APPENDIX 1

SUMMARY TABLES OF GENETIC AND RELATED EFFECTS

Summary table of genetic and related effects of caffeic acid

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
	-		-[1]												+[1]			+															-									

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

In completing the tables, the following symbols indicate the consensus of the Working Group with regard to the results for each endpoint:

+ considered to be positive for the specific endpoint and level of biological complexity

+[1] considered to be positive, but only one valid study was available to the Working Group

- considered to be negative

-[1] considered to be negative, but only one valid study was available to the Working Group

? considered to be equivocal or inconclusive (e.g., there were contradictory results from different laboratories; there were confounding exposures; the results were equivocal)

Summary table of genetic and related effects of *d*-limonene and related compounds

d-Limonene

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
	-													-[1]	-[1]		-[1]		-[1]																					

d-Limonene-1,2-oxide

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
													-[1]																											

Essential oils containing *d*-limonene

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
-[1]	-																																							

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

In completing the tables, the following symbols indicate the consensus of the Working Group with regard to the results for each end-point:

- considered to be negative

-[1] considered to be negative, but only one valid study was available to the Working Group

Summary table of genetic and related effects of 2-amino-3-methylimidazo[4,5-*f*]quinoline (IQ)

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
+	+									+			+	+	+		?					$-^1$	$+^1$	$+^1$	?				$+^1$	$+^1$	+	$-^1$	$+^1$							

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

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$+^1$ considered to be positive, but only one valid study was available to the Working Group

$-^1$ considered to be negative, but only one valid study was available to the Working Group

? considered to be equivocal or inconclusive (e.g., there were contradictory results from different laboratories; there were confounding exposures; the results were equivocal)

Summary table of genetic and related effects of 2-amino-3,4-dimethylimidazo[4,5-*f*]quinoline (MeIQ)

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
+	+									+[1]			+	+	?	+[1]													+[1]		+[1]									

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

In completing the tables, the following symbols indicate the consensus of the Working Group with regard to the results for each end-point:

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Summary table of genetic and related effects of 2-amino-3,8-dimethylimidazo[4,5-*f*]quinoxaline (MeIQx)

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
+	+									+[1]			+	+	+[1]		–[1]						+[1]		–				+	–[1]	+[1a]	–[1]	+[1]							

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

In completing the tables, the following symbols indicate the consensus of the Working Group with regard to the results for each end-point:

+ considered to be positive for the specific endpoint and level of biological complexity

+[1] considered to be positive, but only one valid study was available to the Working Group

– considered to be negative

–[1] considered to be negative, but only one valid study was available to the Working Group

[a]Positive in rat liver; negative in mouse bone marrow

Summary table of genetic and related effects of 2-amino-1-methyl-6-phenylimidazo[4,5-*b*]pyridine (PhIP)

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
+[1]	+													+	+[1]	+		+[1]												+		?[1]	?	?							

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

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Summary table of genetic and related effects of aflatoxins

Aflatoxin B_1

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
+	+		+	+					+[1]	+				+	+	+		+		+	–[1]	+	+	+	+[1]	+				+		+	+	+	+		+*				

Sperm morphology, mice, –
*See Table 13 (pp. 329–334) for listing and references

Aflatoxin B_2

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
?	+		–[1]	–[1]										+	–[1]	+[1]				+[1]		–[1]								+											

Aflatoxin G_1

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
+	+		–[1]	+										+		+[1]		+[1]				+		+[1]		+[1]				+				+							

Summary table of genetic and related effects of aflatoxins (contd)

Aflatoxin G_2

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
-	?			$-^1$									+	-	+						$-^1$																	

Aflatoxin M_1

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
	+												+																									

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

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Summary table of genetic and related effects of toxins derived from *Fusarium graminearum*, *F. culmorum* and *F. crookwellense*

Zearalenone

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
–	–		–[1]												+[1]		+[1]						?[1]																			

Deoxynivalenol

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
	–												–[1]	–[1]			+[1]		+[1]	+[1]																						

Nivalenol

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
															?[1]		+																									

Summary table of genetic and related effects of toxins derived from *Fusarium graminearum*, *F. culmorum* and *F. crookwellense* (contd)

Fusarenone X

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
–	$-^1$			$+^1$										$-^1$	$?^1$		$+^1$				$?^1$																				

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

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Summary table of genetic and related effects of toxins derived from *Fusarium moniliforme*

Fumonisin B_1

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
	–												–[1]																–[1]											

Fumonisin B_2

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
	–												–[1]																–[1]											

Summary table of genetic and related effects of toxins derived from *Fusarium moniliforme* (contd)

Fusarin C

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
?	+													+	+[1]	+[1]	+[1]	+[1]																								

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

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Summary table of genetic and related effects of toxins derived from *Fusarium sporotrichioides*: T-2 toxin

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
–	–		$-^1$	$-^1$						?	$+^1$			+	$+^1$	?	$+^1$	+			$+^1$	$+^1$		$-^1$		$+^1$				$+^1$			$-^1$	$(+)^1$							

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

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$-^1$ considered to be negative, but only one valid study was available to the Working Group

? considered to be equivocal or inconclusive (e.g., there were contradictory results from different laboratories; there were confounding exposures; the results were equivocal)

Summary table of genetic and related effects of ochratoxin A

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
?	?		–[1]											+	–	(+)[1]								–[1]						+		–[1]									

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

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– considered to be negative

–[1] considered to be negative, but only one valid study was available to the Working Group

? considered to be equivocal or inconclusive (e.g., there were contradictory results from different laboratories; there were confounding exposures; the results were equivocal)