PROTOCOL FOR LIFE BALANCE®

Dietary Supplement Information
for Physicians with Naturokinetics®
PRODUCT CODE: P0085
CATEGORY: HEALTHY AGING*

NAC N-Acetyl-Cysteine 600 mg

TECHNICAL SUMMARY

How it Works: N-acetyl-cysteine (NAC) is a stable form of the non-essential amino acid cysteine. Cysteine is a sulfur-containing amino acid that acts as a stabilizer for the formation of protein structures.* Although NAC possesses its own free radical scavenging activity, its primary function in the body is to supply cysteine, which is necessary for glutathione synthesis and replenishment.* This unique formula also contains molybdenum, an essential trace element that functions as a cofactor in many biochemical reactions, and selenium, another trace mineral that supports glutathione production.*

Structure formula:

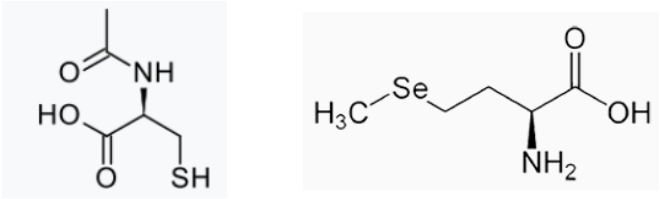

Figure 1: N-Acetyl-Cysteine (NAC) (left) and L-Selenomethionine (right)

Chemical name:

N-Acetyl-Cysteine: (2R)-2-acetamido-3-sulfanylpropanoic acid.

L-Selenomethionine: (S)-2-Amino-4-(methylseleno) butanoic acid.

Allergen and Additive Disclosure: Not manufactured with wheat, gluten, soy, milk, egg, fish, shellfish, or tree nut ingredients. Produced in a GMP facility that processes other ingredients containing these allergens.

Delivery Form: Vegetable Capsules

ROLE AS NUTRIENT/FUNCTION

NAC, selenium, and molybdenum are vital components of cell functions aimed at the reduction of oxidative stress and the optimum function of vital intracellular enzymes.*

NATUROKINETICS®

Liberation: The disintegration of the vegetable capsule using a USP testing method of disintegration in water occurs between zero and 60 minutes.

Absorption: After oral administration, NAC is absorbed in the stomach and intestine. The oral bioavailability of NAC is 9.1% with a half-life of 6.25 h.

L-selenomethionine is absorbed almost entirely in the small intestine. The absorption rate is over 90% via the same mechanism as methionine. The bioavailability of selenium from L-selenomethionine has been shown to be approximately 1.5 to 2-fold higher than that of inorganic forms of selenium.

The exact mechanism of molybdenum absorption is not yet fully elucidated, and preclinical data suggest that it is extensively absorbed after oral ingestion, either passively or by a yet-to-be-determined carrier.

Supplement Facts

Serving Size 1 Capsule

	Amount Per Serving	% Daily Value
Selenium (elemental) (from 5 mg L-Selenomethionine)	25 mcg	45%
N-Acetyl-Cysteine (NAC)	600 mg	†

† Daily Value not established.

Other ingredients: Hypromellose (cellulose capsule), Stearic Acid (vegetable source), Citric Acid and Microcrystalline Cellulose.

- **With Selenium & Molybdenum**
- **Maintains Cellular Health***

SUGGESTED USAGE: Take 1 capsule twice daily, or as directed by your healthcare practitioner.

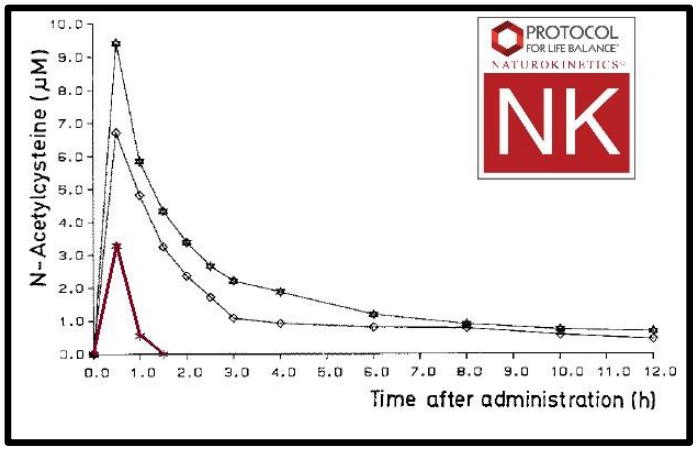

Figure 2: Plasma concentration of reduced NAC (stars), NAC as mixed disulphides (diamonds), total NAC (red) after oral administration of 400 mg NAC.

Distribution: NAC is found primarily in the kidney and liver, with other sources distributing in the adrenal gland, lung, spleen, blood, and brain.

