



University Department of Safety & Health

Gross Anatomy Laboratory
Hazard Communication
Policy

January 2009

Table of Contents

1.0	Introduction
2.0	Definitions
3.0	Hazard Identifications
4.0	Standard Operating Procedures
5.0	Training
6.0	Medical Surveillance
7.0	Record Keeping

1.0 Introduction

The purpose of this Hazard Communication Policy is to ensure the health and safety of students, faculty, and employees in the gross anatomy laboratories. This policy will establish requirements for labeling, training, material safety data sheets and hazard communication. In addition, standard operating procedures will be established for students, faculty, employees and the University Department of Safety and Health.

This policy is required for laboratories that work with the following materials: formaldehyde gas, all mixtures or solutions composed of greater than 0.1 percent formaldehyde, and materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.1 parts per million (ppm).

The University Department of Safety and Health will require all students, faculty and employees to follow all requirements set forth by this policy.

This policy has been developed in compliance with OSHA Standards 1910.1200 (Hazard Communication Standard) and 1910.1048 (Formaldehyde Standard).

2.0 Definitions

For purposes of this policy, the following definitions shall apply:

- 2.1. "Action level" means a concentration of 0.5 part formaldehyde per million parts of air (0.5 ppm) calculated as an eight (8)-hour time-weighted average (TWA) concentration.
- 2.2. "Authorized Person" means any person required by work duties to be present in regulated areas, or authorized to do so by the employer, by this section, or by the OSH Act of 1970.
- 2.3. "Emergency" is any occurrence, such as but not limited to equipment failure, rupture of containers, or failure of control equipment that results in an uncontrolled release of a significant amount of formaldehyde.
- 2.4. "Employee exposure" means the exposure to airborne formaldehyde which would occur without corrections for protection provided by any respirator that is in use.
- 2.5. "Formaldehyde" means the chemical substance, HCHO, Chemical Abstracts Service Registry No. 50-00-0.
- 2.6. "Time Weighted Average (TWA)" refers to concentrations of airborne toxic materials which have been weighed for a certain time duration, usually 8 hours.
- 2.7. "Short Term Exposure Limit (STEL)" means the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.

3.0 Hazard Identification

3.1. The cadavers are embalmed with Hydrol Chemical Company's Anatomical Solution (AS-2600C). This solution is a light brown color with a carbolic odor. The hazardous ingredients are formaldehyde 37% solution, phenol and denatured alcohol. This solution has a boiling point of 142 degrees Fahrenheit, a vapor density > 1 and a vapor pressure equal to 130 mmHg.

3.2. Formaldehyde

3.2.1. Formaldehyde (sometimes called formalin – a mixture of formaldehyde and alcohol usually methanol) is a clear colorless liquid with a pungent odor detectable at 1 parts per million (ppm). It has a boiling point of -19 degrees Celsius, a vapor density of ~ 1 and a vapor pressure equal to 10 mmHg at -88 degrees Celsius.

3.2.2. Major Health Hazards

3.2.2.1. Formaldehyde is regulated by OSHA as a carcinogen (Standard 1910.1048) and is listed in IARC Group 2A (“probable human carcinogen”). This substance is classified as a “select carcinogen” under the criteria of the OSHA Laboratory Standard.

3.2.2.2. Formaldehyde is moderately toxic by skin contact and inhalation. Exposure to formaldehyde gas can cause irritation of the eyes and respiratory tract, coughing, dry throat, tightening of the chest, headache, a sensation of pressure in the head, and palpitations of the heart. Exposure to 0.1 to 5 ppm causes irritation of the eyes, nose and throat; above 10 ppm severe lacrimation occurs, burning in the nose and throat is experienced, and breathing becomes difficult. Acute exposure to concentrations above 25 ppm can cause serious injury, including fatal pulmonary edema. Formaldehyde has low acute toxicity via oral route. Ingestion can cause irritation of the mouth, throat, and stomach, nausea, vomiting, convulsions, and coma. An oral dose of 30 to 100 ml of 37 % formaldehyde (formalin) can be fatal to humans. Formaldehyde solutions can cause severe eye burns and loss of vision. Eye contact may lead to delayed effects that are not appreciably eased by eye washing.

3.2.2.3. Prolonged or repeated exposure to formaldehyde can cause dermatitis and sensitization of the skin and respiratory tract. Following skin contact, a symptom-free period may occur in sensitized individuals. Subsequent exposures can then lead to itching, redness, and the formation of blisters.

