

Core Biosafety Level 3 (BSL-3) Training for CDC Laboratories

This course is part of the CDC's Biosafety Level 3 (BSL-3) curriculum, which consists of 12 learning events designed to provide comprehensive BSL-3 laboratory safety training.

The videos and photos in this course are for demonstration purposes only. For laboratory-specific safety procedures, please refer to your Standard Operating Procedures (SOPs) or consult with your supervisor or safety and occupational health manager.

To access an overview of each learning event in the BSL-3 curriculum, download the reference sheet below. Course registration links are also available where applicable.

[Placeholder - Overview of BSL-3 Learning Events]

Select the button below to start the training

START TRAINING



BSL-3

Overview of Biological and Chemical Materials



Please select the next arrow below to continue...

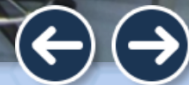
NOTE: This course will take approximately 60 minutes to complete.



BSL-3 Overview of Biological and Chemical Materials

Course Purpose

This eLearning course is designed to provide laboratory personnel with essential knowledge about characteristics and control measures for infectious biological and hazardous chemical materials in a BSL-3 laboratory setting. Participants will learn about how these materials impact the laboratory environment. Through videos, animations, interactive diagrams, self-assessment quizzes, case studies, and scenarios, participants will understand different risk groups for infectious biological agents and the significance of transmission routes, incubation times, susceptibility to disinfectants, and more.



BSL-3 Overview of Biological and Chemical Materials

Course Objectives

By the end of this course, participants will be able to

- Describe inherent characteristics of infectious biological agents handled in the BSL-3 laboratory
- Identify routes of transmission, environmental stability, signs and symptoms of infection, incubation times, and susceptibility to disinfectants for infectious biological agents handled in a BSL-3 laboratory
- Categorize infectious biological agents into risk groups
- Describe biosafety levels and their requirements
- Describe control measures used when working with infectious biological agents
- Describe the risks associated with common hazardous chemicals handled in the BSL-3 laboratory
- Describe control measures used when working with hazardous chemical materials
- Identify appropriate selection, preparation, and use of chemical disinfectants for work in the BSL-3 laboratory



BSL-3 Overview of Biological and Chemical Materials

Introduction



Overview of Biological and Chemical Materials

CHAPTER 1: **Characteristics of Infectious Biological Materials**

Please select the next arrow below to continue...



Characteristics of Infectious Biological Materials

Infectious Biological Agents in BSL-3 Laboratories

Infectious biological agents requiring BSL-3 containment include those that can cause serious or potentially lethal diseases.

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Characteristics of Infectious Biological Materials

BLS-3 Classroom

Select each poster to view its content.

