

## Introduction

Bloodborne Pathogens (BBP) are infectious microorganisms present in human blood that can cause disease to humans. These pathogens include, but are not limited to, Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV). Other common BBP are Malaria, Brucellosis, Syphilis. As a part of Department of Labor, the mission of Occupational Health and Safety Administration (OSHA), is to prevent injuries, promote worker safety, and protect the health of employees in the workplace. OSHA'S Bloodborne Pathogen Standard ([29 CFR 1910.1030](#)) is a federal regulation, aimed at protecting employees who work in occupations where they are at risk of exposure to BBP.

BBP pathogen	Risk of Injury (%)
HIV	0.3%
HBV	6-30%
HCV	2-4%

Courtesy: [CDC](#)

### BBP risks in the workplace:

OSHA estimates that 5.6 million workers in the health care industry and related occupations are at risk of exposure to bloodborne pathogens ([OSHA](#)). Needlestick injuries contribute to the majority of HBV, HCV and HIV occupational infections.



**The content of this course is written specifically to satisfy the OSHA requirements of UAB employees who are at risk of exposure to blood or OPIM. These UAB employees must receive this training overview, as well as any unit-specific exposure control and incident response plans that may differ or expand upon the information outlined in this course material.** If you have any questions about Bloodborne Pathogens, UAB policies, or procedures related to biosafety, contact UAB Biosafety at [Biosafety@uab.edu](mailto:Biosafety@uab.edu)

After his course, participants will be able to:

1. Identify potential sources and risks of exposure to Bloodborne Pathogens at their workplace.
2. Implement containment controls to mitigate the exposure risk to Bloodborne Pathogens.
3. Apply the precautions outlined in the OSHA Bloodborne Pathogens Standard.
4. Correctly respond to exposures, including acute response procedures, treatment providers, and reporting requirements.

## The Bloodborne Pathogens Standard

The [OSHA Bloodborne Pathogens Standard](#) was established to minimize occupational exposure to the HIV, HBV, HCV and other pathogenic microorganisms potentially present in human blood. For more information, see [The UAB Biosafety Manual](#) or email [biosafety@uab.edu](mailto:biosafety@uab.edu).

### Regulatory Definitions

- **The Bloodborne Pathogen Standard** is a set of OSHA regulations associated with workers at risk for BBP exposures. This standard requires employers to establish an exposure control plan, implement the use of universal precautions, provide appropriate personal protective equipment (PPE), and train employees. Employers are also required to offer hepatitis B vaccinations, provide free post-exposure medical evaluations, and follow-up evaluations to all employees at risk for BBP exposures. Medical records associated with BBP requirements are maintained for at least 30 years.
- **Contamination** refers to anything soiled with human blood, OPIM, or Bloodborne Pathogens (BBPs).
- **Decontamination** refers to disinfection or neutralization of infectious organisms from an area, object, or person, reducing the risk of exposure to others.
- **Other Potentially Infectious Materials (OPIM)** are any other potentially contaminated fluids, including:
  - Cells, tissues, or organ cultures containing HIV, HBV, or HCV
  - Cultures producing HIV, HBV, or HCV
  - Humanized animal Specimens (such as blood and organs) with HIV, HBV, HCV, or other BBP
  - Untested Human Body Fluids potentially containing blood
  - Semen, Vaginal Secretions, Cerebrospinal Fluid, Synovial Fluid, Pleural Fluid, Pericardial Fluid, Peritoneal Fluid, and Amniotic Fluid
- **Primary Containment** refers to safety equipment or engineering controls [i.e., Biosafety Cabinets (BSC), PPE, Sharps Containers, and Centrifuge Safety Cups] acting as a primary barrier limiting the infectivity of a pathogen for specific hosts, its dissemination, and survival in the environment.
- **Universal Precautions** is the OSHA concept that all human blood, and certain body fluids (OPIM), are treated as if known to be infectious for bloodborne pathogens, regardless of the perceived health

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status of the source individual.

