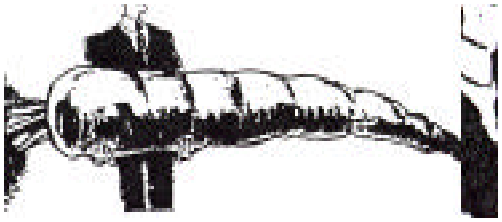

Carotenoid

Vol. 12, No. 1
March 2002

FROM THE EDITOR

"***Nascentes morimur***"

"Our death starts at birth" wrote Marcus Manilius in succint Latin two millennia ago. His words reverberate strongly in our current understanding of life processes. Our life requires controlled suicide of cells which are redundant, damaged or infected. This process, known as apoptosis, is a necessary component of normal development, tissue homeostasis and remodeling, response to irreparable cell injury and defense against cancer and degenerative diseases. Recent investigations, many of which were discussed during 13th Symposium of International Carotenoid Society in Hawaii, pointed toward a possible role of carotenoids in stimulating apoptosis in malignant tumors and their cell cultures. Great hopes are associated with finding phytochemicals which could prevent or even arrest the development of cancer, especially breast, prostate, and colon, those scourges of our fast aging society. The mechanism of apoptosis is in part regulated by mitochondria, which evolved from intracellular parasitic ancestors of purple bacteria entering a symbiotic life within eukaryotic cell about 2 billion years ago. While providing energy to the cell, mitochondria produce and contain dangerous molecules, sometimes triggering destruction of their host. However, the death of a wayward cell may be a life-saving event for the whole multicellular organism.

The Symposium provided a perfect environment to ponder the great importance of carotenoids in the life of bacteria, plants and animals, on a scale of the biosphere, and in the areas of human health. The future of carotenoid research looks more "rosy" and promising than ever, if only it can attract more grant support and many bright, enthusiastic young scientists.

Maria S. Sapuntzakis (Chicago, IL)

News from CARIG Steering Committee

During EB 2001 the Steering Committee regretfully accepted resignation of Anne Sowell (CDC) from the Chair and elected Harold Furr (University of Connecticut), who was instrumental in organization of past CARIG conferences and in preparation of this newsletter, contributing numerous reports and the very popular review of carotenoid publications. Boon Chew (Washington State University) became the Treasurer in place of Susan Mayne (Yale University), who ended her term. The Committee includes also Steve Clinton (Ohio State University), Dale Cooper (Procter & Gamble Co.), Neal Craft (Craft Technologies), Maria Sapuntzakis (***ex officio***, as the editor of Carotenoid News). Two new members were elected: Cheryl Rock (University of California, San Diego) and Wendy White (Iowa State University).

There will be no separate CARIG Pre EB conference at this year's Experimental Biology, because of overlap with the International Carotenoid Society Symposium, which was held in January (see report elsewhere in the newsletter). The CARIG conference will return to its traditional format next year, at EB 2003. In its place, CARIG is co-sponsoring the Carotenoid Minisymposium on Monday, April 22, 2002 (see the highlights of Experimental Biology 2002 below).

UPCOMING EVENTS

April 20-24, 2002
Experimental Biology 2002. New Orleans, LA. Contact: EB' 2002, c/o FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814-3998 **tel:** 301-530-7010, **fax:** 301-530-7014, **E-mail:** eb@faseb.org, **website**: www.faseb.org/meetings/eb2002[see program highlights below]

June 8-10, 2002
International Symposium on the Processing Tomato. Istanbul, Turkey. Organized by the Processing Vegetable Group of the International Society of Horticultural Science. Contact: Benard Bièche, AMITOM, Avignon, France, **tel:** 33-490861695, **fax:** 33-490270658,**E-mail:** tomato@tomate.orgor Dr. Vural Huseyin, Ege University, Department of Horticulture, Izmir, Turkey, **tel/fax:** 90-232-388-1865, **E-mail:** tuncay@agr.ege.edu.tr

July 11-12, 2002
AICR/WCRF International Research Conference on Food, Nutrition and Cancer. Washington, DC. Organized by American Institute for Cancer Research and the World Cancer Research Fund. Contact: AICR/WCRF Conference Secretariat, The Pearson Group, 505 Wythe St, Alexandria, VA 22314, **tel**:703-683-6334, **fax**:703-683-6407 **website**: www.aicr.org/conference.htm

February or March, 2003
XXI International Vitamin A Consultative Group Meeting. Marrakech, Morocco. Tentative theme: Improving the Vitamin A Status of Populations. Contact: IVACG Secretariat, ILSI Research Foundation, One Thomas Circle, NW, 9th floor, Washington DC 20005-5802, **tel**:202-659-9024, **fax**:202-659-3617, **website**: www.ivacg.ilsi.org

---

HIGHLIGHTS OF EXPERIMENTAL BIOLOGY 2002

EB 2002 Student Travel Award
As a continuing memorial to Prof. James Olson, CARIG is honored to continue the tradition of offering a $500 travel award to EB 2002. Each applicant should be first author on an abstract submitted to EB 2002. Awards are based on the merit of the abstract and on financial need; students, staff, and scientists beginning their careers are eligible to apply. Please send a copy of your abstract (on the EB 2002 form) and a letter briefly explaining the need for financial aid, by April 5 to: Dr. Harold Furr, Dept. Nutritional Sciences U-4017, University of Connecticut, Storrs, CT 06269-4017 (FAX 860-486-3674).

