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Campus Safety Health and
Environmental Management Association

Bloodborne Pathogens (BBP)

Contact Chapman University EH&S
with any questions on university-specific practices

SAFETY
FIRST

Objectives

- Applicable regulations
- Common BBP/OPIM
- Control Measures
- PPE
- Emergency Response

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Bloodborne Pathogen Standard

- The Occupational Health and Safety Administration (OSHA) developed the Bloodborne Pathogen (BBP) Standard to protect workers from human BBP exposures

- The BBP Standard covers all occupational exposures to blood or other potentially infectious materials and serves to provide methods to protect workers from exposure to BBPs

- Regulatory Citation: 29 CFR 1910.1030

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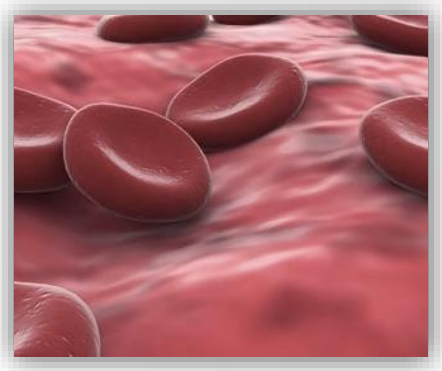
BBP Modes of Transmission



- Sexual contact
- Sharing needles
- Form mothers to babies at / before birth
- Contact with broken skin or parenteral
  - Rashes, cuts, punctures, abrasions, acne, sores, abrasions
- Contact with mucous membranes (splashes)
  - Eyes, nose, mouth

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Sources of Transmission

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Other Potential Infectious Materials (OPIM)

- Semen
- Vaginal secretions
- Cerebrospinal fluid
- Synovial fluid
- Pleural fluid
- Pericardial fluid
- Amniotic fluid
- Saliva in dental procedures
- Any other body fluid contaminated with blood

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Other Potential Infectious Materials (OPIM)

- Any unfixed cells, tissue or organs (other than skin) from a human or primate
- HIV-containing cell or tissue cultures, organ cultures
- HIV- or HBV-containing culture medium or solutions
- Blood, organs or other tissues from experimental animals infected with HIV or HBV

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Other Potential Infectious Materials (OPIM)

If visibly contaminated with blood, practice Universal Precautions. The following are not expected to be infectious unless visibly contaminated with blood:

- Urine
- Sweat
- Feces
- Sputum
- Vomit
- Tears
- Nasal Secretions

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OPIM and Universal Precautions

- OSHA Bloodborne Pathogen Standard requires Universal Precautions to be used when coming into contact with human blood, OPIM, and human body fluids that are visibly contaminated with blood.
  - Example: Vomit that has visible streaks of blood
- Keep in mind: It is always a good practice to wear gloves when handling substances of human origin.

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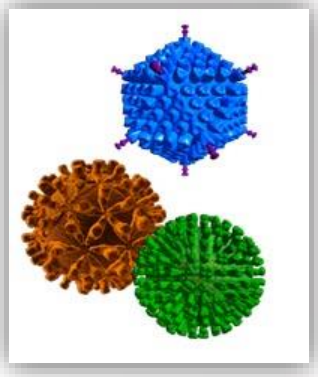
Definition – Bloodborne Pathogens

- Bloodborne Pathogens are pathogenic microorganisms that are present in human blood & can cause disease in humans
- These pathogens include, but are not limited to:
  - Human Immunodeficiency Virus (HIV)
  - Hepatitis C Virus (HCV)
  - Hepatitis C Virus (HCV)
- Workers exposed to these pathogens are at risk for serious illness or death



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Control Measures

- Biological Safety
- Universal Precautions
- Work Practices
- Engineering Controls
- Sharps Safety
- Administrative Controls
- Personal Protective Equipment

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Biological Safety

- Biological safety is the control of the exposure to prevent or minimize health effects to the employee
- This is accomplished through:
  - Engineering Controls
  - Administrative Controls
  - Personal Protective Equipment
  - Good Work Practices

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Preventing Exposure to BBPs

- One way to prevent exposure to bloodborne pathogens is through the practice of universal precautions
- Universal precautions are an approach to infection control in which all human blood & certain human body fluids are treated as if known to be potentially infectious for HIV, HBV, and other bloodborne pathogens

