Nigel Kurgan

Postdoctoral Research Fellow

Novo Nordisk Foundation Center for Basic Metabolic Research

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Exercise physiologist with expertise in metabolism, proteomics, and bioinformatics. I'm interested in combining these approaches to better understand interorgan communication mediated by secreted proteins during exercise and in individuals with metabolic diseases. I am an avid R user for data processing, visualization, and communication/reports, and am passionate about open and reproducible science.

Current Appointments

Novo Nordisk Foundation Center for Basic Metabolic Research, University of Copenhagen — *København, Denmark*

Postdoctoral Research Fellow — *Sep 2022–Present*

Education

Brock University — *St. Catharines, Canada*

Ph.D. Health Biosciences — *2022*

- Conferred with Distinction and a Graduate Student Research Excellence Award
- Funded by Scholarships from NSERC (2017-21) and QEII-GSST (2021-2022)
- Thesis: Sclerostin influences body composition adaptations to exercise training

Brock University — *St. Catharines, Canada*

M.Sc. Applied Health Sciences — *2017*

- Funded by an Ontario Graduate Scholarship
- Thesis: Physical training, inflammation, and bone integrity in elite female rowers

Brock University — *St. Catharines, Canada*

B.Sc. Biomedical Sciences (Honours) — *2015*

- Conferred June 2015 with First-Class Standing
- Thesis: Mitochondrial function and phospholipid composition changes in mdx mice skeletal muscle

Research Experience

University of Copenhagen, NNF CBMR — *København, Denmark*

Postdoctoral Fellow — *2022-Present*

- Functional proteomics and metabolism in the Deshmukh Group

Brock University, Biology — *St. Catharines, Canada*

Research Assistant, Coorssen Top-down Proteomics Lab — *2017-20*

- Top-down proteomic analysis, method development, and teaching

Brock University, Biology — *St. Catharines, Canada*

Research Assistant, Tsiani Cell Signaling Lab — *2018-20*

- Optimized in vitro assays involving treatment of cancer cells with human serum

Canadian Sports Institute of Ontario — *London, Canada*

Laboratory Technician, Athlete Monitoring — *2016*

- Blood and saliva collection and analysis from professional female athletes

Brock University, Kinesiology — *St. Catharines, Canada*

Research Assistant, Brock-Niagara Center for Health and Well-Being — *2011-2015*

- Peer support for physical activity in special populations

Brock University, Biology — *St. Catharines, Canada*

Research Assistant, LebLanc Lab — *2013-14*

- Optimication of mitochondrial isolations and respiration from skeletal muscle of mdx mice

Teaching and Supervision

In addition to the formal supervisory roles listed below, I am also actively involved in the supervision and mentorship of junior lab members.

Thesis Student Supervision *København, Denmark*

University of Copenhagen, NNF CBMR *2023-24*

- Designed and co-supervised a M.Sc. project on exercise regulated peptides that influence metabolism

Thesis Student Supervision *St. Catharines, Canada*

Brock University, Kinesiology *2017-22*

- Co-supervised a M.Sc. project on a bone derived protein that influences muscle fibre type (2020-22)
- Co-supervised an undergraduate research project on cytokine response to acute exercise (2017-20)

Instructor *St. Catharines, Canada*

Brock University, Kinesiology *2019-20*

- KINE 2P09 – Human Physiology (2019-20)

Teaching Assisstant *St. Catharines, Canada*

Brock University, Health Sciences and Kinesiology *2016-21*

- KINE 2P09 – Human Physiology (2020-21)
- KINE 2P97 – Exercise Metabolism (2021)
- GERO 5P88 – The Process of Aging (2020)
- KINE 1P98 – Musculoskeletal Anatomy (2018-19)
- KINE 1P90 – Human Anatomy and Physiology (2017-18)
- HLSC 1F90 – Introduction to Health Sciences (2016-18)

Laboratory Demonstrator *St. Catharines, Canada*

Brock University, Biology and Health Sciences *2015-20*

- AHSC 7P96 – Top-Down Proteomics (2020)
- HLSC 4P95 – Human Pathology (2016)
- HLSC 3P02 – Introduction to Human Immunology (2015)

Leadership, Service & Community Engagement

Manuscript peer-review: Computational and Structural Biotechnology Journal (2), Archives of Physiology and Biochemistry (1), Physiological Reports (1).

