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Dietary Thiocyanate and N-Nitrosation in vivo in the Wistar Rat

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Abstract

The influence of dietary thiocyanate (SCN^-) on N-nitrosation in vivo was investigated over 14 min following the administration, by stomach tube, of single doses of sodium nitrite and dimethylamine hydrochloride to male albino Wistar rats whose diet contained appreciable quantities of bound cyanide (cyanogenic glycosides) and free (nonglycosidic) cyanide. The rate of disappearance of the nitrosating agent (NO_2^-) from the stomach in control animals showed a high linear correlation ($r = -0.84$) with gastric N-nitrosation, as measured by metabolism (N-demethylation) of 'formed' nitrosamine in liver tissue isolated from these animals. This statistical relationship was significantly increased ($r = 0.98$), as well as the rate of NO_2^- utilization and the activity of the N-demethylase enzyme, in animals fed the test diet. Stomach SCN^- content was well correlated with both stomach NO_2^- concentration ($r = -0.95$) and liver N-demethylase activity ($r = +0.93$). Interactions, in vivo, between thiocyanate ion and nitrosamine precursors ingested in food may enhance nitrosamine carcinogenesis.

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Dietary Thiocyanate and N-Nitrosation in vivo in Wistar Rat

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Abstract. The influence of dietary thiocyanate (SCN^-) on N-nitrosation was investigated over 14 min following the administration, by stomach tube, of sodium nitrite and dimethylamine hydrochloride to male albino Wistar rats. The rats ingested appreciable quantities of bound cyanide (cyanogenic glycosides) and free cyanide. The rate of disappearance of the nitrosating agent (NO_2^-) in the control animals showed a high linear correlation ($r = -0.84$) with gas production measured by metabolism (N-demethylation) of 'formed' nitrosamine in the urine from these animals. This statistical relationship was significantly increased as the rate of NO_2^- utilization and the activity of the N-demethylase enzyme in the test diet. Stomach SCN^- content was well correlated with both stomach nitrosation ($r = -0.95$) and liver N-demethylase activity ($r = +0.93$). Interaction between thiocyanate ion and nitrosamine precursors ingested in food may enhance carcinogenesis.

Introduction

The fact that N-nitrosamines are toxic

reaching implications for carcinogenesis [4, 5].

Spontaneous nitrosation

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