NSW StemCell NETWORK

30TH NSW STEM CELL NETWORK WORKSHOP

ORGANOIDS AND REGENERATIVE MEDICINE

WESTMEAD EDUCATION AND CONFERENCE CENTRE

Thursday, 3rd November 2022
930am to 4pm

NSW StemCell NETWORK

SPONSORS AND SUPPORTERS

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The NSW Stem Cell Network gratefully acknowledges the support of Diabetes NSW & ACT and Westmead Education and Conference Centre.

WELCOME

Organoids are self-organising, three-dimensional structures derived from stem cells. Owing to their multicellular histology, organoids have the capacity to recapitulate many aspects of mammalian organ architecture, function, and complexity in vitro, beyond the capacity of what 2D cell culture can offer. Organoids can be generated from adult stem and progenitor cells or, can be directed to differentiate from pluripotent stem cells into a variety of normal and pathological organ-types including those from the neurological, gastrointestinal, cardiorespiratory, endocrinological, reproductive, and urogenital systems. Organoids have changed the face of medical research by providing biological tools for understanding organ-specific development and disease, a platform to study drug design, and a stepping-stone towards the personalised medicine era.

This workshop has been put together to showcase the latest developments in organoid research across NSW.

The day will start with session one, Overview of Organoids, presented by A/Prof Mirella Dottori of the University of Wollongong. This will be followed by Dr Shafagh Waters in session two who will discuss her research in the field of respiratory organoid biology.

After morning tea, we will move onto the third session, which covers the fascinating area of organoids in neurological and eye research. Session three will begin with a talk from Dr Eva Tomaskovic-Crook on clinically compatible hydrogel-based human organoids. Dr Anai Gonzalez Cordero and Dr Tim Kao will present their research on stem cell-derived models of eye research, including retinal and lens development and disease. Prof Geraldine O'Neill will discuss how she uses organoids to understand brain cancer biology. After lunch, we move into session four which will outline research being conducting in the gastrointestinal and endocrinological field. Prof Golo Ahlenstiel will present his research on the multifunctional role of gut and liver organoids, followed by Dr Reena Singh who will discuss the use of pancreatic organoids in the context of diabetes.

This year, we have introduced a new session to the workshop dedicated to giving students the opportunity to be involved in presenting their data. In the last session of the day, students will present their research on organoids to their peers. There will also be the opportunity for students to present their research in poster format at lunch time to help foster networking and opportunities for students, academics, and sponsors.

This workshop would not have been possible without the support of Westmead Education and Conference Centre and our commercial sponsors, Miltenyi Biotec, John Morris Group and the Stem Cell and Organoid Facility at the Children's Medical Research Institute. We encourage all attendees to visit their booths during the program breaks.

We hope you enjoy the workshop and continue to support the NSW Stem Cell Network at future events.

Deb Rooz
Manager
NSW Stem Cell Network

Dr Rachel Shparberg
Deputy Chair
NSW Stem Cell Network

Prof Bernie Tuch
Chair
NSW Stem Cell Network

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PROGRAM

9:30am	Registration opens
10.00am	**Prof. Bernie Tuch - NSW Stem Cell Network** Welcome
Session 1	**Overview of Organoids as biological tools for development, disease and discovery** **Chair: Prof. Patrick Tam (The University of Sydney)**
10.10am	**A/Prof. Mirella Dottori (University of Wollongong)** *Organoids: Paving new Frontiers in Regenerative Medicine*
Session 2	**Respiratory applications** **Chair: Prof. Patrick Tam (The University of Sydney)**
10.35am	**Dr. Shafagh Waters (University of NSW)** *Towards personalized cystic fibrosis medicine*
11.00am	Morning Tea
Session 3	**Neurological and eye applications** **Chair: Prof. Jeremy Crook (The University of Sydney, Chris O'Brien Lifehouse)**
11.30am	**Dr. Eva Tomaskovic-Crook (Chris O'Brien Lifehouse, University of Wollongong)** *Clinically compatible hydro-gel-based human brain organoids for in vitro modelling and regenerative medicine*
11.55am	**Dr. Anai Gonzalez Cordero (The University of Sydney)** *The use of stem cell-derived organoids to model retinal diseases and develop therapies*
12.20pm	**Prof. Geraldine O'Neill (The University of Sydney)** *Organoid/cancer co-cultures reveal distinct biology between brain tumour bulk versus diffusely invaded cells*
12.45pm	**Dr. Tim Kao (Western Sydney University)** *Investigating retinal progenitor and gut mobility cells through transdifferentiation*
1.10pm	Lunch and poster session
Session 4	**Gastrointestinal and endocrinological applications** **Chair: Dr. Chandana Herath (University of NSW)**
2.10pm	**Prof. Golo Ahlenstiel (Western Sydney University)** *It's not all about cancer... the multifunctional role of gut and liver organoids*
2.35pm	**Dr. Reena Singh (The University of Sydney)** *Engineering stem cell-derived islet-like organoids for the treatment and cure of Type 1 diabetes*
3.00pm	Afternoon Tea
Session 5	**Student talks** **Chair: Dr. Michael Morris (The University of Sydney)**
3.30pm	**Student talk 1: Michelle O'Hara-Wright (Children's Medical Research Institute)** *Electrical stimulation enhances retinal organoid development and ability of retinal organoid-derived photoreceptor cells to rescue vision in blind animal models* **Student talk 2: Mitchell B St Clair-Glover (University of Wollongong)** *Bioprinting neural crest cells for in situ differentiation to functional sensory neurons*
4.00pm	Workshop close

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SPEAKER PROFILE

A/PROF MIRELLA DOTTORI

Principal Research Fellow,
University of Wollongong

TALK TITLE

Organoids: Paving new Frontiers in Regenerative Medicine

ABSTRACT

Organoids generated from human pluripotent stem cells have opened new avenues for regenerative medicine, tissue engineering and disease modelling. However, as this frontier technology in stem cell biology rapidly advances, new questions and challenges also emerge. How far can this technology go and how far should it go? Can it ultimately replace the need for animal studies? Does the added complexity and cell heterogeneity found in organoids further complicate the research? These questions and others need to be considered as organoid technologies are being developed and embraced in many laboratories as an in vitro model system to pursue their research.

BIOGRAPHY

Associate Professor Mirella Dottori is a Principal Research Fellow at the Illawarra Health and Medical Research Institute, University of Wollongong, Australia. Her research combines technologies in human pluripotent stem cell biology, neuroscience and bioengineering to develop cellular models of the human nervous system. Her studies have contributed to advancing knowledge in human neurodevelopment and made an impact in regenerative medicine for neurological diseases, particularly Friedreich's ataxia, Parkinson's disease and hearing loss. Recognition of her research achievements include being recipient of NHMRC and ARC fellowships.

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SPEAKER PROFILE

DR SHAFAGH WATERS

UNSW Scientia Senior Lecturer,
School of Medical Sciences, UNSW
Head of Molecular Integrative Cystic Fibrosis (miCF) Research Laboratory
Sydney Children's Hospital, Randwick

TALK TITLE

Towards personalized cystic fibrosis medicine: molecular dynamics and theratyping in patient-derived airway and gut organoids for functional characterization and targeted therapies of rare CFTR mutations

ABSTRACT

Background and Aims: Caused by > 2000 mutations in the CFTR gene, Cystic Fibrosis (CF) is the most common inherited disease in Caucasians. Novel targeted therapies that modulate CFTR have been discovered. Targeted therapy market authorisation is granted based solely on a patients' CFTR mutation, yet clinical effectiveness in eligible patients varies greatly with up to 50% experiencing low clinical efficacy and/or high negative therapeutic side-effects. In addition, CF patients with rare-uncharacterized CFTR mutations have no access to these life-changing therapies. The lifelong cost of $450,000 per patient per year makes their provision without evidence of efficacy prohibitive. This result, in inequitable delivery of care between CF sufferers. Applying precision medicine to clinical practice remains a central challenge, with
robust diagnostic tests critically important.

