Idaho Bureau of Laboratories

Clinical Forum

Volume 4, Issue 3 Fall 2011

State of Idaho

Bureau of Laboratories

2220 Old Penitentiary Rd

Boise, ID 83712-8249

Phone: 208-334-2235

Fax: 208-334-4067

E-mail: statelab@dhw.idaho.gov

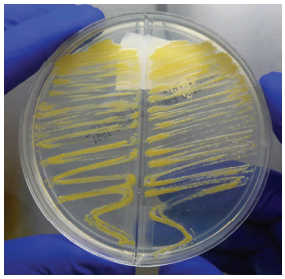
IDAHO DEPARTMENT OF HEALTH & WELFARE

In this issue:

Non-tubercular Mycobacteria (NTM) Identified in Idaho

Steve Gregoire

The primary function of the Idaho Bureau of Laboratories (IBL) TB Lab is to identify and characterize *M. tuberculosis* in clinical samples; however, the majority of all identifications are non-tubercular mycobacteria (NTM). Most NTM's are commonly found as environmental organisms in soil and water, and their pathogenicity varies. The bigger challenge exists with the ever increasing efficiency of microbiology laboratories to isolate and identify small quantities of organisms from patient samples, making the distinction between colonization and true infection more difficult.[1]



Typical rapid growing NTM

The number of NTM species has increased markedly, from 50 species in 1997 to over 125 species in 2007. This increase can be attributed to improved laboratory isolation techniques, such as rapid broth detection systems, but more importantly to advances in molecular capabilities and recognition of 16S rRNA gene sequence

(continued on page 2)

IBL Solicits Submission of Respiratory Specimens for 2011-2012 Flu Season

Colleen Greenwalt

The arrival of fall signals the start another influenza season, and surveillance for the 2011-2012 Influenza Season is kicking into high gear. The U.S. influenza surveillance system is a collaborative effort between CDC, the World Health Organization (WHO) and state, local, and territorial partners. The Virology Laboratory within IBL serves as Idaho's WHO Collaborating Laboratory, and as such, performs RT-PCR, viral culture, and pyrosequencing to monitor the appearance and spread of influenza across the state to determine what viral subtypes are circulating and to detect changes (shifting or drifting) in the viruses. IBL also performs antiviral resistance studies and provides isolates and clinical material to CDC for further antigenic characterization. Our data is used at the national level and ultimately helps guide decisions for the flu vaccine

(continued on page 6)

NTMs Identified in Idaho

continued from page 1

analysis as the standard for taxonomical classification. Since the 16S gene is highly conserved, differences in the gene greater than 1% generally define a new species.[2]

Mycobacteria are in the class of Actinobacteria and family Mycobacteriaceae. The *Mycobacterium* genus along with members of a related *Nocardia* genus, are classified as acid-fast bacteria (AFB) due to their impermeability by certain dyes and stains. A mycolate-rich cell wall, which contains over 60% complex lipids, gives mycobacteria distinct staining characteristics. AFB organisms retain certain dyes when treated with acidified organic compounds (acid-alcohol) and subsequent counterstains. This common staining procedure is used to differentiate acid-fast bacteria from non-acid fast bacteria and is one of the first diagnostic tools used in the identification of *Mycobacterium tuberculosis* infection. It is the mycolic-acid cell wall that explains why NTM's tolerate harsh decontamination procedures used to eradicate other bacterial flora in samples. So, in efforts to recover MTB from a sample, any NTM's present will also survive the decontamination process.

NTM's can be categorized into two groups, rapid growing or slow growing. Rapid growing mycobacteria (RGM) are generally defined as having visible growth on a solid media <7 days after inoculation. Although the majority of NTM's identified at IBL are slow growers, such as *M. avium* complex and M. *gordonae*, RGM make up the larger number of unique identifications. RGM's are extremely hardy and thrive in the most hostile of environments, allowing them to withstand common water system disinfection procedures. Studies have found that these mycobacteria exist in 90% of municipal water systems.[3]

Idaho is a low-incidence state for TB (<3 per 100,000); in 2010 IBL confirmed M. *tuberculosis* from clinical specimens or reference isolates from 10 patients. The most abundant mycobacteria identifications from IBL's TB Lab in 2010 were M. *avium* complex 34.6%, followed by M. *tuberculosis* 19.3%, M. *gordonae* 17.3% and M. *abscessus/chelonae* group 14.2%

(continued on page 4)

IBL Offers Direct MTB NAA Test

Amanda Bruesch

The growth and detection of *Mycobacterium tuberculosis* (MTB) with traditional laboratory methods typically requires 1-8 weeks. However, molecular methods are not dependent on the growth of bacteria and allow for the detection of *M. tuberculosis* complex in a matter of hours. Conventional Nucleic Acid Amplification (NAA) tests identify genetic material unique to MTB complex directly in clinical samples.

