

positive at 24 h and clearly positive at 48 h in CHL cells, and was weakly positive at 20.5 h in CHO cells. However, the concentration of the chemical required to induce chromosomal aberrations was about 80 times higher in CHO cells than in CHL cells. In this case, it appears that the quantitative differences in the results might be related to a difference in the characteristics of the 2 cell lines rather than to protocol differences.

A comparison of results for all chemicals, with and without metabolic activation, is given in Table 4. For tests conducted in the absence of S9 mix, results are in agreement on 19 (76%) of the test chemicals, perhaps a surprisingly high number considering the difference in cell lines and the rather extreme differences in test protocols.

In the presence of S9 mix, agreement was lower; similar results were obtained with only 14 (56%) of the test chemicals. Considering the variability of S9 preparations and the differences in treatment protocols with S9 mix, the level of disagreement between the 2 test systems was not unexpected. Additional tests are being conducted to determine the extent to which similar results are obtained when the same protocol is used in both CHL and CHO cells.

Table 5 presents a more condensed comparison of test results. It is clear that the CHL system gave a much higher frequency of positive results than did the CHO cells with these same 25 chemicals. In CHL cells 20 chemicals (80%) were positive or weakly positive and only 5 gave negative or inconclusive results. In contrast, the CHO system gave positive or weakly positive results with only 12 chemicals (48%) and negative results were produced by 13 chemicals.

Thus, the overall conclusion of this study is that the CHL system detects a higher proportion of chemicals tested as positive than does the CHO test system. Although there may be a difference in the sensitivities of the 2 cell lines to induction of chromosomal aberrations, the results presented in

TABLE 5  
OVERALL RESULTS OF CHROMOSOMAL ABERRATION TESTS IN THE CHL AND CHO TEST SYSTEMS

Test result	+	+w	±	-
Cell system				
CHL	14 (56%) <sup>a</sup>	6 (24%)	2 (8%)	3 (12%)
CHO	11 (44%)	1 (4%)	0	13 (52%)

<sup>a</sup> Number of chemicals (% of chemicals).

this paper suggest that many of the differences could be due to protocol differences and that the most likely protocol differences to effect a difference in results are the length of time that cells are treated with the test chemical and the harvest time. Additional studies are being conducted to elucidate the bases for the different responses.

The most appropriate cell line and protocol for use in screening chemicals for effects will be determined by the purpose of conducting the test and the value of the test in predicting the health concern of interest.

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## Appendix

## Chromosomal aberration data and results

[1] 2,3,4-TRICHLOROPHENOL (15950-66-0) M.W.: 197.45

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	1.0	0.0	1.0	0.0	2.0			
		7.5	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-		
		15.0	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	-	-
		30.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
-	48-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		7.5	100	1.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	-		
		15.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		30.0	100	1.0	0.0	1.0	0.0	0.0	0.0	1.0	2.0	-		
-	6-18	DMSO	100	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0			
		60.0	100	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-		
		90.0	100	0.0	0.0	0.0	2.0	0.0	0.0	1.0	3.0	-	-	
		120.0	100	0.0	0.0	1.0	2.0	0.0	0.0	0.0	2.0	-		
+	6-18	DMSO	100	1.0	0.0	1.0	0.0	0.0	0.0	1.0	2.0			
		60.0	100	1.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-		
		90.0	100	1.0	0.0	1.0	1.0	0.0	0.0	0.0	1.0	-	-	
		120.0	100	0.0	0.0	2.0	3.0	0.0	0.0	0.0	4.0	-		

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.01	1.0	0.01	0.5	0.02	1.5		
		DMSO	200	0.00	0.0	0.00	0.0	0.00	0.0	-	
		11.3	200	0.01	0.5	0.01	1.0	0.02	2.0	-	
		15.1	200	0.02	2.0	0.01	0.5	0.03	2.5	+	-
		37.7	200	0.00	0.0	0.01	0.5	0.01	0.5	-	
		75.4	0							TOX	
+	2-18	Medium	100	0.01	1.0	0.00	0.0	0.01	1.0		
		DMSO	100	0.03	3.0	0.00	0.0	0.03	3.0		
		49.8	100	0.08	5.0	0.01	1.0	0.09	5.0	-	
		60.0	100	0.12	7.0	0.03	2.0	0.25	10.0	-	+
		70.2	25	0.32	28.0	0.36	28.0	0.68	44.0	+	
		80.0	0							TOX	

[2] 2,3,6-TRICHLOROPHENOL (933-75-5) M.W.: 197.45

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		60.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		120.0	100	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	-	-
		180.0	100	0.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	3.0	-	
-	48-0	DMSO	100	0.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0		
		60.0	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		120.0	100	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	5.0	±	±
		180.0	100	0.0	3.0	5.0	0.0	0.0	0.0	0.0	0.0	8.0	±	
-	6-18	DMSO	100	2.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0		
		200.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	-	
		250.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		300.0	100	4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
+	6-18	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		200.0	100	1.0	4.0	1.0	8.0	0.0	0.0	0.0	0.0	11.0	+	
		250.0	100	0.0	3.0	5.0	7.0	0.0	1.0	0.0	0.0	15.0	+	+
		300.0	100	1.0	7.0	17.0	10.0	0.0	0.0	0.0	0.0	24.0	+	

