

# N-Acetyl-L-Cysteine

*"N-Acetyl-L-Cysteine is a powerful agent in your arsenal against many forms of dysbiosis but it also supplies other life enhancing benefits as well."*

You may be familiar with N-Acetyl-L-Cysteine or NAC, but here are several applications you may not be familiar with. Recognize this common scenario? Years of consuming the standard American diet with the immune numbing effects of excess sugar allow pathogens to proliferate. Antibiotic therapies are implemented which change GI flora to favor the growth of various yeasts, two of which are aspergillus and candida. And due to the competitive advantage given by the antibiotics, the yeasts proliferate.

One of their byproducts is a mycotoxin called gliotoxin. Gliotoxin possesses immunosuppressive properties as it appears to suppress and cause apoptosis in certain types of cells of the immune system, including neutrophils, eosinophils, granulocytes, macrophages, and thymocytes. Gliotoxin is a potent neurotoxin. There is also evidence that intestinal gliotoxin may cause dysfunction of the gut barrier by damag-



ing the intestinal absorptive cells called enterocytes. From the yeast's point of view the production of gliotoxin may be fundamental to the establishment of chronic colonization; locally high levels are found, for instance, in the genital tract of women with severe vaginal candidiasis. Let's take gliotoxin toxicity to the next level.

Gliotoxin attracts and depletes glutathione. Glutathione is considered the most valuable antioxidant because it is located inside the cell. Glutathione's role in cytoprotection inside the cell

cannot be overestimated. It is critical in maintaining the oxidation-reduction environment of the cell. Glutathione is also needed among other things for detoxification including heavy metals.

Cellular glutathione is increased in times of stress and down-regulated after a challenge has been faced. It's the holy grail of antioxidants. Gliotoxin molecules contain a highly active surface disulphide bond.

A form of cysteine called N-Acetyl-L-Cystein or NAC has been found to neutralize Gli-

toxin by opening the disulphide bond. Not all orally taken N-Acetyl-L-Cysteine is absorbed; which as it turns out may be a good thing. The longer it remains in the gut the longer it can be useful in counteracting gliotoxin produced by intestinal candida. N-Acetyl-L-Cystein can therefore be a key factor for yeast infections including systemic or chronic vaginal, penile, jock itch, thrush, etc.

Knowing that NAC neutralizes gliotoxin and preserves glutathione is a major benefit; however, other authors have shown that NAC can actually help increase glutathione. Russell Blaylock, a noted neurosurgeon, in his book "Health and Nutrition Secrets That Can Save your Life," amplifies the benefits of NAC. He says "There are ways to increase glutathione in cells even brain cells. Three of the best methods are to supplement your diet with ascorbate, NAC and alpha lipoic acid."

Mercury causes a loss in glutathione; however, NAC can effectively chelate mercury. Dr. Blaylock discourages large amounts of dietary glutathione because even though it can be absorbed through the GI tract by most cells, the brain cells cannot.

Tumor necrosis factor-alpha or TNF-alpha is a powerful inflammatory cytokine in the muscles. Dr. Blaylock notes "NAC used to increase cellular glutathione levels also decreases TNF-alpha levels which may explain in part why diabetics show significant improvement with NAC supplementation.

Let's consider NAC and the common cold. 262 people, mostly elderly, were given 600 mg bid for 6 months. Blood tests of those taking placebo and NAC showed similar titers of flu virus, so NAC did not prevent infection with the influenza virus. However, of those who had detectable flu virus in their bloodstream, only 25 percent of those taking NAC developed flu symptoms.

In contrast, of those who had detectable flu virus in their bloodstream, 79 percent of those taking the placebo developed flu symptoms. Those taking NAC which were infected by the virus had mild symptoms compared to those who did not take NAC.

Thus, the researchers concluded that "Supplementing with NAC significantly reduces the severity and likelihood of having flu symptoms. Due to its safety and support of the immune, lung and hepatic systems, supplementing with NAC appears to be a wise alternative to Western medicine for enjoying a healthier winter season."

Aside from its importance to the immune system and as an antioxidant, NAC is also a mucolytic, meaning that it breaks down lung-clogging mucous in respiratory disorders. Chemists appoint NACs mucolytic properties to its abundance of free sulfhydryl groups, which breaks down the disulfide bonds of mucous, a process that actually thins out mucous. NACs characteristics of being safe, a potent antioxidant and a mucolytic have also been indicated for its use with liver disorders by helping detoxification and lung ailments by reducing congestion.

We started this Tuesday Minute by noting that mycotoxins called gliotoxins make many of your chronic patients very sick by decreasing the potency of their immune system, creating leaky gut, causing probable mitochondrial impairment as well as depleting valuable levels of glutathione.

It never hurts to be reminded that NAC is a powerful agent in your arsenal against many forms of dysbiosis but it also supplies other life enhancing benefits as well. Those are the kind of side effects I like.

Thanks for reading this week's edition. I'll see you next Tuesday.