Bloodborne Pathogens Training for Laboratory Personnel

Environmental Health and Safety

http://www.ehs.pitt.edu

(412) 624-9505
Purpose of Training

• To define bloodborne pathogens, understand transmission routes, and recommend protective measures

• Review associated University biosafety programs and policies

• Complete OSHA and University required training
  – University of Pittsburgh’s Exposure Control Plan describes programs and practices developed by the University to protect employees and ensure compliance with the OSHA standard
  – Annual training required according to OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030)
Bloodborne Pathogens (BBP)

• A bloodborne pathogen is a microorganism present in blood or body fluids that can cause disease in humans

• Examples of bloodborne pathogens:
  – Human Immunodeficiency Virus (HIV)
  – Hepatitis B Virus
  – Hepatitis C Virus
  – Macaque Herpes B Virus
Potential Sources of BBP Transmission

- Contact with human blood, blood products, body fluids, and wastes

- Contact with human cell culture, tissue cultures, or human cell lines
Potential Sources of BBP Transmission

- Research animals naturally carrying pathogens that can cause disease in humans
- Research animals intentionally exposed to biological agents
Potential Sources of BBP Transmission

Bacteria or viruses used in research

- Adenovirus
- Salmonella
- Pseudorabies
- Lentivirus
- Hepatitis
- Herpes

www.phil.cdc.gov
There are two main routes of exposure to BBP:

– Percutaneous (through the skin)

– Mucocutaneous (through the mucous membranes, such as eyes, nose, or mouth)
Percutaneous (through the skin)

Examples of percutaneous exposures are:

- Puncture wounds from needles and other sharps
  - Most common source of bloodborne pathogen exposures in occupational settings

- Damaged skin (cuts or dermatitis)
  - Exposure can occur through cuts, rash, or broken skin on hands if liquid barrier gloves are not worn
**Mucocutaneous**  
(mucous membranes)

Some examples of mucocutaneous exposures are:

- Direct splashes into eyes, nose, and mouth (can occur when not wearing proper face protection)

- Touching mouth, nose, or eyes with gloves

- Mouth pipetting
The Following Section Pertains to Specific Pathogens That May be Present in Human Blood, Body Fluids, or Other Potentially Infectious Materials
Human Immunodeficiency Virus (HIV)

- HIV is the infectious agent that causes AIDS (Acquired Immune Deficiency Syndrome)

- Transmission is known to have occurred as a result of:
  - Punctures from needles or sharps and from blood splashes to mucous membranes
  - Sexual contact
  - Transfusions
  - Sharing of needles
Human Immunodeficiency Virus (HIV)

- HIV appears to be a lifelong infection.

- Symptoms of infection with HIV usually begin as flu-like symptoms, occurring 1 - 4 weeks after infection.

- Within 4 - 12 weeks after infection any flu-like symptoms should have disappeared; you may be asymptomatic for months or years, but the virus can be transmitted to others.

- Symptomatic Infection/AIDS occurs months to years after infection:
  - It is not completely understood what triggers the disease, destroying the body’s immune system.
The Risk of HIV

• Over 1.1 million people in United States are infected with HIV
  – 1 in 6 are unaware of their infection

• From 1985 – 2013
  – 58 confirmed and 150 possible cases of occupationally acquired HIV infection reported to the CDC
  – 25 of the 58 employees who had an occupational exposure have developed AIDS

Since 1999, only one confirmed case has been reported; the decline is attributed to better prevention strategies and improved training (reduction in Sharps injuries)

• Exposures affected laboratory and general staff
  – Laboratory workers – 20 cases
  – Housekeeper/Maintenance – 2 cases

Proper decontamination and waste handling is critical to avoid inadvertently exposing custodial staff to BBP in the laboratory environment
Documented Occupational Transmission of HIV

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6353a4.htm
HIV Risk in Occupational Settings

- The incidence of transmission from contaminated needlestick is low when compared to other BBP (if stuck with a contaminated needle, the chance of developing HIV infection is 3 in 1,000)

- HIV can survive outside the body for 2 - 3 days in a viable blood droplet; HIV is inactivated upon drying

- It is relatively hard to contract HIV in an occupational setting

There is no vaccine for HIV
Bloodborne Viral Hepatitis

• **Hepatitis B virus**
  1.4 million people in the U.S. chronically infected

• **Hepatitis C virus**
  Estimated 2.7 – 3.9 million people in the U.S. chronically infected

• **Hepatitis D virus**
  World Health Organization estimates more than 10 million people worldwide are infected; requires Hepatitis B for replication
The Risk of Hepatitis C

• In 2007, the number of deaths from HCV exceeded the number of HIV/AIDS-related deaths and has since continued to increase

• The incidence of transmission from needlestick is higher than that of HIV (3-5% compared to <0.3%)

• HCV can survive on an environmental surface at room temperature for at least 16 hours but not longer than 4 days and still be capable of causing infection

No vaccine available
Figure 4.1. Reported number of acute hepatitis C cases — United States, 2000–2013

Source: National Notifiable Diseases Surveillance System (NNDSS)
The Risk of Hepatitis B

- Hepatitis B infection has been declining in incidence since 1990 due to effective vaccination strategies.
  - The number of reported cases of acute hepatitis B decreased by 62%, from 8,036 in 2000 to 3,050 in 2013

- However, in 2013, the number of new HBV infections increased 5.4% from 2012 due to increased number of drug-related and healthcare-related outbreaks.

- Easier to contract via contaminated needlestick compared to HIV (6-30% compared to < 0.3%).

- HBV can survive outside the body for at least 7 days and still be capable of causing an infection
Figure 3.1. Reported number of acute hepatitis B cases — United States, 2000–2013

Source: National Notifiable Diseases Surveillance System (NNDSS)
<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>Hepatitis C</td>
<td>3 - 5%</td>
<td>Up to 4 days; About 16 hours at room temperature</td>
<td>No</td>
</tr>
<tr>
<td>Hepatitis D</td>
<td>Data not available</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

• Available from Employee Health Services

• There is NO COST to the employee

• Safe vaccine - no live virus injected
  – Now routinely administered to newborns & children
Hepatitis B Vaccination

The Hepatitis B Vaccine is given as a series of three injections

- 2\textsuperscript{nd} injection given one month after the 1\textsuperscript{st} injection
- 3\textsuperscript{rd} injection given six months after the 1\textsuperscript{st} injection
Hepatitis B Vaccination

Any questions regarding the Hepatitis B vaccine should be directed to Employee Health at (412) 647-3695

- If you’re not sure whether you’ve ever received the vaccination
- If you’re not sure whether you received all three injections in the series
- If you have allergies or may be pregnant
Hepatitis B Vaccination

If you wish to receive the vaccination series, go to:

Employee Health Clinic
3708 Fifth Avenue
Medical Arts Building, Suite 500.59
Normal Work Hours 7:30 AM – 4:00 PM Monday – Friday

• You don’t need to make an appointment

• Bring your Pitt ID with you.