Bloodborne Pathogen Training
University of Colorado, Boulder

Environmental Health and Safety
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The University of Colorado is an NIH funded institution and is required to follow the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard, 29 CFR 1910.1030


This Standard recommends safeguards to protect workers against exposures to blood and other potentially infectious materials.
Course Overview

- Institutional Biosafety Committee (IBC) approval
- Training Requirements
- Characteristics of bloodborne pathogens (BBPs) and other potentially infectious materials (OPIM)
- Routes of transmission of infectious agents
  - Exposure control methods to prevent exposure
  - Infectious or biomedical waste disposal procedures
  - How to address accidents and injuries when working with BBPs and OPIMs
- Managing biohazardous waste
The Institutional Biosafety Committee (IBC) must approve research, class instruction, and field work that includes bloodborne pathogens or other potentially infectious materials

- An IBC application must be completed electronically and submitted to EHSBIO@colorado.edu
- Approved applications are good for 3 years

For additional IBC information, applications, and forms: http://www.colorado.edu/ehs/research/biological.html
Who Must Receive This Training?

- Employees who could be “reasonably anticipated” to have eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials (OPIMs)
- Health care workers, researchers, etc.
Training shall be provided as follows:

– At the time of initial assignment to tasks where occupational exposure may take place;
– Annual training for all employees shall be provided within one year of their previous training.
– Employers shall provide additional training when changes such as modification of tasks or procedures or institution of new tasks or procedures affect the employee's occupational exposure. The additional training may be limited to addressing the new exposures created.
On-the-job training (OJT) is recommended.

Based upon a risk assessment of the specific materials you will handle and procedures you will perform in your lab related duties.

The requirement to perform a risk assessment and OJT rests with the Principal Investigator/lab manager/supervisor.
Universal (Standard) Precautions

“Precautions to protect against exposure must be taken when there is any potential for exposure to bodily fluids. It is assumed that all bodily fluids have the potential to transmit disease”

The Universal Precaution Rule:
Treat all human blood, bodily fluids and other potentially infectious materials as if they are infectious.
Bloodborne pathogens (BBP) are specific microorganisms transmitted in human blood or bodily fluids, which can cause disease in people.

There are three major BBPs:
- Hepatitis B (HBV)
- Hepatitis C (HCV)
- Human Immunodeficiency Virus (HIV)
  - HIV is a human retrovirus that causes AIDS (Acquired Immune Deficiency Syndrome).
  - There is no vaccine to prevent HIV infection.
Hepatitis B Virus

- Very infectious
  - Age dependent chronicity: approx 90% of infants infected at birth develop chronic infections; approx 90% of adults develop an acute infection but resolve infection and become life-long immune

- Causes inflammation of the liver that might lead to liver failure

- Completely preventable by a vaccine

- Survives in dried blood > 1 week

- Can be transmitted via blood exposures and sex
HBV Infections are Preventable

- HBV vaccine series – necessary if working with human tissue
  - Series of three shots (0, 1 mo, 6 mo)
  - Approx ≥ 95% seroconvert
    ▪ If did not convert after immunization, repeat series
  - Titers are recommended after series is complete to determine immunity
  - If unable to convert
    ▪ Assigned different duties?
    ▪ Hepatitis B Immune Globulin (HBIG) post exposure
  - Post-Exposure Prophylaxis is available
HBV Symptoms

- 1 to 6 month incubation
- 30% asymptomatic
- Symptoms may look like:
  - jaundice, dark colored urine
  - fatigue
  - abdominal pain
  - anorexia
  - nausea/vomiting
  - severe, life-threatening liver failure
- If symptoms resolved, life-long immunity
Hepatitis C Virus

- HCV – infection of the liver; major cause of liver cancers
- also causes inflammation of the liver
- no vaccine to prevent infection
- no post-exposure treatment
- acute symptoms similar to HBV infection
- most infected individuals have NO symptoms
- survival outside the host up to 4d, possibly more
- most infected individuals become chronically infected
Human Immunodeficiency Virus (HIV)
- HIV is a human retrovirus that causes AIDS (Acquired Immune Deficiency Syndrome)
- There is no vaccine or cure
- Most occupational infections result from needlestick injuries
- HIV can be isolated from almost all body tissues
  - Highest titer in blood, semen, vaginal secretions, breast milk
- Does not survive long outside the body
- Post-exposure prophylaxis: drug therapy ASAP to prevent likelihood of infection
Besides blood-borne pathogens, there are other potentially infectious materials (OPIM) found in the academic and research laboratory settings:

- Bacteria, Fungi, Rickettsia, Parasites, Prions
- Other Viruses, including oncogenic (cancer causing) viruses, Epstein Barr Virus (Mononucleosis)
- Recombinant DNA from infectious agents
- Cell or tissue cultures of human origin
- Human bodily fluids, tissue and organs
- Hepatitis D
Other Potentially Infectious Materials

- Potentially infectious bodily fluids include:
  - Cerebral Spinal Fluid
  - Synovial Fluid
  - Pericardial Fluid
  - Peritoneal Fluid
  - Pleural Fluid
  - Amniotic Fluid
  - Vaginal Secretions
  - Semen
  - Saliva in Dental Procedures
  - Any Body Fluid with Blood
Risk of Contracting BBPs

- HIV: from a contaminated needle = 0.3%
- HBV: from a contaminated needle = 30%, on average, depending upon state of infection of source patient
- HCV: from a contaminated needle = 1-2%
Needlesticks or contaminated sharps injuries
- Most common means of exposure
- 600,000 to 800,000 exposures occur in the U.S. annually

Can be transmitted through mucous membranes of the
- Eyes, Nose, Mouth

Additional routes of transmission include:
- Inhalation/aerosol exposures
- Ingestion, especially of contaminated food or drink
- Vector-borne transmission, by mosquito or other biting insects

Unbroken skin is a good barrier. However, infectious materials can enter your system through skin openings such as:
- Open sores, Cuts, Abrasions, Acne, Sunburn, Blisters
Exposure Controls consist of those policies and practices that prevent occupational exposures to infectious materials, including:

- Administrative Controls
  - Exposure control plan (ECP)
  - Individual Laboratory Risk assessments
- Universal (Standard) Precautions
- Personal Protective Equipment (PPE)
- Engineering Controls (HVAC, bio-safety cabinets, self-sheathing needles, safer medical devices, and needleless systems)
Exposure control plan (ECP)

- The OSHA BBP Standard requires employers to develop written documents to explain how they will implement the standard, provide training to employees, and to eliminate or minimize occupational exposure to blood-borne pathogens to protect the health and safety of their workers.

- The ECP must be tailored to the specific requirements of the institution; plans must be accessible to all employees, either on-line or in an area where they are available for review on all shifts.
Exposure Control Plan (ECP)

- Determination of employee exposure and
- Implementation of various methods of exposure control, including:
  - Universal (Standard) precautions
  - Engineering and work practice controls
  - Personal protective equipment
  - Waste segregation, treatment and disposal, including sharps
  - Hepatitis B vaccination
  - Post-exposure evaluation and follow-up
  - Communication of hazards to employees and training
  - Recordkeeping: training records, employee health records, exposure/incident records
  - Procedures for evaluating circumstances surrounding exposure incidents
Administrative Controls

- Administrative controls, including risk assessments, are steps taken by supervisors and individual employees, including:
  - Conducting a risk assessment of the materials in use
  - Adhering to vaccination schedules and training schedules
  - Training personnel to handle specific infectious materials and their hazards
  - Promoting individual awareness of personal protective equipment use and engineering controls (sample containers) to minimize or eliminate potential exposure
Sharps Precautions

- You must exercise care when using needles, scalpels, glass pipettes and other sharp instruments or devices. Follow these rules of thumb when handling sharps:
  - Do not recap, bend, break, or otherwise manipulate used needles by hand
  - Do not remove used needles from disposable syringes
  - Place used sharps in labeled or color-coded puncture-resistant, leak-proof, closable, sharps containers for disposal
  - Do not overfill sharps containers
  - Consider the use of alternative, non-sharps equipment whenever possible
Personal Protective Equipment (PPE)

- Whenever you may be exposed to infectious materials you must wear the appropriate personal protective equipment. PPE places a barrier between you and potentially infectious material.