VARIG / CARIG Social
The traditional VARIG / CARIG Social (Vitamin A Research Interaction Group / CArotenoids Research Interaction Group) will take place on Saturday evening, April 20, 6:30 to 8 pm, in the Prince of Wales Room of the Hilton New Orleans Riverside. Cash bar.

Carotenoids Minisymposium
Monday, April 22, 2002; 8 am
New Orleans Convention Center, Room R04
As part of the Carotenoids Minisymposium, a special lecture "The James Olson Memorial Perspectives on Carotenoids" (sponsored by CARIG) will be presented by Dr. Noel Solomons

(CeSSIAM, Guatemala), entitled "Carotenoids as Precursors of Vitamin A: Their Past and Their Future"

RECENT / FORTHCOMING PUBLICATIONS

Proceedings of the 13th International Carotenoid Symposium will be published later this year in Pure and Applied Chemistry (15 plenary and invited lectures from the conference). To order, contact IUPAC Secretariat, P.O.Box 13757, Research Triangle Park, NC 27709. tel: 919-485-8700, fax: 919-485-8706,
E-mail:secretariat@iupac.org and ask to purchase the carotenoids issue (USD $50). The order form can be found at the **website**: www.iupac.org/publications/books/order.html The participants of the Symposium can order the proceedings in advance for $30 by contacting Dr John Bertram, E-mail: John@crch.hawaii.edu

SIGHT AND LIFE Newsletter 4/2001, publication of the Task Force SIGHT AND LIFE, PO Box 2116, 4002 Basel, Switzerland, **tel**: 41-61-688-7494; **fax**: 41-61-688-1910, **website**: www.sightandlife.org. A very interesting article on cloning and characterization of the β,β-carotene 15,15' dioxygenase by Adrian Wyss.

Alphabetical Listing of Recent Publications from September 2001

(prepared by Dr. Harold Furr, University of Connecticut)
More complete list will be available at ICS website:
http://carotenoidsociety.org

(2001) A randomized, placebo-controlled, clinical trial of high-dose supplementation with vitamins C and E, β carotene, and zinc for age-related macular degeneration and vision loss: AREDS report no. 8. ***Arch. Ophthalmol.*** **119**: 1417-1436

(2001) A randomized, placebo-controlled, clinical trial of high-dose supplementation with vitamins C and E and β-carotene for age-related cataract and vision loss: AREDS report no. 9. ***Arch. Ophthalmol.*** **119**: 1439-1452

Barua, A. B. & Olson, J. A. (2001) Xanthophyll epoxides, unlike β-carotene monoepoxides, are not detectibly absorbed by humans. ***J. Nutr.*** **131**: 3212-3215

Bennoun, P. (2001) Chlororespiration and the process of carotenoid biosynthesis. ***Biochim. Biophys. Acta*** **1506**: 133-142

Bohm, V., Puspitasari-Nienaber, N. L., Ferruzzi, M. G. & Schwartz, S. J. (2002) Trolox equivalent antioxidant capacity of different geometrical isomers of α-carotene, β-carotene, lycopene and zeaxanthin. ***J. Agric. Food Chem.*** **50**: 221-226

Breithaupt, D. E., Wirt, U. & Bamedi, A. (2002) Differentiation between lutein monoester regioisomers and detection of lutein diesters from marigold flowers (***Tagetes erecta L.***) and several fruits by LC-MS. ***J. Agric. Food Chem.*** **50**: 66-70

Burri, B. J., Neidlinger, T. R. & Clifford, A. J. (2001) Serum carotenoid depletion follows first-order kinetics in healthy adult women fed naturally low carotenoid diets. ***J. Nutr.*** **131**: 2096-2100

Burri, B. J., Niedlinger, T. R., Clifford, A. J., Dueker, S., Lin, Y. M. & Hickenbottom, S. (2002) Conversion of β-carotene to vitamin A measured with stable isotope methods. ***Am. J. Clin. Nutr.*** **75**: 409S(Abstract)

Cabrini, L., Barzanti, V., Cipollone, M., Fiorentini, D., Grossi, G., Tolomelli, B., Zambonin, L. & Landi, L. (2001) Antioxidants and total peroxyl radical-trapping ability of olive and seed oils. ***J. Agric. Food Chem.*** **49**: 6026-6032

Chen, G. & Djuric, Z. (2001) Carotenoids are degraded by free radicals but do not affect lipid peroxidation in unilamellar liposomes under different oxygen tensions. ***FEBS Lett.*** **505**: 151-154

Chen L, Stacewicz-Sapuntzakis M, Duncan C, Sharifi R, Ghosh L, van Breemen R, Ashton, D., Bowen, P.E. (2001) Oxidative DNA damage in prostate cancer patients consuming tomato sauce-based entrees as a whole-food intervention. ***J Natl Cancer Inst.*** 93:1872–9.

