

List of Participating Companies and Internship Descriptions

Company Name	Company Area of Focus	Location
Allarta Life Science	Bioengineering/biomaterials	Hamilton, Ontario
Internship Description:		
Allarta is a pre-clinical life science company developing proprietary cell encapsulation technology to enable cell-based therapies. The internship project focuses on the delivery of cytokine overexpressing stem cells to treat inflammatory diseases such as rheumatoid arthritis.		
Essential skills required to undertake this internship:		
The candidate should have experience in the following areas: ability to follow standard operating procedures and maintain a clean, safe and orderly work environment; maintaining clear and rigorous experimental records; creating experimental reports; being adaptable and agile when faced with competing priorities having experience working in a collaborative environment, with cell cultures, and microscopy.		
Skills that a prospective intern will learn:		
Allarta provides direct exposure for this role to aspects such as 3D cell culture, microscopy, cell characterization (e.g., live/dead assays), ELISA, assay design and development, animal experiments, and cell encapsulation technology, in a fast-paced environment.		

Company Name	Company Area of Focus	Location
Aspect Biosystems Ltd.	Biomanufacturing, Bioengineering/biomaterials, 3D printing	Vancouver, British Columbia
Internship Description:		
To work on the strategic design and development of our therapeutic cell platforms. They will make major scientific, laboratory-based contributions to our preclinical research and development programs such as our liver or pancreas (diabetes) program.		
Essential skills required to undertake this internship:		
<ul style="list-style-type: none"> • MSc or PhD in cell biology, bioengineering, or a related discipline. • Previous work experience executing research and development in a wet lab setting. • Experience with mammalian cell culture, 3D cell culture and analyzing animal tissues. 		

Skills that a prospective intern will learn:

- Industry lab skills (sterile technique, pipetting etc.)
- Experimental design and execution skills
- Experimental record keeping, reporting, and presentation skills
- How to work in a GMP & GLP Environment
- Become an expert user of Aspect’s microfluidic bioprinting technology

Company Name	Company Area of Focus	Location
Axolotl Biosciences	Biomanufacturing, Bioengineering/biomaterials, Drug screening, Organoid production/transplantation, 3D printing, Reagent production	Victoria, British Columbia

Internship Description:

The intern will work on developing a novel bioink called HeartPrint that takes advantage of Axolotl's patented technology. Axolotl Biosciences was spun out of the internationally recognized research group led by Dr. Stephanie Willerth at the University of Victoria due to demand for innovative bioinks by both academic researchers and biotechnology companies. 3D bioprinting enables the generation of human tissue models for screening potential drug targets in a more relevant fashion compared to animal models. Animal models fail to predict the toxicity of potential drug targets on the cardiovascular system, including the heart. Forty percent of drugs that enter clinical trials fail as a result of unexpected cardiotoxicity. Thus, a huge market exists for a bioink capable of printing human cardiac tissues that can be used to screen potential drugs for this issue. This project will allow our team’s expertise in producing TissuePrint and BrainPrint to perform the research and development necessary to generate such a bioink, which we have termed “HeartPrint”. HeartPrint bioink fills this important market gap and this project will further enable research and development here in Canada.

Essential skills required to undertake this internship:

Experience with biomaterials and tissue culture, hardworking, good team player, and good communication skills.

Skills that a prospective intern will learn:

The intern will be exposed to the manufacture and production of our bioink along with our quality control processes. The intern will also be exposed to entrepreneurship training as part of our team and will interact with beta testers to determine customer needs.

Company Name	Company Area of Focus	Location
BlueRock Therapeutics	Biomanufacturing, Cell Production	Toronto, Ontario
Internship Description:		
<p>The internship project(s) will consist of process and analytical development project(s) to support the manufacturing of PSC derived cell therapies. They will learn how to structure industry focused projects, perform risk assessments, mitigate project risks, and work in a multidisciplinary environment.</p>		
Essential skills required to undertake this internship:		
<p>Experience at the bench performing analytics (i.e., flow cytometry, PCR), tissue culture experience (adherent mammalian cells).</p>		
Skills that a prospective intern will learn:		
<p>They will be exposed to (1) project management, (2) process development required to support cell manufacturing, (3) manufacturing processes, (4) quality control of products, (5) industry management, (6) company structure and environment. And importantly they will be introduced to industry contacts who can help support/advance a career in the industry.</p>		