- **Standard Precautions** are a set of infection control practices applied to all patient care, regardless of the suspected or confirmed infectious status of the patient. Standard precautions expand on universal precautions to recognize additional mechanisms of infection, such as transmission through contact, droplet, or airborne routes.

## Four Key Elements

As per OSHA's Bloodborne pathogen standard, training is comprised of four key elements to eliminate or minimize occupational exposures to bloodborne pathogens.

### *Element #1: Exposure Control Plan (ECP)*

An ECP is a site-specific risk assessment conducted by the Principal Investigator (PI), supervisor, or other designee, and is designed to identify and reduce the risk of BBP exposures. It must be reviewed and updated annually, or earlier, if significant changes in personnel or procedures occur.

The objectives of an ECP are to:

1. Identify the materials or processes in the workplace that pose an increased risk for exposures to BBP (i.e., human blood or OPIM).
2. Determine job classifications or duties that place employees at risk for exposure to BBP.
3. Define the controls required to reduce those risks.

Each laboratory or distinct operational unit containing unfixed material of human origin must include an ECP in their Safety Manual and make it available to all employees determined to be at risk for occupational exposure to Human BBPs.

### *Element #2: Determination of Employee Exposure*

An evaluation must be made to determine if an employee's duties put them at risk for a BBP exposure. After identifying an employee's exposure risk, exposure controls mitigating those risks should be implemented. Controls used to reduce infection risk include Administrative and Workplace Practices, Engineering Controls, and Personal Protective Equipment (PPE).

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Biosafety Officials can help with risk assessments, but the PI, supervisor or designee is **ultimately responsible** for identifying the materials, procedures, and job duties posing a BBP exposure risk to personnel.

## 1. Job Classifications

Campus employees who work in the following job classifications are likely to be at risk for occupational exposure to Bloodborne Pathogens. **This list is by no means exhaustive.**

- Researchers working with unfixed human materials or BBP cultures
- Clinical research staff handling human blood samples
- Environmental Health and Safety Staff
- Environmental Services Personnel
- Campus Police
- Health Profession Instructors and assistants
- Plumbers and mechanics supporting research spaces
- Animal care staff
- Administrators who routinely enter at-risk laboratories

## 2. Routes of Exposure

Infectious organisms gain entry into the body (exposure) through 4 main mechanisms:

- Absorption (through direct contact with mucous membranes)
- Percutaneous injuries with contaminated objects or exposure of open wounds
- Ingestion (eating/drinking)
- Inhalation (infectious aerosols)

Exposure in the workplace can occur as a result of:

- Needle sticks (most common form of exposure)
- Cuts from contaminated sharp (scalpel, broken glass)
- Contaminated blood contact with mucous membranes (eyes, nose, mouth) or open wounds

**Special Note:** Some vector-borne pathogens, such as West Nile Virus and Zika, are present in human blood during an infection, but they are primarily transmitted by mosquito bites in nature. However, procedures in the lab or clinical setting may pose additional exposure risks.



For example, percutaneous injuries with needles or sharps contaminated with vector-borne viruses could lead to an infection. Similarly, vector-borne viruses may be transmitted via respiration if infectious aerosols are created during sample processing in labs or clinics lacking proper primary containment devices or equipment (e.g., biosafety cabinets). For this reason, the agent, procedures, equipment, and personnel should all factor into a risk assessment and exposure control plans.

### *Element #3: Vaccinations and Post-exposure Follow-Up Procedures*

#### 1. HBV Vaccination Program

Supervisors must ensure all persons determined to be at risk for occupational exposure to human Bloodborne Pathogens are offered a Hepatitis B vaccination within ten days of starting work. **Enrollment in UAB Employee Health is key to ensuring individuals are offered HBV vaccinations. Records associated with OSHA requirements will be maintained for at least 30 years post-employment.**



Prompt medical attention may reduce the risk of serious health consequences after an exposure event.

