Bloodborne Pathogens Training

Department of Environmental Health and Safety

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

Slides from this presentation are available at
http://www.ehs.pitt.edu/workplace/training.html
Purpose of Training

- Define bloodborne pathogen transmission
- Recommend protective measures
- Review University biosafety policies
- Complete OSHA and University required training
  - Annual training required according to OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030) and the University of Pittsburgh’s Exposure Control Plan
  - Annual retraining can be completed online via the following website: http://cme.hs.pitt.edu
What are Bloodborne Pathogens?

- **Microorganisms present in blood or body fluids that can cause disease in humans**
- **Examples:**
  - HIV
  - Hepatitis B
  - Hepatitis C
  - Herpes B

HIV by Transmission Electron Micrograph (TEM)

Image from the Public Health Image Library (PHIL)
Sources of BBP Exposures: Human sources

- Human blood, blood products, body fluids and wastes
- Human cell lines
Sources of BBP Exposures: Research Animals

- Research animals exposed to biological agents
- Research animals naturally carrying human pathogens

(By Aaron Logan, from http://www.lightmatter.net/gallery/albums.php (cc-by))
Sources of BBP Exposure: Cultures

- Bacteria or viruses used in research
  - Adenovirus
  - Salmonella
  - Lentivirus
  - Hepatitis
  - Herpes
  - Human Blood/Body Fluids
Body Entry Routes

Percutaneous (through the skin)
- Puncture wounds (needle sticks, sharps injuries)
- Damaged skin (cuts or dermatitis)

Mucocutaneous (mucous membranes)
- Splashes into eyes, nose, and mouth
- Mouth pipetting
Human Immunodeficiency Virus (HIV)

- Causative agent of AIDS (Acquired Immune Deficiency Syndrome)
- HIV-1 (worldwide) and HIV-2 (Africa)
- Transmission has occurred via:
  - Health care accidents (punctures from needles, sharps; blood splashes)
  - Sexual contact
  - Transfusions
  - Needle sharing
Human Immunodeficiency Virus (HIV)

- Appears to be lifelong infection
- Symptoms of the infection:
  - Acute Infection: Flu-like symptoms 1-4 weeks
  - Asymptomatic Infection: 4-12 weeks after infection
    May last month to years, but virus can be transmissible to others
  - Symptomatic Infection/AIDS: Months to years after infection,
    symptoms of continual immunosuppression, opportunistic infection
How Serious is the Risk of HIV?

- Over 1.1 million people in United States are infected
  - 1 in 6 are unaware of their infection
- 57 documented cases in health care workers since 1985
- No preventative vaccine for HIV

- Incidence of transmission from contaminated needlestick < 0.3%
- HIV can survive outside the body at least 2-3 days in a viable blood droplet
Documented Occupational Transmission of HIV

57 documented cases in health care workers since 1985:

Occupations:

- Laboratory workers – 19 cases (16 clinical lab)
- Housekeeper/Maintenance – 2 cases

Injuries:

- 48 exposures – percutaneous (puncture/cut)
- 5 exposures – mucous membrane
- 2 exposures – both puncture/mucous membrane
- 2 exposures – unknown
Bloodborne Viral Hepatitis

• **Hepatitis B** – 800,000 to 1.4 million people in the U.S. chronically infected

• **Hepatitis C** – estimated 4.0 million cases in the U.S. (3.2 million chronically affected)

• **Hepatitis D** – estimated 15 million cases worldwide; requires Hepatitis B for replication

*Image taken from the Public Health Image Library (PHIL)*

Transmission electron micrograph (TEM) of hepatitis B virus (HBV) virions (*Dane particles*)
How Serious is the Risk of Hepatitis C?

- Estimated 17,000 new U.S. cases in 2007 according to Center for Disease Control (CDC)
- Chronic infection 55-85% of infected people
- Estimated 1% of healthcare workers infected
- Approximately 8,000 to 10,000 people each year in the U.S. will die due to chronic HCV infections
- Incidence of transmission from needlestick 3-5%
- HCV can survive on environmental surfaces at room temperature at least 16 hours but not longer than 4 days and still be capable of causing infection
- No vaccine available

* Per 100,000 population.
† Until 1995, acute hepatitis C was reported as acute hepatitis non-A, non-B.
How serious is the Risk of Hepatitis B?

