of glutathione in a dose of 0.15 mmol.kg⁻¹ the concentrations of glutathione, cysteine, and glutamate in plasma did not increase significantly, suggesting that the systemic availability of glutathione is negligible in man. Because of hydrolysis of glutathione by intestinal and hepatic gamma-glutamyltransferase, dietary glutathione is not a major determinant of circulating glutathione, and it is not possible to increase circulating glutathione to a clinically beneficial extent by the oral administration of a single dose of 3 g of glutathione.

Glutathione has been suggested as an important anti-cancer and anti-ageing nutrient but to experience the significant benefits, however, the only proven way to increase intercellular glutathione is with NAC supplementation.

The characteristic antioxidant properties of NAC help to stabilize the cellular redox status, thereby regulating cellular apoptosis, angiogenesis, cell growth and inflammatory response. Both in vivo and in vitro studies confirm the strong antioxidant properties of NAC. Interestingly, it reduces oxidative stress (free radicals in the body) at both high and low concentrations, and in both acute and chronic conditions. The unique antioxidant properties of NAC may explain its strong capacity to attenuate the adverse effects caused by toxic chemicals and drug reactions. The anti-inflammatory properties of this compound are experienced even at low dosages, with effects being dose-dependent. Greater dosages appear to improve bioavailability to exert greater therapeutic potentials.

NAC is recognized as an effective antidote for acetaminophen and carbon monoxide poisoning. Research demonstrates that NAC has other therapeutic potential: NAC was found to prevent ethanol induced hypertension and adverse renal vascular changes in rats via its ability to bind blood acetaldehyde. NAC is also being considered as a treatment alternative to help with inflammatory conditions associated with Cystic Fibrosis. In a group of 18 Cystic Fibrosis (CF) patients with neutrophil airway inflammation (a pulmonary disorder), markers for CF pulmonary function were significantly improved as reflected by decreased sputum elastase activity, and decreased airway neutrophils. The authors stated that high dose oral NAC has the potential to correct antioxidant and inflammatory imbalances associated with CF thereby improving pulmonary health.

NAC has also demonstrated hepatoprotective effects independent of its effects on elevating the antioxidant glutathione.

Studies have shown both oral and intravenous administration of NAC significantly improves the management of unstable angina. A prior study conducted in the Journal of the American College of Cardiology (1997) reported that NAC combined with transdermal nitroglycerin was associated with only 13 % of outcome events (i.e. death, myocardial infarction, and refractory angina) versus 39 % and 31 % in placebo and nitroglycerin groups, respectively. The authors concluded that NAC potentiates the therapeutic effects of nitroglycerin.

An open, randomized, controlled study published in Respiration (1999) using 169 patients, reported that 6 month standard therapy of Chronic Obstructive Pulmonary Disease (COPD) with NAC (600mg/day) showed a 41 % reduction of exacerbations. The number of sick days was substantially less (82) in the NAC group verses the standard therapy group alone (155). There were no reported adverse events with the supplemental intake of NAC. The authors concluded that NAC is well tolerated and improves the management of both moderate to severe COPD.
NAC may also benefit many other health conditions including:

- bronchopulmonary disorders,
- bronchitis,
- epilepsy,
- hyperhomocysteinemia,
- end stage renal disease
- Influenza.
- cocaine addiction
- Obsessive–compulsive disorder
- Trichotillomania and grooming disorders
- Schizophrenia
- Bipolar disorder

Effective Dosage Protocols:

The therapeutic dosage of NAC varies according to the condition being treated. For instance, for COPD the supplemental dose is 600 mg daily while for reducing plasma homocysteine levels 1.2 grams daily have been used. Unfortunately, many products in the commercial market typically contain very low levels of NAC. For this reason Vitex Nutrition has developed formulas containing 1,000 mg of pharmaceutical grade NAC per caplet and 500 mg of NAC + 100 mg vitamin C per **DR capsule** for improved therapeutic potentials. Consult with your natural health practitioner to determine the most effective dose to manage your particular health condition. Otherwise a daily dose of 1 - 2 1,000 mg caplets (1,000 – 2,000 mg) or 2 - 4 DR Caps (1,000-2,000 mg) is a general recommendation.

**DR caps for improved absorption**

**C-NAC 500** is provided in the new **DRcaps** to resist the stomach acid which can denature NAC and deliver NAC directly to the small intestine where it is rapidly absorbed.

Adverse Reactions:

Generally, NAC is well tolerated with occasional mild gastrointestinal upset reported at very high dosages.

Drug Interactions:

Taking NAC with intravenous nitroglycerin may cause severe hypotension and intolerable headaches. Check with health care professional prior to supplemental intake.
References: