2-METHYLAZIRIDINE (PROPYLENEIMINE)

Data were last reviewed in IARC (1975) and the compound was classified in *IARC Monographs* Supplement 7 (1987).

1. Exposure Data

1.1 Chemical and physical data

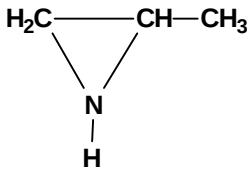
1.1.1 *Nomenclature*

Chem. Abst. Serv. Reg. No.: 75-55-8

Systematic name: 2-Methylaziridine

Synonym: Propylene-1,2-imine

1.1.2 *Structural and molecular formulae and relative molecular mass*



C_3H_7N Relative molecular mass: 57.1

1.1.3 *Physical properties* (for details, see IARC, 1975)

(*a*) *Melting-point*: –65°C

(*b*) *Boiling-point*: 66–67°C

(*c*) *Conversion factor*: $mg/m^3 = 2.34 \times ppm$

1.2 Production and use

2-Methylaziridine is a reactive alkylating agent that is used as an intermediate in the production of polymers, coatings, adhesives, textiles and paper finishes (IARC, 1975).

2. Studies of Cancer in Humans

No data were available to the Working Group.

3. Studies of Cancer in Experimental Animals

2-Methylaziridine was administered to male and female rats by gavage at doses of 0, 10 and 20 mg/kg bw. Treatment-related toxicity was found at both doses and increased mortality was seen at the high dose, which was discontinued after 28 weeks. Animals were killed at week 60. The treatment produced mammary adenocarcinomas in females at both doses, gliomas in both sexes at both doses, squamous-cell carcinomas of the ear duct in both sexes, leukaemia in males and a small number of intestinal tumours in males (IARC, 1975; Weisburger *et al.*, 1981).

4. Other Data Relevant to an Evaluation of Carcinogenicity and its Mechanisms

4.1 Absorption, distribution, metabolism and excretion

No data were available to the Working Group.

4.2 Toxic effects

4.2.1 *Humans*

No data were available to the Working Group.

4.2.2 *Experimental systems*

In a nephrotoxicity study, six male Sprague-Dawley rats were given a single intraperitoneal injection of 2-methylaziridine and their urine was collected over the following 16 days. At a dose level of 20 μL/kg bw, urine volume was increased and *N*-acetyl-β-D-glucosaminidase activity in the urine increased sharply on day 2, reached a maximum on day 3 and remained elevated until day 12, after which it decreased to near normal levels. β-D-Glucosidase and β-D-galactosidase activities increased nine days after the administration of 2-methylaziridine. In contrast to these markers of renal papillary damage, brush border marker enzymes were not consistently affected. A dose level of 30 μL/kg bw induced a sharp decrease in urinary volume until day 7, when the rats became anuric and died. Histology revealed that the 20 μL/kg bw dose induced coagulative necrosis at the tip of the renal papilla (Halman *et al.*, 1986). Renal papillary damage has also been observed in Fischer 344 and Sprague-Dawley rats at the same dose, whereas the multimammate desert mouse, *Mastomys natalensis*, was more resistant, even to a dose of 30 μL/kg bw (Gartland *et al.*, 1989; Holmes *et al.*, 1997).

4.3 Reproductive and developmental effects

No data were available to the Working Group.

4.4 Genetic and related effects

4.4.1 *Humans*

No data were available to the Working Group.

4.4.2 *Experimental systems* (see Table 1 for references)

2-Methylaziridine is mutagenic to bacteria and induces mitotic recombination in *Saccharomyces cerevisiae*. In *Drosophila melanogaster*, it induced somatic mutations of several different types in feeding experiments and sex-linked recessive lethal mutations in an inhalation experiment using repair-deficient genotype of *D. melanogaster*. While transformation was not induced in mouse C3H 10T½ cells when the standard assay was used, transformed colonies did arise if the treated cells were replated.

