May 2025

PROVINCIAL LABORATORY MEDICINE SERVICES
Provincial Health Services Authority
BCCDC Public Health Lab

LABORATORY TRENDS

BC Centre for Disease Control
Provincial Health Services Authority

A Report from the BCCDC Public Health Laboratory

Photo courtesy of Michael Donoghue

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Staffing Highlights

Long Service Award Ceremony for the BCCDC Public Health Laboratory and the Provincial Toxicology Centre

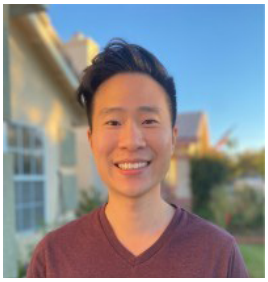
(Left) Meghan McLennan, Loretta Janz, Dr. Jennifer Grant, and Frankie Tsang

On April 16th, 2025 the BCCDC Public Health Laboratory (PHL) and Provincial Toxicology Centre held an event to celebrate long service milestones for over 20 employees.

Recognition was given to individuals who have reached their 5, 10, 15, 25, 30, and even 35 year employment milestone! One of the many award recipents is featured to the left, Loretta, for her 30 years of employment in the BCCDC Bacteriology and Mycology Public Health Laboratory.

We want to extend our gratitude and appreciation for all the individuals who reached these amazing milestones; public health could not operate without your hard work, passion, and commitment.

Martin Cheung—New Team Lead of the Parasitology and the Zoonotic Diseases and Emerging Pathogens Public Health Laboratories

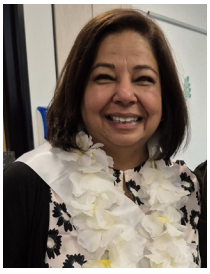


Martin first joined the BCCDC PHL back in 2011 as a co-op student in the Parasitology Lab and in 2013 and later as a technologist in the Clinical Trials Laboratory at the BCCDC PHL. Over the next 12 years, Martin worked in multiple laboratories within the BCCDC PHL, most recently in the Parasitology Laboratory. He recently accepted a new role as the Team Lead of the Parasitology and the Zoonotic Emerging Pathogens (ZEP) Public Health Laboratories.

Martin is excited to be stepping into the role of Team Lead and joining with the ZEP team. He is looking forward to getting to know the team in his new capacity, and to continue the culture of quality the two labs have.

We are excited to welcome Martin in his new role and look forward to the collaborations, continuous improvement, and staff development goals that Martin aims to bring into this next chapter of his career at the BCCDC PHL.

Navdeep Chahil—Outgoing Team Lead of the Parasitology and the Zoonotic Diseases and Emerging Pathogens Public Health Laboratories



After more than 35 years of working for the BCCDC Public Health Laboratory (PHL), we are wishing a heartfelt good-bye to Navdeep as she retires from her role as the Team Lead of the Parasitology and the ZEP Public Health Laboratories.

Navdeep had a profound impact on the BCCDC PHL and her warmth, dilligence, and commitment will not soon be forgotten. We are all wishing nothing but the best in her retirement adventures. Thank you, Navdeep!

Continued success in sequencing for identification, resistance characterization and genotyping of mycobacteria*

Over the last 2 years, the TB/Mycobacteriology laboratory at the BCCDC PHL has performed routine prospective whole genome sequencing (WGS) for all new culture-confirmed cases of *M. tuberculosis*. With the recent laboratory process updates, which allow for sequencing to be performed directly on primary culture-positive MGIT tubes, this has resulted in significant improvements in the turnaround times for both genotypic susceptibility/resistance predictions, as well as organism genotyping to facilitate early recognition of TB cluster evolution.

WGS genotypic susceptibility/resistance testing

The TB/Mycobacteriology laboratory is now able to report genotypic resistance/susceptibility predictions for first line *M. tuberculosis* antimicrobial agents about 7 days in advance of phenotypic results and about 7 days earlier than using the previous process of performing WGS on Löwenstein-Jensen sub-cultures. This facilitates patient care by providing early warning of resistance and early reassurance of susceptibility, allowing for more efficient and appropriate patient care.