- Easier to contract compared to HIV

- Incidence of transmission from needlestick 6-30%

- HBV can survive outside the body at least 7 days and still be capable of causing infection

- Number of new cases in the U.S. has declined 80% since 1991 as a result of vaccinations and a national strategy to eliminate HBV infection

* Per 100,000 population.
Hepatitis B Vaccination

- NO COST to the employee
- No live virus injected – safe vaccine
- Now recommended for newborns and children
- Employee MUST sign Declination Form
- No current recommendation for booster

Image from: www.thehealthage.com
Three shot HBV Series

• Three shot series; 2\textsuperscript{nd} shot one month after the first; 3\textsuperscript{rd} shot 6 months later

• If pregnant now or within 6 months ask your doctor about getting HBV vaccination

• HBV immunity effective for 97% receiving three shot series

• If you have not received all 3 shots, contact Employee Health at 412-647-3695 for instructions
## In Review....

<table>
<thead>
<tr>
<th>Virus</th>
<th>Rate of Needlestick*</th>
<th>Survival Outside of Body</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B</td>
<td>6-30%</td>
<td>Up to 7 days</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>3-5%</td>
<td>Up to 4 days or 16 hours at room temperature</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>Hepatitis B must be present</td>
<td>Hepatitis B</td>
</tr>
<tr>
<td>HIV</td>
<td>&lt; 0.3%</td>
<td>2-3 days in a viable blood droplet</td>
<td>No</td>
</tr>
</tbody>
</table>

*Incidence rates from known infected sources*
Hepatitis B Vaccination

• If you wish to receive the vaccination series, go to:
  Employee Health Clinic
  3708 Fifth Avenue
  Medical Arts Building, Suite 500
  Normal Work Hours 7:30 AM – 4:00 PM Monday – Friday

• Appointment not necessary, proper ID required
Prevention of BBP Diseases

- University Exposure Control Plan
- Universal Precautions
- Engineering Controls
- Safe Laboratory Work Practices
- Personal Protective Equipment
University Exposure Control Plan

Exposure Control Plan Contains:

- Exposure determination procedure
- Methods of compliance
- HBV vaccination plan information
- Exposure incident “follow-up” procedure
- Training requirements
- Recordkeeping plan
- Available at [www.ehs.pitt.edu](http://www.ehs.pitt.edu) – follow biosafety link
The Exposure control plan is located under “Biological Safety”
Environmental Health and Safety

EH&S Website: Biological Safety

Program Description
The Biosafety Program at the University of Pittsburgh provides guidance for faculty, staff, and students who work with biological agents to maintain a safe and healthy working environment, including:

- Identification of biological materials being used,
- Evaluation of the usage procedures for the potential to result in personnel exposure or environmental contamination,
- Design of policies and programs to eliminate exposure or contamination, and
- Review of the effectiveness of these programs.

Programs to ensure the safe handling of biological agents are required by the Federal Government (i.e., OSHA Bloodborne Pathogens Standard) and many granting agencies such as the National Institutes of Health and the U.S. Department of Defense.

The University Biosafety Officer, a member of the Department of Environmental Health and Safety, works closely with the Biohazards Committee and University personnel to ensure that the appropriate Biosafety programs are in compliance with applicable regulations and have the desired protective effects.

University Biosafety Committees
University Biohazards Committee
The University Biohazards Committee is a subcommittee of the University Environmental Health and Safety Committee. It is established to review and approve Biosafety issues, including the maintenance of an active and effective Biosafety program as developed by the Department of Environmental Health and Safety for all University of Pittsburgh faculty, staff and students.

Biohazards Committee Members and Responsibility

Resources
- Safety Manuals
  - University Safety Manual: Table of Contents
- Protocols And Guidelines
  - Biosafety Cabinets (PDF)
  - Biosafety Cabinets - The Basics (PDF)
  - Biosafety Guidelines (PDF)
  - Biosafety Level 3 Research (PDF)
  - BSL-3 Employee Questionnaire (PDF)
  - BSL-3 Equipment Guidelines (PDF)
- Bloodborne Pathogens
  - Exposure Control Plan (PDF)
- Bloodborne Pathogens
  - Training for Anatomical Specimen Users (PDF)
- Botulinum Toxoid Vaccine
  - Info and Consent Form (PDF)
- Sharps Disposal Guidelines (PDF)
- Reporting Injuries by Contaminated Sharps (PDF)
- Safety-Engineered Sharps Initiative (PDF)
- Guidelines for the Safe Use of Formaldehyde (PDF)

Exposure Control Plan and many other resources
Universal Precautions

Also known as “Standard Precautions”

