



NEOLIFE

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TABLE OF CONTENTS

Peer Reviewed Studies.....2
 Blood Sugar Balance2
 Cellular Health.....2
 Cognitive Health.....4
 Heart Health.....6
 Skin Health.....7
 Weight Management.....8

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PEER REVIEWED STUDIES

Fruit and vegetable intake and incidence of type 2 diabetes mellitus: systematic review and meta-analysis

ABSTRACT

OBJECTIVE:

To investigate the independent effects of intake of fruit and vegetables on incidence of type 2 diabetes.

DESIGN:

Systematic review and meta-analysis.

DATA SOURCES:

Medline, Embase, CINAHL, British Nursing Index (BNI), and the Cochrane library were searched for medical subject headings and keywords on diabetes, prediabetes, fruit, and vegetables. Expert opinions were sought and reference lists of relevant articles checked.

STUDY SELECTION:

Prospective cohort studies with an independent measure of intake of fruit, vegetables, or fruit and vegetables and data on incidence of type 2 diabetes.

RESULTS:

Six studies met the inclusion criteria; four of these studies also provided separate information on the consumption of green leafy vegetables. Summary estimates showed that greater intake of green leafy vegetables was associated with a 14% (hazard ratio 0.86, 95% confidence interval 0.77 to 0.97) reduction in risk of type 2 diabetes (P=0.01). The summary estimates showed no significant benefits of increasing the consumption of vegetables, fruit, or fruit and vegetables combined.

CONCLUSION:

Increasing daily intake of green leafy vegetables could significantly reduce the risk of type 2 diabetes and should be investigated further.

Source

Carter P, et al. Fruit and vegetable intake and incidence of type 2 diabetes mellitus: systematic review and meta-analysis. *BMJ*.

2010 Aug 18;341:c4229. doi: 10.1136/bmj.c4229.

BLOOD SUGAR BALANCE

Berries modify the postprandial plasma glucose response to sucrose in healthy subjects

ABSTRACT

Sucrose increases postprandial blood glucose concentrations, and diets with a high glycaemic response may be associated with increased risk of obesity, type 2 diabetes and CVD. Previous studies have suggested that polyphenols may influence carbohydrate digestion and absorption and thereby postprandial glycaemia. Berries are rich sources of various polyphenols and berry products are typically consumed with sucrose. We investigated the glycaemic effect of a berry purée made of bilberries, blackcurrants, cranberries and strawberries, and sweetened with sucrose, in comparison to sucrose with adjustment of available carbohydrates. A total of twelve healthy subjects (eleven women and one man, aged 25-69 years) with normal fasting plasma glucose ingested 150 g of the berry purée with 35 g sucrose or a control sucrose load in a randomised, controlled cross-over design. After consumption of the berry meal, the plasma glucose concentrations were significantly lower at 15 and 30 min (P < 0.05, P < 0.01, respectively) and significantly higher at 150 min (P < 0.05) compared with the control meal. The peak glucose concentration was reached at 45 min after the berry meal and at 30 min after the control meal. The peak increase from the baseline was 1.0 mmol/l smaller (P = 0.002) after ingestion of the berry meal. There was no statistically significant difference in the 3 h area under the glucose response curve. These results show that berries rich in polyphenols decrease the postprandial glucose response of sucrose in healthy subjects. The delayed and attenuated glycaemic response indicates reduced digestion and/or absorption of sucrose from the berry meal.

Source

Törrönen R, et al. Berries modify the postprandial plasma glucose response to sucrose in healthy subjects. *Br J Nutr*. 2010 Apr;103(8):1094-7.

CELLULAR HEALTH

Effect of low carotene diet on malondialdehyde (MDA) concentration

ABSTRACT

OBJECTIVE:

The purpose of the study was to evaluate the effect of a low carotenoid diet (83 micrograms Beta-carotene) on malondialdehyde-thiobarbituric acid (MDA-TBA) concentrations of nine pre-menopausal women.

METHODS:

Subjects lived on the metabolic research unit of the Western Human Nutrition Research Center (WHNRC), where diet, exercise and other activities were controlled. Five subjects (Group C, control group) consumed a low carotenoid diet and received an additional 0.5 mg/day of Beta-carotene while four subjects (Group P, placebo group) received only the low carotenoid diet during days 1 to 60 (period 1). All subjects received 0.5 mg/day of Beta-carotene during days 60 to 100 (period 2), plus three capsules/day mixed carotenoid supplement (Neo-Life Company) during study days 100 to 120. Changes in MDA-TBA concentrations were analyzed during the study periods and between the groups.

