Methyl parathion; CASRN 298-00-0

Human health assessment information on a chemical substance is included in the IRIS database only after a comprehensive review of toxicity data, as outlined in the IRIS assessment development process. Sections I (Health Hazard Assessments for Noncarcinogenic Effects) and II (Carcinogenicity Assessment for Lifetime Exposure) present the conclusions that were reached during the assessment development process. Supporting information and explanations of the methods used to derive the values given in IRIS are provided in the guidance documents located on the IRIS website.

STATUS OF DATA FOR Methyl parathion

File First On-Line 03/31/1987

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	yes	03/31/1987
Inhalation RfC (I.B.)	not evaluated	
Carcinogenicity Assessment (II.)	not evaluated	

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

I.A. Reference Dose for Chronic Oral Exposure (RfD)

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Last Revised — 03/31/1987

The oral Reference Dose (RfD) is based on the assumption that thresholds exist for certain toxic effects such as cellular necrosis. It is expressed in units of mg/kg-day. In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. Please refer to the Background Document for an elaboration of these concepts. RfDs can also be derived for the noncarcinogenic health effects of substances that are also carcinogens. Therefore, it is essential to refer to other sources of

information concerning the carcinogenicity of this substance. If the U.S. EPA has evaluated this substance for potential human carcinogenicity, a summary of that evaluation will be contained in Section II of this file.

I.A.1. Oral RfD Summary

Critical Effect	Experimental Doses*	UF	MF	RfD
RBC, ChE inhibition; reduced hemoglobin, hematocrit and RBCs **2-Year Rat Feeding Study** **Monsanto Co., 1984**	NOEL: 0.5 ppm (0.025 mg/kg/day) LEL: 5.0 ppm (0.25 mg/kg/day)	l00	1	2.5E-4 mg/kg/day

*Conversion Factors -- 1 ppm = 0.05 mg/kg/day (assumed rat food consumption)

I.A.2. Principal and Supporting Studies (Oral RfD)

Monsanto Company. 1984. MRID No. 000139023, 00143965, 00145507. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Sixty rats/sex/group were fed diet containing methyl parathion at concentrations of 0.5, 5 or 50 ppm for 2 years. This study was classified as supplementary because a NOEL for neurologic changes was not adequately defined. Sciatic nerve preparations from 1 of 5 males in the low-dose group and 1 of 5 in the mid-dose group reportedly showed moderate degenerative changes. However, based on effects observed in hematological parameters, a NOEL of 0.5 ppm can be established. Hemoglobin, hematocrit, and RBCs were slightly reduced in mid- and high-dose males, and moderately reduced in high- dose females.

I.A.3. Uncertainty and Modifying Factors (Oral RfD)

UF — Based on a chronic exposure study, an uncertainty factor of 100 was used to account for inter- and intraspecies differences in the extrapolation of toxicity to humans.

MF — None

I.A.4. Additional Studies/Comments (Oral RfD)

In a subchronic study with methyl parathion in humans (Rider et al., l97l), RBC cholinesterase depression was reported, with a NOEL of approximately 0.3 mg/kg/day. Using a UF of l00 to adjust for chronic exposure and intraspecies sensitivity, an RfD based on this study would be 0.003 mg/kg/day. Adequate supporting data for human studies are not available. Nevertheless, even anecdotal data directly relating to human exposure should not be dismissed. Therefore, an RfD based on animal studies should not exceed 0.003 mg/kg/day unless additional data for humans can be found to support such a determination.

Data Considered for Establishing the RfD:

1) 2-Year Feeding - rat: Principal study - see previous description; core grade supplementary

2) Teratology - rat: Embryo/fetotoxicity, developmental NOEL=l0 mg/kg/day (i.p., single dose on day 12 of gestation); LEL=l5 mg/kg/day (mortality, growth retardation retardation, delayed ossification); core grade supplementary (Stauffer Chemical Co., 1967a)

3) Teratology - mouse: Teratogenic NOEL=20 mg/kg/day; LEL=60\mg/kg/day (cleft palate); (i.p., single dose on day l0 of gestation) (Stauffer Chemical Co., 1967b)

4) 3-Month Feeding - rat: NOEL=2.5 ppm; LEL=25 ppm [reduced hematocrit and ChE inhibition (brain, plasma and RBC), increased serum alkaline phosphatase urine specific gravity]; core grade guideline (Monsanto, 1980a)

5) 3-Month Feeding - mouse: NOEL=none; LEL=10 ppm (LDT) [decreased testicular weight (no abnormal histopathology), ChE not determined]; core grade minimum (Monsanto, 1980b)

6) 3-Month Feeding - dog: NOEL=0.3 mg/kg/day; LEL=l mg/kg/day (plasma, RBC ChE inhibition); core grade guideline (Monsanto, 1978)

7) Teratology - rabbit: NOEL=3 mg/kg/day (HDT); LEL=none; core grade supplementary (A/S Cheminova, 1984)

8) Teratology - rat: NOEL=0.3 mg/kg/day (gavage); LEL=l mg/kg/day; core grade supplementary (A/S Cheminova, 1977)

