U of M Biosafety Quiz

Contact Information: Please Print

Full Name (first, middle initial, last name) please underline your last/family name:

Lab Phone #: Office Phone #:

Position:

- □ Principal Investigator
- □ Technician
- □ Research associate/professional
- □ Post Doctorate Fellow
- □ Other: __________________
- □ Undergraduate Student
- □ Masters Student
- □ PhD Student
- □ Summer Student
- □ Volunteer

U of M Email Address:

Department/Unit:

Main Lab Location: Room #: Building:

Who is your Principal Investigator/Supervisor?

(To be completed by EHSO)

Final Mark : \[19 + 14 + 8 + 23 + 15 + 12 + 9 = 100\] % =

To be credited for the Generic Biosafety Training:

1. Go to the EHSO Generic Biosafety PowerPoint available on the Biosafety Training Website.

2. Work through the slides in the presentation and the Public Health Agency of Canada (PHAC) e-learning modules. The link to the e-learning modules is available inside the Generic Biosafety Training PowerPoint.

3. Complete the Contact Information table above along with your answers to the Biosafety Quiz questions on page 2-8. The Quiz is based on the PHAC e-learning modules and the powerpoint.
   - a. Pass mark is 80% and
   - b. You must also correctly answer seven (7) critical questions which are identified in the quiz with a bright green background. Hint: The answers are highlighted in the Powerpoint on slide #s 65, 75 and 77.

4. Ensure you have included your Name and Signature in the space found on Page 2.

5. Please Submit both the Contact Information (page 1) and the Biosafety Quiz (page 2-8) to:

   Steven Cole
   Institutional Biosafety Officer
   C/O Environmental Health and Safety Office
   T248 Basic Sciences Building, Bannatyne Campus
U of M Biosafety Quiz

Name: ____________________________

Signature: ____________________________ (No signature; No pass)

The questions on this quiz are based on the PHAC e-learning modules and Generic Biosafety Presentation.
TOTAL MARKS AVAILABLE: 125

Microbiology Overview / Pathogen Risk Assessment / LAIs

1. Write the letter of each item on the left, next to the number of the appropriate match on the right.
   A. Bacteria ______ 1. Are not infectious
   B. Virus ______ 2. One of the classes is Helminth
   C. Fungi ______ 3. Can have RNA or DNA nucleic acid, but not both
   D. Parasites ______ 4. Multiply by binary fission
   E. Toxins ______ 5. Causes fatal neuro-degenerative diseases
   F. Prions ______ 6. The simplest eukaryotic micro-organism

2. Write the best word (A-C) next to the definitions below.
   A. Disease
   B. Infection
   C. Pathogenicity.

   __________ is the growth of micro-organisms in the host but it does not always cause host injury.
   __________ is damage or injury to the host that impairs function.
   __________ is the ability of a micro-organism to cause disease in a host.

3. Match each of the items from the column on the left to its appropriate definition on the right by placing its letter in the space provided next to the definition.

<table>
<thead>
<tr>
<th>Pathogen Risk Factor</th>
<th>Pathogen Risk Factor Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Pathogenicity</td>
<td>______ Mechanism by which the infectious agent is spread</td>
</tr>
<tr>
<td>b. Virulence</td>
<td>______ Ease or difficulty with which direct transmission occurs</td>
</tr>
<tr>
<td>c. Mode of Transmission</td>
<td>______ Impact on economy and public health</td>
</tr>
<tr>
<td>d. Infectious dose</td>
<td>______ Types of species a pathogen can infect</td>
</tr>
<tr>
<td>e. Communicability</td>
<td>______ The degree of pathogenicity determined by the pathogen’s invasiveness and by its toxigenicity</td>
</tr>
<tr>
<td>f. Survivability</td>
<td>______ Availability of preventative measures and effective treatment</td>
</tr>
<tr>
<td>g. Host Range</td>
<td>______ Number of organisms required to initiate an infection</td>
</tr>
<tr>
<td>h. Endemicity</td>
<td>______ Pathogen endemic to a region or country</td>
</tr>
<tr>
<td>i. Economic/Public Health</td>
<td>______ Ability of an organism to cause disease</td>
</tr>
<tr>
<td>j. Prophylaxis and therapeutics</td>
<td>______ Stability of the pathogen outside of the host</td>
</tr>
</tbody>
</table>
4. Routes of exposure include:
   A. Inoculation   B. Skin/Mucous   C. Ingestion   D. Inhalation

Write the exposure route next to the incident description below.