Methods: We aim to transform how we mange treatment of CF, by advancing precision interventions by creating mini-organs (organoids) from a CF patient's own lung and gut adult-stem cells. We provide molecular phenotyping and determine drug responsiveness of each patient's organoid to treatment in a multi-analyte platform (miCF Avatar) of in vitro CFTR functional assays (electrophysiology and high throughput-live cell imaging), molecular dynamics simulations and an array of 'omics' technologies.

Results: So far airway and gut organoids from over 200 individuals with CF have been created and biobanked. I will demonstrate the application of the miCF Avatar Platform by presenting comprehensive characterisation for three ultra-rare CFTR mutations, S954L, I37R and R352Q, in addition to a cohort of 20 CF patients organoids, with common CFTR mutations tested against clinically available and novel CFTR modulating compounds.

Conclusions and Significance/Impact: The impact of this research is a valuable biobank of CF patinets organoids and improved understanding of CFTR protein and development of a companion diagnostic matching patients with the best available modulator therapies.

BIOGRAPHY

Shafagh Waters (BSc, MSc (Disc.), PhD) is a Scientia senior lecturer at UNSW and an honorary senior scientist at Sydney Children's Hospital. A productive PhD (2012; ANU) and postdoctoral fellowships (2013-2016; UNSW) helped her secure international training fellowships in gene therapy and organoid medicine, establishing her independent lab in 2016. Dr Waters lead an NHMRC funded research program on adult-stem-cell biology for cystic fibrosis (CF) that is supported by international and national industry partnerships. Her work has attracted >35 grants/awards and she was the recipient of a NSW Young Tall Poppy Science Award 2022. Dr Waters team has developed an Australian national biobank of stem-cell-derived airway and gut organoids, and has built a platform for high-throughput therapy-testing on patients organoids. She combines her unique strengths in organoid disease modelling, multi-omic molecular profiling and computational research with clinical data to improve individualised outcomes for patients with CF. This presentation will discuss the application of the functional drug assessment platform by presenting comprehensive characterisation of multiple ultra-rare CFTR mutations in CF patient derived organoids tested against clinically available and novel CFTR modulating compounds.

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SPEAKER PROFILE

DR EVA TOMASKOVIC-CROOK

Senior Research Scientist, Arto Hardy Family Biomedical Innovation, Chris O'Brien Lifehouse
Senior Research Fellow, Intelligent Polymer Research Institute, Australian Institute of Innovative Materials, University of Wollongong
Research Affiliate, School of Medical Sciences, Faculty of Medicine and Health, The University of Sydney

TALK TITLE

Clinically compatible hydro-gel-based human brain organoids for in vitro modelling and regenerative medicine

ABSTRACT

Human brain organoids present a new paradigm for modeling human brain organogenesis, providing unprecedented insight to the molecular and cellular processes of brain development and maturation. Other potential applications include in vitro models of disease and tissue trauma, as well as three-dimensional (3D) clinically relevant tissues for pharmaceuticals development and cell or tissue replacement. A key requirement for this emerging technology in both research and medicine is the simple, scaleable and reproducible generation of organoids using reliable, economical and high-throughput culture platforms. Here we describe such a platform using a defined, clinically compliant, and readily available hydrogel generated from gelatin methacrylate (GelMA). We demonstrate GelMA to be a cell growth substrate for rapid induction of brain organoids from human induced pluripotent stem cells (iPSCs), with scaleable production attained using 3D printed GelMA-based multiwell arrays. Differentiation of iPSCs was systematic and rapid, with early neural precursors forming by day 5, neural rosettes and early-stage neurons by day 14, and organoids with cellular and regional heterogeneity consisting of densely packed cell soma with regional divisions resembling cortical plate or rudimentary grey matter tissue with underlying white matter-like tissue and hollow neural tube-like structures, as well as electrophysiologically active neurons by day 42. The optimised method provides a simplified, direct, and well-defined platform for both research and translation of iPSCs and derivative brain organoids, enabling reliable 3D in vitro modelling and experimentation as well as the provision of clinically relevant cells and tissues for future therapeutics.