RESULTS:

At the start of the study (day 1), no significant difference in the MDA-TBA concentration was observed between the control (Group C) and the placebo (Group P) subjects. During period 1 (days 2 to 60), when Group P subjects consumed the low carotenoid diet without supplementation, the MDA-TBA values for Group P rose markedly and were significantly (p < 0.05) higher than the MDA-TBA values for Group C sub-

jects who were receiving carotenoid supplementation. During period 2 (days 60 to 100) when both groups received carotenoid supplementation, the MDA-TBA values of Group P subjects were significantly ($p < 0.05$) reduced to the point where they were similar to the MDA-TBA values for Group C subjects.

CONCLUSIONS:

These findings provide evidence to support the beneficial effects of carotenoids in preventing lipid peroxidation in the cells. Further studies are needed to identify the exact mechanism by which carotenoids prevent lipid peroxidation and the amount needed for normal activity.

Source

Dixon ZR, et al. Effect of low carotene diet on malondialdehyde (MDA) concentration; *Free Radic Biol Med.* 1996.

Effects of a carotene-deficient diet on measures of oxidative susceptibility and superoxide dismutase activity in adult women

ABSTRACT

The effect of consuming a low carotene diet (approximately 60 micrograms carotene/day) on oxidative susceptibility and superoxide dismutase (SOD) activity in women living in a metabolic research unit was evaluated. The diet had sufficient vitamins A, E, and C. The women ate the diet-supplemented with 1500 micrograms/day beta-carotene for 4 days (baseline), then the unsupplemented diet for 68 days (depletion), followed by the diet supplemented with > 15,000 micrograms/day carotene for 28 days (repletion). Production of hexanal, pentanal, and pentane by copper-oxidized plasma low density lipoproteins from carotene-depleted women was greater than their production of these compounds when repleted with carotene. Erythrocyte SOD activity was depressed in carotene-depleted women; it recovered with repletion. Thiobarbituric acid reactive substances in plasma of carotene-depleted women were elevated and diminished with repletion. Dietary carotene seems to be needed, not only as a precursor of vitamin

A, but also to inhibit oxidative damage and decrease oxidation susceptibility.

Source

Dixon ZR, et al. Effects of a carotene-deficient diet on measures of oxidative susceptibility and superoxide dismutase activity in adult women. *Free Radic Biol Med.* 1994 Dec;17(6):537-44.

Select dietary flavonoids are associated with markers of inflammation and endothelial dysfunction in US women

ABSTRACT

Flavonoids show antiinflammatory effects in vitro and human intervention studies have suggested beneficial effects of flavonoid-rich foods on biomarkers of inflammation and endothelial function. In the present study, we assessed the relationship between flavonoid intake and biomarkers of inflammation and endothelial dysfunction in a cross-sectional study of participants from the Nurses' Health Study cohort. Intake of 6 flavonoid subclasses (flavonols, flavones, flavanones, flavan-3-ols, anthocyanidins, and polymeric flavonoids) was assessed using a FFQ administered in 1990. Also, the main food sources of these flavonoids were examined. Blood samples were collected in 1989–1990 and plasma C-reactive protein (CRP), IL-6, IL-18, soluble tumor necrosis factor receptor-2 (sTNF-R2), soluble intercellular adhesion molecule-1, soluble vascular adhesion molecule-1 (sVCAM-1), and E-selectin were measured in 1194–1598 women. The multivariate-adjusted geometric mean of plasma IL-8 were lower for women in the highest intake quintile of flavones, flavanones, and total flavonoids compared with those in the lowest quintiles by 9% (Q1: 264 ng/L, Q5: 241 ng/L; P-trend = 0.019), 11% (Q1: 273 ng/L, Q5: 244 ng/L; P-trend = 0.011), and 8% (Q1: 276 ng/L, Q5: 55 ng/L; P-trend = 0.034), respectively. The multivariate-adjusted geometric mean for women in the highest intake quintile of flavonol compared with those in the lowest quintile was 4% lower for sVCAM-1 (Q1: 578 µg/L, Q5: 557 µg/L; P-trend = 0.012). Among flavonoid-rich foods, higher intake of grapefruit was significantly associated with lower concen-

trations of CRP and sTNF-R2. In summary, higher intakes of selected flavonoid subclasses were associated with modestly lower concentrations of inflammatory biomarkers. In particular, flavonoids typically found in citrus fruits were modestly associated with lower plasma IL-18 concentrations.

