

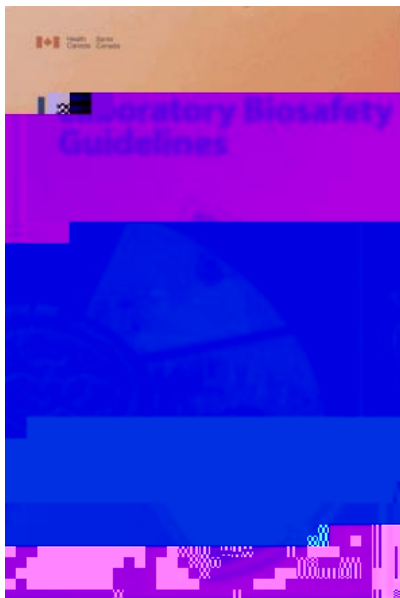
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# Laboratory Research Conduct & Safety: Biohazards and Biosafety

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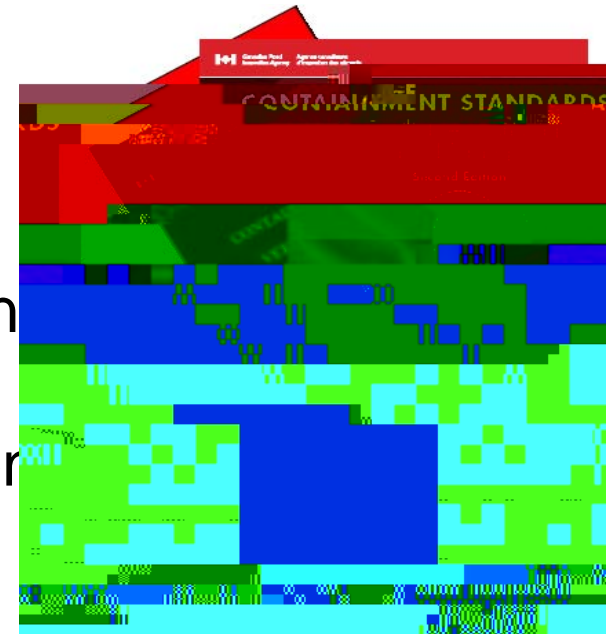
# Regulations



Human Pathogens

Public  
Health  
Agency of  
Canada

Canadian  
Food  
Inspection  
Agency



Animal Pathogens

2010: "Containment Standards for  
Facilities Handling Animal Pathogens"



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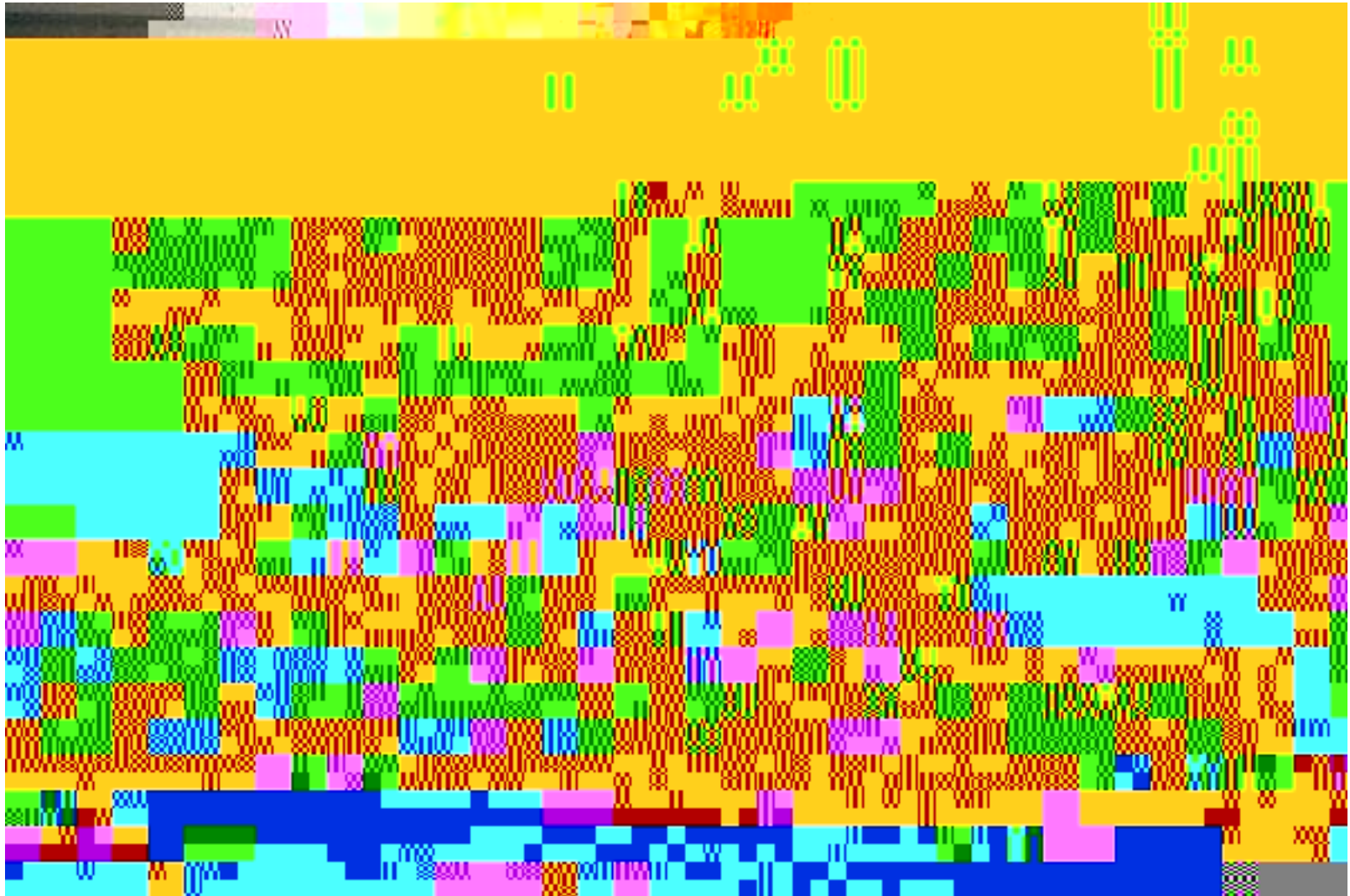
		







