Discussion of Session A, May 21st, 1979 – Summary

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(1) Does a relationship exist between the intake of nitrosamines and cancer incidence?

A correlation between nitrosamine intake and cancer incidence cannot be substantiated by epidemiological studies at present, but it cannot be excluded either. For instance, in a Danish study beer brewers were found to have an increased incidence in pharyngeal, esophageal and liver cancer.

(2) How is the present situation concerning nitrosamine content in beer?

N-nitrosodimethylamine was formed during the malting process and got into the beer via the malt. After detection of this source of contamination the brewing industry rapidly changed the malting technology (by lowering the temperature of the burner in the drying procedure or by the addition of sulphur dioxide). These changes will most certainly strongly decrease the nitrosamine amount in beer. A new study has to be undertaken to prove this effect by experimental data.

(3) Do nitrosamines occur ubiquitously in the environment?

It was stated that nitrosamines are not found everywhere, e.g., air and drinking water are generally free of volatile nitrosamines. Only the air around certain amine plants was found to be polluted by nitrosamines. In some instances, nitrosamines were also detected in waste water.

(4) Are there any data on the formation and intake of non-volatile N-nitroso compounds?

A generally applicable method for the determination of non-volatile nitrosamines is not available at present. These substances are difficult to detect since their properties are often unknown. In addition, they

might be strongly bound to the sample matrix and therefore difficult to extract. After nitrosation of food under elevated gastric conditions, the Ames test showed directly acting mutagens which are supposed to be non-volatile N-nitroso compounds. This finding is discussed in relation to gastric cancer. Non-volatile nitroso-compounds might also act as transnitrosating agents in acidic medium (pH 2).

(5) What is the origin of nitrite in the organism? Nitrite plays an important role as the nitrosating

agent for the in vivo formation of nitrosamines. The amount of endogenously synthesized nitrite is estimated to be much higher than that which is directly ingested. For an exact calculation, not enough data are presently available. The mechanism of the in vivo synthesis is not yet elucidated. Oxidation of ammonia might occur in the more aerobic parts of the upper gastrointestinal tract. Additional studies using stable N- labelled compounds are recommended to elucidate the origin and the fate of nitrite.

(6) How high is the amount of in vivo formed N-nitroso -dimethylamine ?

The range of 1-10 $\mu\text{g/kg/day}$ in man is calculated from the NDMA concentration measured in blood. This kind of calculation is problematic, since the nitrosamine concentration in blood lies near the detection limit of the method and in this kind of experiment formation of artifacts might easily occur.