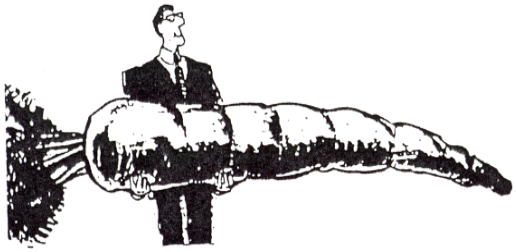

# Carotenoid

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## FROM THE EDITOR

*"Exegi monumentum aere perennius" (Horace)*

"I have raised a monument more lasting than bronze" wrote this great Roman poet in one of his odes – and he was right. Many ancient monuments were destroyed by natural disasters, irreverent people, or simply a passage of time, but his poetry remains an inspiration and is often quoted by writers two thousand years later. Such monuments are also raised by scientists who make great discoveries or change widely accepted theories. Dr Clive West dared to challenge the idea of the efficient conversion of β-carotene to vitamin A in humans, which is still ingrained in minds of nutritionists, food producers and the public. An indiscriminate extrapolation from animal experiments caused this misconception, despite evidence to the contrary, exemplified by poor effectiveness of carotenoids in combating vitamin A deficiency in South Asian children. Dr West used to say: "I am not arrogant – I am right!" His courage and persistence led to the recent changes in official conversion factors, ending the woeful overestimates of vitamin A nutrition in many populations and exerting a major impact on nutrition policies (promoting preformed vitamin A supplements and food, as well as red palm oil and *gac* fruit, rich in bioavailable β-carotene). There can be no more lasting monument to the memory of Dr West than saving countless lives and eyesight of children worldwide, now and in the future.

*Maria S. Sapuntzakis (Chicago, IL)*

## IN MEMORIAM

**Professor Clive Eric West, PhD, DSc, FRACI (1939-2004)**

With Clive West's death on the 27th of August 2004, the world has lost a remarkable scientist. His legacy comprises over 250 scientific publications, a better understanding and awareness of micronutrient malnutrition problems in developing countries, and a small army of former PhD and MS students across the world to continue his work. As a native of Australia, Clive was bound to focus on sheep in his early career. He published many papers on lipid metabolism but later in life – although very proud that one such paper was cited almost a thousand times - he became dismissive about these achievements, because he considered his later work much more relevant. In the 1970s, while living in northern Nigeria, he found his calling in his research on vitamin A deficiency and measles. After having moved to Wageningen in The Netherlands in 1979, he continued to work on vitamin A, but also supervised many studies across the world to combat deficiencies of iodine, iron, zinc and folate. Wary of 'me-too' studies and a strong believer that hardly anything was impossible, Clive always came up with innovative and elegant study designs. Therefore, his studies not only identified causes of malnutrition, but also suggested potential solutions. His crowning achievement was visionary work, conducted under his guidance, showing that the absorption of provitamin A carotenoids from plant sources and their conversion to vitamin A was much less than previously assumed. To Clive's great pride, the most risky project he ever undertook finally resulted in reliable quantification of the vitamin A equivalency of β-carotene. Although highly controversial when first published, these findings eventually became accepted. They now appear in nutrition text-books, guide nutrition policies, and therefore continue to have important consequences for strategies to combat vitamin A deficiency disorders. At all continents except perhaps Australia, Clive organised and taught in micronutrient malnutrition and food composition courses. He was a co-founder of the European Nutrition Leadership Programme and he has empowered others to set up similar programmes in South-East Asia and Africa. Clive brought tremendous energy and utter devotion to his work, and he demanded no less from others. Yet he never forgot what was truly important in his life or that of his family, students, colleagues and friends across the world. Hence, he's become a role model for and friend to so many of us. A friend we had wished more time to finish his never-ending mission. A friend many of us will dearly miss for his trustworthy advice and whose memory will continue to inspire our work and lives.

