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[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 51-54 \(2007\)](#)

CAN TREHALOSE HELP ALLEVIATE HUNTINGTON OR ALZHEIMER DISEASE?

Fred Brouns

ABSTRACT: Trehalose, a disaccharide of glucose + glucose with an α , α -1,1 bond, when made available to proteins in states of severe dehydration, has been shown to have physico-chemical properties that make it possible to replace water molecules being lost from the protein, thereby keeping the protein 3-dimensional structures in place. Such events are of crucial importance to survive for microorganisms that undergo regularly severe to total dehydration, as in the desert. These specific properties of trehalose have also been successfully applied in cryo-preservation of blood cells and tissues and allow renewed and full functionality of proteins once thawed. Recently 2 publications have been carried out on the effect of trehalose on brain function disease associated protein structures. One in vivo, in a mouse model of Huntington disease and one in vitro, to study the aggregation process of betaamyloid proteins known to be involved in the etiology of Alzheimer's disease. In the papers of both studies, that observed positive outcomes, it was suggested that oral trehalose might be beneficial to patients suffering from these diseases. Careful evaluation of the digestion, absorption and metabolism of trehalose, however, indicates that more research is required before any recommendation is justified.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 55-66 \(2007\)](#)

CONJUGATED LINOLEIC ACID: SOURCES, SYNTHESIS AND POTENTIAL HEALTH BENEFITSAN OVERVIEW

Ravinder Nagpal, Hariom Yadav, Anil Kumar Puniya, Kishan Singh, Shalini Jain and Francesco Marotta

ABSTRACT: Conjugated linoleic acid is a group of positional and geometrical isomers of linoleic acid (C18:2, cis-9, cis-12), an essential fatty acid for human and animals. It is produced in ruminants via biohydrogenation of poly-unsaturated fatty acids and during the mechanical processing of dairy products. Meat and dairy products from ruminant animals (such as milk, butter, yogurt and cheese) are the

principal natural sources of CLA in the human diet. Because of its reported biological activities (i.e. anticarcinogenic, antiatherogenic, immune-enhancing and weight-reducing properties) in animal models, CLA has become a subject of interest as a supplement for human nutrition. However, further research is required to check the efficacy and role of CLA, the good fat, in cancer and other disease prevention; and to form the basis of evaluating its effect in humans by observational studies and clinical trials.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 67-82 \(2007\)](#)

FRUITS, VEGETABLES AND THEIR PHYTOCHEMICALS FOR BONE AND JOINT HEALTH

C.E. Lister, M.A. Skinner and D.C. Hunter

ABSTRACT: Evidence from a variety of studies strongly points to a positive link between fruit and vegetable consumption and indices of bone and joint health, although there are few human intervention studies using single fruits or vegetables. Positive effects of eating dried plums (prunes) on human bone health have been reported, and animal studies have demonstrated positive effects with a number of fruits and vegetables. Active phytochemicals for bone health such as isoflavones of soybean, flavonoids of orange and onion and a major carotenoid of tomato have been identified. Citrus fruits are implicated in joint health. Flavonoids found in many common fruits and vegetables have anti-inflammatory and antioxidant activity and have demonstrated effects in animals, and cells in culture. Sulphoraphane, an inducer of phase II enzymes, and present in cruciferous vegetables, has effects on cells in culture related to joint health. Given the various modes of action, combinations of phytochemicals may provide a synergistic effect stimulating a greater improvement in maintenance of bone and joint health than is possible from individual components. Fruit and vegetable fibre can stimulate higher calcium absorption from milk, the mineral most recognised as beneficial for bone health. Maximal benefits might only be achieved by consuming the whole fruit or vegetable or a synergistic mix in combination with other foods.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 83-92 \(2007\)](#)

EFFECT OF EGB761 SUPPLEMENTATION ON METALLOTHIONEIN I + II EXPRESSION AFTER 1-METHYL-4-PHENYLPYRIDINIUM NEUROTOXICITY

Norma Serrano-García1, Ulises Rodríguez-Ortiz, Julio Rojas-Castañeda and Patricia Rojas

ABSTRACT: Metallothionein I+II(MTI+II) are neuroprotective proteins with an antioxidant action during 1- methyl-4-phenylpyridinium (MPP+) neurotoxicity, a model of Parkinson's disease. EGb761 has neuroprotective effects, via its antioxidant action. Here, we investigated whether in vivo pretreatment with

EGb761 alters the expression of MT I+ II during MPP+ neurotoxicity. C-57 black mice were pretreated with EGb761 (10 mg/kg) daily for 17 days followed by administration of MPP+ (0.72 mg/kg) and were sacrificed 2 h, 24 h or 7 days later. Quantitative immunohistochemical evaluation of MT I + II expression was significantly elevated at 24 h in the striatum (21%) and substantia nigra (51%) in MPP+ group. Pretreatment with EGb761 in MPP+ group regulated the MT I + II expression at 24 h to the normal levels in striatum and substantia nigra. Results suggest that EGb761-induced MT I + II expression is due to its protective action against MPP+ neurotoxicity.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 93-98 \(2007\)](#)

