# LABORATORY BIOSAFETY POLICIES/PROCEDURES

## I. GENERAL

These policies/procedures provide general/basic safety requirements to be followed in order to safely detect and correctly identify those biological agents most likely to be used in a bioterrorist incident.

CLIA policies and guidelines are enforced when examining human specimens. Environmental and nonclinical samples should be tested under the same rigorous testing conditions and in compliance with procedural quality control and biosafety requirements.

## II. LABORATORY REQUIREMENTS

A. LRN Reference Laboratories operate in compliance with all BSL-2 and BSL-3 requirements.
   1. Laboratory is certified Biosafety Level 3 (BSL-3).
   2. Laboratory personnel have specific training in handling pathogenic and potentially lethal agents and toxins and are supervised by competent scientists who are experienced in working with these agents.

B. The Biosafety Level 3 facility must be tested for re-verification annually to ensure that the design and operational parameters are being met on a continual basis.

C. Drills or exercises must be conducted at least annually to test and evaluate the effectiveness of the biosafety plan. They must be documented to include how the drill or exercise tested and evaluated the plan, any problems that were identified and corrective actions(s) taken, and the names of registered entity personnel participants. The plan must be reviewed and revised, as necessary, annually, after any drill or exercise and after any incident.

## III. COMPLIANCE METHODS

A. Universal precautions will be used to prevent contact with specimens or other potentially infectious materials/toxins. All specimens or other potentially infectious material will be considered infectious regardless of the perceived status of the source. All cuts or open sores must be bandaged at all times, even if wearing gloves.

B. Universal precautions consist of the following procedures:

1. Routinely use barrier protection to prevent skin and mucous membrane contamination with all specimens or other potentially infectious materials/toxins.
2. Wear gloves when:
   a. Touching specimens or other potentially infectious materials/toxins, including during routine laboratory work.
   b. Touching all laboratory specimens and tissues.
   c. Handling items contaminated with potentially infectious materials/toxins, including specimen containers, laboratory instruments, countertops, etc. (Observe clean technique, i.e. avoid cross-contamination.)
3. Wear a mask and eye covering (safety glasses), or preferably a face shield, during procedures that are likely to generate droplets of potentially infectious materials/toxins to prevent exposure of the mucous membranes of the mouth, nose and eyes. Eye and face protection must either be disposed of with other contaminated laboratory waste or decontaminated before use. Persons who wear contact lenses in laboratories must also wear eye protection.
4. Wash hands or other skin surfaces thoroughly and immediately if contaminated with specimens or other potentially infectious materials/toxins.
5. Change gloves frequently.
6. Wash hands immediately after gloves are removed.
7. Long hair should be restrained so that it cannot contact hands, specimen, containers, or equipment.
8. Take extraordinary care to avoid accidental injuries caused by needles, scalpel blades, laboratory instruments, etc. when performing procedures, cleaning instruments, handling sharp instruments, and disposing of used needles. Broken glassware and other sharp items may be removed only by using a mechanical device or tool (forceps, tongs, broom, and dustpan).
9. Place used needles, skin lances, scalpel blades, and other sharp items into a puncture-resistant biohazard container for disposal. The container should be located as close as possible to the work area.
10. To prevent needlestick injuries, needles must not be recapped, purposely bent, cut, broken, removed from disposable syringes or otherwise manipulated by hand.
11. Any non-disposable sharps must be disinfected with a 1:10 solution of 5.25% - 6.15% hypochlorite solution (5250-6150 mg/L) made fresh daily or Bleach Germicidal Cleaner disinfectant. If used within the BSL-3 laboratory, they must also be placed in an autoclavable sterility pouch which must be placed in a hard-walled container and transported to the autoclave room for steam sterilization.
12. Minimize the need for mouth-to mouth emergency resuscitation procedures. Mouthpieces, resuscitation bags, or other ventilation devices should be used routinely.

