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GLUTARALDEHYDE

Introduction

Glutaraldehyde is used as a cold sterilant to disinfect and clean heat-sensitive equipment such as dialysis instruments, surgical instruments, suction bottles, bronchoscopes, endoscopes, and ear, nose, and throat instruments. This chemical is also used as a tissue fixative in histology and pathology labs and as a hardening agent in the development of X-rays. Glutaraldehyde is a colorless, oily liquid with a pungent odor. Hospital workers use it most often in a diluted form mixed with water. The strength of glutaraldehyde and water solutions typically ranges from 1% to 50%, but other formulations are available. Trade names include Cidex®, Sonacide®, Sporidicin®, Hospex®, Omnicide®, Metricide®, and Wavicide®.

The purpose of this brochure is to

- make you aware of the adverse health effects of glutaraldehyde,
- describe how you can be exposed to glutaraldehyde, and
- provide and identify control methods and work practices to prevent or reduce your exposure to glutaraldehyde.

What health effects can exposure to glutaraldehyde cause?

The following health effects have been reported in hospital workers exposed to glutaraldehyde:

- Throat and lung irritation
- Asthma, asthma-like symptoms, and breathing difficulty
- Nose irritation, sneezing, and wheezing
- Nosebleed
- Burning eyes and conjunctivitis
- Rash—contact and/or allergic dermatitis
- Staining of the hands (brownish or tan)
- Hives
- Headaches
- Nausea

If you experience any of these symptoms when working with glutaraldehyde, report them to your supervisor or safety officer.

Who might be exposed to glutaraldehyde in hospitals?

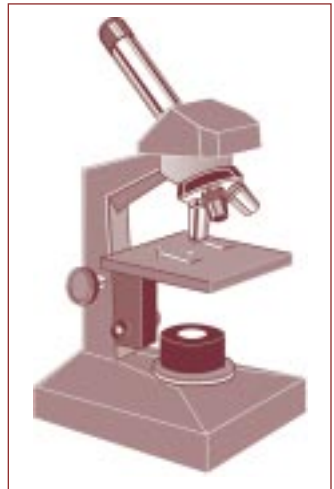
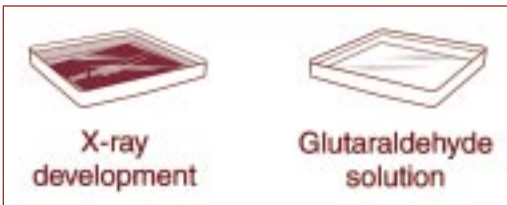
Workers in hospitals who might be exposed to glutaraldehyde include the following:

- Hospital staff who work in areas with a cold sterilizing procedure that uses glutaraldehyde (for example, gastroenterology and cardiology departments)
- Hospital staff who work in operating rooms, dialysis departments, endoscopy units, and intensive care units where glutaraldehyde formulations are used in infection control procedures
- Central service (supply) workers who use glutaraldehyde as a sterilant
- Research technicians, researchers, and pharmacy personnel who either prepare the alkaline solutions or fix tissues in histology and pathology labs
- Laboratory technicians who sterilize benchtops with glutaraldehyde solutions
- Workers who develop X-rays

When are workers most likely to be exposed to glutaraldehyde in hospitals?

Workers can be exposed to glutaraldehyde by breathing it or by skin contact during the following procedures:

- Cold sterilization of instruments in endoscopy and surgical units
 - when glutaraldehyde solution is poured into or out of the sterilizing pans, and
 - when sterilized equipment is removed from the sterilizing pans
- Disinfection of histology/pathology laboratory table tops
- Mixing and activation of various glutaraldehyde solutions
- Tissue fixation in histology labs
- Development of X-rays



How can I protect myself from exposure to glutaraldehyde?

