Daniel T **Holmes**

MD, FRCPC, Clinical Professor

Department of Pathology and Laboratory Medicine, University of British Columbia

+1 778 874 2994 | dtholmes@mail.ubc.ca | labrtorian.com | drdanholmes | drdanholmes

Medical Biochemist. Head and Medical Director of Pathology and Laboratory Medicine, Providence Health, Vancouver, BC. Interested in Clinical Endocrinology, Clinical Mass Spectrometry and Data Science in application to Laboratory Medicine.

Education

University of Toronto — *Toronto, Canada*

BSc (Hons), Chemical Physics — *1990–1994*

University of British Columbia — *Vancouver, Canada*

MD — *2001*

University of British Columbia — *Vancouver, Canada*

Residency, Medical Biochemistry — *2006*

Professional Experience

- Apr 2020–Present: Head and Medical Director, Department of Pathology and Laboratory Medicine, Providence Healthcare
- Jun 2022–Present: Interim Medical Director, BC Provincial Toxicology Laboratory, Provincial Health Services Authority
- Mar 2023–Present: Medical Lead, Data Analytics for Clinical Chemistry, Provincial Lab Medicine Service
- Apr 2017–Apr 2020: Assistant Head, Department of Pathology and Laboratory Medicine, Providence Healthcare
- Sep 2008–Mar 2020: Medical Leader, Clinical Chemistry, Department of Pathology and Laboratory Medicine, Providence Healthcare
- Jul 2006–Present: Medical Biochemist, Department of Pathology and Laboratory Medicine, Providence Healthcare
- Sep 1997–May 2006: Ran large private tutoring company (“Dan The Tutor”) at the University of British Columbia focusing on exam preparation for Calculus 1–3, 100-level Physics, 100-level Chemistry and Organic Chemistry.

Teaching Experience

- UBC Medical Undergraduate
  - 2003: FMED 427, Ovarian Pathology
  - 2003: FMED 427, Pathology of Uterus and Fallopian Tubes
  - 2003–2015: FMED 425, Intracellular Lipid Metabolism
  - 2004–2015: FMED 425, Lipid Lowering Therapies
  - 2008–2015: FMED 425, Lipoprotein Metabolism
  - 2006–2015: Week Chair of Lipid Week
  - 2006, 2008–2021: Problem Based Learning Tutor: Endocrine Block
- UBC Pathology Graduate Studies
  - 2005: PATH 500A, Extracellular Lipid Metabolism
- UBC Bachelor of Medical Laboratory Sciences
  - 2007–Present: PATH 407, Carbon Monoxide, Cyanide and Pesticide Poisoning
  - 2004–2010: PATH 406, Biochemical Investigation of Hypertension
  - 2004–Present: PATH 406, Biochemical Markers of Cardiac Injury
  - 2004–Present: PATH 406, Biochemistry of the Pituitary-Gonadal Axis
- UBC PharmD Program
  - 2006: PATH 548: Lipid Lowering Therapies
  - 2007–2018: PATH 548, Investigation of Hepatocelluar Injury
- General Pathology and Medical Biochemistry Residency Training Program

  - 2005–2015: Markers of Hepatic Injury
  - 2005–2015: Biochemistry of the Pituitary-Gonadal Axis
  - 2005–2015: Extracellular Lipid Metabolism

Professional Affiliations

- Canadian Association of Medical Biochemists
- Canadian Society of Clinical Chemists
- American Association of Clinical Chemists
- Royal College of Physicians and Surgeons of Canada
- Doctors of BC
- BC Association of Laboratory Physicians
- Christian Medical and Dental Society
- Member of the Canadian Registry of Hippocratic Physicians

Committees

- 2024–present: PLMS Medical Biochemistry Advisory Committee
- 2016–present: Clinical Systems Transformation (Cerner Implementation) Laboratory Physician Champion
- 2018–present: Medical Lead: PHSA Provincial Clinical Chemistry Equipment Procurement
- 2016–present: IFCC Committee for the Standardization of Measurement of Insulin and C-Peptide
- 2018, 2022: American Association for Clinical Chemistry Annual Meeting Organizing Committee
- 2014–2022: Mass Spectrometry & Applications to the Clinical Laboratory Scientific Committee Member
- 2020: Mass Spectrometry & Applications to the Clinical Laboratory Scientific Committee, Chair
- 2016–present: Member of the BC Guidelines and Protocols Committee (“GPAC”) and acted as medical lead on the following documents
  - Hormone Testing – Indications and Appropriate Use
  - Testosterone Testing
  - Vitamin D Testing
  - Thyroid Function Testing
- 2018: Chair of the Endocrine Division, American Association for Clinical Chemistry
- 2016–present: Royal College of Physicians and Surgeons Medical Biochemistry Examination Committee
- 2015–2019: Providence Health, Council for Excellence
- 2010–2015: UBC Clinical Faculty Affairs Committee
- 2010–2019: UBC Clinical Faculty Promotions Committee
- 2008–2018: Supervisor, UBC Pathology Summer Research Program
- 2006–2018: RCPSC Medical Biochemistry Residency Training Committee
- 2013–2014: National Guidelines Committee for the Diagnosis of Testosterone Deficiency
- 2021 Ad Hoc National Committee for incorporation of Aritificial Intelligence and Machine Learning into the Royal College Pathology and Laborotory Medicine Fellowship programs

Career Achievements

- Initiated the now-internationally recognized St. Paul’s Hospital Clinical Mass Spectrometry program which is one of the most sophisticated hospital-based clinical mass spectrometry program in North America.
  - the only laboratory in Canada performing thyroglobulin by SISCAPA-LC-MS/MS, able to overcome negative interferences caused by thyroglobulin autuantibodies in patients with papillary and follicular thyroid carcinoma.
  - the only laboratory in the world routinely performing immunoglobulin G subclasses by LC-MS/MS which overcomes analytical interferences seen in IgG4 related disease.
  - the first laboratory in Canada to perform aldosterone and plasma renin activity by LC-MS/MS and reference lab for a major vendor’s automated immunoassay analyzer.
  - the only laboratory in Canada to perform 1,25 dihydroxyvitamin D by LC-MS/MS and reference lab for a major vendor’s automated immunoassay analyzer.
  - BC’s sole provider of azole antifungal therapeutic drug monitoring (voriconazole, posaconazole, itraconazole)
  - the only laboratory in Canada capable of quantitation of synthetic insulin analogues for investigation of

forensic cases, accidental overdoses and intentional insulin misuse.
  - the only laboratory in Canada measuring infliximab by LC-MS/MS.
  - Other assays rotuinely performed: Vitamin D, high sensitivity testosterone, androstenedione, 17-hydroxy-progesterone, plasma and urine cortisol.
- Recruited 2 nationally prominent Medical Biochemists and 2 nationally prominent Clinical Chemists to the Providence Health Clinical Chemistry Team.
- Acted as the medical lead for a multi-year Province-Wide Clinical Chemistry core and immunoassay analyzer procurement. Working with technical, administrative, supply chain and financial representatives throughout BC, negotiated savings of $4M annually in Vancouver Coastal Health and Providence Health alone.
- Acted as the medical laboratory physician champion of the CST Cerner implementation, reviewing and modifying hundreds of clinical order sets, rectifying errors and inconsistencies in test selection, and creating rules for several thousand tests to define allowable period between repeat analyses.
- Began tenure as Head of Department at Providence Health on 01-Apr-2020 and therefore led the department through the COVID response; personally co-wrote all software for COVID data automation in our laboratory with Dr. Mahdi Mobini, PhD.

Software Authorship

- St. Paul's Hospital outpatient requisition scanning software
  - Scans, finds patient identifiers, converts requisitions to PDF and stores by date and patient identifier, performs optical character recognition
  - Allows storing and recovery of standing order requisitions
- Q-See
  - Recovers QC data from Sunquest Laboratory Information System and stores in SQL server on an hourly basis
  - Serves up QC data for review using R Shiny application containerized using Docker
  - Co-authored with Dr. Mahdi Mobini, PhD and Dr. Samuel Chorlton, MD
- Yoyo Monitor
  - Provides real time dashboard feedback to St. Paul's Hospital and Mount Saint Joseph Hospital core laboratory staff on the pending specimen log for samples of urgent and stat priority.
  - Allows rapid identification of samples requiring urgent attention.
- Providence Health COVID Data Automation and Sample Pooling Software
  - Wrote and/or oversaw automation scripts in Linux bash, R language and R Shiny to connect 3 Hamilton robotic liquid handlers, 4 RNA extractors and 4 thermal cyclers and 2 Linux servers.
  - Software tracks samples between instruments whether analyzed in singleton or pools
  - GUI allows sample review before release to laboratory information system using flat files
  - Ended the practice of results reporting using manual transcription
- Mass Spectrometry Data Automation
  - Wrote software to connect Hamilton robotic liquid handlers to SCIEX mass spectrometers
  - Software pre-processes results for laboratory information system, handling results above and below the analytical measuring range, truncating decimals, adding interpretive comments.
  - Passes results to the laboratory information system using flat files.
- Providence Health/Vancouver Coastal COVID Laboratory Dashboard
  - Updates every 30 mins to give testing numbers, (neg/pos) and smoothed rates
  - `https://covid19.providencehealthcare.org/daily/`
- cp-R software for method comparison of biochemical tests
  - open source software written in pyQt4, python and R
  - performs ordinary least squares, Deming or Passing Bablok regression
  - `https://sourceforge.net/projects/cprchempath/`
  - Over 3000 downloads from 81 countres