<table>
<thead>
<tr>
<th>Exposure Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>A pencil that was used to take notes during an experiment was accidentally contaminated. The worker then used this pencil at his station, and absent-mindedly put the tip of the pencil in his mouth while thinking.</td>
</tr>
<tr>
<td>Scratch from a laboratory animal.</td>
</tr>
<tr>
<td>Sniff- Test of cultures.</td>
</tr>
<tr>
<td>A culture tube was dropped onto the bench-top and this caused it to splash onto the worker’s exposed wrist.</td>
</tr>
</tbody>
</table>

5. Indicate whether the following are T-True or F-False
   a) _____ All micro-organisms are pathogens
   b) _____ A specific micro-organism always exhibits only a single level of virulence
   c) _____ There are notable differences in host susceptibility for certain pathogens
   d) _____ Every toxin is highly toxic in minute quantities
   e) _____ Physical barriers and immune system barriers are the host’s natural defenses against pathogens
   f) _____ An opportunistic pathogen may cause disease in patients whose immune function is compromised. These pathogens do not typically cause disease in a host with a healthy immune system.

6. Assign the correct the Risk Group (1-4) next to the Risk Group Characteristic.

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Risk Group Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Individual risk, High Community Risk:</strong> These pathogens are likely to cause serious disease in a human or animal which can often lead to death. The risk of spread of disease to livestock or poultry ranges from low to high depending on the pathogen.</td>
<td></td>
</tr>
<tr>
<td><strong>Low Individual Risk, Low Community Risk:</strong> A microorganism, nucleic acid or protein that is either not capable or causing human or animal disease or capable, but unlikely to do so. These can be opportunistic and may pose a threat to immunocompromised individuals.</td>
<td></td>
</tr>
<tr>
<td><strong>Moderate Individual Risk, Low Community Risk:</strong> These pathogens are able to cause serious disease in a human or animal but are unlikely to do so. Effective treatment and preventative measures are available and the risk of spread of diseases caused by these pathogens is low.</td>
<td></td>
</tr>
<tr>
<td><strong>High Individual Risk, Low Community Risk:</strong> These pathogens are likely to cause serious disease in a human or animal but effective treatment and preventative measures are usually available. The risk of spread of the disease is typically low for the public but the risk of spread to livestock or poultry can range from low to high depending on the pathogen.</td>
<td></td>
</tr>
</tbody>
</table>
Containment Assessments

7. Insert the appropriate Containment Level 1-4, next to the description

<table>
<thead>
<tr>
<th>Containment Level</th>
<th>Containment Level Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Laboratory that is requires a highly complex facility design, maximum engineering controls, specialized biosafety equipment and redundant biosafety features. The researcher is completely isolated from the pathogen.</td>
</tr>
<tr>
<td></td>
<td>Laboratory where biosafety and biosecurity are achieved through comprehensive operational practices and physical containment requirements including stringent facility design and engineering controls; access is strictly controlled and all work with the pathogen is done in a Biological Safety Cabinet.</td>
</tr>
<tr>
<td></td>
<td>Laboratory where biosafety is achieved through a basic level of operational practices and physical design features although due care should be exercised and safe work practices including good microbiological lab practices should be followed.</td>
</tr>
<tr>
<td></td>
<td>Laboratory where biosafety and biosecurity are achieved through operational practices and physical containment requirements that are proportional to the risks associated with the agents being handled there in. For example, all work that may create aerosols is performed in a biological safety cabinet and all waste is decontaminated prior to disposal.</td>
</tr>
</tbody>
</table>