CHO cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.04	2.0	0.00	0.0	0.04	2.0		
		DMSO	200	0.01	1.0	0.01	0.5	0.02	1.5		
		124.0	200	0.04	3.5	0.01	0.5	0.05	4.0	-	
		175.0	200	0.08	7.0	0.00	0.0	0.08	7.0	+	+
		250.0	200	0.07	6.0	0.01	0.5	0.08	6.5	+	
+	2-18	Medium	200	0.03	2.0	0.00	0.0	0.03	2.0		
		DMSO	200	0.01	0.5	0.01	1.0	0.02	1.5		
		150.0	200	0.01	0.5	0.01	1.0	0.02	1.5	-	
		375.0	200	0.14	8.0	0.08	4.5	0.22	10.0	+	+
		750.0	25	0.52	48.0	0.04	4.0	2.56	68.0	+	
		1125.0	0							TOX	

[3] 3,4,5-TRICHLOROPHENOL (609-19-8) M.W.: 197.45

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation	
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		3.7	100	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-	
		7.5	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		15.0	100	0.0	0.0	1.0	1.0	0.0	0.0	0.0	2.0	-	
-	48-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		3.7	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
		7.5	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		15.0	100	1.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
-	6-18	DMSO	100	0.0	0.0	1.0	1.0	0.0	0.0	0.0	2.0		
		15.0	100	1.0	1.0	0.0	0.0	0.0	0.0	2.0	-		
		30.0	100	2.0	0.0	0.0	1.0	0.0	0.0	1.0	-	±	
		60.0	100	0.0	4.0	1.0	0.0	0.0	0.0	5.0	±		
+	6-18	DMSO	100	0.0	3.0	1.0	0.0	0.0	0.0	0.0	4.0		
		15.0	100	0.0	1.0	2.0	1.0	0.0	0.0	3.0	-		
		30.0	100	1.0	4.0	3.0	0.0	0.0	0.0	6.0	±	±	
		60.0	0								TOX		

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.01	1.0	0.01	1.0	0.02	2.0		
		DMSO	200	0.00	0.0	0.00	0.0	0.00	0.0		
		15.0	200	0.00	0.0	0.00	0.0	0.00	0.0	-	
		22.4	200	0.01	0.5	0.00	0.0	0.01	0.5	-	-
		30.0	200	0.02	1.5	0.00	0.0	0.02	1.5	-	
		40.0	0							TOX	
+	2-10	Medium	200	0.01	0.5	0.00	0.0	0.01	0.5		
		DMSO	200	0.01	1.0	0.01	0.5	0.02	1.5		
		15.0	200	0.01	0.5	0.01	0.5	0.01	1.0	-	
		22.4	200	0.02	1.5	0.01	1.0	> 0.08	3.0	-	-
		30.0	200	0.01	0.5	0.01	0.5	0.02	1.0	-	
		40.0	0							TOX	

[4] 2,3,4,5-TETRACHLOROPHENOL (4901-51-3) M.W.: 231.88

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation	
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall
-	24-0	DMSO	100	0.0	0.0	0.0	1.0	0.0	1.0	0.0	2.0		
		7.5	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		15.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		30.0	100	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	-	
-	48-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0		
		7.5	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		15.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		30.0	100	0.0	2.0	1.0	1.0	0.0	0.0	0.0	4.0	-	
-	6-18	DMSO	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0		
		30.0	100	0.0	0.0	0.0	1.0	0.0	0.0	1.0	1.0	-	
		60.0	100	1.0	0.0	0.0	1.0	0.0	0.0	1.0	2.0	-	-
		120.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
+	6-18	DMSO	100	4.0	0.0	1.0	1.0	0.0	0.0	0.0	2.0		
		30.0	100	2.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	-	
		60.0	100	3.0	3.0	1.0	9.0	0.0	0.0	0.0	12.0	+	+w
		120.0	63	1.6	3.2	6.3	17.9	0.0	0.0	0.0	15.9	+	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12.5	Medium	200	0.06	4.0	0.03	2.0	0.08	6.0		
		DMSO	200	0.03	2.5	0.01	1.0	0.04	3.5		
		20.0	200	0.02	2.0	0.01	0.5	0.03	2.5	-	
		30.0	200	0.01	0.5	0.01	0.5	0.01	1.0	-	-
		40.0	200	0.05	4.5	0.00	0.0	0.05	4.5	-	
+	2-10	Medium	200	0.00	0.0	0.03	3.0	0.03	3.0		
		DMSO	200	0.01	0.5	0.01	0.5	0.01	1.0		
		29.8	200	0.02	2.0	0.04	3.5	0.06	5.5	+	
		45.2	200	0.07	5.5	0.08	7.5	0.15	12.0	+	+
		60.3	200	0.07	14.0	0.07	6.0	0.24	17.0	+	

