

Chapter 3 - Principles of Biosafety

3.1 Introduction

A fundamental objective of any biosafety program is the containment of potentially harmful biological agents. The term “containment” is used in describing safe methods, facilities and equipment for managing infectious materials in the laboratory environment where they are being handled or maintained. The purpose of containment is to reduce or eliminate exposure of laboratory workers, other persons, and the outside environment to potentially hazardous agents. The most important element of containment is strict adherence to standard microbiological practices and techniques. Knowledge of standard microbiological practices and techniques is gained through a combination of training and experience.

3.2 Engineering Controls

Engineering controls eliminate or reduce the exposure of individuals to hazards in the laboratory through the use of specialized equipment. In most cases, engineering controls will be the primary barrier

between hazardous materials and the individual. Engineering controls include:

- ☐ Biological safety cabinets (BSCs) (discussed in Appendix A)
- ☐ Other enclosures
- ☐ Safety centrifuge cups
- ☐ Retractable needles

3.3 Personal Protective Equipment

Personal protective equipment (PPE) is equipment that the individual wears to protect them from exposure to hazards in the laboratory. PPE is generally intended to be a secondary barrier meaning that

it is to be used in conjunction with engineering controls to protect the user. PPE may be used a primary barrier when engineering controls are not possible or feasible. PPE worn should be based on the hazard

present and can include:

- ☐ Gloves
- ☐ Safety glasses or splash goggles
- ☐ Lab coat
- ☐ Gown
- ☐ Shoe covers
- ☐ Boots
- ☐ Respirator (includes dust masks)
- ☐ Face shield

3.4 Facility Construction and Design

The design and construction of the facility provides a secondary barrier to protect persons outside

the laboratory. PI's are responsible for providing facilities commensurate with the laboratory's function and the recommended biosafety level for the agents being manipulated. The recommended secondary barrier(s) will depend upon the risk of transmission of specific agents. For example, the exposure risks for most laboratory work in BSL-1 and BSL-2 facilities will be direct contact with the agents, or inadvertent contact exposures through contaminated work environments. Secondary barriers in these laboratories may include separation of the laboratory work area from public access, availability of a decontamination facility (e.g., autoclave) and hand washing facilities.

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