Treat all human blood, body substances, and other potentially infectious material as if they were infectious for HIV, hepatitis or other bloodborne pathogens
## Biosafety Levels

**Biosafety Level (BSL)** - combination of practices, safety equipment, and facilities for the operations performed, the agents handled, and the lab function

<table>
<thead>
<tr>
<th>BSL</th>
<th><strong>Severity</strong></th>
<th><strong>Treatment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Typically does not cause disease in healthy adults</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Can cause disease; Not airborne</td>
<td>Yes</td>
</tr>
<tr>
<td>2+</td>
<td>Indicates BSL-3 work practices in laboratories equipped for BSL-2 work (required for work with lentivirus and lentiviral vectors)</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Can cause disease; Airborne transmission</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Potentially fatal</td>
<td>No</td>
</tr>
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</table>
Biohazard Signage and Labels

Biohazard Entrance Signage must be displayed outside laboratory handling biological materials or agents

Small biohazard labels must be attached to:

- Containers of regulated waste
- Refrigerators or freezers containing blood or other infectious materials
- Other containers used to store, transport, ship blood or other infectious materials
Environmental Health and Safety

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 Emergency 000-000-000
Normal Business Hours Office 000-000-000

BIOHAZARD AREA
ADMITTANCE TO AUTHORIZED PERSONNEL ONLY

Hazard Identity: ____________________________
Responsible Investigator: ___________________
In Case of Emergency Call: ___________________
Daytime: __________________________________
Off Hours: __________________________________
Enterance Requirements: _______________________

Biosafety Level: 1 2 2+
(circle one)

DATE POSTED: ____________________________
Engineering Controls

**Engineering Controls** — Eliminate or reduce exposure through the use of engineered machinery or equipment
Biosafety Cabinets
How does a BSC work?

30% exhaust, 70% recirculated

HEPA filters remove only particulates, NOT chemicals
Puncture-resistant sharps containers
Centrifuge safety cups or sealed rotor heads
Mechanical pipetting devices
Eye and hand wash stations

Hand washing is a valuable tool in preventing infection
Engineering Controls

Safety Engineered Sharps Devices

- Self-sheathing or retractable needles
- Shielded scalpels
- Shielded IV catheter insertion devices

Required for certain procedures
Contact EH&S for more information
Safe Work Practices

Work Practice Controls for BBP Control

- No recapping of needles
- No needles, glass, or scalpels in trash
- Treat all contaminated tools as infectious
- No eating, drinking, smoking in risk areas
- No applying cosmetics, lip balm, contact lenses
- Use good hygiene practices (hand washing with disinfectant soap)
- Use proper lab techniques and wear appropriate laboratory attire
Personal Protective Equipment (PPE)

- Provided by employer at no cost to employees
- Must be specifically selected for tasks performed:
  - Appropriate gloves
  - Protective coveralls / lab coats
  - Eye protection / face shields
  - Surgical masks
  - Resuscitation bag / pocket mouthpiece
Rules of PPE Usage

• **Remove PPE:**
  – If integrity compromised
  – If contaminated
  – When task complete
  – Before leaving laboratory space
  – Before entering public areas

• **Properly dispose of used PPE**

• **Wash hands after removing PPE**
Spill Clean-up
Spill Clean-up

• Wear personal protective equipment (PPE)
  – Latex gloves, face protection, lab coat

• Cover spill with a paper towel
Spill Clean-up

- Pour disinfectant (1:10 bleach) over covered spill

- Allow adequate contact time (15-20 min)
Spill Clean-up

• Remove absorbent and dispose as bio-waste
  – If broken glass or sharp objects are present, use shovel or tongs to dispose

• Remove gloves and dispose of as biological waste

• Wash hands thoroughly
Biological Waste Disposal / supplies

- **Biological Waste Boxes**
  - Available in designated areas of research buildings (consult EH&S, department administrator, other researchers)
  - EH&S Department provides biological waste BOXES and LABELS free of charge
**Biological Waste Disposal /Supplies**

- **Biological Waste Bags**
  - Bags must be labeled with a biohazard symbol and are required to be red or orange in color
  - Investigators (Department) **MUST** purchase biohazard bags and sharps containers
Biological Waste Disposal / Supplies

- **Sharps Containers**
  - Must be labeled with a biohazard symbol and are required to be puncture resistant with a lid
Biological Waste Disposal

Biological Waste Supplies

- Biohazard Bags and Sharps Containers can be purchased through the Biological Science Stockroom (Life Science Building) – Phone (412)-624-4275
Solid Biological Waste