BIOGRAPHY

Dr Eva Tomaskovic-Crook is a Senior Research Scientist with Chris O'Brien Lifehouse Hospital's Biomedical Innovation Hub (BMIH) (2021-), as well as Senior Research Fellow (2021-) at the Intelligent Polymer Research Institute (IPRI), Australian Institute for Innovative Materials, University of Wollongong. Prior to her current positions, Eva was a Research Fellow (2014-2021) and Associate Theme Leader (2020-2021) with the Synthetic Biosystems Theme of the ARC Centre of Excellence for Electromaterials Science (ACES) at University of Wollongong. Eva completed her PhD in 2008 at the Ludwig Institute of Cancer Research, University of Melbourne in the field of cancer cell biology and targeted nanotherapeutics. As a Postdoctoral Fellow at A*STAR's Institute of Molecular and Cell Biology in Singapore, and St Vincent's Institute in Melbourne, her research in cancer cell biology continued, to identify therapeutic targets of metastatic breast cancer using applied bioinformatic approaches. Prior to her PhD studies, Eva was a Senior Research Assistant in the field of Schizophrenia neurobiology and drug discovery at the Mental Health Research Institute in Melbourne, and the Clinical Brain Disorders Branch of the National Institute of Mental Health (NIMH) at the US National Institutes of Health (NIH) in Bethesda, USA.

Eva's research brings together front-line technologies in human stem cells with cell instructive bio- and electro-materials for next generation tissue building. Her approach includes novel 3D-printing, stem-cell derived organoidogenesis, combined with electro-stimulation, particularly for neural tissue engineering and application, but also extending to cardiac tissue and tumour modelling. She has devised and demonstrated novel platforms to build and electrify human stem cells in two-dimensional (2D) and 3D to accelerate their development to specialised, mature and functionally interconnected cells and tissues, with increased responsivity to drug treatment. The platforms apply to both fundamental research and clinical translation: to model tissue development, function and dysfunction; to generate clinically relevant tissues for drug/toxicity testing and diagnostics; for tissue replacement and regenerative medicine; and, as models for medical device development, including advanced electroceuticals (electric pharmaceuticals), and to augment traditional pharmaceutical responsivity. Her work at Chris O'Brien Lifehouse in the Biomedical Innovation Hub is to enable the advancement of fundamental research to transform these innovations into clinical solutions including for cancer diagnostics, therapeutics, and regenerative medicine (tissue) therapy after cancer.

SPEAKER PROFILE

DR ANAI GONZALEZ-CORDERO

Stem Cell Medicine Group Leader,
Children's Medical Research Institute
Conjoint Senior Lecturer,
University of Sydney

TALK TITLE

The use of stem cell-derived organoids to model retinal diseases and develop therapies

ABSTRACT

The field of pluripotent stem cells and its derivatives miniaturised organ-like structures, organoids, has evolved rapidly in the last few years. Particularly, eye research has benefitted tremendously by landmark studies showing the potential of stem cells to form retinal organoids that mimic the development of the retina. These studies have enabled modelling of human retinal diseases and the testing of new therapies to advance translational research. Modulation of culture conditions using biochemical, biomechanical and bioelectric cues promise to improve the maturation of organoids generating differentiation protocols optimised to generate more robust and advanced organoids.

We hypothesise that improved retinal organoids can generate cells with increased potential for therapies, including the generation of healthy photoreceptor cells for cell transplantation. Cell therapy by transplantation using these cells rescued light perception in a mouse model of advanced degeneration offering a favourable therapeutic avenue to treat blindness. Furthermore, the formation of organoids with mature structures enabled the modelling and testing of genetic therapies in inherited diseases affecting the photoreceptor cells, such as Usher2a, a form of retinitis pigmentosa affecting rods and Stargardt's disease affecting the cone cells in the macula. Finally, modulation of organoids was implemented to develop organoids which more closely resemble the human retina, with the aim to develop organoids containing macular regions.

Improvements in these human model systems were crucial to support numerous studies aimed to treat diseases affecting the light-sensing photoreceptor cells of the retina.