*Machteld van Lieshout (North-West University, South Africa)*
*Hans Verhoef (Wageningen University, the Netherlands)*

## UPCOMING EVENTS

**March 31- April 6, 2005**
**Experimental Biology 2005 and XXXV International Congress of Physiological Sciences, San Diego, CA Contact:** EB2005, FASEB Office of Scientific Meetings & Conferences, 9650 Rockville Pike, Bethesda MD 20814-3998, **website**: www.faseb.org/meetings/eb2005 [see CARIG Conference program and other highlights below]

**May 18-21, 2005**
**3rd International conference on diet and optimum health, Portland, Oregon.** Contact: Dr.Balz Frei, Linus Pauling Institute, Oregon State University, 571 Weniger Hall, Corvallis, OR 97331 (http://lpi.oregonstate.edu/conf2005)

**July 17-22, 2005**
**14th International Symposium on Carotenoids, Edinburgh, Scotland. Contact :** George Britton, University of Liverpool, Department of Biochemistry, P.O.Box 143, Liverpool L69 72B, UK, tel: +44 151 795 4457, fax: +44 151 795 4406, web: www.carotenoidsociety.org, E-mail:g.britton@liverpool.ac.uk [see main themes below], Deadline for abstracts is March 31, 2005

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## HIGHLIGHTS OF EXPERIMENTAL BIOLOGY 2005

**Saturday, April 2**, CARIG Annual Conference,1-5pm,San Diego Marriott Hotel & Marina,Marina Ballroom F
CARIG/VARIG Social, 6:30-8:30 pm, San Diego Marriott Hotel & Marina, Laguna Room

**Sunday, April 3**, Carotenoid Poster Session, 12:45-2:45pm, San Diego Convention Center, Exhibit Hall

**Tuesday, April 5**, Carotenoid Minisymposium, 8-10am, San Diego Convention Center, Room 9

**2005 CARIG Annual Conference**
**Saturday, April 2, 2005, 1:00 - 5:00 PM**
**San Diego, Marriott Hotel and Marina F**
**Chair: Julie Mares, University of Wisconsin**

**Co-chairs: Alexandrine During** (USDA Human Nutrition Research Center, Beltsville), **Elizabeth Johnson** (Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University), **Wendy White** (Iowa State University)

1:00-1:40 Carotenoid Metabolites and Their Biological Activity. James Allen Olson Memorial Perspectives on Carotenoids Lecture, *Norman Krinsky*, *Tufts University*

1:40-1:50 Discussion

1:50-2:10 Carotenoids, Gene Regulation and Cancer Prevention. *Xiang-Dong Wang, Tufts University*

2:10-2:20 Discussion

2:20-2:40 Breeding Crops to Alleviate Deficiencies of Vitamin A and Other Micronutrients. *Penny Nestel, Nutrition Coordinator, HarvestPlus*

2:40-2:50 Discussion

3:10-3:15 Tribute to the late Dr. Clive E. West, Professor of Human Nutrition, Wageningen University, The Netherlands. *Noel Solomons*, *Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM), Guatemala*

**Non-Invasive Methods for Measurement of Carotenoids in Tissues**, *Susan Mayne, Yale University, Moderator*

3:15-3:35 Measurement of Carotenoids in the Skin and Retina using Raman Spectroscopy. *Paul Bernstein, University of Utah*

3:35-3:45 Questions

3:45-4:05 Measurement of Carotenoids in the Retina using Heterochromatic Flicker Photometry. *Max Snodderly, Medical College of Georgia*

4:10-4:20 Questions

4:20-4:45 Summary and Panel Discussion (*Mayne, Bernstein, Snodderly and audience*): Strengths and limitations of non-invasive methods, future research needs

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**14th International Symposium on Carotenoids**
**Edinburgh, Scotland, July 17th - 22nd 2005.**

**Main themes:**

- Carotenoids and oxygen
- Nutrition and Metabolism
- Photochemistry and photosynthesis
- Natural states and interactions with other molecules
- Biosynthesis
- Carotenoids and the eye
- Carotenoids and cancer
- Carotenoids and nature
- Carotenoids and anti-aging effects of carotenoids
- Commercial production and applications
- Carotenoids in the post-genomic era

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## RECENT / FORTHCOMING PUBLICATIONS

**Sight and Life Newsletter 3/2005,** publication of the Task Force SIGHT AND LIFE, PO Box 2116, 4002 Basel, Switzerland, **web:** www.sightandlife.org, **tel:** 41-61-688-7494, **fax**: 41-61-688-1910, See especially: In Memoriam, Clive E.West, 1939-2004

Schalch W. Lutein and zeaxanthin supplementation improves visual performance.