## [5] 2,3,4,6-TETRACHLOROPHENOL (58-90-2) M.W.: 231.88

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose ( $\mu\text{g/ml}$ )	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-	±
		30.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		60.0	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	3.0		
		90.0	68	0.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	4.0		
-	48-0	DMSO	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	±
		30.0	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0		
		60.0	100	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	3.0		
		90.0	100	1.0	2.0	5.0	0.0	0.0	1.0	0.0	0.0	8.0		
-	6-18	DMSO	100	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	3.0	-	-
		62.5	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0		
		125.0	100	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0		
		250.0	100	1.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0		
+	6-18	DMSO	100	0.0	2.0	2.0	1.0	0.0	0.0	0.0	0.0	4.0	-	+w
		62.5	100	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0		
		125.0	100	0.0	2.0	3.0	2.0	0.0	0.0	0.0	0.0	6.0		
		250.0	100	0.0	4.0	2.0	9.0	0.0	0.0	0.0	0.0	14.0		

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose ( $\mu\text{g/ml}$ )	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.00	0.0	0.01	0.5	0.01	1.0	-	+w
		DMSO	200	0.01	0.5	0.01	0.5	0.02	1.0		
		25.0	200	0.03	2.5	0.00	0.0	0.03	2.5		
		37.5	200	0.02	1.5	0.00	0.0	0.02	1.5		
		50.0	200	0.05	4.5	0.02	1.5	0.07	6.0		
+	2-18	Medium	200	0.01	0.5	0.01	1.0	0.02	1.5	+	+
		DMSO	200	0.01	0.5	0.02	1.5	0.02	2.0		
		100.0	200	0.19	14.5	0.16	10.5	0.35	20.5		
		150.0	200	0.81	71.0	0.04	3.5	0.94	74.0		
		200.0	0								

[6] 2,3,5,6-TETRACHLOROPHENOL (935-95-5) M.W.: 231.88

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		15.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		30.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	-
		60.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
-	48-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		15.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
		30.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		60.0	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
-	6-18	DMSO	100	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	3.0		
		30.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
		60.0	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-	-
		120.0	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
+	6-18	DMSO	100	0.0	2.0	2.0	1.0	0.0	0.0	0.0	0.0	4.0		
		30.0	100	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	-	
		60.0	100	3.0	5.0	6.0	5.0	0.0	0.0	0.0	0.0	11.0	+	+
		120.0	76	1.3	14.5	43.4	21.1	0.0	0.0	0.0	0.0	60.5	+	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.01	1.0	0.02	1.5	0.03	2.5		
		DMSO	200	0.02	2.0	0.01	1.0	0.03	3.0		
		14.8	200	0.01	0.5	0.01	1.0	0.02	1.5	-	
		37.3	200	0.04	3.0	0.01	0.5	0.05	3.5	-	
		75.0	71	0.07	5.6	0.00	0.0	0.07	5.6	-	-
		112.0	0							TOX	
+	2-18	Medium	200	0.01	1.0	0.01	1.0	0.02	2.0		
		DMSO	200	0.01	1.0	0.01	1.0	0.02	1.5		
		86.8	200	0.03	2.5	0.01	0.5	0.03	3.0	-	
		175.0	25	0.48	16.0	0.20	12.0	1.08	28.0	+	
		262.5	10	0.70	30.0	0.20	10.0	5.90	80.0	+	+
		350.0	0							TOX	

[7] *o*-PHENYLENEDIAMINE (95-54-5) M.W.: 108.15

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		1.5	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-	
		3.0	100	0.0	0.0	0.0	5.0	6.0	0.0	0.0	0.0	9.0	±	+ w
		6.0	100	0.0	0.0	3.0	6.0	8.0	0.0	0.0	0.0	14.0	+	
-	48-0	DMSO	100	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0		
		1.5	100	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	-	
		3.0	100	0.0	5.0	6.0	6.0	0.0	0.0	0.0	0.0	15.0	+	+
		6.0	100	0.0	2.0	19.0	18.0	0.0	0.0	0.0	0.0	32.0	+	
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		6.2	100	1.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	4.0	-	
		12.5	100	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0	4.0	-	+ w
		25.0	100	0.0	2.0	5.0	4.0	0.0	0.0	0.0	0.0	10.0	+	
+	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		6.2	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
		12.5	100	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	-	-
		25.0	100	0.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	4.0	-	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.02	1.5	0.01	0.5	0.02	2.0		
		DMSO	200	0.02	1.0	0.00	0.0	0.02	1.0		
		7.5	200	0.10	6.0	0.03	3.0	0.23	9.0	+	
		11.3	200	0.21	16.0	0.07	4.5	0.38	19.0	+	+
		15.0	100	0.27	16.0	0.05	5.0	0.52	23.0	+	
+	2-18	Medium	200	0.02	1.5	0.01	0.5	0.02	2.0		
		DMSO	200	0.02	1.5	0.01	1.0	0.03	2.5		
		2513.0	200	0.11	9.5	0.03	2.5	0.39	13.0	+	
		3750.0	200	0.05	4.5	0.01	0.5	0.15	6.0	-	+
		5000.0	200	0.09	6.5	0.02	1.0	0.36	9.5	+	



