2017 Annual Report

DEPARTMENT OF PATHOLOGY & LABORATORY MEDICINE

UNIVERSITY OF CALGARY

Alberta Health Services

Submitted by:
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Alberta Health Services - Calgary Zone

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Submissions from:
Division/Section Heads
Managers
Supervisors

Executive Summary

Department Structure and Organization

The Department of Pathology & Laboratory Medicine (DPLM) comprises the medical and scientific staff for Calgary Laboratory Services (CLS). Throughout 2017 it was composed of 6 CLS Divisions and had 88 primary clinical MD appointees and 17 clinical PhD scientists. There were 27 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.

Accomplishments and Highlights

The major clinical accomplishments of each of the 6 Sections are described individually in the report and are too numerous to list here. Academically, 2017 was another excellent year for publications with the maintenance of high levels of academic productivity over the past 4 years. Our residency training programs and fellowship training programs also continue to thrive.

Challenges

CLS performs >30 million laboratory tests per year. Every year, we face the challenge of providing increased services without proportionate increases in funding. Operationally, our biggest challenges are capital funding and space limitations in acute care sites and the DSC.

Workforce Planning

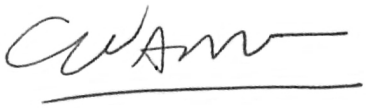
Detailed workforce planning models have been developed and suggest that 2 net new pathologist FTE positions are needed each year to keep up with increase workloads.

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

The year 2018 will be one of change, challenge and opportunity. CLS will officially merge into a larger provincial laboratory entity which will greatly accelerate provincial integration of clinical laboratories. Additionally, work on the adoption of a new Provincial Clinical Information System and preparations for the new Calgary Cancer Centre will continue to present challenges and opportunities.

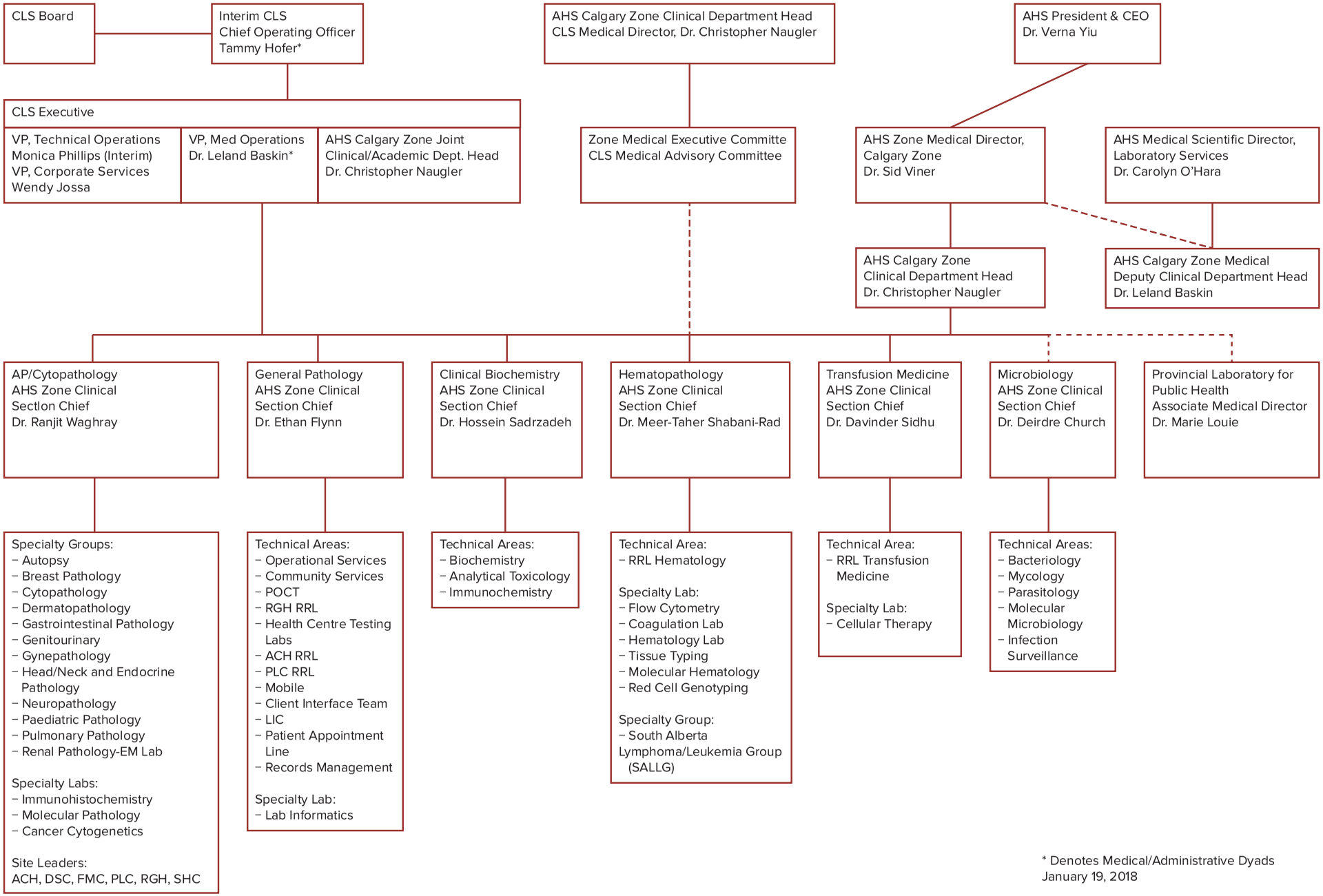


Christopher Naugler, MD
Professor and Head, Department of Pathology & Laboratory Medicine
University of Calgary Cumming School of Medicine/Alberta Health Services – Calgary Zone

Governance

It should be noted that Clinical Sections & Section Chiefs are Divisions and Division Heads in the U of C organizational structure.

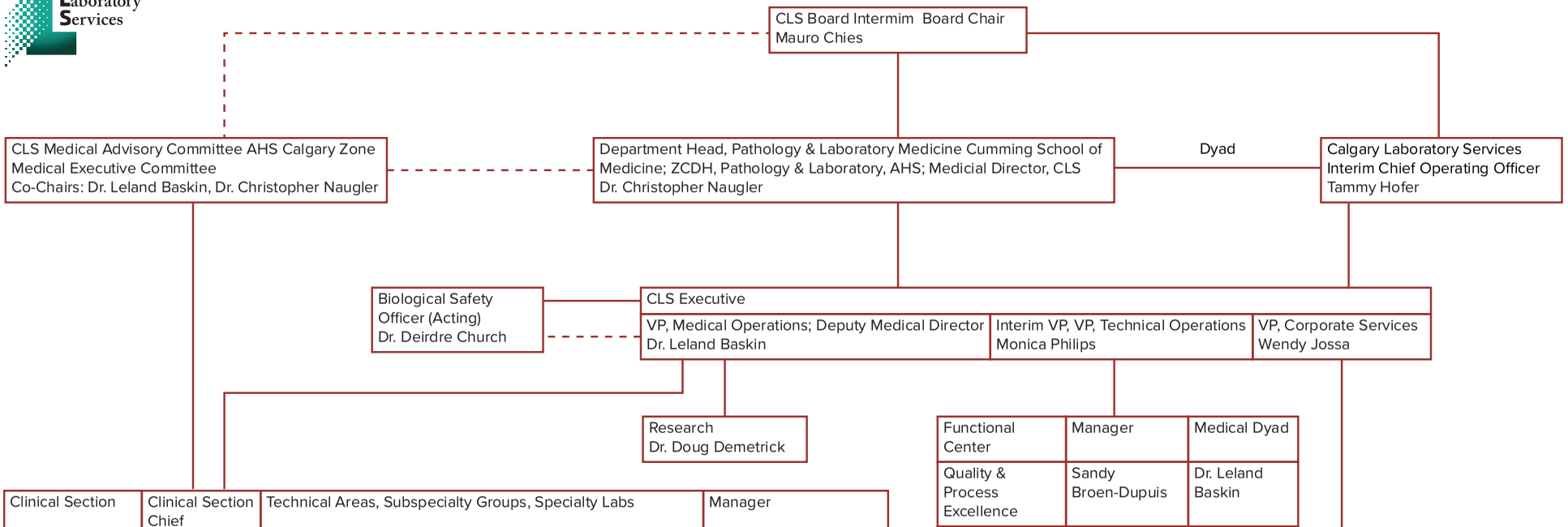
AHS CALGARY ZONE DEPARTMENT OF PATHOLOGY & LABORATORY MEDICINE



* Denotes Medical/Administrative Dyads

January 19, 2018

CLS Governance and Reporting Structure



Clinical Section	Clinical Section Chief	Technical Areas, Subspecialty Groups, Specialty Labs	Manager
General Pathology	Dr. Ethan Flynn	Operational Services	Chris Lemaire
		Community Services	Julia Hendry (Interim)
		RGH RRL, PLC RRL, ACH RRL, SHC RRL, HCTL, Clinical Education	Anita Bamford
		Specialty Group: Labinformatics	Chris Lemaire, Deb Ellas, Anita Bamford
		Client Interface Team, LIC, Patient Appointment Line, Records Management, Mobile Collection Services	Deb Ellas
		Calgary Zone Rural Laboratories	Monica Phillips
Clinical Biochemistry	Dr. Hossein Sadrzadeh	Biochemistry; Analytical Toxicology, Immunochemistry POCT	Sharon Kitt Anita Bamford (POCT)
Microbiology	Dr. Deirdre Church	Bacteriology, Mycology, Parasitology, Molecular Microbobiology, Infection Surveillance	Evelyn Fong
Hematopathology	Dr. Meer-Taher Shabani-Rad	Hematology; Histocompatibility & Immunogenetics Lab; Molecular Hematology; Flow Cytometry	Maureen Cyfra
Transfusion Medicine	Dr. Davinder Sidhu	Transfusion Medicine, Cellular Therapy Laboratory	Patricia Boutiller (Interim)
Anatomic Pathology/ Cytopathology	Dr. Ranjit Waghray	AP Site Leaders: ACH, DSC, FMC, PLC, RGH, SHC	Tracey Lenek
		Specialty Labs: Immunohistochemistry, Molecular Pathology, Cancer Cytogenetics	
		Subspecialty Groups: Autopsy, Breast Pathology, Cytopathology, Dermatopathollogy, Gastrointestinal Pathology, Genitourinary Pathology, Gynepathology, Head/Neck & Endocrine Pathology, Neuropathology, Paediatric Pathology, Pulmonary Pathology, Renal Pathology-EM Lab	
		Cancer Pathology Lead	

Functional Center	Manager	Medical Dyad
Quality & Process Excellence	Sandy Broen-Dupuis	Dr. Leland Baskin
Community Services Project Manager	Brenda Strange	Dr. Ethan Flynn

Functional Center	Manager	Medical Dyad
Human Resources and Legal Affairs	Sumana Dasgupta	Dr. Chris Naugler
Total Rewards	Kris Benson	Dr. Leland Baskin
EH&S	Chris Butler	Dr. Leland Baskin
Business Intelligence, Planning, Opportunities and Contracting	John Thrale	Dr. Chris Naugler
Finance Accounts Receivable, Procurement	Brad Keith	Dr. Leland Baskin
Logistics	Dirk Hauck	Dr. Ethan Flynn
IS Service Lead Administration	Dale Loroff	Dr. Ethan Flynn
Medical Affairs Coordinator	Glenda Schultz	Dr. Chris Naugler

October 17, 2017

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 Site Leader, 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. Lisa DiFrancesco
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, Co-Program Director
Dr. Amy Bromley, Co-Program Director
Dr. Travis Ogilvie
Dr. Iwona Auer-Grzesiak
Dr. Margaret Kelly
Dr. Lisa DiFrancesco
Dr. Mara Caragea
Dr. Sandra Lee
Dr. Leslie Hamilton
Dr. Kyle Kurek
Dr. Jenika Howell
Dr. Davinder Sidhu
Dr. Christopher Naugler (corresponding)
Dr. Marie Dvorakova
Dr. Charlene Hunter

Dr. Bamidele Adeagbo
Dr. Shaun Medlicott
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. Jaelene Mannerfeldt
Dr. Lucy Bradley

Microbiology Residency Training Committee

Dr. Julie Carson – Program Director
Dr. Wilson Chan
Dr. Andrew Johnson
Dr. Rupesh Chawla
Dr. Joseph Kim
Dr. Raymond Tellier
Dr. Davinder Sidhu
Dr. Dan Gregson
Dr. Thomas Griener

Neuropathology Residency Training Committee

Dr. Leslie Hamilton – Program Director
Dr. Lothar Resch – Assistant Program Director
Dr. Jeffrey Joseph
Dr. Jennifer Chan
Dr. Denise Ng
Dr. Tera Jones
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. Walid Mourad

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)

Improving Quality of Care Using New Technologies

Cancer Cytogenetics

- A "MiSeq" NGS was approved for purchase from ancillary funding. The instrument has been ordered and the accessory equipment required for the new platform has also been requested.

Molecular Pathology

- Two (2) Mass Array instruments were acquired. Validation is currently underway. Panels for lung, colon and neural tumors have been completed; melanoma and sarcoma panels are in development.

Streamling Workflow and Gaining Efficiencies

Anatomic Pathology

- Workflow analyses in transcription, Accessioning area and Gross Room were performed to identify improvement opportunities and to TAT targets. An evening transcription shift was implemented in September 2017 to better align the service with when the workload is ready for typing.
- The workload in Immunopathology increased by 19.6% in 2017.
- The MOU for the Renal Biobank has been extended for two (2) additional years – the new commitment will expire December 31, 2019. Also given the rigorous review by the OIPC and the number of questions related to IT securities,. This collaboration between the University and CLS has opened new opportunities for future use of the Biobank.
- The *"MacroPath"* digital imaging camera systems received for both PLC and RGH and are awaiting connection to the Network for photography & mapping of gross specimens.
- Integration of the intradepartmental consult (IDC) process in the "Vantage" Barcode Tracking System is underway.
- Five (5) additional DocVue licenses were purchased in an effort to reduce error codes and subsequent user lock out when the corporate activity exceeds the licensing capacity. Medical Transcriptionists utilize the document scanning program throughout their shift to transcribe information on the requisition with the surgical report.
- The overall workload decreased in Cytopathology by 12.5% and as such an initiative commenced to expand the skill sets of Cytotechnologists. This included training a limited number of volunteers to perform on site assessments including renal biopsy collection, microtomy and grossing colposcopy specimens.
- The new Liquid Base Cytology (LBC) equipment from Hologic was installed and validated.
- Individual performance metrics have been established for the Cytotechnologists which include accuracy rate, abnormal cell detection rate and discrepant interpretation. As of August 2017, monthly reports will be distributed to each tech detailing their individual performance with the target of achieving 98% accuracy.

Cancer Centre Planning

- 50% of the design is complete for Molecular Pathology, Cancer Cytogenomics and the Paraffin Block Storage Room. This will be an excellent collaboration that would enhance laboratory use for the benefit of patients at the Calgary Cancer Centre.

Staffing

Although a number of physicians were interviewed in 2017 not all were able to join CLS however, some are in the process of getting through the rigorous barriers for licensing and in Alberta. Ensuring adequate staffing will allow for good turnaround-times of reports and benefit timely patient care.

Clinical Biochemistry Section

Faculty update:

- Dr. Jessica Gifford, our last year chief fellow, started her 0.75 FTE position at CLS on August 1, 2017. She works at DSC and is involved in general chemistry and quality management. She is also a backup for Dr. Lyle Redman, who is 0.6 FTE. Dr. Gifford is becoming familiar with all Dr. Redman's responsibilities including SPEP reading and interpretation and will be able to cover for him in 2018.
- Dr. Allison Venner started her role as the Provincial Lead for POCT in July 2017. She works as 0.5 FTE for CLS and 0.5 FTE for the province.
- Dr. Alex Chin has continued his training in immunology by attending more meetings and workshops in 2017. He continues to attend meetings at MADL.
- Dr. Jessica Boyd is the new Clinical Co-Chair of the AHS Toxicology Network.
- Dr. Lawrence de Koning became a GFT with the University of Calgary starting in January 2018.

Research update:

- Canadian Longitudinal Study on Aging (CLSA) continues smoothly. We successfully completed the first year work. Dr. Sadrzadeh met with the PI and co-PIs online to discuss pros and cons of keeping vitamin D test. After discussion the group agreed to discontinue vitamin D. Dr. Sadrzadeh suggested combination of NT-proBNP and high sensitivity Troponin T to screen for patients who are susceptible to develop cardiac disease. The scientists agreed. The financial part of adding new test has to be discussed with CLS finance.
- Alberta Tomorrow Project continues smoothly.
- Pegasus first trimester screening research project sponsored by Perkin Elmer continues.
- Active vitamin B12 project (PI, Dr. Sadrzadeh) started in late 2016 and continues in 2017. The results of this study was presented as a poster at AACC.
- Thyrotropin receptor antibody (TSI) project (PI, Dr. 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. 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 – Dr. Jessica Boyd and Dr. 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 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.

Fellowship update:

- 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 and Scientific Centre (community general chemistry, immunology, endocrinology, analytical TDM & toxicology and special chemistry), acute care hospitals and urgent care centres (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. In 2017, our fellows have presented seven abstracts at local, national, and international meetings.

- Our past trainees have been very successful in finding positions as clinical biochemists in clinical laboratories. Our fourth trainee, Dr. Joshua Buse is in his second year of training and has secured a position as a Clinical Biochemist in Regina with the Saskatchewan Health Authority (formerly the Regina Qu'Appelle Health Region). Our fifth trainee, Dr. Jason Robinson has been recruited from the Baylor College of Medicine and is well underway in his first year of training. We will be accepting a sixth trainee for July 2018 commencement. The plan is to continue accepting one fellow per year for a two year training cycle. This year we received 30 qualified applications. Three clinical chemists; Drs. Jessica Gifford, Alex Chin and Hossein Sadrzadeh reviewed all 30 application and chose two candidates for an in-person interview and 10 applicants for telephone interview. One more candidate will be selected telephone form the latter group for in-person interview. The three candidates selected for in-person interviews will present a 45-minutes talk and meet with all the leaders in chemistry division including the manager and supervisors, as well as, few general pathologist. The best candidate will be selected by the group.
- 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 Baskin, Flynn, Shabani-Rad, Ng, and a cytogenetics and molecular pathologist scientist, Dr. Fariborz Kolvear will provide addition teaching and training.

