Christopher J. Gafuik *Ph.D.*

3330 Hospital Drive NW
HMRB 261
Calgary, AB, T2N 1N4
Phone: (403) 860-9154
cjgafuik@ucalgary.ca

EDUCATION

Ph.D.	Molecular Genetics, The Rockefeller University, New York, NY, 2008
M.Sc.	Human Genetics, McGill University, Montreal, QC, 1999
B.Sc.	Biochemistry, *Honors with Distinction*, University of Alberta, Edmonton, AB, 1996

CURRENT ROLE

UNIVERSITY OF CALGARY **Calgary, AB**
Cumming School of Medicine (2020-present)
ACTION Automation Team Lead
Co-Director, Childhood Cancer and Blood Disorders Robotic Screening Platform

- Genetic and small molecule compound screening using image, flow cytometry and spectrophotometric based assays
- Develop and perform precision automated assays as required by investigators and collaborators.
- Binder discovery
- Library management including daughtering, rearraying and hit-picking
- Bio-informatics support including customized Python scripts to build data pipelines

RESEARCH EXPERIENCE

UNIVERSITY OF CALGARY **Calgary, AB**
Department of Department of Microbiology, Immunology and Infectious Disease- Mahoney Laboratory (2013-2020)
Research Associate

- Lead in the design and operationalization of Alberta's first fully-integrated, robotic screening platform.. This included trips to Edmonton, Toronto and Montreal to view similar platforms and establish relationships with screening experts as well as extensive research/analysis on the components to be integrated.
- Conducted several high-throughput screens including image-based drug screens and flow cytometry based siRNA screens
- developed fully-automated experimental pipelines for assays critical to advanced research in CAR T therapy, including virus vector titering and measurements of CAR receptor surface expression and CAR T-cell phenotype and cytotoxicity.
- Designed and tested a strategy for high-throughput gene knock-out using CriSPR/Cas9 technology

UNIVERSITY OF CALGARY **Calgary, AB**
Department of Biochemistry and Molecular Biology – Gravel Laboratory (2011-2013)
Postdoctoral Fellow

- Developed and miniaturized cell based biochemical assays for use in screening small molecule compounds that induce the 'sialidase bypass'
- Conducted *in silico* screening of the Connectivity (CMAP) database, an expansive collection of gene expression signatures. Attended the CMAP conference held at MIT in October 2013.
- Was the teaching assistant for Dr. Mark Beida's undergraduate bioinformatics course (2013 & 2014)

THE ROCKEFELLER UNIVERSITY **New York, NY**
Laboratory of Apoptosis and Cancer Biology – Steller Laboratory *(2008-2010)*
Postdoctoral Fellow

- Developed an *in vivo* model for genetic disorders of hyperactive Ras signaling
- Directed teams to conduct large scale chemical (EMS/ENU) and transposon based genetic screens in *Drosophila*

THE ROCKEFELLER UNIVERSITY **New York, NY**
Laboratory of Apoptosis and Cancer Biology (2001-2008)
PhD in Genetics

- Supervisor: **Dr. Hermann Steller**
- Dissertation**:** Discovery of the First Endogenous Gain of Function Mutation in Drosophila *ras1* as a Dominant Suppressor of apoptosis
- Designed and conducted dominant modifier, deficiency and reversion screens for suppressors of apoptosis.

- Performed structural and biochemical analyses of mutant Ras proteins identified in our screens employing a variety of tools including tissue specific over-expression, affinity purification, real-time fluorescent assays and kinetic phosphate ([γ-^{33}P]GTP) assays

MCGILL UNIVERSITY **Montreal, QC**
Department of Biology *(1996-1999)*
Masters of Science

- Supervisor: **Dr. Roy Gravel**
- Dissertation**:** The Role of Mouse and Human Lysosomal Sialidase in the Catabolism of Ganglioside GM2
- Purification and biochemical characterization of human and mouse lysosomal sialidases. These purified complexes were used to study the metabolic differences between mouse and human catabolism of GM2 ganglioside
- Thesis results published in *Human Molecular Genetics* and *PNAS*

MANUSCRIPTS

Submitted

- For this publication, I miniaturized and automated a complex "bespoke" assay, a fully automated plaque reduction neutralization titre (PRNT) assay to functionally measure neutralizing antibodies against SARS-Cov-2 in patient samples from Alberta Public Laboratories. Using this assay, we were able to measure the levels of neutralizing antibodies against SARS-Cov-2 in 1,816 patient samples.

