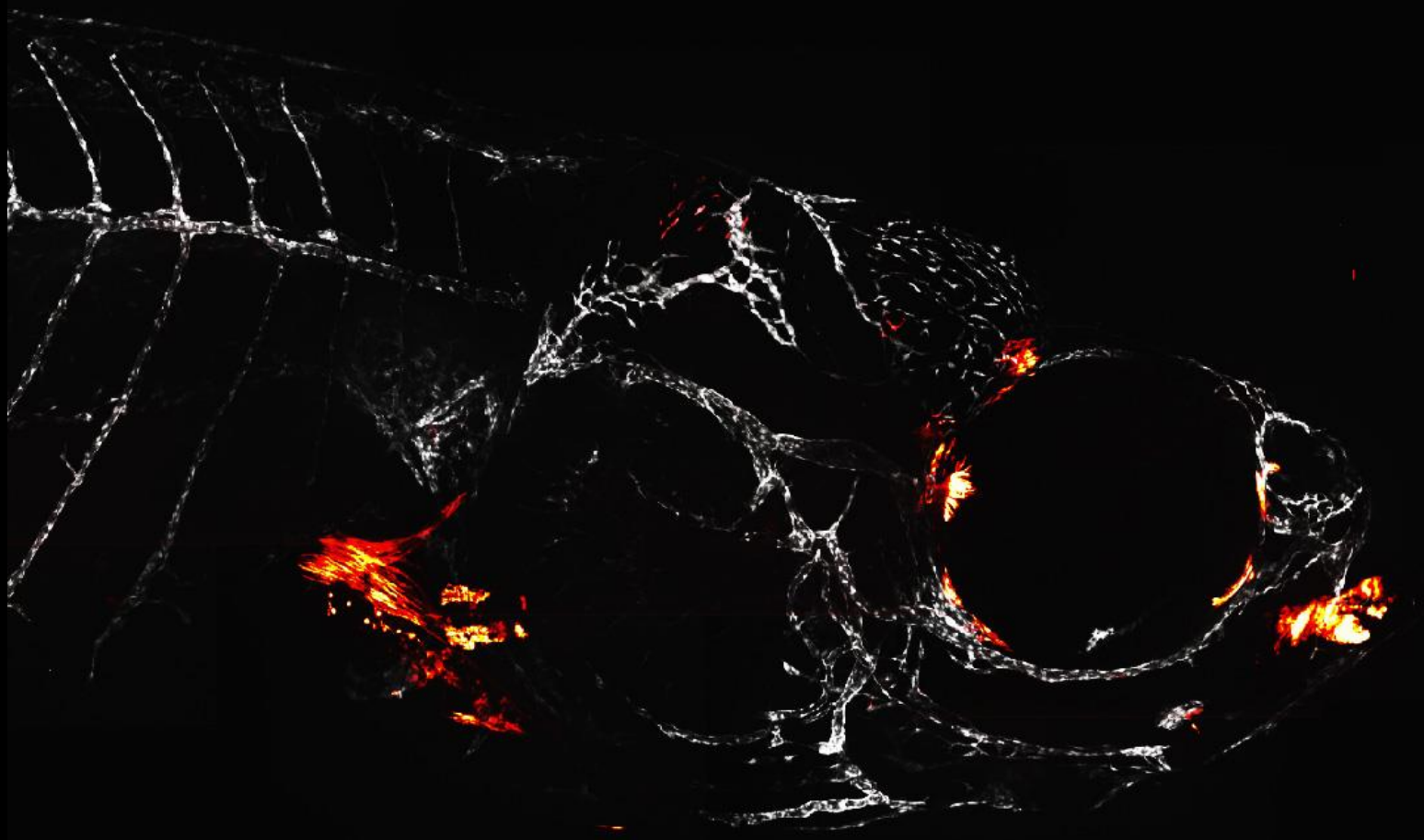
ANZSCDB

Australia and New Zealand Society for
Cell and Developmental Biology Inc.



SPRING NEWSLETTER 2023

ANZSCDB
Australia and New Zealand Society for Cell and Developmental Biology Inc.

NEWSLETTER September 2023

President's Report

Dear colleagues,

I write to you as the current ANZSCDB executive is in the home straight and ready to pass on the baton to Aleks Filipovska and her team. It has been a very busy two years and I am very proud of what we have achieved. As I step down as President, I want to say thank you to so many people that have helped me and ANZSCDB in different ways. First, a huge thank you to Treasurer Jennifer Zenker and Secretary Alex Combes for your dedication, skill and creativity. You both have devoted countless hours to the ANZSCDB and launched many new initiatives, whilst also ensuring that all of the core business has been attended to in a timely and professional manner.

In this issue

Thank you to the ANZSCDB Council (Edna Hardeman, David James, Natasha Harvey, Sally Dunwoodie, Peter Currie, Jo Bowles, Julia Horsfield and Jenny Stow) for your continued service to ANZSCDB. Your wisdom and support over the past two years has been invaluable.