BIOGRAPHY

Dr Anai Gonzalez Cordero gained her degree in Developmental Biology in 2008 from University College London and was subsequently awarded a PhD in eye regeneration from the Wellcome Trust Developmental and Stem Cell Biology programme. Her work on retinal repair using embryonic stem cell-derived photoreceptor precursors, demonstrated proof-of-concept for pluripotent stem cells to be used a renewable source of cells for cell therapy. She is an expert in the field of stem cell technology and organoids. Anai uses these remarkable tools to model retinal diseases and to test new genetic therapies for the treatment of blindness. Anai leads the Stem Cell Medicine Group at the Children's Medical Research Institute (CMRI), The University of Sydney. She also heads a new Stem Cell and Organoid Facility providing a number of human stem cell derived cells, tissues and organoids to all groups and researchers in Australia.

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SPEAKER PROFILE

PROF GERALDINE O'NEILL

Head, Children's Cancer Research Unit,
Kids Research Children's Hospital at Westmead

TALK TITLE

Organoid/cancer co-cultures reveal distinct biology between brain tumour bulk versus diffusely invaded cells

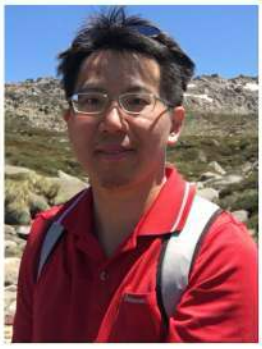
ABSTRACT

Diffuse Intrinsic Pontine Gliomas (DIPGs) are deadly brain cancers in children and there are currently no effective treatments. While it has now been well established that tumour-neuronal cell interaction is an important determinant of DIPG progression, the effect, if any, of the brain tissue environment at the primary tumour site, where tumour-tumour cell interactions predominate, is less clear. To address this question, we have used co-cultures of DIPG cells with cortical organoids derived from human embryonic stem cells. We have created "mosaic" co-cultures enriched for tumour-neuronal cell interactions versus "assembloid" co-cultures enriched for tumour-tumour cell interactions. Sequential window acquisition of all theoretical mass spectra (SWATH-MS) was used to analyse the proteomes of DIPG fractions isolated by flow-assisted cell sorting. Proteomes from DIPG cells grown as spheroids in the absence of organoids, were compared with DIPG cells isolated from mosaic and assembloid co-cultures. This revealed that tumour cell adhesion was reduced, and DNA synthesis and replication were increased, in DIPG cells under both co-culture conditions. By contrast, the mosaic co-culture was alone associated with pathways implicated in dendrite growth. The findings suggest that in addition to previously defined roles for direct tumour-neuronal cell contact, there are microenvironment effects which are independent of this direct contact. We propose that co-culture with brain organoids is a useful tool to parse the contribution of the neuronal microenvironment to brain tumour biology.

BIOGRAPHY

Professor Geraldine O'Neill is an internationally recognized cancer cell biologist who holds joint positions at the Children's Hospital at Westmead and the University of Sydney. Her body of research has helped elucidate the impact of cancer cell interactions with the external tissue environment. She has a special interest in developing improved pre-clinical models for cancer and draws from the latest advances in tissue engineering, cell biology and biophysics to find answers for improved treatments for cancer.

SPEAKER PROFILE



DR TIM KAO

Postdoctoral Research Fellow,
School of Medicine,
University of Western Sydney

TALK TITLE

Investigating retinal progenitor and gut mobility cells through transdifferentiation

ABSTRACT

Millions of patients suffer from gastrointestinal motility disorders or age-related macular degeneration, and there are very limited treatments available. Our groups have generated 3D micro-lenses and unveiled detailed transcriptomic analysis of ROR1-expressing lens epithelial cells, derived from human embryonic stem cells. By having this experience, we performed the transcriptomic analysis on retinal progenitor-like cells derived from human pluripotent stem cells and purified human interstitial cells of Cajal (ICC). Analysis of these data using principal component analysis, heat maps and gene ontology assessments revealed their transcriptomes and the similarity to retinal progenitor cell and ICC in vivo, respectively. These studies provide a resource of gene expression networks from normal human retinal progenitor cells and human ICC during the development, which will be key for producing large number of desired cells obtained from human stem cells through direct cell conversion (called transdifferentiation).

