May, 2013

**Carotenoids, Lutein, Zeaxanthin, BCX**


The Protective Effects of β-Cryptoxanthin on Inflammatory Bone Resorption in a Mouse Experimental Model of Periodontitis.


We examined the effects of β-cryptoxanthin, a typical carotenoid, on inflammatory periodontitis. β-Cryptoxanthin suppressed lipopolysaccharide (LPS)-induced osteoclast formation in co-cultures of bone marrow cells and osteoblasts. In a mouse model of periodontitis, it suppressed bone resorption in the mandibular alveolar bone in vitro and restored alveolar bone loss induced by LPS in vivo. **β-Cryptoxanthin might protect against periodontal disease.**

PMID: 23615426


Erratum: Lutein decreases oxidative stress and inflammation in liver and eyes of guinea pigs fed a hypercholesterolemic diet.

Kim JE, Clark RM, Park Y, Lee J, Fernandez ML.

[This corrects the article on p. 113 in vol. 6, PMID: 22586499.].

PMID: 23610608

[PubMed - as supplied by publisher]

PMCID: PMC3627932

**BMC Int Health Hum Rights.** 2013 Apr 22;13(1):21. [Epub ahead of print]

Cross-sectional dietary deficiencies among a prison population in Papua New Guinea.


**BACKGROUND:** To investigate the dietary adequacy of prisoners of Beon Prison, Madang, Papua New Guinea in response to a report of possible nutritional deficiency.

**METHODS:** We undertook an observational, cross-sectional study. All 254 male inmates (May 2010) were eligible to answer a validated interview-based questionnaire; to have a comprehensive dietary assessment; and to provide blood for biochemical analysis (alpha-tocopherol, beta-carotene, lutein, thiamin, riboflavin, niacin, folate, homocysteine, zinc, ferritin, and vitamins A, B12 and C). Prison guards were invited to participate as a comparison group.

**RESULTS:** 148 male prisoners (58.3%) and 13 male prison guards participated. **Prison rations** consisted of white rice fortified with thiamin, niacin, and iron, tinned tuna, tinned corned beef, water crackers, and black tea, with **occasional intakes of fruit and vegetables.** Some prisoners received supplementary food from weekend visitors. From assessment of the prisoners dietary data, median intakes of calcium (137 mg), potassium (677 mg), magnesium 182 mg, riboflavin (0.308 mg), vitamin A (54.1 mug), vitamin E (1.68 mg), vitamin C (5.7 mg) and folate (76.4 mug) were found to be below estimated average requirements (EAR). Following are the prisoners median (P25, P75) concentration of circulating nutrients and the percentage of prisoners with levels below normal reference ranges or recognized cut-off values: serum retinol 0.73 (0.40, 1.21) mumol/L, 46% below 0.7 mumol/L; plasma folate 2.0 (1.4, 2.6) nmol/L, 98% below 6.8 nmol/L; plasma vitamin C 6.3 (1.0, 19.3) mumol/L, 64% below 11.4 mumol/L; serum zinc 9.9 (8.8, 11.1) mumol/L, 66% below 10.7 mumol/L. **Guards had diets with a higher dietary diversity that were associated with greater intakes of nutrients and biomarker concentrations.**

**CONCLUSIONS:** The prisoners diets are likely lacking in several micronutrients and recommendations for dietary change have been made to the prison authorities. Ongoing vigilance is required in prisons to ensure the basic human right of access to a nutritionally adequate diet is being observed.