Christian, P., West, K. P.,Jr., Khatry, S. K., LeClerq, S. C., Kimbrough-Pradhan, E., Katz, J. & Shrestha, S. R. (2001) Maternal night blindness increases risk of mortality in the first 6 months of life among infants in Nepal. ***J. Nutr.*** **131**: 1510-1512

Coulston, A. M. (2001) The search continues for a tool to evaluate dietary quality. ***Am. J. Clin. Nutr.*** **74**: 417

Cramer, D. W., Kuper, H., Harlow, B. L. & Titus-Ernstoff, L. (2001) Carotenoids, antioxidants and ovarian cancer risk in pre- and postmenopausal women. ***Int. J. Cancer*** **94**: 128-134

Cremades, O., Ponce, E., Corpas, R., Gutierrez, J. F., Jover, M., Alvarez-Ossorio, M. C., Parrado, J. & Bautista, J. (2001) Processing of crawfish ***(Procambarus clarkii)*** for the preparation of carotenoproteins and chitin. ***J. Agric. Food Chem.*** **49**: 5468-5472

Crews, H., Alink, G., Andersen, R., Braesco, V., Holst, B., Maiani, G., Ovesen, L., Scotter, M., Solfrizzo, M., van den Berg, R., Verhagen, H. & Williamson, G. (2001) A critical assessment of some biomarker approaches linked with dietary intake. ***Br. J. Nutr.*** **86 Suppl 1:S5-35.**: S5-S35

Curran-Celentano, J., Hammond, B. R.,Jr., Ciulla, T. A., Cooper, D. A., Pratt, L. M. & Danis, R. B. (2001) Relation between dietary intake, serum concentrations, and retinal concentrations of lutein and zeaxanthin in adults in a Midwest population. ***Am. J. Clin. Nutr.*** **74**: 796-802

de Miguel, T., Sieiro, C., Poza, M. & Villa, T. G. (2001) Analysis of canthaxanthin and related pigments from ***Gordonia jacobaea*** mutants. ***J. Agric. Food Chem.*** **49**: 1200-1202

During, A., Smith, M. K., Piper, J. B. & Smith, J. C. (2001) β-carotene 15,15'-dioxygenase activity in human tissues and cells: evidence of an iron dependency. ***J. Nutr. Biochem.*** **12**: 640-647

Edelenbos, M., Christensen, L. P. & Grevsen, K. (2001) HPLC determination of chlorophyll and carotenoid pigments in processed green pea cultivars ***(Pisum sativum L.)***. ***J. Agric. Food Chem.*** **49**: 4768-4774

Edwards, A. J., You, C. S., Swanson, J. E. & Parker, R. S. (2001) A novel extrinsic reference method for assessing the vitamin A value of plant foods. ***Am. J. Clin. Nutr.*** **74**: 348-355

Erlinger, T. P., Guallar, E., Miller, E. R., Stolzenberg-Solomon, R. & Appel, L. J. (2001) Relationship between systemic markers of inflammation and serum β-carotene levels. ***Arch. Intern. Med.*** **161**: 1903-1908

Feskanich, D., Singh, V., Willett, W. C. & Colditz, G. A. (2002) Vitamin A intake and hip fractures among postmenopausal women. ***JAMA*** **287**: 47-54

Fordham, I. M., Clevidence, B. A., Wiley, E. R. & Zimmerman, R. H. (2001) Fruit of Autumn Olive: a rich source of lycopene. ***HortScience*** **36**: 1136-1137

Gale, C. R., Ashurst, H. E., Powers, H. J. & Martyn, C. N. (2001) Antioxidant vitamin status and carotid atherosclerosis in the elderly. ***Am. J. Clin. Nutr.*** **74**: 402-408

Germano, M., Shkuropatov, A. Y., Permentier, H., de Wijn, R., Hoff, A. J., Shuvalov, V. A. & van Gorkom, H. J. (2001) Pigment organization and their interactions in reaction centers of photosystem II: optical spectroscopy at 6 K of reaction centers with modified pheophytin composition. ***Biochemistry*** **40**: 11472-11482

Guedes De Pinho, P., Silva Ferreira, A. C., Mendes Pinto, M., Benitez, J. G. & Hogg, T. A. (2001) Determination of carotenoid profiles in grapes, musts, and fortified wines from Douro varieties of ***Vitis vinifera***. ***J. Agric. Food Chem.*** **49**: 5484-5488

Heber, D. & Bowerman, S. (2001) Applying science to changing dietary patterns. ***J. Nutr.*** **131**: 3078S-3081S

Hornero-Mendez, D. & Minguez-Mosquera, M. I. (2001) Rapid spectrophotometric determination of red and yellow isochromic carotenoid fractions in paprika and red pepper oleoresins. ***J. Agric. Food Chem.*** **49**: 3584-3588

Jampol, L. M. (2001) Antioxidants, zinc, and age-related macular degeneration: results and recommendations. ***Arch. Ophthalmol.*** **119**: 1533-1534

Kankova, K., Marova, I., Zahejsky, J., Muzik, J., Stejskalova, A., Znojil, V. & Vacha, J. (2001) Polymorphisms 1704G/T and 2184A/G in the RAGE gene are associated with antioxidant status. ***Metabolism*** **50**: 1152-1160

Karnaukhov, V.N. (2000) Functions of carotenoids as a subject of biophysical studies. ***Biophysics*** 45: 355-377

Kessova, I. G., Leo, M. A. & Lieber, C. S. (2001) Effect of β-carotene on hepatic cytochrome P-450 in ethanol-fed rats. ***Alcohol Clin. Exp. Res.*** **25**: 1368-1372