9) 3-Generation Reproduction - rat: NOEL=l0 ppm; LEL=30 ppm (stillbirths, weanling mortality, reduced weanling body weight); core grade minimum (Natural Agricultural Chem. Assoc., 1964)

10) 2-Generation Reproduction - rat: Reproductive NOEL=25 ppm (HDT); Maternal NOEL=5 ppm; LEL=25 ppm (reduced body weight); core grade minimum (Monsanto, 1982)

Other Data Reviewed:

1) 2-Year Feeding - rat (Wistar): NOEL=2 ppm; LEL=10 ppm; (ChE inhibition); body weight gain depression at 50 ppm; (incomplete toxicity data); core grade supplementary (A/S Cheminova, 1981)

2) 30-Day Studies - human

a) Rider, J., J. Swader, E. Puletti. l97l. Anticholinesterase toxicity studies with methyl parathion, guthion and phosdrin in human subjects. Fed. Proc. 30(2): 443 [Abstract]. RBC ChE inhibition at 28 and 30 mg/kg/day. Summary data only. No basis for validation (no core grade).

b) Rider, J., J. Swader, E. Puletti. l970. Methyl parathion and guthion anticholinesterase effects in human subjects. Fed. Proc. 29(2): 347 [Abstract]. Summary data only. No basis for validation (no core grade).

Data Gap(s): Chronic Dog Feeding Study; Chronic Rat Feeding Study

I.A.5. Confidence in the Oral RfD

Study — Medium
Database — Medium
RfD — Medium

The principal study was well conducted with a good number of animals and doses, but confidence is considered medium because it is incomplete in regard to neurological evaluation. Confidence in the database is medium because although it is extensive it fails to confirm the possible neurological problems. Medium confidence in the RfD follows.

I.A.6. EPA Documentation and Review of the Oral RfD

Pesticide Registration Standard, May 1986 (Draft)

Agency Work Group Review — 05/14/1986, 12/09/1986

Verification Date — 12/09/1986

I.A.7. EPA Contacts (Oral RfD)

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name — Methyl parathion
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Not available at this time.

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — Methyl parathion
CASRN — 298-00-0

This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.

III. [reserved]
IV. [reserved]
V. [reserved]

VI. Bibliography

Substance Name — Methyl parathion
CASRN — 298-00-0

VI.A. Oral RfD References

A/S Cheminova. 1977. MRID No. 00143747. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

A/S Cheminova. 1981. MRID No. 00145574, 40250601. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

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Monsanto Company. 1978. MRID No. 00072512. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Monsanto Company. 1980a. MRID No. 00074299. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Monsanto Company. 1980b. MRID No. 00072513. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Monsanto Company. 1982. MRID No. 00119087. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Monsanto Company. 1984. MRID No. 00139023, 00143965, 00145507. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Natural Agricultural Chemical Association. 1964. MRID No. 00081923. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Rider, J., J. Swader, E. Puletti. l97l. Anticholinesterase toxicity studies with methyl parathion, guthion and phosdrin in human subjects. Fed. Proc. 30(2): 443 [Abstract].

Rider, J., J. Swader, E. Puletti. l970. Methyl parathion and guthion anticholinesterase effects in human subjects. Fed. Proc. 29(2): 347 [Abstract].

Stauffer Chemical Company. 1967a. MRID No. 00127241. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

Stauffer Chemical Company. 1967b. MRID No. 00127241. Available from EPA. Write to FOI, EPA, Washington, DC 20460.

VI.B. Inhalation RfC References

None

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — Methyl parathion
CASRN — 298-00-0

Date	Section	Description

No entries

VIII. Synonyms

Substance Name — Methyl parathion
CASRN — 298-00-0
Last Revised — 03/31/1987

- 298-00-0
- 8056 HC
- Azofos
- Azophos
- BAY 11405
- Bladan-M
- Dalf
- Dimethylfenitrothion
- Dimethyl 4-Nitrophenyl Phosphorothionate
- Dimethyl p-Nitrophenyl Phosphorothionate
- Dimethyl p-Nitrophenyl Thiophosphate
- Dimethyl Parathion
- E 601
- ENT 17,292
- Folidol M

- Folidol M-40
- Gearphos
- Meptox
- Metacid 50
- Metacide
- Metafos
- Metaphos
- Methyl-E 605
- Methyl Parathion
- Methylthiophos
- Metron
- M-Parathion
- NCI-C02971
- Nitrox
- Nitrox 80
- Oleovofotox
- O,O-Dimethyl O-(p-Nitrophenyl) Phosphorothioate
- O,O-Dimethyl O-(p-Nitrophenyl) Thionophosphate
- O,O-Dimethyl O-(p-Nitrophenyl) Thiophosphate
- Partron M
- Penncap M
- Penncap MLS
- Phosphorothioic Acid, O,O-Dimethyl O-(4-Nitrophenyl) Ester
- Phosphorothioic Acid, O,O-Dimethyl O-(p-Nitrophenyl) Ester
- Quinophos
- Sinafid M-48
- Thiophenit
- Vofatox
- Wofatox
- Wofotox