Software Languages

- R language: base R, tidyverse, RMarkdown, R Shiny
- Experienced Linux bash, Linux server networking and heterogeneous networking of Linux and Windows
- Markdown, LaTeX
- Basic Python, SQL

- Expect language for shell based robotic process automation
- Autohotkey for Windows-based robotic process automation

Software Skills

- Static report creation using base R, LaTeX, or RMarkdown from:
  - Excel/csv
  - SQL
  - Spark
- Interactive dashboard creation using:
  - Flexdashboard
  - R Shiny and Shiny Server
- Data automation and data cleansing using:
  - Linux bash
  - R language
- Basic robotic process automation

Awards

- Co-applicant on a Genome BC Genomics and Health: Personalized Medicine Program Grant. Biomarkers in Transplantation 3 (BiT3) Study. Funded at $2,572,918.
- Co-Applicant on a Genome BC Applied Genomic Consortium Grant for the Development of Novel Biomarker Blood Tests for COPD (December 2012). Funded at $7M
- Co-applicant Canadian Institutes of Health Research (2007): "Trace element status in chronic hemodialysis patients" Amount awarded (September 2007) $992,811; Term: Five years
- Canadian Society for Clinical Chemistry Award for Research Excellence 2017

Presentations

- *Provincial Lab Medicine Service: AI in Laboratory Medicine*, Vancouver BC, 16-Apr-2024
- *Introduction to the R Statistical Programming Language*, University of Athens, Athens, Greece, 11/12-Nov-2024
- *Tarzan and Jane at work Providence Health Vancouver* Canadian Diagnostics Executive Forum, Toronto, 21-Oct-2024 (**Invited**)
- *Primary Aldosteronism: More common than you think* Making Evidence Matter for Everyone, Vancouver, 14-May-2024 (**Invited**)
- *Systematic Ways to Avoid Fantasy and Self-Deception with Indirect Reference Interval Determination*, Seoul Korea, 25-Sep-2024 (**Invited**)
- *Automating Digital Workflows in the Clinical Laboratory Using Robotic Process Automation*, 29-Jul-2024, Chicago, USA
- *Systematic Ways to Avoid Fantasy and Self-Deception with Indirect Reference Interval Determination*, Chicago, USA 29-Jul-2024
- *Leadership in Laboratories* Clinical Biochemistry Conference, Kuwait City, Kuwait, 03-Mar-2024 (**Invited**)
- *Data Mining to Improve Laboratory Utilization and Patient Care* Clinical Biochemistry Conference, Kuwait City, Kuwait, 03-Mar-2024 (**Invited**)
- *Laboratory Automation/Hyperautomation* Clinical Biochemistry Conference, Kuwait City, Kuwait, 04-Mar-2024 (**Invited**)
- *Advances and pitfalls in indirect reference intervals* Clinical Biochemistry Conference, Kuwait City, Kuwait, 04-Mar-2024 (**Invited**)
- *As is our Pathology, so is our Practice: Cerner laboratory design effects on clinical practice.* 17-Nov-2023 PHSA Data Analytics Summit, Vancouver, BC, (**Invited**)

- *Informatics systems are essential tools for monitoring quality (error) in highly automated laboratories* 19-Jun-2023 POLQM Conference, Vancouver, BC, (**Invited**)
- *Indirect Reference Intervals: What's Real and What's Alchemy* 23-Mar-2023 ISLS11 Conference, Singapore (**Invited**)
- *Delivering Best Possible Laboratory Medicine Care for Primary Aldosteronism and Related Conditions* 12-Dec-2022 NACCCA Rounds, Online (**Invited**)
- *Adrenal Hypertension: Differential Diagnosis, Monitoring & Surveillance* 11-Nov-2022 Canadian Society for Endocrinology and Metabolism, Calgary Alberta (**Invited**)
- *Delivering Best Possible Laboratory Medicine Care for Primary Aldosteronism and Related Conditions* 20-Oct-2022 Cleveland Clinic Department of Pathology and Laboratory Medicine Grand Rounds, Cleveland, OH, USA (**Invited**)
- *Data Science Applications in Laboratory Medicine*, 06-Oct-2022 American Association for Clinical Chemistry Special Presentation, Online (**Invited**)
- *IGG4 Related Disease Diagnosis and Monitoring using LC-MS/MS: Advantages over Nephelometry* 09-Sep-2022 Japanese Society for Biomedical Mass Spectrometry, Tokyo Japan (Remote Presentation) (**Invited**)
- *Building a Sustainable, Scalable Hospital-Based Clinical Mass Spectrometry Program* 23-Aug-2022, International Conference of Biochemistry & Molecular Biology, Tehran Iran (Remote Presentation) (**Invited**)
- *Mass Spectrometry and the Siren-Song of Indirect Reference Intervals*, 23-Jun-2022, ACLPS Conference, Seattle, WA, USA (**Invited**)
- *Applications of the R Language to Laboratory Medicine*, 18-Feb-2022 Harbour UCLA Medical Center Laboratory Medicine Grand Rounds, Online (**Invited**)
- *Update on Mass Spectrometry in Application to Pediatric Laboratory Medicine* 26-Nov-2021, International Congress of Paediatric Laboratory Medicine (Online) (**Invited**)
- *Doing more with R: Create your own Automated Reports and Dashboards*, AACC Annual Meeting (**Invited**), 26-Sep-2021
- *Case Studies in Emerging Technologies in Pediatric Laboratory Medicine*, AACC Annual Meeting, 27-Sep-2021
- *Mind the App: Application Development as a Solution to Unmet Needs in Laboratory Workflows*, AACC Annual Meeting, 30-Sep-2021
- *Development of Automated Reports in Laboratory Medicine with R*, AACC Annual Meeting (**Invited**), 12-Dec-2021
- *Data Automation for Pooled NAT Testing of SARS COV2 – Rapid Development with R*, 15-Apr-2021, CSCC National Roundtable (Online) (**Invited**), 15-Apr-2021
- *Breaking up with Excel, An Introduction to the R Statistical Programming Language*, MSACL annual scientific meeting (**Invited**), 2014–2023, twice annually in Palm Springs, USA and Salzburg Austria
- *Applications of the R Language to Laboratory Medicine*, SIBioC 2020, the Italian Society of Clinical Chemistry (**Invited**), 06-Oct-2020
- *Which Diagnostic Tests are Underutilized or Overutilized*, Langley Memorial Hospital Grand Rounds, 22-Sep-2020
- *Using R to Produce Clinical Reports in the Patient Record*, R Medicine Conference, 29-Aug-2020 (**Invited**)
- *Analytics in the Clinical Laboratory with R: An Expert Panel*, AACC Webinar, 20-Aug-2020 (**Invited**)
- *Challenges in IGF1 Testing and Reporting*, Canadian Society of Endocrinology Annual Meeting, Winnipeg, 03-Oct-2019 (**Invited**)
- *Getting Started with R for Laboratory Medicine*, AACC Annual Meeting, Anahiem CA, 03-Aug-2019 (**Invited**)
- *Reproducible Research and Manuscript Preparation Using R and the Bookdown Package*, AACC Annual Meeting, Anahiem CA, 06-Aug-2019 (**Invited**)