BIOGRAPHY

Tim is interested in using stem cell to study normal human development and human disease. He obtained his PhD at The University of Melbourne in 2019 and demonstrated the robustness of a novel gene expression system which allows researchers to overexpress foreign genes without being silencing in undifferentiated stem cells and differentiating cells derived from stem cells. Following completion of his PhD, he undertakes postdoctoral training in the Regenerative Medicine Laboratory of A/Prof Michael O'Connor at Western Sydney University. He currently focuses on the direct cell conversion of retinal progenitor cells and interstitial cells of Cajal from human stem cells.

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SPEAKER PROFILE

PROF GOLO AHLENSTIEL

Chair of Medicine,
Western Sydney University

TALK TITLE

It's not all about cancer... the multifunctional role of gut and liver organoids

ABSTRACT

Cancer cell lines have been the traditional tool to study the effect of cytokines, therapeutic compounds and cell-cell interaction in humans ex vivo. While the longevity of cancer cell was the main reason for their widespread use, the fact that they were derived from a cancer has remained their limitation. Organoid have revolutionized ex vivo/in vitro research not just in the field of cancer, as they allow us to rapidly generate organ-like cellular networks from almost any tissue from any individual irrespective of underlying disease. This means a significant step forward, as by utilizing organoids we can study immune cell-tissue interaction from the same donor in vitro, assess the effect of new drugs or compounds on an individual's tissue and the long term effect of exposure to inflammation or compounds may have on tissue maturation and growth. The results can serve can to finally accurately predict pathogenesis, treatment response

BIOGRAPHY

Professor Ahlenstiel is Chair of Medicine at Blacktown Clinical School, Western Sydney University and Clinical Network Director Subspecialty Medicine (Cardiology, Endoscopy, Gastroenterology/Hepatology, Neurology and Respiratory Medicine) at Western Sydney Local Health District (WSLHD).

After completing his medical degree and PhD at the University of Bonn in Germany, he received research fellowships from the National Institutes of Health (NIH, USA) and the German Research Foundation (DFG, Germany) to pursue liver research at the National Institutes of Health, Bethesda, MD, USA in 2004.

In 2009 he moved to Sydney where he completed basic physician and advanced training in Gastroenterology/Hepatology in WSLHD in 2013. In 2014 he was appointed Associate Professor of Hepatology at the University of Sydney and became full time staff specialist at Westmead Hospital, before moving to Blacktown-Mount Druitt Hospital as the Chair of Medicine in 2017.

Professor Ahlenstiel is an academic hepatologist with >6,500 career citations, with active research in advanced liver disease, metabolic disease, liver immunology and cancer immunotherapy. He is a Faculty member at the Westmead Institute for Medical Research, and member of the Liver Faculty Executive of GESA, the national society for Gastroenterology and Hepatology in Australia.

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SPEAKER PROFILE

DR REENA SINGH

Research Fellow,
School of Medical Sciences,
Charles Perkins Centre,
The University of Sydney

TALK TITLE

Engineering stem cell-derived islet-like organoids for the treatment and cure of Type 1 diabetes

ABSTRACT

More than 422 million people worldwide suffer from diabetes, constituting 8.5 % of the total population. Type 1 diabetes- represents 10% of all cases, an autoimmune disease resulting in the complete destruction of insulin-producing beta-cells. It is mostly managed by daily insulin injections and continuous glucose monitoring. Despite the technological advancements, use of insulin pumps and continuous glucose monitoring, it is more than often challenging to maintain normal glucose homeostasis leading to long-term secondary complications, including vasculopathy, compromised quality of life for people living with diabetes and a huge socio-economic burden to governments.

