APPENDIX 1.
SUMMARY OF DATA ON GENETIC AND RELATED EFFECTS

Appendix 1. Summary of data on genetic and related effects

Agent	Nonmammalian systems													Mammalian systems																											
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																*In vivo*											
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
Acetaldehyde	+	+							+							+	+*	+*		−*		+*		+		+						+		+*							
Acrolein		+	−*		−*											+*		?																	−*							
Acrylonitrile	+*	+		+	+	+*		+*		−	+			+	+	+	+*	+	−	+	+*	+*	+*	+*		−*				+			−*	−	−					−	
Actinomycin D	−*	−	−*	?	+*				−*		+*			+	+*	+		+	−*	+*		+*				+													−*			
Adriamycin	+	+			+*				+		+*			+	+	+		+		+*		+		+	+*	+				+		+	+	+			+*	+		+*	
Aflatoxin B_1	+	+		+	+					+*	+			+	+	+		+		+		+		+	+*	+				+		+	+	+	+*		+*				
Aflatoxin B_2	−	+		−*	−*									+	−*	+*				+*		−*								+*											
Aflatoxin G_1	+	+		−*	+									+		+*		+*				+								+*				+*							
Aflatoxin G_2	−	?			−*									+	−	+						−*																			
Aflatoxin M_1		+												+*																											
Aldrin	−*	−			+*						−*			?							+*	?				+*			+*				−*	+*	−*						
4-Aminobiphenyl	+*	+												+	+								+*							+*											
Amitrole	−	−		?	?	+			+		−		−*		?	+*				+						−*				−*			−								
Aniline	−	−		−*	−*						−*			−		+		+*		+*				−						+		+	−*									
Arsenic, trivalent	−*	−		+*	−*						−*		−*		−	+	−*	+		+		?		+		+							+*	+*	−			?		?	
Arsenic, pentavalent		−		+*									−*	−*	−	?	−*	+		+		−*		?		+															
Asbestos		−												−*	?	+	+*	+	+	+		−	−*	−		?							−*	−*				?			
Attapulgite														−*		−*																									
Auramine	+*	+	+*	+	−*	+*								+*		+*				+*													−*								
Azathioprine		+			+*							+*	?											−*		+						−*	+	+	+*			−*		?	
Benzal chloride	+*	+																																							
Benzene	+*	−		+	+	+*		+		+*	?	−*		+	+	−	−*	+	+	+		−*	+*	?		+*						+	+	+				−*		+	
Benzidine	−*	+	+*	+*	−	+*		+			?			+	?	+		+		+		+*								+		+	+								
Benzotrichloride	+*	+																																							
Benzoyl chloride	−*	−*																																							
Benzyl chloride	+	+	+	+	+	−					+			+*	+	+		+		?		+*		?		−							−								
Beryllium and beryllium compounds		?		−*										−*	?	+*		+*		+				+*		?															
N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)		+									+*	+*		+*	+*			+*		?																					
Bischloroethyl nitrosourea (BCNU)	+	+		+*							+*			+	+	+		+	+*			+										+	+*	+							
Bis(chloromethyl)ether		+																				+*												−*						+*	
Bleomycins	+	+		+	+				+	+*	+	+*	+*	+	+	?		+	+*	+*		+		?		+						+*	?	+						+*	
1,3-Butadiene		+																														+*	+*								
1,4-Butanediol dimethanesulphonate (Myleran)		+									+*				+	+*		+						+		+				+	−*		+	+	+			+		+*	