# Definition: Biohazards



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# Biohazards

Parasites



Fungi



Viruses

Bacteria

Microbial toxins

e.g., Anthrax edema factor, Botulinum toxin, Pertussis toxin



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# Biohazards

Any material that could contain biohazardous material, for example:

Human tissues, blood, body fluids

Animal tissues, carcasses

Cell lines

Cultures from soil samples

Waste water



# Routes of Disease Transmission

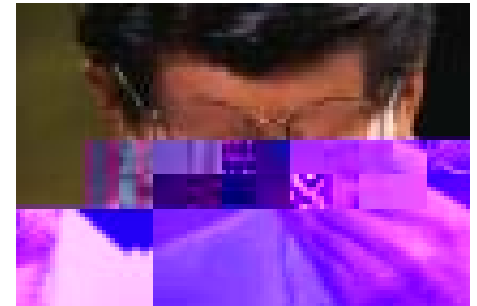
Direct contact (splash)

Inoculation

Ingestion

Indirect contact

Inhalation



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# Safe Work Practices

Understand hazards

Restrict lab access

Avoid clutter

Use personal protective equipment

Lab coat

Gloves

Eye protection





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# Safe Work Practices (cont'd)

No shorts, sandals, etc.

“Universal Precautions” with  
human blood

No food, drinks, etc.





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# Risk Groups

Categorization of relative hazards of infective organisms (4 levels)

Risk classification:

- Pathogenicity

- Infectious dose

- Mode of transmission

- Host range

- Effective prevention (e.g vaccine)

- Effective treatment (e.g., antibiotic, antiviral PEP)





# Risk Groups

## Risk Group 2

- Moderate individual risk
- Low community risk
- Treatment and preventive measures are available

*Listeria* spp., *Salmonella* spp., Creutzfeldt-Jacob agent, *Leishmania* spp., *Toxoplasma* spp., *Ascaris* spp., enteropathogenic *E. coli*, cell lines (HeLa, COS-7, HEK)



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# Risk Groups

## Risk Group 4

- High individual risk
- High community risk
- Cause serious or lethal disease by casual contact
- Effective treatment and preventive measures are **not** usually available

Marburg virus, Ebola virus, *Herpesvirus simiae*, Crimean-Congo hemorrhagic fever



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# Containment Level

Minimum requirements for safe handling (4 levels)

Operational practices

Safe work practices

Engineering, technical, physical:

Location & access

Surface finishes & casework

HVAC



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# Containment Level 1

No special design features

Biological safety cabinet not required, may be used for sterility







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# Containment Levels 3 and 4

## Level 3

Respiratory protection

HEPA filtration of lab exhaust

Strictly controlled access

## Level 4

Isolated facility with sealed perimeter

Positive pressure suits or Class 3 BSC



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# Biohazards Policy\*

“Prior to beginning work with biohazardous material, responsible users must complete and submit an *Application to Use Biohazardous Materials* to Environmental Health & Safety for review and approval”

*\*University Laboratory Safety Committee September 24, 2007*



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# Biohazards Applications

Completed by PI/lab supervisor prior to starting project

Required for research, teaching, diagnostic activities using biohazards

Required for all activities, including Level 1

Submit to EHS for approval (~1 week)



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# Thesis Preparation & Submission Guidelines\*

*“If the research for the thesis involved .....  
microorganisms, living cells, other biohazards  
..... the appropriate compliance certificates  
must be included as an appendix to the  
thesis”*

\*Graduate and Postdoctoral Studies:

[www.mcgill.ca/gps/current/programs/thesis/guidelines/submission](http://www.mcgill.ca/gps/current/programs/thesis/guidelines/submission)



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# Lab Safety Training Courses

“WHMIS Training for Lab Personnel”

“Principles of Laboratory Radiation Safety”

“Introduction to Biosafety”

“Safe Use of Biological Safety Cabinets”

“Hazardous Waste Management & Disposal  
Training for Lab Personnel”



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# Environmental Health & Safety

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