The Health Protective Effects of Aged Garlic Extract

For over thousands of years garlic has been used and even worshiped as a healing and invigorating herb. The benefits effects of garlic in helping to prevent disease are mostly due to its high content of sulfur containing compounds and antioxidant activity. Fresh garlic, however, can cause indigestion, and its pungent odor, long remains on the breath and skin as a social deterrent. These unpleasant effects of fresh garlic are due to allicin, an oxidant that is released when a clove is cut or chewed. Scientific studies show, however, that garlic does not have to be fresh to be effective, nor is its smell required for its health benefits.

Aged Garlic Extract (AGE)

An alternate source of garlic that is odorless and richer in antioxidant than the fresh bulb is the dietary supplement Aged Garlic Extract (Kyolic), manufactured by the Wakunaga Company. Aged garlic extract (AGE) is a concentrated form of organic garlic that has been shown in over 400 scientific research reports to be safe and effective in providing health benefits. In humans, AGE was found to reduce multiple cardiovascular risk factors, lower cholesterol, lower blood pressure, reduce homocysteine, prevent atherosclerosis in coronary arteries by 50 percent, and to cut the risk of heart attacks and increase circulation and immunity. In preclinical studies, AGE has been shown to prevent many kinds of cancer and neurodegenerative disease. It also shows antiaging effects in improving memory, endurance and learning. New studies also show that AGE may have a role in cancer therapy. The unique characteristics of AGE, along with its safety and its scientifically proven health benefits, are discussed in this article.

The Making and Content of AGE

Aged garlic extract provides the health benefits of fresh garlic, sometimes even more so, without the unpleasant side effects of the fresh bulb. AGE is a highly standardized product. Made by extracting and aging organic fresh garlic at...
room temperature for 20 months. This process increases the levels of beneficial antioxidants, to well above those of fresh garlic, and it converts unstable and harsh compounds, such as allicin, to stable health-promoting substances. AGE contains mostly stable water-soluble organosulfur compounds, that are powerful antioxidants and are mainly responsible for AGE's health benefits. They include S-allyl mercaptocysteine, (unique to AGE) and S-allyl cysteine, which has a 98 percent absorption rate into the blood circulation (high bioavailability) and is used to standardize AGE. Also present are some oil soluble organosulfur compounds, flavonoids, a phenol allixin and other beneficial nutrients, including selenium.

Antioxidant Protection by AGE
Damage to cellular molecules, including DNA, lipids and proteins, by unstable free radicals (ROS), leads to disease and aging. ROS are produced in normal metabolism. They increase and can overload the body during infection, inflammation and exercise, and when the body is over exposed to sunlight, radiation, smoking, and some medications. The result is oxidative stress that plays a role in arthritis, atherosclerosis, heart disease, stroke, AIDS, cancer, aging, dementia, Alzheimer's disease (its most common form), and other neurodegenerative conditions.

AGE is richer in antioxidants than other commercial garlic preparations as well as fresh garlic, and it boosts cellular antioxidants, including glutathione, which helps maintain a healthy immune system and prevents drug toxicity.

Cardiovascular Protection
AGE Lowers Cholesterol and Blood Pressure
High LDL cholesterol (the bad cholesterol) and triglycerides, high levels of homocysteine and high blood pressure increase the risk of heart disease and stroke. Clinical studies show that AGE and S-allyl cysteine can help reduce the risk. A daily AGE dose of 2.4–4.8 gm, over the course of 6 months, reduced total cholesterol by 5 to 7 percent, lowered LDL, triglycerides and blood pressure, prevented clot-promoting platelet aggregation, and increased HDL, the good cholesterol.

AGE lowers cholesterol in a similar way to the cholesterol-lowering statin drugs. When statins are combined with AGE, the suppression of cholesterol synthesis is additive. AGE, alone, may serve as a safe and effective cholesterol-lowering nutrient without the effects of fatigue and muscle pain that some people on statin treatment feel.

Homocysteine Reducer
High blood levels of homocysteine, caused mainly by a deficiency in B vitamins and folic acid, increases the risks of heart disease, stroke, Alzheimer's disease, and cancer. AGE added to the diet, in preclinical studies lowered homocysteine, in folate deficiency, helping prevent the consequences of high homocysteine.

Protecting The Arteries and Heart
At a recent conference on the benefits of garlic in preventing and treating cardiovascular disease and cancer (www.2005garlicsymposium.com), Matthew Budoff, M.D., FACC of the UCLA School of Medicine showed that AGE cuts the heart risk factors by more than 67 percent in patients suffering from heart disease. The year-long, double-blind placebo-controlled study used electron beam tomography to non-invasively quantitate and track atherosclerotic plaques formation in the coronary arteries. The findings showed a 22.2 percent plaque progression in patients on placebo, while patients on AGE (1200 mg/day) showed a 7.5 percent plaque progression. The patients on AGE
(but not placebo) showed, a decrease in homocysteine levels and an increase in protective HDL cholesterol.