Islet transplantation provides proof of concept that internally regulated insulin secretion is an effective method for diabetes management and cure. However, it is limited due to the scarcity of donors. Stem cell-derived insulin-producing cells provide a tangible alternative for islet transplantation to meet the demand of millions of people. My research is focused on engineering physiologically functional insulin-producing beta-cells to be used for cell replacement therapy in diabetes. A reliable source of human stem cell-derived bioengineered organoids also provides a platform to unravel the pathophysiology of the onset of disease, identify novel targets for drug discovery and develop precision medicine for the end-users. The outcomes from this study will help in facilitating, clinical trials for the better management and cure of diabetes and vascular diseases.

BIOGRAPHY

Dr Reena Singh is an internationally recognised developmental and stem cell biology scholar. She received her PhD in "Molecular Medicine" from Hannover Medical School, Germany. Following her PhD, she joined Professor Richard Harvey, Victor Chang Cardiac Research Institute, as Postdoctoral Research Scientist. During her PhD and Postdoctoral training, she worked extensively to understand the mechanism of cardiovascular development, congenital heart defects, progenitor specification, differentiation, regeneration and ontology of hematopoietic stem cells. She established strong national and international collaborations and published significant papers in the field of Developmental Biology, such as Circulation Research, Nature Cell Biology, Cell, Elife and Cellular and Molecular Life Sciences as a leading author.

In 2017, she joined the University of Sydney under the John and Ann Chong Fellowship, established a competitive "stem cell for Type 1 diabetes" research program in Charles Perkins Centre, and published a part of her work in STEM CELLS Translational Medicine in 2021. She was recognised by Juvenile Diabetes Research Foundation (JDRF) - Australia and the Macquarie Group Foundation as one of the "Future Leaders and Rising Stars- 2018" in Type 1 diabetes. She was also awarded Diabetes Australia Program Grant in 2021. Following her recent contributions to Type 1 diabetes research, she was interviewed by Harvard Professor (Dr Monica Westley) for an internationally recognised platform, "thesugarscience". Her cardiovascular and Type 1 diabetes work has been showcased in newsletters and media coverage. Dr Singh also serves as an invited editorial board review member of the journals "Frontiers in Cell and Developmental Biology-Signalling", and "Frontiers in Endocrinology" and review grants for funding bodies.

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STUDENT PRESENTATIONS

STUDENT TALKS

1. Electrical stimulation enhances retinal organoid development and ability of retinal organoid-derived photoreceptor cells to rescue vision in blind animal models

Michelle O'Hara-Wright[1,2]; Emilie Wong[1]; Ben Lim[1]; Grady Smith[1]; Nader Aryamanesh[1]; Anai Gonzalez-Cordero[1,2]

[1]Children's Medical Research Institute, Westmead, NSW; [2]Faculty of Medicine and Health, University of Sydney, Sydney, NSW

2. Bioprinting neural crest cells for *in situ* differentiation to functional sensory neurons

Mitchell B St Clair-Glover,[1,2] Sara Miellet,[1] Rocio K Finol-Urdaneta,[1] Zhilian Yue,[2] Gordon G Wallace,[2]

Mirella Dottori[1]

[1]Illawarra Health and Medical Research Institute, University of Wollongong, NSW, Australia; [2]ARC Centre of Excellence for Electromaterials Science, Intelligent Polymer Research Institute, University of Wollongong,
NSW, Australia

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STUDENT PRESENTATIONS

STUDENT POSTERS

1: Establishment of an efficient protocol for generating cardiac organoids

Ismael Aguirre-Maclennan[3], Scott Lee[3], Milan Fernando[3], Anai Gonzalez-Cordero[1,2,3]
[1]School of Medical Sciences, Faculty of Medicine and Health, University of Sydney, 2006, NSW; [2]Stem Cell Medicine Group, [3]Stem Cell and Organoid Facility, Children's Medical Research Institute, University of Sydney, Westmead, 2145, NSW, Australia

2: Efficient directed differentiation of human induced pluripotent stem cells (hIPSCs) towards photoreceptor progenitors using small molecules.

