Biology 47 - LABORATORY PROCEDURES AND SAFETY

It is important to develop safe laboratory habits when working with reagents (chemicals), fluids, preserved specimens, and equipment which can be potentially hazardous. In most instances the general practice of using common sense can prevent any possible problems. Listed below are some simple procedures which should be followed in any laboratory setting. Becoming familiar with them now and making them habits will protect you and others in the lab from potential injury and prepare you for the future.

Safe Laboratory Procedures:

1. Always read the laboratory exercises completely BEFORE beginning. Familiarize yourself as to the activities you will be asked to perform. This will enable you to dress appropriately for the lab as well as coordinate the laboratory activities.
2. Familiarize yourself with your surroundings: Location of safely equipment, waste containers, sharps containers, laboratory instruments, and reagents.
3. Chemical Hazards: Assume that ALL reagents and specimens are a potential hazard. Animal and cadaver specimens are preserved in a chemical mixture which can be hazardous if it comes in contact with your body tissue.
   - When working with preserved specimens ALWAYS use gloves. The use of safety glasses and lab coats are HIGHLY recommended.
   - You may choose to purchase a “dust” mask from a hardware store to reduce the smell and exposure to the preservatives used on animal or cadaver material.
   - If your skin comes in contact with preservative, wash the area with soap and water.
   - If preservative comes in contact with your eyes, nose or mouth, rinse the affected area with copious amounts of water (There is an eye wash at the back sink).
   - Contact lens wearers: Contact lenses tend to absorb the chemicals in the tissue preservative. If you use contact lenses it is recommended that you either: 1. Wear glasses instead, 2. Use safety glasses, or 3. Use disposable contact lenses.
4. DO NOT EAT, DRINK OR SMOKE IN LAB. You may step out of lab at any appropriate time to eat or drink.
5. Dress appropriately. When doing dissections or working with preserved materials you should wear closed toed shoes, clothing which can be soiled, and hair accessories to keep hair out of your working field. Lab coats and safety glasses are not required but are highly recommended. Lab coats can be purchased in the bookstore (either $27 or $8) or may be borrowed during the class on a first come basis.
6. Maintain a clean working environment. Clean & disinfect all working areas at the beginning and end of ALL labs with the Pinesol table wash supplied. Clean & put away all specimens and equipment in its appropriate place.
   - Every student is responsible for maintaining a clean work space. The tables are to be disinfected at the conclusion of each lab. All dissecting materials are to be washed and DRIED following use. All materials and specimens are to be returned in their original condition.
   - a. Biohazardous materials (preserved animal tissue): Dispose of all preserved animal tissue in the labeled biohazard cans. Soiled paper and gloves are to be disposed of in the waste containers – NOT the Biohazardous containers.
   - b. Human Cadaver Material: Human material is not to be disposed of in the biohazard containers, but will be collected in individual cadaver specific collection containers.
c. Scalpels: Return sharp scalpels to the glass scalpel container labeled “Sharp Scalpels”. Dull scalpels are to be disposed of in the glass container labeled “dull Scalpels”. Broken scalpels are to be disposed of in the red plastic “sharps container”.
d. All paper products are to be disposed of in lab trash cans.
e. Large amounts of cat preservative should be disposed of in labeled disposal container in the lab fume hood. Small amounts of fluid can be flushed with water down the sink.

8. Report all spills and accidents to your instructor (no matter how minor).
9. If you cut yourself, rinse the wound for at least one minute in running water to flush out any chemicals. If the bleeding is not extensive, allow to bleed for a minute then apply pressure to stop the bleeding. Use an antibiotic ointment and a bandage to cover the wound.
10. Horseplay, pranks, and other acts of mischief are dangerous and ABSOLUTELY prohibited.
11. IF YOU DON’T KNOW ASK!
12. CLEAN & disinfect your work area BEFORE leaving lab.
13. WASH YOUR HANDS BEFORE LEAVING LAB

Cadavers:
The cadavers which will be used during this course were originally acquired through the Northern California State Willed Body Program. Each cadaver is donated by the deceased individual of his or her own will. The cadavers are given as gifts for the furthering of student preparation in the field of anatomy; none of the bodies are sold. The UCSF Department of Anatomy administers the procurement and preparation of the cadavers. The costs incurred by UCSF for the procurement, preparation, and administrative handling are passed on to the institutions which will be using them for instructional purposes. The final disposition of the cadavers and ALL human anatomical material is the sole responsibility of the institution using the individual. All final arrangements are made through licensed mortuaries or crematories, regulated by the Health and Safety Code of the State of California).