13. Take care to minimize the formation of droplets, spatters, splashes, and spills of specimens or other potentially infectious materials/toxins.
14. Work surfaces are decontaminated at least once a day and after any spill of viable material. See Section IV.D Disinfection/ Decontamination for instructions.

C. All employees with exudative lesions or weeping dermatitis should refrain from handling contaminated equipment and specimens until the condition resolves. NOTE: Alternatively, skin lesions should be covered with an occlusive bandage to prevent contamination.

D. Pregnant women are not known to be at greater risk of contracting bloodborne infections than other laboratory workers. However, pregnant employees should be especially aware of universal precautions.

E. Biosafety training for all laboratory personnel on Biosafety Level 2 and Biosafety Level 3 practices for all potentially infectious materials/toxins, as well as proper use of all Personal Protective Equipment (PPE), will occur on an annual basis. New employees will receive biosafety training immediately after hire. Personnel must receive annual updates or additional training when procedural or policy changes occur.

F. Visitors entering the Biosafety Level 3 laboratory area (rooms 1714A and 1714) and rooms 1715-1718 must undergo biosafety training on an annual basis before entering these areas. There are training materials located outside each of the areas containing agent/toxin information, compliance methods, engineering and work practice controls and decontamination procedures. A training log is located outside each of the areas and must be signed indicating that training was received.

G. The Laboratory Director establishes policies and procedures whereby only persons who have been advised of the potential biohazard, who meet any specific entry requirements and who comply with all entry and exit procedures enter the areas where select agents/toxins are stored/used.
1. Biosafety training for select agents/toxins is required for all visitors entering the areas where those items are stored/used. All visitors will sign a log indicating that they have received this training annually.

H. Immunizations for certain agents handled or potentially present in the laboratory are available for laboratory personnel. The Hepatitis B vaccine is available for all personnel. The smallpox vaccination is available for personnel working within the BSL-3 facility with the risk of exposure to smallpox. The anthrax vaccination is available for those with a risk of exposure to anthrax.

## IV. ENGINEERING AND WORK PRACTICE CONTROLS

A. Engineering and work practice controls will be utilized to eliminate or minimize exposure.
   1. Employees must wash their hands or other skin with soap and water, or flush mucous membranes with water, as soon as possible following an exposure incident (such as a splash of blood to the eyes or an accidental needle stick.)
   2. Employees must wash their hands immediately (or as soon as feasible) after removal of gloves or other personal protective equipment. Hands should be scrubbed vigorously for at least 20 seconds with anti-microbial soap or alcohol-based hand rub; dry hands with disposable towels. Additional scrub time and reapplication of soap/rub may be performed, and a liberal soaking with 70% isopropyl alcohol may be used in advance of washing hands if probability of skin contamination is high. Hand washing protocols must be rigorously followed.
   3. Employees who encounter improperly disposed needles shall notify their supervisor or manager of the location of the needle(s). Additionally, the medical director and other appropriate authorities at the site shall be notified. Needles shall be disposed of in labeled sharps containers provided at each location.
      a. Needles must never be recapped.
      b. Needles may be removed only by using a mechanical device or tool (forceps, pliers, broom, and dustpan).
   4. Non-disposable sharps must be placed in a hard-walled container for transport to a processing area for decontamination, preferably by autoclaving.
   5. In work areas where there is a reasonable likelihood of exposure to potentially infectious materials/toxins, employees are not to eat, drink, apply cosmetics or lip balm, smoke, or handle contact lenses. Food and beverages are not to be kept in refrigerators, freezers, shelves, cabinets, or on counter tops or bench tops where blood or other potentially infectious materials/toxins are present.
   6. Mouth pipetting/suctioning of specimens or other potentially infectious materials/toxins is prohibited.
   7. All procedures will be conducted in a manner that will minimize splashing, spraying, and generation of droplets of specimens or other potentially infectious materials/toxins.
   8. Wear a laboratory coat, with long cuffed sleeves, and gloves, covering cuff of sleeves, when handling specimens or potentially infectious materials/toxins. Coats are worn at all times in the laboratory and are not to be worn outside the laboratory work area. Disposable lab coats or gowns are recommended.
   9. When select agent inventory is accessed, all individuals in the vicinity are required to wear a disposable laboratory coat and nitrile gloves, even if they are not directly involved in the handling of select agents. This includes employees, visitors, service technicians, inspectors, or any other

persons in room 1715 during this time. Access to this area should be restricted while inventory activities are in progress.

