PUBLIC HEALTH MICROBIOLOGY & REFERENCE LABORATORY

Vancouver, BC

# LABORATORY TRENDS

**September 13, 2011**

**In this Issue:**



## Laboratory News

The Editor would like to apologize for omitting the important collaborations with the BC Children's and Women's Hospital Microbiology Laboratory in the article titled, *Molecular Detection and Epidemiology of Enteroviral Meningitis in British Columbia, July 2010 to June 2011*. The joint work with the Microbiology Laboratory was instrumental in validating the enteroviral assay at the Public Health Microbiology & Reference Laboratory (PHMRL).

### Laboratory Liaison Technical Officer Program

The Laboratory Liaison Technical Officer (LLTO) Program is a Public Health Agency of Canada-funded initiative. A select number of technical officers have been placed in various provinces. Their purpose is to strengthen laboratory capacity for communicable disease testing, surveillance, and outbreak preparedness and response.

Kim Macdonald holds the BC LLTO position and has been with the PHMRL since January, 2010. Since this time, Kim has assisted in surveillance initiatives at both the national and provincial level, provided enhanced molecular fingerprinting capacity via certification in Pulsed-Field Gel Electrophoresis for several bacterial agents, and worked on many other laboratory projects.

Currently, Kim has validated a new federally-developed method for genotypic characterization of *Campylobacter jejuni* called Comparative Genomic Fingerprinting (CGF). Working with national partners, Kim has optimized the method for the PHMRL and is working towards standardized analysis of the results. CGF enables further characterization of an elusive organism, and holds great potential for assisting with surveillance and outbreak investigations.

## Global News

### West Nile virus in Greece

Several sentinel chickens part of the surveillance system monitoring mosquito and bird vector populations in the Central Macedonian region hardest hit by the 2010 outbreak of West Nile virus (WNv) demonstrated seroconversion of WNv antibodies. Futher molecular work revealed that the sequences were identical to the virus from a *Culex* mosquito pool tested during the 2010 outbreak. The 2011 detection of the same virus strain found in 2010 suggests that the virus was able to overwinter in the region and is now endemic to the area. Since the publication of this report on 4 August 2011 (*Eurosurveillance*) over 30 human cases of WNv infection has been reported, including many in regions not affected in 2010 (*Eurosurveillance*, 25 August 2011).