3.2.3. Exposure Limits

- 3.2.3.1. The OSHA Permissible Exposure Limit (PEL) is 0.75 ppm (8 hr TWA).
- 3.2.3.2. The OSHA Short Term Exposure Limit (STEL) is 2.0 ppm.
- 3.2.3.3. The University Department of Safety and Health, required under the OSHA regulations, shall assure that no student(s) and/or employee(s) is exposed to an airborne concentration of formaldehyde which exceeds 0.75 parts formaldehyde per million parts of air as an 8-hour time weighted Average (TWA) or exceeds two parts formaldehyde per million parts of air (2 ppm) as a 15 minute short term exposure limit (STEL).

3.3. Phenol

3.3.1. Phenol (synonyms - carbolic acid; hydroxybenzene) is colorless to light pink liquid with a sharp, medicinal odor detectable at 0.06 ppm. It has a boiling point 182 degrees Celsius, a vapor density of 3.2 at the boiling point and a vapor pressure equal to 0.36 mmHg at 20 degrees Celsius.

3.3.2. Major Health Hazards

- 3.3.2.1. The major hazard of phenol is its ability to penetrate the skin rapidly, particularly in the liquid state, causing severe injury which can be fatal.
- 3.3.2.2. Phenol is a corrosive and moderately toxic substance that affects the central nervous system and can cause damage to the liver and kidneys. Phenol is irritating to the skin but has a local anesthetic effect, so that no pain may be felt on initial contact. A whitening of the area of contact generally occurs, and later severe burns may develop. Exposure to phenol vapor can cause severe irritation of the eyes, nose, throat and respiratory tract. Acute exposure by any route may lead to nausea, vomiting, muscle weakness, and coma. Contact of phenol with eyes may cause severe damage and possibly blindness. Ingestion of phenol leads to burning of the mouth and throat and rapid development of digestive disturbances and the systemic effects described above.
- 3.3.2.3. Chronic exposure to phenol may cause vomiting, diarrhea, dizziness, difficulty in swallowing, headache, skin discoloration, and injury to the liver. Phenol has not been shown to be a carcinogen in humans. There is some evidence from animal studies that phenol may be a reproductive toxin.

3.3.3. Exposure Limit

- 3.3.3.1. Phenol has a permissible exposure limit (PEL) of 5.0 ppm (8 hr TWA).
- 3.3.3.2. The University Department of Safety and Health, required under the OSHA regulations, shall assure that no student(s) and/or employee(s) is exposed to an airborne concentration of formaldehyde which exceeds 5.0 parts phenol per million parts of air as an 8-hour time weighted Average (TWA)

4.0 Standard Operating Procedures

4.1. University Department of Safety and Health

4.1.1. Exposure Monitoring

- 4.1.1.1. The University Department of Health and Safety will perform initial and periodic exposure monitoring to determine airborne levels of formaldehyde and phenol in the gross anatomy laboratories.

4.1.1.2. Initial Monitoring

- 4.1.1.2.1. The University Department of Safety and Health will identify all students and employees who may be exposed at or above the action level or at or above the STEL. Once identified, personal exposure monitoring will be performed to determine their exposure. Personal exposure monitoring includes personal samples and area samples.
- 4.1.1.2.2. The initial monitoring process shall be repeated each time there is a change in process, personnel, or control measures which may result in new or additional exposure to formaldehyde or phenol.
- 4.1.1.2.3. The University Department of Safety and Health will promptly monitor a student and/or employee exposure if the student(s) and/or employee(s) reports signs or symptoms of respiratory or dermal conditions associated with formaldehyde or phenol exposure.

4.1.1.3. Periodic Monitoring

4.1.1.3.1. The University Department of Safety and Health will periodically measure and accurately determine exposure to formaldehyde and phenol for students and employees shown by the initial monitoring to be exposed at or above the action level of 0.5 ppm TWA or at or above the STEL.

4.1.1.3.1.1. The University Department of Safety and Health shall repeat the monitoring of the students and/or employees at least every 6 months if the last monitoring results reveal that the student(s) and/or employee(s) exposure results are at or above the action level of 0.5 ppm TWA.

4.1.1.3.1.2. The University Department of Safety and Health shall repeat the monitoring of the student(s) and/or employee(s) at least once a year under worst conditions if the last monitoring results reveal that the student(s) and/or employee(s) exposure results are at or above the STEL.

4.1.1.4. Termination of Monitoring

4.1.1.4.1. The University Department of Safety and Health may discontinue periodic monitoring for students and/or employees if results from two consecutive sampling periods taken at least 7 days apart show that student and/or employee exposure is below the action level and the STEL. The results must be statistically representative and consistent.

