Idaho Bureau of Laboratories

Clinical Forum

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State of Idaho

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IDAHO DEPARTMENT OF HEALTH & WELFARE

Inside this issue:

MMR Vaccination in Idaho

The Idaho Immunization Program

The measles, mumps, and rubella (MMR) vaccine has been available in the United States since 1971 and is currently available in the United States only as a combination vaccine, though single-antigen versions are available in other countries. The vaccine is administered as a two-dose series and is highly effective (>95%) after a single dose, with the second dose catching those 2-5% of people who do not get full measles immunity following the initial dose.

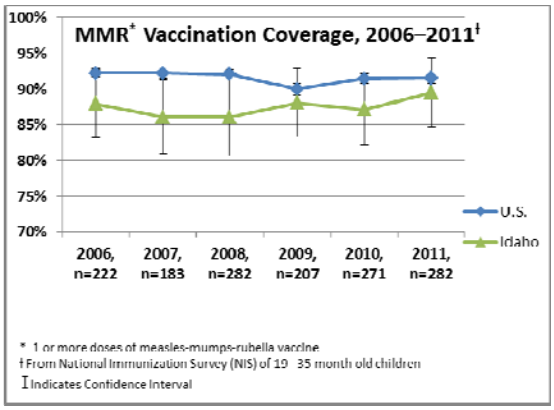

Figure 1. According to the National Immunization Survey, Idaho's MMR vaccination rate among children ages 19-35 months hovers around 85% (with a large confidence interval due to the small sample size) and consistently lags below the national average.

Prior to the introduction of the measles vaccine as single antigen in 1963, the U.S. incidence of measles was over 500,000 cases per year. With the increase in vaccine coverage and the 1989 recommendation for a second dose of MMR, measles incidence in the United States has fallen to nearly zero (220 cases nationwide in 2011, which is less than one case per million population). With the exception of one case imported from Southeast Asia, there have been no measles cases in Idaho since 1996.

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IBL Measles and Mumps PCR Validation

Vonnita Barton

Human cases of measles and mumps viruses can be prevented through the use of vaccines administered as a combination measles, mumps, and rubella vaccine (MMR), which contains three attenuated vaccine strains. Due to high vaccine coverage rates in the US, these are relatively rare diseases. However, mumps, measles, and rubella have not been controlled in many parts of the world, so these viruses are continually introduced into the US through international travel. Additionally, there are groups of people who choose not to vaccinate their children, adding to the small but persistent incidence of these diseases.

The standard diagnostic test for these viruses is detection of viral specific IgM antibody in an acute phase serum sample. However, in countries with high rates of vaccine coverage, some

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Norovirus Genotyping: Changes through the Seasons

Amanda J. Bruesch, MS

The Idaho Bureau of Laboratories (IBL) has been performing genotyping of norovirus outbreaks over the course of four norovirus seasons. Typically, norovirus season runs from October to May. Since Fall 2010, IBL has genotyped 42 outbreaks from Idaho, 14 from Alaska, 16 from Montana, and 13 from Wyoming as one of only five CaliciNet Outbreak Support Centers in the nation.[1] Twice in the past four seasons we have seen a genotype emerge and become the predominant strain circulating only to be replaced by a new dominant strain in a subsequent season. This speaks to the rapid mutation rates found in norovirus as well as the susceptibility of the population to a new strain of norovirus.

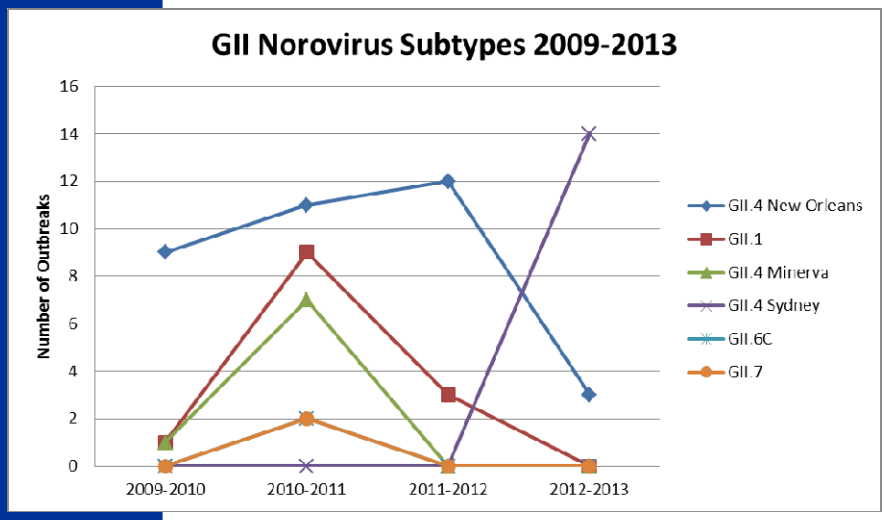

Figure 1. Frequency of norovirus strains by season in Idaho, Alaska, Montana and Wyoming

