

Working with *Mycobacterium bovis*/BCG Post Exposure Plan (PEP).

Background

Mycobacterium bovis Bacillus Calmette-Guérin (BCG) is a weakened, live strain of *Mycobacterium bovis* created to serve as a vaccine against tuberculosis. Although it helps protect against severe forms of the disease, it does not fully prevent pulmonary tuberculosis—the contagious form that affects the lungs. In healthcare and laboratory settings, exposure to live BCG can still trigger immune responses, skin reactions, or infection. Because the body relies on specialized white blood cells (T cells) to control the bacteria, proper tracking and evaluation after an accidental exposure are necessary to protect employee health.

Modes of Transmission

Mycobacterium bovis/BCG infection may occur through:

- Contact with infected animal tissues, fluids, or primary biological specimens from cattle or wild cervids (e.g., deer, elk) can transmit the pathogen through non-intact skin or accidental autoinoculation during necropsy, tissue processing, or fieldwork.
- Prolonged proximity to infected animal hosts, live cultures, or aerosol-generating procedures can result in airborne transmission via inhaled droplet nuclei.
- Active pulmonary *M. bovis* infection can spread aerogenically when an infected individual coughs, speaks, or generates infectious respiratory droplets
- Consuming unpasteurized dairy or unpasteurized biological products contaminated with *M. bovis* serves as a primary foodborne and oral route of infection; pasteurization effectively eradicates the viable pathogen.

Incubation Period

It takes 4 to 12 weeks after exposure for a positive skin reaction or initial lesion to appear, with the highest risk of active disease occurring within the first 1 to 2 years. If untreated, the infection can remain dormant in the body as a latent infection for a lifetime.

Laboratory Hazards

Risks include direct contact with skin and mucous membranes of the eye, nose and mouth, parental inoculation, and ingestion. Laboratory activities and conditions that can lead to exposure risks include:

- High-energy operations such as centrifugation, sonication, vortexing, homogenizing, high-pressure systems, or popping tube caps.
- Using needles, scalpels, microtome blades, or glass pipettes/broken glassware during culture or tissue manipulation.

- Agitating liquid cultures, mechanical pipetting, using shaking incubators, or pouring liquid waste.
- Performing necropsies, handling infected animal tissues, harvesting organs, or manipulating experimentally infected animals without appropriate PPE or containment.
- Performing open-bench operations with live cultures or biological specimens outside of a certified Biosafety Cabinet (BSC).
- Inadvertent contact with contaminated laboratory surfaces, equipment, or waste containers followed by poor hand hygiene or contact with non-intact skin.

Signs and Symptoms

Symptoms of TB disease caused by *M. bovis* are similar to those caused by *M. tuberculosis*, commonly including fever, night sweats, unexplained weight loss, and a persistent cough. Depending on which part of the body is affected by the infection, additional localized symptoms may also occur.

Vaccines

Bacillus Calmette-Guérin (BCG) is a live-attenuated vaccine form of *Mycobacterium bovis* used to prevent tuberculosis, as well as non-tuberculous mycobacterial infections such as leprosy and Buruli ulcer. As the only vaccine against tuberculosis, it is widely administered as part of routine newborn immunization schedules worldwide. Understanding BCG's mode of action helps interprofessional healthcare teams effectively educate patients on tuberculosis prevention.

Treatment

Treatment for inactive TB or active disease caused by *M. bovis* is similar to that for *M. tuberculosis*, though healthcare providers may not initially distinguish between the two strains. Although *M. bovis* is inherently resistant to pyrazinamide—a standard first-line TB medication—this resistance does not usually impair recovery because active disease is managed using a combination of multiple antibiotics.

Pre-Exposure Medical Monitoring

For an individual who will be working in a laboratory setting with *M. bovis* BCG, a baseline TB test is recommended before occupational exposure.