You can protect yourself by using the following control methods and work practices:

- Use local exhaust ventilation (capture velocity of at least 100 feet per minute and at least 10 air exchanges per hour).
- Keep glutaraldehyde baths under a fume hood where possible.
- Use only enough glutaraldehyde to perform the required disinfecting procedure.
- Avoid skin contact: use gloves and aprons made of nitrile or butyl rubber (latex gloves do not provide adequate protection).
- Wash gloved hands after handling glutaraldehyde.
- Wear goggles and face shields when handling glutaraldehyde.
- Seal or cover all containers holding glutaraldehyde solutions.
- Attend training classes in safety awareness about use of and exposure to glutaraldehyde.



Safety Tips

- Become familiar with and be able to recognize sources of glutaraldehyde exposure.
- In case of skin or eye contact, wash with water immediately.
- Clean up spills immediately.
- Refer to ANSI/AAMI [1996] for further information about emergency procedures in the event of a large spill.

CASE REPORT—Several nurses were working in an area where glutaraldehyde was stored in 1-liter baths on countertops and was used to disinfect bronchoscopes. They complained of hives, chest tightness, and watery eyes. Evaluation of the work area indicated that there was a separate (independent) recirculating ventilation system designed to provide 10% outside air. The nurses used no personal protective equipment (such as gloves). Measures were then taken to reduce exposures. These included changing glutaraldehyde containers to air-tight models, using appropriate gloves, and installing local ventilation hoods for glutaraldehyde stations. One month after the implementation of these measures, the nurses' symptoms subsided [Charney 1991].

More information about glutaraldehyde

ANSI/AAMI [1996]. American national standard: safe use and handling of glutaraldehyde-based products in health care facilities. Arlington, VA: American National Standards Institute, Inc., and Association for the Advancement of Medical Instrumentation, ANSI/AAMI ST58-1996.

Babb JR, Bradley CR [1995]. Endoscope decontamination: where do we go from here? *J Hosp Infect* 30(Suppl):543-551.

Ballantyne B, Berman B [1984]. Dermal sensitizing potential of glutaraldehyde: a review and recent observations. *J Toxicol Cutaneous Ocul Toxicol* 3:251-262.

Beauchamp RO Jr., St. Clair MBG, Fennell TR, Clarke DO, Morgan KT [1992]. A critical review of the toxicology of glutaraldehyde. *Crit Rev Toxicol* 22(3,4):143-174.

Butt G, Greenley P, Herrick R, DiBerardinis L [1999]. Exposure to glutaraldehyde vapors during endoscopic sterilization processes in a large research and teaching institution. *Infect Control* 3(4):172-179.

Charney W [1991]. Hidden toxicities of glutaraldehyde. In: Charney W, Schirmer J, eds. *Essentials of modern hospital safety*. Chelsea, MI: Lewis Publishers, Inc., pp. 71-81.

Evans PF, Elliott-Minty C, Saleem A, Morris L, Groves J, Pedersen R [1997]. *Glutaraldehyde: Criteria document for an occupational exposure limit*. London, United Kingdom: Health and Safety Executive (HSE).

Finucane EW [1993]. Monitoring aldehydes in the hospital. In: Charney W, Schirmer J, eds. *Essentials of modern hospital safety*. Vol. 2. Boca Raton, FL: Lewis Publishers, Inc., pp. 191-210.

NIOSH [1997]. *NIOSH pocket guide to chemical hazards*. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 97-140.

Norbäck D [1988]. Skin and respiratory symptoms from exposure to alkaline glutaraldehyde in medical services. *Scand J Work Environ Health* 14:366–371.

Pisaniello DL, Gun RT, Tkaczuk MN, Nitshcke M, Crea J [1997]. Glutaraldehyde exposures and symptoms among endoscopy nurses in South Australia. *Appl Occup Environ Hyg* 12(3):171–177.

Scobbie E, Dabill DW, Groves JA [1996]. Chemical pollutants in x-ray film processing departments. *Ann Occup Hyg* 40(4):423–435.

Stenton SC, Beach JR, Dennis JH, Keaney NP, Hendrick DJ [1994]. Glutaraldehyde, asthma, and work—a cautionary tale. *Occup Med* 44(2):95–98.

Waterman L [1992]. The hazards of health care—glutaraldehyde: a review of its clinical use and abuse. *The Safety & Health Practitioner*, June, pp. 15–17.

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