

Your AntiOxiDense™ Product Science –Green Tea Abstracts

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(1)

Green Tea Compounds Beat Obstructive Sleep Apnea-related Brain Deficits, Study Shows

ScienceDaily (May 18, 2008) — Chemicals found in green tea may be able to stave off the cognitive deficits that occur with obstructive sleep apnea (OSA), according to a new study published in the second issue for May of the American Thoracic Society's American Journal of Respiratory and Critical Care Medicine.

Researchers examined the effects green tea polyphenols (GTP), administered through drinking water, on rats who were intermittently deprived of oxygen during 12-hour "night" cycles, mimicking the intermittent hypoxia (IH) that humans with OSA experience.

People with OSA have been reported to have increased markers of oxidative stress and exhibit architectural changes in their brain tissue in areas involved in learning and memory. Chronic IH in rats produce similar neurological deficit patterns.

"OSA has been increasingly recognized as a serious and frequent health condition with potential long-term morbidities that include learning and psychological disabilities [...]," wrote David Gozal, M.D., professor and director of Kosair Children's Hospital Research Institute at the University of Louisville, lead author of the article. "A growing body of evidence suggests that the adverse neurobehavioral consequences imposed by IH stem, at least in part, from oxidative stress and inflammatory signaling cascades."

GTPs are known to possess anti-oxidant properties, acting as a free radical scavengers, and research has shown that the

compounds may reduce the risk of a variety of different diseases.

"Recent studies have demonstrated the neuroprotective activity of GTP in animal models of neurodegenerative conditions such as Parkinson's and Alzheimer's disease," wrote Dr. Gozal.

In this study, the researchers divided 106 male rats into two groups that underwent intermittent oxygen depletion during the 12-hour "night" cycle for 14 days. One group received drinking water treated with GTP; the other received plain drinking water.

They were then tested for markers of inflammation and oxidative stress, as well as for performance in spatial learning and memory tasks--namely a water "maze" in which the rat had to memorize the location of a hidden platform.

The IH-rats that received the green tea-treated water performed significantly better in a water maze than the rats that drank plain water. "GTP-treated rats exposed to IH displayed significantly greater spatial bias for the previous hidden platform position, indicating that GTPs are capable of attenuating IH-induced spatial learning deficits," wrote Dr. Gozal, adding that GTPs "may represent a potential interventional strategy for patients" with sleep-disordered breathing.

American Thoracic Society (2008, May 18). *Green Tea Compounds Beat Obstructive Sleep Apnea-related Brain Deficits, Study Shows. ScienceDaily.*

(2)

Green Tea Helps Beat Superbugs, Study Suggests

ScienceDaily (Apr. 1, 2008) — Green tea can help beat superbugs according to Egyptian scientists speaking March, 31, 2008 at the Society for General Microbiology's 162nd meeting.

The pharmacy researchers have shown that drinking green tea helps the action of important antibiotics in their fight against

resistant superbugs, making them up to three times more effective.

Green tea is a very common beverage in Egypt, and it is quite likely that patients will drink green tea while taking antibiotics. The medical researchers wanted to find out if green tea would interfere with the action of the antibiotics, have no effect, or increase the medicines' effects.

"We tested green tea in combination with antibiotics against 28 disease causing micro-organisms belonging to two different classes," says Dr Mervat Kassem from the Faculty of Pharmacy at Alexandria University in Egypt. "In every single case green tea enhanced the bacteria-killing activity of the antibiotics. For example the killing effect of chloramphenicol was 99.99% better when taken with green tea than when taken on its own in some circumstances."

Green tea also made 20% of drug-resistant bacteria susceptible to one of the cephalosporin antibiotics. These are important antibiotics that new drug resistant strains of bacteria have evolved to resist.

The results surprised the researchers, showing that in almost every case and for all types of antibiotics tested, drinking green tea at the same time as taking the medicines seemed to reduce the bacteria's drug resistance, even in superbug strains, and increase the action of the antibiotics. In some cases, even a low concentration of green tea was effective.

"Our results show that we should consider more seriously the natural products we consume in our everyday life," says Dr Kassem. "In the future, we will be looking at other natural herb products such as marjoram and thyme to see whether they also contain active compounds which can help in the battle against drug resistant bacteria".

