California Institute of Technology

Bloodborne Pathogens Exposure Control Plan

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CHAPTER I: INTRODUCTION

The California Institute of Technology (Caltech) is committed to conducting work activities in a manner that promotes the safety and health of faculty, staff, students, and visitors and complies with all applicable occupational health and safety regulations. The following Exposure Control Plan (ECP) is provided to eliminate or minimize occupational exposure to Bloodborne Pathogens in accordance with OSHA Standard 29 CFR 1910.1030. The California Code of Regulations, Title 8, Section 5139, Bloodborne Pathogen Standard applies to all Caltech personnel who have occupational exposures to blood or other potentially infectious materials (OPIM). Because research activities in Caltech laboratories, as well as activities supporting the research effort and student life, may expose Caltech employees to microorganisms that cause disease in humans, this plan is designed to eliminate or reduce occupational exposures. This plan sets forth procedures, control measures, and equipment designed to eliminate or minimize risk from exposure to the Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV), and other Bloodborne Pathogens.

The ECP is a key document to assist Caltech members in implementing and ensuring compliance with the Standard. This ECP includes:

- Program administration
- Determination of exposure risk
- Implementation of various methods of exposure control, including
  - Universal precautions
  - Engineering and workplace controls
  - Personal Protective Equipment
  - Housekeeping
- Hepatitis B vaccination program
- Post-exposure management
- Communication of hazards and training
- Recordkeeping

CHAPTER II: PROGRAM ADMINISTRATION

The Caltech Environment, Health, and Safety (EHS) Office and the Institute Biosafety Officer (BSO) are responsible for implementation of the ECP. The Caltech EHS Office and BSO will maintain, review, and update the ECP at least annually and whenever necessary to include new or modified tasks and procedures. Contact Info: safety@caltech.edu; 626-395-6727 or x6727.

Those employees who have occupational exposure to blood or OPIM must comply with the procedures and work practices outlined in the ECP.

Each Caltech Division, Department, and Laboratory will provide and maintain all necessary personal protective equipment (PPE), engineering controls (e.g., sharps containers, annually certified Biosafety Cabinet), labels, and biohazardous waste containers as required by the Standard. Caltech Divisions, Departments, and Laboratories will ensure adequate supplies of equipment are readily available in the appropriate size(s). Employees can contact their direct Supervisors for more information.

The EHS Office and BSO are responsible for training, documentation of training, and making the written ECP available to Caltech personnel as well as OSHA and NIOSH representatives. Contact info: safety@caltech.edu; 626-395-6727 or x6727.
CHAPTER III: EXPOSURE DETERMINATION

Caltech is a world-renowned science and engineering Institute whose academic divisions’ research and education focus on Biology and Biological Engineering; Chemistry and Chemical Engineering; Engineering and Applied Science; Geological and Planetary Sciences; Humanities and Social Sciences; and Physics, Mathematics, and Astronomy. Therefore, there is not a specific job classification at Caltech in which all employees have occupational exposure to Bloodborne Pathogens. For exposure determination, employees are sorted into two main categories: employees engaged in research activity in research laboratory settings (e.g., professors, research technicians, post-doctoral fellows, or PhD candidates) and employees involved in the support of research activities and student life who will have sporadic access to laboratory settings (e.g., custodial staff) or who might provide first aid and/or medical care to Caltech personnel (e.g., Campus Security staff or Student Wellness Services staff).

For all groups, exposure determination is made through distinct risk assessments performed by EHS Safety Engineers and/or the BSO.

A. EXPOSURE DETERMINATION FOR RESEARCH GROUPS

Risk assessment and exposure determination for employees within research groups is performed in part by the Institutional Biosafety Committee (IBC). The IBC, with the support of the BSO, reviews and approves research activities involving sample collection from human subjects and the use of human blood and OPIM as defined by OSHA. All employees registered on an IBC protocol for the use of these materials are considered at risk for potential exposure to Bloodborne Pathogens.