Source

Landberg R, et al. Select dietary flavonoids are associated with markers of inflammation and endothelial dysfunction in US women. *Journal of nutrition*, April 2011, doi: 10.3945/jn.101.133843

The carotenoid beta-cryptoxanthin stimulates the repair of DNA oxidation damage in addition to acting as an antioxidant in human cells

ABSTRACT

The role of dietary antioxidants in human health remains controversial. Fruits and vegetables in the diet are associated with lower rates of chronic disease, and this is often attributed to their content of antioxidants, and a resulting protection against oxidative stress. However, large-scale human trials with antioxidant supplements have shown, if anything, an increase in mortality. We have investigated the biological properties of beta-cryptoxanthin, a common carotenoid, in cell culture model systems, using the comet assay to measure DNA damage. At low concentrations, close to those found in plasma, beta-cryptoxanthin does not itself cause damage, but protects transformed human cells (HeLa and Caco-2) from damage induced by H₂O₂ or by visible light in the presence of a photosensitizer. In addition, it has a striking effect on DNA repair, measured in different ways. Incubation of H₂O₂-treated cells with beta-cryptoxanthin led to a doubling of the rate of rejoining of strand breaks and had a similar effect on the rate of removal of oxidized purines by base excision repair. The latter effect was confirmed with an in vitro assay: cells were incubated with or without beta-cryptoxanthin before preparing an extract, which was then incubated with substrate DNA containing 8-oxo-7,8-dihydroguanine; incision

was more rapid with the extract prepared from carotenoid-preincubated cells. No significant increases were seen in protein content of human 8-oxoguanine DNA glycosylase 1 or apurinic endonuclease 1. The apparent cancer-preventive effects of dietary carotenoids may depend on the enhancement of DNA repair as well as antioxidant protection against damage.

Source

Lorenzo Y, et al. The carotenoid beta-cryptoxanthin stimulates the repair of DNA oxidation damage in addition to acting as an antioxidant in human cells. *Carcinogenesis*. 2009 Feb;30(2):308-14.

COGNITIVE HEALTH

Neural effects of green tea extract on dorsolateral prefrontal cortex

ABSTRACT

BACKGROUND/OBJECTIVES:

Green tea is being recognized as a beverage with potential benefits for human health and cognitive functions. In vivo studies provide preliminary evidence that green tea intake may have a positive role in improving effects on cognitive functions. We aimed to examine the neural effects of green tea extract on brain activation in humans.

SUBJECTS/METHODS:

Functional magnetic resonance imaging was recorded while 12 healthy volunteers performed a working memory task following administration of 250 or 500 ml of a milk whey based green tea containing soft drink or milk whey based soft drink without green tea as control in a double-blind, controlled repeated measures within-subject design with counterbalanced order of substance administration. A whole-brain analysis with a cluster-level threshold of $P < 0.001$ (unadjusted) was followed by an a priori-defined region of interest (ROI) analysis of the dorsolateral prefrontal cortex (DLPFC) including a cluster-level threshold of $P < 0.05$ and family-wise error (FWE) adjustment for multiple comparisons.

RESULTS:

Whole-brain analyses revealed no significant effects after correction for multiple comparisons (FWE $P < 0.05$). Using a ROI approach, green tea extract increased activation in the DLPFC relative to a control condition (FWE $P < 0.001$). This neural effect was related to green tea dosage. Green tea extract was not associated with any significant attenuation in regional activation relative to control condition.

CONCLUSIONS:

These data suggest that green tea extract may modulate brain activity in the DLPFC, a key area that mediates working memory processing in the human brain. Moreover, this is the first neuroimaging study implicating that functional neuroimaging methods provide a means of examining how green tea extract acts on the brain.

Source

Borgwardt S et. al. Neural effects of green tea extract on dorsolateral prefrontal cortex. *Eur J Clin Nutr*. 2012;66(11):1187-92.

Dietary intakes of berries and flavonoids in relation to cognitive decline

ABSTRACT

OBJECTIVE:

Berries are high in flavonoids, especially anthocyanidins, and improve cognition in experimental studies. We prospectively evaluated whether greater long-term intakes of berries and flavonoids are associated with slower rates of cognitive decline in older women.

METHODS:

Beginning in 1980, a semiquantitative food frequency questionnaire was administered every 4 years to Nurses' Health Study participants. In 1995-2001, we began measuring cognitive function in 16,010 participants, aged ≥ 70 years; follow-up assessments were conducted twice, at 2-year intervals. To ascertain long-term diet, we averaged dietary variables from 1980 through the initial cognitive interview. Using multivariate-adjusted, mixed linear regression, we estimated mean differences in slopes of cognitive decline by long-term berry and flavonoid intakes.