PMID: 23601963
The effect of dietary supplementation with the natural carotenoids curcumin and lutein on broiler pigmentation and immunity

Rajput, N.a, Naeem, M.a, Ali, S.b, Zhang, J.F.a, Zhang, L.a, Wang, T.a

The objective of this study was to compare the effects of supplementation with 2 carotenoids, curcumin and lutein, on pigmentation and immunity in lipopolysaccharide (LPS)-stimulated broiler chicks. Two hundred forty 1-d-old Arbor Acres broilers were randomly distributed into 3 dietary treatment groups: a basal diet without carotenoid supplementation (control), a basal diet supplemented with 200 mg/kg of curcumin (CRM), or a basal diet supplemented with 200 mg/kg of lutein (LTN) for 42 d. The birds were vaccinated against Newcastle disease (ND) and avian influenza on d 10. At 16, 18, and 20 d of age, half of the chicks in each group were injected in the abdominal region with either LPS (250 mg/kg of BW) or an equal volume of 0.9% NaCl. The intensity of the shank skin color (Roche color fan score) and the b* (yellow) values of the breasts and thighs were highest in lutein-supplemented broilers, followed by curcumin-supplemented and control broilers, whereas the a* (red) value of the thigh muscle was highest in curcumin-supplemented LPS-induced birds. At 42 d, the relative weight of the abdominal fat was lowest in the CRM-supplemented group, followed by the LTN-supplemented and control groups; the spleen weight was lower in the non-LPS-induced LTN-supplemented group than the LPS-induced control group. The ND and avian influenza titers were significantly higher in the CRM-supplemented group than in the other groups at 20 d; at 30 d, the ND titer was significantly higher in the LPS-induced LTN group. Supplementation with curcumin significantly promoted B and T lymphocyte proliferation in both LPS- and non-LPS-induced birds at 21 d. Curcumin also promoted B lymphocyte proliferation in non-LPS-induced birds at 42 d. Curcumin significantly reduced alanine aminotransferase and aspartate aminotransferase activities at 42 d in non-LPS-treated birds, whereas lutein significantly increased the activities of these enzymes in LPS-induced birds. Both carotenoids significantly lowered lipid oxidation in the liver of supplemented birds. Thus, in broiler chickens, lutein-supplemented birds exhibited better pigmentation efficiency, whereas curcumin-supplemented birds exhibited improved immune responses. © 2013 Poultry Science Association Inc.

Dietary sources of lutein and zeaxanthin carotenoids and their role in eye health (Review)

Abdel-Aal, E.-S.M.a, Akhtar, H.a, Zaheer, K.b, Ali, R.cd

The eye is a major sensory organ that requires special care for a healthy and productive lifestyle. Numerous studies have identified lutein and zeaxanthin to be essential components for eye health. Lutein and zeaxanthin are carotenoid pigments that impart yellow or orange color to various common foods such as cantaloupe, pasta, corn, carrots, orange/yellow peppers, fish, salmon and eggs. Their role in human health, in particular the health of the eye, is well established from epidemiological, clinical and interventional studies. They constitute the main pigments found in the yellow spot of the human retina which protect the macula from damage by blue light, improve visual acuity and scavenge harmful reactive oxygen species. They have also been linked with reduced risk of age-related macular degeneration (AMD) and cataracts. Research over the past decade has focused on the development of carotenoid-rich foods to boost their intake especially in the elderly population. The aim of this article is to review recent scientific evidences supporting the benefits of lutein and zeaxanthin in preventing the onset of two major age-related eye diseases with diets rich in these carotenoids. The review also lists major dietary sources of lutein and zeaxanthin and refers to newly developed foods, daily intake, bioavailability and physiological effects in relation to eye health. Examples of the newly developed high-lutein functional foods are also underlined. © 2013 by the authors; licensee MDPI, Basel, Switzerland.
The European Commission (EC) has approved the use of nature-identical Zeaxanthin in food supplements, DSM Nutritional Products has revealed. The decision follows a positive European Food Safety Authority assessment delivered on September 13, 2012, which concluded that the use level for Zeaxanthin does not raise safety concerns. This opens up the 27 EU Member State market to DSM’s Zeaxanthin brand Optisharp.

Together with Lutein, Zeaxanthin is one of the main components of the macular pigment selectively deposited into the human macula. It is found in a small, highly sensitive area of the retina responsible for central vision where it works as a blue light filter and as an antioxidant.

Optisharp is widely applied to nutritional supplements in several other regions of the world, and the latest approval decision by the EC now offers companies in Europe the opportunity to add value to their products with a scientifically relevant and safe new ingredient.