[8] *m*-PHENYLENEDIAMINE (108-45-2) M.W.: 108.15

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	± ± TOX	±
		15.0	100	0.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0	7.0		
		30.0	100	1.0	0.0	1.0	6.0	0.0	0.0	0.0	0.0	7.0		
		60.0	0											
-	48-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+ + TOX	+
		15.0	100	0.0	0.0	6.0	11.0	0.0	0.0	0.0	1.0	16.0		
		30.0	100	0.0	4.0	8.0	15.0	0.0	0.0	0.0	0.0	21.0		
		60.0	0											
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	- - ±	±
		62.5	100	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0		
		125.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		250.0	92	1.1	2.2	1.1	3.3	0.0	0.0	0.0	0.0	5.4		
+	6-18	DMSO	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	± + TOX	+ <sup>w</sup>
		62.5	100	0.0	2.0	5.0	3.0	0.0	0.0	0.0	0.0	8.0		
		125.0	100	0.0	0.0	12.0	9.0	0.0	0.0	0.0	0.0	17.0		
		250.0	0											

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	Medium	200	0.01	0.5	0.00	0.0	0.01	0.5	+ + + TOX	+
		DMSO	200	0.02	1.5	0.01	0.5	0.02	1.5		
		246.5	100	0.46	28.0	0.09	5.0	> 0.75	31.0		
		502.5	100	0.43	24.0	0.12	11.0	> 0.85	32.0		
		747.0	25	0.96	52.0	0.24	12.0	> 2.00	64.0		
+	2-10	Medium	200	0.03	2.5	0.00	0.0	0.03	2.5	- - - -	-
		DMSO	200	0.02	1.5	0.01	1.0	0.03	2.5		
		2513.0	200	0.04	2.5	0.03	2.5	0.07	4.5		
		3750.0	200	0.03	2.0	0.01	1.0	0.04	2.5		
		5000.0	200	0.04	3.0	0.04	3.5	0.08	6.0		

## [9] 2,6-TOLUENEDIAMINE DIHYDROCHLORIDE (15481-70-6) M.W.: 195.11

## .CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation	
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall
-	24-0	Saline	100	1.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0		
		125.0	100	0.0	1.0	4.0	5.0	0.0	1.0	0.0	10.0	+	
		250.0	100	0.0	1.0	5.0	4.0	0.0	1.0	0.0	9.0	±	+
		500.0	100	0.0	4.0	3.0	14.0	0.0	0.0	0.0	19.0	+	
-	48-0	Saline	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		125.0	100	1.0	0.0	1.0	4.0	0.0	1.0	1.0	7.0	±	
		250.0	100	0.0	2.0	7.0	17.0	0.0	2.0	0.0	23.0	+	+
		500.0	100	0.0	2.0	14.0	47.0	0.0	0.0	0.0	57.0	+	
-	6-18	Saline	100	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0		
		500.0	100	0.0	3.0	0.0	4.0	0.0	0.0	0.0	6.0	±	
		1000.0	100	1.0	1.0	1.0	8.0	0.0	0.0	0.0	9.0	±	+w
		1500.0	100	0.0	2.0	2.0	6.0	0.0	1.0	0.0	10.0	+	
+	6-18	Saline	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0		
		500.0	100	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	-	
		1000.0	100	0.0	2.0	0.0	7.0	0.0	0.0	0.0	9.0	±	+
		1500.0	100	0.0	7.0	12.0	20.0	0.0	1.0	0.0	28.0	+	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	14.5-2.5	Medium	200	0.01	0.5	0.00	0.0	0.01	0.5		
		250.0	200	0.08	7.5	0.00	0.0	0.08	7.5	+	
		500.0	200	0.05	4.5	0.01	0.5	0.05	5.0	+	
		1000.0	200	0.13	9.5	0.05	4.0	0.18	12.0	+	+
		1500.0	104	0.44	26.0	0.04	3.8	0.48	28.8	+	
+	2-11	Medium	200	0.01	0.5	0.00	0.0	0.01	0.5		
		500.0	200	0.01	1.0	0.01	0.5	0.02	1.5	-	
		1000.0	200	0.04	2.5	0.00	0.0	0.04	2.5	-	
		1600.0	200	0.01	1.0	0.00	0.0	0.01	1.0	-	
		3000.0	0							TOX	

