

## BIOSAFETY LEVEL

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**Purpose or  
Principle or  
Introduction**

Policies and procedures are developed to minimize the occupational risk of exposure to infectious agents handled in the microbiology laboratory, in accordance with current recommendations regarding the biosafety levels for working with different organisms.

The laboratory director is responsible for the maintenance of precautions in the laboratory to minimize the risk of personnel infection. Precautions must be appropriate for the types of organisms tested and the nature of the studies performed. Each level consists of combinations of equipment, processes and techniques, and laboratory design that are appropriate for the type of laboratory and infectious agent handled.

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## BIOSAFETY LEVEL, Continued

**Biosafety  
Level  
Designation**

**BSL-2**

### **Biosafety Level 2**

Irvine Medical Center Laboratory is designated as a Biosafety Level (BSL) -2, BSL-2 is suitable for work involving agents that pose moderate hazards to personnel and the environment. It differs from BSL-1 in that: 1) laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures; 2) access to the laboratory is restricted when work is being conducted; and 3) all procedures in which infectious aerosols or splashes may be created are conducted in BSCs or other physical containment equipment.

#### **The following standard and special practices, safety equipment, and facility requirements apply to BSL-2:**

1. Perform all procedures to minimize the creation of splashes and/or aerosols.
2. Decontaminate work surfaces after completion of work and after any spill or splash of potentially infectious material with appropriate disinfectant.
3. Potentially infectious materials must be placed in a durable, leak proof container during collection, handling, processing, storage, or transport within a facility.
4. Laboratory equipment should be routinely decontaminated, as well as, after spills, splashes, or other potential contamination.
  - a. Spills involving infectious materials must be contained, decontaminated, and cleaned up by staff properly trained and equipped to work with infectious material.
  - b. Equipment must be decontaminated before repair, maintenance, or removal from the laboratory.
5. All procedures involving the manipulation of infectious materials that may generate an aerosol should be conducted within a BSC or other physical containment devices.
6. Laboratory doors should be self-closing and have locks in accordance with the institutional policies.

## **BIOSAFETY LEVEL, Continued**

7. Laboratories must have a sink for hand washing. The sink may be manually, hands-free, or automatically operated. It should be located near the exit door.
8. BSCs must be installed so that fluctuations of the room air supply and exhaust do not interfere with proper operations. BSCs should be located away from doors, windows that can be opened, heavily traveled laboratory areas, and other possible airflow disruptions.
9. An eyewash station must be readily available.
10. HEPA filtered exhaust air from a Class II BSC can be safely recirculation back into the laboratory environment if the cabinet is tested and certified at least annually and operated according to manufacturer's recommendations. BSCs can also be connected to the laboratory exhaust system by either a thimble (canopy) connection or directly exhausted to the outside through a hard connection. Provisions to assure proper safety cabinet performance and air system operation must be verified.
11. A method for decontaminating all laboratory wastes should be available in the facility (e.g., autoclave, chemical disinfection, incineration, or other validated decontamination method).

**Refer to Laboratory Workplace Safety P&P for additional standard and special practices.**

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## BIOSAFETY LEVEL, Continued

Table 2. Summary of Recommended Biosafety Levels for Infectious Agents

BSL	Agents	Practices	Primary Barriers and Safety Equipment	Facilities (Secondary Barriers)
1	Not known to consistently cause diseases in healthy adults	Standard microbiological practices	<ul style="list-style-type: none"> <li>No primary barriers required</li> <li>PPE: laboratory coats and gloves, eye, face protection, as needed</li> </ul>	Laboratory bench and sink required
2	<ul style="list-style-type: none"> <li>Agents associated with human disease</li> <li>Routes of transmission include percutaneous injury, ingestion, mucous membrane exposure</li> </ul>	BSL-1 practice plus <ul style="list-style-type: none"> <li>Limited access</li> <li>Biohazard warning signs</li> <li>"Sharps" precautions</li> <li>Biosafety manual defining any needed waste decontamination or medical surveillance policies</li> </ul>	Primary barriers <ul style="list-style-type: none"> <li>BSCs or other physical containment devices used for all manipulations of agents that cause splashes or aerosols of infectious materials</li> <li>PPE: Laboratory coats, gloves, face and eye protection, as needed</li> </ul>	BSL-1 plus <ul style="list-style-type: none"> <li>Autoclave available</li> </ul>
3	Indigenous or exotic agents that may cause serious or potentially lethal disease through the inhalation route of exposure	BSL-2 practice plus <ul style="list-style-type: none"> <li>Controlled access</li> <li>Decontamination of all waste</li> <li>Decontamination of laboratory clothing before laundering</li> </ul>	Primary barriers <ul style="list-style-type: none"> <li>BSCs or other physical containment devices used for all open manipulations of agents</li> <li>PPE: Protective laboratory clothing, gloves, face, eye and respiratory protection, as needed</li> </ul>	BSL-2 plus <ul style="list-style-type: none"> <li>Physical separation from access corridors</li> <li>Self-closing, double-door access</li> <li>Exhausted air not recirculated</li> <li>Negative airflow into laboratory</li> <li>Entry through a room or anteroom</li> <li>Hand washing sink near laboratory exit</li> </ul>
4	<ul style="list-style-type: none"> <li>Dangerous/exotic agents which pose high individual risk of aerosol-transmitted laboratory infections that are frequently fatal, for which there are no vaccines or treatments</li> <li>Agents with a close or identical antigenic relationship to an agent requiring BSL-4 until data are available to redesignate the level</li> <li>Related agents with unknown risk of transmission</li> </ul>	BSL-3 practices plus <ul style="list-style-type: none"> <li>Clothing change before entering</li> <li>Shower on exit</li> <li>All material decontaminated on exit from facility</li> </ul>	Primary barriers <ul style="list-style-type: none"> <li>All procedures conducted in Class III BSCs or Class I or II BSCs in combination with full-body, air-supplied, positive pressure suit</li> </ul>	BSL-3 plus <ul style="list-style-type: none"> <li>Separate building or isolated zone</li> <li>Dedicated supply and exhaust, vacuum, and decontamination systems</li> <li>Other requirements outlined in the text</li> </ul>

### Non- Controlled Documents

CAP Checklist – Microbiology section

<https://www.cdc.gov/training/QuickLearns/biosafety/>

[https://www.cdc.gov/biosafety/publications/bmb15/BMBL5\\_sect\\_IV.pdf](https://www.cdc.gov/biosafety/publications/bmb15/BMBL5_sect_IV.pdf)