Company Name	Company Area of Focus	Location
Immugenia	Gene Therapy, Immunotherapy	Montreal, Quebec
Internship Description:		
<p>In the growing fields of cell, gene and tissue therapy, there is a need to express a given gene only in targeted populations. However, targeted expression of a gene exclusively in a given cell type is not currently available with technologies transferable to the clinic. To address this gap, our lab has developed a strategy to design specific synthetic promoters through an in silico pipeline allowing for the identification of short regulatory sequences that can be harnessed to target the expression in a given cell subset.</p> <p>Building on this technological platform, a start-up company, Immugenia, was created with the goal of bringing our synthetic promoters' platform to the clinic. We envision two fields to develop our transformative technology: the field of regenerative medicine and gene therapy, and the field of stem-cell-based cancer immunotherapy.</p> <p>In regenerative medicine our specific promoters' technology would allow targeting</p>		

expression in any cells when using iPSC, and in gene therapy, it would allow improving a delivery system lacking organ specificity for gene replacement and/or modification. Thus, the goal of this internship is to design and test synthetic promoters for other cell lineages from the hematopoietic system and solid organ.

The intern will be part of a cutting-edge biotechnology project in a stimulating environment on the technological and intellectual level. The intern will be exposed to the intellectual propriety protection process, will present his/her data to the management team and will witness the strategic decisions taken (go/no go inflection points) to drive the project toward a successful completion.

Essential skills required to undertake this internship:

- Molecular biology, good communication skills (English, French is an asset), and autonomy.

Skills that a prospective intern will learn:

The design of small synthetic promoters usable for gene engineering is disruptive in gene engineering. The required methodologies and IP protection processes will be very relevant for their training, by providing tools, knowledge and an intellectual frame of mind. This project combines molecular biology (synthetic promoter design, gene edition, cellular engineering), cellular biology (iPSC, primary hematopoietic stem cells, differentiation assays) and bioinformatics. The student will be assigned a research project that will allow them to apply a translational research approach that will lead to a therapeutical product. The candidate will have the opportunity to drive a project that could have a profound impact on the treatment of degenerative diseases. They will also have the opportunity to train in bioinformatics if desired. The candidate will benefit from the complementary expertise of a multidisciplinary team and of a rich research environment. In addition, they will benefit from cutting-edge methods and technologies in the field. The candidate will be working in close collaboration with other members of the research team, working on a similar, yet different project, fostering their teamwork skills.

Company Name	Company Area of Focus	Location
Mediphage Bioceuticals	Biomanufacturing, Gene Therapy, Gene editing	Toronto, Ontario

Internship Description:

Our BD team would provide training for BD and project management skills. Our R&D team will provide training for multiple skills including but not limited to gene delivery, transfection, cell assays, potency assays, Flow Cyto, QPCR, live imaging, fluorescent imaging, gene and protein expression analysis and in vivo experimental design.

Essential skills required to undertake this internship:

Mammalian cell culture, molecular and cell biology, ELISA, soft skills such as self-organization, time management, documentation, and teamwork.

Skills that a prospective intern will learn:

The candidate will be exposed to a fast-paced start-up space. As a part of Jlabs, Mediphage's trainees and employees get access to management and BD training sessions, which Jlabs provides. The candidate will also be exposed to multiple collaboration sessions and discussions within the company that will prepare them for an industrial position. The candidate also will have the opportunity to learn about the gene therapy landscape and space, which again will be of benefit to them as they get to know the company's activities in this area.

Company Name	Company Area of Focus	Location
Mesintel Therapeutics Inc.	Immunotherapy, -Omics, Drug screening	Vancouver, British Columbia

Internship Description:

The internship project will involve four major components: 1) execution of unique high-throughput screens to identify modifiers (candidates) of mesenchymal progenitor biology; 2) integration of screen-derived candidates with existing datasets (including RNA-seq and single cell omics); 3) assessment of the patentability and translation potential of identified candidates for a variety of clinical indications; and 4) participation in developing a business case for specific candidates, which would include opportunity analysis, competitive landscapes, and partnering plans. In this manner, the intern will have an opportunity to build on their experimental skills, but will also receive training in how targets and associated molecules are vetted and prioritized for subsequent pre-clinical development.

Essential skills required to undertake this internship:

Required skills for this internship include: 1) experience with tissue culture; 2) familiarity with routine molecular and cellular biological experiments (i.e., qPCR, immunodetection, histological staining, etc.); 3) some knowledge of bioinformatics is an asset; and 4) high level of interest and engagement.