King, J. C. (2002) Biotechnology: a solution for improving nutrient bioavailability. ***Int. J. Vit. Nutr. Res.*** **72**: 7-12

Kotake-Nara, E., Kushiro, M., Zhang, H., Sugawara, T., Miyashita, K. & Nagao, A. (2001) Carotenoids affect proliferation of human prostate cancer cells. ***J. Nutr.*** **131**: 3303-3306

Krinsky, N. & Russell, R. M. (2001) Regarding the conversion of β-carotene to vitamin A. ***Nutr. Rev.*** **59**: 309

Krubasik, P., Takaichi, S., Maoka, T., Kobayashi, M., Masamoto, K. & Sandmann, G. (2001) Detailed biosynthetic pathway to decaprenoxanthin diglucoside in ***Corynebacterium glutamicum*** and identification of novel intermediates. ***Arch. Microbiol.*** **176**: 217-223

Lancrajan, I., Diehl, H. A., Socaciu, C., Engelke, M. & Zorn-

Kruppa, M. (2001) Carotenoid incorporation into natural membranes from artificial carriers: liposomes and beta-cyclodextrins. ***Chem. Phys. Lipids*** **112**: 1-10

Li, H. B., Jiang, Y. & Chen, F. (2002) Isolation and purification of lutein from the microalga ***Chlorella vulgaris*** by extraction after saponification. ***J. Agric. Food Chem.*** **50**: 1070-1072

Lietz, G., Henry, C. J., Mulokozi, G., Mugyabuso, J. K., Ballart, A., Ndossi, G. D., Lorri, W. & Tomkins, A. (2001) Comparison of the effects of supplemental red palm oil and sunflower oil on maternal vitamin A status. ***Am. J. Clin. Nutr.*** **74**: 501-509

Maoka, T., Fujiwara, Y., Hashimoto, K. & Akimoto, N. (2001) Capsanthone 3,6-epoxide, a new carotenoid from the fruits of the red paprika ***Capsicum annuum L***. ***J. Agric. Food Chem.*** **49**: 3965-3968

Maoka, T., Mochida, K., Kozuka, M., Ito, Y., Fujiwara, Y., Hashimoto, K., Enjo, F., Ogata, M., Nobukuni, Y., Tokuda, H. & Nishino, H. (2001) Cancer chemopreventive activity of carotenoids in the fruits of red paprika ***Capsicum annuum L***. ***Cancer Lett.*** **172**: 103-109

Masamoto, K., Wada, H., Kaneko, T., Takaichi, S. (2001) Identification of a gene required for cis-to-trans carotene isomerization in carotenogenesis of the cyanobacterium ***Synechocystics sp***. PCC 6803. ***Plant Cell Physiol***. 42:1398-1402

McGhie, T. K. & Ainge, G. D. (2002) Color in fruit of the genus ***Actinidia***: carotenoid and chlorophyll compositions. ***J. Agric. Food Chem.*** **50**: 117-121

Metzger, A., Mukasa, G., Shankar, A. H., Ndeezi, G., Melikian, G. & Semba, R. D. (2001) Antioxidant status and acute malaria in children in Kampala, Uganda. ***Am. J. Trop. Med. Hyg.*** **65**: 115-119

Meydani, M. (2001) Antioxidants and cognitive function. ***Nutr. Rev.*** **59**: S75-80; discussion

Naalsund, T., Malterud, K. E., Partali, V. & Sliwka, H. R. (2001) Synthesis of a triantioxidant compound: combination of β-apo-8'-carotenoic acid, selenacapryloic acid and trolox in a triglyceride. ***Chem. Phys. Lipids*** **112**: 59-65

Naves, M. M. V., Silveira, E. R., Dagli, M. L. Z. & Moreno, F. S. (2001) Effects of β-carotene and vitamin A on oval cell proliferation and connexin 43 expression during hepatic differentiation in the rat. ***J. Nutr. Biochem.*** **12**: 685-692

Ncube, T. N., Greiner, T., Malaba, L. C. & Gebre-Medhin, M. (2001) Supplementing lactating women with pureed papaya and grated carrots improved vitamin A status in a placebo-controlled trial. ***J. Nutr.*** **131**: 1497-1502

Neuhouser, M. L., Rock, C. L., Eldridge, A. L., Kristal, A. R., Patterson, R. E., Cooper, D. A., Neumark-Sztainer, D., Cheskin, L. J. & Thornquist, M. D. (2001) Serum concentrations of retinol, α-tocopherol and the carotenoids are influenced by diet, race and obesity in a sample of healthy adolescents. ***J. Nutr.*** **131**: 2184-2191

Noakes, M., Clifton, P., Ntanios, F., Shrapnel, W., Record, I. & McInerney, J. (2002) An increase in dietary carotenoids when consuming plant sterols or stanols is effective in maintaining plasma carotenoid concentrations. ***Am. J. Clin. Nutr.*** **75**: 79-86

Ntanios, F. Y. & Duchateau, G. S. M. J. E. (2002) A healthy diet rich in carotenoids is effective in maintaining normal blood carotenoids levels during the daily use of plant sterol-enriched spreads. ***Int. J. Vit. Nutr. Res.*** **72**: 32-39