Conference Planning: Brock University's Muscle Health and Education Forum (St. Catharines, Canada) *2021*

- Designed the program, recruited speakers, and chaired sessions

Conference Symposia Chair: Brock University's Muscle Health and Education Forum (St. Catharines, Canada) *2018-21*

- Free Communication chair – Health Science and Biotechnology, Mapping the New Knowledges Meetingx4 years

Conference Symposia Chair: OEP (Barrie, Canada) *2016*

- Sessional Chair – Powerhouse Physiology, Ontario Exercise Physiology Conference

Conference Symposia Chair: Brock University's Muscle Health and Education Forum (St. Catharines, Canada) *2015*

- Chair and Master of Ceremony – Brock's Math and Science Undergraduate Research Conference

Additional training and professional development

2022 **Course in Laboratory Animal Science EU Function ABD (felasa)** (University of Copenhagen, Department of Experimental Medicine)

2022 **DDA Reproducible Research in R – an advanced workshop on creating collaborative and automated analysis for PhD Students and Postdocs** (Danish Diabetes and Endocrine Academy (DDEA))

2022 **Just Bash It** (University of Copenhagen, Center for Health Data Science)

2022 **From Excel to R** (University of Copenhagen, Center for Health Data Science)

2022 **DDA Postdoc Summit - Challenge** (Danish Diabetes and Endocrine Academy (DDEA))

2020 **Canadian Council of Animal Care and Use of Experimental Animals Certification** (Brock University, ACC)

Skills

Laboratory	Physiological/Technical	Software/Tools
Mitochondrial respiration	Metabolic testing (humans and rodents)	R
Bead-based multiplex fluorescent assays	Body composition (humans and rodents)	Rstudio
Extracellular vesicle isolations	Human phlebotomy	RMarkdown
Top-down proteomics	Muscle ultrasound	Git/Github
Bottom-up proteomics	Cell culture	SPSS
Co-immunoprecipitatoin	IPGTT and ITT	GraphPad Prism
Immunoblotting	Tail vein injections	Luminex and Bioplex manager
ELISA	Mouse dissection	ImageJ/Image Lab
Kinetic protein assays	King Fisher robot	Delta2D
Histology (adipose and muscle)	NA	Spectronaut
In vitro assays	NA	DIA-NN
NA	NA	MaxQuant
NA	NA	Perseus
NA	NA	MS Fragger
NA	NA	Cytoscape
NA	NA	String
NA	NA	DAVID

Awards and Funding

2023-25 **NSERC Postdoctoral Fellowship** (University of Copenhagen): Awarded 90,000 CAD to study mechanisms of tissue crosstalk mediated by extracellular vesicles

2022 **Distinguished Graduate Student** (Brock University): Awarded 100 CAD for being the most distinguished graduate from my graduate program

2021 **CSEP Graduate Student Oral Presentation Finalist** (CSEP Conference): Awarded 250 CAD for being selected as a finalist for best graduate student oral presentation

2020-21 **QEII Graduate Scholarship in Science and Technology** (Brock University): Awarded a 15,000 CAD scholarship for my Ph.D. work

2020 **Jack M Miller Excellence in Research** (Brock University): Awarded 1,341 CAD in recognition for my excellence in researc

2017-19 **NSERC Postgraduate Scholarship – Doctoral** (Brock University): Awarded 63,000 CAD to study bone-secreted proteins during exercise

2017-19 **Dean of Graduate Studies Excellence Scholarship** (Brock University): Awarded 21,000 CAD for my academic excellence

2017 **Dean of Graduate Studies Entrance Scholarship – Doctoral** (Brock University): Awarded 2,000 CAD for my academic excellence