10. Double gloves are not necessary if gloves are removed after each use. However, double gloves are required when working within the BSL-3 laboratory. (See "Procedure for the Proper Personal Protective Equipment (PPE) Required for the BSL-3 Laboratory".) Gloves should not be washed or treated with disinfectants/soap. They should be changed as is necessary/appropriate. Remove and dispose of gloves into proper biohazard waste container for sterilization. Gloves must not be worn outside the laboratory.
11. When handling dry forms of toxins that are electrostatic, do not wear gloves (such as latex) that help to generate static electricity.
12. Since the bioterrorism section works with agents that pose a risk to employees as well as to the environment, a gloves risk assessment study was conducted. This evaluation was done on several different types of gloves that were submitted, including latex, vinyl and nitrile, in order to choose the most appropriate type for use in this laboratory. Based on our findings, we concluded that we will use the powder-free nitrile brands. This brand has performed the best in terms of durability, integrity, grip and fit.
13. The use of respiratory protection and eye protection is required when handling specimens or potentially infectious materials/toxins inside the BSL-3 since there may be a potential for aerosols. Safety glasses, face shields or other splatter guard devices must be used as a means of protection against anticipated splashes or sprays of infectious or other hazardous materials. Personnel wearing contact lenses must also wear eye protection. Eye and face protection must be decontaminated before reuse or disposed of with other contaminated laboratory waste. Make every possible effort to utilize the BSCs when handling and processing potentially infectious samples/specimens. The respirators of choice for this facility are N-95 masks or Powered Air Purifying Respirators (PAPRs). The PAPRs provide high level protection and consist of a fully enclosed hood with a face shield, PAPR assembly, filtering device, and protective coveralls. Respirator users require annual certification/training.
14. When conducting liquid transfers and other operations that pose a potential splash or droplet hazard in an open-fronted hood or BSC, safety glasses and disposable facemask, or a face shield, must be worn.
15. Use equipment and supplies that maximize containment of suspect materials (e.g., aerosol proof centrifuges, specimen carriers, and centrifuge cups with tight seal). Seals on centrifuges should be checked monthly and replaced if needed. When working with infectious agents inside the BSL-3 laboratory, the centrifuge rotors containing those infectious agents should be removed from the centrifuge and transported to the BSC before opening.
16. Glassware should be replaced with plastic wherever practical to minimize the risk of cuts and abrasions from contaminated surfaces.