I could not write a final letter without mentioning all of our wonderful ANZSCDB state representatives – Teresa Bonello, Rachel Woodhouse, Alexis Diaz-Vegas, Peter Su, Ivar Noordstra, Merja Joensuu, Anna Oszmiana, Yasmyn Winstanley, Jessica Fletcher, Brooke Huuskes, Jan Manent and Yu Suk Choi. You are so crucial to our society, and play an incredibly important role in promoting ANZSCDB, recruiting new members and in organising the vibrant local meetings that celebrate and communicate our research (see page 13 for details on the upcoming 2023 meetings, including the first ever WA ANZSCDB state meeting).

A huge thank you goes to two rising stars of our society: Ruchi Umargamwala and Sakurako Kobayashi. They joined a newly formed Communications team this year led by Alex Combes and have been an amazing support to the executive, assisting with communications via social media and newsletters. They also organised and convened the first ever ANZSCDB "Ask Me Anything" (AMA) event, featuring Andrew Pask and his amazing efforts to revive the Tasmanian Tiger from extinction. It was an inspiring event (see page 10 for more). With emerging leaders like Ruchi and Saki, the future of the ANZSCDB looks extremely bright.

Finally, I want to thank all of you, our members; you are the lifeblood of the society. A special thanks in particular to all of you that have joined the ANZSCDB for the first

time over the past two years – I hope you find the society as rewarding as I have over the past 17 years.

ANZSCDB Prizes

This a special time of year because it is the ANZSCDB's awards season. We received a record number of nominations and applications this year, which resulted in a very competitive selection process. It gives me great pleasure to announce the winners of the 2023 ANZSCDB prizes:

President's Medal – Professor Jane Visvader (WEHI)
Emerging Leader Award – Associate Professor Edwina McGlinn (ARMI, Monash)
Early Career Researcher Award – Dr Jessica Greaney (ARMI, Monash)
Publication Awards – Azelle Hawdon (ARMI, Monash) and Natalia Benetti (WEHI)
Image Awards –Dr Julie Moreau (BDI, Monash), Andrea Usseglio Gaudi (Peter MacCallum Cancer Centre)

These awards will be presented at the Victorian ANZSCDB meeting, to be held at Bio21 on October 12 and also via Zoom. Jane Visvader and Edwina McGlinn will also give their award lectures at this event. Please see page 3 for more on our prize-winners.

Advocating for basic research

Advocacy is an important activity of ANZSCDB. Earlier this year I wrote a submission to government on improving alignment and coordination between the Medical Research Future Fund (MRFF) and NHMRC's Medical Research Endowment Account. Funding for basic science, including cell biology and developmental biology, has steadily fallen in Australia over many years. ANZSCDB hopes that MRFF funds can be used more strategically and help reverse this trend and provide much needed support for Australian science. I thank the ANZSCDB committee for guidance with this submission, especially Jo Bowles for helping to drive this.

The incoming ANZSCDB president – Professor Aleksandra Filipovska

I wish a big welcome to incoming ANZSCDB President Aleks Filipovska, from the Harry Perkins Institute of Medical Research in Perth. Aleks is a wonderful scientist and excellent leader, and I am sure she will lead ANZSDCB to bigger and better things over the next two years. Aleks has recruited an eager and professional executive team that are well versed in the ANZSCDB, with Jan Manent (incoming Treasurer) being a current state representative of Victoria and Alexis Diaz-Vegas (incoming Secretary) serving as state representative of NSW. Thank you and congratulations Aleks on being the next President of ANZSCDB and all the best to you, Alexis and Jan for the next two years.

Finally, I wish you all well for the remainder of 2023 and a relaxing and enjoyable break over the summer.

ANZSCDB Annual General Meeting
3:30-4:45pm Thursday 28th September
https://monash.zoom.us/j/82078333504?pwd=NnBIY3kwS1MybHpIVDJnaHlLRmJxUT09
meeting ID: 820 7833 3504 pw: 134802

Kieran Harvey,
President, ANZSCDB

Cover: Fish on Fire

"This image depicts the development of lymphatic vascular architecture (grey) and its interplay with a novel transcription factor (red)"

Andrea Usseglio Gaudi, Peter MacCallum Cancer Centre

ANZSCDB AWARDS 2023

2023 ANZSCDB President's Medalist
Professor Jane Visvader

Walter and Eliza Hall Institute for Medical Research

Professor Jane Visvader is internationally recognised for identifying breast stem and progenitor cell populations and elucidating their role in normal development and cancer. Following a landmark discovery of stem cells that are responsible for generating all ductal tissue in the breast, Visvader and team have subsequently defined the stem cell hierarchy and master regulators of differentiation, providing a new framework for the molecular and cellular events that drive mammary gland development and breast cancer. Integrating basic and translational work, mouse and organoid models, advanced imaging and single cell approaches, Visvader has consistently reported breakthroughs and novel methods that transform our insight into epithelial organogenesis and provide potential therapeutic strategies for breast cancer. Accompanied by an outstanding track record of leadership, engagement, and mentorship, Jane's research exemplifies the translational potential that can be realised from fundamental research in cell biology and developmental biology.