Clinical Service Update:

DSC General Chemistry:

- At the end of October 2017, a new pre-analytic system was installed in DSC Chemistry. This system consists of two instruments that serve to de-cap, sort, and load samples into racks; and select to which of the 4 general chemistry lines the samples should go to. In addition, an extensive track system has been put into place to connect the lines to the pre-analytic modules and direct the samples. Once the samples are finished being analyzed they are returned by the track to the pre-analytic system where they are archived.
- 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 have included the introduction of a 4th chemistry line for testing urines and esoteric proteins which was necessary following the decommissioning of two standalone instrument that occurred in September. Together, these additions to the lab will enable us to run more than 14,000 samples per day. Currently, DSC chemistry runs 10,000 samples per day and operates at 70% capacity due to our immunoassay modules that will hopefully be replaced by faster versions in the 2018. The new system and track will also allow us to improve our reagent use and perform reflex testing automatically.
- The track system now in use in DSC chemistry is the first of its kind in Canada and the second in North America. As we were with the c 513 platforms, we anticipate being asked by the vendor in 2018 to facilitate a number of tours of our facilities 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.
- Analytical Toxicology will get two new LC-MS/MS instruments. The first will be a replacement for the API3000, which is 15 years old. 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. These instruments perform free light chains, apolipoproteins A and B, urinary alpha 1 microglobulin, and IgG subclasses.

Point of Care Testing:

- The work on developing Quality Control material for Transcutaneous Bilirubin measurement continues. Two members of POCT team, in collaboration with polymer scientists at U of C developed a polymer that can be used as QC material for bilirubinometer. The team is working to improve the color of the polymer and the QC results.
- Glucose meter- Discussions continue with Roche regarding various operating problems including batteries and docking station issues.
- Activated clotting time quality project finalized during this period but not put into action because of a shortage of perfusion staff.

Publications:

- Total original contributions: 18
- Total Submitted manuscripts: 6

Grant Funding:

- Total funding received: $460,000

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), 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.

Community Services

- Team Care has been implemented at an additional 14 sites; there is only one site remaining to implement pending site renovations. This process change provides visual cues to recognize and address bottlenecks in our process and promotes a team work approach to patient care within our collection sites. We have realized some dramatic improvements in walk-in patient wait times (PWT) due to the process change, appointment patient wait times have experienced a small increase related to this change. The overall patient wait times are becoming more consistent and we are working on further improvements to consistently meet our PWT target.
- Ongoing hiring of casual employees was implemented in late 2017 to ensure a steady supply of staff to provide coverage for unexpected absences, vacations, and leaves without incurring overtime costs.
- Continued to work with Chemistry and Microbiology Clinical Sections for the introduction of *H. pylori* stool collection in adults, to decrease Urea breath test appointments, improve patient care and reduce wait times for appointments for Urea breath test. The stool antigen test became the primary screening method for *H. pylori* effective January 2018.
- Changes were made in the leadership structure of the PSCs replacing OLC positions with Supervisor positions to improve support and oversight for all locations. Portfolios were reallocated to balance workload for supervisors and reduce the number of sites per supervisor to 2-3.
- Cost savings and staff safety initiative to reduce butterfly needle use were introduced and has been successful.
- Worked with Organizational Development and Human Resources on In-services for team leads: in-scope coaching, leading with intent, dealing with upset patients and addressing patient expectations.
- We continue to revise and improve our ECG Escalation process which has been effective by expediting the care of patients presenting at the PSCs for ECG testing while experiencing cardiac events. The most recent revision addresses patients who may be experiencing a cardiac event with atypical symptoms.
- Options for capturing real time patient feedback have been explored and developed for implementation in 2018.
- Many locations received cosmetic upgrades in 2017 with new flooring, painting and improved wayfinding signage.
- A workshop was developed to further disseminate information about the Respectful Workplace and provide opportunities for staff to practice addressing conflict informally with each other. These workshops will be held at each site during the first half of 2018.

Client Services

Lab Information Centre (LIC)

- April 2017- LIC began communicating critical venous blood gases for Calgary Emergency Departments. This change reduces the work for Respiratory staff and allows CLS RRL Medical Laboratory Technologists to focus on testing.
- November 2017- LIC began auditing the Millennium Critical Results Queue to ensure that results which qualify for the queue correspond to the current published CLS Critical Value list. The results of this audit have led to increased standardization between the Critical Results Queue results and the published CLS Critical Values list.
- December 2017- Client Services staff attended training sessions about non-conforming events (NCE) and reviewed their role in the NCE notification process. These training sessions have increased awareness of required communication when NCE are reported and the required steps to alert stakeholders.
- December 2017- LIC add-on request process was successfully transitioned from faxing to printing for all Calgary testing locations. This process change has reduced paper usage by half and improved legibility of the transmission for the receiver.
- January to December 2017 - Continued development of an electronic reference for LIC staff which includes information not contained in the CLS Guide to Services. This reference helps LIC staff ensure they are providing accurate and consistent information, and improves and standardizes our client experience.

Patient Appointment Line (PAL)

- Client Services Feedback Tracking was refined by grouping similar inquiries/answers together. This allows consistent communication with patient inquiries/feedback and helps the department identify opportunities to adjust the PAL Frequently Asked Questions page based on patient feedback.
- April 2017- TimeTrade (patient appointment scheduling system) was successfully transitioned from Tenzing Managed IT Services to IBM SoftLayer servers with minimal impact to patients/staff. This has provided increased system stability and a reduction in unscheduled system service interruptions.
- June 2017 TimeTrade Privacy Impact Assessment (PIA) was reviewed and approved by the Office of the Information and Privacy Commissioner. As a result of this review, standardized comments were developed for staff to enter into the patient appointment booking details to reduce the amount of patient information stored in the system and to ensure compliance with the PIA requirements. A monthly comment audit was developed to monitor comments entered in the system. This helps ensure compliance with the updated PIA requirements. Current audit results show that PAL is now 99.9% compliant with the updated requirements.
- October 2017 – a feature was added to the Patient Appointment Booking System (PABS) to show the soonest available appointment within each site. This enhancement provides patients another way to search for an appointment date and time to suit their needs.
- December 2017 - An electronic reference binder was created for PAL agents to replace the current hard copy manuals. This simplifies the process to keep required information current, reduces the time spent managing the hard copy binders and has reduced paper utilization in the department.

Client Interface Team (CIT)

- CIT continued work with project teams and Sunrise Clinical Manager (SCM) Ambulatory Outpatient clinics to convert clinics from paper reports to a paperless process. This has led to a reduction of approximately 250,000 charts since the project began in 2014.
- CIT worked with the Calgary Zone Ambulatory Information Technology (IT) Subcommittee, clinic leaders and Patient Identification Encounter Management (PIEM) Operations to resolve an issue with fee for service physicians in November 2017 (part of the SCM paper cessation project). The fee for service physicians do not have access to SCM, and paper Anatomical Pathology (AP) provider reports had to be printed to have reports to go to the fee for service physicians. This resulted in duplicate reports for those physicians associated with the affected clinics. The resolution was the creation/ modification of two Clinibase specimen labels: CHR – Lab/DI Encounter Label and CHR – Lab No Encounter Label. This has eliminated the duplicate reports for the physicians associated with the clinics.
- CIT and CLS Mobile Collection Service (MCS) worked with ten Supportive Living 4 (SL4) facilities to change collection and report distribution times. An automated remote print to secure fax machines on individual units was introduced. An additional print time (16:30) was added to the existing remote print distribution. Facilities benefited by receiving results sooner directly to the unit where the tests were ordered.
- CIT began converting Long Term Care (LTC) facility report distributions from printing to a single location, to a print to individual units. Six facilities were converted in 2017. The goal is to have all existing LTCs converted to the new process by Spring 2018. This change reduces turnaround time for laboratory results to be received, thus improving patient care. This change should also result in fewer calls to LIC from LTCs requesting results.

- CIT continues to work with Gen-Clozapine and Clozaril Support Networks (GenCan, CSAN and AA Pharma) to reduce the number of ad hoc requests for CBC results. This involves adding appropriate copy to requests to Standing Order requisitions and calling physicians to request they reissue requisitions to patients which include the appropriate information to ensure results are directed to the appropriate network.
- CIT developed a Standard Operating Procedure (SOP) to handle requisitions with erroneously added tests (not requested by Healthcare Providers). This will help standardize the management of these test requests across LIC, CIT and the affected testing departments. Implementation is planned for early 2018.

Records Management

Data Integrity Team (DIT)

- Three new Laboratories and Histotrac Module were added to the Millennium Laboratory Information System (LIS) in the Fall of 2017: University of Alberta (data entry of referral specimens to CLS), Genetic Laboratory Services (GLS) Edmonton and Mitogen Advanced Diagnostics Laboratory (MADL). CLS DIT provides investigation and remediation support for these additions.
- DIT Lead has provided educational support to MADL for data entry for out-of-province referral testing.
- DIT worked with Histocompatibility & Immunogenetics (HIL) to develop an audit to capture patient demographic discrepancies between Millennium LIS and the HistoTrac Module.
- An attending/ ordering mismatch audit was developed to capture data entry errors when multiple requisitions are entered on one encounter. This audit mitigates the patient safety risk of results not being sent to a Healthcare Provider's electronic medical record (EMR).
- Mobile Collection Services, DIT and CIT worked together to reduce the number of temporary physicians generated as the result of incomplete requestor information on requisitions for acute care discharged inpatients. A process was developed to identify common sources of problematic requisitions, and targeted follow-up information such as requisition aids, are sent to provide additional support and instruction to the identified sources.
- The Data Integrity Team Patient Demographics Group completed cross training for remediating > 20 audits and how to handle patient overlays. This cross training will help reduce the risk of loss of specialized knowledge if staff transition out of this team.

Records

- Records Clerks began sending notifiable communicable disease reports to extra-regional Medical Officers of Health (MOH) in South Zone.
- Records team developed a workflow strategy for regular re-filing to help reduce the back log of un-filed tissue blocks and slides.

Mail Room

- New NeoShip labels (web based application) were introduced in the mail room for sending parcels through Canada Post.
- Mail Room clerks worked with the DIT Physician Build Group to identify physicians with high volume of mailed reports. The goal is to target these physicians to offer alternate means of report distribution.

Optical Scanning

- July 2017- DocVue was successfully upgraded to Version 10.
- Five additional viewing licenses were added to DocVue to support the increasing number of system users in Operations. There are now thirty licenses in place for use to allow better access for Operations staff.

Mobile Collection Services

- August 2017- After-hours collection service was discontinued to align with our Provincial Laboratory partners. This eliminated the Medical Laboratory Assistant (MLA) on-call coverage for weekday evenings (1600h-2000h) which resulted in cost savings. There was an introduction of same-day priority requests for blood work; these priority requests are accepted daily until 1330h. This change has greatly reduced the chaotic nature of the afternoon workflows and reduced MLA overtime.
- October 2016 to May 2017- In order to accommodate an additional 1542 supportive (SL4) beds in the community in 2017, Mobile staff were involved in a SCORE project that created efficiencies and balanced workloads of the MLAs. By reviewing data for each facility and collections per MLA, appropriate collection times, number of MLAs at each site and implementing a rotating schedule, the outcome of the SCORE project resulted in a greater balance of collections per MLA and a more manageable and predictable workflow.
- May 2017- After data analysis and in consultation with the Anticoagulation Clinic leadership, Mobile workflow that required specimens for INR tests for anticoagulation patients to be dropped off at the testing site by 1300h was discontinued. Mobile MLAs are now managing all of their patients based on testing criteria and not focusing on the anti-co-

agulant INRs. Follow-up audits have found that most INR results are being reported prior to 1600h. This has created approximately 1 hour of capacity per MLA per day.

- May 2017- Cost savings found by utilizing Millennium-generated collector barcode labels instead of purchasing expensive stamps that use inkpads.
- During a safety review of Mobile MLA collection bags, it was identified that the canvas supply bags were difficult to disinfect. New Collection tool boxes were developed for each MLA to use for single home patient collections. Only supplies required need to be brought into the patient's home and disinfection of the tool boxes is easier compared to the canvas collection bags.
- Created in AHS Tableau database a new, more user-friendly data pull of the report card for the 105min TAT for each collector's specimens.
- An electronic Excel Daily log sheet of MCS workloads that is fillable and accessible in the server-based MCS Leadership Folder was created to eliminate the existing hard copy log sheet.
- In order to save MLAII time in faxing and emailing information daily to MLAs, a new folder was created in the private IT drive for the MLAs to access history forms for their patients, Lodge lists and a COFA 5 folder for patients with hard to find addresses.
- December 2017- A Service Level Agreement signed with CBI Health Group to provide funded Mobile collections to a new Workers Compensation Board (WCB) rehabilitation facility.

Clinical Education

- MLT pass rate for June 2017 CSMLS exam: 92.2% / National Average for accredited programs: 93.8%.
- A total of 48 SAIT MLA students and 59 ABES MLA students performed their practicum at CLS in 2017.
- In June 2017 CLS had 51 MLT students graduate and there are currently 40 MLT students performing their practicum at CLS.
- CLS Hires in 2017: 26 ABES MLA graduates were hired at CLS, of which 24 are still employed; 8 SAIT MLA graduates were hired and are still employed; and 9 SAIT MLT graduates were hired and are still employed. These numbers are less than for 2016, however with starting to hire more MLAs in the testing areas, and the new SAIT Enhancing MLA program, we would expect these numbers to increase in 2018. MLT numbers could also rise if retirement numbers increase.
- SAIT Fall MLA student intake will follow a new curriculum – 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.
- SAIT Advisory Council meeting in November 2017 – heard from BC and Saskatchewan who are having problems recruiting MLTs.

Health Centre Testing Laboratories (HCTL)

- End of January 2017, went live with the Sysmex XN-550 Hematology analyzers at Airdrie (ACHC), South Calgary (SCHC), Sheldon M. Chumir (SMCHC) and Cochrane (CCHC) HCTLs. These analyzers were 4 of the first 6 analyzers of that model in North America.
- Poster relating to being of the first in North America with the Sysmex XN-550 was presented at the Canadian Society for Medical Laboratory Science (CSMLS) Congress in May 2017.
- Subsequent to go live, data was gathered and shared with the vendor to establish and then validate changes in flagging parameters. The changes made were then used for the launch of the analyzers in the US later in 2017.
- SMCHC has been approached by Sysmex to be a beta test site for a QC monitoring program which will begin in January 2018.
- HCTL MLT III was the change lead for Standardizing PathNet auto-verification parameters with Web Access Management (WAM) auto-validating parameters. This resulted in HCTL, Calgary Rural Labs (CRL), South Health Campus Rapid Response Laboratory (RRL) and Alberta Children's Hospital (ACH) RRL being able to take advantage of slide review changes that were implemented with WAM. This means fewer slide reviews by MLTs. The standardization work continues.
- HCTL Manager and Supervisor met with Diagnostic Imaging (DI) Manager and Supervisor and Union representatives for both the CLS HSAA and AHS HSAA contracts, to collaboratively work through the logistics of hiring a combined Laboratory and X-Ray Technologist (CLXT) to cover the night shift at Airdrie Community Health Centre (ACHC) for when the site went live 24 x 7 on April 3, 2017. It was decided to hire 2 X 0.7 FTE Temporary CLXT and a casual to help cover when regular staff were on vacation or sick.
- Hired 2 CLXT's – one in February plus a casual– trained at HCTL to be ready for opening and a second CLXT to start training in late April at the HCTL to be ready first part of June. A total of 4 CLXT's have been hired and trained to date.
- Met with Airdrie UC senior management to work through sample transport process on the night shift as the CLS cou-

rier would not be involved. 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.

- April 3, 2017 – Airdrie Urgent Care went 24 x 7 – went fairly smoothl– a few bumps that were quickly rectified and has gone well since.
- HCTL continue to meet the targets as established in the TAT metrics. A change in courier routing in October added extended times to offsite STAT testing. To resolve this we changed routing from Airdrie and Cochrane to route directly to FMC for testing rather than stopping at the DSC first.
- June 19, 2017 – mock Code Orange was called and both SCHC and SMCHC were involved. Good exercise to evaluate current processes and the need to revise some of those processes identified as deficient through the exercise.
- SCHC received a Mini-Vidas lab analyzer to replace their existing Mini-Vidas analyzer that was sun setting by the end of 2017. Instrument work up and validation went well. The instrument was in operation in December.
- 2017 workload saw an increase of 27.29% at Airdrie HCTL – due to going 24x7. Saw decreases in volumes at SCHC by 9.41%, Cochrane Testing Lab by 9.84% and Sheldon Chumir by 7.03%. This was due in part to changes in the Chest Pain Protocol ay the UCs – no longer ordering PTT - and Clinitek urinalysis analyzers being placed within the UC spaces.
- The HCTLs were invited for the first time to the CLS Job Fair for graduating MLT students, and the HCTL MLT III attended. A large amount of interest by the students was shown; subsequently the HCTL offered SAIT student tours at the SMCHC site. The students have given positive feedback on this opportunity to see our HCTL lab model.
- HCTLs provided personnel for testing of the 2015 version Millennium upgrade.
- A new D-Dimer assay was implemented CLS-wide; HCTLs verified the method and the LIS changes required.
- Preliminary method evaluation was performed for a new formulation of LDH assay on the Vitros which would allow direct reporting with the present reference range. This would eliminate the adjustment currently required.
- In conjunction with the Client Interface Team (CIT), 4 lab information in-services at SMCHC and SCHC were presented to Hemodialysis staff (2 per site). Lab tours were requested as a result and tours have been given at the SMCHC site. Visual aids have been developed by the MLA and MLTs at SMCHC to aid in correct collection of samples. We have developed a close working relationship with the Clinical Educator at SMCHC as a result of these contacts, and this has greatly improved the working environment for both the lab and the unit. More in-services are being given in 2018.
- In response to a routing issue with timed samples ordered through SCM, a work around on the lab side was developed to allow Urgent Care to continue to manage and track sample collection using the timed status.
- A -70C freezer destined for disposal was rescued, qualified and put into use at SMCHC for storage of QC material. This will cut shipping costs as QC will all be shipped to SMCHC rather than all 4 HCTL sites, and will help with trouble-shooting as the storage conditions for the QC will be constant rather than variable.
- 1 casual MLT has been hired and trained, as casual staff hired in 2016 were absorbed into other positions.
- HCTL MLT II participated in development of CLS Training Tool Kit.
- HCTL MLT III volunteered to be a committee member for RFP for province-wide urine BHCG kit.