Agent	Nonmammalian systems													Mammalian systems																												
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																*In vivo*												
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
Cadmium and cadmium compounds	–*	–		+*	–*						–		–	+	?	–		+		+		+		–*		?							–	–	–	?		–*		?	
Carbon tetrachloride		–		+	+											–*		–*	+*															–*							
Chlorambucil		+		+*	+*						+*				+	+*								+		+				–				+*				+		?	
Chloramphenicol	–	–						–*	+		–	–*						+*						–*		+								+	?						
Chlordane	–*	–		+*				+*						–	?						+	?	–*									+*			–						
Chlormadinone acetate		–*																								–*								–*	–*						
Chlorodifluoromethane		+		–*	–*			+*							–*							–*																			
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU)	+*	+												+	+	+*						+								+					+*			+*			
Chloroform	–	–	+*	+*	+*	–					–			–	–*	–				+*		–*		–*		–*				–			–								
Chloromethyl methyl ether		+*																		+*																				+*	
(4-Chloro-2-methylphenoxy)acetic acid (MCPA)		–			+*						+*		–*			+*																+*	–*	–*				–*		–	
Chloroprene		+*									+*				–*					+*														+*	+					+	
Cholesterol		–																		–*																						
Chromium [VI]	+	+		+	–*							–*	+*	+	+	+		+		+		+		+		+					?		+	+	+*			?	–*	+*	
Chromium [III]	+	–													?	?		?				–*		–		?							–*								
Chrysoidine		+*																																							
Cisplatin	+	+	+*	+*	+			+*	+		+*	+*	+*	+	+	+	+*	+		+				+	+*	+						+		+	–*		+*	+*			
Clofibrate		–*																–*																								
Clomiphene citrate																																	–*	–*							
Conjugated oestrogens		–*																–*								–*															
Cyclamate, calcium		–*									?	?	–					–*								+							–*	+*	–						
Cyclamate, sodium									–*		–		–*					+*						+*		+								–	–					–*	
Cyclohexylamine	–*	–									–	–*	–*					+*		+*				+*		?					+*			?	?						
Cyclophosphamide	+	+	+*	+	+	+					+	+*	+*	+	+	+		+		+		+		+		+				+	+	+	+	+	+			+		+	
Cyclopropane		–*																																							
Dacarbazine		+													+	+*																					–*				
Dapsone		–																																							
DDT	–*	–			–*						–	+*	?	–	–*			?			+	–	–*			–*			+				–*	+	?					?	
Diazepam		–																–*			–*			–*		–							?	–*	?			–*		–	
1,2-Dibromo-3-chloropropane	–*	+								+*	+	?	+*	+*		+*		+*												+					+						
ortho-Dichlorobenzene		–			–*																																				
para-Dichlorobenzene		–			+*																																				
3,3′-Dichlorobenzidine		+																				?																			
Dichloromethane		+		+*	+*			+*			+*			–	–	?		+*		+		–											–*	–*							

Agent	Nonmammalian systems													Mammalian systems																												
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																*In vivo*											
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
2,4-Dichlorophenol		–*												–*																											
2,4-Dichlorophenoxyacetic acid (2,4-D)		–		+	+*			+	+		?		–		+*	–*					+*	+*		+*		+						–	–		–*			–*		–	
1,3-Dichloropropene		+						+*	–*													+*																			
Dicyclohexylamine		–																								+*															
Dieldrin	–*	–									–*			–							+*	+*							+					–*	–						–*
Dienoestrol	–*	–												+						+*				+*																	
Diethyl ether		–*			–*											–*																									
Diethylstilboestrol	?	–	–*	–	–	+		+*		?	–			+	–	?	?	?	+	+	–	?	?	?		?	+			?		?	?	+							
Diethyl sulphate		+			+*		+*	+*	+*	+*	+	+		+	+	+*	+*	+*				+												+*	+						
Dimethisterone																										–*															
3,3′-Dimethoxybenzidine (*ortho*-Dianisidine)		+												+*		+*						+*																			
Dimethylcarbamoyl chloride	+	+	+*	+	+	+*					–*			+*	+*	?		+*		+*		–										–*	+								
Dimethyl sulphate	+	+		+*	+*			?	?		+*			+	+	+		+				+		+*						+*				+		+*						
1,4-Dioxane		–				–*			+*		–*			+*																											
Direct Black 38		+																																							
Direct Blue 6		+*																												+*											
Direct Brown 95		+												–*																+*											
Divinyl ether		+*														+*																									
Enflurane		–														–*																			–*						
Epichlorohydrin	+	+	+*	+	+	+*					+			+*	+	+		+		+*		+		+		+						+*	–	?	–					+	
Erionite														+*						+*		+*																			
Ethinyloestrodiol	–	–			–*						–*			–*	–*			–*		?	+*					–*															
Ethylene dibromide	+	+			+			+	+		+			+	+	+*		+*				+*	+*	+*						+		+*	–*	–*	–			–		–	
Ethylene oxide	+*	+		–*	+			+	+		+	+			+					+*		+*		+		+*				+		+	+	+	+			+	+*	+	
Ethylene thiourea		?	?	?	+	+*					–*			–*	–	–		–				–*										–*	–	–*	–						
Ethynodiol diacetate											–*																														
Ferric oxide																				–*																					
Fluorides (inorganic)																																									
Sodium fluoride		–		–*					+		?		–	?	+	+*		+*		+*		?		–*		?				–*		–*		–							
Sodium monofluorophosphate											–*	–*																													
Sodium silicofluoride											–*																														
Stannous fluoride											–*																														
5-Fluorouracil		?		+*							–*					+*		+	+*												–		+					–		–*	
Fluroxene		+														+*																									
Formaldehyde	+	+	+	+*	+			+*		+	+	+		+		+		+		+*		+	+	+		+				?		–*	–	–	?			?		?	
Halothane		–		+*	+*						?		?			–*																–*	–*	–*	–						
Heptachlor	–*	–		–*				+*			–*			–	–*						+	+*													–*						
Hexachlorobenzene		–*																–*																	–						

