

From October 23 to 25 more than **500** experts in stem cell and regenerative medicine research gathered in Toronto for the 2023 Till & McCulloch Meetings (TMM), Canada's premier stem cell and regenerative medicine conference hosted by the Stem Cell Network. Attendees included world-class researchers, graduate students, postdocs, industry experts and legal scholars from across Canada and around the world who discussed the latest research advances in the field.

This year, during the opening ceremonies, the Stem Cell Network was pleased to award three post-doctoral fellowships alongside its partners, JDRF Canada, MS Canada and Heart & Stroke. These fellowships were awarded to talented post-docs who are pursuing stem cell and regenerative medicine research in type 1 diabetes, multiple sclerosis, and heart disease, respectively. The awardees are:



The J. Andrew McKee Fellowship in Type 1 Diabetes:

Dr. Sing-Young Chen

The SCN-MS Canada Postdoctoral Fellowship in Regenerative Medicine for Multiple Sclerosis:

Dr. Elisabet Jakova

The SCN-H&S Postdoctoral Fellowship for Women's Heart and Brain Health:

Dr. Yimu Zhao



Cayuga Immersion students from the Kawenni:io Private school performed the Thanksgiving Address with support from their teacher to officially open TMM2023.



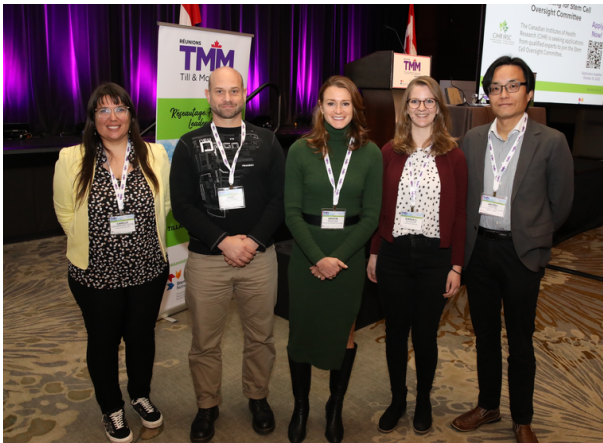
L-R: Michael Rudnicki, Cate Murray, Sing-Young Chen, Yimu Zhao, Elisabet Jakova, Pamela Kanellis, and Cristina Costa.



Dr. Ya-Chieh Hsu, from Harvard University and the Broad Institute, delivered the keynote address entitled, *In and Around: How Bodily and Environmental Changes Shape Tissue Regeneration*.



With **seven plenary sessions over three days**, the conference boasted an exceptional scientific program, full of outstanding speakers covering areas such as AI and machine learning, gene editing, and cell therapies:



L-R: Camille LaCarriere-Keita, Knut Woltjen, Kristin Knouse, Svenja Schüler, and Akitsu Hotta.

Plenary 1: Cell Engineering to Advance Biology and Therapeutics

Chairs: **Knut Woltjen**, Kyoto University; **Camille LaCarriere-Keita**, Université de Sherbrooke

Speakers: **Akitsu Hotta**, Kyoto University, *Clinical-grade HLA-edited iPSCs for Off-the-shelf Regenerative Medicine*; **Svenja Schüler**, Université de Sherbrooke, *Compartmental Aging in the Muscle Stem Cell Niche*; **Kristin Knouse**, Massachusetts Institute of Technology, *Delivering insights into organ homeostasis and regeneration through in vivo genome-wide screens*

Plenary 2: New Technologies in Stem Cell Based Disease Modeling

Chairs: **Yun Li**, The Hospital for Sick Children & University of Toronto; **Victoire Fort**, Université Laval

Speakers: **Yoshiaki Tanaka**, Université de Montréal, *Modeling of Brain Tumor by In Vitro 3D Culture*; **Beatrix Wang**, University of Toronto, *Single cell approaches define two mammalian oligodendrocyte precursor cell populations and their evolution over developmental time*; **Jianping Fu**, University of Michigan, Ann Arbor, *Developmental Bioengineering for Building Human Embryo and Organ Models*; **Kristen Brennand**, Yale University School of Medicine, *Using Stem Cells to Explore the Genetics of Brain Disease*



L-R: Victoire Fort, Yoshiaki Tanaka, Jianping Fu, Beatrix Wang, Kristen Brennand, and Yun Li.