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Eye-spy ingredient approval for Zeaxanthin

The European Commission (EC) has approved the use of nature-identical Zeaxanthin in food supplements, DSM Nutritional Products has revealed.

http://www.foodmanufacture.co.uk/Ingredients/Eye-spy-ingredient-approval-for-Zeaxanthin

Acta Ophthalmologica, 2013

Relationship between macular pigment and visual acuity in eyes with early age-related macular degeneration (Article in press)

Puell, M.C., a , Palomo-Alvarez, C.a, Barrio, A.R.a, Gómez-Sanz, F.J.b, Pérez-Carrasco, M.J.a

Purpose: Today the extent to which MP impacts visual function in early AMD remains unclear. This study examines the relationship between macular pigment optical density (MPOD) and high-contrast visual acuity (HC-VA) and low-contrast visual acuity (LC-VA) in eyes with early age-related macular degeneration (AMD).

Methods: Measurements were made in 22 subjects with early AMD and 27 healthy control subjects. Distance best-corrected VA was measured using HC (96%) and LC (10%) Bailey-Lovie logMAR letter charts under photopic luminance conditions. MPOD was determined at the fovea through apparent motion photometry using the cathode ray tube-based Metropsis psychophysical vision test (Cambridge Research Systems).

Results: No significant differences in foveal MPOD were detected between the control eyes (0.30±0.24 log units) and eyes with early AMD (0.27±0.15 log units). Neither were differences detected between the two groups in mean HC- and LC-VA. Foveal MPOD showed significant correlation with both photopic HC-VA (r=-0.47, p=0.0008) and LC-VA (r=-0.46, p=0.0008) such that as MPOD increased, photopic HC-VA and LC-VA improved (lower logMAR values).

Conclusions: Low MP levels were related to worse visual function in both healthy eyes and eyes with early AMD. Our findings provide direction for future studies designed to improve retinal function through the use of oral supplements known to increase MP levels, especially in eyes with AMD and a low MPOD. © 2013 Acta Ophthalmologica Scandinavica Foundation.

PMID: 23575039
Association of age and macular pigment optical density using dual-wavelength autofluorescence imaging
Lima, V.C.ab, Rosen, R.B.ac, Prata, T.S.b, Dorairaj, S.d, Spielberg, L.a, Maia, M.b, Sallum, J.M.b

Background: Several lines of evidence suggest that macular pigment may play a protective role against age-related macular degeneration, but the influence of age on macular pigment density levels remains unclear. This study was designed to investigate the relationship between age and the normal distribution of macular pigment optical density (MPOD) values surrounding the fovea.

Methods: Consecutive healthy subjects with no evidence of ocular disease were enrolled in this study. After inclusion, MPOD values were measured at specific eccentricities (0.5, 1, and 2 degrees) from the foveal center using a dual-wavelength autofluorescence method employing a modified confocal scanning laser ophthalmoscope. Whenever both eyes were eligible, one was randomly selected for analysis. The correlation between age and MPOD values was investigated using regression analysis.

Results: Thirty subjects (30 eyes) were included (mean age 48.6 ± 16.4 [range 23-77] years). Significant differences were found between MPOD values measured at 0.5, 1, and 2 degrees from the center of the fovea (0.49 ± 0.12 density units, 0.37 ± 0.11 density units, and 0.13 ± 0.05 density units, respectively, P< 0.05). Significant correlations between age and MPOD values at 0.5 and 1 degree were found (P ≤ 0.02). Values measured at 2 degrees did not correlate significantly with age (P = 0.06).

Conclusion: In healthy subjects, MPOD values were highest near the foveal center. These values appeared to increase during adulthood (peak at 45-50 years), followed by a gradual reduction after 60 years of age. © 2013 Lima et al, publisher and licensee Dove Medical Press Ltd.


Dietary Intervention with Mediterranean or Healthy Eating Goals has Similar Effects on Serum and Colon Concentrations of Carotenoids and Fatty Acids.