- *Developing Appropriate Suspicion about Endocrine Lab Results*, Association des Médicines Endocinologues du Québec, Quebec QC, 25-May-2019 (**Invited**)
- *I can A1c clearly now: analytical variability in A1c measurement*. Diabetes Directors Seminar, Vancouver BC, 11-May-2019 (**Invited**)
- *Mass Spectrometry for Protein Analytes*, Endocrinology Grand Rounds, University of Calgary, Calgary AB, 08-May-2019 (**Invited**)
- *In Tests We Trust, but Should We?* Best Medicine Science Conference, Vancouver, BC, 03-May-2019 (**Invited**)
- *Murder and Munchausen's: Investigation in spontaneous hypoglycemia using LC-MS/MS*, Laboratory Medicine Congress & Exhibition, Korean Society for Clinical Chemistry, Seoul Korea, 31-Oct-2018 (**Invited**)
- *Thyroglobulin by tandem mass spectrometry: How to do it. When you need it*, Laboratory Medicine Congress & Exhibition, Korean Society for Clinical Chemistry, Seoul Korea, 31-Oct-2018 (**Invited**)
- *Protein mass spectrometry in routine clinical care–a year's experience with immunoglobulin subclasses and thyroglobulin* Clinical Mass Spectrometry Conference (CMSC), Beijing China 30-Apr-2018 (**Invited**)
- *Data Mining Routine Results for Reference Intervals: Common Errors and Modern Techniques. Mass Spectrometry*, MSACL.org Palm Springs USA, 25-Jan-2018 (**Invited**)
- *Endocrine Applications requiring high sensitivity: performance of the new SCIEX Citrine^{TM} Mass Spectrometry System for measuring Thyroglobulin and 1,25 dihydroxyvitamin D* MSACL.org, Palm Springs USA, 24-Jan-2018
- *The Future of Clinical Mass Spectrometry Panel Discussion* MSACL.org Palm Springs USA, 23-Jan-2018
- *The Case Against Direct-to-Consumer Laboratory Testing* St. Paul's Hospital CME Conference, Vancouver, BC, 24-Nov-2017 (**Invited**)
- *How and When to Order TSH, Estradiol and Testosterone* St. Paul's CME Hospital Conference, Vancouver, BC, 24-Nov-2017 (**Invited**)
- *Test utilization monitoring - a strategy using open source tools* Clinical Biochemistry Conferece, Kuwait City, Kuwait, 04-Nov-2017 (**Invited**)
- *How to determine with age dependent reference intervals: a survey of good and bad Ideas* Clinical Biochemistry Conferece, Kuwait City, Kuwait, 04-Nov-2017 (**Invited**)
- *Investigation of Adult Hypoglycemia: for a laboratory perspective strategy* Clinical Biochemistry Conference, Kuwait City, Kuwait, 05-Nov-2017 (**Invited**)
- *Application of mass spectrometry in therapeutic drug monitoring* Clinical Biochemistry Conference, Kuwait City, Kuwait, 05-Nov-2017 (**Invited**)
- *Data Automation and Informatics with R: Application Showcase* AACC Annual Meeting, San Diego CA, 03-Aug-2017 (**Invited**)
- *Debate: The Case Against Direct to Consumer Testing* Euro Med Lab, Athens Greece, 14-Jun-2017 (**Invited**)
- *Laboratory Conundrums* Canadian Pediatric Endocrine Group, Vancouver, BC, 14-Feb-2017 (**Invited**)
- *Solutions in Search of a Problem? Making Assays Matter for Patients* MSACL.org, Palm Springs, 25-Jan-2017 (**Invited**)
- *Interferences in commercial immunoassays for aldosterone: the case for mass spectrometry* Asia Pacific Federation of Clinical Biochemistry Conference, Taipei Taiwan, 26-Nov-2016 (**Invited**)
- *Are we shooting arrows where there is no target?* Endocrine Days Conference, Vancouver, BC, 21-Oct-2016 (**Invited**)
- *What's new in Thyroid Cancer? Ions. Thyroglobulin by Tandem Mass Spectrometry* BC Head and Neck Tumour Group, Vancouver, BC, 12-Oct-2016 (**Invited**)
- *Modern methods for measuring IGFI*, Endocrine Grand Rounds, McGill University, Montreal QC, 06-Oct-2016 (**Invited**)

- *Saline Suppression Testing and CYP 24A1 deficiency*, Endocrine/Medical Biochemistry Journal Club, McGill University, Montreal QC, 06-Oct-2016 (**Invited**)
- *Varying Those Vexing Voltages: Compound Specific Tuning*, MSACL.org, Salzburg Austria, 14-Sep-2016 (**Invited**)
- *Investigation of Insulin-Mediated Hypoglycemia in the Living and the Dead: The Role of LC-MS/MS* MSACL.org, Salzburg Austria, 15-Sep-2016 (**Invited Keynote Address**)
- *Automation of the Clinical Mass Spectrometry Workflows*, Cherry Blossom Automation Conference, Seoul Korea, 21-Apr-2016 (**Invited Keynote Address**)
- *Application of Mass Spectrometry to the Screening and Diagnosis of Primary Aldosteronism*, Severance Hospital Laboratory Medicine Rounds, Seoul Korea, 20-Apr-2016. (**Invited**)
- *Don't Manually Transcribe Your Results: The Poor Person's Guide to LC-MS/MS LIS Interfacing with R*, MSACL.org Palm Springs USA, 25-Feb-2016
- *Setting Your Mass Spec Team up for Success*, MSAC.org Palm Springs USA, 24-Feb-2016.
- *Laboratory Investigation of Spontaneous Hypoglycemia*, Mayo Clinic, Rochester MN, 30-Sep-2015 (**Invited**)
- *Best Practices and Current Applications of Clinical Mass Spectrometry*, AACC Mass Spectrometry Meeting, Chicago IL, 01-Oct-2015.
- *I think therefore I R, an introduction to the R statistical programming language for Clinical Laboratorians*, AACC Annual Meeting Jul 7, 2015
- *Little Steps with Big Data*, AACC Annual Meeting, Philadelphia, PA, 5-Jul-2015
- *Detecting and Managing Interferences and Contamination in Mass Spectrometric Analysis*, AACC National Webinar, 21-May-2015 (**Invited**)
- *AACC/MSACL: Best Practices and Current Applications–Delivering accurate steroid results with LC-MS/MS: How owning an expensive bicycle does not make you a good cyclist* October 2014, (**Invited**)
- *Detection of Allenic Norleucine, a Nephrotoxic Amino Acid from Amanita Smithiana and Related Mushrooms* MSACL.org Salzburg, Sep 2014
- *Medical Biochemistry in the CKD patient* Canadian Society for Nephrology, Vancouver, BC, 23-Apr-2014 (**Invited**)
- *Three Years Experience in Screening and Diagnosis of Primary Aldosteronism by LC-MS/MS*, MSACL.org, San Diego CA, 26-Feb-2014
- *Rethinking Santa's Appearance. Laboratory Diagnosis of Cushing's Syndrome*, Canadian Society for Clinical Chemists National Webinar, 12-Dec-2013
- *Analytical Considerations and Diagnostic Approaches to Addison's Disease and Cushing's Syndrome*, AACC Annual Meeting, Houston TX 31-Jul-2013.
- *Laboratory Medicine Statistics: A Hands-on Interactive Session with Real Data*, AACC Annual Meeting, Houston TX, 29-Jul-2013
- *Introduction to the R Statistical Computing Language*, Canadian Society for Clinical Chemists National Webinar, 10-Jan-2013 (**Invited**)
- *Bay Area Chapter of the American Association of Clinical Chemistry: Investigation of Primary Aldosteronism*, San Francisco, CA 18-Oct-2012 (**Invited**)
- *Plasma Renin Activity: An Achievable Venture in Proteomic Translation*, BC Proteomics Network Annual Meeting, 20-Feb-2012 (**Invited**)
- *Laboratory Investigation of Primary Aldosteronism*, Canadian Society for Clinical Chemists National Webinar, 12-Jan-2012 (**Invited**)
- *Unusual Causes of an Elevated Osmolal Gap: How to be Circumspect with Serum and Solvents*, Internal Medicine Grand Rounds, St. Paul's Hospital, Vancouver, BC, 01-Dec-2011

- *Hold the Sun: Appropriate Vitamin D Testing and Treatment*, St. Paul's CME Hospital Conference, Vancouver, BC, 17-Nov-2011 (**Invited**)
- *But I didn't Inhale: Urine Drug Screen Pearls*, St. Paul's CME Hospital Conference, Vancouver, BC, 17-Nov-2011 (**Invited**) Adrenal Hypertension: Laboratory Diagnostic Challenges*, Canadian Association of Medical Biochemists Annual Meeting, Quebec QC, 13-Oct-2011 (**Invited**)
- *The Use and Interpretation of Biochemical Testing for the Investigation of Adrenal Hypertension: Primary Aldosteronism. Laboratory Roll in Diagnosis*, AACC Annual Meeting, Atlanta, GA, Jul-2011
- *Practical translational proteomics: Angiotensin I and II by immuno-MALDI MS* Annual Symposium of the BC Proteomics Network, Vancouver, BC, 25-Sep-2010
- *PROOF Centre 2nd Annual Meeting: Biomarker Solutions for Personalized Medicine. "The Clinical Laboratory Approach" for assay validation*, Vancouver, BC, 26-May-2009
- *HbA1c: Emergence as a Diagnostic Tool for Diabetes Mellitus*, Diabetes Directors Seminar, Vancouver, BC, 21-May-2010 (**Invited**)
- *Parathyroid Hormone: everything that you did not need to know for the exam*, BC Endocrine Days, Vancouver, BC, 01-Oct-2010 (**Invited**)
- *Vitamin D Analysis: Perspectives form the Laboratory*, BC Endocrine Days, Vancouver, BC, 01-Oct-2010 (**Invited**)
- *What's new in the literature: Effect of Aging on A1c levels in Individual without Diabetes*, Diabetes Directors Seminar, Vancouver, BC, 25-May-2009 (**Invited**)
- *What's new in the literature: Effect of Aging on A1c levels in Individual without Diabetes*,BC Endocrine Days, Vancouver, BC, 03-Oct-2008 (**Invited**)
- *Primary Aldosteronism, Diagnostic Update*, Internal Medicine Grand Rounds, St. Paul's Hospital, Vancouver, BC, 11-Dec-2007, (**Invited**)
- *Moles/Litre: Not the number of burrowing rodents that fit in a milk carton. Understanding the Technical aspects of Osmolality*, Neprhology Rounds, St Paul's Hospital, Vancouver, BC, 30-Aug-2007
- *Research in Progress Rounds: The Effect of Analytical Variation on Calculated Laboratory Measures*, iCapture Centre Research in Progress Rounds, Vancouver, BC, 05-Feb-2007
- *A Critical Look at eGFR*, Diabetes Directors Seminar, Vancouver, BC, 17-May-2007 (**Invited**)
- *Unusual Lipidology Cases*, BC Childrens' Hospital Pathology Rounds, Vancouver, BC, 31-Oct-2006

