



# Carotenoid News

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## FROM THE EDITOR

« A woman's face with nature's own hand  
painted...»

(William Shakespeare, Sonnet XX)

Nature paints our faces with carotenoids to signal robust health and to attract other members of our species (Stephen ID, *et al. Evol Human Behav* 2011, *in press*). An attractive coloring confirms the ability to procure a nutritious diet, rich in fruit and vegetables. It also indicates enhanced immune function and fertility in both genders, and promises longevity, necessary for preservation of family and species.

From time immemorial, alchemists were trying to find or synthesize an elixir of youth, in addition to the philosophers' stone, that would change base metals to gold (again, that lovely yellow color!). Only one alchemist has succeeded, the legendary Doctor Faust, but with help of the devil. How appropriate that the upcoming International Symposium on Carotenoids will take place in Kraków, at the Jagiellonian University, where Faust was supposed to study medicine and alchemy around the year 1500 under famous Polish professors. The university was already over 100 years old and attracted many foreign students. The meeting of carotenoid luminaries on July 17-22, 2011 promises an exciting agenda of presentations, discussions and sightseeing ([www.carotenoid.pl](http://www.carotenoid.pl)) in one of the oldest towns of Central Europe. Do zobaczenia! (See you there!)

Maria S. Sapuntzakis (Chicago)

## Announcement

The Micronutrient Genomics Project (MGP) was established as a community-driven project to facilitate the development of systematic capture, storage, management, analyses, and dissemination of data and knowledge generated by biological studies focused on micronutrient-genome interactions. MGP aims to create a public portal and open-source bioinformatics toolbox for all "omics" information and evaluation of micronutrient and health studies. The core of the project will focus on access and visualization of genetic/genomic, transcriptomic, proteomic and metabolomic information related to micronutrients. For the vitamin A and carotenoids field we are in the process of establishing an expert group in the various relevant

areas (genetics, nutrition, biochemistry, and epidemiology). The group will:

- 1) collect all available knowledge,
- 2) collaborate with the core bioinformatics team towards constructing pathways and biological networks,
- 3) produce a review according to a preset format that describes the initial state of the art on vitamin A, carotenoids and genetics,
- 4) provide continued updating and support, by updating each review every 5 years.

If you are interested in taking part in this community driven project, contact Dr. Georg Lietz ([georg.lietz@ncl.ac.uk](mailto:georg.lietz@ncl.ac.uk)). Find more information at <http://dx.doi.org/10.1007/s12263-010-0192-8>.

## CARIG Travel Awards

CARIG will award at least two monetary prizes travel based on a poster competition to be held in conjunction with the CARIG/VARIG Social at Experimental Biology 2011. Graduate students and postdoctoral trainees are eligible. Posters must address carotenoid and/or vitamin A research. For those assigned an oral presentation rather than a poster at EB'11, printed copies of your slides with a print copy of your abstract and a small banner may be used for the CARIG/VARIG poster competition. No advance registration is required to participate in the poster competition. Contact: Lewis P. Rubin, MD, University of South Florida, Children's Research Institute, 140 7<sup>th</sup> Ave. South, Rm 2006, St. Petersburg, FL 33701, e-mail: [lrubin@health.usf.edu](mailto:lrubin@health.usf.edu) fax: 727-553-3547.

## UPCOMING EVENTS

March 11 - 13, 2011

**Conference on Progress in Carotenoid Research, Boston, MA.** Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University. Website: [www.carotenoidsconference2011.com](http://www.carotenoidsconference2011.com)

April 9 - 13, 2011

**Experimental Biology 2011, Washington, DC.** Contact: EB2011, FASEB Office of Scientific Meetings & Conferences, 950 Rockville Pike, Bethesda, MD 20814-3998, website: [www.eb2011.org](http://www.eb2011.org), e-mail: [eb@faseb.org](mailto:eb@faseb.org) [see program below].

**July 12 - 15, 2011**

**Macular Carotenoids & AMD (Age-related Macular Degeneration), 2001, Cambridge, UK.**

Contact: [info@macularcarotenoids.org](mailto:info@macularcarotenoids.org), website: [www.macularcarotenoids.org](http://www.macularcarotenoids.org)

**July 17 - 22, 2011**

**16<sup>th</sup> International Symposium on Carotenoids, Kraków, Poland. Website: [www.carotenoid.pl](http://www.carotenoid.pl)**

**Experimental Biology 2011 - ASN Annual Meeting Highlights**

Washington Convention Center, Washington, DC

**Friday, April 8, 2011, 1:00 - 5:00 pm**

The annual EB pre-conference CARIG Symposium will be held at the ASN Headquarters (Renaissance Washington Hotel). The theme is **Carotenoids in Human Nutrition** and the Co-Chairs are Mario Ferruzzi (Purdue University) and Sherry Tanumihardjo (University of Wisconsin-Madison). Harold Furr will present the 2011 James A. Olson Memorial Lecture, "Isotope Dilution Assessment of Vitamin A Status". Other speakers are: Georg Lietz, Julie Mares, Sara Arscott and Shellen Goltz.

