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NEWSLETTER

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Increased Prevalence of *Streptococcus pneumoniae* Serotype 19A Among Children in the United States

By: Jon Radosevic and Kiran Khurana

Streptococcus pneumoniae is a Gram-positive, "lancet shaped," diplococcus (pairs of cocci), catalase negative, alpha hemolytic, optochin sensitive, and bile soluble bacterial organism. It has a polysaccharide capsule that acts as a virulence factor for the organism. Ninety-one different serotypes are known, and these types differ in virulence, prevalence, and extent of drug resistance. *Streptococcus pneumoniae* has remained an extremely important human bacterial pathogen since its initial recognition in the late 1880s. It is the most common cause of community acquired pneumonia, bacterial meningitis, bacteremia, and otitis media. It also causes sinusitis, septic arthritis, osteomyelitis, peritonitis, and endocarditis.

A7-valent pneumococcal conjugate vaccine (PCV7) was licensed in the USA in February of 2000.

This conjugated vaccine is a coupling of a non-toxic diphtheroidal protein (CMR197) with the organism's capsular polysaccharide. Conjugation greatly increases the immunogencity of this vaccine for infants and young children and also produces an anamnestic (immunologic memory) response after the four appropriately administered doses.

PCV7 (Prevnar-7) protects against seven pneumococcal serotypes (4, 6B, 9V, 14, 18C, 19F, 23F), which account for 80% of meningitis and 86% of bacteremia cases in children under five years of age. Since the implementation of PCV7 vaccine, the incidence of invasive pneumococcal disease caused by serotypes covered by the vaccine has significantly decreased in children of this age group. However, subsequent epidemiologic studies have shown that non-vaccine serotypes are emerging and are associated with multi-drug resistance. The cases of non- vaccine serotype 19A, causing invasive and non-invasive pneumococcal infections, have increased over the past several years.

Since 2001, the Indiana State Department of Health (ISDH) Special Bacteriology Laboratory has been serotyping invasive *Streptococcus pneumoniae* isolates from children up to the age of 5 years by using antisera from Statens Serum Institute(Copenhagen, Denmark). This enables us to determine whether infections reported to Indiana State Department of Health are true vaccine failures or a result of a serotype not included in the current available vaccine. Also, the obtained information from this project demonstrates if pneumococcal serotypes causing the majority of illness in this age group have changed over the time.

From January 2005 to December 2009, ISDH laboratory has serotyped 261 *Streptococcus pneumoniae* isolates from invasive infections in children up to the age of five years. During this time period, 27 different serotypes of *Streptococcus pneumoniae* were identified, 71% from children two years of age or younger. Of this age group, 58% were male and

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ISDH Lab Hosts Packaging and Shipping Trainings for Division 6.2 Materials

By: Shelley Matheson

Indiana sentinel laboratorians attended three ISDH-facilitated trainings, "Packaging and Shipping: Division 6.2 Materials," in April. These trainings were held at ISDH Labs, Deaconess Hospital in Evansville, and Lutheran Hospital in Ft. Wayne. Division 6.2 materials are otherwise known as infectious substances affecting humans and/or animals. This course was taught by Patricia Payne, Ph.D., MT (ASCP), a consultant to the Association of Public Health Laboratories (APHL). Dr. Payne has been conducting these courses throughout the United States for more than six years.

These intermediate-level, one-day programs provided a comprehensive overview of regulations applicable to packaging and shipping infectious laboratory specimens and cul-

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Inside this issue:

Our Mission: The Indiana State Department of Health Laboratories partners with other public health agencies to provide timely and accurate information needed for surveillance and outbreak investigations to protect and improve Hoosier health.

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42% were female. Among the non-vaccine serotypes, 19A accounted for 33%, 7F for 16%, Type-1 for 3.5%, and 6A for 3% of the total serotypes. These four serotypes represent nearly 56% of the total isolates received for testing during this five year time period.

In February 2010, the FDA approved Wyeth/Pfizer's Prevnar-13 vaccine, a 13-valent conjugated pneumococcal vaccine, for the immunization of children between the ages of 6 weeks to 5 years to expand protection against invasive disease caused by *Streptococcus pneumoniae serotypes not previously covered by Prevnar-7.* Prevnar-13 includes the seven serotypes of pneumococcal conjugate vaccine 7-valent, plus six additional serotypes-1, 3, 5, 6A, 7F, and the virulent 19A.

The Table-1 summarizes the data for the six serotypes (1, 3, 5, 6A, 7F, 19A) from 2005 to 2009, which are now part of the new vaccine (Prevnar -13) with the further breakdown of invasive infections due to serotypes 19A and 7F by sex.