O'Neill, M. E., Carroll, Y., Corridan, B., Olmedilla, B., Granado, F., Blanco, I., van den Berg, H., Hininger, I., Rousell, A. M., Chopra, M., Southon, S. & Thurnham, D. I. (2001) A European carotenoid database to assess carotenoid intakes and its use in a five-country comparative study. ***Br. J. Nutr.*** **85**: 499-507

Ogle, B. M., Dao, H. T., Mulokozi, G. & Hambraeus, L. (2001) Micronutrient composition and nutritional importance of gathered vegetables in Vietnam. ***Int. J. Food Sci. Nutr.*** **52**: 485-499

Palan, P. R., Mikhail, M. S. & Romney, S. L. (2001) Placental and serum levels of carotenoids in preeclampsia. ***Obstet. Gynecol.*** **98**: 459-462

Paolini, M., Antelli, A., Pozzetti, L., Spetlova, D., Perocco, P., Valgimigli, L., Pedulli, G. F. & Cantelli-Forti, G. (2001) Induction of cytochrome P450 enzymes and over-generation of oxygen radicals in β-carotene supplemented rats. ***Carcinogenesis*** **22**: 1483-1495

Perez-Galvez, A. & Minguez-Mosquera, M. I. (2001) Structure-reactivity relationship in the oxidation of carotenoid pigments of the pepper ***(Capsicum annuum L.)***. ***J. Agric. Food Chem.*** **49**: 4864-4869

Prakash, P., Manfredi, T. G., Jackson, C. L. & Gerber, L. E. (2002) β-Carotene alters the morphology of NCI-H69 small cell lung cancer cells. ***J. Nutr.*** **132**: 121-124

Prakash, P., Russell, R. M. & Krinsky, N. I. (2001) In vitro inhibition of proliferation of estrogen-dependent and estrogen-independent human breast cancer cells treated with carotenoids or retinoids. ***J. Nutr.*** **131**: 1574-1580

Qin, F., Rounds, N. K., Mao, W., Kawai, K. & Liang, C. S. (2001) Antioxidant vitamins prevent cardiomyocyte apoptosis produced by norepinephrine infusion in ferrets. ***Cardiovasc. Res.*** **51**: 736-748

Raisig, A. & Sandmann, G. (2001) Functional properties of diapophytoene and related desaturases of C(30) and C(40) carotenoid biosynthetic pathways. ***Biochim. Biophys. Acta*** **1533**: 164-170

Roca, M. & Minguez-Mosquera, M. I. (2001) Unusual carotenogenesis in fruits with pronounced anthocyanic ripening (***Olea europaea Var. Arbequina***). ***J. Agric. Food Chem.*** **49**: 4414-4419

Schroder, H., Covas, M. I., Marrugat, J., Vila, J., Pena, A., Alcantara, M. & Masia, R. (2001) Use of a three-day estimated food record, a 72-hour recall and a food-frequency questionnaire for dietary assessment in a Mediterranean Spanish population. ***Clin. Nutr.*** **20**: 429-437

Stahl, W., Heinrich, U., Wiseman, S., Eichler, O., Sies, H. & Tronnier, H. (2001) Dietary tomato paste protects against ultraviolet light-induced erythema in humans. ***J. Nutr.*** **131**: 1449-1451

Takeoka, G. R., Dao, L., Flessa, S., Gillespie, D. M., Jewell, W. T., Huebner, B., Bertow, D. & Ebeler, S. E. (2001) Processing effects on lycopene content and antioxidant activity of tomatoes. ***J. Agric. Food Chem.*** **49**: 3713-3717

Tanumihardjo, S. A. (2002) Factors influencing the conversion of carotenoids to retinol: bioavailability to bioconversion to bioefficacy. ***Int. J. Vit. Nutr. Res.*** **72**: 40-45

Taylor, A., Jacques, P. F., Chylack, L. T.,Jr., Hankinson, S. E., Khu, P. M., Rogers, G., Friend, J., Tung, W., Wolfe, J. K., Padhye, N. & Willett, W. C. (2002) Long-term intake of vitamins and carotenoids and odds of early age-related cortical and posterior subcapsular lens opacities. ***Am. J. Clin. Nutr.*** **75**: 540-549

Tomkins, A. (2001) Nutrition and maternal morbidity and mortality. ***Br. J. Nutr.*** **85 Suppl 2**: S93-S99

Truscott, T. G. (2001) Synergistic effects of antioxidant vitamins. ***Bibl. Nutr. Dieta.*** **(55)**: 68-79

Tyssandier, V., Cardinault, N., Caris-Veyrat, C., Amiot, M. J., Grolier, P., Bouteloup, C., Azais-Braesco, V. & Borel, P. (2002) Vegetable-borne lutein, lycopene, and β-carotene compete for incorporation into chylomicrons, with no adverse effect on the medium-term (3-wk) plasma status of carotenoids in humans. ***Am. J. Clin. Nutr.*** **75**: 526-534

van den Berg, H., van der Gaag, M. & Hendriks, H. (2002) Influence of lifestyle on vitamin bioavailability. ***Int. J. Vit. Nutr. Res.*** **72**: 53-9

Zhang, P. & Omaye, S. T. (2001) β-carotene: interactions with α-tocopherol and ascorbic acid in microsomal lipid peroxidation. ***J. Nutr. Biochem.*** **12**: 38-45

MEETING REPORT

The 13th International Carotenoid Society Symposium

The 13th International Carotenoid Society Symposium held in Renaissance Ilikai Hotel in Honolulu, Hawaii, on January 6-11, was hosted by the Cancer Research Center of Hawaii, University of Hawaii at Manoa. It was a huge success with 220 participants from 26 countries and 186 presentations. This provided an excellent opportunity to highlight the groundbreaking research in carotenoids.