The following are examples of job classifications and activities and/or procedures with the potential of occupational exposure. Please note that—as research activities and procedures are always evolving—this list is not exhaustive, and the IBC provides ongoing assessments to keep abreast of the exposure risks for employees in the laboratories (http://ibc.caltech.edu/).

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Tasks/Procedures (Examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor</td>
<td>Work with infectious HIV</td>
</tr>
<tr>
<td>Research Technician</td>
<td>Extract immune cells from human blood</td>
</tr>
<tr>
<td></td>
<td>Handling of NHP tissues</td>
</tr>
<tr>
<td>Postdoctoral Fellow</td>
<td>Culture human cells</td>
</tr>
<tr>
<td>Graduate Student</td>
<td>Extract DNA from human tissues</td>
</tr>
</tbody>
</table>

B. EXPOSURE DETERMINATION FOR SUPPORT GROUPS

Risk assessment and exposure determination for employees within support groups is performed by their Supervisor or by the department head with the assistance of EHS Safety Engineers and/or the BSO.

The following is a list of job classifications wherein some employees have a potential for occupational exposure and tasks and procedures with the potential of occupational exposure may occur.

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Department</th>
<th>Task/Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletic Trainers</td>
<td>Athletic Center</td>
<td>Provide first aid and routine treatment of athletic wounds</td>
</tr>
<tr>
<td>Special Response Officers (SRO)</td>
<td>Facilities – Campus Security</td>
<td>Provide first aid and coordinate emergency response on campus</td>
</tr>
<tr>
<td>Blood clean-up technicians</td>
<td>Facilities – Campus Custodians</td>
<td>Clean emergency scene when blood is present on campus</td>
</tr>
<tr>
<td>Blood clean-up technicians</td>
<td>Facilities – Student Housing Custodians</td>
<td>Clean emergency scene when blood is present in Student Housing</td>
</tr>
</tbody>
</table>
### CHAPTER IV: METHODS OF IMPLEMENTATION AND CONTROL

#### A. UNIVERSAL PRECAUTIONS

All Employees will utilize Universal Precautions. Universal Precautions is an approach to infection control to treat all human blood, human body fluids, and OPIM as if they were known to be infectious for HIV, HBV, and other Bloodborne Pathogens.

#### B. EXPOSURE CONTROL PLAN

Employees covered by the Bloodborne Pathogens Standard receive an explanation of this ECP during their initial training session and annual refresher training. Employees can review this plan any time during their work shifts by contacting the EHS Office. Employee requests for a hard copy of the ECP will be completed within 15 business days upon receipt of such request.

#### C. ENGINEERING CONTROLS AND WORK PRACTICES

Work practice controls and engineering controls are used to prevent or minimize exposure to Bloodborne Pathogens.

The specific work practices and engineering controls used are listed below.

1. **Work Practices**
   
   - Hand washing
     - Personnel must wash their hands immediately or as soon as possible after working with or potential exposure to blood or OPIM.
   
   - Eating, drinking, applying cosmetics or lip balm, smoking, or handling contact lenses is strictly prohibited in clinical or biological research areas for all personnel; this includes all wet laboratory spaces operating at Biosafety Level 1 and above.
   
   - Storage of food or drink for human consumption in clinic or laboratory refrigerators, including cold rooms, is prohibited.
   
   - Personal item storage is prohibited in areas where potentially infectious materials are present. All personal items should be kept in offices or desk areas and not on laboratory bench tops.
   
   - Procedures involving blood and OPIM should only be conducted by properly trained personnel and in a manner that minimizes splashing, spraying, aerosolizing, and/or generating droplets of potentially infectious materials.
   
   - Mouth pipetting or suctioning is strictly prohibited.
   
   - Specimens of blood or OPIM are to be placed in leak-proof primary containers during collection, handling, processing, and storage. For transport, proper labelling, absorbent material, and a secondary leak-proof container should be added.
   