2023 ANZSCDB Emerging Leader Award
Associate Professor Edwina McGlinn

Australian Regenerative Medicine Institute

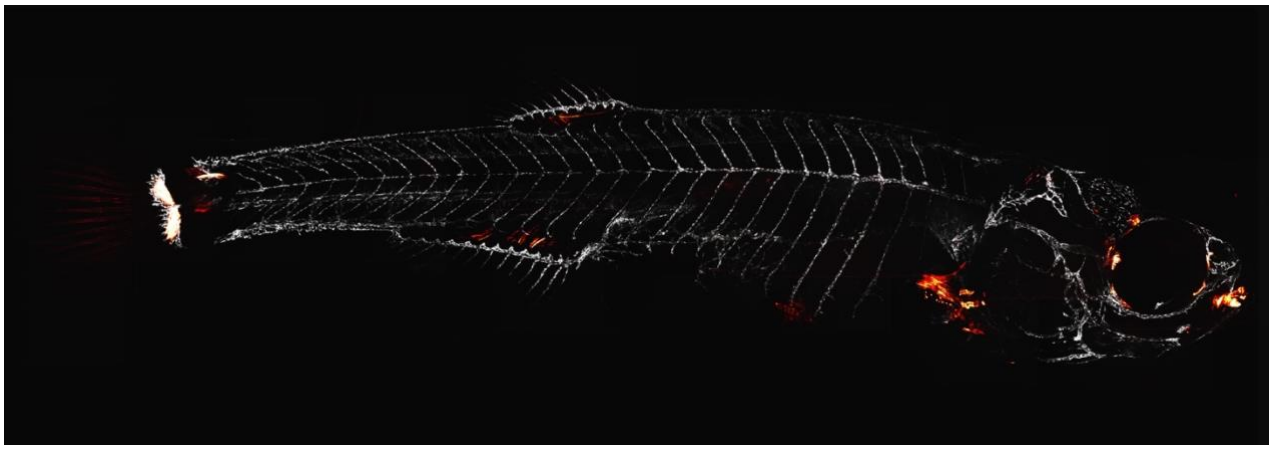
Edwina completed her PhD at the Institute for Molecular Bioscience UQ, and post-doc at Harvard Medical School, prior to joining Monash University as the first EMBL-Australia Group Leader, based at the Australian Regenerative Medicine Institute (ARMI). Here, Edwina has been promoted to Associate Professor and Head of Research Excellence and Mentorship at ARMI. Edwina's work combines complex mouse genetics, pluripotent stem cell differentiation protocols and advanced genomic technologies to reveal novel mechanism driving embryonic growth and patterning. Her specific focus is on identifying novel factors that control the timing of Hox cluster transitions. This has enabled her lab to reveal the regulatory logic controlling precise vertebral number within different regions of the vertebral column, supporting a revised model of Hox function in this classical context whereby Hox function is required to construct axial tissue not solely pattern. More broadly, this work provides a molecular framework to interrogate mechanisms of evolutionary change and congenital anomalies of the vertebral column and spinal cord. In addition to her research, Edwina has a strong passion for the promotion of equity, diversity and inclusion (EDI) in science.

ANZSCDB Early Career Researcher Award
Dr Jessica Greaney

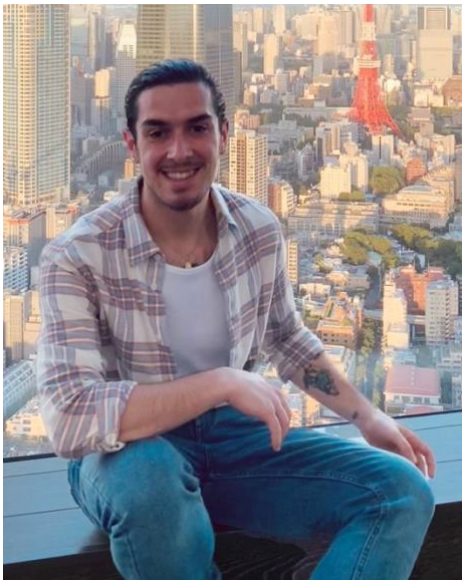
Australian Regenerative Medicine Institute

Dr Greaney's research explores the multifaceted roles of the cytoskeleton in early mammalian development. Jess undertook a PhD in Reproductive Medicine at the University of Queensland in the laboratory of Professor Hayden Homer where she studied the process of oocyte maturation using live-imaging. It was during this time that she developed an interest in the cytoskeleton and how it influences cellular function. Jess later joined the lab of Dr Jennifer Zenker at the Australian Regenerative Medicine Institute at Monash University as a Postdoctoral Research Fellow. She was recently awarded a Monash University Early Career Postdoctoral Fellowship to develop light-activated tools to manipulate microtubules in pluripotent stem cells and the preimplantation mouse embryo. Jess hopes that her work will provide insight into the dynamic nature of the cytoskeleton and a deeper understanding of the interplay between a cell's structure and its identity.