Table-1

*M-male

*F- female

	2009	2008	2007	2006	2005	Total
Serotypes						
1	2	4	0	1	2	9
3	2	1	1	0	1	5
5	0	0	0	1	0	1
6A	4	1	1	1	1	8
7F						42
M*	3	9	4	1	4	21
F*	7	7	6	1	0	21
19A						86
M*	10	13	14	6	6	49
F*	7	9	7	6	8	37

Our five years (2005-2009) of data shows predominance of serotype 19A by 4.6% in male children over females, while serotype 7F remains equally distributed among male and female children.

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STARHS 2010 HIV Surveillance

By: Nicole Simpson

HIV, **H**uman **I**mmunodeficiency **V**irus, is the retrovirus that causes AIDS. HIV is transmitted through the contact of bodily fluids including blood, semen, and breast milk. Over the last twenty years, education and prevention have improved for high risk groups, but rates of transmission have remained constant. Because of this, the CDC has found it necessary to follow the trends of new and recent infections in the United States. Incidence is an estimation of the total number of new HIV infections in a population, based on a sample of people from that population.

Originally, tracking AIDS cases was the primary method to determine HIV transmission trends, because the time span between HIV infection to the development of AIDS was predictable. Once the Highly Active Antiretroviral Therapy (HAART) became widely available in the late 90's, the HIV to AIDS progression was no longer predictable because of an individual's response or lack there of to the therapy. As a result of this, the CDC utilized a serological based algorithm of determining recent infections called STARHS.

STARHS, **S**erological **T**esting **A**lgorithm for **R**ecent **H**IV **S**eroconversion, is the program by which the CDC tracks recent HIV infections on both the local and national levels to estimate rates of incidence. By following the trends of infection, the CDC is able to tailor its HIV prevention efforts and funding towards specific emerging demographics.

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The majority of invasive pneumococcal disease in the USA is caused by 13 serotypes (1, 3, 4, 5, 6A, 7F, 9V, 14, 18C, 19A, 19F, &22F). Now the most common serotype that causes invasive infections in children under 5 years of age is 19A. However, after the introduction of the 13-valent (Prevnar-13) vaccine, continued vigilant surveillance of other serotypes remains necessary. As the incidence of vaccine-preventable serotypes decreases, the incidence of other serotypes not included in the vaccine may increase. Based on our data, the possible emerging serotypes for causing invasive pneumococcal disease in children are serotypes 22F and 33F as shown in the Table-2. These two serotypes are not part of the new vaccine (Prevnar-13).

In Indiana, cases of invasive pneumococcal disease are required to be reported by both the clinician (case of disease) and the laboratory (positive pneumococcal test finding). An isolate of S. pneumoniae is required to be submitted to the ISDH Laboratory if it is from a child less than 5 years of age with invasive disease. The definition of invasive disease according to the Indiana Communicable Disease Rule (410 IAC section 33) is an infection in association with positive bacterial cultures from: blood, cerebrospinal fluid, pleural fluid, pericardial fluid, synovial fluid, or other usually sterile body fluid, or such as necrotizing fasciitis, in association with positive bacterial cultures from those sites.

ISDH Lab *Streptococcus pneumoniae* serotyping data 2005-09

Invasive Disease </= 5 years in age

Table-2

Sero type		NT	1	3	4	5	6A	6B	7C	7F	8	10A	11A	12F
	5Y-F	14	1	1	1	0	2	1	1	21	1	3	1	1
	2Y-F	10	1	1	0	0	1	1	1	14	1	2	0	1
	5Y-M	17	8	3	0	1	6	0	2	21	1	1	1	1
	2Y-M	9	3	3	0	0	4	0	2	14	1	1	0	1
Tot**	5YM/F	31	9	4	1	1	8	1	3	42	2	4	1	2

Table -2, data continued

14	15A	15C	17F	19A	19F	22F	23A	23B	23F	25A	29	33F	35B	38	Tot
1	2	4	1	38	1	2	1	3	0	5	0	3	1	0	110
0	0	1	1	31	1	1	1	2	0	4	0	3	1	0	79
1	2	2	1	48	7	9	0	3	1	2	2	8	2	1	151
1	2	1	1	34	6	8	0	1	1	2	1	6	2	1	105
2	4	6	2	86	8	11	1	6	1	7	2	11	3	1	261

NT = not fully typed, 5Y-M/F = </= 5 years of age male/female, 2Y-M/F = </= 2 years of age male/female

**data does not include multiple isolates on same the individual, Tot = total

Packaging and Shipping Cont.

