

Bioterrorism Preparedness - Laboratory Analysis

Kate Ruoff, Ph.D.

Microbiology Laboratories

Massachusetts General Hospital

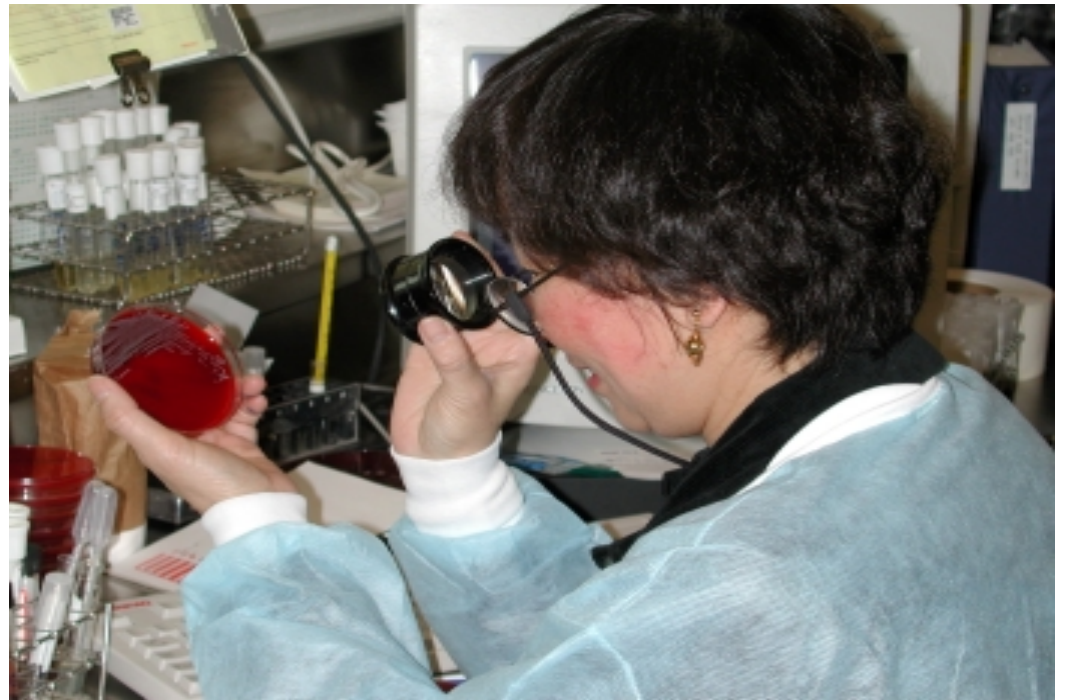
kruoff@partners.org

Report Documentation Page

Report Date 03APR2002	Report Type N/A	Dates Covered (from... to) 03APR2002 - 04APR2002
Title and Subtitle Bioterrorism Preparedness - Laboratory Analysis	Contract Number F19628-00-C-0002	
	Grant Number	
	Program Element Number	
Author(s) Ruoff, Kate	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) Microbiology Laboratories Massachusetts General Hospital	Performing Organization Report Number	
Sponsoring/Monitoring Agency Name(s) and Address(es) Air Force ESC/XPK (Richard Axtell) Hanscom AFB, MA 01731	Sponsor/Monitor's Acronym(s)	
	Sponsor/Monitor's Report Number(s)	
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes Workshop paper from the New England Bioterrorism Preparedness Workshop held 3-4 april 2002 at MIT Lincoln Laboratory, Lexington, MA, The original document contains color images.		
Abstract		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	
Classification of Abstract unclassified	Limitation of Abstract SAR	
Number of Pages 14		

Bioterrorism Preparedness - Laboratory Analysis

An account from
the “real world”
of the clinical
microbiology
laboratory



Clinical Laboratories - The Need for Preparation

- Agents likely to be used by terrorists
 - Unfamiliar, rarely encountered organisms
 - Potential for misidentification, mishandling of specimens, laboratory acquired infection
- Public health agency-sponsored training in the Northeast began in 1999
- Laboratory Response Network (LRN)
- Were we prepared in the autumn of 2001?

