

Vitamin B₂ (Riboflavin)

Function

Riboflavin, like thiamin and some other B vitamins, is essential for normal development, growth, reproduction, lactation, physical performance, and well-being. It is involved in a wide array of essential biochemical oxidation-reduction reactions, especially those that yield energy. Riboflavin is widely distributed in small amounts in many foods, and milk is one important source. Similar to many members of the water-soluble B-complex family of vitamins, riboflavin is easily lost from grains or vegetables upon milling, heating, canning, blanching, and storage. Riboflavin is especially sensitive to light. It is readily absorbed in small amounts from the intestine, and readily excreted through the kidneys (McCormick 1999).

Safety Evidence

Riboflavin consumed orally has no reported toxicity (Miller and Hayes 1982; Food and Nutrition Board 1998; Expert Group on Vitamins and Minerals 2003). Reports of adverse effects all relate to animal studies or cell culture research involving either drugs with phototoxicity, intense exposure of lens tissue to UV light, or both in combination with high levels of riboflavin (Spector et al. 1995; Floersheim 1994). There are no reports of adverse reactions that can be attributed to riboflavin consumed orally from foods or dietary supplements.

Published Official Reviews of Vitamin B₂ (Riboflavin) Safety

The FNB found no evidence of adverse effects associated with excess intake of riboflavin from food or supplements—that is, no toxicity data on which to base a LOAEL or a NOAEL (Food and Nutrition Board 1998). After reviewing extensive clinical and scientific studies using elevated doses, FNB found no basis for a UL value.

The EC SCF likewise found no evidence of toxicity of oral vitamin B₂ and did not set a UL (Scientific Committee on Food 2000).

Based on clinical trial data generated after FNB's review (Schoenen et al. 1998), UK EVM tentatively concluded that 400 mg per day produced only minor and infrequent side effects of uncertain significance (Expert Group on Vitamins and Minerals 2003). Because of the small number of subjects studied at that level of intake under controlled conditions, UK EVM assigned the default toxicological UF of 10 and set a supplemental GL at 40 mg, with a total intake GL at 43 mg because intakes of riboflavin from conventional foods are 3.3 mg or less.

CRN ULS for Vitamin B₂ (Riboflavin)

Using the data of Schoenen and colleagues (Schoenen et al. 1998), CRN identifies 400 mg per day of vitamin B₂ as a level that does not produce a significant pattern of adverse effects. The minor and inconsistent adverse effects reported with 400 mg supplemental intake suggest that the UK EVM UF of 10 is unnecessarily restrictive. Hence, CRN identifies a NOAEL of 200 mg from the 400 mg LOAEL and considers a UF of 2 to be sufficient. The widespread market presence of 200 mg riboflavin supplements without reported adverse effects is consistent with safety at this level.

Comparison of Safety Values for Vitamin B₂ (Riboflavin)

CRN ULS	200 mg
US FNB UL	Reviewed but not established (no toxicological basis)
EC SCF UL	Reviewed but not established (no toxicological basis)
EC supplement maximum	Not established (as of May 2004)
UK EVM GL, supplement	40 mg (43 mg total)

References

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