Operational Services

- Referrals tests listed in CLS Guide to Services, added standard header directly below test name: Referred out for testing. Provincial Laboratory tests also indicates website link.
- In consultation with clinical section chiefs of TM and Operational Services, and in coordination with the manager of the ACH Hemophilia clinic created a procedure for assisting hemophilia patents with blood factors in the ACH OP lab, in consideration of patient and employee safety impacts.
- ACH Accession assisted AHS Public Health with blood collections for employees exposed to measles.
- Implementation of, and continued trials of, tracking of specimens at Hospital sites. Stakeholders include AP, Accession, DSC Microbiology. Major milestones for the Accession team include: May 2017 FMC: Trial track AP specimens arriving to the Accession areas after AP hours. Deemed permanent process in June 2017. Oct 2017 FMC to DSC Micro: Track bronchoalveolar lavage (BAL) specimens. Deemed permanent process Dec 8, 2017. Jan 2018, Feb 2018: Roll out after hours AP tracking to ACH, PLC (Jan), RGH, SHC (Feb).
- SHC continued changes made to staffing balance to accommodate increase percentage (20% increase) of patients utilizing Outpatient Collection laboratory.
- SHC piloting a violence/aggression alert program, partnered with Workplace Health and Safety, with Accession as a stakeholder for input. Program constitutes aggressive alert symbol of orange circle, along with consistent messaging "the patient has a specific care plan" in communications with patients, families and visitors, and health care staff.
- SHC has begun training on direct application on Newborn Metabolic Screening (NMS) cards.
- Privacy screens were installed on all Outpatient lab computers.

- Renin and Renin/Aldosterone GTS pages updated to mitigate errors. A memo was also issued by Immunochemistry to communicate the changes.
- Employee safety visuals implemented to advise on storage and retrieval of eclipse needles to reduce needlestick injuries from clean needles.
- Due to accidents with "exacto" type knives, and with the support of EHS a safer product, Klever Koncept, was rolled out as a best product to reduce risk across CLS.
- Facilitated blood collection for two days for CLS Immunochemistry section. Collection of SST and RST on 22 participants to validate additional tests to be performed on RST tubes. This will help reduce overtime in PSCs as RST tubes are a rapid clotting tube and can be centrifuged within 5 minutes as opposed to 30 minutes for SST.
- Stakeholder review and improvement of regional Dumbwaiter Procedure. Stakeholders include AP, Accession, Courier, CLS Finance and AHS Facilities. Changes to procedure include clarification about roles and responsibilities, delineation of stat/routine request for service, and notification of dumbwaiter checks and all clear.
- Improved process for handling ADAMTS13, and for changing testing location from Mayo to Mitogen Advanced Diagnostic Laboratories (MADL). Routing changed from DSC Referrals to FMC Accession for improved response time, and for direct pickup at FMC Accession by MADL.
- Effective November 15, 2017, CLS changed to using a new tourniquet for each patient during blood collection. CLS has worked with our supplier to switch to a bulk bag of 250 tourniquets and this helps significantly with the added costs.
- Operational changes implemented in response to MADL implementation of Millennium, effective October 23, 2017.
- Correction of system in response to complaint by U of A lab regarding leaking urine specimens for urine citrate. Overfilling of tubes contributing factor. CLS GTS indicated 10mL required. Changes to U of A GTS and CLS GTS to require 3mL has been completed. Also Referrals team will be single patient processing urines to mitigate risk of contamination of non-leaking urines. On January 23, 2018, feedback was received by the UAH lab as follows: "We have noticed a big improvement since our efforts to clarify sample volumes. Samples are being sent from CLS with a much more appropriate volume, and we have not had any issues so far with receiving leaking samples".
- Data entry for immigration samples from Marlborough PSC has been transferred to DSC Accession. This is to ease the workload at the PSC with the intent to improve PSC wait times.
- Continued roll out of ID Band initiative at FMC, PLC and ACH to reduce the frequency of patients without identification bands (ID bands) within Inpatient, Emergency and Day Surgery units using roll out tools utilized at RGH and SHC. Education of patients, nursing and laboratory staff with distribution of patient safety memo and Q&A in collaboration with Patient Care Manager, Nursing Educators, and site administrators.
- To address gaps discovered with Internal Equipment audit, Operational Services decision to add three procedures for MLAII one time reading in Traccess: AD09-1.036 Implementation of Laboratory equipment; AD09-1.080 Documentation and review of equipment maintenance; REG01-165 Storage condition monitoring and equipment. Supervisors SOPs for understanding of requirements and roles with MLAII's by Oct 31, 2017.
- AHS Hand Hygiene auditing guidelines updated. Subsequent provincial review of laboratory phlebotomy SOPs to ensure four moments of hand hygiene requirements as related to hospital environment, patient environment and biological risk, in addition to options for combined or compressed moments. Scrutinized review of laboratory scenarios in collaboration and consultation with AHS Infection Prevention and Control. MLA education tool kit in progress for roll out CLS wide in 2018.
- The implementation of HistoTrac in the HIL/Tissue Typing department scheduled for September 25, 2017. DSC Accession collaboration with Histocompatibility and Immunogenetics Lab (HIL)/Tissue Typing for testing and education of Histotrack implementation. ACH Accession facilitated an MLA resource for two weeks to assist HIL lab. CLS / CRL Preanalytics wide roll out of a temporary job aid table summarizing the changes between the current and new test names and Millennium orderables in addition to a new HIL requisition for reference.
- Beginning July 2017, CLS tests for serum protein electrophoresis from Drumheller, Hanna and Three Hills, approximately 40 per month, data entry done by DSC Accession.
- CLS Operational Services representation at the provincial laboratory level for stakeholder input and development of AHS Laboratory Guideline for Laboratory Personnel on the Skin to Skin Technique during micro collections. Subsequently, CLS Operational Services and Quality collaboration and developed CLS resources for implementation including SOP changes and training checklists to ensure: employee good posture and ergonomic safety, scripts for communicating with the parent and patient positioning for safety. CLS Accession at Calgary hospitals (FMC, PLC, RGH, ACH, PLC) in collaboration with their site nursing educators, fully implemented these guidelines by October 1, 2017 in full support of pain management system. As of November 1, 2017 all Accession sites have implemented the skin to skin technique.

- To comply with the safety for alcohol based hand rub requirements in securing any container larger than 400ml. Solution implemented to install a locking device; facilities can weld a component to the phlebotomy carts to hold the container.
- DSC/PSC: there has been a significant issue where frozen samples from the PSCs were arriving at the DSC partially thawed or completely thawed. DSC leadership, PSC leadership and Quality developed a transportation process so that frozen samples remain frozen. The frozen samples will be packed on ice packs and sent in standard styrofoam containers within a cardboard box.
- Accession worked collaboratively with Cancer Cytogenetics to improve their requisition by including orderables and clear instructions for collection.
- ESS (payroll employee self-service) practices audited across Accession and re-education and implementation of best practices occurred in June 2017.
- June 2017 FMC/PLC/ACH/RGH: Venous blood gas testing of Emergency Department specimens. Accession worked collaboratively with Chemistry for implementation and notification.
- Mock Disaster Code Orange, occurred at all Calgary Acute Care hospitals with Accession participating in the exercise and debrief.
- June 2017, RGH Accession in consultation with ICU/CCU director and site directors: Approval to change sweep times from 06:00 to 05:00 and add additional 07:00 sweep. This improves service. TATs are being monitored to ensure success.
- Nov 2017, FMC implementation of master rotation for scheduling, to ensure continued competency in all duties.
- Feb 2017, ACH collaboration with Rotary Flames House (RFH) with phlebotomy services to their offsite facility. An SLA between RFH and CLS was signed which establishes the process. ACH Accession will absorb this work with current staffing levels and operations.
- DSC Accession Referrals in collaboration with University of Alberta Hospital lab. UofA Referrals started using Cerner Millennium to data enter some tests that are referred to CLS for testing to improve accuracy and quality of ordering and improve tracking of samples, and for time savings overall.
- DSC Accession implementation and operationalization of Alberta Tomorrow Project. CLS is data entering and testing samples for this 3 year clinical trial. This is revenue generating for CLS.
- SHC had a potential Viral Hemorrhagic Fever (VHF) case (later ruled out for VHF) which resulted in just in time PPE training for 4 MLA core staff. Collection kits were prepared in case the patient was admitted to SHC inpatient service. There was thorough collaboration between CLS Medical Microbiologist and SHC Operational Services Team.

Calgary Rural Labs

- QSE: Organization
- QSE: Customer Focus
  - Implementation of Q-Matic system at Okotoks Health and Wellness Centre Outpatient Laboratory to track patient wait time on Tableau.
  - Hot-Shot transport service provided by Silverstar in place for Calgary Rural decreasing turn-around time for STAT samples, July 2017.
- QSE: Safety and Facilities
  - Strathmore Hospital Laboratory relocated to a new space including modular design for ergonomic and efficient workflow August 2017.
  - Implementation of sit/stand workstation at Okotoks outpatient area, December 2017.
- QSE: Personnel
  - Respectful workplace policy rolled out to Calgary Rural Staff via performance conversations, ongoing.
  - Coaching Tool for In Scope Leadership rolled out to Senior Staff, May 2017 and ongoing.
  - Accepted five Northern Alberta Institute of Technology combined Laboratory and X-Ray Technology students at Oilfields/Okotoks, Didsbury, Strathmore, Claresholm/Vulcan, and for the first time ever High River for clinical training, August 2017.
  - Accepted one Southern Alberta Institute of Technology Medical Laboratory Technology student at High River Laboratory, multiple rotations.
  - Continued acceptance of Alberta Business Education School and Southern Alberta Institute of Technology Medical Laboratory Assistant students at all sites, ongoing.
  - Utilizing attrition replaced MLT with MLA at Oilfields Laboratory, MLT with CLXT at Strathmore Hospital Laboratory and CLXT with MLT at Canmore Hospital Laboratory for more appropriate use of skillset, 3rd quarter 2017.
  - In response to Bill 4: An Act to Implement a Supreme Court Ruling Governing Essential Services becoming law, Non EE Managers (AHS) CRL Supervisors worked with zone and site leadership to determine Essential Services for laboratory should a job action or lockout occur during bargaining with union groups, December 2017.

- QSE: Purchasing/Inventory
  - Butterfly needle usage initiatives to reduce costs and unnecessary usage, include staff education, sign-out process, and periodic review of progress to assess success in reduction of butterfly collection sets, October 2017.
- QSE: Equipment
  - Sysmex XN-550 Hematology analyzers installed at Claresholm, Didsbury, Okotoks, Oilfields, Vulcan and Banff Laboratories, June 2017.
  - TOP300 Coagulation instrument installed at Strathmore Laboratory, June 2017.
  - GEM4000 Blood Gas instrument installed at Canmore Laboratory, July 2017.
  - GEM4000 Blood Gas instrument installed at High River Laboratory, November 2017.
- QSE: Process Management
  - Implementation of CRP testing at High River April 2017. Samples referred in from Oilfields, Claresholm, and Vulcan in addition to testing those collected on-site.
  - Stock RBC units placed in Didsbury, Banff and Oilfields Laboratories to allow for computer crossmatch and decreased transport time of crossmatched units, July 2017.
- QSE: Document or Records
- QSE: Information Management
  - Didsbury Laboratory live on MARS Holter Monitor system May 2017. Patient information and holter recordings are now uploaded via software and no longer transported through courier system.
- QSE: Nonconforming Event Management
  - Identification (ID) Band initiative rolled out April 2017. Diagnostic Imaging also participated in this initiative. Emergency and inpatients are not collected unless an ID band is present on the patient's arm.
  - Implemented sending Unusual Phlebotomy Alert forms to Pre-Examination Quality for improved tracking of trends within organization, May 2017.
- QSE: Assessments
  - Participated in Quality Internal Desk Audits throughout 2017 in preparation for accreditation September 2018.
- QSE: Continual Improvement
  - Schedule optimization by implementation of MakeShift online scheduling system allowing staff to view their work schedule, pickup shifts, request trade shifts, and set availability via smartphone application, September 2017.
  - Provide financial reports to CRL Senior Technologists for ground-level review of expenditures in all areas of site, May 2017 and ongoing.

Rockyview General Hospital (RGH) RRL

- Successful installation, validation and implementation of the Sysmex XN9000 Hematology Analyzer on Feb 23, 2017. 0.5 FTE savings realized from the efficiency of the Analyzer.
- Implementation, validation and training of WAM middleware for Sysmex analyzer.
- Two MLTs attended Advanced Sysmex training in Chicago.
- 14 MLT students trained at RGH on Coag, Hematology and Chemistry Analyzers.
- 2 new MLTs trained in 2 departments.
- VBG testing transitioned from Respiratory to Lab with successful go live June 2017. All staff trained and competency passed. Upgrade to foam liners in Pneumatic tube system for transport of VBG samples from ED to lab in order to reserve sample integrity. Respiratory provided the reagents. Lab absorbed the extra FTE required for extra testing.
- Dr. Lawrence de Koning and Dr. Isolde Seiden-Long (Clinical Biochemistry) gave VBG presentations to the RRL staff.
- 1 MLT retired in November 2017. Her FTE was absorbed by part-time staff requesting extra FTE.
- Lab participated in a city wide Mock Code Orange exercise in June 2017. Lab was prepared, but came away with some learnings from the AHS side.
- Implementation, Validation and Training of the I-Chem 100 in Urinalysis to replace the Clinitek as Back-up Urinalysis Analyzer.

South Health Campus (SHC) RRL

- MLA Integration Project – Using Lean Six Sigma methodology, piloting having an MLA in the technical area of the SHC RRL to integrate into the working departments as an integral part of the team.
- Inventory Management – Assessing use of clinical supplies and common goods to better understand costs and focus on future savings.
- Book Exchange – Created a central location for "bring a book – take a book" for staff to enjoy.
- Accountability – Shared with staff the components of the Oz Principles, and routinely discussed key metrics, with the understanding that all lab staff are accountable for them.

- Mock Code Orange exercise, June 2017.
- Team building pasta class at Saskatoon Farm.
- Team building lunch Potlucks (Sandwich & Halloween).
- ESS Implementation at SHC.
- Mental Health First Aid Course attended by senior staff.

Chemistry

- Biotin interference comment added to immunoassays and Flow chart set up for dealing with interference. (January 23, 2017)
- CMISC test built to deal with unusual sample request. I.e. sodium on breast milk, vancomycin on CSF etc. special request letter template developed. (January 31, 2017)
- Critical Venous Blood Gas results now being called by LIC. Other RRL sites going live to run Venous Blood Gases. (April 4, 2017)
- Started validation on refurbished iCHEM 100 received in trade from DSC who took our original. (June 28, 2017)
- Retraining checklists and quizzes repeated for all staff for iCHEM100. (June 2017 – January 2018)
- Changed maintenance schedule on Cobas. Nights to perform daily maintenance and QC on primary instrument to accommodate one Chemistry tech coming in at 8. All QC adjusted accordingly. Times changed on CH-26.06 Attachment # 5 SHC QC schedule. (Sept 11, 2017)
- One Chemistry tech to start 08:00-16:15 shift in conjunction with MLAs starting in RRL. MLAs were trained to do Maintenance on Urinalysis analyzers. MLA training to report urines, Urine BHCG and Occult bloods will start in the new year. (October 10, 2017)
- All yearly competencies were completed by November 15, 2017.

Transfusion Medicine

- Red Cell Screening – Why transfuse 2 when 1 will do. SHC was a pilot site for this.
- Screening Cryoprecipitate orders and recommending Fibrinogen in place of cryo. This is to educate clinicians with respect to available products and decision making towards the best transfusion option for the patient.
- Created TM equipment templates for the clinical engineer that include serial number and description of all TM equipment and what tasks need to be completed for each piece of equipment.
- Changed our process for type and screens so a confirmatory type is completed on a sample collected at a different time then the type and screen. This was to meet the standards. This improves patient safety as identification errors are to common and this extra step ensures patient blood group is correct.

Hematology

- Cellavision Software upgraded.
- Implemented new Body Fluid worklist to assist in tracking referrals.
- Validated and lowered DXH body fluid lower limit on WBC to 100 and RBC to 3000 to align with reporting practices on Sysmex analyzers.
- Change to reporting units when reporting Body Fluids. All fluids now reported x 10^6/L.
- CSF-no longer order Microbiology when WBC >50 if physician did not request it.
- Rule of Three Platelet seminar by Dale Marusyn/Beckman Coulter. Very well attended @ SHC.
- Training Initiative Project and Toolbox development-Hem Tech II part of working group.
- Sysmex User Group seminar attended by Hematology MLTII and MLTI.
- ACL TOP Fibrinogen changes-deleted Fib High and Fib DTI clot curves and moved to reporting IL QFA Fib and QFA Fib Low curves only.
- Altered Fib autovalidation and autoverification limits to go with new clot curves. Decreased tech involvement, improving TAT for those results to autoverify.
- Validation and move to new DDHS 500 reagent for DDimers. Latex, buffer and QC all liquid-improvements so techs no longer need to make reagent and QC. Less issues for errors in reconstitution and can load reagent faster.
- Change to using assayed QC for normal and abnormal QC on ACL TOP.
- Put 'free' APTT reagent into use. Obtained a year's worth from Edmonton zone at no cost to CLS.
- Created new coded comment for patients with high INR who may be on an anticoagulant other than Coumadin or Heparin. (i.e. Dabigatran). Allows tech to free text anticoagulant into comment.
- Change hematology barcodes to read 12 digits instead of 10 to accommodate the new Sysmex analyzers on WAM middleware.
- Discontinued Thrombin Time CAP survey as it was not useful due to results on all supplied specimens having results above the reportable upper cut off on ACL TOP.

- Hematopathology Section Chief began signing all proficiency testing reports to align with accreditation requirements.
- Performed 3 accreditation audits.
- Update to DXH software due to data acquisition issue detected by Beckman Coulter.
- Laser replaced on DXH #1 due to ongoing year-long problems with monocyte% on both surveys and quality control.
- Change to bulk shipping of CAP surveys, distribution from DSC to all sites by CLS couriers.
- Paperless tracking of orders by shipping & receiving-PO's now emailed and stored electronically.

Alberta Children's Hospital (ACH) RRL

- VHF documents revised, and published. VHF competency documents were developed and published.
- Acquired a new floor model centrifuge for TM, two GEM4000s and an airfuge for Chemistry.
- One MLTI was cross-trained in three departments.
- Validated and implemented venous blood gas testing for Emergency department.
- Validated and implemented new floor centrifuge for modifying blood components.
- Validated use of pneumatic tube for Hematology and TM.
- Implemented new process of transporting blood products/components in the pneumatic tube system.
- Completed beta testing project in Hematology.
- Set up and validated primidone testing on Cobas. All phenobarbital and primidone testing was transferred to ACH RRL.
- Participated in Code Orange exercise, June 2017.
- Successful external COR audit.
- Hosted Q&A session for visitors from sister hospital in Japan.
- Changed units for reporting fluids to 10E6/L.
- New d-dimer reagent implemented. Decreased QC frequency.
- New vancomycin and acetaminophen reagent implemented.
- CMISC orderable in Millennium created for all sites (for unusual test requests)
- Gave lab tours for RGH Emergency Department RNs.
- Revised sweat chloride procedure reference ranges and patient data handling process.
- Implemented new process for splitting and washing red cells for neonates, resulting in hematocrit values that are more in line with neonate patients.
- Implemented soft spin only for modifying platelets to reduce damage to older platelets and to decrease time to modify platelets.
- All females of child bearing age or younger now receive Kell-negative red cells to avoid Kell sensitization which may cause severe Hemolytic Disease of the Fetus and Newborn (HDFN).
- Changed expiry of irradiated red cells from 28 days to 14 days from irradiation date to reduce the potential of hyperkalemia especially for pediatric transfusions. As a result, ACH will no longer carry special irradiated (<24 hrs from irradiation) inventory for ECLS program that was sent daily to ACH. This will reduce excess inventory and wastage.
- Canadian Blood Services (CBS) platelet components shelf life was changed from 5 days to 7 days which provides better utilization of platelets and reduces wastage.