Autumn, 2001 - Anthrax!

- Wake-up call for clinical microbiologists
- Expect the unexpected
- Preparedness is an absolute necessity

LAB LABEL

Outpatient Requisition
Clinical Laboratories

Date Collected: _____ Time Collected: _____ Phleb: _____

ORDERING PHYSICIAN NAME: _____ PROVIDER# _____

Copy to Physician Name: _____ Specimen Type/Site: *throat swab*

ICD - 9 CODES _____ PROVIDE DX IF CODE UNKNOWN: *cough panic disorder*

Attention: All services ordered for the patient must meet the definition of medical necessity (i.e., required to diagnose or treat an illness or injury). Documentation must be sufficient to demonstrate same. REFER TO BACK FOR PARTIAL DIAGNOSIS LISTING
r = 5mL red B = 10mL red c = 5mL (green/gel) G = 5mL grey (half-full) L = 3mL lavender b = 4.5 mL blue u = urine

TIME STAMP _____

SSS: HSAH
SSS: Specific organisms sought: B and HSAH

PATIENT IDENTIFICATION AREA

EACH SECTION BELOW REQUIRES SEPARATE SPECIMENS
(1) Complete ALL information on top of form. (2) Order tests.
(3) Draw specimen tubes indicated (Which tube? — Call 4-LABS).
(4) Separate form. (5) Wrap specimens with matching lab sheet.
NOTE: Order all Blood Bank/Tissue Typing tests on the following forms:
Blood Group #10693, HIV #11693, Hepatitis #70155, Tissue Type #70270

MICROBIOLOGY SECTION
(Susceptibility performed when required)

Beta Strep Culture, throat only
 Cervical Culture
 Chlamydia (Body Site required: _____)
 Gonorrhea (Body Site required: _____)
 Herpes (HSV), (Body Site required: _____)
 Heterophile Antibody (Monospot)
 Ova & Parasites
 Stool Culture
 Urine Culture
 Vaginal Culture
 Measles Ab
 RPR (serology)
 Rubella Ab
 HIV Viral Load

Other: _____
 Other: *ANTHRAX*
Comments: *Sony!*

LRN Level A Lab Preparedness

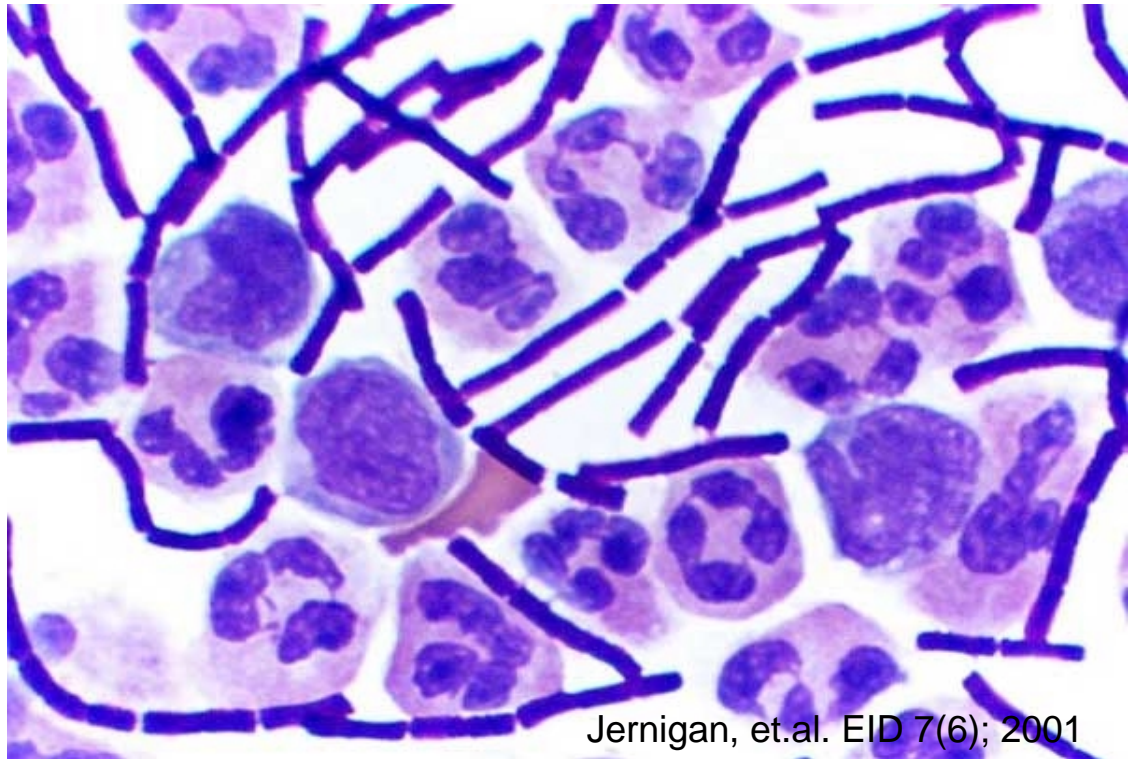
- Level A laboratory functions
 - Rule out / refer
 - Ship suspicious infectious agents to higher level labs for further study
- Level A laboratory activities
 - Formulate laboratory procedures
 - Train staff
 - Biosafety concerns
- Assistance from public health agencies

