Biological Agent Reference Sheet (BARS)
Agent: Human-Derived Materials, Including Blood and Cell Lines

**Agent Characteristics**

<table>
<thead>
<tr>
<th>Risk Group (RG)</th>
<th>Description</th>
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</table>
| **RG-2**        | Human derived materials are potentially infected with bloodborne pathogens and are therefore included in the OSHA Bloodborne Pathogens (BBP) Standard 1910.1030, which includes unfixed blood, cell lines, breast milk, tissues, and fluids such as synovial, cerebrospinal, and pericardial - known as "other potentially infectious materials (OPIM)." These materials are exempt from the standard if they have been chemically fixed, which inherently inactivates the pathogens and renders them non-infectious. Saliva, urine, sweat, emesis, and feces are only considered potentially infected with bloodborne pathogens if they are visibly contaminated with blood. These materials are exempt from the standard if they are not visibly contaminated with blood. Please see the Human Feces BARS for additional guidance when working with this material. |}
| **RG-3**        | Primary human materials (those derived directly from a donor) are at high risk of containing bloodborne pathogens. Established human cell lines (purchased from a vendor or shared by a collaborator) may be unintentionally contaminated upon receipt or during routine experimentation. Some cell lines are known to carry additional pathogen genetic material such as Human Papillomavirus (HPV) DNA in HeLa cells. Cancerous cell lines pose the additional risk of causing localized tumors or, if malignant, additional carcinogenic concerns if exposed. Autologous blood samples (one’s own blood) may become altered during handling in the lab. If an individual is exposed to his/her own blood that has been contaminated with a pathogen from the lab, the immune system may respond less vigorously than it does to allogeneic (non-self) cells. Also, if autologous blood samples are genetically engineered and then accidentally reintroduced into the donor, the altered cells could escape the usual rejection (killing) by the immune system which would kill incidentally introduced allogeneic cells. |

**Agent Type** Biohazard

**Description**

- Human derived materials are potentially infected with bloodborne pathogens and are therefore included in the OSHA Bloodborne Pathogens (BBP) Standard 1910.1030, which includes unfixed blood, cell lines, breast milk, tissues, and fluids such as synovial, cerebrospinal, and pericardial - known as "other potentially infectious materials (OPIM)." These materials are exempt from the standard if they have been chemically fixed, which inherently inactivates the pathogens and renders them non-infectious.
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**Host Range**

- Humans, animals (experimentally inoculated with human-derived materials (such as xenografts)).

**Host Shedding**

- Blood
- Direct contact
- Feces
- Saliva
- Urine
- Other: other potentially infectious bodily fluids/ materials including unfixed tissues, synovial fluids, cerebrospinal fluids, etc.

**Routes of Exposure to Humans**

- Aerosol/Inhalation
- Arthropod Vectors
- Direct Contact
- Mucous Membranes
- Vertical Transmission
- Animal Bites
- Contaminated Items
- Ingestion
- Percutaneous

**Infectious Dose** Unknown

**Incubation Period** Varies

**Health Hazards**

- Flu-like symptoms (i.e. fever, headache, dehydration, weight loss, lethargy)
- Cutaneous symptoms (i.e. skin lesions, rash)
- Gastrointestinal symptoms (i.e. loss of appetite, nausea, vomiting, diarrhea)
- Respiratory symptoms (i.e. coughing, sneezing)
- Neurological symptoms (i.e. loss of sensation, ataxia)
- Musculoskeletal symptoms (i.e. joint and muscle pain)
- Lymphoreticular symptoms (i.e. enlarged internal organs or lymph nodes)
- Reproductive Health concerns (i.e. abortion, fetal abnormalities) – request a Reproductive Health Consultation

**Immunizations**

- Available
- Not Available

**Prophylaxis**

- Hepatitis B Booster, antivirals based on risk assessment

**Risk Group (RG) 1**

- Biosafety Level (BSL) - special practices

**Laboratory Handling Guidelines**

**Laboratory Biosafety Level (BSL)**

- BSL-2

**Attenuated Strain**

**Alternatives**

Using fixed tissues/samples, pathogen screening, cell line verification testing, and use of lower mammalian blood/cell lines first are all viable alternatives to practice procedures prior to handling these materials.

**Training**

- EHS Laboratory Safety Training (CULearn #2555)
- EHS Bloodborne Pathogens Training (CULearn #1070)
- Lab-specific protocol training
- BARS CULearn #2277.39

**Lab Engineering Controls**

- Benchtop
- Biosafety Cabinet (for aerosol containment)
- Chemical Fume Hood
- Centrifuge lids or safety cups; samples are loaded/unloaded inside the BSC
- Use of safety-engineered sharps

**Personal Protective Equipment (PPE)**

- Eye protection
- Single gloves
- Additional gloves
- Snap-front lab coat with cinch cuffs
- Disposable solid front gown
- Additional mucous membrane protection
- Disposable outer sleeves

**Waste Management**

- Regulated Medical Waste (RMW)

**Shipping Guidance**

- Refer to EHS Biological Materials Shipping

**Final Biosafety Level designation will be assigned upon a case-by-case review by the Institutional Biosafety Committee.**

