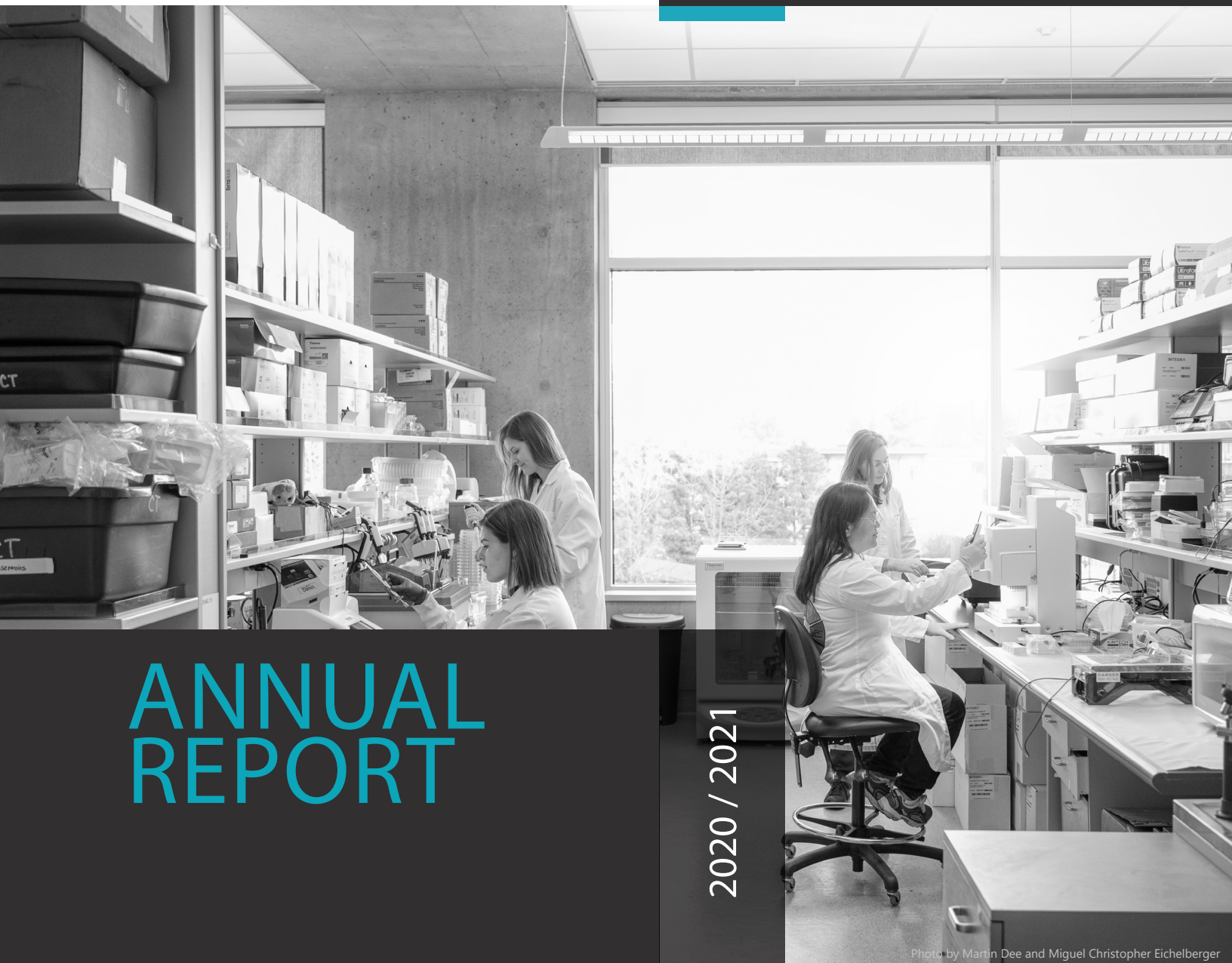




THE UNIVERSITY OF BRITISH COLUMBIA
Life Sciences Institute

www.lsi.ubc.ca



ANNUAL REPORT

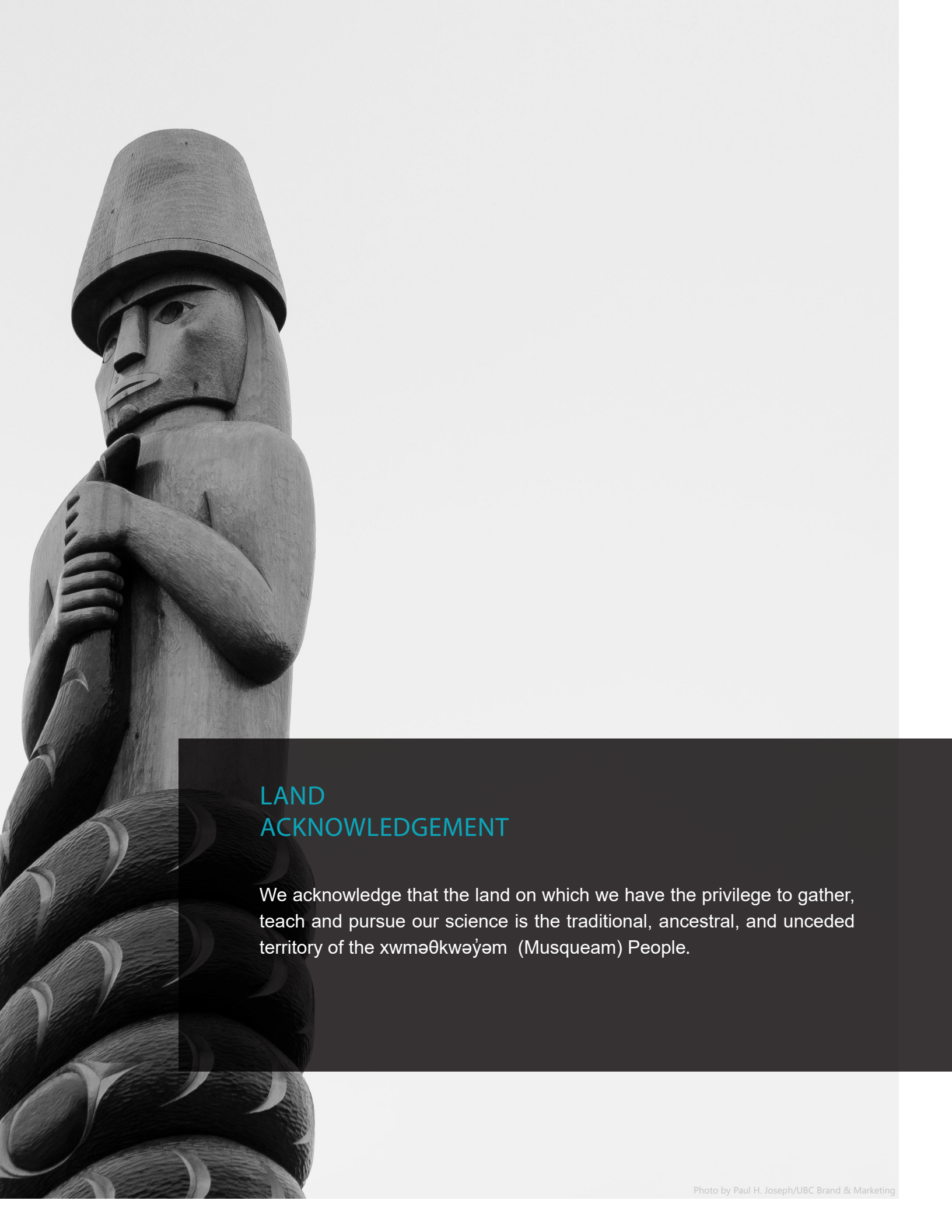
2020 / 2021

Photo by Martin Dee and Miguel Christopher Eichelberger



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Vancouver, BC | V6T 1Z3
Phone: 604.822.4128

INNOVATIVE,
INTERDISCIPLINARY SCIENCE.



LAND ACKNOWLEDGEMENT

We acknowledge that the land on which we have the privilege to gather, teach and pursue our science is the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) People.

ANNUAL REPORT

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COMMENT FROM THE DIRECTOR

Science has become the art of our times, and scientists, the heroes and angels of the moment.

This report, spanning early 2020 through the first three months of 2021, illustrates our capacity to rise above and excel, despite the extraordinary challenges we have faced during this unprecedented period in our lives.

Our success rests on the efforts of many members of the LSI community. In early March, when curtailment was first imposed, we drew together and accomplished this quickly, competently, and smoothly. The LSI, the Life Sciences Centre (LSC) and the Centre for Blood Research (CBR) collaborated closely, receiving and addressing concerns and input, under the seasoned leadership of Drs. Ed Conway and George Mackie. Our department heads, the LSI/LSC team, wing managers, core and infrastructure staff, and others kept things running safely at LSI, all while continuing to do spectacular work through every stage leading towards fully resuming our activities.

The findings featured in this report represent the stunning progress and advances made in our science. As we have chosen to focus in detail on only 10 high impact publications where the primary effort came out of LSI labs, I would be remiss if I failed to mention the most renowned translational example of one of our own, and his role in the discoveries now protecting millions of lives. Dr. Pieter Cullis' work in lipid nanoparticles is the fruit of 40 years of groundwork leading to successful delivery of an mRNA vaccine in the midst of the ongoing pandemic.

Indeed, achievements across all disciplines within the Institute are keeping us ahead of the curve as a world-leading centre of excellence in the life sciences.

I am grateful for the tireless work of our new Deputy Director, Dr. Jim Johnson, who has joined me in leading the LSI at an enormously challenging time. He is laying the groundwork of transformation and working to deliver our vision of a dedicated space that will promote interaction, collaboration, and cross-pollination of ideas between trainees working in different areas. Breaking down the silos that divide us will propagate new and shared expertise in disciplines and techniques and drive our excellent science to even higher levels.

I do not exaggerate when I say the heroes and angels are amongst us, right here at the LSI, and UBC. It is a true privilege to work here among them. I am very proud of our collective scientific endeavor, our contributions toward reopening the world, and our work towards saving lives, livelihoods and our planet.

A handwritten signature in black ink, which appears to read 'Josef Penninger'.

- Dr. Josef Penninger, Director

ABOUT THE LIFE SCIENCES INSTITUTE

The Life Sciences Institute is the premiere fundamental biological research organization at the University of British Columbia.

Since our launch 15 years ago, the LSI has become an innovation hub with global impact, poised on the continuum between basic and applied research.

Working together with colleagues across UBC, Canada, and the world, and learning from our collective experience conducting research responsive to society's biggest health and environmental challenges, the LSI looks to the future with fresh ideas and approaches as we claim our rightful place among the top foundational biological research institutes.

Our achievements rest on the efforts of more than 100 Principal Investigators (current and retired) and over 4,000 research trainees and staff from several UBC faculties and departments who conduct leading-edge, basic and preclinical research and translate their findings into treatments and environmentally sustainable solutions.

We undertake this vital work under nine major themes: blood research; diabetes; cell and neuroscience; and bacterial regulatory networks.



BACTERIAL ADAPTATION AND RESPONSE NETWORKS (BARN)

Group members investigate common molecular mechanisms bacterial adaptation and response to their diverse environments including the human host, oceans, forests, and soil. Expertise covers a range of disciplines, including biochemistry, bioinformatics, chemistry, genetics, genomics, microbial ecology, microbial physiology, and structural biology. <http://barn.lsi.ubc.ca>

CHEMICAL BIOLOGY OF DISEASE (CBD)

This multi-disciplinary team focuses on providing early-stage chemical agents for the treatment of a variety of disease-related pathologies including atherosclerosis, cancer, cardiovascular, immunological and infectious diseases. The group is comprised of biochemists, biophysicists, chemists, microbiologists, and molecular biologists. <http://cbd.lsi.ubc.ca>



NEUROSCIENCE RESEARCH GROUP (NEURO)

The mission of the Neuro Group is to further our understanding of how the nervous system develops and functions and how it is modified by injury, disease as well as genetic and environmental factors. LSI investigators study different levels of neural organization such as molecular/cellular, systems/circuit, behavioral/cognitive. <http://neuroscience.lsi.ubc.ca>



CELL AND DEVELOPMENTAL BIOLOGY (CELL)

Research covers a wide spectrum of cell and developmental biology, focusing on how cells integrate signals and develop into complex multicellular organisms and tissues. An overarching goal is to understand the mechanisms that direct cellular function and interactions during development and to determine how these may be disturbed in a wide range of diseases. Major interests in CELL include cellular junctions, protein trafficking and targeting, morphogenesis, cytoskeletal rearrangements, and signal transduction. <http://celldevelopment.ubc.ca>

INFECTION, INFLAMMATION AND IMMUNITY (I3)

This group focuses on how pathogens cause infections and how the body's immune system combats these infections. Research addresses how the immune system prevents disease, how immune system dysregulation can cause disease, and how manipulating the immune system could lead to new drugs and vaccines for curing or preventing infectious diseases, inflammatory and autoimmune diseases, and cancer. <http://iii.lsi.ubc.ca>

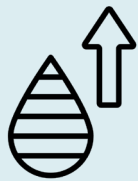


CARDIOVASCULAR RESEARCH GROUP (CRG)

The CRG studies how the heart generates and maintains its regular beat, and controls its force of contraction. Researchers focus on how dysfunctional ion channels lead to cardiac diseases. Expertise includes ion channel electrophysiology, molecular biology and protein structure, and models of cardiac disease. <http://crg.lsi.ubc.ca>

CENTRE FOR BLOOD RESEARCH (CBR)

The goal of the CBR is to improve the health and well-being of patients by performing innovative blood research. Researchers in this Centre use a broad range of leading edge basic science, biotechnological, engineering and clinical investigative approaches on blood and blood-related processes to improve health. <http://www.cbr.ubc.ca>

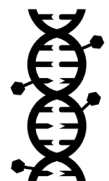


DIABETES RESEARCH GROUP (DRG)

Members of the Diabetes Research Group are studying diabetes from all angles. Their research aims to understand and treat multiple forms of diabetes including type 1 diabetes, type 2 diabetes and conditions associated with these diseases. Diabetes scientists in the LSI are working on projects focused on the fundamental causes of diabetes as well as a novel strategies for treatment. A wide range of studies are ongoing, from investigations into the biochemistry of insulin signaling to the physiology of insulin release from pancreatic islets and much more. <http://diabetes.ubc.ca>

MOLECULAR EPIGENETICS RESEARCH GROUP

This group has a common interest in studying epigenetic gene regulation, namely how cells that have the same DNA can specifically regulate different expression patterns and how gene expression can be influenced without mutations in the actual DNA sequence. The most likely epigenetic processes include DNA modification, changes in histone modification, changes in chromatin structure, and changes involving non-coding RNA production and inheritance. <http://meg.lsi.ubc.ca>



These research groups provide our researchers with a framework to pursue common goals, share expertise and infrastructure, cross-pollinate between disciplines, and mentor students and highly qualified professionals.

In their collective pursuit of fundamental discovery science our scientists enjoy the intellectual freedom to flex their creative muscle and develop ideas or concepts that capture their curiosity in the absence of an immediate, obvious outcome or application. Yet it is from this untried ground that all innovations germinate, whether they are treatments for diseases, vehicles for COVID-19 vaccines, or sustainable approaches that harness the power of microbes to mitigate climate change, the only rival to the pandemic as the greatest challenge of our times.

OUR CONTRIBUTIONS TO SCIENCE AND SOCIETY



LEADING THE FIGHT AGAINST COVID-19

THE ACE2-SPIKE PROTEIN INTERACTION



Discovery of the cell entry mechanism that SARS-CoV2 uses

In the aftermath of the SARS epidemic, our Director Dr. **Josef Penninger** demonstrated a critical role for ACE2 as the cellular receptor for the SARS Coronavirus and linking ACE2 to lung failure in coronavirus infections. In 2020, these pioneering findings became critical and catapulted ACE2 to the most researched molecule globally as the cellular receptor of SARS-CoV2. The interaction between the SARS-CoV2 spike protein and ACE2 forms the basis for all COVID-19 vaccines and therapies including the only rational therapy—human recombinant soluble ACE2 (APN01), which resulted directly from Dr. Penninger's work, and is being tested further as an early intervention against severe COVID-19.

THE PFIZER/BioNTech VACCINE



Made possible by decades of lipid nanoparticle research

Our Former Director (2014-2017) Dr. **Pieter Cullis** has been working on drug delivery systems based on lipid nanoparticles for over 40 years. In 2020, technology originating from his LSI laboratory became the vehicle for the Pfizer/BioNTech COVID-19 vaccine, the first mRNA vaccine to be deployed at global scales and the fastest vaccine ever developed. Importantly, this made UBC one of only two universities world-wide to have made a significant contribution to this vaccine.*

*Gaviria, M. & Kilic, B. A network analysis of COVID-19 mRNA vaccine patents.
Nature Biotechnology 39, 546-548 (2021)

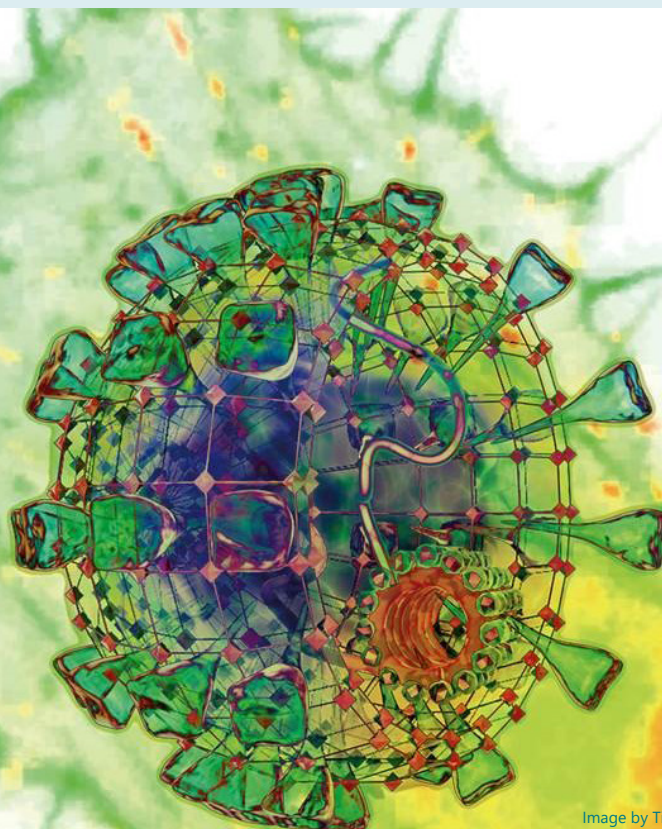


Image by Tibor Kulcsar

CRYSTALLOGRAPHIC STRUCTURE OF A SARS-COV-2 ENZYME



to aid antiviral therapeutic design

Dr. **Natalie Strynadka**, Tier 1 Canada Research Chair in Antibiotic Biology and Medicine, and colleagues resolved the X-ray crystallographic structures of Nsp5 the main protease (Mpro) of SARS-CoV-2 at 1.8 Å resolution. Mpro is linked to essential processing events for viral assembly and maturation. This structure is essential to delineating atomic details of the mechanistic pathway of SARS-CoV-2 replication in infected cells and can be used to optimize current inhibitor hits and design highly potent, novel Mpro inhibitors as life-saving antiviral therapy.

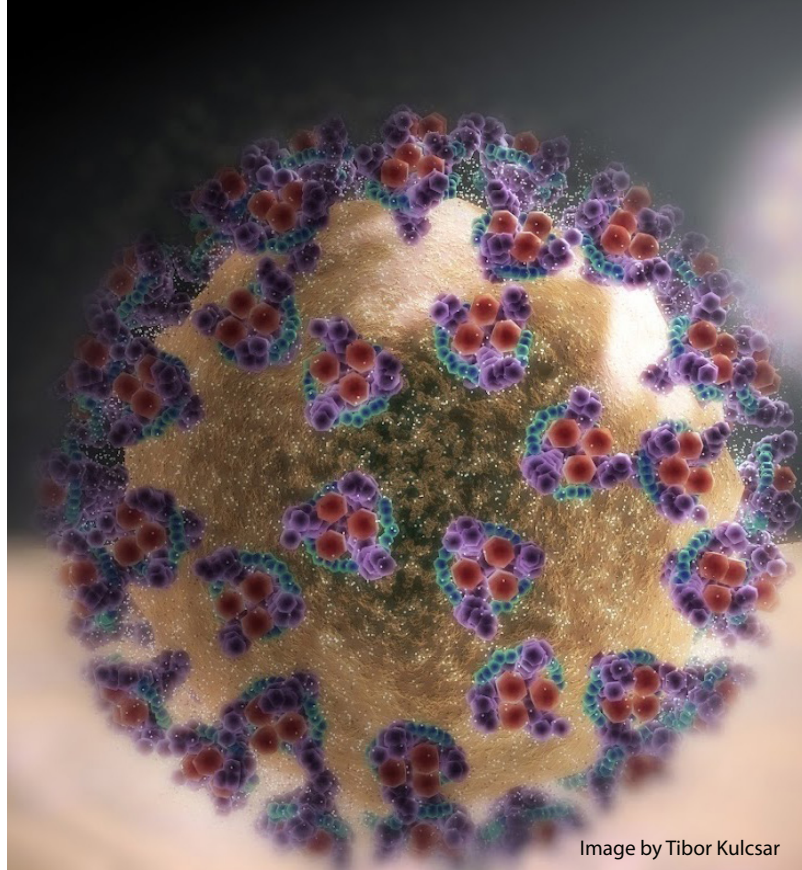


Image by Tibor Kulcsar



PROVIDING MECHANISTIC INSIGHTS TO COMBAT CANCER

NEW TOOLS



to identify cancer-causing mutations

A team led by Dr. **Christopher Loewen** and Dr. **Calvin Roskelley** recently combined high-content microscopy and artificial intelligence (AI) to devise a new method that can quickly and accurately predict the functional consequences of hundreds of genetic variants in cancer-associated genes. Genetic testing is the cornerstone of personalized medicine, and can reveal predisposition to hereditary diseases like cancer. However, there is often little to no clinical data for many of the gene variants identified — resulting in their classification as “variants of unknown significance” — and limiting their value. The new software toolkit they developed, Machine Assisted Phenotype Scoring (MAPS), is a low-cost, cloud-based, automated image analysis platform, part of a novel workflow analyzing changes in protein subcellular localization as an indicator of loss of function. Their method will allow researchers to quickly assess the function of genetic variants at scale, and help realize the full potential of personalized medicine in cancer.