- Solid wastes (culture plates, gloves, PPE, etc.) which have come in contact with potentially infectious material are disinfected and placed in an approved biohazard bag.
- Waste bags are placed in approved biohazard waste box, labeled, and sealed (top and bottom) with packing tape.
- Maximum box weight limit – 30 lbs. (based on Transportation Guidelines).
- Each building has a designated area for pick-up.
- Check [www.ehs.pitt.edu](http://www.ehs.pitt.edu) for pick-up schedule (pick-up usually every Thursday).
Liquid Biological Waste

- Liquid wastes (blood, virus, stock, cell culture waste, etc.) should be treated with appropriate disinfectant (bleach or other EPA registered disinfectant) to inactivate potentially infectious material.
- Following sufficient contact time, the solution should be poured down the drain (avoid splashing and aerosol generation).
- Large volumes of liquid waste should be autoclaved prior to drain disposal.
- Liquid wastes are not permitted to be disposed in biohazard bags.
Autoclaving

- Autoclaves are equipment used to sterilize equipment and supplies by subjecting them to high pressure steam.

- Things that might cause a failure to achieve sterility:
  - Overfilling the autoclave
  - Not running the cycle for long enough
Sharps Disposal

- All sharps must be disposed of in puncture resistant rigid containers with self-closing lids
- No sharps disposal in regular trash or broken glass containers
- Sharps containers should be closed when 2/3 full and disposed according to University guidelines
- Consult EH&S Department concerning building specific procedures for sharps disposal
Blood-Borne Pathogen Accident Treatment and Reporting

**Injury Involving BBP**

- Puncture or Cut
- Splash to Eye, Nose or Mouth

**Remove Contaminated PPE**

- Wash Affected Area with Soap and Water for 15 Minutes
- Flush Affected Area in Eyewash for 15 Minutes

**Report Immediately for Treatment**

- 7:30 AM – 4:00 PM Monday - Friday

  - **If Available Notify Supervisor or PI**

  - Report to Employee Health Clinic
    - 5th Floor, Medical Arts Building
    - (412) 647-3695

- After Work Hours or Weekend

  - Report to Presbyterian University Hospital
    - Emergency Room
    - (412) 647-3333

- Report Injury to University Worker’s Compensation within 24 Hours
  - 1-800-633-1197

  - If Sharps Involved in Injury

  - Fill out Sharps Injury Report
    - www.ehs.pitt.edu
Accident Treatment and Reporting

Report for Treatment
For Bloodborne Pathogen Injuries:

• Employee Health Clinic (5th Floor, Medical Arts Building)
  – Normal work hours
    7:30AM-4:00PM M – F
  – Phone – (412) 647-3695

• Presbyterian University Hospital Emergency Room
  – After work hours or on weekends for medical emergencies
  – Phone – (412) 647-3333
Environmental Health and Safety

Accident Treatment and Reporting

Emergency Situations

• Contact University of Pittsburgh Police
  – (412) 624-2121
Accident Treatment and Reporting

- Call UPMC Work Partners at 1-800-633-1197 (24 hours/day, 7 days/week)
- Notify Supervisor
- If accident involves a “Sharp” such as a needle or scalpel, must also complete “Sharps Injury Report”
  - Available at www.ehs.pitt.edu
Post-Exposure Evaluation and Follow-up Procedure

Confidential Medical Evaluation and Follow-up must be made available following an exposure incident

Must Include:

- Documentation of exposure and how the incident occurred;
- Identification and testing of source individual if available;
- Collection and testing of the employee’s blood for HBV and HIV (employee consent required);
- Counseling and evaluation of reported illness
Post-Exposure Evaluation and Follow-up

Healthcare Professional’s Written Opinion

– Provided within 15 days of completion of evaluation
– Informs employee if they are indicated for, or have received Hepatitis B vaccine
– Limited to information of results of evaluation
– Informs employee of any medical conditions resulting from exposure requiring medical attention
– Findings and results are confidential
Reducing BBP Risks

- Understand the risks associated with your job or function
- Recognize potential exposure situations
- Assure lab equipment is in good condition
- Keep laboratory bench and work areas clean
- Follow established work procedures
- Use personal protective equipment
- Follow universal precautions
- Do not over-schedule yourself
Contact Information

Environmental Health and Safety Department

• Phone: (412)624-9505
• E-mail – biosafe@ehs.pitt.edu
• Campus Address:
  Public Safety Building
  4th floor
  3412 Forbes Avenue