

## GENERAL REMARKS

This ninety-fourth volume of *IARC Monographs* contains evaluations of the carcinogenic hazard to humans of ingested nitrate and nitrite, microcystins and nodularin. This is the first *Monographs* review of these agents, which were nominated as high priorities for future evaluation by the most recent Advisory Group (IARC, 2003).

In view of the body's conversion of nitrate to nitrite and then to *N*-nitroso compounds, interpretation of the epidemiological studies on nitrate/nitrite ingestion was aided by mechanistic information on factors that accelerate or inhibit this conversion. Some epidemiological studies of high nitrate ingestion primarily from vegetables found reduced risks of gastric cancer, while other studies of nitrate/nitrite ingestion from nitrite-preserved meats found increased risks. Mechanistic studies show that the formation of *N*-nitroso compounds is accelerated by the presence of nitrosatable compounds (found in meat) and inhibited by vitamin C and other antioxidants (found often in vegetables). These inferences about *N*-nitrosamine formation are consistent with the epidemiological studies that examined interactions between nitrite and antioxidants and with the animal bioassays that investigated various combinations of nitrate/nitrite, nitrosatable compounds, and antioxidants. The cancer hazard from nitrate/nitrite ingestion cannot be determined without considering these other factors. Accordingly, the Working Group defined the agent not as “ingested nitrate or nitrite”, but as “ingested nitrate or nitrite under conditions that result in endogenous nitrosation”. This marks the first use of a mechanistic event (endogenous nitrosation) leading to carcinogenesis in the wording of an evaluation statement.

A summary of the findings of this volume appears in *The Lancet Oncology* (Grosse *et al.*, 2006).

### References

- Grosse Y, Baan R, Straif K, Secretan B, El Ghissassi F, Coglianò V, on behalf of the WHO International Agency for Research on Cancer Monograph Working Group (2006) Carcinogenicity of nitrate, nitrite, and cyanobacterial peptide toxins. *Lancet Oncology* 7: 628–629. PMID: 16900606.
- IARC (2003) Report of an *Ad-Hoc IARC Monographs* Advisory Group on Priorities for Future Evaluations. Lyon, International Agency for Research on Cancer, Internal Report No. 03/001 [available at <http://monographs.iarc.fr/ENG/Publications/internrep/03-001.pdf>]