[10] *N,N*-DIMETHYL-*p*-PHENYLENEDIAMINE (99-98-9) M.W.: 136.20

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation				
					ctg	ctb	ctc	frg	csb	cse	total	Each	Overall			
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-			
		2.5	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0				
		5.0	100	0.0	0.0	2.0	4.0	0.0	0.0	0.0	0.0	5.0			±	+
		10.0	98	1.0	3.1	13.3	7.1	0.0	0.0	0.0	0.0	21.4			+	
-	48-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-			
		2.5	100	2.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	2.0				
		5.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
		10.0	100	1.0	1.0	0.0	3.0	0.0	0.0	0.0	0.0	4.0				
-	6-18	DMSO	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-			
		5.0	100	3.0	0.0	1.0	3.0	0.0	0.0	0.0	4.0					
		10.0	100	1.0	2.0	11.0	9.0	0.0	0.0	0.0	17.0	+			+	
		20.0	100	3.0	6.0	10.0	6.0	0.0	0.0	0.0	19.0	+				
+	6-18	DMSO	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-			
		5.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0				
		10.0	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0			-	±
		20.0	100	1.0	0.0	1.0	4.0	0.0	0.0	0.0	0.0	5.0			±	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	10-2.5	DMSO	200	0.01	0.5	0.00	0.0	0.01	0.5	-	
		5.0	200	0.00	0.0	0.00	0.0	0.00	0.0		
		10.0	200	0.01	0.5	0.00	0.0	0.01	0.5		
		30.0	155	0.05	3.9	0.01	0.6	0.05	4.5		
+	2-11.5	DMSO	200	0.01	0.5	0.00	0.0	0.01	0.5	-	
		50.0	200	0.00	0.0	0.00	0.0	0.00	0.0		
		100.0	200	0.01	1.0	0.01	0.5	0.02	1.5		
		160.0	200	0.02	1.5	0.00	0.0	0.02	1.5		

[11] *N,N,N',N'*-TETRAMETHYL-*p*-PHENYLENEDIAMINE (100-22-1) M.W.: 164.24

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0		
		5.0	100	1.0	1.0	2.0	3.0	0.0	0.0	0.0	0.0	5.0	±	
		10.0	100	0.0	5.0	13.0	6.0	0.0	0.0	0.0	0.0	18.0	+	+
		15.0	100	1.0	15.0	25.0	16.0	0.0	0.0	0.0	0.0	32.0	+	
-	48-0	DMSO	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		5.0	100	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	2.0	-	
		10.0	100	1.0	3.0	7.0	8.0	0.0	0.0	1.0	1.0	16.0	+	+
		15.0	100	0.0	3.0	10.0	13.0	0.0	0.0	0.0	0.0	22.0	+	
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0		
		10.0	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		20.0	100	0.0	3.0	2.0	4.0	0.0	0.0	0.0	0.0	8.0	±	+w
		30.0	100	0.0	3.0	1.0	8.0	0.0	0.0	0.0	0.0	11.0	+	
+	6-18	DMSO	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		10.0	100	1.0	2.0	0.0	1.0	0.0	0.0	0.0	0.0	3.0	-	
		20.0	100	1.0	5.0	10.0	11.0	0.0	0.0	0.0	0.0	18.0	+	+w
		30.0	100	2.0	1.0	3.0	7.0	0.0	0.0	0.0	0.0	8.0	±	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	10-2.5	DMSO	200	0.01	0.5	0.00	0.0	0.01	0.5		
		16.0	200	0.01	1.0	0.00	0.0	0.01	1.0	-	
		30.0	200	0.00	0.0	0.00	0.0	0.00	0.0	-	+w
		50.0	200	0.08	6.0	0.01	0.5	0.09	6.5	+	
+	2-11.5	DMSO	200	0.01	0.5	0.00	0.0	0.01	0.5		
		30.0	200	0.02	1.5	0.02	1.0	0.03	2.5	-	
		50.0	200	0.04	2.5	0.06	3.5	0.10	5.5	+	+
		100.0	200	0.15	10.5	0.20	12.0	0.36	20.0	+	