### Dengue Research

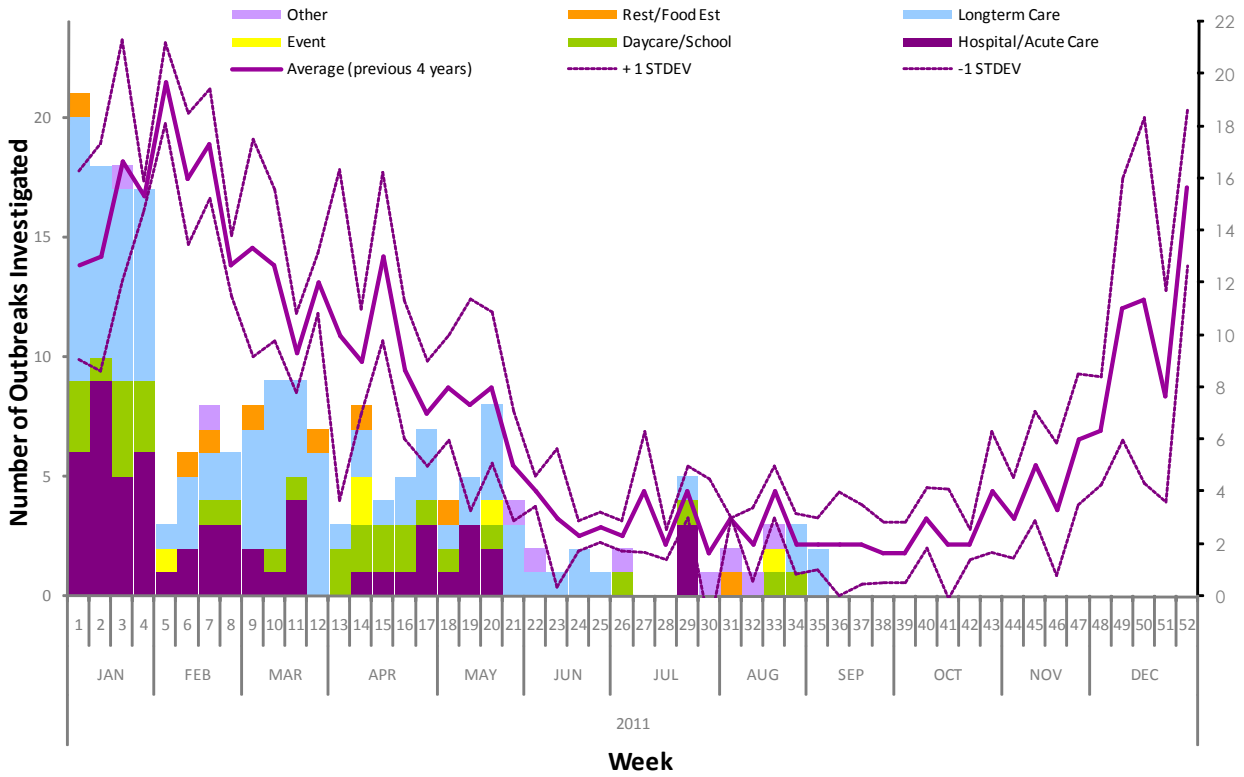
Outbreaks of dengue fever is a persistent challenge to more than 100 tropical and subtropical countries where the disease is endemic. Australian and American researchers have developed a new strategy for controlling mosquito vector populations harbouring the virus. The researchers infected *Aedes aegypti* populations with a strain of a bacterial parasite which was found to suppress the dengue virus in infected mosquitoes. Infection with the *Wolbachia* strain not only affects reproductive capacity but also ensures transmission since non-infected females mating with infected males will not produce eggs. Dengue incidence should be greatly reduced with the spread of these virus-resistant populations. (*Nature*, online 24 August 2011).

## Gastrointestinal Outbreaks

In August, there were 11 gastrointestinal (GI) outbreaks investigated at the PHMRL; 3 were confirmed to be due to norovirus by RT-PCR. Outbreaks were identified from 4 longterm care facilities, 2 daycare, 1 event, 1 food service establishment (several impacted), 1 private function, 1 camp and from the community (Figure 1). No other etiologies were found except for cases of Diarrhetic Shellfish Poisoning (DSP) linked to contaminated mussels and reported from several restaurants in early August. This was the first account of DSP in western Canada.

The data available are from outbreaks in which the PHMRL has been notified. Some acute care microbiology laboratories are also testing for norovirus in the province and these data do not include outbreaks from Vancouver Island Health Authority. Given the nature of GI outbreaks, samples are not always available for testing.

Figure 1
Gastrointestinal outbreaks investigated since January, 2011, Environmental Microbiology, Bacteriology & Mycology, Parasitology and Virology Programs, PHMRL.