The UCLA study adds to the body of data showing that AGE reduces multiple risk factors associated with heart disease. These include an anticlotting effect, stimulation of blood circulation in capillaries, and anti-inflammatory effects by inhibiting prostaglandin synthesis, protecting arteries from inflammation that accelerates clot formation, and, as seen above, reducing of LDL, triglycerides and blood pressure.

Its striking results in coronary artery protection by AGE in people with heart disease, are good news for those at high risk for heart attacks. AGE can safely be added to other treatments, such as statins, increasing efficacy and potentially helping to postpone the need for cardiac surgery. For healthy people, AGE adding to the diet may serve as a health strategy, helping to prevent atherosclerosis and to maintain a healthy heart.

**A Booster of Immunity**
The immune system consists of many types of cells and protective substances that fight infections and life-threatening diseases, such as cancer. A strong immune system defends against bacteria, viruses and fungal diseases. When immunity is damaged, as in the case of AIDS, or due to poor diet, stress, environmental pollution, disease, and aging, the body is at loss to fight off infectious organisms. AGE stimulates immunity and helps combat infection.

**Antiviral, Anticancer**
Preclinical studies show that AGE prevents influenza virus infection and is as effective as a vaccine treatment. AGE improves immunity in AIDS patients by increasing the activity of natural killer cells (NK) that kill invading organisms and cancer cells, stimulating the number and activity of many types of immune cells (lymphocyte, macrophages), and boosting their anticancer activity.

In a clinical study, subjects given 1800 mg of AGE/day for three weeks, showed a 155.5 percent increase in NK cell activity, while those receiving 35 grams of fresh garlic/day (equivalent to 10 cloves) had only a 139.9 percent increase, indicating the superior immune-enhancing benefits of AGE. In
another study, of AIDS patients, NK cells, that are depleted in AIDS, rose to normal levels after AGE supplementation for 6 weeks.

**Antifungal and Antibacterial**

AGE inhibits the growth of the yeast *Candida albicans*, the cause of frequent oral infections in HIV-positive patients and sexually transmitted conditions. AGE kills *Helobacter pylori* that is associated with stomach ulcers and cancer, and, may act as a cure, since about 84 percent of people infected with *H. pylori* are resistant to antibiotic treatment.

**Protection Against UV Light**

Exposure to ultraviolet light lowers certain types of immunity and increases the risk of UV induced aging skin and cancer. AGE protects against UV induced immunosuppression by preventing free radical damage and other photo products that lower immunity and are responsible for the damaging effects of UV.

**Anti-allergy Effects**

Allergies, triggered by histamine released from special cells (mast cells) can disrupt our daily lives. In preclinical studies, AGE prevented histamine release by 50–90 percent, depending on the AGE dose. And it reduced allergic reactions by 24–45 percent following exposure to allergy-causing substances.

**Protecting Against Stress and Enhancing Vigor**

Traditional medicine has long prescribed garlic as an invigorating and anti-stress herbal remedy. Studies with AGE show that, indeed, this garlic supplement reduces fatigue and enhances vigor. Findings from preclinical studies show that AGE doubled endurance in swimming and in running on a treadmill.

A clinical study in Japan showed that hospitalized patients improved stress symptoms related to their conditions, following intake of AGE and vitamins B₁ and B₁₂. The stress conditions were related to respiratory, digestive, neuromuscular, cardiovascular and digestive complaints. AGE supplementation also reduced weakness and fatigue in the patients.

**Cancer Prevention**

Cancer results from DNA mutations that accumulate over time, increasing risk with age. Free radical injury and chemical carcinogen-binding are major causes of DNA damage. Garlic-rich diets lower the risk of human stomach, colon and prostate cancer. For example, an Iowa study of 42,000 older women showed that those who ate garlic more than once a week halved their risk of colon cancer, compared to non-garlic eaters.

But not everyone can tolerate garlic. AGE has been shown in preclinical studies to prevent many types of cancer, by destroying DNA-damaging free radicals, increasing antioxidant levels in cell, blocking carcinogen binding to DNA, and increasing the disposal of carcinogens that enter the body. In these ways, AGE prevented cancer in the mammary glands, the bladder, the colon, the stomach, the liver, the lungs, and the esophagus.

**AGE in Cancer Therapy**

Recent cellular studies show that S-allyl cysteine and S-allyl mercaptocysteine, a unique compound in AGE, stop the growth of human colon, breast and prostate cancer cells. The compounds in AGE stopped nearly 80 percent of prostate cancer cell growth. In prostate cancer AGE prevented the production of substances needed for cancer cell multiplication, increased the breakdown of testosterone that is needed for prostate cancer growth, and reduced the levels of PSA, a prostate
cancer marker. S-allyl mercaptocysteine stopped colon cancer cell growth by 71 percent, disrupting the division machinery of the cells and ultimately killing the cells by a process of cell suicide (apoptosis).

Preventing Drug Toxicity
Cardiotoxicity and liver toxicity by ROS-producing drugs such as doxorubicin, methotrexate, and 5 fluorouracil, (used in cancer therapy,) are of major concern in cancer treatment. AGE has been found to protect heart cells from doxorubicin toxicity and liver cells from methotrexate and 5-fluorouracil toxicity, showing a potential use for AGE in the clinic for patients receiving anti-cancer treatment.