- Here are some basic rules to follow:
  - PPE should be readily accessible
  - Always wear PPE in exposure situations
  - Wear a lab coat, gloves and eye protection (safety glasses, goggles, face shield) whenever splashing is imminent
  - Remove and replace PPE that is torn or punctured, or that loses its ability to function as a barrier to potentially infectious materials
  - Remove PPE before leaving the work area
  - Dispose of contaminated PPE properly in biohazard waste container – must have a lid, preferably a step-activated trash can lid
Hand Hygiene

- Most common mode of transmission of pathogens is via hands!
- Often infections acquired in healthcare and research settings are due to not washing your hands
- Employees must wash their hands with soap and water:
  - immediately, or as soon as feasible, after removal of gloves or other PPE
  - whenever they leave the work area, go on break, or before eating
  - following contact with blood or other potentially infectious materials
Engineering controls

- Containment is the concept of managing materials to reduce or eliminate potential exposures to personnel, the general public and the outside environment
  - Primary containment consists of good microbiological techniques, appropriate vaccinations or immunizations, appropriate PPE and safety equipment

Support Resources

An Exposure Control Plan Template and OSHA Model Plans & Programs for BBP & HAZCOM can be found at: http://www.colorado.edu/ehs/training/biosafety.html#b
Spills

- Always wear PPE when cleaning spills
- Always disinfect spills first – then use absorbent material to wipe up
  - must use disinfectant and contact time that is specific to the pathogen
- Always be aware of sharps
- Always dispose of waste properly
  - refer to the EH&S Biological Laboratory Waste Management - Disposal Policy & Procedure
If you are exposed to blood or other potentially infectious or hazardous materials, follow these steps:

- If you experience a needlestick or sharps injury, immediately wash needlesticks or cuts with soap and water
- Splashes to the nose, mouth, or skin should be flushed with water
- Irrigate eyes using eyewash, for 15 minutes
- Report the incident to your supervisor. **Colorado State law requires you to notify your supervisor in writing within 4 days of an accident, injury or exposure**
- **Immediately seek medical treatment**
Where Should I Go for Medical Treatment?

- Incidents involving worker exposure to infectious material are covered under Worker's Compensation for initial medical care at:
  - Arbor Occupational Medicine (303) 443-0496 (4790 Table Mesa Drive, Suite 200, Boulder), or
  - WORKWELL Occupational Medicine (303) 702-1612 (Burlington Medical Center, 205 S. Main St., Suite C, Longmont).

- For after-hour treatment, go to Boulder Community Hospital.

- Workers have the right to confidential medical evaluation, follow-up, and counseling.
What Must I Do After the Accident?

- “Accidents” happen even when all precautions are taken
- The IBC and EH&S (492-6025) must be notified immediately of the incident, even if there is a “perceived” exposure
- Call 911 or 492-6666 if it is after University hours
- A Risk Management “Employee Injury Report Form” must be completed for all injuries, [https://urm.cu.edu/docs/forms/incident_report_form.asp](https://urm.cu.edu/docs/forms/incident_report_form.asp)
- And a “Needle Stick or Bodily Fluid Exposure Report Form” for these types of injuries/exposures, [https://urm.cu.edu/docs/forms/needlestick_incident_report_form.asp](https://urm.cu.edu/docs/forms/needlestick_incident_report_form.asp)
Managing Biohazardous Waste

- All waste generated from working with BBP or OPIM must be processed through an approved biohazardous waste vendor (e.g. Stericycle) or through the EH&S Biological Laboratory Waste Management - Disposal Policy & Procedure
  

- Solid waste must be placed in an autoclave bag that is in a secured, labeled, and covered biowaste container – preferably with a step-activated trash can lid

- Both solid and liquid biohazardous waste must be autoclaved or use chemical disinfection before disposal

- Wear proper PPE whenever handing or processing biohazardous waste
Questions?

Contact Information

Environmental Health and Safety
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THANK YOU

You are now ready to take the required BBP Quiz