Working with biohazardous materials in an accelerator laboratory: Developing a lab to achieve compliance in the US

Robin Broussard
Naresh Deoli
Armin de Vera
Harry J. Whitlow
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Applications of Accelerators

• Traditional
  • Materials Science
  • Nuclear Science

• Non-traditional
  • Agricultural
  • Archeological
  • Biological
  • Biomedical
Non-traditional Risks

• Agricultural
  • Pathogens in specimens
  • Eggs hatching

• Archeological
  • Pathogens in specimens

• Biological
  • Pathogens in specimens
  • Eggs hatching
  • Maintaining sterility
  • Animal Welfare

• Biomedical
  • Pathogens in specimens
  • Sterility of cells and tissues
  • Proper consent obtained
Needs for Working With Live Research Items

• **Seeds/Pollen**
  • Clean
  • Dry

• **Plants**
  • Temperature
  • Water/humidity
  • Lighting
  • Soil/Substrate
Needs for Working With Live Research Items

- Animals
  - Temperature
  - Water/humidity
  - Lighting
  - Air exchanges
  - Food
  - Caging
  - Waste disposal
  - Enrichment
  - Biosafety Cabinet
  - Transportation?
Needs for Working With Live Research Items

• Cells and Tissues
  • Incubator to maintain temperature and humidity
  • Media to grow in/on
  • Lighting (plant cells)
  • Gas bottles
  • Biosafety Cabinet
  • Pipettors
  • Microscope
  • Biohazard disposal
Needs for Working With Live Research Items

• Bacteria & Viruses
  • Incubator to maintain temperature and humidity
  • Media to grow in/on
  • Gas CO₂ bottles
  • Biosafety Cabinet
  • Pipettors
  • Streaking tools
  • Microscope
  • Biohazard disposal
  • Method to transport
Ethics & Compliance

• Plants & Seeds
  • Irradiation could alter DNA and genes
  • Cannot be released into the environment without proper testing and approval
  • Institutional Biosafety Committee (IBC)
  • The Coordinated Framework for Regulation of Biotechnology
Ethics & Compliance

• Animals & their tissues
  • Institutional Animal Care and Use Committee (IACUC)
    • Reviews research use
    • Restraint devices
    • Inspects housing
  • Institutional Biosafety Committee (IBC)
    • Reviews safety measures protecting staff and public from any pathogens

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Ethics & Compliance

• Cells & Tissues
  • Depends on the source
    • Animal should have IACUC approval
    • Human should have Institutional Review Board (IRB)
  • Live or fixed
    • Live primary cells and tissues could have pathogens
      • May need IBC approval
    • Fixed – pathogens can’t infect
Ethics & Compliance

• Bacteria and Viruses
  • Institutional Biosafety Committee (IBC)
    • Reviews and sets safety measures protecting staff and public from pathogens
  • Types of disinfectant, proper PPE
Resources

• Vice President for Research Office
  • Research Integrity or Research Compliance Office
  • Institutional Animal Care and Use Committee
  • Institutional Biosafety Committee
  • Institutional Review Board
Resources

• University - Office of Environmental Health and Safety
  • Institutional Biosafety Committee
    • Hazardous waste pick up
    • Training on pathogens
    • Laboratory set up and inspection

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Resources

• Plants
  • The Coordinated Framework for Regulation of Biotechnology
    • USDA – Regulation of Biotech Plants
      • USDA Biotechnology Resources
    • EPA - Biopesticides
    • FDA - Genetic Engineering of Plants
Resources

• Animals
  • Office of Laboratory Animal Welfare
    • Public Health Service (PHS) Policy
    • The “Guide”
    • AVMA guidelines
    • Education – pre-recorded webinars and podcasts
  • Animal Welfare Act and Regulations
    • Dogs & Cats
    • Guinea pigs & Hamsters
    • Rabbits
    • Non-human Primates
    • Marine Mammals

• Resources
  • Sample Documents
    - Domestic Assurance
    - Interinstitutional Assurance
    - Foreign Assurance
Resources

• Biosafety
  • CDC – Biosafety in Microbiological & Biomedical Laboratories
  • NIH Office of Science Policy – Biosafety, Biosecurity and Emerging Biotechnology
Resources

• Robin Broussard, PhD
• Robin.Broussard@louisiana.edu
• 337-482-1419
Questions?

Thank you for attending today’s presentation.