2018 Annual Report

Alberta Health Services

UNIVERSITY OF CALGARY

DEPARTMENT OF PATHOLOGY & LABORATORY MEDICINE

Submitted by:
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Executive Summary

The Department of Pathology & Laboratory Medicine (DPLM) comprises the medical and scientific staff for Alberta Public Laboratories (formerly Calgary Laboratory Services (CLS). Throughout 2018 it was composed of 6 Divisions and had 69 primary clinical MD appointees and 12 clinical PhD scientists. There were 28 members with University of Calgary GFT and 77 with Clinical Faculty appointments. The Medical/Scientific staff are located at all 5 acute-care hospital sites, at CLS' central laboratory facility the Diagnostic & Scientific Centre (DSC), and at the University of Calgary Health Sciences Centre, Heritage Medical Research Building, and Health Research Innovation Centre.

The DPLM has historically encompassed the same medical and scientific staff as Calgary Laboratory Services (CLS). However in September 2018, CLS was renamed Alberta Public Laboratories and expanded to include all publicly funded laboratories in Alberta with the exception of DynaLife in Edmonton.

Accomplishments and Highlights

Accomplishments of individual sections are described in this report. 2018 was an excellent year for research and development with major new research investment in precision health initiatives. 2018 was also a record year for publications with 165 peer reviewed publications.

Challenges

There are ongoing challenges with extremely limited capital funding and space limitations at a number of tertiary care sites. Test volumes continue to increase and this is especially marked in anatomic pathology where volumes at some sites are increasing at about 10% per year. The transition of Calgary Laboratory Services to Alberta Public Laboratories has been extremely challenging and has created a number of significant unresolved issues for staff at all levels of the organization.

Workforce Planning

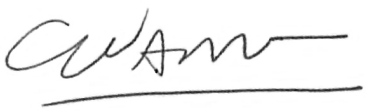
Increases in medical and scientific staffing have not kept pace with service increases and we are now understaffed by about 10%. Detailed workforce plans have been developed but remain unfunded. This presents a significant risk to timely delivery of laboratory diagnostic services.

Quality Programs

CLS' comprehensive quality assurance program is based on a Quality Management System model designed to support high quality, cost-effective laboratory services with a strong focus on patient safety. Laboratory-wide performance indicators are reported monthly and there are formal systems in place for serious adverse events, and patient concerns reporting and resolutions. Several new key metrics have been added to better reflect appropriateness and cost effectiveness.

Future Directions and Initiatives

Exciting opportunities exist to increase research and development in areas of precision health. Significant investments in translational research space at the University of Calgary will present enhanced opportunities for diagnostic laboratory start-ups. A tremendous amount of work remains in the integration of multiple laboratories in Alberta into the new Alberta Public Laboratories. This is happening concurrently with the significant time commitment of faculty and staff into the provincial Connect Care initiative.



Christopher Naugler, MD
Professor and Head, Department of Pathology & Laboratory Medicine
University of Calgary Cumming School of Medicine/Alberta Health Services – Calgary Zone

Departmental Committees

CLS Medical Advisory Committee/AHS Calgary Zone Medical Executive Committee

Dr. Leland Baskin, VP of Medical Operations, CLS & Clinical Section Chief, Transfusion Medicine, Co-Chair
Dr. Christopher Naugler, Zone Clinical Department Head (ZCDH), DPLM & Medical Director, CLS, Co-Chair
Dr. Ranjit Waghray, Clinical Section Chief, Anatomic Pathology/Cytopathology (DSC) & Acting AP/Cyto Site Leader, Diagnostic & Scientific Center (DSC)
Dr. Hossein Sadrzadeh, Clinical Section Chief, Clinical Biochemistry (DSC)
Dr. Ethan Flynn, Clinical Section Chief, General Pathology (DSC)
Dr. Meer-Taher Shabani-Rad, Clinical Section Chief, Hematology (FMC)
Dr. Deirdre Church, Clinical Section Chief, Microbiology (DSC)
Dr. Davinder Sidhu, Clinical Section Chief, Transfusion Medicine (FMC)
Dr. Travis Ogilvie, AP Site Leader, Foothills Medical Centre (FMC)
Dr. Andrew Schell, AP Site Leader, Peter Lougheed Centre (PLC)
Dr. A. Kulaga AP Site Leader, Rockyview General Hospital (RGH)
Dr. Marie-Anne Brundler, AP Site Leader, Alberta Children's Hospital (ACH)
Dr. Chad Luedtke, AP Site Leader, South Health Campus (SHC)
Ms. Tammy Hofer, Acting Chief Operating Officer
Mr. Dale Gray (Interim, Monica Phillips) VP Technical Operations
Ms. Sandy Broen-Dupuis, Quality Manager

Laboratory Services Calgary Zone Quality Assurance Subcommittee of the Laboratory Services Provincial Quality Assurance Committee

Dr. Anna Sienko, Chair
Dr. Leland Baskin, VP of Medical Operations, Deputy Medical Director
Mr. Dale Gray (Interim Monica Phillips), VP Technical Operations
Dr. Andrew Schell, Site Leader, PLC
Dr. Ranjit Waghray, AP/Cyto Clinical Section Chief
Ms. Marcene Campbell, Clinical Safety Advisor
Ms. Sandra Eyton-Jones, Zone/Program Quality Coordinator
Ms. Denise LaPerle, Provincial Anatomic Pathology Quality Lead
Dr. Christopher Naugler, Zone Clinical Dept Head (Adhoc)
Ms. Tammy Hofer, Interim Chief Operating Officer (Adhoc)

CLS Department of Pathology & Laboratory Medicine Business Meeting

This is a quarterly meeting of all laboratory medicine medical and scientific staff in the Region. Co-chaired by the Department Head and CLS VP Medical Operations

Anatomic Pathology Residency Training Committee

Dr. Carolin Teman, Program Director
Dr. Amy Bromley, CBME Lead
Dr. Travis Ogilvie
Dr. Iwona Auer
Dr. Martin Hyrcza
Dr. Mara Caragea
Dr. Sandra Lee
Dr. Denise Ng
Dr. Kyle Kurek
Dr. Jenika Howell
Dr. Davinder Sidhu
Dr. Christopher Naugler (corresponding)
Dr. Marie Dvorakova/Nicole Bures
Dr. Charlene Hunter
Dr. Eric Bol
Dr. Shaun Medlicott
Dr. Konstantin Koro

Dr. Adrian Box
AP Junior Resident (rotates)
AP Chief Resident (rotates)
GP Chief Resident (rotates)

General Pathology Residency Training Committee

Dr. Davinder Sidhu – Program Director
Dr. Christopher Naugler (Corresponding)
Dr. Amid Abdullah
Dr. Carolin Teman
Dr. Iwona Auer
Dr. Alex Chin
Dr. Julie Carson
Dr. Heidi Paulin
Dr. Ryan Lenz (Corresponding)
Dr. Pavandeep Gill

Microbiology Residency Training Committee

Dr. Julie Carson – Program Director
Dr. Wilson Chan
Dr. Andrew Johnson
Dr. Dan Gregson
Dr. Davinder Sidhu
Dr. Joseph Kim
Dr. Raymond Tellier
Dr. Taj Jadavji
Dr. Wilson Chan
Dr. Helen Bibby – PGY 1

Neuropathology Residency Training Committee

Dr. Denise Ng – Program Director
Dr. Lothar Resch – Assistant Program Director
Dr. Jeffrey Joseph
Dr. Jennifer Chan
Dr. Ana Nikolic
Dr. Denise Ng
Dr. Eric Bol
Dr. Marie-Anne Brundler
Dr. Carolin Teman/Dr. Amy Bromley (ex-officio)
Dr. Davinder Sidhu (ex-officio)
Dr. Christopher Naugler (corresponding)
Chief Resident (residents' representative)

Fellowship Committee

Dr. Christopher Naugler (Interim Chair)
Dr. Carolin Teman
Dr. Davinder Sidhu
Dr. Jessica Boyd
Dr. Julie Carson
Dr. Denise Ng

Divisions, Sections and/or Programs

Alberta Health Services Clinical Sections/University of Calgary, Cumming School of Medicine Divisions:

Clinical Section/Division, Anatomic Pathology/Cytopathology Clinical Section Chief/Division Head, Dr. Ranjit Waghray
Clinical Section/Division, Clinical Biochemistry Clinical Section Chief/Division Head, Dr. Hossein Sadrzadeh
Clinical Section/Division, General Pathology Clinical Section Chief/Division Head, Dr. Ethan Flynn

Clinical Section/Division, Hematopathology Clinical Section Chief/Division Head, Dr. Meer-Taher Shabani-Rad
Clinical Section/Division, Microbiology Clinical Section Chief/Division Head, Dr. Deirdre Church
Clinical Section, Transfusion Medicine Clinical Section Chief/Division Head, Dr. Leland Baskin/Dr. Davinder Sidhu

Membership (Appendix 1.1)

Accomplishments and Highlights

Clinical Service (by Section)

Anatomical Pathology/Cytopathology Section (AP/Cyto)

Workload

	2018 Specimens	% change (vs. 2017)
Anatomic Pathology (blocks)	591,745	+2.7%
Cytopathology	204,426	-1.4%
Non-Gyne Cytology	12,367	

Equipment

- A low throughput NGS instrument sold by Illumina was purchased through CLS funds to validate Molecular tests for Myeloma. The tests have been validated and parallel testing is in progress.
- New microscopes were purchased and replaced older deteriorating ones and for some new hire pathologists
- Acquisition and installation of mass array instrumentation for Molecular Pathology lab was done and new tests are being added as they are validated.
- Acquisition of Panther for HPV testing

New Projects

- AP Process Excellence TAT Project
  - AP Process Excellence projects were completed at all sites and over a 7 month period the TAT of specimens from Accession to distribution fell below 48 hours.
- AP Process Excellence Clerical TAT project
  - Several different initiatives were tried and a final decision is still pending. The repeated downtime of e-Scription and Desktop recorder have caused a lot of concern at different times. Repeated efforts to get pathologists to use Dragon dictation have not been successful. Many physicians have been typing their own reports. However, there is been some success with Path techs using Dragon.

Quality Reviews

- CLS is currently compliant with and actively participating in the AHS APQA plan.
- CLS is also actively participating in the development of the AHS Cytopathology QA plan

Fiscal Responsibility

- The Section continues to function within limited resources and tight timelines. Staff experiencing stress and burnout due to RSIs as well as sickness is a frequent event.
- Additional services in Cytopathology added, ROSE (Rapid On-Site Evaluation) for Lung Cancer cases with significant improvement in TAT for advances Lung cancer patients.

Transition to APL

On September 1st official transition of CLS to APL occurred. However, the transition of physicians and staff was not smooth and without stress. It is hoped everyone will settle down over the next several months but payment delays and similar challenges were hard on staff.

Staff

- One AP Supervisor position was eliminated.
- New Lead for Dermpath was appointed – Dr. Thomas Brenn
- Two new Cytopathologists recruited, Drs. Terzic and Gao, both located at the DSC.
- Cytotechnologists have been performing ROSE at FMC and ACH. They attend and collect Kidney biopsies. They are also assigned grossing of colpo cases and some microtome cutting.

Technical Updates

- Gastric Her2Neu testing is being performed at CLS.
- The AP Provincial requisition is now active.

APL

The new organizational structure of Alberta Public Laboratories is in place with provincial Directors and Sector-based Managers and Supervisors. The Medical structure is also defined with Sector-based responsibilities. Work still remains to be done with completion of Discipline Committees.

Clinical Biochemistry Section

Faculty update:

- Dr. Jessica Gifford, who joined the clinical biochemistry section and works at DSC core chemistry and POCT in August 2017, successfully passed both written and oral portions of the Canadian Academy of Clinical Biochemistry board examination. This is the board certification that she needs to direct a clinical chemistry lab.
- Dr. Allison Venner is the new Clinical Co-Chair of the AHS Chemistry Network
- Dr. Lawrence de Koning became a GFT with the University of Calgary starting in January 2018.
- Dr. Lyle Redman retired September 2018.

Research update:

- Canadian Longitudinal Study on Aging (CLSA) continues smoothly. In the past 18 months, we have analyzed over 26,000 specimens and performed greater than 260,000 tests. The next phase of the trial will resume in Fall 2018 with an expanded test menu that now includes NT-pro BNP and high sensitivity Troponin T.
- Alberta Tomorrow Project continues smoothly.
- Pegasus project was successfully completed.
- Active vitamin B12 project (PI, Dr. Sadrzadeh) started in late 2016 and continues in 2018. The results of this study were presented as a poster at AACC.
- Thyrotropin receptor antibody (TSI) project (PI, Dr. Hossein Sadrzadeh) will start in January 2018.
- The ethics application has been approved. Dr. Greg Kline is the endocrinologist co-investigator. The sponsor has submitted the first payment for the study to CLS and patients will be recruited by the endocrinologist either in third week of December or January 2018. The study will evaluate the diagnostic and prognostic potentials of TSI (a chimeric test to measure anti TSH receptor antibody) to diagnose Graves' disease and follow the patients during therapy. TSI from Siemens will be compared with TRAB, the current assay on Roche.
- Myeloma project (PI, Dr. Hossein Sadrzadeh) continues. This study has been designed to investigate the prognostic potential of a new test panel in patients with multiple myeloma.
- CLS Grant Competition – Drs. Jessica Boyd and Hossein Sadrzadeh received $30,000 to develop LC-MS/MS methods for measuring immunosuppressants from dried blood spots. The study continues without problem. We are working to develop a method to extract these drugs from paper. A PhD-level research assistant has been recruited for this project.
- Graduate student- Deema Qasrawi started to work with Dr. Sadrzadeh in 2016. Her project is to develop an LC-MS/MS method to detect 6 steroids simultaneously from dried blood spot and liquid blood specimens to detect Congenital Adrenal Hyperplasia. The project is progressing quite well. The method to detect and measure all 6 steroids simultaneously has been developed and is being evaluated based on CLSI guidelines.
- Establishing reference intervals for chemistry tests in Alberta. The work continues until reference intervals for all analytes in clinical biochemistry are established. Committee members are: Hossein Sadrzadeh, Trefor Higgin, Yury Butorin, Allison Venner and Colleen Paluck.
- CLS Grant Competition – Dr. Isolde Seiden Long received a grant (about $36,000) to replace Helium gas with Hydrogen gas due to helium shortage for the Gas Chromatograph systems at FMC. The project has started and will continue in 2018.

- CLS Grant Competition – Dr. Alex Chin received a grant (~$12,000) to determine the optimal ANA screening titer to appropriately triage pediatric patients for referral to pediatric rheumatology and to predict the onset of systemic autoimmune rheumatic diseases. The project is in the process of receiving ethics approval from AHS and in collaboration with pediatric rheumatology, recruitment of patients will commence in 2018.

Fellowship update:

- At the recent CSCC annual meeting in Ottawa, our fellows Jason Robinson and Joshua Buse presented 7 abstracts. In addition, Jason Robinson received two Awards for best abstract and oral presentation.
- Starting 2018, our fellows shadow an endocrinologist at the RRDTC clinics to learn about all aspects of clinical patient management. This will provide our fellow with a unique opportunity to witness and learn about taking patient history, examining, diagnosing and treating patients with endocrine disorders.
- The program Co-Directors are Drs. Hossein Sadrzadeh and Alex Chin and with six other clinical biochemists; Drs. Lawrence de Koning, Jessica Boyd, Allison Venner, Isolde Seiden Long, Jessica Gifford, and Lyle Redman are the faculty directly involved in teaching and training the fellows. In addition, several pathologists; Drs. Leland Baskin, Ethan Flynn, Meer-Taher Shabani-Rad, Denise Ng, and a cytogenetics and molecular pathologist scientist, Dr. Fariborz Kolvear have provided additional teaching and training.
- The successful candidate for 2018-2020 academic year is Dr. Heather Paul. Heather has completed her Ph.D. in nutrition under the supervision of Dr. Raylene Reimer at the University of Calgary and has past work experience as an emergency medical technician.
- Our COMACC accreditation will expire in June 2019. Drs. Chin and Sadrzadeh completed a re-accreditation self-study and submitted it in December 2018. WE are awaiting their response. If our self-study is accepted there will be no official visit of our program by COMACC commissioners.

Clinical Service Update:

DSC General Chemistry:

- The new pre-analytic system that was installed in DSC Chemistry at the end of October 2017, has been working relatively smoothly.
- The addition of the pre-analytic and track systems adds to the major changes that have occurred in DSC chemistry in the last few months. These changes included the introduction of a 4th chemistry line for testing urines and esoteric proteins. The DSC Core chemistry lab can handle greater than 14,000 samples per day, which is now 4000 specimens more than we used to run.
- The track system now in use in DSC chemistry is the first of its kind in Canada and the second in North America. As in the past, we anticipate to provide a number of tours to our colleagues in North America to showcase these new instruments.

Toxicology Lab:

- On November 1, 2017 Analytical Toxicology went live with a new urine drug screening process for opioid dependency clinics. Specimens from these clinics now go straight to LC-MS/MS analysis for simultaneous detection and measurement of 20-25 drugs of abuse, bypassing most of the immunoassay screen. In addition, the new process includes automated sample extraction, middleware interfacing with Millennium (for the first time the MS results will directly go to our LIS), and an improved patient report (all data are reported and explained clearly). This is the culmination of a two year project to improve and streamline urine drug testing for opioid dependency clinics in order to deal with the workload increases caused by the opioid epidemic.
- The two new LC-MS/MS instruments that were purchased in 2017 and 2018 have been installed. One of these two instruments will be used to replace an old instrument. The second instrument will be dedicated to endocrinology testing including IGF-1, thyroglobulin, and 17-hydroxyprogesterone. Funding for this instrument is a result of Clinical Biochemistry's successful application for CLS Ancillary funds. A committee has been formed by Dr. Sadrzadeh which includes an endocrinologist (Dr. Greg Kline) and Drs. Boyd and Chin as well as the chemistry fellows to prioritize the tests to be developed on LC-MS/MS.

Endocrine Lab:

- Endocrine/immunoassay lab went live with two OptiLite instruments from The Binding Site that has improved work flow in the lab.
- ANA reporting has been expanded from 5 to 10 patterns. An interface between the middleware with Millennium is underway and the goal is to eventually be in line with the international standardization efforts and report on 28 patterns.

Point of Care Testing:

- The work on developing Quality Control material for Transcutaneous Bilirubin measurement has been completed and tested. A member of University Innovation Office visited with us and has been looking in the feasibility of patenting the QC material and marketing it for CLS.
- Activated clotting time quality project is in the evaluation process. The physicians, who have purchased the POC devices, must comply with our policy on QC procedures. New model of the iSTAT vs. Hemochron for activated clotting time called the Affinity being evaluated at ACH.
- Scalp lactate project currently on hold and waiting from OB/GYN to implement the process.

Awards:

CLS was the recipient of the Canadian Society of Clinical Chemists 2018 Innovation Award for the utilization work in toxicology. This is a highly prestigious award that is given to clinical biochemists who have provided an outstanding contribution in the field of clinical biochemistry and laboratory medicine. University of Toronto received a similar award a couple of years ago for a multi-center international study to establish pediatric reference intervals currently in use in North America (CALIPER project).

General Pathology Section

The General Pathology Section has medical oversight for CLS Pre-Analytical and Post-Analytical activities, including Operational Services (including Accessions and Outpatient Labs), Community Services (including 19 Patient Service Centres; lab and ECG services), and Client Services (including Records Management, Client Interface Team, Patient Appointment Line, Mobile Collection Services, Laboratory Information Centre); as well as medical oversight for the 4 Health Care Testing Laboratories (HCTL), 9 Calgary Zone Rural Laboratories (CRL), the 4 Calgary Zone Rapid Response Laboratories (RRL), MLT/MLA Clinical Education, and Laboratory Informatics.

Operational Services

- Jan 2018 ACH Accession provided 2 staff members for an afterhours (5-8 pm) clinic to collect bloodwork on patient who may have been exposed to measles.
- ECGs now autocomplete at the PSCs. Previously ECGs did not autocomplete: PSCs placed the ECGs in transit and DSC Accession received them into Millennium even though no ECG tracing was ever sent to DSC Accession. (DSC Accession would see up to 5 pages of ECGs on the Collections Pending [CPR] list). New process: ECGs autocomplete when logged into the site at which they are ordered. This is a significant time saving change for both PSCs and DSC Accession.
- April 2018 Code Orange declared for ACH. Accession increased staffing for half an evening shift and a full night shift in order to provide increased coverage for collections in the ED as well as increased specimen reception staff in the lab to deal with the increased workload.
- The tracking of critical samples project is now complete and part of standard workflow. Added work activities for all areas involved. Improved patient safety, as there are no known missing samples with the specimen types within the scope of the initiative. A close out report was held in Supervisors/Managers meeting and QUPEC in August 2018.
- Q Quality report sent to ACH Quality, ACH Directors by CLS Clinical Safety Advisor, summarizing the ID Band project. The successful pilot was at RGH in 2016; CLS implemented a practice change when laboratory staff encounter an acute care patient (including Emergency patients) without an ID band. The change was implemented at SHC in April 2017 and the three remaining acute care sites (ACH, FMC & PLC) in January 2018. Site leaders and CLS leadership supported a culture shift requiring all acute care patients to wear ID bands before laboratory staff would collect blood. The default practice of verbal identification and completion of the laboratory Unusual Phlebotomy Patient Safety Alert (UPA) form as a workaround was no longer acceptable unless there was a clinical reason a patient could not wear an ID band. A manual audit of pre and post implementation shows success with the reduction of rebanded patients and with the reduction of collections based on verbal identification. This in turn reduces the risk of patient misidentification and also reduces the unnecessary time spent in correcting unbanded patients.
- Hand Hygiene: Roll out of new laboratory practices in Hand Hygiene completed as scheduled. In July 2018, in addition to manual logs, FMC, ACH, RGH, PLC, SHC hospital sites began using iPads loaded with the Provincial Hand Hygiene applications called Clean Hands to monitor Hand Hygiene compliance in the laboratory and also as a contributor for other units. iPads allow for direct uploading of data to AHS Clean Hands portal. Auditing of Outpatient collection sites in addition to Inpatient observations also in effect.