Schwartz S.J. Food Matrix effects on carotenoid absorption. [James Allen Olson Memorial Lecture presented at CARIG Annual Conference, April 17, 2004]

Afender H. The 3rd International Congress on Pigments in Foods [Report]

**Vitamin and Mineral Safety**. Hathcock, J. N. (2004) Council for Responsible Nutrition, Washington,DC.

**HarvestPlus Handbook for Carotenoid Analysis.** Rodriguez-Amaya, D. B. & Kimura, M. (2004) Harvest Plus Technical Monograph 2, Washington, DC.

**Carotenoids in Health and Disease.** Krinsky,N., Mayne,S.T., & Sies,H. (eds.) (2004) Marcel Dekker, New York.

Barua, A. B. Bioconversion of provitamin A carotenoids.

Bernstein, P. S. & Gellermann, W. Noninvasive assessment of carotenoids in the human eye and skin.

Cantrell, A. & Truscott, T. G. Carotenoids and radicals: interactions with other nutrients.

Ferruzzi, M. G. & Schwartz, S. J. Methodology for assessment of carotenoid levels in blood plasma and plasma fractions.

Furr, H. C. & Clark, R. M. Transport, uptake, and target tissue storage of carotenoids.

Gruszecki, W. I. Carotenoid orientation: role in membrane stabilization.

Hughes, D. A. Carotenoids and immune responses.

Krinsky, N., Mayne, S. T., & Sies, H. Carotenoids: looking forward.

Landrum, J. T. & Bone, R. A. Mechanistic evidence for eye diseases and carotenoids.

Liaaen-Jensen, S. Basic carotenoid chemistry.

Mares, J. A. Carotenoids and eye disease: epidemiological evidence.

Mathews-Roth, M. M. Therapeutic uses of carotenoids in skin photosensitivity diseases.

O'Brien, N. & O'Connor, T. Induction of cytochrome P450 enzymes by carotenoids.

Palozza, P. Evidence for pro-oxidant effects of carotenoids in vitro and in vivo: implications in health and disease.

Rock, C. L. Relationship of carotenoids to cancer.

Sesso, H. D. & Gaziano, J. M. Heart and vascular diseases.

Sharoni, Y., Danilenko, M., & Levy, J. Anticancer activity of carotenoids: from human studies to cellular processes and gene regulation.

Stahl, W. & Sies, H. Carotenoids in systemic protection against sunburn.

Tang, G. & Russell, R. M. Bioequivalence of provitamin A carotenoids.

Von Lintig, J. Conversion of carotenoids to vitamin A: new insights on the molecular level.

Wang, X. D. Carotenoid oxidative/degradative products and their biological activities.

Woggon, W. D. & Kundu, M. K. Enzymatic versus chemical cleavage of carotenoids: supramolecular enzyme mimics for β-carotene 15,15'-monooxygenase.

Young, A. J., Phillip, D. M., & Lowe, G. M. Carotenoid antioxidant activity.

**Carotenoids and Retinoids: Molecular Aspects and Health Issues**. Packer,L., Obermueller-Jevic,U., Kraemer,K., & Sies,H. (eds.) (2005) AOCS Press, Champaign,IL.

**Dietary guidelines for Americans 2005,** US DHHS, USDA, www.healthierus.gov/dietaryguidelines

## Alphabetical Listing of Recent Publications

Prepared by Dr. Harold Furr, Craft Technologies, Inc.

More extensive list may found at www.carotenoidsociety.org


Agrahar-Murugkar, D. & Pal, P. P. (2004) Intake of nutrients and food sources of nutrients among the Khasi tribal women of India. Nutrition 20: 268-273.

Aguilo, A., Tauler, P., Fuentespina, E., Villa, G., Cordova, A., Tur, J. A., & Pons, A. (2004) Antioxidant diet supplementation influences blood iron status in endurance athletes. Int.J.Sport Nutr.Exerc.Metab 14: 147-160.

Alemzadeh, R. & Feehan, T. (2004) Variable effects of β-carotene therapy in a child with erythropoietic protoporphyria. Eur.J.Pediatr.163:547-549.

