Opinion on mixed tocopherols, tocotrienol tocopherol and tocotrienols as sources for vitamin E added as a nutritional substance in food supplements[1]

Scientific Opinion of the Panel on Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food

(Question No EFSA Q-2005-146, Q-2005-172, Q-2006-265)

Adopted on 22 February 2008 by written procedure

PANEL MEMBERS

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SUMMARY

Following a request from the Commission, the Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food (AFC) has been asked to evaluate the safety and bioavailability of mixed tocopherols, tocotrienol tocopherol and tocotrienols as a source for vitamin E when added for nutritional purposes in food supplements.

The present opinion deals only with the safety and bioavailability of three particular sources of vitamin E, intended for the general population, to be added in food supplements. The safety of vitamin E itself, in terms of amounts that may be consumed, is outside the remit of this Panel.
Vitamin E has been evaluated by the Scientific Committee on Food (SCF) who set a tolerable upper intake level (UL) of vitamin E (as d-alpha-tocopherol) for adults of 300 mg alpha-tocopherol equivalents /day. JECFA has defined an Acceptable Daily Intake (ADI) of 0.15-2 mg/kg bw/day calculated as alpha-tocopherol.

The three preparations, mixed tocopherols, tocotrienol tocopherol and tocotrienols are proposed to be used as sources of vitamin E. These sources contain varying amounts of tocopherols and tocotrienols.

Studies indicate that tocopherols and tocotrienols are bioavailable, with tocotrienols having shorter plasma half-lives and probably different tissue distribution than alpha-tocopherol, the major constituent of natural vitamin E.

[1] For citation purposes: Scientific Opinion of the Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food on a request from the Commission on mixed tocopherols, tocotrienol tocopherol and tocotrienols as sources for vitamin E. *The EFSA Journal* (2008) 640, 1-34.

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Since the bioavailability and tissue distribution of tocotrienols appear to be different from that of tocopherols and since the specifications of the two tocotrienol preparations of the present opinion do not match the specifications for E306, the only registered vitamin E additive which has specification including tocotrienols, safety assessment of these tocotrienol-containing preparations cannot be based on upper limits for vitamin E.

From a subchronic toxicity study in rats with tocotrienol rich palm oil extract (70 % tocotrienols) the Panel concluded that a no-observed-adverse-effect level (NOAEL) of 120 mg tocotrienol extract/kg bw/day for male rats and 130 mg tocotrienol extract /kg bw/day for female rats can be derived. The effects observed at this dose level were not considered to be adverse.

The tocotrienol rich fractions were shown in bacterial tests to be not genotoxic and long-term studies gave no indications of neoplastic lesions.

Intake of mixed tocopherols

Intake of mixed tocopherols from supplement use will be in accordance with the UL for Vitamin E (as d-alpha-tocopherol) of 300 mg /day for adults set by the SCF in 2003 (SCF, 2003).

Intake of tocotrienol tocopherol

The proposed uses and use levels of tocotrienol tocopherol for supplement intake are based on the recommended daily allowance (RDA) for alpha-tocopherol. In Europe the RDA is set to 10 mg Vitamin E in European Council Directive 90/496/EEC (1990). Since the tocotrienol tocopherol preparation contains 11.5 mg alpha-tocopherol and 15.5 mg tocotrienols per 100 mg these values from the European Directive would amount to a daily intake of 87 mg of the tocotrienol tocopherol preparation containing 13.5 mg tocotrienols amounting to an intake of 0.23 mg tocotrienols/kg bw/day for a 60 kg person. This would be at least 500 times lower than the NOAEL for the tocotrienols in the rat study.

Given the specifications of the tocopherol tocotrienol preparation, a daily intake of 87 mg of tocotrienols plus tocopherols would amount to 10 mg alpha-tocopherol plus 0.44 mg beta-tocopherol (amounting to 0.22 mg alpha-tocopherol equivalents) plus 3.9 mg gamma-tocopherol (0.98 mg alpha-tocopherol equivalents) plus 1.04 mg delta-tocopherol (0.10 mg alpha-tocopherol equivalents). Together this would amount to 11.3 mg alpha-tocopherol equivalents and would be significantly below the UL of 300 mg alpha-tocopherol equivalents established by the SCF in 2003. For a 60 kg person this intake would amount to 0.19 mg alpha-tocopherol equivalents/kg bw/day.

Intake of tocotrienols

The petitioner indicates that tocotrienols are normally incorporated in softgel capsules providing up to 1000 mg of tocotrienols per daily dose. This would result in a daily intake of 16.7 mg tocotrienols/kg bw/day for a 60 kg person and would be only 7 times below the NOAEL of the rat study and higher than the 5 mg/kg bw/day frequently demonstrated to be without adverse effects in human studies.

In conclusion, the Panel considers that the use of mixed tocopherols and tocotrienol tocopherol as a source of vitamin E in food supplements for the general population at the proposed levels of use is not of safety concern.

However, the available safety data are insufficient to conclude on the safety of the proposed use and use levels of the tocotrienols (the preparation containing mainly tocotrienols).

Key words:

Food supplements, mixed tocopherols, tocotrienol tocopherol and tocotrienols**,** CAS Registry Numbers 1406-18-4, 59-02-9, 148-03-8, 7616-22-0, 119-13-1, vitamin E.