Agent	Nonmammalian systems													Mammalian systems																											
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																*In vivo*											
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
Hexachlorocyclohexanes	–*	–		+*	–*						–			?			–*	–*			+	–																			
Hexoestrol		–*																																–	?					–*	
Hydralazine	+	+												+				?												?											
Hydrazine	+	+			+		–*	+	+*		+			+*	?	+								+*						–*											
Isoflurane		–														–*		–*				+											–*		–*							
Isonicotinic acid hydrazide (Isoniazid)		+		–*										–		+		+		–*		–		?		?				–		–*		–	–					–*	
Lead and lead compounds																																									
Lead and inorganic lead compounds	–*	–		–	–								–*							?		–*				–				–		–*	?	?				?		?	
Tetraethyl- and tetramethyllead		–*																																							
Magenta																																									
para-Magenta	–*	+		–*										–*						–*																					
Magenta I		+*																																							
Medroxyprogesterone acetate																+*																									
Megestrol acetate																										–*															
Melphalan		+									+		+*	+	+	+*		+*		+		+		+		+*								+*				+		+	
6-Mercaptopurine	+*	+													+	+*		+	–*	–*						+*									+	+	+	–*		+*		+*
Mestranol		–*									–			–*							+*					–*				–*				–*								
Methotrexate	–*	?								+*	–*				+	+*		+		+*		–*		–*		+				–*								?		+	
Methoxyflurane		–														–*																									
5-Methoxypsoralen																																									
+ultraviolet A radiation	+*	+	+*	+*	+									+*	+	+						+*		+		+															
in the dark		?																																							
8-Methoxypsoralen (Methoxsalen)																																									
+ ultraviolet A radiation	+	+		+	+									+	+	+	+*	+		–*		+	+*	+		+															
in the dark		+			?									?	?									?		?						+*						--		_*	
Methyl bromide		+						+*			+*			–*	+									+*						+*			+								
Methyl chloride		+							+*											+*		–*	+*	+*																	
4,4′-Methylene bis(2-chloroaniline) (MOCA)	+*	+		?	–*	+*								+		?																									
N-Methyl-*N*′-nitro-*N*-nitrosoguanidine	+	+		+	+		+*	+*	+		+			+	+	+		+		+		+		+		+						+*									
Metronidazole	+*	+		–*	+						–			?	?	–								?		–				+	+*	+	+	+*	–*						
Mustard gas (Sulphur mustard)	+*				+						+	+	+*	+	+*			+												–*		–*	–							–-	
																														+*											
1-Naphthylamine	+*	+		?	–	+*		+*			–			?	?	?		+		–*																					
2-Naphthylamine	+*	+		+	+	+		+			?		+*	+	?	+		+		+		+*								?			–*								
1-Naphthylthiourea (ANTU)		+												–*																+	+*	+	–*								
Nickel and nickel compounds	+	–		+*	+*									+	?	+		+		+		–		+		?				+					–*			–		?	
Nitrogen mustard	+	+		+	+				+	+*	+*		+*	+	?	+		+*		+		+		+		+				+*			+		+*					+*	
Nitrous oxide		–*														–*																									
Norethisterone		–																								–*	–*								?	+*					
Norethynodrel		–												–*							+*						–*														
Norgestrel		–									?																														

