

Formaldehyde Safety and Exposure Prevention in the Gross Anatomy Laboratory

Your work in the gross anatomy [laboratory](#) will expose you to formaldehyde. This document will inform you of the potential hazards of formaldehyde exposure and describe the protective equipment you should wear and the procedures to follow to limit your exposure.

How to Limit Your Exposure to Formaldehyde

- **Limit physical contact:** Avoid unprotected direct contact with the cadaver and any released fluids. [The American Association recommends](#) to [wear, gloves, scrubs, gowns and protective eyewear](#) such as safety glasses to prevent contamination of skin or clothing. Remove rings from fingers and loose/dangling wrist accessories. Keep necklaces and long hair restrained. Replace/decontaminate items upon contamination. Wash your hands thoroughly at the end of each class. Should unprotected direct contact occur, rinse affected areas for 15 minutes. Know where the emergency eyewash and shower stations are located.
- **Avoid contamination of personal items:** Store personal belongings in provided lockers. Use bookstands to hold dissection guides. Food and drinks are prohibited in the lab.
- **Ventilation:** The classroom is equipped with a ventilation system to minimize formaldehyde exposure. Do not tamper with the system by moving the dissection table. Keep lab suite doors closed.
- **Fluid management:** Use the provided suction device to remove excess fluids from the chest cavity. Avoid allowing formaldehyde-containing liquids to pool on the floor. Clean up spills promptly with paper towels and dispose of them in a lidded trash container. Ensure the drain bucket under the dissection table is kept closed. Maintain labelling of hazardous waste containers.
- **Cadaver coverage:** Properly cover the cadaver after use to minimize the release of formaldehyde into the classroom.
- **Use appropriate gloves to handle formaldehyde.** Formaldehyde can be absorbed through the skin, and certain gloves are more effective. Opt for gloves made from butyl rubber, neoprene rubber, or nitrile rubber. Avoid latex rubber, natural rubber, polyethylene, or polyvinyl alcohol gloves, as they don't provide sufficient protection. Learn about selecting [suitable gloves to minimize risk](#).

Health Hazards

- **Formaldehyde properties:** Formaldehyde is a nearly colorless gas with a pungent odor. It is commonly used as a preservative in a solution called formalin, which contains 37% formaldehyde by weight.
- **Potential hazards:** Formaldehyde and its solutions are known human carcinogens, irritants, acutely toxic, flammable, and chemical sensitizers.
- **Routes of exposure:** Inhalation, ingestion, skin contact, and eye contact can all lead to adverse health effects.
- **Chronic exposure:** Formaldehyde exposure [has been linked](#) to respiratory issues, skin irritation, and certain cancers, including lung and nasal cancers



If avoiding formaldehyde exposure during pregnancy or breastfeeding isn't possible, take these precautions:

- If exposure can't be avoided, consider wearing respirators to reduce inhalation of harmful chemicals. Note that charcoal or surgical masks won't offer adequate protection. Properly using respirators is crucial for effectiveness. Discuss with your doctor and employer if you believe respirator usage might be necessary.
- After work, wash any formaldehyde off your skin and change your clothes to minimize continued exposure. Place used clothing in a plastic bag to prevent accidental contamination. Consider dedicating a pair of shoes for areas where formaldehyde is used and avoid bringing the shoes into personal areas until they have been cleaned.
- Promptly clean up spills using formaldehyde neutralization pads or sheets to mitigate risks.
- Additionally, if there's a spill or splash, promptly remove gloves and gowns to minimize skin absorption.
- When working with formalin-preserved tissues, cadavers, or animal specimens, rinse them in water to remove excess formalin before dissection. Keep formalin solutions under a chemical fume hood or in a separate room within the lab.
- Be aware that certain activities, such as initial opening/dissection of the chest and abdomen, may entail higher formaldehyde exposure levels.
- Dispose of formaldehyde [contaminated waste](#) in sealed, labeled containers to prevent further exposure in the work area.