5. Evaluation

No epidemiological data relevant to the carcinogenicity of 2-methylaziridine were available.

There is *sufficient evidence* for the carcinogenicity in experimental animals of 2-methylaziridine.

Overall evaluation

2-Methylaziridine is *possibly carcinogenic to humans (Group 2B)*.

6. References

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Table 1. Genetic and related effects of 2-methylaziridine

Test system	Result[a]		Dose[b] (LED or HID)	Reference
	Without exogenous metabolic system	With exogenous metabolic system		
SA0, *Salmonella typhimurium* TA100, reverse mutation	+	NT	2.5	Simmon (1979a)
SA0, *Salmonella typhimurium* TA100, reverse mutation	+	+	5.0	Dunkel *et al.* (1984)[c]
SA5, *Salmonella typhimurium* TA1535, reverse mutation	+	NT	75	McCann *et al.* (1975)
SA5, *Salmonella typhimurium* TA1535, reverse mutation	+	NT	2.5	Simmon (1979a)
SA5, *Salmonella typhimurium* TA1535, reverse mutation	+	+	1.6	Dunkel *et al.* (1984)[c]
SA7, *Salmonella typhimurium* TA1537, reverse mutation	–	NT	NG	Simmon (1979a)
SA7, *Salmonella typhimurium* TA1537, reverse mutation	–	–	167	Dunkel *et al.* (1984)[c]
SA8, *Salmonella typhimurium* TA1538, reverse mutation	–	NT	NG	Simmon (1979a)
SA8, *Salmonella typhimurium* TA1538, reverse mutation	–	–	167	Dunkel *et al.* (1984)[c]
SA9, *Salmonella typhimurium* TA98, reverse mutation	–	NT	NG	Simmon (1979a)
SA9, *Salmonella typhimurium* TA98, reverse mutation	–	–	167	Dunkel *et al.* (1984)[c]
SAS, *Salmonella typhimurium* TA1536, reverse mutation	–	NT	NG	Simmon (1979a)
ECW, *Escherichia coli* WP2 *uvr*A, reverse mutation	+	+	167	Dunkel *et al.* (1984)[c]
SCH, *Saccharomyces cerevisiae* D3, homozygosis by mitotic recombination	+	+	100	Simmon (1979b)
DMM, *Drosophila melanogaster*, somatic mutation (unstable *zeste-white* eye)	+		57 feed	Batiste-Alentorn *et al.* (1991)
DMM, *Drosophila melanogaster*, somatic mutation (*white-ivory* eye)	+		57 feed	Batiste-Alentorn *et al.* (1994)
DMM, *Drosophila melanogaster*, somatic mutation (wing spot)	+		114 feed	Batiste-Alentorn *et al.* (1995)
DMX, *Drosophila melanogaster*, sex-linked recessive lethal mutations	–[d]		2000 ppm inh 24 h	Vogel & Nivard (1997)
TCM, Cell transformation, C3H/10T½ mouse cells *in vitro*	–[e]	NT	4	Schechtman *et al.* (1987)

Table 1 (contd)

Test system	Result[a]		Dose[b] (LED or HID)	Reference
	Without exogenous metabolic system	With exogenous metabolic system		
HMM, Host-mediated assay, *Salmonella typhimurium* TA1535, Swiss-Webster mouse peritoneal cavity	+		355 po	Simmon *et al.* (1979)
HMM, Host-mediated assay, *Saccharomyces cerevisiae* D3, Swiss-Webster mouse peritoneal cavity	–		NG	Simmon *et al.* (1979)

[a] +, positive; –, negative; NT, not tested
[b] LED, lowest effective dose; HID, highest ineffective dose; in-vitro tests, µg/mL; in-vivo tests, mg/kg bw/day; NG, not given; inh, inhalation; po, oral
[c] Data from four laboratories
[d] Positive in excision repair deficient genotype
[e] Positive if treated cells are replated

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