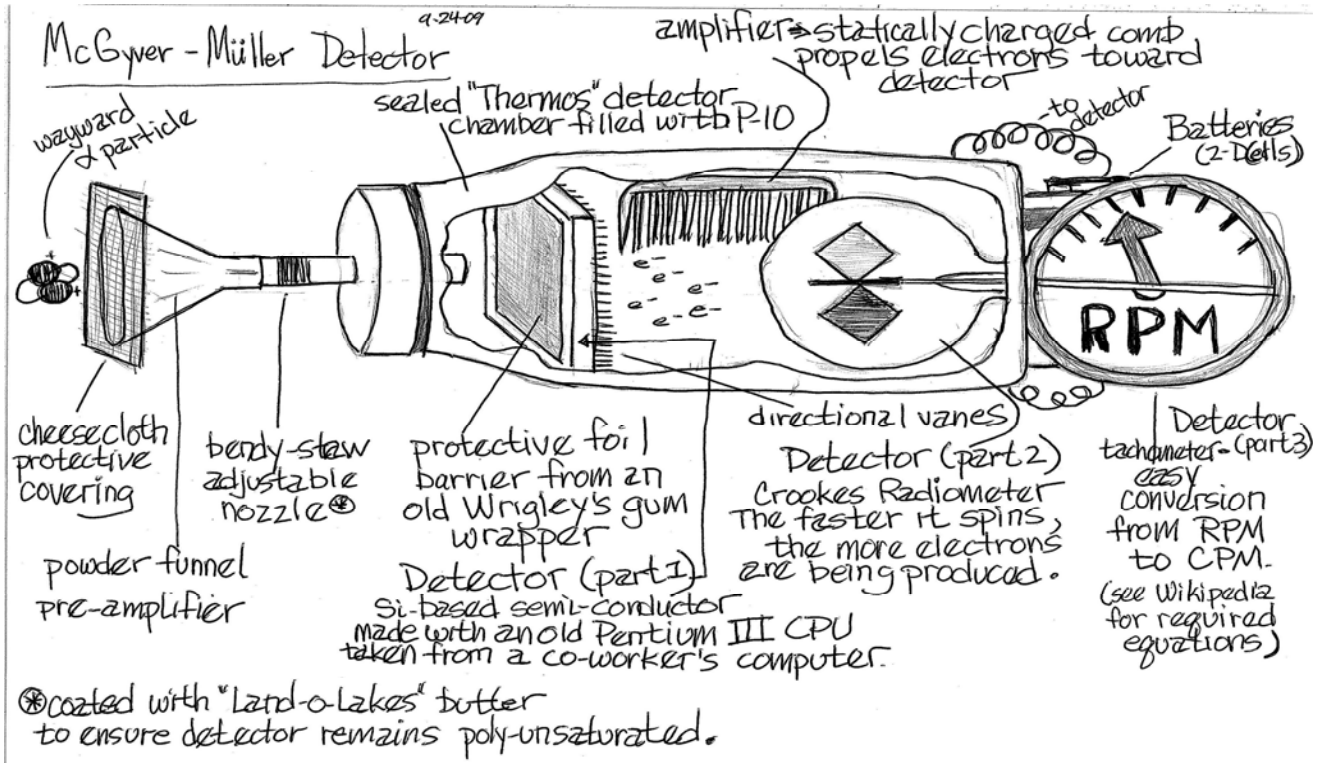
(Continued from page 1)

tures. Dr. Payne provided lectures, demonstrations and allowed participants to perform group hands-on exercises while in class. These instructional tools provided knowledge on complying with international, federal, and local transportation regulations. Participants learned how to properly classify, mark, label and document infectious materials for shipping by land, air and United States mail. Participants were tested on their knowledge of the regulations and received documentation of their attendance and testing. Once signed off on by their employers, participants were certified for packaging and shipping infectious substances for up to three years.

The April Packaging and Shipping trainings were an overall success. Dr. Payne did an outstanding job, and all 47 participants passed their exams! One participant commented, "Another amazing training/learning experience. Thanks so much." ISDH Laboratories will be facilitating two more packaging and shipping trainings in October.

Dr. Patricia Payne talks to a class of students at the Deaconess Hospital Training.

Humorous Scientific Invention Illustration provided by: Mike Oberthur



STARHS Cont.