17. Potentially infectious materials must be placed in a durable, leak proof container during collection, handling, processing, storage, or transport within a facility.
18. All cultures, stocks, and other regulated wastes are decontaminated before disposal by autoclaving. Materials to be decontaminated outside of the immediate laboratory are placed in a durable, leak proof container, and closed for transport from the laboratory. Infectious waste from the BSL-3 laboratory should be decontaminated before removal for off-site disposal.
19. Materials to be removed from the facility for decontamination must be packed in accordance with applicable local, state, and federal regulations.
20. Packaging containers in contact with infectious materials shall be decontaminated or considered a biohazard and be disposed of accordingly. All equipment in contact with infectious materials shall be decontaminated, as appropriate.
21. All open manipulations involving infectious materials/toxins are conducted in biological safety cabinets or other physical containment devices within the containment module. No work in open vessels is conducted on the open bench. When a procedure cannot be performed within a BSC, a combination of PPE and other containment devices, such as a centrifuge safety cup or sealed rotor, must be used. Clean-up is facilitated by using plastic-backed paper toweling on non-perforated work surfaces within biological safety cabinets.
22. Protective laboratory clothing such as solid-front gowns, wrap-around gowns, and disposable scrub suits or coveralls are worn by laboratory personnel while in the BSL-3 laboratory. Protective clothing is not worn outside the laboratory. Clothing must be disposed of when overtly contaminated. Disposable scrub suits are available and may be used if other clothing becomes contaminated.
23. A “Fever Watch Log” is included as part of medical surveillance. All employees working within the BSL-3 laboratory will document each time they are working with infectious agents/toxins. If they should become ill, there will be a record of potential exposure opportunities.
24. Since occupational exposure to human pathogens is a risk, baseline serum samples are collected as appropriate and stored for all at-risk personnel. Additional serum specimens may be periodically collected, depending on the agents handled or the function of the laboratory.
25. All laboratory personnel manipulating select agents and/or toxins under BSL-3 conditions, including women of child-bearing age, pregnant women, and immunocompromised individuals who may be exposed to human pathogens specific to select agents and toxins are provided with information regarding the hazards they may encounter while working with these materials. This information is conveyed in the *Safety Training for Biological Threat Agents* annual training for those employees. Additional information concerning the specific hazards associated with all registered select agents and toxins may be found in the “Infectious Agents Material Safety Data Sheets” manual located in room 1715 and in Appendix A –

Hazardous Characteristics of Select Agents & Pathogens. First aid/treatment procedures are also included in the SDS for infectious agents. Those individuals with the conditions noted above are encouraged to self-identify to the county's healthcare provider for appropriate counseling and guidance. Refer to section VI, Post-Exposure Evaluation and Follow-Up for additional information.

26. All high-risk operations will be conducted with two knowledgeable individuals present. Each must be familiar with the applicable procedures, maintain visual contact with the other, and be ready to assist in the event of an accident.
27. Animal testing is not performed at the Tarrant County Public Health Department bioterrorism laboratory; therefore, no animals of any kind will be allowed in the clinical laboratory at any time.
28. Testing involving plants is not performed at the Tarrant County Public Health Department bioterrorism laboratory and no plants of any kind will be allowed in the Biosafety Level 3 laboratory area (rooms 1714A and 1714) and rooms 1715-1718.
29. The biosafety and containment procedures must be sufficient to contain the select agent or toxin (e.g., physical structure and features of the entity, and operational and procedural safeguards). Provisions to assure proper biosafety cabinet performance and air system operation must be verified. The interlock will be tested as part of the annual biological safety cabinet certification, along with certification of the HEPA filters.
28. Movement of BT personnel transporting select agents from registered areas through non-registered areas such as hallways/corridors will occur due to the design of the laboratory. When this is necessary, select agents are secured inside a sturdy hard plastic sealed container to prevent any accidental releases from occurring.
29. Viable select agents are not manipulated outside of the BSL-3 laboratory. Rendering select agents non-viable is achieved by following the directions in the procedure *Inactivation of Select Agents*, such as extraction followed by filtration. This procedure is found in the *Laboratory Operations Procedures/Policies, Bioterrorism Section* manual. The procedure states that any viable cells (vegetative and spores) are removed after performing this procedure. A sterility check is performed by using 10% of the filtrate incubated on a sheep blood agar plate for a minimum of five days. If the extract is made from *Francisella tularensis*, a chocolate (CHOC) plate must be used instead of SBA.
30. Investigate to determine the reason for any failure of a validated inactivation procedure or any failure to remove viable select agent from material. If the Responsible Official is unable to determine the cause of a deviation from a validated inactivation procedure or a viable select agent removal method, or receives a report of any inactivation failure after the movement of material to another location, the Responsible Official must report immediately by telephone or email the inactivation or viable agent removal method failure to CDC or APHIS.