Once absorbed, selenium from L-selenomethionine is incorporated into a long-term body pool. Selenium is incorporated into tissue proteins such as skeletal muscle, liver, erythrocytes, and plasma albumin, from which it can subsequently be released by catabolism to maintain selenium status.

After absorption, molybdenum is incorporated into a transport protein. At least part of it is stored as molybdopterin complexes. It is primarily stored in the liver, kidney, adrenal glands, and bones. It can also be found in the lungs, spleen, skin, and muscles.

Metabolism: After absorption into the small intestine, NAC is metabolized in the intestinal wall, liver, and kidney into cysteine, glutathione, and inorganic sulfite.

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

Following absorption, L-selenomethionine is metabolized to other forms of selenium such as hydrogen selenide and/or diverted into pathways of methionine metabolism and stored as selenoproteins.

As an inorganic essential micronutrient molybdenum is not metabolized in the body.

Elimination: Approximately one third of the orally administered NAC is eliminated in the urine within 24 hours of ingestion.

The half-life of L-selenomethionine is 252 days. Metabolites of selenomethionine are excreted in urine, but when high quantities of selenium are present in the body, a volatile metabolite, dimethylselenide, is formed and excreted via respiration.

Molybdenum has a rapid turnover in kidneys and spleen. In the liver, bones and adrenal glands, its turnover is slower. Homeostatic regulation of molybdenum levels is controlled mainly via the renal system, with approximately 90% of molybdenum excreted in the urine within a few hours of ingestion.

CLINICAL VALIDATION

NAC supplementation and its free radical scavenging properties have been extensively researched in clinical studies.*

- In a randomized, multicenter, placebo-controlled, double-blind study involving 262 healthy individuals, NAC was taken at the dosage of 600 mg twice daily beginning in the fall season for 6 months. Cell-mediated immunity was evaluated by performing antigenic skin applications at months 1, 3, and 6. Volunteers in the NAC group presented different skin reactions at 6 months after antigenic presentation when compared to placebo, confirming clinically the immunomodulating properties of NAC.*
- In a randomized, placebo-controlled study, with 55 healthy, trained, young adults receiving 1.9 g per day of NAC for 3 days and performing intensity resistance exercises, it was demonstrated that NAC increases a P/A ratio determined from the values of TBARS, SOD, GPX, and CAT.[i]* A higher P/A ratio leads to a more significant defense against oxidative stress.*

SAFETY INFORMATION

Tolerability: High intakes of NAC may trigger gastrointestinal discomfort; however, in clinical studies, 600 mg NAC twice daily is well tolerated.

Selenomethionine is generally well-tolerated.

Supplemental intakes of molybdenum can be ingested in daily amounts that do not exceed 2 mg/day.

Contraindications: NAC is contraindicated in individuals with acetylcysteine allergy.

INTERACTIONS

Drug Interactions: NAC may reduce the capacity of charcoal to absorb acetaminophen and salicylic acid. Administration of NAC while taking nitroglycerin may trigger hypotension and headaches.

Preliminary evidence suggests that selenium may impact coagulation by increasing bleeding time. Individuals taking anticoagulants such as warfarin or antiplatelet medications should exert caution when initiating selenium supplementation and/or before surgery. Preliminary research suggests that selenium can inhibit the hepatic metabolism of barbiturates, thereby theoretically prolonging their sedative effects.

There are no known interactions between molybdenum and medications.

Supplement Interactions: Supplements affecting platelet aggregation and coagulation should be used with caution when taking selenium supplements. Some food and herbal ingredients may accumulate large amounts of selenium and could, theoretically, result in selenium accumulation in the body. Vitamin C may theoretically decrease the absorption of selenium for some supplements. Preliminary research suggests zinc may also reduce selenium absorption.

Preliminary evidence suggest that molybdenum could interfere with copper body pool; copper status should be evaluated for prolonged, intense molybdenum supplementation especially for individuals with low copper intakes or who have a dysregulation of copper.

Interaction with Lab Tests: NAC supplementation may affect serum chloride, lipoprotein A, and liver enzymes as well as urine ketone test results.

Excessive selenium intake may result in altered tests results, such as elevated total cholesterol, non-HDL lipoprotein levels, creatinine kinase levels, and modifications of EKG (ST segment elevation and T-wave changes). Excess selenium may impact thyroid function by lowering thyroxine (T4) levels, which can be clinically significant if other factors such as iodine deficiency are not contributing factors to thyroid dysfunction.

STORAGE

Store in a cool, dry place.

[i] TBARS: measure of lipid peroxidation products in blood, SOD: measure of erythrocyte superoxide dismutase activity, GPx: measure of glutathione peroxidase activity in plasma, CAT: measure of catalase activity in plasma, P/A ratio: Loverro's pro-antioxidant coefficient (higher P/A ratio leads to a more efficient defense against oxidative stress).*

*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.