RESULTS:

Greater intakes of blueberries and strawberries were associated with slower rates of cognitive decline (eg, for a global score averaging all 6 cognitive tests, for blueberries: p-trend = 0.014 and mean difference = 0.04, 95% confidence interval [CI] = 0.01-0.07, comparing extreme categories of intake; for strawberries: p-trend = 0.022 and mean difference = 0.03, 95% CI = 0.00-0.06, comparing extreme categories of intake), after adjusting for multiple potential confounders. These effect estimates were equivalent to those we found for approximately 1.5 to 2.5 years of age in our cohort, indicating that berry intake appears to delay cognitive aging by up to 2.5 years. Additionally, in further supporting evidence, greater intakes of anthocyanidins and total flavonoids were associated with slower rates of cognitive decline (p-trends = 0.015 and 0.053, respectively, for the global score).

INTERPRETATION:

Higher intake of flavonoids, particularly from berries, appears to reduce rates of cognitive decline in older adults.

Source

Devore EE, Kang JH, Breteler MM, Grodstein F. Dietary intakes of berries and flavonoids in relation to cognitive decline. *Ann Neurol*. 2012;72(1):135-43.

Berry fruit enhances beneficial signaling in the brain

ABSTRACT

Increased lifespans have led to population aging and brought attention to healthcare concerns associated with old age. A growing body of preclinical and clinical research has identified neurological benefits associated with the consumption of berry fruits. In addition to their now well-known antioxidant effects, dietary supplementation with berry fruits also has direct effects on the brain. Intake of these fruits may help to prevent age-related neurodegeneration and resulting changes in cognitive and motor function. In cell and animal models, berry fruits mediate signaling pathways involved in inflammation and cell survival in addition

to enhancing neuroplasticity, neurotransmission, and calcium buffering, all of which lead to attenuation of age- and pathology-related deficits in behavior. Recent clinical trials have extended these antioxidant, anti-inflammatory, and cognition-sparing effects to humans. This paper reviews recent evidence for the beneficial signaling effects of berry fruits on the brain and behavior.

Source

Miller MG, Shukitt-Hale B. Berry fruit enhances beneficial signaling in the brain. *J. Agric. Food Chem.*, 2012, 60 (23): 5709–5715.

A combination of green tea extract and L-theanine improve memory and attention in subjects with mild cognitive impairment: A double blind placebo controlled study

ABSTRACT

A combination of green tea extract and L-theanine (LGNC-07) has been reported to have beneficial effects on cognition in animal studies. In this randomized, double-blind, placebo-controlled study, the effect of LGNC-07 on memory and attention in subjects with mild cognitive impairment (MCI) was investigated. Ninety-one MCI subjects whose Mini Mental State Examination-K (MMSE-K) scores were between 21 and 26 and who were in either stage 2 or 3 on the Global Deterioration Scale were enrolled in this study. The treatment group (13 men, 32 women; 57.58±9.45 years) took 1,680mg of LGNC-07, and the placebo group (12 men, 34 women; 56.28±9.92 years) received an equivalent amount of maltodextrin and lactose for 16 weeks. Neuropsychological tests (Rey–Kim memory test and Stroop color–word test) and electroencephalography were conducted to evaluate the effect of LGNC-07 on memory and attention. Further analyses were stratified by baseline severity to evaluate treatment response on the degree of impairment (MMSE-K 21–23 and 24–26). LGNC-07 led to improvements in memory by marginally increasing delayed recognition in the Rey–Kim memory test ($P = .0572$). Stratified analyses showed that LGNC-07 improved memory and selective attention by signifi-

cantly increasing the Rey–Kim memory quotient and word reading in the subjects with MMSE-K scores of 21–23 (LGNC-07, $n = 11$; placebo, $n = 9$). Electroencephalograms were recorded in 24 randomly selected subjects hourly for 3 hours in eye-open, eye-closed, and reading states after a single dose of LGNC-07 (LGNC-07, $n = 12$; placebo, $n = 12$). Brain theta waves, an indicator of cognitive alertness, were increased significantly in the temporal, frontal, parietal, and occipital areas after 3 hours in the eye-open and reading states. Therefore, this study suggests that LGNC-07 has potential as an intervention for cognitive improvement.