The conference was focused on the biological properties of carotenoids, especially regarding human health. These included bioconversion, absorption & kinetics, cancer, eye, health benefits, lycopene, commercial production of carotenoids, carotenoids as antioxidants, gene regulation by carotenoids, phytochemistry and photosynthesis. The scientific content of the sessions was outstanding and all presentations certainly contributed to the hot issues of carotenoid research, pure and applied. Dr. Clinton and Dr. Giovannucci's talks on the role of tomatoes and lycopene in preventing prostate cancer gave me extensive background of ***in vivo, in vitro*** and epidemiological studies. This symposium has put me in a strong position to move into the exciting new (for me) area of carotenoids. It was very enjoyable to interact with the people who work in the field of carotenoids, sharing ideas and research results in a friendly atmosphere.

On the last evening a Banquet was held in the conference center. The hosts had arranged a traditional Polynesian culture revue and we were able to enjoy the authentic ambiance provided by professional Hawaiian

dancers. A special menu was served to round off this evening in true Japanese, Italian, and American style. Free afternoons gave us the opportunity to learn about the history of Hawaii and discover the historic places such as Pearl Harbor. We are all very grateful to the Committee of the International Carotenoid Society for the Symposium, with Dr. John Bertram as Chair and Symposium organizer. Next symposium will be held in Edinburgh, Scotland, on July 17-22, 2005, with Dr. Andrew Young as Program Chair.

Eun-Sun Hwang (Chicago, IL)
Postdoctoral Fellow

TECHNICAL NOTE
Molecular Weights of Carotenoids
Elemental Compositions and Exact Masses of Common Carotenoids

Carotenoid	Composition	Exact Mass
β-apo-8'-carotenal	$C_{30}H_{40}O$	416.3079
3-hydroxy-β-apo-8'-carotenal	$C_{30}H_{40}O_2$	432.3028
α-carotene	$C_{40}H_{56}$	536.4382
β-carotene	$C_{40}H_{56}$	536.4382
γ-carotene	$C_{40}H_{56}$	536.4382
lycopene	$C_{40}H_{56}$	536.4382
neurosporene	$C_{40}H_{58}$	538.4539
ζ-carotene	$C_{40}H_{60}$	540.4695
phytofluene	$C_{40}H_{62}$	542.4852
phytoene	$C_{40}H_{64}$	544.5008
2',3'-anhydrolutein	$C_{40}H_{54}O$	550.4175
echinenone	$C_{40}H_{54}O$	550.4175
α-cryrptoxanthin	$C_{40}H_{56}O$	552.4331
β-cryptoxanthin	$C_{40}H_{56}O$	552.4331
alloxanthin	$C_{40}H_{52}O_2$	564.3967
canthaxanthin	$C_{40}H_{52}O_2$	564.3967
diatoxanthin	$C_{40}H_{54}O_2$	566.4124
lutein	$C_{40}H_{56}O_2$	568.4280
isozeaxanthin	$C_{40}H_{56}O_2$	568.4280
zeaxanthin	$C_{40}H_{56}O_2$	568.4280
lycopene-16,16'-diol	$C_{40}H_{56}O_2$	568.4280
4-ketoalloxanthin	$C_{40}H_{50}O_4$	578.3760
pectenolone	$C_{40}H_{52}O_3$	580.3916
phoenicoxanthin	$C_{40}H_{52}O_3$	580.3916
4-ketozeaxanthin	$C_{40}H_{54}O_3$	582.4073
antheraxanthin	$C_{40}H_{56}O_3$	584.4229
lutein epoxide	$C_{40}H_{56}O_3$	584.4229
7,8,7',8'-tetradehydroastaxanthin	$C_{40}H_{48}O_4$	592.3553
7,8-didehydroastaxanthin	$C_{40}H_{50}O_4$	594.3709
astaxanthin	$C_{40}H_{52}O_4$	596.3866
neoxanthin	$C_{40}H_{56}O_4$	600.4179
isozeaxanthin bispelargonate	$C_{58}H_{88}O_4$	848.6683

Exact mass is defined as the monoisotopic molecular weight of a molecule and is calculated using the mass of the most abundant isotope of each element.

Richard B. van Breemen, "Mass Spectrometry of Carotenoids" pp F2.4.1-F2.4.13. In ***Current Protocols in Food Analytical Chemistry*** Vol 1. Ronald E. Wrolstad (Editor-in-Chief), 2001, John Wiley & Sons, New York, NY.

NEWS AND VIEWS

Native Bananas Rich in Provitamin A Carotenoids

A University of Queensland researcher, who is working to arrest a serious Vitamin A deficiency in the Federated States of Micronesia (FSM), believes she may have uncovered an under-utilised weapon against chronic disease in Australia: bananas.

PhD student Lois Englberger, who has worked and studied in FSM since 1997, began testing native bananas on the advice of Micronesian locals who had long used the fruits as traditional weaning foods. As imported foods - such as rice and fatty products - have increasingly replaced the islands' native foods in recent years, negative health consequences have followed, including the emergence of Vitamin A deficiency characterised by night blindness.