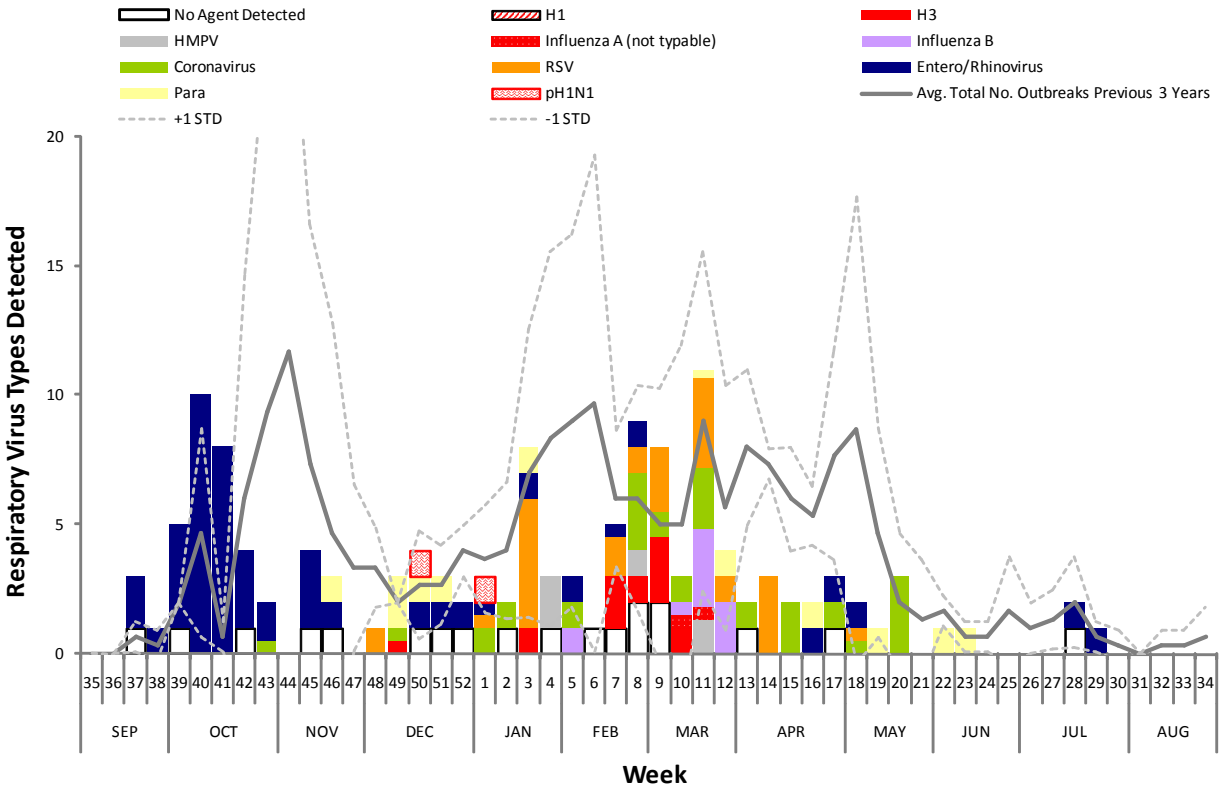


# Respiratory Outbreaks

In August, 2011 samples were submitted from two longterm care facilities for outbreak investigation at the PHMRL (Figure 2). Enterovirus/rhinovirus were detected for both outbreaks using PCR and Luminex methods.

Figure 2 reflects respiratory sample results submitted for investigation to the PHMRL and is not representative of respiratory outbreaks in the entire BC community.

Figure 2
Respiratory outbreaks investigated since January, 2011, Virology Program, PHMRL.



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# *Neisseria gonorrhoeae* Susceptibility Testing Trends

Gonorrhea is the second most reported sexually transmitted infection after chlamydia and since the 1990s, has been gradually increasing both in BC (Figure 3) and in Canada (*Canadian Guidelines on Sexually Transmitted Infections*, updated 2010). *Neisseria gonorrhoeae* causes infection of mucosal membranes of the urethra, cervix, throat and rectrum. Endocervical, rectal, pharyngeal and urethral swabs and urine samples are tested for gonococcal infection through either culture or nucleic acid tests (NAT). Culture enables further antimicrobial susceptibility testing to occur which is important for monitoring resistance trends and to inform treatment guidelines.

Figure 3.
Number of gonorrhea case reports and number of isolates tested for antimicrobial resistance in BC, 1991-2010.