Targeted next generation sequencing (NGS) approaches can also be utilized for early genotypic predictions of TB resistance or susceptibility direct from smear-positive patient specimens. First line treatment Rifampin, Isoniazid, Pyrazinamide and Ethambutol (RIPE) targets are included on the NGS panel, as well as a Quinolone target. Direct molecular resistance predictions for TB are currently only performed by consultation with the BCCDC Medical Microbiologist on a case-by-case basis, but once done can provide key intelligence for both early therapy adjustment, as well as facilitate early TB patient de-isolation, within the timeframes recommended by the currently proposed guidelines (1).

Non-tuberculous Mycobacteria identification

Since November of 2023 the TB/Mycobacteriology laboratory has also been performing Non-tuberculous Mycobacteria (NTM) identification using a targeted NGS approach. This approach was developed in response to the discontinuation of critical commercially available reagents for NTM identification and to facilitate more efficient high throughput testing for a group of organisms that have seen documented increases in incidence globally (2-5). NGS-based identification has improved the lab's ability to discern between scenarios of re-infection versus persistent infection for *Mycobacterium avium* complex-mediated disease. Previously used methods have identified this group of organisms, which accounts for ~50% of NTM-related infections in BC, to complex level only – the current level of resolution allows clinicians to make better informed decisions regarding patient care, as well as improves our understanding of the epidemiology of this disease. Part of the targeted NGS approach includes detection of presence or absence of inducible macrolide resistance markers in *M. abscessus* complex organisms. Macrolides are a cornerstone agent of NTM management, and being able to provide early prediction of inducible resistance in cases of *M. abscessus* complex disease equips physicians with key information for patient management.

A team effort

The BCCDC PHL TB/Mycobacteriology genomics program has been recognized nationally for its leadership in providing cutting edge laboratory diagnostics for TB and NTM infections. This fully DAP-accredited program is a true testament to the ingenuity, dedication and cooperation of the TB/Mycobacteriology, Molecular/Genomics, Bioinformatics, PLOVER and PLMS Data Management teams at the BCCDC PHL that have worked to stand it up.

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2. Lai et al. Increasing incidence of nontuberculous mycobacteria, Taiwan, 2000-2008; Emerg Infect Dis. 2010 Feb;16(2):294-6
3. Moore et al. Increasing reports of non-tuberculous mycobacteria in England, Wales and Northern Ireland, 1995-2006; BMC Public Health. 2010 Oct 15:10:612
4. Prevots et al. Nontuberculous mycobacterial lung disease prevalence at four integrated health care delivery systems; Am J Respir Crit Care Med. 2010 Oct 1;182(7):970-6
5. Kumar et al. Non-tuberculous mycobacterial pulmonary disease (NTM-PD): Epidemiology, diagnosis and multidisciplinary management; Clin Med (Lond). 2024 Jan;24(1):100017

*Prepared by Dr. Inna Sekirov and Trevor Hird, TB/Mycobacteriology PHL

High Volume Serology Laboratory Automation Upgrade

The High Volume Serology (HVS) Public Health Laboratory at the BCCDC performs over 2 million serological tests per year as the specialized reference laboratory for British Columbia and Yukon. For the last two decades, HVS has relied on an automated testing platform that assists laboratory staff in sorting, preparing, moving, and testing these high volumes of samples. However, the automation line was reaching the end of its serviceable life and started having frequent maintenance issues. Therefore, the HVS PHL knew it was time to plan and execute a huge infrastructure upgrade for their automation line.