Alija, A. J., Bresgen, N., Sommerburg, O., Siems, W., & Eckl, P. M. (2004) Cytotoxic and genotoxic effects of β-carotene breakdown products on primary rat hepatocytes. Carcinogenesis 25: 827-831.

Alves-Rodrigues, A. & Shao, A. (2004) The science behind lutein. Toxicol.Lett. 150: 57-83.

Aman, R., Bayha, S., Carle, R., & Schieber, A. (2004) Determination of carotenoid stereoisomers in commercial dietary supplements by HPLC. J.Agric.Food Chem. 52: 6086-6090.

Amar, E. C., Kiron, V., Satoh, S., & Watanabe, T. (2004) Enhancement of innate immunity in rainbow trout (*Oncorhynchus mykiss* Walbaum) associated with dietary intake of carotenoids from natural products. Fish.Shellfish.Immunol. 16: 527-537.

Amundsen, A. L., Ntanios, F., van der Put, N., & Ose, L. (2004) Long-term compliance and changes in plasma lipids, plant sterols and carotenoids in children and parents with FH consuming plant sterol ester-enriched spread. Eur.J.Clin.Nutr. 58:1612-1620.

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Andreoli, R., Manini, P., Poli, D., Bergamaschi, E., Mutti, A., & Niessen, W. M. (2004) Development of a simplified method for the simultaneous determination of retinol, α-tocopherol, and β-carotene in serum by LC-MS with APCI. Anal.Bioanal.Chem. 378: 987-994.

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Asai, A., Sugawara, T., Ono, H., & Nagao, A. (2004) Biotransformation of fucoxanthinol into amarouciaxanthin A in mice and HepG2 cells: formation and cytotoxicity of fucoxanthin metabolites. Drug Metab Dispos. 32: 205-211.

Asai, A., Terasaki, M., & Nagao, A. (2004) An epoxide-furanoid rearrangement of spinach neoxanthin occurs in the gastrointestinal tract of mice and in vitro: formation and cytostatic activity of neochrome stereoisomers. J.Nutr. 134: 2237-2243.

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## MEETING REPORT
## Carotenoids and Dietary Lipids in Health and Disease
## EU F5 DLARFID Project Conference – Kraków, Poland, December 9-12, 2004

Within the European Commission Framework 5th Programme, the Consortium of ten research centers from seven EU countries was formed to achieve the aims of **DLARFID** (European Commission Research Project: "**Dietary Lipids as Risk Factors in Development.** Mechanistic Issues" www.dlarfid.org). Their efforts were directed to study the β-carotene (BC) and fatty acid interaction in experimental models, using the most advanced methods of molecular biology (cDNA-microarray, high-resolution 2D gel electrophoresis, flow cytometry). The main purpose for the creation of the DLARFID consortium was the integration of research centers working on the effects of carotenoids and fatty acids in various normal and altered human cells and tissues. The final DLARFID meeting was held in Krakow on Decrmber 9 -12, 2004. It served as a recapitulation of DLARFID consortium efforts but also presented current state-of-art knowledge on carotenoids in human health and pathology. Therefore organizers had invited recognized experts from Europe and USA, who delivered the lectures on their latest results in this field. Thus, the DLARFID final meeting was not limited to the consortium researchers, but also included a specialized update on carotenoids and fatty acids for all interested scientists (130 participants including Eastern European countries such as Hungary, Ukraine, Czech Republic). This report will highlight the presentations on carotenoids included in various sessions.