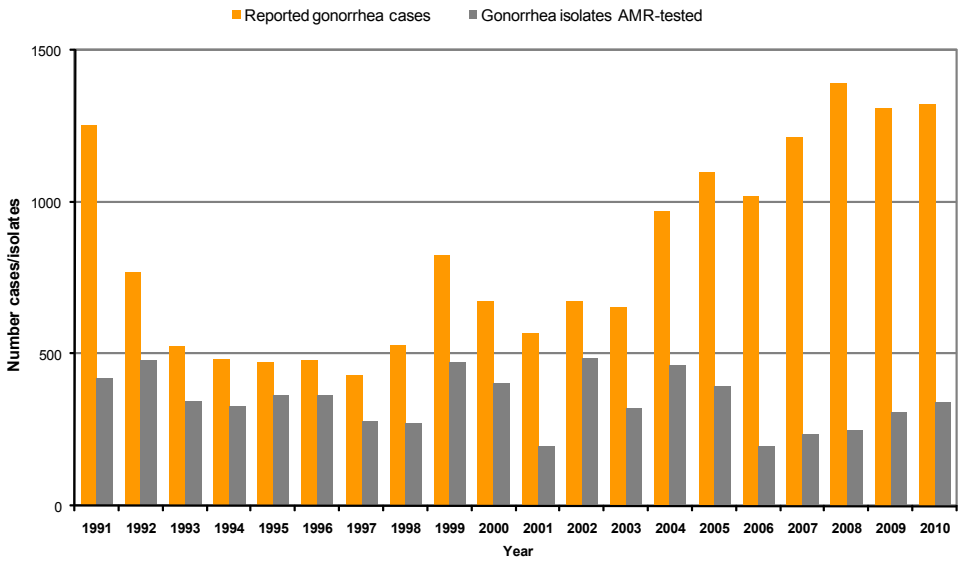
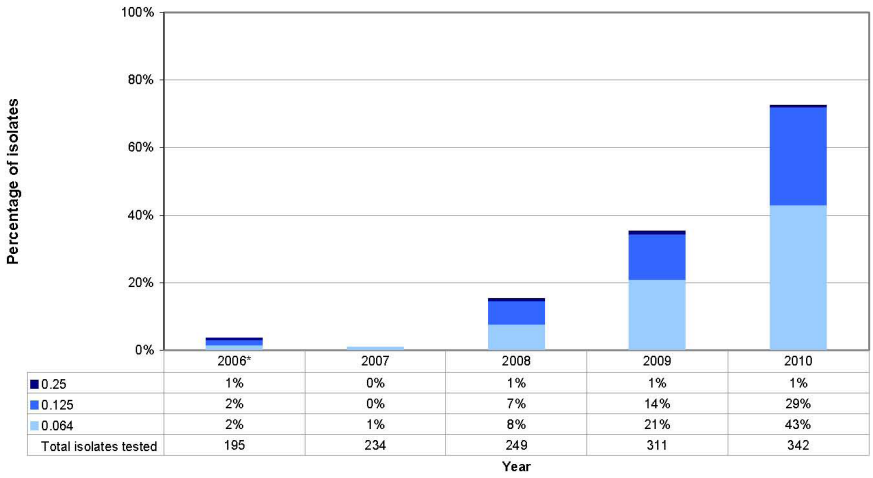



Figure 3 demonstrates the impact of the increased use of NATs in diagnosing gonorrhea in the latter half of 2000s in BC, mainly through outpatient clinical services. The PHMRL, through our close ties with the BC Centre for Disease Control (BCCDC) STI Clinics, routinely perform culture and NAT for *N. gonorrhoeae*. The PHMRL offers susceptibility testing against first-line and alternative treatment antimicrobials for all positive *N. gonorrhoeae* cultures. Determining the minimum inhibitory concentrations (MICs) that will inhibit the growth of *N. gonorrhoeae* indicates the effectiveness of antimicrobials at varying concentrations. Elevated MICs over the last few years for cefixime, currently the preferred treatment antibiotic, is a noteworthy trend (Figure 4). The percentage of isolates with cefixime MICs ≥0.125 µg/mL increased from 3% to 30% during 2006-2010. Decreasing cephalosporin susceptibility trends have also been recently reported in the United States (MMWR, 8 July 2011) and is suggestive that *N. gonorrhoeae* is on its path to developing resistance to yet another class of antimicrobials. Continued sentinel surveillance work by BCCDC STI Clinics and the PHMRL is important in monitoring these resistance trends.

Figure 4.
Percent of gonorrhea isolates with elevated cefixime MICs in BC, 2006-2010. MIC ≥ 1.0 is defined as resistant. No specimens had MIC ≥ 0.5. *Data missing for Jan 1- Mar 8, 2006.