   - Equipment must be routinely maintained according to a maintenance schedule (e.g., certification of Biosafety Cabinet) and routinely decontaminated.
   
   - Equipment must be decontaminated before servicing or shipping.
   
   - Broken glassware should never be picked up by hand.
Tongs or a brush with dustpan are to be used when handling broken glassware.

- The use of needles, syringes, razor blades, and other sharps is to be minimized whenever possible. After use, syringe-needle units must be disposed of in a dedicated sharps container at the point of use without removing, bending, or recapping the needles.

2. Engineering Controls

*Biosafety Cabinets*

Research activities are to be performed in Biosafety Cabinets whenever there is a high potential of splashing or aerosol release of human material.

Biosafety Cabinets are to be checked by laboratory personnel for proper functioning each time they are used. All laboratory personnel should be trained on how to properly operate research activities in a Biosafety Cabinet.

Biosafety Cabinets must be certified according to the National Sanitation Foundation / American National Standards Institute (NSF/ANSI) 49 Standard annually, when newly installed, or when moved, and the inspection record shall be posted on the Biosafety Cabinet (certification sticker). Certification is performed by approved Caltech vendors operating according to the NSF/ANSI 49 Standard.

*Needles and Non-Needle Sharps*

When convenient or appropriate, the use of sharps should be eliminated or minimized. If sharps must be used, the following precautions are to be implemented:

- Needles and other sharps will not be bent, recapped, removed, sheared, or purposely broken.
  - Needles will never be recapped using two hands. If a needle must absolutely be recapped, a one-handed method or a mechanical device (e.g., forceps or hemostats) is to be used.
- Contaminated sharps must be placed in puncture-resistant sharps containers labeled with the biohazard sign.
  - Biohazard sharps containers must not be overfilled. When the container is 2/3 full as indicated by the "full line" on the container, employees will close it and contact the EHS Office for pick up by completing the online form for *Facilities Service Requests*.
- Sharps with engineered sharps injury protection should be used when working with human material unless engineered sharps injury protection is not available. Note: To determine if there is a viable device with engineered sharps injury protection available, a minimum of two vendors must be researched to determine market availability.
- Blades and other cutting tools should be engineered with safe and self-retracting blades whenever possible.

For employees within the research groups, Caltech identifies the need for changes in engineering controls and work practices through regular EHS and BSO inspections of laboratory spaces. Laboratories handling human-derived material or OPIM operate at Biosafety Level 2 in accordance with the *Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition*, published by the U.S. Department of Health and Human Services. New procedures or products are evaluated in consultation with the IBC and the BSO.

For employees within the support groups, Caltech identifies the need for changes in engineering controls and work practices through regular EHS inspections. New procedures or products are evaluated by EHS Safety Engineers and the BSO.

For medical personnel (nurses and medical assistants) at Student Wellness Services (SWS), changes in engineering controls and equipment are assessed under the SWS Infection Control Program.

3. Personal Protective Equipment (PPE)

PPE is provided to Caltech employees in the appropriate size and at no cost to them. Training in the use of the appropriate PPE for specific tasks or procedures is provided by their Supervisors, by the EHS Office, or by the BSO, depending on the task and the training requirement.
The types of PPE available to employees are:

- Nitrile gloves
- Latex gloves
- Safety glasses
- Safety goggles
- Face masks
- Face shields
- N95 respirators
- Lab coats
- Disposable gowns

PPE is located in each research laboratory (BSL2-designated areas) or patient room at Student Wellness Services. PPE is also available in an on-site EHS storage unit for EHS Safety Engineer incident response purposes. Exact locations for specific PPE may be obtained through lab Supervisors, EHS personnel, or employee Supervisors.