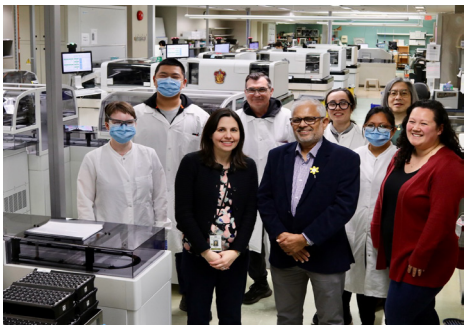

Image 1: Members of the HVS PHL team at the BCCDC standing in front of the new automation line. *Photo courtesy of Michael Donoghue.*

The challenge

Given the complexity of this type of upgrade, the ideal situation would have been for the new automation pipeline to be installed and run in parallel with the existing equipment. However, due to physical space constraints, this could not be done. The HVS team now faced a significant challenge—how to replace the existing testing infrastructure while maintaining public health testing capabilities. The entire HVS team, along with support from other laboratories within the BCCDC PHL, spent countless hours planning out, in detail, the workflows that would be required throughout the different project phases to ensure minimal to no impact on patient care.

The plan

Given the limited space available, it was decided that the existing testing infrastructure had to be removed before the new automation equipment could be installed. This meant that for approximately two months the HVS laboratory had to switch to an entirely manual testing workflow. During these two months, the HVS laboratory had to manually sort, centrifuge, de-cap, load, and store ~4,000 samples per day!

The outcomes

The successful upgrade and implementation of the new automated HVS testing equipment not only modernizes the testing infrastructure in the HVS laboratory to a state-of-the-art level, but it also has numerous positive outcomes for patients including:

- The average turnaround time for human immunodeficiency virus (HIV) screening test has decreased by almost 50% since the automation upgrade (**Figure 1**).
- The new automation equipment includes two refrigerated storage units (**Image 2**) that are connected to the line and hold a combined 30,000 samples. The addition of refrigerated storage improves efficiency by allowing “hands-free” add-on testing and automatic disposal of samples.
- Lastly, the new automation line allows for additional testing equipment to be added to further improve the quality and turnaround time for all HVS tests. This last phase of the project is ongoing.

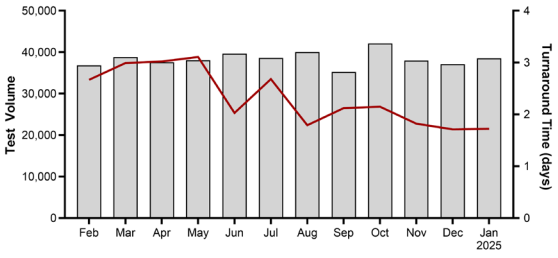

Figure 1: Test Volume (grey bars) and average Turnaround Time from sample receipt to result (red line) for HIV screening test.

This automation was no small feat! Congratulations to the HVS laboratory team for all their hard work over the last 18 months and for the successful implementation of the new automated infrastructure. Also, a huge thank you to everyone who helped support the HVS throughout this major upgrade.

Image 2: Two refrigerated storage units connected to the line which hold a combined 30,000 samples.

Estimating mpox seroprevalence in Vancouver metropolitan area*

Citlali Márquez, Gabrielle Cortez, Inaru Enriquez, Danielle Luk, Tahereh Valadbeigy, Darrell H. S. Tan, Mayank Singal, and Agatha Jassem

In May 2022, a rapid worldwide increase in mpox cases prompted the World Health Organization (WHO) to declare it a global health emergency. Amongst the affected populations, the impact on the gay and bisexual men/men who have sex with men (GB/MSM) community was particularly pronounced. As of January 2025, BC reported 325 cases.

Subsequent reports have suggested the existence of asymptomatic, subclinical, and undiagnosed cases, which may have resulted in an underestimation of the true mpox prevalence. To address this, serological studies are a powerful tool that can be leveraged to detect previous contact with mpox virus (MPXV) and estimate the burden of illness. The BCCDC PHL has validated a serological assay capable of detecting antibodies specific to mpox. This algorithm demonstrates a sensitivity of 88% (95% CI [79-94%]) and a specificity of 96% (95% CI [90-98%]).

Serosurvey

A serosurvey was designed to detect MPXV antibodies in residual sera from males attending syphilis testing at selected STI clinics throughout the Vancouver metropolitan area at two time points between July 2023 and January-March 2024. Mpox vaccination status was determined through linkage to the Panorama registry.

