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Bio

BIO

Dr. Raffick Bowen is a Clinical Professor of Pathology and Co-Director of the Clinical Chemistry and Immunology Laboratory at Stanford University Medical Center. Dr. Bowen received his certification in Medical Laboratory Technology (MLT similar to MT/MLS/CLS in the United States) from the Canadian Society for Medical Laboratory Science (CSMLS) and has a license as a Clinical Chemist Specialist from the State of California. He completed his BSc in Medical Laboratory Science (MLS) and Ph.D. focusing on omega-6 and omega-3 fatty acids on brain neuronal and glial cell membrane structure and function with implications to the manufacturing of infant formula's fatty acid composition from the University of Alberta. Dr. Bowen completed a post-doctoral diploma in Clinical Chemistry (DClChem) from the University of Toronto and he became a Fellow of the Canadian Academy of Clinical Biochemistry (FCACB). Dr. Bowen has also spent a few years at the National Institutes of Health in Bethesda, Maryland as a Fogarty Post-Doctoral Fellow at the NIH Clinical Center. Dr. Bowen is a Diplomate of the American Board of Clinical Chemistry (DABCC). Also, Dr. Bowen is a Fellow of the American Academy of Clinical Biochemistry (FAACC). Dr. Bowen has also completed his Master in Health Administration (MHA) degree from the University of British Columbia. In summary, he is a Medical Technologist, Clinical Biochemist/Scientist with advanced business concepts as they relate to the healthcare system.

I believe that philosophy dictates practice and engaging in this self-reflection process will result in an increased understanding of our beliefs about the nature of our professional work and life.

As a leader, I believe in teamwork, collaboration, and collective decision-making. W. Edwards Deming is the main influence of my management philosophy: It is not enough to do your best; you must know what to do, and then do your best. I also believe that financial accountability, transparency, and continuous improvement are essential for the success of a diagnostic laboratory. " In God we trust; all others must bring data." - Dr. Deming

My vision of Laboratory Medicine is to provide a continuous quality of service that is beyond the expectations of our clients.

"Never regard study as a duty, but as the enviable opportunity to learn to know the liberating influence of beauty in the realm of the spirit for your own personal joy and to the profit of the community to which your later work belongs"

Author: Albert Einstein

CLINICAL FOCUS

- Clinical Biochemistry
- Clinical Pathology

ACADEMIC APPOINTMENTS

- Clinical Professor, Pathology

ADMINISTRATIVE APPOINTMENTS

- Co-Director of Clinical Chemistry and Immunology Laboratory, Stanford Healthcare, (2013- present)
- Associate Director of Clinical Chemistry and Immunology Laboratory, STANFORD HEALTHCARE, (2006-2013)

HONORS AND AWARDS

- Resident Teaching Award,, Faculty of Pathology (2017)
- Value-Based Research Award, Department of Pathology (2017)
- Best Poster Award, European Conference on Preanalytical Phase (EFLM) (2015)
- Clinical Chemist Recognition Award, American Association of Clinical Chemistry (2015)
- Outstanding Speaker Award, American Association of Clinical Chemistry (2013)
- Clinical Chemist Recognition Award, American Association of Clinical Chemistry (2012)
- Fellow, National Academy of Clinical Biochemistry (2012)
- Resident Teaching Award, Faculty of Pathology (2011)
- Outstanding Speaker Award, American Association of Clinical Chemistry (2010)
- Distinguished Abstract, National Academy of Clinical Biochemistry (2009)
- Diplomate, American Board of Clinical Chemistry (2007)
- Distinguished Abstract, National Academy of Clinical Biochemistry (2006)
- Fellow, Canadian Academy of Clinical Chemistry (2005)
- Forgarty Fellowship, National Institutes of Health (2003-2006)
- Clinical Chemistry Trainee Award, Dade Behring (2003)
- Fellowship in Clinical Chemistry, Ontario Ministry of Health (2001-2003)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Roche Advisory Group (2017 - present)
- Member, National Academy of Clinical Biochemistry (2012 - present)
- Member, American Association of Clinical Chemistry (2003 - present)
- Member, Canadian Society of Clinical Chemistry (2003 - present)

PATENTS

- Richard Zare, Samuel Kim, Raffick Bowen. "United States Patent 033,844 Methods for modifying a hydrophobic surface hydrophobic polymer surface and devices thereof-pending", Leland Stanford Junior University

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Blood collection tubes are much more complex devices than is commonly appreciated by clinical laboratorians. Commercial tubes have multiple components that contribute to the optimal formation of serum or plasma for laboratory analysis.