**Friday, April 8, 2011, 6:30 - 9:30 pm**

The VARIG/CARIG Social and Poster Competition. Trainees (undergraduate, graduate, postdocs) are especially encouraged to set up posters. Poster boards, pins and light refreshments will be provided. Poster awards will be presented. The CARIG business meeting will be convened (open to all CARIG members) immediately after the awards presentations. All CARIG members are urged to attend. You can sign up as a member of CARIG RIS on the spot!

**Sunday, April 10<sup>th</sup>, 10:30am - 12:30pm**

Symposium: Biofortification of provitamin A in maize for Africa.

**Sunday, April 10<sup>th</sup>, 10:30am - 12:30pm**

CARIG RIS: Biofortification of staple crops with micronutrients (minisymposium). Speakers include Howarth Bouis (HarvestPlus, Washington, DC), Kevin Pixley (CIMMYT/UW-Madison), Natalia Palacios (CIMMYT, Mexico), Sherry Tanumihardjo (CARIG), and Beatrice Kawana (Zambia).

[YES, despite our requests to avoid simultaneous scheduling for the two above symposia, they are held at the same time.]

Other minisymposia:

**Tuesday, April 12<sup>th</sup>, 8:00am - 10:00am**

Vitamins & Minerals RIS: Vitamin A, Carotenoids and Retinoids.

**Tuesday, April 12<sup>th</sup>, 10:30am - 12:30pm**

CARIG RIS: Carotenoids and Health.

Poster sessions:

**Tuesday, April 12, 2011** Biofortification of Staple Crops with Micronutrients.

**Tuesday, April 12, 2011** Carotenoids and Health.

## **RECENT / FORTHCOMING PUBLICATIONS**

**SIGHT AND LIFE Magazine 3/2010.** PO Box 2116, 4002 Basel, Switzerland, tel: 41-61-815-8756, fax: 41-61-815-8190, website: [www.sightandlife.org](http://www.sightandlife.org)  
e-mail: [klaus.kraemer@sightandlife.org](mailto:klaus.kraemer@sightandlife.org)

See especially:

Renzi LM, Hammond BR. Nutrition as a mediator of visual health across the lifespan, pp 7-12.

**Chemistry and biotechnology of carotenoids.** Namitha KK, Negi PS. *Crit Rev Food Sci Nutr* 2010, 50:728-86.

**$\beta$ -Carotene is an important vitamin A source for humans.** T. Grune et al., *J Nutr* 2010, 140:226S-2285S.

**Colors with functions: elucidating the biochemical and molecular basis of carotenoid metabolism.** J. von Lintig, *Annual Rev Nutr* 2010, 30:35-56.

**Carotenoids.** Eds. Landrum JT, Wang X-D, Wurtzel ET. A special issue of *Archives Biochem Biophys*, 2010, 504(1):1-168.

**Potential health-promoting effects of astaxanthin: A high-value carotenoid mostly from microalgae.** J-P Yuan, et al, *Mol Nutr Food Res* 2011, 55:150-65.

**Alphabetical Listing of Recent Publications** may be found at [www.carotenoidsociety.org](http://www.carotenoidsociety.org) under Articles. It is prepared by Dr. Harold Furr, Department of Nutritional Sciences, University of Wisconsin, Madison.

## **Conference report**

A Cognition, Eye Health, and Lutein Advisory Board Conference was held on January 14, 2011 in New York City, sponsored by the Abbott Nutrition Health Institute. The Conference was Co-Chaired by Lewis P. Rubin, MD (USF) and Gary Chan, MD (U of Utah). Several ASN and CARIG members participated. In addition to the Co-Chairs, Speakers were: Paul Bernstein, MD, PhD (U of Utah); Anne Fulton, MD (Harvard); John Landrum, PhD (FIU); Jane Carver, PhD (USF); Elizabeth Johnson, PhD

(Tufts, USDA Nutrition Center). The preliminary objectives included:

Discussion of lutein's potential role in eye development and therefore brain (cognitive) development,

Assessment of the protective benefits of lutein for eye and brain health based on published scientific evidence and the advisors' findings and experience,

Discussion of the potential synergistic role of lutein and DHA in eye and brain development,

Reaching consensus and developing a lutein position statement as well as further scientific content.