- Planning for roll out of SHC Complex Care Hub (CCH) Inpatient (IP) Unit. Already rolled out at RGH. Summary of program: largest component is the Hospital at Home (HAH) component in partnership with the Community Care Paramedic Program (CCP). Patients are identified and assessed in Emergency/IP Medical unit. If they meet criteria and are agreeable they are admitted to Complex Care Hub. Patients are seen daily; may bring into dedicated space in Day Medicine area or assess/treat at home in partnership with CCP. CCH is built as IP unit in Clinibase/SCM; this allows quick access to RGH services such as Diagnostic Imaging, patient is given same priority as Inpatient but requires booking of procedure. The goal is better quality of life for appropriate patients. Home Med list in SCM is used for meds that patient or Home Care is administering; this allows these meds to be tracked but kept separate from the ordered meds in SCM. Feedback from physicians – this is changing the way that they practice; building capacity in Primary Care and in partnership with Calgary West Central PCN. Link to Complex Care Hub article on AHS Interchange week published July 19th, 2018 - albertahealthservices.ca/news/Page14545.aspx. Timeline for implementation: January 2019.
- Request from Collaborative Care, CoACT Team Lead, to respond to CoACT Collaborative Care Current State Assessment for Laboratory. For reference: see CoACT page on InSite https://insite.albertahealthservices.ca/coact/Page9614.aspx. Two questions pertaining to the laboratory: i) Are lab results available in time for team based morning rounds (by 0900)? and ii) Are stat lab results notifications to accountable clinician completed within 30 minutes of result availability? Data provided to program showing laboratory meeting requirements.
- Cancer Care began the distribution of Aria generated requisitions to CLS/CRL sites. First pass requisition had ambiguous/unknown test information and sometimes incomplete/unclear physician location requiring added time spent troubleshooting with follow up, sometimes resulting in patient wait time delays and delays in patient treatments. In collaboration with Aria, improvements were made to the standard requisition. CCI went live on November 26, 2018. TBCC projected go live in March 2019.
- In collaboration with Molecular Pathology, implementation of collection of TM790 blood collection at FMC site. Includes new tube type and resolving logistics for transport to Heritage building.
- Updates completed to the PLC Functional Plan for the laboratory. Includes forecasting FTE requirements, updating space requirements and outlining adjacencies and workflow. Last functional plan completed in 2005. PLC Functional program signed off in November 2018.
- CPSA Accreditation responses and evidence of compliance submitted and complete. Accreditation successful.
- Post training competency program created in response to accreditation recommendation. The post training competency is based on tasks (not benches) so they can be standardized across Hospital Accession areas.
- October 2018, CLS/CRL implemented the use of "Calgary Zone" in PathNet Millennium, instead of the physician name for Calgary Zone physicians. Extensive stakeholder engagement and testing complete. Benefits include fewer keystrokes, simpler data entry for community patients and aligns with Edmonton zone data entry. This is for GenLab only; no changes for Anatomic Pathology or Mobile Collection Services. Changes to training processes completed.
- Cancer Care Project, Collections Laboratory 75 % complete, no concerns.
- Planning has started for the addition of 8 new Inpatient beds within the D pod of the FMC Emergency area.
- On December 3, 2018 a new Bronchoalveolar Lavage/Bronchial Wash requisition trialed at the FMC Bronchoscopy Suite. The requisition was created with stakeholder input from Bronchoscopy Suite, Accession, Microbiology, Anatomic Pathology, Cytology, and Hematology. The use of a single requisition process (along with the use of the newly created destination bag label) will provide staff in the Bronchoscopy Suite fewer requisitions to complete, leading to more complete information and will also facilitate specimens remaining together during transport to the lab.
- Joint initiative with DSC Accession and Chemistry: Added a pop up warning in PathNet Millennium for DSC Accession Data Entry that triggers an action for specimens over the sample integrity time limit (>8hrs for LD; >12 hours for Total or Direct Bili; >15 hours for K). The pop up box indicates to bring the sample to Chemistry, where the MLT assesses the sample stability and decides on cancellation and recollection. Prior to Nov 20, 2018 there was no intervention.
- Collaboration with Provincial Laboratory for Public Health to update and standardize Anti-Tuberculosis Serum Drug Level instruction sheets for blood collection and processing.
- Working on improvement to BCERP to include information for DSC Accession and DSC Referrals handling of specimens.
- Developed a process to facilitate QA dialysate samples data entry and conductivity testing for hemodialysis instruments within Southern Alberta Renal Program (SARP). FMC will be the centralized testing site, with approximately 10 samples/average per month. Start date: October 2018.
- On request of FMC Administration, first morning sweep times swapped between Unit 41B and FMC Unit 52, for improved flow on unit 41B effective September 2018.

- DSC had major flooding October 3, 2018 due to burst piping in Chemistry 4th floor water source. No known patient impacts. No impacts to DSC Accession.
- In November 2018, DSC Accession submitted six Accident Illness Investigations, some resulting in employee lost time. Employees experiencing illness, nausea, headaches, discomfort due to odors, smells, fumes, irritation in the Accession area stemming from facilities work. Working with DSC facilities and EH&S to resolve the issues.
- A review of RLS data Mar1-Nov1 2018 for Calgary urban hospitals shows a continued high frequency of patients not having identification arm bands prior to blood collection. The clinical conditions as a reason for noncompliance are varied. For the rest of the province, there are only rare exceptions where laboratory staff is asked to collect a patient without an ID band (in the Emergency department in extreme emergent situations). The RLS information, aggregate and site specific information, has been forwarded to Calgary hospital clinical safety leads to review.
- November 2018: Changes to the South Zone Meditech shipping batch indicate patient pay requirements for Billing. DSC staff will data enter with the billing financial class to trigger the billing when DSC/Calgary does the testing. Changes to quick references and training of staff done.
- ACH leaders engaged CLS for support and implementation of the "Commitment to Comfort" initiatives as directed by the Alberta Children's Hospital (ACH) site Pain Committee. The request is for laboratory to implement evidence-based practices related to pain interventions and strategies for clinically significant improvements in patient and family satisfaction surrounding pain, first at ACH, and then within the entire Calgary Zone. ACH is pursuing a Child Kind certification http://childkindinternational.org/ . CLS Process Excellence and ACH Accession Supervisor have undertaken a project assessment/implementation of pain management tools, change management, data collection, and best practices. Project on-going from November 2018 to March 2019. ACH site hosted ChildKind on December 6th and were successful in receiving their ChildKind designation.
- Connect Care Council has endorsed the recommendation to use Healthwise from myHealthAlberta as the knowledge base and for patient education materials.
- December 2018 implementation of the new organization structure of Alberta Public Laboratories. Urban Hospital Accession departments are now under the management of Hospital Site Managers. Operational Services structure disbanded. DSC Pre-Post Analytic now encompasses Accession, Referrals, Mailroom, Optical Scanning and Records.
- RFP for Referrals Laboratory ongoing as of December 2018.

Client Services

Records Management (Data Integrity, Records, DSC Mail Room, Optical Scanning)

- Client Services call tree for 403-770-3600 was updated on August 13, 2018 so that clients no longer have to choose whether to select LIC for results under one year, or the Records department for results greater than one year. LIC will manage all Millennium requests; if there are requests for results from PathNet Classic, LIC will re-direct the call to the Records Team.
- Pre-Exam, Records Management and Finance evaluated the registration practice of writing with red pen on requisitions for billing purposes that required Optical Scanning to photocopy the requisition and direct the copy to the Finance department. Reviewing the process identified an opportunity to reduce what needed to be written on a requisition and copied. There is a time savings for staff involved in the process and resources required.
- The CLS Records Team worked with the Quality Coordinator responsible for record retention to clean up over 7000 transmittal records for materials that were grandfathered over to current off-site storage vendor. Clean-up also included the destruction of 405 boxes.
- CIT and DIT are working jointly to identify clients that receive a high volume of paper charts and approaching the clients to receive their charts by fax to reduce the number of hard copy reports printing in the DSC mailroom and improve the TAT for health providers to receive test results.
- DIT and Quality identified a deficiency in the 9 tab registration rule that was deleting leading zeros on out-of-province PHNs when it copied the PHN over to the MRN field, creating mismatch PHN/MRN errors. AHS IT worked on a solution and DIT completed testing. Change implemented in Millennium Prod on August 7, 2018.
- DIT worked with CORE stakeholders to add additional Cancer Care locations and standardized naming conventions (Implemented in Millennium Prod, February 2018).
- DIT took over the audit for Multiple MRN remediation from AHS IT.
- Two new high speed scanners for Optical Scanning were implemented in August 2018. One new feature is a sensor which detects staples and paper clips on the requisitions being scanned. The scanning process stops to prevent staples and paper clips from damaging the rollers which will save on repair costs and will reduce downtimes.

- Optical Scanning Team worked with vendors to develop a second purge date for Anatomical Pathology (AP) and Cytology documents; General Lab documents are retained for a two year cycle and AP/Cyto now have a four year retention. This extension allows AP/Cyto to shred hard copies at two years.
- Joint Mail Room and Courier Office – now receiving, sorting and delivering AHS Calgary Zone mail.
- December 2018 implementation of the new organization structure of Alberta Public Laboratories. Mailroom, Optical Scanning and Records have been transferred to Pre-Post Analytic. Data Integrity Team (DIT) is retained within Client Response, which under the new organization structure has APL-wide administrative oversight under the new APL Integrated Programs directorate.

Client Services (Client Interface Team, Lab Information Centre, Patient Appointment Line)

- CIT has taken on the role to review and validate lab requisitions for physicians' offices/ clinics that are printing a lab requisition from the electronic medical record database (EMR).
- LIC Phone tree was changed to direct more patient calls for information, from the MLTs to the clerks. Clerks are now taking calls for such things as patient preparation for specific testing, how to collect specimens, PSC hours of operation, etc. The phone tree has been simplified to make it easier for lab clients to navigate.
- November 20, 2018: LIC began communicating Critical Sickle Cell results on behalf of Hematology.
- December 3, 2018: LIC began managing add-on requests for Calgary Rural Labs.
- December 2018 implementation of the new organization structure of Alberta Public Laboratories. Client Services restructured as Client Response, which under the new organization structure has APL-wide administrative oversight under the new APL Integrated Programs directorate.

Mobile Collection Services (MCS)

- Approximately 750 additional funded Long Term Care (LTC) /Supportive Living (SL) beds have been added throughout the year. MCS added 4 MLA I and 1 Clerk I positions to support the increased service needs.
  - June - Agecare Skypointe opened with 352 funded beds.
  - August - Intercare Brentwood added 109 funded beds.
  - September - Bethany Riverview opened with 210 funded beds.
  - November - Wing Kei Greenview added 78 funded beds.
- April 2018: Process change introduced to improve INR turnaround times for Anti-Coagulant Clinic patient collections. A Priority requisition was created and trialed for medically critical patients to facilitate earlier collection times to provide a same-day INR result. The trial has been successful and this requisition will be implemented.
- April 2018: The MCS back office space in Glenbrook was reconfigured to accommodate one additional workstation for clerical and administrative functions. We continue to review options for MCS administration to relocate to provide more space. This will accommodate expected growth, and improve workflow by having all staff in one area with a call center layout.
- July 2018: Created a new Communication folder and implemented an electronic tracking log for MLA and clerical staff reading. This provides a way to centralize memos and information sent via email, and enables staff to access documents via hyperlinks. It also provides a way for senior staff to monitor staff completion of required reading.
- July 2018: Revised the MCS Pet Policy for residential visits. This update requires staff to ensure pets are restrained prior to entering the home. This will enhance staff safety when there are pets in the homes.
- Fall 2018: Removed phone tree from Mobile Office phone system to better manage incoming phone calls and to reduce the number of outbound phone calls in response to messages. Two clerks are now logged into the phone queue during the day and answer all incoming calls, rather than having callers leave messages which then need to be returned. Caller feedback to this change has been very positive.
- Fall 2018: Changed process for LTC requests/ requisitions for collections that are called as 'extras' during the day. LTC facilities now fax requisitions to the MCS Office for same day data entry. This process change means the orders are in Millennium when MCS MLAs start their next work day and leads to improved turnaround time for testing.
- Fall 2018: MCS is piloting seven new Toyota CHR vehicles. These vehicles have higher clearance and a wider frame than the currently used Toyota Matrix and Prius models. These features should mitigate some of the challenges staff have driving in difficult winter road conditions, particularly in residential and rural areas.
- Fall 2018: Changed process for LTC/SL4 facilities for requisitions for next day 06:00 collections. Requisitions which were not previously faxed to the MCS office are now kept in an identifiable red folder in the facility to indicate to MCS staff that they need to be data entered. MCS staff send the requisitions to the MCS Office for immediate data entry. When MCS staff return to their drop off location they print the necessary labels and process these samples. This has led to improved turnaround time for testing as the samples can then be integrated into the regular PSC workflow.

- During February and March 2018 there were four staff falls due to ice and winter conditions. October 2018: MCS MLAs were provided the opportunity to purchase a pair of winter boots with Arctic Vibram soles (to be reimbursed by the company to a maximum of $200). The goal is to help prevent staff from slipping and falling on icy sidewalks and in parking lots by providing appropriate footwear. As of February 2019 approximately 60% of the MCS MLAs have purchased these boots. There have been no documented MCS staff falls up to February 14, 2019.
- November 2018: a Safety and Hazard Assessment form and process were created for use by MCS Senior Staff when investigating staff safety concerns regarding patient homes. This will provide a more standardized approach to patient reassessments and required follow up.
- December 2018 implementation of the new organization structure of Alberta Public Laboratories. MCS is no longer part of Client Services, and under the new organization structure has APL-wide (provincial) oversight under the Community Services directorate.

Health Centre Testing Laboratories (HCTL)

- SMCHC was approached by Sysmex to be a beta test site for a QC monitoring program which began in January 2018. Testing was successful – offered BCQM system for proactively monitoring issues with the analyzers through QC review and technical signals. Idea is to reduce downtime of the instruments and be able to troubleshoot early in seeing any apparent issue.
- HCTL MLT III is the designated SME (Subject Matter Expert) representing the HCTLs as well the RRLs (Rapid Response Labs) for the new Connect Care Beaker Lab build; sits on two working groups – General Chemistry and Hematology.
- CLXTs continue to cover the night shift at ACHC (Airdrie Community Health Centre). Have hired and trained two new staff over the course of the year.
- Airdrie Urgent Care senior management to work through sample transport process on the night shift as the CLS courier service would not be involved in this process. Two local taxi services were negotiated with to establish transport during the night shift for the small volume of specimens needing to be sent off-site for lab testing. There have been challenges with this service – talks continue with the taxi companies and senior management of Airdrie Urgent Care Centre.
- HCTLs had a successful CPSA accreditation in September 2018. Minor non-compliance issues were easily and quickly resolved. Staff and sites were well prepared.
- SCHC (South Calgary Health Centre) underwent a major renovation in both the Outpatient PSC collection area as well as the HCTL in late April 2018. This required the lab to shut down for 48 hours. Planning on how to deal with samples from the SCHC Urgent Care over that time frame were well thought out and discussions on the immediate needs for Urgent Care lab testing occurred. It was determined an interim way of performing cardiac troponin (*c*TnI) testing was required. The staff were able to move the analyzer required for this testing, do a mini validation and then receive samples for *c*TnI testing. The smooth transition was greatly appreciated by SCHC Urgent Care. HCTL did an amazing job in collaboration with CLS Lab Medical to have instruments moved out of the lab on a Friday at 5:00 pm, then moved back in and validated to accept samples from Urgent Care by 8:00 am the following Sunday morning.
- 2018 workload saw an increase in lab testing volume at Airdrie HCTL by 15.37% (Airdrie Health Centre went 24x7 in April 2017), Cochrane HCTL by 7.82% and Sheldon Chumir HCTL by 3.73%. SCHC HCTL saw a decrease in volume by 1.06%.
- LDH assay on the Vitros was discontinued at the HCTLs due to low volumes and presence of other tests better suited for physicians on the test menu.
- 1 MLT at ACHC retired at the end of 2018; the position was filled with a casual staff member.
- HCTL MLT III volunteered to be a committee member for RFP for province-wide urine BHCG kit.

Clinical Education:

- MLT pass rate for June 2018 CSMLS exam: 94.0% / National Average for accredited programs: 90.0%.
- A total of 48 SAIT MLA students and 59 ABES MLA students performed their practicum at CLS in 2018.
- In June 2018 CLS had 51 MLT students graduate and there are currently 36 MLT students performing their practicum at CLS.
- CLS Hires in 2018: 26 ABES MLA graduates were hired at CLS, of which all 26 are still employed; 11 SAIT MLA graduates were hired and are still employed; and 19 SAIT MLT graduates were hired and are still employed. These numbers are a little more than 2017, with an initiative to hire more MLAs in the testing areas; with the new SAIT Enhancing MLA program, as well as a number of MLT retirements we would expect these numbers to increase again in 2019.

- SAIT MLA student intake continues to follow a new curriculum introduced in the fall of 2017 – the training program is extended to 15 weeks from 13 weeks. Additional classes include Loading Instruments, Understanding QA, ECGs and Critical Thinking. This is to match requirements of a MLA from employers. This added skill level is helpful in hiring for the technical areas.
- In late November the SAIT MLT student schedule was changed for their Microbiology practicum module from day shift to evening shift. This was to allow this training space to be utilized for expanded Microbiology testing during the day shift hours.
- SAIT Advisory Council meeting in October 2018 – heard from British Columbia and Saskatchewan who are still having problems recruiting MLTs. We did see an increase in the number of SAIT MLT graduates taking jobs out of province.

Community Services

- Team Care has now been implemented at all PSC locations except Chestermere and Richmond Road. These two locations are currently too small to utilize the team care process. The overall patient wait times (PWT) are becoming more consistent and we are working on further improvements to consistently meet our PWT target.
- Real Time Patient Feedback is being captured through a variety of mechanisms including an online survey. Response rates for the survey are good for our appointment patients; we continue to be challenged in gathering feedback from our walk-in patients. The patients are able to rate different aspects of their experience and are provided a free text area to provide suggestions or more detailed feedback. The majority of the feedback we have received reports a positive patient experience. The free text suggestions and detailed feedback have allowed us to target some problem areas such as privacy concerns for urine sample cupboards, parking and signage concerns, and customer service.
- Renovations were completed at many sites in 2018 and included fresh paint, new flooring, new wayfinding signage, and in some locations new back lab furniture and collection room pedestals.
- We were fortunate to present some ideas for proposed changes for our Patient Service Centres to the AHS Patient and Family Advisory group in June 2018. The interaction was robust and generated valuable insight into the patient perspective of our operations and proposals. Feedback received from this group was collated and has helped to form our direction and decisions for these projects.
- Respectful Workplace workshops were held with the PSC staff in 2018. The workshops share information about our policies and procedures and included an interactive component where participants were able to practice having conversations about common respectful workplace issues.
- Hand hygiene audits were introduced at the PSCs in April of 2018. This increased awareness about proper hand hygiene and provided valuable information allowing us to target training to those sites who were underperforming on the audits.
- The Stadium PSC location was permanently closed on Friday July 20, 2018.
- A new PSC was opened in the Richmond Road Diagnostic and Treatment Centre on July 25, 2018. This new location is open Monday to Friday from 0700 to 1515.
- Changes were made in October to the PSC schedules to move the sites to be self-sufficient for regular staffing. There were some FTE transfers made at that time to better align our staffing with workload at all of the sites.
- A new process for auditing the temperature of our specimen transport containers was developed in response to accreditation citations. Quarterly audits began in December 2018.
- Regular staff in-services for the PSC staff were implemented in the Fall of 2018. The PSCs close early on a rotating schedule so content can be delivered in a focused manner to the entire team at each site. These in-services will be held three times per year with content designed to provide staff with skills to improve the patient experience and provide training on new policies, procedures, and equipment. The Fall 2018 in-services focused on the new hand hygiene policies and procedures, change management training, and providing updates on the lab transition to Alberta Public Laboratories.
- An appointment arrival staggering project was trialed at four sites in the Fall changing the appointment start times from 10 minute intervals to 5 minute intervals; two of the sites trialed the standard appointment lengths concurrently. These trials were not successful, reductions in patient wait times were not achieved and the reception line became more difficult to manage with the 5 minute arrivals. The trial has been discontinued.
- The Chestermere PSC location added an additional two hours of service every weekday starting Oct 21, 2018. The site now sees patients on an appointment only basis from 0800 to 1300 on weekdays.
- The PSC staff have been empowered to bring continuous improvement ideas forward and a number of these ideas have been successfully trialed and shared with the entire group for adoption at other sites. These include the development of alternate ECG patient workflows to better suit the existing variations in site layouts and staffing levels, development

of a back lab processing algorithm to improve sample processing efficiency, and changes to staff break times and structure (two 30 minute breaks vs one 30 minute plus two 15 minute breaks).