[12] *N,N*-DIETHYL-*p*-PHENYLENEDIAMINE (93-05-0) M.W.: 164.28

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation				
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall			
-	24-0	DMSO	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-			
		0.6	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0				
		1.2	100	0.0	0.0	2.0	1.0	0.0	0.0	0.0	0.0	2.0			-	+w
		2.5	100	0.0	9.0	19.0	12.0	1.0	0.0	0.0	0.0	24.0			+	
-	48-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-			
		0.6	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0				
		1.2	100	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0			-	-
		2.5	100	0.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	3.0			-	
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-			
		2.5	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0				
		5.0	100	0.0	2.0	8.0	4.0	0.0	0.0	0.0	0.0	10.0			+	+
		10.0	93	2.2	1.1	15.1	16.1	0.0	0.0	0.0	0.0	24.7			+	
+	6-18	DMSO	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	-			
		2.5	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	3.0				
		5.0	100	0.0	2.0	0.0	1.0	0.0	0.0	0.0	0.0	3.0			-	-
		10.0	100	0.0	3.0	0.0	1.0	0.0	0.0	0.0	0.0	3.0			-	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation		
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall	
-	10-2.5	DMSO	200	0.01	1.0	0.00	0.0	0.01	1.0	-		
		10.0	200	0.03	2.5	0.02	2.0	0.05	4.5			
		16.0	200	0.01	1.0	0.18	15.5	0.19	16.5			+
		20.0	200	0.08	6.0	0.00	0.0	0.08	6.0			+
+	2-11.5	DMSO	200	0.02	1.5	0.00	0.0	0.02	1.5	-		
		30.0	200	0.00	0.0	0.00	0.0	0.00	0.0			
		50.0	200	0.01	1.0	0.00	0.0	0.01	1.0			
		100.0	200	0.01	0.5	0.01	0.5	0.01	1.0			
		160.0	0									TOX

[13] *N,N'*-DI-*sec.*-BUTYL-*p*-PHENYLENEDIAMINE (101-96-2) M.W.: 220.40

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	±
		0.5	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		1.0	100	1.0	1.0	1.0	0.0	0.0	0.0	0.0	3.0	0.0		
		2.0	100	2.0	1.0	1.0	5.0	0.0	0.0	0.0	5.0	0.0		
-	48-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		0.5	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0		
		1.0	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		2.0	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0		
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	±
		1.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		2.0	100	0.0	2.0	1.0	1.0	0.0	0.0	0.0	4.0	0.0		
		4.0	100	1.0	5.0	0.0	2.0	0.0	0.0	1.0	8.0	0.0		
+	6-18	DMSO	100	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	-	-
		1.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		2.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		4.0	100	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0		

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	10-2.5	DMSO	200	0.01	0.5	0.00	0.0	0.01	0.5	-	-
		1.0	200	0.00	0.0	0.00	0.0	0.00	0.0		
		1.6	200	0.00	0.0	0.00	0.0	0.00	0.0		
		3.0	200	0.01	0.5	0.01	0.5	0.01	1.0		
		5.0	50	0.00	0.0	0.00	0.0	0.00	0.0		
+	2-11.5	DMSO	200	0.02	1.5	0.00	0.0	0.02	1.5	-	-
		5.0	200	0.01	1.0	0.00	0.0	0.01	1.0		
		10.0	200	0.01	0.5	0.00	0.0	0.01	0.5		
		16.0	200	0.01	0.5	0.00	0.0	0.01	0.5		
		30.0	200	0.00	0.0	0.00	0.0	0.00	0.0		
		50.0	0								

[14] *N,N'*-DIPHENYL-*p*-PHENYLENEDIAMINE (74-31-7) M.W.: 260.34

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0		
		1.8	100	0.0	0.0	9.0	6.0	0.0	0.0	0.0	0.0	12.0	+	
		3.7	100	0.0	5.0	17.0	22.0	0.0	0.0	0.0	0.0	32.0	+	+
		7.5	0										TOX	
-	48-0	DMSO	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		1.8	100	2.0	3.0	10.0	23.0	0.0	0.0	0.0	0.0	27.0	+	
		3.7	100	1.0	5.0	30.0	63.0	0.0	0.0	0.0	0.0	68.0	+	+
		7.5	0										TOX	
-	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		3.7	100	0.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	3.0	-	
		7.5	100	0.0	0.0	1.0	5.0	0.0	0.0	0.0	0.0	6.0	±	±
		15.0	100	0.0	2.0	1.0	5.0	0.0	0.0	0.0	0.0	7.0	±	
+	6-18	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		3.7	100	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		7.5	100	1.0	2.0	0.0	0.0	0.0	0.0	0.0	1.0	3.0	-	-
		15.0	100	2.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0	3.0	-	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	10-2.5	DMSO	200	0.01	1.0	0.01	1.0	0.01	1.0		
		10.0	200	0.03	3.0	0.01	1.0	0.04	4.0	-	
		16.0	200	0.02	2.0	0.00	0.0	0.02	2.0	-	-
		30.0	200	0.04	4.0	0.01	1.0	0.04	4.0	-	
+	2-11.0	DMSO	200	0.01	1.0	0.00	0.0	0.01	1.0		
		50.0	200	0.03	3.0	0.00	0.0	0.03	3.0	-	
		100.0	200	0.02	2.0	0.00	0.0	0.02	2.0	-	-
		160.0	200	0.03	3.0	0.00	0.0	0.03	3.0	-	