Baseline testing is recommended because it provides a reference point in case of:

- Needlestick injuries,
- Mucous membrane exposure and,
- Other potential occupational exposures

This ensures that any future positive results can be accurately assessed as work-related or non-occupational and to support appropriate post-exposure evaluations and follow-up if needed.

TB baseline testing is confidential, and a positive TB baseline result does not automatically disqualify someone from laboratory work; this is evaluated on a case-by-case basis with Occupational Health.

Additional follow-up testing only occurs if an exposure incident happens.

Biosafety Requirements and Procedures

Physical Containment

Biosafety Level 2 (BSL-2) and Animal Biosafety Level 2 (ABSL-2) practices, facilities, and containment equipment are required for all activities involving the handling of potentially infectious clinical materials, cultures, and infected animals. All procedures that may generate splashes or aerosols—including vortexing, centrifugation, sonication, and necropsies of experimentally infected animals—must be performed within a certified Biosafety Cabinet (BSC) or using appropriate physical containment equipment. Enhanced BSL-2 practices or additional containment procedures are recommended for activities involving large volumes, high concentrations of *M. bovis* / BCG, or a high potential for aerosol generation.

Personal Protective Equipment (PPE)

Standard laboratory personal protective equipment including a lab coat, eye protection, disposable gloves, long pants and closed-toed shoes must be worn when handling *Mycobacterium bovis*/BCG

Depending on the research activities being performed, a fit-tested respirator (N95, etc.) may also be recommended or required.

Spills

Biological Agent Spill within a Biosafety Cabinet

1. Keep the biosafety cabinet on.
2. Don appropriate PPE for cleaning up the spill (gloves, lab coats, safety goggles, etc.).
3. Place absorbent materials on and around the spill (e.g., paper towels).
4. Apply an effective disinfectant (e.g., 1:10 dilution of bleach) to the spill and allow it to sit for the appropriate contact time (e.g., 15-30 minutes for bleach). Avoid splashing and creation of aerosols.
5. Clean/Wipe the spill area
6. Check the spill tray under the front grille for any residue.
7. Dispose waste into red biohazard bag.

8. Clean the area again (if using bleach as a disinfectant, do a final wash of the area with 70% alcohol or water to prevent corrosion of your biosafety cabinet).
9. Remove PPE.
10. Wash hands with soap and water.
11. Report the spill to your PI/Lab Manager/Supervisor

Biological Agent Spill Outside of a Biosafety Cabinet (BSL-2 Laboratories):

1. Notify all personnel in the area that a spill has occurred and evacuate everyone in the vicinity.
2. Close the door
3. Remove any contaminated clothing and wash exposed areas with mild soap and water for 15 minutes.
4. Report details and/or request assistance.
 - i. EHSRM During business hours (951) 827 – 5228
 - ii. UCPD Non-Emergency/ Non-Business Hours (951) 827 – 5222
 - iii. UCPD Emergency 9-1-1
5. Wait 30 minutes to allow aerosols to settle or vent.
6. Don appropriate BSL-2 PPE for cleaning up the spill (e.g., N95 respirator or PAPR, solid-front gown or Tyvek suit, double gloves, and safety goggles/face shield).
7. Place absorbent materials on and around the spill (e.g., paper towels).
8. Apply an effective disinfectant (e.g., 1:10 dilution of bleach) to the spill and allow it to sit for the appropriate contact time (e.g., 30 minutes for bleach). Avoid splashing and creation of aerosols.
9. Clean/Wipe the spill area.
10. Dispose waste into red biohazard bag.
11. Clean the area again.
12. Remove PPE.
13. Wash hands with soap and water.
14. Report the spill to your PI/Lab Manager/Supervisor.

Disinfection and Inactivation

10% bleach solution (0.5% sodium hypochlorite) followed by 70% ethanol-bleach solution is recommended to be made fresh daily and contact time must be 30 minutes.