Source

Park SK, et al. A combination of green tea extract and L-theanine improve memory and attention in subjects with mild cognitive impairment: A double blind placebo controlled study. *Journal of Medicinal Foods*, 2011; 14(4): 334-343

Prion protein-mediated neurotoxicity of amyloid- β oligomers requires lipid rafts and the transmembrane LRP1

ABSTRACT

Soluble oligomers of the amyloid- β ($A\beta$) peptide cause neurotoxicity, synaptic dysfunction, and memory impairments that underlie Alzheimer disease (AD). The cellular prion protein (PrPC) was recently identified as a high affinity neuronal receptor for $A\beta$ oligomers. We report that fibrillar $A\beta$ oligomers recognized by the OC antibody, which have been shown to correlate with the onset and severity of AD, bind preferentially to cells and neurons expressing PrPC. The binding of $A\beta$ oligomers to cell surface PrPC, as well as their downstream activation of Fyn kinase, was dependent on the integrity of cholesterol-rich lipid rafts. In SH-SY5Y cells, fluorescence microscopy and co-localization with subcellular markers revealed that the $A\beta$ oligomers co-internalized with PrPC, accumulated in endosomes, and subsequently trafficked to lysosomes. The cell surface binding, internalization, and downstream toxicity of $A\beta$ oligomers was dependent on the transmembrane low density lipoprotein receptor-

related protein-1 (LRP1). The binding of $A\beta$ oligomers to cell surface PrPC impaired its ability to inhibit the activity of the β -secretase BACE1, which cleaves the amyloid precursor protein to produce $A\beta$. The green tea polyphenol (–)-epigallocatechin gallate and the red wine extract resveratrol both remodeled the fibrillar conformation of $A\beta$ oligomers. The resulting nonfibrillar oligomers displayed significantly reduced binding to PrPC-expressing cells and were no longer cytotoxic. These data indicate that soluble, fibrillar $A\beta$ oligomers bind to PrPC in a conformation-dependent manner and require the integrity of lipid rafts and the transmembrane LRP1 for their cytotoxicity, thus revealing potential targets to alleviate the neurotoxic properties of $A\beta$ oligomers in AD.

Source

Rushworth JV et. al. Prion protein-mediated neurotoxicity of amyloid- β oligomers requires lipid rafts and the transmembrane LRP1. *Journal of Biological Chemistry* 2013;288: 8935-8951.

Obesity phenotypes in midlife and cognition in early old age. The Whitehall II cohort study

ABSTRACT

OBJECTIVE:

To examine the association of body mass index (BMI) and metabolic status with cognitive function and decline.

METHODS:

A total of 6,401 adults (71.2% men), aged 39–63 years in 1991–1993, provided data on BMI (normal weight 18.5–24.9 kg/m², overweight 25–29.9 kg/m²; and obese ≥ 30 kg/m²) and metabolic status (abnormality defined as 2 or more of 1) triglycerides ≥ 1.69 mmol/L or lipid-lowering drugs, 2) systolic blood pressure ≥ 130 mm Hg, diastolic blood pressure ≥ 85 mm Hg, or anti-hypertensive drugs, 3) glucose ≥ 5.6 mmol/L or medications for diabetes, and 4) high-density lipoprotein cholesterol < 1.04 mmol/L for men and < 1.29 mmol/L for women). Four cognitive tests (memory, reasoning, semantic, and phonemic fluency) were administered in 1997–1999, 2002–

2004, and 2007–2009, standardized to z scores, and averaged to yield a global score.

RESULTS:

Of the participants, 31.0% had metabolic abnormalities, 52.7% were normal weight, 38.2% were overweight, and 9.1% were obese. Among the obese, the global cognitive score at baseline ($p = 0.82$) and decline ($p = 0.19$) over 10 years was similar in the metabolically normal and abnormal groups. In the metabolically normal group, the 10-year decline in the global cognitive score was similar (p for trend = 0.36) in the normal weight (−0.40; 95% confidence interval [CI] −0.42 to −0.38), overweight (−0.42; 95% CI −0.45 to −0.39), and obese (−0.42; 95% CI −0.50 to −0.34) groups. However, in the metabolically abnormal group, the decline on the global score was faster among obese (−0.49; 95% CI −0.55 to −0.42) than among normal weight individuals (−0.42; 95% CI −0.50 to −0.34), ($p = 0.03$).

CONCLUSIONS:

In these analyses the fastest cognitive decline was observed in those with both obesity and metabolic abnormality.

Source

Singh-Manoux A. et al. Obesity phenotypes in midlife and cognition in early old age. The Whitehall II cohort study. *Neurology* 2012;79 (8):755-762.