A NEW ROLE FOR RANKL



in breast cancer

Dr. **Josef Penninger** made the groundbreaking discovery that the RANKL/RANK system plays a key role in preventing tumour development in triple negative BRCA1-driven breast cancer, opening up new possibilities for treatment of this aggressive and deadly disease. Years of basic research by Dr. Penninger's team into the RANKL/RANK interaction elucidated how the immune system functions in bone loss, founding a new field in osteoimmunology and leading to the development of denosumab, a monoclonal antibody targeting RANKL, used to treat bone loss in old age and in cancer patients. Now, based on Dr. Penninger's new findings, denosumab (Prolia®/Xgeva®) is in Phase III clinical trials for the prevention of BRCA1-driven breast cancer, underway in North America, Australia, and Europe, providing hope to hundreds of thousands of BRCA1 mutation carriers.

NEW CANCER IMMUNOTHERAPIES



Driving the development of next-generation treatments

Research led by Dr. **Kenneth Harder** and colleagues is driving the development of a next-generation cancer immunotherapy targeting myeloid cells in the immune system, which have been linked to suppression of anti-tumour immune responses. The team has formed a start-up, ME Therapeutics, to further develop their treatment, which is predicted to complement current immunotherapies and help overcome resistance in patients with refractory cancers. Their approach shows potential for treating multiple cancer types and will substantially impact cancer patient outcomes.

BREAKTHROUGHS IN DIABETES: RESEARCH TO TRANSLATION

STEM-CELL DERIVED CURE FOR DIABETES



at the global forefront

Drs. **Tim Kieffer** and **Jim Johnson**, working with several industry partners, have been at the global forefront of the effort for a stem-cell derived diabetes cure for almost a decade. Kieffer demonstrated the reversal of diabetes in animal models using embryonic stem cells differentiated into insulin-producing beta-cell lineage and pioneered the use of macro-encapsulation for cell containment. This technology is now in a first-in-human and first-in-class clinical trial. Kieffer and Johnson were the first in the world to report an advanced differentiation protocol that resulted in cells capable of glucose-induced insulin secretion in culture, and rapid reversal of diabetes in rodents following transplant.

BLOOD VESSEL ORGANOIDS TO STUDY DIABETES



a new model for the study
of blood vessel changes

Dr. **Josef Penninger** developed the world's first self-organizing 3D human blood vessel organoids from embryonic stem cells, which faithfully recapitulate the structure and function of human blood vessels and are amenable systems for modelling and identifying the regulators of diabetic vasculopathy, a disease affecting hundreds of millions of people globally. As the Canadian lead on a UK-Canada Diabetes Research Team, Dr. Penninger will use his organoid model to investigate the potential of two previously identified molecules to reverse blood vessel changes caused by high blood sugar in diabetes. This research is expected to accelerate discovery of new treatments for blood vessel complications in diabetes.



TACKLING TUBERCULOSIS: A GLOBAL HEALTH SECURITY THREAT

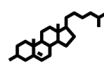
NEW TREATMENTS FOR INFECTIOUS RESPIRATORY DISEASES



combatting drug-resistant bacteria

Tuberculosis (TB) is one of the most devastating infectious diseases, causing ~10 million new infections and 2 million deaths each year. The emergence of multidrug-resistant strains of the bacteria that causes TB has created an urgent demand for new and better treatments. Dr. **Yossef Av-Gay** has developed specialized intracellular high-throughput screening assays to identify several novel anti-TB compounds active in human macrophages, focusing particularly on host-directed therapies as a strategy to avoid bacterial evolution of resistance. They have previously also shown efficacy of nitric oxide (NO) as an antimicrobial agent, leading to the foundation of Beyond Air (XAIR on NASDAQ), now developing treatments for bronchiolitis, viral infections, and cystic fibrosis based on his work.

TARGETING CHOLESTEROL CATABOLISM



to treat tuberculosis

Tier 1 Canada Research Chair in Microbial Catabolism and Biocatalysis, Dr. **Lindsay Eltis** has made seminal discoveries that advance our understanding of steroid catabolism by several bacteria including the pathogen of tuberculosis, *Mycobacterium tuberculosis* (Mtb). This includes – elucidation of a pathway conserved in all known steroid-degrading bacteria by which they degrade the last two steroid rings; characterization of a novel ring-opening enzyme, *lpdAB*, which is required for the virulence of Mtb; and establishing that the ability of Mtb to catabolize host-derived cholesterol is essential to the pathogen's virulence and that targeting cholesterol catabolism in Mtb is a promising therapeutic strategy. Based on these fundamental discoveries Dr. Eltis is collaborating with academic and industry partners to develop two classes of compounds as treatment and validating additional therapeutic targets in the cholesterol catabolic pathway.

LIFE SCIENCES INSTITUTE BY THE NUMBERS



INTERDISCIPLINARY MAKEUP

10

DEPARTMENTS

5

FACULTIES



GRANTS

\$40,431,083

RECEIVED IN FUNDING



RESEARCHERS

83

PRINCIPAL
INVESTIGATORS

756

HIGHLY QUALIFIED
PERSONNEL



TRANSLATION

17

ACTIVE SPIN-OFFS



PUBLICATIONS

221

IN 2020-2021

TEN IMPACTFUL PUBLICATIONS



BLOOD CIRCULATION OF A NOVEL NANOPARTICLE PROVIDES INSIGHTS ON HOW THE IMMUNE SYSTEM READS NANOMATERIALS

Lipid nanoparticles (LNPs) made the jump from scientific journals to public awareness in a matter of months as the mechanism delivering mRNA vaccines into millions of people's arms around the world.

While this delivery system enabled protection levels beyond any initial expectation, LNPs are only one means of introducing therapeutics via nanomaterials into the blood stream. Nanomedicine's potential is tremendous, but unlocking its possibilities requires significant work to identify and mitigate any potential toxicity. The interaction between the immune system and nanomaterials is the focus of an important study led by Centre for Blood Research investigator **Jayachandran Kizhakkedathu**, with UBC and international collaborators published in [Nature Communications](#). [Read more](#)



INTERFERON STUDY PROVIDES GLOBAL VIEW OF THE COMPLEX CELLULAR NETWORKS ACTIVATED IN IMMUNE RESPONSE

The type I interferon (IFN) response is an ancient pathway in the body's armamentarium against viruses. This defense, on a cellular level, involves inducing transcription of hundreds of IFN-stimulated genes. Using biochemical and transcriptomic approaches, IFN-stimulated genes have been thoroughly catalogued across multiple species and cell types. But their antiviral mechanisms have not been fully characterized.

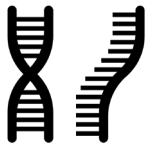
Using a combination of quantitative proteomic approaches, Biochemistry and Molecular Biology researchers **Eric Jan** and **Leonard Foster** shed light on these mechanisms by investigating the effects of IFN signaling on the human proteome, and mapping how IFN induces rearrangements in the protein-protein interaction network in humans in a study published in [Genome Biology](#). [Read More](#)



INSIGHTS INTO THE MECHANISMS THAT CONTROL BLOOD DEVELOPMENT AND IMMUNE RESPONSE

Stem cells and their potential impact on human health hold fascinating possibilities for repair and regeneration. They also play essential roles in the capacity to fight infections. Blood stem cells are the linchpin in this process, prompting living organisms to produce immune cells. However, the intricacies and regulation of infection-triggered conversion of blood stem cells to cells with immune function is not well understood.

Dr. **Guy Tanentzapf**, a Cellular and Physiological Sciences researcher in the LSI focuses on the role played by the cellular environment, or extracellular matrix, in the regulation of stem cells and its micro-environment. In a study in [Current Biology](#), Dr. Tanentzapf and his team, led by first author Dr. **Rohan Khadilkar**, explored the impact of external cues in the extracellular matrix, or ECM, on integrins—the main family of adhesion receptors that function as molecular fingertips that sense the environment and then facilitate signalling inside the cells. [Read More](#)



RADICAL AND ELEGANT GENE TRANSCRIPTION FINDINGS OVERTURN EXISTING THEORY ON HISTONE ACETYLATION

Approximately two metres of DNA is packaged into the nucleus of a single human cell. This process is facilitated by a class of proteins known as histones that, akin to spools of threads, compact the DNA into a compartment that is only 0.00002-0.00004 metres in diameter. Only a fraction of the human genome codes for proteins, the basic building blocks of cells, and storing the remaining DNA in an inaccessible form is important for correct gene expression, genome stability, and protection of cells from the dangerous effects of the parasitic retroviral DNA elements that make up much of the human genome. Cells are therefore challenged with the task of keeping part of the genome in an active and accessible state, while maintaining the remainder as inactive and inaccessible.

A key pathway for regulating chromatin structure is the neutralization of positively charged amino acids within histones, a process called histone acetylation. This modification weakens histone contacts with the negatively charged DNA, allowing cellular machinery to access the underlying DNA. Consistent with this, a tight correlation between histone acetylation and gene activation has been confirmed by a large body of evidence. The importance of histone acetylation for normal cell function is underscored by the fact that many disease-causing mutations have been mapped to genes encoding histone acetyltransferases (HATs) and histone deacetylases (HDACs), the enzymes that add or remove this modification, and drugs targeting these enzymes show promise for treatment of a wide range of disorders.

The destabilizing effects of acetylation on chromatin structure have led to a general assumption about the sequence of events: that acetylation occurs before gene transcription. A “radical and elegant” study published in [Nature Communications](#) by Drs. **LeAnn Howe** (Biochemistry & Molecular Biology) and **Matthew Lorincz** (Medical Genetics) suggests that this is not the case. Using immunoblot and chromatin immunoprecipitation-sequencing in budding yeast cells, the researchers clearly show that the bulk of histone acetylation depends on transcription and does not precede it. This dependency is explained by the need for RNA polymerase II to disrupt chromatin, allowing HATs to access their histone substrates. This research challenges the existing dogma that histone acetylation is simply part of the gene activation process, and instead suggests that acetylation is a component of a feed forward loop that maintains active gene expression states.



USING CRYO-EM AS A STRUCTURAL SLEUTH TO IDENTIFY TARGETS FOR TREATING A RARE DISEASE: MALIGNANT HYPERTHERMIA

Malignant Hyperthermia (MH) is an anesthetist’s nightmare, and the source of wrenching loss to thousands of families.

Before it was well understood, up to 90 percent of people who carried a mutation in the ryanodine receptor in RyR1, a protein linked to skeletal muscle, died when exposed for the first—or a subsequent time—to volatile (inhaled) anesthetic.

Patients lead fairly normal lives, until there is a trigger. MH episodes are brutal: muscles can go rigid and temperatures can soar up to 43C. If not treated immediately with the right drug, the patient will die.

Dr. **Filip Van Petegem**, a professor of Biochemistry and Molecular Biology, studies mutations of the ryanodine receptor, a daunting channel protein noted for its size and complexity. In a paper published in [Nature Communications](#), Van Petegem and colleagues showed the sequence variations associated with MH cause large changes in the structure of the RyR1 protein, which make it easier for this channel to open.

This opening allows calcium ions to flow between the compartments of the cell, where the increased concentration of calcium signals functions such as gene transcription, proliferation and cell migration. In muscle cells, this flow triggers contraction. [Read More](#)



SEX-BASED DIFFERENCES IN METHYLATION SO STRIKING - MALE AND FEMALE GERM CELLS LOOK AS IF THEY ORIGINATE FROM DIFFERENT SPECIES

One of the lingering epigenetic mysteries in germ cell biology is: how can sperm and eggs of the same species have DNA methylation profiles so different from, one another? In a study published in [Nature Genetics](#) Dr. **Matthew Lorincz** and Dr. **Kenjiro Shirane** uncover the underlying basis of “a significant fraction” of sex-based DNA methylation differences, demonstrating that male and female germ cells use related, but distinct histone methyltransferases to direct DNA methylation across the genome.

Only 40 percent of the genome is methylated in mouse oocytes (eggs), whereas over 80 percent of the genome is methylated in mature sperm. The molecular basis of these sex-based differences in *de novo* DNA methylation remains an enigma. In this study, using conditional knockout mice and next generation sequencing approaches to study the transcriptome and epigenome, the researchers show that distinct histone H3 lysine 36 (H3K36) methyltransferases (KMTases) play instructive roles in *de novo* DNA methylation in mouse oocytes and sperm.

Lorincz, Shirane and their collaborators have been working for several years to dissect the interplay between histone modifications and DNA methylation, using the mouse as a model system. Until their 2020 work, the role of histone marks in guiding DNA methylation in the male germline was unknown. [Read More](#)



NEW RESEARCH HIGHLIGHTS THE IMPORTANCE OF A FORGOTTEN ORGAN IN ENSURING HEALTHY PREGNANCIES

An international research team led by Dr. **Josef Penninger** uncovered for the first time the importance of a small gland tucked behind the sternum that works to prevent miscarriage and diabetes in pregnant women. The organ in question is the thymus, identified in a study published in *Nature* as playing a significant role in both metabolic control and immunity in pregnancy.

How the immune system adapts to support mother and fetus has puzzled researchers for decades. The study, published in [Nature](#), revealed that female sex hormones instruct important changes in the thymus, a central organ of the immune system, to produce specialized cells called Tregs to deal with physiological changes that arise in pregnancy. The researchers also identified RANK, a receptor expressed in a part of the thymus called the epithelium, as the key molecule behind this mechanism. Previously, its role in pregnancy was not known. To get a better understanding, the researchers studied mice where RANK had been deleted from the thymus. They found that the absence of RANK prevented the production of Tregs in the thymus during pregnancy. This resulted in fewer Tregs in the placentas, leading to elevated rates of miscarriage. [Read more](#)



CHARACTERIZATION OF ALKYLGUAIACOL-DEGRADING CYTOCHROMES P450 FOR THE BIOCATALYTIC VALORIZATION OF LIGNIN

Climate change and the shortage of fossil-derived gas and oil are driving thirst for renewable resources. Interest is growing in the lignin in forestry and agricultural waste streams, as this aromatic polymer has tremendous untapped potential as a source of high-value products, including carbon fiber, commodity chemicals, and fuels.

As the second-most abundant biopolymer on earth after cellulose, an estimated 100 million tons of lignin is produced annually. Effective processing methods have advanced slowly, but new opportunities for upgrading lignin are accelerating as the result of research into fractionation technologies and the engineering of microbes to convert lignin into a useable form.

An interdisciplinary collaboration between Microbiology and Immunology researchers Dr. **Lindsay Eltis** and Dr. **William Mohn** is playing an important role in this emerging area. In a significant 2020 publication in [PNAS](#), the team identified a novel microbial pathway for breaking down alkyl guaiacols - fragrant liquid and/or solid materials derived from several types of industrial lignins. [Read More](#)



A NEW ASSAY AND MACHINE LEARNING UNCLOAK THE CANCER-CAUSING POTENTIAL OF VARIANTS OF AN IMPORTANT TUMOR SUPPRESSOR GENE

As genetic testing becomes more routine, genetic variations are being identified in the population faster than ever. For disease-associated genes, this scenario makes it imperative that scientists differentiate between benign and disease-causing variants, so that treatment can begin, or a patient's status can be understood, and monitored.

People with disease-causing variants of PTEN, a tumor suppressor gene, will develop hamartoma tumor syndrome, a spectrum of conditions associated with multiple cancerous or benign tumors. Although the enzymatic function of PTEN and the consequences of a number of its tumor-linked mutations are known, there is little or no information about many recently identified clinical variants.

In a study that made the July 2020 cover of the journal [Cancer Research](#), Cellular and Physiological Sciences researchers Dr. **Calvin D. Roskelley** and Dr. **Christopher J.R. Loewen** addressed this gap by developing a cell-based assay that uses a premalignant cell line derived from the thin layer of tissue that coats and lines the surface of the milk ducts in the breast. These human mammary epithelial cells were deficient in PTEN. [Read More](#)



ATOMIC BLUEPRINTS PROVIDE VALUABLE SUPPORT IN DESIGN OF MECHANISM-BASED ANTIVIRALS TO COMBAT COVID-19

As COVID-19 ravaged the planet, a small group of investigators at the LSI pivoted their research, and began working at full tilt to identify ways to cripple the SARS-CoV-2 virus.

Biochemistry and Molecular Biology researcher Dr. **Natalie Strynadka**'s lab was one of four at the Institute to receive support in an early round of federal funding aimed at rapid response to the urgent need for treatment. As the director of the High Resolution Macromolecular Electron Microscopy facility at the Institute, where her research includes a focus on the structure of inhibitors that block antibiotic-resistance, she set her sights on finding a way to block replication of SARS-CoV-2. Her team's target was Main Protease (Mpro), an enzyme produced by the virus.

When SARS-CoV-2 infects cells, it starts producing new viral proteins to make more viruses. Initially, a long chain of "polyproteins" is produced from the viral genome, which need to be cut (cleaved) off into individual functional units. In the absence of this essential processing by proteases, including Mpro, the virus cannot replicate. This makes proteases an attractive target for the rapid development of antiviral drugs. Proven drug therapies for other global viral pathogens, such as HIV, also target central proteases.

In a paper published in [Nature Communications](#), the team revealed how Mpro binds the protein it cleaves (its substrate) to provide important clues as to how it works and how best to design drugs to block its action. [Read More](#)

FACULTY

AWARDS AND ACHIEVEMENTS

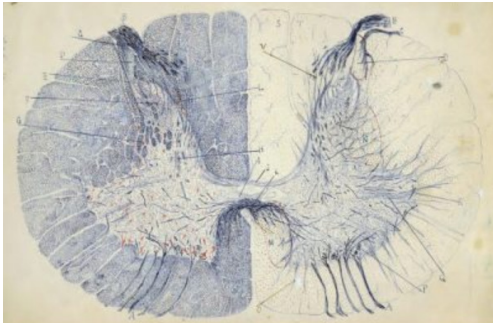


Image from the Archivio Fernando Castro, used as an illustration for the 12th FENS Forum of Neuroscience in Glasgow UK, 11 July 2020.

KAREN CHEUNG

Dept of Electrical & Computer Engineering, School of Biomedical Engineering

was [elected as a fellow by the American Institute for Biological Engineering](#), one of the highest professional distinctions in biomedical engineering.

DANA DEVINE

Depts of Biochemistry & Molecular Biology, Pathology & Laboratory Medicine, Director, Centre for Blood Research

received the International Society for Blood Transfusion's President's Award and became president-elect of the AABB (formerly known as the American Society of Blood Banks).

JAYACHANDRAN KIZHAKKEDATHU

Depts of Chemistry, Pathology & Laboratory Medicine, Centre for Blood Research, UBC School of Biomedical Engineering

was [named a Fellow, Biomaterials Science and Engineering](#) by the International Union of Societies for Biomaterials Science and Engineering.

ELIZABETH RIDEOUT

Dept of Cellular & Physiological Sciences

was named [CIHR Sex and Gender Science Chair in Genetics](#).

CAROLINA TROPINI

Dept of Microbiology & Immunology, School of Biomedical Engineering

was [named a Distinguished Investigator by the Paul G. Allen Frontiers Group](#). Dr. Tropini was also recognized as a Johnson & Johnson Scholar and [winner of the 2020 Johnson & Johnson Women in STEM2D Scholars Award](#) in the field of Engineering, as well as a [2019-2021 CIFAR Azrieli Global Scholar](#).

MARK CEMBROWSKI

Dept of Cellular & Physiological Sciences

was appointed a member of the Cajal Club, and the recipient of this year's [Krieg Cortical Explorer Award](#). Dr. Cembrowski was also recognized with a [Michael Smith Foundation for Health Research 2020 Scholar Award for early investigators](#) and was named a [2019 Brain Canada Azrieli Foundation Future Leader in Canadian Brain Research](#)

ED CONWAY

Dept of Medicine, Centre for Blood Research

received a [2020 UBC Science Co-op Supervisor Recognition Award](#), recognizing the outstanding mentorship and coaching he provides to co-op students.

RACHEL FERNANDEZ

Dept of Microbiology and Immunology

was [appointed UBC Associate Vice-President, Research and Innovation](#), effective March 15, 2021. Fernandez joined Dr. Murphy and Associate Vice-Presidents, Research and Innovation, Dr. Matthew Evenden and Dr. Phil Barker in sharing leadership of a diverse range of portfolio units and initiatives that support UBC's research and innovation activities.

JOY RICHMAN

Dept of Oral Health Sciences

was honoured by the Canadian Association for Dental Research (CADR) and the Association of Canadian Faculties of Dentistry (ACFD) with a [national award honouring outstanding dental research faculty](#).

KENJI SUGIOKA

Dept of Zoology

was [named a recipient of a Michael Smith Foundation for Health Research 2020 Scholar award](#). The program is designed to support early career researchers in establishing research careers.

OUR STRENGTH IN TRAINING THE NEXT GENERATION

[Read an interview with Lianna Watt, pictured here with her supervisor, Dr. Elizabeth Rideout.](#)

Photo by Kerry Blackadar

IT IS OUR RESPONSIBILITY

to prepare the scientists who will shed light on the unanswered and unanswerable questions that we cannot yet resolve. From undergraduate to postdoctoral levels — from atoms to molecules — to organisms and their environment, we are dedicated to preparing our students, colleagues and highly qualified professionals to extend the frontiers of science beyond our times.

Above all, we believe that research is foremost about people - people who entrust us with their hopes and resources to improve health, quality of life, and societal resilience through our science and people who conduct and support the scientific research that leads to new knowledge and solutions.

TRAINEE

AWARDS AND ACHIEVEMENTS

LSI PHD STUDENTS RECOGNIZED WITH TOP NATIONAL AWARDS

PhD candidates Peter Grin and Jerry Leung were 2020 recipients of the prestigious Frederick Banting and Charles Best Canada Graduate Scholarship Doctoral Award, which is granted to high-calibre doctoral students at Canadian institutions.



Jerry Leung (Cullis Lab) studies the use of lipid nanoparticles (LNPs) to modify and enhance platelet function as a novel cell therapy, which has immediate applications towards the treatment of particular blood disorders and related conditions. He hopes to develop a useful research tool and contribute to the generation of more effective blood transfusion products for hemorrhage control and the treatment of other diseases which platelets might modulate.