- A PSC dashboard report was developed to share real time information with front line staff weekly about how their site is doing in comparison to the PSC group as a whole. The dashboard includes information from the patient survey regarding visit ratings, washroom cleanliness, staff courtesy, productivity and patient volume indicators and patient wait time information.
- A development program for our MLA IIs was introduced in November 2018 and will be continuing through 2019.
- December 2018 implementation of the new organization structure of Alberta Public Laboratories. CLS Community Services portfolio became "Area A Patient Service Centres" portfolio under the APL-wide Community Services directorate.

ECG

- PSC and MCS sites have been working towards implementing new Schiller ECG acquisition modules. Thus far we have successfully replaced the 54 old PCs with new DELL OptiPlex 3050 desktop PCs, and 30 old netbooks with new DELL Latitude 5480 laptops that will run the program needed for the Schiller ECG acquisition module. This new ECG module will replace the aging Welch Allyn system that is currently in place. This project also included the implementation of new escalation criteria that will catch those patients over 60 years old with low heart rates. We have also been able to customize the software to have visual alerts that tell the PSC or MCS staff when a patient has a critical abnormal rhythm and the steps to follow in these cases. This will eliminate excessive steps that are currently in the ECG process making it simpler and more streamlined. The project is ongoing with an expected completion date for full implementation in June 2019.
- As part of our commitment to quality improvement with ECG interpretations we have a peer review program in place that randomly selects 100 ECGs per week that go to an alternative reader for review. From January 1, 2018 to September 31, 2018 86,043 ECGs were read by our contracted consortium. 3508 (4%) of those were randomly sent for review. Of the 3508 ECGs that were reviewed, 78 (2.2%) had minor disagreements and 13 (0.37%) had major disagreements. This high rate of concordance is an excellent achievement on the part of the ECG readers.

Calgary Rural Labs (CRL)

- Instrumentation
  - iSTAT Alinity instruments have replaced iSTAT-1 instruments at Vulcan and Oilfields, and the GEM 3500 at Claresholm. This provides better cost per test at low volume blood gas testing sites.
  - Canmore, High River and Strathmore implemented the Sysmex XN-550 Hematology Analyzers, replacing Beckman Coulter LH 700 series instruments.
  - Vulcan implemented a new Clinitek Advantus Urinalysis Analyzer due to failure of the old analyzer.
  - Banff and Okotoks implemented new Mini-Vidas analyzers, due to sunsetting of old analyzers.
- Testing
  - CRP testing provided at Strathmore and Canmore.
  - LD testing replaced with LDHI, and centralized to High River, Strathmore and Canmore.
- Personnel
  - Four Combined Laboratory and X-Ray (CLXT) students from NAIT underwent a 10 month practicum rotation in Claresholm, Vulcan, Oilfields/Okotoks, and Strathmore.
  - All regular Medical Laboratory Assistant (MLA) employees of the Okotoks laboratory have been trained in Non Violent Crisis Intervention.
  - High River rural lab participated in training two SAIT MLT students for their Chemistry rotations.
  - The process of attrition saw the MLT III at High River replaced with a MLT II, to align with provincial standardization of supervision of rural laboratories.
  - Management and supervision of all Calgary Rural CLXTs was transferred to APL on December 10 2018, in collaboration with the Diagnostic Imaging Department.
  - Most rural lab sites participated in training of SAIT and/or ABES MLA students.
- Organization/Patient Improvement
  - LIC is performing patient recalls for CRL for lab-cancelled specimens. This is for community patients only, and not for Transfusion Medicine, routine urinalysis or blood gases. LIC has the experience to provide consistent messaging and scripting for clarity to patients.
  - LIC is now managing test add-ons for CRL.
  - The nine rural lab sites underwent accreditation, with six of nine sites receiving full accreditation; CPSA requesting further information for the other three sites.
  - High River Health Foundation purchased two new phlebotomy chairs for High River and Nanton lab sites.

- Q-Matic was installed at the High River outpatient lab to track patient wait times.
- Successful discussions were held with management staff at Sagewood Seniors Community (Strathmore) and Seasons Retirement Community (High River) to align off-site collection practices and provide service for SL4 patients without impacting operations.

December 2018 implementation of the new organization structure of Alberta Public Laboratories. Calgary Rural Labs were transitioned into the portfolio of Area 3, Rural Hospitals Directorate South Sector, APL, with the existing Consultant Pathologist continuing to function in a dyad with the Area 3 Rural Hospitals Manager.

Rockyview General Hospital (RGH) RRL

- RGH had a successful CPSA Accreditation within the departments of Transfusion Medicine, Hematology and Chemistry with very few minor citations. The staff worked for months preparing for this all-important date.
- 3 new MLTs were trained in three departments.
- 16 MLT students were trained at RGH in Hematology, Coagulation and Chemistry.
- Office space was relocated to decrease traffic flow through Transfusion Medicine.
- One MLT attended the Understanding Yourself as a Leader (UYAAL) course and one other attended the Mental Health course.
- Team building staff celebrations included Spring Day, Stampede lunch, Hallowe'en potluck and Welcome to APL potluck lunch.
- 2 MLTs retired in 2018, and we celebrated their retirement with a staff tea and cake.
- "Leading with Intent" and "Change Management" were presented to the staff as well as lunch 'n' learns by Homewood Health.
- Yearly competencies were completed by all staff in all 3 departments of the RRL.

Transfusion Medicine

- Implementation, training and competency of staff in the use of blue line coolers for transport of platelets within the hospital. The new coolers will provide a controlled temperature for 5 hours as opposed to one hour previously.
- Implementation of confirmatory ABO/Rh type for each patient receiving blood – according to Accreditation standards.

Hematology

- Worked up the first new LED microscope in an RRL.
- Worked up a new Hematek stainer.
- Implemented Body Fluid controls as per CPSA Accreditation standards.

Chemistry

- RGH Chemistry worked up the new Lipase application for Cobas 6000 users.
- Ongoing Venous Blood Gas deficiency reports to ED monthly. As a result of these reports ED changed the SCM requisition to include reminders to address some of the deficiencies.
- Found a cost saving for printer paper in Chemistry across the RRLs by using a different paper supplier.

South Health Campus (SHC) RRL

General

- Molecular Integration Project – Using Process Improvement methodology, determining workload balance for a new molecular testing platform in the RRL to ensure a seamless transition into the Stat Lab from Microbiology.
- Mock Site Wide Viral Hemorrhagic Fever (VHF) Simulation.
- Prosci Change Management training provided for all staff in the ADKAR model.
- Successful CPSA Accreditation.
- Leading by Intent Methodology introduced.
- Provide stakeholder feedback to Connect Care.
- Team building lunch Potlucks (Summer Patio BBQ, Spring Fling, Halloween).

Transfusion Medicine

- Completed Lab layout project in the TM area to enhance workflow and improve efficiencies.

Molecular

- Moved 5 Panther analyzers from Microbiology into the SHC Rapid Response Lab.
- Trained 17 MLTs on the Panther Platform for Microbiology testing.
- Integrated 2 MLAs into the Molecular lab duties.

Alberta Children's Hospital (ACH) RRL

- CPSA accreditation preparation. Successfully passed inspection. Minor citation responses completed.
- Continuing Education sessions offered - Communication and Conflict, and Leading by Intent.
- Critical result audit prints on TM printer between 03:00 and 03:45 as a reminder to staff to call critical results when LIC is not available.
- Began pilot for integration of MLAI into the technical area of the RRL. Started training 1 MLA in TM to assist in maintenance tasks and assigning/dispensing PPP.
- Research study (BioFire) was given space within the RRL for the study.
- Add-ons are now done by LIC except from ED.
- Two VHF simulations completed. Ongoing training on proper PPE donning/doffing.
- Acquired a new Hematek stainer.
- New process for handling peripheral blood smear referral samples on weekends.
- Critical report audit pulled weekly for Clinical Chemist review.
- Hemolysis index for ionized calcium study.
- ICa, CSF pH, Mthb and CoHb testing transferred from Respiratory to CLS.
- 72 hour fecal fat procedure discontinued. New fecal weight reporting started. Results of this shared and published in Journal of Applied Lab Medicine.
- Worked with EH&S on handling samples with hazardous medications on board (e.g. methotrexate samples).
- Confirmatory ABO/Rh is a 2nd result from specimen collected at different time to ensure specimen was collected from correct patient by confirmation of ABO/Rh.
- Netcare became available to all TM techs to aid in finding confirmatory ABO/Rh.
- Millennium is now checking for current ABO/Rh type when dispensing plasma and platelet products.
- Searching for antigen negative units in Millennium for patient specific needs has been upgraded.
- Health Canada preparation and inspection. Minor citation responses completed. ACH TM passed.
- Health Canada requested that, for any new processes or changes in process, the MLTs read and sign off the approved SOP, training checklist and competency which is to be completed prior to implementation date of the process.
- When dispensing or returning products the visual inspection field will no longer default OK. MLTs will now click on drop down arrow and select appropriate reason.
- ACH TM participated in Cellular Therapy Lab (CTL) CPSA accreditation for patients receiving a bone marrow transplant. Certification successful.
- Blueline Platelet Coolers used to transport platelet for MTP or OR to maintain acceptable storage temperature. Good for 5 hours in platelet cooler.

Peter Lougheed Centre (PLC) RRL

Hematology:

- Obtained an ergonomic microscope with phase & retic ocular from Capital equipment.
- Identified issues with the quality of stain from manufacturer and escalated citywide.
- Submitted an IT request to have 2 separate labels for HbA1C and CBC to avoid missing tests when sent out.
- Initiated a transfer list for bone marrow samples that are sent off-site to track logistics.
- Collected bone marrow samples from 436 patients, mainly from Hematologist Specialty Clinic.
- Continue to monitor number of clotted samples received from nurse collections.
- Held a CE presentation on Cellavision case studies, June 2018.
- Created a WAM rule to review discrepant WBC counts.
- Increased the linearity on the Sysmex analyzer for synovial fluids to avoid sample manipulation and potential errors for dilutions.
- Implemented body fluid controls post-accreditation review.
- Trained 4 new staff members in Hematology.

Chemistry:

- Increased testing parameters on venous blood gases that now include Ionized calcium, Methemoglobin, and Carboxyhemoglobin.
- Validated method and initiated testing of PH analysis on CSF samples.
- Decreased one level of QC material for Ammonia and ETOH analysis –cost saving.
- Obtained a new micro-centrifuge from Capital equipment.
- Dr. Isolde Seiden-Long presented an in-service on QC review for technologists.
- Trained 5 new staff members in Chemistry.

Transfusion Medicine:

- Implemented use of platelet coolers to transport platelets with Massive Transfusion Packs and to the ORs.
- Switched the IVIG brand that 51 patients were receiving to help meet CBS utilization targets.
- Started stocking an inventory of concurrent apheresis plasma.
- Developed process with the OR to ensure the collection of the confirmatory ABO type on patients when required.
- Streamlined the process for dispensing IVIG to Specialty Clinics to make it more efficient.
- Trained 2 new staff members in TM.
- Implemented the Primex temperature monitoring system for the Women's Health Clinic and Specialty Clinic refrigerators.
- Successful Health Canada and CPSA inspections.
- Installed and implemented a new double door blood bank refrigerator, a new blood product storage freezer and a new platelet incubator with agitator to replace old equipment.

General:

- Hired 2 student graduates and trained them in 2 & 3 departments.
- Provided 4 lab tours to Emergency department as part of their orientation.
- Hired 6 new staff members to cover maternity leaves.
- Implemented CLS Toolkit from the training working group and cut down on training time for maternity leave staff returning to work.
- Implemented a contingency plan document to follow when staffing numbers fall below minimum levels.
- Performed bench timings in Hematology and Chemistry on all three shifts to look at better workflow and timing of equipment maintenance.
- Presented Leading by Intent to 8 senior staff members; 26 staff members attended change management sessions.
- Completed annual competencies by the end of November and required reading was above 80%.
- Participated in a successful CPSA accreditation review with deficiencies that were minor to correct.
- Participated in functional planning for a new lab space to meet future needs with an expanded Emergency department.
- Senior staff toured South Health Campus, DSC and FMC McCaig building to prepare for design phase of lab space planning if funding is approved.
- Responded to the Code Green partial evacuation of PLC in October. Overall, the RRL handled the situation well with recommendations for improvements in communication between site and lab.

December 2018 implementation of the new organization structure of Alberta Public Laboratories. CLS RRL Manager-GP Medical Division Head dyad ceased to exist under the new APL organizational structure. This has been replaced by the respective Hospital Manager working with the corresponding Hospital Medical Site Lead in collaboration with Sector Clinical Section Chiefs.

Hematopathology Section

DSC/FMC/Hematology/Special Hematology/Urinalysis/Special Coagulation:

- Designates participating in EPIC build working groups as subject matter experts.
- Participation in provincial standardization of reference ranges and EPIC SME groups is ongoing.
- Senior staff attended the 2 day Mental Health workshop.
- Staff attended change management sessions.
- Linearity for TNC for Synovial fluids changed from > 10,000 X10E6/L to >40,000 X 10E6/L
- DSC/FMC: 2018 Accreditation successful
- FMC/DSC: Implementing use of commercial control for manual body fluid cell counts (as a result of accreditation recommendation). This will affect FMC, DSC, RRLs and Banff.

DSC Hematology/Urinalysis:

- DSC: Hgb A1C and CBC orders netting to one EDTA collection tube resulting in cost savings. The Hematology Sysmex tube sorter is managing all EDTA tubes- processing CBC/ sorting all lavender topped tubes thereby decreasing sorting of tubes by Accession department.DSC Hematology trialing a temp MLA in the department.

- DSC: Process underway to transfer Urinalysis from Hematology functional center to Chemistry. Transfer to be effective April of 2019. Staff duties to remain intact, changes to supervisory/ management structure.
- DSC MLA Accn staff are now loading all EDTA tubes into Sysmex (CBC analyzer) racks prior to delivering to the testing department. This task had previously been done by MLTs in the testing department so has resulted in a cost effective transfer of tasks.
- DSC: Trial MLA position in Hematology completed. Trial was a success. Will assess any upcoming MLT vacancies for the opportunity to convert a portion of MLT FTE to MLA FTE.

FMC Hematology:

- Hematology participating in trial process of a single consolidated BAL requisition. FMC bronchoscopy suite is the trial location. AP/Micro/Cyto/Hem/Accn departments are involved in the trial.
- Positive sickle cell screen results are now flagged as critical and appear on the LIC queue for notification.

FMC Special Hematology:

- Consult BM reports are now in Net Care
- Successful accreditation
- CLS Requisition is included to hemoglobinopathy/thalassemia work up study, to capture family history for proper evaluation.
- Improved new label for sickle cell and Hemoglobinopathy to eliminate additional sample collection.
- Revised reporting format for sickle cell screen to improve efficiency with emergency patient at the ACH.
- Residents Training Program; 11 residents from December to August 2018.
- Projects in process:
- Calgary Cancer Center planning, Epic, Internal Grant accepted for to determine the trends of thalassemia/hemoglobinopathy diagnosed in Calgary area over the past 16 Years.
- ACH molecular lab instituted a new procedure which will decrease the number of send outs to McMaster and result in a cost savings for hemoglobin electrophoresis.
- Dr. Tariq Roshan, Hematopathologist- commenced July 2018
- Cancer Centre project continues.
- Improvements to review process of myeloid neoplasms.
- Resident training: 16 residents in 2018

Special Coag:

- Factor XIII Antigen – Due to the amount of requests from the Bleeding Disorder Clinics it was necessary to offer the assay in Calgary instead of referring samples out of province.
- Factor IX Chromogenic - Used to measure Factor IX in Hemophilia B patients being treated with the extended half-life glycoPEGylated (N9-GP) recombinant human factor IX.
- Cross trained techs to do testing of V Leiden and II G20210A testing that is currently being done in Molecular Hematology.
- Changed inhibitor testing to a Modified Bethesda Assay. Improves sensitivity to low titer inhibitors, allows the lab to screen for inhibitors while the patient is receiving product, and has improved factor stability.
- Switch in progress to IL controls and calibrator, previous supplier Precision Biologic.
- Updated at SOP's.
- Guidelines established for sign out/interpretation of all cases.
- Teaching of 7 residents/fellows.
- Training of a new technologist.
- Feb 2019 – began reporting quantitative AntiXa Rivaroxaban and AntiXa Apixaban levels.

Flow Cytometry

- Completed a 3 ½ year project for Beckman Coulter which has resulted in:
  - ClearLLab Lymphoid Screening Tube – both IVD and CE status granted for use in diagnostic clinical labs in the EU and USA.
  - ClearLLab 10C Panels for leukemia/lymphoma investigation – granted CE status in October 2018 for use in clinical flow cytometry labs in the EU.
  - ClearLLab 10C Panels – data submitted to the FDA, awaiting approval of IVD status.

These are the first CE/IVD reagents, software, and instrument approved for leukemia/lymphoma investigation by flow cytometry in the world.

- As part of the on-going department Paperless Project, an additional 7 tests now have their documents scanned and stored in FCS Express.
- Created standardized, paperless, numerical based analysis templates for all antibody cocktails used in the laboratory – eliminated reviewer subjectivity and increased TAT.
- Standardized antibody titration QC and documentation by creating analysis templates for all fluorochromes with automatic result calculations, graphing, and paperless filing.
- Developed visual lot number tracking system for all chemicals and reagents to ensure traceability and maintenance of adequate supply.
- Created new process for Reagent QC that is now paperless, standardizes analysis for all staff and improves TAT.
- Created new process to visually track all equipment and their monthly, biannual and annual required maintenance.
- Re-designed the department's Continuous Quality Improvement (CQI) Report, to a new and improved Quality Dashboard.
- As part of the Hematopathology resident/fellowship training program, Flow Cytometry as trained several fellows (3) and residents (23) as well as completed 3 Observerships and 2 elective training sessions.
- Discontinued ZAP 70 testing for CLL
- Implemented five new tests to laboratory test menu to assist in the diagnosis of pediatric and adult immunodeficiencies in June 2018.
- Implemented the first Millennium report (LRBA) to include a flow cytometry image.
- T cell counts on all allogeneic pediatric apheresis patient products.
- Continuing with planning and design of the lab space in the new Calgary Cancer Centre, currently finalizing 100% design stage plans.
- Completely transitioned to a Kanban system for department ordering
- Updated to FSC Express v6. New version is able to processes larger files, faster and provides greater flexibility in data analysis.

Molecular Hematology

- Next Generation Sequencing (NGS) 54 Gene Myeloid Panel performed on over 300 patients from across the province since inception in late 2017.
- Developed single gene testing for MYD88 gene mutations. DNA from 20 patient bone marrow aspirates analyzed. The development of single gene testing has substantially reduced the high cost associated with sending samples to American laboratories.
- Currently validating the use of archived FFPE samples to allow repatriation of all MYD88 testing.
- In final stages of creating NGS workflow and reporting in Millennium LIS to allow electronic tracking of DNA specimens and reporting of all NGS results.
- Validated use of 3500DX Capillary Analyzer for hematopoietic cell chimerism STR analysis on flow separated cells. This upgrade to an eight capillary instrument allows increased capacity for STR analysis and will allow adoption of other molecular assays based on this technology including maternal T-cell engraftment assays.
- Single gene testing for CEBPA mutations in AML patients by capillary electrophoresis now used as orthogonal testing only for cases where NGS gene region coverage is suboptimal.
- STAT testing for FLT3 gene mutations now offered for all newly diagnosed AML patients with a target turn-around-time of 3-5 business days.
- New laboratory scientist recently hired to handle increasing NGS workloads and to aid in succession planning requirements for the molecular laboratory
- Two technologists from Special Coagulation now fully trained and currently performing inherited thrombosis risk factor molecular assays in the laboratory, freeing up Molecular Hematology staff to focus on emerging molecular technologies.
- Continued participation in Specialized Lab Fellowship training program for residents and fellows in Clinical Hematology, BMT, Pediatric Hematology/Oncology, Pathology, and Hematopathology.
- Developed and introduced JAK2-testing algorithm based on simple CBC-based decision rule to guide appropriate JAK2 V617F mutation testing in the province. This testing algorithm is expected to reduces >50% JAK2 mutation screening performed unnecessary.
- All CPSA/WCDAA accreditation issues successfully addressed and corrected by August deadline.

- Medical/Scientific staff of the Molecular Hematology Lab were successful in obtaining research grants of over $50,000 through different funding competitions.
- Medical/Scientific staff of the Molecular Hematology Lab have published eight research articles.