HEART HEALTH

Select dietary flavonoids are associated with markers of inflammation and endothelial dysfunction in US women

ABSTRACT

Flavonoids show antiinflammatory effects in vitro and human intervention studies have suggested beneficial effects of flavonoid-rich foods on biomarkers of inflammation and endothelial function. In the present study, we assessed the relationship between flavonoid intake and biomarkers

of inflammation and endothelial dysfunction in a cross-sectional study of participants from the Nurses' Health Study cohort. Intake of 6 flavonoid subclasses (flavonols, flavones, flavanones, flavan-3-ols, anthocyanidins, and polymeric flavonoids) was assessed using a FFQ administered in 1990. Also, the main food sources of these flavonoids were examined. Blood samples were collected in 1989–1990 and plasma C-reactive protein (CRP), IL-6, IL-18, soluble tumor necrosis factor receptor-2 (sTNF-R2), soluble intercellular adhesion molecule-1, soluble vascular adhesion molecule-1 (sVCAM-1), and E-selectin were measured in 1194–1598 women. The multivariate-adjusted geometric mean of plasma IL-8 were lower for women in the highest intake quintile of flavonols, flavanones, and total flavonoids compared with those in the lowest quintiles by 9% (Q1: 264 ng/L, Q5: 241 ng/L; P -trend = 0.019), 11% (Q1: 273 ng/L, Q5: 244 ng/L; P -trend = 0.011), and 8% (Q1: 276 ng/L, Q5: 55 ng/L; P -trend = 0.034), respectively. The multivariate-adjusted geometric mean for women in the highest intake quintile of flavonol compared with those in the lowest quintile was 4% lower for sVCAM-1 (Q1: 578 μ g/L, Q5: 557 μ g/L; P -trend = 0.012). Among flavonoid-rich foods, higher intake of grapefruit was significantly associated with lower concentrations of CRP and sTNF-R2. In summary, higher intakes of selected flavonoid subclasses were associated with modestly lower concentrations of inflammatory biomarkers. In particular, flavonoids typically found in citrus fruits were modestly associated with lower plasma IL-18 concentrations.

Source

Landberg R, et al. Select dietary flavonoids are associated with markers of inflammation and endothelial dysfunction in US women. *Journal of nutrition*, April 2011, doi: 10.3945/jn.101.133843

Total antioxidant capacity of diet and risk of stroke: a population-based prospective cohort of women

ABSTRACT

BACKGROUND AND PURPOSE:

Consumption of antioxidant-rich foods may reduce the risk of stroke by inhibition of oxidative stress and inflammation. Total antioxidant capacity (TAC) takes into account all antioxidants and the synergistic effects between them. We examined the association between dietary TAC and stroke incidence in cardiovascular disease (CVD)-free women and in women with CVD history at baseline.

METHODS:

The study included women (31,035 CVD-free and 5680 with CVD history at baseline), aged 49 to 83 years, from the Swedish Mammography Cohort. Diet was assessed with a food frequency questionnaire. Dietary TAC was calculated using oxygen radical absorbance capacity values. Stroke cases were ascertained by linkage with the Swedish Hospital Discharge Registry.

RESULTS:

During follow-up (September 1997 to December 2009), we identified 1322 stroke cases (988 cerebral infarctions, 226 hemorrhagic strokes, and 108 unspecified strokes) among CVD-free women and 1007 stroke cases (796 cerebral infarctions, 100 hemorrhagic strokes, and 111 unspecified strokes) among women with a CVD history. The multivariable hazard ratio of total stroke comparing the highest with the lowest quintile of dietary TAC was 0.83 (95% CI, 0.70-0.99; P for trend=0.04) in CVD-free women. Among women with a CVD history, the hazard ratios for the highest versus lowest quartile of TAC were 0.90 (95% CI, 0.75-1.07; P for trend=0.30) for total stroke and 0.55 (95% CI, 0.32-0.95; P for trend=0.03) for hemorrhagic stroke.

CONCLUSIONS:

These findings suggest that dietary TAC is inversely associated with total stroke among CVD-free women and hemorrhagic stroke among women with CVD history.

Source

Rautiainen S, Larsson S, Virtamo J, Wolk A. Total antioxidant capacity of diet and risk of stroke: a population-based prospective cohort of women. *Stroke* 2012;43(2):335-40.

Berries modify the postprandial plasma glucose response to sucrose in healthy subjects

ABSTRACT

Sucrose increases postprandial blood glucose concentrations, and diets with a high glycaemic response may be associated with increased risk of obesity, type 2 diabetes and CVD. Previous studies have suggested that polyphenols may influence carbohydrate digestion and absorption and thereby postprandial glycaemia. Berries are rich sources of various polyphenols and berry products are typically consumed with sucrose. We investigated the glycaemic effect of a berry purée made of bilberries, blackcurrants, cranberries and strawberries, and sweetened with sucrose, in comparison to sucrose with adjustment of available carbohydrates. A total of twelve healthy subjects (eleven women and one man, aged 25-69 years) with normal fasting plasma glucose ingested 150 g of the berry purée with 35 g sucrose or a control sucrose load in a randomised, controlled cross-over design. After consumption of the berry meal, the plasma glucose concentrations were significantly lower at 15 and 30 min ($P < 0.05$, $P < 0.01$, respectively) and significantly higher at 150 min ($P < 0.05$) compared with the control meal. The peak glucose concentration was reached at 45 min after the berry meal and at 30 min after the control meal. The peak increase from the baseline was 1.0 mmol/l smaller ($P = 0.002$) after ingestion of the berry meal. There was no statistically significant difference in the 3 h area under the glucose response curve. These results show that berries rich in polyphenols decrease the postprandial glucose response of sucrose in healthy subjects. The delayed and attenuated glycaemic response indicates reduced digestion and/

or absorption of sucrose from the berry meal.