All employees using PPE must observe the following precautions:

- Wear appropriate gloves when it is reasonably anticipated that there may be hand contact with blood or OPIM and when handling or touching contaminated or potentially contaminated items or surfaces.
- Never wash or decontaminate disposable gloves for reuse—nitrile and latex gloves are one-time use only.
- Utility gloves may be decontaminated for reuse if their integrity is not compromised; discard utility gloves if they show signs of cracking, peeling, tearing, puncturing, or deterioration.
- Wear appropriate face and eye protection when splashes, sprays, splatters, or droplets of blood or OPIM may occur, posing a hazard to the eyes, nose, or mouth.
- Remove PPE immediately after it becomes contaminated and before leaving the work area.
- Discard used PPE in a biohazard/biomedical red bin and red bag waste containers.
- Always wash hands immediately or as soon as feasible after removing gloves and other PPE.

Personnel engaged in research activities with live HIV should also don and doff specialized PPE according to the laboratory SOP as reviewed and approved by the IBC and the BSO.

4. Waste Management and Housekeeping

Regulated waste is to be placed in containers which are closable, constructed to contain all contents and prevent leakage, appropriately labeled and/or color-coded, and closed prior to removal to prevent spillage or protrusion of contents during handling.

- Bloodborne Pathogen or BSL2 solid waste is placed in a red bin lined with red bags that are labeled with the universal biohazard symbol and the ASTM markings required by the California Department of Public Health. These containers should not be used for sharps or other materials that can easily puncture the plastic liner.
- Sharps (needles and non-needle objects that could readily puncture or cut the skin) are discarded in dedicated biohazard sharps containers, which are closeable, puncture-resistant, and leak-proof. Each department is responsible for supplying appropriate sharps containers.

All contaminated items are to be discarded immediately or as soon as possible in appropriate containers at the point of use.

Containers (bins and pans) are to be cleaned and decontaminated as soon as feasible after visible contamination. A solution of 10% bleach is an appropriate disinfectant for surfaces and containers in a research laboratory setting. Clinical settings can also use EPA-registered disinfectant(s).

Broken glassware that may be contaminated is only to be picked up using mechanical means such as tongs or a brush and dustpan.

Lab coats should be laundered on a regular basis. Each department is responsible for the organization of
the laundry service to be used. If a lab coat is visibly contaminated with human blood or OPIM, it is highly recommended to discard it in the biohazardous solid waste container.

Work practices should include regular, beginning of the day, and end of the day surface decontamination for patient rooms/treatment areas, research benches, and biosafety cabinets used to handle human-derived material. An appropriate disinfectant such as a solution of 10% bleach or Accelerated Hydrogen Peroxide solution should be used. Clinical settings can also use an EPA-registered disinfectant.

A portable (tabletop) steam sterilizer is used in the Student Wellness Services clinic for the sterilization of small instruments (e.g., forceps, scissors) used in minimally to non-invasive procedures. The ability of the sterilizer to reach physical parameters necessary to achieve sterilization should be monitored by mechanical, chemical, and biological indicators.

Cleaning tools used in blood emergency scene cleanup by support groups are to be decontaminated chemically with 10% bleach after use. In case of heavy contamination, it is highly recommended to discard the tools in a biohazardous waste container of the appropriate size.

5. Labels

The following labeling methods are used at Caltech:

- Research laboratory doors are labeled with biohazard signs indicating the use of human blood or OPIM inside the laboratory space. Labels include access and emergency contact information.
- Waste containers (red bin and sharps containers) have all visible sides marked with a biohazard label.
- Labeling methods for Student Wellness Services are described in detail in their Infection Control Program.

EHS is responsible for ensuring that warning labels are affixed and/or red bags are used as required for regulated waste. Employees are to notify the EHS Office (626-395-6727 or x6727) if they discover regulated waste containers, refrigerators containing human blood or OPIM, contaminated equipment, etc. without proper labels or liners. Labs are responsible for the purchase of related sharps/waste containers, the EHS Office provides the red bags.