**I. Lipids and carotenoids. Sources, metabolism and mechanisms of genomic and non-genomic actions**

**Dr. S. Southon** discussed four challenges associated with understanding and measuring carotenoid bioavailability: release of carotenoids from food matrix and processing into an absorbable form (bioaccessibility), passage of carotenoids from gut lumen into the body (absorption), interpreting plasma response and inter-individual variation. Carotenoids used as colorants are likely to be better absorbed because of the form in which they are dispersed in food. **Prof. R. Eliot** presented an overview of the known effects of carotenoids and discussed the use of model systems and functional genomic approaches to elucidate their modes of action. **Prof. J. Lintig** focused his lecture on animal carotenoid metabolism. By analyzing blind *Drosophila* mutants, Prof. J. Lintig's group identified genes involved in carotenoid/retinoid metabolism and characterized their functions, including the key enzyme catalyzing provitamin A conversion to vitamin A. **Prof. S. Cinti** showed his studies on BC in ferrets. While rodents transform practically all ingested BC into retinol, in ferrets, as in humans, part of BC is absorbed intact and released into the circulation. His group showed that the higher BC dose induced significant increase of body weight compared with controls. In addition, chronic treatment with BC induced a dose-dependent hypertrophy of white adipocytes and increased neoangiogenesis in subcutaneous white adipose tissue (WAT). They also found focally evident liver steatosis. The knowledge of BC metabolism in both humans and ferrets is scarce, and the vast majority of studies on mammalian BC have been done on rodents or other laboratory small mammals. Thus, care has to be taken to avoid the direct extrapolation of these results to humans.

**IIa. Carotenoids and lipids in cell proliferation and differentiation (normal cells)**

**Prof. A. Palou** demonstrated the impact of retinoic acid (RA) and chronic vitamin A administration on food intake and its relationship to changes of body adiposity in NMRI and C57BL/6J mice. They showed that vitamin A down-regulates leptin expression in white and brown adipose tissue, and circulating leptin levels, independently of changes in adipose tissue mass, and that this effect does not correlate with increased food intake. They also demonstrated a direct inhibitory effect of RA on leptin expression in both white and brown adipocyte cell cultures. Reduction of leptin levels by specific nutrients is of potential interest from a clinical point of view. **Prof. G. Schmitz** presented a study on retinoids as potent inducers of the macrophage lipid efflux. Primary human monocytes and *in-vitro* differentiated macrophages were stimulated with BC, 9-cis RA, and *all-trans* RA (ATRA), and global gene expression profiles were analyzed by Affymetrix DNA-microarrays and by quantitative TaqMan RT-PCR. They have identified a strong upregulation of a cluster of genes involved in cholesterol metabolism including apolipoproteins (apoC-I, apoC-II, apoC-IV, apoE), the scavenger receptor CD36, steroid-27-hydroxylase (CYP27A1), liver X receptor α (LXRα), and ATP-binding cassette transporters A1 (ABCA1) and G1 (ABCG1). Since the CYP27A1 gene displayed the strongest upregulation on the mRNA level, they cloned various deletion constructs of the promoter region and analyzed the response to retinoids in macrophages. Thereby, a novel RA-responsive element could be located within 191bp of the proximal CYP27A1 promoter. To further assess the functional consequences of retinoid receptor action, they carried out phospholipid and cholesterol efflux assays. They observed a strong induction of apoA-I dependent lipid efflux in stimulated macrophages, implicating an important role for retinoids in cellular functions of macrophages. **Prof. A. Dembinska-Kiec** presented the effect of BC and fatty acids in umbilical cord progenitor cell differentiation. She concluded that BC in the physiological concentration range stimulates early steps of angiogenic activity of endothelial cells by activation of cellular migration (chemotaxis) as well as matrix reorganization and decrease of cell adhesion. Microarray techniques (in cooperation with Prof G.Schmitz and Prof. J. Keijeer) demonstrated the BC-induced expression of genes reorganizing the extracelullar matrix and adhesion and the potent activation of Rho/Rac/Cdc42 GTPase signaling pathway, which in turn may promote HUVEC migration and formation of immature capillary network.

