



Ruben Y. Luo

Assistant Professor of Pathology

Bio

BIO

Ruben Y. Luo, PhD, DABCC, FADLM is an Assistant Professor of Pathology at Stanford University and Associate Director of Clinical Chemistry Laboratory at Stanford Health Care. He has been dedicated to innovations in translational laboratory medicine: discovery of novel diagnostic markers and innovation of diagnostic technologies. His research focuses on (1) discovering the clinical diagnostic value of molecular characteristics of protein biomarkers, and (2) developing high-resolution mass spectrometry and label-free optical sensing technologies for characterization and accurate measurement of biomarkers. He completed his clinical chemistry fellowship at University of California San Francisco. Prior to the fellowship, he had several years of work experience in the clinical diagnostic industry. He received his PhD in analytical chemistry from Stanford University, and BS in chemistry from Peking University.

He has been an active member and conference speaker in the international clinical chemistry and mass spectrometry communities, e.g., Association for Diagnostics and Laboratory Medicine (ADLM; formerly American Association for Clinical Chemistry, AACC), American Society for Mass Spectrometry (ASMS), Mass Spectrometry & Advances in Clinical Lab (MSACL). His research awards include 2022 AACC George Grannis Award for Excellence in Research and Scientific Publication, 2021 NACCCA Outstanding Research Award, 2020 American Society for Clinical Pathology (ASCP) "40 Under Forty" Honoree, 2020 AACC Academy's Distinguished Abstract Award, 2019 and 2020 AACC TDM Best Abstract Awards for Outstanding Research, 2019 AACC Student Poster Contest 1st Place, 2020 AACC Student Poster Contest 2nd Place, and 2018 AACC Hot Topics Invited Speaker. He currently serves as an associate editor of JMSACL and an editorial board member of Scientific Reports.

ACADEMIC APPOINTMENTS

- Assistant Professor - University Medical Line, Pathology
- Member, Bio-X
- Member, SPARK at Stanford
- Faculty Fellow, Sarafan ChEM-H

ADMINISTRATIVE APPOINTMENTS

- Associate Director, Clinical Chemistry Laboratory, Stanford Health Care, (2021- present)

HONORS AND AWARDS

- AACC George Grannis Award for Excellence in Research and Scientific Publication, American Association for Clinical Chemistry (2022)
- MSACL Lab Director Educational Grant, Mass Spectrometry & Advances in the Clinical Lab (2022)
- NACCCA Outstanding Research Award, North American Chinese Clinical Chemists Association (2021)
- ASCP "40 Under Forty" Honoree, American Society for Clinical Pathology (2020)

- AACC Academy's Distinguished Abstract Award, American Association for Clinical Chemistry (2020)
- AACC Best Abstract Award for Outstanding Research in TDM, American Association for Clinical Chemistry (2020)
- AACC Best Abstract Award for Outstanding Research in TDM, American Association for Clinical Chemistry (2019)
- MSACL Young Investigator Educational Grants, Mass Spectrometry & Advances in the Clinical Lab (2018-2020)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member-at-Large, Mass Spectrometry and Separation Sciences Division, American Association for Clinical Chemistry (2021 - present)
- Member, American Society for Clinical Pathology (2020 - 2022)
- Board Member, North American Chinese Clinical Chemists Association (2019 - present)
- Member, American Society for Mass Spectrometry (2018 - present)
- Member, American Association for Clinical Chemistry (2017 - present)

PROFESSIONAL EDUCATION

- Board Certification, American Board of Clinical Chemistry (2020)
- Fellowship, UCSF Clinical Chemistry Fellowship Program (2020)
- PhD, Stanford University (2008)
- BS, Peking University (2003)

PATENTS

- R. N. Zare, Y. Luo, F. Yu. "United States Patent 8,289,519 Surface Plasmon Resonance (SPR) Microscopy Systems, Method of Fabrication Thereof, and Methods of Use Thereof", Stanford University, Oct 16, 2012

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Apply top-down mass spectrometry and label-free immunoassay to the study and utilization of biomarker proteoforms in clinical diagnosis.