In the 2009–2010 season, GII.4 New Orleans–a new variant in the most prevalent genogroup of GII.4–became the chief strain found in outbreaks across the nation.[2] In addition to receiving nearly twice as many specimens for genotyping in the 2010-2011 season, we also saw a greater diversity of genotypes. GII.4 New Orleans remained the leading GII strain until just two seasons later when the recently described GII.4 Sydney emerged.[3] Once again, the norovirus landscape has been taken over by this new strain, and GII.4 Sydney was the only strain detected in all Idaho outbreaks tested at IBL for the 2012-2013 season (Figure 1). In the case of GII.4 Sydney, it appears that no increase in norovirus activity was seen with the new strain.[2]

IBL will be closely watching the norovirus genotypes as the season progresses to see if GII.4 Sydney remains the dominant strain or if a new strain of norovirus emerges this season. With the help of the district health departments and their thorough investigation and sample collection from norovirus outbreaks, we can accurately characterize the outbreaks seen in Idaho and contribute to the national surveillance of norovirus.

References

[1]IBL Selected as CaliciNet Outbreak Support Center. (2011, Spring). *Clinical Forum, 4*(1), 4.

[2]Yen, C. W. (2011). Impact of an Emergent Norovirus Variant in 2009 on Norovirus Outbreak Activity in the United States. *Clinical Infectious Diseases*, 1-4.

[3]Centers for Disease Control and Prevention. (2013, January 25). Notes from the Field: Emergence of New Norovirus Strain GII.4 Sydney - United States, 2012. *MMWR*, 62(3), pp. 55-55.

MMR Vaccination in Idaho

continued from page 1

The annual incidence of mumps and rubella has also dropped by over 99% since the introduction of vaccines to prevent these diseases. The national incidence of mumps dropped from over 162,000 cases per year pre-vaccine, to 404 cases in 2011, and rubella dropped from over 47,000 cases per year to just four in 2011. Only a few cases of mumps are reported in Idaho each year (< 10 per year since 1995), and rubella hasn't been reported since 2002.

Despite some thoroughly refuted allegations from the late 1990s, the MMR vaccine is safe, and vaccination is much safer than becoming infected with wild-type disease, which can result in acute encephalitis, orchitis, oophoritis, pancreatitis, deafness, spontaneous abortion (in pregnant women), or death . A 14-year prospective follow-up study from Finland was published in 2000 which reviewed almost 3 million vaccines given to 1.8 million individuals and found only 95 serious adverse reactions that could possibly (likelihood of causality ranged from 14% to 100%), be linked to the MMR vaccine and no deaths.[1] This is a serious adverse reaction rate of approximately 0.0032% (1 in 31,250), which is 62 times lower than the death rate from measles alone (approximately 0.2% or 1 in 500),[2] not counting other serious complications of measles, mumps, or rubella.

According to the National Immunization Survey, MMR vaccination rates have remained mostly stable in Idaho in recent years (Figure 1), with no statistically -significant changes year to year, though Idaho's rate for MMR vaccination lags below the national average and the Healthy People 2020 target of 90% coverage.

References

[1]Pediatr Infect Dis J, 2000;19:1127–34.

[2] Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Atkinson W, Wolfe S, Hamborsky J, eds. 12th ed. Washington DC: Public Health Foundation, 2011. P. 175.

IBL Measles and Mumps PCR Validation

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infections occur in individuals with a prior history of vaccination. In many of these cases, serologic testing may be inconclusive, so direct detection of viral RNA is crucial for case confirmation.

The CDC real-time RT-PCR assays for mumps and measles were designed to detect viral RNA in clinical samples.

The best sample for mumps RT-PCR is a buccal or nasal swab collected when the patient first presents with symptoms. See the CDC website http://www.cdc.gov/mumps/lab/specimen-collect.html for information on how to collect a buccal swab and special handling information. Processing the swabs within 24 hours of collection will enhance the sensitivity of both the RT-PCR and virus isolation. Swabs should be placed in 2 mL of standard viral transport medium (VTM) and maintained at 4°C. If the sample cannot be tested with 24 hours, it is best preserved by freezing at -70°C.

