

Bloodborne Pathogens Profile

Bloodborne pathogens (BBP's) may be present in blood, unfixed tissues and certain other body fluids. BBP's are transmitted through breaks in the skin such as needle sticks or cuts involving BBP-containing materials. Direct contact of BBP-containing materials with damaged unprotected skin is another route of exposure. Finally, splashes to the eyes, nose or mouth involving BBP-containing materials can also lead to transmission.

In the case of human-derived materials, the 3 most common BBPs reported in the U.S. are HIV, HBV and HCV. Features of these viruses and infections they cause are summarized below.

	Human Immunodeficiency Virus (HIV)	Hepatitis B Virus (HBV)	Hepatitis C Virus (HCV)
Symptoms	Acute: "flu-like", myalgia, arthralgia, diarrhea, nausea, headache, etc.	Acute: asymptomatic, or nausea, abdominal pain, fever vomiting, jaundice, dark urine, etc.	Acute: asymptomatic or fatigue, myalgia, fever, RU quadrant pain, nausea, jaundice, rash, arthralgia, etc.
Incubation Period	<ul style="list-style-type: none"> Time to detectable antibodies: 1 to 3 months Time to AIDS <1 year to 15+ years 	60-150 days (average is 90 days)	2 to 12 weeks
Complications	<ul style="list-style-type: none"> Without adequate treatment Acquired Immune Deficiency Syndrome (AIDS) can develop This immune system depletion leads to susceptibility to opportunistic infections 	Chronic Hepatitis B infection can develop which may lead to chronic liver diseases including cirrhosis of the liver and hepatocellular carcinoma	Up to 85% of cases lead to chronic infection which can result in chronic hepatitis, cirrhosis, and hepatocellular carcinoma
Epidemiology	<ul style="list-style-type: none"> Approximately 84.2 (64 to 113) million people worldwide have been infected Approximately 40.1 million people have died from HIV Approximately 95% of the individuals affected live in the developing world 	<ul style="list-style-type: none"> Approximately 2 billion people worldwide have been infected 296 million have chronic infections 820,000 individuals die yearly from HBV-related liver conditions 	<ul style="list-style-type: none"> Approximately 2.2 to 3% of the world population (170 million people) have been infected Highest prevalence in WHO's African and Eastern Mediterranean regions
Infection risk via needle stick	• 3 in 1000 (0.3%)	300 in 1000 (30%)	18 in 1000 (1.8%)
Stable/viable on environmental surfaces?	Not very (rapidly loses viral concentration: at least 7 days in serum drying on glass)	Very (at least 7 days on environmental surfaces)	Slightly (at least 16 hours in plasma drying on environmental surfaces)
Vaccine Available?	No	Yes, it is recommended	No
Post-Exposure Prophylaxis	Use of two to four antiretroviral drugs	Hepatitis B immunoglobulin (HBIG) treatment	Not recommended
Treatment	<ul style="list-style-type: none"> HIV/AIDS is managed as a chronic disease Highly active antiretroviral therapy (HAART) is provided 	HBIG or one of seven available antivirals	Mono-therapy or combination therapy of interferon and ribavirin
Exposure risk features	Viral load is higher if source individual is not taking treatments	Viral load is highest in individuals with active infection	Mostly transmitted through blood-to-blood contact

Questions regarding BBP exposure risk associated with lab research?

Contact VU Biosafety at
vubiosafety@vanderbilt.edu

Information / Web Resources:

[CDC Preventing Healthcare-Associated Infections \(HAIs\)](#)

[Health Canada Pathogen Safety Data Sheets](#)

Bloodborne Pathogens Exposure Control Basics for Lab Researchers

A person handling any viable human-derived tissues, most body fluids, cells or wastes contaminated with these materials in a basic research setting, is considered to have a reasonably anticipated risk of exposure to bloodborne pathogens. Examples of laboratory research activities that put a person “at risk” for exposure include:



- Lab work with human cells
- Processing human blood or other BBP-risk body fluids
- Using unfixed human tissues or anatomical parts
- Administration or harvest of human-derived cells/explants in animal research
- Using lentiviral (HIV-based) vectors in bench or animal research
- Handling untreated lab wastes contaminated with BBP risk materials (including cell media and sharps)
- Cleaning up spills of human blood or BBP risk materials.

***NOTE: Chemical, physical or other methods of inactivation of human-derived sample materials to eliminate infectious agent risk must be cleared with the VU Biosafety Officer before handling such materials to be in adherence with this policy.**

If your lab activities put you at risk for BBP exposure...

1. Review the **Best Practices for Use of Human-derived Materials & Bloodborne Pathogens in Basic Research Applications** on the [VU Biosafety webpage](#) as well as the [Vanderbilt University BBP Exposure Control Plan](#).
2. Ensure that you complete Biosafety 101: Standard Microbiological Practices and Working Safely with Human-derived Materials modules in Oracle Learn. The direct links to these courses can be found on the [VU Biosafety Training Table](#). **NOTE: These modules are expected to be completed before a person handles BBP risk materials in the lab.**
3. Contact the [Vanderbilt Occupational Health Clinic](#) to ensure that you receive the hepatitis B vaccination if needed or to waive the vaccine if you’ve already received it.
4. Know and follow the specific exposure control procedures apply to BBP risk materials per OSHA requirements:
 - **Safety Engineered Sharps** – Because needlesticks and injuries from sharps that are improperly disposed of are a well-documented BBP exposure risk, safety-engineered sharps are expected to be used for procedures involving human-derived tissues, cells and body fluids. A safety-engineered sharps device allows the user to activate a mechanism to isolate the sharp surface after the point of use (such as through a shield or retraction mechanism); the mechanism must be integral to the device so that it can be activated with the hand holding the device. When a safety-engineered sharp cannot be used, this must be on record with VU Biosafety. This includes sharps used to administer human-derived materials or lentiviral vectors to animals.
 - **Sharps Handling Practices** – Follow all practices outlined in Using Sharps Safely in Laboratory Research Applications. Do not bend, break, or recap needles or scalpels. Do not separate used needles and syringes.
 - **Disinfectants** – At the conclusion of work with BBP risk materials including all human cells, the disinfectant used to treat surfaces and items handled during the task must be an EPA registered product that is effective for the destruction of HIV and HBV. See the [EPA List D](#) for products that meet this requirement.
 - **Biohazard Labeling** – Labels should have a red or fluorescent orange colored background with the symbol in a contrasting color and the word “biohazard”. Labels should be used to alert all as to where BBP risk materials are present. Examples include: lab entrances, storage units, transport containers, biowaste containers, lab equipment that may have contaminated components.
 - **Elevated Risk Materials** – Work with whole bloodborne pathogens (HIV, HBV or HCV) or with human-derived materials from known or suspected infected populations will require additional safety practices. Contact [VUBiosafety](#) for more information before receiving or working with these materials.
 - **Post-exposure Response Procedure** – The medical assessment for BBP exposures is time-sensitive and involves several initial and follow-up steps. Do not delay in reporting to OHC (or Vanderbilt Adult Emergency if after hours or weekend) to start assessment.