Little is known about dietary effect on colonic nutrient concentrations associated with preventive foods. This study observed 120 persons at increased risk of colon cancer randomized to a Mediterranean versus a Healthy Eating diet for six months. The former targeted increases in whole grains, fruits, vegetables, monounsaturated and n3 fats. Healthy Eating diet was based on Healthy People 2010 recommendations. At baseline, dietary fat and carotenoid intakes were poorly associated (Spearman ρ < 0.4) with serum and colon concentrations. Strong associations were observed between serum and colon measurements of β-cryptoxanthin (ρ = 0.58, p-value < 0.001), α-carotene (ρ = 0.48, p-value < 0.001), and β-carotene (ρ = 0.45, p-value < 0.001). After six months, the Healthy Eating arm increased serum lutein, β- and α-carotene significantly (p-value < 0.05). In the Mediterranean arm the significant increases were in serum lutein, β-cryptoxanthin, β-carotene, monounsaturated and n3 fats. A significant group-by-time interaction (p-value = 0.03) was obtained for monounsaturated fats. Colonic increases in carotenoids and n3 fats were significant only in Healthy Eating arm, while group-by-time interaction were significant for β-carotene (p-value = 0.02), and α-carotene (p-value = 0.03). Changes in colon concentrations were not significantly associated with reported dietary changes. Changes in colon and serum concentrations were strongly associated for β-cryptoxanthin (ρ = 0.56, p-value < 0.001), and α-carotene (ρ = 0.40, p-value < 0.001). The associations between colonic and serum concentrations suggest the potential utility of using serum concentration as a target in dietary interventions aimed at reducing colon cancer risk.

PMID: 23592741
Beirne RO.
To investigate the role of macular pigment in preserving foveal short-wavelength-sensitive (SWS) visual function in the ageing eye orientation identification acuity was measured in the fovea and at 12° eccentricity (nasal visual field) under SWS-cone isolating conditions in 73 participants (aged 20-71). Macular pigment optical density (MPOD) was measured at 0.5° eccentricity from the foveal centre using a heterochromatic flicker photometry (HFP) based instrument. MPOD was not significantly related to age but reduced SWS orientation identification acuity was associated with increasing age in the fovea and at 12° eccentricity. The rate at which foveal acuity changed in relation to acuity at 12° with increasing age was not significantly related to macular pigment levels. These findings do not support the hypothesis that higher macular pigment levels protect S-cone mediated foveal visual function in the ageing eye.

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PMID: 23591086

Biomolecules and Therapeutics, Volume 21, Issue 2, 2013, Pages 173-179
Self-nanoemulsifying drug delivery system of lutein: Physicochemical properties and effect on bioavailability of warfarin
Yoo, J.a, Baskaran, R.b, Yoo, B.-K.b
Objective of present study was to prepare and characterize self-nanoemulsifying drug delivery system (SNEDDS) of lutein and to evaluate its effect on bioavailability of warfarin. The SNEDDS was prepared using an oil, a surfactant, and co-surfactants with optimal composition based on pseudo-ternary phase diagram. Effect of the SNEDDS on the bioavailability of warfarin was performed using Sprague Dawley rats. Lutein was successfully formulated as SNEDDS for immediate self-emulsification and dissolution by using combination of Peceol as oil, Labrasol as surfactant, and Transcutol-HP or Lutrol-E400 as co-surfactant. Almost complete dissolution was achieved after 15 min while lutein was not detectable from the lutein powder or intra-capsule content of a commercial formulation. SNEDDS formulation of lutein affected bioavailability of warfarin, showing about 10% increase in Cmax and AUC of the drug in rats while lutein as non-SNEDDS did not alter these parameters. Although exact mechanism is not yet elucidated, it appears that surfactant and co-surfactant used for SNEDDS formulation caused disturbance in the anatomy of small intestinal microvilli, leading to permeability change of the mucosal membrane. Based on this finding, it is suggested that drugs with narrow therapeutic range such as warfarin be administered with caution to avoid undesirable drug interaction due to large amount of surfactants contained in SNEDDS. © 2013 The Korean Society of Applied Pharmacology.