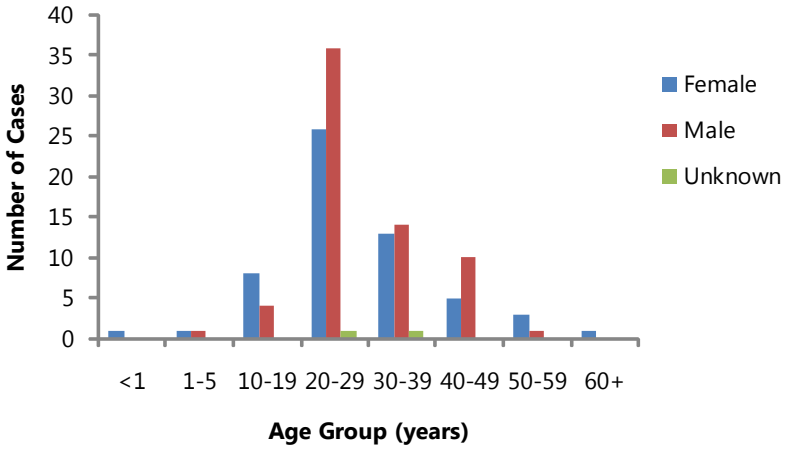

| | 2006* | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| 0.25 | 1% | 0% | 1% | 1% | 1% |
| 0.125 | 2% | 0% | 7% | 14% | 29% |
| 0.064 | 2% | 1% | 8% | 21% | 43% |
| Total isolates tested | 195 | 234 | 249 | 311 | 342 |

**Source:** Figures are prepared by Rachel McKay and Travis Hottes with support from Dr. Mark Gilbert, Dr. Richard Lester and Dr. Linda Hoang. See also: *Antimicrobial Resistance Trends in the Province of British Columbia 2010* report.

# Mumps Outbreak

A mumps outbreak continues in the province. Since January, there have been 126 PHMRL laboratory-confirmed cases of mumps. The outbreak began in the Whistler area but has become more widespread within Vancouver Coastal Health, Fraser Health, Interior Health and Vancouver Island Health Authorities. Over 72% are within the 20-39 age range and 53% are male (Figure 5).

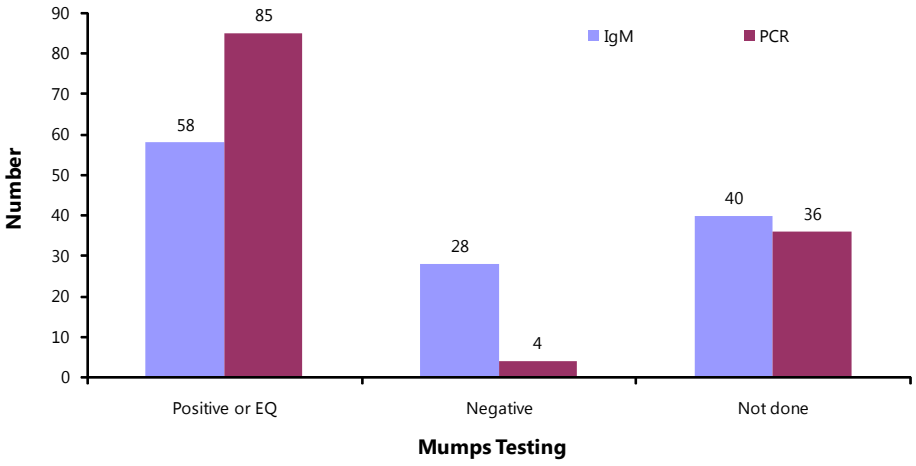
Figure 5
Age and gender of laboratory-confirmed mumps cases, Virology and High Volume Serology Programs, PHMRL.




Genotype G has been identified by the NML as the predominant mumps strain for this outbreak; genotype G is a common genotype that has been circulating globally for decades.

Testing for serology only may be inconclusive (over 30% of IgM non-reactive samples have been PCR positive for mumps virus, Figure 6). Blood for serology as well as urine/buccal swabs for PCR testing are therefore encouraged.

Figure 6
Mumps testing by serology and RT-PCR, Virology and High Volume Serology Programs, PHMRL.



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## Arbovirus Surveillance

Arboviral diseases are caused by arthropod-borne viruses which are maintained in nature through transmission between arthropod vectors (usually mosquitoes and ticks) and susceptible vertebrate hosts (usually birds and small mammals) (Table 1). Humans and domestic animals, considered to be "dead end" hosts, usually do not contribute to the transmission cycle but can develop illness when infected arthropods take a blood meal.

