Adapting Lethality to Homeland Defense and Security

Biodefense and the Global War on Terror

Brendan McCluskey
Homeland Defense Liaison
University of Medicine and Dentistry of New Jersey

15-June-2005
“Today's problems cannot be solved with the same thinking that created them.”

- Albert Einstein
UMDNJ

• Largest independent academic institution of its kind
• 20,000+ students, faculty, staff, and other personnel
• Recognized leader in health care delivery, biomedical research, medical and health education, and community service
UMDNJ

• Statewide institution
• 4 major campuses plus satellite campus
• Integrated hospital (Newark)
• Network of behavioral health centers
• Affiliations with many health care and educational institutions
CIA: “Al Qaeda Ready to Use WMD”

- Al Qaeda’s goal is the use of chemical, biological, radiological or nuclear weapons to cause mass casualties

June 3, 2003
Source: Washington Times
Research

- **Basic Research**
  - Blood detection assays
  - Human genetics of susceptibility
  - Plume modeling
  - Effects of pharmaceuticals on radiation detectors

- **Applied Research**
  - Tissue digestion cassette
  - Bioinformatics
  - Broad application respirators
Preparedness

- Standardized (off the shelf)
  - HazMat Emergency Response
  - WMD/Domestic Preparedness
  - Incident Command System
  - Forensic Epidemiology
- Novel (custom designed)
  - EMS Response to the Large Scale Incident
  - 40-hour Terrorism Program (Public Health)
  - Case-based Training Institute
  - Graduate concentration in biodefense
Current Projects

- Research
  - Host Response to Select Agents
- Preparedness
  - Case-based Training
“Progress occurs when courageous, skillful leaders seize the opportunity to change things for the better.”

- Harry S. Truman
Biodefense research at UMDNJ

- HOST RESPONSE
  - Can infection-specific signatures be detected?
Transcriptional Profiling

Transcriptional profiling: gene expression in infected cells

- Detect host response to infection
  - Infect human blood cells with agents
  - Perform DNA microarrays
  - Determine which genes are up-regulated or down-regulated
- Identify signature profiles of gene expression for each infection
Transcriptional Profiling
Transcriptional Profiling

Bacillus anthracis (anthrax)

Burkholderia mallei (glanders)

Yersinia pestis (plague)
Transcriptional Profiling

A four-color, single-well multiplex assay to detect select pathogens

Detected 50 molecules

Anthrax

Glanders

Tularemia

Plague

Dresses 50 molecules

- Y. pestis
- B. anthracis
- F. tularensis
- B. mallei
- No DNA
Transcriptional Profiling

Transcriptional profiles may reflect particular infection

anthrax
plague
influenza
“The three great essentials to achieving anything worthwhile are: first, hard work, second, stick-to-it-iveness, and third, common sense.”

- Thomas Edison
History of Case-Based Training

- CDC Epidemic Intelligence Service
- Military War Colleges (Naval War College)
- Harvard Business School
- Medical Schools
Case-based Training

- Vicarious experience
- Learn what to do AND how to do it
- Learn multiple roles
- More effective at triggering memory
- Know what to expect when event occurs
Case-based Training

• A role play of an event that actually happened
• Based on historical events or simulated scenarios
• Similar to a table-top exercise
• Subjects:
  • Foodborne illness, chem/ rad events, investigating infectious disease outbreaks
• Multidisciplinary approach -
  • First responders, public health, scientists and clinicians
  • Microbiology/immunology/genetics/molecular biology
  • In vitro and in vivo models
  • Training, planning, and exercising
Homeland Defense/Security Team

Research
- Nancy Connell
- Grant Gallagher
- David Alland
- Liz Raveche
- Jerry Ellner
- Kevin Fennelly
- Steve Schutzer
- Nick Megjugorac
- Jessica Mann
- Rebeka Pestoff
- Carolina Sofer
- Catina Crismale

Preparedness
- Jason Emmel
- Andrea Marcus
- James Smith
- Tim Phelan
- Nikiesha Nicholas
- Kathy Wioland
- Mary Paczkowski
- Jamie Steiger
- Dennis Boos
- Henry Cortacans
- Nancy Hamstra
- William Halperin
Thank You

Brendan McCluskey
Homeland Defense Liaison
University of Medicine and Dentistry of New Jersey
30 Bergen Street ADMC 1422
P.O. Box 1709
Newark, New Jersey 07101-1709 USA
973-972-6144 office
973-972-6104 fax
brendan.mccluskey@umdnj.edu email