

# Three A Day Antioxidant™

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New &  
Improved  
Formula

*Three-A-Day Antioxidant synergistically combines many nutrients that have a positive effect on the immune system. It also combats free radicals and helps detoxify harmful chemicals including heavy metals. L-Leucine when taken with NAC prevents mercury from being re-absorbed into the central nervous system. This contains mainly water soluble nutrients.*

## THIS FORMULA HAS BEEN IMPROVED IN THE FOLLOWING WAYS:

- The alpha tocopherol has been changed to the all inclusive mixed tocopherols.
- Lipoic Acid has been added due to its ability to regenerate the Vitamin E and C in this formula so they can have long acting antioxidant activity.
- The Grape Seed Extract is now even better. This Leucoselect Proprietary formula is phospholipid bound for far superior absorption - plus it is standardized for polyphenol activity.
- The curcumin is now standardized to higher curcuminoids (95%).
- The Green Tea is now a **MUCH** higher standardized EGCg (50%).
- The manganese and molybdenum are now chelated Albion minerals.
- The zinc and selenium are bound to methionine which aids the synthesis of metallothionein, the important zinc binding protein, aiding the removal of heavy metals such as cadmium. Methionine is a sulfur containing amino acid involved in Phase II detoxification.

## DID YOU KNOW?

1. Green tea EGCg (epigallocatechin gallate) is effective against H. Pylori (known to cause ulcers). Research shows that antibiotics such as amoxicillin worked BETTER in the presence of EGCg.<sup>2</sup>
2. "It is concluded that pathways activated by GTPPs or EGCg in normal epithelial versus tumor cells create different oxidative environments, favoring either normal cell survival or tumor cell destruction. This finding may lead to applications of naturally occurring polyphenols to enhance the effectiveness of chemo/radiation therapy to promote cancer cell death while protecting normal cells."<sup>3</sup>
3. EGCg is more effective when taken along with curcumin. Curcumin increases its cellular absorption.<sup>4</sup>

### References:

1. Involvement of multidrug resistance-associated proteins in regulating cellular levels of (-)-epigallocatechin-3-gallate and its methyl metabolites. Hong J, Lambert JD, Lee SH, Sinko PJ, Yang CS. Biochem Biophys Res Commun. 2003 Oct 10;310(1):222-7.
2. A combination effect of epigallocatechin gallate, a major compound of green tea catechins, with antibiotics on Helicobacter pylori growth in vitro. Yanagawa Y, Yamamoto Y, Hara Y, Shimamura T. Curr Microbiol. 2003 Sep;47(3):244-9.
3. Green tea polyphenol causes differential oxidative environments in tumor versus normal epithelial cells. J Pharmacol Exp Ther. 2003 Oct;307(1):230-6. Epub 2003 Sep 03. Yamamoto T, Hsu S, Lewis J, Wataha J, Dickinson D, Singh B, Bollag WB, Lockwood P, Ueta E, Osaki T, Schuster G.
4. Involvement of multidrug resistance-associated proteins in regulating cellular levels of (-)-epigallocatechin-3-gallate and its methyl metabolites. Biochem Biophys Res Commun. 2003 Oct 10;310(1):222-7 Hong J, Lambert JD, Lee SH, Sinko PJ, Yang CS.
5. Chemical studies on antioxidant mechanism of curcuminoid: analysis of radical reaction products from curcumin. J Agric Food Chem. 1999 Jan; 47(1): 71-7. Masuda T, Hidaka K, Shinohara A, Maekawa T, Takeda Y, Yamaguchi H.
6. Toxic metals and antioxidants: Part II. The role of antioxidants in arsenic and cadmium toxicity. Altern Med Rev. 2003 May;8(2):106-28 Patrick L.
7. Effects of oral cadmium exposure on expression of metallothionein-I and metallothionein-II mRNA in rat prostate. Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2002 Oct;20(5):323-6. Zeng X, Jin T, Zhou Y.
8. Influence of dietary methionine level on the liver metallothionein mRNA level in rats. Biosci Biotechnol Biochem. 2002 Nov;66(11):2465-70
9. Contribution of glutathione and metallothioneins to protection against copper toxicity and redox cycling: quantitative analysis using MT+/+ and MT-/- mouse lung fibroblast cells. Chem Res Toxicol. 2002 Aug;15(8):1080-7 Jiang J, St Croix CM, Sussman N, Zhao Q, Pitt BR, Kagan VE

