



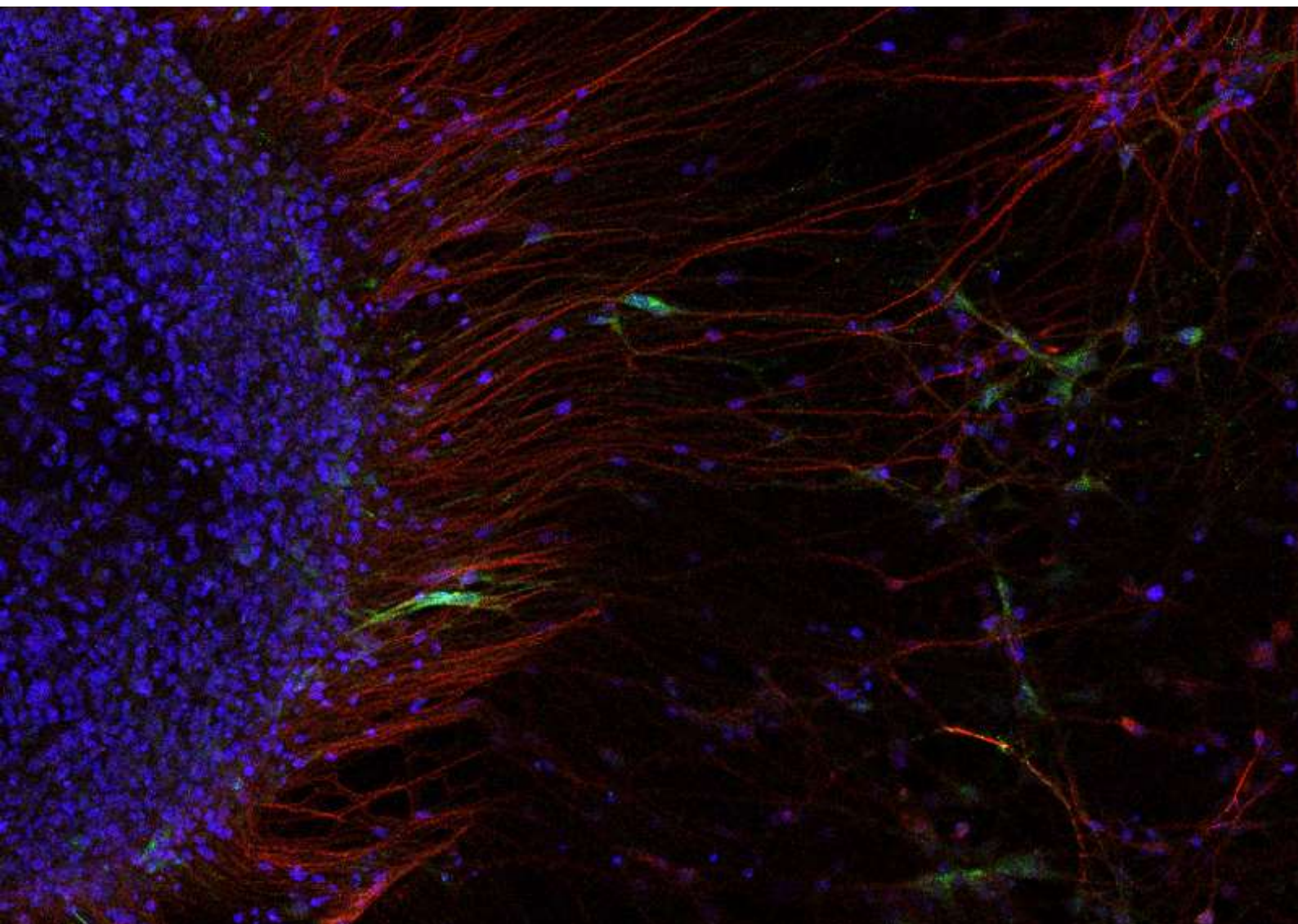
Australia's National
Science Agency

Program

Cutting Edge Symposia - Challenges and opportunities for “ex-vivo” model systems

“The Dome” Geelong Library

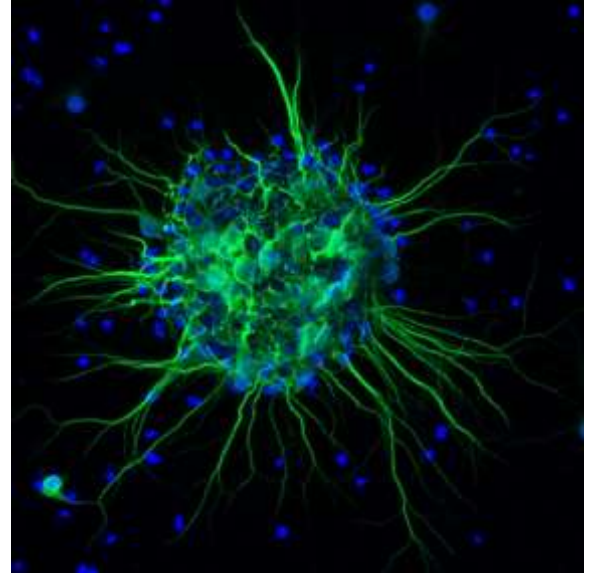
Wednesday 26 February – Friday 28 February 2020





Welcome!

Dramatic advances in materials science and cell biology have led to the development of new and increasingly complex experimental platforms for disease modelling. This cutting edge symposium will showcase recent developments in 3D tissue culture, stem cell technology, automation, micro and nano fabrication. This timely forum will also address key challenges for developing these technologies to replicate important aspects of disease progression and pathogenesis.



Sponsors





Day 1 | Tuesday 26 February 2020

Disease modelling: Relevance, advantages & limitations

SESSION 1: Challenges in modelling host-pathogen biology of human and animal disease

This session will be structured as a prelude discussion to subsequent topics. The aim of this session is to outline the current models, challenges and future needs in the area of modelling host-pathogen biology for human and animal disease.

TIME	TOPIC	SPEAKER
9:15 - 9:30 AM	Welcome	
9:30 – 11.00 AM	SESSION 1: Challenges in modelling host-pathogen biology of human and animal disease	
9:30 – 9:40 AM	Chair overview	Dr Nathan Godde, CSIRO
9:40 – 10:10 AM	iPSC-Based Neuronal Platforms for Modelling CNS Infections and Drug Screening	Dr Leonardo D’Aiuto, University of Pittsburgh
10:10 – 10:30 AM	Modelling neurotropic viruses in horse iPSC derived systems	Dr Deanne Whitworth, University of Queensland
10:30 – 10:45 AM	Organoids as a model for rabbit caliciviruses infection	Dr Egi Kardia, CSIRO
