

# 555 GOLF NUTRITIONAL TIPS

## ‘PERFORMANCE EXCELLENCE’

### N-ACETYLCYSTEINE (NAC)

Our first targeted antioxidant is N-acetylcysteine (NAC). NAC is an amino acid that is easily and quickly processed by the human body to produce the most abundant antioxidant found in our bodies — glutathione. You might ask, why not just take a glutathione supplement directly?

Well, as it turns out, the human body does not absorb and utilize glutathione effectively when taken directly. Our bodies are much better at producing our own glutathione when we are provided precursors of the antioxidant. According to scientists, the most effective precursor in assisting the body’s production of glutathione is NAC. As an aside, another powerful precursor of glutathione is vitamin D. As we described in the multi-nutrient section, many Americans are vitamin D deficient. Therefore, supplementing both vitamin D and NAC is helpful in boosting glutathione production.

“Cysteine” family amino acids (of which NAC belongs) are found in many high-protein foods, including:

- Meats such as poultry and pork
- Oats, wheat germ and other whole grains
- Eggs, yogurt, whey protein and other dairy products
- Vegetables such as broccoli, onions and red peppers

Careful readers will note that the Mediterranean-style diet contains many sources of cysteine-family amino acids (i.e., whole grains, poultry and vegetables).

Given that glutathione is the most abundant antioxidant in our bodies, one would think that NAC would be on the government’s list of DRIs, but it does not appear. This is especially puzzling when one considers that glutathione deficiency has been found in studies examining chronic health conditions ranging from lung disease to macular degeneration.

NAC has been shown to be helpful in reducing oxidative stress in numerous studies and has also been shown to improve exercise tolerance in both healthy adults and those with certain chronic health conditions such as lung disease. Most human studies have evaluated NAC's effectiveness at 600 mg to 1,200 mg daily dosages.

Below is some research that details the powerful effects of NAC:

**NAC reduces inflammatory response of macrophages (white blood cells) exposed to bacteria.** In this human cell study, researchers exposed macrophages to lipopolysaccharide molecules (these molecules form the outside covering of bacteria cells) causing the macrophages to release proteins known as cytokines that are present in significant concentrations during inflammation. The researchers then introduced NAC into this mixture to determine whether it had any impact on the cytokine population in the mixture. They discovered NAC significantly reduced the cytokine counts leading researchers to conclude NAC has an inflammation-reducing effect.[1]

**NAC improves inspiratory capacity and forced vital lung capacity in COPD patients engaged in an exercise program.** In another study, 24 subjects were divided into two groups, one receiving 1,200 mg of NAC daily and the other receiving a placebo, and participated in a six-week exercise program. Then, the two groups switched supplementation regimens and again participated in a six-week exercise program. Researchers evaluated the inspiratory capacity and forced vital capacity of the two groups at rest and immediately after exercise. They discovered higher levels of both measures in the NAC supplementation groups and further determined the NAC groups experienced longer endurance times during exercise compared to the placebo groups.[2]

**NAC reduces respiratory muscle fatigue during heavy exercise.** Eight healthy adults enrolled in a study engaged in heavy bouts of cardiovascular exercise. Forty-five minutes prior to exercise, half the study subjects were provided with 1,800 mg of NAC, and the other half were given a placebo supplement. Researchers evaluated respiratory performance (inspiratory pressure, expiratory pressure) before exercise and again every five minutes during exercise. They discovered the NAC group experienced significantly higher inspiratory pressure than the placebo group at 25 minutes and 30 minutes into exercise, leading the researchers to conclude that NAC reduced respiratory muscle fatigue during exercise.[3]

**NAC reduces oxidative stress in coronary artery cells of patients with atherosclerosis.** Cells that line the coronary arteries (endothelium) were extracted from 26 human subjects with known severe atherosclerosis. The cells from each donor were divided into two lots with one lot receiving NAC and the other lot receiving no antioxidant supplementation. Approximately 100 days after NAC supplementation commenced, researchers analyzed the cells for known markers of oxidative stress and cell damage. They found that 58% of the patient cells receiving NAC experienced significant

reduction in lipid peroxidation (sign of reduced oxidative stress) and maintained or elongated telomere length (sign of reduced cell DNA damage). Researchers concluded that NAC supplementation was beneficial for reducing the impact of oxidative stress and cell damage in coronary arteries for a majority of study subjects with severe coronary artery disease. As an aside, among the atherosclerotic patient population in the study whose cells responded favorably to NAC supplementation, 93% had high cholesterol, 67% had high blood pressure, 13% were diabetic and 73% were either current or former smokers.[4]

NAC's ability to help fend off chronic health conditions ranging from oxidative stress to inflammation *and* improve exercise tolerance is why it's the first of the targeted antioxidants we recommend.

**“Welcome Aboard!”  
“Enjoy The Ride!”**

**SATISFACTION GUARANTEED**

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