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## 2. Exposure and Injury-Response Procedures

Have you been exposed to human blood or OPIM? You should:

- Stay calm and wash affected areas with soap and running water for 15 minutes
- If blood has splashed on your face, flush exposed mucous membranes (e.g., eyes, nose or mouth) with running water for 15 minutes
- Make sure all the affected area are cleaned and decontaminated
- Notify your Supervisor as soon as possible
- For Medical Care, Contact "[The Needlestick and Exposure Team](#)."

### **The Needlestick and Exposure Team:**

Location: [Spain Wallace SW123, 620 19th Street South, Birmingham, AL 35233](#)

Phone: **(205) 934-3411** (Call this number during regular business hours or after-hours/weekends).

For all BBP exposures (regardless of needle involvement), ask for the "**The Needlestick and Exposure Team.**"

Please see UAB Exposure Response Plans at the end of this course material. For more information refer [Appendix 4.3](#), UAB Exposure Response Flowchart in biosafety manual.

## 3. Reporting

### **a) UAB On-The-Job Injury (OJI) Program**

Employees are required to report any exposure or injury to their supervisor. UAB Human Resources [On-the-Job Injury and Illness \(OJI\) Program](#) houses instructions and forms necessary for any medical treatment with a chance of generating a bill. Reporting mechanisms are also housed on the UAB HR OJI site. Hospital employees report incidents via the Trend Tracker Form, whereas campus employees, students, and visitors submit an OJI Incident Report Form.

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UAB Employees and Students must submit reports within 48 hours to receive the following at no cost:

- A confidential medical exam
- Counseling
- Blood testing and analysis
- A confidential reply from the attending healthcare professional within 15 days

Despite the **48-hour reporting requirement**, you are strongly encouraged to report all exposures to **The Needlestick and Exposure Team** part of Employee Health **immediately**, since the timing of post-exposure treatment for HIV is a critical determinant of efficacy.

Non-UAB employees (volunteers, visiting scientists, scholars, observers, and minors) contact Employee Health for reporting. However, paperwork is forwarded to their respective healthcare provider for health care services.

## **b) Reporting to EH&S**

After acute response procedures and/or medical treatments are addressed, **BBP exposures related to research or classroom-activities** should be reported to the UAB Biosafety Officer (BSO) in Environmental Health & Safety (EH&S) at (205) 934-2487 or [biosafety@uab.edu](mailto:biosafety@uab.edu). The BSO will investigate the circumstances surrounding the exposure, and work with the supervisor, PI, or manager to develop additional prevention strategies. In some cases, additional reports with the UAB IBC and/or NIH Office of Sponsored Programs may be necessary.

## ***Element #4: Training and Record keeping***

### **1. Employee Training**

Employees whose job assignments place them at risk for BBP exposure must complete training within ten working days of initial appointment and annually thereafter. This Bloodborne Pathogens Training Course (BIO500) satisfies the initial training requirement and is updated each year to fulfill annual refresher training

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requirements. Supervisors are responsible for ensuring all laboratory personnel complete the Bloodborne Pathogens Training (BIO500) annually.

## 2. Record Keeping:

As per OSHA bloodborne pathogen standard, employers are required to maintain the following records of each employee:

- a) Medical records for the duration of employment plus 30 years
- b) Training records for 3 years from the date of training.
- c) Sharps injury records for 5 years from the time of reporting.

## Methods of Exposure Control

Universal precautions are methods of preventing exposure of employees to human blood, body fluids, or OPIM through the assumption that all of these materials pose an exposure risk to bloodborne pathogens. The following are four exposure control methods per the OSHA standard.

### I. *Administrative controls:*

Administrative controls are policies and procedures that emphasizes on proper guidance and safe work practices while working with bloodborne pathogens within laboratory. It is the responsibility of PI/supervisor to ensure that personnel working with BBP follows these policies and procedures. In addition, administrative controls include hazard communication and employee training.