Peer Reviewed Publications

1. Leung, A. A., Padwal, R. S., Hundemer, G. L., Venos, E., Campbell, D. J., Holmes, D. T., Orton, D. J., So, C. B., Przybojewski, S. J., Caughlin, C. E., et al. (2025). Confirmatory testing for primary aldosteronism: A study of diagnostic test accuracy. *Annals of Internal Medicine*.
2. Gandhi, C., Denis, M.-C., Holmes, D., Rivera, J., Van Uum, S., Ezzat, S., & Chik, C. (2025). Impact of strict IGF1 control on quality-of-life scores in patients with acromegaly. *Frontiers in Endocrinology*, *16*, 1516899.
3. Ritchie, G., Mobini, M., Malladi, V. S., Lawson, T., Young, M., Jang, W., Mohammadi, H., Payne, M., Stefanovic, A., Tang, P., et al. (2025). Interdisciplinary collaboration to develop a custom genomic analysis pipeline for the clinical laboratory: Hepatitis b virus and cytomegalovirus antiviral resistance genotyping. *Clinical Chemistry*, *71*(11), 1169–1175.
4. Patel, K., Arvisais-Anhalt, S., Bunch, D. R., Holmes, D. T., & Spies, N. C. (2025). Robotic process automation in laboratory medicine. *Clinical Chemistry*, *71*(6), 624–628.
5. Mattman, A., Gugten, J. G. van der, DeMarco, M. L., Carruthers, M., Chin, A., Chen, L. Y., & Holmes, D. T. (2024). *Spurious elevations in serum IgG2 may be seen by immunonephelometry in IgG4-RD-response to chan et al [1]*.
6. Kline, G. A., Symonds, C. J., & Holmes, D. T. (2024). *Intranasal corticosteroids may have systemic absorption and potential impact upon cortisol measures*.
7. Birks, P., Al-Zeer, B., Holmes, D., Elzayat, R., Canney, M., Djurdjev, O., Shao, T. S., Zheng, Y., Silver, S. A., & Levin, A. (2024). Assessing discharge communication and follow-up of acute kidney injury in british columbia: A retrospective chart review. *Canadian Journal of Kidney Health and Disease*, *11*, 20543581231222064.

8. Birks, P., Al-Zeer, B., Holmes, D., Elzayat, R., Canney, M., Djurdjev, O., Shao, T. S., Zheng, Y., Silver, S. A., & Levin, A. (2024). Assessing discharge communication and follow-up of acute kidney injury in british columbia: A retrospective chart review. *Canadian Journal of Kidney Health and Disease*, *11*, 20543581231222064. https://doi.org/10.1177/20543581231222064
9. Ye, S. C., Cheung, C. C., Lauder, E., Grunau, B., Moghaddam, N., Diepen, S. van, Holmes, D. T., Sekhon, M. S., Christenson, J., Tallon, J. M., et al. (2024). Association of admission serum sodium and outcomes following out-of-hospital cardiac arrest. *American Heart Journal*, *268*, 29–36.
10. Ye, S. C., Cheung, C. C., Lauder, E., Grunau, B., Moghaddam, N., van Diepen, S., Holmes, D. T., Sekhon, M. S., Christenson, J., Tallon, J. M., & Fordyce, C. B. (2024). Association of admission serum sodium and outcomes following out-of-hospital cardiac arrest. *American Heart Journal*, *268*, 29–36. https://doi.org/https://doi.org/10.1016/j.ahj.2023.11.011
11. Stukas, S., Cooper, J., Higgins, V., Holmes, D., Adeli, K., & Wellington, C. L. (2024). Pediatric reference intervals for serum neurofilament light and glial fibrillary acidic protein using the canadian laboratory initiative on pediatric reference intervals (CALIPER) cohort. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *62*(4), 698–705.
12. Stukas, S., Cooper, J., Higgins, V., Holmes, D., Adeli, K., & Wellington, C. L. (2024). *Clinical Chemistry and Laboratory Medicine (CCLM)*, *62*(4), 698–705. https://doi.org/doi:10.1515/cclm-2023-0660
13. Mwimanzi, F., Lapointe, H. R., Cheung, P. K., Sang, Y., Yaseen, F., Kalikawe, R., Datwani, S., Burns, L., Young, L., Leung, V., Ennis, S., Brumme, C. J., Montaner, J. S. G., Dong, W., Prystajecky, N., Lowe, C. F., DeMarco, M. L., Holmes, D. T., Simons, J., … Brockman, M. A. (2023). Impact of Age and Severe Acute Respiratory Syndrome Coronavirus 2 Breakthrough Infection on Humoral Immune Responses After Three Doses of Coronavirus Disease 2019 mRNA Vaccine. *Open Forum Infectious Diseases*, *10*(3), ofad073. https://doi.org/10.1093/ofid/ofad073
14. Kline, G. A., & Holmes, D. T. (2023). Bone turnover markers for assessment of anti-resorptive effect in clinical practice: A good idea meets the problem of measurement uncertainty. *Clinical Biochemistry*, *116*, 100–104. https://doi.org/https://doi.org/10.1016/j.clinbiochem.2023.04.007
15. Lapointe, H. R., Mwimanzi, F., Cheung, P. K., Sang, Y., Yaseen, F., Umviligihozo, G., Kalikawe, R., Speckmaier, S., Moran-Garcia, N., Datwani, S., et al. (2023). People with human immunodeficiency virus receiving suppressive antiretroviral therapy show typical antibody durability after dual coronavirus disease 2019 vaccination and strong third dose responses. *The Journal of Infectious Diseases*, *227*(7), 838–849.
16. Lapointe, H. R., Mwimanzi, F., Cheung, P. K., Sang, Y., Yaseen, F., Speckmaier, S., Barad, E., Moran-Garcia, N., Datwani, S., Duncan, M. C., et al. (2023). Antibody response durability following three-dose coronavirus disease 2019 vaccination in people with HIV receiving suppressive antiretroviral therapy. *Aids*, *37*(5), 709–721.
17. Cooper, J. G., Stukas, S., Ghodsi, M., Ahmed, N., Diaz-Arrastia, R., Holmes, D. T., & Wellington, C. L. (2023). Age specific reference intervals for plasma biomarkers of neurodegeneration and neurotrauma in a canadian population. *Clinical Biochemistry*, *121*, 110680.
18. Cooper, J. G., Stukas, S., Ghodsi, M., Ahmed, N., Diaz-Arrastia, R., Holmes, D. T., & Wellington, C. L. (2023). Age specific reference intervals for plasma biomarkers of neurodegeneration and neurotrauma in a canadian population. *Clinical Biochemistry*, *121-122*, 110680. https://doi.org/https://doi.org/10.1016/j.clinbiochem.2023.110680
19. Duncan, M. C., Omondi, F. H., Kinloch, N. N., Lapointe, H. R., Speckmaier, S., Garcia, N. M., Lawson, T., DeMarco, M. L., Simons, J., Holmes, D. T., et al. (2023). *Effects of COVID-19 mRNA vaccination on HIV viremia and reservoir size (preprint)*.
20. Mobini, M., Matic, N., Gugten, J. G. V. D., Ritchie, G., Lowe, C. F., & Holmes, D. T. (2023). End-to-End Data Automation for Pooled Sample SARS-CoV-2 Using R and Other Open-Source Tools. *The Journal of Applied Laboratory Medicine*, *8*(1), 41–52. https://doi.org/10.1093/jalm/jfac109
21. Krumm, N., Bazydlo, L. A., Bunch, D. R., Haymond, S., & Holmes, D. T. (2023). Diving into data science: A clinical laboratory update. In *The Journal of Applied Laboratory Medicine* (No. 1; Vol. 8, pp. 1–2). Oxford University Press US.
22. Bann, S., Nguyen, A., Gill, S., Raudzus, J., Holmes, D. T., & Wiseman, S. M. (2023). Lithium related thyroid and parathyroid disease: Updated clinical practice guidelines are needed. *Journal of Affective Disorders*, *339*, 471–477.