The very special individuals which have given their bodies so that students could have the opportunity to study anatomy using human bodies deserve our utmost respect and gratitude. Their gift goes beyond the simple act of serving the student’s educational needs, but hopefully through their selflessness, each student will be able to help many others with their knowledge. For respect of these individual and their families when referring to the cadavers, ONLY their given names will be used (first name only). The copies of the death certificates can be made available to the students upon request, departing important, relevant information of cause of death, age, & previous medical history. Unauthorized viewing or photography is strictly prohibited.

Cadaver Dissection, Use & Handling:
All human material to be viewed during the semester has been dissected and prepared for student examination. Biology 47 students will not dissect any human materials during this semester, but may be eligible for the Human Cadaver Dissection course – Biology 50. Each cadaver has been fixed with embalming solution for at least 6 months. The cadavers are therefore very heavy (with fluid) and may have strong embalming fluid odor. The embalming fluid does contain formalin, but only a small percent (< 0.65%) becomes aromatic). If you feel that the formalin is irritating your eyes, nasal passageways or throat move yourself into a well ventilated environment (preferably outside) and please notify me immediately. Appropriate accommodations can them be made.

Cadaver tissue recently exposed and dissected has a greater degree of embalming fluid saturating the tissue. Recently exposed tissue will therefore have a stronger odor and a greater potential to irritate your mucosal membranes and eyes. Since the cadavers you will be using have recently been dissected, use the exhaust fans over both doors whenever tissue is exposed. In order to
minimize the permeation of the building with the embalming fluid odor the inside doors will remain locked.

The greatest damage to cadaver material is the irreversible desiccation (drying out) of the tissue. In order to minimize this desiccation, *any time* the tissue is exposed, it must be continually saturated with a “wetting solution. Wetting solution is a Phenol / water / glycerol mixture designed to minimize the desiccation of the tissue. The wetting solution will be available in squeeze bottles and should be used to saturate the tissue during any viewing period, as well as immediately before the tissue is put away. When putting the tissue away following viewing, the tissue must be saturated with wetting solution and wrapped in cloth.

**Potential Chemical hazards working with embalmed specimens:**

**EMBALMING CHEMICALS**- A number of chemicals are used in various proportions to preserve cadavers. These chemicals are typically: formaldehyde, phenol, methanol, and glycerin. These chemicals may be hazardous if they get in or on your body. A great deal of effort has gone into reducing or eliminating any possible hazardous exposure while performing dissections. The embalming method, the laboratory ventilation, the personal protective equipment you are instructed to wear, and your training in proper dissection practices are all designed to help minimize your exposure.

**FORMALDEHYDE** – Formaldehyde is classified as a potential human carcinogen. It is part of the embalming solution at 1.9% concentration. In addition to preserving tissue for long periods of time it also acts to inactivate many microorganisms that may reside in the tissue. The permissible exposure limit for formaldehyde is 0.75 parts per million. Airborne concentrations of formaldehyde above 0.1 ppm (parts per million) can cause irritation of the eyes, nose, and throat. Higher concentrations can be dangerous to life and health. Skin contact with formaldehyde can also result in various skin reactions, including sensitization. The concentrations of formaldehyde used for embalming are low. In addition, air monitoring for formaldehyde during anatomy dissections, for the most part, have indicated low levels. Wear protective nitrile gloves and a lab coat. Wash your hands after dissections and, if you suspect contamination.

**PHENOL** – Phenol is another chemical that is used in the embalming solution at 9.3% concentration. It can cause irritations and burns and can have systemic toxicity. It has a characteristic sweet acrid odor that you most likely detect when you enter anatomy class. The permissible exposure limit for phenol is 5 parts per million in air. Skin contact is the major route of exposure of this chemical. Use nitrile gloves and a lab coat when performing dissections. Wash hands thoroughly after completion of your anatomy work or whenever you suspect that your skin has come in contact with preserved tissue.

**METHYL ALCOHOL** - This chemical is also used in embalming solutions at 11.1%. Contact with this chemical can result in irritation to the skin, eyes, nose, throat, and nervous system. It has a characteristic pungent odor. The permissible exposure limit is 200 parts per million in air. Prevent skin contact by wearing nitrile gloves and lab coat. Wash your hands carefully after dissection, or if you suspect skin contact.