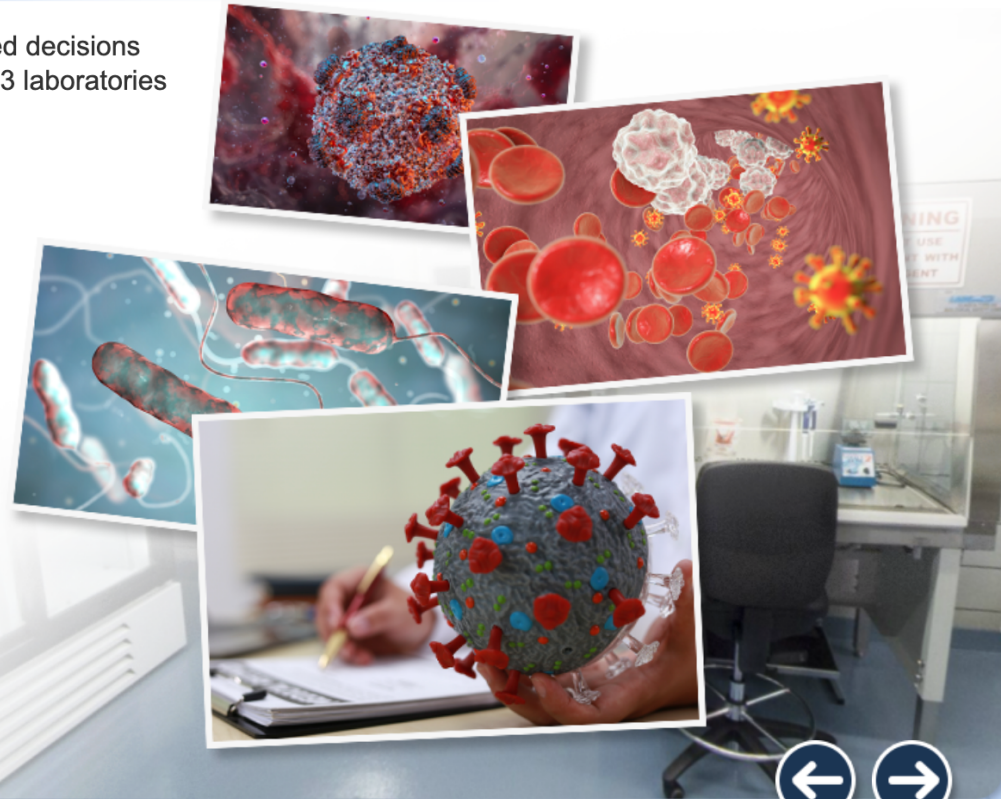


Characteristics of Infectious Biological Materials

Characteristics of Infectious Biological Agents

When making safety, handling, and equipment-related decisions about infectious biological agents, personnel in BSL-3 laboratories must consider various characteristics of the agents.

- Prevalence
- Environmental Stability
- Susceptibility to Disinfectants
- Modes of Transmission
- Host Range
- Infectious Dose
- Incubation Time
- Signs and Symptoms of Infection
- Methods of Inactivation
- Preventative Measures
- Treatments