Peter Grin (Overall Lab) studies an important protein involved in regulating the levels of LDL-cholesterol in the blood, and how this protein, called PCSK9 is processed by a particular family of protease enzymes, and also looks at the functional biological effects of this processing on the development of heart disease or stroke. During the pandemic the Overall lab transitioned to studying proteases made by the SARS-CoV-2 virus, and Peter became increasingly involved in efforts to unravel biology related to SARS-CoV-2 proteases.

[Read more](#) about our Banting scholars



PRIYE IWORIMA WINS A GOLD AWARD IN CHSRF'S 2020 POSTER COMPETITION

Priye Iworima, a PhD student in the Kieffer Lab received a Canadian Student Health Research Forum Gold Award for her poster presentation in the 2020 competition. Graduate programs focusing on health research across the country are asked each year to nominate their top doctoral trainee to attend CSHRF, and Iworima was nominated by the School of Biomedical Engineering at UBC. CHSRF awards celebrate trainees based on their excellence in, and contributions to, healthcare research. During the course of the CHSRF event, participants compete in the Canadian Institute of Health Research National Poster Presentation, attend the University of Manitoba's Gairdner Symposium, and have the opportunity to network with other exceptional graduate trainees and Gairdner Laureates. Iworima was one of 177 trainees to compete, and was recognized for her pursuit of a cure for type-1 diabetes, a condition characterized by chronic high blood sugar due to a deficiency of insulin from the pancreatic islets.

Diabetes can be reversed through cell transplantation, but its widespread use as a form of insulin replacement therapy is limited by the scarcity of donor islets. Iworima's research is exploring the use of stem cells as an unlimited source of insulin-producing cells to treat diabetes. Together with colleagues in the Kieffer Lab, she is using a stepwise protocol to convert the stem cells into insulin producing pancreatic islets. The researchers are optimizing this cell culture protocol while also investigating procedures that will permit large-scale manufacturing of stem cell-derived islet cells. Ultimately, they hope that these cells can be used to effectively treat diabetes.

Listen to an interview with Priye Iworima on ["From Beta Cells to Bicycles"](#), the BC Diabetes Network's podcast. Learn more about the research being done in the Kieffer lab by [clicking here](#) and following Priye on [Twitter](#).



2020 MICHAEL SMITH FOUNDATION FOR HEALTH RESEARCH AWARDEE FOCUSES FELLOWSHIP ON RARE ARRHYTHMIAS



Dr. Alison Yueh Li made the jump from a doctorate focusing on genetic mutations in cardiac hypertrophic cardiomyopathy at Simon Fraser University to a Michael Smith Foundation Health Research Traineeship Awardee in the Van Petegem Lab at the outset of the pandemic.

As one of 43 exceptional BC health researchers selected by the Foundation that year, Li's fellowship work will continue to centre on the heart, but will move to the notably large and complex ryanodine receptor (RyR2). Working alongside Dr. Filip Van Petegem, and in collaboration with her former PhD supervisor Dr. Glen Tibbits, she is developing novel therapeutic targets to treat arrhythmia-causing variants in the ryanodine receptor.

The MSFHR award will provide the opportunity to explore the link between mutations in RyR2 (the cardiac isoform) and stress-induced cardiac arrhythmia. These arrhythmias are of particular clinical interest, because they cause CPVT (catecholaminergic polymorphic ventricular tachycardia), placing people with RyR2 mutations at risk for sudden cardiac death. Dr. Li is using cryo-electron microscopy to see how the mutations affect the structure of RyR2.

Read about [Dr. Li's MSHRF-funded fellowship](#)

A FULBRIGHT SCHOLAR AND A WALTER BENJAMIN AWARDEE JOIN THE CEMBROWSKI LAB



A spring 2020 graduate in biology from the University of Oregon, **Rennie Kendrick** joined the laboratory of Assistant Professor Dr. Mark Cembrowski on a prestigious Fulbright scholarship in January, 2021.

Kendrick has been developing and applying big-data experimental paradigms to study the cellular and molecular basis of fear memory in the brain. While she has known for a long time she would pursue a career in research, Kendrick wanted to take some time off before going to graduate school to get additional research experience. The opportunity to model biological systems in big data was a major draw to Vancouver.

Kendrick completed her degree in biology at the University of Oregon Clark Honors College, working as a research assistant in the labs of Dr. David McCormick and Dr. Dasa Zeithamova. Her honors thesis work in Dr. Zeithamova's lab aimed to identify learning conditions that enhance associative memory and promote memory integration.

[Read more about Rennie Kendrick](#)

A “lucky and perfect fit” for Walter Benjamin award winner

Dr. **Larissa Kraus**, a Walter Benjamin Fellowship awardee came to the Cembrowski Lab to work on a collaborative project that harnesses her experience with human brain tissue and her interest in epilepsy.

She began working with resected living human brain tissue during her PhD at the Charité in Berlin as part of an investigation of novel anti-epileptic mechanisms. A meeting between her supervisor and Dr. Cembrowski identified potential synergies between Kraus's work and Cembrowski's techniques and expertise with single cell RNA sequencing. In short order, Kraus and Cembrowski decided to do a project together, which builds on Kraus's interests in epilepsy, its causes and treatment and leverages her experience with living tissue. Identifying new therapeutic options for temporal lobe epilepsy is important to Kraus, given that 30-40% of patients with this condition continue to have seizures despite taking multiple anti-epileptic drugs.

[Read more about Dr. Kraus](#)



Photo by Paul H. Joseph/UBC Brand & Marketing

JORDAN J. SHIMELL RECEIVES A BRAIN STAR AWARD FOR WORK UNDERSTANDING X-LINKED INTELLECTUAL DISABILITY

The Canadian Association for Neuroscience (CAN) announced winners of the prestigious Canadian Institutes of Health Research's Institute of Neurosciences, Mental Health and Addiction (CIHR-INMHA) Brain Star Awards in August of 2020. Dr. **Jordan Shimell**, a former PhD student in the Bamji Lab, was one of the 16 recipients selected from across the country.

Brain Star awards are given to students and trainees who have published high impact discoveries in the fields and disciplines covered by the INMHA. Shimell was recognized for his work studying the role of the enzyme ZDHHC9 in brain connectivity. His results showed that ZDHHC9 regulates neuron growth, as neurons lacking ZDHHC9 had shorter, less complicated dendrites, which are the branches of neurons that receive inputs from other cells. Shimell's work also showed that ZDHHC9 modified the balance of excitatory and inhibitory synapses formed onto these cells, specifically through a mechanism leading to a reduction in inhibitory synapses. These findings further our understanding of the role of palmitoylation in the nervous system and may provide the foundations for therapeutic interventions for patients with alterations in ZDHHC9 function.

Dr. Shimell's work offers new clarity on the role of ZDHHC9 at the cellular level and its implications for circuit development. The findings also offer a plausible mechanism for how loss of ZDHHC9 might contribute to intellectual disability and epilepsy. A related publication in *Cell Reports*, "The X-linked intellectual disability gene *Zdhhc9* is essential for dendrite outgrowth and inhibitory synapse formation," was based on Shimell's PhD thesis. He is now a scientific recruiter for STEMCELL Technologies.

[Read more about Dr. Shimell](#) and his work. [Read the paper.](#) This research was supported by the Canadian Institutes of Health Research



LIANNA WAT SWEEPS CIHR GOLD, A GAIRDNER, AND WILL GO TO THE 2023 LINDAU NOBEL LAUREATE MEETING



LSI PhD student **Lianna Wat** prevailed over the top 5% of Canada's doctoral students conducting health research to sweep three prestigious accolades including the Lindau Award at the 2020 virtual Canadian Student Health Research Forum (CSHRF).

Now in her final year working with Dr. Elizabeth Rideout, Wat was the first-ever student put forward by the Cell and Developmental Biology program, her home department.

During the course of the CSHRF event, participants compete in the Canadian Institute of Health Research (CIHR) National Poster Presentation, attend the University of Manitoba's Gairdner Symposium, and have the opportunity to network with other exceptional graduate trainees and Gairdner Laureates. This year, 177 trainees competed in the CIHR National Poster Presentation. The top six trainees from the CIHR National Poster Presentation competition are then selected for a second round of judging conducted by Gairdner Laureates to determine Gairdner Student Award recipients and the Lindau Award recipient—the CSHRF only awards one Lindau Award per year.

A ten-slide online presentation of Wat's PhD project captured the attention of the judges, who are all Gairdner Laureates. Wat presented her work on a gene called *brummer*, which encodes a protein equivalent to mammalian ATGL, and its role in male-female differences in fruit fly fat storage and breakdown. The goal of the project is to understand how males and females regulate fat metabolism differently as this knowledge will aid in the development of more effective treatments for metabolic diseases in both sexes

Due to finish her doctoral work by the end of 2021, Wat weighed a post-doctoral fellowship, vs pursuing an MD degree. She will be pursuing a fellowship at Stanford, with Dr. Katrin Svensson. [Read more about Lianna Wat and her research.](#) [Read about the Lindau Meetings in 2020.](#)

FEATURED TRAINEE PUBLICATIONS

LSI PHD STUDENT DEVELOPS NEW TOOL FOR STUDYING THE ROLE OF GENES OF INTEREST IN BETA-CELLS AND DIABETES

Adam Ramzy, a third-year year medical student at UBC, helped develop a novel gene therapy tool that can act as a “trojan horse” to selectively deliver Cre to beta-cells in the pancreas.



An MD/PhD student in Kieffer Lab since 2014, Ramzy was first author on a 2020 study published in Nature Research Scientific Reports. The study is one of the chapters of his thesis, alongside other work on insulin-producing beta-cell development and function.

Conventionally, expression of Cre in specific cells required use of special genetically modified mice that are extremely costly and time-consuming to generate. In their study, Ramzy and colleagues present an alternative: a novel gene therapy tool that can act as a “trojan horse” to selectively deliver Cre to beta-cells in the pancreas. In this study, they demonstrate the utility of the tool by studying the impact of loss of the insulin gene on beta-cell identity. This tool will be broadly useful to researchers in the field of diabetes for studying the role of genes of interest in beta cells. It is being used in multiple ongoing projects within the Kieffer lab. [Read More.](#)

MD/POSTDOC BRINGS INSIGHTS FROM CANCER CLINIC TO CONSIDERATION OF AUTOIMMUNE ROLE IN SEVERE COVID-19

During a rotation in Zurich Dr. **Omar Hasan Ali** encountered patients with severe COVID-19 who had the same thrombosis localized in their toes that he and his mentor were used to seeing in their cancer patients. The mentor, Dr. Lukas Flatz, a professor of dermatology, had a flash of inspiration based on clinical experience with other autoimmune reactions, when the body attacks its own tissues. In this case, the blood clots and purplish toes seen in COVID-19 reminded the Swiss researchers of patients with a condition known as antiphospholipid syndrome (APS). The rare condition, typically triggered by an infection, causes the body to develop antiphospholipid antibodies, which play an essential role in blood coagulation. What about the SARS-CoV-2 virus, they wondered.



A retrospective international cohort study was launched with 64 patients, divided into three groups: one with mild COVID-19 from the Principality of Liechtenstein and two cohorts with severe COVID-19 from Switzerland. Measurements included clinical parameters, laboratory inflammation markers and two distinctive aPL. Just as suspected, the researchers found a highly significant association with elevated IgA-aPL in patients with severe COVID-19. In addition, total IgA antibodies were significantly higher as well. LSI's tie in with the research extended beyond Hasan Ali's new fellowship in the **Penninger** Lab. Hasan Ali shared preliminary results with Dr. Penninger, seeking guidance on potential mechanisms of action and data interpretation. A subsequent study published in Clinical Infectious Diseases states the researchers saw a novel significant association of severe COVID-19 with IgA and IgA-aPL, that may emerge from a strong response against SARS-CoV-2 in the lung. [Read More.](#)
[Read the Paper.](#)

ANALYSIS CHALLENGES LONG-HELD ASSUMPTIONS ABOUT PATERNAL DNA METHYLATION IN THE FIRST STAGES OF LIFE



Julien Richard Albert finished his PhD in medical genetics on a crescendo, challenging the conventional wisdom on methylation of sperm DNA following fertilization of eggs. For years, sperm DNA has been thought to be mostly stripped of methylation (5-methylcytosine) in the aftermath of conception. But findings Richard Albert and colleagues published in [Nature Communications](#) showed that in the first stages of life, some regions on incoming paternal chromosomes actually show a robust increase in DNA methylation.

Not what Richard Albert expected, given the number of slides he'd seen presented by international experts that showed the wave of DNA methylation loss at this stage. He and mentor Dr. **Matthew Lorincz** already knew from previous microscopy experiments that the paternally inherited DNA is preferentially demethylated immediately following fertilization, while maternal DNA methylation levels remain relatively constant. The pair, in collaboration with colleagues at Tokyo University of Agriculture and colleagues at UBC employed high-resolution experiments to confirm that the paternally inherited DNA loses over 5 times more DNA methylation compared to maternal DNA.

While the vast majority of regions lost DNA methylation, as expected, a minority of regions showed antithetical yet robust gain of DNA methylation following fertilization. Working with colleagues at Japan's Kyushu University, the researchers identified maternally inherited DNMT3A proteins as being responsible for this new phenomenon. [Read More](#)

SHEDDING LIGHT ON IMPLICATIONS OF STAC3 MUTATIONS IN MUSCULAR DISORDERS

Five or more mutations in the STAC3 gene are known to influence muscular disorders, but little is known about how those mutations translate into the biochemistry of misfiring muscle contraction. PhD student **Britany Rufenach** and Dr. **Filip Van Petegem** are looking at how known mutations in the STAC3 gene affect excitation-contraction coupling. In a study published in [Structure](#), they analyzed the effect of the disease-associated variants, and their ability to bind to the calcium channel. With the aim of better understanding the molecular mechanisms of this disease, they looked specifically at how these mutations affect the binding of CaV1.1 (the calcium channel), because that interaction is vital for STAC3's role in muscle contraction.

STAC3 links two large membrane proteins in muscle cells: the voltage-gated calcium channel (CaV) located in the plasma membrane, and the Ryanodine receptor (RyR), located in the Sarcoplasmic reticulum. Its interaction with the CaV is understood, but how it couples with the RyR may reveal the mechanisms of many disease mutations. The researchers found that some of these are quite severe, knocking out the CaV completely, while others greatly weaken it. Other mutations act only to disrupt excitation contraction coupling, making a target for mutations causing myopathies and malignant hyperthermia. [Read More](#)

Image: Cover art for the August issue of *Structure* was created by Britany Rufenach, in her first outing with Blender, a 3-D modeling program. The image illustrates that when the link between the calcium channel (red) and STAC3 (blue) is broken, muscle function is impaired.



ACIDITY MAY PLAY A ROLE IN ESOPHAGEAL CANCER – AND POINT THE WAY TO NEW TREATMENT APPROACHES



Dr. **Shane Duggan** and an international team of researchers including UBC Dean of Medicine Dr. Dermot Kelleher have discovered that pH levels may play a key role in the metastasis of esophageal cancer as well as cellular changes that set the stage for its development. Their findings, reported in a cover story appearing in [Cellular and Molecular Gastroenterology and Hepatology](#) provide important context for precursor lesions, or wounds, that present in the esophagus, as well as the eventual escape or metastasis of cancer cells in esophageal adenocarcinoma (EAC).

The study showed that genes regulating differing forms of cellular movement and invasion used by esophageal cells during wound healing, precancerous cell expansion and metastatic processes are modulated by the surrounding pH levels. Only 14 per cent of Canadian patients remain alive five years after a diagnosis of esophageal cancer. Many patients who develop esophageal adenocarcinoma have a significant history of gastro-esophageal reflux disease, or GERD. Between 5-12 percent of Canadians have the condition, which causes pain, ulceration and inflammation. The episodic wounding of the tissues by stomach acid promotes the development and expansion of a genetically unstable, precancerous lesion known as Barrett's esophagus.

The researchers found novel functions for many genes in the regulation of both fast escape-like and slow invasive-type movements respectively. These may facilitate the expansion of Barrett's esophagus lesions, and metastasis of esophageal cancer cells. The pH environments encountered by esophageal cells may directly enable the niche for cancer development - and further progression that leads to such poor outcomes in esophageal cancer patients. Using high-content imaging analysis and screening, the team screened large, small interfering RNA (siRNA) libraries of 6,000 genes to identify those that impact cell shape and cell movement, leading to a fundamental insight about the relationship between cell shape and cancer metastasis. [Read More](#)

CIRCUMVENTING SELECTIVE PERMEABILITY: SMALL BINDING PROTEINS HITCH A RIDE INTO CELL CYTOSOL VIA SALMONELLA'S SENSORY PROBE



An international team led by LSI postdoctoral fellow **Antoine Chabloz** harnessed salmonella's syringe-like system to inject specific proteins into the fluid that fills cells.

More than a quarter of all human proteins are thought to bathe in this milieu, where they interact with one another as well as with proteins from every other cellular compartment. Yet until now, it's been impossible to efficiently study interactions between those proteins, as there was no system or means to enable other antibody-like proteins, such as DARPins and monobodies, to reach the cytosol. Both of these proteins can specifically inhibit certain protein-protein interactions that have significant therapeutic potential.

The team engineered a novel cytosolic protein delivery system enabling us to efficiently deliver those proteins directly inside the cell – once in the cytosol they can target essential protein-protein interactions with high specificity, a finding published online in [Communications Biology](#), a new, open-access journal produced by Nature. Piercing the wall surrounding eukaryotic cells has been done before, but the researchers did so for the first time with small binding proteins, namely DARPins and monobodies. In addition, they were able to specifically inhibit a protein called RAS, which is at the center of one of the most mutated pathways in cancer. [Read More](#)



Illustration: "Vienna science under the Salmonella sun," by Cian Karl Ebert, at the age of six.

PHD GRADUATE CHLOE GERAK TARGETS PROTEIN-PROTEIN INTERACTIONS AND TAKES AIM AT CANCER

Chloe Gerak took aim at the uncontrolled cell division in cancer using a combination of high-throughput screening, computational modeling, and NMR to find and characterize small molecule inhibitors of protein-protein interactions. In a study published in the [Journal of Biological Chemistry](#) her focus is on a member of the ETS family, ETV6, which plays an important role in embryonic development and hematopoietic regulation. Structurally, ETV6 has two protein domains: an ETS DNA-binding domain and a PNT domain. The PNT domain of ETV6 is of particular interest to Gerak, as it's able to self-polymerize, allowing for multiple PNT domains to come together, which then allows the ETS DNA-binding domain to bind to DNA with higher affinity.

The ETV6 PNT domain has been found in numerous chromosomal translocations, which have been found in over 40 different types of cancer. The cancer-causing mechanism is thought to be related to the PNT domain's self-polymerization property, as this brings the fusion proteins produced from the translocations together. If the fusion is to a receptor tyrosine kinase, this results in their dimerization, which is the mechanism that activates their kinase activity. This in turn stimulates downstream signaling pathways, often resulting in uncontrollable cell division and cancer. This makes the PNT domain a great target for a chemotherapy drug.

In her search for a molecule that will inhibit PNT domain polymerization, Gerak, a PhD candidate in the Department of Biochemistry and Molecular Biology at the Life Sciences Institute designed a high throughput split luciferase screening assay to do just that. After screening more than 17,000 compounds for a reduction in light (and therefore an inhibition in dimerization), she got a few hits, but they also resulted in the same decrease in emission in the control cell line. She screened an additional library that specifically targets protein-protein interactions. Working with a collaborator in Bristol, she used molecular modelling and their BUDE (Bristol University Docking Engine) virtual screening platform to screen 8.2 million compounds that were each in 20 different conformations to either interface of the PNT domains. The findings from these screens were published in [SLAS](#).

Dr. Gerak is now a postdoctoral fellow at the University of Melbourne in Australia. [Read more](#)



Photo by Paul H. Joseph/UBC Brand & Marketing

CONGRATULATIONS TO THIS YEAR'S LSI GRADUATES.