CHAPTER V: HEPATITIS B VACCINATION

EHS and the BSO will provide training to Caltech employees on Hepatitis B vaccinations that addresses safety, benefits, efficacy, methods of administration, and availability of the vaccine. The Hepatitis B vaccination series is available at no cost after initial employee training and within 10 days of initial assignment to all Caltech employees identified in the exposure determination section of this document.

Vaccination is encouraged unless 1) documentation exists that the employee has previously received the series, 2) antibody testing reveals that the employee is immune, or 3) medical evaluation shows that vaccination is contraindicated.

If an employee declines the vaccination, the employee must sign a declination form. Employees who decline may request and obtain the vaccination at a later date during their employment at no cost. Documentation of refusal of the vaccination is kept on file in the EHS Office.

Vaccination will be performed by the Caltech-contracted Occupational Health Provider: Concentra Urgent Care - 9350 Flair Dr., Unit 102, El Monte 91731 / 626.407.0300 M-Fri. 8:00am-5:00pm.

Vaccination records are kept as confidential patient information by Concentra under HIPAA regulations.
CHAPTER VI: POST-EXPOSURE MANAGEMENT

Caltech operates under an Injury and Illness Prevention Program, and the EHS Office investigates and follows up on incidents and accidents in conjunction with all necessary reporting and follow-up requirements.

Caltech ensures that the health care provider responsible for the occupational health program for employees is properly informed about research and support activity taking place at Caltech as it relates to potential Bloodborne Pathogens exposure, Hepatitis B vaccination program, post-exposure evaluation, and follow-up.

A. POST-EXPOSURE RESPONSE

Personnel accidentally exposed via ingestion, skin puncture, or obvious inhalation of an infectious agent should immediately receive or self-perform appropriate first aid. Personnel are trained on the following first-aid procedures:

1. For a Needle Stick or a Cut from a Contaminated Sharp
   - Immediately wash the area with soap and water or an appropriate disinfectant; and
   - Wash the area with appropriate disinfectant (alcohol wipes, iodine pads, hydrogen peroxide).

2. For a Splash in the Eye
   - Immediately flush the eye with temperate water from the nearest eyewash station (tested monthly) for 15 minutes. If an eyewash station is not available, use temperate water from the faucet or an emergency eye saline solution for 15 minutes.
   - Hold the eyelid open to ensure effective rinsing.

3. For Contamination on the Body
   - Remove contaminated clothing, shoes, jewelry, etc.
   - Immediately flood exposed skin with water and wash with soap and water. If a safety shower is not available, use a faucet.

B. OBTAINING MEDICAL ATTENTION AND REPORTING INSTRUCTIONS

Immediately following first-aid procedures, the exposed individual will be advised to seek medical attention for the determination of available treatment and follow-up by an Occupational Health Care Physician, adhering to the following procedure:

Call security at x5000 or 626-395-5000 and indicate the nature of the incident.
   1. Security will call 911 if paramedics are necessary.
   2. If employee is not able to drive themselves to the clinic, Security will arrange for a taxi and provide employee with a voucher for payment.

Occupational Health Clinics

Report to one of the following Occupational Health Clinics contracted by Caltech:

Monday to Friday:
  8:00am-5:00pm: Concentra Urgent Care - 9350 Flair Dr., Unit 102, El Monte 91731 / 626.407.0300
  5pm-8:00am: Huntington Memorial Hospital 711 S. Fairmount Ave., Pasadena 91105 / 626.397.5000

Weekends:
  Huntington Memorial Hospital (address/phone above)

In addition, all injuries, accidents, and exposures should be reported to the employee’s Supervisor and the Caltech EHS Office at 626-395-6727 or x6727 using the Supervisors Injury Investigation Report with the original provided to the Disability & Leave Administration Unit at Mail Code 170-84 within three working days of the incident.
Research Laboratories that use HIV or HIV-derived virus containing greater than ½ the HIV viral genome must review, post, and adhere to the HIV Exposure Response Procedure designed for the laboratory. Personnel exposed or potentially exposed to HIV or HIV pseudo virus will follow the posted procedures.

