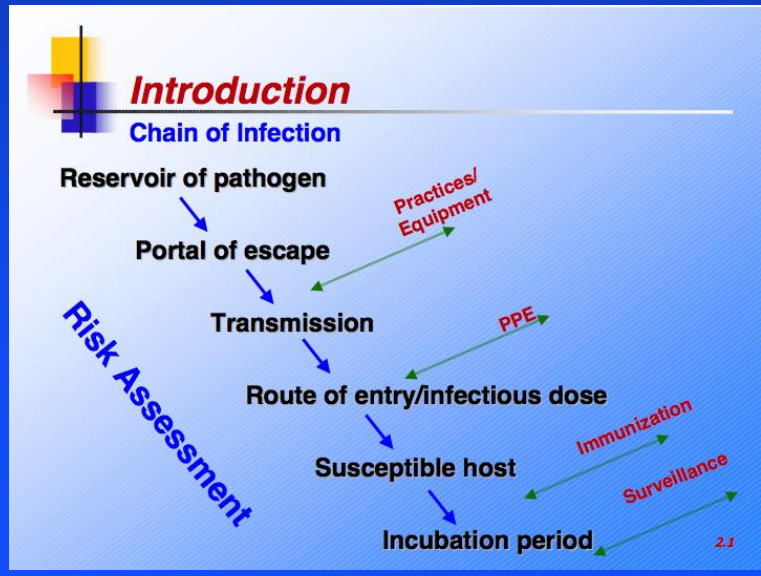
Biosafety at MUSC

- *Unit 3*
  - **How to determine the relative biosafety risk associated with a planned experiment**

Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **Questions to Ask ?**
  - **Hazard Levels**
    - ☞ **MSDS for Microbes**
  - **Standard Microbiological Practices**
  - **Special Practices**
  - **Containment Equipment**



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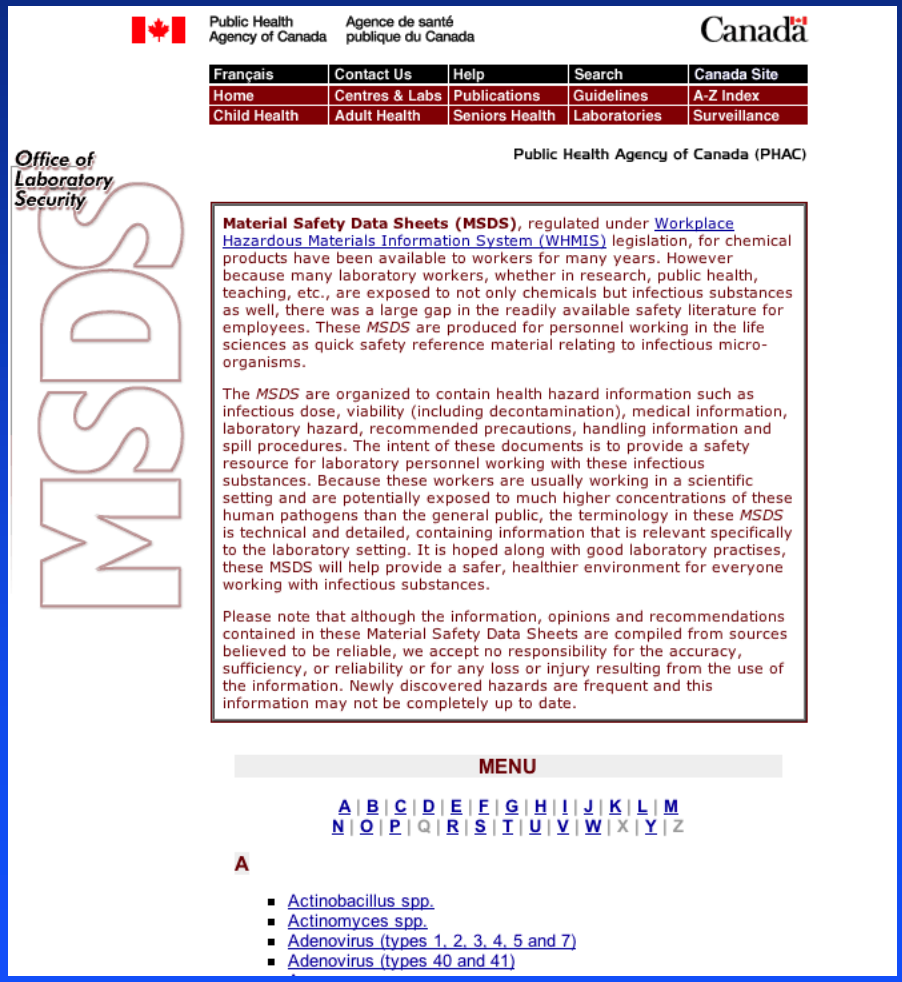