#### 1. Hazard Communication

OSHA requires hazard communication to employees who may come in contact with Bloodborne Pathogens by the use of warning signs, labels, and annual employee training. Post Biohazard Warning Labels on or near the entrance to an area or lab where blood or OPIM is stored/used. Signage includes:



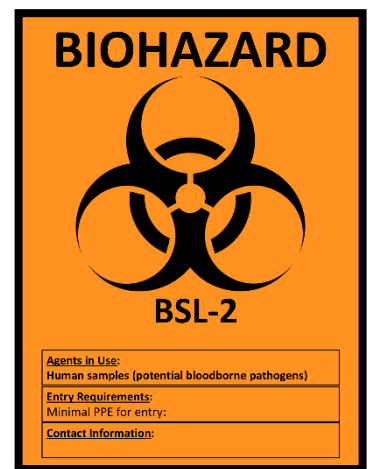
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- Universal Biohazard Symbol
- Special PPE requirements
- Name of biohazardous materials used
- Emergency contact information
- See OSHA Hazard Communication [Awareness](#) or [Advanced](#) Training Courses

## 2. Biohazard Labels

Biohazard Warning Labels must be:

- Red or fluorescent orange
- Imprinted with the Universal Biohazard Symbol
- Placed on all biohazard storage areas, medical waste containers, or equipment
- Applied to sample containers leaving the work area
- Posted on lab entrances
  - “Biosafety Level 2” (BSL2) containment designation
  - List names of infectious materials or agent(s) used in the lab (e.g., “Human tissues,” or “HBV”)
  - List requirements [i.e., PPE, training (if applicable)] for entry to the laboratory.



A biohazard warning label on tubes/boxes is not required for clinical specimens if the samples do not leave the laboratory and standard precautions have been followed.

## II. Workplace Controls

Workplace controls reduce the risk of exposure to bloodborne pathogen by practicing good laboratory procedures, following facility specific and lab specific SOP's, personal hygiene, and decontamination procedure in workplace.

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## 1. Good laboratory procedures include:

- Dispose sharps immediately in sharps container
- Use disposable gloves when working with blood or OPIM
- Cleaned and decontaminated with an appropriate disinfectant daily (after work has concluded) and immediately after contamination with blood or OPIM.
- Labeled with a Universal Biohazard Symbol if used for storage or processing of Human Blood or OPIM.
- **Never** recap or bend contaminated needles
- **Never** mouth pipette infectious materials
- **Never** store food or drink in a refrigerator or laboratory containing blood or OPIM.
- **Never** eat or drink in laboratory.
- **Never** handle contact lenses in prohibited work areas where work with BBP is carried.
- **Never** pick up broken glass wear with bare hands. Always use brush, dust pan, tongs or forceps.

## 2. Decontamination:

- Immediately clean and disinfect any visible surface contamination from blood or OPIM.
- Isolate areas of suspected contamination until decontamination is completed.
- Cover spills with absorbent material, pour the appropriate disinfectant on to saturate the area, and allow to sit for the designated contact time.
- After disinfecting and removing bulk material, clean and decontaminate the surface using the disinfectant.

## 3. Handwashing

Wash hands as soon as possible in the following situations:

- After the removal of gloves or other PPE
- After any contact with human blood or OPIM
- Before leaving the work area



If liquid soap and water are not immediately available for handwashing, use antiseptic paper towels or an antiseptic hand lotion until a handwashing sink can be located.