*Lewis P. Rubin, MD (USF)*

## TECHNICAL NOTE

### Microencapsulation may stabilize lycopene color properties

A microencapsulation spray drying process could stabilize lycopene for better use as a coloring agent in food. Microencapsulation aims to totally entrap the pigment particles in a protective network, which isolates and stabilizes lycopene. The new study, published in the *J Food Process Engineering* (doi: 10.1111/j.1745-4530.2010.00562.x), evaluates the coloring stability of free lycopene in comparison with a microencapsulated lycopene, using the pre-extrusion coloring of a rice flour extrudate as a model. The experiments were carried out by extrusion of rice flour containing 1% of lycopene microcapsules or the equivalent concentration of free lycopene. Microencapsulation was found to produce better color retention when used in the extrusion model, and also led to a 2-fold increase in storage stability. The previous research had suggested that lycopene stability might be 7-fold improved via a spray drying microencapsulation process.

[www.nutraingredients-usa.com](http://www.nutraingredients-usa.com) (2/25/2011)

## NEWS AND VIEWS

### Carogac – a new carotenoid-rich extract

Michigan-based Telos Ceuticals, LLC has launched a new carotenoid-rich extract from *Momordica cochinchinensis* Spreng, offering 76 times the amount of lycopene in tomatoes, 60 times the vitamin C in oranges, and 10 times the  $\beta$ -carotene in carrots. According to analysis by the US Department of Agriculture (*J Agric Food Chem* 2004, 52:274-79), extract from the gac fruit also contains 40 times the zeaxanthin in corn, and is a source of  $\omega$ -6 and  $\omega$ -9 fatty acids, and vitamin E. The extract is described as water-soluble and flavor neutral, and can be easily integrated into a range of foods, beverages and supplements. Carogac is stable and suitable in

most food and beverage, as well as personal care product processing. It can be used as a natural food colorant, and has a “vibrant red-orange color”.

[www.nutraingredients-usa.com](http://www.nutraingredients-usa.com) (10/13/2010)

### High $\alpha$ -carotene levels linked to longer life

Although  $\alpha$ -carotene is chemically similar to  $\beta$ -carotene, previous studies have suggested that  $\alpha$ -carotene is around 10 times more effective than  $\beta$ -carotene in inhibiting the development of cancer cells, and that it is more potent in reducing the effects of liver cancer, and inhibiting the tumor-promoting actions of glycerol in lung carcinogenesis and skin tumors. Presently, the researchers assessed the direct relationship between  $\alpha$ -carotene concentrations and risk of death among 15,318 US adults in the NHANES III (*Li C et al. Arch Intern Med.* doi: 10.1001/archinternmed.2010.440). In this prospective study over a mean follow-up period of 13.9 years, the serum  $\alpha$ -carotene concentrations were inversely associated with risk of death from all causes, CVD, cancer, and all causes other than CVD and cancer. The overall risk of death during the study was reduced by up to 39% for individuals having a blood  $\alpha$ -carotene levels of 9  $\mu$ g/dL or higher, when compared with individuals at 0-1  $\mu$ g/dL. The risk was reported to be 23% lower among those who had concentrations 2-3  $\mu$ g/dL, 27% lower at 4-5  $\mu$ g/dL, and 34% lower at 6-8  $\mu$ g/dL. Consistent with findings from previous studies, an especially strong association was found between serum  $\alpha$ -carotene concentrations and risk for death from some specific causes, including cancers of the aero-digestive track, diabetes, and chronic respiratory disease. The inverse association was independent of demographic characteristics, lifestyle habits, and traditional health risk factors, and indicated that the results support increasing fruit and vegetable consumption as a means of preventing premature death and suggest a need for clinical research into the health benefits of  $\alpha$ -carotene.

[www.nutraingredients-usa.com](http://www.nutraingredients-usa.com) (11/23/2010)

### Skin carotenoid coloration – a cue to health perception

When given a choice, people prefer the carotenoid skin color over suntanned skin (*Stephen ID, et al. Evolution and Human Behavior*, doi: 10.1016/j.evolhumbehav.2010.09.003). If you want a healthier and more attractive skin color, you are better off eating a healthy diet with plenty of fruit and vegetables than lying in the sun. Evolution favors individuals who choose healthier mates. The bright yellow beaks and colorful feathers of many male birds are advertising their good nutrition and health status. Females of these species prefer to mate with

brighter, more colored males. This is the first study in which such cues have been demonstrated in humans, and it suggests that the effect may exist cross-culturally, since similar preferences for skin yellowness were found in a white (UK) and a black (South African) population. The experiments involved computer manipulation of face color on photographs, and the participants were given the instruction to “make the face as healthy as possible” by changing yellow (carotenoid) and lightness (melanin) color dimensions with a mouse pointer.