23. Bann, S., Nguyen, A., Gill, S., Raudzus, J., Holmes, D. T., & Wiseman, S. M. (2023). Lithium related thyroid and parathyroid disease: Updated clinical practice guidelines are needed. *Journal of Affective Disorders*, *339*, 471–477. https://doi.org/https://doi.org/10.1016/j.jad.2023.07.037
24. Datwani, S., Kalikawe, R., Mwimanzi, F., Speckmaier, S., Liang, R., Sang, Y., Waterworth, R., Yaseen, F., Lapointe, H. R., Barad, E., et al. (2023). Dynamics of t-cell responses following COVID-19 mRNA vaccination and breakthrough infection in older adults. *Pathogens and Immunity*, *8*(1), 117.
25. Mwimanzi, F., Lapointe, H. R., Cheung, P. K., Sang, Y., Yaseen, F., Umviligihozo, G., Kalikawe, R., Datwani, S., Omondi, F. H., Burns, L., et al. (2022). Older adults mount less durable humoral responses to two doses of COVID-19 mRNA vaccine but strong initial responses to a third dose. *The Journal of Infectious Diseases*, *226*(6), 983–994.
26. Lapointe, H. R., Mwimanzi, F., Cheung, P. K., Young, L., DeMarco, M. L., Brumme, C. J., Prystajecky, N., Brockman, M. A., & Brumme, Z. L. (2022). Serial infection with SARS-CoV-2 omicron BA. 1 and BA. 2 following three-dose COVID-19 vaccination. *Frontiers in Immunology*, *13*, 947021.
27. Cooper, J. G., Stukas, S. K., Ghodsi, M., Ahmed, N., Holmes, D., & Wellington, C. L. (2022). Reference intervals for plasma biomarkers of alzheimer's disease. *Alzheimer's & Dementia*, *18*, e064762.
28. Coope, R. J., Matic, N., Pandoh, P. K., Corbett, R. D., Smailus, D. E., Pleasance, S., Lowe, C. F., Ritchie, G., Chorlton, S. D., Young, M., et al. (2022). Automated library construction and analysis for high-throughput nanopore sequencing of SARS-CoV-2. *The Journal of Applied Laboratory Medicine*, *7*(5), 1025–1036.
29. Holmes, D. T., Mobini, M., & McCudden, C. R. (2021). Reproducible manuscript preparation with RMarkdown application to JMSACL and other Elsevier Journals. *Journal of Mass Spectrometry and Advances in the Clinical Lab*, *22*, 8–16. https://doi.org/10.1016/j.jmsacl.2021.09.002
30. Grober, E. D., Krakowsky, Y., Khera, M., Holmes, D. T., Lee, J. C., Grantmyre, J. E., Patel, P., Bebb, R. A., Fitzpatrick, R., Campbell, J. D., Carrier, S., & Morgentaler, A. (2021). Canadian Urological Association guideline on testosterone deficiency in men: Evidence-based Q&A. *Canadian Urological Association Journal*, *15*(5), E234–E243. https://doi.org/10.5489/cuaj.7252
31. Holmes, D. T., Romney, M. G., Angel, P., & DeMarco, M. L. (2020). Proteomic applications in pathology and laboratory medicine: Present state and future prospects. *Clinical Biochemistry*, *82*, 12–20. https://doi.org/10.1016/j.clinbiochem.2020.05.007
32. Mak, N. T. J. J., Li, J., Vasilyeva, E., Hiebert, J., Guo, M., Lustig, D., Holmes, D., & Wiseman, S. M. (2020). Intraoperative parathyroid hormone measurement during parathyroidectomy for treatment of primary hyperparathyroidism: When should you end the operation? *The American Journal of Surgery*, *219*(5), 785–789. https://doi.org/10.1016/j.amjsurg.2020.02.049
33. Holmes, D. T. (2020). Self-Ordering Laboratory Testing: Limitations When a Physician Is not Part of the Model. *Clinics in Laboratory Medicine*, *40*(1), 37–49. https://doi.org/10.1016/j.cll.2019.11.002
34. McCormack, J. P., & Holmes, D. T. (2020). Your results may vary: The imprecision of medical measurements. *BMJ*, *368*, m149. https://doi.org/10.1136/bmj.m149
35. Holmes, D. T. (2019). A brief update on mass spectrometry applications to routine clinical endocrinology. *Clinical Mass Spectrometry*, *13*, 18–20. https://doi.org/10.1016/j.clinms.2019.05.006
36. Kline, G. A., Darras, P., Leung, A. A., So, B., Chin, A., & Holmes, D. T. (2019). Surprisingly low aldosterone levels in peripheral veins following intravenous sedation during adrenal vein sampling: Implications for the concept of nonsuppressibility in primary aldosteronism. *Journal of Hypertension*, *37*(3), 596–602. https://doi.org/10.1097/HJH.0000000000001905
37. Holmes, D. T., & Buhr, K. A. (2019). Widespread Incorrect Implementation of the Hoffmann Method, the Correct Approach, and Modern Alternatives. *American Journal of Clinical Pathology*, *151*(3), 328–336. https://doi.org/10.1093/ajcp/aqy149
38. French, D., Drees, J., Stone, J. A., Holmes, D. T., & Gugten, J. G. van der. (2019). Comparison of four clinically validated testosterone LC-MS/MS assays: Harmonization is an attainable goal. *Clinical Mass Spectrometry*, *11*, 12–20. https://doi.org/10.1016/j.clinms.2018.11.005
39. Khan, W., Van Der Gugten, G., & Holmes, D. T. (2019). Thyrotoxicosis due to 1000-fold error in compounded liothyronine: A case elucidated by mass spectrometry. *Clinical Mass Spectrometry*, *11*, 8–11. https://doi.org/https://doi.org/10.1016/j.clinms.2018.11.003
40. Humphries, K. H., Gao, M., Lee, M. K., Izadnegahdar, M., Holmes, D. T., Scheuermeyer, F. X., Mackay, M., Mattman, A., & Grafstein, E. (2018). Sex Differences in Cardiac Troponin Testing in Patients Presenting to the Emergency Department with Chest Pain. *Journal of Women's Health*, *27*(11), 1327–1334. https://doi.org/10.1089/jwh.2017.6812

41. Tonelli, M., Wiebe, N., Bello, A., Field, C. J., Gill, J. S., Hemmelgarn, B. R., Holmes, D. T., Jindal, K., Klarenbach, S. W., Manns, B. J., Thadhani, R., & Kinniburgh, D. (2018). Concentrations of Trace Elements and Clinical Outcomes in Hemodialysis Patients: A Prospective Cohort Study. *Clinical Journal of the American Society of Nephrology*, *13*(6), 907–915. https://doi.org/10.2215/CJN.11451017
42. Gugten, G. van der, DeMarco, M. L., Chen, L. Y. C., Chin, A., Carruthers, M., Holmes, D. T., & Mattman, A. (2018). Resolution of Spurious Immunonephelometric IgG Subclass Measurement Discrepancies by LC-MS/MS. *Clinical Chemistry*, *64*(4), 735–742. https://doi.org/10.1373/clinchem.2017.282319
43. Winston-McPherson, G. N., Samraj, A. N., Poster, K., Yamaguchi, D., Dickerson, J. A., Drees, J. C., Holmes, D. T., & Greene, D. N. (2018). Performance characteristics of the Beckman Coulter UniCel DxI 800 TSH (3rd IS) assay. *Clinica Chimica Acta*, *478*, 90–100. https://doi.org/10.1016/j.cca.2017.12.029
44. Humphries, K. H., Lee, M. K., Izadnegahdar, M., Gao, M., Holmes, D. T., Scheuermeyer, F. X., Mackay, M., Mattman, A., & Grafstein, E. (2018). Sex Differences in Diagnoses, Treatment, and Outcomes for Emergency Department Patients With Chest Pain and Elevated Cardiac Troponin. *Academic Emergency Medicine*, *25*(4), 413–424. https://doi.org/10.1111/acem.13371
45. Carter, R. L. R., Talbot, K., Hur, W. S., Meixner, S. C., Van Der Gugten, J. G., Holmes, D. T., Côté, H. C. F., Kastrup, C. J., Smith, T. W., Lee, A. Y. Y., & Pryzdial, E. L. G. (2018). Rivaroxaban and apixaban induce clotting factor Xa fibrinolytic activity. *Journal of Thrombosis and Haemostasis*, *16*(11), 2276–2288. https://doi.org/10.1111/jth.14281
46. Bahar, B., Tuncel, A. F., Holmes, E. W., & Holmes, D. T. (2017). An interactive website for analytical method comparison and bias estimation. *Clinical Biochemistry*, *50*(18), 1025–1029. https://doi.org/10.1016/j.clinbiochem.2017.08.008
47. Kline, G., & Holmes, D. T. (2017). Adrenal venous sampling for primary aldosteronism: Laboratory medicine best practice. *Journal of Clinical Pathology*, *70*(11), 911–916. https://doi.org/10.1136/jclinpath-2017-204423
48. Tonelli, M., Wiebe, N., Bello, A., Field, C. J., Gill, J. S., Hemmelgarn, B. R., Holmes, D. T., Jindal, K., Klarenbach, S. W., Manns, B. J., Thadhani, R., & Kinniburgh, D. (2017). Concentrations of Trace Elements in Hemodialysis Patients: A Prospective Cohort Study. *American Journal of Kidney Diseases*, *70*(5), 696–704. https://doi.org/10.1053/j.ajkd.2017.06.029
49. Newby, B., & Holmes, D. T. (2017). Effect of Tubing Flush or Preconditioning on Available Insulin Concentration for IV Infusion: A Pilot Project. *Canadian Journal of Hospital Pharmacy*, *70*(4). https://doi.org/10.4212/cjhp.v70i4.1685
50. Saeedi, R., Mojebi-Mogharar, A., Sandhu, S. K., Dubland, J. A., Ford, J.-A., Yousefi, M., Pudek, M., Holmes, D. T., Erb, S. R., Kwan, W. C. P., Kendler, D. L., & Yoshida, E. M. (2017). Http://www.scielo.org.mx/scielo.php?script=sci_abstract&pid=S1665-26812017000200207&lng=es&nrm=iso&tlng=en. *Annals of Hepatology*, *16*(2), 207–214. https://doi.org/10.5604/16652681.1231577
51. Kline, G. A., & Holmes, D. T. (2017). De-evolution of diagnostic testing for adrenal insufficiency. *The Lancet Diabetes & Endocrinology*, *5*(2), 88–90. https://doi.org/10.1016/S2213-8587(16)30145-0
52. Kline, G. A., Buse, J. D., Van Der Gugten, J. G., Holmes, D. T., Chin, A. C., & Sadrzadeh, S. M. H. (2017). Factitious ACTH-dependent, apparent hypercortisolism: The problem with late-night salivary cortisol measurements collected at home. *Clinical Endocrinology*, *87*(6), 882–885. https://doi.org/10.1111/cen.13478
53. Taves, M. D., Plumb, A. W., Korol, A. M., Van Der Gugten, J. G., Holmes, D. T., Abraham, N., & Soma, K. K. (2016). Lymphoid organs of neonatal and adult mice preferentially produce active glucocorticoids from metabolites, not precursors. *Brain, Behavior, and Immunity*, *57*, 271–281. https://doi.org/10.1016/j.bbi.2016.05.003
54. Percy, A. J., Byrns, S., Pennington, S. R., Holmes, D. T., Anderson, N. L., Agreste, T. M., & Duffy, M. A. (2016). Clinical translation of MS-based, quantitative plasma proteomics: Status, challenges, requirements, and potential. *Expert Review of Proteomics*, *13*(7), 673–684. https://doi.org/10.1080/14789450.2016.1205950
55. Creary, S. E., Pyle-Eilola, A. L., Varga, E., Cotten, S. W., S. Lorey, T., Holmes, D. T., & Greene, D. N. (2016). Method-dependent Discrepancies in Fetal Hemoglobin Quantification in Patients With Hemoglobin S. *Journal of Pediatric Hematology/Oncology*, *38*(5), 402–405. https://doi.org/10.1097/MPH.0000000000000575