In Canada, although not very common, the main arboviral encephalitis agents are Eastern Equine Encephalitis, Western Equine Encephalitis, Powassan virus, St. Louis Encephalitis and West Nile virus (WNv). The majority of human cases due to arboviral infections occur between June and September when host arthropods are the most active; however, travel to endemic areas can also be a potential source of infection.

Laboratory diagnosis of human arboviral infection relies mainly on antibody tests. At the PHMRL, enzyme immunoassays (EIA) for dengue and WNv are available for serological screening. For 2011, there have been 32 probable acute dengue infections detected so far with the peak being in March (Figure 7).

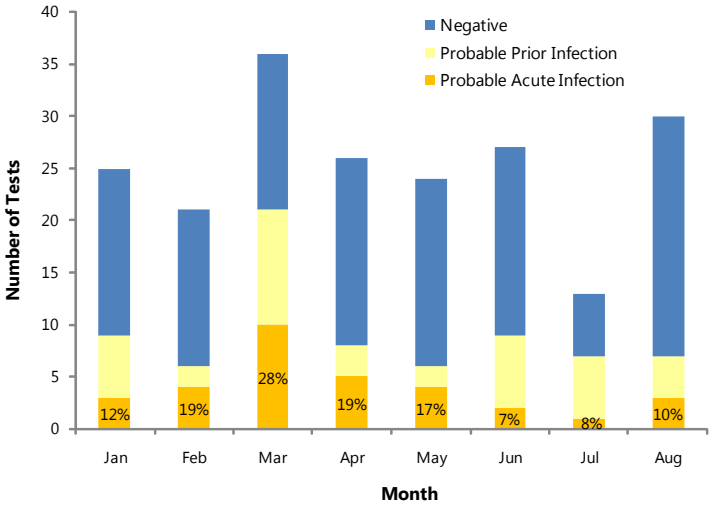
Table 1

Arboviruses that can cause human disease. In-house testing for dengue virus and West Nile virus (in red) are available at the PHMRL; the remaining tests are referred out to the National Microbiology Laboratory.

| Virus | Virus Family | Vertebrate Host | Arthropod Vector |
|---|---|---|---|
| California Encephalitis | Bunyaviridae | Mammals | Mosquitoes |
| Hantaan | | Rodents | |
| Jamestown Canyon | | Mammals | Mosquitoes |
| Snowshoe hare | | Mammals | Mosquitoes |
| Dengue | Flaviviridae | Humans | Mosquitoes |
| Powassan | | Mammals | Ticks |
| St. Louis Encephalitis | | Birds | Mosquitoes |
| West Nile | | Birds | Mosquitoes |
| Yellow Fever | | Monkeys | Mosquitoes |
| Colorado Tick Fever | Reoviridae | Rodents | Ticks |
| Chikungunya | Togaviridae | Primates | Mosquitoes |
| Eastern Equine Encephalitis | | Birds, Mammals, Reptiles | Mosquitoes |
| Western Equine Encephalitis | | Birds, Mammals | Mosquitoes |

Figure 7

Dengue testing by EIA serology from January to August, 2011, Zoonotic Diseases & Emerging Pathogens Program, PHMRL.




Mosquito-borne encephalitis also offers a public health opportunity for surveillance to determine risk. Since 2006, BCCDC in collaboration with all health authorities has been collecting mosquito samples for identification and WNv virus testing on select (*Culex* spp.) mosquito populations at the PHMRL. Mosquito surveillance begins June 1 of each year and ends in September. As of this report date, 2015 mosquito pools have been tested with no WNv detected. Mosquito surveillance data is further supplemented by testing corvids and horses through the Animal Health Centre in Abbotsford as well as WNv testing of donated blood by the Canadian Blood Services. Nationally, there have been twenty-one human cases of WNv infection [Ontario (13) and Quebec (8)] reported to date. One death associated with WNv has also been reported since the start of the season.

**Source:** Figures and data prepared by Yvonne Simpson from the Zoonotic Diseases & Emerging Pathogens Program.

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## A Report of the Public Health Microbiology & Reference Laboratory, Vancouver, BC

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