My research has shown that the silicone surfactant, Silwet L-720, used in blood collection tubes from a major manufacturer interferes with some immunoassays. This surfactant causes desorption of capture antibodies from the solid-phase in some immunoassay reagents. In addition, these tube additives can interfere with other analytical techniques like mass spectrometry.

Since the quality of patient care depends on the quality of all the information that a physician uses in making treatment decisions, blood collection tubes should be manufactured to an extremely high standard like other medical devices. These tube-related interferences unlike patient specimens are not detected by routine quality control or proficiency testing since laboratorians typically do not pour these materials into the tube types used by their lab. Thus, any tube-related interferences will be missed by the clinical lab, which can lead to increased costs due to recollection and retesting, misdiagnosis, erroneous test results, increased turnaround times of test results, delays in patient care, decreased patient satisfaction, and diminished reputation of a healthcare institution.

I am currently testing different types of surfactants and tube wall surface modification on immunoassays. This work will hopefully lead to blood collection tubes with minimum or no assay interferences and a better understanding of the effects of blood collection tube surfactant and additives on clinical assays, particularly, immunoassays.

Publications

PUBLICATIONS

- **Bias and Accuracy of Glomerular Filtration Rate Estimating Equations in the US: A Systematic Review and Meta-Analysis.** *JAMA network open*
  Yan, A. F., Williams, M. Y., Shi, Z., Oyekan, R., Yoon, C., Bowen, R., Chertow, G. M.
  2024; 7 (3): e241127
- **Inadvertent omission of a specimen integrity comment- an overlooked post-analytical error.** *Clinical chemistry and laboratory medicine*
  Bowen, R. A., Daigh, L. H.
  2024
- **Impact of Blood Collection Devices and Mode of Transportation on Peripheral Venous Blood Gas Parameters.** *Clinica chimica acta; international journal of clinical chemistry*
  Bowen, R. A., Esguerra, V., Arboleda, E., Cheng, P., Hu, B.
  2023: 117464
- **Sporadically low chemistry test results due to fluid malfunction.** *Clinica chimica acta; international journal of clinical chemistry*
  Huynh, L., Hu, B., Cheng, P., Bowen, R. A.
  2023: 117357
- **Validated transport conditions maintain the quality of washed red blood cells.** *Transfusion*
  Baker, S. A., Wong, L. K., Wieland, R., Bulterys, P., Allard, L., Nguyen, L., Quach, T., Nguyen, A., Chaesuh, E., Cheng, P., Bowen, R., Virk, M.
  2022; 62 (9): 1860-1870
- **Impact of recentrifugation of blood collection tubes on chemistry and immunochemistry analytes after 24 and 72 hours of refrigerated storage on the Roche Cobas 8000 platform.** *Clinica chimica acta; international journal of clinical chemistry*
  Bowen, R. A., Esguerra, V., Walker, M., Cheng, P., Nguyen, T.
  2022
- **Unexpectedly low tacrolimus concentrations attributed to inappropriately labeled water container from the instrument manufacturer.** *Clinical chemistry and laboratory medicine*
  Ames, E., Bowen, R. A.
  2022
- **Preanalytical error: Improper gel barrier formation in a serum separator tube despite appropriate centrifugation condition.** *Clinica chimica acta; international journal of clinical chemistry*
  Allard, L., Bowen, R. A.
  2021

- **Does the number of plasma separator tube inversions alter clinical chemistry and immunoassay test results on a Roche Cobas 8000 clinical chemistry platform?** *Clinica chimica acta; international journal of clinical chemistry*
  Bowen, R. A., Esguerra, V., Walker, M.
  2020

- **Ethical and organizational considerations for mandatory COVID-19 vaccination of health care workers: A clinical laboratorian's perspective** *CLINICA CHIMICA ACTA*
  Bowen, R. R.
  2020; 510: 421–22

- **Ethical and organizational considerations for mandatory COVID-19 vaccination of health care workers: a clinical laboratorian's perspective.** *Clinica chimica acta; international journal of clinical chemistry*
  Bowen, R. A.
  2020

- **Utility of High-Sensitivity and Conventional Troponin in Patients Undergoing Transcatheter Aortic Valve Replacement: Incremental Prognostic Value to B-type Natriuretic Peptide.** *Scientific reports*
  Kobayashi, Y., Kim, J. B., Moneghetti, K. J., Fischbein, M., Lee, A., Watkins, C. A., Yeung, A. C., Liang, D., Ozen, M. O., Demirci, U., Bowen, R., Fearon, W. F., Haddad, et al
  2019; 9 (1): 14936

