

EXERCISE # 1**LABORATORY BIOSAFETY PROTOCOLS**

The protocols emphasize the use of good microbiological work practices, appropriate containment equipment, proper facility design, operation and maintenance, and administrative considerations to minimize the risk of worker injury or illness.

“Laboratory biosafety” is the term used to describe the containment principles, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins, or their accidental release. “Laboratory biosecurity” refers to institutional and personal security measures designed to prevent the loss, theft, misuse, diversion or intentional release of pathogens and toxins.

MICROBIOLOGICAL RISKS

1. Pathogenicity of the agent and infectious dose.
2. Potential outcome of exposure.
3. Natural route of infection.
4. Other routes of infection, resulting from laboratory manipulations (parenteral, airborne, ingestion).
5. Stability of the agent in the environment.
6. Concentration of the agent and volume of concentrated material to be manipulated.
7. Presence of a suitable host (human or animal).
8. Laboratory activity planned (sonication, aerosolization, centrifugation, etc.).
9. Any genetic manipulation of the organism that may extend the host range of the agent or alter the agent's sensitivity to known, effective treatment.

PERSONAL PROTECTION

1. Laboratory overalls, gowns or uniforms must be worn at all times for work in the laboratory.
2. Appropriate gloves must be worn for all procedures that may involve direct or accidental contact with blood, body fluids and other potentially infectious materials or infected animals. After use, gloves should be removed aseptically and hands must then be washed.
3. Personnel must wash their hands after handling infectious materials and animals, and before they leave the laboratory working areas.

4. Safety glasses, face shields (visors) or other protective devices must be worn when it is necessary to protect the eyes and face from splashes, impacting objects and sources of artificial ultraviolet radiation.
5. It is prohibited to wear protective laboratory clothing outside the laboratory, e.g. in canteens, coffee rooms, offices, libraries, staff rooms and toilets.
6. Open-toed footwear must not be worn in laboratories.
7. Eating, drinking, smoking, applying cosmetics and handling contact lenses is prohibited in the laboratory working areas.
8. Storing human foods or drinks anywhere in the laboratory working areas is prohibited.
9. Protective laboratory clothing that has been used in the laboratory must not be stored in the same lockers or cupboards as street clothing.

LABORATORY WORKING AREAS

1. The laboratory should be kept neat, clean and free of materials that are not pertinent to the work.
2. Work surfaces must be decontaminated after any spill of potentially dangerous material and at the end of the working day.
3. All contaminated materials, specimens and cultures must be decontaminated before disposal or cleaning for reuse.
4. Packing and transportation must follow applicable national and/or international regulations.
5. When windows can be opened, they should be fitted with arthropod-proof screens.

EMERGENCY EQUIPMENT

The following emergency equipment must be available:

1. First-aid kit, including universal and special antidotes.
2. Appropriate fire extinguishers, fire blankets.

The following are also suggested but may be varied according to local circumstances:

1. Full protective clothing (one-piece overalls, gloves and head covering for incidents involving microorganisms in risk).
2. Full-face respirators with appropriate chemical and particulate filter canisters.
3. Room disinfection apparatus, e.g. sprays and formaldehyde vaporizers.
4. Stretcher.
5. Tools, e.g. hammers, axes, spanners, screwdrivers, ladders, ropes.

6. Hazard area demarcation equipment and notices.

CHEMICAL DISINFECTION

The following chemicals or germicides are used to disinfect the materials.

1. Chlorine (Sodium hypochlorite)
2. Chloramines
3. Chlorine dioxide (ClO₂)
4. Formaldehyde
5. Alcohols
6. Iodine and Iodophors
7. Hydrogen peroxide
8. Peracid

HEAT DISINFECTION AND STERILIZATION

Saturated steam under pressure (autoclaving) is the most effective way of sterilizing laboratory materials.

The following cycle will surely sterilize the correctly loaded materials.

1. 3 minutes holding time at 134°C
2. 10 minutes holding time at 126°C
3. 15 minutes holding time at 121°C
4. 25 minutes holding time at 115°C

QUESTIONS

1. How scientists can protect themselves against microbiological risks in laboratory?
2. While working in laboratory areas, which cares should be taken?
3. What is biosafety?