- The median age of individuals in both surveys was in the late 30s, with approximately 30% of participants born before 1972.
- Around 47% of individuals were unvaccinated, 22% had received one dose, and 30% had received two doses.
- The median time between vaccination and sample collection was 369 days post-first dose and 273 days post-second dose.

Results

- Overall antibody positivity was approximately 15%, with rates of 18% in 2023 and 13% in 2024 (Table 1).
- The lowest positivity rate was found amongst unvaccinated individuals born after 1972 (7%), while the highest positivity was observed in individuals vaccinated with two doses (average 63%).

Table 1: Distribution of Anti-MPXV positivity per vaccination status

	All Samples (%) [95% CI]	Unvaccinated (%) [95% CI]	1 Dose (%) [95% CI]	2 Doses (%) [95% CI]
July 2023	**105 (18) [15-21]**	**16 (15) [10-23]**	**19 (18) [12-27]**	**70 (67) [57-75]**
Median age (years)	**55**	60	54	51
Born before 1972	**62 (34) [28-41]**	13(21) [13-33]	12 (19) [11-31]	37 (60) [47-71]
Born after 1972	**43 (10) [8-14]**	3 (7) [2-19]	7(16) [8-30]	33 (77) [62-87]
January-March 2024	**74 (13) [11-16]**	**13 (18) [11-28]**	**17 (23) [15-34]**	**44 (59)** [48-70]
Median age (years)	**58**	61	58	53
Born before 1972	**46 (28) [22-36]**	11 (24) [14-38]	13 (28) [17-43]	23 (50) [36-64]
Born after 1972	**28 (7) [5-10]**	2 (7) [2-23]	5 (18) [8-36]	21 (75) [57-87]

- Antibody titres remained relatively stable for over 500 days post-vaccination, whether one or two doses were administered (Figure 2).

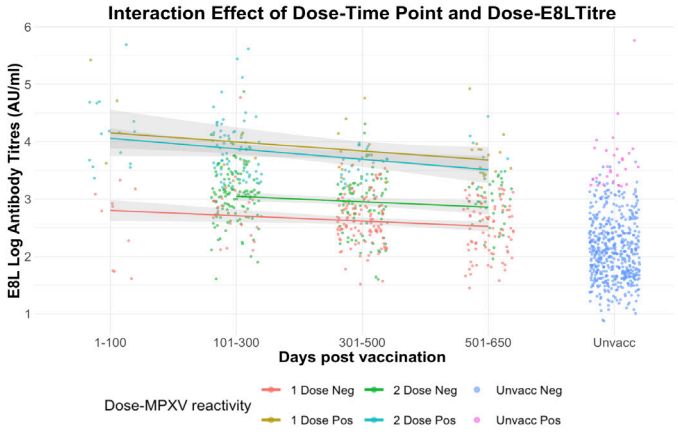

Figure 2: Interaction between vaccination status and days post vaccination on log-transformed antibody titres of the MPXV E8L antigen. The shaded area around the regression lines represents the 95% confidence interval (CI). Pos and Neg refer to classification by reactivity algorithm. *E8L shown as representative antigen, analysis performed on A35R and B6R antigens showed similar results.*

*Prepared by Dr. Citlali Márquez, Serosurveillance Senior Scientist

Norovirus Trends*

Clinical Norovirus Sequencing Trends

Over the past year, the GII.17_GII.P17 genotype has rapidly emerged as the dominant norovirus strain in BC, replacing the previously prevalent GII.4_GII.P16 genotype and marking a major shift in circulating genotypes. From March 2024 to February 2025, 99 GII.17_GII.P17 cases were detected—compared to just 3 during the same period the previous year. This replacement has become particularly pronounced in recent months (**Figure 3**): over the past three months,GII.17_GII.P17 accounted for 79.5% (n=31) of all GII samples (n=39), while GII.4_P16 made up only 10.2% (n=4). This strain replacement may account for increased norovirus activity this season.