HIL

- Collaborated with other national transplant programs to achieve 1000 renal transplants via the Highly Sensitized Patient (HSP) and Kidney Paired Exchange (KPD national registries.
- Representrf HIL in the HLA Laboratory National Committee meeting in Toronto.
- HIL leadership staff are currently working on EPIC implementation and planning for Histotrac standardization throughout the province.
- In June our previous fellow Dr. Ahmed Mostafa successfully finished his Histocompatibility fellowship and was retained to conduct HLA NGS validation on behalf of HIL for one year.
- A new HIL Fellow, Dr. Alison Gareau, started July 2018 for a two year training program. This Fellow comes from Halifax and will be the 6th Fellow to go through the training since the Fellowship's inception in 2007. HIL Fellowship continues to be one of four ASHI accredited Histocompatibility Fellowships worldwide.
- HIL continues to teach fellows and residents from hematology, pathology, transplant, and others. The teaching is done in week long rotations that aim at giving the trainee a good understanding of histocompatibility. The trainees spend their time in one to one teaching with the clinical director, bench rotations, and discussions of scientific papers, QA, safety, and management concepts.
- We trained new HIL techs on SBT and to be on-call 24/7
- Danielle Christian, our HIL MLT-I has been selected as the recipient of 'ASHI Rising Star Award' for 2018.
- HIL received the renewal of CLS histocompatibility and immunogenetics fellowship program by the American Society for Histocompatibility and Immunogenetics (ASHI.) The renewal is for five years, from September 1, 2018 to August 31, 2023.
- Acquired and installed an automation suite for HLA Next Generation Sequencing at the HIL and have started validation. We expect to be done with validation within the next 6 months.
- HIL medical director Dr Noureddine Berka rotated out from the chairmanship of ASHI Director Training Review and Credentialing committee after four years of service.

Two HIL fellows that graduated from our fellowship, Dr. Licini and Dr. Abubaker have passed the American Board for Histocompatibility and Immunogenetics (ABHI).

Microbiology Section

Microbiology Divisional Accomplishment's

CLS Medical Microbiologists are recognized leaders in translational research.

- CLS Medical Microbiologists have been awarded ~$20M in external research funding over the past 2 years as follows:
  - Dr. Deirdre Church and Dr. Ian Lewis were successful in their Genomic Application Partnership Program (GAPP) grant to develop a microfluidics-metabolomics device that would revolutionize how medical microbiology laboratories currently diagnose bloodstream infections. The prototype technology will be jointly developed and verified by UC/CLS. A major industry partner has been secured for further commercialization of these product(s). This is the first GAPP funding that has been secured by CLS/AHS and in total this project provides more than $2M in new funds within a total project budget of $6M. The entire project team thanks CLS, AHS and UC for their outstanding support of this project.
  - Dr. Deirdre Church and Dr. Ian Lewis and team were successful in their Large-Scale Applied Research Project (LSARP) grant. Our vision is to develop a Precision Infection Management (PIM) approach to diagnosis and management of infection based on the virulence of the pathogen(s) as well as the clinical status of the host. This $11M project will bring together an outstanding team of CLS, AHS, UC and external researchers, and it will accelerate development and implementation of advanced –omics technologies within Alberta. The grant is one of only ~30 selected across Canada. We are excited to see this important initiative come to fruition.
  - Dr. Deirdre Church and Ian Lewis were recently awarded a $725,000 CIHR operating grant for "Reducing the burden of antimicrobial resistance via rapid diagnosis or urinary tract infections" as part of the Antimicrobial Resistance: Point of Care Diagnostics in Human Health Phase 2 competition. This project will further develop rapid metabolomics based testing to diagnose and treat UTIs in ambulatory practice.

- Dr. Dylan Pillai and Dr Aidan Hollis and team were successful in their Canadian Institutes of Health Research grant for C. difficile near patient testing versus centralized laboratory testing: a cluster randomized trial. This $328.950.00 grant was the only successful applicant from CLS and was ranked 4th of 57 applications (94.6 percentile) with a rating of 4.29
- Dr. Johann Pitout's research team was awarded $2M JPI-EC-AMR grant late last year to study the transmission dynamics of antibacterial resistance in Escherichia coli ST131. This important international initiative is well under way and involves a number of CLS personnel.

- Recruitment: The first graduates of the Medical Microbiology Residency Training Program in Calgary have joined our medical microbiology practice.
  - Dr. Kristen Brown joins as a 0.5 FTE at Calgary Laboratory Services in combination with her clinical practice of Infectious Diseases. She has a special interest in prosthetic joint infections, operative specimen collection, and quality assurance initiatives.
  - Dr. Tom Griener (1.0 FTE) joined our department in August. He has special interests on microbiology test utilization, resistance mechanism determinants, and the clinical effectiveness of antimicrobial therapeutics on anaerobic bacteria.
  - Dr Luis Lisboa, has been recruited and is expected to join our Medical Microbiology practice July 2019
- New service level agreement for South/Central Zone was developed to pave the way for CLS Microbiology to transition to being the Southern Alberta Hub. The increase in medical staff has been instrumental in our ability to provide increased microbiology oversight to centres outside of Calgary in the southern region of the province. Since 2014, our department has been providing microbiology consultation services, including call, to South Zone laboratories in Lethbridge and Medicine Hat. In 2018, we expanded the scope of our services and deepened our relationship with these laboratories, establishing full medical oversight, and reviewing all critical results in conjunction with clinical interventions and consultation. This service was further expanded to Red Deer, Camrose, Vegreville, and Banff as of April 2018. As a result, there are currently two microbiologists-on-call on a daily basis during the work week, with one covering Calgary, and the other covering the regional spoke centres. Medical Microbiology and technical support for rural sites is now provided by CLS. Dr Wilson Chan has assumed responsibility for Medicine Hat, Lethbridge, and Banff. Dr Michael Groeschel has assumed responsibility for Red Deer, Camrose, and Vegreville.
- CLS Medical Microbiology has been operating as a centralized hub laboratory for the vast majority of medical microbiology testing in the Calgary region for the past 20 years. Since 2004 the population of Calgary and surrounding area has more than doubled with an average of 4% test volume growth annually. CLS Microbiology has had minimal operational automation and no increase in space allocation or FTE. Microbiology test volumes continue in an upward trend as does the average cost per test. There has been a test volume growth of 6.4% since 2012. The average cost per test increased 8% in F2019 when compared to F2018. We continue to explore options to more efficiently utilize our current space and plan for growth as the centralized hub Clinical Microbiology Laboratory for Southern Alberta. The current DSC laboratory must be completely renovated and expanded to meet the current and increasing needs of Southern Alberta patients. As a result of the space constraints and in order to meet patient care needs, gain operational efficiencies and facilitate responsiveness to expected test volume growths to STI testing on our Panther instruments, this testing platform was transferred to SHC RRL. Medical over sight of the testing platform remains with the Microbiologists. CLS collaborated with Provincial Laboratory Southern Alberta to transfer clinical testing for *Chlamydia trachomatis* and *Neisseria gonorrheae* from the STI Clinic, the Sexual Reproductive Health and Safeworks in Calgary Zone to CLS. This move enabled leveraging favorable pricing with the CLS contract and the vendor to achieve cost savings.
- *H. pylori* Stool Antigen testing (HpSAT): CLS Executive and Lab Leaders approved implementation of HpSAT in CLS Microbiology. Effective January 2, 2018, the *H. pylori* stool antigen test replaced Urea Breath Test (UBT) to screen for H. pylori. In collaboration with GI Specialists, a clinical algorithm was simultaneously implemented. UBT will remain available for patients referred to Gastroenterology. This practice change improved patient access to H. pylori testing services with significant cost savings. The success of this initiative has met the approval by Lab Leaders for provincial roll out. This roll out is expected to be implemented in April 2019, with an estimated cost savings estimated at more than 1 million dollars annually.
- Renovations were required to install a second InoqulA+ (front end automation). The InoqulA+ provides redundancy and stability to front end automation and aligns with the long term vision to move to total lab automation. The InoqulA+ is expected to provide better isolation of clinically significant organisms, but has a slower throughput than the 2 instruments it is replacing. LEAN teams were leveraged to examine the utilization of the instruments and workflows to minimize impact to patient care, TAT, and staff schedules. Workflow continues to be modified to maximize efficiencies of front end automation.

- CLS Microbiology performs a high volume of throat swab tests to detect Group A Streptococcus using Hologics hybridization (GASD). However, the company will no longer support this platform in the near future. CLS Microbiology developed a business case to move all testing in Southern Alberta onto real-time GAS detection that was presented to CLS Exec. We continue to explore this avenue in F2020 to improve access for all Albertans to provide timely results for better patient outcomes and to support antibiotic stewardship.
- BD Max instruments have been implemented for enteric parasite testing. This has resulted in a 27% increase in the number of pathogens detected. Expansion provincially to include enteric bacteria is expected in F2020. A study lead by the AB Gastro Working Group will assure that the patients', public health, clinical and laboratory needs are met by current proposed test methods.
- Carbapenemase testing: The detection of highly resistant Gram-negative *Enterobacteriaceae* using phenotypic methods is laborious and poorly sensitive. A major validation study was undertaken using the largest bank of carbapenem-resistant organisms yet reported in the literature, with representation from all the major families of enzymes. Carbapenemase testing using a lateral flow method has been introduced for carbapenem resistant Gram-negative rods. This will drastically shorten the turn-around times relative to our send outs to the National Microbiology Laboratory for PCR.
- STEC media: The chromogenic agar for screening of Shiga-toxin producing *E. coli* (STEC) was implemented in the laboratory. Detection rates for non-O157 STEC from stool have increased significantly, especially over the summer months, when the risk of bacterial gastroenteritis is highest.
- Influenza and RSV represent the largest burden of severe viral respiratory disease in Alberta. Influenza testing is not available on a rapid basis in most urban and rural centres (except Alberta Children's Hospital). The viral panel performed at Provincial Laboratory requires transport from outlying areas. Consequently, the turnaround time from collection to result is ≥48 h, which is too slow for most clinical applications of the result and affects our ability to prevent, rapidly detect and respond to annual respiratory viral outbreaks provincially. Rapid diagnosis of respiratory viruses allows the appropriate and timely use of antiviral agents, reduces the duration of hospitalization, and improves antibiotic stewardship. On site testing for Flu A/B & RSV is being piloted in Lethbridge and Medicine Hat. Positive outcomes for patients were immediately realized. Plans are underway for provincial roll out.
- Direct testing of blood samples using DNA detection methods (Illumigene platform) for malaria has been introduced. As a consequence of introducing this method repeat testing on negative samples is no longer needed. In addition, negative results are available with the same turn-around times as positive results. This should improve flow of these patients through the emergency rooms in South Sector.
- Labguard Temperature Monitoring system was installed for the Virtuo instrument bank to address staff safety concerns. Labguard is a facility monitoring system which measures, monitors, records and alerts when any chamber or area falls out of specifications. Collaboration with the vendor continues to explore how this system can be expanded to monitor other instruments in the CLS Microbiology laboratory.

Transfusion Medicine Section

On January 14, 2018 the CPSA standard requiring a second patient identification process to confirm the patient's ABO type (CABO) was introduced. This second ABO ensures that the right blood group is in the patient's history for any potential transfusions.

In January 2018 revisions to the CLS Community Requisition included the removal of the ABO/Rh test selection box. Physicians would still have the ability to order the test by writing in the "Other Test" area of the requisition. This change has improved test utilization and decreased the ordering of this test when there is no clinical indication. The change was also incorporated into the Calgary Rural Requisition.

On February 1, 2018, CLS created a 0.3FTE Transfusion Safety Leader (RN) position for the Calgary Zone Sub-cutaneous Immune Globulin Clinic (SCIG). This position oversees patient registration, training and on-going management. To help support the clinic and future growth, an additional 0.2FTE was provided by Alberta Health Services on April 1, 2018. The clinic has since been built in Clinibase and SCM. Continued significant growth has required additional Transfusion Medicine staff support. Other funding options are being explored to offset the ongoing growth and demand for this service.

March 2018, ACH and PLC were inspected by Health Canada. Both sites had successful audits and received notice of completion on June 7, 2018.

April 1, 2018, Canadian Blood Services launched its new inventory of plasma protein products now supplied by Shire. This change impacted 300-400 outpatients who IVIG treatment in hospital clinics and approximately 120 patients that are enrolled in the Sub-cutaneous IVIG program. TM staff continue to work with CBS and clinicians to transition patients to the new products.

In April 2018, changes were implemented to IVIG ordering in SCM – expanded list of indications, mandatory height and weight fields for dosing and dose calculator to correct dosing for BMI.

May 2018 Transfusion Medicine participated in the CPSA accreditation. All responses to TM citations have been submitted and were accepted.

June 2018, Mediware Hemocare Life Labs (HCLL) was the successful candidate in the RFP process for the Transfusion Medicine LIS in the Connect Care Project. In September 2018 a name change occurred for Mediware HCLL, the company and software is now known as WellSky Transfusion.

Effective July 5th 2018, red cell and plasma orders submitted by physicians in the Calgary Rural Zone are now screened by Transfusion Medicine. Screening is performed on orders for stable inpatient and outpatients. Screening will be excluded for patients who are hemodynamically unstable and TBCC patients. The new CRL requisition (REQ9010TM) recently published will support this process.

On August 7, 2018 new blue-line platelet coolers were rolled at all CLS acute care sites. This is an initiative to reduce the wastage of in-date platelets due to improper storage/handling processes that occur on the nursing units. Validation of the coolers provides stable platelet storage temperatures for 5 hours.

On June 26, 2018 the FMC Adult Trauma Group held a Mass Casualty Incident mock exercise in the FMC Emergency department. This protocol is designed to manage occasions when multiple patients requiring resuscitation, operative intervention, and ICU care, is present concurrently without a code orange activation. The MCI is defined as 3 or more level 1 trauma patients expected within 1 hour of each other; or any number of critically ill patients that have the potential to overwhelm current ER capacity. FMC TM participated by preparing mock blood components that were used during the exercise. Transfusion Medicine simultaneously ran a mock exercise on paper to capture inventory levels, staff levels and communication processes during the exercise.

The SCM rebuild for HLA matched platelets went live September 18th, 2018. This rebuild includes a comment on the patient's chart to ensure clinicians are aware of the patient's platelet requirements (HLA matched platelets). The comment also states that notification to Transfusion Medicine is required. This change was requested due to an AHS Quality Review recommendation.

September 2018, the Calgary Rural Labs participated in a CPSA accreditation. Responses to TM citations have been submitted.

Foothills Transfusion Medicine participated in the Unidentified Patients in the Emergency Department Pilot Project. Different naming conventions are being used to identify the safest way to name an "unknown" patient in Emergency and especially when there are multiple unknown patients at the same time. The pilot was a success and the initiative will be rolled out at the Calgary acute care sites early January 2019.

New Initiatives

FMC Transfusion Medicine will start validating a process to titre isohemagglutinins in platelet doses that could eliminate the need to concentrate ABO incompatible platelets.

TM is looking at the discontinuation of pooling cryoprecipitate. This would eliminate staff having to maintain a competency for a procedure rarely performed and align with other Transfusion Medicine centres in the province.

Future Plans

Plasma product order screening will be introduced to Calgary Zone hospitals in early 2019 to align practice with existing transfusion guidelines and Choosing Wisely Canada recommendations. The screening will not include cardiac units, ICU, operating rooms or Emergency.

A pilot will commence in early 2019 introducing a pale pink sticker on the back of the transfusion tag. The intent is to capture documentation of the storage of the red cells once they have left Transfusion Medicine. All staff handling the unit will document the time that the red cell is placed in and out of a controlled refrigerator. This is in response to a Health Canada and CPSA citation. The pilot will involve FMC NU57 and the Operating Rooms.

The new Massive Transfusion Protocol will be introduced on January 17, 2019. Platelets will be issued with every 2nd MTP issued for a patient. This excludes cardiac and vascular patients.

A recent review of cryoprecipitate usage at RGH and SHC supports the decision to discontinue cryoprecipitate inventory at these sites. Further consultation with stakeholders will take place. Additionally, cryoprecipitate orders continue to be screened at all Calgary acute care sites and, where applicable, clinicians are encouraged to use RiaStap (fibrinogen)

Calgary is hosting the 2019 Canadian Society of Transfusion Medicine conference. The conference runs from May 30 – June 2nd, 2019.

Cellular Therapy Laboratory

- CTL provided the processing for the first Canadian $^{+}$T cell/CD19+ B cell depletion of a haplo-identical product for a pediatric patient. These engineered grafts provide precise products that are ideal for patients that do not have matched donors available with reduced risk of post-transplant complications. CTL has successfully completed 2 of these procedures with 3 additional planned for early 2019. CTL is currently the only processing facility in Canada performing this life-saving procedure.
- Successful FACT Inspection occurred on June 26. CTL received no citations and was commended on the hands-on and dedicated leadership of the cell processing facility by Dr. Prokopishyn.
- CTL is key in quality initiative with the Apheresis department for improvement of collection efficiency and quality of cellular therapy products collected. CTL has generated automated reports that allow for assessment of product collection quality based on a number of donor and collection parameters.
- CTL is instrumental in a provincial initiative to utilizing innovative cellular therapy in treatment of cancer patients in Alberta. Dr. Prokopishyn is the Manufacturing Director for the provincial. The first clinical trial that will use in-Alberta manufactured CD19 CAR-T cells for treatment of patients. Patient enrollment will begin in 2019.
- CTL continued to see an increased number of requests for processing of unrelated blood and marrow transplant products for send-out to other transplant centres (national and international). This work is in addition to all the processing performed for the adult and pediatric patients in Alberta.
- CTL Director, Dr. Nicole L. Prokopishyn, was an invited speaker at:
  - The International Society for Cellular Therapy Meeting in Montreal May 2018.
  - Vein to Vein 2018 and provided updates on new developments in cellular therapy.
  - The National Marrow Donor Program (NMDP) Fall Meeting, presented research findings on the decline in quality of bone marrow harvested from unrelated donors in North America over time.
- Dr. Nicole L. Prokopishyn was an invited attendee at the Canadian Cell Therapy Workshop on Canadian Cell Therapy. A national initiative is underway to provide new immune and cellular therapies to Canadians. Dr. Prokopishyn represents Alberta on this national working group. Dr. Prokopishyn is also the laboratory representative for the provincial working committee on CAR-T cell therapy in Alberta.
- Dr. Prokopishyn attended the June 2018 Canadian Bone Marrow Transplant Group (CBMTG) as an invited attendee with an appointment to the newly created CBMTG regulatory committee for new cellular therapies. CTL will be participating in several national clinical trials for new therapies.
- CTL is participating in several corporate sponsored clinical trials:
  - Utilization of autologous CAR-T cellular therapy products for the treatment of hematological malignancies. These cellular therapies utilize a patient's own T cells that are modified to search out and destroy tumour cells. The clinical trials include treatment of Multiple Myeloma, Lymphoma, and Leukemia.
  - Utilization of virus specific T cells for the treatment of post-transplant viral complications. The first clinical trial will examine EBV-specific T cells in treat of EBV disease post-transplant.
  - Utilization of gene modified autologous endothelial progenitor cells for treatment of pulmonary arterial hypertension.
  - Utilization of gene modified autologous blood stem cells for treatment of Fabry's Disease. Three Fabry's patients have been treated thus far in Calgary. Calgary has been accepted as the only Canadian site for an international clinical trial examining the efficacy of stem cell gene therapy treatment of Treatment-Naïve Subjects with Classic-Fabry Disease. This is an expansion of the already success gene therapy trial conducted here in Calgary.
  - Treatment of Gaucher Disease using blood stem cell gene therapy.
- CTL continues to finalize laboratory design at the New Calgary Cancer Centre.

Education

Educational Programs Provided by the Department of Pathology & Laboratory Medicine

The medical and scientific staff of CLS are responsible for a wide array of educational activities that include: (1) residency training programs in Anatomic Pathology, General Pathology , Neuropathology, and Microbiology (2) mandatory rotations (e.g. hematopathology) for a number of other residency programs, (3) lectures and small group sessions in a number of undergraduate courses, (4) the Medical Sciences 515/Biology 515 Course, (5) parts of the Bachelor of Health Sciences program, (6) supervision of elective rotating residents from other programs and rotating clinical clerks, (7) training of fellows, (8) graduate student supervision, (9) summer student supervision, (10) Continuing Medical Education events, and (11) the Pathologists' Assistant M.Sc. program.

Anatomic Pathology Residency Training Program (Co-Program Directors: Drs. Amy Bromley & Carolin Teman)

Program Structure: This is a five-year program leading to certification in Anatomical Pathology by the Royal College of Physicians and Surgeons of Canada. Following the PGY1 clinical year, our residents build a solid foundation in adult surgical and autopsy pathology in PGY2. During PGY3-5 they complete subspecialty rotations, elective rotations, research, and 4 months of chief resident service. The program is designed to give graded responsibility to residents. In the final year of training residents are expected to perform at the level of a junior faculty member, recognizing that faculty-resident supervision is always occurring. We accept four new residents per year, consisting of three Canadian medical graduates and one international medical graduate. We are currently at full capacity with 20 residents. Generous financial and administrative support is provided by the University of Calgary's Department of Pathology and Laboratory Medicine.

Teaching: A philosophy of independent self-directed learning underlies the program. Teaching takes place via a combination of dedicated educational events, group learning and one-on-one teaching. Structured educational events include weekly clinical-pathological correlation rounds with Internal Medicine, Departmental Continuing Medical Education rounds, resident-led Gross Pathology rounds, and a dedicated weekly academic half day consisting of unknown slide rounds, autopsy rounds, and didactic teaching. Residents are also expected to read and study independently.