- **Detection of Circulating Tumor DNA in Patients With Uterine Leiomyomas** *JCO PRECISION ONCOLOGY*
  Przybyl, J., Spans, L., Lum, D. A., Zhu, S., Vennam, S., Forgo, E., Varma, S., Ganjoo, K., Hastie, T., Bowen, R., Debiec-Rychter, M., van de Rijn, M.
  2019; 3

- **Detection of Circulating Tumor DNA in Patients With Uterine Leiomyomas.** *JCO precision oncology*
  Przybyl, J., Spans, L., Lum, D. A., Zhu, S., Vennam, S., Forgó, E., Varma, S., Ganjoo, K., Hastie, T., Bowen, R., Debiec-Rychter, M., van de Rijn, M.
  2019; 3

- **Best practices in mitigating the risk of biotin interference with laboratory testing.** *Clinical biochemistry*
  Bowen, R., Benavides, R., Colon-Franco, J. M., Katzman, B. M., Muthukumar, A., Sadrzadeh, H., Straseski, J., Klause, U., Tran, N.
  2019

- **Falsely high sirolimus concentrations due to everolimus cross-reactivity in the Siemens sirolimus immunoassay: Corrective actions implemented** *CLINICA CHIMICA ACTA*
  Bowen, R., Rieta, R., Joshi, R., Lee, R. C.
  2019; 489: 162–63

- **Impact of underfilling heparinized collection tubes on ionized calcium measurements.** *Clinica chimica acta; international journal of clinical chemistry*
  Tung, J. K., Bowen, R. A.
  2019

- **Quality Control Practices for Chemistry and Immunochemistry in a Cohort of 21 Large Academic Medical Centers** *AMERICAN JOURNAL OF CLINICAL PATHOLOGY*
  Rosenbaum, M. W., Flood, J. G., Melanson, S. F., Baumann, N. A., Marzinke, M. A., Rai, A. J., Hayden, J., Wu, A. B., Ladror, M., Lifshitz, M. S., Scott, M. G., Peck-Palmer, O. M., Bowen, et al
  2018; 150 (2): 96–104

- **Surface characterization and free thyroid hormones response of chemically modified poly(ethylene terephthalate) blood collection tubes** *APPLIED SURFACE SCIENCE*
  Dil, E., Kim, S. C., Saffar, A., Ajji, A., Zare, R. N., Sattayapiwat, A., Esguerra, V., Bowen, R. R.
  2018; 442: 602–12

- **Falsely high sirolimus concentrations due to everolimus cross-reactivity in the Siemens sirolimus immunoassay: Corrective actions implemented.** *Clinica chimica acta; international journal of clinical chemistry*
  Bowen, R. n., Rieta, R. n., Joshi, R. n., Lee, R. C.
  2017

- **Blood collection tubes as medical devices: The potential to affect assays and proposed verification and validation processes for the clinical laboratory.** *Clinical biochemistry*
  Bowen, R. A., Adcock, D.

2016

- **Falsely low plasma human chorionic gonadotropin (hCG) concentrations: Corrective actions implemented** *CLINICA CHIMICA ACTA*
  Zemek, A., Rieta, R., Bowen, R. R.
  2016; 460: 126–27

- **Performance of chemically modified plastic blood collection tubes.** *Clinical biochemistry*
  Bowen, R. A., Kim, S. C., Sattayapiwat, A., Austria-Esguerra, V., Zare, R. N.
  2016; 49 (1): 90-99

- **Re-engineering laboratory diagnostics for preventing preanalytical errors.** *Clinical biochemistry*
  Lippi, G. n., Bowen, R. n., Adcock, D. M.
  2016; 49 (18): 1313–14

- **Performance of chemically modified plastic blood collection tubes** *CLINICAL BIOCHEMISTRY*
  Bowen, R. A., Kim, S. C., Sattayapiwat, A., Austria-Esguerra, V., Zare, R. N.
  2016; 49 (1-2): 90-99

- **Cyst Fluid Glucose is Rapidly Feasible and Accurate in Diagnosing Mucinous Pancreatic Cysts.** *American journal of gastroenterology*
  Zikos, T., Pham, K., Bowen, R., Chen, A. M., Banerjee, S., Friedland, S., Dua, M. M., Norton, J. A., Poultsides, G. A., Visser, B. C., Park, W. G.
  2015; 110 (6): 909-914

