Biosafety Training for Chemists

Department of Environmental Health and Safety

412-624-9505
www.ehs.pitt.edu

October 27th and 28th, 2014
Purpose of Training

• Discuss biological safety levels
• Review typical biological agents used in research
• Outline biological waste handling
• Understand sharps disposal...biological vs. chemical
• Review disinfection procedures
• Discuss biological spill cleanup
Biosafety Definition

• “Microbiological practices, safety equipment and facility safeguards that protect laboratory workers, the environment, and the public from exposure to infectious microorganisms that are handled and stored in the laboratory."¹

• *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 5th Edition is the resource for biosafety guidance.

¹- BMBL, 5th Edition, page 1
# Biosafety Levels

**Biosafety Level (BSL)** – determination of work practices, safety equipment and facility construction that a laboratory must follow to handle and store biological agents.

<table>
<thead>
<tr>
<th>BSL</th>
<th>Hazard</th>
<th>Example Agent(s)</th>
<th>Work Occurs in Chemistry Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Well characterized agents; typically do not cause disease in healthy adults</td>
<td><em>E.coli</em></td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Can cause disease; exposure routes via contact with blood or through blood; not airborne</td>
<td>Human blood, Human cells, Adenovirus</td>
<td>Yes</td>
</tr>
<tr>
<td>2+</td>
<td>BSL-2 equipped laboratory; researchers utilize BSL-3 work practices</td>
<td>Lentivirus (causative agent of AIDS)</td>
<td>Not Current</td>
</tr>
<tr>
<td>3</td>
<td>Airborne transmission; vaccine or treatment available</td>
<td><em>Mycobacterium tuberculosis</em>, West Nile Virus</td>
<td>NO</td>
</tr>
<tr>
<td>4</td>
<td>Exotic agents; frequently fatal; no vaccine or treatment</td>
<td><em>Ebola</em></td>
<td>NO</td>
</tr>
</tbody>
</table>
Biohazard door signs

University Department
Building and Room Location
Authorized Personnel Only

Biosafety Level 2

In Case of Emergency, contact
University Police 412-624-2121
Investigator Name 000-000-000
Normal Business Hours
Lab Manager 000-000-000
Biosafety Level 3
BSL-3

Inhalation Hazard
Respiratory Protection REQUIRED beyond this point.
(additional Personal Protective Equipment necessary)
Biohazard Warning Labels

Small biohazard labels must be attached to:

- Containers used to store, transport or ship biological / infectious materials (ex. cooler to transport human specimens)
- Refrigerators or freezers containing biological or other infectious materials
- Other equipment used to store or manipulate biological agents (ex. Biosafety safety cabinet, centrifuge, incubator, etc.)
Biological Waste Box and Label

Chemistry

Dr. Chemistry
Chevron
10/27/14
Biological Waste - Solid

- All solid biological waste (plasticware and PPE) must be disposed within a biohazard waste bag that is contained in a biohazard waste box.
- Biological waste bags can be purchased from the Biological Sciences Stockroom.
- Boxes must be labeled and sealed on the top and bottom with packing tape (boxes are provided by EH&S).
- Biological waste labels must also be completed and affixed to the biological waste box (labels are provided by EH&S).
- Maximum biological box weight limit – 30 lbs. (based on Transportation Guidelines).
- Biological waste boxes should be placed on the Chevron loading dock on Wednesday nights (boxes should be placed near the cylinder racks on the dock, under cover from the elements).
Biological Waste Handling

• Glass, needles and other sharps are **NOT** permitted to be disposed in a red biohazard waste bag

• Biologically contaminated liquids are **NOT** permitted to be disposed in a red biohazard waste bag (NO liquids should be disposed in a biohazard waste bag)
Biological Waste - Liquids

- Liquid biological wastes (blood, virus, stock solutions, cell culture waste, etc.) must be treated with appropriate disinfectant (bleach or other EPA registered disinfectant)

- Following sufficient contact time (15-20 minutes), the solution should be poured down the drain (avoid splashing and aerosol generation)
Biological Waste - Sharps

- All biologically contaminated sharps (needles, razors, scalpels, etc.) MUST be disposed in a sharps container.

- Sharps containers must be made of rigid, puncture resistant plastic and have the biological hazard symbol visible on the container.
**Biological vs. Chemical Sharps**

**Biological sharps**
- Any sharp (needle, razor blade, scalpel, etc.) that has come into contact with potentially infectious material (BSL-1 and above) or research animal

**Chemical sharps**
- Any sharp (needle, razor blade, scalpel, etc.) that is used with a hazardous chemical
Engineering Controls

• Engineering Controls are designed (when utilized and operating correctly) to eliminate or reduce exposures to biological agents

• Engineering Controls include:
  – Biological safety cabinets
  – Centrifuge safety cups or sealed rotor heads
  – Sharps disposal containers
Biological Safety Cabinet

• Biological safety cabinets (BSCs) provide primary containment for work with human pathogens

• BSC protects laboratory personnel (and visitors) from potential exposures

• BSC protects research samples from contamination

• BSC protects the environment from biological aerosol releases
Biological Safety Cabinet
Biological Disinfectant

- When working at BSL-1, 70% alcohol is sufficient for disinfecting work surfaces and equipment
- When working at BSL-2 (and above), an appropriate EPA-registered disinfectant is required
  - 1:10 bleach solution
  - CaviCide™ or CaviWipes™
  - Accel® TB
Biological Spill Clean-up

- Isolate the area
- Wear personal protective equipment (PPE)
  - Latex or nitrile gloves
  - Face protection (safety glasses and surgical mask)
- Cover the spill with paper towels
- Pour disinfectant over the covered spill (working from the outside inward)
- Allow adequate contact time (15-20 minutes)
- Pick-up absorbent material and dispose as biological waste
- Remove PPE and dispose as biological waste
- Wash hands with disinfectant soap and water
Hepatitis B Vaccination

• If you work with potentially infectious material, the Hepatitis B vaccination is strongly recommended.

• The Hepatitis B vaccination is available through Employee Health (located in the Medical Arts Building).

• Information on the vaccination is available at the following links, [http://www.ehs.pitt.edu/assets/docs/ECP-2014.pdf](http://www.ehs.pitt.edu/assets/docs/ECP-2014.pdf) and [http://www.ehs.pitt.edu/assets/docs/BBPtraining.pdf](http://www.ehs.pitt.edu/assets/docs/BBPtraining.pdf)