Evaluation: Residents are assessed via in-training evaluation reports (ITERs) completed for each rotation. Several rotations also incorporate end-of-rotation slide exams or group presentations into their assessments. PGY2 autopsy and surgical pathology rotations also utilize encounter assessment forms to provide daily or weekly feedback to trainees. PGY2-PGY5 residents are also assessed via biannual exams, including a full RCPSC-style examination each winter and spring, and the American Society of Clinical Pathology Resident In–Service Exam (RISE) each spring. Additional examinations are offered for residents in difficulty and for senior residents preparing for the Royal College examination. The program director meets with each resident at least twice yearly to discuss the resident's academic progress, research projects, subspecialty interests, and fellowship/career plans.

Research: Involvement in research activities is an integral part of the program. Beginning in the PGY2 year, residents undertake one or more research projects with the advice and mentorship of the Resident Research Committee. In 2018 the Anatomical Pathology residency program allocated $15,000 of its budget toward resident research grants, which are distributed on a competitive basis. Residents present their research findings at the annual departmental research day, as well as at national and international meetings. During 2018, University of Calgary Anatomical Pathology residents were involved in 41 research projects, presented 13 abstracts at national and international meetings, and co-authored 9 peer-reviewed scientific publications.

Resident progress and news: Our program graduated one resident in 2018. This resident passed his Royal College Anatomical Pathology examination on the first attempt, continuing our program's trend of 100% first-time success in the RSPSC examinations for the past >10 years. This graduate is currently completing a molecular pathology fellowship at Stanford, and will return to Calgary in July 2019 for a pediatric pathology fellowship. Current PGY4-5 residents have secured fellowships in head and neck / endocrine pathology at Yale, GYN pathology at Yale, GI/liver pathology at Memorial - Sloan Kettering, GI/liver pathology at Emory University, GI pathology at Washington University, and GYN pathology in Calgary. The University of Calgary's Anatomical Pathology residency program is well-regarded nationally, and receives a large number of applicants for the annual CaRMS match. In 2018 we filled all four CaRMS positions with outstanding applicants. We received a large number of applications for the current match cycle also, and anticipate another excellent match result in February 2019.

Program accreditation and upcoming changes: The Anatomical Pathology residency program received full accreditation by the Royal College of Physicians and Surgeons of Canada following an External Review in 2015. An internal review will occur in April 2020, and our next external review is scheduled for 2021. The program's greatest challenge over the next few years will be the transition to Competency By Design (CBD), the Royal College competency-based medical education program. All Canadian Anatomical Pathology programs will transition to CBD in July 2019. We have been working behind the scenes to facilitate this transition, and anticipate that it will be fairly seamless.

General Pathology Residency Training Program (Program Director: Dr. Davinder Sidhu)

Our program is a five-year program leading to certification in General Pathology by the Royal College of Physicians and Surgeons of Canada. The University of Calgary through co-sponsorship with Calgary Laboratory Services offer General Pathology Residency Training highlighting on laboratory management and pathology informatics. The General Pathology Residency Program is 5 years in duration (4 years of laboratory Medicine and one basic clinical year). The basic clinical year is designed to provide exposure to most of the medical and surgical services that rely heavily on the clinical and anatomical pathology laboratory and to prepare the resident for the Medical Council of Canada Qualifying Examination Part II. Upon successful completion of the education program, the residents will be competent to function as consultants in General Pathology and medical laboratory directors.

For the 7th consecutive year the General Pathology program has filled all resident positions at the CaRMS match. Part of the success of our program lays in our close association with the highly successful University of Calgary Anatomic Pathology and Neuropathology Residency Training Program and our large group of over 90 pathologists and laboratory scientists.

Three key features unique to the program that have drawn medical students and residents from across the country include General Pathology Mentorship program, Community and Rural Laboratory Management training program and the Pathology Informatics/Laboratory Utilization office.

Research: The general pathology faculty has great interest in basic science, pathology informatics and laboratory utilization and so research in these areas is promoted. General pathology residents are expected to complete at least one research project during their residency. In 2018 our residents have undertaken 11 approved research projects and have presented or will present findings at USCAP, CAP, ACLPS and various other conferences. The Research Committee coordinates resident research and the Resident Training Committee monitors the manpower required for the project and our department has special funds available for resident research.

Didactic schedule: Pathology and clinico-pathologic seminars are held weekly on Fridays during academic half-day. Clinical chemistry half-days occur weekly Wednesdays with a "case of the week" format and Medical Microbiology academic half days occur Thursdays in conjunction with Infectious Disease residency academic days. Residents are exempted from work commitments during these periods. Residents are also expected to present at clinico-pathologic rounds, held weekly in conjunction with the Department of Internal Medicine. Residents also participate in medical student teaching at the University of Calgary. Presentations at other rounds (Department of Surgery/Nephrology/TBCC) are also encouraged.

Evaluation: An in-training evaluation report (ITER) is completed after each rotation. The ITER is reviewed with the resident and emphasis is on continuous constructive feedback for the resident. Beginning in 2019 the new Royal College mandated Competency By Design (CBD) initiative will be implemented nationally for general pathology evaluation and feedback and document preparation is currently underway jointly with Anatomical Pathology. Starting in the PGY2 year, all residents take two exams (RISE Examination and Annual Xmas exam) each year mimicking the fellowship exam by the RCPSC and the American Board Examination respectively.

Training Sites: Diagnostic and Scientific Centre, Foothills Medical Centre (FMC), Alberta Children's Hospital (ACH), Peter Lougheed Centre (PLC), Rockyview General Hospital (RGH), Medical Examiner's Office, Community/rural laboratories (provide extensive opportunity for management training), Community hospital rotations are taken at Red Deer General Hospital in Red Deer, AB and a collaborative rural training rotation at White Horse Hospital, Yukon.

A number of transfer residents from Anatomical Pathology, Aesthesia and Family Medicine have joined the General Pathology in 2018 bringing the total number of residents to 14.

Our program has successfully graduated every general pathology resident that has applied to the Royal College Examination, all of whom have successfully passed the General Pathology certification exams by the Royal College of Physicians and Surgeons of Canada. Our next graduates will be writing their certification exams in the Spring of 2019 and one has successfully secured a fellowship position in Forensic Pathology and the other will start as a staff pathologist at the Red Deer General Hospital.

Successful onsite Royal College accreditation survey/review of the University of Calgary's General Pathology Residency Training Program took place on February 24, 2015 with no deficiencies noted and the next internal review accreditation is planned for May 2019 and document review and preparation is currently underway. CBD rollout is planned to coincide with the 2019-2020 academic year.

Microbiology Residency Training Program (Program Director: Dr. Julie Carson)

The Medical Microbiology residency training program at the University of Calgary is a five-year program that aims to train medical microbiologists that are competent and confident practitioners. The program's rotations are focused at developing expertise and skills in the four major spheres of medical microbiology: the medical, scientific, and administrative direction and management of a clinical diagnostic laboratory; the provision of clinical consultation in infectious diseases; infection control and antimicrobial stewardship; and public health.

The PGY-1 year provides an experience akin to the rotating internship, with rotations in a variety of related clinical disciplines to supplement the clinical knowledge and skillset of the trainee. PGY years 2 through 5 involve a mix of rotations in the diagnostic laboratory, with particular foci in bacteriology, virology, mycology, and parasitology; clinical infectious diseases, including both adult and pediatric, inpatient and outpatient services; infection control, antimicrobial stewardship, and public health. There is a significant amount of elective time included in order to allow trainees to further develop in subspecialties of their choosing.

2018 marked our third full academic year. It was a successful year. First, our mandatory Royal College internal accreditation as a new program was successful and with follow up review on the University's next regular Royal College accreditation schedule, set for spring 2020. Second, our first two residents in the program became our first two graduates from our program – they both wrote and passed their Royal College of Physicians and Surgeons exams and successfully secured jobs here in Calgary. And third, in 2018 we also matched our fist resident through the R-1 CARMS match. Our first PGY1 resident started July 2018 and has been successfully progressing through their rotations.

Our program also supports the training of Infectious Disease Residents (12 weeks) and General Pathology Residents (24 weeks). We collaborate closely with our Infectious Disease programs with respect to shared curricula in Infection Control and Stewardship as well as our academic half day content. We continue to have healthy interest in the program from residents within the University of Calgary Infectious Disease subspecialty residency program. With deliberate planning of their infectious disease training and electives in Medical Microbiology, ID residents can meet the Medical Microbiology training requirements with an extra year of Medical Microbiology training. We have secured PGME funding for one ID resident to enter and complete this final year in Medical Microbiology in the 2019-2020 academic year.

Medical Microbiology is not expected to transition to Competency By Design, the Royal College competency-based medical education program, until 2021. The Royal College Subspecialty process to develop the specific Medical Microbiology program content will start Fall 2019.

Neuropathology Residency Training Program (Program Director: Dr. Denise Ng & Dr. Lothar Resch, Assistant Program Director)

This is a five-year program leading to certification in Neuropathology by the Royal College of Physicians and Surgeons of Canada. The University of Calgary program includes one year of clinical medicine, one year of anatomic pathology and three years of neuropathology training, including two core years with graded responsibility in the reporting of adult and pediatric surgical and autopsy cases materials, including intraoperative consultations, and nerve and muscle biopsies. The fifth year is an elective year and may be used for further training in neuropathology and/or other pathology subspecialties; clinical rotations; or research. Ongoing participation in research activities is encouraged throughout residency training, and there are ample local research opportunities into neuro-degenerative disorders, neuro-oncology, neuro-regeneration, cerebral ischemia, and developmental disorders. Residents have also taken advantage of research opportunities in other areas

of Canada and abroad. Trainees gain experience in the application of new technologies in the study of the pathogenesis of disease including immunodiagnostics, molecular pathology, cytogenetics, and electron microscopy. Medicolegal and diagnostic consultations are an integral component of this program, as is participation in undergraduate and postgraduate teaching programs. We also anticipate some incoming changes as the residency program is to undergo transition to the CBME model with rollout in 2020. More reflection and work will also be underway in preparation for the University of Calgary Site Review by the Royal College. However, as the program was recently given full accreditation in the internal review in 2018, this review is expected to be smooth as we continue to make improvements in our training program.

Within the last few years, the University of Calgary Neuropathology Residency Program has been one of the more active neuropathology training programs across Canada. In the 2018-2019 academic year, we have four residents in the program. Of particular interest, Dr. Madison Gray is currently completing research on the developing circuitry of the hindbrain with Dr Julie Lefebvre (the Canada Research Chair in Developmental Neural Circuitry) at The Hospital for Sick Children (SickKids) Research Institute in Toronto. Also in this past year, we have welcomed our former graduate, Dr. Ana Nikolic, as a staff pathologist while she completes her studies under the auspices of the Clinical Investigator Program. There was an unusually high number of applicants in Neuropathology this year in the first round of the CARMS match, and we eagerly await the match results for the 2019-2020 year. We are also heavily involved in teaching medical students and residents from other specialties who complete rotations with us, including Neurosurgery, Adult and Pediatric Neurology, Anatomic Pathology, General Pathology, Neuroradiology and Radiation Oncology.

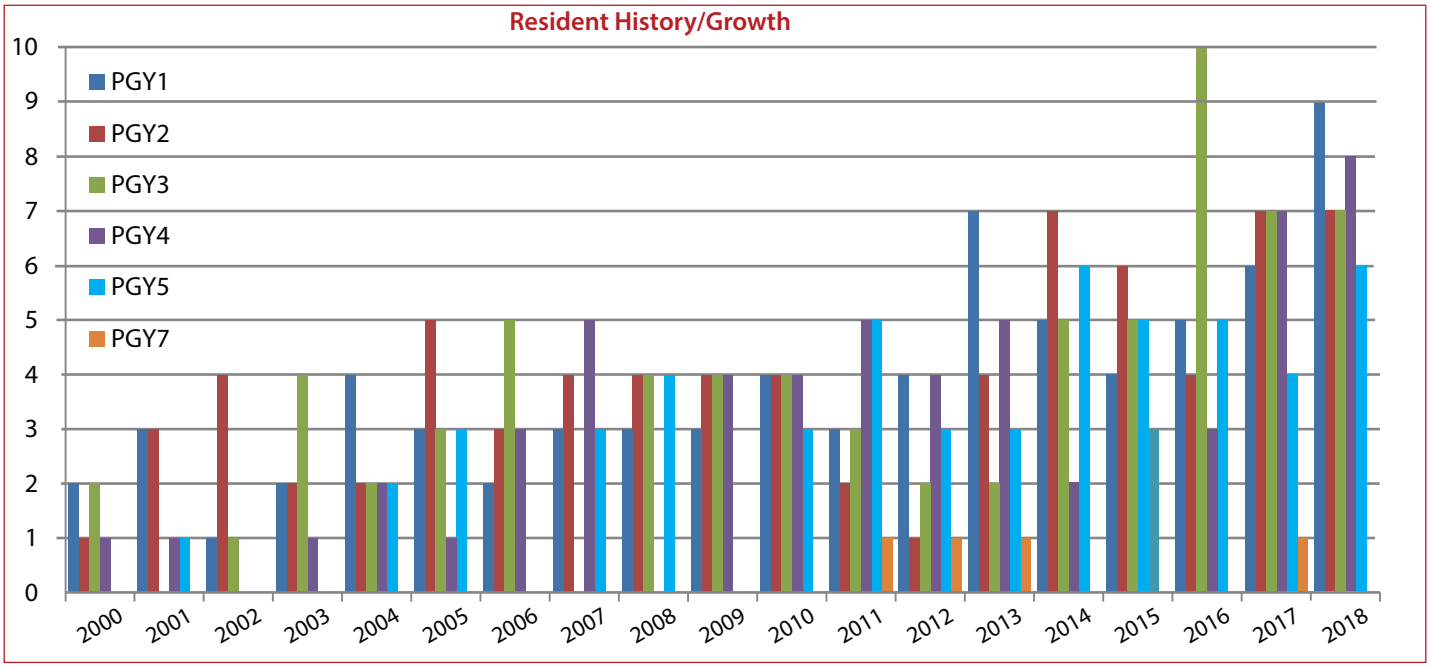


Figure 1- Resident History/Growth

Medical Sciences 515/Biology 515 Course (Course Director: Dr. Davinder Sidhu)

The BIOL/MDSC 515 course ran from January 8th to April 10th 2018. The basis of the course is the cellular and molecular mechanisms underlying basic human disease processes and how these can be influenced by lifestyle and environmental factors and the ways in which this knowledge can be used in the laboratory diagnosis of diseases and in the biomedical research. The Department of Pathology and Laboratory Medicine is responsible for the development and teaching of this course and it continues to be very well received by students. The 2018 year's enrolment was 24 students. Our faculty provided 38.5 hours of lectures over the course of the semester in this course. This year the course average was 81%.

Undergraduate Medical Education (Department Representative: Dr. Lothar Resch)

The University of Calgary undergraduate teaching program for medical students follows an integrated approach in accordance with the requirements of the Medical Council of Canada. Pathology is part of the basic sciences component of the curriculum and is taught as part of each integrated course. Small group teaching, as an essential part of pathology teaching, requires an increased teacher-student ratio. The increasing size of the medical student classes has resulted in a significant increased demand for teaching time.

Department members are involved in teaching (lectures and small group sessions) for a number of courses including but not limited to: Cardiovascular, Respiratory System, Applied Evidence Based Medicine, Trial Advocate Course, Renal, Neurosciences, Blood, Molecular Biology of Cancer, Cancer Biology, Pathobiology, Directed Path Research Projects, Integrative Course, Pathology of Neoplasia, Pathology of Hepatobiliary Diseases, Endocrine, Gastrointestinal, Introduction to Medicine, Reproduction, Gynecological Pathology, Environmental Pathology, Upper Respiratory Tract Infections, Pneumonia and Pulmonary Infections, Human Genetics and Musculoskeletal/Skin.

In a typical year, the Department of Pathology & Laboratory Medicine faculty members provide about 1,200 hours of undergraduate medical education teaching.

Postgraduate Clinical Trainees

Geographic Full Time (GFT) faculty members provide greater than 2,000 hours of teaching per year to support postgraduate clinical trainees, including department residency training programs, rotating residents and fellows. Clinical faculty members also make very extensive contributions to teaching residents and fellows; although this time has not been quantified, it is likely similar or greater in magnitude.

Fellowship Programs (Interim Chair: Dr. Christopher Naugler)

Up to 6 internally (CLS) funded positions are available each year. Four of these positions are meant to fund board-certified (or board-eligible) Anatomic Pathology Fellows wanting to develop subspecialty skills in an area of Anatomic Pathology. In some years, we also train externally funded fellows.

The DPLM/CLS Fellowship Committee selects qualified applicants for internally and externally funded Fellowship positions. Positions are open to either MD or PhD applicants, depending upon the field of study. We currently offer fellowships in Breast Pathology, Cytogenetics, Dermatopathology, Gastrointestinal Pathology, Gynecological Pathology, Hematopathology, Histocompatibility, Pediatric Pathology, Pulmonary Pathology, Renal/Transplant Pathology, Uropathology and offer an Area of Focused Competency (AFC) in Cytopathology.

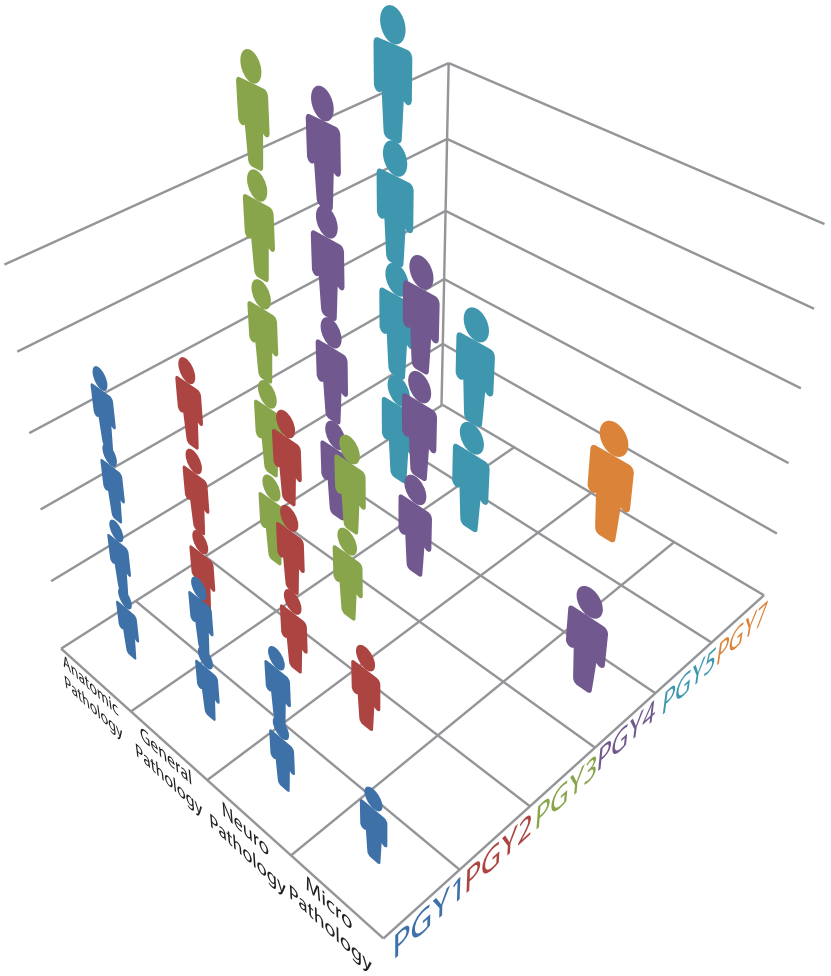


Figure 2- Number of Residents

Clinical Biochemistry Fellowship Program (Co-Program Directors: Drs. Hossein Sadrzadeh & Alex Chin)

The CLS and DPLM postdoctoral fellowship training program in Clinical Biochemistry is accredited by both the Canadian Academy of Clinical Biochemistry (CACB) and the Commission on Accreditation in Clinical Chemistry (ComACC) in the United States. The Fellowship program continues to work closely with the University of Calgary Cumming School of Medicine General Pathology Residency Training program to enhance training opportunities for both residents and fellows. Fellows undergo clinical laboratory rotations at the Diagnostic & Scientific Centre (community general chemistry, immunology, endocrinology, analytical TDM & toxicology and special chemistry), acute care hospitals and urgent care centers (chemistry and core laboratories), pediatric clinical chemistry, and point-of-care testing. Clinical chemistry fellows also have the opportunity to engage in other rotations such as newborn screening, biochemical genetics, molecular diagnostics, and rural laboratory management. Graduates of our program are eligible to work in North America and can take the Clinical Biochemistry specialist certification examination in Canada and the American Board of Clinical Chemistry examination in the United States.

The following Clinical Fellows, trained at CLS:

Fellows	Specialty Area	Supervisor	Year
Robinson, Jason	Clinical Biochemistry	Drs. Hossein Sadrzadeh & Alex Chin	2017-2019
Paul, Heather	Clinical Biochemistry	Drs. Hossein Sadrzadeh & Alex Chin	2018-2020
Thommasen, Amy	Dermatopathology	Dr. Thomas Brenn	2018-2019
Brett, Mary-Anne	Gynecological Pathology	Dr. Martin Koebel	2018-2019
Tompkins, Jeffrey	Hematopathology	Dr. Iwona Auer	2018-2019
Gareau, Alison	Histocompatibility	Dr. Noureddine Berka	2018-2020
Gao, Yuan	Genitourinary Pathology	Dr. Asli Yilmaz	2018-2019

Graduate Students

There is currently no experimental pathology graduate program in the Faculty of Graduate Studies; however, a number of graduate students are supervised by members of the Department.