Idaho Bureau of Laboratories (IBL) offers a direct MTB NAAT with capabilities beyond those of conventional tests by distinguishing between MTB complex and common non-tubercular mycobacteria such as *Mycobacterium avium* complex, *M. chelonae/abscessus* complex, and *M. gordonae.* The ability to rapidly distinguish TB from NTM will help clinicians determine treatment regimens and help public health officials make decisions re-

(continued on page 5)

Non-Tuberculosis Mycobacterium Word Find

answers on page 6

X E U R X G F O G Q X V L E D M Z Z Z U E Z E S B N E A K C
D S R F I M O E F C I A B K A D R G U B X Z L Y C D C T M S
L N V E F M M E M E B R S D O W Q S U S U L Q O K Q H F V A
C E U C N B V O R A Z F A M M B V M O A O U F J W Y P X O K
W G L B R C E B N G L G V G N Q M O Y T K I M A D X V D X P
X R A Q J P X R E J A M C Z C O E Z P X V G H I I L V U V V
L E B V H W C N O S H O G Q P B T R I Q W S B B X D O U P S
F B S W D X A M C W H N T X T M D J V W B L K J K A V S T D
O S C Q T V C A T U D N C H M B W C T Q P Y L Y K K U F C E
J K E A E E R S R O I A M D B U P U M R X I O T U K L R I E
F I S N T I K I V E P T G N F F V L U Z Z T U S W C B B Q T
O R S O E Q K R A M C I T Z O P B F Q S T B L G G P F I F P
Z E U N R G C N D U G Q W B R Q E X E W I M T G T N Z B F W
W D S S R O O D P C G C H A T P K U N H A A W N S S O I W W
K E X N A L E N T I F L A V U M A X E N X S R F K Q A H D X
D R N X E N O P I A Y Y M A I Y T E C L E D N O D S W S J H
K F N H Z K N I V C B X K S T E S W S A U Q K F R B H Q N L
U E C X R A S A D O A W D W U H K N W B G Z A J I A Y M N V
P O M Y P A V A Z H Q F W L M M W J G H H L C T I K E A I C
L L N N S L X E R P S S O W U Y O A O I H J F Q V N U A O S
X T O N Q W V M O B F V L C C M U G A R L W N G K W D X L F
Y A A R U N T K C F E V I X I R S Y R E Z F Z F D Y L H Z R
A K S K J M U I V A G N N G T J B R O W N O F I I V S E A H
A P U Z D U T C N C E Y S Y P T T M H E F D P Y K L G L P X
U B J G I N G O S G O J K F E Q G Z Q V R C P N K Z X S P H
R T Q V I I D O O G A X Y B S G A I P I C K Q X O X W Z C B
E B E F T R P C B E K B I I Q M U T W K K G S A J E T Y W U
R G N E O A U R U M X A E H M P T U I E Z K Q X Z G G F Y S
V V K G U M O Z D I Z Z U S Y Y O T B V B W H U P J Q L R E
J Y N U F T H F C A A N U D G M F J R J L Y Z F R K J A T Z

ABSCESSUS
AVIUM
CHELONAE
FACINOGENES
FORTUITUM
FREDERIKSBERGENSE
GENAVENSE
GOODII
GORDONAE
KANSASII
LENTIFLAVUM
MADAGASCARIENSE
MARINUM
MUCOGENICUM
NEBRASKENSE
NEOAURUM
PHOCAICUM
SEPTICUM
TERRAE
WOLINSKYI
XENOPI

To be added or removed from the Clinical Forum email list

statelab@dhw.idaho.gov

Bioterrorism Preparedness Workshop

Wendy Loumeau

Idaho Bureau of Laboratories is preparing for the next Sentinel Laboratory Preparedness Workshop. It will be Thursday, October 27 from 8 am – 5 pm.

