

Genetic toxicity of sodium dichromate dihydrate in NTP peripheral blood micronucleus tests

B6C3F1 male and female mice were administered sodium dichromate dihydrate (62.5 - 1000 mg/L) in drinking water for 3 months. At the end of the exposure period, blood smears were made and slides were scored for frequency of micronucleated normochromatic erythrocytes. 5 animals per treatment group were analyzed. Data showed no significant increase in the frequency of micronucleated erythrocytes in male or female mice over the dose range tested; there was a small decrease in the percentage of polymorphic erythrocytes (%PCE) among total erythrocytes (a measure of bone marrow toxicity), but the changes did not correlate well with dose (Table 1).

Additional studies were conducted in male transgenic mice administered sodium dichromate dihydrate in drinking water for a 3 month period. A significant dose-related increase in micronucleated normochromatic erythrocytes (MN-NCE) was seen in one group of AM3(C57BL/6) male mice (Table 2); analysis of MN frequencies in a second group of this same strain of mice after 3 months of exposure to sodium chromate dihydrate showed no increase in micronucleated erythrocytes (Table 3). An increase in micronucleated erythrocytes that was judged to be equivocal was noted in male B6C3F1 mice (Table 4), based on the trend test which showed a small but not statistically significant increase in MN-NCE; no individual dose groups were significantly increased over the control group in this study. Finally, no increase in micronucleated erythrocytes was observed in male BALB-C mice (Table 5).

Table 1. Frequency of MN-NCE in B6C3F1 mice

Treatment	Dose	MN-NCE/ 1000 NCE	Pairwise P	%PCE
Males				
Water		2.70 ± 0.46		4.1
Cr VI	62.5	2.60 ± 0.48	0.5547	3.5
	125	2.20 ± 0.51	0.7627	3.1
	250	3.70 ± 0.44	0.1053	3.3
	500	2.50 ± 0.42	0.6094	2.7
	1000	2.00 ± 0.52	0.8467	3.3
	Trend		P=0.857*	
Females				
Water		1.70 ± 0.37		3.6
Cr VI	62.5	1.20 ± 0.34	0.8236	2.5
	125	1.60 ± 0.29	0.5692	3.4
	250	1.80 ± 0.30	0.4328	3.9
	500	2.10 ± 0.37	0.2580	3.2
	1000	1.90 ± 0.24	0.3693	2.7
	Trend		P=0.158*	

Table 2. Frequency of MN-NCE in male AM3(C57BL/6) male mice

Treatment	Dose	MN-NCE/ 1000 NCE	Pairwise P	%PCE
Males				
Water		1.50 ± 0.35		3.2
Cr VI	62.5	2.30 ± 0.25	0.0970	2.9
	125	2.80 ± 0.25	0.0236	3.2
	250	4.40 ± 0.81	0.0001**	2.7
		P=0.000*		

** significant increase (P < 0.008)

Table 3. Frequency of MN-NCE in AM3(C57BL/6) male mice

Treatment	Dose	MN-NCE/ 1000 NCE	Pairwise P	%PCE
Males				
Water		1.80 ± 0.34		2.5
Cr VI	62.5	2.70 ± 0.20	0.0896	2.7
	125	3.30 ± 0.46	0.0177	2.7
	250	2.88 ± 0.38	0.0664	2.4
		P=0.078*		

Table 4. Frequency of MN-NCE in B6C3F1 male mice

Treatment	Dose	MN-NCE/ 1000 NCE	Pairwise P	%PCE
Males				
Water		2.20 ± 0.58		3.3
Cr VI	62.5	3.20 ± 0.41	0.0865	3.6
	125	3.00 ± 0.16	0.1333	3.2
	250	3.80 ± 0.37	0.0193	2.8
		P=0.031*		

Table 5. Frequency of MN-NCE in BALB-C male mice

Treatment	Dose	MN-NCE/ 1000 NCE	Pairwise P	%PCE
Males				
Water		4.70 ± 0.46		3.7
Cr VI	62.5	3.90 ± 0.48	0.8063	4.0
	125	3.30 ± 0.80	0.9416	3.3
	250	4.20 ± 0.34	0.7024	3.5
		P=0.680*		

*One-tailed Cochran-Armitage trend test to measure dose-related increases in micronucleated erythrocytes. Significant at P = 0.025.