Peter Lougheed Centre (PLC) RRL

Hematology

- Validated testing for body fluid testing on Sysmex XN9000 analyzer to reduce time for processing and eliminates manual testing.
- Initiated reporting Body Fluid RBC and WBC results in x10^6/L for consistent reporting throughout the province.
- Hematology MLT II and hematology preceptor completed Sysmex advanced user training in Chicago.
- Implemented testing of improved DDimer (DDHS500) procedure.
- Expanded auto verification reporting for QFA Fibrinogen testing.
- Four staff members attended the Sysmex XN User Group meeting – staff education.
- MLT II attended the Sysmex WAM User Group meeting.
- Continue to monitor and report number of clotted samples received from nurse collects on the units through the RLS reporting system - Quality improvement.
- Cellavison analyzer was decommissioned and re-purposed to Edmonton with the implementation of the Sysmex analyzer.
- Decreased 0.5 FTE staffing with the implementation of the new Sysmex analyzer due to less blood slide reviews.

Chemistry

- Validated 2 GEM 4000 blood gas instruments and trained staff to run Venous Blood Gases for Emergency Department to ease pressure on Respiratory staff.
- Middleware and interface completed for iChem 100 backup urine analyzer. Implemented with minimal staff training.
- PTN/DIG/CSFTP/and ProBNP were moved to one instrument to save cost of reagents.
- Found new supplier and combined order for iChem and Excyte heat–sensitive paper. Cost saving initiative.
- MLT II in Chemistry and Hematology have implemented an earlier start time to support night staff and handle bench shortages for unexpected absences.

Transfusion Medicine

- Implemented red cell order screening to support the national blood supply initiative.
- Implemented and trained staff on the use of the sterile connecting device to provide products for increased beds and expansion in NICU.
- Expanded product preparation on site for neonates to include split red cells, split washed red cells and split platelets.
- All staff trained and given access to Netcare for new process related to the 2018 Millennium upgrade and changing CSTM and CPSA standards.
- Implemented screening orders for cryoprecipitate to see if fibrinogen could be given instead.
- Exchanged the benches in TM with benches at SHC to improve the workspace at both sites.
- Implemented provision of Kell negative red cell units to all female patients less than 45 years to prevent formation of maternal antibodies.
- Centralized ordering of supplies used in the preparation of blood components to FMC to have a centralized place to maintain Certificates of Analysis on these items to comply with Health Canada regulations.
- Implemented the Primex temperature monitoring system on the main OR blood fridge and the Hybrid OR blood fridge to improve compliance of temperature monitoring.
- Implemented red cell recycling to FMC to ensure our inventory is fresh and units are not wasted due to outdates.
- Implemented a second order of supplies from CBS for platelets and red cells from FMC on weekdays to improve the blood component management to reduce stat orders and decrease costs.
- Increased our blood product inventory to cover the increases in transfusion activities with the vascular OR's and NICU expansions.
- Monitored and maintained 80% decrease in blood type and antibody screens on maternity patients.

General

- MLT preceptor participated in MLT job fair.
- Staff competencies were completed in all three departments and annual reading met target of + 80%.
- Quality audits were successful with few deficiencies noted and were corrected.
- A full complement of SAIT students were trained in Hematology and Chemistry.
- Participated in a successful COR audit review (89%).
- Participation in AHS print deployment initiative reduced number of printers in the testing area and offices resulting in less costs for associated supplies.
- Participated in city wide CODE Orange exercise, June 2017. Lessons were learned and shared.
- Submitted CRSR to PLC Administration to review laboratory space. Funding has been approved for function and design planning.
- Initiated attaching a picture of the product on Kanban cards to distinguish 2 "look alike" reagents/products.

General Pathology Residency Training Program

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 6th 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 the 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 2017 our residents have undertaken 14 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. 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.

Training Sites: Several sites including 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 new collaborative rural training rotation at Whitehorse Hospital, Yukon.

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 graduate will be writing her certification exams in the Spring of 2018 and has successfully secured a fellowship position with CLS in Dermatopathology, well in advance of her graduation.

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 accreditation is planned for 2019-20 academic year. CBD rollout is also planned to coincide with the 2019-2020 academic year.

Hematopathology Section

Jan-July 2017 New CBC analyzers (SYSMEX) were installed at DSC, PLC, RGH, 4 HCTL (Health Centre Testing labs) sites as well as 6 CRL (Rural) sites. New middleware between the SYSMEX and millennium was installed at DSC, FMC, PGH, and RGH.

Nov 2017: ESR requests from community patients are being cancelled and converted to a CRP. Rheumatologists and some Clinical Specialists are still able to request ESR testing.

Urgent Care Centres and Inpatient/Emergency departments are not affected at this time.

- Jan 16 DSC went live with the new Sysmex XN11 system – the first of its kind in Canada with the XN11 and high speed tube sorter
- Jan 18 PLC went live with the new Sysmex XN9000-201 System

- Feb 21 RGH went live with the new Sysmex XN9000-201 System and FMC joined all other Sysmex sites when they are added to the WAM middleware (work area management)
- HCTL's went live on the new Sysmex XNL analyzers in March- April and rural sites that got the new Sysmex XNL either went live or are going live this week.
- The DSC's Hematology Sysmex System to provide service to outpatients has been fully implemented.
- The Hematology Lab has started to perform Broncho-Alveolar Lavage (BAL) Differential for Interstitial Lung Disease (this service is provided to Pulmonary Medicine only).

Flow Cytometry

- Flow cytometry is preparing to participate in a 3 month Beta testing project – Phase III will involve working with the vendor R&D department
- Flow Cytometry has been approached to participate in Phase IV Clinical PhaseBeta testing where data is compiled for FDA. This phase of testing is expected to last approximately 4 months.
- Toronto Sick Kids Hospital, as part of an international study, is referring testing to CLS Flow Cytometry department.
- Update on the operational integration of the Hematology Translational Lab (HTL) with the Hematology Molecular/ Flow Lab:
    - Starting June 5, 2017, cell sorting at HTL will begin which will improve efficiency and reduce costs. HTL has acquired an advanced cell sorting Flow-Sorter (13 colour Flow Cytometry with 4 way sorting) as the current CLS-Flow Cytometry cell sorter is antiquated and difficult to use.
    - Validation of Myeloid Gene Panel by NGS has been completed and testing will start after completion of the accreditation process for the HTL Lab in July 2017.
    - Referrals to the Immune Deficiency Lab at Flow Cytometry are increasing and the lab is currently receiving specimens from across Canada.

Special Coagulation

- Possibly establish factor XIII test at DSC
- Need to set up monitoring for up-coming new factor IX product (N9-GP). May need provincial network.
- Protein C chromogenic assay as a screening test for protein C deficiency (some of other Labs in Canada already switched, we have done some data analysis, results are supportive).
- Just finished upgrading software on ACL-top and new D-dimer test.
- We will use cut off for factor level instead of reference range. This change will start January, 2018.
- Timely and accurate report of all cases.
- Help to establish platelet electron microscope (EM) test
- Validate aPTT SS reagent (replace SP) for factor assay
- Validate new D-dimer kit with software update in all instruments in Calgary
- Protein C chromogenic test as a screening test for protein C deficiency
- Modify anti-Xa test on call policy
- Continue involvement in general pathology and hematology residents/fellows teaching/training
- Staff education: Join the hematology bleeding disorder clinic Journal Club regularly

Molecular Hematology

The focus in Molecular Hematology over the past year has been to improve reporting practices and facilitate advanced patient care. We have improved reporting safety and accessibility by building CEBPA (April 2017) and Quantitative PCR for BCR-ABL1 (August 2017) reports into Millennium/Helix and in turn Netcare, making them readily available to clinicians. Molecular hematology has instituted local STAT testing for FLT3 gene mutations in all AML patients to guide treatment decisions at time of diagnosis. (Precision Medicine).

In order to accommodate the demand for advanced molecular techniques, we have partnered with Dr. Faisal Kahn and created the Hematology Translational Laboratory (HTL). This lab is WCDAA accredited, and has been providing targeted, Next Generation Sequencing (NGS) for AML/MPN patients in the Calgary region since September 18, 2017. As of December 11, 2017, this NGS service will be expanded Alberta-wide. The HTL has taken over sorting post-transplant samples from pediatric and adult BMT programs for donor hematopoietic cell chimerism determination (July 2017), freeing up staff in Flow Cytometry for other testing demands.

Special Hematology

Special Hematology kept up with steady workload compared to last year, the refugee clinics and the sickle cell clinics for both adult and children are the regular contributor to our workload. Dr. Tariq Roshan joined our HemPath division. We had 11 Residents/Fellow training through our Bone Marrow and Hemoglobinopathy program. A new BM extract file was created for quality control, Utilization management, and Educational search and planning for molecular testing. Weekly reviewed was introduce for New Acute Myeloid Leukemia and MDS evolving to AML by the Myeloid Group.

Histocompatibility and Immunogentics Laboratory

- HIL has successfully passed American Society for Histocompatibility and Immunogenetics (ASHI) Accreditation and received a new certificate valid until August 31, 2019.
- HIL successfully implemented HIL laboratory information system, Histotrac and went live September 25, 2017. We are currently in the post go live phase continuing to work with the vendor to optimize the system for our use and correct all bugs in the implementation. HIL worked with AHS purchasing to finalize a HLA NGS RFP that was posted November 27, 2017.
- We plan to make a decision on the successful HLA NGS vendor toward the end of January 2018.
- The HIL Fellowship Program successfully selected a new Fellow that will start 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.
- The HIL research team continues to be active and has published multiple peer review manuscripts that involved HIL Fellow and technologists' authorship. We continue to pursue funding from CLS and other external agencies to support the HIL projects.
- 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.

Microbiologoy Section

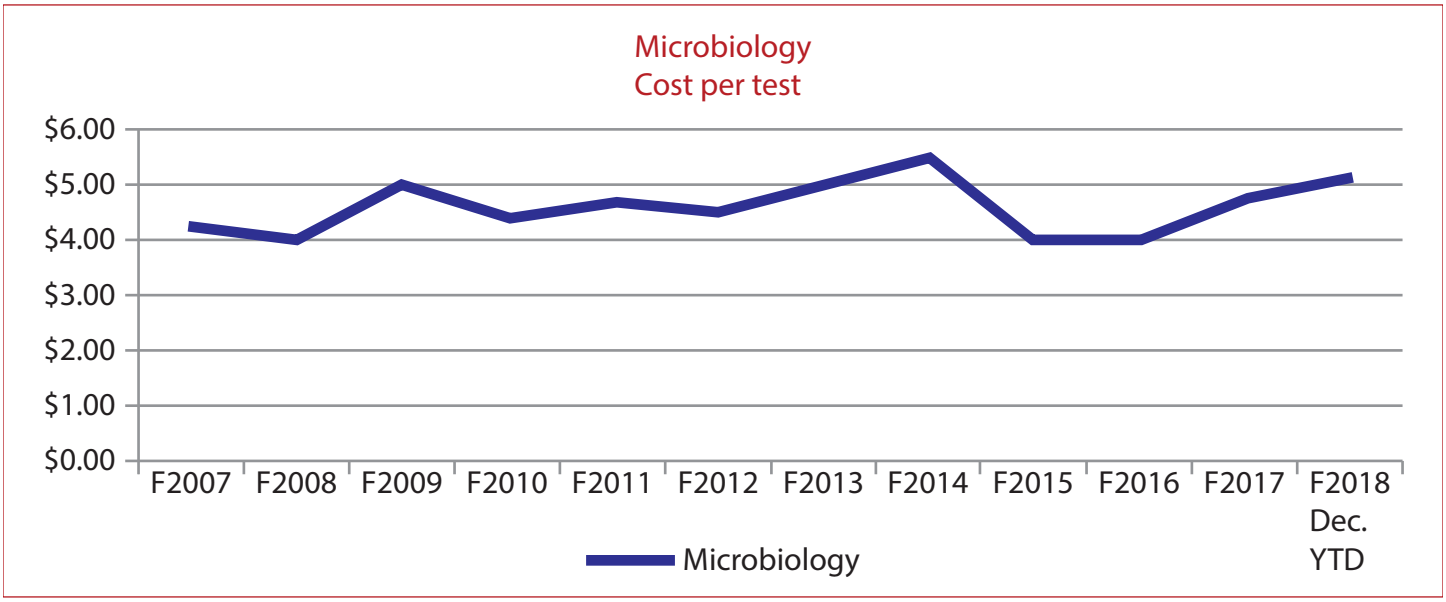
Microbiology Divisional Accomplishment's

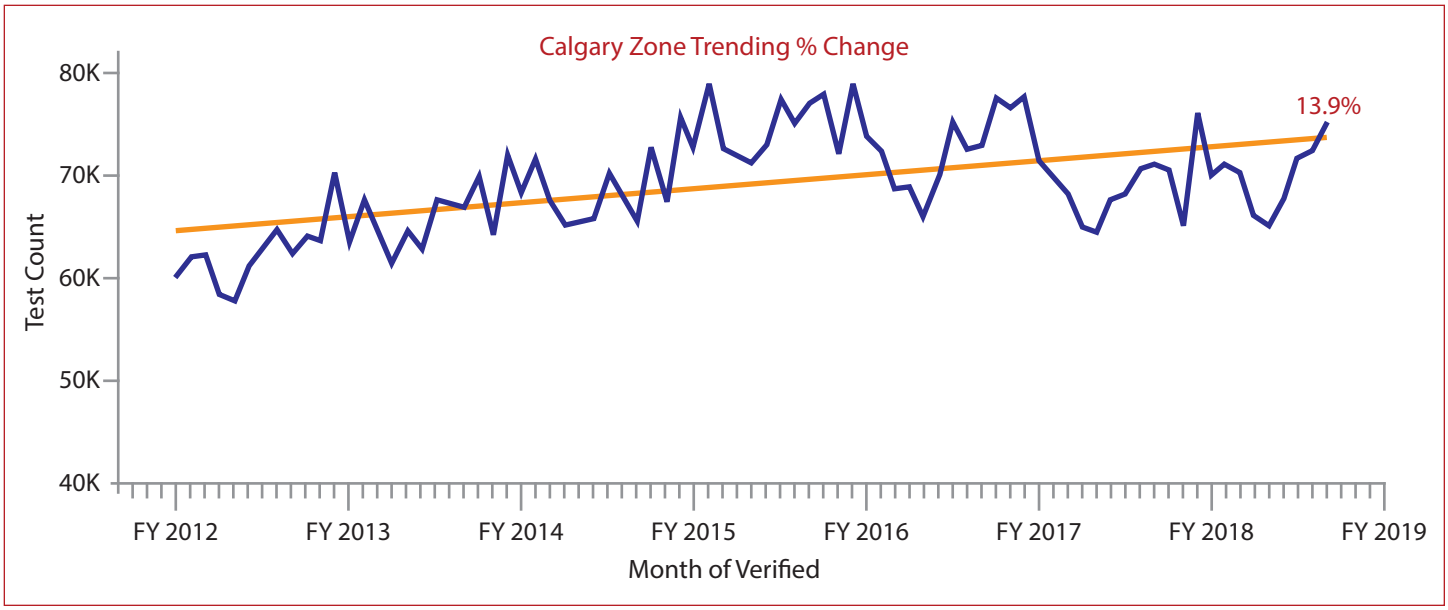
- Dr. Wilson Chan has assumed responsibility for rural Microbiology practice in South Zone. As CLS Microbiology transitions to being the Southern Alberta hub lab it is important to understand rural patient care requirements.
- Dr. Michael Groeschel started at CLS September 2017, as our newest Medical Microbiologist. He recently graduated from the Medical Microbiology training program in Edmonton. We welcome him and are excited to have him as part of our team. Another fulltime Medical Microbiologist is currently being recruited to start as soon as possible.
- Pamela Churko, Microbiology Supervisor is a welcome addition to our leadership team.
- H. pylori Stool Antigen testing (HpSAT): With the approval of CLS Executive and Lab Leaders, H. pylori Stool Antigen Test (HpSAT) in Microbiology is now offered as the primary screening test for *H. pylori* infection. A study to compare UBT results with HpSAT showed 98.6% equivalence, 98.3% negative predictive value, and 100% positive predictive value compared to UBT. In collaboration with GI Specialists, a clinical algorithm was implemented where HpSAT is the primary diagnostic screening test for *H. pylori* infection. UBT will remain available for patients referred to Gastroenterology. This practice change will improve patient access to H. pylori testing services with significant cost savings.
- Autoclaves that were more than 30 years old and leaked regularly caused mold to grow in the walls presenting a safety risk. Major clean up and renovations have been completed to the wall between the Mycology laboratory and the autoclave room. New autoclaves have been installed.
- New front-end automation, InoqulA+, was implemented. Staff are becoming more familiar with this automation and work continues to maximize efficiencies. Implementation of InoqulA+ is required for total laboratory automation (TLA) in the future. CLS Microbiology has reached a total sample volume (~1.5M) per annum that cannot be efficiently handled without implementation of automation in the near future. We are working with CLS Executive to secure the necessary capital to allow TLA to be phased in by 2020.
- 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 is developing a business case to move all testing in Southern Alberta onto real-time PCR GAS detection.
- CLS Microbiology is designed as a hub laboratory for Calgary. Due to growth and space limitations, GAS, GBS and STI testing, representing approximately 44% of Microbiology sample volumes per annum, were being sent off site to SHC. This results in large volumes of microbiology samples having to be packed and shipped from DSC to SCH creating

operational inefficiencies, potential risk to specimen integrity, and delay in TAT. As it was cost prohibitive to move to a molecular testing platform for GAS and to be prepared to adapt to the expected growth in test volumes, GAS and GBS were moved back to DSC in December 2017. Additionally, to meet patient care needs, to gain operational efficiencies and to facilitate responsiveness to expected test volume growths to STI testing (Panthers), work is in progress to transfer the instruments to SHC RRL. Medical over sight of the testing platform remains with the Microbiologists.