10:45 – 11.00 AM	A comparison of airway organoids and air-liquid interface as tools in respiratory research	Dr Qianyu Helen Chen, University of Melbourne
11:00 – 11:30 AM	MORNING TEA	

SESSION 2: Engineering representative animal models, current advances, challenges and limitations

The advent of gene-editing technology has led to the emergence of new and improved animal models of disease that are increasingly humanised, express reporters or are more susceptible to disease. This session will discuss the current advances in animal modelling, whilst outlining gaps and hurdles in implementing these systems and where future advancements need to be made.

TIME	TOPIC	SPEAKER
11:30 – 1:00 PM	SESSION 2: Engineering representative animal models, current advances, challenges and limitations	
11.30 – 11:40 AM	Chair overview	Dr Seshadri (Vasan) Vasan, CSIRO and University of York
11:40 – 12:10 PM	Generating ex-vivo experimental platforms from genetically engineered mice	Dr Patrick Humbert, La Trobe Institute
12: 10 – 12:30 PM	Advances in mouse models of motor neuron disease and frontotemporal dementia	Dr Adam Walker, University of Queensland
12:30 – 12:45 PM	Modelling lyssavirus infections in primary murine neural cultures and human stem cell-derived neural cultures	Dr Vinod Sundaramoorthy, CSIRO
12:45 – 1.00 PM	In vitro 3D fibrosis model for biomaterial testing	Dr Zay Oo, CSIRO and Swinburne University of Technology
1:00 – 1:45 PM	LUNCH	



SESSION 3: Application of Stem Cell Technology for Disease Modelling, filling the gaps of in vivo modelling

Since 2006, methods for making stem cells and an expanding range of differentiation protocols have been devised allowing for the creation of new models of disease previously not possible. Advantages and challenges of stem cell-derived systems will be showcased and discussed.