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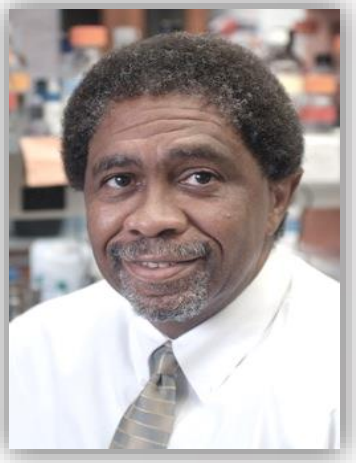
Perspective on Universal Precautions

"We treat all blood in our laboratory as if it could kill us if we weren't careful. We follow the same practices for handling blood whether or not the sample is from a patient with a bloodborne disease – say, HIV or Hepatitis B – or from a normal uninfected donor. Labs that don't take the same precautions with all blood are just wrong."

- Phillip J. Browning, M.D., Associate Professor of Medicine, Vanderbilt University



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Recognizing Exposure Potential

- To evaluate the effectiveness of engineering controls, work practices & personal protective equipment, you need to assess the risk of the task being performed
- Look for the potential for exposure in the task being performed:
  - Potential for needle stick?
    Example: tail vein injections of tumor cells into rodents
  - Potential for splash?
    Example: vortexing human cell lines

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Appropriate Work Practices

- Routine use of barriers (such as gloves and/or goggles) when anticipating contact with blood or body fluids
- Remembering to wash hands & other skin surfaces immediately after contact with blood or body fluids
- Careful handling & disposing of sharp instruments during and after use

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Appropriate Work Practices *(continued…)*

- Performing human cell culture in a Biological Safety Cabinet
- Discarding used needles in an approved sharps container without recapping the needle
- Performing procedures involving blood or OPIM in a manner which minimizes splashes and generation of aerosols

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Work Practices – Hand Washing

- Hand washing facilities must be readily available for employee use
- Hands must be washed after removing gloves & after any exposure incident
- Waterless hand sanitizer may be utilized if hand washing facilities are not available but hands should be washed with soap & water as soon as feasible

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Work Practices – Hand Washing *(Continued…)*

When washing your hands be sure to:

- Use warm water that is a comfortable temperature
- Use liquid soap
- Use friction by rubbing your hands together
- Rinse downward
- Dry thoroughly

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Work Practice Controls

- Engineering Controls:
  The equipment and devices that are used to minimize or eliminate employee exposure to bloodborne pathogens
- Personal Protective Equipment:
  Any exposure risk remaining after the institution of engineering & work practice controls shall be mitigated via the use of personal protective equipment (PPE)

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Std. Microbiological Practices, Research Labs

- Good Practices
  - Restricted access
  - Good hygiene
  - Use mechanical pipetting devices
  - Minimize splashes and aerosol
  - Appropriate decontamination
  - Appropriate signage

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Std. Microbiological Practices, Research Labs *(Continued…)*

- Bad Practices
  - Eating, Drinking Smoking
  - Application of Cosmetics
  - Handling of Contact Lenses
  - Mouth Pipetting

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Std. Microbiological Practices, Research Labs (Continued…)

- Workers must not consume food and drink in areas where work involving exposure or potential exposure to blood or other potentially infectious materials
- Food and beverages can become contaminated by work surfaces or by process that generate splashes, splatters, and aerosols
- Eating and drinking is only permitted in designated areas

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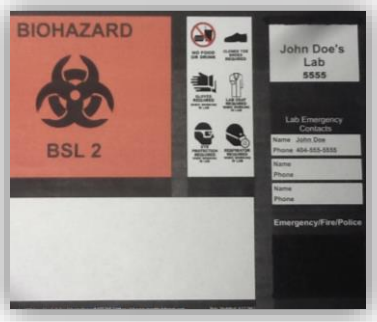
Administrative Controls – Signs

- Biohazard Signs must be posted at the entrance of each HIV/HBV research laboratory
- Each sign must include:
  - Special requirements to enter the area
  - Name and telephone number of lab director or other responsible individual



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Administrative Controls - Labels

- Biohazard Labels must be affixed to the container in a manner that prevents removal
- Biohazard labels must be predominantly red or orange red with a prominent biohazard symbol
- Red bags or red containers can also be used in lieu of biohazard labels

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Administrative Controls – Waste Disposal

What is wrong with these pictures?