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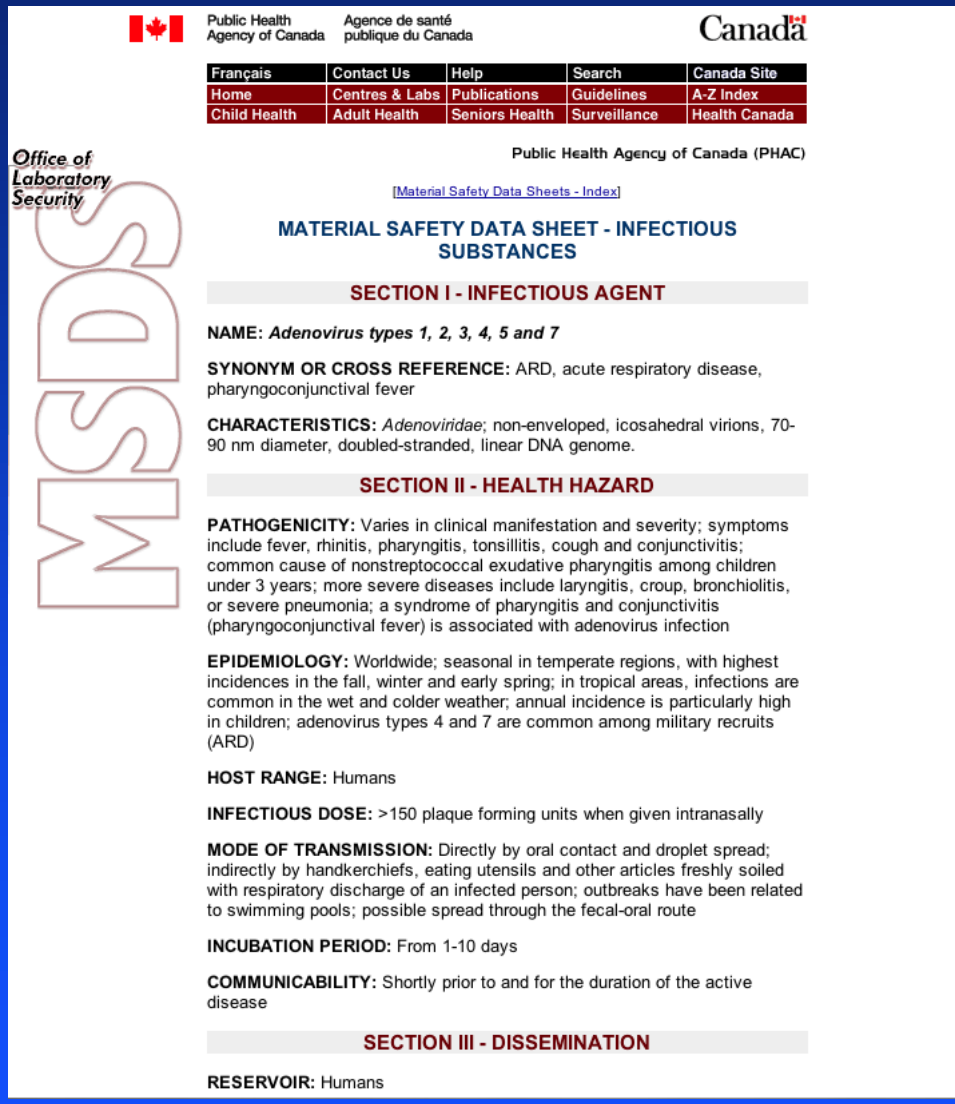
Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **Questions to Ask ?**
  - **Hazard Levels**
    - **MSDS for Microbes**
      - **Issue Aerosol**
        - **150 pfu is infectious intra-nasally**
      - **Incubation**
        - **1-10 days**
      - **Communicability**
        - **Yes**