Throat or nasopharyngeal swabs are generally the preferred samples for measles virus isolation or RT-PCR detection.[1] Buccal swabs and urine samples may also contain the virus. Collect samples at the first contact with a suspected case of measles and/or as soon after a rash as possible.

The Idaho Bureau of Laboratories is in the process of validating the CDC-developed mumps and measles RT -PCR assays to provide a 24 hour turn-around time on a suspected case of either virus. Samples may be associated with sporadic cases or outbreaks. More information will be available following method validation. IBL also has access to the APHL/CDC Vaccine Preventable Disease (VPD) Reference Center which offers RT-PCR and genotyping for measles, mumps, and rubella.

References

[1]Centers for Disease Control and Prevention. (2009). *Specimens for Measles Virus Isolation or RT-PCR Detection*. Retrieved from http://www.cdc.gov/measles/lab-tools/rt-pcr.html

"Processing the swabs within 24 hours of collection will enhance the sensitivity of both the RT-PCR and virus isolation"

Molecular Detection of Markers of Drug Resistance in *Mycobacterium tuberculosis*

Amanda J. Bruesch, MS

The Idaho Bureau of Laboratories (IBL) implemented a molecular test for the detection of *Mycobacterium tuberculosis* (TB) DNA in a clinical specimen in 2011. Prior to that time, we were sending samples to reference labs in order to assist in the direct detection of TB DNA in primary samples. We are now testing 50-60 samples per year using our TB nucleic acid amplification test (TB NAAT). With the rapid acceptance and utilization of this test, it was apparent that these rapid results were assisting in the management of TB cases. IBL plans to expand TB services to include molecular detection of markers for drug resistance; this will contribute to selecting the best drug treatment regimen for TB patients.

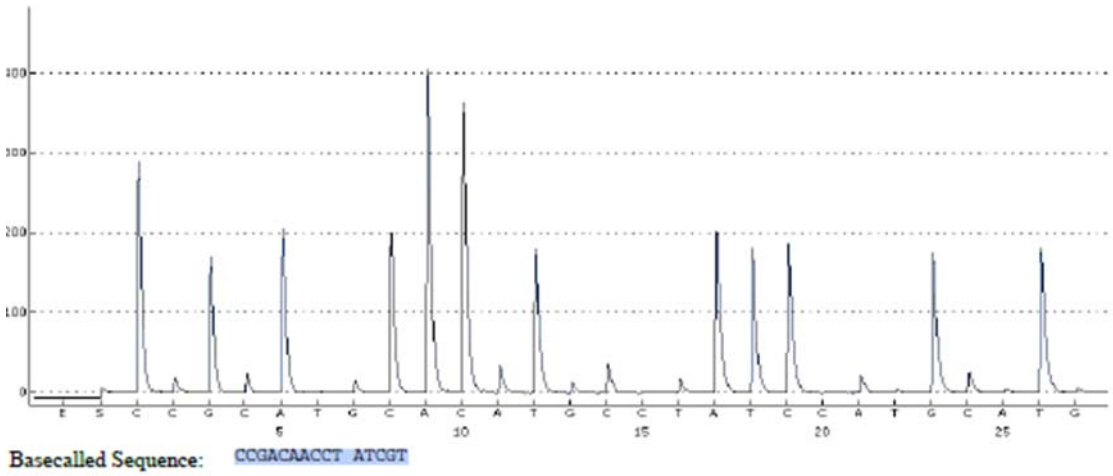

Figure 1. Pyrogram of katG gene showing the nucleotide sequence for a susceptible strain of TB—the peaks represent light emission and nucleotide binding

With the increasing use of molecular methods, it is now well known that certain mutations in specific genes of *Mycobacterium tuberculosis* are commonly associated with resistance to first-line drugs used to treat the disease.[1] Several large reference centers including CDC, National Jewish, and the California Department of Public Health perform this type of testing. IBL has utilized their services for this type of testing on a limited basis. However, if the testing could be performed in-house, we would experience not only a cost savings but also a time savings in not having to send out the sample.

Earlier this year, a pilot study was undertaken at IBL to obtain and optimize methods for molecular detection of drug resistance markers in TB using traditional Sanger sequencing and pyrosequencing. The focus for this testing has been on two very important drugs in the TB treatment regimen–isoniazid (INH) and rifampin (RIF). IBL has successfully demonstrated the ability to detect mutations in two regions that are associated with resistance for INH and a variety of mutations in the rifampin resistance determining region (RRDR) which are associated with resistance to rifampin. The process of validating the methods in-house and completing the analysis of assay performance are now being performed. It is our hope to begin offering this new testing by the end of the year.