[See our LSI Graduate Gallery](#)

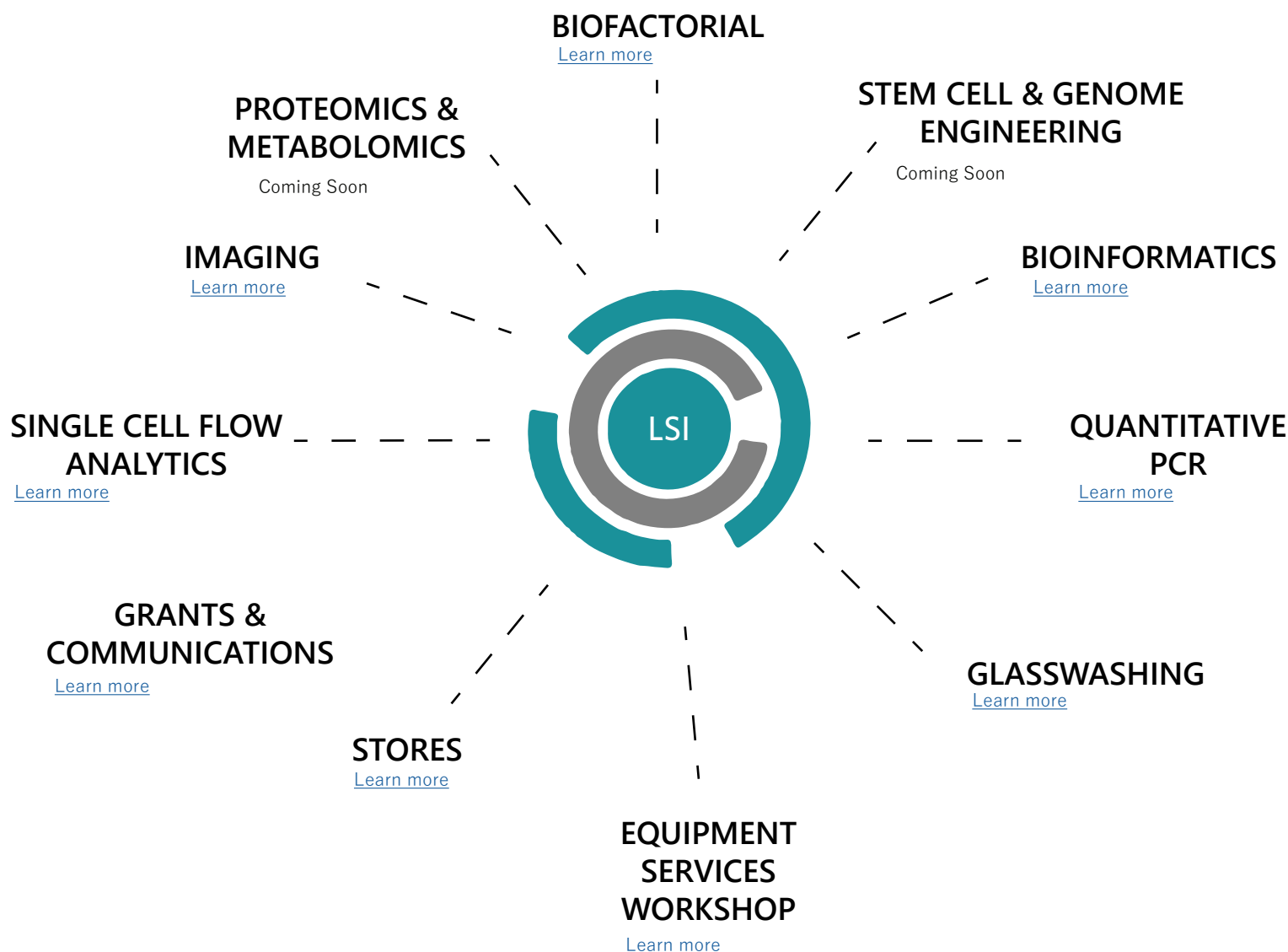


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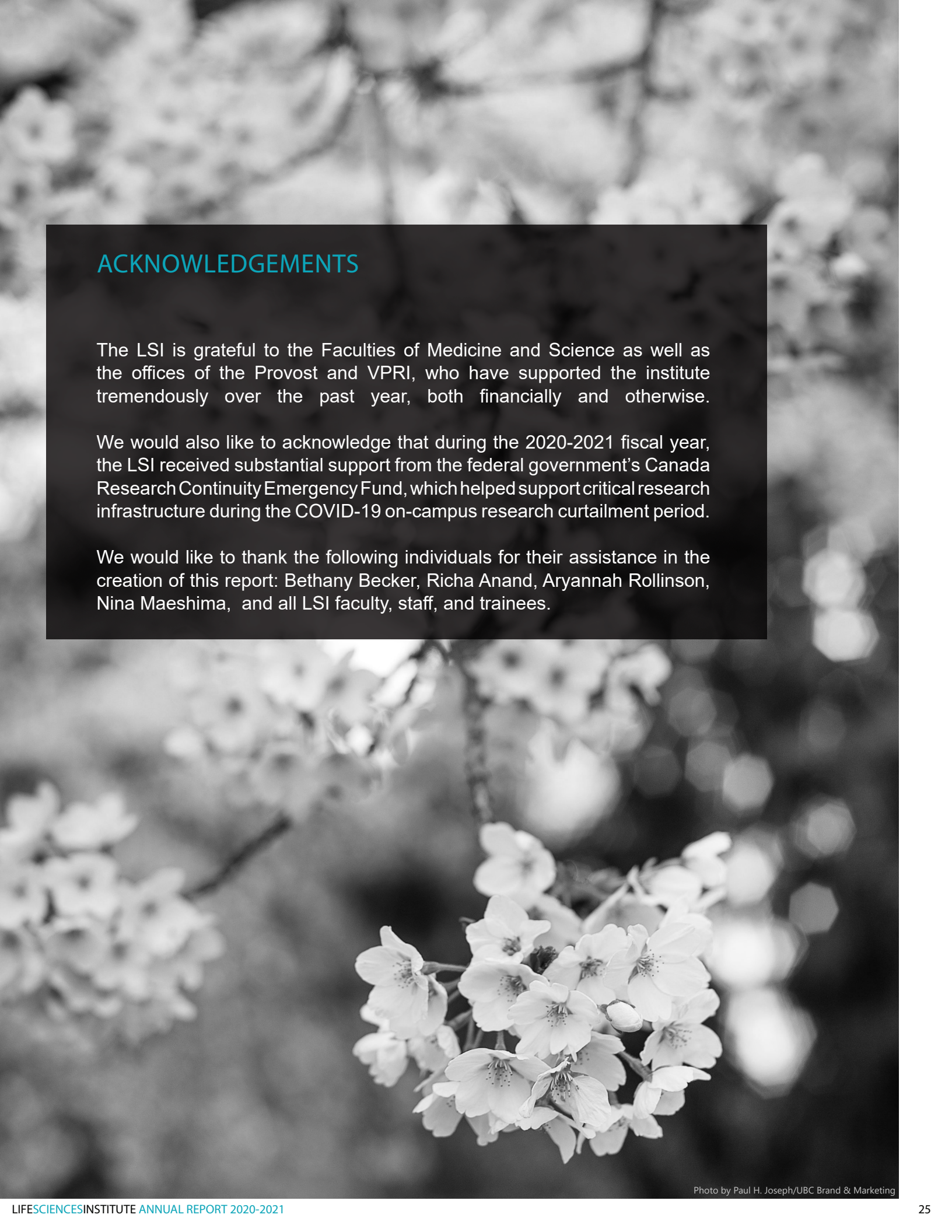
The LSI is home to state-of-the-art scientific facilities that propagate new and shared expertise in disciplines and techniques, and drive our excellent science to even higher levels.

Managed by skilled researchers and technicians, our technologies and expertise are available to all LSI researchers as well as external users.

Core services provide additional support for research and infrastructure, including the Equipment Services Workshop for maintenance and repair of laboratory equipment, our Stores facility, providing the LSI community with convenient access to common lab supplies at a reduced cost, and QPCR as well as glasswashing.



To learn more about infrastructure available at the Life Sciences Institute and information about other facilities in the Life Sciences Centre, visit [our website](#).



ACKNOWLEDGEMENTS

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We would also like to acknowledge that during the 2020-2021 fiscal year, the LSI received substantial support from the federal government's Canada Research Continuity Emergency Fund, which helped support critical research infrastructure during the COVID-19 on-campus research curtailment period.

We would like to thank the following individuals for their assistance in the creation of this report: Bethany Becker, Richa Anand, Aryannah Rollinson, Nina Maeshima, and all LSI faculty, staff, and trainees.

APPENDIX

FULL LIST OF PUBLICATIONS

1. Jun D, Richardson-Sanchez T, Mahey A, **Murphy MEP, Fernandez RC, Beatty JT**. Introduction of the Menaquinone Biosynthetic Pathway into Rhodospirillum rubrum and de Novo Synthesis of Menaquinone for Incorporation into Heterologously Expressed Integral Membrane Proteins. ACS Synth Biol. 2020 Apr 21. doi: 10.1021/acssynbio.0c00066. PubMed PMID: 32271543. <https://www.ncbi.nlm.nih.gov/pubmed/32271543?dopt=Abstract>
2. Holt C, Hamborg L, Lau K, Brohus M, Sørensen AB, Larsen KT, Sommer C, **Van Petegem F**, Overgaard MT, Wimmer R. The arrhythmogenic N53I variant subtly changes the structure and dynamics in the calmodulin N-domain, altering its interaction with the cardiac ryanodine receptor. J Biol Chem. 2020 Apr 21. pii: jbc.RA120.013430. doi: 10.1074/jbc.RA120.013430. PubMed PMID: 32317284. <https://www.ncbi.nlm.nih.gov/pubmed/32317284?dopt=Abstract>
3. Caveney NA, Egan AJF, Ayala I, Laguri C, Robb CS, Breukink E, Vollmer W, **Strynadka NCJ**, Simorre JP. Structure of the Peptidoglycan Synthase Activator LpoP in Pseudomonas aeruginosa. Structure. 2020 Apr 9. pii: S0969-2126(20)30094-0. doi: 10.1016/j.str.2020.03.012. PubMed PMID: 32320673. <https://www.ncbi.nlm.nih.gov/pubmed/32320673?dopt=Abstract>
4. Ramzy A, Asadi A, **Kieffer TJ**. Revisiting Proinsulin Processing: Evidence That Human β -Cells Process Proinsulin With Prohormone Convertase (PC) 1/3 But Not PC2. Diabetes. 2020 Apr 14. pii: db190276. doi: 10.2337/db19-0276. PubMed PMID: 32291281. <https://www.ncbi.nlm.nih.gov/pubmed/32291281?dopt=Abstract>
5. Tabernero A, Koulakoff A, Roux L, Venance L, Leybaert L, Sáez JC, **Naus CC**. Christian Giaume (November 1951-July 2019). Glia. 2020 Apr 16. doi: 10.1002/glia.23836. PubMed PMID: 32298009. <https://www.ncbi.nlm.nih.gov/pubmed/32298009?dopt=Abstract>
6. Hunter AC, Petley-Ragan LM, Das M, **Auld VJ**. Basigin associates with integrin in order to regulate perineurial glia and Drosophila nervous system morphology. J Neurosci. 2020 Apr 6. pii: JN-RM-1397-19. doi: 10.1523/JNEUROSCI.1397-19.2020. PubMed PMID: 32265259. <https://www.ncbi.nlm.nih.gov/pubmed/32265259?dopt=Abstract>
7. Déjean G, Tamura K, Cabrera A, Jain N, Pudlo NA, Pereira G, Viborg AH, **Van Petegem F**, Martens EC, Brumer H. Synergy between Cell Surface Glycosidases and Glycan-Binding Proteins Dictates the Utilization of Specific Beta(1,3)-Glucans by Human Gut Bacteroides. mBio. 2020 Apr 7;11(2). pii: e00095-20. doi: 10.1128/mBio.00095-20. PubMed PMID: 32265336. <https://www.ncbi.nlm.nih.gov/pubmed/32265336?dopt=Abstract>
8. Lin BH, Sutherland MR, Rosell FI, Morrissey JH, **Prydzial ELG**. Coagulation factor VIIa binds to herpes simplex virus 1-encoded glycoprotein C forming a factor X-enhanced tenase complex oriented on membranes. J Thromb Haemost. 2020 Jun;18(6):1370-1380. doi: 10.1111/jth.14790. Epub 2020 Apr 9. PMID: 32145149. <https://pubmed.ncbi.nlm.nih.gov/32145149/>
9. Jalily PH, Duncan MC, **Fedida D**, Wang J, Tietjen I. Put a cork in it: Plugging the M2 viral ion channel to sink influenza. Antiviral Res. 2020 Mar 27:104780. doi: 10.1016/j.antiviral.2020.104780. Review. PubMed PMID: 32229237; PubMed Central PMCID: PMC7102647. <https://www.ncbi.nlm.nih.gov/pubmed/32229237?dopt=Abstract>
10. Brind'Amour J, **Lorincz MC**. Setting the chromatin stage in oocytes. Nat Cell Biol. 2020 Mar 30. doi: 10.1038/s41556-020-0499-7. PubMed PMID: 32231308. <https://www.ncbi.nlm.nih.gov/pubmed/32231308?dopt=Abstract>
11. Workman SD, **Strynadka NCJ**. A Slippery Scaffold: Synthesis and Recycling of the Bacterial Cell Wall Carrier Lipid. J Mol Biol. 2020 Mar 28. pii: S0022-2836(20)30258-8. doi: 10.1016/j.jmb.2020.03.025. Review. PubMed PMID: 32234311. <https://www.ncbi.nlm.nih.gov/pubmed/32234311?dopt=Abstract>
12. Phipps SM, Garry CE, Kamal S, **Johnson JD**, Gilmer J, Long A, Kelleher D, Duggan SP. High Content Imaging of Barrett's-Associated High Grade Dysplasia Cells Following siRNA Library Screening Reveals Acid Responsive Regulators of Cellular Transitions. Cell Mol Gastroenterol Hepatol. 2020 May 13:S2352-345X(20)30072-2. doi: 10.1016/j.jcmgh.2020.05.002. . PMID: 32416156. <https://pubmed.ncbi.nlm.nih.gov/32416156/?dopt=Abstract>
13. Adak T, Morales DL, Cook AJ, Grigg JC, **Murphy MEP**, Tanner ME. ArnD is a deformylase involved in polymyxin resistance. Chem Commun (Camb). 2020 May 20. doi: 10.1039/d0cc02241a. . PMID: 32432293. <https://pubmed.ncbi.nlm.nih.gov/32432293/?dopt=Abstract>
14. **Nabi IR**. Preface. Cancer Metastasis Rev. 2020 May 16. doi: 10.1007/s10555-020-09894-7. . PMID: 32417991. <https://pubmed.ncbi.nlm.nih.gov/32417991/?dopt=Abstract>

15. Hughes MR, Hernaez DC, Cait J, Refaeli I, Lo B, **Roskelley C**, McNaghy KM. A Sticky Wicket: Defining Molecular Functions for CD34 in Hematopoietic Cells. *Exp Hematol*. 2020 May 15:S0301-472X(20)30181-8. doi: 10.1016/j.exphem.2020.05.004. . PMID: 32422232. <https://pubmed.ncbi.nlm.nih.gov/32422232/?dopt=Abstract>
16. Orthofer M, Valsesia A, Mägi R, Wang QP, Kaczanowska J, Kozieradzki I, Leopoldi A, Cikes D, Zopf LM, Tretiakov EO, Demetz E, Hilbe R, Boehm A, Ticevic M, Nõukas M, Jais A, Spirk K, Clark T, Amann S, Lepamets M, Neumayr C, Arnold C, Dou Z, Kuhn V, Novatchkova M, Cronin SJF, Tietge UJF, Müller S, Pospisilik JA, Nagy V, Hui CC, Lazovic J, Esterbauer H, Hagelkruys A, Tancevski I, Kiefer FW, Harkany T, Haubensak W, Neely GG, Metspalu A, Hager J, Gheldof N, **Penninger JM**. Identification of ALK in Thinness. *Cell*. 2020 May 13:S0092-8674(20)30497-9. doi: 10.1016/j.cell.2020.04.034. . PMID: 32442405. <https://pubmed.ncbi.nlm.nih.gov/32442405/?dopt=Abstract>
17. Adams A, **Vogl W**. Knockdown of IP3R1 Disrupts TBC-ER Contact Sites and the Morphology of Apical Processes Encapsulating Late Spermatids. *Biol Reprod*. 2020 May 14. pii: ioaa074. doi: 10.1093/biolre/ioaa074. PubMed PMID: 32406903. <https://www.ncbi.nlm.nih.gov/pubmed/32406903?dopt=Abstract>
18. Anilkumar P, Lawson TB, Abbina S, Mäkelä JTA, Sabatelle RC, Takeuchi LE, Snyder BD, Grinstaff MW, **Kizhakkedathu JN**. Mega macromolecules as single molecule lubricants for hard and soft surfaces. *Nat Commun*. 2020 May 1;11(1):2139. doi: 10.1038/s41467-020-15975-6. PubMed PMID: 32358489; PubMed Central PMCID: PMC7195476. <https://www.ncbi.nlm.nih.gov/pubmed/32358489?dopt=Abstract>
19. Chao JT, Hollman R, Meyers WM, Meili F, Matreyek KA, Dean P, Fowler DM, Haas K, **Roskelley CD**, **Loewen CJR**. A premalignant cell-based model for functionalization and classification of PTEN variants. *Cancer Res*. 2020 May 4. pii: canres.3278.2019. doi: 10.1158/0008-5472.CAN-19-3278. PubMed PMID: 32366478. <https://www.ncbi.nlm.nih.gov/pubmed/32366478?dopt=Abstract>
20. Worrall LJ, Hu J, **Strynadka NCJ**. Aligning the Symmetry of the Type III Secretion System Needle Complex. *J Chem Inf Model*. 2020 May 4. doi: 10.1021/acs.jcim.0c00088. PubMed PMID: 32293878. <https://www.ncbi.nlm.nih.gov/pubmed/32293878?dopt=Abstract>
21. Kogler M, Tortola L, Negri GL, Leopoldi A, El-Naggar AM, Mereiter S, Gomez Diaz C, Nitsch R, Tortora D, Kavirayani AM, Gapp BV, Rao S, Uribealago I, Hoffmann D, Cikes D, Novatchkova M, Williams CA, Trent JM, Ikeda F, Daugaard M, Hagelkruys A, Sorensen PH, **Penninger JM**. HACE1 prevents lung carcinogenesis via inhibition of RAC-family GTPases. *Cancer Res*. 2020 May 4. pii: canres.2270.2019. doi: 10.1158/0008-5472.CAN-19-2270. PubMed PMID: 32366477. <https://www.ncbi.nlm.nih.gov/pubmed/32366477?dopt=Abstract>
22. Post KL, Belmadani M, Ganguly P, Meili F, Dingwall R, McDiarmid TA, Meyers WM, Herrington C, Young BP, Callaghan DB, Rogic S, Edwards M, Niciforovic A, Cau A, Rankin CH, **O'Connor TP**, **Bamji SX**, **Loewen CJR**, **Allan DW**, Pavlidis P, Haas K. Multi-model functionalization of disease-associated PTEN missense mutations identifies multiple molecular mechanisms underlying protein dysfunction. *Nat Commun*. 2020 Apr 29;11(1):2073. doi: 10.1038/s41467-020-15943-0. PubMed PMID: 32350270; PubMed Central PMCID: PMC7190743. <https://www.ncbi.nlm.nih.gov/pubmed/32350270?dopt=Abstract>
23. Chen CH, Lai CH, Hong YK, Lu JM, Lin SY, Lee TC, Chang LY, Ho ML, **Conway EM**, Wu HL, Cheng TL. Thrombomodulin functional domains support osteoblast differentiation and bone healing in diabetes in mice. *J Bone Miner Res*. 2020 Apr 24. doi: 10.1002/jbmr.4036. PubMed PMID: 32329910. <https://www.ncbi.nlm.nih.gov/pubmed/32329910?dopt=Abstract>
24. Erwin SR, Sun W, Copeland M, Lindo S, Spruston N, **Cembrowski MS**. A Sparse, Spatially Biased Subtype of Mature Granule Cell Dominates Recruitment in Hippocampal-Associated Behaviors. *Cell Rep*. 2020 Apr 28;31(4):107551. doi: 10.1016/j.celrep.2020.107551. PubMed PMID: 32348756. <https://www.ncbi.nlm.nih.gov/pubmed/32348756?dopt=Abstract>
25. Monteil V, Kwon H, Prado P, Hagelkrüys A, Wimmer RA, Stahl M, Leopoldi A, Garreta E, Hurtado Del Pozo C, Prosper F, Romero JP, Wirsberger G, Zhang H, Slutsky AS, Conder R, Montserrat N, Mirazimi A, **Penninger JM**. Inhibition of SARS-CoV-2 Infections in Engineered Human Tissues Using Clinical-Grade Soluble Human ACE2. *Cell*. 2020 Apr 17. pii: S0092-8674(20)30399-8. doi: 10.1016/j.cell.2020.04.004. PubMed PMID: 32333836; PubMed Central PMCID: PMC7181998. <https://www.ncbi.nlm.nih.gov/pubmed/32333836?dopt=Abstract>
26. **Accili E**. An ion channel in the company of a transporter. *J Gen Physiol*. 2020 Jul 6;152(7):e202012590. doi: 10.1085/jgp.202012590. PMID: 32579683. <https://pubmed.ncbi.nlm.nih.gov/32579683/>
27. Wang Y, Eldstrom J, **Fedida D**. Gating and Regulation of KCNQ1 and KCNQ1 + KCNE1 Channel Complexes. *Front Physiol*. 2020 Jun 4;11:504. doi: 10.3389/fphys.2020.00504. PMID: 32581825; PMCID: PMC7287213. <https://pubmed.ncbi.nlm.nih.gov/32581825/>
28. Haage A, Wagner K, Deng W, Venkatesh B, Mitchell C, Goodwin K, Bogutz A, **Lefebvre L**, **Van Raamsdonk CD**, **Tanentzapf G**. Precise coordination of cell-ECM adhesion is essential for efficient melanoblast migration during development. *Development*. 2020 Jun 24;dev.184234. doi: 10.1242/dev.184234. . PMID: 32580934. <https://pubmed.ncbi.nlm.nih.gov/32580934/>
29. **Nabi IR**. Biography-Ivan Robert Nabi. *Cancer Metastasis Rev*. 2020 Jun;39(2):333. doi: 10.1007/s10555-020-09893-8. PMID: 32577925. <https://pubmed.ncbi.nlm.nih.gov/32577925/>
30. Falkowski K, Bielecka E, Thøgersen IB, Bocheńska O, Płaza K, Kalińska M, Szaśadek L, Magoch M, Pęcak A, Wiśniewska M, Gruba N, Wysocka M, Wojtysiak A, Brzezińska-Bodal M, Sychowska K, Pejkovska A, Rehders M, Butler G, **Overall CM**, Brix K, Dubin G, Lesner A, Kozik A, Enghild JJ, Potempa J, Kantyka T. Kallikrein-Related Peptidase 14 Activates Zymogens of Membrane Type Matrix Metalloproteinases (MT-MMPs)-A CleavEx Based Analysis. *Int J Mol Sci*. 2020 Jun 19;21(12):E4383. doi: 10.3390/ijms21124383. PMID: 32575583. <https://pubmed.ncbi.nlm.nih.gov/32575583/>
31. Bárdy P, Füzik T, Hrebík D, Pantůček R, **Thomas Beatty J**, Plevka P. Structure and mechanism of DNA delivery of a gene transfer agent. *Nat Commun*. 2020 Jun 15;11(1):3034. doi: 10.1038/s41467-020-16669-9. PMID: 32541663; PMCID: PMC7296036. <https://pubmed.ncbi.nlm.nih.gov/32541663/>