ANZSCDB Image Awards



Fish on Fire



This image depicts the development of lymphatic vascular architecture (grey) and its interplay with a novel transcription factor highly expressed in the fins (red) in a 21 days post fertilization zebrafish. Given the size of the zebrafish at this stage, a special mounting technique was required to ensure survival of the animal during the 4 hour in vivo imaging session. The image itself is composed by 20 single images, captured on Olympus FVMPE-RS Multiphoton, 25x objective. Images were individually processed in Fiji to ensure equal exposure parameters and tiled in Adobe Illustrator.

Andrea Usseglio Gaudi
Peter MacCallum Cancer Centre
& Uppsala University

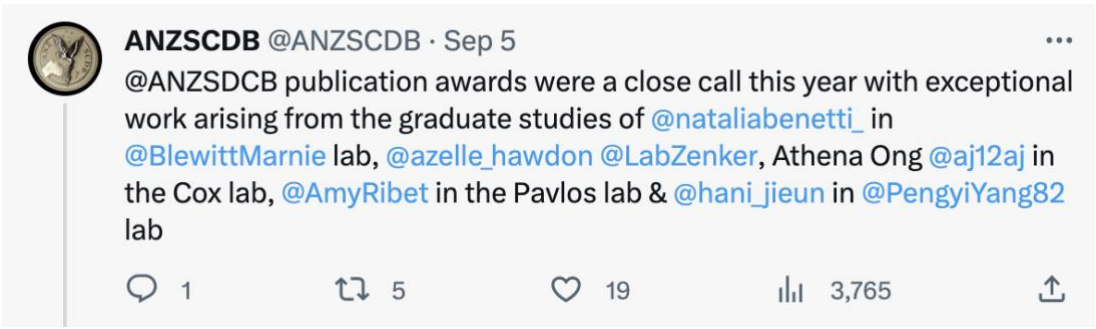
Dr Julie Moreau
Monash Biomedicine Discovery Institute

Growing Kidney

An E12.5 mouse embryonic kidney expressing Tomato (cyan) in all cell types and GFP (magenta) in nephron progenitor cells was imaged every 5 minutes for 72 hours on a spinning disk confocal microscope. Movies like this provide insight into how progenitor self-renewal and differentiation are regulated during organogenesis and inspire new strategies to recreate complex tissues in vitro.

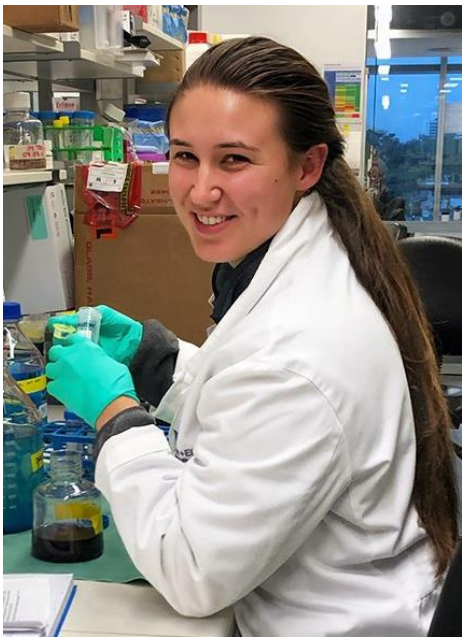
View Dr Moreau's movie on the [image award website].

ANZSCDB Publication awards



ANZSCDB Publication Award in Developmental Biology

Dr Natalia Benetti
Walter and Eliza Hall Institute of Medical Research and the University of Melbourne



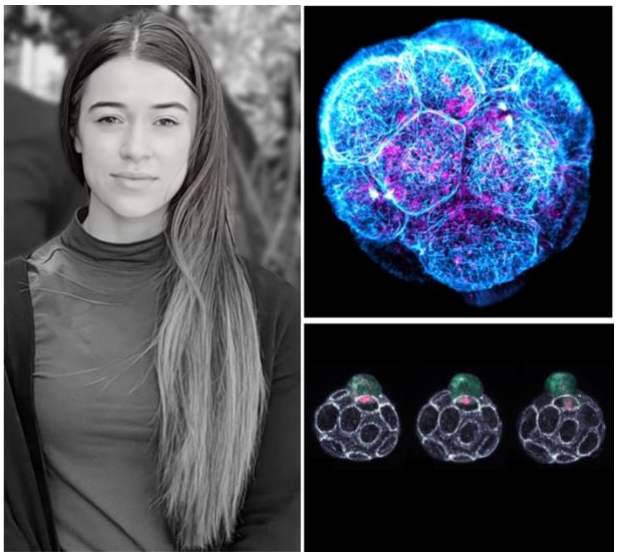
Benetti, N., Gouil, Q., Tapia del Fierro, A. Beck, T., Breslin, K., Keniry, A., McGlinn, E., Blewitt, M.E. **Maternal SMCHD1 regulates Hox gene expression and patterning in the mouse embryo** Nat Commun 13, 4295 (2022). https://doi.org/10.1038/s41467-022-32057-x

"In this paper, we report for the first time in mammals, that removing a factor (SMCHD1) in the oocyte can have consequences for Hox gene expression and embryo patterning a week later in the developing embryo. This is a surprise, given that the embryo contains abundant SMCHD1 for at least 5 days before any effect is observed, meaning there is a long-lived epigenetic memory normally created by maternal SMCHD1. This is an exciting discovery, suggesting the maternal supply of epigenetic regulators plays a critical role in embryo patterning. It also has implications for humans as pathogenic polymorphisms in SMCHD1 are associated with two different genetic disorders."