Journal of Supercritical Fluids, Volume 77, 2013, Pages 103-109
Supercritical anti-solvent micronization of marigold-derived lutein dissolved in dichloromethane and ethanol
Boonnoun, P.a, Nerome, H.b, Machmudah, S.b, Goto, M.b, Shotipruk, A.a
This work aims to study supercritical anti-solvent (SAS) micronization of lutein derived from marigold flowers. Lutein solution in dichloromethane (DCM) or ethanol was atomized into the stream of supercritical carbon dioxide (SC-CO2) through a concentric nozzle in a pressurized vessel. The effects of pressure and SC-CO2 flow rate on morphology, mean particle size (MPS) and particle size distribution (PSD) were investigated. The reduction in lutein MPS from 202.3 μm of unprocessed lutein to 1.58 μm and 902 nm could be achieved by SAS micronization using DCM and ethanol, respectively. In both solvent systems, no significant effects of pressure and SC-CO2 flow rate on particle morphology were observed. However, pressure was found to have a significant effect on MPS and PSDs of lutein particles. © 2013 Elsevier B.V.
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Genetic determinants of macular pigments in women the carotenoids in age-related eye disease study
May, 2013


PURPOSE. To investigate genetic determinants of macular pigment optical density in women from the Carotenoids in Age-Related Eye Disease Study (CAREDS), an ancillary study of the Women's Health Initiative Observational Study.

METHODS. 1585 of 2005 CAREDS participants had macular pigment optical density (MPOD) measured noninvasively using customized heterochromatic flicker photometry and blood samples genotyped for 440 single nucleotide polymorphisms (SNPs) in 26 candidate genes related to absorption, transport, binding, and cleavage of carotenoids directly, or via lipid transport. SNPs were individually tested for associations with MPOD using least-squares linear regression.

RESULTS. Twenty-one SNPs from 11 genes were associated with MPOD (P ≤ 0.05) after adjusting for dietary intake of lutein and zeaxanthin. This includes variants in or near genes related to zeaxanthin binding in the macula (GSTP1), carotenoid cleavage (BCMO1), cholesterol transport or uptake (SCARB1, ABCA1, ABCG5, and LIPC), long-chain omega-3 fatty acid status (ELOVL2, FADS1, and FADS2), and various maculopathies (ALDH3A2 and RPE65). The strongest association was for rs11645428 near BCMO1 (bA=0.029, P=2.2 3 10^−4). Conditional modeling within genes and further adjustment for other predictors of MPOD, including waist circumference, diabetes, and dietary intake of fiber, resulted in 13 SNPs from 10 genes maintaining independent association with MPOD. Variation in these single gene polymorphisms accounted for 5% of the variability in MPOD (P=3.5 3 10*11).

CONCLUSIONS. Our results support that MPOD is a multi-factorial phenotype associated with variation in genes related to carotenoid transport, uptake, and metabolism, independent of known dietary and health influences on MPOD. © 2013 The Association for Research in Vision and Ophthalmology, Inc.

Journal of Nutrition, Volume 143, Issue 4, 1 April 2013, Pages 448-456

CD36 and sr-bi are involved in cellular uptake of provitamin A carotenoids by caco-2 and hek cells, and some of their genetic variants are associated with plasma concentrations of these micronutrients in humans