**GLYCERIN** - Glycerin is used in the embalming solution at 11.1%. This chemical is an irritant to the eyes, nose, throat, and respiratory system. It is a colorless, odorless liquid. The permissible exposure limit for this chemical is 5 mg/m³. Prevent contact by wearing protective nitrile gloves and clothing such as a lab coat. Wash your hands carefully after dissections or if you suspect skin contact.

**INFECTIOUS AGENTS** – Infectious agents are microorganisms that may cause disease in humans or animals. Much like chemicals, you can be exposed to infectious agents by
inhalation, ingestion, injection or contact. Human tissues may contain infectious agents, however the embalming solutions used on the cadavers not only preserve the tissue but also destroy many infectious agents. In addition, the cadavers are screened and therefore are of low risk. To minimize the risk of exposure to infectious agents, make sure that the tissues with which you are working, have been properly preserved. Wear nitrile gloves and protective clothing such as a lab coat. Wash hands thoroughly after working with tissue or if you suspect that you may have been exposed. There must be no eating or drinking in work areas where tissues are present. Report all accidents to the course director.

**ERGONOMICS** - Ergonomics of dissections can be quite awkward, uncomfortable and draining as you will likely be sitting or standing in the same position for a long time. When performing dissections always try to position your self in the most comfortable position as possible for the dissection you are trying to accomplish. Adjust the height of the cadaver relative to you or you to the cadaver. Whether this means sitting on a stool, raising the gurney or adjusting the position of a limb with ties or rubber positioners. Get close to the area with which you are working, avoid excessive repetitive motions, avoid extensive fixed positions and, take regular breaks to relax strained areas.

**PERSONAL HYGIENE** – After you complete your work in the anatomy class, remove protective equipment such as gloves, apron and safety glasses and wash thoroughly with mild soap and water. Washing should be careful and deliberate, ensuring thorough cleaning of any possible exposed skin. If you suspect that you have been exposed during the dissections, stop what you are doing, remove protective equipment and wash carefully as above.

**Minimizing Cadaver Tissue Damage**: The greatest damage to cadaver material is three fold. 1. the irreversible desiccation (drying out) of the tissue 2. the introduction of pathogen (fungal spores) and 3. unintentional tearing or cutting of tissue.

Desiccation: to minimize the desiccation, *any time* the tissue is exposed, it must be continually saturated with a “wetting solution” – especially connective tissue i.e. ligaments and tendons. Wetting solution is a 1% phenol ethanol / water mixture designed to minimize to desiccation of the tissue. The wetting solution will be available in squeeze bottles and should be used to saturate the tissue during a dissection or viewing period, as well a immediately before the tissue is put away. When putting the tissue away following a dissection, the tissue must be saturated with wetting solution and wrapped in cloth and the cadaver bags should be sealed as best as possible.

Introduction of pathogen: to minimize the introduction of pathogen, always re-glove when you have stepped away form your dissection and handled material other than your dissecting equipment and materials and reference texts. Always wash dissection tools following use and if you suspect an instrument is not clean wash it prior to use.

**CAMPUS SAFETY / EMERGENCY PROCEDURES**  
**Earthquake**: “Duck, Cover and Hold” : Protect yourselves by taking cover under the laboratory tables. Do not exit the building until the tremors have ceased. Following an earthquake, students will meet in PARKING LOT #2 : BEFORE leaving campus. (This will enable the instructor to know if anyone is missing).  
**Fire**: “Evacuate, alert, & call” : Evacuate the immediate area, notify the instructor, and sound alarm. When fire alarm sounds, students are to meet in outside parking lot #2.
**Evacuation:** From the Science and Math Building, assemble in parking lot #2. Remain until the instructor has a “head count”. Do not leave campus until instructed, doing so may interfere with safety procedures or emergency vehicles.

Nearest emergency phone: Any faculty office phone (dial 9-911)
Fire Extinguisher: Under the instructor’s front desk
Fire Alarm: In the inside hallway adjacent to classroom
Public Phone: Top of the driveway, nearest to parking lot 2

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<tr>
<td>Life Threatening Emergency: 9-911</td>
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<td>District Police: 9-299-2311</td>
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