C. PROCEDURES FOR EVALUATING THE CIRCUMSTANCES SURROUNDING AN EXPOSURE INCIDENT

EHS and/or the BSO will review the circumstances of all exposure incidents to determine:

• Engineering controls in use at the time
• Work Practices followed
• Description of the device used (type/brand)
• PPE or protective clothing used at the time
• Location of the incident
• Procedure being performed when incident occurred
• Employee’s training history

The Disability and Leave Administration Unit at Caltech will record all percutaneous (through the skin) injuries from contaminated sharps in a Cal/OSHA Log 300 Form.

CHAPTER VII: EMPLOYEE TRAINING

All Caltech employees who have potential occupational exposure to Bloodborne Pathogens receive initial and annual refresher training (in person or online).

Employees of Student Wellness Services are trained by the Medical Director for the Center.

All Caltech employees who have occupational exposure to Bloodborne Pathogens receive training on the epidemiology, symptoms, and transmission of Bloodborne Pathogens diseases. In addition, the training program covers, at a minimum, the following elements:

• An explanation of the OSHA Bloodborne Pathogens Standard.
• An explanation of the ECP and how to obtain a copy.
• An explanation of methods to recognize tasks and other activities that may involve exposure to blood and OPIM, including what constitutes an exposure incident.
• An explanation of the use and limitations of engineering controls, work practices, and PPE.
• An explanation of the types, uses, location, removal, handling, decontamination, and disposal of PPE.
• An explanation of the basis for PPE selection.
• Information on the Hepatitis B vaccine, including information on its efficacy, safety, methods of administration, the benefits of being vaccinated, and that the vaccine will be offered free of charge.
• Information on the appropriate actions to take and persons to contact in an emergency involving blood or OPIM.
• An explanation of the procedures to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
• Information on the post-exposure evaluation and follow-up that the employer is required to provide for the employee following an exposure incident.
• An explanation of the signs and labels and/or color coding required by the Standard and used at Caltech.
• An opportunity for interactive questions and answers with the person conducting the training session.

Training materials are available at the EHS Office or at Student Wellness Services.
CHAPTER VIII: RECORDKEEPING

A. BBP TRAINING RECORDS

BBP Training records are created for each employee. EHS training documents are kept for at least three years in the EHS Office.

The training records include
- The date of training
- The name of the course (BBP)
- Completion status – attended/not attended
- The name, Caltech ID number, and Division/Department of the person attending the training

EHS employee training records are provided upon request to the employee or the employee’s authorized representative within 15 working days. Such requests should be addressed to the EHS Office at safety.training@caltech.edu.

B. MEDICAL RECORDS

Medical records are maintained for each employee with occupational exposure in accordance with the Department of Industrial Relations Title 8, Section 3204 “Access to Employee Exposure and Medical Records.” Caltech-contracted occupational health care providers are responsible for maintenance of requisite medical records. These confidential records are kept for at minimum the duration of an individual’s employment plus 30 years.

Employee medical records are provided upon request to the employee or to anyone having written consent from the employee within 15 working days. Such requests should be sent to the Caltech-contracted occupational health care provider directly.

C. OSHA RECORDKEEPING

Exposure incidents require completion of a Supervisors Injury Investigation Report. Once completed, email the form to safety@caltech.edu then return the original completed form to the Disability & Leave Administration Unit at Mail Code 170-84 within three working days of the incident. Exposure incidents are evaluated and recorded by the Disability and Leave Administration Unit using the Cal/OSHA Log 300 Form to determine if the case meets OSHA’s Recordkeeping Requirements (Title 8 Sections 14300–14300.48).

All recorded incidents include at minimum:
- Date of injury
- Witness(es) to injury
- Department/work area where injury occurred
- Description/explanation of how injury occurred

This log is reviewed as part of the annual program evaluation and maintained for at least five years from the date the exposure incident occurred.

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