

N-ACETYL CYSTEINE

OrthoPacks™



CLINICAL APPLICATIONS

- Improves Glutathione Status
- Supports Detoxification of Environmental Toxins and Pollutants
- Supports Healthy Respiratory Function
- Supports Cellular Antioxidant Activity

ESSENTIAL AMINO ACIDS

What is NAC?

N-acetyl cysteine (NAC) is an amino acid that boosts antioxidant function and is commonly used as an agent to help clear sinus and airway congestion caused by mucus overproduction. NAC is a source of the conditionally essential amino acid L-cysteine and is a precursor to the tripeptide glutathione, an essential intracellular antioxidant, and therefore supports antioxidant and cellular detoxification pathways in the body. In addition, a growing body of research also highlights the role of NAC in supporting neuropsychiatric health. Each capsule of N-Acetyl Cysteine provides 500 mg of this versatile amino acid.

Overview

N-acetyl cysteine is one of the few antioxidants found to raise glutathione levels. Glutathione is an important antioxidant used in many different metabolic processes within the body. Maintaining adequate levels is important to maintaining the health of the respiratory, hepatic and immune systems. It is also important in supporting antioxidant protection of lipids and proteins and supporting the normal response to inflammation.¹⁻⁷ Glutathione is not well absorbed by the body when taken orally, so it can be difficult to sustain adequate glutathione levels. NAC has been shown to significantly increase glutathione levels. NAC is also capable of reducing the viscosity of mucous and is also used to support respiratory and pulmonary health.

Detox Support and Antioxidant Protection†

Though studies have shown the absorption of oral glutathione to be limited,⁸ supplementation with NAC has been shown to significantly increase circulating levels of glutathione in

the body.^{9,10} Increasing glutathione levels in turn increases the production of specialized antioxidant enzymes such as glutathione peroxidase, glutathione reductase and detoxification enzymes such as glutathione S-transferases. Through the activity of these enzymes, NAC protects the body from oxidative damage, increases phase II detoxification, and enhances the normal breakdown of toxins and other metabolic byproducts of the body.

Respiratory Function†

Studies show NAC supports normal mucous production and may positively support pulmonary and respiratory function, especially when consumed over a prolonged period.^{11,12} A clinical trial of 100 smokers found NAC significantly improved measures of pulmonary health,¹³ and high-dose NAC taken over a one year period resulted in significantly improved small airway clarity and decreased frequency of respiratory challenges.¹⁴ A systematic review found NAC to be effective in supporting children's pulmonary health as well.¹⁵ NAC was also shown to support pulmonary health after inhalation of mustard gas.¹⁶

Neuropsychiatry Health†

More recently, research has pointed to the role of NAC in targeting a diverse array of factors related to the neuropsychiatric health. NAC has been shown to protect neurons from oxidative damage, and to improve neurotransmitter production, mitochondrial function and inflammatory balance.¹⁷ Studies have also highlighted the role of NAC in modulating oxidative stress as its mechanism of action in neuropsychiatric health.¹⁸ In one 12-week, double-blind, randomized, placebo-controlled study of NAC in

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children with developmental delay, NAC resulted in significant improvements in irritability scores.¹⁹

Directions

As recommended by your health care professional.

Does Not Contain

Gluten, corn, yeast, artificial colors or flavors.

Cautions

If you are pregnant or nursing, consult your physician before taking this product.

Supplement Facts ^{V1}		
Serving Size 1 Capsule		
	Amount Per Serving	% Daily Value
N-Acetyl-L-Cysteine USP	500 mg	*
* Daily Value not established.		

Other Ingredients: Hypromellose (Natural Vegetable Capsule), Microcrystalline Cellulose, Magnesium Stearate, Silicon Dioxide and Stearic Acid.