31. Review, and revise as necessary, each of the entity's validated inactivation procedures or viable agent removal methods. The review must be conducted annually or after any change in Principal Investigator, change in the validated inactivation procedure or viable select agent removal method, or failure of the validated inactivation procedure or viable select agent removal method. The review must be documented, and training must be conducted if there are any changes to the validated inactivation procedure, viable select agent removal method, or viability testing protocol.
32. No manipulation of select agents and toxins are allowed at the same time as non-select agents and toxins. The BSL-3 area only has one biological safety cabinet, but it is thoroughly decontaminated before and after manipulation of each sample type to prevent unintentional contamination.

B. Special engineering and work practice controls must be utilized when working with or manipulating toxins.
1. All unrelated and nonessential work should be restricted from areas where stock solutions of toxin or organisms producing toxin are used. When toxins are in use, the BSL-3 should be clearly posted: "Toxins in Use – Authorized Personnel Only".
2. If toxins are stored in the laboratory, all containers should be sealed, labeled, and secured to ensure restricted access; refrigerators and other storage containers should be clearly labeled and provide contact information for trained, responsible laboratory staff.
3. All pressurized tubes or other containers holding toxins should be opened in a BSC, chemical fume hood, or other ventilated enclosure.
4. Operations that expose toxin solutions to vacuum or pressure, for example sterilization of toxin solutions by membrane filtration, should always be handled in this manner, and the operator should also use appropriate respiratory protection.
5. Glassware should be replaced with plastic for handling toxin solutions wherever practical to minimize the risk of cuts or abrasions from contaminated surfaces.
6. Thinwalled glass equipment should be completely avoided. Glass Pasteur pipettes are particularly dangerous for transferring toxin solutions and should be replaced with disposable plastic pipettes. Glass chromatography columns under pressure must be enclosed within a plastic water jacket or other secondary container.

C. Risk assessments:
1. A risk assessment must be performed each time a select agent or toxin may be present during a testing event. The risk assessment must encompass the hazards that personnel may encounter. Many variables are present that must be considered for each individual. All biosafety precautions regarding select agents or toxins must be followed. Personnel working with select agents or toxins must be assessed and evaluated if any

symptoms of exposure appear. Following testing, inactivation and decontamination would be performed according to the specific instructions. Each assessment performed would be specific to the variables encountered for each select agent or toxin present.
The risk assessments that have been created for select agents and toxins are agent-specific biosafety assessments, confirmatory methods assessments, culture methods for preliminary ID assessments and sample receipt, processing, PCR and TRF assessments. These risk assessments may be found in the *Risk Assessments for the Bioterrorism Response and Emerging Agents (BREA) Section* manual.

2. The specific biological agents and toxins stored/utilized within the BSL-3 area (rooms 1714 & 1714A) and stored in the BT Suite area (room 1715 only) may be found in the *Incident Response Plan,* located in the *Laboratory Operations Procedures/Policies for the Bioterrorism Section* manual, Section IV.F.1.b, *Types of Biological Agents and Toxins.*

D. Disinfection/decontamination
   1. General decontamination information
      a. Laboratory coats and gloves should always be utilized when cleaning up a spill. Eye and respiratory protection are required if there is any potential for generation of aerosols and/or chemical fumes.
   2. Routine decontamination of laboratory work surfaces, **NO** suspect agent
      a. Work surfaces should be wiped down both prior to and after use.
      b. Decontaminate work surfaces with a 1:10 solution of 5.25% - 6.15% hypochlorite solution (5250-6150 mg/L) made fresh daily or Bleach Germicidal Cleaner disinfectant.
   3. Decontamination of *laboratory work surfaces* **WITH** suspect agent
      a. If decontaminating surfaces with toxins and/or spores, decontaminate with a 1:10 solution of 5.25% - 6.15% hypochlorite solution (5250-6150 mg/L) made fresh daily or Bleach Germicidal Cleaner disinfectant.
      b. After allowing to air dry, surfaces may be wiped down with RNase Away.
      c. Dispose of all adsorbent towels/material into autoclave containers/bags for sterilization (60 min, 121$^{o}$ C, 15 psi, slow exhaust).
   4. Decontamination of *spills* **WITH** suspect agent
      a. Immediately alert co-workers within close proximity.
      b. Remove any potentially contaminated PPE and don new PPE (i.e. gloves, boot covers, wrap-around gown, lab coat, safety glasses, etc).
      c. Gather spill kit and hang spill signs located in spill kit.
      d. Establish spill parameter.
      e. Soak towels located in spill kit with a 1:10 solution of 5.25% - 6.15% hypochlorite, or EPA registered equivalent (Bleach Germicidal Cleaner disinfectant). To reduce the chance of creating aerosols, do not spray the spill directly.