This work was conducted as part of Natalia's PhD in Professor Marnie Blewitt's laboratory and was co-supervised by Associate Professor Edwina McGlinn at the Australian Regenerative Medicine Institute. Dr Benetti has recently moved to The Max Planck Institute for Molecular Genetics in Berlin for a postdoc.

ANZSCDB Publication Award in Cell Biology

Azelle Hawdon
Australian Regenerative Medicine Institute



Hawdon, A., Geoghegan, N.D., Mohenska, M., Elsenhans, A., Ferguson, C., Polo, J.M., Parton, R.G., Zenker, J. **Apicobasal RNA asymmetries regulate cell fate in the early mouse embryo**. Nat Commun 14, 2909 (2023). https://doi.org/10.1038/s41467-023-38436-2

"Using advanced live imaging techniques, our study sheds light on the intricate processes occurring within cells of the preimplantation mouse embryo. By examining the real-time dynamics of RNA molecules, translation, microtubules and organelles in their spatial and temporal context, we uncover insights into the interplay between molecular dynamics, cellular organisation and gene expression. Integrating cell and developmental biology, our findings establish a framework for understanding how subcellular asymmetries in RNA distribution and translation capacity synergistically contribute to cell fate decisions during mammalian embryo development."

Teaching

Educating students to develop real life skills in an age of generative AI

What were your University days like? Did you go to lectures in a lecture theatre, trying to take notes from the slides and stay awake, because if you missed information you'd have to catch up from the textbook or friends? Did you try to cram all that material for an end of semester written exam in a dusty hall with hundreds of other students? Did lab classes involve basic experiments where the results were known, but were also lots of fun? Or did you watch recorded lectures at home in your PJs, through an online learning platform? You may also have memories during COVID lockdowns of attending hastily developed Zoom lab classes and "show-your-pet" sessions that were used to try and improve group morale.

Whichever of these experiences is relevant to you, our way of work and available technologies continues to rapidly change. Likewise, the way we teach and assess students has had to swiftly adapt in response to different circumstances and the availability of artificial intelligence platforms such as ChatGPT.

The Department of Anatomy and Developmental Biology at Monash introduced a major in Developmental Biology within the BSc degree in 2007 with a variety of units across 2nd and 3rd year and have continued to develop the course utilising case studies and practical experiences. These have been enhanced since the opening in 2019 of our new Biomedical Learning and Teaching Building with "state of the art" laboratory facilities. The challenge at present is how do we make use of these facilities to motivate students to master concepts and skills that are future-focussed within the discipline but also provide them with transferable skills that support success in their careers?

There are an abundance of new molecular and cellular techniques for studying tissues but what key skills should we expose undergraduate students to? Future employers emphasise the importance of attributes including communication, digital literacy, problem solving and creativity. There is also the logistics of planning laboratory classes and assessments for large classes, time and space availability, and competing demands on student time. Our approach was to turn to our research community for input by running a session at our departmental retreat where we asked researchers what skills are important to develop in our undergraduate students. Critical thinking was considered the most vital skill, together with resilience (incorporating an ability to handle failure), initiative, practical laboratory skills, statistics, synthesising scientific literature, awareness of bias and research ethics, and scientific writing skills. This informed a review of our course to incorporate a mix of practical, theoretical and general employability skills. This include classes where we challenge students to conduct ambitious practical experiments with cells and embryos where many students experience failure. This can be used to encourage students to critically evaluate what may have gone wrong, and creatively plan a new approach. We also incorporate datasets from research performed by groups in our department that include "failed data". Don't we all have plenty of data from experiments that didn't work! This is a much more real-life experience of conducting research.

Alongside design of classes, there is also a dramatic transition in how we assess students. Academic integrity including plagiarism, collusion and contract cheating needs to be managed. With new improved versions of AI text generators such as

ChatGPT continuing to appear we need to adapt assessment strategies. Monash University is transitioning away from traditional invigilated exams to more authentic assessments which incorporate skills and knowledge required in the workplace. We are utilising laboratory reports that requires troubleshooting data and challenging students to design experiments, produce videos and animations. We have also introduced oral viva voce exams, where communication and knowledge are assessed using defined criteria. These assessments are largely AI-resistant as they require students to demonstrate their own knowledge.

By designing inspiring course material and utilising assessments that encourage skills highly relevant to future careers we hope to empower our students to creatively engage in their own education. It is extremely rewarding to witness students experiencing "light bulb" moments in practical classes and workshops. Education has undergone many changes in the past 20 years, and will continue to adapt as our field advances.

Sonja McKeown, Chantal Hoppe, Julia Young, Helen Abud

Educators from the Department of Anatomy and Developmental Biology, Monash University; L-R Sonja McKeown, Julia Young, Craig Smith, Reyhan Akhtar, Helen Abud, Kim Catania and Chantal Hoppe in the practical teaching lab.