Characteristics of Infectious Biological Materials

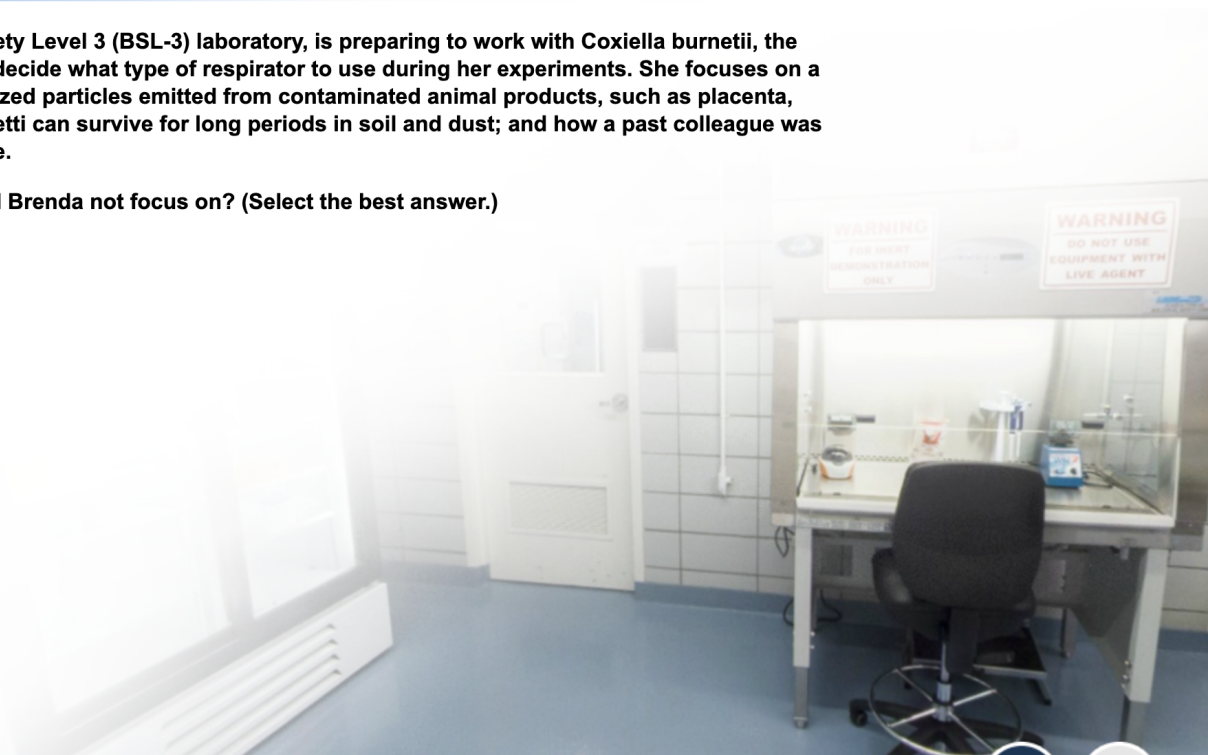
Knowledge Check

Brenda, a laboratory scientist in a Biosafety Level 3 (BSL-3) laboratory, is preparing to work with *Coxiella burnetii*, the causative agent of Q fever. Brenda must decide what type of respirator to use during her experiments. She focuses on a few aspects of the pathogen: the aerosolized particles emitted from contaminated animal products, such as placenta, urine, feces, and milk; how *Coxiella burnetii* can survive for long periods in soil and dust; and how a past colleague was infected and was treated with doxycycline.

Which of the following characteristics did Brenda not focus on? (Select the best answer.)

- ☐ Environmental Stability
- ☐ Host Range
- ☐ Availability of Treatment
- ☐ Routes of Transmission

SUBMIT



Control Measures for Infectious Biological Materials

Biosafety and Biosecurity

Biosafety refers to principles, practices, and procedures implemented to prevent unintentional exposure to biological agents and toxins, or their accidental release. Biosafety protects laboratory personnel, the environment, and the public.

Biosecurity involves strategies and practices designed to protect against the theft, misuse, or intentional release of harmful biological agents and toxins. It focuses on preventing the deliberate introduction of pathogens or biotoxins into the environment.



Control Measures for Infectious Biological Materials

Knowledge Check

In a BSL-3 laboratory, Perry notices Anita acting suspiciously around the storage area where high-risk pathogens are kept. Perry informs their supervisor, Nadine, who reviews security footage and confirms Anita is accessing a storage area without proper authorization and tampering with security locks.

Is the situation a biosafety or biosecurity concern? (Select the best answer.)

- ☐ Biosafety
- ☐ Biosecurity

SUBMIT



Control Measures for Infectious Biological Materials

Knowledge Check

In a BSL-3 laboratory, Perry notices Anita acting suspiciously where high-risk pathogens are kept. Perry informs security footage and confirms Anita is accessing a server without authorization and tampering with security locks.

Is the situation a biosafety or biosecurity concern?

- ☐ Biosafety
- ☒ Biosecurity

SUBMIT

BSL3_Overview_of_Biological_and_Chemical_Materials_alphaX

Correct! This is a biosecurity concern because an individual is suspected of deliberately attempting to steal or misuse harmful biological agents, posing a threat of intentional release into the environment. Biosecurity focuses on preventing the intentional introduction of pathogens or biotoxins by malicious actors, rather than accidental exposure or release.