56. Kim, R. B., Morse, B. L., Djurdjev, O., Tang, M., Muirhead, N., Barrett, B., Holmes, D. T., Madore, F., Clase, C. M., Rigatto, C., Levin, A., Agharazii, M., Blouin, J., Samson, F., Akbarii, A., Cheesman, J., Courtney, J., Hamer, S., Delic, E., … Mahoney, K. (2016). Advanced chronic kidney disease populations have elevated trimethylamine N-oxide levels associated with increased cardiovascular events. *Kidney International*, *89*(5), 1144–1152. https://doi.org/10.1016/j.kint.2016.01.014
57. Ranjitkar, P., Turtle, C. J., Harris, N. S., Holmes, D. T., Pyle-Eilola, A., Maloney, D. G., & Greene, D. N. (2016). Susceptibility of commonly used ferritin assays to the classic hook effect. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *54*(2), e41–e43. https://doi.org/10.1515/cclm-2015-0604
58. Greene, D. N., Baird, G. S., Kwong, S.-L., Lorey, T. S., & Holmes, D. T. (2016). Challenges in harmonizing integrated healthcare network laboratories: Multi-center evaluation of the hCG5 assay. *Clinical Biochemistry*, *49*(1), 105–110. https://doi.org/10.1016/j.clinbiochem.2015.08.019
59. Cembrowski, G., Topping, K., Versluys, K., Tran, D., Malick, M., Holmes, D., & Clarke, G. (2016). The use of serial outpatient complete blood count (CBC) results to derive biologic variation: A new tool to gauge the acceptability of hematology testing. *International Journal of Laboratory Hematology*, *38*(2), 111–118. https://doi.org/10.1111/ijlh.12443
60. Manolopoulou, J., Fischer, E., Dietz, A., Diederich, S., Holmes, D., Junnila, R., Grimminger, P., Reincke, M., Morganti, A., & Bidlingmaier, M. (2015). Clinical validation for the aldosterone-to-renin ratio and aldosterone suppression testing using simultaneous fully automated chemiluminescence immunoassays. *Journal of Hypertension*, *33*(12), 2500–2511. https://doi.org/10.1097/HJH.0000000000000727
61. Almohaya, M., Saeedi, R., Dubland, J., Low, A., Holmes, D., Reid, G., & Kendler, D. (2015). Variability and Underpotency of Cholecalciferol Content of Commercial Vitamin D Preparations. *Canadian Journal of Diabetes*, *39*(6), 545–546. https://doi.org/10.1016/j.jcjd.2015.09.074
62. Tolan, N. V., Parnas, M. L., Baudhuin, L. M., Cervinski, M. A., Chan, A. S., Holmes, D. T., Horowitz, G., Klee, E. W., Kumar, R. B., & Master, S. R. (2015). "Big Data" in Laboratory Medicine. *Clinical Chemistry*, *61*(12), 1433–1440. https://doi.org/10.1373/clinchem.2015.248591
63. Raizman, J. E., Diamandis, E. P., Holmes, D., Stowasser, M., Auchus, R., & Cavalier, E. (2015). A Renin-ssance in Primary Aldosteronism Testing: Obstacles and Opportunities for Screening, Diagnosis, and Management. *Clinical Chemistry*, *61*(8), 1022–1027. https://doi.org/10.1373/clinchem.2015.242990
64. Apperley, S., Park, H. Y., Holmes, D. T., Man, S. F. P., Tashkin, D., Wise, R. A., Connett, J. E., & Sin, D. D. (2015). Serum Bilirubin and Disease Progression in Mild COPD. *Chest*, *148*(1), 169–175. https://doi.org/10.1378/chest.14-2150
65. Popp, R., Malmström, D., Chambers, A. G., Lin, D., Camenzind, A. G., Gugten, J. G. van der, Holmes, D. T., Pugia, M., Jaremek, M., Cornett, S., Suckau, D., & Borchers, C. H. (2015). An automated assay for the clinical measurement of plasma renin activity by immuno-MALDI (iMALDI). *Biochimica Et Biophysica Acta (BBA) - Proteins and Proteomics*, *1854*(6), 547–558. https://doi.org/10.1016/j.bbapap.2014.10.008
66. Rehan, M., Raizman, J. E., Cavalier, E., Don-Wauchope, A. C., & Holmes, D. T. (2015). Laboratory challenges in primary aldosteronism screening and diagnosis. *Clinical Biochemistry*, *48*(6), 377–387. https://doi.org/10.1016/j.clinbiochem.2015.01.003
67. Greene, D. N., Holmes, D. T., Liang, J., Kwong, S.-L., Lorey, T. S., & Petrie, M. S. (2015). Challenges in harmonizing integrated healthcare network laboratories: Multi-center evaluation of the AccuTnI+3 troponin assay. *Clinical Biochemistry*, *48*(4), 268–274. https://doi.org/10.1016/j.clinbiochem.2014.11.009
68. Holmes, D. T. (2015). Cp-R, an interface the R programming language for clinical laboratory method comparisons. *Clinical Biochemistry*, *48*(3), 192–195. https://doi.org/10.1016/j.clinbiochem.2014.10.015
69. Chau, K., Holmes, D., Melck, A., & Chan-Yan, C. (2015). Secondary Hypertension Due To Concomitant Aldosterone-Producing Adenoma and Parathyroid Adenoma. *American Journal of Hypertension*, *28*(2), 280–282. https://doi.org/10.1093/ajh/hpu102
70. Taves, M. D., Plumb, A. W., Sandkam, B. A., Ma, C., Van Der Gugten, J. G., Holmes, D. T., Close, D. A., Abraham, N., & Soma, K. K. (2015). Steroid Profiling Reveals Widespread Local Regulation of Glucocorticoid Levels During Mouse Development. *Endocrinology*, *156*(2), 511–522. https://doi.org/10.1210/en.2013-1606
71. Yorke, E., Stafford, S., Holmes, D., Sheth, S., & Melck, A. (2015). Aldosterone deficiency after unilateral adrenalectomy for Conn's syndrome: A case report and literature review. *International Journal of Surgery Case Reports*, *7*, 141–144. https://doi.org/10.1016/j.ijscr.2015.01.013
72. Bach, E., & Holmes, D. T. (2015). Reqscan: An open source solution for laboratory requisition scanning, archiving and retrieval. *Journal of Pathology Informatics*, *6*, 3. https://doi.org/10.4103/2153-3539.150256

