

## ALMUSTAQBAL UNIVERSITY

College of Health and Medical Techniques  
Medical Laboratories Techniques Department

Stage : Fourth year students

Subject : Laboratory Management - Lecture 11

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## Safety precautions in biological laboratories

Safety precautions in a biological lab are essential to protect personnel, prevent contamination, and ensure the integrity of experiments.

Below are key safety measures to follow:

### 1. Personal Protective Equipment (PPE)

- **Lab Coats:** Wear a lab coat to protect clothing and skin from spills or splashes.
- **Gloves:** Use disposable gloves when handling biological materials, chemicals, or hazardous substances.
- **Eye Protection:** Wear safety goggles or face shields to protect against splashes or aerosols.
- **Closed-Toe Shoes:** Avoid open-toed shoes to protect feet from spills or dropped items.
- **Masks/Respirators:** Use when working with airborne pathogens or hazardous aerosols.



# Lab Safety Rules

Science labs offer great opportunities for learning, teaching, and research. They also pose hazards that require proper safety precautions.



Stay safe when conducting your labs by maintaining social distancing.



## Dress appropriately

Tie back long hair, and wear suitable gloves, goggles, and other personal protective equipment. Avoid touching your eyes, nose, and mouth.

## Proper supervision

Don't perform lab experiments without instructor supervision unless given permission to do so.





## Know location of emergency numbers & safety equipment

Know the location of safety equipment and emergency phone numbers (such as poison control) so you can access them quickly if necessary.





## No food

Don't eat or drink in the lab, and never taste chemicals.



## ID hazards

Identify hazardous materials before beginning labs.



## Be attentive

Be attentive while in the lab. Don't leave lit Bunsen burners unattended or leave an experiment in progress.

## Be careful when handling hot glassware

Turn off all heating appliances when not in use. Keep flammable objects away from your work space.







## Keep a clean work space

Don't obstruct work areas, floors, or exits. Keep coats, bags, and other personal items stored in designated areas away from the lab. Don't block sink drains with debris.



## Handle glassware carefully

Properly dispose of anything that breaks. Report cuts, spills, and broken glass to your instructor immediately.



## Clean up







After completing the lab, carefully clean your work space and the equipment, and wash your hands with soap and warm water for at least 20 seconds.

## 2. Hygiene Practices

- **Handwashing:** Wash hands thoroughly before and after working in the lab, after removing gloves, and before eating or drinking.
- **No Eating or Drinking:** Never consume food or beverages in the lab to avoid accidental ingestion of hazardous materials.
- **Avoid Touching Face:** Do not touch your face, eyes, or mouth while working in the lab.

### 3. Proper Handling of Biological Materials

- **Labeling:** Clearly label all samples, reagents, and containers with their contents and hazard level.
- **Aseptic Techniques:** Use sterile techniques to prevent contamination of cultures and samples.
- **Biohazard Waste Disposal:** Dispose of biological waste in designated biohazard containers, and follow proper autoclaving procedures.
- **Sharps Handling:** Use puncture-resistant containers for needles, scalpels, and other sharps.