Beaver, D. & Limnios, IJ
Clem Jones Centre for Regenerative Medicine, Bond University, Queensland, Australia

3: Robust Differentiation of Retinal Pigment Epithelial Cells from Human Embryonic Stem using Small Molecules

Rucinski, A., Beaver, D. & Limnios, IJ
Clem Jones Centre for Regenerative Medicine, Bond University, Queensland, Australia

4: Investigating stemness and transdifferentiation in regeneration using single cell RNA & ATAC sequencing in sponges

Di Pan, Cuneyt Caglar, Marcin Adamski, Maja Adamska
Division of Biomedical Science and Biochemistry, Research School of Biology, ANU College of Science, The Australian National University

5: Developing a Macular Region in Stem Cell-Derived Retinal Organoids

Benjamin Y. Lim[1,2], Michelle O'Hara Wright[1,2], Emilie Wong[1], Anai Gonzalez-Cordero[1,2]
[1]Stem Cell Medicine Group, Children's Medical Research Institute, 2145, NSW; [2]School of Medical Sciences, Faculty of Medicine and Health, University of Sydney, 2006, NSW

6: Demonstrating the functionality of PSC-derived cortical brain organoids

Scott Lee[3], Milan Fernando[3*], Ismael Aguire-Maclennan[3], Anai Gonzalez-Cordero[1,2,3]*
[1]Stem Cell Medicine Group, [2]Stem Cell and Organoid Facility, Children's Medical Research Institute, University of Sydney, Westmead, 2145, NSW, Australia; [3] School of Medical Sciences, Faculty of Medicine and Health, University of Sydney, 2006, NSW

7: Neurotrophic factors are not required for long term ventral midbrain organoid culture.

Tyra Fraser
University of Melbourne, Florey Institute of Neuroscience and Mental Health

8: Modelling Familial ALS *in vitro*

Georgia Eleftheriou, Stefano Frausin, Cameron Hunt, Christopher Bye, Bradley Turner, Clare Parish, Lachlan Thompson
University of Melbourne, Florey Institute of Neuroscience and Mental Health

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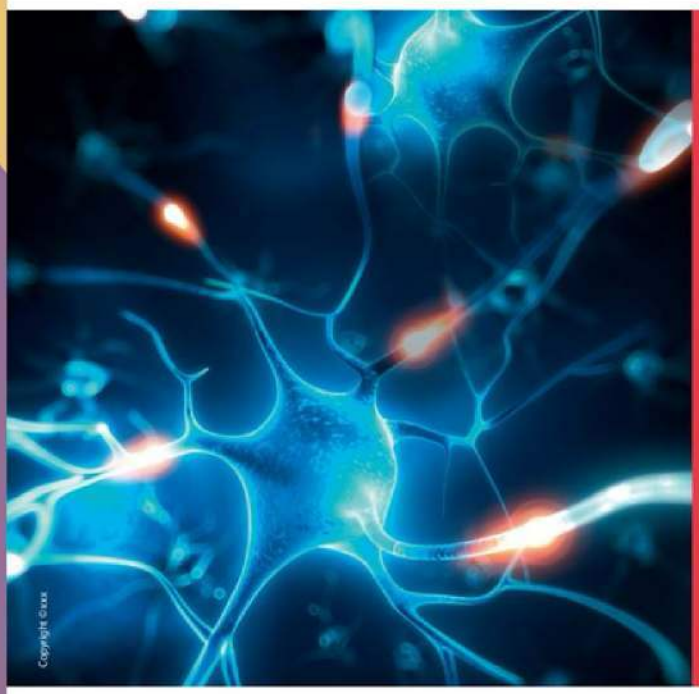

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NOTES

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JOIN THE NSW STEM CELL NETWORK

The NSW Stem Cell Network is a professional community with an interest in all forms of stem cells. Our all inclusive free membership makes this network unique in consisting of not only researchers and practitioners, but members of the public, industry and government bodies. Our aim is to ensure effective communication between diverse sectors for the advancement of stem cell research. As a member, you will receive invitations to upcoming network and external stem cell-related events.

Sign up at www.stemcellnetwork.org.au

CAREERS

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CONTACT

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