Society for General Microbiology (2008, April 1). *Green Tea Helps Beat Superbugs, Study Suggests. ScienceDaily*

(3)

Green Tea Boosts Production Of Detox Enzymes, Rendering Cancerous Chemicals Harmless

ScienceDaily (Aug. 12, 2007) — Concentrated chemicals derived from green tea dramatically boosted production of a group of key detoxification enzymes in people with low levels of these beneficial proteins, according to researchers at Arizona Cancer Center.

These findings, published in the August issue of *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research, suggest that a green tea concentrate might help some people strengthen their metabolic defense against toxins capable of causing cancer.

In a study of 42 people, the concentrate -- composed of chemicals known as green tea catechins in amounts equal to that found in 8-16 cups of green tea -- boosted production of the enzymes, which belong to the glutathione S-transferase (GST) family, by as much as 80 percent in some participants.

GST enzymes are believed to be crucial to the body's defense against cancer-causing chemicals and other toxins, according to the study's lead investigator, H.-H. Sherry Chow, Ph.D., a research associate professor at the University of Arizona. They modify the cancer-causing molecules that would otherwise damage cellular DNA, thus rendering them inert.

"They actually convert known carcinogens to non-toxic chemicals, and studies have shown a correlation between deficient expression of these enzymes and increased risk of developing some cancers," Chow said.

"Expression of this enzyme varies dramatically in people due to genetic variation and environmental factors," Chow added. "Green tea catechins somehow increase gene expression of these enzymes, which can be an advantage to people with low levels to

start with."

Green tea has long been of interest to researchers given studies that have shown populations in which it is often consumed, such as the Chinese and Japanese, generally have lower rates of cancer. To find out if green tea can protect against cancer, the NCI has sponsored a number of rigorous scientific studies testing capsules of the extract, Polyphenon E, that have been prepared in Japan to meet exact specifications. These pills contain epigallocatechin gallate (EGCG), a catechin known for its potent antioxidant activity, and are currently being tested against a variety of cancers in clinical trials.

This study was designed to see if green tea catechin concentrate had any effect on the levels of GST enzymes in healthy individuals research that could explain the tea's anti-cancer properties. Healthy volunteers were asked to abstain from consuming any tea or tea-related products for four weeks. At the end of this "washout period," blood was drawn and baseline GST enzyme levels were determined for each participant. Then, the volunteers were asked to take four Polyphenon E capsules, for a total of 800 milligrams of EGCG, each morning on an empty stomach for four weeks and to abstain from drinking tea or eating many cruciferous vegetables, which contain other beneficial chemicals. Another blood sample was taken after four weeks, and GST activity was determined.

Researchers found that use of Polyphenon E enhanced GST activity when data from all participants were included for analysis. But it had its most significant effect in volunteers whose baseline blood measurements showed low GST activity -- an 80 percent increase compared to baseline GST activity. Activity did not change in volunteers with medium GST expression, or in those with the highest levels, GST seemed to decrease slightly although researchers believe that decline was due to random variation.

"This is the first clinical study to show proof that chemicals in green tea can increase detoxification enzymes in humans," Chow said. "There may be other mechanism in play by which green tea

may protect against cancer development, but this is a good place to start."

The NCI supported the study and researchers from NCI also participated in conducting the study.

American Association for Cancer Research (2007, August 12). *Green Tea Boosts Production Of Detox Enzymes, Rendering Cancerous Chemicals Harmless. ScienceDaily.*

(4)

Cup Of Green Tea To Keep The Bacteria Away

ScienceDaily (Jan. 16, 2007) — Beneficial effects of green tea have been known for millenia, particularly in Asian cultures. An ancient Chinese proverb says: "Better to be deprived of food for three days, than tea for one". A cup of green tea contains up to 200 mg of catechins, whose biological activity has been mainly attributed to its antioxidant activity. Efficiency of green tea extract in oral hygiene has been known for centuries and this gave researchers a clue that antibacterial activity might be involved.

Now researchers from the National institute of Chemistry in Ljubljana, Slovenia discovered that the main ingredients of green tea are able to perform other tricks. They found out that green tea catechins inhibit essential bacterial enzyme DNA gyrase, which is the target of several existing clinically used drugs. By the use of NMR spectroscopy, researchers from Slovenia have now pinpointed the ATP-binding site of DNA gyrase as target of EGCG, the most abundant catechin from the green tea extract. Up to now several compounds targeted against the ATP-binding site of bacteria gyrase have been known but couldn't be used as drugs due to their side effects on mammalian cells.