4.1.1.5. Accuracy of Monitoring

4.1.1.5.1. Monitoring shall be accurate, at the 95 percent confidence level, to within plus or minus 25 percent for airborne concentrations of formaldehyde at the TWA and the STEL and to within plus or minus 35 percent for airborne concentrations of formaldehyde at the action level.

4.1.1.6. Notification of Monitoring Results

4.1.1.6.1. Within 15 days of receiving the results of exposure monitoring conducted, the University Department of Safety and Health shall notify the affected student(s) and/or employee(s) of these results. Notification shall be in writing, either by distributing copies of the results to the student(s) and employee(s) or by posting the results.

4.1.1.6.1.1. If the student (s) and /or employee(s) exposure is over either PEL, the University Department of Safety and Health shall develop and implement a written plan to reduce student and/or employee exposure to or below both PELs, and give written notice to employees. The written notice shall contain a description of the corrective action being taken by the department to decrease exposure.

4.1.1.7. Regulated Areas

4.1.1.7.1. The University Department of Safety and Health will establish regulated areas where the concentration of airborne formaldehyde or phenol exceeds either the TWA or the STEL. All entrances and access ways will be posted with signs bearing the following information:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

DANGER
PHENOL
IRRITANT AND RAPID SKIN ABSORPTION
AUTHORIZED PERSONNEL ONLY

4.1.1.7.2. The University Department of Safety and Health will limit the access to regulated areas to authorized persons who have been trained to recognize the hazards of formaldehyde and phenol.

4.1.1.8. Methods of Compliance

4.1.1.8.1. The University Department of Safety and Health will institute engineering and work practice controls to reduce and maintain employee/student exposures too formaldehyde and phenol at or below their respective TWA and STEL. If it is established that feasible engineering and work practice controls cannot reduce employee/student exposure to or below the respective PELs, then the University Department of Safety and Health will apply these controls to reduce employee/student exposures to the extent feasible and will supplement them with the appropriately selected respirators.

4.1.2. Respirator Protection

- 4.1.2.1. The University Department of Safety and Health has established a Respiratory Protection Program in accordance with OSHA regulations (29 CFR 1910.134). The program establishes requirements that the University Department of Safety and Health, employees and students must fulfill prior to performing work with a respirator.
- 4.1.2.2. The University Department of Safety and Health will provide respiratory protection to Gross Anatomy Laboratory employees and students for the following situations:
 - 4.1.2.2.1. Whenever feasible engineering and work practice controls cannot reduce employee (s) and/or student (s) exposure to or below the PELs, the University Department of Safety and Health shall apply these controls to reduce employee exposure to the extent feasible and shall supplement them with respirators.
 - 4.1.2.2.2. Periods necessary to install or implement feasible engineering and work practice controls.
 - 4.1.2.2.3. Work operation for which feasible engineering and work practice controls are not yet sufficient to reduce employee (s) and student (s) exposure to or below the PELs.
 - 4.1.2.2.4. Medical conditions
- 4.1.2.3 If air-purifying chemical-cartridge respirators are used, the employee and/or student must:
 - 4.1.2.3.1 Replace the cartridge after three hours of use or at the end of the work shift, whichever occurs first, unless the cartridge contains a NIOSH-approved End of service life indicator (ESLI)
- 4.1.2.3. Drexel University shall select appropriate respirators based on the Table 1 below from OSHA 1910.1048 Table 1:

Table 1. Minimum Requirements for Respiratory Protection against Formaldehyde

Formaldehyde Concentration	Minimum Respirator required
Up to 7.5 ppm (10 x PEL)	Full face piece with cartridges or canisters specifically approved for protection against formaldehyde ¹
Up to 75 ppm (100 x PEL)	Full face mask, with chin style or chest or back mounted type industrial size canister specifically approved for protection against formaldehyde. Type C supplied-air respirator, pressure demand or continuous flow type, with full face piece, hood or helmet.
Above 75 ppm or unknown (emergencies) (100 x PEL)	Self contained breathing apparatus (SCBA) with positive pressure full face piece. Combination supplied-air, full face piece positive pressure respirator with auxiliary self contained air supply.

¹ A half-mask respirator with cartridges specifically approved for protection against formaldehyde can be substituted for the full face piece respirator providing that effective gas-proof goggles are provided and used in combination with the half-faced respirator.

4.2. Faculty/Students/Employees

4.2.1. Faculty and students are required to follow all the operating procedures set for in this policy and all other applicable University policies especially the University Chemical Hygiene plan and the Hazardous Material Emergency Response plan.