L-R: Vardit Ravitsky, Nevcia Case, Alex John London, & Cathy Jian.

Plenary 3: Integrating AI and ML into Research and Clinical Care: Scientific and Ethical Challenges

Chairs: **Vardit Ravitsky**, Université de Montréal & Harvard Medical School; **Nevcica Case**, University of Alberta

Speakers: **Cathy Jian**, Stem Cell Club, *Designing effective TikToks in public health: perspectives of eligible potential stem cell donors on donor recruitment TikToks' utility, content and design*; **Anna Goldenberg**, University of Toronto; **Alex John London**, Carnegie Mellon University





L-R: Bernhard Lehnertz, Jessica May Corpuz, Robert Wynn, David Knapp, and Xin Yue.

Plenary 4: Roadblocks to Clinically Meaningful Gene Editing to Stem Cells

Chairs: **Bernard Thébaud**, The Ottawa Hospital; **Xin Yue (Sharon) Xie**, Western University

Speakers: **David Knapp**, Université de Montréal, *Precision editing of primary human hematopoietic stem and progenitors at near-perfect efficiency*; **Jessica May Corpuz**, University of Calgary, *Intervertebral disc degeneration and the trans-differentiation of native cells*; **Bernhard Lehnertz**, ExCellThera Inc., *Engineering of HSC grafts towards the next generation of leukemia therapies*; **Robert Wynn**, Manchester University NHS Foundation Trust, *Stem Cell Gene Therapies in Children with Metabolic Diseases*.

Plenary 5: Methodological Advances and Applications of Stem Cells

Chairs: **Karun Singh**, University Health Network & University of Toronto; **Paul Fabre**, Université de Montréal

Speakers: **Anca Pasca**, Stanford Medicine, *Disruption of the Cellular Circadian Clock Impairs Synaptosome Engulfment in Organoid-derived Human Astrocytes*; **Maggie Chopra**, University of British Columbia, *Early-life gut microbiome metabolites shape the epigenome of blood progenitors and alter immune development and susceptibility to allergic asthma*; **Shinichiro Ogawa**, University Health Network & University of Toronto, *Developing stem cell-based therapies for the treatment of liver diseases*; **Jason Spence**, University of Michigan, *Interrogating stem cell niches in the developing human gut*



L-R: Karun Singh, Shinichiro Ogawa, Jason Spence, Maggie Chopra, Anca Pasca, and Paul Fabre.



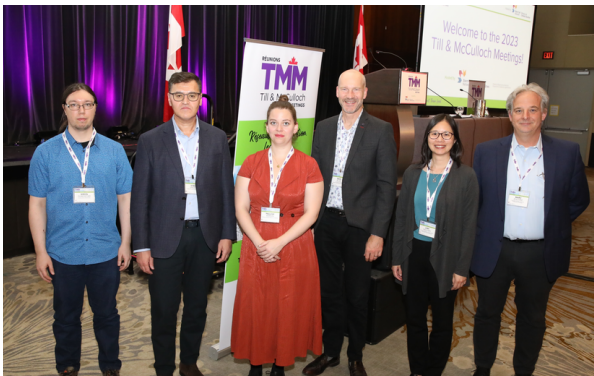
L-R: Alberto Camacho-Magallanes, Cristina Nostro, Stefan Irion, Sara Vasconcelos, Véronique Moulin, and George Cairns.

Plenary 6: Cell-based Regenerative Medicine

Chairs: **Sara Vasconcelos**, University of Toronto & University Health Network; **George Cairns**, University of Ottawa

Speakers: **Stefan Irion**, BlueRock Therapeutics, *Bemdaneprocel - From Bench to Bedside*; **Alberto Camacho-Magallanes**, Ottawa Hospital Research Institute, *Identification of TWIST1 as a True Synthetic Lethal Target of TSC2-Null Neural Crest Cells through Genome-Wide CRISPR Knockout Screen*; **Véronique Moulin**, Université Laval, *Autologous Self-Assembly Skin Substitutes (SASS): using a tissue engineering method to treat Canadian burn victims*; **Cristina Nostro**, University Health Network & University of Toronto, *Characterizing the therapeutic potential of immune-evasive stem cell-derived islet-like cells*.





L-R: Simon Dumontier, Ilyas Singec, Pauline Bardin, David Allan, Linh Nguyen, and Marc Jeschke.