Pathologists' Assistant M.Sc. (Program Director, Bill Gorday - Medical Director: Dr. Jim Wright)

- Pathologists' Assistants (PAs) are "physician extenders" for anatomic pathologists. PAs perform delegated medical tasks under the supervision of a medically qualified pathologist. They perform initial examination, dissection, and gross description of surgically removed tissues, assist in dissection of bodies during autopsies, and perform intraoperative frozen sections. They possess a highly standardized skill set related to each of these procedures, allowing pathologists to spend more of their time looking at slides.
- The thesis-based Pathologists' Assistants Masters program at the University of Calgary began in 2012 as a specialization within Medical Sciences Graduate studies. The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), an American agency that accredits training programs of allied health professionals who work in anatomic pathology or clinical pathology laboratories, visited the program in April 2014 and the program was ultimately accredited in October 2014. Accreditation of our program is a huge benefit to our students, as it makes them eligible to write the American Society of Clinical Pathology board certification exam and Canadian Certification Council of Pathologists' Assistants exam, which allows them to work anywhere in North America. The next accreditation application has been submitted and the site visit booked for April 29th and 30th, 2019.
- Currently the program is only one of two NAACLS accredited Pathologists' Assistant programs in Canada.
- In 2016 the program transitioned from thesis-based to a course-based Masters program under Graduate Science Education at the Cumming School of Medicine. The first year is didactic course work and the second year is practicum based.
- Program Statistics- Graduation rate 100%, Attrition rate 0%, Employment rate 100%, ASCP Exam pass rate 100%, CCCPA-CCCAP exam pass rate 100%. Exam pass rates are based on eligible graduates who wrote the exam.
- The program currently admits six students a year.
- The program has practical affiliations with APL (Calgary), Chinook Regional Hospital (Lethbridge), Medical Examiner's Office (Calgary) and Vancouver General Hospital.
    - May of 2019 we will send our first student to Vancouver General Hospital for one month.
    - There have been preliminary talks with individuals in Saskatchewan to discuss future affiliation opportunities.

Continuing Medical Education

CLS provides teaching for Medical Laboratory Technologists (MLT)/Medical Laboratory Assistants (MLA), Cytotechnology, Combined Laboratory and X-Ray Technologists (CLXT) Education Program. Additionally, department members provide weekly CME Rounds and participate in numerous Department of Medicine Rounds as well as presentations at National and International conferences.

Research (CLS and Externally Funded)

CLS/APL Research is committed to supporting Research activities which facilitate the development of new knowledge and improve patient care. These research initiatives include clinical trials, basic science research as well as robust research and development diagnostic programs which aim to enhance the delivery of pathology and laboratory medicine services to Albertans.

The research service we offer spans research initiatives that involve researchers, both internal and external to APL, including Alberta Health Services (AHS), University of Calgary, University of Alberta, the Tom Baker Cancer Centre (TBCC), other Canadian Universities and numerous research organizations in the U.S.

Our research activities include the management of a myriad of research initiatives currently numbering in excess of 900 active R&D opportunities in areas of Precision Medicine, Genomics Research, Biorepositories, evaluation of Novel Diagnostics. Having strong ties with the Department of Pathology and Laboratory Medicine at the University of Calgary, we are deeply rooted within the academic, research and translational clinical activities and spaces within the Alberta Health Technology Sector. Our important work bridges Research initiatives with new technology implementation, development of Novel diagnostic tests and collaboration with Pharma and Laboratory stakeholders.

Medical direction and leadership of Research has been provided by the VP Medical Operations, CLS Medical Director and Head of Department of Pathology and Laboratory Medicine, Cumming School of Medicine until the recent Alberta Public Laboratories (APL) transition of Research to the APL Chief Administrative Officer in September 2018. The overarching Research management APL Calgary team includes the Research and Development Program Coordinator and Provincial Research Supervisor.

Our Research team works to ensure Health Information Act (HIA), Good Clinical Practice (GCP), Health Canada and FDA compliance. In order to provide comprehensive protocol review and laboratory research setup, laboratory testing and patient blood and tissue collection, processing, packaging and shipping services for Clinical Trials and research, we leverage experienced medical laboratory technologist research coordinators, medical laboratory assistants as well as Laboratory Specialists that are involved in the review, setup and conduct of laboratory research protocols across Alberta Health Services facilities across Alberta. The Research office also functions as a bridge between the University of Calgary's Research and Accounting office in the procurement of reagents/ supplies and setting up project accounts for disbursement of grant funding for CLS Researchers.

We continue to collaborate with AHS Research Administration to ensure alignment of provincial research processes, including Connect Care, Epic Beaker initiatives. Functional Planning for the Calgary New Cancer Center as well as collaborating on the Edmonton Hub Lab Build ensures APL laboratory research services will continue to support communicable and non-communicable diseases such as oncology clinical trials and the respective translational research programs.

Demand for APL Research Services has continued to grow year over year as we are an important nexus for revenue generating opportunities. Annual research revenue generated from the Calgary R&D operations have increased at a steady pace annually.

We anticipate expanding efficiencies gained in translational activities, partnerships with industry as well as medical scientific expertise to an Alberta-wide Research and Development Program under the APL umbrella.

A brief summary of the initiatives undertaken by CLS/ APL Research in 2018:

- Ongoing meetings for the design and build of CLS/APL Clinical Trials and Research Laboratory space in the New Cancer Care Center continued
- CLS Research participated in Clinical Trial Market Day on May 17, 2018 to celebrate International Clinical Trial Day at the HRIC atrium where we showcased CLS Research Services to staff from TBCC Clinical Research Unit (CRU), U of C School of Medicine, Alberta Health Innovates (AIHS), Foothills and McCaig Tower Medical and Clinical Trials Stakeholders.
- Research Office worked collaboratively with New Business on several CLS revenue generating initiatives.
- CLS Research participated in the review and revision of the annual Provincial Laboratory Service and Test List for Clinical Trials and Research Studies.
- CLS Research is a stakeholder at the Provincial Tissue to Researchers -Working Group meetings.
- CLS has a unique data set of Pathology and Laboratory Medicine information that is a valuable source of health data that can be accessed through the research service we provide for the province of Alberta. Research Office continues to work with AHS Research Administration to ensure provincial laboratory research data requests comply with the HIA, are covered by research data agreements and are released with appropriate risk mitigation in place.
- Ongoing participation on Provincial Research Connect Care, Epic-Beaker meetings.
- Provincial standardization with a focus on research services and patient care.

2018 CLS Summer Research Studentship Competitions:

The CLS Research Department offers two research summer studentship award programs: Master of Biomedical Technology (MBT) Program and the CLS Undergraduate Competition.

Master of Biomedical Technology Competition

No applications were received.

Undergraduate Competition

Supervisor	Student	Project
Dr. Faisal Khan	Yacine Berka	Cell free DNA Chimerism Assays for Prediction of Graft Versus Host Disease after Allogeneic Hematopoeitic Cell Transplantation
Dr. Dylan Pillai	Ruth Legese	Genotyping malaria using next generation sequencing methods
Dr. Tarek Bismar	Karm Alhasan	Identify Copy Number Abberation (CAN) status and expression of novel driver genes in Prostate Cancer Cells

Outcomes resulting from CLS Research Competition projects completed in 2018:

- **Thyroid Function Tests in Pregnancy: Trimester Specific Reference Ranges on the CLS Test Platform.** Dr. Richard Krause, Dr. Lois Donovan, Dr. Amy Metcalfe, Dr. Alex Chin, Dr. Jo-Ann Johnson. The objective of this study was to validate local reference ranges for TSH, Free T4 and Total T4 in the first, second and third trimesters of Pregnancy. This project has resulted in the development of local, gestational age specific reference ranges in pregnancy for Thyroid Function results so that clinicians are now able to more accurately diagnose patients with thyroid dysfunction in pregnancy. This information has provided clinicians with appropriate reference ranges to target therapeutic management of patients. Local care pathways have been developed at CLS and work has begun to promote appropriate utilization of Thyroid Laboratory Tests in Pregnancy. Numerous CME presentations have been given about the finding of this study. Manuscript submitted for publication to the Journal "Thyroid" decision is pending. This work was also used to develop a care pathway for assessing thyroid function in Calgary that is used in the Calgary Zone, reported on all thyroid test results now and can be found on line at http://bit.ly/2BIWDIG.
- **Developing a novel LC-MS/MS method for measuring 6 steroids simultaneously within dried blood spots.** Dr. Hossein Sadrzadeh, Dr. Joshua Buse. The objective of this study was to develop a liquid chromatography-tandem mass spectrometric (LC-MS/MS) method for simultaneous measurement of six steroid molecules using dried blood specimens (DBS) for the accurate diagnosis of congenital adrenal hyperplasia (CAH). The most important QA aspect of this project is the introduction of calculation of Clinical Assessment Ratio (CA) for confirming CAH diagnosis. CA is measured by adding the serum values of 17OHP and 21-Deoxycortisol (or Androstenedione) divided by Cortisol. If the CA is equal or greater than one it indicates CAH. So, the diagnosis of CAH is confirmed by measuring 3 steroids and calculating CA. Without this method it is not possible to calculate CA, as our current approach for the diagnosis of CAH is by measuring only one steroid, 17OHP. Thus, the result of our work significantly improved the diagnosis of CAH and patient care and will be of great addition to our practice for future work and diagnosing other conditions. In addition, many clinical chemistry laboratories around the world will learn our approach and implement not only our method, but also calculating CA ratio. The latter is of great educational value to clinical chemists and pathologists. Manuscripts in progress; the following abstracts were presented at different meetings:
  - **Deema Qasrawi**, Joshua Buse, Jessica Boyd, S.M.H. Sadrzadeh (2018) "A new method to detect Congenital adrenal hyperplasia" Annual Conference of the Canadian Society of Clinical Chemists (CSCC), Ottawa, Ontario, Canada
  - **Deema Qasrawi**, Joshua Buse, Jessica Boyd, S.M.H. Sadrzadeh (2018) "Tandem mass spectrometric measurement of seven steroids in dried blood spots to diagnose Congenital adrenal hyperplasia" Mass Spectrometry: Applications to the Clinical Lab (MSACL) 2018 US 10th Annual conference and Exhibits, Palm Springs, CA, USA
  - **Deema Qasrawi**, Joshua Buse, Jessica Boyd, S.M.H. Sadrzadeh (2017) "Measuring Steroids from dried blood spots using Tandem mass spectrometry to diagnose Congenital adrenal hyperplasia" Department of Pathology and Laboratory Medicine Research Day, University of Calgary, Calgary, AB, Canada
- **LAMP-based SNP genotyping method to detect resistant malaria.** Dr. Dylan Pillai. The objective of this study was to determine a rapid sensitive detection method for artemisinin resistant mutations in K13 propeller gene of Plasmo-

dium falciparum. The research led to an improvement in methodology or the practice of laboratory medicine, and contributed to educational training for PhD students. Manuscript is in progress and can be accessed via Open Forum Infectious Diseases, ofy011, https://doi.org/10.1093/ofid/ofy011.

- **Improving the recovery of stem cells following cryopreservation of Allogeneic cellular therapy products by elucidating what key factors determine successful post-thaw recovery.** Dr. Nicole Prokopishyn, Joanne Luider. The objective of this study was to determine the key factors that influence the ability of hematopoietic stem/progenitor cells (HPCs) collected from Autologous and Allogeneic donors to successfully cryopreserve and thaw. These studies will determine what fundamental differences exist between Allogeneic and Autologous derived cellular therapy products (CTPs) and how these differences impact the "freeze-ability" and recovery of the HPCs in CTPs. An understanding of these influential elements will allow for modification of collection and lab processes, improving recovery and functionality of Allogeneic HPCs post freeze. Research is still in progress. It is anticipated the final analysis will provide more relevant information that will improve methodology in CTL. Key factors including timing of testing and handling of specimens has already been observed with the assay optimization. This has already resulted in QA improvements to the standard QC testing of Cryopreserved products in CTL. The educational value resulting from this research is an increased insight into the factors involved in cryopreservation of Allogeneic and Autologous CTPs. Final analysis of all samples with further understand. Publications are in progress based on the preliminary data and will be submitted with completion of the project.
- **Development of Quality Control material for the Transcutaneous Bilirubin (TcB) Meter.** Dr. Lyle Redman, Brenda Adams, Suzanne Snozyk, Monica Phillips. The objective of this study was to improve the quality management for the TcB program. This project was very successful in generating a QC material for the TcB meters that is robust and meets clinical performance requirements (i.e. approximates clinically relevant levels of bilirubin). Currently, there is no commercially available QC material for the TcB meters and the creation of this product will improve the ability of POCT to assess the analytical performance of the meters in the Calgary Zone. In addition, the QC material will be shared with other laboratories and POCT programs in the province in the near future. This project aimed to develop a quality control material that could be used as part of the QA (Quality Assurance) program for the TcB meters. Currently, such a product does not exist on the market. Using the quality control material to frequently assess the meters' performance will enable the Point of Care Testing (POCT) team to ensure that the instruments are performing within specifications. There are no publications to date.

Anatomic Pathology Research Lab (APRL)

The Anatomic Pathology Research Laboratory (APRL) located at the HMRB, FMC, continues to provide quality service to accommodate an increasing number of research projects for both internal and external principle investigators. Some of the tests and services offered in support of research at the APRL include immunohistochemistry (IHC) for method development of new antibodies, creation of tissue microarrays (TMA), CISH, and curls/scrolls or core punches for molecular testing. With the benefit of the two lab specialists on site and the efficient automatic Omnis staining platform, the APRL is able to handle increased workload, and provide new technical support to Calgary CLS/APL pathologists.

In response to some of the pathologists' inquiries, the lab specialists at the APRL started to focus on the application of in situ hybridization (ISH), particularly the new CISH RNA technology, and new detection systems which can be creatively applied to increase the sensitivity of conventional ISH. Tremendous time was spent on the development of conventional ISH to detect DNA or RNA, and the application of a new detection system over the past year. As a result, one DNA-ISH and one RNA-ISH were successfully developed at the APRL. Extra effort was spent on providing consultation and technical advice to new or potential researchers.

The APRL was continuously very productive in 2018. One of the Lab specialists at the APRL provided laboratory support to Molecular Pathology in setting up their mass array platform. There were 78 publications involving APRL services.

The APRL kept adding new interesting markers to their robust antibody list. In 2018, the APRL lab specialists communicated and worked together with pathologists and the CLS/ APL clinical IHC lab to promote the transfer of antibodies that are valuable for diagnostic use. Three antibodies (Ubi, BRG1 and ARID1B) were transferred to the IHC clinical lab in the December of 2018. The successful transfer of new antibodies to the diagnostic pool will benefit patient care in the future.

2018 Publications involving APRL services

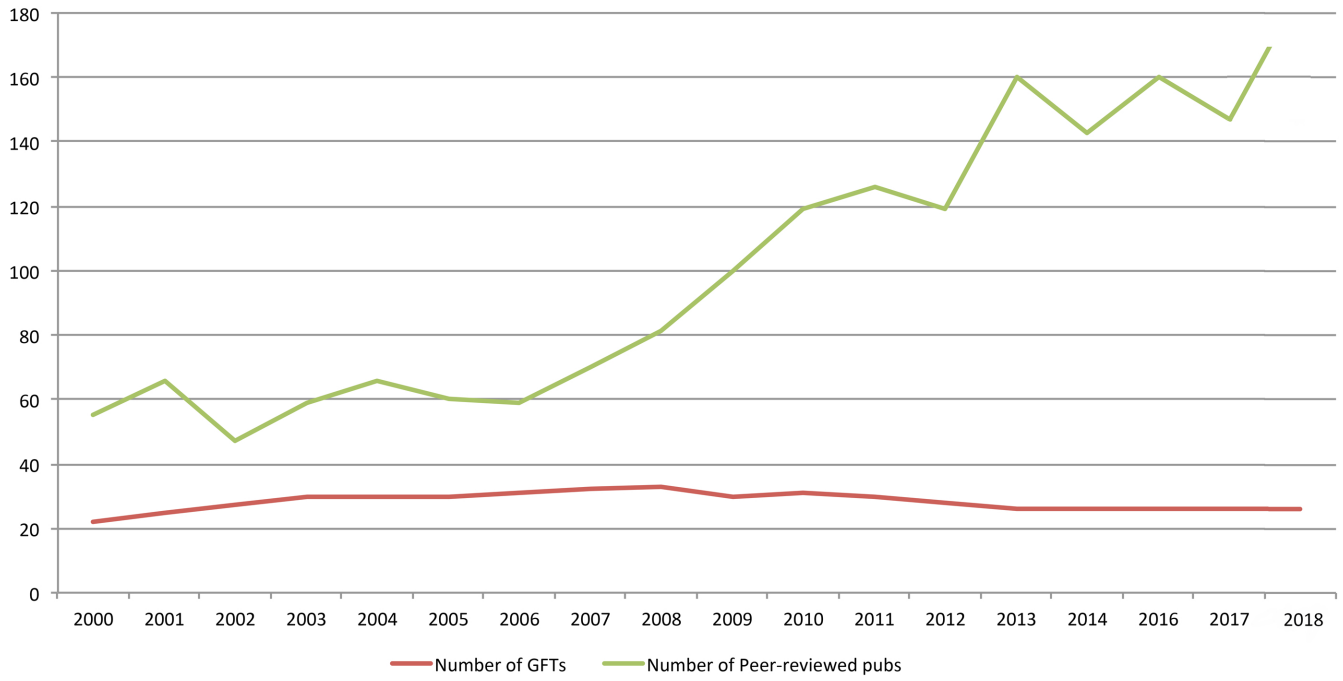
1. Rambau PF, Vierkant RA, Intermaggio MP, Kelemen LE, Goodman MT, Herpel E, Pharoah PD, Kommoss S, Jimenez-Linan M, Karlan BY, Gentry-Maharaj A, Menon U, Polo SH, Candido Dos Reis FJ, Doherty JA, Gayther SA, Sharma R, Larson MC, Harnett PR, Hatfield E, de Andrade JM, Nelson GS, Steed H, Schildkraut JM, Carney ME, Høgdall E, Whittemore AS, Widschwendter M, Kennedy CJ, Wang F, Wang Q, Wang C, Armasu SM, Daley F, Coulson P, Jones ME, Anglesio MS, Chow C, de Fazio A, García-Closas M, Brucker SY, Cybulski C, Harris HR, Hartkopf AD, Huzarski T, Jensen A, Lubiński J, Oszurek O, Benitez J, Mina F, Staebler A, Taran FA, Pasternak J, Talhouk A, Rossing MA, Hendley J; AOCS Group, Edwards RP, Fereday S, Modugno F, Ness RB, Sieh W, El-Bahrawy MA, Winham SJ, Lester J, Kjaer SK, Gronwald J, Sinn P, Fasching PA, Chang-Claude J, Moysich KB, Bowtell DD, Hernandez BY, Luk H, Behrens S, Shah M, Jung A, Ghatage P, Alsop J, Alsop K, García-Donas J, Thompson PJ, Swerdlow AJ, Karpinskyj C, Cazorla-Jiménez A, García MJ, Deen S, Wilkens LR, Palacios J, Berchuck A, Koziak JM, Brenton JD, Cook LS, Goode EL, Huntsman DG, Ramus SJ, Köbel M. Association of p16 expression with prognosis varies across ovarian carcinoma histotypes: an Ovarian Tumor Tissue Analysis consortium study. J Pathol Clin Res. 2018 Oct;4(4):250-261. doi: 10.1002/cjp2.109. Epub 2018 Sep 21. PubMed PMID: 30062862; PubMed Central PMCID: PMC6174617.
2. Le Page C, Rahimi K, Köbel M, Tonin PN, Meunier L, Portelance L, Bernard M, Nelson BH, Bernardini MQ, Bartlett JMS, Bachvarov D, Gotlieb WH, Gilks B, McAlpine JN, Nachtigal MW, Piché A, Watson PH, Vanderhyden B, Huntsman DG, Provencher DM, Mes-Masson AM. Characteristics and outcome of the COEUR Canadian validation cohort for ovarian cancer biomarkers. BMC Cancer. 2018 Mar 27;18(1):347. doi: 10.1186/s12885-018-4242-8. PubMed PMID: 29587661; PubMed Central PMCID: PMC5872529.
3. Assem H, Rambau PF, Lee S, Ogilvie T, Sienko A, Kelemen LE, Köbel M. High-grade Endometrioid Carcinoma of the Ovary: A Clinicopathologic Study of 30 Cases. Am J Surg Pathol. 2018 Apr;42(4):534-544. doi: 10.1097/PAS.0000000000001016. PubMed PMID: 29309296.
4. Garsed DW, Alsop K, Fereday S, Emmanuel C, Kennedy CJ, Etemadmoghadam D, Gao B, Gebski V, Garès V, Christie EL, Wouters MCA, Milne K, George J, Patch AM, Li J, Arnau GM, Semple T, Gadipally SR, Chiew YE, Hendley J, Mikeska T, Zapparoli GV, Amarasinghe K, Grimmond SM, Pearson JV, Waddell N, Hung J, Stewart CJR, Sharma R, Allan PE, Rambau PF, McNally O, Mileshkin L, Hamilton A, Ananda S, Grossi M, Cohen PA, Leung YC, Rome RM, Beale P, Blomfield P, Friedlander M, Brand A, Dobrovic A, Köbel M, Harnett P, Nelson BH, Bowtell DDL, deFazio A; Nadia Traficante, for the Australian Ovarian Cancer Study Group. Homologous Recombination DNA Repair Pathway Disruption and Retinoblastoma Protein Loss Are Associated with Exceptional Survival in High-Grade Serous Ovarian Cancer. Clin Cancer Res. 2018 Feb 1;24(3):569-580. doi: 10.1158/1078-0432.CCR-17-1621. Epub 2017 Oct 23. PubMed PMID: 29061645.
5. Annexin A10 and HES-1 Immunohistochemistry in Right-Sided Traditional Serrated Adenomas Suggests an Origin from Sessile Serrated Adenoma" P. Minoo. It is accepted in Applied Immunohistochemistry & Molecular Morphology.