Contribute to the ANZSCDB newsletter!

ANZSCDB aims to identify and promote topics of interest to the society, to seek and distribute member news, and establish pathways for advocacy and policy development. These aims rely on member contributions so please get in touch with articles and ideas to help promote issues relevant to you.

Education in cell biology and developmental biology, and issues relating to teaching and research roles have been raised as an area that is underappreciated in the society. Newsletter submissions provide an opportunity to recognise and celebrate the great work many of our members do in this space.

Please send items to the society Secretary, the communications team, or your state representatives.

Nominations for ANZSCDB State/NZ Representatives

State and NZ representatives play essential roles for ANZSCDB. They work with the Executive to promote the society and its activities by **fostering local communities**, **recruiting new members** and **gathering news for communication** to our membership base. ANZSCDB's aim is to have enthusiastic and capable state/NZ reps that reflect the diversity of our community.

What's involved?

- Work with the ANZSCDB Executive and Committee to advise on and implement new and existing policies and activities
- **Coordinate a local scientific meeting with support from the Exec, State Reps, and an organising committee of your choice**
- Gather and communicate news on member activities, awards and publications
- Contribute your ideas and member feedback on how ANZSCDB can better represent and serve Cell Biologists and Developmental Biologists in AU & NZ

Nominations are currently open for the following states: NSW, QLD, VIC, SA, TAS, WA, New Zealand. Please nominate via email (alex.combes@monash.edu) by 5pm Monday 25th September. Elections will be held at the AGM on 28th September from 3:30pm onwards over Zoom (follow this link or use meeting ID: 820 7833 3504 passcode: 134802)

The ANZSCDB Annual General Meeting

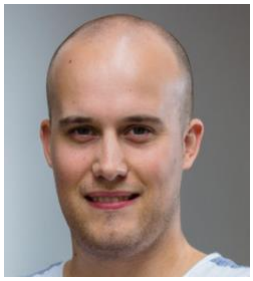
will be held over zoom from

3:30-4:45pm Thursday 28th September

https://monash.zoom.us/j/82078333504?pwd=NnBIY3kwS1MybHpIVDJnaHlLRmJxUT09
Or, enter meeting ID: 820 7833 3504 and passcode: 134802

Come along to the AGM to learn about society finances, plans and activities, to participate in State Representative elections, and contribute your views and ideas about society activities now and into the future.

THANK YOU to outgoing State Representatives



QLD

Ivar Noordstra

VIC

Jan Manent

SA

Anna Oszmiana

NSW

Alexis Diaz-Vegas

WA

Yu Suk Choi

ANZSCDB Webinar + AMA Session with Professor Andrew Pask

The ANZSCDB held its first Webinar + Ask-Me-Anything (AMA) Session on 10 August 2023 with Professor Andrew Pask from the University of Melbourne.

Organised by the Communications and Engagement Team, this session was curated for ANZSCDB members and friends to reunite through an informal, light-hearted discussion on topics of research which have generated public interest beyond academia. Particularly for students and Early Career Researchers, we designed this event to inspire today's emerging scientists and learn about careers and life in science from leaders in our community.

We were honoured to have Professor Pask guide us through his academic journey and life in science. Professor Pask has received numerous accolades over the years, however, his current project on de-extincting the Thylacine, or the Tasmanian Tiger, has gained international recognition. Supported by the US-based biotechnology company, Colossal Biosciences, Professor Pask is leading efforts to restore Thylacine populations in Australia, increase biodiversity within climate-impacted environments, develop novel genetic tools, and improve assisted reproductive technologies (ART) to prevent extinction of endangered marsupial species.

We had over 40 participants from across Australia join us for this session where Professor Pask imparted valuable knowledge and advice to scientists seeking long-term careers in academia. This included information on grant applications, publications, how to obtain fellowships and promotions, and how to become involved in science communications through media outreach.

Professor Pask's engaging webinar was followed by an AMA session where participants were given the opportunity to connect with Professor Pask and learn more about his career. Questions ranged from the 'Jurassic Park' nature of Professor Pask's work to the likelihood of the Thylacine acclimatising to the current Australian climate given its

extinction event over 90 years ago. Other questions sought advice on how to take on additional opportunities without compromising scientific progress and how to overcome difficulties in academia.
Overall, our first Webinar + AMA Session was a success by all accounts!

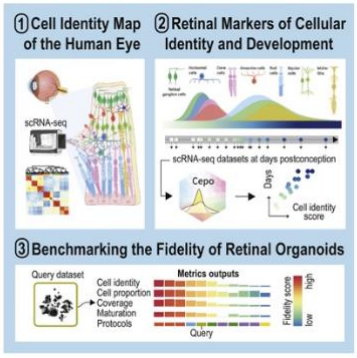
I would like to thank Professor Pask for his time and sharing his journey with us, and I acknowledge the efforts of Dr Alex Combes and Sakurako Kobayashi in the organisation of this event. I thank the ANZSCDB State Representatives for sharing this event with state members and ensuring the great turn out we received. To our participants, thank you for coming along! It was wonderful to see so many familiar names gathered on a virtual platform.