Potts KG, Noyce R, Todesco H, John C, **Gafuik C**, De Heuvel E, Osz K, Favis N, Ellestad K, Zemp FJ, Rajwani J, Kim DS, Turk M, Evseev D, Buimarinos M, Abdelkareem A, Gordon P, Morrissy S, Corcoran J, Chan J, Kelly M, Evans D, Ilko C, Bell J and Mahoney DJ. Intranasal spike-pseudotyped VSV generates rapid sterilizing immunity and durable cross-protection against SARS-CoV-2 and variants of concern. In submission.

Under Review

- I simultaneously knocked out the two genes using CRISPR, a novel technology to the lab at the time, to genetically engineer tumour cells that are infection-sensitive and infection-resistant to VSV, an oncolytic virus used in cancer therapy.

Jahanara Rajwani, Madison Turk, Victor Naumenko, **Chris Gafuik**, Dae-Sun Kim, Shannon Snelling, Laura K Mah, Gerone A Gonzales, Jingna Xue, Daniil Vishnevskiy, Ayan Chanda, Kyle Potts, Hayley Todesco, Keith CK Lau, Karys M Hildebrand, Jennifer A Chan, Shan Liao, Michael J Monument, Martin Hyrcza, Pinaki Bose, Craig N Jenne, Johnathan Canton, Franz J Zemp, Douglas J Mahoney. VSVΔM51 drives CD8+ T cell-mediated tumour regression through infection of both cancer and non-cancer cells. In revision at ***Nat Communications.***

Potts KG, Noyce RS, **Gafuik C**, John CM, Todesco HM, Ellestad K, De Heuvel E, Favis N, Kelly MM, Evans DH and Mahoney DJ. Booster vaccines protect animals with waning immunity from Delta VOC infection, disease, and transmission. In revision at ***Nat Communications*** (https://doi.org/10.1101/2021.12.27.474282)

Accepted

Duncan K. Brownsey, **Christopher J. Gafuik**, Dae-Sun Kim, Leonie O'Sullivan, Evgueni Gorobets, Samuel Krukowski, Madison Turk, Craig N. Jenne, Douglas J. Mahoney, and Darren J. Derksen. 2023. Utilising the Intrinsic Fluorescence of Pomalidomide for Imaging Applications. *ChemComm*.

Published

- I conducted an image-based drug screen to identify compounds that impact the epigenetic regulation of the histone variant macroH2A2. Several drugs were successfully identified and validated using in vitro and in vivo models.

Nikolic, A., Maule, F., Bobyn, A., Ellestad, K., Paik, S., Marhon, S.A., Mehdipour, P., Lun, X., Chen, H.-M., Mallard, C., Hay, A.J., Johnston, M.J., **Gafuik, C.J.**, Zemp, F.J., Shen, Y., Ninkovic, N., Osz, K., Labit, E., Berger, N.D., Brownsey, D.K., Kelly, J.J., Biernaskie, J., Dirks, P.B., Derksen, D.J., Jones, S.J.M., Senger, D.L., Chan, J.A., Mahoney, D.J., De Carvalho, D.D., Gallo, M., 2023. macroH2A2 antagonizes epigenetic programs of stemness in glioblastoma. *Nat Commun 14, 3062*.

Kim D, Dastidar H, Zhang CF, Zemp FJ, Lau K, Ernst M, Rakic A, Sikdar S, Rajwani J, Naumenko V, Balce D, Ewanchuk B, Taylor P, Yates R, Jenne C, **Gafuik C** and Mahoney DJ (2017) Smac mimetics and oncolytic viruses synergize in driving anticancer T cell responses through complementary mechanisms. *Nat Commun*. Aug 24;8(1):344

Christopher Gafuik and Hermann Steller. A gain-of-function germline mutation in *Drosophila ras1* affects apoptosis and cell fate during development. *PlosONE 2011;6(8):e23535*

Igdoura SA, **Gafuik C**, Mertineit C, Saberi F, Pshezhetsky AV, Potier M, Trasler JM, Gravel RA. Cloning of the cDNA and gene encoding mouse lysosomal sialidase and correction of sialidase deficiency in human sialidosis and mouse SM/J fibroblasts. *Hum Mol Genet*. 1998 Jan;7(1):115-21.

Leclerc D, Wilson A, Dumas R, **Gafuik C**, Song D, Watkins D, Heng HH, Rommens JM, Scherer SW, Rosenblatt DS, Gravel RA. Cloning and mapping of a cDNA for methionine synthase reductase, a flavoprotein defective in patients with homocystinuria. *PNAS*. 1998 Mar 17; 95(6): 3059-64.