Publications

Department members with a primary appointment in the DPLM and whose primary remuneration is derived from either CLS or UofC DPLM (i.e., list excludes cross-appointments) published 165 peer-reviewed papers and book chapters in 2018

Presentations

Members of the DPLM also presented many scientific papers at prestigious national or international meetings in 2018. While such presentations generally represent the generation of new knowledge, these are not listed here as the assumption is that the important presentations will be turned into peer-reviewed publications and will appear in a subsequent DPLM Annual Report.



Research Grants

Another measure of research productivity is peer-reviewed grant funding. For a complete list of Departmental research grant holdings, both as principle investigator, co-investigator and collaborator, please refer to Appendix 1.4.

Medical Leadership and Administration

- Dr. Margaret Kelly was appointed Site Leader, Foothills Medical Centre/McCaig Tower.
- Dr. Hallgrimur Benediktsson was appointed Specialty Group Leader, Renal Pathology.

Workforce Planning

Summary of Recruitment/Departures - 2018

Medical Staff - Recruitment			
Medical Staff	Start Date	GFT/Clinical	Primary Division
Brenn, Thomas	2018 February	Professor	Anatomic Pathology/Cytopathology
Gao, Chen	2018 April	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Nikolic, Ana	2018 July		Anatomic Pathology/Cytopathology
Roshan, Tariq	2018 July	Clinical Assistant Professor	Hematopathology
Brown, Kristen	2018 July	Clinical Assistant Professor	Microbiology
Koro, Konstantin	2018 August	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Hyrcza, Martin	2018 August	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Griener, Thomas	2018 August	Clinical Assistant Professor	Microbiology
O'Connor, Kate	2018 October	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Box, Adrian	2018 November	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Medical Staff - Departures			
DiFrancesco, Lisa	2018 April	Associate Professor	Anatomic Pathology/Cytopathology
Hamilton, Leslie	2018 April	Clinical Assistant Professor	Anatomic Pathology/Cytopathology

Medical Staff - Recruitment			
Gottipati, Srinivas	2018 July	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Gui, Xianyong (Sean)	2018 August	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Redman, Lyle	2018 October		Clinical Biochemistry

Appendices

1.1 Membership Lists

Clinical Section of Anatomic Pathology/Cytopathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Abi Daoud, Marie	Clinical	Assistant Professor	DSC	Dermatopathology
Anders, Karl	Clinical	Associate Professor	SHC	Surgical Pathology
Benediktsson, Hallgrimur	GFT	Professor	FMC	Renal Pathology, Transplantation
Bismar, Tarek	GFT	Professor	RGH	Genitourinary Pathology Anatomic Pathology
Box, Adrian	Clinical	Assistant Professor	FMC	Molecular Genetic Pathology
Brenn, Thomas	GFT	Professor	DSC	Dermatopathology
Bromley, Amy	Clinical	Associate Professor	FMC	Autopsy Pathology
Brown, Holly	Clinical	Assistant Professor	RGH	Dermatopathology
Brundler, Marie-Anne	GFT	Professor	ACH	Pediatric Pathology
Bures, Nicole	Clinical	Assistant Professor	DSC	Cytopathology, Breast Pathology
Caragea, Mara	Clinical	Assistant Professor	FMC	Bone & Soft Tissue Pathology
Chan, Elaine	Clinical	Assistant Professor	ACH	Pediatric Pathology
Chan, Jennifer	GFT	Associate Professor	FMC	Neuropathology
Demetrick, Douglas	GFT	Associate Professor	HSC	Molecular Pathology
Duggan, Maire	GFT	Professor	FMC	Cytopathology, Gynecological Pathology
Dvorakova, Marie	Clinical	Assistant Professor	DSC	Cytopathology
Eidus, Leslie	Clinical	Associate Professor	RGH	Gastrointestinal Pathology
Falck, Vincent	Clinical	Associate Professor	FMC	Gastrointestinal Pathology,Surgical Pathology
Franko, Angela	Clinical	Assistant Professor	FMC	Pulmonary Pathology
Galman, Lanie	Clinical	Assistant Professor	SHC	Breast Pathology, Oncologic Surgical Pathology
Gao, Chen	Clinical	Assistant Professor	DSC	Ctyopathology
George, David	Clinical	Associate Professor	FMC	Renal Pathology
Gorecki, Margaret	Clinical	Assistant Professor	DSC	Surgical Pathology, Cytopathology
Gorombey, Steve	Clinical	Assistant Professor	PLC	Cytopathology, General Pathology
Gough, James	Clinical	Professor	FMC	Renal Pathology, Cytopathology
Guggisberg, Kelly	Clinical	Assistant Professor	RGH	ENT Pathology, Dermatopathology
Howell, Jenika	Clinical	Assistant Professor	PLC	Surgical Pathology
Hunter, Charlene	Clinical	Assistant Professor	DSC	Surgical Pathology, Dermatopathology
Hyrcza, Martin	Clinical	Assistant Professor	FMC	Head/Neck, Endocrine & Ophthalmic Pathology

Clinical Section of Anatomic Pathology/Cytopathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Itani, Doha	Clinical	Associate Professor	FMC	Molecular Genetic Pathology Hematopathology
Joseph, Jeffrey	GFT	Professor	FMC	Neuropathology
Kelly, Margaret	GFT	Associate Professor	FMC	Surgical Pathology, Pulmonary Pathology
Khalil, Moosa	Clinical	Associate Professor	FMC	Cytopathology, Surgical Pathology, Endocrine Pathology
Klonowski, Paul	Clinical	Assistant Professor	DSC	Surgical Pathology, Lab Informatics
Koebel, Martin	GFT	Associate Professor	FMC	Gynecological Pathology, Autopsy
Koro, Konstantin	Clinical	Assistant Professor	FMC	Gastrointestinal & Liver Pathology
Kulaga, Andrew	Clinical	Associate Professor	RGH	Genitourinary Pathology, Surgical Pathology
Kurek, Kyle	GFT	Assistant Professor	ACH	Pediatric Pathology
Lee, Sandra	Clinical	Assistant Professor	SHC	Gynecological Pathology
Luedtke, Chad	Clinical	Assistant Professor	SHC	Breast Pathology
Medlicott, Shaun	Clinical	Associate Professor	RGH	Gastrointestinal Pathology
Minoo, Parham	Clinical	Assistant Professor	FMC	Surgical Pathology Hematopathology
Morava-Protzner, Izabella	Clinical	Associate Professor	PLC	Surgical Pathology
Naert, Karen	Clinical	Assistant Professor	DSC	Dermatopathology
Ng, Denise	Clinical	Assistant Professor	FMC	Surgical Pathology Neuropathology
Nikolic, Ana			FMC	Neuropathology
O'Connor, Kate	Clinical	Assistant Professor	FMC	Surgical Pathology Gastrointestinal & Breast Pathology
Ogilvie, Travis	GFT	Associate Professor	FMC	Breast Pathology, Gynecological Pathology, Molecular Pathology
Oryschak, Allan	Clinical	Associate Professor	RGH	Ophthalmic Pathology, Surgical Pathology
Paslawski, Doreen	Clinical	Assistant Professor	RGH	Breast Pathology, Surgical Pathology
Pinto-Rojas, Alfredo	GFT	Associate Professor	ACH	Pediatric Pathology
Rashid-Kolvear, Fariborz	Clinical	Associate Professor	DSC	Cytogenetics
Resch, Lothar	GFT	Associate Professor	FMC	Neuropatholgy
Schell, Andrew	Clinical	Assistant Professor	PLC	Gastrointestinal Pathology
Schneider, Michelle	Clinical	Assistant Professor	DSC	Dermatopathology
Sienko, Anna	Clinical	Professor	PLC	Surgical Pathology, Cytopathology
Simpson, Roderick	GFT	Professor	FMC	Head & Neck Pathology
Swanson, Paul	Clinical	Full Professor	DSC	Bone & Soft Tissue Gastrointestinal Path, Breast Path Lung & Thoracic, ENT
Teman, Carolin	Clinical	Assistant Professor	FMC	Surgical Pathology Hematopathology
Terzic, Tatjana	Clinical	Assistant Professor	DSC	Cytopathology, Gynecologic Pathology
Trpkov, Kiril	GFT	Professor	RGH	Genitourinary Pathology, Renal Pathology
Urbanski, Stefan	Clinical	Professor	FMC	Gastrointestinal Pathology, Liver Pathology, Pulmonary Neoplasia
Waghray, Ranjit	Clinical	Professor	DSC	Surgical Pathology, Cytopathology
Wang, Yinong	Clinical	Associate Professor	DSC	Surgical Pathology, Cardiac Pathology

Clinical Section of Anatomic Pathology/Cytopathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Whitcomb, Emma	Clinical	Assistant Professor	SHC	GI/Liver Pathology
Wright, James	GFT	Professor	ACH	Pediatric and Perinatal Pathology Experimental Pathology
Yang, Hua	Clinical	Associate Professor	FMC	Breast Pathology
Yilmaz, Asli	GFT	Associate Professor	RGH	Genitourinary Pathology, Surgical Pathology
Yu, Weiming	Clinical	Associate Professor	ACH	Pediatric Pathology, Cardiac Pathology

Clinical Section of Clinical Biochemistry				
Medical/Scientific Staff	GFT/ Clinical	Rank	Site	Special Expertise
Boyd, Jessica	Clinical	Assistant Professor	DSC	Analytical and Environmental Toxicology
Chin, Alex	Clinical	Assistant Professor	DSC	Immunochemist, Clinical Chemistry
de Koning, Lawrence	Clinical	Associate Professor	ACH	General Pathology, Pediatric Clinical Chemistry
Gifford, Jessica	Clinical	Assistant Professor	DSC	Clinical Biochemistry
Sadrzadeh, Hossein	Clinical	Professor	DSC	Endocrinology, Nutrition Pharmacogenomics, Clinical Biochemistry
Seiden Long, Isolde	Clinical	Associate Professor	FMC	Clinical Biochemistry
Venner, Allison	Clinical	Assistant Professor	DSC	Clinical Chemistry

Clinical Section of General Pathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Abdullah, Amid	Clinical	Assistant Professor	DSC	General Pathology
Flynn, Ethan	Clinical	Associate Professor	DSC	General Pathology
Larsen, Erik	Clinical	Assistant Professor	RGH	Surgical Pathology, Clinical Chemistry
Mourad, Walid	Clinical	Professor	DSC	General Pathology, Hematopathology, Cytopathology
Naugler, Christopher	GFT	Professor	DSC	Lab Informatics, General Pathology

Clinical Section of Hematopathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Auer, Iwona	Clinical	Associate Professor	FMC	Flow Cytometry, Lymphoma
Berka, Noureddine	Clinical	Professor	DSC	Tissue Typing
Dharmani-Khan, Poonam	Clinical	Assistant Professor	FMC	Transplantation Immunology, Flow Cytometry and Transcriptome Analysis
Fourie, Thomas	Clinical	Assistant Professor	FMC	Hematological Pathology, Flow Cytometry
Jiang, Xiu Yan (Sue)	Clinical	Assistant Professor	DSC	Hematopathology
Khan, Faisal	GFT	Associate Professor	HMRB	Tissue Typing
Mahe, Etienne	Clinical	Assistant Professor	FMC	Hematopathology & Transfusion Medicine
Mansoor, Adnan	GFT	Professor	FMC	Hematopathology

Clinical Section of Hematopathology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Prokopishyn, Nicole	Clinical	Assistant Professor	FMC	Stem Cell Lab
Roshan, Tariq	Clinical	Assistant Professor	FMC	Hematopathology
Shabani-Rad, Meer-Taher	Clinical	Associate Professor	FMC	Hematopathology
Shameli, Afshin	Clinical	Assistant Professor	FMC	Hematopathology
Sinclair, Gary	Clinical	Adjunct Associate Professor	DSC	Molecular Hematology

Clinical Section of Microbiology				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Berenger, Byron	Clinical	Assistant Professor	DSC	Medical Microbiology
Brown, Kristen	Clinical	Lecturer	DSC	Medical Microbiology
Carson, Julie	Clinical	Associate Professor	DSC	Mycology, Enterics, Wounds
Chan, Wilson	Clinical	Assistant Professor	DSC	Telediagnostics, Mycology, Parasitology
Church, Deirdre	GFT	Professor	DSC	Medical Microbiology, HIV Diagnostics, STDs, Anaerobes, Mycology
Gregson, Daniel	GFT	Associate Professor	DSC	Virology, Sirology, General Microbiology
Griener, Thomas	Clinical	Assistant Professor	DSC	Medical Microbiology
Groeschel, Michael	Clinical	Assistant Professor	DSC	Medical Microbiology
Lynch, Tarah	Clinical	Assistant Professor	DSC	Bioinformatics, Microbial Genomics
Pillai, Dylan	GFT	Professor	DSC	Molecular Diagnostics Parasitology
Pitout, Johann	GFT	Professor	DSC	Antibiotic susceptibility/ARO Bacteriology, Parasitology

Clinical Section of Transfusion Medicine				
Medical Staff	GFT/ Clinical	Rank	Site	Special Expertise
Baskin, Leland	Clinical	Associate Professor	DSC	Chemical Pathology, General Pathology
Sidhu, Davinder	Clinical	Assistant Professor	FMC	General Pathology, Transfusion Medicine

1.2 Current Workforce Plan (see Workforce Planning)

1.3 Scholarly Publications

Publications in Peer-Reviewed Journals

Abi Daoud, Marie

Gill P, Arlette J, Shiau CJ, **Abi Daoud MS**. Case Report: Diagnosis of a Rare Plaque-Like Dermal Fibroma Successfully Treated With Mohs Surgery. J Cutan Med Surg. 22(1):89-93, 2018

Benediktsson, Hallgrimur

Cunningham A, **Benediktsson H**, Muruve DA, Hildebrand AM, Ravani P. Trends in Biopsy-Based Diagnosis of Kidney Disease: A Population Study. Can J Kidney Health Dis. 5:2054358118799690, 2018

Komada T, Chung H, Lau A, Platnich JM, Beck PL, **Benediktsson H**, Duff HJ, Jenne CN, Muruve DA. Macrophage Uptake of Necrotic Cell DNA Activates the AIM2 Inflammasome to Regulate a Proinflammatory Phenotype in CKD. J Am Soc Nephrol. 29(4):1165-1181, 2018

Lau A, Chung H, Komada T, Platnich JM, Sandall CF, Choudhury SR, Chun J, Naumenko V, Surewaard BG, Nelson MC, Ulke-Lemée A, Beck PL, **Benediktsson H**, Jevnikar AM, Snelgrove SL, Hickey MJ, Senger DL, James MT, Macdonald JA, Kubes P, Jenne CN, Muruve DA. Renal immune surveillance and dipeptidase-1 contribute to contrast-induced acute kidney injury. J Clin Invest. 128(7):2894-2913, 2018

Ma I, Guo M, Muruve D; **Benediktsson H**, Naugler C. Sociodemographic associations with chronic kidney disease in a large Canadian city: a cross-sectional observation study. BMC Nephrol. 19(1):198, 2018

Sharfuddin N, Nourbakhsh M, Box A, **Benediktsson H**, Muruve DA. Anticoagulant Related Nephropathy Induced by Dabigatran. Case Rep Nephrol. 7381505, 2018

Berenger, Byron

Grisaru S, **Berenger B**, Freedman S. Case 19-2018: A 15-Year-Old Girl with Acute Kidney Injury. N Engl J Med. 379(18):e34, 2018

Berka, Noureddine

Mostafa AA, Petrosenko M, Stamm L, Khan F, **Berka N**. A novel HLA-A*26 allele, HLA-A*26:01:44, identified in a Caucasian individual. HLA. 91(2):127-128, 2018

Mostafa AA, Kostur C, Stamm L1, Khan F, **Berka N**. Characterization of a novel allele, HLA-C*02:135N, by full-length gene sequencing in a bone marrow donor. HLA. 91(6):538-539, 2018

Bismar, Tarek

Abou-Ouf H, Alshalaifa M, Takhar M, Erho N, Donnelly B, Davicioni E, Kames RJ, **Bismar TA**. Validation of a 10-gene molecular signature for predicting biochemical recurrence and clinical metastasis in localized prostate cancer. J Cancer Res Clin Oncol. 144(5):883-891, 2018

Aheam TU, Peisch S, Pettersson A, Ebot EM, Zhou K, Graff RE, Sinnott JA, Fazli L, Judson GL, **Bismar TA**, Rider JR, Gerke T, Chan JM, Fiorentino M, Flavin R, Sesso HD, Finn S, Giovannucci EL, Gleave M, Loda M, Li Z, Pollak M, Mucci LA. Expression of IGF/insulin receptor in prostate cancer tissue and progression to lethal disease. Transdiciplinary Prostate Cancer Partnership (ToPCaP). Carcinogenesis. (12):1431-1437, 2018

Bismar TA, Hegazy S, Feng Z, Yu D, Donnelly B, Palanisamy N, Trock BJ. Clinical utility of assessing PTEN and ERG protein expression in prostate cancer patients: a proposed method for risk stratification. J Cancer Res Clin Oncol. J Cancer Res Clin Oncol. 144(11):2117-2125, 2018

Bismar TA, Hegazy S, Feng Z, Yu D, Donnelly B, Palanisamy N, Trock BJ. Clinical utility of assessing PTEN and ERG protein expression in prostate cancer patients: a proposed method for risk stratification. J Cancer Res Clin Oncol. J Cancer Res Clin Oncol. 2018 Nov;144(11):2117-2125, 2018

Stoletov K, Willetts L, Paproski RJ, Bond DJ, Raha S, Jovel J, Adam B, Robertson AE, Wong F, Woolner E, Sosnowski DL, **Bismar TA**, Wong GK, Zijlstra A, Lewis JD. Quantitative in vivo whole genome motility screen reveals novel therapeutic targets to block cancer metastasis. Nat Commun. 9(1):2343, 2018

Brenn, Thomas

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Ferreira I, Kind P, Van Den Berghe I, Melly L, Offner F, Hornick JL, **Brenn T**. Melanocytic naevi with perineurial differentiation: a distinctive variant of neurotised naevi and a diagnostic pitfall with desmoplastic melanoma. Histopathology. 72(4):679-684, 2018.