32. Al-Riyami AZ, Schäfer R, van der Berg K, Bloch EM, Escourt LJ, Goel R, Hindawi S, Josephson CD, Land K, McQuilten ZK, Spitalnik SL, Wood EM, **Devine DV**, So-Osman C; ISBT Convalescent Plasma Working Group. Clinical use of Convalescent Plasma in the COVID-19 pandemic; a transfusion-focussed gap analysis with recommendations for future research priorities. *Vox Sang*. 2020 Jun 15. doi: 10.1111/vox.12973. . PMID: 32542847. <https://pubmed.ncbi.nlm.nih.gov/32542847/>
33. Bloch EM, Goel R, Wendel S, Burnouf T, Al-Riyami AZ, Ang AL, DeAngelis V, Dumont LJ, Land K, Lee CK, Oreh A, Patidar G, Spitalnik SL, Vermeulen M, Hindawi S, Van den Berg K, Tiberghien P, Vrielink H, Young P, **Devine D**, So-Osman C; ISBT Convalescent Plasma Working Group. Guidance for the Procurement of COVID-19 Convalescent Plasma: Differences between High and Low-Middle Income Countries. *Vox Sang*. 2020 Jun 13. doi: 10.1111/vox.12970. . PMID: 32533868. <https://pubmed.ncbi.nlm.nih.gov/32533868/>
34. Kerr CH, Skinnider MA, Andrews DDT, Madero AM, Chan QWT, Stacey RG, Stoykov N, **Jan E**, Foster LJ. Dynamic rewiring of the human interactome by interferon signaling. *Genome Biol*. 2020 Jun 15;21(1):140. doi: 10.1186/s13059-020-02050-y. PMID: 32539747; PMCID: PMC7294662. <https://pubmed.ncbi.nlm.nih.gov/32539747/>
35. Abbina S, Takeuchi LE, Anilkumar P, Yu K, Rogalski JC, Sheno RA, Constantinescu I, **Kizhakkedathu JN**. Blood circulation of soft nanomaterials is governed by dynamic remodeling of protein opsonins at nano-biointerface. *Nat Commun*. 2020 Jun 16;11(1):3048. doi: 10.1038/s41467-020-16772-x. PMID: 32546688. <https://pubmed.ncbi.nlm.nih.gov/32546688/>
36. Hendi A, **Mizumoto K**. GFPnovo2, a brighter GFP variant for in vivo labeling in *C. elegans*. *MicroPubl Biol*. 2018 Sep 6;2018:10.17912/49YB-7K39. doi: 10.17912/49YB-7K39. PMID: 32550394; PMCID: PMC7282520. <https://pubmed.ncbi.nlm.nih.gov/32550394/>
37. Tsai K, Huang YH, Ma C, Baldwin TA, **Harder KW**, Vallance BA, Priatel JJ. Cutting Edge: Intestinal Mucus Limits the Clonal Deletion of Developing T Cells Specific for an Oral Antigen. *J Immunol*. 2020 Jun 15;ji1900687. doi: 10.4049/jimmunol.1900687. . PMID: 32540993. <https://pubmed.ncbi.nlm.nih.gov/32540993/>
38. **Devine DV**. SARS in Canada: Lessons learned for the blood operator. *Transfus Med*. 2020 Jun;30(3):172-173. doi: 10.1111/tme.12699. PMID: 32529741; PMCID: PMC7276835. <https://pubmed.ncbi.nlm.nih.gov/32529741/?dopt=Abstract>
39. Horianopoulos LC, Hu G, Caza M, Schmitt K, Overby P, **Johnson JD**, Valerius O, Braus GH, Kronstad JW. The Novel J-Domain Protein Mrj1 Is Required for Mitochondrial Respiration and Virulence in *Cryptococcus neoformans*. *mBio*. 2020 Jun 9;11(3):e01127-20. doi: 10.1128/mBio.01127-20. PMID: 32518190. <https://pubmed.ncbi.nlm.nih.gov/32518190/?dopt=Abstract>
40. Refaeli I, Hughes MR, Wong AK, Bissonnette MLZ, **Roskelley CD**, **Vogl WA**, Barbour SJ, Freedman BS, McNagny KM. Distinct Functional Requirements for Podocalyxin in Immature and Mature Podocytes Reveal Mechanisms of Human Kidney Disease. *Sci Rep*. 2020 Jun 10;10(1):9419. doi: 10.1038/s41598-020-64907-3. PMID: 32523052. <https://pubmed.ncbi.nlm.nih.gov/32523052/?dopt=Abstract>
41. Alexander JAN, Radaeva M, King DT, Chambers HF, Cherkasov A, Chatterjee SS, **Strynadka NCJ**. -Structural analysis of avibactam-mediated activation of the bla and mec divergons in methicillin-resistant *Staphylococcus aureus*. *J Biol Chem*. 2020 Jun 9;jbc.RA120.013029. doi: 10.1074/jbc.RA120.013029. . PMID: 32518158. <https://pubmed.ncbi.nlm.nih.gov/32518158/?dopt=Abstract>
42. Marshall NC, Thejoe M, Klein T, Serapio-Palacios A, Santos AS, von Krosigk N, **Kizhakkedathu JN**, Stoykov N, Foster LJ, **Overall CM**, Finlay BB. Master Sculptor at Work: Enteropathogenic *Escherichia coli* Infection Uniquely Modifies Mitochondrial Proteolysis during Its Control of Human Cell Death. *mSystems*. 2020 Jun 2;5(3):e00283-20. doi: 10.1128/mSystems.00283-20. PMID: 32487743. <https://pubmed.ncbi.nlm.nih.gov/32487743/?dopt=Abstract>
43. Young BP, Post KL, Chao JT, Meili F, Haas K, **Loewen CJR**. Sentinel Interaction Mapping (SIM) - A generic approach for the functional analysis of human disease gene variants using yeast. *Dis Model Mech*. 2020 May 29;dmm.044560. doi: 10.1242/dmm.044560. . PMID: 32471850. <https://pubmed.ncbi.nlm.nih.gov/32471850/?dopt=Abstract>
44. Rufenach B, Christy D, Flucher BE, Bui JM, Gsponer J, Campiglio M, **Van Petegem F**. Multiple Sequence Variants in STAC3 Affect Interactions with Ca_v1.1 and Excitation-Contraction Coupling. *Structure*. 2020 May 27:S0969-2126(20)30174-X. doi: 10.1016/j.str.2020.05.005. . PMID: 32492370. <https://pubmed.ncbi.nlm.nih.gov/32492370/?dopt=Abstract>
45. **Davies JE**. In memory of Professor Arnold L. Demain. *J Antibiot (Tokyo)*. 2020 May 28. doi: 10.1038/s41429-020-0325-2. . PMID: 32461629. <https://pubmed.ncbi.nlm.nih.gov/32461629/?dopt=Abstract>
46. Shim YA, Campbell T, Weliwitigoda A, Dosanjh M, **Johnson P**. Regulation of CD71⁺TER119⁺ erythroid progenitor cells by CD45. *Exp Hematol*. 2020 May 22:S0301-472X(20)30182-X. doi: 10.1016/j.exphem.2020.05.005. . PMID: 32450207. <https://pubmed.ncbi.nlm.nih.gov/32450207/?dopt=Abstract>
47. Ahmadabadi HY, Yu K, **Kizhakkedathu JN**. Surface modification approaches for prevention of implant associated infections. *Colloids Surf B Biointerfaces*. 2020 May 12;193:111116. doi: 10.1016/j.colsurfb.2020.111116. . PMID: 32447202. <https://pubmed.ncbi.nlm.nih.gov/32447202/?dopt=Abstract>
48. Jain F, Longakit A, Huang JL, **Van Raamsdonk CD**. Endothelin signaling promotes melanoma tumorigenesis driven by constitutively active GNAQ. *Pigment Cell Melanoma Res*. 2020 May 26. doi: 10.1111/pcmr.12900. . PMID: 32453908. <https://pubmed.ncbi.nlm.nih.gov/32453908/?dopt=Abstract>
49. **Vogel Ciernia A**, Link VM, Careaga M, LaSalle J, Ashwood P. Genetic variants drive altered epigenetic regulation of endotoxin response in BTBR macrophages. *Brain Behav Immun*. 2020 May 23:S0889-1591(20)30260-9. doi: 10.1016/j.bbi.2020.05.058. . PMID: 32454135. <https://pubmed.ncbi.nlm.nih.gov/32454135/?dopt=Abstract>

50. Strilchuk AW, Meixner SC, Leung J, Safikhan N, Kulkarni JA, Russell HM, van der Meel R, Sutherland MR, Owens Iii AP, Palumbo J, **Conway EM, Prydzial EL, Cullis P**, Kastrop CJ. Sustained Depletion of FXIII-A by Inducing Acquired FXIII-B Deficiency. *Blood*. 2020 Jul 17;blood.2020004976. doi: 10.1182/blood.2020004976. . PMID: 32678423. <https://pubmed.ncbi.nlm.nih.gov/32678423/>
51. Haw J, Polzer J, **Devine DV**. Emotional labour and cord blood collection: frontline perspectives. *J Health Organ Manag*. 2020 Jun 9;34(5):587-601. doi: 10.1108/JHOM-10-2019-0305. PMID: 32681634. <https://pubmed.ncbi.nlm.nih.gov/32681634/>
52. **Prydzial ELG**, Sutherland MR, Lin BH, **Horwitz M**. Antiviral anticoagulation. *Res Pract Thromb Haemost*. 2020 Jul 6;4(5):774-788. doi: 10.1002/rth2.12406. PMID: 32685886; PMCID: PMC7354393. <https://pubmed.ncbi.nlm.nih.gov/32685886/>
53. Appelberg S, Gupta S, Akusjärvi SS, Ambikan AT, Mikaeloff F, Saccon E, Végvári Á, Benfeitas R, Sperk M, Ståhlberg M, Krishnan S, Singh K, **Penninger JM**, Mirazimi A, Neogi U. Dysregulation in Akt/mTOR/HIF-1 signaling identified by proteo-transcriptomics of SARS-CoV-2 infected cells. *Emerg Microbes Infect*. 2020 Jul 21:1-36. doi: 10.1080/22221751.2020.1799723. . PMID: 32691695. <https://pubmed.ncbi.nlm.nih.gov/32691695/>
54. Thompson E, Eldstrom J, **Fedida D**. Hormonal Signaling Actions on Kv7.1 (KCNQ1) Channels. *Annu Rev Pharmacol Toxicol*. 2020 Jul 15. doi: 10.1146/annurev-pharmtox-010919-023645. . PMID: 32667860. <https://pubmed.ncbi.nlm.nih.gov/32667860/>
55. Witzigmann D, Kulkarni JA, Leung J, Chen S, **Cullis PR**, van der Meel R. Lipid nanoparticle technology for therapeutic gene regulation in the liver. *Adv Drug Deliv Rev*. 2020 Jul 1:S0169-409X(20)30072-7. doi: 10.1016/j.addr.2020.06.026. . PMID: 32622021; PMCID: PMC7329694. <https://pubmed.ncbi.nlm.nih.gov/32622021/>
56. Morgan-Lang C, McLaughlin R, Armstrong Z, Zhang G, Chan K, **Hallam SJ**. TreeSAPP: The Tree-based Sensitive and Accurate Phylogenetic Profiler. *Bioinformatics*. 2020 Jul 8;btaa588. doi: 10.1093/bioinformatics/btaa588. . PMID: 32637989. <https://pubmed.ncbi.nlm.nih.gov/32637989/>
57. Lee J, Kim K, Cho JH, Bae JY, O'Leary TP, **Johnson JD**, Bae YC, Kim EK. Insulin synthesized in the paraventricular nucleus of the hypothalamus regulates pituitary growth hormone production. *JCI Insight*. 2020 Jul 9:135412. doi: 10.1172/jci.insight.135412. . PMID: 32644973. <https://pubmed.ncbi.nlm.nih.gov/32644973/>
58. Drayton M, **Kizhakkedathu JN**, Straus SK. Towards Robust Delivery of Antimicrobial Peptides to Combat Bacterial Resistance. *Molecules*. 2020 Jul 3;25(13):E3048. doi: 10.3390/molecules25133048. PMID: 32635310. <https://pubmed.ncbi.nlm.nih.gov/32635310/>
59. Khadilkar RJ, Ho KYL, Venkatesh B, **Tanentzapf G**. Integrins Modulate Extracellular Matrix Organization to Control Cell Signaling during Hematopoiesis. *Curr Biol*. 2020 Jul 4:S0960-9822(20)30843-5. doi: 10.1016/j.cub.2020.06.027. . PMID: 32649911. <https://pubmed.ncbi.nlm.nih.gov/32649911/>
60. Chabloz A, Schaefer JV, Kozieradzki I, Cronin SJF, Streibinger D, Macaluso F, Wald J, Rabbitts TH, Plückthun A, Marlovits TC, **Penninger JM**. Salmonella-based platform for efficient delivery of functional binding proteins to the cytosol. *Commun Biol*. 2020 Jul 3;3(1):342. doi: 10.1038/s42003-020-1072-4. PMID: 32620833; PMCID: PMC7335062. <https://pubmed.ncbi.nlm.nih.gov/32620833/>
61. **MacGillivray RTA, Conway EM**. Obituary for Earl Warren Davie 1927-2020. *J Thromb Haemost*. 2020 Jun 30. doi: 10.1111/jth.14978. . PMID: 32608042. <https://pubmed.ncbi.nlm.nih.gov/32608042/>
62. Szeinbaum N, Nunn BL, Cavazos AR, **Crowe SA**, Stewart FJ, DiChristina TJ, Reinhard CT, Glass JB. Novel insights into the taxonomic diversity and molecular mechanisms of bacterial Mn(III) reduction. *Environ Microbiol Rep*. 2020 Jul 2. doi: 10.1111/1758-2229.12867. . PMID: 32613749. <https://pubmed.ncbi.nlm.nih.gov/32613749/>
63. Ramzy A, Tuduri E, Glavas MM, Baker RK, Mojibian M, Fox JK, O'Dwyer SM, Dai D, Hu X, Denroche HC, Edeer N, Gray SL, Verchere CB, **Johnson JD, Kieffer TJ**. AAV8 Ins1-Cre can produce efficient β -cell recombination but requires consideration of off-target effects. *Sci Rep*. 2020 Jun 29;10(1):10518. doi: 10.1038/s41598-020-67136-w. PMID: 32601405; PMCID: PMC7324556. <https://pubmed.ncbi.nlm.nih.gov/32601405/>
64. Achazi K, Haag R, Ballauff M, Darnedde J, **Kizhakkedathu JN**, Maysinger D, Multhaup G. Understanding the interaction of polyelectrolyte architectures with proteins and biosystems. *Angew Chem Int Ed Engl*. 2020 Jun 26. doi: 10.1002/anie.202006457. . PMID: 32589355. <https://pubmed.ncbi.nlm.nih.gov/32589355/>
65. Duncan MC, Onguéné PA, Kihara I, Nebangwa DN, Naidu ME, Williams DE, Balgi AD, Andrae-Marobela K, **Roberge M**, Andersen RJ, Niikura M, Ntie-Kang F, Tietjen I. Virtual Screening Identifies Chebulagic Acid as an Inhibitor of the M2(S31N) Viral Ion Channel and Influenza A Virus. *Molecules*. 2020 Jun 24;25(12):E2903. doi: 10.3390/molecules25122903. PMID: 32599753. <https://pubmed.ncbi.nlm.nih.gov/32599753/>
66. Curtis SB, Molday LL, Garces FA, **Molday RS**. Functional Analysis and Classification of Homozygous and Hypomorphic ABCA4 Variants Associated with Stargardt Macular Degeneration. *Hum Mutat*. 2020 Aug 26. doi: 10.1002/humu.24100. . PMID: 32845050. <https://pubmed.ncbi.nlm.nih.gov/32845050/>
67. Thompson DA, Iannaccone A, Ali RR, Arshavsky VY, Audo I, Bainbridge JWB, Besirli CG, Birch DG, Branham KE, Cideciyan AV, Daiger SP, Dalkara D, Duncan JL, Fahim AT, Flannery JG, Gattagna R, Heckenlively JR, Heon E, Jayasundera KT, Khan NW, Klassen H, Leroy BP, **Molday RS**, Musch DC, Pennesi ME, Petersen-Jones SM, Pierce EA, Rao RC, Reh TA, Sahel JA, Sharon D, Sieving PA, Strettoi E, Yang P, Zacks DN; Monaciano Consortium. Advancing Clinical Trials for Inherited Retinal Diseases: Recommendations from the Second Monaciano Symposium. *Transl Vis Sci Technol*. 2020 Jun 3;9(7):2. doi: 10.1167/tvst.9.7.2. PMID: 32832209; PMCID: PMC7414644. <https://pubmed.ncbi.nlm.nih.gov/32832209/>
68. Noël G, Tham DKL, Guadagno E, MacVicar B, **Moukles H**. The Laminin-Induced Phosphorylation of PKC δ Regulates AQP4 Distribution and Water Permeabil-

- ity in Rat Astrocytes. *Cell Mol Neurobiol*. 2020 Aug 26. doi: 10.1007/s10571-020-00944-w. . PMID: 32851539. <https://pubmed.ncbi.nlm.nih.gov/32851539/>
69. Morell M, **Vogl AW**, IJsseldijk LL, Piscitelli-Doshkov M, Tong L, Ostertag S, Ferreira M, Fraija-Fernandez N, Colegrove KM, Puel JL, Raverty SA, Shadwick RE. Echolocating Whales and Bats Express the Motor Protein Prestin in the Inner Ear: A Potential Marker for Hearing Loss. *Front Vet Sci*. 2020 Jul 17;7:429. doi: 10.3389/fvets.2020.00429. PMID: 32851016; PMCID: PMC7396497. <https://pubmed.ncbi.nlm.nih.gov/32851016/>
 70. Ming J, Cronin SJF, **Penninger JM**. Targeting the RANKL/RANK/OPG Axis for Cancer Therapy. *Front Oncol*. 2020 Aug 7;10:1283. doi: 10.3389/fonc.2020.01283. PMID: 32850393; PMCID: PMC7426519. <https://pubmed.ncbi.nlm.nih.gov/32850393/>
 71. Nitta T, Tsutsumi M, Nitta S, Muro R, Suzuki EC, Nakano K, Tomofuji Y, Sawa S, Okamura T, **Penninger JM**, Takayanagi H. Fibroblasts as a source of self-antigens for central immune tolerance. *Nat Immunol*. 2020 Aug 24. doi: 10.1038/s41590-020-0756-8. . PMID: 32839611. <https://pubmed.ncbi.nlm.nih.gov/32839611/>
 72. Chamberlain TC, Cheung ST, Yoon JSJ, Ming-Lum A, Gardill BR, Shakibakho S, Dzananovic E, Ban F, Samiea A, Jawanda K, Priatel J, Krystal G, Ong CJ, Cherkasov A, Andersen RJ, McKenna SA, **Van Petegem F**, Mui AL. Interleukin-10 and Small Molecule SHIP1 Allosteric Regulators Trigger Anti-inflammatory Effects through SHIP1/STAT3 Complexes. *iScience*. 2020 Aug 21;23(8):101433. doi: 10.1016/j.isci.2020.101433. Epub 2020 Aug 2. PMID: 32823063. <https://pubmed.ncbi.nlm.nih.gov/32823063/>
 73. Ma R, Haji-Ghassemi O, Ma D, Jiang H, Lin L, Yao L, Samurkas A, Li Y, Wang Y, Cao P, Wu S, Zhang Y, Murayama T, Moussian B, **Van Petegem F**, Yuchi Z. Structural basis for diamide modulation of ryanodine receptor. *Nat Chem Biol*. 2020 Aug 17. doi: 10.1038/s41589-020-0627-5. . PMID: 32807966. <https://pubmed.ncbi.nlm.nih.gov/32807966/>
 74. **Conway EM, Prydzial ELG**. Is the COVID-19 thrombotic catastrophe complement-connected? *J Thromb Haemost*. 2020 Aug 6. doi: 10.1111/jth.15050. . PMID: 32762081. <https://pubmed.ncbi.nlm.nih.gov/32762081/>
 75. Liu MM, Coleman S, Wilkinson L, Smith ML, Hoang T, Niyah N, Mukherjee M, Huynh S, Parker CT, Kovac J, Hancock REW, **Gaynor EC**. Unique inducible filamentous motility identified in pathogenic *Bacillus cereus* group species. *ISME J*. 2020 Aug 7. doi: 10.1038/s41396-020-0728-x. . PMID: 32770116. <https://pubmed.ncbi.nlm.nih.gov/32770116/>
 76. Hedil M, Nakasu EYT, Nagata T, Wen J, **Jan E**, Michereff-Filho M, Inoue-Nagata AK. New features on the genomic organization of a novel dicistrovirus identified from the sweet potato whitefly *Bemisia tabaci*. *Virus Res*. 2020 Aug 7:198112. doi: 10.1016/j.virusres.2020.198112. . PMID: 32777388. <https://pubmed.ncbi.nlm.nih.gov/32777388/>
 77. Chan ACK, Lin H, Koch D, Grass G, Nies DH, **Murphy MEP**. A copper site is required for iron transport by the periplasmic proteins P19 and FetP. *Metallomics*. 2020 Aug 11. doi: 10.1039/d0mt00130a. . PMID: 32780051. <https://pubmed.ncbi.nlm.nih.gov/32780051/>
 78. Koide M, Yamashita T, Murakami K, Uehara S, Nakamura K, Nakamura M, Matsushita M, Ara T, Yasuda H, **Penninger JM**, Takahashi N, Udagawa N, Kobayashi Y. Sclerostin expression in trabecular bone is downregulated by osteoclasts. *Sci Rep*. 2020 Aug 13;10(1):13751. doi: 10.1038/s41598-020-70817-1. PMID: 32792620. <https://pubmed.ncbi.nlm.nih.gov/32792620/>
 79. Conley AJ, Place N, Legacki E, **Hammond GL**, Cunha GR, Drea CM, Weldele ML, Glickman SE. Spotted hyaenas and the sexual spectrum: reproductive endocrinology and development. *J Endocrinol*. 2020 Aug 1;JOE-20-0252.R1. doi: 10.1530/JOE-20-0252. . PMID: 32755997. <https://pubmed.ncbi.nlm.nih.gov/32755997/>
 80. Satti S, Deng P, Matthews K, Duffy SP, **Ma H**. Multiplexed end-point microfluidic chemotaxis assay using centrifugal alignment. *Lab Chip*. 2020 Aug 4. doi: 10.1039/d0lc00311e. . PMID: 32748936. <https://pubmed.ncbi.nlm.nih.gov/32748936/>
 81. Perez SEI, Hahn AS, Krzywinski M, **Hallam SJ**. Hive Panel Explorer: an interactive network visualization tool. *Bioinformatics*. 2020 Jul 27:btaa683. doi: 10.1093/bioinformatics/btaa683. . PMID: 32717050. <https://pubmed.ncbi.nlm.nih.gov/32717050/>
 82. Botezelli JD, Overby P, Lindo L, Wang S, Haïda O, Lim GE, Templeman NM, Pauli JR, **Johnson JD**. Adipose depot-specific upregulation of Ucp1 or mitochondrial oxidative complex proteins are early consequences of genetic insulin reduction in mice. *Am J Physiol Endocrinol Metab*. 2020 Jul 27. doi: 10.1152/ajpendo.00128.2020. . PMID: 32715748. <https://pubmed.ncbi.nlm.nih.gov/32715748/>
 83. Rebollo R, Galvão-Ferrari M, Gagnier L, Zhang Y, Ferraj A, Beck CR, **Lorincz MC**, Mager DL. Inter-Strain Epigenomic Profiling Reveals a Candidate IAP Master Copy in C3H Mice. *Viruses*. 2020 Jul 21;12(7):E783. doi: 10.3390/v12070783. PMID: 32708087. <https://pubmed.ncbi.nlm.nih.gov/32708087/>
 84. Millar D, Hayes C, Jones J, Klapper E, Knip JN, Luu HS, Noland DK, Petitti L, Poisson JL, Spaepen E, Ye Z, **Maurer-Spurej E**. Comparison of the platelet activation status of single-donor platelets obtained with two different cell separator technologies. *Transfusion*. 2020 Jul 29. doi: 10.1111/trf.15934. . PMID: 32729161. <https://pubmed.ncbi.nlm.nih.gov/32729161/>
 85. Khosla K, **Naus CC**, Sin WC. Cx43 in Neural Progenitors Promotes Glioma Invasion in a 3D Culture System. *Int J Mol Sci*. 2020 Jul 23;21(15):E5216. doi: 10.3390/ijms21155216. PMID: 32717889. <https://pubmed.ncbi.nlm.nih.gov/32717889/>
 86. Ooshio T, Yamamoto M, Fujii K, Xin B, Watanabe K, Goto M, Okada Y, Suzuki A, **Penninger JM**, Nishina H, Nishikawa Y. Hepatocyte MKK7 Contributes to Restoration of the Liver Parenchyma Following Injury. *Hepatology*. 2020 Sep 23. doi: 10.1002/hep.31565. . PMID: 32969030. <https://pubmed.ncbi.nlm.nih.gov/32969030/>