Lead researcher Roman Jerala, the head of the Laboratory of Biotechnology at NIC explains: "We can anticipate to avoid the problem of toxicity using the compounds based on the green tea

catechins, which have centuries of established safety record in the human diet."

This finding may be used to develop even more potent antibacterial compounds. Results were recently published in the Journal of Medicinal Chemistry.

National Institute Of Chemistry, Slovenia (2007, January 16).
Cup Of Green Tea To Keep The Bacteria Away. ScienceDaily.

(5)

AMERICAN BOTANICAL COUNCIL-HerbClip:

Pastore R, Fratellone P.

Potential health benefits of green tea (Camellia sinensis): a narrative review.

Explore. Dec 2006;2(6):531-539.

Second only to water, tea is the most common beverage consumed worldwide, with a per capita consumption of approximately 0.12 liter per day. White, green, and black teas are all harvested from the plant *Camellia sinensis*. Much research is available on the health benefits of green tea for various implications, including different types of cancer, heart disease, and liver disease. These authors present a thorough review of animal and human studies of the health benefits of green tea. The major components of green tea are its polyphenols. The major polyphenols in green tea are flavonoids: catechins epicatechin (EC), epigallocatechin (EGC), epicatechin gallate (ECG), and epigallocatechin gallate (EGCG).

The authors cite numerous studies of green tea and its anti-inflammatory, anticarcinogenic, and antioxidative properties, as well as its uses in the prevention of various diseases. Below are findings from some of those studies.

- Antiviral properties - EGC and ECG were found to be potent inhibitors of influenza virus replication in cell culture. Quantitative

analysis revealed that, at high concentration, EGCG and ECG also suppressed viral RNA synthesis in cells; EGC failed to show such an effect.

- Antioxidant properties - Green tea may help prevent atherosclerosis, particularly coronary artery disease. Japanese researchers have shown that green tea reduces the levels of low-density lipoprotein cholesterol. One study showed that those who drank green tea regularly had a 36% lower risk for heart disease than nondrinkers. Another Japanese population-based study found that men who drink green tea are more likely to have lower total cholesterol than those who do not drink green tea. In a cross-cultural study of 16 cohorts, known as the Seven Countries Study, the higher polyphenol intake of green tea was inversely correlated with mortality rates of coronary heart disease after 25 years of follow-up.^{1,2}

- Autoimmune disorders - The authors cited a study of cells in salivary glands and skin tissue that found that those cells exposed to EGCG showed RNA and protein levels, indicating that autoantigen levels were suppressed in the normal cells.

- Arrhythmias - Tea drinkers have a lower rate of death following a heart attack than those who do not drink tea. A study presented at the Heart Rhythm Society's 25th Annual Scientific sessions in 2004 found that EGCG could help prevent ventricular arrhythmias, which can follow heart attacks.³

- Anticarcinogenic properties - One study suggests that EGCG and other tea catechins suppress tumor promotion by inhibiting the release of tumor necrosis factor-alpha, which is believed to stimulate tumor promotion and progression of initiated cells as well as premalignant cells.⁴ The authors also cite a study of mice that were transplanted with non-Hodgkin's lymphoma cells. Green tea prevented 50% of the tumors from taking hold and significantly inhibited tumor growth.

- Bladder cancer - A few studies have examined the relationship between bladder cancer and green tea consumption. In one study of people with and without bladder cancer, women who

drank black tea and powdered green tea were less likely to develop bladder cancer.

- Breast cancer - EGCG, EGC, and ECG reduce the proliferation of human breast cancer cells in vitro and decrease breast tumor growth in rodents. In Japanese studies, EGCG decreased both the severity of the initial diagnosis and the likelihood of recurrence; green tea consumption was associated with lower risk of the cancer spreading to the lymph nodes; and an overall lower incidence of cancer was seen among people who drank 10 or more cups of green tea a day.