Follow disinfection/inactivation protocols approved by the Institutional Biosafety Committee (IBC) and/or Institutional Animal Care and Use Committee (IACUC) as outlined in your Biological Use Authorization (BUA) and/or Animal Use Protocol (AUP), respectively.

Laboratory Practices

- Standard microbiological and BSL-2 practices must be followed, including performing all manipulation of live *Mycobacterium bovis* / BCG inside a certified Biosafety Cabinet (BSC).
- A BSL-2/ABSL-2 biohazard warning sign must be posted on the laboratory door whenever *Mycobacterium bovis* / BCG is actively in use or stored.
- Animal cages housing inoculated animals must be clearly labeled with the biohazard symbol, pathogen name (*Mycobacterium bovis* / BCG), and exact date of inoculation.
- Preparation, inoculation, cage changes, and animal handling involving infected animals must be performed within a certified Biosafety Cabinet or other appropriate primary containment device.
- Carcasses must be disposed of as biohazardous waste.
- Safety-engineered sharps devices (e.g., retractable needles, blunt-end cannulas, safety scalpel blades) must be used whenever technically feasible to minimize the risk of accidental parenteral exposure.

Waste Disposal Procedures

- Sharps Waste: Place all sharps in red sharps container that is rigid, leak proof, and has the international biohazard symbol. Do not recap needles. Once $\frac{3}{4}$ full or at the fill line, close and secure the lid. Closed and secured sharps containers can be placed in the EHSRM provided biohazardous waste collections bins for pickup and disposal. Additional sharps containers can be requested for free from EHSRM.
- Solid Waste: Label a dual-test compliant red biohazard bag with PI name, building and room number before filling it. Bag should be placed in a hard-walled, leak-proof container with a tight fitting lid before adding waste. Within 7 days of first waste generation or once bag is $\frac{3}{4}$ full, whichever is earlier, close the bag and transfer to EHSRM provided biohazardous waste collection bin.
- Liquid Waste: Prepare a compatible waste bottle with a tight fitting cap. Add enough undiluted bleach to the bottle to achieve 10% final concentration of bleach (1 part bleach: 9 part liquid waste). Cap tightly, invert, and gently mix contents to ensure bleach contacts all inner surfaces of the bottle. Let bottle sit for appropriate contact time (30 minutes) before pouring down laboratory sink drain followed by copious amounts of water to flush the pipes. If using another liquid disinfectant, create and affix Waste Accumulation Storage Tracking electronically (WASTE) label to bottle and dispose of as chemical waste following the WASTE process.
- Animal Bedding, Waste and Caging Equipment: Follow vivaria standard operating procedures for disinfection of reusable caging equipment prior to cage washing or dispose of disposable cages as biohazardous waste. Bedding and other waste in contact with animals or their excretions should be disposed of as biohazardous waste.

- Animal Carcasses: Dispose of carcasses as pathological biohazardous waste.

Immediate Response Following Exposure

- Eyes or Mucous Membrane Exposure from Splash or Aerosols - rinse a minimum of 15-minutes using eye wash and report to your supervisor immediately. Follow *Reporting Exposure Incidents* protocol.
- Skin Contamination - Wash affected areas with soap and water for 15-minutes and report the incident to your supervisor immediately. Follow *Reporting Exposure Incidents* protocol.
- Needlestick and/or Sharps Exposure – Wash and express wound with soap and water for 15 minutes. Immediately notify your supervisor. Follow *Reporting Exposure Incidents* protocol.