Once these methods are validated at IBL, not only will we be able to detect TB DNA in primary samples within 24-48 hours, but we will also be able to provide critical information regarding potential drug resistance to help guide patient treatment. All of this work is done in support of TB control to protect the health of Idahoans. IBL thanks participating labs and district health departments for their contribution to TB surveillance.

References

[1]Bravo LT, et al. (2009). Pyrosequencing for rapid detection of Mycobacterium tuberculosis resistance to rifampin, isoniazid, and fluoroquinolones. *J. Clin. Microbiol*. 47:3985-3990.

Word Scramble

answers on page 6

1. EESMSLA _____
2. UPSMM _____
3. ELAUBLR _____
4. EICVCNA _____
5. AMOUIZTNNMII _____
6. ICEHNEALPSTI _____
7. COITRIHS _____
8. RGAAOAESNNPYHL BWAS _____ _____
9. CUBLAC SBAW _____ _____
10. YCMAEUROBMCTI EUTCBSLSIRUO _____ _____
11. CUENLIC DCIA IIAINALFOPCTM TTSE _____ _____ _____ _____
12. CEENOGURISNQPY _____
13. ZDNAIIOIS _____
14. FNAIMPIR _____
15. OURRVNISO _____
16. NGYPETEO _____
17. KUERATBO _____
18. NLIUSLRCEVAE _____

To be added or removed from the Clinical Forum email list:

statelab@dhw.idaho.gov

Fall 2013 Sentinel Laboratory Preparedness Workshop

The Idaho Bureau of Laboratories' (IBL) Preparedness Group has scheduled the Fall 2013 Sentinel Laboratory Preparedness Workshop for Tuesday, November 5th from 9:00 am to 5:00 pm. The workshop is available to laboratorians within the Idaho Sentinel Laboratory Network (ISLN) and Idaho district health epidemiologists.

There will be a few changes to the workshop from previous years:

- Registration is now available online at http://www.keysurvey.com/f/542874/2603/.
- A presentation on epidemiologic response to a biothreat incident will now be included.
- A packaging and shipping exercise (not certification) will be included.
- IBL does not have funding to assist with transportation and hotel accommodations. Trainings in Northern and Eastern Idaho will be scheduled in the spring of 2014.

Contact Wendy Loumeau with questions at loumeauw@dhw.idaho.gov or 208-334-2235 ext. 258 or to obtain a flyer with detailed information.

Solution to Word Scramble

1. MEASLES
2. MUMPS
3. RUBELLA
4. VACCINE
5. IMMUNIZATION
6. ENCEPHALITIS
7. ORCHITIS
8. NASOPHARYNGEAL SWAB
9. BUCCAL SWAB
10. MYCOBACTERIUM TUBERCULOSIS
11. NUCLEIC ACID AMPLIFICATION TEST
12. PYROSEQUENCING
13. ISONIAZID
14. RIFAMPIN
15. NOROVIRUS
16. GENOTYPE
17. OUTBREAK
18. SURVEILLANCE

LAB SAFETY TIP: GLOVE USE

Gloves are an important part of your personal protective equipment. Keep these tips in mind to increase safety in your laboratory:

- Wear gloves when working with infectious agents or hazardous chemicals.
- Change gloves often and in between samples to prevent cross contamination.
- Remove gloves and wash hands before leaving your laboratory space.
- Do not wear gloves outside the laboratory and hallways.
- Do not wear expired gloves.

Upcoming Teleconferences

October 1, 2013; 11:00 am Mountain Time

"2013 Influenza Update"

October 9, 2013; 11:00 am Mountain Time

"Multistate Outbreak of Meningitis and other Fungal Infections"

October 15, 2013; 11:00 am Mountain Time

"AST of Bacteria that Cause Gastroenteritis"

October 24, 2013; 11:00 am Mountain Time

"Changes in LRN Sentinel Lab Protocols"

October 29, 2013; 11:00 am Mountain Time

"Improving the Gram Stain"

November 5, 2013; 11:00 am Mountain Time

"An Update on Hepatitis C Virus Diagnostic Testing"

November 13, 2013; 11:00 am Mountain Time

"M.A.S.T.E.R.: An Updated Resource for Antimicrobial Susceptibility"

December 10, 2013; 11:00 am Mountain Time

"Detect and Protect: Carbapenum Resistant Enterobacteriaceae"

Archived programs are available upon request. Contact Wendy Loumeau at loumeauw@dhw.idaho.gov for more information.