BLOODBORNE PATHOGENS & SAFE SHARPS USE
BIOSAFETY COMPLIANCE PROGRAM

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ANIMAL WELFARE AND BIOSAFETY PROGRAMS
Office of Research Compliance
https://www.hawaii.edu/researchcompliance/biological-safety
Biosafety – Under Vice President for Research and Innovation

From distant galaxies to the ocean depths...and everywhere in between™

for Researchers and Staff

for Business and Industry
Online Help for IACUC Forms

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Online help and links have been added to the current IACUC protocol request form and will be updated as needed. Any question that has help available will have a question mark (?) button.

Eagle-i Discovery Tool

Eagle-i is a research discovery tool for finding biomedical research resources across participating institutions. You can access it at https://www.eagle-i.net/, or enter search criteria in the search box below.
On the training calendar below, click on the title of a training date for more information.

**Biosafety Training**

**Today**  

**Tuesday, September 5**

1:00pm  
*Kaka‘ako - ORC 102 - Initial Bloodborne Pathogens Training*

**Thursday, September 7**

10:00am  
*Kaka‘ako - ORC 101 - Initial General Biosafety Training*

**Tuesday, September 19**

1:00pm  
**ORC 101 - Initial General Biosafety Training**

**When**
1.0.0pm, September 19, 1pm – 3pm

**Where**
1955 East West Road, Honolulu, HI 96822 (Ag Sci 219) *(map)*

**Description**
General training on UH policies regarding biological safety, principles of safe lab practices, appropriate handling, storage, transport, decontamination and disposal, and of biological substances

more details  
*copy to my calendar*

**Friday, September 22**

4:00pm  
**ORC 102 - Initial Bloodborne Pathogens Training**

**Monday, October 16**

3:00pm  
**ORC 102 - Initial Bloodborne Pathogens Training**

**Wednesday, October 18**

10:00am  
**ORC 101 - Initial General Biosafety Training**

Showing events until 2/28. *(look for more)*
LEARNING OBJECTIVES

After completing this presentation, you should be able to:

• Give examples of workers who are at risk of exposure to bloodborne pathogens.
• List several ways exposure to bloodborne pathogens can occur.
• Describe key aspects of a Bloodborne Pathogens Exposure Control Plan
• Explain how PPE, work practice and engineering controls along with good housekeeping can help protect against exposure to bloodborne pathogens
• Describe the procedures to follow after an exposure
• Understand the use of labels and signs to communicate hazards
**OSHA Bloodborne Pathogens Standard**


- **Purpose:** To limit the occupational exposure to blood and other potentially infectious materials (OPIMs) because the exposure could result in the transmission of a bloodborne pathogen leading to disease or death.
  - Published December 1991.
  - Became effective March 1992.

HiOSH incorporated the OSHA BBP standard in 2000 under HAR Title 12-205.1 *Bloodborne Pathogens*
Bloodborne Pathogens Standards Overview

- Exposure Control Plan
- Engineering Controls
- Work Practice Controls
- HIV and HBV and HCV viruses
- Hepatitis B Vaccination, Post-Exposure follow-up procedures
- Documentation (Sharps Injury Log, Training Records)
- Exposure and Incident response reporting
- Signage
Who’s At Risk?

- Laboratory workers
- Physicians, nurses, emergency room personnel
- Dentists, dental workers
- Blood bank technicians
- Medical Examiners
- Firefighters, Police
- First Responders
- Medical Waste treatment handlers
- Home healthcare providers
Exposure to Bloodborne Pathogens

Routes of exposure in the Lab setting

- **Cuts**
  - from contaminated sharps; blades, scalpel,
  - broken glass etc..
- **Direct Contact** with mucous membranes and skin
  - splashes, direct contact from poor lab practices
- **Contact** with broken skin
  - Pre-existing wound, bug bite etc.
- **Inhalation**
  - aerosol generated from centrifugation, mixing, spills, splashes, manipulation with an inoculation loop
- **Ingestion**
  - splashes, touching mouth, eating, mouth pipetting

The *Most common* route of exposure to BBP’s: “**NEEDLESTICK**”
Complying with the Bloodborne Pathogens Standard

Methods used to reduce the likelihood of exposure:

• Universal Precautions
• Engineering and Work Practice Controls
• Personal Protective Equipment
• Housekeeping
Universal Precautions

A set of precautions designed to prevent transmission of HIV, HBV, and other bloodborne pathogens whenever there is a potential for contact with blood or other potentially infectious materials (OPIM): (CDC)

- **Treat ALL human blood and certain body fluids as if they are infectious**
- **Use protective barriers**: gloves, gowns, masks and other protective wear to reduce the risk of exposure to the workers skin, mucous membranes.
- **Take safety precautions**: safety needles, not using needles, or scalpels or other sharp devices
OPIM: **Other Potentially Infectious Material:**