[15] *N,N'*-DI-2-NAPHTHYL-*p*-PHENYLENEDIAMINE (93-46-9) M.W.: 360.48

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	csc	total	Each	Overall	
-	24-0	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		500.0	100	1.0	0.0	5.0	3.0	0.0	0.0	0.0	0.0	8.0	±	
		1000.0	100	0.0	0.0	5.0	10.0	0.0	0.0	0.0	0.0	14.0	+	+
		1500.0	100	0.0	2.0	6.0	8.0	0.0	0.0	0.0	1.0	15.0	+	
-	48-0	DMSO	100	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		500.0	100	0.0	3.0	8.0	11.0	0.0	0.0	0.0	0.0	16.0	+	
		1000.0	100	1.0	3.0	6.0	11.0	0.0	0.0	0.0	0.0	17.0	+	+
		1500.0	100	1.0	4.0	14.0	26.0	0.0	0.0	0.0	0.0	37.0	+	
-	6-18	DMSO	100	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		250.0	100	0.0	1.0	2.0	3.0	0.0	0.0	0.0	0.0	5.0	±	
		500.0	100	1.0	0.0	4.0	6.0	0.0	0.0	0.0	0.0	7.0	±	±
		1000.0	100	1.0	0.0	2.0	6.0	0.0	0.0	0.0	0.0	7.0	±	
+	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0		
		250.0	100	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		500.0	100	0.0	1.0	3.0	3.0	0.0	0.0	0.0	0.0	6.0	±	±
		1000.0	100	2.0	1.0	4.0	1.0	0.0	0.0	0.0	0.0	6.0	±	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	10-2.5	DMSO	200	0.01	1.0	0.01	1.0	0.01	1.0		
		500.0	200	0.01	1.0	0.01	1.0	0.02	2.0	-	
		1000.0	200	0.01	1.0	0.00	0.0	0.01	1.0	-	-
		1600.0	200	0.00	0.0	0.00	0.0	0.00	0.0	-	
+	2-11.0	DMSO	200	0.01	1.0	0.00	0.0	0.01	1.0		
		160.0	200	0.01	1.0	0.01	1.0	0.01	1.0	-	
		300.0	200	0.01	1.0	0.00	0.0	0.01	1.0	-	
		500.0	200	0.01	1.0	0.01	1.0	0.02	2.0	-	-
		1000.0	0							TOX	



CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		7.5	100	1.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0		-	
		15.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-	
		30.0	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0		-	
-	48-0	DMSO	100	2.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0			
		7.5	100	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0		-	
		15.0	100	1.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0		-	
		30.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-	
-	6-18	DMSO	100	0.0	1.0	1.0	1.0	0.0	0.0	0.0	3.0			
		15.6	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0		-	
		31.3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-	
		62.5	100	3.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0		-	
+	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0			
		15.6	100	1.0	0.0	2.0	2.0	0.0	0.0	0.0	4.0		-	
		31.3	0										TOX	
		62.5	0										TOX	

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-2.5	DMSO	200	0.03	3.0	0.01	1.0	0.04	3.0		
		3.0	200	0.06	5.0	0.01	1.0	0.07	6.0		-
		10.0	200	0.05	3.0	0.00	0.0	0.05	3.0		-
		29.9	200	0.04	4.0	0.01	1.0	0.10	5.0		-
		49.8	0								
+	2-18	DMSO	200	0.02	2.0	0.00	0.0	0.02	1.5		
		10.0	200	0.05	4.0	0.02	2.0	0.07	5.0		-
		14.9	200	0.04	4.0	0.01	1.0	0.05	3.5		-
		19.9	200	0.04	2.0	0.02	2.0	0.07	4.0		-
		29.8	0								

[17] *N*-PHENYL-2-NAPHTHYLAMINE (135-88-6) M.W.: 219.30

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0		
		7.5	100	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		15.0	100	3.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	-	-
		30.0	100	2.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	-	
-	48-0	DMSO	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		7.5	100	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	-	
		15.0	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
		30.0	0										TOX	
-	6-18	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		30.0	100	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
		60.0	100	3.0	2.0	0.0	0.0	0.0	1.0	0.0	0.0	3.0	-	-
		90.0	100	0.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0	4.0	-	
+	6-18	DMSO	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0		
		30.0	100	0.0	2.0	1.0	4.0	0.0	0.0	0.0	0.0	5.0	±	
		60.0	100	0.0	5.0	3.0	5.0	0.0	0.0	0.0	0.0	11.0	+	+w
		90.0	100	0.0	7.0	4.0	6.0	0.0	0.0	0.0	0.0	14.0	+	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-2.5	DMSO	200	0.02	1.0	0.02	2.0	0.04	3.0		
		3.0	200	0.01	1.0	0.00	0.0	0.01	1.0	-	
		9.9	200	0.02	1.5	0.01	0.5	0.02	2.0	-	
		29.7	200	0.01	0.5	0.00	0.0	0.01	0.5	-	-
		49.5	0								TOX
+	2-10	DMSO	200	0.05	5.0	0.01	1.0	0.06	6.0		
		3.0	200	0.06	5.0	0.01	0.5	0.06	5.5	-	
		9.9	200	0.03	2.0	0.01	0.5	0.03	2.5	-	
		29.7	200	0.08	6.5	0.01	0.5	0.18	8.0	-	-
		49.5	0								TOX

CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose (µg/ml)	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	±
		7.5	100	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		15.0	100	0.0	1.0	0.0	2.0	0.0	1.0	0.0	4.0	0.0		
		30.0	100	0.0	1.0	4.0	4.0	0.0	0.0	0.0	9.0	0.0		
-	48-0	DMSO	100	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	+w
		7.5	100	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	2.0		
		15.0	100	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	4.0		
		30.0	100	0.0	3.0	5.0	8.0	0.0	0.0	0.0	15.0	0.0		
-	6-18	DMSO	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	±
		15.6	100	2.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0		
		31.3	100	0.0	1.0	1.0	2.0	0.0	0.0	0.0	4.0	0.0		
		62.5	100	3.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0	0.0		
+	6-18	DMSO	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	±	±
		15.6	100	0.0	1.0	0.0	2.0	0.0	0.0	0.0	3.0	0.0		
		31.3	100	0.0	4.0	2.0	3.0	0.0	0.0	0.0	8.0	0.0		
		62.5	0											

CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose (µg/ml)	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-2.5	DMSO	200	0.03	2.0	0.00	0.0	0.03	2.0	-	-
		1.5	200	0.03	2.5	0.00	0.0	0.03	2.5		
		5.0	200	0.01	0.5	0.00	0.0	0.01	0.5		
		15.0	200	0.02	1.5	0.00	0.0	0.02	1.5		
		49.8	28	0.00	0.0	0.00	0.0	0.00	0.0		
+	2-10	DMSO	200	0.05	3.5	0.03	1.5	0.07	4.0	-	-
		15.0	200	0.05	4.0	0.05	4.5	0.15	8.0		
		20.0	200	0.11	9.0	0.10	8.0	0.31	17.5		
		30.0	200	0.06	6.0	0.03	3.0	0.19	8.5		

[19] 4,4'-DIMETHOXYDIPHENYLAMINE (101-70-2) M.W.: 229.30

## CHL cells

S9 mix	Treatment time (h) <sup>a</sup>	Dose ( $\mu\text{g}/\text{ml}$ )	Total cells	Polyploid (%)	Frequency of aberrant cells (%) <sup>b</sup>							Evaluation		
					ctg	ctb	cte	frg	csb	cse	total	Each	Overall	
-	24-0	DMSO	100	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		7.5	100	0.0	1.0	0.0	1.0	0.0	1.0	0.0	0.0	3.0	-	
		15.0	100	0.0	2.0	3.0	3.0	0.0	0.0	0.0	0.0	7.0	±	+ w
		30.0	100	1.0	4.0	4.0	7.0	0.0	0.0	0.0	0.0	12.0	+	
-	48-0	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		7.5	100	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.0	-	
		15.0	100	0.0	1.0	3.0	3.0	0.0	0.0	0.0	0.0	7.0	±	+
		30.0	100	0.0	4.0	18.0	24.0	0.0	0.0	0.0	0.0	31.0	+	
-	6-18	DMSO	100	0.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	4.0		
		7.5	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		15.0	100	3.0	0.0	1.0	1.0	0.0	1.0	0.0	0.0	3.0	-	+ w
		30.0	100	12.0	0.0	4.0	7.0	0.0	0.0	0.0	0.0	10.0	+	
+	6-18	DMSO	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		7.5	100	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-	
		15.0	100	3.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2.0	-	+ w
		30.0	100	0.0	2.0	3.0	17.0	0.0	0.0	1.0	0.0	21.0	+	

## CHO cells

S9 mix	Treatment time (h) <sup>c</sup>	Dose ( $\mu\text{g}/\text{ml}$ )	Total cells	Simple aber.		Complex aber.		Total aber.		Evaluation	
				No./cell	% cells	No./cell	% cells	No./cell	% cells	Each	Overall
-	8-12	DMSO	200	0.01	0.5	0.01	1.0	0.02	1.5		
		504.0	200	0.06	3.0	0.02	1.5	0.08	4.5	-	
		1501.0	200	0.04	3.5	0.05	2.0	0.09	4.5	-	+ w
		2498.0	200	0.06	5.0	0.03	2.5	0.09	7.5	+	
+	2-10	DMSO	200	0.04	3.0	0.02	1.5	0.05	4.0		
		132.0	200	0.09	6.5	0.08	7.5	0.22	11.5	+	
		440.0	200	0.09	5.0	0.05	4.5	0.18	8.5	-	±
		1320.0	200	0.03	3.0	0.03	2.5	0.06	5.5	-	