- BD Max for Enteric Pathogens has been implemented. Giardia/Cryptosporidium screen performed by Calgary Laboratory Services (CLS) transitioned from enzyme immunoassay (EIA) to a more sensitive Parasite (Protozoal) screen PCR method that will detect 3 parasites: Giardia, Cryptosporidium species, and Entamoeba histolytica. These three pathogens comprise a significant majority of parasitic infections that are encountered in clinical practice in Southern Alberta. This PCR method is more sensitive and allows routine testing for E. histolytica infection. There is a potential to add other enteric pathogens to the BD Max testing platform. 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 molecular test methods.
- Virtuos: upgrade to BacT/ALERT for blood cultures have been successfully implemented. This upgrade has streamlined the handling of blood cultures, and provides better, timelier queues to flag positives.
- Two Viteks that have surpassed end of life were replaced with two new ones.
- CLS started performing Malaria testing for Medicine Hat. The process that exists for Lethbridge was mirrored for Medicine Hat.
- A comprehensive Biosafety and Biosecurity audit has been completed and identified deficiencies have been addressed. A comprehensive Pathogens Safety Data Sheet (PSDS) spreadsheet has been completed for all pathogens.
- Legionella testing on bronchoalveolar lavage samples using real-time PCR started October, 2017. The new platform detects both Legionella species and *Legionella pneumophila* specifically with a faster turnaround time than culture. It does not differentiate between serogroups of *Legionella pneumophila*. Culture will be set up on PCR positive samples. PCR negative samples will not be cultured.
- Direct MALDI-TOF mass spectrometry, performed directly on all positive blood culture isolates, was introduced into the workflow. This method provides rapid organisms identification directly from blood cultures.

Microbiology Workload: Microbiology Test volumes continue in an upward trend as does the average cost per test. See Figures 1 and 2.





Transfusion Medicine Section

Staffing

- The position of TM Clinical Section Chief was assumed by Dr. Davinder Sidhu on July 1, 2017. The previous CSC, Dr. Leland Baskin continues to support TM physician, and acting CSC in the absence of Dr. Sidhu.
- TM Manager Monica Philips was seconded to the temporary position of VP Operations. Patricia Boutilier was the successful candidate to replace her for a 1-year term as the acting TM Manager.
- TM Supervisor Julia Hendry accepted a temporary manager position. Deanna Dillabough was the successful candidate to replace her for a 1-year term as the acting TM Supervisor

Quality: Enhancing Quality in HealthCare

- In response to the Health Canada inspection 2017 and CLS internal audit findings a process was initiated to improve the completeness and correctness of equipment records. TM staff began preparing pre-populated templates for use by Clinical Engineers. TM staff prepopulate fields in the PM and repair forms that identify equipment as well as those fields that define the appropriate performance parameters for each piece of equipment serviced by CE. The pilot for this project is expected to be completed in January 2018, with adoption by other CLS clinical sections and departments beginning in 2018.
- In order to reduce the number of unnecessary transfusions, an algorithm was developed for application to red cell orders. The algorithm has reduced transfusions by 200 units/month in the Calgary zone and the process will be expanded to rural sites in April 2018.
- Turnaround times are routinely monitored for STAT pretransfusion testing. Specimens with negative antibody screens and no historical record of significant antibodies are included.
- Turnaround time target established by CLS from order to completion of antibody screen is 145 minutes. This target was consistently met.
- The previous in lab (from receipt of sample in lab until report of antibody screen) target of 70 minutes was found to be driving inefficiencies within the laboratories with respect to instrument utilization. Changing the target to 90 minutes has allowed instrument use to be optimized without jeopardizing patient care. This target was consistently achieved at all urban sites.
- Continued screening of cryoprecipitate orders by the TM physician and recommending treatment with fibrinogen concentrate where its use would be more appropriate.

Access: Support increased access to healthcare System

- Continued partnership with the Community Paramedic Program to provide home transfusions for eligible patients. CLS Transfusion Medicine and the Community Paramedic Program received a Health Quality Council of Alberta Patient Experience Award for this innovative Home Transfusion Program.
- Continued expansion of the Subcutaneous Immune Globulin Home Infusion program to allow patients to treat themselves with immune globulin via home infusion rather than monthly IV infusions at outpatient clinics.

- Banff and Didsbury labs are now stocking red cells for remote cross matching to reduce turnaround times for transfusion requests and transportation needs.

Sustainability: Provide value to the healthcare system

- In order to reduce the number of unnecessary transfusions, an algorithm was developed for application to red cell orders. The algorithm has reduced transfusions by 200 units/month in the Calgary zone and the process will be expanded to rural sites in April 2018.
- Changes in defined "child bearing" ages from 55 reduced to age 45 and guidelines changes to transfusion in males in acute bleeding has reduced emergent O negative RBC usage across Calgary.
- Implementation of new policy to restrict females of child bearing age (>45yrs) and males (under 18yrs) to receive only K negative red cells unless patient is known to be positive for the K antigen has been completed.
- With the implementation of Health Canada regulations, the requirements for retention of TM records have been redefined in CSA, CSTM and WCDAA standards. There are no longer any records requiring 'permanent' or undefined' retention. Following the completion of the 2017 trim, a request was placed to the CLS records department listing all TM records that are currently categorized with 'permanent' or 'undefined' retention periods. These records will be re-designated in the CLS database as per current standards so that they qualify for destruction appropriately.
- Established and implemented practice guidelines for ordering pretransfusion testing on obstetrical patients. This has resulted in cost savings of approximately $200,000 annually across all sites.
- Platelet products expiry has changed from 5 days to 7 days post collection. CLS TM is keeping a close eye on inventory levels and expiry rates and has modified standing orders for platelets to prevent increases in expiry rates for these products.

Innovation: Pursue creative solutions to demands in healthcare

- Implemented RhD Bead chip platform using 35 genetic markers to perform Rh genotyping to detect up to 70 Weak D and partial D genetic variants for sickle cell patients and females of child bearing age. Changes have been made to RhD genotype reporting to align with CAP recommendations. Rh undetermined and Rh variant types are being added to the LIS to accommodate these changes.
- Testing of the LIS upgrade scheduled for late 2017 has been completed. This upgrade includes a change to patient ABO/Rh testing requirements to reduce the potential impact of wrong blood in tube (WBIT) incidents and comply with accreditation standards. Two blood groups from separate collections will be required (and must be identical) before a patient can be transfused with red cells that are not group O (universal donor type).
- Banff and Didsbury labs are now stocking red cells for remote cross matching to reduce turnaround times for transfusion requests and transportation needs.
- CMV negative products have been eliminated for all indications except for intrauterine transfusion; standard CMV safe red cells will be utilized for all other indications as CBS has eliminated routine testing for CMV.
- Indications for irradiated red cells are changing to more closely align with NAC recommendations. Irradiated blood expiry has changed from 28 days post irradiation to 14 days post irradiation.
- Canadian Blood Services is now providing K- red cells for red cell standing orders received on Monday and Thursday. They are also providing Rh, K and JK (Kidd) antigen tested red cells (7 units) for ACH. These units are used for special needs patients which includes aplastic anemia, thalassemia and sickle cell patients.

Relationship: Build stronger relationships with our healthcare partners

- A new cord blood testing requisition has been implemented for use by midwives and at site that do not have physician electronic order entry capability.
- Ongoing work with Calgary zone AHS to repatriate subcutaneous immune globulin home infusion program training and patient case management from the laboratory to nursing continues.
- A new requisition has been created that would assist Calgary Rural sites with the red cell order screening and effective blood product utilization processes.

Training and education

- Competency assessment plans were developed for
  - Technologist working in urban acute care facilities
  - MLAs working in urban acute care facilities
  - Technologists working in HCTL facilities
  - Technologists and CLXTs working in CRLs
- A training program for CXLT (combined x-ray and lab technologist) staff has been developed; this classification of staff do not receive any TM training in their certification program but do dispense blood products. New CXLT staff will be

trained at FMC TM, existing staff will receive modified supplemental TM training at their site by the CLS TM Tech III's or appropriately trained site designates.
- Completed training of additional TM MLTs in CTL processes.
- Completed annual competency assessment for all TM staff.
- Provided ongoing training for residents and fellows as part of Specialized Laboratory Training Program providing a 4 week Introduction to Transfusion Medicine rotation and a 2 week Advanced Transfusion Medicine rotation. TM trained 11 Adult Hematology/Oncology fellows, 5 Pediatric Hematology/Oncology fellows, 10 Anaesthesia residents, and 3 General Pathology residents and 2 Hematopathology Fellows in 2017.
- TM staffed attended continuing education through webinars, teleconferences and weekly rounds/educational sessions.

Future Plans

- Plasma product order screening will be introduced to Calgary Zone hospitals to align practice with existing transfusion guidelines and Choosing Wisely Canada recommendations. Algorithms from Edmonton, Saskatoon and Ontario (Orbcon) will be reviewed.
- Implement changes to IVIG ordering in SCM – expanded list of indications, mandatory height and weight fields for dosing and dose calculator to correct dosing for BMI. (Upload has been delayed till January 2018).
- Stakeholder feedback will be solicited in January 2018 to provide feedback on the removal of the ABO/Rh test selection box on the CLS Community Requisition. Physicians will have the ability to order the test by writing in the "Other Test" area of the requisition. It is hoped that the removal of the selection box will improve test utilization and decrease the ordering of this test when there is no clinical indication.
- CLS will be working with CBS and Shire to transition patients from their current treatment plan of plasma protein products provided by CLS Behring to Shire plasma protein products. This is expected to impact 300-400 outpatients currently receive IVIG treatment in hospital clinics and approximately 120 patients that are enrolled in the Sub-cutaneous IVIG program. The change coagulation products will also impact patients (C1 Esterase, von Willebrand factor and fibrinogen).

Cellular Therapy Laboratory

- Staffing
  - An increased number of requests have been received for processing of unrelated blood and marrow transplant products for send-out to other transplant centres (national and international) is occurring. Impact on services and resources is currently being assessed.
- Quality: *Enhancing Quality in HealthCare*
  - With Apheresis department for improvement of efficiency and quality of peripheral blood stem cell collections has been approved and will begin in January 2018. CTL currently using in-house custom made reports to monitor collection efficiency metrics.
  - With ABMTP program for tracking and assessing engraftment. CTL has generated reports in StemLab that allow for correlation of engraftment with products infused and cell dose infused. Reports are utilized by ABMTP for quality reporting.
  - New reports and monitoring mechanism instituted for CTP key quality indicators including cryopreservation, adverse infusion reactions, and non-conforming products. These metrics are included in quarterly and annual quality reports generated by CTL and provided to ABMTP.
  - CTL hosted a laboratory session for the Canadian Blood and Marrow Transplant Group (CBMTG) meeting that occurred in Calgary June 9-10, 2017. The laboratory session was chaired by Dr. Prokopishyn and included presentation of novel automated GMP cell processing and electronic records systems.
  - CTL is now performing additional processing of Cellular Therapy Products (CTPs) for pediatric patient with certain immune deficiencies. The processing includes partial fresh infusion of the CTP (often after Red Cell and/or plasma reduction, CD34+ cell enrichment of the remaining product, and cryopreservation of the CD34+ cell enriched portion and the negative fraction for future cellular therapies, if required. The entire process takes a 1 MLT a minimum of 9 hours. The number of immune-deficiency pediatric patients has increased in recent years.
- Access: *Support increased access to healthcare System*
  - Continued partnership with the Community Paramedic Program to provide home transfusions for eligible patients. CLS Transfusion Medicine and the Community Paramedic Program received a Health Quality Council of Alberta Patient Experience Award for this innovative Home Transfusion Program.
  - Continued expansion of the Subcutaneous Immune Globulin Home Infusion program to allow patients to treat themselves with immune globulin via home infusion rather than monthly IV infusions at outpatient clinics.

- Banff and Didsbury labs are now stocking red cells for remote cross matching to reduce turnaround times for transfusion requests and transportation needs.

- Sustainability: *Provide value to the healthcare system*
  - CTL has installed the CliniMACs Prodigy. This automated GMP cell processing instrument will allow for the generation of precision cellular therapy products aimed to fight viral infection and cancers. As well the instrument can be used to transduce blood stem cells with gene correction and replacement DNA that can be used to treat a variety of disease via blood stem cell gene therapy protocols.
  - CTL has installed a BioSpherix XVivo GMP hood that will allow for the clinical production of a variety of stem cells, including Mesenchymal Stromal Cells for the treatment of septic shock and orthopedic diseases.
- Innovation: *Pursue creative solutions to demands in healthcare*
  - CTL Staff Training has occurred on the CliniMACs Prodigy. The Prodigy is an innovative GMP device for modifying and generating clinical cellular therapy. The first application with be generation of CD34+ T cell/CD19 depleted haplo-identical products for use in pediatric patients. These products have been shown to significantly reduce chronic graft vs host disease (GVHD) while still providing superior engraftment. Costing and planning for clinical use roll-out currently underway.
  - CTL collaborated on the First Blood Stem Cell Gene Therapy Clinical Trial in Canada. Patient's cells from a Fabry disease patient were collected and genetically modified in December 2016 and re-infused into the patient in January 2017. The recipient of this treatment has now successfully engrafted the genetically modified stem cells.
  - A second patient has been infused with genetically modified CD34+ cells as part of the Canadian Fabry Patient Gene Therapy Clinical Trial. Calgary is the only site to have enrolled and transplanted patients in the clinical trial. Plans are underway to make Calgary the site for the expanded Phase II/III Clinical Trial.
  - Dr. Prokopishyn will be presenting at the American Society for Hematology (ASH) an abstract on the world-wide decrease in bone marrow quality over time. Research project is in conjunction with CIBMTR.
  - The StemLab database version was upgraded in mid-February allowing for necessary changes to ISBT labels for stem cell products.
- Relationship: *Build stronger relationships with our healthcare partners*
  - CTL is working with the Edmonton autologous transplant program to determine the best strategies for collection and processing of autologous CTPs in Edmonton with the impeding discontinuation of CBS services in 2018.
  - Dr. Sidhu has initiated a Quality Improvement plan in conjunction with Dr. Louis Girard (Nephrology) and Dr. Nicole Prokopishyn to improve Apheresis Stem Cell Collection Efficiencies for Autologous and Allogeneic collections beginning January 2018.
- Training and Education
  - Training has been completed on use of the CliniMACs Prodigy for graft modification that will include depletion of T cell subsets and enrichment of stem/progenitor cells. These products are aimed to improve transplant outcomes.
  - Two CTL Staff members attended the CBMTG meeting in Calgary. Registration fees were provided by CBMTG in exchange for CLS CTL assistance in meeting preparation.
  - Dr. Prokopishyn was an invited speaker at the International Society for Cellular Therapy (ISCT) convention in London, UK. Dr. Prokopishyn presented on quality assurance processes and corrective action in a cellular therapy laboratory as well as research on improved efficiencies in cryopreservation of autologous stem cell products.

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 4-5 months of chief resident service. The program is designed to give graded responsibility to the resident. 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 currently have 17 residents.

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 into their assessments. In preparation for our upcoming transition to competency-based education, our program has recently initiated daily feedback forms for PGY2 autopsy and surgical pathology rotations. Beginning in the PGY2 year, resident progress is also assessed via biannual exams. These include a full RCPSC-style examination each winter, and the American Society of Clinical Pathology Resident In –Service Exam each spring. Additional examinations are offered for residents in difficulty and for senior residents preparing for the Royal College examination. Program directors meet with each resident at least twice a year to discuss their progress in the residency program, research projects, and fellowship/career plans.

Research:
Involvement in research activities is an integral part of the program. Starting in the PGY2 year, residents embark on a research project with the advice and mentorship of the Resident Research Committee. In 2017 the Anatomical Pathology residency program dedicated $15,000 of its budget toward research grants for our residents. Residents present their research findings at the annual departmental research day. Funding is also available to present at national and international meetings. During 2017 our residents were involved in 16 research projects, presented three abstracts at national and international meetings, and authored seven peer-reviewed scientific publications. For the upcoming 2018 USCAP meeting our residents are presenting an additional four abstracts.

Resident progress and news:
Our program graduated three residents in 2017. All three passed their Royal College examination on the first attempt, continuing our program's trend of 100% first-time success in the RSPSC examinations for the past >10 years. One graduate accepted a job in Vancouver, and the other two are currently completing subspecialty fellowships. Our current PGY4-5 residents have also secured highly prestigious fellowships, including molecular pathology at Stanford, head and neck / endocrine pathology at Yale, GYN pathology at Yale, and GI / liver pathology at Memorial Sloan Kettering. Our program is well-regarded nationally, and receives a large number of applicants for the annual CaRMS match. In 2017 we received 62 applications and filled all four CaRMS positions with outstanding applicants. For the 2018 match we again received a large number of applications and anticipate another excellent match result in March 2018.

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 either in in 2018-2019, and our next external review is scheduled for 2020-2021. 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 6th 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 2017 our residents have undertaken 14 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. 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.

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 new collaborative rural training rotation at White Horse Hospital, Yukon.

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 graduate will be writing her certification exams in the Spring of 2018 and has successfully secured a fellowship position with CLS in Dermatopathology, well in advance of her graduation.

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 accreditation is planned for 2019-20 academic year. CBD rollout is also 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 produce 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 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; 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.

The 2017-2018 academic year marked our second full academic year. With that came a Royal College of Physicians and Surgeons internal accreditation/review in September 2017. The process was a positive one and we await the report from the College.

Our two current residents continue to progress as expected. They were both accepted and attended a competitive Molecular Diagnostics course in the UK with support from the Program. They are both preparing for their Royal College exams in the spring and will be our first two graduates from the program.

We continue to have close collaboration with the Infectious Disease subspecialty programs and share an academic half day curriculum and together successfully rolled out a new antimicrobial stewardship curriculum and a public health rotation in the last year.

We have had 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.

Our first participation in the CARMS match (2017) was disappointing as we did not match a candidate however there continues to be interest in the program and the 2018 process is underway. We hope to have a trainee for 2018-2019 academic year.

Medical Microbiology is not expected to transition to Competency By Design, the Royal College competency-based medical education program, until 2021. While this is still some time away, the training program will start to incorporate some "In the Meantime" activities to help with this transition.

Neuropathology Residency Training Program (Program Director: Dr. Leslie Hamilton and 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. 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 spring of 2017, we had two residents complete their clinical training. Both were successful in their Royal College examinations in Neuropathology and both went on to secure positions related to their chosen career paths: Dr. Schmitt was recruited to the University of Alberta where she is now working as a staff neuropathologist; and Dr. Nikolic was accepted into the highly competitive Clinical Investigator Program to further develop her clinical research skills. In the 2016-2017 academic year, we have three residents in the program. One of our residents,

Dr. 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. There was a strong interest in Neuropathology this year in the first round of the CARMS match, and we eagerly await the match results for the 2017-2018 year given the strong applicant pool. 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.