8. List the correct order, 1, 2 or 3 for the three steps in the risk assessment process.
   _____ Determining the containment level appropriate to the agent for the specific procedures
   _____ Assessing personal and personnel safety in the laboratory, establish control measures, reassess if necessary.
   _____ Evaluating agent-specific characteristics to determine the agent’s risk group

9. Select the appropriate item that must be considered when assessing the containment level requirements for a pathogen.
   □ Quantity of the pathogen that will be handled
   □ Use of aerosol creating procedures
   □ Concentration of the culture that will be handled
   □ Type of work: e.g. in vivo, in vitro or large scale
   □ All of the above
General Safety for Containment Labs

10. For the following lab practices indicate Yes or No if the item would be included in the list of “correct lab practices”
— Work over a plastic-backed absorbent material
— Open centrifuge and blender immediately after each use
— Avoid flaming loops and use a micro-incinerator or disposable loop if possible
— To avoid aerosol production perform streaking on rough rather than smooth plates
— Unscrew the cap of a tube and open it immediately
— Pour liquids through a funnel and place the end of the funnel into disinfectant
— Use plastic screw-capped tubes and flasks whenever possible
— Before disposal of a needle and syringe into an approved sharps container you recap the needle and remove the needle from the syringe
— Decontaminate and label contaminated equipment that leaves the laboratory for servicing and disposal
— Work surfaces that are cracked or chipped may continue to be used for a period of time
— Don’t report accidental exposures, including near misses
— Use pipettes calibrated “to deliver” rather than blow out to the last drop

Containment Level 2 Practices

11. For Containment Level 2 (CL2) labs indicate whether the following are T-True or F-False

______ Biohazard warning signage must be posted at the Containment Zone point(s) of entry and must include the international biohazard warning symbol, containment level, information about special provisions for entry and contact information for the person responsible.

______ Some work on an open bench is allowed.

______ The doors to the CL2 must be lockable and kept closed at all times

______ Risk assessments are needed to establish the procedures, concentrations and volumes that require the use of a BSC.

______ If trades people have keys to the Containment 2 lab, they can work there unsupervised by lab staff.

______ ‘On-the-Job’ training is adequate for a new student in the lab; evaluation of competence before allowing unsupervised work with infectious material is not required.

______ Containment personnel must notify their supervisor of any symptoms or illness that may have been caused by the infectious material being handled.

______ Lab coats can be worn in public hallways, elevators and in administrative offices.

______ Personal clothing may be stored in the lab on the same hooks that are used for lab coat storage.

______ If you wash your hands after working in the BSC and removing your gloves, you do not have to wash them again when you leave the containment zone, if in the interim, you only worked at the computer.
Containers of infectious material or toxins stored outside the containment zone must be stored in locked storage equipment or within an area with restricted access and only opened within CL2.

**PPE and BSCs**

12. Which of the following places in the lab area is it **not** acceptable to wear gloves? Choose one
   
   - A. Computer, Phone, Door knobs
   - B. Removing cultures from the incubator
   - C. When working with infectious material in the BSC
   - D. A and B

13. A laboratory is working with a Risk Group 2 pathogen that is not transmitted by the aerosol route. Their work does not involve splashes nor the creation of aerosols. Which of the following protective clothing is required in a Containment Level 2 lab setting? **Select one.**
   
   - A. Lab coat, Gloves, Shoes, Respiratory Protection.
   - B. Lab coat, Gloves, Safety goggles.
   - C. Lab coat, Gloves, Shoes that enclose the whole foot.
   - D. Gloves, Shoes, Safety Glasses, Longs pants.

