Dear Hermelinda,

I attentively read the “Proposed Updated Public Health Goals for Nitrate/Nitrite in Drinking Water”, from the “Office of Environmental Health Hazard Assessment [OEHHA]” of the “California Environmental Protection Agency [CalEPA]” (December 2016, 98 pp).

If you agree, I would like to express my viewpoint.

I agree with the two following statements:

- “OEHHA agrees that the body of evidence is not conclusive enough to establish a causal relationship between nitrate exposure and cancer.” (p. 57)
- “There is inconsistent evidence of nitrate-induced developmental and reproductive toxicity in humans.” (p. 57)

But I disagree with your presentation of the nitrate-induced infant methemoglobinemia, for three reasons:

- 1) You write: “Methemoglobinemia was not observed in any cases where the drinking water nitrate levels were ≤ 45 mg/L.” (p.56)


- First, the limit of 10 mg NO₃⁻-N l⁻¹, i.e. 45 mg NO₃⁻ l⁻¹, suggested by Comly (1945) in potable water, was proposed at a rough guess [Cf. Box 6.1, p. 75].
- Secondly, the diagnostic criteria (or inclusion criteria) adopted by Bosch et al. (1950) were curiously founded on the only suggestion from Comly. So, cases with less than 10 mg NO₃⁻-N l⁻¹ were not included in the review.
- Thirdly, Walton (1951) drew up a table. Of course, the number of cases of infant methemoglobinemia with water nitrate content below 10 mg NO₃⁻-N l⁻¹ was equal to zero.
- Fourthly, without critical eye, the doubtful limit of 10 mg NO₃⁻-N l⁻¹, or 45 mg NO₃⁻ l⁻¹, (or its administrative equivalent: 50 mg NO₃⁻ l⁻¹) was universally accepted by the official bodies.

- 2) You do not make the distinction between well water and municipal drinking water, an essential distinction.

- First, well water may be filthy, with bacterial contamination. On the contrary, municipal drinking water is always controlled, with less than 10² germs ml⁻¹.
- Secondly, in a feeding bottle, nitrate is only reduced into nitrite when bacterial population...
exceeds 10^6 germs ml\(^{-1}\) [Cf. L’hirondel J. and L’hirondel, J.-L. (2002), p.40 and Tamme, T. \textit{et al.} (2010)]. There is no reduction at all of nitrate into nitrite, whatever the nitrate concentration may be, when bacterial population is below 10^6 germs ml\(^{-1}\).

- Thirdly, in 1985 the WHO stated that at that time some 2000 cases of infant methemoglobinemia had been reported since 1945 in the world medical literature [L’hirondel, J. and L’hirondel, J.-L. (2002), p.46]. 100% of the 2000 cases came from well water, 0% from municipal drinking water.

This point is fundamental. It should be taken into consideration.

- 3) After citing my book about infant gastric pH, you take into account the opposite viewpoint (p.16).

My book: “L’hirondel J. and L’hirondel J.-L. (2002)” (pp. 26-27) mentioned the results of 7 experimental studies (Avery \textit{et al.}, 1966; Reed, 1996; Luhby \textit{et al.}, 1954; Agunod \textit{et al.}, 1969; Jean-Louis \textit{et al.}, 1993; Harries and Fraser, 1968; Sondheimer \textit{et al.}, 1985). After day 1, infant gastric pH is acidic (from 2.5 to 5.5). It is also acidic (< 3) in premature and very low birth weight infants.

These results do not arrest your attention. On the contrary, you write: “\textit{Although gastric pH drops within hours after birth, infants subsequently go through a period of relative achlorhydria, where the pH slowly increases over 10 days. The gastric pH will eventually drop to adult levels by 2 years of age (Kenner and Lott, 2007), but remains more alkaline than the adult gastric pH during infancy}”.

No figure of infant gastric pH supports the text. And the book from Kenner and Lott is not at my disposal. Some questions occur to me: Did Kenner and Lott carry out their own experiments in infant gastric juices, or did they only recopy what other authors themselves said or recopied? If Kenner and Lott carried out their own experiments, what were exactly the figures?

Finally, the scientific truth is clear:

1) In infants, hemoglobin cannot be transformed by dietary nitrate into methemoglobin, if dietary nitrate is not reduced into nitrite.

2) In infants, in the mouth, dietary nitrate (and also salivary nitrate, after enterosalivary circulation of nitrate) cannot be reduced into salivary nitrite, because nitrate-reducing oral microflora is absent. Before the age of 6 months, nitrite concentration in saliva is very low, even zero, though salivary nitrate concentration is high, up to 250 mg NO3\(^{-} \) l\(^{-1}\) (Eisenbrand \textit{et al.}, 1980) [Cf. L’hirondel, J. and L’hirondel, J.-L., 2002, p.25].

2) In infants (like in adults), in the stomach, dietary nitrate (and also salivary nitrate after enterosalivary circulation of nitrate) cannot be reduced into nitrite. Unless contrary arguments from experiments by Kenner and Lott, 2007, the infant gastric pH is acidic. Virtually sterile, the infant gastric juice contains less than 10^6 germs ml\(^{-1}\). [Cf. L’hirondel, J. and L’hirondel, J.-L., 2002, p.26].
3) In infants (like in adults), in the colon, dietary nitrate (and also salivary nitrate after enterosalivary circulation of nitrate) cannot be reduced into nitrite, because nitrate is rapidly and almost immediately absorbed. It passes from the upper small intestine (the duodenum and the jejunum) to the blood stream, where it mixes with endogenously synthesized nitrate. Nitrate is not detected in feces [Cf. L’hirondel, J. and L’huiroendel, J.-L., 2002, p.21].

4) In infants, in the feeding bottle, nitrate from municipal drinking water, whatever its concentration, cannot be reduced into nitrite. Municipal drinking water is bacterially controlled. It always contains less than $10^6$ germs ml$^{-1}$, really less than $10^2$ germs ml$^{-1}$.

5) In infants, in the feeding bottle, on the contrary, nitrate from well water can be reduced into nitrite when the well is filthy, and when well water contains more than $10^6$ germs ml$^{-1}$. There is a risk of methemoglobinemia. In infants, it is the only (and real) danger with dietary nitrate.

So, today, the role of official bodies should be double:

- A) To turn the attention of parents to the real danger of well water when it is filthy and contains large quantities of germs. The risk of infant methemoglobinemia (and also of infective diarrhea) can be lethal.

- B) To reconsider the maximum nitrate level in municipal drinking water. Such a maximum nitrate level has no scientific basis. It is onerous and useless.

Sincerely yours.

PS: Thanks for your answer and your explanations.

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