- Cervical cancer - The authors cite one study that suggests that EGCG can inhibit cervical cancer cell growth through induction of apoptosis (programmed cell death) and cell cycle arrest, as well as regulation of gene expression in vitro. In vivo antitumor effects of EGCG were also observed. "EGCG likely provides an additional option for a new and potential drug approach for cervical cancer patients," say the authors.

- Colorectal cancer - The authors cite a study at Oregon State University on mice that were genetically predisposed to develop intestinal tumors. After 12 weeks of treatment, the mice that were given green tea had significantly fewer tumors than mice that received no treatment.

- Esophageal cancer - Although studies in laboratory animals have found that green tea polyphenols inhibit the growth of esophageal cancer cells, the results of studies in humans are mixed. The hotter the tea (or any other hot beverage), the greater the risk for developing esophageal cancer, suggests some evidence. However, the authors cite one Chinese study that showed that green tea consumption yielded a reduced risk of up to 60% for developing esophageal cancer.

- Lung cancer - Green tea consumption has been found to be associated with a reduced risk of lung cancer among nonsmokers.

- Other cancers - Numerous studies support the beneficial health effects of green tea on the following types of cancer:

osteosarcoma; pancreatic, prostate, skin, and stomach cancer; and leukemia.

- Human immunodeficiency virus (HIV) infection - EGCG prevents the binding of HIV to human T cells, the first step in HIV infection. Additional research is needed for the clinical application of EGCG as an anti-HIV drug, say the authors.

- Hair and skin health - A study of mice showed that anti-inflammatory and stress-inhibiting effects of green tea polyphenols may influence hair regrowth. EGCG reactivates dying skin cells.

- Endurance - In combination with naturally occurring polyphenols, EGCG boosted endurance exercise performance in lab rats.

- Arthritis - EGCG may inhibit cartilage resorption in arthritic joints and has been shown to protect cartilage destruction in test-tube models that mimic arthritic joints.

- Intestinal disorders - Green tea may help reduce inflammation associated with Crohn's disease and ulcerative colitis.

- Diabetes - Animal studies suggest that green tea may help prevent type 1 diabetes and slow the progression once it has developed. EGCG has been found to increase insulin sensitivity and may repair damaged beta cells.

- Liver disorders - Population-based studies and animal studies have shown that green tea consumption helps protect against liver disorders. Green tea also appears to protect the liver from the damaging effects of toxic substances such as alcohol.

- Neurodegenerative diseases - The authors suggest that the brain-penetrating property of green tea polyphenols, as well as their antioxidant and iron-chelating properties, may make green tea compounds an important class of drugs to be developed to treat neurodegenerative diseases for which oxidative stress has been implicated.

- Fungal infections - EGCG acts as an antifolate compound on *Candida albicans*, disturbing its folic acid metabolism. According to the authors, this could represent a starting point for therapies involving anti-folates and azoles used as an alternative for the treatment of *C. albicans* infections.

- Obesity - EGCG improved weight loss in animal and human studies.

Regarding contraindications, the authors note that green tea contains vitamin K and may interfere with warfarin (based on one person consuming a gallon of green tea daily while on the medicine). Also, people sensitive to caffeine should use caffeine-free green tea or caffeine-free green tea extract. "The years of safe consumption of green tea, backed up by the numerous studies showing health benefits, warrant a general recommendation to consume it regularly. Although the human clinical data is still limited, this abstract shows that green tea has its place in both the conventional and alternative medical communities," say the authors. -Shari Henson

References

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4-Fujiki H, Suganuma M, Kurusu M, et al. *New TNF-alpha releasing inhibitors as cancer preventive agents from traditional herbal medicine and combination cancer prevention study with*

EGCG and sulindac or tamoxifen. Mutat Res. 2003;523-524:119-125.

(6)

Consumption Of Green Tea Associated With Reduced Mortality In Japanese Adults

ScienceDaily (Sep. 13, 2006) — Adults in Japan who consumed higher amounts of green tea had a lower risk of death due to all causes and due to cardiovascular disease, according to a study in the September 13 issue of JAMA. But there was no link between green tea consumption and a reduced risk of death due to cancer.

Tea is the most consumed beverage in the world aside from water. Three billion kilograms of tea are produced each year worldwide, according to background information in the article. Because of the high rates of tea consumption in the global population, even small effects in humans could have large implications for public health. Among teas, green tea polyphenols have been extensively studied as cardiovascular disease (CVD) and cancer chemopreventive agents. Although substantial evidence from in vitro and animal studies indicates that green tea preparations may impede CVD and carcinogenic processes, the possible protective role of green tea consumption against these diseases in humans remains unclear.