Post-Exposure Medical Monitoring

Individuals with a known or suspected exposure to *Mycobacterium bovis*/BCG should:

- Undergo a baseline Tuberculosis Skin Test (TST) or Interferon-Gamma Release Assay (IGRA blood test) through Occupational Health as soon as possible after exposure, unless a documented positive baseline already exists.
- Receive a follow-up TST or IGRA test at 8 to 12 weeks post-exposure to detect potential conversion (latent infection).
- Monitor for signs and symptoms of active tuberculosis disease—including persistent cough, fever, night sweats, unexplained weight loss, or localized swelling/lesions—for 1 to 2 years following the incident.
- Report any developing symptoms immediately to Occupational Health and your primary care physician to initiate clinical evaluation, chest radiography, and diagnostic workup.
- Inform treating healthcare providers of the specific *M. bovis* or live BCG strain exposure so appropriate diagnostic testing and multi-drug therapy (accounting for intrinsic pyrazinamide resistance) can be selected.

Reporting Exposure Incidents

Any exposure incidents such as with eyes, nose, mouth, skin contamination, needlestick and/or sharps exposure—must **be immediately reported** to:

- **Your PI or laboratory supervisor**
- **UCR Biosafety Officer (BSO) and EHSRM at (951) 827-5528** or using the [online reporting link](#) at the top of the [EHSRM webpage](#).
- **Occupational Health** ehsocchealth@ucr.edu

- You may contact the **UCI Medical Center Infectious Disease Fellow on call at 714-456-6011 for immediate counseling and guidance.** UCR maintains an agreement with the UCI Center for Occupational and Environmental Health (COEH) Clinic, which serves as our Occupational Health provider and reviews UCR's Animal Occupational Health Program.

Undergraduate Student Employees report your injury to your supervisor (or go to [Employee Injuries](#)). For life-threatening injuries, call 911 immediately. For all other injury types, seek Medical Treatment at UCR's preferred Occupational Clinics. Visit the [Medical Treatment Facilities](#) webpage to learn more about where to seek medical treatment.

References

“About Bovine Tuberculosis in Humans.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, www.cdc.gov/tb/about/m-bovis.html. Accessed 7 Aug. 2026.

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Okafor, Chika N. “Bacillus Calmette Guerin (BCG) Vaccine.” *StatPearls [Internet]*., U.S. National Library of Medicine, 3 July 2023, www.ncbi.nlm.nih.gov/books/NBK538185/. Accessed 7 Aug. 2026.



**University of California, Riverside
BIOLOGICAL AGENT CARD**



My job requires me to work with *Mycobacterium bovis* (BCG) and animals orally injected with it.

If the person with this card exhibits any of the symptoms listed on the back, immediately contact the UCI Medical Center Infectious Disease Fellow on call at (714) 456-6011. For immediate medical counseling on what to do right away, proceed to the nearest Emergency Department and present this card. For more information or to report an incident call: UC Riverside, Occupational Health, at (951) 827-5528.

***Mycobacterium bovis* BCG** can enter the body through ingestion, inhalation, injection, or abraded skin.

INCUBATION PERIOD: 4 to 12 weeks after exposure.

SYMPTOMS: Symptoms of TB disease caused by *M. bovis* are similar to those caused by *M. tuberculosis*, commonly including fever, night sweats, unexplained weight loss, and a persistent cough. Depending on which part of the body is affected by the infection, additional localized symptoms may also occur.

TREATMENT: Combination antibiotic therapy, similar to *M. Tuberculosis*, consists isoniazid, rifampin, ethambutol, pyrazinamide. *M. Bovis* has inherent resistance to pyrazinamide. Treatment is adjusted based on culture and susceptibility results and with the aid of an infectious diseases specialist.

Acknowledgement of Working with Mycobacterium bovis

By signing below, I confirm that I have reviewed and understood the requirements for working with Mycobacterium bovis I agree to comply with all outlined responsibilities, including:

- Following safe laboratory practices and use of appropriate PPE
- Applying proper first aid and decontamination procedures in the event of an exposure
- Promptly reporting any exposures, incidents, or safety concerns to my supervisor, Biosafety Officer, and Occupational Health

Name (Print)	Identification*	Signature	Date	Supervisor / Principal Investigator

*Identification: Provide your UCR Student ID, Employee ID, UCR NetID, UCR Email, or Date of Birth.