

Tocotrienols show promise against cancer growth

By Stephen Daniells

03/08/2007 - Tocotrienol, the less well known form of vitamin E, could prevent the formation of new blood vessels, and therefore hold promise against a range of diseases, suggests new animal study.

Japanese researchers, led by Kiyotaka Nakagawa from Tohoku University, looked at the ability of [tocotrienol](#) to prevent [angiogenesis](#), associated with tumour growth, rheumatoid arthritis, and diabetic retinopathy.

"Our findings suggest that tocotrienol has potential as a therapeutic dietary supplement for preventing angiogenic disorders, and therefore future clinical study will be required to evaluate the efficacy and safety of tocotrienol," wrote the researchers in the *Journal of Nutrition*.

There are eight forms of vitamin E: four tocopherols (alpha, beta, gamma, delta) and four tocotrienols (alpha, beta, gamma, delta). Alpha-tocopherol (alpha-Toc) is the main source found in supplements and in the European diet, while gamma-tocopherol (gamma-Toc) is the most common form in the American diet.

Tocotrienols are only minor components in plants, although several sources with relatively high levels include palm oil, cereal grains and rice bran.

While the majority of research on vitamin E has focused on alpha-Toc, studies into tocotrienols account for less than one per cent of all research into vitamin E.

The researchers performed preliminary *in vitro* studies and found that tocotrienol was effective at inhibiting angiogenesis in both bovine aortic endothelial cells and human umbilical vein endothelial cells.

Nakagawa and co-workers therefore extended their investigation to test the ability of tocotrienol to suppress angiogenesis *in vivo* using the mouse dorsal air sac (DAS) assay and the chick embryo chorioallantoic membrane (CAM) assay.

The former, on exposure to a dietary supplementation of 10 mg tocotrienol-rich oil per day (equivalent to 4.4 mg tocotrienol per day) suppressed angiogenesis by 44 per cent, compared to control.

In the chick embryo assay, tocotrienol (500-1000 µg/egg) was found to inhibit new blood vessel formation, while simultaneously increasing the area containing no blood vessels by 36 to 50 per cent.

An *in vitro* mechanistic study indicated that the tocotrienol influenced fibroblast growth, cells that provide the structural framework for many tissues, by changing cell signalling as well as

inducing programmed cell death (apoptosis) in endothelial cells.

The researchers called for more research, particularly clinical studies to further evaluate the potential of tocotrienol against angiogenic disorders.

Tocotrienols took centre stage earlier this week at IFT Food Expo 2007 in Chicago when Chandan Sen from Ohio State University told attendees that the vitamin E form offers interesting opportunities for industry thanks to their unique properties, with studies also showing great potential against [neurodegenerative](#) diseases.

"I see that as a great opportunity for academia and industry to capitalise," he said.

Source: *Journal of Nutrition*

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"In Vivo Angiogenesis Is Suppressed by Unsaturated Vitamin E, Tocotrienol"

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