2016-17 **Ontario Graduate Scholarship – Masters** (Brock University): Awarded 15,000 CAD to study bone health in elite female rowers

2016-17 **Dean of Graduate Studies Excellence Scholarship – Masters** (Brock University): Awarded 2,500 CAD for my academic excellence

2016 **CSEP Poster Award Finalist** (CSEP Conference): Selected as a finalist for best poster

2016 **Dean of Graduate Studies Spring Research Fellowship** (Brock University): Awarded 4,000 CAD for my academic excellence

2015-16 **Dean of Graduate Studies Entrance Scholarship** (Brock University): Awarded 2,500 CAD for my academic excellence

2015 **Graduate Studies Fellowship** (Brock University): Awarded 7,000 CAD to study the bone response to acute exercise

2012-14 **Brock Returning Scholars Award/Deans Honour List** (Brock University): Awarded 1,500 CAD for my academic excellence

2010 **Brock Entrance Scholars Award** (Brock University): Awarded 2,500 CAD for my academic excellence

Publications

*indicates equal contribution

2022

Charnaud, S., Munro, J., Semenec, L., Mazhari, R., Brewster, J., Bourke, C., **Ruybal-Pesántez, S.**, James, R., Lautu-Gumal, D., Karunajeewa, H., & Mueller, I. (2022, *accepted*). *PacBio long-read amplicon sequencing for scalable high-resolution population allele typing of the complex CYP2D6 locus*. Communications Biology.

Ruybal-Pesántez, S., Tiedje, K. E., Pilosof, S., Tonkin-Hill, G., He, Q., Rask, T. S., Amenga-Etego, L., Oduro, A. R., Koram, K. A., Pascual, M., & Day, K. P. (2022). *Age-specific patterns of DBLa var diversity can explain why residents of high malaria transmission areas remain susceptible to Plasmodium falciparum blood stage infection throughout life.* International Journal for Parasitology. https://doi.org/10.1016/j.ijpara.2021.12.001

- This work was featured on the Herminthology #WomenBehindTheWork initiative

Feng, Q., Tiedje, K. E., **Ruybal-Pesántez, S.**, Tonkin-Hill, G., Duffy, M. F., Day, K. P., Shim, H., & Chan, Y. (2022). *An accurate method for identifying recent recombinants from unaligned sequences.* Bioinformatics. https://doi.org/10.1093/bioinformatics/btac012

2021

Ruybal-Pesántez, S., Sáenz, F., Deed, S. L., Johnson, E. K., Larremore, D. B., Vera-Arias, C. A., Tiedje, K. E. & Day, K. P. (2021, *preprint*). *Clinical malaria incidence following an outbreak in Ecuador was predominantly associated with Plasmodium falciparum with recombinant variant antigen gene repertoires.* medRxiv. https://doi.org/10.1101/2021.04.12.21255093

Mazhari, R., **Ruybal-Pesántez, S.**, Angrisano, F., Kiernan-Walker, N., Hyslop, S., Longley, R. J., Bourke, C., Chen, C., Williamson, D. A., Robinson, L. J., Mueller, I., & Eriksson, E. M. (2021). *SARS-CoV-2 Multi-Antigen Serology Assay*. Methods and Protocols, 4(4), 72. https://doi.org/10.3390/mps4040072

Argyropoulos, D. C.* , **Ruybal-Pesántez, S.*** , Deed, S. L., Oduro, A. R., Dadzie, S. K., Appawu, M. A., Asoala, V., Pascual, M., Koram, K. A., Day, K. P., & Tiedje, K. E. (2021). *The impact of indoor residual spraying on Plasmodium falciparum microsatellite variation in an area of high seasonal malaria transmission in Ghana, West Africa*. Molecular Ecology, 30(16), 3974–3992. https://doi.org/10.1111/mec.16029

- This work was chosen by the editors to be featured in the Molecular Ecology blog