- **Transforming plastic surfaces with electrophilic backbones from hydrophobic to hydrophilic.** *ACS applied materials & interfaces*
  Kim, S., Bowen, R. A., Zare, R. N.
  2015; 7 (3): 1925-1931

- **Correlation of urine protein-creatinine ratios and 24-hour urinary excretion in twin pregnancies**
  Osmundson, S., Lafayette, R., Bowen, R., Roque, V., Aziz, N.
  MOSBY-ELSEVIER.2015: S124–S125

- **Commutability of the Epstein-Barr virus WHO international standard across two quantitative PCR methods.** *Journal of clinical microbiology*
  Abeynayake, J., Johnson, R., Libiran, P., Sahoo, M. K., Cao, H., Bowen, R., Chan, K. C., Le, Q., Pinsky, B. A.
  2014; 52 (10): 3802-3804

- **Chemical modification of plastic blood collection tubes to achieve hydrophilic interior surfaces**
  Zare, R. N., Kim, S., Bowen, R. R.
  AMER CHEMICAL SOC.2014

- **Maternal proteinuria in twin compared with singleton pregnancies.** *Obstetrics and gynecology*
  Osmundson, S. S., Lafayette, R. A., Bowen, R. A., Roque, V. C., Garabedian, M. J., Aziz, N.
  2014; 124 (2): 332-337

- **Blood collection tube-related alterations in analyte concentrations in quality control material and serum specimens.** *Clinical biochemistry*
  Bowen, R. A., Sattayapiwat, A., Gounden, V., Remaley, A. T.
  2014; 47 (3): 150-157

- **Interferences from blood collection tube components on clinical chemistry assays.** *Biochemia medica*
  Bowen, R. A., Remaley, A. T.
  2014; 24 (1): 31-44

- **Interferences from blood collection tube components on clinical chemistry assays** *BIOCHEMIA MEDICA*
  Bowen, R. A., Remaley, A. T.
  2014; 24 (1): 31-44

- **Urinary protein excretion in non-hypertensive twin pregnancies**
  Osmundson, S., Roque, V., Bowen, R., Garabedian, M., Lafayette, R., Aziz, N.
  MOSBY-ELSEVIER.2014: S379–S380

- **Metabolomic-derived novel cyst fluid biomarkers for pancreatic cysts: glucose and kynurenine** *GASTROINTESTINAL ENDOSCOPY*
  Park, W. G., Wu, M., Bowen, R., Zheng, M., Fitch, W. L., Pai, R. K., Wodziak, D., Visser, B. C., Poultsides, G. A., Norton, J. A., Banerjee, S., Chen, A. M., Friedland, et al

2013; 78 (2): 295-?

- **Preanalytical quality improvement: in quality we trust** *CLINICAL CHEMISTRY AND LABORATORY MEDICINE*
  Lippi, G., Becan-McBride, K., Behulova, D., Bowen, R. A., Church, S., Delanghe, J., Grankvist, K., Kitchen, S., Nybo, M., Nauck, M., Nikolac, N., Palicka, V., Plebani, et al
  2013; 51 (1): 229-241

- **Serum testosterone quantitation by liquid chromatography-tandem mass spectrometry: Interference from blood collection tubes** *CLINICAL BIOCHEMISTRY*
  Shi, R. Z., van Rossum, H. H., Bowen, R. A.
  2012; 45 (18): 1706-1709

- **Comparison of Aptt and anti-Xa Activity with Patient Outcomes in a Large Cohort of Hospitalized Patients Treated with Unfractionated Heparin**
  Jin, J., Price, E. A., Houng (Marie) Nguyen, H., Krishnan, G., Balise, R., Bowen, R., Zehnder, J.
  WILEY-BLACKWELL.2012: S174–S174

- **Prolonged aPTT Relative to Anti-Xa Is Associated with Increased 30-Day Mortality in Hospitalized Patients Treated with Unfractionated Heparin** *53rd Annual Meeting and Exposition of the American-Society-of-Hematology (ASH)*
  Jin, J., Price, E., Huong Nguyen, H., Krishnan, G., Balise, R., Bowen, R. A., Zehnder, J. L.
  AMER SOC HEMATOLOGY.2011: 559–59

- **Tubes and additives for venous and capillary blood collection tubes; approved standard H1-A6** *CLSI standard*
  Dubrowny N, A. B.
  2010