We are open to organising more Webinar + AMA Sessions in the near future. If you have a researcher in mind who has a journey to share and has made significant contributions to the fields of Cell Biology and/or Developmental Biology, please reach out to us at https://www.anzscdb.org/communications-and-engagement.

Until next time,

Ruchi Umargamwala
PhD Candidate
Molecular Regulation Laboratory
Centre for Cancer Biology
University of South Australia, SA

News and Activites



PhD student Hani Jieun Kim from the Children's Medical Research Institute and University of Sydney has led a landmark single cell meta-analysis study of fetal, postnatal and adult cell types in the human eye. Hani and team report new markers of cellular maturation, cell identity, and utilise their reference to critically evaluate cell types produced from multiple retinal organoid differentiation protocols. The study required development of computational methods to compare cell types, which are likely to benefit many fields, and the authors also released an open-source platform for researchers to benchmark future datasets against the primary and organoid retinal reference resource (https://shiny.maths.usyd.edu.au/Eikon/). "Our work provides a foundation for better understanding the human eye development and disease processes."

Kim H.J., O'Hara-Wright M., Kim D., Loi H.T., Lim B.Y., Jamieson R.V., Gonzalez-Cordero A., Yang P. **Comprehensive characterization of fetal and mature retinal cell identity to assess the fidelity of retinal organoids** *Stem Cell Reports* 2022 10.1016/j.stemcr.2022.12.002

PhD student **Athena Ong** from the **Cox lab** at the Peter MacCallum Cancer Research Institute and colleagues have published a new report illustrating an essential role for the KEAP1-NRF2 pathway during development. "The KEAP1–NRF2 pathway plays a central role in the regulation of redox and metabolic homeostasis. Although NRF2 has been extensively investigated in various disease states, there is a limited understanding of how NRF2 contributes to development. Here, we demonstrate that NRF2 activation induces post-developmental lethality that is preceded by liver abnormalities and accumulation of lysosomes. Mechanistically, we find that NRF2 activates the master transcriptional regulators of lysosomal biogenesis, TFEB/TFE3. These studies highlight a critical role for the maintenance of lysosomal homeostasis during development and, more broadly, suggest that aberrant lysosomal biogenesis may be a hallmark of NRF2-driven pathologies."

Ong, A. J. S., Bladen, C. E., Tigani, T. A., Karamalakis, A. P., Evason, K. J., Brown, K. K., & Cox, A. G. **The KEAP1-NRF2 pathway regulates TFEB/TFE3-dependent lysosomal biogenesis.** *Proceedings of the National Academy of Sciences of the United States of America* 2023 10.1073/pnas.2217425120

Nathan Pavlos's lab at the University of Western Australia has published a landmark study co-led by PhD student **Amy Ribet** defining the molecular landscape of secretory lysosomes isolated from bone-digesting osteoclasts and an essential role for the Slc37a2 monosaccharide transporter in the regulation of bone mass. "through a series of rigorous cell biological experiments we discovered the existence of a previously unappreciated tubular lysosomal network in osteoclasts that was required for bone resorptive function." Amy drove the organelle-isolation procedures, discovery proteomics and cell biological experiments and noted the study "makes use of multi-omics data in a way rarely seen in osteoclast biology and creates freely available resources for osteoclast and lysosome biologists."

Ng P.Y.*, Ribet A.B.P.*, Guo Q., Mullin B.H., Tan J.W.Y., Landao-Bassonga E., Stephens S., Chen K., Yuan J., Abudulai L., Bollen M., Nguyen E.T.T.T., Kular J., Papadimitriou J.M., Søe K., Teasdale R.D., Xu J., Parton R.G., Takayanagi H., **Pavlos N.J. Sugar transporter Slc37a2 regulates bone metabolism in mice via a tubular lysosomal network in osteoclasts.** Nature Communications 2023 10.1038/s41467-023-36484-2

New work from Thomas Cox, Paul Timpson and colleagues presents data on a first-in-class pan-lysyl oxidase inhibitor to treat pancreatic cancer. The paper presents the development and validation of a novel, first-in-class mechanism-based pan-lysyl oxidase family inhibitor (PXS-5505), including the first public release of its molecular structure. The team demonstrate target inhibition *in vitro* and *in vivo*, and that PXS-5505 functions as an anti-fibrotic agent to decrease chemotherapy-induced tumour desmoplasia, reduce cancer cell invasion and metastasis, and potentiate the efficacy of chemotherapy through improving tumour perfusion and downregulating tumour stiffness and STAT3 activation in mouse and human PDX models, with efficacy in primary and metastatic disease settings.