4.2.2. General Laboratory Safety Procedures

- 4.2.2.1. Eating, drinking, smoking, chewing gum or applying cosmetics in the laboratory is strictly forbidden.
- 4.2.2.2. Avoid practical jokes or other behavior that might confuse, startle or distract another worker.
- 4.2.2.3. Gloves must never be worn in the hallways, elevators, or public areas of the university. Prior to leaving room remove gloves. Do not open doors, press buttons, etc. with contaminated gloves.
- 4.2.2.4. Open-toed footwear cannot be worn in laboratories. Avoid wearing sandals, perforated shoes, sneakers or ankle shoes made of canvas.
- 4.2.2.5. Shorts, skirts, and short sleeve shirts cannot be worn in the laboratory.
- 4.2.2.6. Drainage buckets must be emptied and rinsed at the end of each laboratory.
- 4.2.2.7. Clean the dissection table and surrounding floor at the end of each laboratory. Wipe up any extra anatomical solution present on the floor or table.
- 4.2.2.8. Wash areas of exposed skin thoroughly before leaving the laboratory.
- 4.2.2.9. Confine long hair and loose clothing.
- 4.2.2.10. Report all injuries to the laboratory supervisor. Incident report must be filled out for all injuries. Fax the report to the University Department of Safety and Health 215-762-7899.

4.2.3. Personal Protective Equipment (PPE)

- 4.2.3.1. In accordance with OSHA standards, Faculty Members/Laboratory Supervisors shall require students to obtain the appropriate PPE prior to commencing any laboratory activities.
- 4.2.3.2. The employer shall select protective clothing and equipment based upon the form of formaldehyde to be encountered, the conditions of use, and the hazard to be prevented.
- 4.2.3.3. All employees should know the locations of PPE and how to obtain additional materials when necessary.
- 4.2.3.4. All contact with the eyes and skin with liquids containing 1 percent or more formaldehyde shall be prevented by the use of chemical protective clothing made of material impervious to formaldehyde

and the use of other personal protective equipment, such as goggles and face shields, as appropriate to the operation.

4.2.3.5. Glove Protection

4.2.3.5.1. The University Department of Safety and Health requires that **only disposable Nitrile gloves** be used during laboratory activities. Disposable latex and neoprene gloves are not suitable.

4.2.3.5.2. Inspect all gloves before each use. Wash them before removal. Dispose of them appropriately.

4.2.3.6. Protective Clothing

4.2.3.6.1. Laboratory coats or disposable gowns are to be worn during all laboratory activities.

4.2.3.6.2. The laboratory coat and scrubs should be washed at least once a week to prevent contact dermatitis. Do not wash laboratory scrubs and coat with personal clothing.

4.2.3.6.3. Full body protection shall be worn for entry into areas where concentrations exceed 100 ppm and for emergency reentry into areas of unknown concentration.

4.2.3.7. Eye Protection

4.2.3.7.1. Eye protection should be worn at all times during the laboratory activities. For operations involving formaldehyde and phenol, safety splash goggles. Depending on the operation, face shields may be required to be worn over splash goggles.

4.2.3.7.2. Contact lenses are not to be worn during laboratory activities.

4.2.4. Emergency Spill Response

4.2.4.1. Faculty and students will implement the Hazardous Material Emergency Spill Response plan in the event of a spill involving the embalming fluid.

4.2.5. Chemical Exposure

4.2.5.1. Laboratory Supervisor or faculty member shall contact the University Department of Safety and Health (215-895-5919) if any of the following exposures occur:

4.2.5.1.1. Eye Contact

- 4.2.5.1.1.1. Using the eyewash station immediately flush for at least 15 minutes.
- 4.2.5.1.1.2. Hold the eyelids away from the eyeball, and move the eye up and down and sideways to wash thoroughly behind the eyelids.
- 4.2.5.1.1.3. Obtain MSDS information
- 4.2.5.1.1.4. Get medical attention immediately. Report to student/employee health (or nearest emergency room) for evaluation. Follow first aid by prompt treatment by a member of a medical staff or an ophthalmologist who is acquainted with chemical injuries.

4.2.5.1.2. Inhalation

- 4.2.5.1.2.1. Remove to fresh air.
- 4.2.5.1.2.2. If not breathing, give artificial respiration.
- 4.2.5.1.2.3. If breathing is difficult, give oxygen.
- 4.2.5.1.2.4. Get medical attention immediately. Contact the emergency operator (phone 80) for assistance

4.2.5.1.3. Skin Contact

- 4.2.5.1.3.1. Immediately flush with flowing water for no less than 15 minutes (i.e. sink or safety shower).
- 4.2.5.1.3.2. If clothes are contaminated the do not attempt to wipe the clothes. Remove all contaminated clothing, shoes and jewelry while using the safety shower. Seconds count, so do not waste time because of modesty.
- 4.2.5.1.3.3. Take care not to spread the chemical on the skin or, especially, in the eyes. Use caution when removing pullover shirts or sweaters to prevent contamination of the eyes. It may be better to cut the garments off.
- 4.2.5.1.3.4. Check the MSDS to see if any delayed effects should be expected.
- 4.2.5.1.3.5. Discard contaminated clothes as hazardous waste or have them laundered separately from other clothing.