Source

Törrönen R, et al. Berries modify the postprandial plasma glucose response to sucrose in healthy subjects. *Br J Nutr.* 2010 Apr;103(8):1094-7.

SKIN HEALTH

Polyphenols: Skin photoprotection and inhibition of photo-carcinogenesis

ABSTRACT

Polyphenols are a large family of naturally occurring plant products and are widely distributed in plant foods, such as, fruits, vegetables, nuts, flowers, bark and seeds, etc. These polyphenols contribute to the beneficial health effects of dietary products. Clinical and epidemiological studies suggest that exposure of the skin to environmental factors/pollutants, such as solar ultraviolet (UV) radiation induce harmful effects and leads to various skin diseases including the risk of melanoma and non-melanoma skin cancers. The incidence of non-melanoma skin cancer, comprising of squamous cell carcinoma and basal cell carcinoma, is a significant public health concern world-wide. Exposure of the skin to solar UV radiation results in inflammation, oxidative stress, DNA damage, dysregulation of cellular signaling pathways and immunosuppression thereby resulting in skin cancer. The regular intake of natural plant products, especially polyphenols, which are widely present in fruits, vegetables, dry legumes and beverages have gained considerable attention as protective agents against the adverse effects of UV radiation. In this article, we first discussed the impact of polyphenols on human health based on their structure-activity relationship and bioavailability. We then discussed in detail the photoprotective effects of some selected polyphenols on UV-induced skin inflammation, proliferation, immunosuppression, DNA damage and dysregulation of important cellular signaling path-

ways and their implications in skin cancer management. The selected polyphenols include: green tea polyphenols, pomegranate fruit extract, grape seed proanthocyanidins, resveratrol, silymarin, genistein and delphinidin. The new information on the mechanisms of action of these polyphenols supports their potential use in skin photoprotection and prevention of photocarcinogenesis in humans.

Source

Afaq F et al. Polyphenols: Skin photoprotection and inhibition of photo-carcinogenesis. *Mini Rev Med Chem* 11:1200-1215, 2011.

Botanicals in Dermatology: An Evidence based Review

ABSTRACT

Botanical extracts and single compounds are increasingly used in cosmetics but also in over-the-counter drugs and food supplements. The focus of the present review is on controlled clinical trials with botanicals in the treatment of acne, inflammatory skin diseases, skin infections, UV-induced skin damage, skin cancer, alopecia, vitiligo, and wounds. Studies with botanical cosmetics and drugs are discussed, as well as studies with botanical food supplements. Experimental research on botanicals was considered to a limited extent when it seemed promising for clinical use in the near future. In acne therapy, Mahonia, tea tree oil, and *Saccharomyces* may have the potential to become standard treatments. Mahonia, *Hypericum*, *Glycyrrhiza* and some traditional Chinese medicines appear promising for atopic dermatitis. Some plant-derived substances like diethanol and methoxsalen (8-methoxypsoralen) [in combination with UVA] are already accepted as standard treatments in psoriasis; Mahonia and *Capsicum* (capsaicin) are the next candidates suggested by present evidence. Oral administration and topical application of antioxidant plant extracts (green and black tea, carotenoids, coffee, and many flavonoids from fruits and vegetables) can protect skin from UV-induced erythema, early aging, and irradiation-induced cancer. Hair loss and vitiligo are also traditional

fields of application for botanicals. According to the number and quality of clinical trials with botanicals, the best evidence exists for the treatment of inflammatory skin diseases, i.e. atopic dermatitis and psoriasis. However, many more controlled clinical studies are needed to determine the efficacy and risks of plant-derived products in dermatology. Safety aspects, especially related to sensitization and photodermatitis, have to be taken into account. Therefore, clinicians should not only be informed of the beneficial effects but also the specific adverse effects of botanicals used for dermatologic disorders and cosmetic purposes.

Source

Reuter J et al. Botanicals in Dermatology: An Evidence based Review. *Am J Clin Dermatol* 11:247-67, 2010.