This one-day, hands-on workshop will provide an overview of the sentinel clinical laboratory's role in the presumptive identification of the primary agents of bioterrorism. Participants will learn about the Laboratory Response Network and sentinel laboratory protocols for ruling out suspect agents. Laboratory demonstrations will outline the microbiology of these agents so that participants can recognize the culture, staining, and biochemical characteristics.

IBL has funding available to assist with transportation and hotel accommodations for up to 20 participants. Registration forms and additional information are available at statelab.idaho.gov under the Training tab. Contact Wendy Loumeau for questions and registration information (208-334-2235 ext. 258 or Loumeauw@dhw.idaho.gov).

NTMs Identified in Idaho

continued from page 2

(Figure 1). The remaining 14.2% consist of 26 distinct mycobacterium species, all preliminarily identified by 16S rRNA gene sequence analysis and confirmed by phenotypic characteristics.

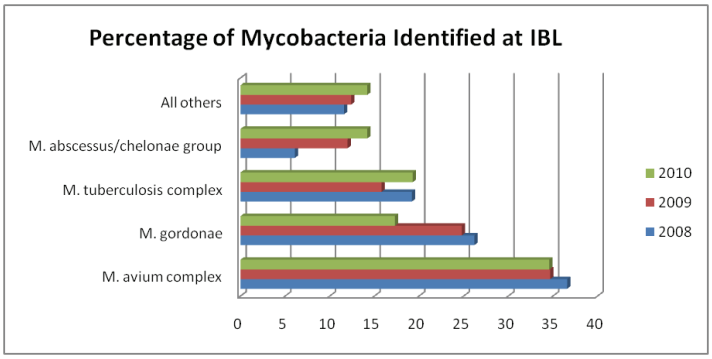


Figure 1

Studies have shown nosocomial outbreaks and pseudo-outbreaks of NTM in the United States have usually involved exposure to water sources, such as ice machines, drinking water fountains, or contamination of sterile equipment with tap water. These common exposures may contribute to the recovery of NTM from a patient sample.

One of the more difficult challenges facing public health officials is the ability to quickly distinguish between TB infection and NTM disease, considering both have similar presentations and demographic risk factors. Kendall et al., recently compiled a population-based study comparing the demographic and clinical features of TB and NTM patient data. Their findings suggest that clinical TB patients were more likely to report constitutional symptoms, be <50 years and born outside the United States. For NTM patients, chronic obstructive pulmonary disease (COPD), the use immunosuppressive medications and age >50 seemed to be categorizing factors for NTM disease. These data may aid in distinguishing between TB and NTM before any laboratory identifications are made.

With advancing capabilities to recover and isolate AFB using rapid growth detection systems and selective media, combined with the expanding use of molecular diagnostics to identify these isolates, it will be the determination of the significance of such identifications that will become the greater challenge.

References

[1] "Imaging in Nontuberculous Mycobacterial Lung Infections", Anjali Agrawal, MedScape, Apr 3 2008, http://emedicine.medscape.com/article/358828-overview .

[2] "An Official ATS/IDSA Statement: Diagnosis, Treatment, and Prevention of Nontuberculous Mycobacterial Diseases" David E. Griffith, et al, American Journal of Respiratory and Critical Care Medicine, Vol 175. pp. 367-416, (2007).

[3] "Occurance of mycobacteria in biofilm samples",R. Schulze-Robbecke B Janning, Fischeder R. Tubercle and Lun Disease, 73, 141-144, Copyright 1992.

[4] "Clinical and Taxonomic Status of Pathogenic Nonpigmented or Late-Pigementing Rapidly Growing Mycobacteria", Brown-Elliot, Barbara A., Wallace, Richard J., Clinical Microbiology Reviews, Oct 2002, p716-746.

[5] "Distinguishing Tuberculosis from Nontuberculous Mycobacteria Lung Disease, Oregon, USA" Kendall, Brain A, et al, Emerging Infectious Diseases, March 2011, Vol. 17, No. 3 p506-509.