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The ISDH Serology Lab participates in the STARHS project by identifying HIV-1 positive samples that are tested on site. Samples that are submitted to the ISDH Lab for HIV testing are screened initially using a Chemiluminescent Assay (CIA), which detects antibodies to both HIV-1 and HIV-2. Samples which tested positive on the CIA are then confirmed with the Western blot assay. Both of these tests are antibody-antigen interaction based assays. A subset of the HIV-1 positive samples that meet criteria for potential recent infection are identified and forwarded to the STARHS Lab at New York State Department of Health for further characterization. In addition, the ISDH Serology Lab also serves as a sample transfer point for all other laboratories that are part of this project in Indiana including Clarian Pathology Lab, South Bend Medical Foundation, and the Indiana Blood Center.

Participation of the ISDH Serology Lab in the STARHS program has enabled data collection to assess the rate of incidence of HIV in Indiana. Based on the statistical data from the Office of Clinical Data and Research in ISDH, there was a 20% overall increase in new HIV infections from 2006 to 2007 in Indiana. The largest increase among newly diagnosed was the 40+ age group at a 46% increase. Women also make up an estimated 38% of those who are at increased risk of a new HIV infection. MSM actually demonstrated a decrease in new infections of 17%, but they are still the risk group with the highest rate of transmission.

The information from the STARHS program allows HIV prevention efforts to be directed to the populations with the highest risk factors, thus maximizing the resources of the HIV prevention program.

Nicole is performing a Western Blot to confirm specimens for HIV. While the Ortho Eci can screen for HIV positives, a more specific confirmation test is necessary to screen out false positives.

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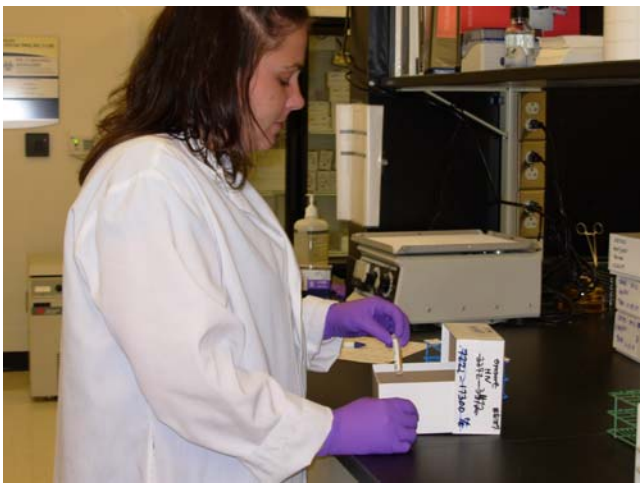

Brandy Thomas is putting away the samples which have been tested on the Ortho Eci. ISDH gets and screens thousands of serum specimens a year for HIV and Hepatitis.

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The Indiana State Department of Health supports Indiana's economic prosperity and quality of life by promoting, protecting and providing for the health of Hoosiers in their communities.

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A Healthier America: One Community at a Time

By Ellie Carter and Shelley Matheson

On April 6th and 7th public health practitioners and students came together to learn and share ideas and to the celebrate National Public Health Week at the conference "A Healthier America: One Community at a Time" held at the IUPUI Conference Center in Indianapolis. The agenda was packed full of engaging plenary and breakout sessions representing the wide range of disciplines that comprises public health.

The ISDH Lab got involved by collaborating on two different tabletop exercise breakout sessions: "It Takes a Village to Fight TB" and "Foodborne Disease Outbreak Response."

"It Takes a Village to Fight TB" focused on the chain of events that occur during a TB outbreak. ISDH Labs collaborated with several key TB stakeholders including the ISDH TB Control Program, a physician, a local public health nurse, and the ISDH Crisis Communications Coordinator. The collective effort that is required to "fight TB" was demonstrated during this tabletop session by breaking the audience up into groups and giving each group a "job" as one of the key stakeholders. A TB outbreak scenario was provided, and the groups role played and discussed. "It Takes a Village to Fight TB" was very well-received by participants. One participant commented "Thanks to all for making it a very positive experience! It was great to work with all of you energetic TB folks!"

For the Foodborne Disease Outbreak Response tabletop exercise the ISDH Lab, Epidemiology, and Food Protection Program collaborated to present an interactive, fictitious case-study of an outbreak of Norovirus one university campus. Participants had an opportunity to suggest possible reactions and ask questions at various stages presented through out the activity. The outbreak investigation highlighted clinical and environmental laboratory testing, the environmental assessment of food preparation facilities, and the need for state- and county-level cooperation to quickly and efficiently assess and respond to outbreaks of foodborne disease.

Shelley speaking during the TB portion of the Public Health Conference.