OK

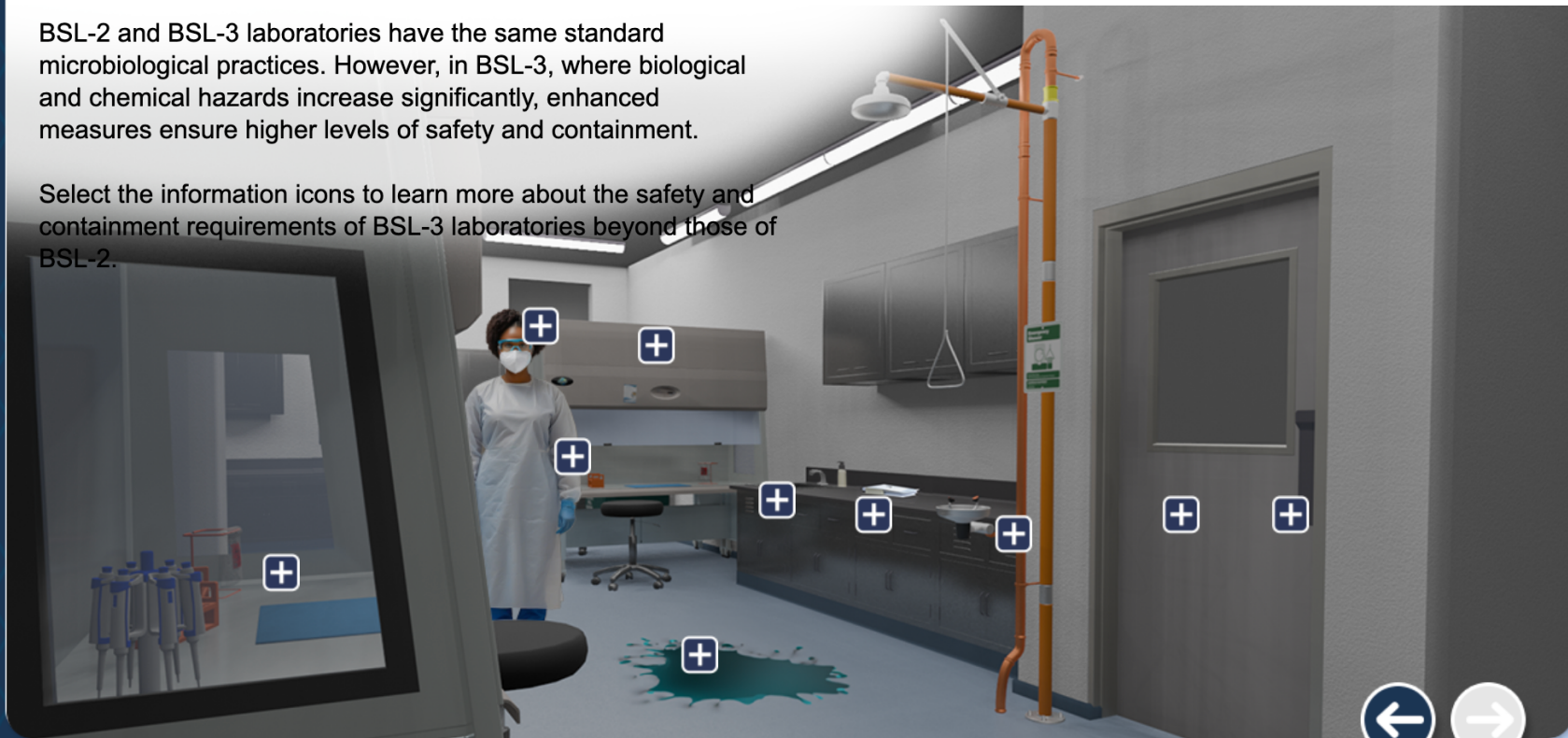


Control Measures for Infectious Biological Materials

BSL-3 Enhancements

BSL-2 and BSL-3 laboratories have the same standard microbiological practices. However, in BSL-3, where biological and chemical hazards increase significantly, enhanced measures ensure higher levels of safety and containment.

Select the information icons to learn more about the safety and containment requirements of BSL-3 laboratories beyond those of BSL-2.



Control Measures for Infectious Biological Materials

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Safety Manual & Emergency Response

- The safety manual contains protocols for emergency situations including exposures, medical emergencies, laboratory malfunctions, and other potential emergencies.
- Personnel receive training in emergency response procedures.



Control Measures for Infectious Biological Materials

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Access Controls



Hazardous Chemical Characteristics and Control Measures

Common Hazardous Chemicals in BSL-3 Laboratories

In BSL-3 laboratories, a number of chemicals are used for research, and for disinfection, decontamination, and inactivation. With exposure, all pose safety risks that laboratory personnel must be aware of.

Formaldehyde, ethanol, and hydrogen peroxide are all commonly used at BSL-3, though may also be used at other biosafety levels. Select the icons to learn more about them.



Check the chemical hygiene plan for other chemicals used in your BSL-3 laboratory.

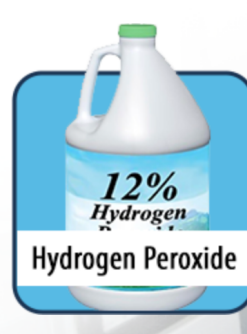


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Ethanol

Hazards:

- Highly flammable: significant fire hazard
- Respiratory irritation (coughing, sore throat, shortness of breath)
- Central nervous system effects (dizziness, headache, drowsiness, unconsciousness)
- Skin and eye irritation (redness, dryness, burning)

Check the chemical hygiene plan for other chemicals used in your BSL-3 laboratory.