87. Shirane K, Miura F, Ito T, **Lorincz MC**. NSD1-deposited H3K36me2 directs de novo methylation in the mouse male germline and counteracts Polycomb-associated silencing. *Nat Genet.* 2020 Sep 14. doi: 10.1038/s41588-020-0689-z. . PMID: 32929285. <https://pubmed.ncbi.nlm.nih.gov/32929285/>
88. Terrado M, Okon M, **McIntosh LP**, Plettner E. Ligand- and pH-Induced Structural Transition of Gypsy Moth *Lymantria dispar* Pheromone-Binding Protein 1 (LdisPBP1). *Biochemistry.* 2020 Sep 11. doi: 10.1021/acs.biochem.0c00592. . PMID: 32877603. <https://pubmed.ncbi.nlm.nih.gov/32877603/>
89. Hagelkruys A, Wirnsberger G, Stadlmann J, Wöhner M, Horrer M, Vilagos B, Jonsson G, Kogler M, Tortola L, Novatchkova M, Bönelt P, Hoffmann D, Kogler R, Steffen U, Schett G, Busslinger M, Bergthaler A, Klein C, **Penninger JM**. A crucial role for Jagunal homolog 1 in humoral immunity and antibody glycosylation in mice and humans. *J Exp Med.* 2021 Jan 4;218(1):e20200559. doi: 10.1084/jem.20200559. PMID: 32930709. <https://pubmed.ncbi.nlm.nih.gov/32930709/>
90. Kolic J, Beet L, Overby P, Cen HH, Panzhinskiy E, Ure DR, Cross JL, Huizinga RB, **Johnson JD**. Differential effects of voclosporin and tacrolimus on insulin secretion from human islets. *Endocrinology.* 2020 Sep 7:bqaa162. doi: 10.1210/endocr/bqaa162. . PMID: 32894758. <https://pubmed.ncbi.nlm.nih.gov/32894758/>
91. Adams A, **Vogl W**. ORP9 Knockdown Delays the Maturation of Junction Related Endocytic Structures in the Testis and Leads to Impaired Sperm Release†. *Biol Reprod.* 2020 Sep 9:ioaa159. doi: 10.1093/biolre/ioaa159. . PMID: 32901807. <https://pubmed.ncbi.nlm.nih.gov/32901807/>
92. Adams A, **Vogl W**, Dawson C, Raverty S, Haulena M, Skoretz SA. Laryngeal and soft palate valving in the harbour seal (*Phoca vitulina*). *J Exp Biol.* 2020 Sep 6:jeb.230201. doi: 10.1242/jeb.230201. . PMID: 32895326. <https://pubmed.ncbi.nlm.nih.gov/32895326/>
93. Francia V, Schifflers RM, **Cullis PR**, Witzigmann D. The Biomolecular Corona of Lipid Nanoparticles for Gene Therapy. *Bioconjug Chem.* 2020 Aug 31. doi: 10.1021/acs.bioconjugchem.0c00366. . PMID: 32786370. <https://pubmed.ncbi.nlm.nih.gov/32786370/>
94. Jara MA, Werneck-De-Castro JP, Lubaczewski C, **Johnson JD**, Bernal-Mizrachi E. Pancreatic and duodenal homeobox-1 (PDX1) contributes to β -cell mass expansion and proliferation induced by Akt/PKB pathway. *Islets.* 2020 Mar 3;12(2):32-40. doi: 10.1080/19382014.2020.1762471. PMID: 32876522. <https://pubmed.ncbi.nlm.nih.gov/32876522/>
95. Majewski DD, Okon M, Heinkel F, Robb CS, Vuckovic M, **McIntosh LP**, **Strynadka NCJ**. Characterization of the Pilotin-Secretin Complex from the *Salmonella enterica* Type III Secretion System Using Hybrid Structural Methods. *Structure.* 2020 Aug 27;S0969-2126(20)30288-4. doi: 10.1016/j.str.2020.08.006. . PMID: 32877645. <https://pubmed.ncbi.nlm.nih.gov/32877645/>
96. Ibarra Moreno CA, Kraeva N, Zvaritch E, Figueroa L, Rios E, Biesecker L, **Van Petegem F**, Hopkins PM, Riaz S. A multi-dimensional analysis of genotype-phenotype discordance in malignant hyperthermia susceptibility. *Br J Anaesth.* 2020 Aug 26;S0007-0912(20)30633-4. doi: 10.1016/j.bja.2020.07.042. . PMID: 32861507. <https://pubmed.ncbi.nlm.nih.gov/32861507/>
97. O'Leary TP, Sullivan KE, Wang L, Clements J, Lemire AL, **Cembrowski MS**. Extensive and spatially variable within-cell-type heterogeneity across the basolateral amygdala. *Elife.* 2020 Sep 1;9:e59003. doi: 10.7554/eLife.59003. . PMID: 32869744. <https://pubmed.ncbi.nlm.nih.gov/32869744/>
98. Sharifkhodaei Z, **Auld VJ**. Overexpressed Gliotactin activates BMP signaling through interfering with the Tkv-Dad association. *Genome.* 2020 Oct 16:1-12. doi: 10.1139/gen-2020-0026. . PMID: 33064024. <https://pubmed.ncbi.nlm.nih.gov/33064024/>
99. Hoiland RL, Fergusson NA, Mitra AR, Griesdale DEG, **Devine DV**, Stukas S, Cooper J, Thiara S, Foster D, Chen LYC, Lee AYY, **Conway EM**, Wellington CL, Sekhon MS. The association of ABO blood group with indices of disease severity and multiorgan dysfunction in COVID-19. *Blood Adv.* 2020 Oct 27;4(20):4981-4989. doi: 10.1182/bloodadvances.2020002623. PMID: 33057633. <https://pubmed.ncbi.nlm.nih.gov/33057633/>
100. Price HR, Lai D, **Kim H**, Wright TE, Coughtrie MWH, Collier AC. Detection and quantitation of non-steroidal anti-inflammatory drug use close to the time of birth using umbilical cord tissue. *Toxicol Rep.* 2020 Sep 8;7:1311-1318. doi: 10.1016/j.toxrep.2020.09.003. PMID: 33072523; PMCID: PMC7548959. <https://pubmed.ncbi.nlm.nih.gov/33072523/>
101. Espinet E, Gu Z, Imbusch CD, Giese NA, Buscher M, Safavi M, Weisenburger S, Klein C, Vogel V, Falcone M, Insua-Rodriguez J, Reitberger M, Thiel V, Kossi SO, Muckenhuber A, Sarai K, Lee AY, Backx E, Zarei S, Gaida MM, Rodriguez-Paredes M, Donato E, Yen HY, Eils R, Schlesner M, Pfarr N, Hackert T, Plass C, Brors B, Steiger K, Weichenhan D, Arda HE, Rooman I, **Kopp JL**, Strobel O, Weichert W, Sprick MR, Trump A. Aggressive PDACs show hypomethylation of repetitive elements and the execution of an intrinsic IFN program linked to a ductal cell-of-origin. *Cancer Discov.* 2020 Oct 15;CD-20-1202. doi: 10.1158/2159-8290.CD-20-1202. . PMID: 33060108. <https://pubmed.ncbi.nlm.nih.gov/33060108/>
102. Amenyogbe N, Dimitriu P, Cho P, Ruck C, Fortuno ES 3rd, Cai B, Alimenti A, Côté HCF, Maan EJ, Slogrove AL, Esser M, Marchant A, Goetghebuer T, Shannon CP, Tebbutt SJ, Kollmann TR, **Mohn WW**, Smolen KK. Innate Immune Responses and Gut Microbiomes Distinguish HIV-Exposed from HIV-Unexposed Children in a Population-Specific Manner. *J Immunol.* 2020 Oct 16;ji2000040. doi: 10.4049/jimmunol.2000040. . PMID: 33067377. <https://pubmed.ncbi.nlm.nih.gov/33067377/>
103. **Overall CM**. The HUPO High-Stringency Inventory of Humanity's Shared Human Proteome Revealed. *J Proteome Res.* 2020 Oct 19. doi: 10.1021/acs.jproteome.0c00794. . PMID: 33074000. <https://pubmed.ncbi.nlm.nih.gov/33074000/>

104. Adhikari S, Nice EC, Deutsch EW, Lane L, Omenn GS, Pennington SR, Paik YK, **Overall CM**, Corrales FJ, Cristea IM, Van Eyk JE, Uhlén M, Lindskog C, Chan DW, Bairoch A, Waddington JC, Justice JL, LaBaer J, Rodriguez H, He F, Kostrzewa M, Ping P, Gundry RL, Stewart P, Srivastava S, Srivastava S, Nogueira FCS, Domont GB, Vandenbrouck Y, Lam MPY, Wennersten S, Vizcaino JA, Wilkins M, Schwenk JM, Lundberg E, Bandeira N, Marko-Varga G, Weintraub ST, Pineau C, Kusebauch U, Moritz RL, Ahn SB, Palmblad M, Snyder MP, Aebersold R, Baker MS. A high-stringency blueprint of the human proteome. *Nat Commun*. 2020 Oct 16;11(1):5301. doi: 10.1038/s41467-020-19045-9. PMID: 33067450; PMCID: PMC7568584. <https://pubmed.ncbi.nlm.nih.gov/33067450/>
105. Genovese I, Giamogante F, Barazzuol L, Battista T, Fiorillo A, Vicario M, D'Alessandro G, Cipriani R, Limatola C, Rossi D, Sorrentino V, Poser E, Mosca L, Squitieri F, Perluigi M, Arena A, **van Petegem F**, Tito C, Fazi F, Giorgi C, Cali T, Ilari A, Colotti G. Sorcin is an early marker of neurodegeneration, Ca²⁺ dysregulation and endoplasmic reticulum stress associated to neurodegenerative diseases. *Cell Death Dis*. 2020 Oct 15;11(10):861. doi: 10.1038/s41419-020-03063-y. PMID: 33060591; PMCID: PMC7566454. <https://pubmed.ncbi.nlm.nih.gov/33060591/>
106. **Teves SS**. Function through absence: Active RNA exclusion from chromosomes leads to proper cell division. *J Cell Biol*. 2020 Nov 2;219(11):e202009193. doi: 10.1083/jcb.202009193. PMID: 33053169. <https://pubmed.ncbi.nlm.nih.gov/33053169/>
107. Sexton DL, **Tocheva EI**. Ultrastructure of Exospore Formation in *Streptomyces* Revealed by Cryo-Electron Tomography. *Front Microbiol*. 2020 Sep 24;11:581135. doi: 10.3389/fmicb.2020.581135. PMID: 33072052; PMCID: PMC7541840. <https://pubmed.ncbi.nlm.nih.gov/33072052/>
108. Sage AP, Ng KW, Marshall EA, Stewart GL, Minatel BC, Enfield KSS, Martin SD, **Brown CJ**, **Abraham N**, Lam WL. Assessment of long non-coding RNA expression reveals novel mediators of the lung tumour immune response. *Sci Rep*. 2020 Oct 9;10(1):16945. doi: 10.1038/s41598-020-73787-6. PMID: 33037279. <https://pubmed.ncbi.nlm.nih.gov/33037279/>
109. Hadjesfandiari N, Levin E, Serrano K, Yi QL, **Devine DV**. Risk analysis of transfusion of cryoprecipitate without consideration of ABO group. *Transfusion*. 2020 Oct 10. doi: 10.1111/trf.16125. . PMID: 33037661. <https://pubmed.ncbi.nlm.nih.gov/33037661/>
110. Shapira T, Rankine-Wilson L, Chao JD, Pichler V, Rens C, Pfeifer T, **Av-Gay Y**. High-Content Screening of Eukaryotic Kinase Inhibitors Identify CHK2 Inhibitor Activity Against *Mycobacterium tuberculosis*. *Front Microbiol*. 2020 Sep 18;11:553962. doi: 10.3389/fmicb.2020.553962. PMID: 33042061; PMCID: PMC7530171. <https://pubmed.ncbi.nlm.nih.gov/33042061/>
111. Behroozian S, Svensson SL, Li LY, **Davies JE**. Broad-Spectrum Antimicrobial and Antibiofilm Activity of a Natural Clay Mineral from British Columbia, Canada. *mBio*. 2020 Oct 6;11(5):e02350-20. doi: 10.1128/mBio.02350-20. PMID: 33024043. <https://pubmed.ncbi.nlm.nih.gov/33024043/>
112. Ayala-Muñoz D, Simister R, **Crowe S**, Macalady J, Burgos WD. Functional redundancy imparts process stability to acidic Fe(II)-oxidizing microbial reactors. *Environ Microbiol*. 2020 Sep 29. doi: 10.1111/1462-2920.15259. . PMID: 32996242. <https://pubmed.ncbi.nlm.nih.gov/32996242/>
113. Fetherolf MM, Levy-Booth DJ, Navas LE, Liu J, Grigg JC, Wilson A, Katahira R, Beckham GT, **Mohn WW**, **Eltis LD**. Characterization of alkylguaiacol-degrading cytochromes P450 for the biocatalytic valorization of lignin. *Proc Natl Acad Sci U S A*. 2020 Sep 28;201916349. doi: 10.1073/pnas.1916349117. . PMID: 32989155. <https://pubmed.ncbi.nlm.nih.gov/32989155/>
114. M A Basher AR, McLaughlin RJ, **Hallam SJ**. Metabolic pathway inference using multi-label classification with rich pathway features. *PLoS Comput Biol*. 2020 Oct 1;16(10):e1008174. doi: 10.1371/journal.pcbi.1008174. PMID: 33001968. <https://pubmed.ncbi.nlm.nih.gov/33001968/>
115. Brink KS, Wu P, Chuong CM, **Richman JM**. The Effects of Premature Tooth Extraction and Damage on Replacement Timing in the Green Iguana. *Integr Comp Biol*. 2020 Jul 6;icaa099. doi: 10.1093/icb/icaa099. . PMID: 32974642. <https://pubmed.ncbi.nlm.nih.gov/32974642/>
116. Xiong R, **Sugioka K**. Improved 3D cellular morphometry of *Caenorhabditis elegans* embryos using a refractive index matching medium. *PLoS One*. 2020 Sep 30;15(9):e0238955. doi: 10.1371/journal.pone.0238955. PMID: 32997668. <https://pubmed.ncbi.nlm.nih.gov/32997668/>
117. Hasan Ali O, Bomze D, Risch L, Brugger SD, Paprotny M, Weber M, Thiel S, Kern L, Albrich WC, Kohler P, Kahlert CR, Vernazza P, Bühler PK, Schüpbach RA, Gómez-Mejía A, Popa AM, Bergthaler A, **Penninger JM**, Flatz L. Severe COVID-19 is associated with elevated serum IgA and antiphospholipid IgA-antibodies. *Clin Infect Dis*. 2020 Sep 30;ciaa1496. doi: 10.1093/cid/ciaa1496. . PMID: 32997739. <https://pubmed.ncbi.nlm.nih.gov/32997739/>
118. Kulkarni JA, Thomson SB, Zaifman J, Leung J, Wagner PK, Hill A, Tam YYC, **Cullis PR**, Petkau TL, Leavitt BR. Spontaneous, solvent-free entrapment of siRNA within lipid nanoparticles. *Nanoscale*. 2020 Nov 26. doi: 10.1039/d0nr06816k. . PMID: 33241838. <https://pubmed.ncbi.nlm.nih.gov/33241838/>
119. Schulze HG, Rangan S, Vardaki M, Iworima D, **Kieffer T**, Blades M, Turner R, Piret JM. EXPRESS: Augmented Two-Dimensional Correlation Spectroscopy for the Joint Analysis of Correlated Changes in Spectroscopic and Disparate Sources. *Appl Spectrosc*. 2020 Nov 24;3702820979331. doi: 10.1177/0003702820979331. . PMID: 33231477. <https://pubmed.ncbi.nlm.nih.gov/33231477/>
120. Canals Hernaez D, Hughes MR, Dean P, Bergqvist P, Samudio I, Blixt O, Wiedemeyer K, Li Y, Bond C, Cruz E, Köbel M, Gilks B, **Roskelley CD**, McNagny KM. PODO447: a novel antibody to a tumor-restricted epitope on the cancer antigen podocalyxin. *J Immunother Cancer*. 2020 Nov;8(2):e001128. doi: 10.1136/jitc-2020-001128. PMID: 33243933. <https://pubmed.ncbi.nlm.nih.gov/33243933/>
121. Sullivan KE, Kendrick RM, **Cembrowski MS**. Elucidating memory in the brain via single-cell transcriptomics. *J Neurochem*. 2020 Nov 23. doi: 10.1111/jnc.15250. . PMID: 33230878. <https://pubmed.ncbi.nlm.nih.gov/33230878/>
122. Gazitúa MC, Vik DR, Roux S, Gregory AC, Bolduc B, Widner B, Mulholland MR, **Hallam SJ**, Ulloa O, Sullivan MB. Potential virus-mediated nitrogen cycling in

