Assessment of Zinc Intake in Relation to Tolerable Upper Intake Levels

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Authors’ contributions

This work was carried out in collaboration between all authors. The opinion has been assessed and approved by the panel on nutrition, dietetic products, novel food and allergy of VKM. All authors read and approved the final manuscript.

ABSTRACT

The Norwegian Food Safety Authority (NFSA, Mattilsynet) has requested the Norwegian Scientific Committee for Food Safety (VKM) to assess the intake of iron zinc in the Norwegian population in relation to tolerable upper intake levels (ULs). The existing maximum limit for zinc in food supplements is 25 mg/day.

VKM has also conducted scenario calculations to illustrate the consequences of amending the maximum limit to 1, 2, 5, 10, 15 or 20 mg/day.

Zinc is an essential trace element required for RNA, DNA and protein synthesis, cellular division, differentiation and growth (Mac Donald, 2000). Zinc is required for catalytic function in several
enzymes and participates in all major biochemical pathways in the body. The function of the
immune system depends on the ability of its cells to proliferate and differentiate, which is impaired
in individuals with suboptimal zinc status (Barton et al. 2000). Due to its role in cell division and
differentiation, adequate zinc nutrition is particularly important in children, and the requirements per
kg body weight are highest in early life. The endogenous intestinal losses can vary from 7
mmol/day (0.5 mg/day) to more than 45 mmol/day (3 mg/day), depending on zinc intake (King and
Turnlund, 1989).

The requirements for zinc vary according to age and bioavailability. Several bioactive compounds
in food such as tannins and phytic acids interact with zinc absorption and increase zinc
requirements. The requirements vary twenty-fold according to life stage and diet.

Zinc supplements, even at or slightly above the recommended intakes, can cause nausea and
vomiting. The main concern with chronic zinc excess is, however, copper deficiency which is
associated with several chronic illnesses. However, copper deficiency is uncommon due to the
ubiquitous presence of copper in the diet.

VKM proposes to use the ULs set by IOM (2001) as they provide values also for children and
adolescents. The tolerable upper intake level set for adults is 40 mg zinc per day from food (and
water) and supplements.

Based on the scenario estimations, a dietary zinc intake at the 95th percentile and additionally 20
mg zinc from food supplements will lead to an intake close to the tolerable upper intake level
established by IOM for adults. For adolescents and child populations the maximum amounts are 15
and 5 mg for 13- and 9-year-olds, respectively. For 2 and 4-year-olds, P95 from intake of zinc from
food alone exceeds the UL.

Keywords: VKM; risk assessment; Norwegian scientific committee for food safety; zinc; food
supplement; upper level; exposure.

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NOTE:

This work was carried out in collaboration between all authors. The opinion has been assessed and
approved by the Panel on Nutrition, Dietetic Products, Novel Food and Allergy of VKM. All authors
read and approved the final manuscript.

Competence of VKM experts: Persons working for VKM, either as appointed members of the
Committee or as external experts, do this by virtue of their scientific expertise, not as representatives
for their employers or third party interests. The Civil Services Act instructions on legal competence
apply for all work prepared by VKM.

levels. Opinion of the Panel on Nutrition, Dietetic Products, Novel Food and Allergy of the Norwegian

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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