Activities of Clinical Micro Labs

- “Average” Labs
 - Microscopic examination of specimens
 - Culture of specimens and isolation of many bacterial and fungal pathogens
 - Identification and susceptibility testing
- “Advanced” Labs
 - Viruses (culture, direct detection)
 - Mycobacteria (culture, susceptibility)
 - Certain fungi (culture and identification)
 - Molecular testing

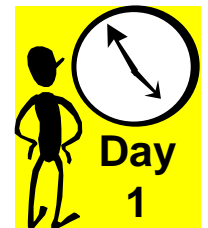
Level A Lab Example: *B. anthracis*

- Gram stain* of CSF, positive blood culture or wound culture shows large gram-positive rods



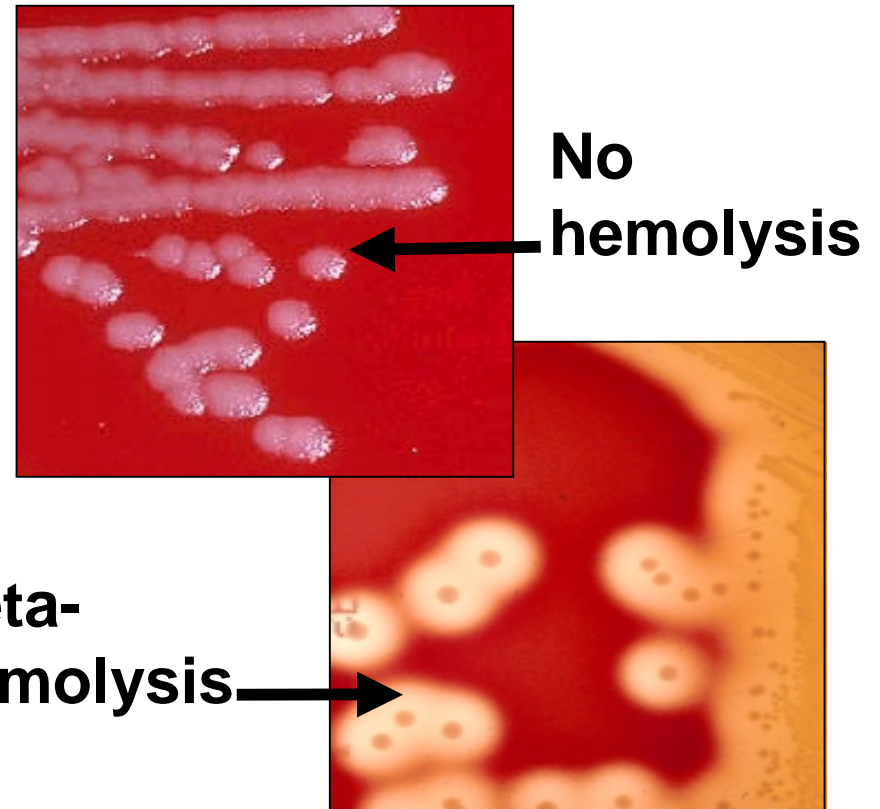
Jernigan, et.al. EID 7(6); 2001

*Gram stain: Differential stain, not specific, but can be extremely helpful



Level A Lab Example: *B. anthracis*

- Culture on blood agar*. Examine for characteristic colony morphology and lack of beta-hemolysis



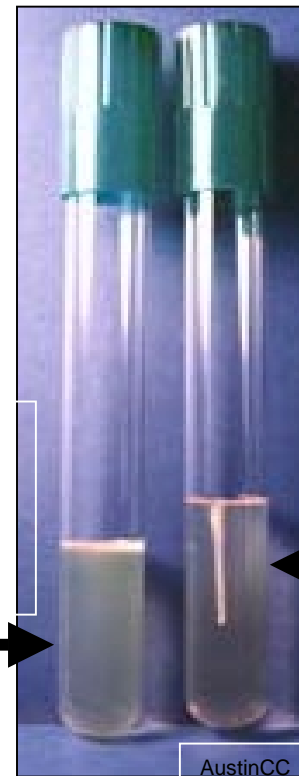
*Agents of anthrax and plague are “easy” to grow. Agents of tularemia, brucellosis are harder to recover, may require special media



Level A Lab Example: *B. anthracis*

- Perform identification tests. For ?*B. anthracis*, perform motility test*

Growth throughout medium (motile)



Growth only near original inoculation stab (non-motile)

*Minimal rule out tests (minimal manipulation of potentially dangerous cultures) are recommended for Level A labs



Level A Lab Example: *B. anthracis*

- Ruled in?