- oxygen-depleted oceanic waters. *ISME J.* 2020 Nov 16. doi: 10.1038/s41396-020-00825-6. . PMID: 33199808. <https://pubmed.ncbi.nlm.nih.gov/33199808/>
123. Kubiura-Ichimaru M, Ito T, **Lefebvre L**, Tada M. Cyclic DNA remethylation following active demethylation at euchromatic regions in mouse embryonic stem cells. *Chromosome Res.* 2020 Nov 17. doi: 10.1007/s10577-020-09645-y. . PMID: 33205231. <https://pubmed.ncbi.nlm.nih.gov/33205231/>
 124. Khater IM, **Nabi IR**, Hamarneh G. A Review of Super-Resolution Single-Molecule Localization Microscopy Cluster Analysis and Quantification Methods. *Patterns (N Y).* 2020 Jun 12;1(3):100038. doi: 10.1016/j.patter.2020.100038. PMID: 33205106; PMCID: PMC7660399. <https://pubmed.ncbi.nlm.nih.gov/33205106/>
 125. Attwood KM, Robichaud A, Westhaver LP, Castle EL, Brandman DM, Balgi AD, **Roberge M**, Colp P, Croul S, Kim I, McCormick C, Corcoran JA, Weeks A. Raloxifene prevents stress granule dissolution, impairs translational control and promotes cell death during hypoxia in glioblastoma cells. *Cell Death Dis.* 2020 Nov 17;11(11):989. doi: 10.1038/s41419-020-03159-5. PMID: 33203845; PMCID: PMC7673037. <https://pubmed.ncbi.nlm.nih.gov/33203845/>
 126. Lee J, Worrall LJ, Vuckovic M, Rosell FI, Gentile F, Ton AT, Caveney NA, Ban F, Cherkasov A, Paetzel M, **Strynadka NCJ**. Crystallographic structure of wild-type SARS-CoV-2 main protease acyl-enzyme intermediate with physiological C-terminal autoprocessing site. *Nat Commun.* 2020 Nov 18;11(1):5877. doi: 10.1038/s41467-020-19662-4. PMID: 33208735. <https://pubmed.ncbi.nlm.nih.gov/33208735/>
 127. Fennell LM, Gomez Diaz C, Deszcz L, Kavirayani A, Hoffmann D, Yanagitani K, Schleiffer A, Mechtler K, Hagelkruys A, **Penninger J**, Ikeda F. Site-specific ubiquitination of the E3 ligase HOIP regulates apoptosis and immune signaling. *EMBO J.* 2020 Nov 20:e103303. doi: 10.15252/embj.2019103303. . PMID: 33215740. <https://pubmed.ncbi.nlm.nih.gov/33215740/>
 128. Stebbing J, Sánchez Nieves G, Falcone M, Youhanna S, Richardson P, Ottaviani S, Shen JX, Sommerauer C, Tiseo G, Ghiadoni L, Virdis A, Monzani F, Rizos LR, Forfori F, Avendaño-Céspedes A, De Marco S, Carrozzi L, Lena F, Sánchez-Jurado PM, Lacerenza LG, Cesira N, Caldevilla-Bernardo D, Perrella A, Niccoli L, Méndez LS, Matarrese D, Goletti D, Tan YJ, Monteil V, Dranitsaris G, Cantini F, Farcomeni A, Dutta S, Burley SK, Zhang H, Pistello M, Li W, Mas Romero M, Andrés Pretel F, Simón-Talero RS, García-Molina R, Kutter C, Felce JH, Nizami ZF, Miklosi AG, **Penninger JM**, Menichetti F, Mirazimi A, Abizanda P, Lauschke VM. JAK inhibition reduces SARS-CoV-2 liver infectivity and modulates inflammatory responses to reduce morbidity and mortality. *Sci Adv.* 2020 Nov 13:eabe4724. doi: 10.1126/sciadv.abe4724. . PMID: 33187978. <https://pubmed.ncbi.nlm.nih.gov/33187978/>
 129. Choi JR, Lee JH, Xu A, Matthews K, Xie S, Duffy SP, **Ma H**. Monolithic hydrogel nanowells-in-microwells enabling simultaneous single cell secretion and phenotype analysis. *Lab Chip.* 2020 Nov 17. doi: 10.1039/d0lc00965b. . PMID: 33201962. <https://pubmed.ncbi.nlm.nih.gov/33201962/>
 130. Berryman S, Matthews K, Lee JH, Duffy SP, **Ma H**. Image-based phenotyping of disaggregated cells using deep learning. *Commun Biol.* 2020 Nov 13;3(1):674. doi: 10.1038/s42003-020-01399-x. PMID: 33188302; PMCID: PMC7666170. <https://pubmed.ncbi.nlm.nih.gov/33188302/>
 131. Gammon RR, **Devine D**, Katz LM, Quinley E, Wu Y, Rowe K, Razatos A, Min K, Reichenberg S, Smith R. Buffy coat platelets coming to America: Are we ready? *Transfusion.* 2020 Nov 10. doi: 10.1111/trf.16184. . PMID: 33174258. <https://pubmed.ncbi.nlm.nih.gov/33174258/>
 132. Shim YA, Weliwitigoda A, Campbell T, Dosanjh M, **Johnson P**. Splenic erythroid progenitors decrease TNF α production by macrophages and reduce systemic inflammation in a mouse model of T cell-induced colitis. *Eur J Immunol.* 2020 Nov 12. doi: 10.1002/eji.202048687. . PMID: 33180325. <https://pubmed.ncbi.nlm.nih.gov/33180325/>
 133. Majewski DD, Lyons BJE, Atkinson CE, **Strynadka NCJ**. Cryo-EM analysis of the SctV cytosolic domain from the enteropathogenic E. coli T3SS injectisome. *J Struct Biol.* 2020 Oct 28;212(3):107660. doi: 10.1016/j.jsb.2020.107660. . PMID: 33129970. <https://pubmed.ncbi.nlm.nih.gov/33129970/>
 134. Monteil V, Dyczynski M, Lauschke VM, Kwon H, Wirnsberger G, Youhanna S, Zhang H, Slutsky A, Hurtado Del Pozo C, Horn M, Montserrat N, **Penninger JM**, Mirazimi A. Human soluble ACE2 improves the effect of remdesivir in SARS-CoV-2 infection. *EMBO Mol Med.* 2020 Nov 12:e13426. doi: 10.15252/emmm.202013426. . PMID: 33179852. <https://pubmed.ncbi.nlm.nih.gov/33179852/>
 135. **Penninger JM**, Grant MB, Sung JJY. The Role of Angiotensin Converting Enzyme 2 (ACE2) in Modulating Gut Microbiota, Intestinal Inflammation, and Coronavirus Infection. *Gastroenterology.* 2020 Oct 29:S0016-5085(20)35327-0. doi: 10.1053/j.gastro.2020.07.067. . PMID: 33130103. <https://pubmed.ncbi.nlm.nih.gov/33130103/>
 136. Berndt AJ, Othonos KM, Lian T, Flibotte S, Miao M, Buiyan S, Cho RY, Fong JS, Hur SA, Pavlidis P, **Allan DW**. A low affinity cis-regulatory BMP response element restricts target gene activation to subsets of Drosophila neurons. *Elife.* 2020 Oct 30;9:e59650. doi: 10.7554/eLife.59650. . PMID: 33124981. <https://pubmed.ncbi.nlm.nih.gov/33124981/>
 137. Vesnaver E, Goldman M, O'Brien S, MacPherson P, Butler-Foster T, Lapierre D, Otis J, **Devine DV**, Germain M, Rosser A, MacDonagh R, Randall T, Osbourne-Sorrell W, Clement-Thorne B, Al-Bakri TB, Rubini KA, Hill NE, Presseau J. Barriers and enablers to source plasma donation by gay, bisexual and other men who have sex with men under revised eligibility criteria: protocol for a multiple stakeholder feasibility study. *Health Res Policy Syst.* 2020 Nov 2;18(1):131. doi: 10.1186/s12961-020-00643-4. PMID: 33138828; PMCID: PMC7605323. <https://pubmed.ncbi.nlm.nih.gov/33138828/>
 138. Levy-Booth DJ, Hashimi A, Roccor R, Liu LY, Renneckar S, **Eltis LD**, **Mohn WW**. Genomics and metatranscriptomics of biogeochemical cycling and degradation of lignin-derived aromatic compounds in thermal swamp sediment. *ISME J.* 2020 Nov 2. doi: 10.1038/s41396-020-00820-x. . PMID: 33139871. <https://pubmed.ncbi.nlm.nih.gov/33139871/>
 139. Irwin NAT, Pittis AA, Mathur V, **Howe LJ**, Keeling PJ, Lynn DH, Bourland WA. The Function and Evolution of Motile DNA Replication Systems in Ciliates. *Curr Biol.* 2020 Oct 27:S0960-9822(20)31447-0. doi: 10.1016/j.cub.2020.09.077. . PMID: 33125869. <https://pubmed.ncbi.nlm.nih.gov/33125869/>

140. Pereira S, Cline DL, Glavas MM, Covey SD, **Kieffer TJ**. Tissue-specific effects of leptin on glucose and lipid metabolism. *Endocr Rev*. 2020 Nov 5;bnaa027. doi: 10.1210/rev/bnaa027. . PMID: 33150398. <https://pubmed.ncbi.nlm.nih.gov/33150398/>
141. Wallert M, Nie C, Anilkumar P, Abbina S, Bhatia S, Ludwig K, **Kizhakkedathu JN**, Haag R, Block S. Mucin-Inspired, High Molecular Weight Virus Binding Inhibitors Show Biphasic Binding Behavior to Influenza A Viruses. *Small*. 2020 Nov 1:e2004635. doi: 10.1002/smll.202004635. . PMID: 33135314. <https://pubmed.ncbi.nlm.nih.gov/33135314/>
142. Millington JW, **Rideout EJ**. Sexual Dimorphism: Ecdysone Modulates Sex Differences in the Gut. *Curr Biol*. 2020 Nov 2;30(21):R1327-R1330. doi: 10.1016/j.cub.2020.08.088. PMID: 33142105. <https://pubmed.ncbi.nlm.nih.gov/33142105/>
143. Pazos M, Peters K, Boes A, Safaei Y, Kenward C, Caveney NA, Laguri C, Breukink E, **Strynadka NCJ**, Simorre JP, Terrak M, Vollmer W. SPOR Proteins Are Required for Functionality of Class A Penicillin-Binding Proteins in *Escherichia coli*. *mBio*. 2020 Nov 3;11(6):e02796-20. doi: 10.1128/mBio.02796-20. PMID: 33144379. <https://pubmed.ncbi.nlm.nih.gov/33144379/>
144. Cheung YWS, Nam SE, **Yip CK**. Recent Advances in Single-Particle Electron Microscopic Analysis of Autophagy Degradation Machinery. *Int J Mol Sci*. 2020 Oct 28;21(21):E8051. doi: 10.3390/ijms21218051. PMID: 33126766. <https://pubmed.ncbi.nlm.nih.gov/33126766/>
145. Zoufaly A, Poglitsch M, Aberle JH, Hoepler W, Seitz T, Traugott M, Grieb A, Pawelka E, Laferl H, Wenisch C, Neuhold S, Haider D, Stiasny K, Bergthaler A, Puchhammer-Stoeckl E, Mirazimi A, Montserrat N, Zhang H, Slutsky AS, **Penninger JM**. Human recombinant soluble ACE2 in severe COVID-19. *Lancet Respir Med*. 2020 Nov;8(11):1154-1158. doi: 10.1016/S2213-2600(20)30418-5. Epub 2020 Sep 24. Erratum in: *Lancet Respir Med*. 2020 Nov;8(11):e78. PMID: 33131609; PMCID: PMC7515587. <https://pubmed.ncbi.nlm.nih.gov/33131609/>
146. Toews JN, **Hammond GL**, **Viau V**. Liver at the nexus of rat postnatal HPA axis maturation and sexual dimorphism. *J Endocrinol*. 2020 Oct 1:JOE-20-0286.R1. doi: 10.1530/JOE-20-0286. . PMID: 33112814. <https://pubmed.ncbi.nlm.nih.gov/33112814/>
147. Cloherty APM, Olmstead AD, Ribeiro CMS, **Jean F**. Hijacking of Lipid Droplets by Hepatitis C, Dengue and Zika Viruses-From Viral Protein Moonlighting to Extracellular Release. *Int J Mol Sci*. 2020 Oct 24;21(21):E7901. doi: 10.3390/ijms21217901. PMID: 33114346. <https://pubmed.ncbi.nlm.nih.gov/33114346/>
148. Li S, Huang Z, Li X, Zhao Y, Jiang X, Wen Y, Luo H, Wang L, Guan Q, Cafeeva I, **Brooks DE**, Ngan CYC, **Kizhakkedathu JN**, Du C. Evaluation of hyperbranched polyglycerol for cold perfusion and storage of donor kidneys in a pig model of kidney autotransplantation. *J Biomed Mater Res B Appl Biomater*. 2020 Oct 24:e34750. doi: 10.1002/jbm.b.34750. . PMID: 33098184. <https://pubmed.ncbi.nlm.nih.gov/33098184/>
149. Richard Albert J, Au Yeung WK, Toriyama K, Kobayashi H, Hirasawa R, Brind'Amour J, Bogutz A, Sasaki H, **Lorincz M**. Maternal DNMT3A-dependent de novo methylation of the paternal genome inhibits gene expression in the early embryo. *Nat Commun*. 2020 Oct 27;11(1):5417. doi: 10.1038/s41467-020-19279-7. PMID: 33110091. <https://pubmed.ncbi.nlm.nih.gov/33110091/>
150. Price RM, Budzynski MA, Kundra S, **Teves SS**. Advances in visualizing transcription factor-DNA interactions. *Genome*. 2020 Oct 28. doi: 10.1139/gen-2020-0086. . PMID: 33113335. <https://pubmed.ncbi.nlm.nih.gov/33113335/>
151. Shin T, Hiraoka Y, Yamasaki T, Marth JD, **Penninger JM**, Kanai-Azuma M, Tanaka K, Kofuji S, Nishina H. MKK7-deficiency in mature neurons impairs parental behavior in mice. *Genes Cells*. 2020 Oct 23. doi: 10.1111/gtc.12816. . PMID: 33098150. <https://pubmed.ncbi.nlm.nih.gov/33098150/>
152. Gerak CAN, Zhang SM, Balgi AD, **Sadowski IJ**, Sessions RB, **McIntosh LP**, **Roberge M**. A Multipronged Screening Approach Targeting Inhibition of ETV6 PNT Domain Polymerization. *SLAS Discov*. 2020 Dec 21:2472555220979599. doi: 10.1177/2472555220979599. . PMID: 33345679. <https://pubmed.ncbi.nlm.nih.gov/33345679/>
153. Hillebrand GG, Dimitriu P, Malik K, Park Y, Qu D, **Mohn WW**, Kong R. Temporal Variation of the Facial Skin Microbiome: A 2-Year Longitudinal Study in Healthy Adults. *Plast Reconstr Surg*. 2021 Jan 1;147(1S-2):50S-61S. doi: 10.1097/PRS.0000000000007621. PMID: 33347075. <https://pubmed.ncbi.nlm.nih.gov/33347075/>
154. M A Basher AR, **Hallam SJ**. Leveraging heterogeneous network embedding for metabolic pathway prediction. *Bioinformatics*. 2020 Oct 20:btaa906. doi: 10.1093/bioinformatics/btaa906. . PMID: 33305310. <https://pubmed.ncbi.nlm.nih.gov/33305310/>
155. Márquez AC, Shanina I, **Horwitz MS**. Multiple Sclerosis-Like Symptoms in Mice Are Driven by Latent γ Herpesvirus-68 Infected B Cells. *Front Immunol*. 2020 Nov 19;11:584297. doi: 10.3389/fimmu.2020.584297. PMID: 33329556; PMCID: PMC7711133. <https://pubmed.ncbi.nlm.nih.gov/33329556/>
156. Shannon CP, Blimkie TM, Ben-Othman R, Gladish N, Amenyogbe N, Drissler S, Edgar RD, Chan Q, Krajden M, Foster LJ, Kobor MS, **Mohn WW**, Brinkman RR, Le Cao KA, Scheuermann RH, Tebbutt SJ, Hancock REW, Koff WC, Kollmann TR, Sadarangani M, Lee AH. Multi-Omic Data Integration Allows Baseline Immune Signatures to Predict Hepatitis B Vaccine Response in a Small Cohort. *Front Immunol*. 2020 Nov 30;11:578801. doi: 10.3389/fimmu.2020.578801. PMID: 33329547; PMCID: PMC7734088. <https://pubmed.ncbi.nlm.nih.gov/33329547/>
157. Gómez-Aleza C, Nguyen B, Yoldi G, Ciscar M, Barranco A, Hernández-Jiménez E, Maetens M, Salgado R, Zafeirolou M, Pellegrini P, Venet D, Garaud S, Trinidad EM, Benítez S, Vuylsteke P, Polastro L, Wildiers H, Simon P, Lindeman G, Larsimont D, Van den Eynden G, Velghe C, Rothé F, Willard-Gallo K, Michiels S, Muñoz P, Walzer T, Planelles L, **Penninger J**, Azim HA Jr, Loi S, Piccart M, Sotiriou C, González-Suárez E. Inhibition of RANK signaling in breast cancer induces an anti-tumor immune response orchestrated by CD8⁺ T cells. *Nat Commun*. 2020 Dec 10;11(1):6335. doi: 10.1038/s41467-020-20138-8. PMID: 33303745; PMCID: PMC7728758. <https://pubmed.ncbi.nlm.nih.gov/33303745/>

158. Farrera-Calderon RG, Pallegar P, Westbye AB, Wiesmann C, Lang AS, **Beatty JT**. The CckA-ChpT-CtrA phosphorelay controlling *Rhodobacter capsulatus* gene transfer agent (RcGTA) production is bi-directional and regulated by cyclic-di-GMP. *J Bacteriol*. 2020 Dec 7;JB.00525-20. doi: 10.1128/JB.00525-20. PMID: 33288624. <https://pubmed.ncbi.nlm.nih.gov/33288624/>
159. Chazeirat T, Denamur S, Bojarski KK, Andrault PM, Sizaret D, Zhang F, Saidi A, Tardieu M, Linhardt RJ, Labarthe F, **Brömme D**, Samsonov SA, Lalmanach G, Lecaillon F. The abnormal accumulation of heparan sulfate in patients with mucopolysaccharidosis prevents the elastolytic activity of cathepsin V. *Carbohydr Polym*. 2021 Feb 1;253:117261. doi: 10.1016/j.carbpol.2020.117261. Epub 2020 Oct 20. PMID: 33278943. <https://pubmed.ncbi.nlm.nih.gov/33278943/>
160. Salmikangas S, Laiho JE, Kalander K, Laajala M, Honkima A, Shanina I, Oikarinen S, **Horwitz MS**, Hyöty H, Marjomäki V. Detection of Viral -RNA and +RNA Strands in Enterovirus-Infected Cells and Tissues. *Microorganisms*. 2020 Dec 4;8(12):E1928. doi: 10.3390/microorganisms8121928. PMID: 33291747. <https://pubmed.ncbi.nlm.nih.gov/33291747/>
161. **Overall CM**. The Human Proteome: 90% in the Light, 10% on the Dark Side. *J Proteome Res*. 2020 Dec 4;19(12):4731-4734. doi: 10.1021/acs.jproteome.0c00914. PMID: 33272019. <https://pubmed.ncbi.nlm.nih.gov/33272019/>
162. Jenkins ML, Harris NJ, Dalwadi U, Fleming KD, Ziemianowicz DS, Rafiei A, Martin EM, Schriemer DC, **Yip CK**, Burke JE. The substrate specificity of the human TRAPPII complex's Rab-guanine nucleotide exchange factor activity. *Commun Biol*. 2020 Dec 4;3(1):735. doi: 10.1038/s42003-020-01459-2. PMID: 33277614; PMCID: PMC7719173. <https://pubmed.ncbi.nlm.nih.gov/33277614/>
163. Tsukasaki M, Huynh NC, Okamoto K, Muro R, Terashima A, Kurikawa Y, Komatsu N, Pluemsakunthai W, Nitta T, Abe T, Kiyonari H, Okamura T, Sakai M, Matsukawa T, Matsumoto M, Kobayashi Y, **Penninger JM**, Takayanagi H. Stepwise cell fate decision pathways during osteoclastogenesis at single-cell resolution. *Nat Metab*. 2020 Dec 7. doi: 10.1038/s42255-020-00318-y. PMID: 33288951. <https://pubmed.ncbi.nlm.nih.gov/33288951/>
164. Long RKM, Moriarty KP, Cardoen B, Gao G, **Vogl AW**, Jean F, Hamarneh G, **Nabi IR**. Super resolution microscopy and deep learning identify Zika virus reorganization of the endoplasmic reticulum. *Sci Rep*. 2020 Dec 1;10(1):20937. doi: 10.1038/s41598-020-77170-3. PMID: 33262363; PMCID: PMC7708840. <https://pubmed.ncbi.nlm.nih.gov/33262363/>
165. Ben-Othman R, Cai B, Liu AC, Varankovich N, He D, Blimkie TM, Lee AH, Gill EE, Novotny M, Aevermann B, Drissler S, Shannon CP, McCann S, Marty K, Bjornson G, Edgar RD, Lin DTS, Gladish N, MacIsaac J, Amenyogbe N, Chan Q, Llibre A, Collin J, Landais E, Le K, Reiss SM, Koff WC, Havenar-Daughton C, Heran M, Sangha B, Walt D, Krajden M, Crotty S, Sok D, Briney B, Burton DR, Duffy D, Foster LJ, **Mohn WW**, Kobor MS, Tebbutt SJ, Brinkman RR, Scheuermann RH, Hancock REW, Kollmann TR, Sadarangani M. Systems Biology Methods Applied to Blood and Tissue for a Comprehensive Analysis of Immune Response to Hepatitis B Vaccine in Adults. *Front Immunol*. 2020 Nov 4;11:580373. doi: 10.3389/fimmu.2020.580373. PMID: 33250895; PMCID: PMC7672042. <https://pubmed.ncbi.nlm.nih.gov/33250895/>
166. Yang H, Mirsepasi-Lauridsen HC, Struve C, Allaire JM, Sivignon A, **Vogl W**, Bosman ES, Ma C, Fotovati A, Reid GS, Li X, Petersen AM, Gouin SG, Barnich N, Jacobson K, Yu HB, Krogfelt KA, Vallance BA. Ulcerative Colitis-associated *E. coli* pathobionts potentiate colitis in susceptible hosts. *Gut Microbes*. 2020 Dec 1:1-19. doi: 10.1080/19490976.2020.1847976. PMID: 33258388. <https://pubmed.ncbi.nlm.nih.gov/33258388/>
167. Shpilka T, Du Y, Yang Q, Melber A, Uma Naresh N, Lavelle J, Kim S, Liu P, **Weidberg H**, Li R, Yu J, Zhu LJ, Strittmatter L, Haynes CM. UPRmt scales mitochondrial network expansion with protein synthesis via mitochondrial import in *Caenorhabditis elegans*. *Nat Commun*. 2021 Jan 20;12(1):479. doi: 10.1038/s41467-020-20784-y. PMID: 33473112. <https://pubmed.ncbi.nlm.nih.gov/33473112/>
168. Terada T, Kulkarni JA, Huynh A, Chen S, van der Meel R, Tam YYC, **Cullis PR**. Characterization of Lipid Nanoparticles Containing Ionizable Cationic Lipids Using Design-of-Experiments Approach. *Langmuir*. 2021 Jan 13. doi: 10.1021/acs.langmuir.0c03039. PMID: 33439022. <https://pubmed.ncbi.nlm.nih.gov/33439022/>
169. Martin BJE, Brind'Amour J, Kuzmin A, Jensen KN, Liu ZC, **Lorincz M**, **Howe LJ**. Transcription shapes genome-wide histone acetylation patterns. *Nat Commun*. 2021 Jan 11;12(1):210. doi: 10.1038/s41467-020-20543-z. PMID: 33431884. <https://pubmed.ncbi.nlm.nih.gov/33431884/>
170. Mohamud Y, Xue YC, Liu H, Ng CS, Bahreyni A, **Jan E**, Luo H. The papain-like protease of coronaviruses cleaves ULK1 to disrupt host autophagy. *Biochem Biophys Res Commun*. 2021 Jan 8;540:75-82. doi: 10.1016/j.bbrc.2020.12.091. PMID: 33450483. <https://pubmed.ncbi.nlm.nih.gov/33450483/>
171. Gerak CAN, Cho SY, Kolesnikov M, Okon M, **Murphy MEP**, Sessions RB, **Roberge M**, **McIntosh LP**. Biophysical characterization of the ETV6 PNT domain polymerization interfaces. *J Biol Chem*. 2021 Jan 12;296(1):100284. doi: 10.1016/j.jbc.2021.100284. PMID: 33450226. <https://pubmed.ncbi.nlm.nih.gov/33450226/>
172. Amenyogbe N, Dimitriu P, Smolen KK, Brown EM, Shannon CP, Tebbutt SJ, Cooper PJ, Marchant A, Goetghebuer T, Esser M, Finlay BB, Kollmann TR, **Mohn WW**. Biogeography of the Relationship between the Child Gut Microbiome and Innate Immune System. *mBio*. 2021 Jan 12;12(1):e03079-20. doi: 10.1128/mBio.03079-20. PMID: 33436437. <https://pubmed.ncbi.nlm.nih.gov/33436437/>
173. Millington JW, Brownrigg GP, Chao C, Sun Z, Basner-Collins PJ, Wat LW, Hudry B, Miguel-Aliaga I, **Rideout EJ**. Female-biased upregulation of insulin pathway activity mediates the sex difference in *Drosophila* body size plasticity. *Elife*. 2021 Jan 15;10:e58341. doi: 10.7554/eLife.58341. PMID: 33448263. <https://pubmed.ncbi.nlm.nih.gov/33448263/>
174. Terada T, Kulkarni JA, Huynh A, Tam YYC, **Cullis P**. Protective Effect of Edaravone against Cationic Lipid-Mediated Oxidative Stress and Apoptosis. *Biol Pharm Bull*. 2021;44(1):144-149. doi: 10.1248/bpb.b20-00679. PMID: 33390543. <https://pubmed.ncbi.nlm.nih.gov/33390543/>