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Office of Laboratory Security

MSDS

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[Material Safety Data Sheets - Index]

MATERIAL SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

SECTION I - INFECTIOUS AGENT

NAME: ***Adenovirus types 1, 2, 3, 4, 5 and 7***

SYNONYM OR CROSS REFERENCE: ARD, acute respiratory disease, pharyngoconjunctival fever

CHARACTERISTICS: *Adenoviridae*; non-enveloped, icosahedral virions, 70-90 nm diameter, doubled-stranded, linear DNA genome.

SECTION II - HEALTH HAZARD

PATHOGENICITY: Varies in clinical manifestation and severity; symptoms include fever, rhinitis, pharyngitis, tonsillitis, cough and conjunctivitis; common cause of nonstreptococcal exudative pharyngitis among children under 3 years; more severe diseases include laryngitis, croup, bronchiolitis, or severe pneumonia; a syndrome of pharyngitis and conjunctivitis (pharyngoconjunctival fever) is associated with adenovirus infection

EPIDEMIOLOGY: Worldwide; seasonal in temperate regions, with highest incidences in the fall, winter and early spring; in tropical areas, infections are common in the wet and colder weather; annual incidence is particularly high in children; adenovirus types 4 and 7 are common among military recruits (ARD)

HOST RANGE: Humans

INFECTIOUS DOSE: >150 plaque forming units when given intranasally

MODE OF TRANSMISSION: Directly by oral contact and droplet spread; indirectly by handkerchiefs, eating utensils and other articles freshly soiled with respiratory discharge of an infected person; outbreaks have been related to swimming pools; possible spread through the fecal-oral route

INCUBATION PERIOD: From 1-10 days

COMMUNICABILITY: Shortly prior to and for the duration of the active disease

SECTION III - DISSEMINATION

RESERVOIR: Humans

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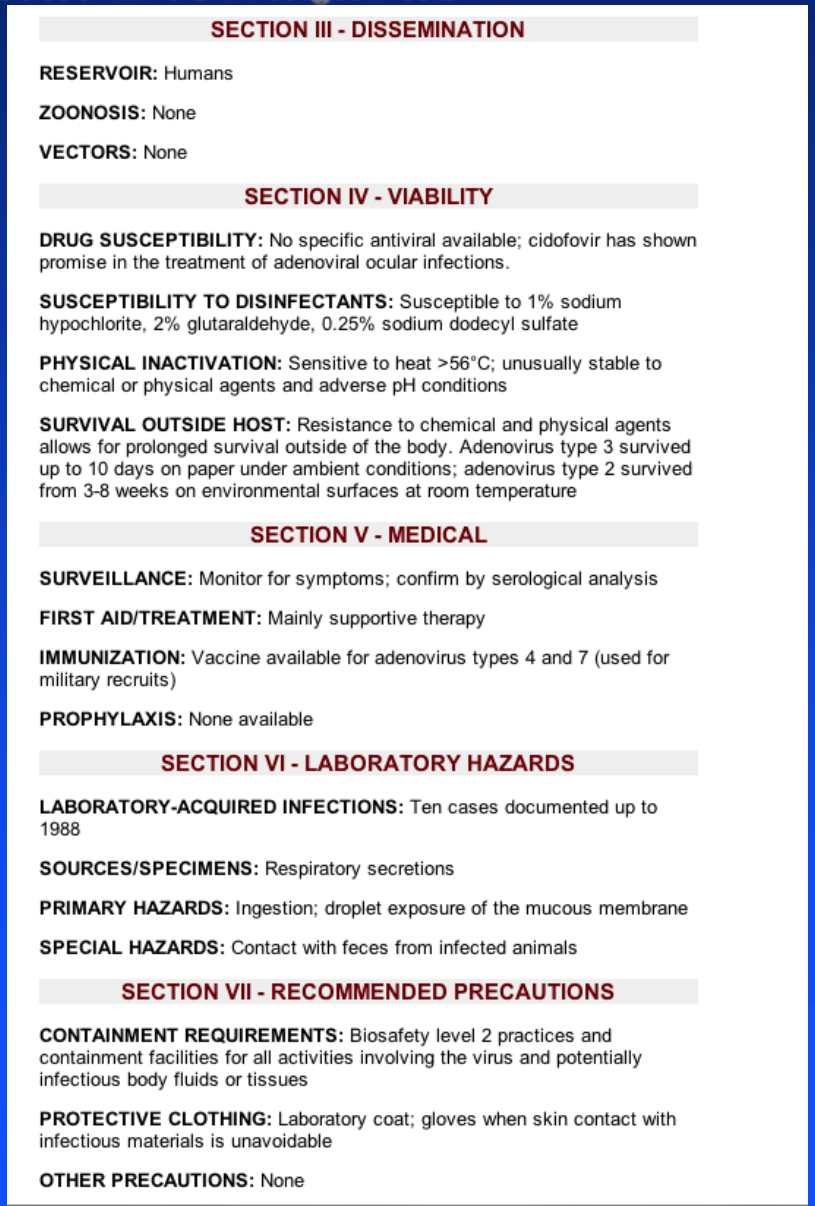
Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **Questions to Ask ?**
  - **Hazard Levels**
    - **Disinfectants**
      - **Bleach**
    - **Physical Inactivation**
    - **Survival outside host**
      - **Type 3 survival 10 days on paper**
      - **Type 2 survived 3-8 weeks on environmental surfaces at room temperature.**