- Human Blood, semen, synovial fluid, amniotic fluid, CSF, pleural fluid, peritoneal fluid, pericardial fluid, vaginal secretions
- Body fluid visibly contaminated with blood
- Unfixed organ or tissue from human
- Cells, tissues or organs known to contain HIV, HBV
- Cell lines even if *certified free* of bloodborne pathogens
- Vertebrate animals, tissues and cell lines
- Fecal matter should be considered. Human feces are known to be able to transmit Hepatitis A, Hepatitis E, Shigella, pathogenic E. coli
## Examples of BBP’s

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Route of Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herpes Simiae (B Virus)</td>
<td>Percutaneous, mucosal</td>
</tr>
<tr>
<td>Rabies</td>
<td>Percutaneous, mucosal</td>
</tr>
<tr>
<td>Simian Immunodeficiency Virus</td>
<td>Percutaneous, mucosal</td>
</tr>
<tr>
<td>Hepatitis A, E</td>
<td>Fecal– oral</td>
</tr>
<tr>
<td>Hepatitis B, C, D</td>
<td>Percutaneous, mucosal</td>
</tr>
<tr>
<td>HIV</td>
<td>Percutaneous</td>
</tr>
<tr>
<td>Malaria</td>
<td>Percutaneous</td>
</tr>
<tr>
<td>Dengue</td>
<td>Percutaneous</td>
</tr>
</tbody>
</table>
Hepatitis B Virus

Illness caused by the *Hepatitis B virus* (HBV) a DNA virus which infects the liver.

- **Transmission**: percutaneous, blood, tatooing, blood-to-blood contact
- **Incubation Period**: 45-160 Days (can survive up to 7 days on bench)
- **Signs and Symptoms**: fever, nausea, fatigue, muscle, joint pain, abdominal pain, diarrhea or vomiting, headache, dark urine, light colored stools, jaundice
- **Chronic Carriers**
- **Treatment**: Alfa Interferon, Lamivudine, Adefovir dipivoxil, Baraclude
- **Prevention**: Hepatitis B Vaccination
Hepatitis C Virus

Illness caused by the *Hepatitis C virus* (HCV) a RNA virus which infects the liver.

- **Transmission**: similar to HBV, percutaneous, blood, tattooing, blood-to-blood contact, transfusions
- **Incubation Period**: 14-180 Days (can survive from 16 hours up to 4 days on bench)
- **Signs and Symptoms**: insidious, anorexia, nausea and vomiting, vague abdominal discomfort, less jaundice than HBV – 90% asymptomatic or mild acute infections
- **Chronic Infection**: 50-80% develop chronic infections and about half of those develop liver disease
- **Treatment**: slow-release interferon's, Ribavirin
- **Prevention**: No vaccine currently available
Viral Hepatitis in Hawaii

• One of the highest rates of liver cancer in the U.S.
• One of the highest rates of chronic Hepatitis B/C
• 15,000 cases of Hepatitis C reported (DOH 2001)
• 23,000 living with Hepatitis C
• 1-3% of Hawaii residents living with chronic Hepatitis B (13,000-14,000)
## Risk of Infection following a needle stick injury from an **known** infected source

<table>
<thead>
<tr>
<th>PATHOGEN</th>
<th>RISK (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBV</td>
<td>30%</td>
</tr>
<tr>
<td>HCV</td>
<td>3%</td>
</tr>
<tr>
<td>HIV</td>
<td>0.3%</td>
</tr>
</tbody>
</table>
Hepatitis B Vaccination

Vaccines available are recombinant synthetic forms of the Hepatitis B surface Antigen (HBsAg); (Recombivax HB or Engerix B)

OSHA BBP Standard requires;
• Vaccine must be available free of charge at a reasonable time and place to all employees at risk of exposure within 10 working days of initial assignment unless
  – Employee has verified existing vaccination
  – Antibody test indicates immunity
• Vaccination must be performed by licensed healthcare professional
• Must be provided even if employee initially declines
• Employees declining must sign declination form
• Booster doses must be provided
Engineering Controls

Engineering Controls help reduce employee risk to exposure by removing the hazard or isolating the worker.