PROJECTS

- Application of Proteoforms in Blood and Cerebrospinal Fluid as Potential Clinical Diagnostic Markers
- Study of β 2-Transferrin and Development of a Next-Generation Assay to Detect Cerebrospinal Fluid Leak
- Top-Down Identification of Hemoglobin Variants Using Capillary Electrophoresis Coupled with High-Resolution Mass Spectrometry
- Development of a Therapeutic Drug Monitoring Assay for Immunosuppressive Drugs Using High-Resolution Mass Spectrometry
- Development of a Therapeutic Drug Monitoring Assay for Antifungal Agents Using High-Resolution Mass Spectrometry

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Morgan Mann

Publications

PUBLICATIONS

- **Clonality Determination by Detecting Unmodified Monoclonal Serum Free Light Chains Using On-Probe Extraction Coupled with Liquid Chromatography-High-Resolution Mass Spectrometry.** *Clinical chemistry*
Yeung, P. S., Liu, Y., Yang, S., Ruan, A., Kerr, C. R., Wong, C. V., Shi, R. Z., Iberri, D. J., Luo, R. Y.

2024

- **Study of β 1-transferrin and β 2-transferrin using microprobe-capture in-emitter elution and high-resolution mass spectrometry.** *Scientific reports*
Luo, R. Y., Pfaffroth, C., Yang, S., Hoang, K., Yeung, P. S., Zehnder, J. L., Shi, R. Z.
2023; 13 (1): 14974
- **Microprobe-Capture In-Emitter Elution: An Affinity Capture Technique to Directly Couple a Label-Free Optical Sensing Technology with Mass Spectrometry for Protein Analysis.** *Analytical chemistry*
Luo, R. Y., Yang, S.
2023
- **Neutral-Coating Capillary Electrophoresis Coupled with High-Resolution Mass Spectrometry for Top-Down Identification of Hemoglobin Variants.** *Clinical chemistry*
Luo, R. Y., Wong, C., Xia, J. Q., Glader, B. E., Shi, R., Zehnder, J. L.
2022
- **A SARS-CoV-2 Label-Free Surrogate Virus Neutralization Test and a Longitudinal Study of Antibody Characteristics in COVID-19 Patients.** *Journal of clinical microbiology*
Luo, Y. R., Yun, C., Chakraborty, I., Wu, A. H., Lynch, K. L.
2021; 59 (7): e0019321
- **Development of Label-Free Immunoassays as Novel Solutions for the Measurement of Monoclonal Antibody Drugs and Antidrug Antibodies** *CLINICAL CHEMISTRY*
Luo, Y., Chakraborty, I., Lazar-Molnar, E., Wu, A. B., Lynch, K. L.
2020; 66 (10): 1319-1328
- **Prediction of risk for early or very early preterm births using high-resolution urinary metabolomic profiling.** *BMC pregnancy and childbirth*
Zhang, Y., Sylvester, K. G., Wong, R. J., Blumenfeld, Y. J., Hwa, K. Y., Chou, C. J., Thyparambil, S., Liao, W., Han, Z., Schilling, J., Jin, B., Marić, I., Aghaeepour, et al
2024; 24 (1): 783
- **Targeted Multiplex Proteomics for the Development and Validation of Biomarkers in Primary Aldosteronism Subtyping.** *European journal of endocrinology*
Zhou, F., Ding, Y., Chen, T., Tang, Q., Zhang, J., Thyparambil, S., Jin, B., Han, Z., Chou, C. J., Schilling, J., Luo, R. Y., Tian, H., Sylvester, et al
2024
- **Targeted multiplex validation of CSF proteomic biomarkers: implications for differentiation of PCNSL from tumor-free controls and other brain tumors.** *Frontiers in immunology*
Ma, J., Lin, Z., Zhang, Y., Ding, Y., Tang, Q., Qian, Y., Jin, B., Luo, R. Y., Liao, W. L., Thyparambil, S., Han, Z., Chou, C. J., Schilling, et al
2024; 15: 1343109
- **An up-conversion fluorescence lateral-flow immunoassay for rapid detection of Daratumumab in serum protein electrophoresis clinical samples.** *Clinica chimica acta; international journal of clinical chemistry*
Liu, Y., Tao, Y., Yeung, P. S., Lu, M., Liu, J., Yu, F., Shi, R., Yiqi Luo, R.
2024: 119677
- **Assessment of Community Lead Exposure and Poisoning by Reviewing Medical Records of Patients with Measurable Level of Lead in Blood at an Academic Medical Center**
Brar, N., Zhang, J., Huang, S., Patel, P., Singh, S., Luo, R., Dodd, D., Shi, R.
ELSEVIER SCIENCE INC.2024: S1985-S1986
- **Transport of Full-Length Proteins through a Nanopore: One Step Closer to Single-Molecule Proteomics.** *Clinical chemistry*
Yeung, P. S., Luo, R. Y.
2024; 70 (2): 462-463
- **Global metabolomics revealed deviations from the metabolic aging clock in colorectal cancer patients.** *Theranostics*
Zhang, L., Mo, S., Zhu, X., Chou, C. J., Jin, B., Han, Z., Schilling, J., Liao, W., Thyparambil, S., Luo, R. Y., Whitin, J. C., Tian, L., Nagpal, et al
2024; 14 (4): 1602-1614
- **Exploring the feasibility of using long-term stored newborn dried blood spots to identify metabolic features for congenital heart disease screening.** *Biomarker research*