SECTION III - DISSEMINATION

RESERVOIR: Humans

ZOONOSIS: None

VECTORS: None

SECTION IV - VIABILITY

DRUG SUSCEPTIBILITY: No specific antiviral available; cidofovir has shown promise in the treatment of adenoviral ocular infections.

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to 1% sodium hypochlorite, 2% glutaraldehyde, 0.25% sodium dodecyl sulfate

PHYSICAL INACTIVATION: Sensitive to heat >56°C; unusually stable to chemical or physical agents and adverse pH conditions

SURVIVAL OUTSIDE HOST: Resistance to chemical and physical agents allows for prolonged survival outside of the body. Adenovirus type 3 survived up to 10 days on paper under ambient conditions; adenovirus type 2 survived from 3-8 weeks on environmental surfaces at room temperature

SECTION V - MEDICAL

SURVEILLANCE: Monitor for symptoms; confirm by serological analysis

FIRST AID/TREATMENT: Mainly supportive therapy

IMMUNIZATION: Vaccine available for adenovirus types 4 and 7 (used for military recruits)

PROPHYLAXIS: None available

SECTION VI - LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: Ten cases documented up to 1988

SOURCES/SPECIMENS: Respiratory secretions

PRIMARY HAZARDS: Ingestion; droplet exposure of the mucous membrane

SPECIAL HAZARDS: Contact with feces from infected animals

SECTION VII - RECOMMENDED PRECAUTIONS

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices and containment facilities for all activities involving the virus and potentially infectious body fluids or tissues

PROTECTIVE CLOTHING: Laboratory coat; gloves when skin contact with infectious materials is unavoidable

OTHER PRECAUTIONS: None

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Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **Questions to Ask ?**
  - **Hazard Levels**
    - **10 case of lab infections**
  - **Special Hazards**
    - **Contact with feces from infected animals**
  - **Spills**
  - **Disposal**

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PROTECTIVE CLOTHING: Laboratory coat; gloves when skin contact with infectious materials is unavoidable

OTHER PRECAUTIONS: None

SECTION VIII - HANDLING INFORMATION

SPILLS: Allow aerosols to settle; wearing protective clothing gently cover the spill with absorbent paper towel and apply 1% sodium hypochlorite starting at the perimeter and working towards the centre; allow sufficient contact time (30 min) before clean up

DISPOSAL: Decontaminate all wastes before disposal; steam sterilization, incineration, chemical disinfection

STORAGE: In sealed containers that are appropriately labelled

SECTION IX - MISCELLANEOUS INFORMATION

Date prepared: November 1999

Prepared by: Office of Laboratory Security, PHAC

Although the information, opinions and recommendations contained in this Material Safety Data Sheet are compiled from sources believed to be reliable, we accept no responsibility for the accuracy, sufficiency, or reliability or for any loss or injury resulting from the use of the information. Newly discovered hazards are frequent and this information may not be completely up to date.

