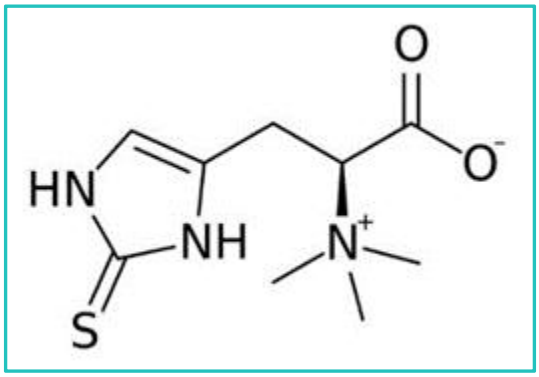
ACERBIO

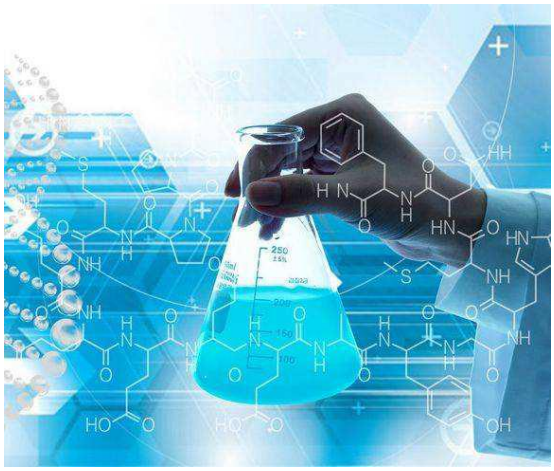
L-Ergothioneine:

A Unique Natural Amino Acid Essential to Human Health

What is L-ergothioneine?

L-Ergothioneine (ERGO) is an unusual thio-histidine betaine amino acid discovered a century ago. In humans, ERGO has been shown to accumulate in various cells and tissues at high concentrations (100 μM to 2 mM) [1]. But human body does not synthesize ERGO, so has to obtain it from diet. Edible mushrooms are the major dietary source of ERGO [2]. In recent years, ERGO has gained considerable attention by the scientific community, including some of the world-renowned researchers including Drs. Bruce Ames, Solomon Snyder and Barry Halliwell, due to its unique properties and biological functions.





Why is L-ergothioneine sounique?

A major discovery in 2005 found that ERGO in mammals is taken up by a specialized ERGO transporter protein (ETT) OCTN1 (encoded by gene SLC22A4) [3]. OCTN1 occurs in almost all tissues of human body [4]. The presence of a specific transporter for ERGO that makes it highly bioavailable and avidly retained strongly indicates that humans gain benefit from obtaining and retaining it in their tissues. Specific transporters are rarely present for non-nutrient bioactive compounds such as polyphenols, which are rapidly metabolized and excreted from the body. ERGO is very stable under physiological conditions, hence it does not readily undergo auto-oxidation as rapidly as other thiol antioxidants such as glutathione that can generate free radicals in the process.

L-ergothioneine is powerful antioxidant

ERGO has long been known to play a significant role as an antioxidant. Early in vitro studies have demonstrated the abilities of ERGO to scavenge reactive oxygen species and reactive nitrogen species such as hydroxyl radicals, hypochlorous acid, singlet oxygen and peroxynitrite. Evidence accumulated in recent years suggest that ERGO may function as a physiological antioxidant and cytoprotectant [5]. The distribution of ERGO in the body reveals that the compound is preferentially accumulated in organs and cells with high levels of oxidative stress such as liver, kidneys and erythrocytes. It is also present in high concentrations in mitochondria, a major source of oxidants. Lack of ERGO transporter results in oxidative damage to proteins, lipids, and DNA, and higher levels of mortality in human cells.

Health benefits of L-ergothioneine

Based on a range of in vitro and in vivo studies, ERGO has exhibited the ability to modulate inflammation, protect against acute respiratory distress syndrome, prevent endothelial dysfunction, protect against ischemia and reperfusion injury, protect against neuronal damage, counteract iron dysregulation, hinder lung and liver fibrosis, and mitigate damage to the lungs, kidneys, liver, gastrointestinal tract, and testis, amongst many others. In a study conducted in Sweden involving over 3200 adult men and women, 112 plasma metabolites were measured. ERGO was found to be most strongly associated with decreased risk of CVD and reduced mortality after 21.4 years of follow-up [6]. More recently, ERGO was proposed by Dr. Halliwell as a potential application in the treatment of COVID-19. It could be used as a therapeutic to reduce the severity and mortality of COVID-19, especially in the elderly and those with underlying health conditions [7].

The role of L-ergothioneine as a longevity vitamin

Dr. Bruce Ames recently suggested that ERGO should be considered a 'longevity vitamin', based on the presence of ERGO in human tissues, the essentiality of its transport system, its possible involvement in CVD prevention, its antioxidant, and cytoprotective activities [8]. Americans have been estimated to consume less ERGO (1.1 mg/day) than individuals in four European countries including Finland, France, Ireland and Italy (up to 4.6 mg/day in Italy). The lower intakes of ERGO were shown to coincide with a greater prevalence of chronic neurological diseases of aging and lower life expectancies [9]. Very recently, low plasma ERGO levels were associated with neurodegeneration and cerebrovascular disease in dementia [10].

L-ergothioneine is a functional ingredient in skin care

Studies demonstrated that L-ergothioneine protects skin cells from UV-irradiation [11]. Scientific data have also showed that L-ergothioneine presented anti-inflammatory, antioxidant, photoprotective, antimicrobial, anti-tyrosinase, anti-elastase, and anti-collagenase activities. It can be utilized as ingredient to suppress the severity of inflammatory skin diseases (e.g., eczema, seborrheic dermatitis, and psoriasis), offer photoprotection to the skin, and correct Hyperpigmentation [12]. L-ergothioneine is considered as one of the top botanical ingredients used in anti-aging creams currently on the market [13]. It has been used as a "secret ingredient" by several high-end cosmetic brands.

Is L-ergothioneine safe?

Vital Ergo® is produced via fermentation using non-genetically modified yeast. It has achieved Generally Recognized As Safe (GRAS) status through self-affirmed GRAS process. A number of high-dose studies have indicated that ERGO is safe for human consumption at levels far in excess of those likely to be encountered in foodstuffs. And it has been declared safe by the European Food Standards Agency (EFSA) even for young children, pregnant and breastfeeding women[14].

Reference

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