## III. Engineering Controls

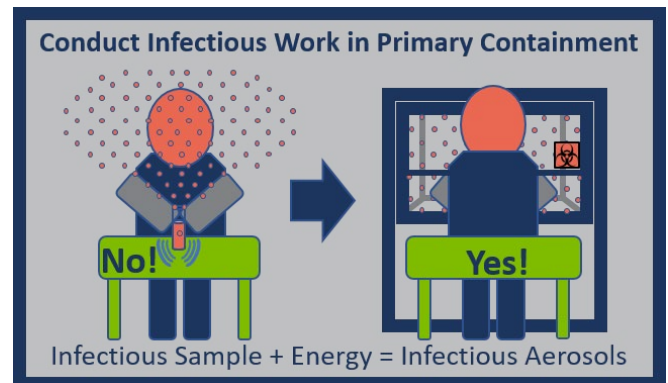
Engineering Controls eliminate or reduce exposure to BBP through the use or substitution of engineered safety machinery or equipment. You should always use these types of controls when working with any infectious materials.



Safety Centrifuge Cups and Biosafety Cabinets (BSC) are the most common engineering controls used for the manipulation of blood and body fluids. Airflow should be directional, from public corridors into in BSL2 laboratories (and hospital isolation suites), and the air should not recirculate to other areas of the building.

### 1. Control of Infectious Aerosols in the laboratory

Any procedure imparting energy to a sample can create aerosols. Activities creating aerosols include pipetting, vortexing, sonicating, and centrifuging samples. Proficiency, diligence, and the attitude of the individuals conducting the work are also factors that determine the likelihood and routes of exposures in the laboratory. Poor handwashing or glove-changing practices can quickly disseminate infectious agents to multiple surfaces. Similarly, sloppy or rushed sample processing techniques



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exacerbate infectious aerosol production.

Infectious aerosols are particularly relevant in the research setting since most Laboratory-Associated Infections (LAIs) occur by aerosol-based transmission. The small size of infectious particles and a lack of awareness about activities that can create aerosols often increases the likelihood of an LAI. Because of their smaller volume, aerosols have a reduced infectious load capacity per particle, but these particles are efficiently disseminated and pose an infection risk to anyone in the vicinity. In contrast, droplets are larger and quickly settle from the air, but they also may contain higher loads of infectious agents that can be easily transferred to other laboratory surfaces, increasing the risk of mucous membrane or ingestion-based exposures.

## 2. Sharps Containers

Always place sharps in the OSHA compliant sharps containers! These containers should be:

- Made from hard plastic
- Designed for the disposal of sharps
- Labeled with the Universal Biohazard Symbol
- Replaced when the contents reach the fill line on the container or when approximately  $\frac{3}{4}$  full



## 3. Mechanical Pipettes

You use mechanical pipettes for transferring human blood or bodily fluids. **Mouth pipetting is strictly prohibited!**



## 4. Needleless System

A needleless system is defined as a “non-needle sharp or a needle with a built-in safety feature or mechanism effectively reducing the risk of a percutaneous exposure incident.” Percutaneous means “administered, removed, or absorbed by way of the skin, as an injection, needle biopsy, or transdermal drug.”



## IV. Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is specialized clothing or equipment that protects personnel against exposure and acts as a barrier while handling potentially infectious blood or OPIM.

Examples: Gloves, Gowns, Lab Coats, Shoe Covers, Mask or Respirators, Face Shield, Googles etc.,

PPE is explicitly worn to prevent BBP exposure and contamination. Always wear PPE when working with human blood or OPIM. PPE must be replaced frequently, or immediately if it becomes contaminated or damaged in any way. Discard any potentially contaminated disposable PPE as medical waste.



The PI or Department is responsible for supplying, replacing, or disinfecting PPE, as needed.

- Minimal Required PPE:
  - Appropriate Gloves: The gloves should be material that does not absorb liquid (i.e., Nitrile Gloves).
    - **Never** reuse single-use gloves!
    - **Never** use ripped or compromised gloves
    - **Never** wear gloves outside of the laboratory
    - **Never** touch door handles with gloves
  - Always practice removing gloves inside out.
  - Always discard disposable PPE in appropriate waste container for disposal
  - Cleaned and buttoned lab coat (remains in the lab, except to autoclave or launder)
  - Eye protection may be required if there are splash hazards and the type of procedure performed.
    - Full-Face Shield (if there is a risk of a splash hazard)
    - Safety Glasses (if there is a risk of a physical hazard)

## Waste Disposal

The bloodborne pathogens standard defines regulated waste as liquid or semi-liquid blood or other potentially infectious material (OPIM); contaminated items that would release blood or OPIM in a liquid or semi-liquid state if compressed; items that are caked with dried blood or OPIM and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM.

