COMMITTEE ON MUTAGENICITY OF CHEMICALS IN FOOD CONSUMER PRODUCTS AND THE ENVIRONMENT (COM)

CONCLUSION ON STUDY ON THE MUTAGENICITY OF SODIUM BENZOATE AND POTASSIUM SORBATE

Sodium benzoate (E211) and potassium sorbate (E202) are two examples of organic acid food preservatives based on benzoic and sorbic acids. Benzoic acid and its sodium, potassium and calcium salts and sorbic acid and its potassium and calcium salts are permitted for use in a wide range of foods in the EU. These preservatives have been subject to a risk assessment by the Joint FAO/WHO Expert Committee on Food Additives (JECFA).[1,2]

In 1999, a study was published in Free Radical Biology and Medicine by Professor Peter Piper, then from University College London, which raised the possibility that these preservatives may be mutagenic to the yeast mitochondrial genome. [3]

This study used genetically modified yeast cells in an *in vitro* system to demonstrate the effects of potassium sorbate and sodium benzoate on the respiratory capabilities of the cells. Yeast superoxide dismutase (SOD) mutant *S. cerevisiae* cells were incubated with the two preservatives and the effects observed using a halo assay. The author concluded that the test substances produced an increased number of respiratory-deficient yeast cells under aerobic conditions which indicates that damage was occurring to the mitochondrial DNA in the yeast cells.

Using a postal consultation, COM members were asked by the Food Standards Agency to comment on the paper by Professor Piper whilst taking into account the large package of other toxicological data available on these preservatives.

Members were interested in the hypothesis presented by Professor Piper but were of the opinion that direct extrapolation of these results from SOD mutant yeast cells to mammalian cells *in vivo* was not possible. Members considered that mammalian mitochondria *in vivo* have sufficient anti-oxidant and DNA repair mechanisms to deal with any oxidative stress that may be attributed to the action of these preservatives in addition to that normally seen through the normal respiratory activities of the cell. The SOD mutant cells used in the study by Professor Piper have a significantly attenuated anti-oxidant and DNA repair response and therefore had a greater susceptibility to oxidative DNA damage.

In conclusion, COM members noted the evaluation of sorbates and benzoates by JECFA and were aware of the large package of toxicology data, including

1) Joint WHO/FAO Expert Committee on Food Additives (1996) Benzyl acetate, benzyl alcohol, benzaldehyde and benzoic acid and its salts. Available at: http://www.inchem.org/documents/jecfa/jecmono/v37je05.htm

2) Joint WHO/FAO Expert Committee on Food Additives (1974) Toxicological evaluation of some food additives, including anti-caking agents, antimicrobials, antioxidants, emulsifiers and thickening agents. Available at: http://www.inchem.org/documents/jecfa/jecmono/v05je18.htm

3) Piper P.W. (1999) Yeast superoxide dismutase mutants reveal a pro-oxidant action of weak organic acid food preservatives. Free Radical Biology and Medicine. 27 (11/12) 1219-1227

rodent carcinogenicity studies. COM members concluded that the study by Professor Piper did not suggest a need for a full re-evaluation of the mutagenicity data on benzoates and sorbates. On the basis of this conclusion, no further *in vivo* mutagenicity testing of these two preservatives was considered necessary at this time.

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2) Joint WHO/FAO Expert Committee on Food Additives (1974) Toxicological evaluation of some food additives, including anti-caking agents, antimicrobials, antioxidants, emulsifiers and thickening agents. Available at: http://www.inchem.org/documents/jecfa/jecmono/v05je18.htm

3) Piper P.W. (1999) Yeast superoxide dismutase mutants reveal a pro-oxidant action of weak organic acid food preservatives. Free Radical Biology and Medicine. 27 (11/12) 1219-1227