**IIb. Carotenoids and lipids in cell proliferation and differentiation (cancer cells)**

**Prof. P. Palozza** gave a lecture concerning effects of BC and lycopene in cells exposed to cigarette smoke condensate. It can be hypothesized that BC modulates intracellular redox status and through this mechanism, it affects redox-sensitizer pathways involved in the regulation of cell cycle progression and apoptosis. In cultured cells, the answer to the question: "Can BC affect cell growth by a redox mechanism?" is "yes". However, these results have been demonstrated only *in vitro*. Our knowledge of the redox regulation of cell growth by BC *in vivo* remains fragmented and incomplete. **Prof. R. Goralczyk** indicated that impaired retinoid signaling is not likely a key factor in lung tumorigenesis in a mouse model. Her group found no effect of BC, irrespective of dose and time point of treatment, on tumor formation in the NNK-initiated A/J-mouse lung cancer model. According to this group, the enhancement of NNK-induced bronchial epithelial cell proliferation by BC shortly after initiation is unlikely to be predictive for later tumor formation. Modulation of RA-responsive gene expression levels by NNK and/or by BC was not predictive for later tumor development. Moderate increases in RARß by BC alone are indicative of intact BC metabolism and sensitivity to RA in the mice. Down-regulation of RARß in NNK-induced lung adenomas, however, is similar to human lung cancer and further confirms the A/J-mouse as a valuable model for lung carcinogenesis. In conclusion, they were not able to confirm the hypothesis that BC promotes lung tumor formation by causing impaired retinoid signaling. In his lecture **Prof. J. Kejer** raised the necessity to establish the window of benefit and to identify early markers of effect and to obtain insight in the mechanism of action of BC, in the absence or presence of environmental risk factors. Human cell lines can be used to analyze effects of BC, but exposure studies with BC show that cell lines display a widely variable behavior, which hampers translation to the *in vivo* situation in humans. Alternatively, animal studies can be used. Especially the ferret seems to be a good model, but little sequence information on this species is available. Genomic techniques will undoubtedly contribute to the understanding of effects of nutrients and nutrition on our health. **Prof. P. Laidler** analyzed the effect of BC and fatty acids on proliferation and apoptosis of human melanoma and prostate cancer cells. The presented study was carried on human cancer cell lines: A375, WM-35-melanoma and LNCaP (androgen dependent), PC-3 (androgen independent) prostate cancer. The data pointed to the selective stimulation of LNCaP proliferation by BC. In the other cell lines BC+arachidonic acid induced cell cycle delay in GI phase, which was most likely related to the changes in physiological activity of proteins involved in cell cycle progression. **Prof. M. Stacewicz-Sapuntzakis** discussed a tomato sauce intervention trial with prostate cancer patients, conducted by her team, as well as related cell culture experiments, and provided possible mechanistic explanations of the results in the light of recent findings concerning the beneficial effect of lycopene interaction with specific genes. **Prof. A. Skotnicki and Dr T. Sacha** presented a study on the effect of BC and its derivatives on differentiation, proliferation and apoptosis in three human acute leukemia cell lines. They demonstrated that, contrary to ATRA, BC concentrations achievable *in vivo* do not affect the proliferation and differentiation process of these leukemic cell lines, but can influence and enhance the apoptosis by modulating the expression of regulatory genes. **Prof. J.**

**Bertram** studied the molecular mechanisms for upregulated expression of connexin 43 (Cx43) by cancer preventive retinoids and carotenoids. This up-regulation correlates with suppression of carcinogen-induced transformation in IOTI/2 cells. Simultaneus treatment with a retinoid and BC or astaxanthin resulted in supra-additive Cx43 expression, which indicates separate mechanisms of gene regulation.

**III. Carotenoids - the biophysical aspects**

**Prof. T. Truscott** discussed possible consequences of using lycopene and other carotenoids as dietary supplements. He considered cell membrane models in terms of carotenoid structure and their influence on the properties of lipid membrane. The formation of aggregates by polar carotenoids is also proposed to be of significance in their ability to quench singlet oxygen. **Prof. K. Strzałka and Prof. W. Gruszecki** presented an overview of research on the effect of carotenoids on structural and dynamic properties of lipid membranes using electron paramagnetic resonance, nuclear magnetic resonance, differential scanning calorimetry, X ray diffractometry, monomolecular layer technique, and other. **Prof. W. Stahl** discussed the role of carotenoids in nutritional protection as they comprise a class of natural fat-soluble pigments. Photooxidative damage is suggested to be involved in the pathobiochemistry of several diseases affecting the skin and the eye, and carotenoids may protect light-exposed tissues. Lutein and zeaxanthin are the predominant carotenoids of the retina and are considered to act as photoprotectants preventing retinal degeneration.