Resident History/Growth (Figures 1 and 2)

Figure 1

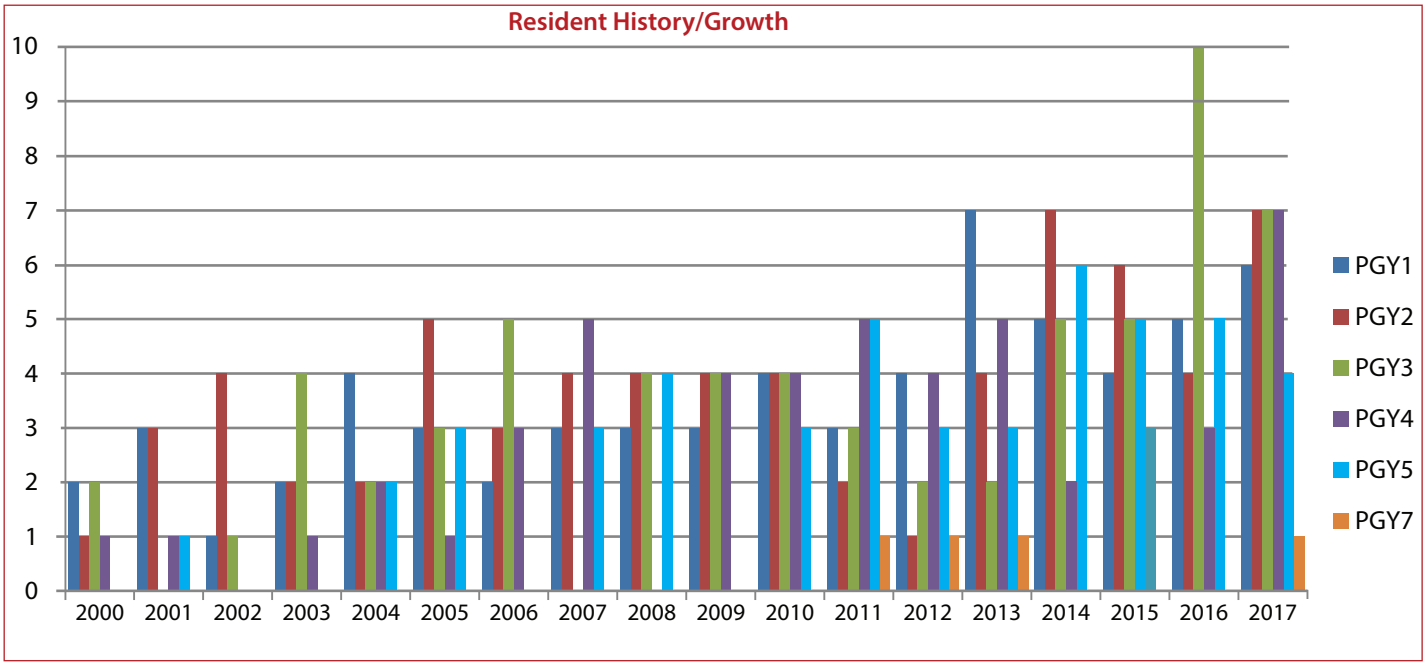
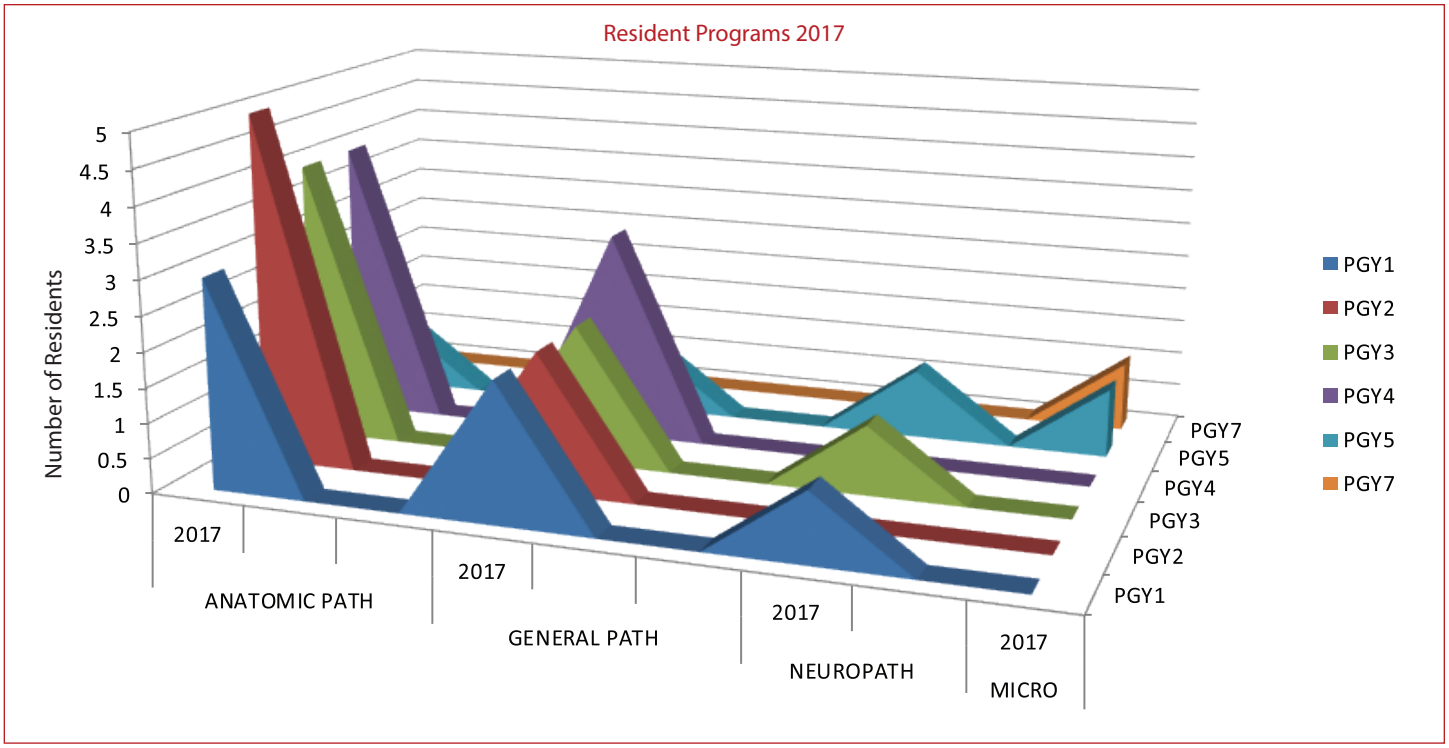


Figure 2 - Enrolment in DPLM Residency Training Programs



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

The BIOL/MDSC 515 course ran from January 9 to April 12, 2017. 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. This year's enrolment was 22 students. Our faculty provided 38 hours of lectures over the course of the semester in this course. This year the course average was 83%.

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.

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 and Scientific Centre (community general chemistry, immunology, endocrinology, analytical TDM & toxicology and special chemistry), acute care hospitals and urgent care centres (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. In 2017, our fellows have presented seven abstracts at local, national, and international meetings.

Our past trainees have been very successful in finding positions as clinical biochemists in clinical laboratories. Our fourth trainee, Dr. Joshua Buse is in his second year of training and has secured a position as a Clinical Biochemist in Regina with

the Saskatchewan Health Authority (formerly the Regina Qu'Appelle Health Region). Our fifth trainee, Dr. Jason Robinson has been recruited from the Baylor College of Medicine and is well underway in his first year of training. We will be accepting a sixth trainee for July 2018 commencement. The plan is to continue accepting one fellow per year for a two year training cycle. This year we received 30 qualified applications. Three clinical chemists; Drs. Jessica Gifford, Alex Chin and Hossein Sadrzadeh reviewed all 30 application and chose two candidates for an in-person interview and 10 applicants for telephone interview. One more candidate will be selected telephone form the latter group for in-person interview. The three candidates selected for in-person interviews will present a 45-minutes talk and meet with all the leaders in chemistry division including the manager and supervisors, as well as, few general pathologist. The best candidate will be selected by the group.

The programs 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, a cytogenetics, molecular pathologist and scientist Dr. Fariborz Kolvear will provide additional teaching and training.

The following Clinical Fellows, trained at CLS:

Fellows	Specialty Area	Supervisor	Year
(2016-2018)			
Buse, Joshua	Clinical Biochemistry	Drs. Hossein Sadrzadeh & Isolde Seiden-Long	2016-2018
Mostafa, Ahmed	Histocompatibility	Dr. Noureddine Berka	2015-2017
Zachara, Susanna	Renal Pathology	Dr. Hallgrimur Benediktsson	2016-2017
(2017-2019)			
Box, Alan	Renal Pathology	Dr. Gottipati	2017-2018
Robinson, Jason	Clinical Biochemistry	Drs. Hossein Sadrzadeh & Alex Chin	2017-2019
Roshan, Roshan	Hematopathology	Dr. Iwona Auer-Grzesiak	2017-2018

Graduate Students

There is currently no experimental pathology graduate program in the Faculty of Graduate Studies; however, 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 is due October 2018 with the site visit occurring in the spring of 2019.
- We are now a course-based Masters program under Graduate Science Education at the Cumming School of Medicine. The course-based model still includes research opportunities for students, but focuses more on hands on training and experience to allow students to be ready for the workforce upon graduation. This professional Masters degree is one of only a few programs of its type at the University of Calgary, and is being used as an example of the changing focus of graduate studies across Canada and the world. Our program boasts a 100% pass rate at the ASCP exam and 100% employment rate after graduation.
- The program has new affiliations with the Office of the Chief Medical Examiner and Chinook Regional Hospital in Lethbridge and we are excited to offer our students practical training opportunities at these centres.

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 Research Department

Calgary Laboratory Services is committed to supporting Research which includes clinical trials, basic science research as well as a robust research and development diagnostics program which aims to enhance the delivery of pathology and laboratory medicine services to Albertans, facilitate the development of new knowledge and improve patient care. The CLS Research Department oversees a myriad of projects currently numbering in excess of 950 active research initiatives. The Research Department has strong ties with the Department of Pathology and Laboratory Medicine at the University of Calgary and is deeply rooted within the academic, research and translational clinical activities of CLS' Medical and Scientific staff. Overall direction and leadership of Research is provided by the CLS VP Medical Operations, CLS Medical Director and Head of Department of Pathology and Laboratory Medicine, Cumming School of Medicine. The Research Department is integrated with CLS Clinical Leaders and operates under guidance from the CLS Research Committee which oversees CLS research activities across all Clinical Sections. The CLS Research management team includes the Program Leader for Research and Development, Research and Development Program Coordinator, and Research Supervisor. The Team works in step with the Research Committee and the Head of Department of Pathology and Laboratory Medicine to ensure Health Information Act (HIA), Good Clinical Practice (GCP), Health Canada and FDA compliance. In order to provide comprehensive laboratory testing and patient blood and tissue collection services for clinical research, the Research department has experienced coordinators, medical laboratory technologists, assistants as well as Laboratory Specialists that are involved in the review, setup and conduct of laboratory research protocols across Alberta Health Services facilities such as Foothills Medical Complex, Tom Baker Cancer Center, Alberta Children's Hospital, South Health Campus, Peter Lougheed Hospital, Rocky View General Hospital and CLS sites at these facilities as well as servicing University of Calgary and researchers from outside of Alberta. 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. Laboratory Specialists at the CLS Anatomic Pathology Research Lab (APRL) deliver specialist Anatomic Pathology research support to researchers at CLS/ U of C in addition to being a resource for the development and translation of experimental diagnostics into the clinical realm. Some of the tests and services offered in support of research at the Anatomic Pathology Research Laboratory include immunohistochemistry (IHC) for method development of new antibodies, creation of tissue microarrays (TMA), and curls/scrolls or core punches for molecular testing. 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.

A summary of the initiatives undertaken by CLS Research in 2017:

- Demand for CLS Research Services continues to grow and the number of new Research studies opened per year continues to increase. We have seen an increase over the last two years from approximately 700 to 900 active projects.
- CLS Research Coordinators transitioned to the new HRCM billing system. The research coordinators were instrumental in providing feedback to ensure the success of the new system, and developed a user manual specifically for the CLS research department.
- The Research Office continues to collaborate with Amira Diagnostics on the research and development of the Alzheimer's Diagnostic test. The team plans to attend the Alzheimer's Association International Conference in 2018.
- Due to the implementation of Team Care at the CLS PSC's and the expectations regarding patient wait times, a process review for facilitating efficient collection and handling of research patients at Sheldon Chumir to support SAC and Renal Clinical Trials was undertaken between the CLS Research Office, Community Service PSC Manager and Supervisor.
- Meetings for the design and build of CLS Clinical Trials and Research Laboratory space in the New Cancer Care Center has reached the milestone of 50% design completion.
- CLS Research participated in Clinical Trials Research Day held at the Cumming School of Medicine on May 18, 2017 where we showcased CLS Research Services to staff from TBCC, U of C School of Medicine, U of C Clinical Research Unit (CRU), Alberta Health Innovates (AIHS), Foothills and McCaig Tower Medical and Clinical Trials Stakeholders.

- Research Office worked collaboratively with New Business on numerous CLS revenue generating initiatives such as BNP, TSI, GAPP, and ALSAARP.
- CLS Research is working in collaboration with the director of the Heritage Medical Research Center (HMRC) to determine improved research processes between CLS and HMRC.
- CLS Research met with TBCC CRU to discuss the importance of submitting blue local testing research requisitions to the SSB Research Office for billing to ensure accurate cost recovery.
- CLS Research Office reviewed Dr. Joseph's submission to ethics to ensure HIA and AP policy compliance in November 2017. Research study involves the APRL lab specialist's development and workup of antibodies and IHC stains in order to study protein and macromolecular expression in normal ageing and disease using the tissues available in the brain bank.
- CLS Molecular Pathology, Dr. Demetrick, CLS Finance and CLS Research assisted Dr. Ralf Paschke in the development of a thyroid panel which will ultimately be used as a diagnostic assay on the new MassArray instrument.
- CLS Research provided feedback regarding the Research components of the Provincial Sample Acceptance Policy.
- 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.
- 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. New protocols dealing with the recruitment of renal patients for clinical trials have undergone review by the Research Office in conjunction with AHS Research Admin, CLS Provincial Data Team and DIMR analytics. The project has multiple catchment sites in the Edmonton Zone and Calgary Zone. The number of laboratory research requests for data received and processed through the CLS Research Office continues to increase annually.
- Research Office identified a Subject Matter Expert (SME) to represent CLS Research and Clinical Trials at the Connect Care meetings.
- The Research Office has worked with the CLS Privacy Office, Renal Biobank (RBB) Management team, CLS Executive and Clinical Section of AP to finalize an updated Memorandum of Understanding (MOU) between CLS and the RBB. The Renal Biobank PIA was accepted by the Privacy Commissioners Office (OIPC) in October 2017, thus clearing the way for the Bank to go operational with Provision of the Slide Images to CLS Pathologists, assisting in Clinical case review.
- The Research Office assisted Megan Boire, Lab Manager East Area North Zone regarding barriers to the implementation of Clinical Trials and Research in the Edmonton Zone. We also shared with her strategies and efficiencies gained at CLS over the last 5 years.
- Dr. Michael Mengel and Shelley Rawlake are doing a review of Clinical Trials and translational research activities with a prospect of transitioning to the Edmonton Hub Lab and when building processes want to ensure alignment with CLS Research.
- In response to the requests of CLS pathologists, the APRL successfully added the double stain and FISH/CISH tests to the current list in 2017. The APRL will continue to work with CLS pathologists to bring potential new tests to CLS.
- Lab specialists at the APRL provided laboratory support to 9 pathologists, for 16 individual projects and completed a total of 250 research requests. A total of 32 new antibodies (method development) were set up on the Dako Omnis and 2 double stains. A total of 1468 slides were stained and 20 TMAs were constructed.
- APRL has tested more than 300 antibodies in the past. A number of the tested antibodies have been applied to translational research in the past years and proved to be highly valuable for diagnostic use. Detailed IHC protocols for 10-12 antibodies were transferred to the clinical lab. The successful transfer of new antibodies to the diagnostic pool will benefit patient care in the future.
- The lab specialists at the APRL are investigating the development of a new assay/ in-situ hybridization technique called NISH (nano-particles-In Situ Hybridization). The benefits of the new technique may result in similar detection sensitivity as FISH without the associated decay over time.
- The APRL lab specialists continue to work up the conditions for potential new antibodies to be transferred to the DSC Immuno Lab for clinical use. Control TMA's were created as validation blocks for ISH for the Immuno Lab as well.

2017 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

Two projects and student applications were approved; both students declined.