73. Greene, D. N., Liang, J., Holmes, D. T., Resch, A., & Lorey, T. S. (2014). Neonatal total bilirubin measurements: Still room for harmonization. *Clinical Biochemistry*, *47*(12), 1112–1115. https://doi.org/10.1016/j.clinbiochem.2014.04.001
74. Versluys, K. A., Redel, S., Kunst, A. N., Rimkus, M., Chin, D., Tran, D., Holmes, D., & Cembrowski, G. S. (2014). Tighter precision target required for lactate testing in patients with lactic acidosis. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *52*(6), 809–813. https://doi.org/10.1515/cclm-2013-0685
75. Saeedi, R., Jiang, S. Y., Holmes, D. T., & Kendler, D. L. (2014). Fibroblast Growth Factor 23 is Elevated in Tenofovir-Related Hypophosphatemia. *Calcified Tissue International*, *94*(6), 665–668. https://doi.org/10.1007/s00223-014-9854-7
76. Levin, A., Rigatto, C., Barrett, B., Madore, F., Muirhead, N., Holmes, D., Clase, C. M., Tang, M., Djurdjev, O., on behalf of the CanPREDDICT Investigators, Agharazii, M., Québec;, L.-D. de, Akbarii, A., Barré, P., Barrett, B., Clase, C., Cooper, S., Forzley, B., Cournoyer, S., … Yeates, K. (2014). Biomarkers of inflammation, fibrosis, cardiac stretch and injury predict death but not renal replacement therapy at 1 year in a Canadian chronic kidney disease cohort. *Nephrology Dialysis Transplantation*, *29*(5), 1037–1047. https://doi.org/10.1093/ndt/gft479
77. Vrablik, M., Holmes, D., Forer, B., Juren, A., Martinka, P., & Frohlich, J. (2014). Use of ezetimibe results in more patients reaching lipid targets without side effects. *Cor Et Vasa*, *56*(2), e128–e132. https://doi.org/10.1016/j.crvasa.2014.01.006
78. Greene, D. N., Holmes, D. T., Lin, M.-J., Liang, J. Y., Lorey, T. S., & Schmidt, R. L. (2014). Development of an equation to correct for hemolysis in direct bilirubin measurements. *Clinica Chimica Acta*, *429*, 194–197. https://doi.org/10.1016/j.cca.2013.12.023
79. Wong, S. L., Priestman, A., & Holmes, D. T. (2014). Recurrent Hypoglycemia from Insulin Autoimmune Syndrome. *Journal of General Internal Medicine*, *29*(1), 250–254. https://doi.org/10.1007/s11606-013-2588-9
80. Camenzind, A. G., Gugten, J. G. van der, Popp, R., Holmes, D. T., & Borchers, C. H. (2013). Development and evaluation of an immuno-MALDI (iMALDI) assay for angiotensin I and the diagnosis of secondary hypertension. *Clinical Proteomics*, *10*(1), 20. https://doi.org/10.1186/1559-0275-10-20
81. Lam, E., Strugnell, S. S., Bajdik, C., Holmes, D., & Wiseman, S. M. (2013). Limited adequacy of thyroid cancer patient follow-up at a Canadian tertiary care centre. *Canadian Journal of Surgery*, *56*(6), 385–392. https://doi.org/10.1503/cjs.018112
82. Elliott, P., & Holmes, D. T. (2013). Adrenal vein sampling: Substantial need for technical improvement at regional referral centres. *Clinical Biochemistry*, *46*(15), 1399–1404. https://doi.org/10.1016/j.clinbiochem.2013.04.004
83. Levin, A., Rigatto, C., Brendan, B., Madore, F., Muirhead, N., Holmes, D., Clase, C. M., Tang, M., & Djurdjev, O. (2013). Cohort profile: Canadian study of prediction of death, dialysis and interim cardiovascular events (CanPREDDICT). *BMC Nephrology*, *14*(1), 121. https://doi.org/10.1186/1471-2369-14-121
84. Davis, D. D., Tee, M. C., Kowal, J., Holmes, D. T., & Wiseman, S. M. (2013). Streamlining of intra-operative parathyroid hormone measurements for cure during parathyroidectomy. *The American Journal of Surgery*, *205*(5), 597–601. https://doi.org/10.1016/j.amjsurg.2013.01.027
85. Tee, M. C., Holmes, D. T., & Wiseman, S. M. (2013). Ionized vs serum calcium in the diagnosis and management of primary hyperparathyroidism: Which is superior? *The American Journal of Surgery*, *205*(5), 591–596. https://doi.org/10.1016/j.amjsurg.2013.01.017
86. Apperley, S., Kroeger, P., Kirchmair, M., Kiaii, M., Holmes, D. T., & Garber, I. (2013). Laboratory confirmation of Amanita smithiana mushroom poisoning. *Clinical Toxicology*, *51*(4), 249–251. https://doi.org/10.3109/15563650.2013.778995
87. Gugten, J. G. V. D., Crawford, M., Grant, R. P., & Holmes, D. T. (2012). Supported liquid extraction offers improved sample preparation for aldosterone analysis by liquid chromatography tandem mass spectrometry. *Journal of Clinical Pathology*, *65*(11), 1045–1048. https://doi.org/10.1136/jclinpath-2012-200990
88. Tansley, G., Holmes, D. T., Lütjohann, D., Head, E., & Wellington, C. L. (2012). Sterol Lipid Metabolism in Down Syndrome Revisited: Down Syndrome Is Associated with a Selective Reduction in Serum Brassicasterol Levels. *Current Gerontology and Geriatrics Research*, *2012*, e179318. https://doi.org/10.1155/2012/179318

89. Gugten, J. G. V. D., Dubland, J., Liu, H.-F., Wang, A., Joseph, C., & Holmes, D. T. (2012). Determination of serum aldosterone by liquid chromatography and tandem mass spectrometry: A liquid–liquid extraction method for the ABSCIEX API-5000 mass spectrometry system. *Journal of Clinical Pathology*, *65*(5), 457–462. https://doi.org/10.1136/jclinpath-2011-200564
90. Mason, D. R., Reid, J. D., Camenzind, A. G., Holmes, D. T., & Borchers, C. H. (2012). Duplexed iMALDI for the detection of angiotensin I and angiotensin II. *Methods*, *56*(2), 213–222. https://doi.org/10.1016/j.ymeth.2012.02.006
91. Verma, S., Gupta, M., Holmes, D. T., Xu, L., Teoh, H., Gupta, S., Yusuf, S., & Lonn, E. M. (2011). Plasma renin activity predicts cardiovascular mortality in the Heart Outcomes Prevention Evaluation (HOPE) study. *European Heart Journal*, *32*(17), 2135–2142. https://doi.org/10.1093/eurheartj/ehr066
92. Chiarelli, G., Beaulieu, M., Taylor, P., Levin, A., & Holmes, D. T. (2011). Elimination of BNP by Peritoneal Dialysis: Investigation of Analytical Issues. *Peritoneal Dialysis International*, *31*(2), 199–202. https://doi.org/10.3747/pdi.2008.00279
93. Bello, A. K., Thadhani, R., Hemmelgarn, B., Klarenbach, S., Gill, J., Chan, C., Zimmerman, D., Holmes, D., Cembrowski, G., Opgenorth, D., Sibrian, R., Karkhaneh, M., Tiv, S., Wiebe, N., & Tonelli, M. (2011). Design and implementation of the canadian kidney disease cohort study (CKDCS): A prospective observational study of incident hemodialysis patients. *BMC Nephrology*, *12*(1), 10. https://doi.org/10.1186/1471-2369-12-10
94. Reid, J. D., Holmes, D. T., Mason, D. R., Shah, B., & Borchers, C. H. (2010). Towards the development of an immuno MALDI (iMALDI) mass spectrometry assay for the diagnosis of hypertension. *Journal of the American Society for Mass Spectrometry*, *21*(10), 1680–1686. https://doi.org/10.1016/j.jasms.2010.01.024
95. Klinke, J. A., Shapira, S. C., Akbari, E., & Holmes, D. T. (2010). Quetiapine-associated cholestasis causing lipoprotein-X and pseudohyponatraemia. *Journal of Clinical Pathology*, *63*(8), 741–743. https://doi.org/10.1136/jcp.2008.064063
96. Hung, T., Dewitt, C. R., Martz, W., Schreiber, W., & Holmes, D. T. (2010). Fomepizole fails to prevent progression of acidosis in 2-butoxyethanol and ethanol coingestion. *Clinical Toxicology*, *48*(6), 569–571. https://doi.org/10.3109/15563650.2010.492350
97. Verma, S., Gupta, M., Holmes, D. T., Teoh, H., Xu, L., Yusuf, S., & Lonn, E. M. (2009). Abstract 1134: Plasma Renin Activity is Associated With Increased Cardiovascular Events and Mortality in the HOPE Study. *Circulation*, *120*(suppl_18), S453–S453. https://doi.org/10.1161/circ.120.suppl_18.S453-a
98. Zimmerman, A. C., Buhr, K. A., Lear, S. A., & Holmes, D. T. (2009). Age-dependent reference intervals for measured bioavailable testosterone on the Siemens Advia Centaur: Ethnicity-specific values not necessary for South Asians. *Clinical Biochemistry*, *42*(9), 922–925. https://doi.org/10.1016/j.clinbiochem.2009.02.011
99. Lim, J. P., Irvine, R., Bugis, S., Holmes, D., & Wiseman, S. M. (2009). Intact parathyroid hormone measurement 1 hour after thyroid surgery identifies individuals at high risk for the development of symptomatic hypocalcemia. *The American Journal of Surgery*, *197*(5), 648–654. https://doi.org/10.1016/j.amjsurg.2008.12.012
100. Al Riyami, N., Zimmerman, A. C., Rosenberg, F. M., & Holmes, D. T. (2009). Spurious hyperbilirubinemia caused by naproxen. *Clinical Biochemistry*, *42*(1), 129–131. https://doi.org/10.1016/j.clinbiochem.2008.09.119
101. Prchal, D., Holmes, D. T., & Levin, A. (2008). Nephrogenic systemic fibrosis: The story unfolds. *Kidney International*, *73*(12), 1335–1337. https://doi.org/10.1038/ki.2008.157
102. Holmes, D. T., Frohlich, J., & Buhr, K. A. (2008). The concept of precision extended to the atherogenic index of plasma. *Clinical Biochemistry*, *41*(7), 631–635. https://doi.org/10.1016/j.clinbiochem.2008.01.023
103. Rahalkar, A. R., Wang, J., Sirrs, S., Dimmick, J., Holmes, D., Urquhart, N., Hegele, R. A., & Mattman, A. (2008). An Unusual Case of Severe Hypertriglyceridemia and Splenomegaly. *Clinical Chemistry*, *54*(3), 606–610. https://doi.org/10.1373/clinchem.2007.097139
104. Shoman, N., Melck, A., Holmes, D., Irvine, R., Bugis, S., Zhang, H., & Wiseman, S. M. (2008). Utility of intraoperative parathyroid hormone measurement in predicting postparathyroidectomy hypocalcemia. *Journal of Otolaryngology - Head & Neck Surgery = Le Journal D'oto-Rhino-Laryngologie Et De Chirurgie Cervico-Faciale*, *37*(1), 16–22.
105. Holmes, D. T., & Buhr, K. A. (2007). Error propagation in calculated ratios. *Clinical Biochemistry*, *40*(9), 728–734. https://doi.org/10.1016/j.clinbiochem.2006.12.014