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TIME	TOPIC	SPEAKER
1:45 – 3:30 PM	SESSION 3: Application of Stem Cell Technology for Disease Modelling, filling the gaps of in vivo modelling	
1:45 – 1:55 PM	Chair overview	Dr Carmel O'Brien, CSIRO
1:55 – 2:20 PM	Modelling human brain disorders with functional iPSC neurons in vitro	Dr Cedric Brady, SAHMRI and Flinders University
2:20 – 2:45 PM	Generation of kidney organoids from human pluripotent stem cells	Dr Kynan Lawlor, Murdoch Children's Research Institute (MCRI)
2:45 – 3:00 PM	Functional screening in human PSC-derived cardiac organoids	Dr Holly Voges, MCRI and QIMR Berghofer
3:00 – 3:15 PM	Engineering techniques to recreate the complex microenvironment of the blood-retinal barrier in vitro	Dr Ashley Murphy, CSIRO
3:15 – 3:30 PM	TBA	
3:30 – 4:00 PM	AFTERNOON TEA	

SESSION 4: Model systems "wish list" workshop.

Panel discussion around problems with current models/ future hurdles/ potential applications. 4-5 selected leaders representing academia and industry across each field will participate in a panel discussion to facilitate cross talk across disciplines.

TIME	TOPIC	PANEL
	SESSION 4: Model systems "wish list" workshop	
4:00 – 5:00 PM	Panel discussion	Dr Leon Chew, Stem Cell Technologies, Canada
5:00 – 7:00 PM	DRINKS AND POSTER PRESENTATIONS	



Day 2 | Wednesday 27 February 2020

Fabricated microenvironments and automation

SESSION 5: Developing organoid and 3D culture models towards personalised treatment strategies

Recent years have seen a rapid increase in the use of organoid cultures for research. These complex systems self-organise to recapitulate many essential features of tissues but exhibit inherent variability and in many cases require consensus within the scientific community on culturing techniques. How these complex cultures can be further modified to reveal new insights into pathogenesis will be explored.

TIME	TOPIC	SPEAKER
9:30 – 11:00 AM	SESSION 5: Developing organoid and 3D culture models towards personalised treatment strategies	
9:30 – 9:40 AM	Chair overview	Dr Leah Cosgrove, CSIRO
9:40 – 10:05 AM	Organoids: modelling tissue homeostasis and human disease	Dr Elizabeth Vincan, University of Melbourne and VIDRL
10:05 – 10:25 AM	TBA	Dr Thierry Jarde, Monash University
10:25 – 10:40 AM	Engineered Plant-based Nanocellulose Hydrogel for Small Intestine Organoids Culture	Dr Rodrigo Curvello, Monash University
10:40 – 11:00 AM	A comparison of neural network function in 2D culture, 3D hydrogels, and organoids	Dr Justin Bourke, University of Wollongong and St Vincent's Hospital Melbourne
11:00 – 11:30 AM	MORNING TEA	

SESSION 6: Next-generation fabrication for researchers

Micro/nanofabrication technologies are increasingly utilised for cell biology applications. A wide range of surfaces and bioscaffolds have now been created to recapitulate microenvironments and regulate cell behaviour or response. How these new advances in material science can best be applied to deliver new pathological insights and deliver new diagnostics and treatments will be explored.

TIME	TOPIC	SPEAKER
11:30 – 1:00 PM	SESSION 6: Next-generation fabrication for researchers	
11:30 – 11:40 AM	Chair overview	Dr Sally McArthur CSIRO
11:40 – 12:05 PM	Using biomaterials to understand and control stem cell behaviour	Dr Jess Frith, Monash University
12:05 – 12:25 PM	Biomaterials and biofabrication strategies for engineering 3D tissue constructs	Dr Andrea O'Connor, University of Melbourne
12:25 – 12:40 PM	Establishing the BBB on a chip: lessons learnt so far	Dr Bo Peng, CSIRO and Monash University
12:40 – 1:00 PM	Micro and Nanoengineering tissue culture plates to unlock the potential of in vitro cultures	Dr Victor Cadarso, Monash University and Centre for Nanofabrication
1:00 – 2:00 PM	LUNCH	



SESSION 7: Automated Technologies

Robotics and high throughput screening platforms have allowed us to understand the full complexity of host-disease interactions and reveal new candidates for therapy. Robust assay development and detailed planning are essential for success and will be discussed by leaders in the field.

