AHCDC Genotyping Reference laboratory: Annual report for 2024

Director: Dr. David Lillicrap

Co-Director: Dr. Harriet Feilotter

Senior Clinical Scientists: Dr. Mackenzie Bowman

Technologists: Gina Jones (MLT), Samira Kheitan, Aomei Mo

Clinical Administrative Assistant: Julie Grabell

Introduction:

A central, reference variant testing laboratory was initiated at Queen's University in Kingston in November 2000, with funds from Health Canada. Testing in the laboratory is performed by two technologists: Gina Jones (MLT) and Samira Kheitan. An additional technician, Aomei Mo provides part-time support to the lab. The laboratory is located on the fourth floor of the Richardson Laboratory building in the Department of Pathology and Molecular Medicine at Queen's University.

The Laboratory is supervised by Dr. David Lillicrap. Dr. Harriet Feilotter serves as the Laboratory Co-Director. Dr. Mackenzie Bowman has held the appointment of Senior Clinical Scientist from March 2023-present and previously from 2019-2021. Julie Grabell joined the group in late 2023 to assist with administrative duties.

Facility Purpose:

The objective of this core AHCDC facility is to provide a national service for genetic analysis of inherited bleeding disorders. The majority of this testing is for hemophilia A and B and von Willebrand disease, for which the laboratory has a formal Ontario Ministry of Health and Long-Term Care license. In addition, non-licensed testing has been performed for other less prevalent inherited bleeding disorders such as factors V, VII, X, XI, XII, XIII and fibrinogen deficiencies.

Methodologies:

Samples for analysis are sent to Kingston as genomic DNA or whole blood from which DNA is extracted. DNA is amplified using PCR and the amplified fragments are analyzed by DNA sequence analysis. *F8* Intron 22 analysis by inverse PCR began in the lab in December 2020. Towards the end of 2024 we began initial validation testing for an eventual transition to the use of whole genome next generation sequencing (NGS) as a screening strategy for a subset of our samples. It is hoped that this transition will have been completed by the summer of 2025.

Report turnaround time:

When requested (eg. in instances of prenatal testing) and when the pedigree-specific variant is known, a result can be reported in 7-10 days. In most instances, results are reported to the referring clinic within 1-3 months. Reports for rare bleeding disorders are issued after 3-6 month periods.

Laboratory Accreditation and Licencing:

During February 2022, the laboratory underwent a full accreditation assessment by Accreditation Diagnostics Canada (formerly IQMH, Institute of Quality Management in Healthcare) which provides laboratory accreditation to ISO 15189 standards. A four-year renewal of the lab's accreditation certificate was granted May 24th 2022. The laboratory will undergo the next full accreditation assessment in early 2026.

On July 1st 2024, the laboratory's Ontario Ministry of Health and Long-Term Care license for genetic testing for hemophilia A, hemophilia B and von Willebrand disease was renewed for a 2 year period.

Laboratory Activity: January 1 to December 31, 2024

Hemophilia A Referrals: 200

- Affected males : 83 cases
- Carrier testing : 114 cases

Disease Severity

- Severe FVIII deficiency : 22 cases
- Moderate FVIII deficiency : 9 cases
- Mild FVIII deficiency : 39 cases
- Unknown : 130 cases

Referring Clinic (% of cases)

- ON 55.5 %
- BC 10.5 %
- AB 10 %
- NS 6 %
- MB 4.5 %
- NB 4%
- NL 3 %
- QC 2 %
- SK 1.5 %
- Others: 3.5 %

Hemophilia A reports generated in 2024: 206

Hemophilia B Referrals: 48

- Affected males : 18 cases
- Carrier testing : 29 cases

Disease Severity

- Severe FIX deficiency : 3 cases
- Moderate FIX deficiency : 5 cases
- Mild FIX deficiency : 3 cases
- Unknown : 37 cases

Referring Clinic (% of cases)

- ON 58.3 %
- BC 10.4 %
- AB 8.3 %
- NS 4.2 %
- MB 12.5 %
- NL 0 %
- QC 0 %
- NB 0 %
- SK 0 %
- Others: 6.3 %

Hemophilia B reports generated in 2024: 47

von Willebrand Disease Referrals: 153

- Type 1 (incl 1C): 7 cases
- Type 2 (A,B,M): 99 cases
- Type 2N: 24 cases
- Type 3: 9 cases
- Unknown: 14 cases

Referring Clinic (% of cases)

- ON 60.5 %
- BC 13.8 %
- AB 7.2 %
- NS 6.6 %
- NB 6 %
- QC 2.6 %
- MB 2 %
- NL 0 %
- SK 0 %
- Others: 1.3 %

von Willebrand Disease reports generated in 2024: 150

Rare Bleeding Disorder Referrals: 48

- Factor V: 2 cases
- Factor VII: 20 cases
- Factor X: 3 cases
- Factor XI: 12 cases
- Factor XII: 0 cases
- Factor XIII: 2 cases
- Factor VIII/V: 1 case
- Fibrinogen: 4 cases
- GPIba: 1 case
- ADAMTS-13: 3 cases
- Protein S: 0 cases
- Protein C: 0 cases

Rare Bleeding Disorder reports generated in 2024: 59