Griewank KG, Wiesner T, Murali R, Pischler C, Muller H, Koelsche C, Moeller I, Franklin C, Cosgarea I, Sucker A, Schilling B, Bielefeld N, Schwamborn M, Sucker A, Schadendorf D, Schaller J, Horn S, **Brenn T**, Mentzel T. Atypical fibroxanthoma and pleomorphic dermal sarcoma harbor frequent NOTCH1/2 and FAT1 mutations and similar DNA copy number alteration profiles. Mod Pathol. 31(3):418-428, 2018

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Bromley, Amy

Amlani A, **Bromley A**, Fifi-Mah A. ANCA Vasculitis and Hemophagocytic Lymphohistiocytosis following a Fecal Microbiota Transplant. Case Rep Rheumatol. 2018:926353, 2018

Avery MB, Alaqeel A, **Bromley AB**, Chen YX, Wong JH, Eesa M, Mitha AP. A refined experimental model of fusiform aneurysms in a rabbit carotid artery. J Neurosurg. 1:1-8, 2018

Brundler, Marie-Anne

Brundler MA, Kurek KC, Patel K, Jester I. Submucosal Colonic Lipoblastoma Presenting With Colo-colonic Intussusception in an Infant. Pediatr Dev Pathol. 21(4):401-405, 2018

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Slack JC, Sanchez-Glanville C, Steele M, Wong AL, **Brundler MA**. Retroperitoneal Angiomatoid Fibrous Histiocytoma Presenting as a Recurrent Spontaneous Retroperitoneal Hemorrhage in a 9-Year-Old Boy. J Pediatr Hematol Oncol. 40(4):307-311, 2018

Yu W, Brundler M-A, Wright JR Jr. Polyglucosan bodies in placental extravillious trophoblast for the diagnosis of fatal perinatal neuromuscular type glycogen storage disease type IV. Pediatr Dev Pathol. 21(4): 423-427, 2018

Chan, Jennifer

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Yuan AL, Ricks CB, Bohm AK, Lun X, Maxwell L, Safdar S, Bukhari S, Gerber A, Sayeed W, Bering EA, Pedersen H, **Chan JA**, Shen Y, Marra M, Kaplan DR, Mason W, Goodman LD, Ezhilarasan R, Kaufmann AB, Cabral M, Robbins SM, Senger DL, Cahill DP, Sulman EP, Cairncross JG, Blough MD. ABT-888 restores sensitivity in temozolomide resistant glioma cells and xenografts. PLoS One. 13(8):e0202860, 2018

Chan, Wilson

Griener TP, Naugler C, **Chan WW**, Church DL. Sociodemographic correlates of urine culture test utilization in Calgary, Alberta. BMC Urol. 18(1):2, 2018

Cheaveau J, Nguyen H, Chow B, Marasinghe D, Mohon AN, Yuan H, Viana G, van Schalkwyk D, Church D, **Chan W**, Pillai DR. Clinical Validation of a Commercial LAMP Test for Ruling out Malaria in Returning Travelers: A Prospective Diagnostic Trial. Open Forum Infect Dis. 5(11):ofy260, 2018

Chin, Alex

Whiteside S, Markova M, **Chin A**, Lam C, Dharmani-Khan P, Modi M, Khan F, Storek J. Influence of Chemotherapy on Allergen-Specific IgE. Int Arch Allergy Immunol. 177(2):145-152, 2018

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Lithgow K, **Chin A,** Debert CT, Kline GA. Utility of serum IGF-1 for diagnosis of growth hormone deficiency following traumatic brain injury and sport-related concussion. BMC Endocr Disord. 18(1):20, 2018

Van Der Gugten G, Demarco Ml, Chen Lyc, **Chin A**, Caruthers M, Holmes Dt, Mattman A. Resolution of Spurious Immunonephelometric IgG Subclass Measurement Discrepancies by LC-MS/MS. Clin Chem. 64(4):735-742, 2018

Church, Deirdre

Cheaveau J, Nguyen H, Chow B, Marasinghe D, Mohon AN, Yuan H, Viana G, van Schalkwyk D, **Church D**, Chan W, Pillai DR. Clinical Validation of a Commercial LAMP Test for Ruling out Malaria in Returning Travelers: A Prospective Diagnostic Trial. Open Forum Infect Dis. 5(11):ofy260, 2018

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Ugarte-Torres A, Perry S, Franko A, **Church DL**. Multidrug-resistant Aeromonas hydrophila causing fatal bilateral necrotizing fasciitis in an immunocompromised patient: a case report. J Med Case Rep. 12(1):326, 2018

van Marle G, **Church DL**, van der Meer F, Gill MJ. Combating the HIV reservoirs. Biotechnol Genet Eng Rev. 34(1):76-89, 2018

de Koning, Lawrence

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Kandula N. Cooper AJ, Schneider JA, Fujimoto K, Kanaya AM, Van Horn L, **de Koning L**, Siddique J. Personal social networks and organizational affiliation of South Asians in the United States. BMC Public Health. 18:218, 2018

Southern DA, James MT, Wilton SB, **de Koning L**, Quan H, Knudtson ML, Ghali WA. Expanding the impact of a longstanding Canadian cardiac registry through data linkage: challenges and opportunities. International Journal of Population Data Science. 3(3):9:1-11, 2018

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Demetrick, Doug

Demetrick DJ. Molecular Auditing: An Evaluation of Unsuspected Tissue Specimen Misidentification. Arch Pathol Lab Med. 142(11):1407-1414, 2018

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Dharmani-Khan, Poonam

Whiteside S, Markova M, Chin A, Lam C, **Dharmani-Khan P**, Modi M, Khan F, Storek J. Influence of Chemotherapy on Allergen-Specific IgE. Int Arch Allergy Immunol. 177(2):145-152, 2018

DiFrancesco, Lisa

Sar A, Duan Q, Khalil M, **DiFrancesco LM**, Ewanowich C, Lytwyn A, Djordjevic B, Itani D, Lee S, Köbel M, Glaze S, Park E,

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Duggan, Maire

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Eidus, Leslie

Medlicott S, **Eidus L**, Trpkov K. Isolated pulse granuloma in a mesenteric lymph node: unusual nodal manifestation associated with crohn disease complicated by ileal adenocarcinoma. AJSP: Reviews & Reports. 23(6):271-273, 2018

Franko, Angela

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Ugarte-Torres A, Perry S, **Franko A**, Church DL. Multidrug-resistant Aeromonas hydrophila causing fatal bilateral necrotizing fasciitis in an immunocompromised patient: a case report. J Med Case Rep. 12(1):326, 2018

Gifford, Jessica

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1.4 Research Grants

2018 CLS Health Services Research Funding Competition Projects Awarded Funding

2018 CLS Health Services Research Competition

The CLS Research Department announced award results for the twenty first annual CLS Health Services Research Funding Competition. A total of $103,655.00 was awarded by CLS to researchers in 2018. One hundred and forty five projects have received funding through the Research Competition since it began in 1998.

2018 CLS Health Services Research Projects Awarded Funding

Principal Investigator/ Co- Investigators	Topic	Budget
Dr. Tarek Bismar	Characterization of Multi Biomarkers Signature to Stratify Prostate Cancer Patients In Active Surveillance Programs: Steps Toward Active Role of Pathologists in Personalized Medicine	$14,995.00
Dr. Michael Groeschel, Dr. Julie Carson	Pan-dermatophyte direct real-time PCR development and validation	$13,800.00
Dr. Poonam Dharmani-Khan, Dr. Faisal Khan, Dr. Jan Storek	Differentiating Graft versus Host and Graft versus Leukemia allo-immune responses after Allogeneic Hematopoietic Stem Cell Transplantation	$14,980.00
Dr. Faisal Khan, Dr. Jan Storek, Dr. Meer-Taher Shabani-Rad, Dr. Gary Sinclair, Dr. Poonam Dharmani-Khan	Novel Chimerism Assays for Early Prediction of Acute Myeloid Leukemia Relapse after Allogeneic Hematopoeitic Cell Transplantation	$14,880.00
	Phase I Total	$58,655.00
Dr. Byron Berenger, Dr. Dylan Pillai, Dr. Linda Chu	The Clinical and Public Health Impact of Culture-Independent Diagnostic Tests: Establishing the duration of nucleic acid shedding in stool for cases of bacterial gastroenteritis	$45,000.00
	Phase II Total	$44,222.72
	Competition Total	$103,655.00

2018 External Research Grants and Awards
(held by DPLM Faculty) Does not include those of cross-appointments

Medical Staff	Year	Funding Source	Total Award	*PI/CO-INV
Berka, Noureddine				
Precision Medicine Can PREVENT AMR: Applying Precision Medicine Technologies in Canada to Prevent Antibody Mediated Rejection and Premature Kidney Transplant Loss	2018-2022	Genome Canada 2017 Large-Scale Applied Research Project Competition Genomics and Precision Health	$9,700,000	Co-Applicant and End User
Gene Variants Influencing Complement-Dependent Cytotoxicity (CDC) and Antibody-Dependent Cellular Cytotoxicity (ADCC) as Predictors of Antibody Mediated Rejection (AMR) after Kidney Transplantation	2017-18	Canadian National Transplant Research Program	$25,000	Co-Inv
Bismar, Tarek				
Characterization of Novel Molecular Signature for Accurately Predicting Prostate Cancer Progression in Active Surveillance	2018 – 2021	Prostate Cancer Canada	$1,499,650	PI

Medical Staff	Year	Funding Source	Total Award	*PI/CO-INV
Employing Biomarkers in Active Surveillance Prostate Cancer – Improved Clinical Management and Addressing Overtreatment	2018 – 19	Arnie Charbonneau Cancer Institute	$50,000	PI
Novel molecular biomarkers of Genitourinary, Breast & Gynecological malignancies in United Arab Emirates population	2017 - 19	Sheikh Hamdan Bin Rashid Al Maktoum Award for Medical Sciences	$48,183	PI
Characterization of SKAP2, GARS and FKPB14 in prostate cancer: implication to disease progression and patient's prognosis	2017 – 18	Ride For Dad	$42,944	PI
Androgen receptor variants in patients with prostate cancer undergoing androgen deprivation and radiotherapy study	2016 – 18	Jensen	$75,000	Co-Inv
Validation of molecular biomarkers in active surveillance population.	2016 – 18	Ride For Dad	$39,444	PI
Chan, Jennifer				
Precision Oncology for Young People (PROFYLE)	2016-2021	Terry Fox Research Institute	$159,254	Co-Inv
The role of CIC in oligodendroglioma	2014-19	Canadian Institutes of Health Research	$656,900	PI
Church, Deirdre				
Reducing the Global Burden of Infectious Diseases through Precision Population Health	2018-2022	Genome Alberta (Large Scale Applied Research Project (LSARP)	$11,000,300	Co-Inv
Microscale Metabolomics for rapid Detection of Infections and Identification of Drug Resistance	2017-2021	Genomic Applications Partnership Program (GAPP)/ Genome Canada	$6,024,696	Co-Inv
Microscale Metabolomics for Rapid Detection of Infections and Identification of Drug Resistance	2016-19	Biomedical Engineering, University of Calgary	$150,000	Co-Inv
de Koning, Lawrence				
Maternal Iron Nutrition & its Consequences in Pregnant Women & Their Children in The AB Pregnancy Outcomes & Nutrition (APrON)	2018-2020	Canadian Institutes of Health	$385,000	Co-Inv
Getting to precision in public health: Leveraging nationally representative dietary intake data to match vulnerable populations with targeted chronic disease prevention	2018	Libin Cardiovascular Institute of Alberta Seed Grant	$25,000	Co-Inv
Demetrick, Doug				
Characterizing sexually dimorphic drug metabolism using induced pluripotent stem cell derived hepatocytes	2017-19	Canadian Institutes of Health	$80,000	Co-Inv
Dharmani-Khan, Poonam				
NK cell related identifiers of allogeneic HCT adverse outcomes	2017-2018	CIHR bridge funding, ACHRI	$20,000	Co-Inv
Green, Francis				
The improvement of mine safety and Health	2017-2020	Alpha Foundation USA	1,800,000 $75,000 USD	Co-Inv Dr. Franko

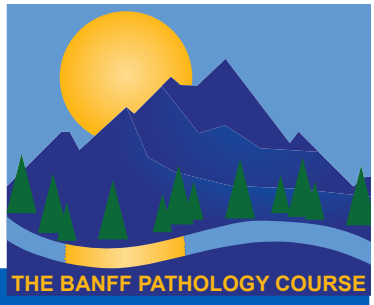
Medical Staff	Year	Funding Source	Total Award	*PI/CO-INV
High resolution microscopy of living human cells using Richardson Technology Microscopy	2004-2020	Multiple Sources	$509,145	PI
Gregson, Daniel				
Research Funds	2018-2023	University of Calgary/Operating Grant	$32,308	PI
Reducing the Global Burden of Infectious Diseases through precision population health	2017-2020	Genome Alberta	$6,024,696	Co-Inv
Joseph, Jeffrey				
Donald Burns and Louise Berlin Professor in Dementia Research	2015-2020	University of Calgary	$500,000	PI
Calgary Brain Bank	2015-2020	Marion Lamb (Private)	$500,000	PI
Khan, Faisal				
Natural Killer Cell Related Molecular and Functional Identifiers for Adverse Outcomes of Allgoenic Hematopoietic Cell Transplantation	2017-19	Alberta Children's Hospital Foundation	$20,000	
NK cell based biomarkers for allo-HCT outcomes	2017-18	University of Calgary Alberta	$25,000	PI
Gene Variants Influencing Complement-Dependent Cytotoxicity (CDC) and Antibody-Dependent Cellular Cytotoxicity (ADCC) as Predictors of Antibody Mediated Rejection (AMR) after Kidney Transplantation	2017-18	Canadian National Transplant Research Program	$25,000	PI
Role of Natural Killer Cells in Blood and Marrow Transplantation	2016-18	Anonymous Award for HCT research	$150,000	PI
Role of Natural Killer Cells Receptor genes in the immunopathogenesis and prognosis of different types of Lymphoma	2015-18	Alberta Cancer Foundation	$97,125	PI
Genetic Profiling of Killer Immunoglobulin-Like Receptors (KIRs) of Natural Killer Cells as Predictors of ATG-Conditioned HLA-matched Pediatric Allogeneic Hematopoietic Cell Transplantation (HCT) Outcomes.	2015-18	C17 Research Network	$115,000	PI
5+14=0: A new Maths based on KIR genes to reduce Graft versus host disease after allogeneic HCT	2014-2100	Buckley Family Cancer Research Excel Award	$168,000	PI
Non-HLA Immunogenetic Biomarkers Important for Pathogenesis and Therapy of Complications of Paediatric Hematopoietic Cell Transplantation	2011-18	Alberta Children Hospital Foundation	$500,000	PI
Barb Ibbotson ACHF Chair Award	2010-2020	Alberta Children's Hospital Foundation	$500,000 $(50,00 per year)	PI

Medical Staff	Year	Funding Source	Total Award	*PI/CO-INV
Koebel, Martin				
Validation of CCNE1 as prognostic marker in tubo-ovarian high-grade serous carcinoma.	2018-2020	Terry Fox Research Institute	$25,000	PI
Kurek, Kyle				
ROHHAD Syndrome The project aims to determine the genetic basis for this rare disorder, Rapid-onset Obesity with Hypothalamic dysfunction, Hypoventilation, and Autonomic Dysregulation, and to characterize the neural crest tumors associated with this condition	2018-2020	ROHHAD Fight Association Award	$132,000	Co-PI
Non-heritable genetic diseases of the skeletal system: pathogenesis and treatment. The project aims to establish several animal models for PIK3CA-associated vascular anomaly-overgrowth disorders and to determine the genetic basis for other vascular and skeletal disorders.	2014-19	NIH-NIAMS	$500,000	Co-PI
Mansoor, Adnan				
Pan Canadian harmonization of Immunohistochemistry protocols for cell of origin classification of diffuse large B-cell lymphoma (DLBCL)	2017-18	Jensen Canada / Johnson & Johnson Research Fund	$56,430	Co-PI
Naugler, Christoper				
Early diagnosis of Alzheimer's disease: Development of validation techniques for quantitative spectral fluorescence microscopy	2017-18	Alberta Prion Research Institute	$73,163	PI
Understanding the barriers and facilitators to care in patients with poorly controlled diabetes.	2017-19	Canadian Diabetes Association Operating Grant	$274,338	Co-Inv
Using novel population-based datasets to produce and implement clinical prediction models for preterm preeclampsia stillbirth, maternal ICU and long-term cardiovascular disease among Canadian women	2016-2020	CIHR Project Scheme	$336,382	Co-Inv
Misutilization of laboratory tests: pathways to correction	2015-2020	CIHR Foundation Scheme	$1,056,420	PI
Misutilization of laboratory tests: pathways to correction.	2015-2020	University of Calgary & AB Innovates Health Solutions	$25,000	PI
Family integrated care (FiCare) in level II NICUs: An innovative program in Alberta	2015-18	AB Innovates Health Solutions Partnership for Research & Innovation in the Health System	$750,000	Co-Inv
Improving the efficient and equitable care of patients with chronic medical conditions	2014-19	Alberta Innovates Health Solutions, CRIO Team Grant	$5,000,000	Collaborator

Medical Staff	Year	Funding Source	Total Award	*PI/CO-INV
Implementation and evaluation of a clinical pathway for chronic kidney disease in primary care	2014-19	Canadian Institutes of Health Research	$524,421	Co-Inv
Pillai, Dylan				
C. difficile near patient testing (NPT): a cluster randomized trial	2018-2020	Clinical Research Fund, University of Calgary	$50,000	PI
C. difficile near patient testing (NPT): a cluster randomized trial	2017-2020	Canadian Institutes of Health Research	$328,950	PI
LAMP diagnostic for malaria in pregnancy	2017-19	Grand Challenges Canada	$100,000	PI
Malaria liver abnormalities in travelers	2017-18	Medicines for Malaria Venture	$17,800	PI
Prevention and treatment of chronic intra-cellular infectious diseases (PT-CIID)	2016-18	University of Calgary VPR Matching Funds	$200,000	Co-Inv
Pitout, Johann				
The molecular basis of the carbapenem resistance epidemic	2018-2022	National Institutes of Health (NIH)	$190,000	PI
Escherichia coli ST131: a model for high-risk transmission dynamics of antimicrobial resistance	2017-2020	JPIAMR/CHIR	$599,000	PI
Zhang, Kunyan				
Molecular assay development and their applications in the Centre for Antimicrobial Resistance (CAR) Program	2017-2022	Alberta Health Services –CAR Program Laboratory Operating Grant	$300,000	PI
Development of a New Multiplex PCR (M-PCR) Assay for Rapid Detection of Methicillin-Resistant Staphylococcus aureus (MRSA) Directly from Clinical Samples. (AMR Phase I)	2017-19	Canadian Institute of Health Research Operating Grant	$389,976	PI
Pilot Project-Development of a New Multi-plex PCR (M-PCR) Assay for Rapid Detec-tion of Methicillin-Resistant Staphylococcus aureus (MRSA). Directly from clinical samples (AMR-EOI)	2016-18	Canadian Institute of Health Research Operating Grant	$9,961	PI
The Bugs-to-Drugs Initiative	2016-2018	VP Research Office UofC (Operating Grant) Infections, Inflammation & Chronic Dis-eases (IICD) in a changing environment 2016 Call for Transformative Proposals	$250,000	o-PI

1.5 Banff Pathology Course

2018 Banff Pathology Course Program
Pulmonary, Thoracic & Lung Pathology
Banff Springs Hotel, Banff National Park
September 6-8, 2018



Guest Faculty / Keynote Speakers	
Andrew Churg, MD, PhD Professor of Pathology University of British Columbia British Columbia, BC	William Travis, MD Pathologist, Director Thoracic Pathology Memorial Sloan Kettering Cancer Center New York, NY
Joseph J. Maleszewski, MD Professor of Laboratory Medicine & Pathology Professor of Medicine Mayo Clinic Rochester, MN	

Wednesday, September 5	
17:00-18:30	Registration is open in KC 200 Galleria South
Thursday, September 6	
06:30-07:30	Registration in KC 200 Galleria South
06:30-07:30	Full Breakfast in KC105
07:30-07:40	Introductory Remarks & Welcome (Drs. Mengel/Naugler) in KC 201/203
07:40-08:40	Morning Keynote: Dr. Andrew Churg : Update on Diagnosis of Malignant Mesothelioma
08:40-09:30	Dr. Joseph Maleszewski: "Pulmonary Vascular Disease"
09:30-10:20	Dr. Moosa Khalil: "Thoracic Cytopathology Illustrated"
10:20-10:50	Break in KC 105
10:50-11:40	Dr. Andrew Churg: "Approach to Acute Lung Injury"
11:40-12:30	Dr. Colin Schieman: "Surgical considerations for biopsy related to interstitial lung disease"
12:30-14:00	Lunch Break in the Vistas Dining Room
14:00-15:00	Afternoon Keynote: Dr. Joseph Maleszewski: "Neoplastic Cardiac Pathology"
15:00-16:00	Local Faculty: "Non-Neoplastic Case Presentations"
17:30	Wine & Cheese Reception in KC 105
Friday, September 7	
06:30-07:30	Registration in KC 200 Galleria South
06:30-07:30	Full Breakfast in KC 105
07:30-07:40	Introductory Remarks & Welcome (Drs. Naugler/Mengel) in KC 201/203
07:40-08:40	Morning Keynote: Dr. Joseph Maleszewski: "Non-Neoplastic Cardiovascular Pathology for the General Anatomic Pathologist"
08:40-09:30	Dr. Andrew Chung: "Granulomatous Pulmonary Disease"
09:30-10:20	Dr. Mireille Kattar: "Thoracic Microbiology for the General Anatomic Pathologist"
10:20-10:50	Break in KC 105
10:50-11:40	Dr. Alain Tremblay: "Update on Lung Cancer Screening"
11:40-12:30	Local Faculty: "Neoplastic Case Presentations"
12:30-14:00	Lunch Break in the Vistas Dining Room
12:30-14:00	ASLP Annual Meeting in KC 205

14:00-15:00	14:00-15:00 Afternoon Keynote: Dr. William Travis: "Update on Lung Cancer and Staging"
15:00-16:00	Dr. William Travis: "Approach to Diagnosis of Lung Adenocarcinoma in Resection Specimens"
17:30	Wine & Cheese Reception KC 200 Galleria South
18:30	Banquet - Plated three course dinner in KC201/203
Saturday, September 8	
06:30-07:30	Registration in KC 200 Galleria South
06:30-07:30	Full Breakfast in KC 105
07:30-07:40	Introductory Remarks & Welcome (Drs. Naugler/Mengel) in KC 201/203
07:40-08:40	Morning Keynote: Dr. Andrew Churg: "Classification of Idiopathic Interstitial Pneumonia"
08:40-09:30	Dr. William Travis: Dr. Andrew Churg: "Value of Radiologic-Pathologic Correlation in Interstitial Lung Disease Diagnosis"
09:30-10:20	Drs. Margaret Kelly , Kelly Johannson and Tracy Elliot: "The Gold Standard in Action, ILD MDD"
10:20-10:50	Break in KC 105
10:50-11:40	Afternoon Keynote: Dr. William Travis: "Update on Mediastinal Tumors including Thymomas"
11:40-12:30	Dr. Doha Itani: "Molecular Thoracic Pathology"
12:30	Closing Remarks in KC 201/203
12:40	Departure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