GLYCIDALDEHYDE

Data were last reviewed in IARC (1976) and the compound was classified in *IARC Monographs* Supplement 7 (1987).

1. Exposure Data

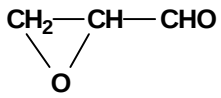
1.1 Chemical and physical data

1.1.1 *Nomenclature*

Chem. Abstr. Serv. Reg. No.: 765-34-4

Systematic name: Oxirane-carboxaldehyde

1.1.2 *Structural and molecular formulae and relative molecular mass*



$C_3H_4O_2$ Relative molecular mass: 72.1

1.1.3 *Physical properties* (for details, see IARC, 1976)

(*a*) *Boiling-point*: 112–113°C

(*b*) *Conversion factor*: $mg/m^3 = 2.95 \times ppm$

1.2 Production and use

Glycidaldehyde has been used as a cross-linking agent for the finishing of wool, for the oil tanning and fat liquoring of leather and surgical sutures (IARC, 1976).

2. Studies of Cancer in Humans

No data were available to the Working Group.

3. Studies of Cancer in Experimental Animals

Glycidaldehyde was tested for carcinogenicity in mice by skin application and by subcutaneous injection and in rats by subcutaneous injection. It produced malignant tumours at the site of application in both species (IARC, 1976).

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*

Glycidaldehyde produces skin irritation and sensitization (IARC, 1976).

4.2.2 *Experimental systems*

Repeated inhalation of glycidaldehyde by rats resulted in a reduction in nucleated marrow cells and focal necrosis of liver and kidney. Repeated intravenous injections into rabbits lowered the leukocyte count and the proportion of polymorphonuclear cells. It is also irritating to the skin and mucous membranes (IARC, 1976). The carcinogenicity and genotoxicity of glycidaldehyde have been reviewed (Feron *et al.*, 1991).

4.3 Reproductive and developmental effects

No data were available to the Working Group.

4.4 Genetic and related effects

The genotoxicity of glycidaldehyde has been reviewed (Feron *et al.*, 1991).

4.4.1 *Humans*

No data were available to the Working Group.

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

Glycidaldehyde induces mutations in bacteriophage T4, bacteria, yeast and sex-linked recessive lethal mutations in *Drosophila melanogaster*, but not *hprt* locus mutations in mouse lymphoma L5178Y. DNA adducts can be found *in vitro* using calf thymus DNA and *in vivo* in skin cells of mice treated topically with glycidaldehyde. The main adduct, in this case, has been identified as a cyclic adduct of deoxyadenosine, namely, 3-β-D-deoxyribofuranosyl-7-(hydroxymethyl)-3*H*-imidazo[2,1-*i*]purine-3′-monophosphate. The

Table 1. Genetic and related effects of glycidaldehyde

Test system	Result[a]		Dose (LED or HID)[b]	Reference
	Without exogenous metabolic system	With exogenous metabolic system		
SA0, *Salmonella typhimurium* TA100, reverse mutation	+	+	5	Wade *et al*. (1979)
SA9, *Salmonella typhimurium* TA98, reverse mutation	–	–	100	Wade *et al*. (1979)
ECF, Bacteriophage T4-infected *Escherichia coli*, forward mutation	+	NT	3400	Corbet *et al*. (1970)
KPF, *Klebsiella pneumoniae*, forward mutation	+	NT	1.4	Knaap *et al*. (1982)
SCR, *Saccharomyces cerevisiae* S211, reverse mutation	–	NT	11000	Izard (1973)
SCR, *Saccharomyces cerevisiae* S138, reverse mutation	–	NT	11000	Izard (1973)
DMX, *Drosophila melanogaster* germ cell, sex-linked recessive lethal mutations	+		1800 inj	Knaap *et al*. (1982)
G5T, Gene mutation, mouse lymphoma L5178Y cells, *hprt* locus *in vitro*	–	NT	7.2	Knaap *et al*. (1982)
TCS, Cell transformation, Syrian hamster embryo cells *in vitro*	(+)	NT	1	Pienta *et al*. (1977)
BID, Binding (covalent) to calf thymus DNA *in vitro*	+		600	Van Duuren & Loewengart (1977)
BID, Binding (covalent) to calf thymus DNA *in vitro*	+	NT	685	Steiner *et al*. (1992)
BVD, Binding (covalent) to DNA, male C3H mice *in vivo*	+		2 mg/mouse skin-painting	Steiner *et al*. (1992)

[a] +, positive; (+), weak 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; inj, injection

frequency of this adduct was 1 adduct per 6.4×10^4 nucleotides after a 2-mg application and 1 adduct per 7.6×10^3 nucleotides after a 10-mg skin-painting (Steiner *et al.*, 1992). Glycidaldehyde gave a marginally positive result of uncertain significance for the morphological transformation of Syrian hamster embryo cells *in vitro*.

5. Evaluation

No epidemiological data relevant to the carcinogenicity of glycidaldehyde were available.

There is *sufficient evidence* in experimental animals for the carcinogenicity of glycidaldehyde.

Overall evaluation

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

6. References

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