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Administrative Controls – Waste Disposal *(Continued…)*

- Always discard into proper waste streams
- Inappropriate waste disposal can injure waste removal personnel

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Administrative Controls – Waste Disposal *(Continued…)*

- Human Blood, Human Body Fluids, and Other Potentially Infectious Materials must be disposed of through one of the following treatment methods:
  - Steam sterilization
  - Chemical disinfection
  - Disposal by an approved infectious waste treatment and disposal facility (e.g Stericycle)

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Administrative Controls – Waste Disposal *(Continued…)*

- Human Cell and Tissue Culture Waste
  - Disposable tissue culture supplies and solid waste
  - Collect in an orange or clear autoclave bag labeled with biohazard symbol
  - Autoclave and dispose in regular trash
  - Examples: Serological Pipets, Pipet Tips, Petri Dishes

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Administrative Controls – Waste Disposal *(Continued…)*

- Glassware
  - Broken Glassware – dispose of broken glass into the Glass Box
  - Contaminated Glassware – (e.g. pastuer pipettes used in human cell culture) dispose into sharps container
- Liquid Waste
  - Autoclave (steam sterilization) or treat with bleach (1:10 dilution) prior to disposal in sanitary sewer

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Personal Protective Equipment (PPE)

- All employees should have access to PPE that is task appropriate & the correct size
- PPE may include, but is not limited to:
  - Gloves, Gowns, Lab Coats, Face Shields and Goggles
- Employee training on PPE should include:
  - Location, Proper use and Proper Disposal
  - Decontamination Procedures for Reusable Equipment
  - Selection of Proper PPE for the Task

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PPE	Picture	When to Wear	Examples
Eye Protection		• Worn when there is a potential for splashes/splatters of liquid	• Safety Glasses • Goggles • Face Shields
Gloves		• Worn to protect hands • May be single use or reusable	• Vinyl • Latex • Nitrile
Protective Clothing		• Worn to protect skin & clothing from hazards	• Lab Coat • Lab Apron
Respiratory Protection		• Worn to prevent inhalation of airborne microorganisms, dust, mists, & chemical fumes • Prior to wearing employees must obtain: medical clearance & training, then fit test • This must occur annually	• N95 • Full Face

PPE – Working with Blood/OPIM

- Always wear protective gloves to prevent them from becoming soiled with blood or OPIM.
- Wear laboratory coat or gown, eye protection, and a surgical mask when conducting procedures that may cause splattering.
- When pipetting, you should always use a mechanical pipetting device. Never mouth pipet.

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PPE – Working with Blood/OPIM *(Continued…)*

- Use a Biological Safety Cabinet to contain procedures that generate aerosols (i.e. vortexing samples).
- Wash your hands as soon as the procedure is complete and always before leaving the laboratory

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Contaminated Laundry – Handling Recommendations

- Reusable lab coats should never be taken home to be laundered
- Lab coats worn during the manipulation of blood or OPIM should be bagged & appropriately labeled with the universal biohazard symbol prior to pick-up or drop-off for laundry service
- Attempts should be made to limit contact with contaminated laundry

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How to Clean Up Simple Spills

- Wear appropriate PPE
- Prevent/control spreading with absorbent materials
- Collect residues
- Decontaminate area / equipment
- Complete incident report

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Biological / Blood Spills

- Disinfect human blood or OPIM spills with a freshly prepared one-in-ten dilution of household bleach.
- Be aware that bleach degrades overtime due contact with organic material and sunlight.
- Clean all work surfaces with 70% isopropyl alcohol when procedures are complete.

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Biological / Blood Spills *(Continued…)*

- Remember that if you are exposed to blood that you must wash the exposed area or wound with soap and water. Then, you must proceed directly to medical attention.
- All incidents must be reported to your supervisor and others by following the procedures outlined by your institution.

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Inhalation Pathogen Spill Guidelines

- Applicable when handling cell culture that contains pathogens transmitted through inhalation or aerosol
- Hold your breath and leave the laboratory immediately
- Alert everyone else in the lab (i.e. post a warning sign that can be used as a signal to others)
- Close the door and do not re-enter the space
- Post a warning sign on the outside of the door
- Contact your institution's designated Emergency Response Personnel

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Emergency Response Procedures

- Immediately utilize eyewash, shower, soap, water and/or other incident protocol
- Seek medical attention through employee health services or the emergency room
- Report incident to your supervisor
- Follow up with healthcare professional to receive a written opinion and instructions for additional testing requirements.

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