

BIOSAFETY

WirginiaTech

Invent the Future



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Bison BSL-3





General Principles of Biosafety

- Three elements of Biosafety:
 - Lab practice and techniques
 - Personal protective equipment (Primary barrier)
 - Facility design (????) (Secondary barrier)
- Increasing level of personnel and environmental protection

Biosafety Level 1 (BSL 1)

- Organisms or practice known to not cause disease in healthy adult humans.
- Well characterized agent "Avirulent organisms", plasmid DNA
- Minimal hazard to lab personnel and the environment
- Examples:
 - E. coli, Bacillus spp, local soil bacteria
 - Exempt categories of DNA work (plasmid DNA)

Biosafety Level 1 Facility Design (Secondary Barrier)

Requirements:

- Laboratories have doors
- Sink for hand washing
- Work surfaces easily cleaned
- Bench tops are impervious to water
- Sturdy furniture
- Windows fitted with flyscreens

Biosafety Level 2 (BSL-2)

BSL 2: indigenous moderate risk agents

 Mild or treatable disease in humans
 Not spread by approach.

 Primary Hazard: Skin break, mucous membrane exposure or ingestion.

Examples:

- Hepatitis A,B+C, HIV, some Salmonellae
- Healthy Human derived blood and blood products
- Some rDNA



Requirements:

- Laboratories have lockable doors
- Sink for hand washing
- Work surfaces easily cleaned
- Bench tops are impervious to water
- Sturdy furniture

Biosafety Level 2

Facility Design (Secondary Barriers)

Requirements (cont.):

- Biological safety cabinets installed as needed
- Adequate illumination
- Eyewash readily available
- Air flows into lab without re-circulation to non-lab areas
- Windows fitted with flyscreens

Biosafety Level 3 (BSL 3)

- Indigenous or exotic agents with potential for respiratory transmission or lethal consequences.
- Examples:
 - M. tuberculosis (TB)
 - B. anthracis (ANTHRAX)
 - Brucella spp. (Malta fever)
 - FMD and RVF (not in Egypt)
 - SARS and West Nile viruses
 - Primary and Secondary barriers to protect personnel in contiguous areas

Institute for Critical Technology and Applied Science

Requirement of Biosafety Level 3 BSL-1 and 2 Facilities PLUS:

- + Separate building or isolated zone
- + Double door entry

🏨 Virginia

- + Directional inward airflow (-ve pressure)
- +Enclosures for aerosol generating equipment
- + Room penetrations sealed
- + Walls, floors and ceilings are water resistant for easy cleaning

High maintenance cost, High security, rules and regulations

Biosafety Level 4 (BSL-4)

- lethal exotic agents especially where there is no vaccine or therapy.
 - BSL 4 facility is separate facility or HVAC isolated zone
 - Examples: Ebola, Marburg and Lassa Fever viruses



Biosafety Level O (BSL-O) Biosafety Level –ve (BSL-ve)



What is the level of Biosafety in your lab or work facility ?



"The patient in the next bed is highly infectious. Thank God for these curtains."



How to

raise

Biosafety

level in your lab?



Facility

Control access to the laboratory Biosec

Closed doors Locked doors

Laboratory Biosecurity Issue in Egypt



BIOHAZARD





Facility

Effective Pest Management

Screen Windows

Spray at the end of the week





Lab practice

Wash hands After removing the gloves Before leaving the lab. liquid soap is generally preferable to bar soap 20 seconds at least





TIDES IN



Always wash hands to remove residue before leaving

Lab practice

No Eating, drinking, smoking, handling contact lenses, applying cosmetics, and storing food





NO SMOKING UNLESS YOU'RE ON FIRE





Mouth pipetting is prohibited; mechanical pipetting devices must be used.







Lab practice

No Recap











Lab practice





Needle stick

Report

- •Post-exposure medical evaluation
- •Test the source (HBV, HCV, HIV)
- Prophylaxis treatment if possible





University Policy

Laboratory personnel must be provided with

Medical surveillance
(Base line)
Immunizations (HBV)







Lab practice

Laboratory equipment should be routinely decontaminated, as well as, after spills, splashes, or other potential contamination.





<u>A laboratory-specific biosafety manual</u>

- •Prepared and adopted as policy.
- •Must be available and accessible.
- Review and updated
- Keep record





All laboratory personnel must demonstrate proficiency in standard and special practices before working with special agents.(training, body system, certification) More likely you will get infected because of a bad coworker





Emergency Response Plan

Assuming the worse (large spill) **(if you can't handle it, don't do it)**

How to handle emergency (fire, medical emergency, missing samples, missing









Protective laboratory clothing











Eye and face protection



Aerosol and droplets 82 % of all acquired lab infection **Pike 1976**





N-95







Transporting infectious agents Biosafety behind laboratory wall









Animal Biosafety





Withou ariand research we could it have put an end topolio, smalpore rubella and diplification. Now some would like to put an end to animal research Obscored includes they don't have can are heart diverse or AIDS Foundation for Biomedical Research



Starting a new lab or reevaluating your old lab

Risk Assessment of the work to be done with a specific agent or under specific circumstances determines the appropriate combination of biosafety to employ

Inspection of the lab, protocols, SOP, emergency response plan

Conditional approval or complete approval with regular inspection.

Laboratory Biosafety Key Resources (I)

 Biosafety in Microbiological and Biomedical Laboratories (BMBL),5th Ed.

U.S. Department of Health and Human Services http://www.cdc.gov/od/ohs/biosfty/bmbl5/bmbl5to

http://www.slh.wisc.edu/wps/wcm/connect/extranet/com dis/

 Laboratory Biosafety Manual, 3rd Ed.
 World Health Organization, 2004 http://www.who.int.csr/resources/publications/biosafety/ WHO_CDS_CSR_LYO_2004_11/en/







I Think You Should Be More Explicit Here In Step Two