Plenary 7: Cell and Cellular Product Therapeutics

Chairs: **Marc Jeschke**, McMaster University; **Simon Dumontier**, Université de Sherbrooke

Speakers: **David Allan**, Ottawa Hospital Research Institute, University of Ottawa, & Canadian Blood Services, *Using knowledge synthesis to accelerate clinical translation of cell-based therapies*; **Pauline Bardin**, Ottawa Hospital Research Institute, *Lung regeneration for inherited interstitial lung disease using a novel combinatorial AAV gene therapy*; **Linh Nguyen**, University Health Network, *T cell manufacture for clinical trials at the Princess Margaret Cancer Centre*; **Ilyas Singec**, FUJIFILM Cellular Dynamics, *Next-Generation iPSC Technologies for Clinical Translation*.



Dr. Gordon Keller was presented the 2023 **Till & McCulloch Award** in recognition of his paper published in *Cell Stem Cell*, [Modeling human multi-lineage heart field development with pluripotent stem cells](#). The Till & McCulloch Award is presented annually to a Canadian-based researcher who has made an exceptional contribution to global stem cell research in that year. **Dr. Keller** was nominated by his peers and selected by the Till & McCulloch Meetings Scientific Program Committee.

Also recognized for outstanding work in the field is **Dr. Murtaza Nagree** who was presented with the 2023 **Drew Lyall Award of Excellence**, an honour given to the lead trainee author of the highest ranked abstract for his work on [A hematopoietic stem cell subset that retains memory of prior inflammatory stress accumulates in aging and clonal hematopoiesis](#). **Dr. Nagree** is a Postdoctoral Fellow in the John Dick Lab at the University Health Network who, in collaboration with Andy Zeng under the supervision of Dr. Stephanie Xie, is working to unravel how blood stem cells react to and remember inflammation.



Both Dr. Keller and Dr. Nagree gave special presentations to delegates, overviewing their latest research.





As always at TMM, trainees were able to participate in poster sessions and short talks. With over 270 abstracts submitted to the competition this year, SCN was proud to announce this year's winners on the third day of the conference. Below is a list of the winners and the title of their presentations:

Trainee Poster Presentations Winners:

Basic Research:

- **Chanèle Cyr-Depauw**, *Single-cell RNA sequencing reveals repair features of human umbilical cord mesenchymal stromal cells for treatment of experimental neonatal lung injury*
- **Grace Kuo**, *Engineering CAR-expressing innate lymphoid cells (ILCs) from human pluripotent stem cells (hPSCs) for cancer immunotherapy*
- **Soh Ishiguru**, *A multi-kingdom genetic barcoding system for precise target clone isolation*

ELSI:

- **Madison Foster**, *Co-creation of a guiding framework to engage patients in laboratory-based regenerative medicine research*

Bioengineering:

- **Erik Jacques**, *In silico predictions coupled with mini-IDLE identifies myofiber-derived biomolecules dictating muscle stem cell quiescence re-entry*

Clinical Translation & Commercialization

- **Martin Barbier**, *Gene therapy of recessive dystrophic epidermolysis bullosa skin cells leads to dermal-epidermal adhesion strength restoration in autologous bilayered self-assembled skin substitutes*



Under the Microscope Oral Presentation Winners:

Session 1: Homaira Hamidzada, University of Toronto, Slava Epelman Lab; *Primitive macrophages enhance the function of bioengineered human cardiac microtissues*

Session 2: Shira Landau, University of Toronto, Milica Radisic Lab; *Primitive macrophages promote the vessel formation and establishment of perfusable vasculature in human cardiac tissues*



L-R: Beatrix Wang and Sharon Louis.

Plenary Oral Presentation Winner:

- **Beatrix Wang**, University of Toronto, Freda Miller & David Kaplan Lab; *Single cell approaches define two mammalian oligodendrocyte precursor cell populations and their evolution over developmental time*



L-R: Beatrix Wang, Martin Barbier, Chanèle Cyr-Depauw, Homaira Hamidzada, Shira Landau, and Grace Kuo.





This year TMM delegates heard from two patient speakers, twin brothers Andre and Nathan Cordeiro, who were diagnosed at a young age with an inherited disorder that affects vision called Leber congenital amaurosis (LCA). In 2020, with the help of Fighting Blindness Canada, the family was able to successfully advocate for approval of the first gene-therapy to treat the boys' condition.