Skills that a prospective intern will learn:

The intern will gain numerous skills that will prepare them for a job in industry, including: 1) development and execution of robust screens; 2) development of cross-validation skills for target assessment; 3) tools for the evaluation of the business and therapeutic opportunities of identified candidates; 4) insights into pre-clinical programs aimed at modifying mesenchymal progenitor (MP) activity for the treatment of various diseases. MP dysfunction

is associated with a wide spectrum of diseases, and there is intense interest in this field from a range of biotechnology and pharmaceutical companies.

Company Name	Company Area of Focus	Location
Morphocell Technologies	Bioengineering/biomaterials, Organoid production/transplantation	Montreal, Quebec
Internship Description:		
<p>Morphocell is working to bring its human iPSC-derived engineered liver tissues to the clinic to treat severe liver disease in children and adults. The internship projects will involve focusing on a specific aspect of such a development all while being able to follow the larger picture of a start-up regenerative medicine company navigating towards a first-in-human clinical trial. Process development and scale-up, CTA/IND-enabling preclinical studies, formulation/fill/finish, and pipeline R&D are the different sub-projects the interns will be asked to work on. The choice of the project will be made based on the intern’s background, goals and personal interests. They will be supervised by experienced personnel and will learn how to operate within GLP standards. Knowledge specific to the assigned tasks will be provided, as well as wider exposure to the company’s R&D, IP, regulatory and BD strategies.</p>		
Essential skills required to undertake this internship:		
<p>Enthusiasm for regenerative medicine, drive to develop therapies to help patients in need, detail-oriented, able to work within a team, strong background on stem cells, iPSC, and cell therapy or biomaterial engineering.</p>		
Skills that a prospective intern will learn:		
<p>Interns will be exposed to skills such as functional characterization of iPSC-derived engineered tissues, in vivo metabolic tests, process development involving stirred bioreactors, assay development, biomaterial engineering, technical writing, and IP analysis, according to the project assigned to them. Such skills are rare and among the most requested for technicians, scientists and engineers in the field of regenerative medicine.</p>		

Company Name	Company Area of Focus	Location
Octane Orthobiologics	Bioengineering/biomaterials	Kingston, Ontario
Internship Description:		

Octane's customizable automation system enables the complete automation of cell culture processes in an enclosed system. The student will be involved in the design and translation of a manual cell culture process related to connective tissue repair to the automated bioreactor.

Essential skills required to undertake this internship:

Knowledge of tissue engineering and cell culture.

Skills that a prospective intern will learn:

Cell culture technique, cell culture assays, experimental design, writing of technical documents.

Company Name	Company Area of Focus	Location
PanTHERA CryoSolutions Inc.	Biomanufacturing, Bioengineering/biomaterials, Reagent production	Ottawa, Ontario OR Edmonton, Alberta

Internship Description:

PanTHERA CryoSolutions is a Canadian company based out of Edmonton, Alberta, which was incorporated in September 2017 to leverage technology developed at the University of Alberta and the University of Ottawa. The company designs, manufactures and markets preformulated reagents and solutions for use in the low temperature storage of cell- and tissue-based therapeutics, in vitro diagnostic materials and research tools.

Cryopreservation is an essential element of the up-stream and down-stream production of cell-based therapeutics. To meet these challenges, personnel trained in advanced cell preservation, biobanking and cell processing engineering are required to develop and implement the critically important cell stabilization and logistics systems required to deliver cell-based therapies.

PanTHERA would be interested in hosting suitable SCN-MITACS trainees as interns at our Edmonton or Ottawa facilities. This would include bringing graduate-level students (MSc and PhD) and post-doctoral fellows for 4 or 8 month internships aimed at leveraging their individual skills to advance our research program and to provide them with experiential training in industrial cryopreservation, quality systems, product development and entrepreneurship/commercialization.

Essential skills required to undertake this internship:

Strong computer skills; advanced knowledge in biology or chemistry; experience in cell and tissue culture would be an asset.

Skills that a prospective intern will learn:

Trainees with a strong background in chemistry / pharmaceutical sciences could work closely with our chemical synthesis team developing their experience and knowledge in small molecule synthesis, quality control, packaging and quality assurance. This would include working on projects related to lean manufacturing, process control and scaling chemical synthesis.

In addition to being a lead developer of novel small molecule cryoprotective compounds, we have a full low temperature biology lab in Edmonton where we are developing innovative approaches for the cryopreservation of cell, tissue and organ systems. A trainee would gain valuable experience in the design and optimization of cryopreservation protocols for various cell-based platforms (MSC, iPSC, HSC, CAR-T, NK, PBMCs). This would include the application of state-of-the-art cell assessment techniques, modelling / simulation tools, and physical assessment.