**IV. Dietary carotenoids and lipids: lesson learned from epidemiological and genetic studies**

**Prof. P. Berstein** talked about synergistic effects of zeaxanthin and its binding protein in the prevention of lipid membrane oxidation. His group recently purified, identified and characterized an isoform of glutathione S-transferase (GSTP1) as a zeaxanthin-binding protein in the macula of the human eye, which binds to the two forms of zeaxanthin endogenously found in the foveal region. It may yield important insights into their potential role as protectants against age-related macular degeneration. Another study presented by Prof. Bernstein linked the adipose and red blood cell lipids with severity of dominant Stargardt macular dystrophy. It was the first demonstration that dietary factors can influence the severity of an inherited human macular dystrophy. **Prof. R. Ruhl** discussed beneficial and detrimental effects of BC on xenobiotic metabolism. He focused on the evaluation of physiological and nutritional relevance of BC as an inducer of phase I enzymes in the human organism via PXR-mediated mechanisms.

In the enchanted surroundings of medieval Kraków preparing for Christmas, the participants took the opportunity to discuss and establish ideas for future research and cooperation. All abstracts (including poster sessions) were printed in the **Acta Angiologica, Supplement to Volume 10, 2004** (Journal of Polish Angiological Society and Polish Society of Vascular Surgery. www.angiologia.pl). The selected plenary lectures will be published in a special issue of **Biochemica Biophysica Acta (BBA)** (March/April 2005).

*Prof. Aldona Dembinska-Kieć, MD, PhD*
*DLARFID Coordinator (Krakow, Poland)*

## NEWS AND VIEWS

### Novel Classification of RP LC Columns

The French can often be counted on to do things differently. The Interchim (www.interchim.com) column is like no other, but it makes sense. The sites involve subcritical chromatography with methanol as the mobile phase modifier. This mobile phase has very low viscosity, and hence diffusion rates should be high, producing very narrow peaks. The test probes are carotenoid pigments (zeaxanthin, *all-trans-* and *13 cis-* β-carotene). This test has been used to classify 120 commercial columns into 13 distinct groups. For more information, contact letiam.colonnes@iut-orsay.fr



### Carrot Compound (not β-Carotene!) Fights Cancer in Animal Tests

A compound found in carrots, which acts as a natural pesticide, reduced the risk of cancer in rats by a third. These findings offer new insight into how carrot consumption may protect against cancer, as previously demonstrated in epidemiological studies. **Falcarinol** protects carrots and other vegetables in the same family from fungal diseases. Previous research on the compound, which is toxic to humans in large doses, has concentrated on its actions on plant disease defence. *"It was simply not considered interesting for humans because it is toxic in high amounts,"* explained study author Dr Kirsten Brandt, (Newcastle University's School of Agriculture, Food and Rural Development). However, falcarinol is also present in ginseng, a long-established medicinal plant, and initial findings showing that it could protect against cancer, led a team from Newcastle University in the UK, the University of Southern Denmark and the Danish Institute of Agricultural Sciences to look more closely at the compound. Their results, (*J Agr Food Chem 53, 2005)*, show that after 18 weeks rats with pre-cancerous tumours, who ate a popular variety of carrots along with their ordinary feed, and another group that consumed falcarinol in a quantity equal to that in the carrots, were one third less likely to develop full-scale tumours than the rats in the control group. *"We already know that carrots are good for us and can reduce the risk of cancer, but until now we have not known which compound in the vegetable has these special properties,"* said Dr Brandt. The findings lead to a potential explanation for the confusion surrounding the widely researched carotenoid β-carotene, another important component in carrots. *"β-Carotene has been widely investigated in extensive intervention studies. One of the big conundrums was that β-carotene alone was found to raise the risk of cancer, yet people who ate a lot of carrots did not experience this elevated risk,"* she said. *"This led to a simple explanation that it must be something else in the carrot that has a protective effect, as it can't be the β-carotene."*

*NUTRA USA Ingredients.com, February 9, 2005*
*Website: http://www.nutraingredients-usa.com/*

### ANNOUNCEMENT

### Postdoctoral Position Available in Carotenoid Research

The position will be focused on the biochemistry and biophysics of the macular carotenoids in the human eye and other tissues with special emphasis on their role in age-related macular degeneration and other disorders related to oxidative stress. Relevant techniques for the project will include protein purification, HPLC, mass spectrometry, and Raman spectroscopy.

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