 - *Bacillus* species with characteristic colony morphology, non-hemolytic, non-motile
- REFER
 - Contact Level B lab
 - Ship suspect isolate



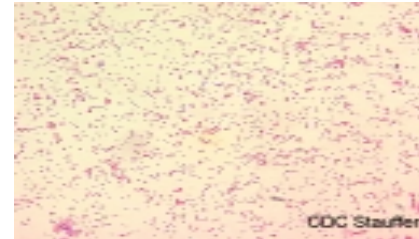
Level A Lab Preparedness - Where Are We Now?

- Bigger seems to be “better”
 - Wider variety of pathogens encountered; personnel experienced in working with infrequently isolated agents
 - More and/or better biosafety equipment
 - Institutional support for needed resources is more likely in larger hospitals
- Small labs can still have successful preparedness programs

Level A Lab Preparedness



Anthrax



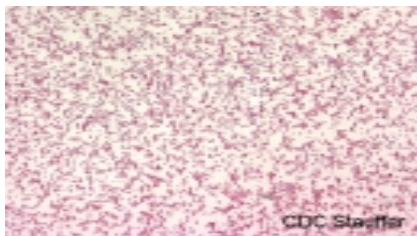
Brucellosis



Plague



**Botulism-
Specimen processing/
shipping only**



Tularemia



**Smallpox, VHF-
More guidance needed
for Level A labs**



**Environmental testing
for *B. anthracis* spores**

Clinical Lab Preparedness – Next Steps

- Extend training (category B agents)
- Enhance communication/cooperation with higher level public health labs
 - NLS
- Dissemination of some Level B procedures to select Level A labs
 - ?Rapid, specific tests/reagents
 - ?BSL3 activities in select labs
 - ?Surge capacity

Level A Clinical Microbiology Laboratories

- Can be instrumental in early recognition
- Must be trained, alert and vigilant
- Form partnerships with public health labs for BT preparedness assistance, BT response plans, and overall improvement of the public health system