[www.laboratoryequipment.com](http://www.laboratoryequipment.com) (1/12/2011)

### Heart-healthy lycopene

Lycopene may benefit heart health by boosting the body's natural antioxidant defenses and protecting against DNA damage. A daily supplement was associated with increased activity of superoxide dismutase (SOD), an antioxidant enzyme, and a reduction of DNA damage in white blood cells (*Kim JY et al., doi:10.1016/j.atherosclerosis.2010.11.036*). Furthermore, the apparent benefits extended to a reduction in systolic blood pressure and a decrease in levels of high-sensitivity C-reactive protein (hsCRP), a marker of inflammation. The researchers recruited 126 healthy men (average age 34 y, BMI 24 kg/m<sup>2</sup>), and randomly assigned them to receive a daily 6 or 15 mg supplement of lycopene (*Lyc-O-Mato*, Lycored), or placebo for 8 weeks. Since the lycopene capsule used in this study also contains  $\beta$ -carotene (~0.5 mg), the subjects in the 15-mg lycopene/day group had a 65% percent increase in serum lycopene and a 20% increase in  $\beta$ -carotene concentration. Plasma SOD activity increased by 2.37 U/mL in the 15 mg group, compared with an increase of 1.73 U/mL in the 6 mg group, and a decrease in SOD activity in the placebo group. In the high dose group, the lymphocyte DNA damage (measured by comet test) was reduced, CRP levels decreased by 57%, and endothelial function (assessed by the finger arterial pulse amplitude and adhesion molecules in plasma) was significantly improved. The beneficial effects of lycopene supplementation on endothelial function were remarkable in subjects with relatively impaired endothelial cell function at initial level.

[www.nutraingredients-usa.com](http://www.nutraingredients-usa.com) (1/28/2011)

### Carotenoids may improve male urinary tract health

Dietary carotenoids may reduce the risk of developing lower urinary tract symptoms (LUTS) in men. LUTS are reported in more than 40% of older men, and symptoms include frequent and urgent urination, as well as a weak urinary stream.

Recently, data were collected and analyzed from 1466 men, 30-79 y old, enrolled in the Boston Area Community Health Survey (2002–2005), using food frequency questionnaires (FFQs) and in-person interviews. The American Urological Symptom Index was used to define moderate-to-severe LUTS. Results showed a significant reduction in the risk of LUTS for men consuming the greatest amounts dietary carotenoids. The highest quartile of lycopene intake from dietary sources (2.25 mg/day) was associated with a 39% decrease in total LUTS and 37% decrease in storage symptoms, compared with the lowest quartile of 0.3 mg/day. Dietary  $\beta$ -carotene quartiles (1.5 mg, 2.5 mg, 4.8 mg/day) were, respectively, 36%, 47%, 44% less likely to report storage symptoms than men in the lowest quartile (0.8 mg/day). However, supplemental  $\beta$ -carotene was associated with higher incidence of LUTS, especially in smokers.

*Maserejian NN et al, J Nutr 2011,141:267-73*

### Internet Addresses for Carotenoid Researchers

1. USDA Nutrient Database for Standard Reference (SR23) is a major source of food composition data for epidemiologists and nutritionists. Carotenoid Food Database contains best available estimates of carotenoid content in foods: [www.nal.usda.gov/fnic/foodcomp/Data/car98/car\\_tbl.pdf](http://www.nal.usda.gov/fnic/foodcomp/Data/car98/car_tbl.pdf) and [www.nal.usda.gov/fnic/foodcomp/Data/car98/zea\\_tbl.pdf](http://www.nal.usda.gov/fnic/foodcomp/Data/car98/zea_tbl.pdf)
2. Agricultural Research Service (ARS) prepared searchable database to view 60-nutrient profile (including carotenoids) for more than 13,000 foods: [www.ars.usda.gov/foodsearch](http://www.ars.usda.gov/foodsearch)
3. International Carotenoid Society (ICS) Website: [www.carotenoidsociety.org](http://www.carotenoidsociety.org)
4. LIPID BANK for Web. Carotenoid Section of Lipid Database developed by Research Institute, International Medical Center of Japan <http://lipidbank.jp>. Also available on ICS webpage: [www.carotenoidsociety.org](http://www.carotenoidsociety.org) through Articles button.

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