

Reviewer's report

Title: Does the evidence about health risks associated with nitrate ingestion warrant an increase of the nitrate standard for drinking water?

Version: 1 **Date:** 30 June 2006

Reviewer: Hermann H. H Dieter

Reviewer's report:

General

Reviewer Recommendation Term: Major Revision

Overall Reviewer Manuscript Rating: 70

Comments to Editor:

Comment to Author:

Minor essential revisions: No. 5-7 (see below)

Major compulsory revisions: Nos. 8-12 (see below).

Discretionary Revisions: None

1. The paper addresses an important and timely issue
2. The paper is well reasoned, although some important discussion points (points 8-12 below) should be intensified
3. The paper is relatively balanced, although the authors opinion remains clearly recognizable
4. The standard of writing is very acceptable (easy to read and to understand)
5. The 1st line of the first paragraph on p.4 should be complemented by an information against what Nigel Benjamin is skeptic. The present text explains this only in the following paragraph of that page.
6. in the 3rd line of the 4th paragraph, "(McKnight et al. 1997)" must be replaced by "[9]"
7. 2nd line of page 6: whrite "no" instead of "not".
8. The authors should consider also the indirect effects of environmental nitrate/nitrite on human health as they were outlined e.g. in detail in a very recent review by Camargo JA and Alonso A [Environ Int June 15 (2006)], although indirect effects do not seem to have been subject of discussion in November 2005 in Salt Lake City.
The environmental and indirect health effects should be complemented by the fact or problem that nitrate is a transport form of oxygen into oxygen poor groundwater. If microbiologically denitrified, the groundwater redox state might be changed with the consequence that toxic metals are oxidized and mobilized from insoluble sulfides to easily soluble sulfates (as has been published for Nickel).
9. Citation 18 (Weyer et al., 2001) should refer not only on the increased cancer rates in urinary bladder and ovaries but also on decreased rates in uterus and colon as it was observed in that study. Since NOC formation/suppression at relatively low pH is the biochemical background for the cancerogenic potential of nitrite/nitrate, only promotion/initiation or suppression of cancer by nitrate/nitrite in urinary bladder and stomach seems plausible. In total, the study by Weyer et al. is - if ever - a very questionable argument in favour of a carcinogenic potential of nitrite/nitrate in drinking water at such low (here 11 mg/l) concentrations. The results could easily have been generated by chance.
10. In their (semi-)quantitative risk/benefit assessment, the authors should also take into account the documented possibility that the resorption rate from pure drinking water of small ions in the gastric tract often is distinctly higher than from food. This is the more important as many persons drink water not only during a meal but also (or only) between meals. Under such a condition, not only the resorption might be

higher but also the first pass antioxidant concentration be lower than if food is taken up simultaneously with drinking water

11. On page 6, third line from second last paragraph, the statement "this trend is not related to concerns about nitrate" seems questionable. At least in Germany, parents living in supply areas with more than 10 - 20 mg/l in their drinking water nitrate use very often bottled water to prepare formula food although concentrations of at least up to 50 mg/l nitrate are safe for babies.

12. A strong argument in favour of keeping the 50 mg/l-value to protect babies from acute toxicity of nitrate/nitrite is the published observation that additional risk factors (digestive tract diseases, contamination of standing food or water with nitrate reducing bacteria) might strongly enhance the nitrate/nitrite body burden. Such factors can only be individually controlled, whereas a limit value (here 50 mg/l nitrate) must be applicable and safe under any condition of possible acute intoxication.

13. It would be worthwhile to mention that a maximal value for nitrate in drinking water as based on chronic toxicity (babies and adults) could be set lege artis at 13 mg/l nitrate. Such a value would correspond to a 10%-allocation of the TDI = 260 mg/kg per body mass and day on two liters of Drinking water per day and person. The present allocation (40% , corresponding with 50 mg/l, resp.) is extremely high for an environmental contaminant. A reasonable compromise between all stakeholders (toxicologists, agriculture, analytics, environmental hygiene) could be an upper quality goal between 20 and 30 mg/l nitrate in waters which are influenced by agriculture.

What next?: Accept after minor essential revisions

Level of interest: An article of importance in its field

Quality of written English: Acceptable