Exposure Limits

- **Regulatory limits:** The California Occupational Safety and Health Administration (Cal-OSHA) sets a formaldehyde permissible exposure limit (PEL) of 0.75 ppm as an eight-hour time-weighted average (TWA). Short-term exposure limit (STEL) is 2 ppm for a 15-minute period. The Action Level is 0.5 ppm TWA -
- **Recommended limits:** The American Conference of Governmental Industrial Hygienists (ACGIH) suggests a threshold limit value (TLV) of 0.1 ppm as an eight-hour time-weighted average, with a STEL of 0.3 ppm for 15 minutes. (Title 8, Section 5217)

- **Monitoring:** UCR EH&S Department routinely monitors formaldehyde exposure levels during gross anatomy classes. Historic monitoring results indicate formaldehyde exposure during gross anatomy procedures to be between 0.13 ppm and 0.45ppm (TWA). Here is the [2019 sampling report](#) and the [2022 sampling report](#) for these areas.

What is Not Known?

- The exact causes of fertility problems and miscarriages related to formaldehyde exposure.
- Safe exposure levels for formaldehyde and related chemicals.
- The likelihood of formaldehyde entering breast milk.

Reducing Exposure

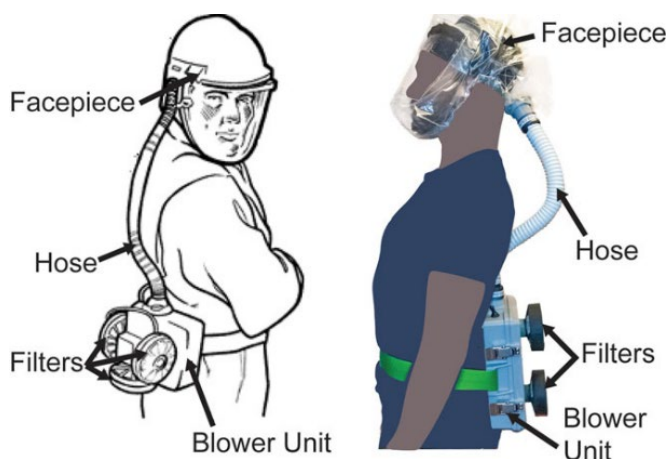
- Communicate with your employer or safety officer about formaldehyde exposure levels.
- Follow recommended exposure limits and wear appropriate protective equipment.
- Minimize skin contact and utilize external ventilation.
- Rinse specimens before dissection and properly dispose of contaminated waste.
- Follow required laboratory safety training and procedures.

Personal Protective Equipment - Reproductive Health

Personal protective equipment (PPE) such as gloves, protective clothing like gowns, goggles, and respirators can help reduce exposure to hazardous chemicals like formaldehyde. It's important to select the right type of PPE for the specific tasks and chemicals involved.

- **Gloves Selection:** Opt for gloves resistant to formaldehyde permeation. [Neoprene rubber](#) particularly in a double-layered (double glove) configuration, is advised for both formaldehyde and phenol, which are commonly found in tissue preservation solutions. It is advisable to replace disposable gloves, including disposable gowns every 30 minutes to ensure their continued effectiveness.
- **Managing Double Gloving:** While double gloving can lead to discomfort due to increased heat and moisture, there are strategies to alleviate this. One option is to remove both gloves, wash hands with soap, and allow them to rest. Alternatively, the top glove can be removed and replaced with a new one. [Extended cuffs](#) provide additional wrist protection. For enhanced safeguarding, consider double gloving with one layer beneath the gown and the other over it. Disposable gloves used during embalming procedures should never be reused and must be discarded promptly after removal.
- **Respirators:** Ensure respirators fit properly and consider alternatives if pregnant. Here is an example of potential respirator that you can use.





- **Work Practices:** Stand as far away for the tissues/ solutions containing formaldehyde and share dissection load to minimize exposure time.
- **Do not block exhaust ducts (i.e., drawdown table surface intakes or exhaust duct near floor as applicable).** Do not place equipment, containers, or other items directly in front of exhaust intakes. Maintain a clear area around these systems (e.g., no obstruction between work area and exhaust intakes). Do not cover intakes located on the surface of the cadaver table (cadaver and sheets can partially block and/or hinder exhaust intakes on the drawdown table).



Additional Resources

- Applicable regulation: <https://www.dir.ca.gov/title8/5217.html>

- [Ansell 8th Edition Chemical Resistance Guide](#)
- [NIOSH- Protective Clothing and Ensembles](#)
- [NIOSH PPE Directory](#)
- *Quick Selection Guide to Chemical Protective Clothing, 5th ed.* (Forsberg K, Mansdorf SZ. Wiley, 2007)
- [Take-Home Exposures – Reproductive Health](#)