- Sturdy Sharps Disposal Containers
- Self-sheathing Needles
- Safer medical devices; Sharps with engineered sharps injury protections, needle less systems
Work Practice Controls

Work Practice Controls Reduce the likelihood of exposure by altering **HOW** a procedure/task is performed

- Pre-planning work, review procedure, equipment and materials required prior to beginning work
- Designated Work areas for pathogens use
- Limiting amount of pathogens used or removed from storage
- Using secondary container during transport
- Familiarity with location and use of
  - Biological spill kit
  - Eyewash, safety shower, fire alarm, and other emergency equipment
Housekeeping

• Written Daily Clean up Procedures for decontamination of work surfaces
  – Before Experiments/Procedures
  – After Experiments/Procedures
  – After a spill/contamination
• Keep Emergency Exits Clear of clutter
• Keep Equipment properly maintained
• Keep Hazardous material properly stored
Exposure Control Plan

Required under the BBP Standard to have a **WRITTEN PLAN** identifying procedures where risks to BBP may occur and implementation of a set of procedures that reduce the risk.

- Should outline the major methods of control:
  - Use of **Universal Precautions**
  - Engineering and Work Practice controls
  - PPE: right kind for the potential risks
  - Housekeeping – schedules and plans
Exposure Control Plan

Written Plan must be **reviewed annually** and contain provisions to:

- Provide training to all staff
- Offer Hepatitis B Vaccination to all staff
- Ensure Incident Response Procedures are understood and followed
- Ensure Post Exposure follow up
- Recordkeeping (Sharps Injury Log, Training)
- Biohazard Labeling
- Implement new safe sharps devices when available
Safer Needle Devices

Requirement under the *Needlestick Safety Act 2001* to implement safer sharps devices when there is a potential for exposure to BBP or OPIM’s

Self re-sheathing scalpel
Examples of Safer Needle Devices

OSHA
Recordkeeping: Sharps Injury Log

- Mandatory Documentation (29 CFR 1904)
- Must be confidential
- Maintained independently from OSHA 300
- Log must contain for Each incident:
  - Type and brand of device that was involved
  - The Department or area the incident occurred in
  - A description of the incident

![Sharps Injury Log Table](image)
What Are Sharps?

ANY OBJECT that can puncture or cut the skin and cause injury

- Microscope Slides, Cover Slips
- Petri Dish
- Pipet tips
- Needles
Sharps Injury Prevention

Methods to reduce risk:

• Use non-needle sharps or a needle with a built in safety feature or mechanism that effectively reduces the risk of an exposure incident. (SESIP - Sharps and Engineered Sharps Injury Protections)
• Animal Restraints
• Immediate Collection and Disposal of Sharps
• Minimize Use of Sharps
• Avoidance of Glass products
Sharps Disposal

• Contaminated
  – Biological - Separate properly labeled containers
  – Radioactive - Contact Radiation Safety
  – Chemical - Contact Chemical Safety

• Non Contaminated
  – Sturdy cardboard boxes with plastic liners designed to handle sharps.
  – Label
Do you know what to do in an Emergency?

Iniki Kaui 1992

UH IBR Manoa Flood October 2004

CDC
In Case of Exposure

• Report immediately to PI/supervisor (within 24hrs)

• Be prepared for the emergency before it happens
  - Familiar with exposure specific plans
  - Conduct drills
  - Know reporting procedures - who?
  - BioLab Incident Report Form

• Go to the your medical provider as needed
Emergency Response

All Lab personnel should know what to do in an emergency

Be able to identify the locations of the:

- Eye Wash Station
- Designated Hand Wash Station
- Phone
- Spill Kit

Find the:

- Emergency Contact Information
- Procedures on reporting an accident
Incident Response

Provide care to injured person first. Call Campus Security depending on severity of injury let them call 911, physician if necessary.

**Percutaneous Injury.** Wash affected area with disinfectant/soap and warm water. Apply dressing and seek medical attention. *Notify your PI, Biosafety Compliance Program.*

**Splashes to Face.** Flush affected area in eyewash for 15 minutes. *Notify your PI, Biosafety Compliance Program.*

**Aerosol Exposure.** Hold your breath, leave room where aerosol was generated immediately. Carefully remove your PPE (turn inside out). Wash hands with warm water and soap. Post a sign “Do Not Enter; Spill” on door. Lab should be evacuated for a minimum of 30 minutes.

- Notify PI, Research Compliance Officer/Biosafety.
- Until PI/ Safety Officers gives permission, no one should enter lab.
Exposure, Incidents Reporting

- Notify Principal Investigator, lab manager or supervisor to initiate accident or exposure incident report WITHIN 24 hours of accident
- *BioLab Incident Report Form* must be filed within 24 hours
- PI/supervisor might need to report the accident to IBC (rDNA & Infectious agents), IACUC (animals), IRB (committee on human subjects), Human Resources, Risk Management…..workmen's comp.?