Scavenger receptor class B type I (SR-BI) and cluster determinant 36 (CD36) have been involved in cellular uptake of some provitamin A carotenoids. However, data are incomplete (e.g., there are no data on a-carotene), and it is not known whether genetic variants in their encoding genes can affect provitamin A carotenoid status. The objectives were 1) to assess the involvement of these scavenger receptors in cellular uptake of themain provitamin A carotenoids (i.e., b-carotene, a-carotene, and b-cryptoxanthin) as well as that of preformed vitamin A (i.e., retinol) and 2) to investigate the contribution of genetic variations in genes encoding these proteins to interindividual variations in plasma concentrations of provitamin A carotenoids. The involvement of SR-BI and CD36 in carotenoids and retinol cellular uptake was investigated in Caco-2 and human embryonic kidney (HEK) cell lines. The involvement of scavenger receptor class B type I (SCARB1) and CD36 genetic variants on plasma concentrations of provitamin A carotenoids was assessed by association studies in 3 independent populations. Cell experiments suggested the involvement of both proteins in cellular uptake of provitamin A carotenoids but not in that of retinol. Association studies showed that several plasma provitamin A carotenoid concentrations were significantly different (P < 0.0083) between participants who bore different genotypes at single nucleotide polymorphisms and haplotypes in CD36 and SCARB1. In conclusion, SR-BI and CD36 are involved in cellular uptake of provitamin A carotenoids, and genetic variations in their...

**Analyses of the correlation between dermal and blood carotenoids in female cattle by optical methods.**

Klein, J., Darvin, M.E., Meinke, M.C., Schweigert, F.J., Müller, K.E., Lademann, J.

Herd health programs for the maintenance of welfare and productivity in cattle need efficient tools for monitoring the health of individual animals. Recent reports demonstrate that the oxidative status is related to various stress conditions in dairy cows. Biomarkers, among other carotenoids, could serve as indicators of stress originating from the environment (e.g., heat stress or sun radiation) or from the animal itself (e.g., disease). To date, only invasive in vitro tests are available to assess the oxidative status in cattle. The present study compares the results of optical noninvasive in vivo measurements of dermal carotenoids in cattle udder skin using an LED-based miniaturized spectroscopic system (MSS) with those obtained by photometric analysis of beta carotene in whole blood samples using a portable device. Correlations between the concentrations of dermal and blood carotenoids were calculated under consideration of the nutritional status of the animals. Significant correlation (R = 0.86) was found for cattle with a moderate to obese body condition. Thus, the blood and skin concentrations of the marker substance beta carotene are comparable under stable stress conditions of the cattle. This demonstrates that the MSS is suitable for noninvasive assessment of dermal carotenoid concentrations in cattle.

**Physical Chemistry Chemical Physics**, Volume 15, Issue 17, 7 May 2013, Pages 6527-6538

Conformational changes of β-carotene and zeaxanthin immersed in a model membrane through atomistic molecular dynamics simulations

Cerezo, J.a, Zúñiga, J.a, Bastida, A.a, Requena, A.a, Pedro Cerón-Carrasco, J.b

In this work, we investigate systems formed by β-carotene and zeaxanthin embedded separately in a model lipid bilayer of 1,2-dimyristoyl-sn- glycerol-3-phosphocholine (DMPC) through molecular dynamics (MD) simulations. The study is conducted using an all-atoms model and by analyzing the structural changes that occur at both the carotenoid molecule and the membrane during the simulations. We concentrate specifically on the conformation of the conjugated chain, given the relevance that this feature has in modulating the spectroscopic and antioxidant properties of the carotenoids. The force fields of the carotenoids are parametrized accordingly in order to reproduce the rotation potentials of the conjugated chains calculated using quantum DFT methods. A model to quantify the effective conjugated chain length is presented. The MD simulations are carried out using the parameters adjusted for the carotenoids along with those provided by the CHARMM36 force field for the lipids of the membrane. A differentiating dynamic behavior of β-carotene and zeaxanthin within the bilayer is observed in the simulations, which is analyzed in detail through umbrella sampling techniques. This behavior is driven basically by the interactions of the lipid polar heads with the hydroxyl groups of zeaxanthin, which are absent in β-carotene. These interactions influence the carotenoid orientation, modify the conformational distribution of the dihedral angles of the conjugated chain significantly, and specifically distort the membrane structure. © 2013 the Owner Societies.