Anything potentially contaminated with Bloodborne Pathogens must be disinfected or disposed of as medical waste. Examples include contaminated specimen containers, pipette tips, syringes, needles, and culture plates, etc. If you are responsible for generating, handling, or signing for the removal of medical waste at UAB, you are required to complete [Medical Waste Management for Labs \(BIO301L\)](#).



Any waste contaminated with [Category A](#) must be autoclaved before being offered as medical waste to Stericycle.

Cultures of bloodborne pathogens is considered “Category A” infectious substances affecting humans. Category A waste cannot be disposed of as “regulated medical waste” until chemically or physically inactivated. Autoclaves used for inactivating Category A material must be validated (after every 40 hrs. used for inactivation purposes) and validation records must be maintained. Inactivated Category A material can then be disposed of as medical waste through stericycle. For more information please refer to [Chapter 7.1: medical waste management for research laboratories](#) and [Appendix 3.2.b: Laboratory Autoclaves Safety and Sustainability Guidelines](#) in UAB biosafety manual. Contact [biosafety@uab.edu](mailto:biosafety@uab.edu) if you have any further questions.

### Transport:

Specimens of blood or OPIM should always be placed in leak proof container during handling, transport, or shipping. They should be properly labeled as a biohazard. A secondary container is required if the outside of the primary container is contaminated or if there is a chance of sample leak. Equipment to be service must be decontaminated with EPA registered disinfectant before transport.

Refer chapter 8. transport and shipping of biological materials in Biosafety manual for more information.

### Conclusion

This section concludes the course material for Bloodborne Pathogens (BIO500). You should now complete the Reality Check.

### EH&S Decision Tree

EH&S has developed many training courses available to all active UAB Employees and Students. These course topics include radiation safety, biosafety, chemical safety, building life safety, waste (hazardous, medical, or universal), PPE, and hazard communication. EH&S has a [decision tree](#) to assist you in choosing the right course to match the knowledge or skills you may need at work every day, as well. If you have any questions or comments, contact EH&S at (205) 934-2487.



While all courses are broadly available to the UAB community, the training may be intended for a particular audience at UAB. More detailed instruction or alternative reporting or response procedures may be appropriate, depending on your specific roles and responsibilities at UAB. This information should be included in your exposure control plan.

# Treatment for Exposures at UAB

**I was exposed to**  
human blood, fluid, or tissue,  
biologic agent, chemical agent,  
radiation lasers, animal

**CALL 911 IN AN EMERGENCY**  
unconscious, seizures, difficulty  
breathing, significant bleeding,  
chemical spills of 500mL or more,  
or other life threatening injuries

Activate agent-specific safety plan,  
initiate decontamination procedures

**205-934-3411**  
Ask for the "needlestick and  
exposure team"

**Campus Employees and Students**  
Complete OJI Incident Report  
Supervisor should also complete "Initial  
Medical Evaluation Form" and send it with  
the employee; paperwork  
**MUST BE COMPLETED** within 48 hours  
OJI form located at:  
[https://www.uab.edu/humanresources/  
home/relations/oji](https://www.uab.edu/humanresources/home/relations/oji)

**Hospital/Medicine Employees  
and Students**  
Complete Trend Tracker  
Trend Tracker information located at:  
[https://www.uab.edu/humanresources/  
home/relations/oji](https://www.uab.edu/humanresources/home/relations/oji)

**You will be triaged to care depending on exposure**



EMPLOYEE HEALTH

The University of Alabama at Birmingham





# On-the-job Injury at UAB