In addition to PI notification the Research Compliance Office should be notified within 24 hours for:
- Large spills (> 100-200 ml or when unable to contain)
- ALL BSL-3 spills
- ALL Select Agent spills
- rDNA that results in an environmental exposure or injury
- Incidents resulting in personal injury
Biological Spill Response
• **Cover spill** with absorbent material.
• **Saturate** with appropriate disinfectant. Starting from the outside and working toward the center of spill.
• Allow disinfectant to soak (**minimum 10 minutes**).
Bloodborne Pathogens Module
Biosafety Compliance Program

• With gloved hands; pick up all wastes and place slowly and carefully into biowaste container.
• Cover area again with disinfectant then clean up with absorbent material.
• Remove your gloves and dispose in the biowaste container.
• Wash hands with warm water and soap.
• Put on new gloves and if necessary new lab coat.
Basic Elements of a Biological Spill Kit

- Spill Cleanup Protocol/instructions
- Absorbent material; paper towels or pads
- Disinfectant - Bleach or other appropriate disinfectant
- A bottle to make fresh diluted disinfectant
- Forceps, dust pan, plastic scoop, or other device for handling sharps or broken glass
- Autoclavable biohazard bags to collect contaminated items
- Disposable nitrile gloves
- Durable Utility Gloves
- Appropriate PPE (lab coat or jumpsuit, safety goggles, shoe covers, face mask, N95**).

**Lab personnel requiring N95 respirators must have a medical evaluation from a registered healthcare professional prior to being fit tested in order to wear a respirator.**
## Biological Spill Procedure - Example

<table>
<thead>
<tr>
<th><strong>Outside of Biosafety Cabinet (BSC)</strong></th>
<th><strong>BSL-1 Spills, or Small Scale (&lt;200 mL) BSL-2 Spills</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notify</strong></td>
<td>Notify others in the immediate area that a spill has occurred.</td>
</tr>
<tr>
<td><strong>Treat Human Injury</strong></td>
<td>Tend to any injured personnel. Call 911 if necessary</td>
</tr>
<tr>
<td><strong>Treat personal contamination</strong></td>
<td>Place contaminated clothing in biohazardous bag. Wash skin thoroughly with soap and water.</td>
</tr>
<tr>
<td><strong>Wear PPE</strong></td>
<td>Don lab coat, gloves, face protection.</td>
</tr>
<tr>
<td><strong>Decontaminate spill</strong></td>
<td>Cover spill absorbent material. Saturate the paper towel with appropriate disinfectant, starting with the edges of the spill and working towards the center. Allow contact time of at least 30 minutes.</td>
</tr>
<tr>
<td><strong>Clean up</strong></td>
<td>After the 30 minute contact time, with gloved hands pick up absorbent material and place in biohazardous bag. Use appropriate equipment (scoop, dustpan, or forceps) to pick up any broken glass. Place in sharps container.</td>
</tr>
<tr>
<td><strong>Disinfect surrounding area</strong></td>
<td>Carefully spray area and surrounding areas with appropriate disinfectant wipe up with absorbent material. Place all waste material in autoclave bag</td>
</tr>
<tr>
<td><strong>Decontaminate material and PPE</strong></td>
<td>Autoclave contaminated material and PPE. Decontaminate any reusable items with disinfectant.</td>
</tr>
<tr>
<td></td>
<td>Wash hands and exposed skin areas with soap and warm water</td>
</tr>
<tr>
<td><strong>Document and reporting</strong></td>
<td>Notify PI or supervisor of large spills. If exposure occurred, submit exposure incident report to Supervisor and Biosafety Compliance Program</td>
</tr>
</tbody>
</table>
Biohazard Warning Labels

Warning Labels incorporating the “Universal Biohazard Symbol” must be on:

- Containers containing biohazardous (regulated) wastes
- Containers used to store, transport blood or other potentially infectious materials
- Refrigerators and freezers containing blood or other potentially infectious materials
Biohazard Warning Labels

Equipment
29 CFR 1910.1030 requires:
- Initial must be in classroom
- Annual Refresher:
  - You will be added to the Laulima Bloodborne_Lab course for doing you refreshers
  - You will be sent a reminder the month before you training expires
Each Laboratory must have a **WRITTEN Exposure Control Plan** specific to the potential risks of exposure in the lab if they are working with BBP or OPIMs.

**Work Practices, Engineering Controls and Housekeeping.**

**PPE**: Safety equipment must be available to protect employees and be used (BSC, autoclaves, safe sharps, sharps containers etc..).

**Sharps**: Proper Use, Handling and Disposal of ALL sharps

**Biohazard labels** must be placed on all regulated wastes, storage containers, containers used to transport or ship bloodborne pathogens or other potential biohazardous materials.

All human blood, tissue and other body fluids should be handled using **Universal Precautions!**
- Treat all samples as if they are infectious

**Annual refresher training** required.
QUESTIONS?

Questions are guaranteed in life; Answers aren’t!