f. Working outside-in, cover spill with towels.
g. Allow for appropriate contact time. For biological agents, the contact time should be 20-30 minutes, for toxins, 30 minutes. At lower temperatures and/or with significant quantities of organic matter, the contact time may need to be increased (e.g., up to 60 min with 1:10 hypochlorite).
h. Working outside-in, pick up towels using tongs, also located in spill kit.
i. Dispose of contaminated towels and waste in biohazard bags/boxes to be autoclaved.
j. Mop spill area with a 1:10 solution of 5.25% - 6.15% hypochlorite, or EPA registered equivalent (Bleach Germicidal Cleaner disinfectant).
k. Remove gloves and boot covers. Don new PPE.
l. Log and report incident. All releases/exposures to select agents or toxins should be immediately reported to CDC by submission of APHIS/CDC Form 3 – Incident Notification and Reporting (Theft, Loss or Release). This form may be found online at http://www.selectagents.gov using the forms tab located near the top of the page.

5. Gross decontamination of BSL-3
   a. If gross contamination of the BSL-3 lab area should occur, vapor phase hydrogen peroxide decontamination must be performed. This is done by using the CURIS Core VHP System. Refer to BTP-105 *Operation of the CURIS Core Decontamination System* for instructions.
6. Decontamination of supplies/waste
   a. Contaminated items such as pipettes, needles, loops, and microscope slides should be immersed in decontamination solution until autoclaving.
   b. Disposable, microbiological and non-corrosive chemical wastes are decontaminated by autoclaving (60 min, 121° C, 15 psi, slow exhaust) in closed containers/biohazard bags, then labeled properly and disposed of per laboratory biosafety policies.
7. Decontamination of equipment:
   a. Follow published guidelines for decontamination of equipment.
   b. Equipment must be decontaminated before repair, maintenance, or removal from the laboratory.
8. Special decontamination procedure for *Coxiella burnetii*
   a. Special decontamination procedures are necessary for *Coxiella burnetii* because sodium hypochlorite (household bleach) solutions are not completely effective.
   b. Two disinfectants effective against *C. burnetii* are 70% ethanol and 5% Micro-Chem Plus™, a blend of two quaternary ammonium compounds.

E. Appropriate Biosafety Level (BSL) Working Conditions for each Threat Agent

| Agent | BSL | Laboratory Risk |
|---|---|---|
| *B. anthracis* | 2/3 | medium |
| *Y. pestis* | 2/3 | medium |
| *F. tularensis* | 2/3 | high |
| *Brucella spp.* | 2/3 | high |
| Smallpox | 4 | high |
| *Burkholderia spp.* | 3 | high |
| Ricin toxin | 2/3 | high |
| H5 Avian Influenza | 3 | high |

F. Biological safety cabinet (BSC) operation

1. All open manipulations of materials with suspect agents must be performed in a certified biological safety cabinet (BSC).
2. Certify BSC operations annually. A smoke test procedure must be performed to verify that operational parameters are being met (negative air-pressure).
3. Assure that proper airflow and sterile operations are not impaired; remove unnecessary items from cabinet and intake grills.
4. Keep disinfectant/decontamination supplies readily accessible to BSC for routine cleaning and spill treatment.
5. Decontaminate BSC both prior to use and after use; allow BSC to run ≥10 min prior to use.
6. Dispose of or remove contaminated or waste materials from BSC in properly closed disposal containers (covered trays/pans, sharps container, biohazard bags).
7. Procedures requiring removal of items from a BSC, such as slides for microscopy, should follow published microbiological practices and precautions. As is appropriate, all equipment/materials/waste containers should be decontaminated prior to removal from the BSC.
8. The BSC blower motor may be turned off when not in use to preserve filter life. Leave the BSC sash raised so that proper room exhaust can occur.

