



## **Tocotrienols shown to inhibit skin pigment production**

***Latest research found that tocotrienols are effective in inhibiting the production of skin pigment, melanin, indicating a potential means for skin whitening.***

July 2010, Singapore – Scientists in Singapore have found that tocotrienols, which are members of the Vitamin E family, are effective in inhibiting the production of melanin – the pigment that gives skin its colour. The study also found that tocotrienols are capable of suppressing melanin biosynthesis that has been induced by ultraviolet light. Hence, these results strongly suggest that tocotrienols could have an instrumental role to play in skin whitening.

The study found that tocotrienols are effective in suppressing the activity of tyrosinase – an enzyme that is essential for the production of melanin in skin cells. Specifically, two isomeric forms of tocotrienols – gamma and delta – have been found to significantly suppress the action of tyrosinase in melanin-generating cells from human and mouse. Also of great interest is that since skin pigmentation is a hallmark of melanoma – a malignant form of skin cancer – the control of tyrosinase activity may provide a basis for treating patients with this type of cancer.

These findings by scientists at Davos Life Science (Singapore) will be reported in the upcoming edition of Pigment Cell & Melanoma Research – the official journal of the International Federation of Pigment Cell Societies and the Society for Melanoma Research.

“As an application to our research, gamma- and delta-tocotrienols are lipid soluble agents that can penetrate skin lipids effectively to release natural nutrients and produce whitening of the skin. Compared to other water soluble agents (kojic acid, arbutin, sodium lactate), tocotrienols can penetrate more deeply through the skin to deliver the active ingredients in a controlled and constant manner,” said Dr. Daniel Yap, the leading scientists for the study and head of R&D at Davos Life Science.



In the study, researchers treated both human and mouse melanoma cells with tocotrienols. They found that gamma- and delta-tocotrienols significantly suppressed tyrosinase activity, even when used in very low doses compared to other common skin whitening agents. These results suggest that the unsaturated isoprenoid side chain of tocotrienols – a unique structural property of this class of compounds – may account for their capability in inhibiting melanin production.

Another key finding of the study concerns the production of skin melanin induced by ultraviolet light (UVB). The process takes place through a mechanism that is different from the normal activation of tyrosinase. Researchers found that, among palm vitamin E members, gamma- and delta-tocotrienols possess the highest sun protection factor (SPF) and are effective in blocking the biosynthesis of melanin arising from exposure to UVB.

In addition, the study investigated the effects of tocotrienols vis-a-vis other biochemical agents that are known to inhibit melanin production. It was found that tocotrienols are significantly more potent than these agents, which include kojic acid, sodium lactate and arbutin (not reported in this study). When melanoma cells were treated with gamma- and delta-tocotrienols for an extended period from 24 hours to 48 hours, it enhanced the suppression of tyrosinase. Conversely, the opposite effect was observed when the treatment period for kojic acid and sodium lactate was similarly lengthened. This suggests that the inhibitory effect by these agents is not only short-lived, but are also weaker compared to tocotrienols.

In addition, the study found that low doses of gamma- and delta-tocotrienols produced the same inhibitory effect on tyrosinase as much higher concentrations of kojic acid, arbutin and sodium lactate. In fact, tocotrienols are shown to have at least 150 times more potency than sodium lactate, kojic acid and arbutin in suppressing the biosynthesis of melanin. Interestingly, when tocotrienols are combined with kojic acid, the two compounds work in synergy and reinforce the inhibition of tyrosinase activity.



“Since kojic acid can be toxic when used in long term, combination with gamma- and delta-tocotrienols could provide a treatment strategy that is effective in inhibiting melanin production while presenting a lower risk of long-term kojic acid toxicity. Also, it is vital to ensure that skin lightening formulas do not contain ingredients that are harmful to the skin such as mercury chloride, and are safe to use on a regular basis,” said Dr. Yap.

The findings of this study are highly promising in the bid for skin whitening. “We conducted an in-house human clinical trial using a topical cream base containing 2% gamma-tocotrienol. After one month of dermal application, there was significant lightening of age spots. Findings like these certainly point to the exciting prospects of tocotrienols as a key agent in producing skin whitening,” said Mr Arthur Ling, CEO of Davos Life Science Pte Ltd.

### **About Davos Life Science**

Davos Life Science was established in 2004 as the world largest tocotrienol manufacturer. The company extracts natural palm tocotrienols for use in health supplements, functional foods, personal care products and pharmaceutical formulations under the brand name 'Natural e3'. The company has also set up the world largest research and development centre dedicated to tocotrienols. For more information, please visit [www.davoslife.com](http://www.davoslife.com)