Undergraduate Competition

Supervisor	Student	Project
Dr. Dylan Pillai	Kevin Perera	Shotgun metagenomics: Diagnosis of Patients with Febrile Illness Using Unbiased Next Generation Sequencing Technology
Dr. Faisal Khan	Yacine Berka	Gene variants Influencing CDC and ADCC pathway as Predictors of Antibody Mediated Rejection (AMR) after Kidney Transplantation
Dr. Martin Koebel	Sydney Yap	Machine learning algorithm for ovarian carcinoma typing

Outcomes resulting from CLS Research Competition projects completed in 2017:

- **Role of immunohistochemistry in the classification of follicular thyroid lesions. Dr. Moosa Khalil, Dr. Janice Pasieka, Dr. Doug Demetrick, Dr. Sandy Widder, Dr. Kelly Guggisberg.** The objectives of this project were to: 1) determine if the addition of certain immunohistochemical markers (cytokeratin 19, galectin 3, HBME1, thyroperoxidase) to the H&E histomorphology will influence the accuracy of the classification of follicular thyroid neoplasms which were previously classified on H&E morphology alone, and 2) determine the level of interobserver agreement for the diagnosis of the follicular variant of papillary thyroid carcinoma (FVPTC) by the use of H&E sections alone and by the combined use of H&E sections and immunostained sections for the above listed markers. This project highlighted the clinical impact and the magnitude of the inter observer variation in the diagnosis of follicular patterned lesions of the thyroid gland at CLS. It also demonstrated the utility of applying objective methods to minimize the diagnostic variations. Future utilization of the diagnostic methods learned from this project to both surgical pathology and cytology samples of thyroid gland has the potential to reduce the number of the cyto-histologic discrepancies. Publication and abstract:
  - Widder S., Guggisberg K., Khalil M., Pasieka J.L. 2007. A pathologic re-review of follicular thyroid neoplasms: The impact of changing the threshold for the diagnosis of the follicular variant of papillary thyroid carcinoma. Surgery 144(1): pp. 80-85.
  - Abstract: A Morphological and Clinico-Pathological Review of Follicular Thyroid Neoplasms: An Increase in the Prevalence of Malignancy with the Application of Recently Published Criteria for Follicular Neoplasms
- **Characterising Oral Human Papilloma Virus Infections in HIV Positive Men who have Sex with Men. Dr. Constance Finney, Dr. Angel Chu, Dr. Ranjit Waghray, Dr. Ron Read, Dr. John Gill.** The objectives of this project were to: 1) identify the prevalence and type of HPV oral infections in Calgarian HIV(+) men who have sex with men (MSM), 2) identify whether rates of HPV detection differ depending on the oral sampling site, and 3) determine whether antibody levels to HPV can be detected in blood from HIV(+) MSM. The preliminary data obtained from this pilot study enabled the investigators to apply for a comprehensive CLS project and CIHR grant. The project did not accomplish the goals of the original proposal as they have tested 35 out of 100 individuals and obtained no positive HPV tests. The research allowed the team to determine that HPV is not being detected in the small pool of HIV+MSM in Calgary, which is informative for Dr. Chu.
- **Development of a quantitative fecal fat test based on microscopy and automated image analysis. Dr. Lawrence de Koning, Dr. Christopher Naugler, Dr. Steven Martin, Dr. Maitreyi Raman.** The objective of this project was to collect pilot data to develop a simple, rapid, reproducible, and inexpensive replacement to the Van de Kamer quantitative fecal fat test at Alberta Children's Hospital (ACH). The original proposal was to create an automated image analysis procedure to quantitate fecal fat globule surface area. The findings suggest that a qualitative assessment via an existing CLS test was just as good, combined with specimen weight. This is a much less onerous procedure than using image analysis to examine fat globule surface area and this project will streamline fat malabsorption testing at CLS. This will involve cancellation of the Van de Kamer quantitative fecal fat, and replacement with the alternative developed by the investigators – which includes a mathematical transformation pf specimen weight and a qualitative test for fat globules. Pediatric GI has consented to the replacement of the quantitative fecal fat method with these tests. This research showed that simple optical measures of fat droplets combined with fecal weight can predict fat malabsorption by the Van de Kamer fecal fat method. A panel containing these two tests will be set up by CLS.
  - Abstract: Korostensky M, Naugler C, de Koning L. A risk score for abnormal fecal fat excretion based on fecal weight and lipid droplets measured by photomicroscopy and automated image analysis. Canadian Society of Clinical Chemists Annual Meeting, Edmonton, AB, Canada. June 20, 2016. (To be published in the journal Clinical Biochemistry)
- **Allergen-specific IgE before and after chemotherapy. Dr. Alex Chin, Dr. Jan Storek.** The objective of this project was to determine whether chemotherapy affects the presence or absence of allergen-specific IgE (A-IgE) in serum. The

findings from this study will assist in the interpretation of allergen-specific IgE results in context of B cell counts in patients undergoing hematopoietic stem cell transplantation. The findings demonstrate that allergen-specific IgE can be reduced by treatment with chemotherapeutic agents for hematopoietic stem cell transplantation despite the more profound decrease in antibody producing cells (B cells). This will help the clinical team to manage allergic diseases in this patient population. In a similar manner discussed above, the findings from this study demonstrate that there is a population of plasma cells which are resistant to chemotherapy. This is useful information for clinicians to manage allergic conditions in patients undergoing hematopoietic stem cell transplantation. Manuscript in preparation:

- Article title: Influence of chemotherapy on allergen-specific IgE
- Article Type: Full Length Article
- Short Title: Chemotherapy and A-IgE
- Authors: Sarah Whiteside, Marketa Markova, Alex Chin, Poonam Dharmani-Khan, Monica Modi, Faisal Khan, Jan Storek

- **Prognostic significance of MN1, ERG, BAALC and EVI1 (MEBE) expression signature in various cytogenetic risk groups among patients with Acute Myeloid Leukemia (AML). Dr. Adnan Mansoor, Dr. Ariz Akhter, Dr. Meer-Taher Shabani-Rad, Dr. Fariborz Rashid-Kolvear.** The objective of this study was to validate four genes (MEBE) signature across various cytogenetic risk groups in AML. The research provided automated technology application for the prognosis in AML in Laboratory and provided research experience to two students, post-doctoral and undergraduate. Publication:
  - Akhter A, Farooq F, Elyamany G, Mughal MK, Rashid-Kolvear F, Shabani-Rad MT, Street L, Mansoor A. Acute Myeloid Leukemia (AML): Upregulation of BAALC/MN1/MLLT11/EVI1 gene Cluster Relate With Poor Overall Survival and a Possible Linkage With Coexpression of MYC/BCL2 Proteins. Appl Immunohistochem Mol Morphol. 2017 30. [Epub ahead of print]

2017 Publications involving APRL services

1. Xianyong Gui, Ziran Meng, Yarrow J McConnell, Shuhong Liu, Vincent G Falck, Lloyd A Mack, Walley J Temple. Differing expression profiles of Notch/enterocyte and Wnt/secretory lineage signallings are associated with morphological diversity of appendiceal tumours J Clin Pathol. 70:40–50, 2017

2. Ji Li1, Yuchu Yan, Ziran Meng, Shuhong Liu, Paul L. Beck, Subrata Ghosh, Jiaming Qian, Xianyong Gui Microscopic Colitis Evolved Into Inflammatory Bowel Diseases Is Characterized by Increased Th1/Tc1 Cells in Colonic Mucosal Lamina Propria. Dig Dis Sci. 62:2755–2767, 2017

3. 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, Traficante N, 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; 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. 2017 Oct 23. [Epub ahead of print]

4. Rambau P, Kelemen LE, Steed H, Quan ML, Ghatage P, Köbel M. Association of Hormone Receptor Expression with Survival in Ovarian Endometrioid Carcinoma: Biological Validation and Clinical Implications. Int J Mol Sci. 18(3) pii: E515, 2017

5. Kelemen LE, Rambau PF, Koziak JM, Steed H, Köbel M. Synchronous endometrial and ovarian carcinomas: predictors of risk and associations with survival and tumor expression profiles. Cancer Causes Control. 28(5):447-457, 2017

6. Rambau PF, McIntyre JB, Taylor J, Lee S, Ogilvie T, Sienko A, Morris D, Duggan MA, McCluggage WG, Köbel M. Morphologic Reproducibility, Genotyping, and Immunohistochemical Profiling Do Not Support a Category of Seromucinous Carcinoma of the Ovary. Am J Surg Pathol. 41(5):685-695, 2017

7. Köbel M, Tessier-Cloutier B, Leo J, Hoang LN, Gilks CB, Soslow RA, Delair D, Stewart CJR, Lee CH. Frequent Mismatch Repair Protein Deficiency in Mixed Endometrioid and Clear Cell Carcinoma of the Endometrium. Int J Gynecol Pathol. 36(6):555-561, 2017

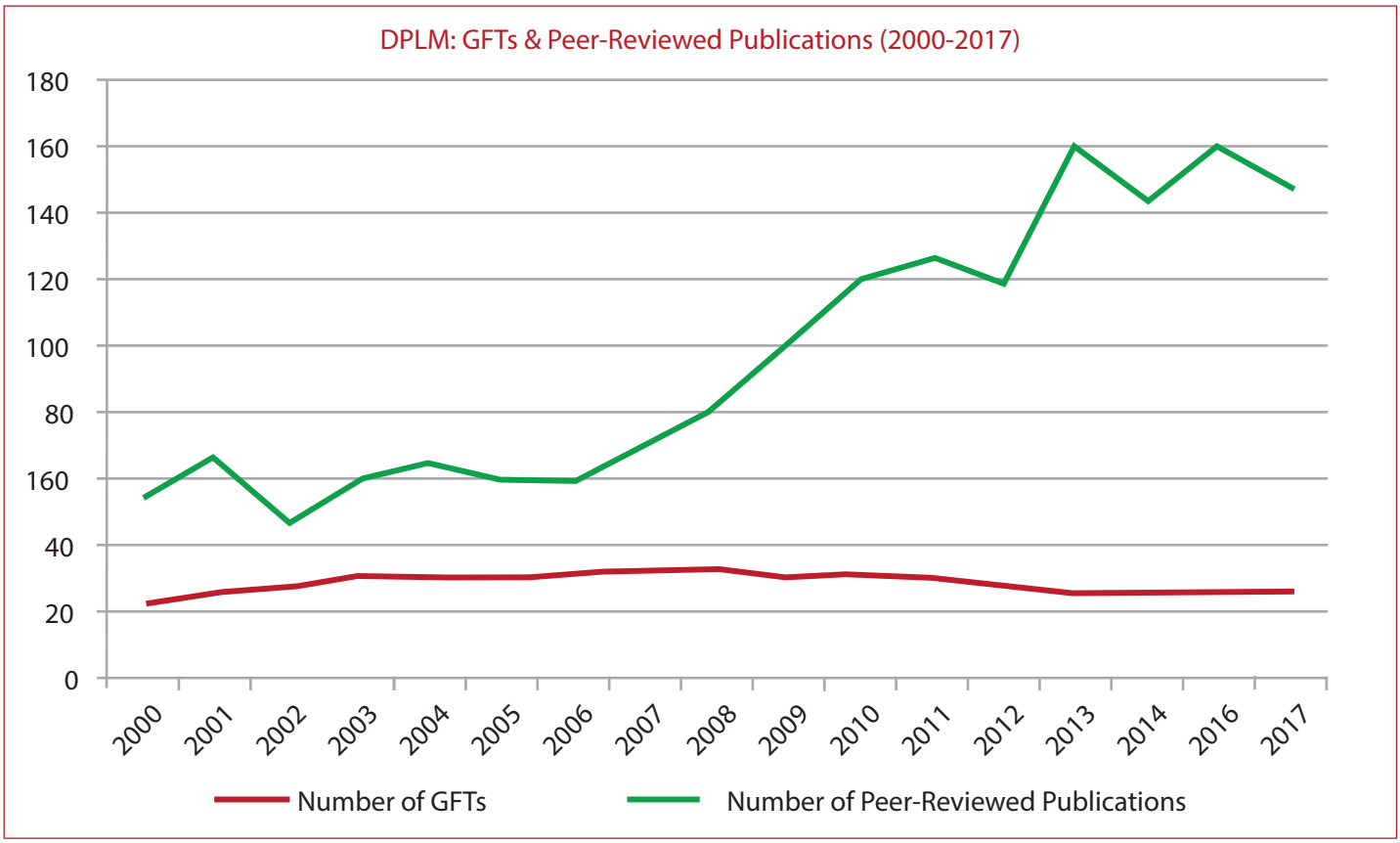
8. Gui X, Escobar J, Lee CH, Duggan MA, Köbel M. Synchronous Ovarian and Appendiceal Mucinous Neoplasms in the Absence of Pseudomyxoma Peritonei. Int J Gynecol Cancer. 27(2):214-222, 2017

9. McIntyre JB, Rambau PF, Chan A, Yap S, Morris D, Nelson GS, Köbel M. Molecular alterations in indolent, aggressive and recurrent ovarian low-grade serous carcinoma. Histopathology. 70(3):347-358, 2017

10. Chen W, Husain A, Nelson GS, Rambau PF, Liu S, Lee CH, Lee S, Duggan MA, Köbel M. Immunohistochemical Profiling of Endometrial Serous Carcinoma. Int J Gynecol Pathol. 36(2):128-139, 2017

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 166 peer-reviewed papers and book chapters in 2017.



Presentations

Members of the DPLM also presented many scientific papers at prestigious national or international meetings in 2017. 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. Chad Luedtke was appointed Site Leader, South Health Campus
- Dr. Margaret Kelly was appointed Specialty Group Leader, Pulmonary Pathology
- Dr. Srinivas Gottipati was appointed Specialty Group Leader, Renal Pathology
- Dr. Mara Caragea was appointed Specialty Group Leader, Bone & Soft Tissue Pathology
- Dr. Leland Baskin was appointed Specialty Group Leader, Laboratory Informatics

Workforce Planning

Summary of Recruitment - 2017

Medical Staff - Recruitment			
Medical Staff	Start Date	GFT/Clinical	Primary Division
Venner, Allison	2017 January	Clinical Assistant Professor	Clinical Biochemistry
Li, Catherine	2017 February	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Dharmani-Khan, Poonam	2017 April	Clinical Assistant Professor	Hematopathology
Lynch, Tarah	2017 July	Clinical Assistant Professor	Microbiology
Gifford, Jessica	2017 August	Clinical Assistant Professor	Clinical Biochemistry
Groeschel, Michael	2017 September	Clinical Assistant Professor	Microbiology
Terzic, Tatjana	2017 October	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Franko, Angela	2017 November	Clinical Assistant Professor	Anatomic Pathology/Cytopathology
Medical Staff - Departures			
Byung Kim	2017 September	Clinical Assistant Professor	Anatomic Pathology/Cytopathology

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
Bromley, Amy	Clinical	Assistant 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
DiFrancesco, Lisa	GFT	Associate Professor	FMC	Soft Tissue & Bone 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	Gastointestinal Pathology, Surgical Pathology
Franko, Angela	Clinical	Assistant Professor	FMC	Pulmonary Pathology

Galman, Lanie	Clinical	Assistant Professor	SHC	Breast Pathology, Oncologic Surgical Pathology
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
Gottipati, Srinivas	Clinical	Assistant Professor	FMC	Renal Pathology, Surgical Pathology
Gough, James	Clinical	Professor	FMC	Renal Pathology, Cytopathology
Guggisberg, Kelly	Clinical	Assistant Professor	RGH	ENT Pathology, Dermatopathology
Gui, Xianyong (Sean)	Clinical	Associate Professor	FMC	Gastrointestinal Pathology
Hamilton, Leslie	Clinical	Assistant Professor	FMC	Neuropathology
Howell, Jenika	Clinical	Assistant Professor	PLC	Surgical Pathology
Hunter, Charlene	Clinical	Assistant Professor	DSC	Surgical Pathology, Dermatopathology
Itani, Doha	Clinical	Assistant 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
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
Li, Catherine	Clinical	Assistant Professor	DSC	Medical Genetics, Clinical Chemistry
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
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	Assistant 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	FMC	Bone and Soft Tissue, Gastrointestinal Pathology, 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	Associate Professor	PLC	Surgical Pathology, Cytopathology
Wang, Yinong	Clinical	Associate Professor	DSC	Surgical Pathology, Cardiac Pathology
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	Immunochemisty, Clinical Chemistry
de Koning, Lawrence	Clinical	Associate Professor	ACH	General Pathology, Pediatric Clinical Chemistry
Gifford, Jessica	Clinical	Assistant Professor	DSC	Clinical Biochemistry
Redman, Lyle	Clinical		DSC	Point of Care, Clinical Chemistry
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	Associate Professor	DSC	Lab Informatics, General Pathology
Clinical Section of Hematopathology				
Medical Staff	**GFT/ Clinical**	**Rank**	**Site**	**Special Expertise**
Auer-Grzesiak, Iwona	Clinical	Associate Professor	FMC	Flow Cytometry, Lymphoma
Berka, Noureddine	Clinical	Assistant 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
Prokopishyn, Nicole	Clinical	Assistant Professor	FMC	Stem Cell Lab
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
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
Groeschel, Michael	Clinical	Assistant Professor	DSC	Medical Microbiology
Lynch, Tarah	Clinical	Assistant Professor	DSC	Bioinformatics, Microbial Genomics
Pillai, Dylan	GFT	Associate Professor	DSC	Molecular Diagnostics, Parasitology
Pitout, Johann	GFT	Professor	DSC	Anitbiotic 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

Baskin, Leland

Nguyen LT, Buse JD, **Baskin L**, Sadrzadeh SMH, Naugler C. Influence of diurnal variation and fasting on serum iron concentrations in a community-based population. Clin Biochem. 50:1237-1242, 2017

Benediktsson, Hallgrimur

Muruve DA, Mann MC, Chapman K, Wong JF, Ravani P, Page SA, **Benediktsson H**. The biobank for the molecular classification of kidney disease: research translation and precision medicine in nephrology. BMC Nephrol. 18(1):252, 2017

Berenger, Byron

Berenger B, Chui L, Reimer AR, Allen V, Alexander D, Domingo M-C, Haldane D, Hoang L, Levett P, A MacKeen, Marcino D, Sheitoyan-Pesant C, Zahariadis G on behalf of the Canadian Public Health Laboratory Network. Canadian Public Health Laboratory Network position statement: Nonculture based diagnostics for gastroenteritis and implications for public health investigations. Can Comm Dis Repor. 42(12):279-281, 2017

Berka, Noureddine

Mostafa AA, Petrosenko M, Stamm L, Khan FM, **Berka N**. The novel HLA-B*08:183 allele identified by sequence-based typing in a Caucasian leukemia patient. HLA. 90(6):367-368, 2017

Mostafa AA, Khan FM, Stamm L, Petrosenko M, **Berka N**. HLA-DQB1*05:144, a novel allele, discovered in a Southeast Asian donor for stem cell transplantation. HLA. 90(3):182-183, 2017

Bismar, Tarek

Trpkov K. Abou-Ouf H, Hes O, Lopez JI, Nesi G, Comperat E, Sibony M, Osunkoya AO, Zhou M, Gokden N, Leroy X, Berney DM, Werneck I, Musto ML, Athanazio DA, Yilmaz A, Donnelly B, Hyndman ME, Gill AJ, McKenney JK, **Bismar TA.** Eosinophilic Solid and Cystic Renal Cell Carcinoma (ESC RCC): Further Morphological and Molecular Characteristics of ESC RCC as a Distinct Entity. Am J Surg Pathol. 41(10):1299-1308, 2017

Remondini T, Van Zyl S, **Bismar TA**, Yilmaz S, Hyndman ME. Tubulovillous Adenoma in the Bladder in a Dual Pancreas-Kidney Transplant Patient. J Endourol Case Rep. 3(1):17-20, 2017

Huang KC, Evans A, Donnelly B, **Bismar TA**. SPINK1 Overexpression in Localized Prostate Cancer: a Rare Event Inversely Associated with ERG Expression and Exclusive of Homozygous PTEN Deletion. Pathol Oncol Res. 23(2):399-407, 2017

Brundler, Marie-Anne

Myers KA, Nikolic A, Romanchuk K, Weis E, **Brundler MA**, Lafay-Cousin L, Costello F. Optic neuropathy in the context of leukemia or lymphoma: diagnostic approach to a neuro-oncologic emergency. Neuro-oncol Pract. 4(1):60-66, 2017

Carson, Julie

Connors WJ, **Carson JA**, Chan WW, Parkins MD. Albendazole-responsive disseminated Tubulinosema acridophagus in a patient with chronic lymphocytic leukaemia. Clin Microbiol Infect. 23(9):684-685, 2017

Cameron M., Moser D., **Carson J.**, Maitland A., Conly JM., A case of group G streptococcal endocarditis masquerading as acute rheumatic fever. Official Journal of the Association of Medical Microbiology and Infectious Disease, Canada. Vol. 2, No. 1, 79-85, 2017