Flu Facts

Colleen Greenwalt

- Influenza can cause mild to severe illness and at times can lead to death.
- Symptoms usually appear suddenly and typically include a fever of ≥100°C and cough and/or sore throat, muscle or body aches, headache, fatigue, at times a runny or stuffy nose.
- Vomiting and diarrhea may seen in children.
- Recovery may range from a few days to less than two weeks.
- Some people, especially those with chronic health problems, may develop complications which can be life-threatening such as pneumonia or bronchitis.
- Children younger than 5, but especially those younger than 2 years old, adults 65 years of age and older, and women who are pregnant are at higher risk of developing flu-related complications.
- Influenza is very contagious.
- Most adults may be infectious beginning 1 day before onset of symptoms and up to 5 to 7 days after becoming sick.
- Children may be able to infect others for longer than 7 days.
- Influenza viruses are spread primarily by droplets created when someone coughs, sneezes, or even talks.
- The virus can be spread to others up to six feet away.
- The virus may also linger on surfaces or objects. A person can become infected by touching an infected surface then touching their own mouth or nose.

MTB NAA Testing

continued from page 2

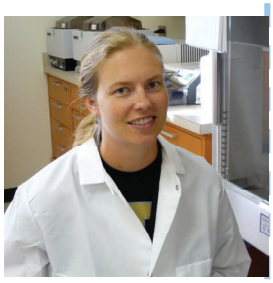
garding contact investigations and isolation. The implications of rapid diagnostic tests for hospitals and clinics are significant: improved patient care, reduced medical costs, and more effective use of isolation rooms[1,2].

This test is recommended for samples from persons who have never received anti-TB treatment or have received less than 7 days of anti-TB treatment during the past year and can be used on AFB smear-negative as well as AFB smear-positive samples. The performance of IBL's direct NAA test has not been evaluated with non-respiratory samples.

REFERENCES

[1] Centers for Disease Control and Prevention. Nucleic acid amplification tests for tuberculosis. *MMWR* 1996;45:950-2.

IBL Welcomes New Microbiologist Senior



Jamie Femreite joined the Idaho Bureau of Laboratories team in early September as a Microbiologist Senior. In her position, she will be one of three microbiologists rotating through the virology, reference bacteriology, mycobacteriology, and molecular epidemiology laboratories within the Clinical Microbiology Section.

Jamie attended the University of Idaho and played on the soccer team then transferred to Washington State University where she graduated with a degree in Microbiology. She came to us from the Washington Animal Disease Diagnostic Lab as a microbiologist.

Jamie's husband, Josh, is the Technology Director at Idaho Distance Education Academy. She and her husband have a two-year old daughter, Jordan, and a dog, Cairo. In her free time she enjoys soccer, biking, and arts and crafts including scrapbooking and making cards.

Upcoming Workshop

Bioterrorism Preparedness Workshop

Presented by Idaho Bureau of Laboratories

October 27th, 8:00 am—5:00 pm Mountain Time

Contact Wendy Loumeau to register:

208-334-2235 ext. 258 or Loumeauw@dhw.idaho.gov

Solution to Word Find

(Over,Down,Direction)
ABSCESSUS(3,6,S)
AVIUM(10,23,W)
CHELONAE(3,18,NE)
FACINOGENES(12,19,NW)
FORTUITUM(15,11,S)
FREDERIKSBERGENSE(2,17,N)
GENAVENSE(10,5,SW)
GOODII(10,26,W)
GORDONAE(4,29,NE)
KANSASII(2,23,NE)
LENTIFLAVUM(6,15,E)
MADAGASCARIENSE(16,1,SW)
MARINUM(6,29,N)
MUCOGENICUM(6,29,NE)
NEBRASKENSE(12,23,NW)
NEOAURUM(3,28,E)
PHOCAICUM(10,20,N)
SEPTICUM(15,26,N)
TERRAE(5,11,S)
WOLINSKYI(13,19,S)
XENOPI(4,16,E)

Submission of Respiratory Specimens

continued from page 1

components each year. Because IBL does not see patients, its program is critically dependent upon the participation of health care providers and laboratories across Idaho to submit a few respiratory specimens throughout the season from patients demonstrating Influenza-like Illness or have tested positive by rapid influenza tests. For information about surveillance and the how/when/where details of submission, please contact Colleen Greenwalt at greenwac@dhw.idaho.gov or Vonnita Barton at bartonv@dhw.idaho.gov or call 334-2235.