DIETARY PHYTOSTEROLS INHIBIT THE LIPID MODULATING EFFECTS OF SESAMIN IN RATS
Ali A. Moazzami, Jan Frank, Torbjörn Lundh, Bengt Vessby and Afaf Kamal-Eldin

ABSTRACT: The major lignan in the unsaponifiable fraction of sesame lipids, sesamin, is known to affect lipid metabolism. For example, sesamin inhibits the clearance of tocopherols, the activity of Δ^5 -desaturase during fatty acid metabolism, and reduces cholesterol absorption and biosynthesis. In order to study whether dietary phytosterols, which are known to reduce the absorption of lipid soluble dietary factors, may influence the lipid-modulating effects of sesamin, rats were fed, in a 2X2 Latin-square design, diets containing two concentrations of sesamin and phytosterols for 4 weeks. Tocopherols and cholesterol were analyzed in plasma and liver and the fatty acid profile was determined in liver lipids. Sesamin increased Δ^5 -tocopherol concentrations in plasma and liver ($p < 0.001$), whereas the phytosterols had no effect. However, an increase in the phytosterol content of the diet resulted in a reduction of the Δ^5 -tocopherol-elevating effect of sesamin in plasma ($p < 0.01$). Similarly, sesamin increased the percentage of dihomo-gamma-linolenic acid in liver lipids ($p < 0.05$), which was abolished by the addition of phytosterols. Neither sesamin nor phytosterols significantly altered cholesterol concentrations in plasma or liver. In conclusion, these results suggest that in rats, dietary phytosterols may interact with sesamin in a way reducing its biological activities.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 99-106 \(2007\)](#)

COMPARISON OF RILUZOLE WITH N-ACETYLCYSTEINE AND VITAMIN E AGAINST H₂O₂- AND GLUTAMATE-INDUCED CYTOTOXICITY IN A MOTOR NEURON CELL LINE
Sang-Seob Jang, Jeong-Geun Lim, Bo-Ra Im, Won-Ki Baek and Dae-Kyu Song

ABSTRACT: Amyotrophic lateral sclerosis (ALS) is characterized by selective motor-neuron death, the causes of which may include oxidative stress and glutamate toxicity. Although riluzole is recognized as the only drug to prolong the

life span of ALS patients, the exact way that it works is mainly unknown. We evaluated effects of riluzole and compared it with those of N-acetylcysteine (NAC) and vitamin E in the motor-neuron cell line NSC-34. When the cells were post-treated with each drug for 24 h from the 6-h timepoint after 30-min H₂O₂ treatment, cell survival was all increased without any significant difference in drug potency. In the differentiated NSC34 cells to express functional glutamate receptors, each of the three drugs co-treated with glutamate was effective on glutamate-resistant cell survival. These results suggest that the tested three drugs have similar protective effect in NSC-34 cells against the oxidant and glutamate toxicity, at least in a short-time period.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 107-110 \(2007\)](#)

GREEN TEA COMPONENT, (-)-EPIGALLOCATECHIN GALLATE, BUT NOT L-THEANINE, HAS SEDATIVE EFFECTS IN CHICK UNDER ACUTE STRESS CONDITIONS

Nami Adachi, Yang-Ho Choi, Rie Suenaga¹, Shozo Tomonaga, D. Michael Denbow and Mitsuhiro Furuse

ABSTRACT: Tea has two major components that may act on the brain to reduce stress. One is (-)-epigallocatechin gallate (EGCG), which we have recently shown to cause a sedative effect through gamma-aminobutyric acid (GABA)_A receptors in the brain of neonatal chicks, and another is L-theanine that is shown to induce a feeling of relaxation in humans. The purpose of the present study was to compare the effects of EGCG and theanine on stress in neonatal chicks. Intracerebroventricular (i.c.v.) injection of EGCG (109 nmol) attenuated the increase in vocalization and spontaneous activity that is observed during a 10 min social-isolation stress. Consistent with this result, EGCG decreased the time for active wakefulness while increasing that of sleep-like behavior. L-Theanine (109 nmol) had no effect on these behaviors. It was concluded that central EGCG, but not Ltheanine, plays a role in reducing stress associated with social isolation in our model using neonatal chicks.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 111-120 \(2007\)](#)