**Animal Vivarium Guidance**

**Animal Housing Biosafety Level (ABSL)**

- ABSL-1
- ABSL-2
- ABSL-3

**Animal Biosecurity**

- Experimental animals are housed separately
- Information not available

**Perform Inoculations**

- Benchtop
- Biosafety Cabinet
- Cage Changing Station

**Change Cages**

- Benchtop
- Biosafety Cabinet
- Cage Changing Station

**EHS/Biosafety Page 1**
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Exposure and Spill Procedures

<table>
<thead>
<tr>
<th>Mucous Membranes</th>
<th><strong>Flush eyes, mouth or nose for 15 minutes at eyewash station. See: responding to exposures.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Exposures</td>
<td><strong>Wash with soap and water for 15 minutes (open wounds, sores, etc.) and a minimum of 20 seconds of soap and water for areas with intact skin. See: responding to exposures.</strong></td>
</tr>
<tr>
<td>Small Spills</td>
<td><strong>Notify others working in the lab. Evacuate area and allow 30 minutes for aerosols to settle. Don appropriate PPE. Cover area of the spill with paper towels and apply disinfectant, working from the perimeter toward the center. Allow 30 minutes of contact time before disposal and cleanup of spill materials. See: spill cleanup.</strong></td>
</tr>
<tr>
<td>Large Spills</td>
<td><strong>Request assistance from the EHS Spill Team by calling CUPD dispatch. Call 911 from a campus phone or 607-255-1111 from a mobile phone.</strong></td>
</tr>
</tbody>
</table>

Incident Reporting

| **Immediately report the incident to supervisor and complete the EHS online injury/illness report as soon as possible.** |

Medical Follow Up

<table>
<thead>
<tr>
<th>During Business Hours</th>
<th>After Hours Care:</th>
<th>Emergencies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell Health 607-255-5155 (24-hour phone consultation line)</td>
<td>Cornell Health Services 24-hour phone consultation line or local urgent care as listed on above webpage.</td>
<td>Call 911 from a campus phone or 607-255-1111 from a mobile phone.</td>
</tr>
</tbody>
</table>

Biosafety Level 2 Containment Requirements Summary

**Personal Hygiene**

- Remove PPE before leaving the lab – avoid wearing PPE in public spaces.
- Wash hands frequently with soap and water after removing gloves, handling samples, leaving lab, etc.
- Change gloves frequently while working, and before removing samples from the biosafety cabinet to minimize potential contamination of equipment and surfaces within the lab.

**Standard Microbiological Practices**

- In addition to standard BSL1 practices:
  - Biohazard signs and labels on equipment.
  - Use a biological safety cabinet (BSC), such as a Class II Type A2, for manipulations that can generate infectious aerosols.
  - Use aerosol containing devices for high energy activities which may generate infectious aerosols. For example, centrifugation of agents which may generate infectious aerosols will use gasketed rotors or buckets. Rotors or buckets will be removed and opened inside a BSC. Centrifuge tubes will be filled and opened in a BSC.
  - Vacuum lines are protected with liquid disinfectant-filled traps and 0.45 micron filters.
  - Sharps handling and safety practices are implemented.
  - Decontaminate work surfaces after completion of work and after any spill or splash of potentially infectious material with appropriate disinfectant.
  - Chemically disinfect all surfaces and equipment.
  - Potentially infectious materials are placed in durable, leak proof, labeled primary containers during collection, handling, processing, and secondary containers during storage, or transport within a facility.
  - Windows in BSL-2 labs remain closed.

**Special Practices**

- All persons entering the laboratory are advised of the potential hazards and meet specific entry/exit requirements.
- The laboratory supervisor ensures that lab personnel demonstrate proficiency in standard and special microbiological practices before working with such agents.
- Laboratory equipment are routinely decontaminated, as well as, after spills, splashes or other potential contamination.
- Spills involving infectious materials are contained, decontaminated, and cleaned up by staff properly trained and equipped to work with infectious material.
- Equipment is decontaminated before repair, maintenance, or removal from the laboratory.

**Regulated Medical Waste (RMW)**

**Online RMW Pickup Request**

**Regulated Medical Waste Guidance**

- **Soft waste:**
  - All materials that come into contact with this agent must be placed in a biohazard waste bag.
  - If working in a BSC, have a biohazard waste bag inside the BSC for waste collection.
  - All equipment, tubes, and waste bags that are brought out of the biosafety cabinet are wiped with appropriate disinfectant.
  - Place smaller red bag waste from BSC into larger red bag outside the BSC for transport.

- **Sharps waste:**
  - Place in leak proof sharps container labeled with the biohazard symbol. If working in a BSC, place a sharps container in the BSC.

- **Liquid waste:**
  - Add EHS-approved disinfectant to appropriate concentration, hold for contact time specified per manufacturer’s guidelines, and then gently pour down the drain.

**Special Considerations**

- **Experiment-Specific Requirements**
  - See lab protocols for additional information, any deviations from this BARS, and for lab-specific expectations.

**References**


Cornell EHS would like to thank Emory University for the use of their Biological Agent Reference Sheet (BARS) format and some content.