Ms Englberger said her search for local foods with possibly high amounts of provitamin A carotenoids – the precursors to Vitamin A – led her to discover a number of banana varieties and giant swamp taro that contained very high amounts of the carotenoids.

"Excitingly, these are actually the first varieties of bananas and giant swamp taro in the world that have been identified as being Vitamin A-rich," she explained. While the news was promising for FSM, Ms Englberger said her current research also held possible implications for Australian nutrition, particularly in terms of meeting the health challenges posed by chronic diseases. "Recent research has indicated that a diet rich in carotenoids may work against the onset of chronic disease. It follows that bananas rich in carotenoids may have special value for both children and adults," she said. "To date, the banana industry has focused worldwide on marketing and producing only the Cavendish variety, with low carotenoid content. Perhaps it is time we looked at alternative varieties, as well as native Australian foods that could be untapped sources of Vitamin A."

The University of Queenland Media Release, July 2001

Tomato Sauce May Reduce DNA Damage in Prostate Cancer Patients

A component of tomato sauce may help reduce DNA damage in white blood cells and in the prostate, a new study suggests. This may have implications for the prevention or treatment of prostate cancer. The active ingredient could be lycopene, an antioxidant found in large amounts in tomatoes.

Men with prostate cancer, who consumed one tomato sauce-based entree a day for three weeks, had a statistically significant decrease in the amount of DNA damage in their white blood cells and prostate tissues. The pasta treatments also led to a reduction in their blood levels of prostate-specific antigen (PSA), a protein used to assess prostate cancer risk, report Longwen Chen M.D., Ph.D., Phyllis Bowen, Ph.D., R.D., and their colleagues at the University of Illinois at Chicago. The findings appear in the Dec. 19 issue of the ***Journal of the National Cancer Institute.***

Human prostate tissue may be particularly vulnerable to oxidative DNA damage caused by free radicals, and an accumulation of this damage may play a role in the development of prostate cancer. Antioxidants such as lycopene can help remove free radicals. Tomatoes are especially rich in lycopene. In past epidemiologic studies, men who reported eating more tomato-based foods had a lower risk for prostate cancer—the second leading cause of cancer-related deaths among U.S. men.

In the new study, investigators measured blood leukocyte and prostate lycopene concentration, blood PSA levels, and blood leukocyte DNA damage in 32 men with localized prostate cancer. The subjects then ate one tomato-based pasta dish a day for three weeks before their scheduled prostate cancer surgery. Entrees consisted of a three-fourth cup of spaghetti sauce incorporated into four different dishes: sausage lasagna, baked rigatoni, penne pasta, and stuffed shells.

After the three-week regimen, and after surgery, there was an accumulation of lycopene in the prostate tissues and a statistically significant 21.3% decrease in oxidative DNA damage in leukocytes compared with pre-intervention levels.

Their prostate DNA damage was 28.3% lower than a control group's. PSA levels decreased 17.5% after the intervention, but the authors note that it is unclear whether lycopene was the cause of the reduction. The answer may come from the results of an ongoing clinical trial involving lycopene and a placebo.

University of Illinois at Chicago Press Release, December 13, 2001

Tomato Sauce Cuts Cancer Risk

Men who consume tomato products two or more times a week can significantly reduce their chances of contracting prostate cancer, a study found.

The finding is based on data from the Health Professional Follow-Up Study, a project that followed the health history and dietary habits of 47,000 men, aged 40 to 75, from 1986 to 1998. During that period, 2,481 of the men developed prostate cancer.

Dietary questionnaires in the study included such food items as tomatoes, tomato sauce, tomato juice, pizza, watermelon and pink grapefruit, along with salsa, ketchup and other tomato-based condiments. When the data was adjusted for the effects of other life style factors, the researchers found that tomatoes, especially if they had been cooked, were beneficial against prostate cancer. Those who ate at least two meals a week containing tomato products lowered their risk of prostate cancer by 24 percent to 36 percent.

Dr. Edward Giovannucci of Brigham and Women's Hospital and the Harvard School of Public Health, the first author of the study, said it supported earlier research involving foods such as tomatoes that were high in lycopene, a powerful antioxidant. Lycopene is thought to protect against cancer by absorbing oxygen free-radicals, which are chemicals created during metabolism that can damage the genetic structure of cells. Spaghetti sauce was the most popular and also seemed to give the most protection. Cooking raw tomatoes, as is done to make spaghetti sauce, may break down cell walls of the fruit and allow the body to absorb more lycopene. "These most recent findings add support to the notion that a diet rich in tomatoes and lycopene-containing foods, as well as other fruits and vegetables, may reduce the risk of prostate cancer." Giovannucci said. A report on the study appears today in the Journal of the National Cancer Institute.

Jo Ann Carson, a clinical nutritionist at the University of Texas, Southwest Medical Center in Dallas, said the study "is an example that what we eat can affect our risk of cancer."The study also supports the idea that foods rich in antioxidants, rather than vitamin pills, provide the most cancer protection, she said. "Eating the whole foods seems to give a beneficial combination that would be lacking in supplements," Carson said.