106. Bar, S. L., Holmes, D. T., & Frohlich, J. (2007). Asymptomatic hypothyroidism and statin-induced myopathy. *Canadian Family Physician*, *53*(3), 428–431. https://www.cfp.ca/content/53/3/428
107. Yong, R. L., Holmes, D. T., & Sreenivasan, G. M. (2006). Aluminum Toxicity Due to Intravenous Injection of Boiled Methadone. *New England Journal of Medicine*, *354*(11), 1210–1211. https://doi.org/10.1056/NEJMc053341
108. Holmes, D. T., Schick, B. A., Humphries, K. H., & Frohlich, J. (2005). Lipoprotein(a) Is an Independent Risk Factor for Cardiovascular Disease in Heterozygous Familial Hypercholesterolemia. *Clinical Chemistry*, *51*(11), 2067–2073. https://doi.org/10.1373/clinchem.2005.055228
109. Morris, T. J., Litvinova, M. M., Ralston, D., Mattman, A., Holmes, D., & Lockitch, G. (2005). A novel ferroportin mutation in a Canadian family with autosomal dominant hemochromatosis. *Blood Cells, Molecules, and Diseases*, *35*(3), 309–314. https://doi.org/10.1016/j.bcmd.2005.07.007
110. Holmes, D. T., Levin, A., Forer, B., & Rosenberg, F. (2005). Preanalytical Influences on DPC IMMULITE 2000 Intact PTH Assays of Plasma and Serum from Dialysis Patients. *Clinical Chemistry*, *51*(5), 915–917. https://doi.org/10.1373/clinchem.2004.046821
111. Normén, L., Holmes, D., & Frohlich, J. (2005). Plant sterols and their role in combined use with statins for lipid lowering. *Current Opinion in Investigational Drugs (London, England: 2000)*, *6*(3), 307–316.
112. Holmes, D., Shapiro, M., & Brumer, P. (1996). Coherent control of bimolecular collisions: Collinear reactive scattering. *The Journal of Chemical Physics*, *105*(20), 9162–9166. https://doi.org/10.1063/1.472749

Book Chapters

1. Holmes, D. T., & Bertholf, R. L. (2023). Disorders of the Pituitary Gland. In N. Rifai (Ed.), *Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics*. Elsevier Health Sciences.
2. Gugten, J. G. van der, & Holmes, D. T. (2022). Quantitation of renin activity in plasma using liquid chromatography-tandem mass spectrometry (LC-MS/MS). In *Clinical applications of mass spectrometry in biomolecular analysis: Methods and protocols* (pp. 439–450). Springer US New York, NY.
3. Gugten, J. G. van der, & Holmes, D. T. (2022). Quantitation of aldosterone in serum or plasma using liquid chromatography-tandem mass spectrometry (LC-MS/MS). In *Clinical applications of mass spectrometry in biomolecular analysis: Methods and protocols* (pp. 45–54). Springer US New York, NY.
4. Gugten, J. G. van der, Holmes, D. T., & Mattman, A. (2022). Quantitation of IgG subclasses in serum using liquid chromatography–tandem mass spectrometry (LC–MS/MS). In *Clinical applications of mass spectrometry in biomolecular analysis: Methods and protocols* (pp. 205–216). Springer US New York, NY.
5. Gugten, J. G. van der, Razavi, M., & Holmes, D. T. (2022). Quantitation of thyroglobulin in serum using SISCAPA and liquid chromatography-tandem mass spectrometry (LC-MS/MS). In *Clinical applications of mass spectrometry in biomolecular analysis: Methods and protocols* (pp. 473–483). Springer US New York, NY.
6. Holmes, D. T., & Kline, G. (2021). Chapter 18 - The endocrinology of aging. In W. E. Winter, B. Holmquist, L. J. Sokoll, & R. L. Bertholf (Eds.), *Handbook of Diagnostic Endocrinology (Third Edition)* (pp. 663–685). Academic Press. https://doi.org/10.1016/B978-0-12-818277-2.00018-2
7. Holmes, D. T., Bertholf, R. L., & Winter, W. E. (2021). Pituitary Function and Pathophysiology. In N. Rifai (Ed.), *Tietz Textbook of Clinical Chemistry and Molecular Diagnostics* (pp. 55-1-55-38). Elsevier Health Sciences.
8. Holmes, D. T. (2020). Statistical methods in laboratory medicine. In M. Marzinke & W. Clarke (Eds.), *Contemporary practice in clinical chemistry* (4th ed.). Elsevier.
9. Dighe, A., Greene, D., Holmes, D. T., & Mais, D. D. (2017). Chemistry. In D. D. Mais (Ed.), *Practical clinical pathology* (2nd ed.). ASCP Press.
10. Van Der Gugten, J. G., Wong, S., & Holmes, D. T. (2016). Quantitation of Insulin Analogues in Serum Using Immunoaffinity Extraction, Liquid Chromatography, and Tandem Mass Spectrometry. In U. Garg (Ed.), *Clinical Applications of Mass Spectrometry in Biomolecular Analysis: Methods and Protocols* (pp. 119–130). Springer. https://doi.org/10.1007/978-1-4939-3182-8_14

Letters to the Editor

1. Krumm, N., Bazydlo, L. A., Bunch, D. R., Haymond, S., & Holmes, D. T. (2023). Diving into data science: A clinical laboratory update. In *The Journal of Applied Laboratory Medicine* (No. 1; Vol. 8, pp. 1–2). Oxford University Press US.
2. Mattman, A., Gugten, J. G. van der, DeMarco, M. L., Carruthers, M., Chin, A., Chen, L. Y., & Holmes, D. T. (2023). *Spurious elevations in serum IgG2 may be seen by immunonephelometry in IgG4-RD-response to chan et al [1].*

3. Bunch, D. R., & Holmes, D. T. (2022). Clinical pathology and the data science revolution. *Journal of Mass Spectrometry and Advances in the Clinical Lab*, *24*, 41.
4. Kline, G. A., Symonds, C. J., & Holmes, D. T. (2021). Systemic absorption of intranasal corticosteroids may occur and can potentially affect the hypothalamic–pituitary–adrenal axis. *CMAJ*, *193*(12), E426–E426. https://doi.org/10.1503/cmaj.78162
5. Mattman, A., Chen, L. Y. C., Gugten, G. van der, Chin, A., Carruthers, M., DeMarco, M. L., & Holmes, D. T. (2020). In IgG4 related disease, elevated IgG2 is an artifact not a biomarker. *Seminars in Arthritis and Rheumatism*, *50*(2), e8. https://doi.org/10.1016/j.semarthrit.2019.08.002
6. Holmes, D. T. (2019). Correct implementation of the Hoffmann method. *Clinical Biochemistry*, *70*, 49–50. https://doi.org/10.1016/j.clinbiochem.2019.02.007
7. Katayev, A., Fleming, J. K., Holmes, D. T., & Buhr, K. A. (2019). Widespread implementation of the hoffmann method: A second opinion. *American Journal of Clinical Pathology*, *152*(1), 116–117.
8. Mattman, A., Chen, L. Y. C., Gugten, G. van der, Chin, A., Carruthers, M., DeMarco, M. L., & Holmes, D. T. (2018). Comment on: IgG4-related disease presenting with raised serum IgG2—real timeline of IgG4-RD? *Rheumatology*, *57*(6), 1125–1126. https://doi.org/10.1093/rheumatology/key044
9. Lin, D. C., Raizman, J. E., Holmes, D. T., Don-Wauchope, A. C., & Yip, P. M. (2017). Evaluation of a chemiluminescent immunoassay for urinary aldosterone on the DiaSorin LIAISON automated platform against RIA and LC-MS/MS. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *55*(8), e181–e183. https://doi.org/10.1515/cclm-2016-0841
10. Holmes, D. T., & Frohlich, J. J. (2008). The Canadian lipid guidelines are difficult to model quantitatively. *The Canadian Journal of Cardiology*, *24*(8), 621. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2644358/
11. Holmes, D. T. (2008). Primary Hyperlipidemias: An Atlas of Investigation and Diagnosis. *The Canadian Journal of Cardiology*, *24*(5), 406. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2643147/
12. Holmes, D. T., & Buhr, K. (2006). Mathematical Modeling: Assumptions Affect Results. *Clinical Chemistry*, *52*(8), 1606–1608. https://doi.org/10.1373/clinchem.2006.069476
13. Holmes, D. T., Long, P., & Frohlich, J. (2005). Dysbetalipoproteinemia and clomipramine. *The American Journal of Psychiatry*, *162*(7), 1384–1385. https://doi.org/10.1176/appi.ajp.162.7.1384-a

Personal Interests

- Distance running: former national level XC and middle distance track athlete
- Cycling: Zwift enthusiast
- Canoeing: Algonquin Park and Bowron Lake Provincial Park fan
- Flyfishing: I enjoy freshwater and saltwater flyfishing
- Faith: I lead a Bible study fellowship group for Iranian immigrants to Canada
- Family: Married with 4 Children aged 8–20 y