

Editorial

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P. Schreier (above)
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Vitamin E – New Insights into Molecular Details

Vitamins and minerals represent the fundamentals of the nutraceutical industries. From diabetes through cardiovascular diseases to cancer, vitamins are bringing increasing activity into the nutraceutical markets. The vitamin segment was around 7 billion US \$ in sales for 2003, the top vitamins being multivitamins, the B vitamins, vitamin E, vitamin C, and α/β -carotenes.

From a regulatory point of view, the industries will have to contend with several ongoing international issues. A recent development affecting the vitamin business is the new system devised by the FDA to grade health claims for foods and dietary supplements. This ranking system, created to give consumers more and improved information about dietary choices, will have a significant impact on product development. In terms of the specific vitamins, the FDA approved a qualified health claim for antioxidant vitamins and cancer, provided that products using the health claim use one of disclaimers issued by the FDA. Within Europe, there are some interesting regulatory developments as well. In accordance with the EU Directive for Food Supplements, the European community will limit the number of allowable dietary ingredients used in supplements and establish upper safe limits (USLs) for vitamins (and minerals). Also under discussion in Europe is legislation to restrict claims on foods and dietary supplements. The newly proposed regulation will provide legal security and address these issues by specifying the conditions for the use of nutrition and health claims, prohibiting certain claims and scientifically evaluating the use of claims in relation to the nutritional profile of foods. Individual scientific evaluation and pre-marketing approval will be required and only claims that can be substantiated will be permitted on the EU level after being evaluated by the European Food Safety Authority (EFSA).

These regulatory developments reflect the situation of scientific state-of-the-art as reviewed in this issue of MNF for vitamin E by Claus Schneider. Recent research on vitamin E has led to many new insights into molecular details, but also to controversies about its usefulness as a dietary supplement. For instance, clinical trials

of vitamin E (and β -carotene) in preventing specific diseases such as coronary artery disease have generated conflicting and mixed outcomes. Researchers found that vitamin E provided no benefit in overall mortality and cardiovascular death. In addition, recently, six large-scale, well-designed epidemiological studies have reported that regular vitamin E, *i. e.*, α -tocopherol, did not provide any protection against heart attacks. γ -Tocopherol and tocotrienols were missing in all these trials; thus the question arises whether the right heart-protective properties were investigated. It may well turn out that a full spectrum of tocopherols and tocotrienols is needed which acts synergistically to confer vitamin E's heart health properties.

In fact, there is still much to do, as outlined in Claus Schneider's overview. In human physiology, α -tocopherol and its isomers may be involved in the progression of low-density lipoprotein (LDL) oxidation and atherosclerosis, not only through their antioxidative (or pro-oxidant!) activities, but also through their ability to regulate gene expression and functional activities of proteins that are critically involved in atherogenesis. Dietary uptake of vitamin E through the intestine is non-specific, but its transport into very low-density lipoprotein (VLDL) and ensuing lipoproteins is regulated by cytosolic proteins that are involved in the intracellular trafficking of the water-insoluble tocopherols. Polymorphisms and mutations of the genes encoding the trafficking proteins result in more or less severe neurologic abnormalities.

Also in these considerations it has to be stressed that the term vitamin E comprises a group of eight structurally related tocopherols and tocotrienols, *i. e.*, individual isomers with different properties. Consequently, these considerations are also relevant for the design of transgenic crop plants with the goal of enhancing the vitamin E content because an engineered biosynthetic pathway may be directed toward the formation of one isomer. Individual tocopherol isomers may have particular physiological effects in human health and disease, and there is still only an incomplete understanding of all aspects of vitamin E action; new aspects have still to be discovered.

With this comprehensive overview of one of the most fascinating vitamins with its different facets in nutrition, health and disease, we have opened a series of reviews on attractive current topics in molecular nutrition. The next issue of MOLECULAR NUTRITION & FOOD RESEARCH will exclusively contain review articles dealing with proanthocyanidins, ochratoxin A, heterocyclic aromatic amines and other interesting topics.

MOLECULAR NUTRITION & FOOD RESEARCH started in September 2004 and especially for new readers we have included the contents of 2004 in this issue. We hope that the readers enjoy the articles and also like the idea of having an interdisciplinary journal in the field of molecular nutrition and food research.

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