Tonkin-Hill, G., **Ruybal-Pesántez, S.**, Tiedje, K. E., Rougeron, V., Duffy, M. F., Zakeri, S., Pumpaibool, T., Harnyuttanakorn, P., Branch, O. H., Ruiz-Mesía, L., Rask, T. S., Prugnolle, F., Papenfuss, A. T., Chan, Y., & Day, K. P. (2021). *Evolutionary analyses of the major variant surface antigen-encoding genes reveal population structure of Plasmodium falciparum within and between continents*. PLOS Genetics, 17(2), e1009269. https://doi.org/10.1371/journal.pgen.1009269

- This work was chosen by the editors to be featured with an accompanying Perspectives piece

2020

Narh, C. A., Ghansah, A., Duffy, M. F., **Ruybal-Pesántez, S.**, Onwona, C. O., Oduro, A. R., Koram, K. A., Day, K. P.* , & Tiedje, K. E.* (2020). *Evolution of antimalarial drug resistance markers in the reservoir of Plasmodium falciparum infections in the Upper East Region of Ghana*. The Journal of Infectious Diseases. https://doi.org/10.1093/infdis/jiaa286

2019

Pilosof, S., He, Q., Tiedje, K. E., **Ruybal-Pesántez, S.**, Day, K. P., & Pascual, M. (2019). *Competition for hosts modulates vast antigenic diversity to generate persistent strain structure in Plasmodium falciparum.* PLOS Biology, 17(6), e3000336. https://doi.org/10.1371/journal.pbio.3000336

2018

He, Q., Pilosof, S., Tiedje, K. E., **Ruybal-Pesántez, S.**, Artzy-Randrup, Y., Baskerville, E. B., Day, K. P., & Pascual, M. (2018). *Networks of genetic similarity reveal non-neutral processes shape strain structure in Plasmodium falciparum*. Nature Communications, 9(1), 1817. https://doi.org/10.1038/s41467-018-04219-3

Rorick, M. M., Artzy-Randrup, Y., **Ruybal-Pesántez, S.**, Tiedje, K. E., Rask, T. S., Oduro, A., Ghansah, A., Koram, K., Day, K. P., & Pascual, M. (2018). *Signatures of competition and strain structure within the major blood-stage antigen of Plasmodium falciparum in a local community in Ghana*. Ecology and Evolution, 8(7), 3574–3588. https://doi.org/10.1002/ece3.3803

2017

Ruybal-Pesántez, S., Tiedje, K. E., Rorick, M. M., Amenga-Etego, L., Ghansah, A., Oduro, A. R., Koram, K. A., & Day, K. P. (2017). *Lack of Geospatial Population Structure Yet Significant Linkage Disequilibrium in the Reservoir of Plasmodium falciparum in Bongo District, Ghana*. The American Journal of Tropical Medicine and Hygiene, 97(4), 1180–1189. https://doi.org/10.4269/ajtmh.17-0119

Ruybal-Pesántez, S.* , Tiedje, K. E.* , Tonkin-Hill, G., Rask, T. S., Kamya, M. R., Greenhouse, B., Dorsey, G., Duffy, M. F., & Day, K. P. (2017). *Population genomics of virulence genes of Plasmodium falciparum in clinical isolates from Uganda*. Scientific Reports, 7(1), 11810. https://doi.org/10.1038/s41598-017-11814-9

Conferences

For other non-traditional academic contributions, I have also developed several `R Shiny` web applications to support COVID-19 surveillance efforts and `R flexdashboard` for real-time updates and data visualization of both programmatic/operational aspects and preliminary epidemiological trends as part of the coordination of population-based field studies. Check out my GitHub

CovidClassifyR

Shazia Ruybal-Pesántez *Sep 2021*

- This Shiny web application was developed to support COVID-19 serosurveillance in Papua New Guinea enabling classification of unknown samples as recently exposed to SARS-CoV-2. This tool makes the downstream processing, quality control and interpretation of the raw data generated from a validated COVID-19 serological assay (Mazhari et al 2020) accessible to all researchers without the need for a specialist background in statistical methods and advanced programming. Funding was provided by a COVID-19 Digital Grant, media release

Sclerostin regulates exercise-induced adaptations in energy expenditure and body composition in C57BL/6J mice

Kurgan N , Stoikos J, Baranowski BJ, Dhaliwal R, Sweezey-Munroe JB, Fajardo VA, MacPherson REK, Klentrou P. *2021*

- Graduate Student Oral Award Finalist.