ACE also prevents liver toxicity from environmental toxins and carcinogens and from acetaminophen

Acetaminophen, is the most prescribed painkiller, also known as Tylenol. FDA warnings that thousands of Americans unknowingly take potentially fatal doses of acetaminophen (more than 4000 mg/day) highlights the need for protection. Overdoses of acetaminophen deplete liver glutathione, a detoxifying molecule, causing the liver to go into failure. AGE’s water soluble S-allyl cysteine and S-mercaptocysteine prevent acetaminophen toxicity by scavenging acetaminophen free radicals and increasing glutathione production and also by acting as antidotes when given following toxic doses of acetaminophen.

When volunteers ingested 10 ml/day (3000 mg) AGE for three months and were given one gram acetaminophen before and after the AGE course, AGE enhanced acetaminophen detoxification.

Sickle Cell Anemia Therapy
Sickle cell anemia is a life-threatening hereditary disease in which oxidative stress plays a prominent role. With its high antioxidant content, AGE has therapeutic effects.

In a 4-week small study, patients with sickle cell anemia who ingested 5 ml/day (1500 mg) of AGE, showed a significant reduction in the sickle cell markers.

Neuroprotective Effect of AGE
Approximately 10 percent of people older than 65 years have Alzheimer’s disease. The disease is marked by deposits of a free radical producing protein (beta amyloid peptide) in the brain and the death of brain cells (neurons) by apoptosis (cell suicide). Neuronal apoptosis also occurs after a stroke, when a clot in blood vessels prevents the transport of oxygen and nutrients to the brain (ischemia), causing cell death and leading to dementia.

AGE has the potential to protect the brain against neurodegenerative conditions by preventing brain injury following ischemia and by protecting neuronal cells against the toxic effects of beta amyloid peptide and death by apoptosis. Studies show that S-allyl cysteine, the major compound in AGE, also prevents neuronal death following ischemia and increases by 30 percent cell survival in the hippocampus, the memory region of the brain, compared to controls.

Anti-aging Effects
Preclinical studies in models that are genetically susceptible to early aging show that AGE has prevented the
degeneration of the brain's frontal lobe, improved learning and memory retention, and extended life span. Isolated neurons from the hippocampus area grown in the presence of AGE showed an unusual ability to grow and branch, which may be linked to the findings that AGE increases learning and cognition.

The Safety of AGE
The safety of AGE has been confirmed in toxicological tests and in clinical studies with more than 1000 subjects. High quality control in AGE production by the Wakunaga Company, and AGE standardization by its stable and bioavailable key compound S-allyl cysteine, provides assurance that whether in capsule, tablet or liquid form AGE always contains a standard amount of stable beneficial ingredients, as labeled. These facts have made Kyolic AGE the choice garlic preparation in scientific research on the health benefits of garlic, in over 400 studies in major universities.

As there are other garlic products on the market, customers are often confused about allicin, since garlic powder manufacturers advertise allicin as a measure of the product's activity and benefits. Allicin is a volatile and reactive oxidant and is not bioavailable. Eric Block, Ph.D., a pioneer in garlic research, states, "Some products talk about allicin content, allicin potential or allicin yield. Since there is no way to stabilize allicin itself, any claims concerning actual allicin content in a product cannot be correct." Aged garlic extract (Kyolic) is stable, odorless and highly bioavailable.

Conclusions
Aged garlic extract (Kyolic) provides the health benefits of fresh garlic and often improves upon it. Safe, effective and rich in antioxidants, AGE:
* Protects against cardiovascular diseases, decreasing risk factors for heart attacks and stroke; lowers LDL cholesterol, by the same mechanism as statins; reduces tri-glycerides; elevates HDL; decreases homocysteine and blood pressure; increases circulation in capillaries; reduces clot-forming platelet activity and inflammation, preventing coronary atherogenic plaques; and, in a new study AGE cut heart-attack risk factors by 67 percent. A recent conference further confirmed the cardioprotective effects of AGE (www.2005garlicsymposium.com).
* Has anticancer activity, prevents free radical and carcinogen-induced DNA damage, and increases carcinogen detoxification, emphasized in a recent symposium (www.2005garlicsymposium.com)
* Protects against toxic effects of pollution, radiation, UV light, and drug toxicity.
* Boosts immunity and protects against viral, bacterial (H. pylori), and yeast infections, and allergies.
* Reduces fatigue and stress and enhances vigor.
* Has anti-aging and neuroprotective effects, prevents neuron death, enhances memory and learning, and stimulates the growth and branching of neurons of the memory region of the brain, the hippocampus.
* Stops the growth of a wide variety of human cancer cells, including breast, colon, and prostate cancer, melanoma and erythroleukemia, and it has potential as an adjuvant in cancer therapy.
* Taken regularly, aged garlic extract (Kyolic) provides a comprehensive health.

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