Chan, Jennifer

Neumann JE, Wefers AK, Lambo S, Bianchi E, Bockstaller M, Dorostkar MM, Meister V, Schneider PR, Müller-Renner I, Merk DJ, Shakarami M, Sharma T, Chavez L, Glass R, **Chan JA**, Taketo MM, Neumann P, Kool M, Schüller U. A mouse model for Embryonal Tumors with Multilayered Rosettes (ETMR) predicts tumor responsiveness to Sonic hedgehog inhibitors. Nat Med. (10):1191-1202, 2017

Schmidt C, Schubert NA, Brabetz S, Mack N, Schwalm B, **Chan JA**, Selt F, Herold-Mende C, Witt O, Milde T, Pfister SM, Korshunov A, Kool M. Pre-clinical drug screen reveals topotecan, actinomycin D, and volasertib as potential new therapeutic candidates for ETMR brain tumor patients. Neuro Oncol. 19(12):1607-1617, 2017

Cavalli FMG, Remke M, Rampasek L, Peacock J, Shih DJH, Luu B, Garzia L, Torchia J, Nor C, Morrissy AS, Agnihotri S, Thompson YY, Kuzan-Fischer CM, Farooq H, Isaev K, Daniels C, Cho BK, Kim SK, Wang KC, Lee JY, Grajkowska WA, Perek-Polnik M, Vasiljevic A, Faure-Conter C, Jouvet A, Giannini C, Nageswara Rao AA, Li KKW, Ng HK, Eberhart CG, Pollack IF, Hamilton RL, Gillespie GY, Olson JM, Leary S, Weiss WA, Lach B, Chambless LB, Thompson RC, Cooper MK, Vibhakar R, Hauser P, van Veelen MC, Kros JM, French PJ, Ra YS, Kumabe T, López-Aguilar E, Zitterbart K, Sterba J, Finocchiaro G, Massimino M, Van Meir EG, Osuka S, Shofuda T, Klekner A, Zollo M, Leonard JR, Rubin JB, Jabado N, Albrecht S, Mora J, Van Meter TE, Jung S, Moore AS, Hallahan AR, **Chan JA**, Tirapelli DPC, Carlotti CG, Fouladi M, Pimentel J, Faria CC, Saad AG, Massimi L, Liau LM, Wheeler H, Nakamura H, Elbabaa SK, Perezpeña-Diazconti M, Chico Ponce de León F, Robinson S, Zapotocky M, Lassaletta A, Huang A, Hawkins CE, Tabori U, Bouffet E, Bartels U, Dirks PB, Rutka JT, Bader GD, Reimand J, Goldenberg A, Ramaswamy V, Taylor MD. Intertumoral heterogeneity within medulloblastoma subgroups. Cancer Cell. 31(6):737-754, 2017

Chan, Wilson

Rypien C, Chow B, **Chan WW,** Church, DL, Pillai DR. Detection of Plasmodium infection by the illumigene malaria assay compared to reference microscopy and real-time PCR. J Clin Microbiol 55(10):3037-3045, 2017

Benavente ED, Ward Z, **Chan W**, Mohareb FR, Sutherland CJ, Roper C, Clark TG. Genomic variation in Plasmodium vivax malaria reveals regions under selective pressure. PLoS One 12(5):e0177134, 2017

Connors WJ, Carson JA, **Chan WW**, Parkins MD. Albendazole-responsive disseminated Tubulinosema acridophagus in a patient with chronic lymphocytic leukaemia. Clin Microbiol Infect. 23(9):684-685, 2017

Edwards BD, Somayaji R, Missaghi B, **Chan WW**, Bois AJ. Prosthetic joint and implant contamination caused by Ralstonia pickettii: a report of three cases. 2017. SICOT J 3:32, 2017

Chin, Alex

Naugler C, Hemmelgarn B, Quan H, Clement F, Sajobi T, Thomas R Turin TC, Hnydyk W, **Chin A**, Wesenberg J. Implementation of an intervention to reduce population-based screening for vitamin D deficiency: a cross-sectional study. Canadian Medical Association Journal Open. 5:E36-39, 2017

Leung AA, Orton DJ, **Chin A**, Sadrzadeh H, Kline GA. Novel Approach to Establishing an Aldosterone: Renin Ratio Cutoff for Primary Aldosteronism. Hypertension. 69(3):450-456, 2017

Kline G.A, Buse JD, Van Der Gugten JG, Holmes DT, **Chin AC**, Sadrzadeh SMH. Factitious ACTH-dependent, apparent hypercortisolism: The problem with late-night salivary cortisol measurements collected at home. Clin Endocrinol (Oxf). 87:882-885, 2017

Church, Deirdre

Chernesky MA, Jang D, Maring I, Hoag LMN, Naidu P, Levett PN, Wylie J, Rebbapragada A, Ratnam S, Smieja M, Weinbaum B, Getman D and the Canadian MG Study Group (**Church DL** – Member). Mycoplasma genitalium antibiotic resistance mediating mutations in Canadian women with or without Chlamydia trachomatis infect. Sex Transm Dis. 44(7):433-435, 2017

Somayaji R, Naugler C, Guo M, **Church D**. Examining sociodemographic risk factors for Chlamydia trachomatis infection: a population-based cohort study. Future Microbiol. 12:1363-1370, 2017

Clark L, Parkins MD, Chow BL, Lynch T, **Church DL**. Endocarditis caused by an oral taxon species of Bergeyella identified by partial 16S sequencing: case report and review of the literature. JAMMI. 2(1):56-63, 2017

Church DL, Baxter H, Lloyd T, Larios O, Gregson DB. Evaluation of Strep B Select Chromogenic Medium and the Fast-Track Diagnostics Group B Streptococcus (GBS) Real-Time PCR Assay Compared to Routine Culture for Detection of GBS during Antepartum Screening. J Clin Microbiol. 55(7):2137-2142, 2017

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1.4 Research Grants – Rhonda Jackson

2017 CLS Health Services Research Funding Competition Projects Awarded Funding

The CLS Research Department announced award results for the twentieth annual CLS Health Services Research Funding

Competition. A total of $137,055.52 was awarded by CLS to researchers in 2017. One hundred and forty two projects have received funding through the Research Competition since it began in 1998.

Principal Investigator/ Co- Investigators	Topic	Budget
Dr. Wilson Chan, Dr. Kristine Brown	Blood Culture Bottles to improve the sensitivity of tissue culture in Prosthesis related infections	$14,737.85
Dr. Martin Koebel	Development of a clinical-grade CCNE1 assay for formalin-fixed, paraffin-embedded tissue.	$15,000.00
Dr. Parham Minoo	Role of microRNA 422a (miR-422a) in malignant progression of sessile serrated adenoma	$14,415.00
Dr. Gisele Peirano, Dr. Deirdre Church, Dr. Siobhan Holland	Extra-intestinal pathogenic Escherichia coli (ExPEC) bloodstream infections: A retrospective analysis of local epidemiology in Calgary	$14,978.00
Dr. Alex Chin, Dr. Susanne Benseler, Dr. Nicole Johnson	Defining the optimal titer for anti-nuclear antibody (ANA) screening for children in the Calgary zone	$11,831.00
Dr. Dylan Pillai, Dr. Wilson Chan	Validation of novel malaria testing algorithm at CLS	$15,000.00
Dr. Noureddine Berka, Dr. Ahmed Mostafa	Improvements of crossmatching technique to eliminates interference by Rituximab therapy.	$14,990.00
Phase I Total		$100,951.85
Dr. Isolde Seiden Long, Dr. Joshua Buse	Moving from Helium to Hydrogen carrier gas: The next generation of Toxic Alcohols testing	$36,103.67
Phase II Total		$36,103.67
Competition Total		$137,055.52

2017 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				
Development of a Novel Kidney Biopsy Tissue Based Molecular Genetics Approach to Identify Donors' HLA Type from Transplanted Organs	2015-17	National Science, Technology and Innovation Plan/ KACST	$533,302	Co-Inv
Genetic Profiling of Killer Immunoglobulin-Like Receptors (KIRs) of Natural Killer Cells as Predictors of ATG-Conditioned HLA-matched Pediatric Allogeneic Cell Transplantation (HTC) Outcomes	2015-17	The Childhood Cancer Canada Foundation C17 Research Network	$115,000	Co-Inv
Role of Natural Killer Cells Receptor genes in the immunopathogenesis and prognosis of different types of Lymphoma	2015-17	Alberta Cancer Foundation	$97,125	Co-Inv
Innovative diagnostics to improve the management of urothelial carcinoma"	2014-17	Collaborative Research and Innovation Opportunities	$750,000	Co-Inv
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

MEDICAL STAFF	YEAR	FUNDING SOURCE	TOTAL AWARD	*PI/ CO-INV
BISMAR, TAREK				
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	$48,183.75	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
Blood based detection of the migration switch in prostate cancer to predict metastatic disease	2015 - 17	University of Alberta	$100,000 Over 2 years	PI
Blood based detection of the migration switch in prostate cancer to predict metastatic disease.	2014 - 17	Prostate Cancer Canada – Movember Translation Acceleration Grant (TAG)	$1,495,000 Over 3 years	Co-Inv
Innovative diagnostics to improve the management of urothelial carcinoma	2014 - 17	Collaborative Research and Innovation Opportunities	$750,000 Over 3 years	Co-Inv
Movember GAP1 tissue biomarker project	2013 - 17	Prostate Cancer Canada – Movember GAP1	$141,793	PI
Interaction of TMPRSS2-ERG fusion gene and PTEN genomic deletions in prostate cancer progression. Principal investigator	2008-17	Prostate Cancer Research Foundation USA (Young Investigator Award)	$450,000	PI
CHAN, JENNIFER				
Precision Oncology for Young People (PROFYLE)	2016-2021	Terry Fox Research Institute	$159,254	Co-Inv
Investigating the role of Lin28 in the pathogenesis and maintenance of stem cell properties in ETMR	2015-17	Charbonneau Cancer Research Institute, University of Calgary	$25,000	PI
Dissecting the role of Etv5 and Asc11 in oligodendrogliomagenesis	2015-17	Cancer Research Society	$120,000	PI
The role of CIC in oligodendroglioma	2014-19	Canadian Institutes of Health Research	$656,900	PI
Modeling and therapeutic targeting of the clinical and genetic diversity of glioblastoma	2012-17	Terry Fox Research Institute (with multiple co-funding sources)	$512,500	Co-PI
MicroRNA functions in cerebellar development and disease	2010-17	Alberta Heritage Foundation Clinical Investigator Award	$770,000	PI

MEDICAL STAFF	YEAR	FUNDING SOURCE	TOTAL AWARD	*PI/ CO-INV
CHURCH, DEIRDRE				
Microscale Metabolomics for rapid Detection of Infections and Identification of Drug Resistance	2017-2020	Genomic Applications Partnership Program (GAPP)/ Genome Canada	$6,024,696	Co-PI
Device for the rapid detection of seven common bloodstream infections and assessment of antibiotic susceptibility	2017-2020	Genomic Applications Partnership Program (GAPP)/ Genome Canada	$2,080,891	PI
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				
Refined prognostication in coronary artery disease using routine laboratory test data	2014-17	MSI Foundation Research Grant	$98,000	PI
DEMETRICK, DOUG				
Characterising sexually dimorphic drug metabolism using induced pluripotent stem cell derived hepatocytes	2017-19	Canadian Institutes of Health	$80,000	Co-Inv
GREEN, FRANCIS				
The improvement of mine safety and Health	2017-2020	Alpha Foundation	$1,800,000 Calgary $75,000	Co-Inv
High resolution microscopy of living human cells using Richardson Technology Microscopy	2004-18	Anonymous Foundations	$509,145	PI
GREGSON, DANIEL				
Reducing the Global Burden of Infectious Diseases through precision population health	2017-2020	Genome Alberta	$6,024,696	Co-Inv
Clinical Validation of the Molecular-Based Automated BD MAX Enteric Extended Bacterial Panel	2015-17	Becton Dickinson	$85,000	Co-Inv
JOSEPH, JEFFREY				
Donald Burns and Louise Berlin Professor in Dementia Research	2015-2020	University of Calgary	$500,000	PI
KELLY, MARGARET				
Investigating the phenotype and role of mast cells in idiopathic pulmonary fibrosis	2015-17	Medimmune Investigator Initiated Grant	$207,126	PI
KHAN, FAISAL				
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

MEDICAL STAFF	YEAR	FUNDING SOURCE	TOTAL AWARD	*PI/ CO-INV
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	2014-18	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 ($50,000 per year)	PI
KUREK, KYLE				
Non-heritable genetic diseases of the skeletal system: pathogenesis and treatment	2014-19	NIH-NIAMS	$500,000	Co-PI
MANSOOR, ADNAN				
Acute Myeloid Leukemia (AML): Improving current clinical risk stratification, through identification of novel molecular markers of prognostic significance by gene expression profiling	2015-17	Calgary Health Trust Hematology Education and Research Fund	$30,000	Co-PI
NAUGLER, CHRISTOPHER				
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
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

MEDICAL STAFF	YEAR	FUNDING SOURCE	TOTAL AWARD	*PI/ CO-INV
PILLAI, DYLAN				
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 intracellular infectious diseases (PT-CIID)	2016-18	University of Calgary VPR Matching Funds	$200,000	Co-Inv
Clinical trial: Point of care testing for C. difficile	2016-17	CIHR	$10,000	PI
Clinical Validation of the Molecular-Based Automated BD MAX Enteric Extended Bacterial Panel	2015-17	Becton Dickinson	$85,000	Co-Inv
PITOUT, JOHANN				
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 ($60,000 per year)	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
Development of a New Multiplex PCR (M-PCR) Assay for Rapid Detection of Methicillin-Resistant Staphylococcus aureus (MRSA). Directly from clinical samples	2016-18	Canadian Institute of Health Research Operating Grant	$9,961	PI

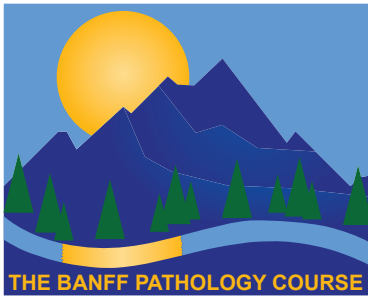
1.5 Banff Pathology Course

2017 Banff Pathology Course Program

Bone / Soft Tissue / Dermatopathology Pathology Update

Banff Springs Hotel, Banff National Park

August 31 – September 2, 2017



Guest Faculty / Keynote Speakers	
Dirk Elston, MD Professor and Chair Department of Dermatology and Dermatologic Surgery Medical University of South Carolina Charleston, SC	Petur Nielsen, MD Professor of Pathology Harvard Medical School Massachusetts General Hospital Boston, MA
Jodi M. Carter, MD, PhD Consultant Pathologist Mayo Clinic Rochester, MN	

Course Program	
Wednesday, August 30, 2017	
17:00-18:30	Registration is open in KC 200 Galleria South
Thursday, August 31, 2017 – BONE & SOFT TISSUE	
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 in KC 201/203
07:40-08:40	Opening Keynote 1: Lipomatous tumours - evolving concepts Dr. Petur Nielsen
08:40-09:30	Session 1: Nerve Sheath Tumors - Dr. Jodi Carter
09:30-10:20	Session 2: Immunohistochemistry of Soft Tissue Tumors: Tried & True and Some Things New - Dr. Bret Wehrli
10:20-10:50	Break in KC 105
10:50-11:40	Session 3: Fibro-Myo-Lipo-oma: A Primer on Pediatric (Myo)Fibroblastic Lesions - Dr. Kyle Kurek
11:40-12:30	Session 4: Giant Cell Rich and Cystic Lesions of Bone - Dr. Petur Nielsen
12:30-14:00	Lunch Break in the Vistas Dining Room
14:00-14:50	Session 5: Vascular Anomalies Update - Dr. Kyle Kurek
14:50-16:30	Case Presentations Case 1: Sinister Shin Splints - Erik Nohr (PGY5-Anatomic Pathology), Doha Itani Case 2: Could Have Fooled Me! - Mahra Nourbakhsh (PGY4-Anatomic Pathology), Doha Itani Case 3: Left Hand Mass in a Child - Nicholas Wiebe (PGY4-Anatomic Pathology), Kyle Kurek Case 4: TBD - Hisham Assem (PGY4-Anatomic Pathology), Mara Caragea Case 5: TBD - Marcia Abbott (PGY4-General Pathology), Mara Caragea Case 6: Bilateral Pulmonary Nodules NYD - Asifa Amin (PGY3-General Pathology), Jingyang Huang
17:30	Wine & Cheese Reception in KC 105
Friday, September 1, 2017 – BONE & SOFT TISSUE	
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 in KC 201/203
07:40-08:40	Opening Keynote 1: Notochordal Cell tumors - Dr. Petur Nielsen
08:40-09:30	Session 1: Cartilaginous Bone Lesions - Dr. Jodi Carter
09:30-10:20	Session 2: Myxoid Tumors of Soft Tissue - Dr. Bret Wehrli
10:20-10:50	Break in KC 105
10:50-11:40	Session 3: Non-Neoplastic Orthopedic Pathology - Dr. Petur Nielsen
11:40-12:30	Session 4: Vascular Tumors of Bone - Dr. Petur Nielsen
12:30-14:00	Lunch Break in the Vistas Dining Room
12:30–14:00	ASLP Annual Meeting in Lunch KC 205
14:00-16:00	Derm Case studies Case 1: All in the Family - Dr. Charlene Hunter Case 2: What Kind of Muffin? - Drs Tawny Hung & Kimberly Wood Case 3: "Patient referred for surgical correction of ptosis". Usual presentation of an unusual cutaneous neoplasm. - Dr. M. Nausherwan Mahmood Case 4: Clinicopathological correlation on the dermatology consult service - Sabrina Nurmohamed & Dr. Karen Naert
17:30	Wine & Cheese Reception KC 200 Galleria South
18:30	Banquet - Plated three course dinner in KC201/203

Course Program	
Saturday, September 2, 2017 - DERMATOPATHOLOGY	
06:30-07:15	Registration KC 200 Galleria South
06:30-07:15	Full Breakfast KC 105
07:15-07:25	Introductory Remarks in KC 201/203
07:25-08:25	Dermpath session 1: Approach to melanocytic lesions - Dr. Dirk Elston
08:25-09:15	Dermpath session 2: Cutaneous infection/infestations - Dr. Dirk Elston
09:15-9:40	Dermpath session 3: AJCC 8th edition for melanoma - Dr. M. Nausherwan Mahmood
09:40-10:05	Challenging Cases in Childhood Melanoma - Dr. Charlene Hunter & Dr. Pavandeep Gill
10:05-10:30	Break KC 105
10:30-11:20	Dermpath session 4: Rheumatologic diseases - Dr. Dirk Elston
11:20-12:20	Dermpath session 5: Review of common dermpath diagnoses for the surgical pathologist - Dr. Tawny Hung
12:20-13:20	Dermpath session 6: Clinicopathological correlation for non-specific dermatoses - Dr. Dirk Elston
13:20	Closing Remarks in KC 201/203
13:30	Departure