Serosurveillance of COVID-19 in Ecuadorian blood donors dashboard (not open-source)

Shazia Ruybal-Pesántez *Jun 2020*

- This R flexdashboard was developed to support COVID-19 serosurveillance in Ecuadorian blood donors in collaboration with the Ecuadorian Red Cross National Blood Bank as part of the emergency response to COVID-19 (active early in the pandemic, June 2020-Dec 2020). This dashboard presented anonymized and aggregated data generated from monthly screening of blood donation samples to visualize seroprevalence trends. Due to confidentiality and internal permissions at ERC this tool is not publicly available.

ICEMR weekly dashboard (not open-source)

Shazia Ruybal-Pesántez *Mar 2020*

- This R flexdashboard was developed to support the ICEMR field teams in Madang, Papua New Guinea (active during the entire longitudinal cohort study March 2020 until Sep 2021). This dashboard was updated weekly and presented operational data (e.g. follow-up rates in each field site) that could be used by the team to plan field activies and identify any areas for improvement as well as preliminary epidemiological trends (e.g. RDT positivity, prevalence of fever). As this tool was meant for internal use within the ICEMR project, it is not publicly available.

processqpcR

Shazia Ruybal-Pesántez *In development*

- This Shiny web application is in development to support laboratory researchers with little to no programming skills with a tool for downstream processing of raw data generated from several qPCR machines (e.g. Lightcyler480, Quantstudio, etc). Functions will include automatic matching of sample IDs using a user-supplied 96-well or 384-well plate map, quantification of unknown samples using the assay standard curve/positive controls (e.g. to detect malaria-positive samples) and some preliminary visualizations of the data.

Selected presentations

I have participated in oral and poster presentations at 18 conferences (13 international, 5 national; 6 travel awards).

2023 **Basic Metabolic Research and Critical Thinking Ph.D. Seminar – Lead seminars on the application of mass-spectrometry-based proteomics and metabolomics**, University of Copenhagen, Center for Protein Research

2018-21 **HLSC 4P98 – Leveraging proteomics to understand the molecular response to exercise**, Brock University, Faculty of Biological Sciences

2019-20 **GERO 5P88 – Molecular mechanisms of age-related bone loss, Annually**, Brock University, Faculty of Applied Health Sciences

2017-20 **KINE 1P90 – Gas Exchange and Transport, Annually**, Brock University, Faculty of Applied Health Sciences

2017-20 **KINE 1P90 – The Blood and its Constituents, Annually**, Brock University, Faculty of Applied Health Sciences

2017-18 **HSLC 2P09 – Ion Channels and Action Potentials, Annually**, Brock University, Faculty of Applied Health Sciences

About me

I am half Ecuadorian and half American, born in The Netherlands, I am fluent in English and Spanish (beginner French and Dutch), and grew up overseas in several countries in Africa and Latin America: Ecuador, Tanzania, Guatemala, and Honduras. I am an Australian Permanent Resident and have been living in Melbourne, Australia since 2014 when I moved to pursue my PhD. Apart from my research, I am highly committed to furthering health and development initiatives, particularly in my home country of Ecuador. From early 2016 until the COVID-19 pandemic, I was CEO and co-founder of the The Artisan Project, a social enterprise that worked hand in hand with talented indigenous artisans in Ecuador. We used fashion as a tool to create income-generating opportunities, particularly for indigenous women, and impulse social impact and innovation. During the COVID-19 pandemic I was actively involved as a consultant epidemiologist providing analyses on case and testing trends, importation dynamics, Reff calculations, among others, to the Ecuadorian National COVID-19 Emergency Response committee - most of this work remains unpublished due to competing political agendas and turnover of public health officials.