175. Perez-Borrajerio C, Heinkel F, Gsponer J, **McIntosh LP**. Conformational Plasticity and DNA-Binding Specificity of the Eukaryotic Transcription Factor Pax5. *Biochemistry*. 2021 Jan 5. doi: 10.1021/acs.biochem.0c00737. . PMID: 33398994. <https://pubmed.ncbi.nlm.nih.gov/33398994/>
176. Mesnil M, Defamie N, **Naus C**, Sarrouilhe D. Brain Disorders and Chemical Pollutants: A Gap Junction Link? *Biomolecules*. 2020 Dec 31;11(1):E51. doi: 10.3390/biom11010051. PMID: 33396565. <https://pubmed.ncbi.nlm.nih.gov/33396565/>
177. Hepburn M, Saltzberg DJ, Lee L, Fang S, Atkinson C, **Strynadka NCJ**, Sali A, Lees-Miller SP, Schriemer DC. The active DNA-PK holoenzyme occupies a tensed state in a staggered synaptic complex. *Structure*. 2020 Dec 30:S0969-2126(20)30473-1. doi: 10.1016/j.str.2020.12.006. . PMID: 33412091. <https://pubmed.ncbi.nlm.nih.gov/33412091/>
178. Moulson AJ, **Av-Gay Y**. BCG immunomodulation: From the 'hygiene hypothesis' to COVID-19. *Immunobiology*. 2020 Dec 24;226(1):152052. doi: 10.1016/j.imbio.2020.152052. . PMID: 33418320. <https://pubmed.ncbi.nlm.nih.gov/33418320/>
179. Noonan AJC, Qiu Y, Ho JCH, Ocampo J, Vreugdenhil KA, Marr RA, Zhao Z, Yoshikuni Y, **Hallam SJ**. CRAGE-mediated insertion of fluorescent chromosomal markers for accurate and scalable measurement of co-culture dynamics in *Escherichia coli*. *Synth Biol (Oxf)*. 2020 Sep 3;5(1):ysaa015. doi: 10.1093/synbio/ysaa015. PMID: 33381654; PMCID: PMC7751189. <https://pubmed.ncbi.nlm.nih.gov/33381654/>
180. Garces FA, Scortecci JF, **Molday RS**. Functional Characterization of ABCA4 Missense Variants Linked to Stargardt Macular Degeneration. *Int J Mol Sci*. 2020 Dec 27;22(1):E185. doi: 10.3390/ijms22010185. PMID: 33375396. <https://pubmed.ncbi.nlm.nih.gov/33375396/>
181. Tam V, Chen P, Yee A, Solis N, Klein T, Kudelko M, Sharma R, Chan WC, **Overall CM**, Haglund L, Sham PC, Cheah KSE, Chan D. DIPPER, a spatiotemporal proteomics atlas of human intervertebral discs for exploring ageing and degeneration dynamics. *Elife*. 2020 Dec 31;9:e64940. doi: 10.7554/eLife.64940. . PMID: 33382035. <https://pubmed.ncbi.nlm.nih.gov/33382035/>
182. McLean MA, Niknafs N, Scoten OC, Chau CMY, MacKay M, **Weinberg J**, Synnes A, Miller SP, Grunau RE. Sensory processing and cortisol at age 4 years: Procedural pain-related stress in children born very preterm. *Dev Psychobiol*. 2020 Dec 29. doi: 10.1002/dev.22079. . PMID: 33377181. <https://pubmed.ncbi.nlm.nih.gov/33377181/>
183. Beskrovnaya P, Fakih D, Morneau I, Hashimi A, Bello DG, Xing S, Nanci A, Huan T, **Tocheva EI**. No endospore formation confirmed in members of the phylum Proteobacteria. *Appl Environ Microbiol*. 2020 Dec 18:AEM.02312-20. doi: 10.1128/AEM.02312-20. . PMID: 33355101. <https://pubmed.ncbi.nlm.nih.gov/33355101/>
184. Paolino M, Kogelgruber R, Cronin SJF, Uribealago I, Rauscher E, Harreiter J, Schuster M, Bancher-Todesca D, Pranjic B, Novatchkova M, Fededa JP, White AJ, Sigl V, Dekan S, Penz T, Bock C, Kenner L, Holländer GA, Anderson G, Kautzky-Willer A, **Penninger JM**. RANK links thymic regulatory T cells to fetal loss and gestational diabetes in pregnancy. *Nature*. 2020 Dec 23. doi: 10.1038/s41586-020-03071-0. . PMID: 33361811. <https://pubmed.ncbi.nlm.nih.gov/33361811/>
185. Balaton BP, Fornes O, Wasserman WW, **Brown CJ**. Cross-species examination of X-chromosome inactivation highlights domains of escape from silencing. *Epigenetics Chromatin*. 2021 Feb 17;14(1):12. doi: 10.1186/s13072-021-00386-8. PMID: 33597016. <https://pubmed.ncbi.nlm.nih.gov/33597016/>
186. Goel R, Bloch EM, Pirenne F, Al-Riyami AZ, Crowe E, Dau L, Land K, Townsend M, Jecko T, Rahimi-Levene N, Patidar G, Josephson CD, Arora S, Vermeulen M, Vrieling H, Montemayor C, Oreh A, Hindawi S, van den Berg K, Serrano K, So-Osman C, Wood E, **Devine DV**, Spitalnik SL; ISBT COVID-19 Working Group. ABO blood group and COVID-19: a review on behalf of the ISBT COVID-19 working group. *Vox Sang*. 2021 Feb 12. doi: 10.1111/vox.13076. . PMID: 33578447. <https://pubmed.ncbi.nlm.nih.gov/33578447/>
187. Kumaran K, Krishnaveni GV, Suryanarayana KG, Prasad MP, Belavendra A, Atkinson S, Balasubramaniam R, Bandsma RHJ, Bhutta ZA, Chandak GR, Comelli EM, Davidge ST, Dennis CL, **Hammond GL**, Jha P, Joseph KS, Joshi SR, Krishna M, Lee K, Lye S, McGowan P, Nepomnaschy P, Padvetnaya V, Pyne S, Sachdev HS, Sahariah SA, Singhal N, Trasler J, Yajnik CS, Baird J, Barker M, Martin MC, Husain N, Sellen D, Fall CHD, Shah PS, Matthews SG. Protocol for a cluster randomised trial evaluating a multifaceted intervention starting preconceptionally-Early Interventions to Support Trajectories for Healthy Life in India (EINSTEIN): a Healthy Life Trajectories Initiative (HeLTI) Study. *BMJ Open*. 2021 Feb 16;11(2):e045862. doi: 10.1136/bmjopen-2020-045862. PMID: 33593789. <https://pubmed.ncbi.nlm.nih.gov/33593789/>
188. Lismer A, Dumeaux V, Lafleur C, Lambrot R, Brind'Amour J, **Lorincz MC**, Kimmins S. Histone H3 lysine 4 trimethylation in sperm is transmitted to the embryo and associated with diet-induced phenotypes in the offspring. *Dev Cell*. 2021 Feb 15:S1534-5807(21)00072-1. doi: 10.1016/j.devcel.2021.01.014. . PMID: 33596408. <https://pubmed.ncbi.nlm.nih.gov/33596408/>
189. Tamura K, Dejean G, **Van Petegem F**, Brumer H. Distinct protein architectures mediate species-specific beta-glucan binding and metabolism in the human gut microbiota. *J Biol Chem*. 2021 Feb 12:100415. doi: 10.1016/j.jbc.2021.100415. . PMID: 33587952. <https://pubmed.ncbi.nlm.nih.gov/33587952/>
190. Maheux AF, Boudreau DK, Abed JY, Bérubé É, Brodeur S, Bernard KA, Hashimi A, Ducrey É, Guay ÉF, Raymond F, Corbeil J, Domingo MC, Roy PH, Boissinot M, **Tocheva EI**, Omar RF. *Criibacterium bergeronii* gen. nov., sp. nov., a new member of the family Peptostreptococcaceae, isolated from human clinical samples. *Int J Syst Evol Microbiol*. 2021 Feb 15. doi: 10.1099/ijsem.0.004691. . PMID: 33586648. <https://pubmed.ncbi.nlm.nih.gov/33586648/>
191. Turgu B, Zhang F, El-Naggar A, Negri GL, Kogler M, Tortola L, Johnson F, Ng T, Li A, Yapp D, Lockwood W, Martinez D, Maris JM, Dugaard M, **Penninger JM**, Hughes CS, Sorensen PH. HACE1 blocks HIF1 α accumulation under hypoxia in a RAC1 dependent manner. *Oncogene*. 2021 Feb 18. doi: 10.1038/s41388-021-01680-1. . PMID: 33603169. <https://pubmed.ncbi.nlm.nih.gov/33603169/>

192. Heidari E, Harrison AN, Jafarinia E, Tavasoli AR, Almadani N, **Molday RS**, Garshasbi M. Novel variants in critical domains of ATP8A2 and expansion of clinical spectrum. *Hum Mutat.* 2021 Feb 10. doi: 10.1002/humu.24180. . PMID: 33565221. <https://pubmed.ncbi.nlm.nih.gov/33565221/>
193. Mischkulnig M, Kiesel B, Lötsch D, Roetzer T, Borkovec M, Wadiura LI, Roessler K, Hervey-Jumper S, **Penninger JM**, Berger MS, Widhalm G, Erhart F. Heme Biosynthesis mRNA Expression Signature: Towards a Novel Prognostic Biomarker in Patients with Diffusely Infiltrating Gliomas. *Cancers (Basel).* 2021 Feb 7;13(4):662. doi: 10.3390/cancers13040662. PMID: 33562253. <https://pubmed.ncbi.nlm.nih.gov/33562253/>
194. Rayani K, Seffernick J, Li AY, Davis JP, Spuches AM, **Van Petegem F**, Solaro RJ, Lindert S, Tibbits GF. Binding of calcium and magnesium to human cardiac Troponin C. *J Biol Chem.* 2021 Feb 3:100350. doi: 10.1016/j.jbc.2021.100350. . PMID: 33548225. <https://pubmed.ncbi.nlm.nih.gov/33548225/>
195. Woll KA, Haji-Ghassemi O, **Van Petegem F**. Pathological conformations of disease mutant Ryanodine Receptors revealed by cryo-EM. *Nat Commun.* 2021 Feb 5;12(1):807. doi: 10.1038/s41467-021-21141-3. PMID: 33547325. <https://pubmed.ncbi.nlm.nih.gov/33547325/>
196. Holman PJ, Rainecki C, Chao A, Grewal R, Haghighat S, Fung C, Morgan E, Ellis L, Yu W, **Weinberg J**. Altered social recognition memory and hypothalamic neuropeptide expression in adolescent male and female rats following prenatal alcohol exposure and/or early-life adversity. *Psychoneuroendocrinology.* 2021 Jan 21;126:105146. doi: 10.1016/j.psychneuen.2021.105146. . PMID: 33517167. <https://pubmed.ncbi.nlm.nih.gov/33517167/>
197. Lin H, Ascher DB, Myung Y, Lamborg CH, **Hallam SJ**, Gionfriddo CM, Holt KE, Moreau JW. Mercury methylation by metabolically versatile and cosmopolitan marine bacteria. *ISME J.* 2021 Jan 27. doi: 10.1038/s41396-020-00889-4. . PMID: 33504941. <https://pubmed.ncbi.nlm.nih.gov/33504941/>
198. Song X, Ji H, Li Y, Xiong Y, Qiu L, Zhong R, Tian M, **Kizhakkedathu JN**, Su B, Wei Q, Zhao W, Zhao C. Transient blood thinning during extracorporeal blood purification via the inactivation of coagulation factors by hydrogel microspheres. *Nat Biomed Eng.* 2021 Jan 25. doi: 10.1038/s41551-020-00673-x. . PMID: 33495638. <https://pubmed.ncbi.nlm.nih.gov/33495638/>
199. Mora M, Mell JC, Ehrlich GD, Ehrlich RL, **Redfield RJ**. Genome-wide analysis of DNA uptake across the outer membrane of naturally competent *Haemophilus influenzae*. *iScience.* 2020 Dec 30;24(1):102007. doi: 10.1016/j.isci.2020.102007. PMID: 33490915; PMCID: PMC7811141. <https://pubmed.ncbi.nlm.nih.gov/33490915/>
200. Shimell JJ, Globa A, Sepers MD, Wild AR, Matin N, Raymond LA, **Bamji SX**. Regulation of hippocampal excitatory synapses by the *Zdhc5* palmitoyl acyl transferase. *J Cell Sci.* 2021 Mar 23:jcs.254276. doi: 10.1242/jcs.254276. . PMID: 33758079. <https://pubmed.ncbi.nlm.nih.gov/33758079/>
201. Dixon-McDougall T, **Brown CJ**. Independent domains for recruitment of PRC1 and PRC2 by human XIST. *PLoS Genet.* 2021 Mar 22;17(3):e1009123. doi: 10.1371/journal.pgen.1009123. . PMID: 33750950. <https://pubmed.ncbi.nlm.nih.gov/33750950/>
202. Arbaeen AF, Schubert P, Sheffield WP, **Devine DV**. Pathogen reduction of whole blood: Supplementing fibrinogen partly corrects clot formation in a massive transfusion model. *Transfusion.* 2021 Mar 21. doi: 10.1111/trf.16382. . PMID: 33745131. <https://pubmed.ncbi.nlm.nih.gov/33745131/>
203. Notonier S, Werner AZ, Kuatsjah E, Dumalo L, Abraham PE, Hatmaker EA, Hoyt CB, Amore A, Ramirez KJ, Woodworth SP, Klingeman DM, Giannone RJ, Guss AM, Hettich RL, **Eltis LD**, Johnson CW, Beckham GT. Metabolism of syringyl lignin-derived compounds in *Pseudomonas putida* enables convergent production of 2-pyrone-4,6-dicarboxylic acid. *Metab Eng.* 2021 Mar 16;65:111-122. doi: 10.1016/j.ymben.2021.02.005. . PMID: 33741529. <https://pubmed.ncbi.nlm.nih.gov/33741529/>
204. Safabakhsh S, Panwar P, Barichello S, Sangha SS, Hanson PJ, **Van Petegem F**, Laksman Z. The Role of Phosphorylation in Atrial Fibrillation: A Focus on Mass Spectrometry Approaches. *Cardiovasc Res.* 2021 Mar 21:cvab095. doi: 10.1093/cvr/cvab095. . PMID: 33744917. <https://pubmed.ncbi.nlm.nih.gov/33744917/>
205. Danescu A, Rens EG, Rehki J, Woo J, Akazawa T, Fu K, Edelstein-Keshet L, **Richman JM**. Symmetry and fluctuation of cell movements in neural crest-derived facial mesenchyme. *Development.* 2021 Mar 23:dev.193755. doi: 10.1242/dev.193755. . PMID: 33757991. <https://pubmed.ncbi.nlm.nih.gov/33757991/>
206. Baradaran-Heravi A, Balgi AD, Hosseini-Farahabadi S, Choi K, Has C, **Roberge M**. Effect of small molecule eRF3 degraders on premature termination codon readthrough. *Nucleic Acids Res.* 2021 Mar 25:gkab194. doi: 10.1093/nar/gkab194. . PMID: 33764477. <https://pubmed.ncbi.nlm.nih.gov/33764477/>
207. Slaine PD, Kleer M, Duguay BA, Pringle ES, Kadijk E, Ying S, Balgi A, **Roberge M**, McCormick C, Khapersky DA. Thiopurines activate an antiviral unfolded protein response that blocks influenza A virus glycoprotein accumulation. *J Virol.* 2021 Mar 24:JVI.00453-21. doi: 10.1128/JVI.00453-21. . PMID: 33762409. <https://pubmed.ncbi.nlm.nih.gov/33762409/>
208. Beskrovnaya P, Sexton DL, Golmohammadzadeh M, Hashimi A, **Tocheva EI**. Structural, Metabolic and Evolutionary Comparison of Bacterial Endospore and Exospore Formation. *Front Microbiol.* 2021 Mar 9;12:630573. doi: 10.3389/fmicb.2021.630573. PMID: 33767680; PMCID: PMC7985256. <https://pubmed.ncbi.nlm.nih.gov/33767680/>
209. Kuo CH, Huang YH, Chen PK, Lee GH, Tang MJ, **Conway EM**, Shi GY, Wu HL. VEGF-Induced Endothelial Podosomes via ROCK2-Dependent Thrombomodulin Expression Initiate Sprouting Angiogenesis. *Arterioscler Thromb Vasc Biol.* 2021 Mar 18:ATVBAHA121315931. doi: 10.1161/ATVBAHA.121.315931. . PMID: 33730876. <https://pubmed.ncbi.nlm.nih.gov/33730876/>
210. Drews SJ, **Devine DV**, McManus J, Mendoza E, Manguiat K, Wood H, Girardin R, Dupuis A, McDonough K, Drobot M. A trend of dropping anti-SARS-CoV-2 plaque reduction neutralization test titers over time in Canadian convalescent plasma donors. *Transfusion.* 2021 Mar 18. doi: 10.1111/trf.16364. . PMID: 33734448. <https://pubmed.ncbi.nlm.nih.gov/33734448/>

211. Sheng-Huei Lin C, Chan ACK, Vermeulen J, Brockerman J, Soni AS, Tanner ME, **Gaynor EC, McIntosh LP**, Simorre JP, **Murphy MEP**. Peptidoglycan binding by a pocket on the accessory NTF2-domain of Pgp2 directs helical cell shape of *Campylobacter jejuni*. *J Biol Chem*. 2021 Mar 9;100528. doi: 10.1016/j.jbc.2021.100528. . PMID: 33711341. <https://pubmed.ncbi.nlm.nih.gov/33711341/>
212. Ulloa O, Henríquez-Castillo C, Ramírez-Flandes S, Plominsky AM, Murillo AA, Morgan-Lang C, **Hallam SJ**, Stepanauskas R. The cyanobacterium *Prochlorococcus* has divergent light-harvesting antennae and may have evolved in a low-oxygen ocean. *Proc Natl Acad Sci U S A*. 2021 Mar 16;118(11):e2025638118. doi: 10.1073/pnas.2025638118. PMID: 33707213. <https://pubmed.ncbi.nlm.nih.gov/33707213/>
213. Demir F, **Kizhakkedathu JN**, Rinschen MM, Huesgen PF. MANTI: Automated Annotation of Protein N-Termini for Rapid Interpretation of N-Terminome Data Sets. *Anal Chem*. 2021 Mar 17. doi: 10.1021/acs.analchem.1c00310. . PMID: 33729755. <https://pubmed.ncbi.nlm.nih.gov/33729755/>
214. Abbasi U, Abbina S, Gill A, Bhagat V, **Kizhakkedathu JN**. A facile colorimetric method for the quantification of labile iron pool and total iron in cells and tissue specimens. *Sci Rep*. 2021 Mar 16;11(1):6008. doi: 10.1038/s41598-021-85387-z. PMID: 33727584; PMCID: PMC7971025. <https://pubmed.ncbi.nlm.nih.gov/33727584/>
215. Mulligan VK, Workman S, Sun T, Rettie S, Li X, Worrall LJ, Craven TW, King DT, Hosseinzadeh P, Watkins AM, Renfrew PD, Guffy S, Labonte JW, Moretti R, Bonneau R, **Strynadka NCJ**, Baker D. Computationally designed peptide macrocycle inhibitors of New Delhi metallo- β -lactamase 1. *Proc Natl Acad Sci U S A*. 2021 Mar 23;118(12):e2012800118. doi: 10.1073/pnas.2012800118. PMID: 33723038. <https://pubmed.ncbi.nlm.nih.gov/33723038/>
216. Nam SE, Cheung YWS, Nguyen TN, Gong M, Chan S, Lazarou M, **Yip CK**. Insights on autophagosome-lysosome tethering from structural and biochemical characterization of human autophagy factor EPG5. *Commun Biol*. 2021 Mar 5;4(1):291. doi: 10.1038/s42003-021-01830-x. PMID: 33674710. <https://pubmed.ncbi.nlm.nih.gov/33674710/>
217. Yip W, Hughes MR, Li Y, Cait A, Hirst M, **Mohn WW**, McNagny KM. Butyrate Shapes Immune Cell Fate and Function in Allergic Asthma. *Front Immunol*. 2021 Feb 15;12:628453. doi: 10.3389/fimmu.2021.628453. PMID: 33659009; PMCID: PMC7917140. <https://pubmed.ncbi.nlm.nih.gov/33659009/>
218. Klionsky DJ...**Yip CK**...(+ ~3000 others)...Tong C-K. Guidelines for the use and interpretation of assays for monitoring autophagy (4th edition). *Autophagy*. 2021 Feb 8;1-382. doi: 10.1080/15548627.2020.1797280. . PMID: 33634751. <https://pubmed.ncbi.nlm.nih.gov/33634751/>
219. Schubert P, Culibrk L, Culibrk B, **Conway EM**, Goodrich RP, **Devine DV**. Releasates of riboflavin/UV-treated platelets: Microvesicles suppress cytokine-mediated endothelial cell migration/proliferation. *Transfusion*. 2021 Feb 24. doi: 10.1111/trf.16337. . PMID: 33629371. <https://pubmed.ncbi.nlm.nih.gov/33629371/>
220. Dill-McFarland KA, König SG, Mazel F, Oliver DC, McEwen LM, Hong KY, **Hallam SJ**. An integrated, modular approach to data science education in microbiology. *PLoS Comput Biol*. 2021 Feb 25;17(2):e1008661. doi: 10.1371/journal.pcbi.1008661. PMID: 33630850. <https://pubmed.ncbi.nlm.nih.gov/33630850/>
221. Rens C, Chao JD, Sexton DL, **Tocheva EI, Av-Gay Y**. Roles for phthiocerol dimycocerosate lipids in *Mycobacterium tuberculosis* pathogenesis. *Microbiology (Reading)*. 2021 Feb 25. doi: 10.1099/mic.0.001042. . PMID: 33629944. <https://pubmed.ncbi.nlm.nih.gov/33629944/>