**Ophthalmology**, 2013

Investigation of Genetic Variation in Scavenger Receptor Class B, Member 1 (SCARB1) and Association with Serum Carotenoids (Article in press)

McKay, G.J.a, Loane, E.b, Nolan, J.M.c, Patterson, C.C.a, Meyers, K.J.d, Mares, J.A.d, Yonova-Doing, E.e, Hammond, C.J.e, Beatty, S.c, Silvestri, G.f

Objective: To investigate association of scavenger receptor class B, member 1 (SCARB1) genetic variants with serum carotenoid levels of lutein (L) and zeaxanthin (Z) and macular pigment optical density (MPOD).

Design: A cross-sectional study of healthy adults aged 20 to 70.
Participants: We recruited 302 participants after local advertisement.
Methods: We measured MPOD by customized heterochromatic flicker photometry. Fasting blood samples were taken for serum L and Z measurement by high-performance liquid chromatography and lipoprotein analysis by spectrophotometric assay. Forty-seven single nucleotide polymorphisms (SNPs) across SCARB1 were genotyped using Sequenom technology. Association analyses were performed using PLINK to compare allele and haplotype means, with adjustment for potential confounding and correction for multiple comparisons by permutation testing. Replication analysis was performed in the TwinsUK and Carotenoids in Age-Related Eye Disease Study (CAREDS) cohorts.
Main Outcome Measures: Odds ratios for MPOD area, serum L and Z concentrations associated with genetic variations in SCARB1 and interactions between SCARB1 and gender.
Results: After multiple regression analysis with adjustment for age, body mass index, gender, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, triglycerides, smoking, and dietary L and Z levels, 5 SNPs were significantly associated with serum L concentration and 1 SNP with MPOD (P<0.01). Only the association between rs11057841 and serum L withstood correction for multiple comparisons by permutation testing (P<0.01) and replicated in the TwinsUK cohort (P = 0.014). Independent replication was also observed in the CAREDS cohort with rs10846744 (P = 2×10^-4), an SNP in high linkage disequilibrium with rs11057841 (r² = 0.93). No interactions by gender were found. Haplotype analysis revealed no stronger association than obtained with single SNP analyses.
Conclusions: Our study has identified association between rs11057841 and serum L concentration (24% increase per T allele) in healthy subjects, independent of potential confounding factors. Our data supports further evaluation of the role for SCARB1 in the transport of macular pigment and the possible modulation of age-related macular degeneration risk through combating the effects of oxidative stress within the retina.
Financial Disclosure(s): Proprietary or commercial disclosures may be found after the references. © 2013 American Academy of Ophthalmology.
PMID: 23562302

Cis carotenoids: colorful molecules and free radical quenchers. Hernandez-Marin E, Galano A, Martinez A.
We present a density functional theory (DFT) and time-dependent density functional theory (TD-DFT) study on the stability, antioxidant properties with respect to the single electron transfer mechanism, and electronic absorption spectra of some isomers (9-cis, 13-cis, and 15-cis) of carotenoids such as astaxanthin, lycopene, and those present in virgin olive oil (lutein, β-carotene, neoxanthin, antheraxanthin, violaxanthin, neochrome, luteoxanthin, mutatoxanthin, and violaxanthin). In general, the calculated relative stability of the cis isomers appears to be in line with experimental observations. It is predicted that the above-mentioned carotenoids (cis and trans isomers) will transfer one electron to the (•)OH radical. However, this transference is not plausible with radicals such as (•)OOH, (•)OC2H5, (•)OOC2H5, (•)NO2, and (•)OCH2CH═CH2. On the other hand, some carotenoids (β-carotene, lycopene, lutein, astaxanthin, violaxanthin, and antheraxanthin) will likely accept, in a medium of low polarity, one electron from the radical (•)O2(-).
However, neoxanthin, auroxanthin, mutatoxanthin, luteoxanthin, and neochrome would not participate in such an electronic transfer mechanism. The TD-DFT studies show that neutral species of the cis and trans isomers maintain the same color. On the contrary, the ionic species undergo a "bleaching" process where the absorption wavelengths shift to longer values (>700 nm). Additionally, the formation of a complex between astaxanthin and Cu(2+) is explored as well as the effect that the metal atom will have in the UV-vis spectrum.
PMID: 23560647