G. Emergencies inside the BSL-3 area

For detailed information concerning emergencies inside the BSL-3 area, refer to section IV.F.1.g in the *Incident Response Plan*. This plan may be found in the *Laboratory Operations Procedures/Policies, Bioterrorism Section* manual.

## V. EXPOSURE

Exposure to infectious agents is defined as parenteral (needle stick or other punctures of the skin with a used needle or other sharp item), mucous membrane (splatters/aerosols into the eyes, nose, or mouth), or direct contamination of an open wound or non-intact skin with an infectious substance. All exposures to select agents or toxins should be

immediately reported to CDC by submission of APHIS/CDC Form 3 – Incident Notification and Reporting (Theft, Loss or Release). This form may be found online at http://www.selectagents.gov using the forms tab located near the top of the page.

## VI. POST-EXPOSURE EVALUATION AND FOLLOW-UP

When the employee incurs an exposure incident, it shall be reported immediately to their direct supervisor after first aid is initiated to treat the wound or site of exposure. If the direct supervisor is not available, then the incident should be reported to the next available supervisor or authorized person. All exposure incidents shall be reported, investigated, and documented as outlined in the Tarrant County Public Health Department Risk Management Plan. Following a report of an exposure incident, the exposed employee shall go to the Worker's Compensation Medical Care Program-RiverView Provider Group for a confidential medical evaluation and follow-up. In the event of a suspected exposure refer to the Risk Management Plan, Reporting Employees Injuries and Incidents section in the Tarrant County Public Health Policies manual. Medical evaluation, surveillance, and treatment should be provided and appropriate records maintained.

## VII. REFERENCES

A. *Procedure for Laboratory Safety and Decontamination,* 10/23/01, http://www.lrnb.cdc.gov.htm

B. *Bloodborne Pathogen Exposure Control Plan*, Tarrant County Public Health Department, September 2006

C. *Infection Prevention and Control Guidelines*, Tarrant County Public Health Department, June 2016

D. *Biosafety in Microbiological and Biomedical Laboratories (BMBL), 6th Edition;* Revised June 2020

E. *Tarrant County Public Health Policies, Risk Management Plan*, Tarrant County Public Health Department, 9/25/2017

# Hazardous Characteristics of Select Agents & Toxins

| | HAZARD ROUTES | |
|---|---|---|
| | Direct contact with cultures or materials from humans or the environment | |
| | Ingestion | |
| | Injection | |
| | Exposure to infectious aerosols and droplets | |

