Sodium alginate

Toxicological Data on the Unburnt Ingredient

[+ve, positive; -ve, negative; ?, equivocal, with metabolic activation; without metabolic activation]

In vivo

Species	Test conditions	Endpoint	Results	References
Mice, Swiss ICR/Ha, males, 7-10 per group	Test conditions A dominant lethal assay where males were given a single intraperitoneal injection of alginic acid at 0, 82, 200 or 1000 mg/kg bw, and subsequently mated with untreated females (1 male to 3 females) on a weekly basis for 8 wk. One male (of nine) died at the highest dose. Early foetal deaths were monitored	Germ cell mutations and/or chromosome damage	Results -ve actual data were not presented for test compounds judged as negative, so no independent verification was possible	References Epstein et al. 1972

In vitro

Test system	Test conditions	Endpoint	Activation	Results	References
			status		
Chinese	Cells incubated	Chromosome	Without	-ve	Ishidate et
hamster lung	with sodium	damage and			al. 1984,
fibroblast cells	alginate at three	changes in		limited	1988
	concentrations,	chromosome		study as	
	up to 1 mg/ml	numbers		no S9 was	
	(the highest			used	
	non-toxic dose),				
	for 24 and 48 hr,				
	then cells were				
	examined for				
	chromosome				
	aberrations and				
	polyploidy				

Chinese hamster ovary cells	Cells incubated with sodium alginate at three concentrations, up to 0.1 mg/ml. Cells were examined for chromosome aberrations	Chromosome damage	Without	-ve limited study as no S9 was used	Larripa et al. 1987
Salmonella typhimurium strains TA92, TA94, TA98, TA100, TA1535 and T1537 (and possibly TA2637)	Six sodium alginate concentrations, up to 10 mg/plate, were tested in duplicate	Mutation	With and without S9	-ve good quality study	Ishidate et al. 1984
Salmonella typhimurium strains TA97 and TA102	Ames test using a pre-incubation step. Sodium alginate was tested at six concentrations up to 10 mg/plate	Mutation	With and without S9	-ve limited test as only two strains were used	Fujita and Sasaki, 1993
Salmonella typhimurium strains TA98 and TA100	Ames test on sodium alginate. Paper is in Japanese, no experimental details in English, though most compounds were tested at a range of concentrations up to 1 or 10 mg/plate	Mutation	With and without S9	-ve limited test (only two strains used), limited data given in English	Haresaku et al. 1985
Bacillus subtilis bacteria, strains H17 (rec+) and M45 (rec-)	A rec assay measuring differential killing, indicative of	DNA damage	With and without S9	No test (reported as -ve, but toxicity	Ishizaki and Ueno, 1987

	DNA damage. Alginic acid was tested at up to 2 mg/plate, which was not toxic to either strain			must be achieved in order to make this claim)	
Salmonella typhimurium strains TA98 and TA100	Test of the ability of alginic acid to inhibit the mutagenic activity of various known mutagen (IQ)	Anti- mutagenicity	With and without S9	Alginic acid reduced the potency of several known mutagens	Yamaguchi, 1992
Salmonella typhimurium strain TA98	Test of the ability of sodium alginate to inhibit the mutagenic activity of a known mutagen (IQ)	Anti- mutagenicity	Without S9	No effect on IQ's mutagenic potency	Edenharder et al. 1995

References

Edenharder R et al. (1995). Modifying actions of solvent extracts from fruit and vegetable residues on 2-amino-3-methylimidazo[4,5-f]quinoline (IQ) and 2-amino-3,4-dimethylimidazo[4,5-f]quinoxaline (MeIQx) induced mutagenesis in Salmonella typhimurium TA 98. Mutation Research 341, 303-318.

Epstein S S et al. (1972). Detection of chemical mutagens by the dominant lethal assay in the mouse. Toxicology and Applied Pharmacology 23, 288-325.

Fujita H and Sasaki M (1993). Mutagenicity test of food additives with *Salmonella typhimurium* TA97 and TA102. Annals of the Tokyo Metro Research Laboratory 44, 278-287.

Haresaku M et al. (1985). Mutagenicity study (Ames test) of toothpaste ingredients. Journal of the Society of Cosmetic Chemists of Japan 19, 100 (in Japanese).

Ishidate M et al. (1984). Primary mutagenicity screening of food additives currently used in Japan. Food and Chemical Toxicology 22, 623-636.

Ishidate M et al. (1988). A comparative analysis of data on the clastogenicity of 951 chemical substances tested in mammalian cell cultures. Mutation Research 195, 151-213.

Ishizaki M and Ueno S (1987). The DNA damaging activity of natural food additives (IV). Journal of the Food Hygiene Society of Japan 28, 498.

JECFA (1993). 39th JECFA report. Toxicological evaluation of certain food additives and naturally occurring toxicants. WHO Food Additives Series no 30, WHO Technical Report Series no 828. WHO, Geneva.

Larripa I B et al. (1987). Biological activity in Macrocystis pyrifera from Argentina: sodium alginate, fucoidan and laminaran. II. Genotoxicity. Hydrobiologia 151/152, 491 (cited in JECFA, 1993).

Merck (2006). The Merck Index. An encyclopedia of chemicals, drugs, and biologicals. 14th Edition. M.J. O'Neil et al. (eds). Merck & Co., Inc. Whitehouse Station, NJ, USA.

Yamaguchi T (1992). Inhibitory activity of heat treated vegetables and indigestible polysaccharides on mutagenicity. Mutation Research 284, 205-213.