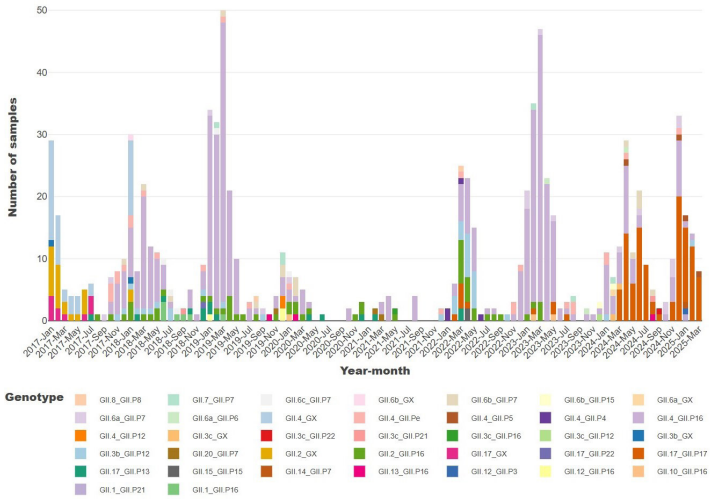

Figure 3: Number of Norovirus GII samples sequenced since 2017 grouped by date and genotype. Figure courtesy of Kevin Yang.

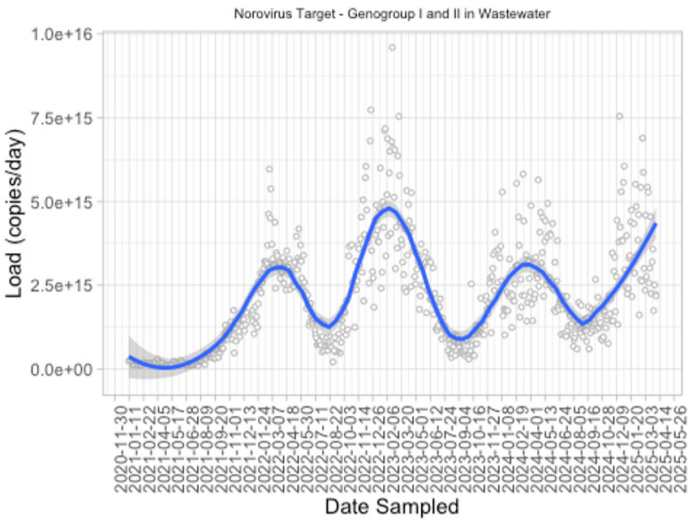

Figure 4: Load of Norovirus (Genogroup I and II) in municipal wastewater from one representative site in British Columbia. Load is calculated by multiplying the concentration of Norovirus GI/GII (copies/L) by flow rate obtained from the treatment plant (in Millions of Litres per day).

Norovirus in Wastewater Trends

Wastewater surveillance is a reliable, unbiased method for monitoring enteric pathogens at the community level, offering data at the population-scale. At the Environmental Microbiology Laboratory at the BCCDC PHL, influent community wastewater samples are tested via PCR for norovirus genogroups I and II, which typically follow a seasonal pattern—rising in the fall and peaking in the spring. However, this year, levels have already surpassed those of the previous season and continue to climb (Figure 4). While we would typically expect the levels to peak by now, the sharp increase may be linked to the emergence of a new genotype, GII.17_GII.P17. The growing presence of GII.17_GII.P17 seems to be driving the recent surge in norovirus activity in both the U.S. and Europe.

*Prepared by Dr. Natalie Prystajecky and Dr. Sarah Mansour, Environmental Microbiology PHLt

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The Public Health Laboratory at the BC Centre for Disease Control (BCCDC) provides consultative, interpretative testing and analyses for clinical and environmental infectious diseases in partnership with other microbiology laboratories and public health workers across the province and nationally. The BCCDC PHL is the provincial communicable disease detection, fingerprinting, and molecular epidemiology centre providing advanced and specialized services along with international defined laboratory core functions. The Provincial Toxicology Centre conducts toxicology testing and analysis for clinical patients, including therapeutic drug monitoring, drug screening tests, and forensic toxicology analyses for the BC Coroners Service.

This report may be freely distributed to your colleagues. If you would like more specific information or would like to include any figures for other reporting purposes, please contact us.

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