In the summer of 2022, Andre and Nathan were the first children in Canada to receive the gene therapy Luxturna® and the results have been life-changing.

At TMM, Andre and Nathan reflected on how far they've come since the procedure by sharing memories of trick-or-treating in the dark without the need for aid and seeing stars in the sky for the first time. "Everything about the sky amazes me. I want to see it. I don't want to take these opportunities for granted. Other people might think it's normal, but for me it's a new thing. It's very exciting for me," said Andre.

Although the brothers' experience was a positive one, in answering a question from the audience about the need for ongoing dialogue and access to researchers in advance of receiving a cell or gene therapy, Andre said: "it would definitely help. [Researchers] have more in-depth knowledge of what we're doing. I only had a basic understanding. If you told me exactly what's going on it would help me feel comfortable."

In the end, Nathan and Andre had one key take-home message for researchers in the room: "Right now you might not think your work makes an impact, but it really does help people. It takes a big team of people and eventually, it happened," Nathan said. "Maybe you're not working on things directly impacting me, but your work has impact and it does matter. You may not realize how much it helps people," said Andre.



L-R: Larissa Moniz, Cate Murray, Andre Cordeiro, Christina Cordeiro, and Nathan Cordeiro.



Of course, it would not be TMM without the informative pre-conference sessions organized by SCN's Trainee Communications Committee. This year trainees were invited to participate in a variety of sessions, listed below.



Tips and Tricks: Improve the Quality of your Manuscripts and Get Published!

In the first half of this workshop, trainees learned how to create an effective graphical abstract that ties together explanations of complex scientific topics to allow better communication of their research. This session included a talk from an early career investigator on how to structure graphical abstracts, as well as a tutorial on important features in BioRender. The morning concluded with an abstract presentation competition.

In the afternoon, the workshop focused on teaching trainees how to present their research in a compelling manner to convince journal editors and reviewers to publish their research stories. The afternoon started with expert talks from journal editors and an experienced principal investigator who provided tips for tailoring manuscripts to target journals, as well as insights into the submission and revision process. The workshop concluded with a panel discussion where trainees engaged with experts and asked questions about the submission process and the importance of publishing for career progression.



Getting the “Likes and Subscribes” from your hiring committee: A masterclass for developing your networking skills and successfully navigating job application processes

The first part of this workshop highlighted the importance of networking and informational interviews. Attendees learned to craft an effective elevator pitch and introduce themselves to initiate conversations with key connections in order to learn about the jobs they’re interested in. There was also an elevator pitch competition for attendees interested in getting expert feedback.

The second part of the workshop focused on how to progress in the application process. Attendees got expert advice on how to construct and tailor their cover letter for each application, followed by a session that covered the most important interview skills for leaving a positive impression. Attendees also learned about the academic interview process, including chalk talks, as well as common industry and government interview questions and answering techniques.

The day wrapped up with an expert panel discussion and dedicated Q&A time for trainees to learn more about jobs and recruitment in their target sector.

New this year was an unprecedented number of breakout sessions, special pre-conference and post-conference sessions. Many thanks to sponsoring organizations and partners for organizing the following sessions:

- Anatomy of a Grant: how to land your first CIHR grant for Early Career Researchers
- The Business of Regenerative Medicine: Entrepreneurship one stem cell at a time (Presented by SCN and OBIO)
- Accelerating the Impact of Predictive Human Culture Assays Workshop
- Experimental Derisking for Venture Creation (Presented by CCRM)
- Enhancing Genetic Stability in Human Pluripotent Stem Cells Passaged and Maintained Single Cells Through Novel Culture Medium Conditions (Presented by STEMCELL Technologies)
- PHC Solutions in Cell and Gene Therapy (Presented by PHC Corporation)
- Leveraging Autofluorescence using Full Spectrum Profiling (Presented by Cytex)
- See what you sort, sort what you see with the BD FACSDiscover™ S8 (BD Biosciences)
- Applications of single cell, spatial and in situ multiomic solutions in stem cell research (Presented by 10x Genomics)
- Realizing the potential of Canadian cell & gene therapy: Translation vs Transfer (Presented by weCANtranslate Network)
- The Virtual Human Development Workshop



TMM 2023 Recap

tillandmcculloch.ca

TMM is only possible with the support of the numerous sponsors and volunteers whose generous time and effort make these meetings a success year after year. We hope to see you next year in Montréal!

See you in November 2024!



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