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TIME	TOPIC	SPEAKER
2:00 – 4:45 PM	SESSION 7: Automated Technologies	
2:00 – 2:10 PM	Chair overview	Director - Biomedical Materials Translational Facility CSIRO
2:10 – 2:35 PM	Challenges in scale-up manufacturing of brain-like ex-vivo models	Dr Christos Papadimitriou Tessara Therapeutics
2:35 – 2:55 PM	Towards high throughput 3D phenotypic screening	Dr Kaylene Simpson Victorian Centre for Functional Genomics
2:55 – 3:15 PM	Development of a Modular Automated System for Maintenance and Differentiation of Adherent Human Pluripotent Stem Cells	Dr Maciej Daniszewski University of Melbourne
3:15 – 3:30 PM	A novel brain organoid high-throughput platform to study glioblastoma using multimodal high-content fluorescence microscopy	Dr Mariana Oksdath Mansilla Centre for Cancer Biology, South Australia Pathology and University of South Australia
3:30 – 3:45 PM	Implementing personalised medicine for cystic fibrosis patients: Personalised stem cell derived organoids to select optimal treatment for each patient	Dr Shafagh Water, University of NSW
3:45 – 4:15 PM	AFTERNOON TEA	



Day 3 | Friday 28 February 2020

AAHL showcase and Early Career Researcher (ECR) workshop

Morning sessions will be held at AAHL. A bus to AAHL will be provided from Geelong station to AAHL.

Please advise organisers by return of email to Megan.Dearnley@csiro.au if bus transportation is required during the day.

Working at AAHL: *We will offer a virtual tour of the facility coupled with discussion and presentations from researchers to showcase the work that is possible within the facility. ECRs and students will be encouraged to present their work in this session.*

Tours of secure area: *During the morning a limited number of physical tours into the secure area will be offered and undertaken for symposium participants that have pre-registered. Please email Megan.Dearnley@csiro.au if you are interested in a tour of the secure PC3/4 laboratories.*

TIME	TOPIC	SPEAKER
9:00 – 10:30 AM	Welcome and induction	Prof Trevor Drew, Director of AAHL
10:30 – 11:30 AM	Short talks on AAHL research	
10:30 – 10:45 AM	A case study example of AAHL's pathology capability	John Bingham
	Vector borne diseases	Mathilda Laureti
	Controlling exotic pests	Caitlin Cooper
	Computational modelling of disease epidemics	Peter Durr
	Accessing AAHL – opportunities and collaborating	Kerry Petty
11:30 – 12:00 PM	MORNING TEA	
12:30	TRAVEL TO ECR WORKSHOP AND LUNCH AT LITTLE CREATURES	
1:00 – 2:00 PM	ECR LUNCH Discussion will focus on career advice for ECRs, particularly around productive ways to collaborate across disciplines to achieve high impact science in their research	
2:00 – 3:15 PM	ERC MINI ORAL SESSION (selected from posters): 5-minute presentation with 2 minute questions for ERC's and students only	
2:00 – 2:10 PM	Recapturing tumour complexity in microfluidic 3D cell culture platform	Dr Chia-Chi Chien, University of South Australia
2:10 – 2:20 PM	Mass Spectrometry Analyses of Multicellular Tumour Spheroids	Dr Manuela Klingler-Hoffman, University of South Australia
	Rabies against the machine: Using iPSC-derived neurons and artificial intelligence to identify biomarkers of lyssavirus infection	Dr Ryan Farr, CSIRO
	3D cell culture models to combat new human respiratory viruses	Dr Liz Pharo, CSIRO

	TBA
	TBA
3:15 – 3:40	LIGHT REFRESHMENTS PROVIDED
	CLOSE - BUS BACK TO GEELONG

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