- Ceresnak, S. R., Zhang, Y., Ling, X. B., Su, K. J., Tang, Q., Jin, B., Schilling, J., Chou, C. J., Han, Z., Floyd, B. J., Whitin, J. C., Hwa, K. Y., Sylvester, et al
2023; 11 (1): 97
- **Comparison of liquid chromatography-high-resolution tandem mass spectrometry (MS2) and multi-stage mass spectrometry (MS3) for screening toxic natural products.** *Journal of mass spectrometry and advances in the clinical lab*
Luo, R. Y., Comstock, K., Ding, C., Wu, A. H., Lynch, K. L.
2023; 30: 38-44
 - **High-throughput quantitation of amino acids and acylcarnitine in cerebrospinal fluid: identification of PCNSL biomarkers and potential metabolic messengers.** *Frontiers in molecular biosciences*
Ma, J., Chen, K., Ding, Y., Li, X., Tang, Q., Jin, B., Luo, R. Y., Thyparambil, S., Han, Z., Chou, C. J., Zhou, A., Schilling, J., Lin, et al
2023; 10: 1257079
 - **Development of a Urine Metabolomics Biomarker-Based Prediction Model for Preeclampsia during Early Pregnancy.** *Metabolites*
Zhang, Y., Sylvester, K. G., Jin, B., Wong, R. J., Schilling, J., Chou, C. J., Han, Z., Luo, R. Y., Tian, L., Ladella, S., Mo, L., Maric, I., Blumenfeld, et al
2023; 13 (6)
 - **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
 - **Accurate Identification of Hemoglobin Variants By Top-Down Protein Analysis Using Capillary Electrophoresis-HighResolution Mass Spectrometry**
Luo, R., Wong, C., Xia, J., Glader, B., Shi, R., Zehnder, J. L.
AMER SOC HEMATOLOGY.2022: 5384-5386
 - **Serum peptidomic screening identified circulating peptide biomarkers predictive for preeclampsia.** *Frontiers in cardiovascular medicine*
Zhao, S., Yin, C., Zhai, Y., Jia, Z., Su, S., Lu, Y., Meng, L., Li, C., Liu, X., Cong, Y., Li, Y., Liu, Y., Chen, et al
2022; 9: 946433
 - **Primary Hyperparathyroidism in Pregnancy: Insights From a Case of a 28-Year-Old Woman With Miscarriages and Hyperemesis Gravidarum** *ANNALS OF LABORATORY MEDICINE*
Zhang, L., Luo, Y., Hu, Y., Zhai, Y., Gao, H., Cao, Z.
2021; 41 (3): 336-338
 - **Establishment of a High-Resolution Liquid Chromatography-Mass Spectrometry Spectral Library for Screening Toxic Natural Products.** *Journal of analytical toxicology*
Luo, Y. R., Goodnough, R., Yun, C., Wu, A. H., Lynch, K. L.
2021
 - **Simultaneous quantitation of four androgens and 17-hydroxyprogesterone in polycystic ovarian syndrome patients by LC-MS/MS** *JOURNAL OF CLINICAL LABORATORY ANALYSIS*
Cao, Z., Lu, Y., Cong, Y., Liu, Y., Li, Y., Wang, H., Zhang, Q., Huang, W., Liu, J., Dong, Y., Tang, G., Luo, Y. R., Yin, et al
2020; 34 (12): e23539
 - **A case of unexplained duodenal ulcer and massive gastrointestinal bleed** *CLINICA CHIMICA ACTA*
Luo, Y., Goodnough, R., Menza, R., Badea, A., Luu, H., Kornblith, L. Z., Lynch, K. L.
2020; 506: 188-190
 - **A thin-film interferometry-based label-free immunoassay for the detection of daratumumab interference in serum protein electrophoresis** *CLINICA CHIMICA ACTA*
Luo, Y., Chakraborty, I., Zuk, R. F., Lynch, K. L., Wu, A. B.
2020; 502: 128-132
 - **Kinetics of SARS-CoV-2 Antibody Avidity Maturation and Association with Disease Severity.** *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*
Luo, Y. R., Chakraborty, I., Yun, C., Wu, A. H., Lynch, K. L.
2020