14. Indicate whether the following are **T-True** or **F-False**

   - _____ Workers must have a good understanding of how the BSC works and be trained to use it correctly.
   - _____ Laminar flow hoods (a.k.a. clean bench) and fume hoods can be used for protection from biological hazards.
   - _____ Class II BSCs provide sample/product, personnel and environmental protection.
   - _____ A BSC must be certified before its first use, annually, and after any move.
   - _____ The air curtain at the front of the cabinet is not easily disrupted by people walking behind it or opening doors which are located too close to the cabinet, or moving your arms in and out of the cabinet rapidly.
   - _____ The best place to set-up work in a BSC is towards the front.
   - _____ **If you do not have enough room in your BSC, it is OK to discard items in containers outside of the cabinet.**
   - _____ The use of open flames are not recommended inside a BSC because the flame can damage the integrity of the HEPA filter and create heat build-up resulting in air turbulence and disruption of airflow patterns inside the cabinet.
   - _____ Disposable sterile loops and micro-incinerators are a good alternative to the use of open flames in a BSC.
   - _____ **If you let the BSC run for five minutes after you are finished, this can adequately replace surface disinfecting items before removing them from the cabinet.**
   - _____ **UV lights in the BSC work as well as surface disinfection for cleaning the inside of the BSC.**
15. Indicate whether the following are T-True or F-False

_____ A cardboard box is an appropriate support stand for an autoclave bag used to collect biohazardous waste if it has a biohazard sign on it?

_____ Glass pasteur pipettes can be collected in an autoclave bags for autoclaving?

_____ 95% alcohol is the best concentration to use for disinfection in the lab?

_____ Housekeeping staff should not help with spill clean-up in the lab.

_____ A 1/10 dilution of a store bought solution of household bleach (~5.25% hypochlorite) will maintain its efficacy for many months.

_____ Autoclave tape that has turned dark after the item has gone through an autoclave cycle, indicates that the contents have been sterilized.

_____ Ensure effective disinfectants against the biohazardous material are always available in the areas where the agent is handled or stored.

_____ Regularly perform efficacy monitoring of autoclaves with biological indicators

_____ Hand washing is the single most important practice to prevent transmission of pathogenic organisms to yourself and others.

16. Match each item with the correct option from the drop down list. Hint: Look for the answers in the e-learning module Decontamination in the Lab, slide 6 of 17 and also in Question 2 of 5 on slide 9.

A. decontamination; B. disinfection; C. sterilization;

_____ Use of a thermal, chemical or radiological process to destroy all microbial life, including large numbers of highly resistant bacterial spores.

_____ Killing, inhibiting or removing micro-organisms that may cause disease. It is usually carried out through thermal, chemical, or radiological process.

_____ Process by which materials and surfaces are rendered safe to handle and reasonably free of micro-organisms.
Spill Response and Biosafety/Biosecurity

17. List the following key techniques to prevent the release of contaminated material during a spill clean-up in the correct order (1-6). (Note that additional steps may be required depending on the size and location of the spill.) Hint: Look for the answer in the e-learning module Decontamination in the Lab, slide 8 of 17. The information is repeated on slide # 82 of the Powerpoint presentation.

____ Use forceps to pick up any broken glass or sharps and place them in a leak-proof puncture resistant container.

____ Allow aerosols to settle.

____ While wearing protective clothing, gently cover the spill with paper towels.

____ Allow sufficient contact time before clean up.

____ Use a gentle flooding action to reduce the creation of aerosols.

____ Apply appropriate disinfectant, starting at the perimeter, working inwards towards the centre.

Biosecurity

18. Choose the best answer (A. Biosecurity, B. Biosafety, C. Biosecurity & Biosafety) for the following statements:

____ These concepts prevent the accidental release of pathogens and toxins potentially infecting or affecting lab workers, the general population and the environment.

____ These concepts prevent the deliberate theft or diversion of high-risk biological agents for malicious use (such as bioterrorism and bioweapons).

____ These concepts include authorized access, incident reporting, lab work areas separated from public areas, risk assessments and emergency response plans.