Oral green tea catechin metabolites are incorporated into human skin and protect against UV radiation-induced cutaneous inflammation in association with reduced production of pro-inflammatory eicosanoid 12-hydroxyeicosatetraenoic acid

ABSTRACT

Green tea catechins (GTC) reduce UV radiation (UVR)-induced inflammation in experimental models, but human studies are scarce and their cutaneous bioavailability and mechanism of photoprotection are unknown. We aimed to examine oral GTC cutaneous uptake, ability to protect human skin against erythema induced by a UVR dose range and impact on potent cyclo-oxygenase- and lipoxygenase-produced mediators of UVR inflammation, PGE2 and 12-hydroxyeicosatetraenoic acid (12-HETE), respectively. In an open oral intervention study, sixteen healthy human subjects (phototype I/II) were given low-dose GTC (540 mg) with vitamin C (50 mg) daily for 12 weeks. Pre- and post-supplementation, the buttock skin was exposed to UVR and the resultant erythema quantified. Skin blister fluid and biopsies were taken from the unexposed and the UVR-exposed skin 24 h after a pro-inflammatory UVR challenge (three minimal erythema doses). Urine, skin tissue and fluid were analysed for catechin content and skin fluid for PGE2 and 12-HETE

by liquid chromatography coupled to tandem MS. A total of fourteen completing subjects were supplement compliant (twelve female, median 42.5 years, range 29-59 years). Benzoic acid levels were increased in skin fluid post-supplementation ($P= 0.03$), and methylated gallic acid and several intact catechins and hydroxyphenyl-valerolactones were detected in the skin tissue and fluid. AUC analysis for UVR erythema revealed reduced response post-GTC ($P= 0.037$). Pre-supplementation, PGE2 and 12-HETE were UVR induced ($P= 0.003, 0.0001$). After GTC, UVR-induced 12-HETE reduced from mean 64 (sd 42) to 41 (sd 32) pg/ μ l ($P= 0.01$), while PGE2 was unaltered. Thus, GTC intake results in the incorporation of catechin metabolites into human skin associated with abrogated UVR-induced 12-HETE; this may contribute to protection against sunburn inflammation and potentially longer-term UVR-mediated damage.

Source

Rhodes LE et al. Oral green tea catechin metabolites are incorporated into human skin and protect against UV radiation-induced cutaneous inflammation in association with reduced production of pro-inflammatory eicosanoid 12-hydroxyeicosatetraenoic acid. *Br*

Discovering the link between nutrition and skin aging. Review

ABSTRACT

Skin has been reported to reflect the general inner-health status and aging. Nutrition and its reflection on skin has always been an interesting topic for scientists and physicians throughout the centuries worldwide. Vitamins, carotenoids, tocopherols, flavonoids and a variety of plant extracts have been reported to possess potent anti-oxidant properties and have been widely used in the skin care industry either as topically applied agents or oral supplements in an attempt to prolong youthful skin appearance. This review will provide an overview of the current literature "linking" nutrition with skin aging.

Source

Schagen S et al. Discovering the link between nutrition and skin aging. Review. *Dermato-Endocrinol* 4:298-307, 2012.

WEIGHT MANAGEMENT

Critical Review. Laboratory, epidemiological, and human intervention studies show that tea (*Camellia sinensis*) may be useful in the prevention of obesity

ABSTRACT

Tea (*Camellia sinensis*, Theaceae) and tea polyphenols have been studied for the prevention of chronic diseases, including obesity. Obesity currently affects >20% of adults in the United States and is a risk factor for chronic diseases such as type II diabetes, cardiovascular disease, and cancer. Given this increasing public health concern, the use of dietary agents for the prevention of obesity would be of tremendous benefit. Whereas many laboratory studies have demonstrated the potential efficacy of green or black tea for the prevention of obesity, the underlying mechanisms remain unclear. The results of human intervention studies are mixed and the role of caffeine has not been clearly established. Finally, there is emerging evidence that high doses of tea polyphenols may have adverse side effects. Given that the results of scientific studies on dietary components, including tea polyphenols, are often translated into dietary supplements, understanding the potential toxicities of the tea polyphenols is critical to understanding their potential usefulness in preventing obesity. In this review, we will critically evaluate the evidence for the prevention of obesity by tea, discuss the relevance of proposed mechanisms in light of tea polyphenol bioavailability, and review the reports concerning the toxic effects of high doses of tea polyphenols and the implication that this has for the potential use of tea for the prevention of obesity. We hope that this review will expose areas for further study and encourage research on this important public health issue.

Source

Grove KA and Lambert JD. Critical Review. Laboratory, epidemiological, and human intervention studies show that tea (*Camellia sinensis*) may be useful in the prevention of obesity. *J of Nutr* 140:446-53, 2010.