Shinichi Kuriyama, M.D., Ph.D., of the Tohoku University School of Public Policy, Sendai, Japan, and colleagues examined the association between green tea consumption and mortality (death rate) due to all causes, CVD, and cancer within a large population. The study, initiated in 1994, included 40,530 adults (age 40 to 79 years) in northeastern Japan, where green tea is widely consumed. Within this region, 80 percent of the population drinks green tea and more than half of them consume 3 or more cups and day. The participants, who had no history of stroke, coronary heart disease, or cancer at baseline, were followed for up to 11 years (1995-2005) for all-cause death and

for up to 7 years (1995-2001) for cause-specific death.

Over 11 years of follow-up, 4,209 participants died, and over 7 years of follow-up, 892 participants died of cardiovascular disease and 1,134 participants died of cancer. The researchers found that green tea consumption was inversely associated with death due to all causes and due to cardiovascular disease.

Compared with participants who consumed less than 1 cup/d of green tea, those who consumed 5 or more cups/d had a risk of all-cause mortality and CVD mortality that was 16 percent lower (during 11 years of follow-up) and 26 percent lower (during 7 years of follow-up), respectively.

These inverse associations of all-cause and CVD mortality were stronger among women, although the inverse association for green tea consumption was observed in both sexes. In women, compared with those who consumed less than 1 cup/d of green tea, those who consumed 5 or more cups/d had a 31 percent lower risk of CVD death.

The researchers found there no significant association between green tea consumption and death from cancer. There were weak or neutral relationships between black tea or oolong tea and mortality.

"Clinical trials are ultimately necessary to confirm the protective effect of green tea on mortality," the authors write.

This study was supported by a Health Sciences Research Grant for Health Services, Ministry of Health, Labour, and Welfare, Japan.

JAMA and Archives Journals (2006, September 13). *Consumption Of Green Tea Associated With Reduced Mortality In Japanese Adults.* ScienceDaily.

(7)

Green Tea And The 'Asian Paradox'

ScienceDaily (Jun. 6, 2006) — There is a lower incidence of cardiovascular disease and cancer in Asia where people smoke heavily, which may be accounted for by high consumption of tea, particularly green tea, according to a review article published by a Yale School of Medicine researcher.

"We do not yet have a full explanation for the 'Asian paradox,' which refers to the very low incidence of both heart disease and cancer in Asia, even though consumption of cigarettes is greater than in most other countries," said Bauer Sumpio, M.D., professor and Chief of Vascular Surgery in the Department of Surgery. "But we now have some theories."

Sumpio, the lead author of the review in the Journal of the American College of Surgeons, said he and his colleagues reviewed more than 100 experimental and clinical studies about green tea in writing the article.

He said one theory is that the average 1.2 liters of green tea consumed daily by many people in Asia offers the anti-oxidant protective effects of the polyphenolic EGCG. EGCG may prevent LDL oxidation, which has been shown to play a key role in the pathophysiology of arteriosclerosis. EGCG also reduces the amount of platelet aggregation, regulates lipids, and promotes proliferation and migration of smooth muscle cells, which are all factors in reducing cardiovascular disease, he said.

Sumpio said other reports show that EGCG prevents growth of certain tumors. Tea, according to studies, also can improve gastrointestinal function, alcohol metabolism, kidney, liver and pancreatic function, protect skin and eyes and alleviate arthritis. Tea has been used in managing and preventing allergies, diabetes, bacterial and viral infections, cavities, reduce or cure diseases with an inflammatory component and improve neurologic and psychological health.

"More studies are necessary to fully elucidate and better understand green tea's method of action, particularly at the cellular level," Sumpio said. "The evidence is strong that green

tea consumption is a useful dietary habit to lower the risk for, as well as treat, a number of chronic diseases. Certainly, however, smoking cessation is the best way to prevent cardiovascular disease and cancer."

Reference: Journal of the American College of Surgeons 202: 813-825 (May 2006)

Yale University (2006, June 6). *Green Tea And The 'Asian Paradox'*. *ScienceDaily*.

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