March 6, 2002
The New York Times

ANNOUNCEMENTS

International Carotenoid Society Website News

The web site of the International Carotenoid Society has been migrated to a new server. You should now access the web site using your browser to connect to http://carotenoidsociety.org I am hopeful that in its new home, the site will be more responsive, stable and secure.

We have also added a new feature under the Members link. When you login with your id and password, you will find a new button labeled "Message Board". When you click on this button, you will be brought to the "Carotenoid Society Forum", where you can post messages pertaining to your work on carotenoids. The topics include General Announcements, Positions Available and Wanted, General Ads, and General Question and Answers. If you post a message and someone responds to it, you will get an e-mail notification that someone has done so, if you check the "Notify of Reply" option. This module will accept posting of requests for information, procedures, sources of carotenoids, advertisements for postdoctoral and other professional positions, and provide a forum in which a nested discussion of Society business, e.g. venues for symposia, program proposals, endorsements of candidates for election as officers or councilors in the Society, etc. may be carried out.

However, to use the Message Board, you must first register with the "Carotenoid Society Forum". Registration to the Forum is necessary because it uses a separate database from the Member login. Once you have clicked on the "Message Board" button and are at the Carotenoid Society Forum page, do the following:

1. Click "Register". Fill in the information, and you will be sent another password automatically by e-mail.
2. Obtain your new password from your e-mail.
3. Revisit the "Carotenoid Society Forum" page, and login to the forum using the provided password. You can then change the provided password if you wish, or you can elect to stay logged in to the Forum, so when you close your browser and come back, you will still be connected to it. Just remember that logging into the Members area and participation in the Carotenoid Society Forum are independent tasks.
4. You may now post messages on the Forum.

The Welcome message posted on the Carotenoid Society Forum is also stated here:

"Welcome to the new discussion forum for the International Carotenoid Society. This electronic forum is provided as a service for the members of the International Carotenoid Society and is intended to foster discussion and to communicate information. Although the forum is largely unmoderated, which means the site managers will not usually initiate, control, nor censor the discussion, anything considered inappropriate will be removed. No messages should be regarded as official statements of Society policy, regardless of who posted the message. Also, the products described or opinions expressed in this forum are not necessarily endorsed by any of the officers of the Society nor by the Society itself. Thank you, and please do not hesitate to contact me with any questions or comments."

Harry A. Frank, ICS President
E-mail: harry.frank@uconn.edu

Plant Phenolics and Human Health Research Interest Group
5th Annual Scientific Symposium
Saturday, April 20, 2002
12:30 p.m. - 6:00 p.m.
New Orleans Convention Center
Experimental Biology 2002
(No registration fee for PhenHRIG)

Chairpersons : Myron Gross (University of Minnesota)
Gary R. Beecher (USDA)

12:30 p.m. PhenHRIG Mixer
1:00 p.m. Welcome to PhenHRIG & Introduction to Phenolics and Health (Myron D. Gross)
KEYNOTE ADDRESS
1:15 p.m. Activity Guided Isolation of Biologically Active Phenolic Substances (John M. Pezzuto)
FLAVONOID METABOLISM
1:55 p.m. Bioavailability, Metabolism, and Clinical Relevance of Soy Isoflavones (Kenneth D.R. Setchell)
2:30 p.m. Metabolism of Flavonoids (Peter C.H. Hollman)
3:05 p.m. New Investigators Introductions*
3:15 p.m. Panel Discussion: Uptake, Metabolism, and Activity of Flavonoids
3:30 p.m. Break

BIOLOGICAL ACTIVITY OF PHENOLICS

3:45 p.m. Influence of Tea on Carcinogenesis (C.S. Yang)
4:20 p.m. Dietary Flavonoids and Endothelial Function (Joseph A. Vita)
4:55 p.m. New Investigators Introductions*
5:05 p.m. Panel Discussion: In Vivo Functions of Flavonoids
5:30 p.m. Business Meeting

*PhenHRIG encourages young investigators to introduce themselves and share their research interests. For more information about participation in the New Investigators Introduction, contact Dr. Myron Gross at gross@epi.umn.edu or call 612-624-5417.

Internet Addresses for Carotenoid Researchers

1. This list is intended to be an open forum for carotenoid researchers from around the world to discuss recent developments in this field: CARIG.Forum@lists.unh.edu. To subscribe, send e-mail to:listproc@lists.unh.edu. In the body of the message write: subscribe CARIG Forum, your name.

2. International Carotenoid Society Web Page: www.carotenoidsociety.org Anyone wishing to join the society and be listed in the web directory, please contact Harry A. Frank at harry.frank@uconn.edu.

3. Carotenoid Food Database: www.nal.usda.gov/fnic/foodcomp/

Published twice a year, in February and August by **CAROTENOID RESEARCH INTERACTIVE GROUP (CARIG)**

Chairperson:	**Harold Furr (Storrs, CT)**
Treasurer:	**Boon Chew (Pullman, WA)**
Editor:	**Maria S. Sapuntzakis (Chicago, IL)**
Address:	**Human Nutrition, M/C 517 University of Illinois at Chicago 1919 West Taylor St. Chicago, Il. 60612**
Fax:	**312-413-0319**
E-mail:	**msapuntz@uic.edu**
Subscription:	**$10 per year (checks payable to CARIG)**
Website:	**www.carotenoidsociety.org**

"Are you thinking of them as food or as dietary supplements?"

X