

Vitamin E tocotrienols: life beyond tocopherols

Bharat Aggarwal · Kalanithi Nesaretnam

Received: 21 April 2011 / Accepted: 29 April 2011
© Springer-Verlag 2011

An extensive amount of work has been carried out on vitamin E, which was first identified as a “fertility factor” in 1938 by two researchers from the University of California, Berkeley. This vitamin E, referred to as tocopherol, consists of a chromanol ring with a 15-carbon isoprenoid chain. Based on the number and position of methyl groups on the chromanol ring, there are four saturated analogues. Almost 16,000 pubmed citations indicate that a lot is known about this vitamin. However, there is another vitamin E, called tocotrienol, that has three trans double bonds in the isoprenoid tail and was first described in Nature in 1965. There is very little known about this vitamin E, as indicated by less than 1,000 (about 700) pubmed citations. Therefore, the first *International Conference on Tocotrienols and its Role in Chronic Diseases* was organized in Las Vegas, USA, from July 29–30th 2010 to discuss the chemistry, biology, and clinical implication of tocotrienols and was sponsored by the Malaysian Palm Oil Board. This was also timely as tocotrienol received GRAS status from USFDA in April 2010. It was a two-day conference, with 27 speakers. From this conference, it became clear that tocotrienols exhibit health benefits quite different from that of tocopherols, and in most cases, these activities are superior for human use. There were also indications that different isomers of tocotrienols exhibit distinct activities. For instance, while α -tocotrienol was highly effective in the brain for cerebral ischemia, γ - and δ -tocotrienol exhibited

strong anticancer activities. The current special issue of *Genes and Nutrition* is devoted to various aspects of tocotrienols as discussed at this conference. We sought to build upon the various unique and novel benefits of tocotrienols, for example, the role of tocotrienols in cardio-protection based on structure–function relationships, the radioprotective properties of γ -tocotrienol as well as the protective effects of vitamin E against hypercholesterolemia-induced age-related disease (Das; Kartal Ozer). The molecular mechanism of tocotrienols was equally appreciated and addressed using comparative gene expression profiling in tocol-treated endothelial cells (Hauer Jensen). While information continues to emerge on the anticancer effects of tocotrienols, a review on tocotrienols and breast cancer aims to update on the present understanding of tocotrienols in clinical trials (Nesaretnam), likewise for the anti-cancer mechanism of tocotrienols where multiple cell signaling pathways were addressed and compared against the pathways involved in tocopherol (Aggarwal; Galli). The concept of combination approach with γ -tocotrienol and statin or receptor tyrosine kinase inhibitor was also reviewed (Sylvester). In addition to that, the role of tocotrienols in attenuating tumor angiogenesis was re-examined using pro-angiogenic markers in human umbilical vein endothelial cells and murine mammary cancer cells (Selvaduray). Although not every presentation made at the conference is represented in this issue, it gives the readers an idea about the diversity of applications for tocotrienols.

Finally, our sincere thanks are extended to all participants and working committee in making this event a success. The meeting stimulated fruitful discussions on tocotrienols among international researchers, and we look forward to meeting again in July 2011 at the second conference.

This paper is part of a Special Issue entitled “Tocotrienols in health and disease” (Guest editors: Bharat B. Aggarwal and Kalanithi Nesaretnam).

B. Aggarwal (✉) · K. Nesaretnam
Houston, TX, USA
e-mail: aggarwal@mdanderson.org