| ORGANISM | PATHOGENICITY: | INCUBATION PERIOD: |
|---|---|---|
| **Bacillus anthracis** | Skin lesion becoming papular, then vesiculated and developing into a depressed eschar (5-20% case fatality in untreated cases); inhalation anthrax - respiratory distress, fever and shock with death shortly thereafter; intestinal anthrax - abdominal distress followed by fever, septicemia and death (rare) | Within 7 days of exposure, usually 2 - 5 days |
| **Burkholderia mallei** | Appears in three forms: a chronic pulmonary form with cough, mucopurulent discharge; Farcy, a form characterized by multiple abscesses in the skin, subcutaneous tissues and lymphatics; an acute septicemic form with fever, chills, prostration and death in 7-10 days | 1-14 days |
| **Burkholderia pseudomallei** | Melioidosis - an endemic glanders-like disease; clinical symptoms vary from inapparent infection to chronic infection to rapidly fatal septicemia; may simulate typhoid fever or more commonly tuberculosis, with symptoms such as empyema, chronic abscesses and osteomyelitis | 2 days to years |
| **Brucella spp.** | All Brucella isolates are potentially pathogenic to humans; systemic bacterial disease with acute or insidious onset; intermittent fever, headache, weakness, profuse sweating, chills, arthralgia; localized suppurative infections; subclinical infections are frequent; <2% case fatality rate for untreated cases; may have long recovery period | Highly variable; 5 - 60 days |
| **Coxiella burnetii** | Coxiella burnetii is the causative agent of Q fever. Infections are asymptomatic in as many as 60% of cases. Manifestations of Q fever can be affected by age, strain, route of transmission, gender, and inoculum size, and vary from country to country.The most common manifestations of acute Q fever are self-limited flu-like illness, atypical pneumonia and hepatitis. One of the most common manifestations is acute, self-limiting febrile illness, characterized by severe headaches (51%), cough (34%), myalgia (37%), arthralgia (27%), pericarditis (1%), chills, weakness, malaise, severe sweats, and rarely a rash. | 13 - 28 days respiratory<br>24 - 48 hours if accidentially inoculated |
| **Francisella tularensis** | Human tularemia presents as an indolent ulcer at site of infection, accompanied by swelling of the regional lymph nodes (ulceroglandular); sudden on set of pain and fever, fever generally lasts 3 - 6 weeks without treatment; inhalation may be followed by a pneumonic disease or primary systemic (typhoidal) picture; type B strains 5-15% fatality rate; type A strains approximately 35% mortality from pulmonary tularemia | 1 - 14 days, usually 3 - 5 days |
| **Ricin toxin** | If ingested, symptoms include nausea, vomiting, abdominal cramps and diarrhea. This could lead to severe dehydration, liver and kidney failure and death. | 2 - 6 hours if eaten |
| | If inhaled, symptoms include nausea, fever, cough, chest tightness and difficulty breathing. This could lead to fluid in the lungs, respiratory failure and death | 8 hours if inhaled |
| | If ricin is injected, the muscles and lymph nodes near the injection site would die. This could lead to liver and kidney failure and death within 36-72 hours | |
| **West Nile virus** | Most individuals infected with WNV remain asymptomatic. West Nile fever is typically a mild illness lasting 3 to 6 days. The main symptoms are sudden onset of fever with chills, rash, malaise, headache, backache, arthralgia, myalgia and eye pain. Meningitis, encephalitis, and/or acute flaccid paralysis develop in less than 1% of WNV-infected individuals. Patients with neurological disease typically have a febrile prodrome of 1 to 7 days, which may be biphasic, before they develop neurological symptoms. Typically, neurological patients will present with a fever, stiff neck, headache, weak muscles, gastrointestinal symptoms, disorientation, tremors, convulsions, and paralysis. | Ranges from 2 to 6 days, but may extend to 14 days |
| **Yersinia pestis** | Zoonotic disease; bubonic plague with lymphadenitis in nodes receiving drainage from site of flea bite, occuring in lymph nodes and inguinal areas, fever, 50% case fatality if untreated; may progress to septicemic plague with dissemination by blood to meninges; secondary pneumonic plague with pneumonia, mediastinitis, and pleural effusion; untreated pneumonic and septicemic are fatal | 1 - 6 days |
| **SARS-CoV-2** | People with COVID-19 have had a wide range of symptoms reported – ranging from mild symptoms to severe illness. Possible symptoms include: fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, & diarrhea | 2-14 days |
| **Mpox** | People with mpox often get a rash that may be located on hands, feet, chest, face, or mouth or near the genitals, including penis, testicles, labia, and vagina, and anus. Other symptoms can include fever, chills, swollen lymph nodes, exhaustion, muscle aches, headache, and respiratory symptoms (sore throat, nasal congestion, and cough). | 3-17 days |