Pantothenic Acid

Introduction

Pantothenic acid has an essential role in the metabolism of carbohydrates, fatty acids, and amino acids; in acetyl group transfers in the biosynthesis of steroids and porphyrins; and in the acetylation of some drugs (Plesofsky-Vig 1994). The name of the vitamin is derived from the Greek words meaning "from everywhere," a term that aptly fits its widespread distribution in foods. Human deficiency of pantothenic acid is rare. Experimental deficiencies in animals produce a range of defects in growth, development, metabolism, and physiological function.

Safety Considerations

Toxicity of oral pantothenic acid is extremely low, and no cases have been reported in humans. Intakes as high as 200 mg per kg per day for animals and 10 g per day for humans have been tolerated for extended periods without adverse effects (Miller and Hayes 1982; Institute of Medicine [IOM] 1998). Although most studies relate to daily consumption of 5 to 10 mg, daily amounts as high as 10 g have been consumed orally in clinical studies for many weeks without toxic effects.

Official Reviews

IOM (1998). The IOM set an acceptable intake (AI) of pantothenic acid of 5 mg per day for adults. The IOM found no reports of adverse effects of oral pantothenic acid in humans and therefore did not establish a UL.

Expert Group on Vitamins and Minerals (EVM 2003). The UK's EVM likewise found no reports or clinical trial evidence of adverse effects of oral pantothenic acid or calcium pantothenate in humans. Because of this, there was no basis for a proper risk assessment and they did not set a SUL. However, they did establish a guidance level derived from data showing an

absence of adverse effects at supplemental intakes of 2,000 mg per day (General Practitioner Research Group 1980). A conservative UF of 10 was selected to calculate a guidance level for a supplemental intake of 200 mg per day and a total intake of 210 mg per day accounting for up to 10 mg from foods.

European Food Safety Authority (EFSA 2006). In its evaluation of pantothenic acid, EFSA noted the lack of systematic oral dose-response intake studies and very low toxicity of pantothenic acid (consumed as calcium pantothenate or panthenol). It was concluded that no LOAEL and NOAEL could be determined, and thus no numerical UL was established. EFSA also indicated that intakes of pantothenic acid considerably higher than current intake levels from all sources do not represent a health risk for the general population.

CRN Recommendations

There are no reports of toxicity from oral administration on which a LOAEL value could be based. The clinical trial data (General Practitioner Research Group 1980) identified by the EVM provided evidence that supplemental intakes of 2,000 mg did not produce adverse effects. The amount of available information is much smaller than desirable, but with the absence of adverse effects with daily intakes as high as 10 g, and systematic clinical experience with oral intakes of up to 1,000 mg per day (Komar 1991), 1,000 mg per day is selected as the CRN supplemental UL value.

Quantitative Summary for Pantothenic Acid

CRN UL, supplemental intake	1,000 mg/day
IOM UL, total intake	Not determined
EFSA UL, total intake	Not determined
EC supplement maximum	Not determined
EVM, guidance level	200 mg/day supplemental; 210 mg/day total intake

References

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