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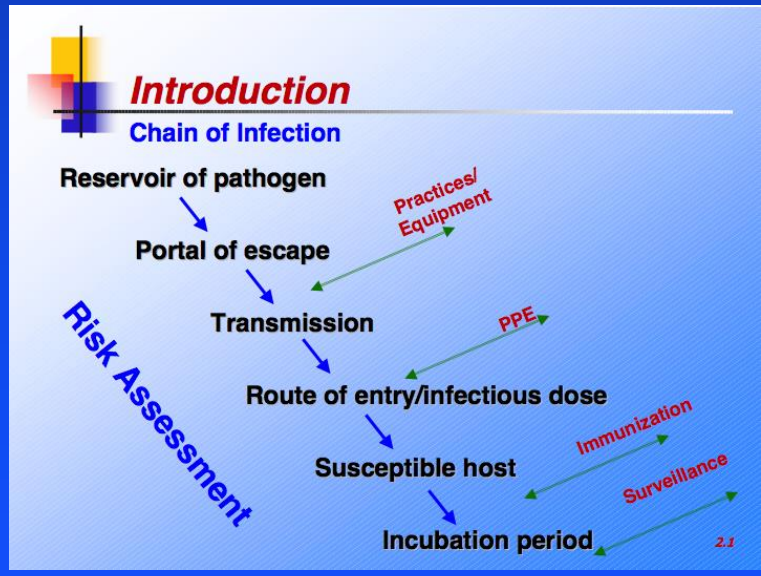

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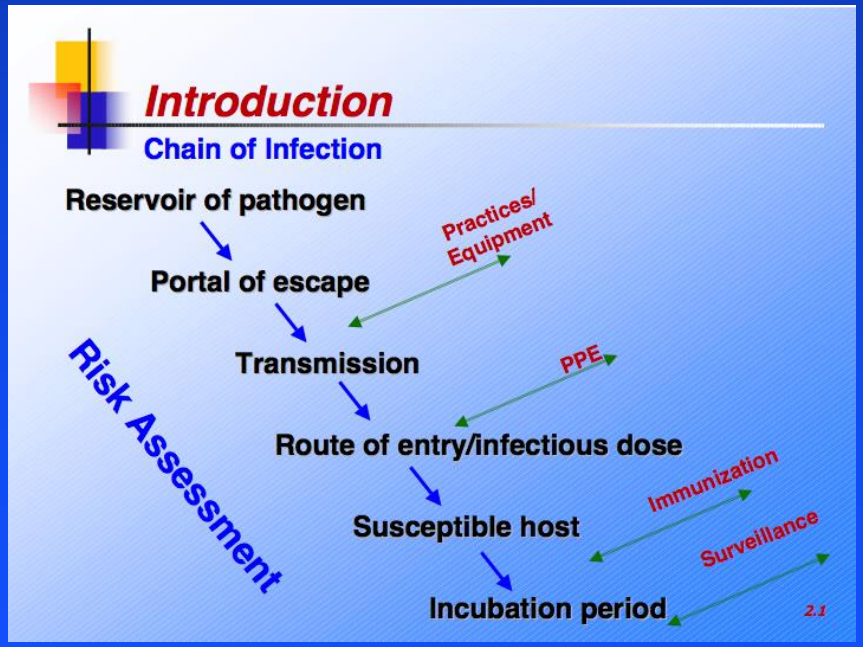
Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- ***Infectious Agents***
  - ***Work may only be conducted with prior approval of the IBC regardless of the safety classification of the agent***
  - **You must follow the requirements as specified in the CDC/NIH *Biosafety in Microbiological and Biomedical Laboratories Manual***
  - **Containment requirements may be subject to modification by the IBC**

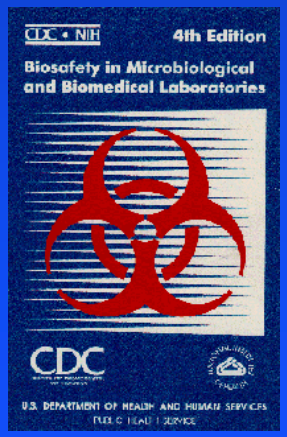
Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **Define the risk**
  - **Infectious Agents List**
  - **Experimental Protocol**
    - **How big ?**
    - **Aerosols ?**
    - **Animals ?**



Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **SECTION II - Principles of Biosafety**
  - **Recommended Biosafety Levels for Infectious Agents in the Laboratory**
  - **Summary of Recommended Biosafety Levels for Activities in Which Experimentally or Naturally Infected Vertebrate Animals Are Used**



http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4toc.htm

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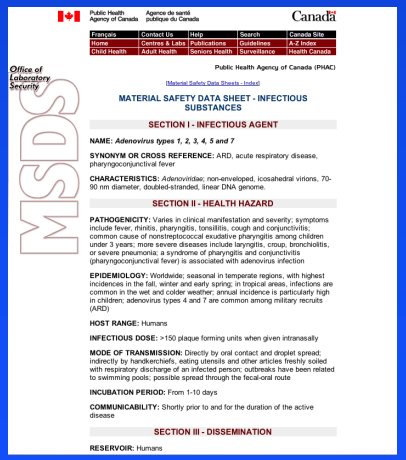


http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s2.htm

Laboratory Containment Levels for Biological Research Involving Potential Biohazards

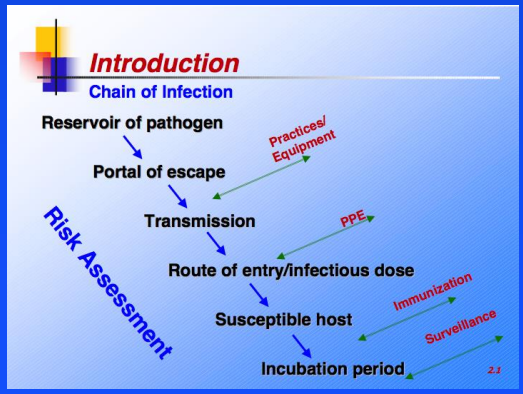
- **Section III Laboratory- Biosafety Level Criteria**
  - **BSL 1, BSL 2, BSL 3, BSL 4**
  - **Comparison of Biological Safety Cabinets**
- **Section IV-Vertebrate Animal Biosafety Level Criteria**
  - **ABSL 1,**
  - **ABSL 2,**
  - **ABSL 3,**
  - **ABSL 4**

http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s3.htm

http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s4.htm

Laboratory Containment Levels for Biological Research Involving Potential Biohazards

- **SECTION V - Risk Assessment**
- **SECTION VI- Recommended Biosafety Levels For Infectious Agents and Infected Animals**
- **Section VII-** Agent Summary Statements



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http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s6.htm

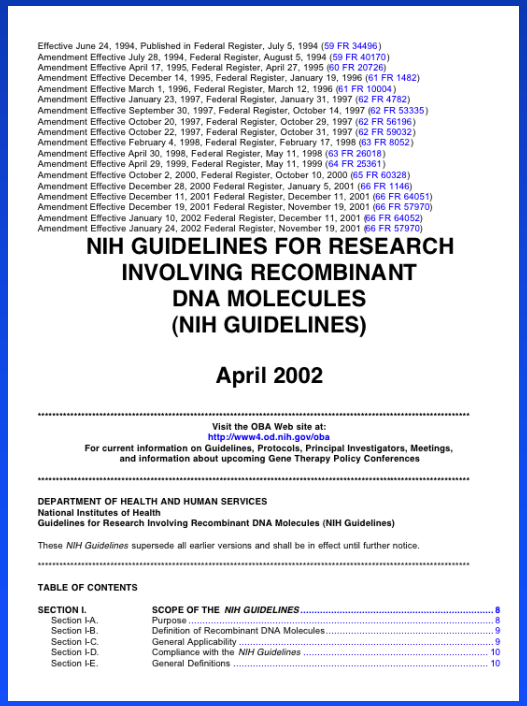
http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4s7.htm

Recombinant DNA, Gene Therapy and Transgenics

Guidelines for Research Involving Recombinant DNA Molecules

Or in PDF at this site

- *Scope*
- *Safety*
- *Experiments Governed*
- *Roles and Responsibilities*



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April 2002

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http://www4.od.nih.gov/oba/rac/guidelines_02/NIH_Gdlnes_lnk_2002z.pdf