Agent	Nonmammalian systems													Mammalian systems																											
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																*In vivo*											
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
Ochratoxin A		–			–*									+	–																	–*									
Oestradiol-17β		–												?	–*	–*			+*					–	+*	–*	–*			?				–*							
Oestriol																								?			–*														
Oestrone															–*																										
Pentachlorophenol	–*	?		?	+*						–*		–*																		+*							*		?	
Phenacetin		+									–*			–*				+*														?	?	?							
Phenazopyridine hydrochloride		–*									–*																														
Phenelzine sulphate	+*	+*																												–*											
Phenobarbital		?		–	–	+*				–	–			–	+	+	–*	+	–*	?	+		+*	–*		+			+*			–*	–*	–*							
Phenylbutazone		–*																+						–*		–*							–*	–*	–*						–*	
N-Phenyl-2-naphthylamine		–*																																							
Phenytoin	+*	–																		+*	+					–*							+*	–*	–*			?		–	
Polybrominated biphenyls		–												–	–						+		–*										–*	–							
Polychlorinated biphenyls	–	–										–*	–*	+						*	–*					–*							?	.	?							
Prednisone		–*																																–*							
Procarbazine hydrochloride	+	?		+	+					+	+	?	+		+	–*				–*										+	+	+	+	+*	?						
Progesterone		–												–*				–*		?				–*		–								–*	–*							
Propylene oxide	+*	+			+						+*			+*	+*	+*		+*								+*							+*									
Reserpine		–												–*				–						–*		–*									–*							
Saccharin, unspecified	–*	–		–		+								+*				–*			?									–	+*		–*		?						
Saccharin, sodium		–		+*	+*						?	–*			–*	+		+		–*				+*		+*					–*	+*	–*	–	?						
Silica		–														–*	+*			+*	*												–*									
Styrene		?		+*	+*				+*		+*		–*	+*	+*	+*		+				–*		+	+	+				+		+	+*	?				?	+	+	
Sulfamethoxazole		–*																								–*														–*	
Talc		–*			–*																					–*								–*	–*						
Testosterone		–*																																–*							
2,3,7,8-Tetrachlorodibenzo-*para*-dioxin (TCDD)		–												–*	+*					–*	–*											–	–*	–	–*					?	
1,1,2,2-Tetrachloroethane	+*	–		+*	+*						–*									–*																					
Tetrachloroethylene		–		+*	–			+*			–*			–*						+*										+*								–*		–*	
2,3,4,6-Tetrachlorophenol		–*																																							
ortho-Toluenesulphonamide		–									?																				–*		–*								
ortho-Toluidine		+		–	?	+*				–	+			?	?	?	–*	+	+*	+		+	+*	+*								?	–*								
Treosulphan									+																																
Trichloroethylene		+		+	+			+*						–*		–*				+		+*		+*						+*	+*		+*		–*						
2,4,5-Trichlorophenol		–																																				–*		–*	
2,4,6-Trichlorophenol		–		–*	+*																										+*										

Agent	Nonmammalian systems													Mammalian systems																												
	Prokaryotes		Lower eukaryotes				Plants			Insects				*In vitro*																		*In vivo*										
														Animal cells								Human cells								Animals							Humans				
	D	G	D	R	G	A	D	G	C	R	G	C	A	D	G	S	M	C	A	T	I	D	G	S	M	C	A	T	I	D	G	S	M	C	DL	A	D	S	M	C	A
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)		–			+*				+*		?		–								+*												–*	+*	–	+*		?			
4,5′,8-Trimethylpsoralen + ultraviolet A radiation	+	?			+									+								+		+						+*											
in the dark		?																				?		–																	
Tris(aziridinyl)-*para*-benzoquinone (Triaziquone)	+*	+*		+				+*			+	+	+	+*		+	+*	–*						+		+							+	+	+						
Tris(1-aziridinyl)phosphine sulphide (Thiotepa)		+			+*				+		+*				+*	+		+		+*				+		+						+*	+	+	+					+*	
Tris(2,3-dibromopropyl)phosphate	+	+										+*		?	+	+		+		+		+*		+*		–*						?	+*	?							
Uracil mustard	+*	+		+*							+*		+*		+*																				–*						
Vinblastine sulphate		–*													–*			–*															+*		–*						
Vincristine sulphate		–*									–*			–*	+*	–*		–	+*	+*				?									+								
Vinyl chloride	+	+		+	+*			+			+	–*	–	+*	+					+				+*						+	–*	+*	+	+	–			?		+	
Vinylidene chloride		+		+*	+*			+*						+*	. *															+*				–*	–						

A, aneuploidy; C, chromosomal aberrations; D, DNA damage; DL, dominant lethal mutations; G, gene mutation; I, inhibition of intercellular communication; M micronuclei; R mitotic recombination and gene conversion; S, sister chromatid exchange; T, cell transformation

*Only one valid study was available to the Working Group.