

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™ for Glutaraldehyde



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U.S. Department of Health and
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Public Health Service
Agency for Toxic Substances
and Disease Registry
www.atsdr.cdc.gov

Contact Information:
Division of Toxicology
and Human Health Sciences
Environmental Toxicology Branch

1600 Clifton Road NE, F-57
Atlanta, GA GA 30329-4027
1-800-CDC-INFO
1-800-232-4636



General Populations

- Contaminated air is the most important source of exposure to glutaraldehyde.
- Exposure of the general population may be minimal since it is primarily used in industrial or medical applications. Visitors and/or patients at facilities that use glutaraldehyde could be exposed to it in air.
- Exposure could occur in health care settings where cleaning agents containing glutaraldehyde are used and have been spilled or there was inadequate rinsing of surfaces and/or inadequate ventilation.

Occupational Populations

- Workers may be exposed to higher levels of glutaraldehyde if they use it for disinfecting medical and dental equipment; approximately 5-10% of health care workers are reported to be exposed to glutaraldehyde.
- Workers at facilities that use or produce it may also be exposed to higher levels.
- Because glutaraldehyde is used in oil and gas recovery operations (including hydrofracturing processes), there is potential for exposure among workers and the general population in areas surrounding such operations

Toxicokinetics

- Glutaraldehyde can be absorbed through the respiratory tract, gastrointestinal tract, and unprotected skin.
- Glutaraldehyde and/or its breakdown products can be widely distributed throughout the body via the blood.
- The major metabolic pathway for glutaraldehyde is oxidation to glutaric γ -semialdehyde and eventual oxidation to carbon dioxide.
- Most glutaraldehyde that reaches the blood is excreted as carbon dioxide in expired air. Some glutaraldehyde and/or its breakdown products are excreted in the urine. Much glutaraldehyde and/or its breakdown products left the body of orally-treated animals in their feces and to a lesser extent in their urine; some was exhaled as carbon dioxide.

Normal Human Levels

- No information was located regarding normal levels of glutaraldehyde in humans.

Biomarkers

- Glutaraldehyde-specific markers have not been identified. Detection of glutaraldehyde in tissue samples or body fluids could serve as confirmation of exposure.

Environmental Levels

Air

- Glutaraldehyde has been detected in indoor and outdoor air. Because it is released from vehicle emissions, higher levels are expected in urban areas.

Water

- Glutaraldehyde has been detected in waste water from such facilities as hospitals, textile and paper industries, industrial water treatment plants, and oil and gas recovery.

Soil

- No monitoring data are available for soil.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2017. Toxicological Profile for Glutaraldehyde. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Glutaraldehyde is a Liquid

- Glutaraldehyde is a colorless, oily liquid with a pungent odor.
- Glutaraldehyde is used in industrial, laboratory, agricultural, and medical settings. Its primary use is for cold sterilization of medical and dental equipment. Other uses include leather tanning, antimicrobial agent and pesticide, egg sanitation, and biological tissue fixative.
- There are limited consumer uses for glutaraldehyde; these include use as a slimicide in paints and laundry detergents and to sanitize hard surfaces in areas that the general population may encounter.

- Inhalation – Most likely route of exposure for general population; one of the primary routes of occupational exposure.
- Oral – Limited potential for oral exposure to glutaraldehyde.
- Dermal – Potential route of exposure for the general population. One of the primary routes of occupational exposure.

Glutaraldehyde in the Environment

- In the environment, glutaraldehyde is expected to partition to water. It is not expected to volatilize from water or soil.
- Glutaraldehyde degrades under aerobic and anaerobic conditions in water and under aerobic conditions in soil.
- It is not expected to bioaccumulate in aquatic species.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- An MRL of 0.001 ppm has been derived for acute-duration (≤ 14 days) inhalation exposure to glutaraldehyde.
- An MRL of 0.00003 ppm has been derived for intermediate-duration (15-364 days) inhalation exposure to glutaraldehyde.
- No chronic-duration (≥ 365 days) inhalation MRL was derived for glutaraldehyde.

Oral

- No acute- or intermediate-duration oral MRLs were derived for glutaraldehyde.
- An MRL of 0.1 mg/kg/day has been derived for chronic-duration (≥ 365 days) oral exposure to glutaraldehyde.

Health Effects

- Glutaraldehyde is a contact irritant, likely dermal sensitizer, and potential respiratory sensitizer.
- The respiratory tract is the most sensitive target following inhalation exposure to glutaraldehyde. In animals, nasal effects are observed at low concentrations.
- Glutaraldehyde irritates eyes and skin upon direct contact. Severe effects have been reported at higher concentrations.
- An inhalation study in rats and mice did not find evidence of carcinogenic activity. One study reported an increased incidence of lymphoma in rats administered glutaraldehyde orally; however, EPA concluded that the tumor increases were not related to glutaraldehyde treatment.

Children's Health

- Children exposed to glutaraldehyde would likely experience effects similar to those seen in poisoned adults.
- Limited human data and available animal data do not indicate a developmental toxicity concern for glutaraldehyde.