- **Is High-Resolution Liquid Chromatography-Multistage Mass Spectrometry (LC-HR-MSn) a Good Choice for Screening Toxic Natural Products?**
Luo, Y. R.
American Association for Clinical Chemistry.
2020 ; AACC Academy's Scientific Shorts
- **Label-Free Detection of Therapeutic Monoclonal Antibody Interference**
Luo, Y. R.
American Association for Clinical Chemistry.
2020 ; Clinical Laboratory News
- **Correlation of Breath and Blood Delta(9)-Tetrahydrocannabinol Concentrations and Release Kinetics Following Controlled Administration of Smoked Cannabis** *CLINICAL CHEMISTRY*
Lynch, K. L., Luo, Y., Hooshfar, S., Yun, C.
2019; 65 (9): 1171-1179
- **Azo coupling-based derivatization method for high-sensitivity liquid chromatography-tandem mass spectrometry analysis of tetrahydrocannabinol and other aromatic compounds** *JOURNAL OF CHROMATOGRAPHY A*
Luo, Y., Han, J., Yun, C., Lynch, K. L.
2019; 1597: 109-118
- **Quantitation of Cannabinoids in Breath Samples Using a Novel Derivatization LC-MS/MS Assay with Ultra-High Sensitivity** *JOURNAL OF ANALYTICAL TOXICOLOGY*
Luo, Y., Yun, C., Lynch, K. L.
2019; 43 (5): 331-339
- **Drug Induced Liver Injury and Lactic Acidosis Associated with Chronic Sustained Release Nicotinamide Exposure** *American Journal of Biomedical Science & Research*
Goodnough, R., Monto, A., Luo, Y. R., Lynch, K. L., Blanc, P. D.
2019; 5 (2): 000894
- **Ligand Immobilization in Protein Interaction Studies – An Unattended Amine Coupling Protocol with Automatic Coinjection Activation**
Luo, R., Bronner, V., Zafir-Lavie, I., Thornton, K., Shezifi, D.
Bio-Rad Laboratories.
2014 ; Bioradiations
- **Novel Liposome-Capture Surface Chemistries to Analyze Drug-Lipid Interaction Using the ProteOn™ XPR36 System**
Edri, M., Luo, R., Rabkin, E., Nimri, S., Shezifi, D.
Bio-Rad Laboratories.
2014 ; Bioradiations
- **Analyzing Binding Kinetics with Surface Plasmon Resonance Complemented with Direct Mass Spectrometry on the Same Sensor Chip**
Luo, R., Zhu, M., Roth, S., Plows, F.
Bio-Rad Laboratories.
2013 ; Bioradiations
- **A Novel Biotinylated Ligand-Capture Method with Surface Regeneration Capability for Label-Free Biomolecular Interaction Analysis**
Zhu, M., Shezifi, D., Nimri, S., Luo, R.
Bio-Rad Laboratories.
2013 ; Bioradiations
- **Immobilization of Active Kinases for Small Molecule Inhibition Studies**
Popplewell, J., Luo, R.
Bio-Rad Laboratories.
2013 ; Bioradiations
- **Microfluidic Device for Coupling Capillary Electrophoresis and Matrix-Assisted Laser Desorption Ionization-Mass Spectrometry** *JALA*
Luo, Y., Xu, S., Schilling, J. W., Lau, K. H., Whitin, J. C., Yu, T. T., Cohen, H. J.
2009; 14 (5): 252-261

- **Perforated membrane method for fabricating three-dimensional polydimethylsiloxane microfluidic devices** *LAB ON A CHIP*
Luo, Y., Zare, R. N.
2008; 8 (10): 1688-1694
- **Microfluidic device for immunoassays based on surface plasmon resonance imaging** *LAB ON A CHIP*
Luo, Y., Yu, F., Zare, R. N.
2008; 8 (5): 694-700
- **PHYS 2-Analysis of biomolecular heterogeneity using fluorescence fluctuation spectroscopy**
Zare, R. N., Kim, S., Luo, Y.
AMER CHEMICAL SOC.2007
- **ANYL 396-Combining microfluidics with surface plasmon resonance imaging for rapid label-free immunoassays**
Luo, Y., Yu, F., Zare, R. N.
AMER CHEMICAL SOC.2007
- **Controlling electroosmotic flow in poly(dimethylsiloxane) separation channels by means of prepolymer additives** *ANALYTICAL CHEMISTRY*
Luo, Y., Huang, B., Wu, H., Zare, R. N.
2006; 78 (13): 4588-4592
- **Optimized separation of isoquinoline alkaloids in Thalictum herbal medicine by microemulsion electrokinetic chromatography** *JOURNAL OF LIQUID CHROMATOGRAPHY & RELATED TECHNOLOGIES*
Luo, Y. Q., Bo, T., Li, M., Gong, S. X., Li, K. A., Liu, H. W.
2003; 26 (11): 1719-1730
- **Separation of isoquinoline alkaloids and saponins by microemulsion electrokinetic chromatography with anionic and cationic surfactants** *CHROMATOGRAPHIA*
Bo, T., Zhong, L., Li, M., Luo, Y. Q., Li, K. A., Liu, H. W., Guo, D. A.
2002; 56 (11-12): 709-716

