Three Questions to Answer Today

• 1. Are People Getting Sick in Laboratories from What They Are Working With?
• 2. What Were Common Issues Identified in These High Profile Infections?
• 3. Are There Specific Things That Can be Done to Reduce the Risk of a Laboratory-Acquired Infection?
Are People Getting Sick in Laboratories from What They Are Working With?

- Case 1 Cowpox Infection Acquired From Lab Contamination
- Case 2 Texas A&M Researcher Infected with Brucella
- Case 3 Boston University Laboratory Tularemia Cases
Case 1  **Cowpox Infection Acquired From Lab Contamination**

**Facts:**

- No previous incident/accident reported by researcher
- Researcher noticed suspicious ulcerated lesion on finger lasting 3 months
- Biopsied tissue submitted to CDC and identified as rDNA strain of Cowpox stored in Lab’s freezer
- Environmental sampling of lab revealed rDNA strain of Cowpox on surfaces inside lab including freezer
Coxpox

Symptoms

- Cowpox is a viral skin infection caused by the cowpox or catpox virus. This is a member of the orthopoxvirus family, which includes the variola virus that causes smallpox. Cowpox is similar to but much milder than the highly contagious and sometimes deadly smallpox disease. Most human cases of cowpox appear as one or a small number of pus-like lesions on the hands and face, which then ulcerate and form a black scab before healing on their own.
Case 2 Texas A&M Researcher Infected with Brucella

- **Facts:**
  - February of 2006 researcher is infected with Brucella after cleaning aerosol chamber in Select Agent lab
  - CDC Inspection in July of 2007 Found:
    - Security Issues
    - Training Issues
    - Medical Surveillance Issues
    - Lack of or Inconsistent Implementation of Policy Issues
  - Resulted in 1 million dollar fine and shutting down all Select Agent Research until resolved
Brucella

**Symptoms**
- Brucellosis: Loss of appetite and weight loss, back pain, head ache, fatigue, fever, feeling ill, muscle aches, profuse sweating, loss or alteration of vision.

**Microorganism**
Case 3 Boston University Laboratory Tularemia Cases

• Facts:
  – Three BU researchers became ill in 2004 after working with what they thought was a BSL2 live vaccine strain of *Francisella tularensis* (LVS Type B) not associated with human disease
  – Testing by CDC revealed that lab samples contained *Francisella tularensis* Type A associated with human disease, requiring BSL3
  – Investigation found: routine failure to comply with BSL2 safety protocols, inadequate “signs and symptoms” in medical surveillance program, authority issues in BU IBC
Francisella tularensis

Symptoms

• Francisella: (Tularemia) Skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth sores, diarrhea or pneumonia. If the bacteria are inhaled, symptoms can include abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness.

Microorganism
What Were Common Issues Identified in These High Profile Infections

- Risk Assessment for Biological Materials Inadequate
- Existing Policies Not Adequate for Risks or Policies Not Followed
- Training for Staff Incomplete
- Verification Systems for Effectiveness of Biosafety System Not Always Followed
- Reporting of Symptoms Not Always Timely or Consistent to Employee Health
Are There Specific Things That Can be Done to Reduce the Risk of a Laboratory-Acquired Infection?

- Effective Biological Risk Assessment is Most Important Part of Effective Biosafety System
- “Risk assessment is a process used to identify the hazardous characteristics of a known infectious or potentially infectious agent or material, the activities that can result in a person’s exposure to an agent, the likelihood that such exposure will cause a LAI, and the probable consequences of such an infection.”

BMBL 5th Ed.
Risk Assessment Considerations

- Biological Agent
- Procedures
- Host
Objectives

• Prevent a Laboratory-Acquired Infection
• Learn Basics of Biological Risk Assessment Process
• What Can We Learn From High Profile Incidents?
• Practical Understanding of Importance of Good Handling Techniques When Using Biological Materials
Biological Agent
Environment
Host
Case Study Methodology

• Describe Facts
• Put Student in Role of Investigator
• What Are Specific Areas That Directly Apply to Setting Up and Maintaining an Effective Biosafety Management System?
CSI UA

• Facts
  – You are Biosafety Officer
  – Receive call from Campus Occupational Health that several people from same lab have arrived over an 8 hour time with flu-like symptoms. When asked what they were working on, they said a harmless vaccine strain
Minimum Learning Objectives

• Identify Three Core Elements for Biological Risk Assessment
  – What is the specific hazard associated with the agent/material?
  – How can risk of laboratory acquired infection be reduced?
  – What are three key components of a biosafety system? (ventilation, SOP’s, training)
Applying Learning Objectives

• Facts:
  – A chemistry professor is using tissue culture to test a chemical indicator for influenza virus. As laboratory safety representative, you have noticed many students doing this work getting “flu-like symptoms” and having to stay home. You suspect something is not right. Where do you start and what specific questions do you ask the PI? What resources are available to you for your investigation?
Applying Learning Objectives

• Facts
  – As laboratory safety representative, you have been asked by the chemistry professor to help her set up a new experiment using Methicillin-Resistant Staphylococcus aureus (MRSA). What steps should you take to do conduct a biological risk assessment?
Demonstration

• Objective
  – Seeing graphical evidence using florescence to show how poor technique can create biological and chemical contamination

• How
  – Materials: Gloves, Bench Absorbent Pads, Solvent, Kim wipes, Florencecence Powder, Glo Germ Solution, Aerosol Producing Equipment, UV Light, Disposal Bags

• Key Visual
  – Show how material can be easily and invisibly transferred for other to be contaminated
## Materials and Methods

### Exercise One

<table>
<thead>
<tr>
<th><strong>Materials</strong></th>
<th><strong>Methods</strong></th>
<th><strong>Objective</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Powder Transfer Tool</td>
<td>2. Student is asked to take a small amount of powder and place on absorbent</td>
<td>can create biological and chemical contamination</td>
</tr>
<tr>
<td>3. Disposable Gloves</td>
<td>pad</td>
<td></td>
</tr>
<tr>
<td>4. Lab Bench Absorbent Pads</td>
<td>3. Student cleans off transfer tool w/solvent</td>
<td></td>
</tr>
<tr>
<td>5. Disposable Wipes</td>
<td>4. Student is asked to take glove off</td>
<td></td>
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<tr>
<td>6. Cleaning Solvent</td>
<td>5. Student hand and measuring tool is shown under black light to observe</td>
<td></td>
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<tr>
<td>7. Black Light</td>
<td>contamination</td>
<td></td>
</tr>
<tr>
<td>8. Disposal Bag</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Materials and Methods

### Exercise Two

<table>
<thead>
<tr>
<th>Materials</th>
<th>Methods</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Glo Germ Florescence Solution in Screw-Top Bottle</td>
<td>1. Student put gloves on</td>
<td>1. Seeing graphical evidence using florescence to show how poor technique can create biological and chemical contamination</td>
</tr>
<tr>
<td>2. Disposable Gloves</td>
<td>2. Student is asked to take a small amount of solution and transfer to disposable cup with pipettor</td>
<td></td>
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<tr>
<td>3. Pipettor w/ Disposable Tips</td>
<td>3. Student is asked to take glove off</td>
<td></td>
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<tr>
<td>4. Disposable Cups for Solution</td>
<td>4. Student hand and pipettor is shown under black light to observe contamination</td>
<td></td>
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<td>5. Lab Bench Absorbent Pads</td>
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