4.2.5.1.4. Ingestion

- 4.2.5.1.4.1. Contact the emergency operator (dial “80”), emergency room, or Poison Control Center.
- 4.2.5.1.4.2. Obtain the MSDS.

4.2.5.1.4.3. Do not induce vomiting or drink large quantities of water unless directed to do so by a medical professional.

4.2.5.2. Housekeeping

4.2.5.2.1. Proper personal protection equipment must be worn during all housekeeping procedures (i.e. disposable gloves or heavy duty gloves).

4.2.5.3. Embalming Personnel

4.2.5.3.1. Proper personal protection equipment must be worn during all embalming procedures. Refer to section 4.2.2 for specifications.

4.2.5.3.2. Embalming fluid containers must be kept closed at all times except when removing fluid for procedures.

4.2.5.3.3. Drainage buckets must be emptied after each class.

4.2.5.3.4. Excess embalming fluid must be disposed according to applicable federal, state or local regulations.

4.2.5.3.5. The embalming personnel must follow all requirements set forth in this policy and all other applicable University policies especially the University Chemical Hygiene Plan and the Hazardous Material Emergency Spill Response Plan.

5.0 Training

5.1. The University Department of Safety and Health will provide hazard communication training to all university employees and students who are associated with the Gross Anatomy Laboratory.

5.2. The training sessions are schedule for the first week of the class of each new term.

5.3. The training program will entail the following topics:

5.3.1. Hazard Identification

5.3.2. Exposure Routes

5.3.3. Personal Protection Equipment

5.3.4. Standard Operating Procedures

5.3.5. Hazardous Material Emergency Spill Response

5.3.6. Chemical Hygiene

5.3.7. Medical Surveillance

5.4. The University Department of Safety and Health shall document all emergency response training.

6.0 Medical Surveillance

- 6.1. Any employee exposed to formaldehyde or formaldehyde containing solutions at concentrations at or exceeding the action level or exceeding the STEL must be enrolled into the University's Formaldehyde Medical Surveillance program.
- 6.2. The Drexel University's Formaldehyde Medical Surveillance program complies with all requirements set forth in section L of 29 CFR 1910.1048 including medical examinations and questionnaires.

7.0 Record Keeping

- 7.1. The University Department of Safety and Health will establish and maintain an accurate record of all measurements taken to monitor employee exposure to formaldehyde. The record will be maintained for at least 30 years. This record includes:
 - 7.1.1. Date of Measurement
 - 7.1.2. Operation being Monitored
 - 7.1.3. Method of sampling and analysis and evidence of their accuracy and precision
 - 7.1.4. Number, durations, time and results of samples collected
 - 7.1.5. Types of protective devices donned
 - 7.1.6. Names, job classifications, social security numbers and exposure estimates of the employees whose exposures are represented by the actual monitoring results.
- 7.2. The University Department of Safety and Health will maintain a record of the objective data relied upon to support the determination that no employee is exposed to formaldehyde at or above the action level. The record will be maintained for at least 30 years.
- 7.3. The University Department of Safety and Health will establish and maintain an accurate record for each employee subject to medical surveillance under 29 CFR 1910.1048. The record will be maintained for the duration of employment plus 30 years. This record includes:
 - 7.3.1. Name and Social Security number of employee
 - 7.3.2. Physician's written opinion
 - 7.3.3. Listing of any employee health complaints that may be related to exposure to formaldehyde
 - 7.3.4. A copy of the medical examination results, including medical disease questionnaires and results of any medical tests required by the standard or mandated by the examining physician.
- 7.4. The University Department of Safety and Health will establish and maintain accurate records for employees/students subject to respirator fit testing. The

record will be maintained until replaced by a more recent record. This record includes:

- 7.4.1. Copy of protocol selected for respirator fit testing
 - 7.4.2. Size and Manufacturer of the types of respirators available for selection
 - 7.4.3. Date of most recent fit testing, name and social security number of each tested employee and the respirator type and facepiece selected.
- 7.5. The University Department of Safety and Health will make available all records concerning exposure monitoring, determinations, medical surveillance and respirator fit testing as specified in 29 CFR 1910.1049 (o) 6.