PRESENTATIONS

- Applying Top-Down Mass Spectrometry to Clinical Chemistry Lab: Characterization of β 2-Transferrin and Identification of Hemoglobin Variants - Consortium for Top-Down Proteomics Seminar Series (October 20, 2022)
- Application of Capillary Electrophoresis-Mass Spectrometry to the Clinical Practice of Hemoglobin Variant Identification - CASMS Conference (October 19, 2022)
- Applying Top-Down High-Resolution Mass Spectrometry to Analyze Proteoforms: Characterization of β 2-Transferrin and Identification of Hemoglobin Variants - AACC Annual Scientific Meeting & Clinical Lab Expo (July 27, 2022)
- Label-Free Immunoassay: From a Biomolecular Interaction Characterization Tool to a Clinical Chemistry Platform - AACC Annual Scientific Meeting & Clinical Lab Expo (July 26, 2022)
- Label-Free Immunoassay: An Emerging Platform in Clinical Immunology and Therapeutic Biologics Monitoring - AACC Annual Scientific Meeting & Clinical Lab Expo (July 25, 2022)
- Clinical Diagnosis of Hemoglobin Variants Based on Top-down Structural Characterization Using Capillary Electrophoresis-Coupled High-Resolution Mass Spectrometry - ASMS Conference (June 6, 2022)
- Capillary Zone Electrophoresis Coupling with High-Resolution Mass Spectrometry for Top-down Structural Characterization of Hemoglobin Variants - MSACL Annual Conference & Exhibits (April 7, 2022)
- A Therapeutic Drug Monitoring Assay of Immunosuppressants Using TurboFlow LC and High-Resolution Mass Spectrometry - MSACL Annual Conference & Exhibits (April 7, 2022)
- Finding the "Silent Killers" – Mass Spectrometry for Identifying Natural Toxins - Clinical Mass Spectrometry Forum (April 9, 2022)
- Applications of Label-Free Immunoassays in SARS-CoV-2 Serology - Gator Bio Webinar Series (November 18, 2020)
- Clinical Toxicology Applications of High-Sensitivity and High-Resolution Mass Spectrometry - Mass Spectrometry for Clinical Diagnosis (September 16, 2019)
- High-Resolution Mass Spectrometry Library for Identification of Natural Product Toxicity Cases - NACCCA Annual Meeting (August 7, 2019)
- Rapid Plate-Format Label-Free Immunoassays for Quantitation of Monoclonal Antibody Drugs and Detection of Anti-Drug Antibodies in Serum Samples - AACC Annual Scientific Meeting (August 6, 2019)

- Quantitation of Cannabinoids in Breath Samples Using a Novel Derivatization LC-MS Assay with Ultrahigh Sensitivity - ASMS Conference (June 6, 2019)
- A Novel Derivatization Method for High-Sensitivity LC-MS/MS Analysis of Aromatic Compounds – Quantitation of Cannabinoids in Human Breath - MSACL Annual Conference & Exhibits (April 3, 2019)
- High-Resolution Mass Spectrometry Analysis for Toxicity Associated with Natural Products - Clinical Mass Spectrometry Forum (March 15, 2019)
- A Novel Derivatization-Based LC-MS/MS Method with High Sensitivity for Quantitation of Cannabinoids in Breath Samples - AACC Annual Scientific Meeting (August 1, 2018)
- Simple and Rapid LC-MS/MS Methods for Quantitation of Five Cannabinoids in Breath and Blood Samples - MSACL Annual Conference (January 24, 2018)
- Derivatization for Clinical Mass Spectrometry: A Thing in the Past or the Future - Clinical Mass Spectrometry Forum (March 30, 2018)
- Developing Microfluidic Chips for Coupling Capillary Electrophoresis with Matrix-Assisted Laser Desorption Ionization-Mass Spectrometry - PITTCON Conference (March 3, 2008)
- Combining Microfluidics with Surface Plasmon Resonance Imaging for Rapid Label-Free Immunoassays - ACS National Meeting (August 22, 2007)