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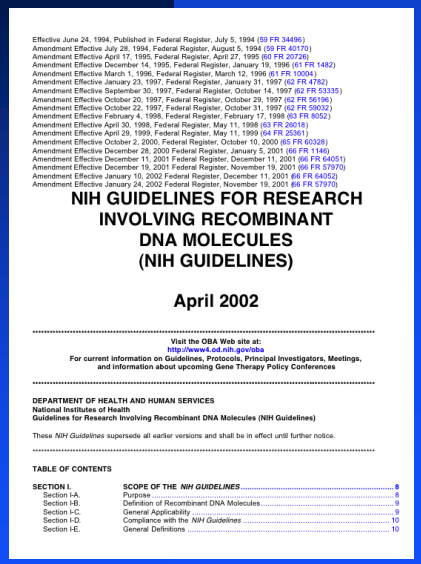
- *Classification of Human Etiologic Agents on the Basis of Hazard*
  - Appendix B-I. Risk Group 1 (RG1) Agents
  - Appendix B-II. Risk Group 2 (RG2) Agents
  - Appendix B-III. Risk Group 3 (RG3) Agents
  - Appendix B-IV. Risk Group 4 (RG4) Agents



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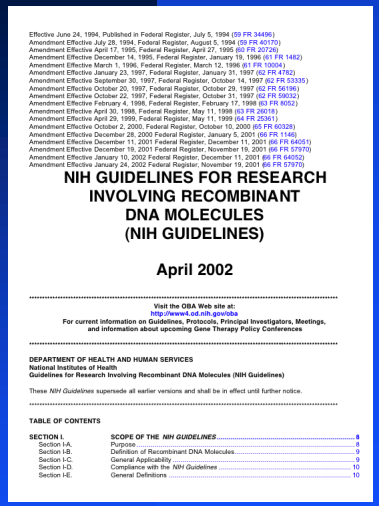
  - **Appendix Q-I. General Considerations**
    - **Appendix Q-I-A. Containment Levels**
    - **Appendix Q-I-B. Disposal of Animals (BL1-N through BL4-N)**
    - **Appendix Q-II. Physical and Biological Containment Levels**
    - **Appendix Q-II-A. Biosafety Level 1 - Animals (BL1-N)**
    - **Appendix Q-II-B. Biosafety Level 2 - Animals (BL2-N)**
    - **Appendix Q-II-C. Biosafety Level 3 - Animals (BL3-N)**
    - **Appendix Q-II-D. Biosafety Level 4 - Animals (BL4-N)**
    - **Appendix Q-III. Footnotes and References for Appendix Q**



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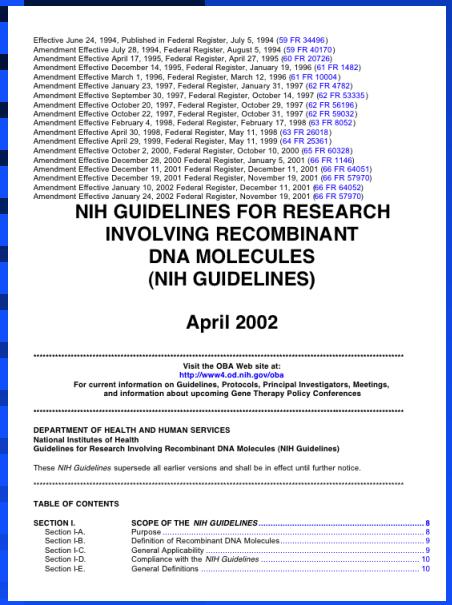
Guidelines for Research Involving Recombinant DNA Molecules

- **What's Exempt?**
  - See section III F (page 20 NIH Guide (April 02))
    - **Those that are not in organisms or viruses**
    - **Those that consist entirely of DNA segments from a single non-chromosomal or viral DNA source, though one or more of the segments may be synthetic**
    - **Those that consist entirely of DNA from a prokaryotic host including its indigenous plasmids or viruses when propagated in that host (or a closely related strain of the same species), or when transferred to another host by well established physiological means.**
    - **Those that consist entirely of DNA from a eukaryotic host including its indigenous chloroplasts, mitochondria or plasmids (excluding viruses) when propagated in that host.**
  - **Bottom line… PCR and gel running..**



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