- **Impact of blood collection devices on clinical chemistry assays** *CLINICAL BIOCHEMISTRY*
  Bowen, R. A., Hortin, G. L., Csako, G., Otanez, O. H., Remaley, A. T.
  2010; 43 (1-2): 4-25

- **Validation and Verification of Tubes for venous and capillary blood specimen collection; GP34-A** *CLSI guideline*
  Dubrowny N, A. B.
  2010

- **Rapid blood separation is superior to fluoride for preventing in vitro reductions in measured blood glucose concentration** *JOURNAL OF CLINICAL PATHOLOGY*
  Shi, R. Z., Seeley, E. S., Bowen, R., Faix, J. D.
  2009; 62 (8): 752-753

- **Identification and resolution of exogenous immunoassay interferences** *Clinical Laboratory International*
  Bowen RAR
  2008

- **Differential effect of blood collection tubes on total free fatty acids (FFA) and total triiodothyronine (TT3) concentration: A model for studying interference from tube constituents** *CLINICA CHIMICA ACTA*
  Bowen, R. A., Vu, C., Remaley, A. T., Hortin, G. L., Csako, G.
  2007; 378 (1-2): 181-193

- **Immunoassay interference by a commonly used blood collection tube additive, the organosilicone surfactant Silwet L-720** *CLINICAL CHEMISTRY*
  Bowen, R. A., Chan, Y., Ruddel, M. E., Hortin, G. L., Csako, G., Demosky, S. J., Remaley, A. T.
  2005; 51 (10): 1874-1882

- **Effect of blood collection tubes on total triiodothyronine and other laboratory assays** *CLINICAL CHEMISTRY*
  Bowen, R. A., Chan, Y., Cohen, J., Rehak, N. N., Hortin, G. L., Csako, G., Remaley, A. T.
  2005; 51 (2): 424-433

- **Potential interferences from blood collection tubes in mass spectrometric analyses of serum polypeptides** *CLINICAL CHEMISTRY*
  Drake, S. K., Bowen, R. A., Remaley, A. T., Hortin, G. L.
  2004; 50 (12): 2398-2401

- **Identification and Resolution of Immunoassay Interferences** *Handbook of Diagnostic Endocrinology*
  Raffick A.R. Bowen, Alan T. Remaley

- **Mass spectrometry quantitation of immunosuppressive drugs in clinical specimens using online solid-phase extraction and accurate-mass full scan-single ion monitoring.** *Journal of mass spectrometry and advances in the clinical lab*
  Yeung, P. S., Miller, P., Lai-Nyugen, T. B., Cheng, P., Ibrahim, A., Shi, R., Bowen, R. A., Luo, R. Y.
  2023; 28: 99-104

- **Targeted plasma metabolomics combined with machine learning for the diagnosis of severe acute respiratory syndrome virus type 2.** *Frontiers in microbiology*
  Le, A. T., Wu, M., Khan, A., Phillips, N., Rajpurkar, P., Garland, M., Magid, K., Sibai, M., Huang, C., Sahoo, M. K., Bowen, R., Cowan, T. M., Pinsky, et al
  2022; 13: 1059289

- **Metabolomic-derived novel cyst fluid biomarkers for pancreatic cysts: glucose and kynurenine.** *Gastrointestinal endoscopy*
  Park, W. G., Wu, M., Bowen, R., Zheng, M., Fitch, W. L., Pai, R. K., Wodziak, D., Visser, B. C., Poultsides, G. A., Norton, J. A., Banerjee, S., Chen, A. M., Friedland, et al
  2013; 78 (2): 295-302 e2

- **Discordant aPTT and anti-Xa values and outcomes in hospitalized patients treated with intravenous unfractionated heparin.** *Annals of pharmacotherapy*
  Price, E. A., Jin, J., Nguyen, H. M., Krishnan, G., Bowen, R., Zehnder, J. L.
  2013; 47 (2): 151-158

- **Elevated vitamin B-12 levels in autoimmune lymphoproliferative syndrome attributable to elevated haptocorrin in lymphocytes** *CLINICAL BIOCHEMISTRY*
  Bowen, R. A., Dowdell, K. C., Dale, J. K., Drake, S. K., Fleisher, T. A., Hortin, G. L., Remaley, A. T., Nexo, E., Rao, V. K.
  2012; 45 (6): 490-492

- **False-negative result for cocaine metabolites on a lateral-flow drug test slide corrected by dilution** *CLINICAL CHEMISTRY*
  Bowen, R. A., George, D. T., Hortin, G. L.
  2005; 51 (4): 790-791