<b>SHARPS</b> Red Sharps Container	<b>BIOHAZARD</b> Red Container or Red Liner in Container	<b>TRACE CHEMO</b> Yellow Container
<ul style="list-style-type: none"> <li>✓ Needles</li> <li>✓ Ampules</li> <li>✓ Broken Glass</li> <li>✓ Blades</li> <li>✓ Razors</li> <li>✓ Staples</li> <li>✓ Trocars</li> <li>✓ Guide Wires</li> <li>✓ Other Sharps</li> </ul> 	<ul style="list-style-type: none"> <li>✓ Infectious Waste</li> <li>✓ Blood Products (albumin, etc)</li> <li>✓ Contaminated Personal Protective Equipment (PPE)</li> <li>✓ IV Tubing</li> <li>✓ Cultures, Stocks</li> </ul> 	<ul style="list-style-type: none"> <li>✓ Empty vials, ampules</li> <li>✓ Empty Syringes, Needles</li> <li>✓ Empty IVs</li> <li>✓ Gowns</li> <li>✓ Gloves</li> <li>✓ Tubing</li> <li>✓ Aprons</li> <li>✓ Wipes</li> <li>✓ Packaging</li> </ul> 
<b>RCRA HAZARD</b> Black Container	<b>PHARMACEUTICAL</b> Blue Container	<b>RADIOACTIVE</b> Shielded Containers with Radioactive Symbol
<ul style="list-style-type: none"> <li>✓ Hazardous meds (RCRA)</li> <li>✓ Half/Partial doses (RCRA)</li> <li>✓ Hazardous bulk meds</li> <li>✓ P-listed drugs, packaging</li> <li>✓ Bulk chemo</li> <li>✓ Pathological Waste (Incineration Only)</li> </ul> 	<ul style="list-style-type: none"> <li>✓ Pills</li> <li>✓ Injectables</li> <li>✓ Antibiotics</li> </ul> 	<ul style="list-style-type: none"> <li>✓ Fluorine-18 (F-18). 110 minutes half-life.</li> <li>✓ Technetium-99 (T-99m). 6 hours half-life.</li> <li>✓ Iodine-131 (I-131). 8 days half-life.</li> <li>✓ Strontium-89 (Sr-89). 52 days half-life.</li> <li>✓ Iridium-192 (Ir-192). 74 days half-life.</li> <li>✓ Cobalt-60 (Co-60). 53 years half-life.</li> </ul> 

## 4. Equipment and Workspace Safety

- **Decontamination:** Regularly clean and disinfect work surfaces and equipment.
- **Biosafety Cabinets:** Use biosafety cabinets (BSCs) for handling potentially infectious materials or hazardous agents.
- **Centrifuge Safety:** Ensure proper balancing of centrifuge tubes and use sealed rotors if working with hazardous materials.
- **Autoclave Use:** Follow protocols for sterilizing materials and ensure proper cooling before handling.

## 5. Chemical Safety

- **Chemical Storage:** Store chemicals according to compatibility and hazard class (e.g., flammables in a fireproof cabinet).
- **Material Safety Data Sheets (MSDS):** Familiarize yourself with the hazards and handling procedures for chemicals used in the lab.
- **Fume Hoods:** Use fume hoods when working with volatile or toxic chemicals.





## 6. Emergency Preparedness

- **Spill Kits:** Keep spill kits for biological, chemical, and radioactive materials readily available.
- **Emergency Equipment:** Know the location of fire extinguishers, eyewash stations, and safety showers.
- **First Aid:** Ensure first aid kits are accessible and stocked.
- **Incident Reporting:** Report all accidents, spills, or exposures to supervisors immediately.

## 7. Training and Compliance

- **Lab-Specific Training:** Complete training on lab safety protocols, equipment use, and emergency procedures.
- **Biosafety Levels (BSL):** Follow guidelines specific to the biosafety level of the lab (BSL-1 to BSL-4).
- **Standard Operating Procedures (SOPs):** Adhere to established protocols for experiments and equipment use.

## 8. Environmental Safety

- **Ventilation:** Ensure proper ventilation in the lab to prevent the buildup of hazardous fumes or aerosols.
- **Waste Segregation:** Separate biological, chemical, and radioactive waste for proper disposal.
- **Minimize Aerosols:** Avoid actions that generate aerosols, such as vigorous pipetting or opening centrifuge tubes too quickly.

## 9. Security Measures

- **Access Control:** Restrict lab access to authorized personnel only.
- **Inventory Management:** Keep an inventory of hazardous materials and biological agents.
- **Locking Samples:** Store sensitive or hazardous materials in locked cabinets or freezers.



By following these precautions, you can minimize risks and maintain a safe working environment in a biological lab. Always stay informed about lab-specific hazards and protocols.