Trainees would gain experience working in a cGMP environment under a defined quality system and would be exposed to project management tools used by our teams.

We work with a large number of commercial cell therapy companies, so trainees would be exposed to the challenges currently faced by these partners in bringing their innovative cell therapeutics to market. Collaborative problem solving, data analysis, and communication skills will be tested in trainees.

Trainees will gain an understanding of how B2B relationships are developed and fostered in the cell therapy industry and will establish valuable personal and professional relationships with key influencers in the cell therapy industry.

Company Name	Company Area of Focus	Location
RepliCel Life Sciences, Inc.	Biomanufacturing, Cell Production	Vancouver, British Columbia

Internship Description:

The intern will assist in projects aimed at optimizing the manufacturing of RepliCel's cell therapy products including:

- identification and evaluation of enzymatic reagents capable of digesting collected tissue (as manufacturing raw material) while minimizing cell loss
- identification and evaluation of markers capable of being used in cell selection at beginning, in-process, and/or end of manufacturing
- identification and evaluation of technologies capable of being used for positive and/or negative cell selection at beginning, in-process, and/or end of manufacturing

- evaluation and bio-comparability of cells grown in nanoparticles in suspension culture vs 2D plastic culture containers
- identifying makers with the potential to act as surrogates for efficacy/potency by correlating new markers with established potency markers
- identification and evaluation of serum-free media for culture of the company's cell therapy products
- evaluation and bio-comparability of cells grown in serum-free vs serum-based media
- evaluating and comparing current 'closed' systems for adherent cell manufacturing

The intern will be expected to interact with other laboratory personnel, technology providers, and company management. The intern will interact with and support patent counsel on development of new patents. The intern will support management in creation of financial models demonstrating the impact of manufacturing optimization on manufacturing infrastructure requirements to meet global demand.

Essential skills required to undertake this internship:

Cell culture.

Skills that a prospective intern will learn:

The trainee will be exposed to laboratory research, product/process development, cGMP manufacturing, technology and reagent evaluations/comparisons, patent filings and strategy, manufacturing modeling, financial models, and biomaterials used in cell culture.

Company Name	Company Area of Focus	Location
Virica Biotech	Biomanufacturing, Gene Therapy, Reagent production	Ottawa, Ontario

Internship Description:

Virica was founded in 2018 based on a decade of research carried out in the laboratory of Dr. Jean-Simon Diallo, at the Ottawa Hospital Research Institute, through his world-class research in oncolytic viruses. Leveraging high-throughput methods, Dr. Diallo identified a library of >130 small molecules (Viral Sensitizers; VSE) which enhances the production and potency of viral vectors by transiently antagonizing cellular innate antiviral pathways. Adding VSE to upstream processes can significantly enhance yield in viral vector production settings, as well as increase transduction efficiency in cell-based therapy manufacturing. To date Virica has demonstrated the utility of VSE in the manufacturing of viral vectors, and has an active R&D program investigating the use of VSE for increased transduction of immune-based cell therapies (T-cells, NK cells).

Virica wishes to extend their internal R&D program to investigate the use of VSE for more efficient transduction and reprogramming of stem cells. Interns will be expected to spearhead a stem-cell-based R&D project aimed at identifying VSE molecules which increase the transduction efficiency of Lentivirus-based vectors in stem cells. Leveraging Virica's compound library, high-throughput methods, and internal DOE expertise, trainees will develop single and multi-compound VSE formulation(s) aimed at driving more efficient production of therapeutic stem cells. As fully integrated members of the R&D team, trainees will be exposed to industry-based thinking, which must incorporate scientific, business, regulatory, and IP considerations into strategic decision making. Furthermore, beyond technical skills, trainees will develop project management, technical writing, and communication skills as part of the mentorship/training program.

Essential skills required to undertake this internship:

Virica Biotech is looking for an individual who can contribute their stem cell expertise (culturing, reprogramming, characterizing) to complement our in-house capacity in cell therapy and viral vector manufacturing. Specifically, interns must be well-versed in general stem cell culturing, transfection, transduction (viral and/or non-viral), and characterization of stem cells.

Skills that a prospective intern will learn:

Not only will trainees gain relevant technical expertise, but emphasis will also be placed on proper experimental design, critical thinking, problem solving, evidence-based decision making, and written and oral communication, all skills highly relevant for careers in industry. Trainees will also be afforded the opportunity to present directly to the management team at Virica and be exposed to industry-based approaches and strategies (industry R&D, regulatory, knowledge transfer, IP issues). Consequently, trainees will be well-positioned to contribute as HQPs to the growing Canadian biotechnology sector.