# Research Abstracts

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### ■ **Toxic metals and antioxidants: Part II. The role of antioxidants in arsenic and cadmium toxicity.**

*Altern Med Rev. 2003 May;8(2):106-28, Patrick L.*

Exposure to toxic metals has become an increasingly recognized source of illness worldwide. Both cadmium and arsenic are ubiquitous in the environment, and exposure through food and water as well as occupational sources can contribute to a well-defined spectrum of disease. The symptom picture of arsenic toxicity is characterized by dermal lesions, anemia, and an increased risk for cardiovascular disease, diabetes, and liver damage. Cadmium has a significant effect on renal function, and as a result alters bone metabolism, leading to osteoporosis and osteomalacia. Cadmium-induced genotoxicity also increases risk for several cancers. The mechanisms of arsenic- and cadmium-induced damage include the production of free radicals that alter mitochondrial activity and genetic information. The metabolism and excretion of these heavy metals depend on the presence of antioxidants and thiols that aid arsenic methylation and both arsenic and cadmium metallothionein-binding. S-adenosylmethionine, lipoic acid, glutathione, selenium, zinc, N-acetylcysteine (NAC), methionine, cysteine, alpha-tocopherol, and ascorbic acid have specific roles in the mitigation of heavy metal toxicity. Several antioxidants including NAC, zinc, methionine, and cysteine, when used in conjunction with standard chelating agents, can improve the mobilization and excretion of arsenic and cadmium.

### ■ **Study of the effect of the administration of Cd(II), cysteine, methionine, and Cd(II) together with cysteine or methionine on the conversion of xanthine dehydrogenase into xanthine oxidase.**

*Biol Trace Elem Res. 2000 Jul;76(1):19-30, Esteves AC, Felcman J.*

Cadmium is known to be a potent pulmonary carcinogen to human beings and to induce prostate tumor. The sequestration of cadmium, an extremely toxic element to living cells, which is performed by biological ligands such as amino acids, peptides, proteins or enzymes is important to minimize its participation in such deleterious processes. The synthesis of metallothionein is induced by a wide range of metals, in which cadmium is a particularly potent inducer. This protein is usually associated with cadmium exposure in man. Because metallothioneins may act as a detoxification agent for cadmium and chelation involves sulfur donor atoms, we administered only cadmium, cysteine, or methionine to rats and also each of these S-amino acids together with cadmium and measured the production of superoxide radicals derived from the conversion of xanthine dehydrogenase to xanthine oxidase. It could be seen in this work that the presence of cadmium enhances this conversion. However, its inoculation with cysteine or methionine almost completely diminishes this effect and this can be the result of the fact that these amino acids complex Cd(II). Thus, these compounds can be a model of the action of metallothionein, removing cadmium from circulation and preventing its deleterious effect.

### ■ **Influence of dietary methionine level on the liver metallothionein mRNA level in rats.**

*Biosci Biotechnol Biochem. 2002 Nov;66(11):2465-70, Nocianetri KA, Sakakibara S, Kanno T, Kikuchi H, Kurasaki M, Aoyama Y.*

The effects of some methyl-containing compounds added to a choline-deficient diet on the metallothionein mRNA level in the rat liver were studied. The addition of choline or carnitine to the choline-deficient diet did not induce a gain in body weight, while the addition of either betaine or methionine to the choline-deficient diet, or of methionine to the choline-deficient diet with choline significantly increased the body weight. The metallothionein mRNA level in the liver of rats fed on the choline-deficient diet was similar to that of rats fed on the choline-deficient diet with choline, betaine or carnitine. However, the addition of methionine to the choline-deficient diet with or without choline caused a marked suppression in the metallothionein mRNA level in the liver. It is thus surmised that the metallothionein mRNA level in the liver might be regulated by the dietary content of methionine.