ID# 742000

References

- De Rosa SC, et al. N-acetylcysteine replenishes glutathione in HIV infection. *Eur J Clin Invest* 2000 Oct;30(10):841-2. [PMID: 11029607].
- Atkuri KR, Mantovani JJ, Herzenberg LA, et al. N-Acetylcysteine -a safe antidote for cysteine/glutathione deficiency. *Curr Opin Pharmacol*. 2007 Aug;7(4):355-9. Review. [PMID: 17602868].
- White AC, Thannickal VJ, Fanburg BL. Glutathione deficiency in human disease. *J Nutr Biochem*. 1994;5:218-26. <http://www.sciencedirect.com/science/article/pii/0955286394900396> Updated January 27, 2003. Accessed February 27, 2012.
- Pace GW, Leaf CD. The role of oxidative stress in HIV Disease. *Free Rad Biol Med*. 1995;19:523-8. [PMID: 7590404].
- Favier A, Sappey C, Leclerc P, et al. Antioxidant status and lipid peroxidation in patients infected with HIV. *Chem Biol Interact*. 1994 Jun;91(2-3):165-80. Review. [PMID: 8194133].
- Nakamura H, Masutani H, Yodoi J. Redox imbalance and its control in HIV infection. *Antioxid Redox Signal*. 2002 Jun;4(3):455-64. [PMID: 12215212].
- Roberts RL, Aroda VR, Ank BJ. N-acetylcysteine enhances antibody-dependent cellular toxicity in neutrophils and mononuclear cells from healthy adults and human immunodeficiency virus-infected patients. *J Infect Dis*. 1995 Dec;172(6):1492-502. [PMID: 7594708].
- Witschi A, et al. The systemic availability of oral glutathione. *Eur J Clin Pharmacol*. 1992;43:667-9. [PMID: 1362956].
- De Rosa SC, et al. N-acetylcysteine replenishes glutathione in HIV infection. *Eur J Clin Invest* 2000 Oct;30(10):841-2. [PMID: 11029607].
- Atkuri KR, Mantovani JJ, Herzenberg LA, et al. N-Acetylcysteine -a safe antidote for cysteine/glutathione deficiency. *Curr Opin Pharmacol*. 2007 Aug;7(4):355-9. Review. [PMID: 17602868].
- Grandjean EM, Berthet P, Ruffmann R, Leuenberger P. Efficacy of oral long-term N-acetylcysteine in chronic bronchopulmonary disease: a meta-analysis of published double-blind, placebo-controlled clinical trials. *Clin Ther*. 2000 Feb 22(2):209-21. [PMID: 10743980].
- Yalçin E, Altin F, Cinhüseynoglu F, et al. N-acetylcysteine in chronic blepharitis. *Cornea*. 2002 Mar;21(2):164-8. [PMID: 11862087].
- Mirhosseini SJ, Forouzannia SK, Nasirian M, Ali-Hassan- Sayegh S. Saudi J Anaesth. N-acetylcysteine instead of theophylline in patients with COPD who are candidates for elective off-pump CABG surgery: Is it possible in cardiovascular surgery unit? *Saudi Journal of Anaesthesia*. 2013 Apr;7(2):151-4. doi: 10.4103/1658-354X.114069.
- Tse HN, Raiteri L, Wong KY, Yee KS, Ng LY, Wai KY, Loo CK, Chan MH. High-dose N-acetylcysteine in stable COPD: the 1-year, double-blind, randomized, placebo-controlled HIACE study. *Chest*. 2013 Jul;144(1):106-18. doi: 10.1378/chest.12-2357.
- Chalumeau M, Duijvestijn YC. Acetylcysteine and carbocysteine for acute upper and lower respiratory tract infections in paediatric patients without chronic broncho-pulmonary disease. *Cochrane Database Syst Rev*. 2013 May 31;5:CD003124. doi: 10.1002/14651858.CD003124.pub4.
- Jugg B, Fairhall S, Smith A, Rutter S, Mann T, Perrott R, Jenner J, Salguero J, Shute J, Sciuto AM. N-acetyl-L-cysteine protects against inhaled sulfur mustard poisoning in the large swine. *Clin Toxicol (Phila)*. 2013 May;51(4):216-24. doi: 10.3109/15563650.2013.780208. *Epub* 2013 Apr 2.
- Berk M, Malhi GS, Gray LJ, Dean OM. Trends Pharmacol Sci. 2013 Mar;34(3):167-77. doi: 10.1016/j.tips.2013.01.001. *Epub* 2013 Jan 29. The promise of N-acetylcysteine in neuropsychiatry.
- Ng F, Berk M, Dean O, Bush AI. Oxidative stress in psychiatric disorders: evidence base and therapeutic implications. *Int J Neuropsychopharmacol*. 2008 Sep;11(6):851-76. doi: 10.1017/S1461145707008401. *Epub* 2008 Jan 21.
- Hardan AY, Fung LK, Libove RA, Obukhanych TV, Nair S, Herzenberg LA, Frazier TW, Tirouvanziam R. A randomized controlled pilot trial of oral N-acetylcysteine in children with autism. *Biol Psychiatry*. 2012 Jun 1;71(11):956-61. doi: 10.1016/j.biopsych.2012.01.014. *Epub* 2012 Feb 18.

LT-PDN-1810P-A

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