LIKE NIACIN DEFICIENT RATS, *CD38*^{-/-} MICE SHOW IMPROVED PERFORMANCE IN THE WATER MAZE

Genevieve S. Young, Elena Choleris, Frances E. Lund and James B. Kirkland

ABSTRACT: CD38 is a type II glycoprotein that catalyzes the formation of the intracellular calcium signalling molecule cyclic ADP-ribose (cADPR) from nicotinamide adenine dinucleotide (NAD⁺), which is derived from dietary niacin. We recently demonstrated that in niacin deficient rats, brain cADPR is decreased and performance in the Morris Water Maze (MWM) is improved. Since brain cADPR is similarly decreased in *Cd38*^{-/-} mice, we used the MWM to determine

whether water maze performance is also improved in CD38 knockouts. In the hidden platform water maze task, Cd38^{-/-} mice showed a reduction in latencies and proximity averages, and a tendency towards greater spatial accuracy in a probe trial, which suggests an improvement in spatial learning ability. However, the effect was less significant than that seen with niacin deficiency. The magnitude of cADPR change was greater in the niacin deficiency models than in Cd38^{-/-} mice (25-35% vs. 16%), so when considered relative to this, these results suggest that although CD38 forms only a portion of brain cADPR, its removal impacts on brain function by a similar mechanism as that of niacin deficiency.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 121-128 \(2007\)](#)

EFFECTS OF DIET ON GROWTH AND EMOTIONALITY IN SWISS WEBSTER MICE

Leslie R. Meek and Bobbie S. Olson

ABSTRACT: This study was designed to investigate the effects of added nutrition on growth and emotionality in mice. Swiss Webster dams were fed one of three diets daily (n=10 in each group): standard chow (control); standard chow plus spinach; or high-fat chow spinach from 2 weeks before conception and throughout lactation. More pups were born in the high-fat chow group and they were significantly larger from birth through day 21 than in the other groups. As adults, animals in the spinach-supplemented groups showed significantly more frequent risk assessment and shorter latencies to those behaviours than did the control group. In contrast, the control group explored an open field significantly sooner and longer and than either spinach-group. The control group also sniffed the open field and the object in it significantly more frequently and with a shorter latency than did the spinach-fed groups. Adding nutritional elements such as fat and spinach to a standard laboratory diet resulted in increased growth and greater levels of emotionality in Swiss Webster mice.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 129-134 \(2007\)](#)

SHORT AND MID-TERM BIOAVAILABILITY OF FLAVANONES FROM ORANGES IN HUMANS

S. De Pascual-Teresa, C. Sánchez-Moreno, F. Granada, B. Olmedilla, B. De Ancos and M. P. Cano

ABSTRACT: Flavanones are a group of flavonoids characteristic of citrus fruits that have been associated with hypocholesterolemic and antioxidative effects. Flavanones from oranges, mainly hesperetin and naringenin, have also been proved to be effective in the inhibition of chemically induced carcinogenesis in animal models. Although there are some studies regarding the bioavailability of flavanones from orange juice or pure compounds, the levels of hesperetin and naringenin that may be reached in plasma after the consumption of oranges in a normal diet in

humans is largely unknown. The purpose of this study was to investigate the effects of single and repeated intakes of a normal amount of orange flavanones on hesperidin and naringin plasma concentrations and antioxidant activity in humans. After ingestion of 400 g of minimally processed orange fruit the levels of plasma hesperetin increased gradually throughout the study period. The maximum level of hesperetin reached in plasma was 148 nmol/L, whereas for naringenin the maximum level was only 15 nmol/L. Plasma FRAP decreased slightly during the study, however this decrease was not significant. In the multiple-dose response study the results showed a significant increase over the baseline levels of hesperetin in plasma after 7 and 14 days of daily ingestion of 200 g orange, thus indicating that the effect obtained after a single-dose ingestion is not predictive of the effect after a multiple-dose regimen.

[Current Topics in Nutraceutical Research, Volume 5, Number 2/3, pp. 135-138 \(2007\)](#)

HYPOZINCEMIA IN BIPOLAR I DISORDER (BID) PATIENTS

Issa Nourmohammadi, Mohammad Ghaderi, Saba Hydar and Ehsan Noormohammadi

ABSTRACT: One-third of the world's population is at risk of zinc deficiency. It has been hypothesized that low serum/plasma zinc may contribute to alteration of brain Zn homeostasis and thus lead to various psychological disorders. This study was designed to evaluate serum zinc (Zn) as well as copper (Cu) concentrations in patients with Bipolar I Disorder (BID) in our community to support the findings on the possible association of Zn in neuropsychological functions. Participants included 30 BID patients with different phases of mania and depression and 30 healthy controls. Results indicated the mean serum Zn level of the BID group was significantly lower than that of controls ($P < 0.0001$). Similar results were obtained for Cu. These findings suggest a possible association of Zn levels on neuropsychological dysfunction.