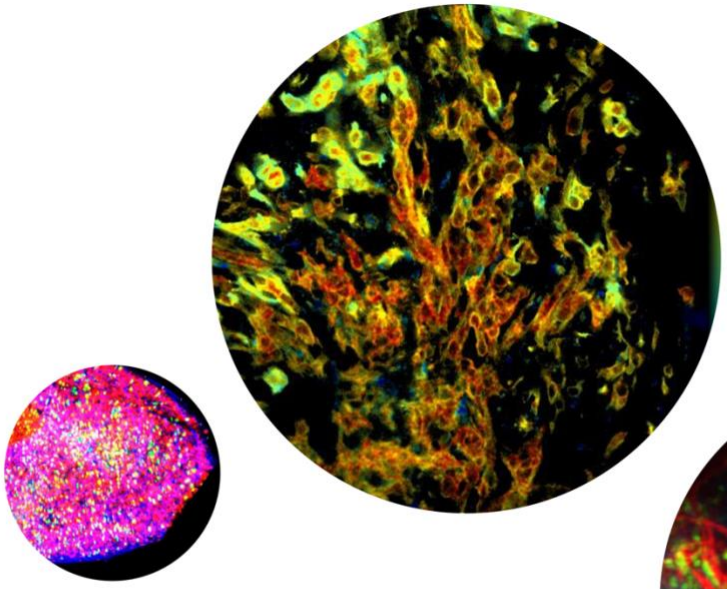
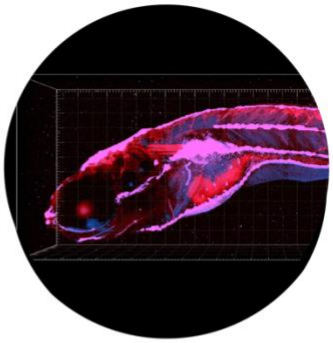
Read the Garvan press release or check out the paper in *Nature Cancer:*
Chitty J.L. et al., *A first-in-class pan-lysyl oxidase inhibitor impairs stromal remodeling and enhances gemcitabine response and survival in pancreatic cancer*
https://www.nature.com/articles/s43018-023-00614-y

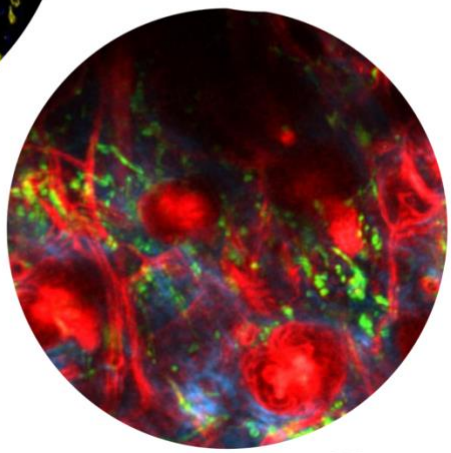
Upcoming meetings & seminars

ComBio 2024 will be held as part of [Biomolecular Horizons 2024], which will bring together the International Union of Biochemistry and Molecular Biology, the Federation of Asian & Oceanian Biochemists & Molecular Biologists & Australian Societies that usually contribute to ComBio, including ANZSCDB.

Stem Cell Conversations Seminar Series and Developmental Biology Conversations Seminar Series

Looking to engage with other ECRs in the stem cell and developmental biology fields? Join Stem Cell Conversations on Zoom Wednesdays 11-11:30 am. A series run by ECRs for ECRs, it provides a warm and welcoming atmosphere where you can gain experience and exposure, exchange ideas, and connect with like-minded colleagues. Each 30-minute Conversation features two outstanding researchers presenting on the same topic, followed by an open Conversation about their research. **National and local Stem Cell Conversations are held monthly, and a Developmental Biology Conversation is held on the last Wednesday of each month.** To learn more or join our mailing list, email CSCS-conversation@unimelb.edu.au. We look forward to you joining the Conversation!



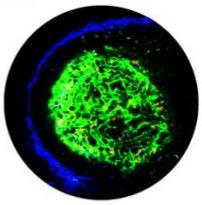
23th -24th of November 2023

at the Garvan Institute of Medical Research

BREAKING BARRIERS

AIMS 2023

Australian Intravital Microscopy Symposium



Maria Goeppert Mayer
invited speaker

Cristina Lo Celso
Imperial College, UK

Misty Jenkins, WEHI
Max Nobis, VIB Belgium
Holly Chinnery, UMelb
Scott Mueller, Doherty
Mel White, UQ
Michael Hickey, Monash
Tatyana Chtanova, UNSW
Ian Cockburn, ANU

Nathan Pavlos, UWA
Connie Wong, Monash
Edwin Hawkin, WEHI
Laura Downie UMelb
Maté Biro, UNSW
Liz Caldon, Garvan
Michael Samuel, UniSA
Steve Lee, ANU

Register to attend at: www.garvan.org.au/aims

Registration opens 16th of August 2023 | early bird closing 25th of September 2023

NSW cancer institute NSW | NewSpec | Pathtech | OXFORD INSTRUMENTS | IMARIS | Nikon | ACRF INCITe Centre | Proudly supported by ACRF | AUSTRALIAN CANCER RESEARCH FOUNDATION | Garvan Institute of Medical Research | LIGHT MICROSCOPY AUSTRALIA | Leica MICROSYSTEMS | ZEISS | EVIDENT | OLYMPUS

2023 ANZSCDB

Australia and New Zealand Society for Cell and Developmental Biology Inc.

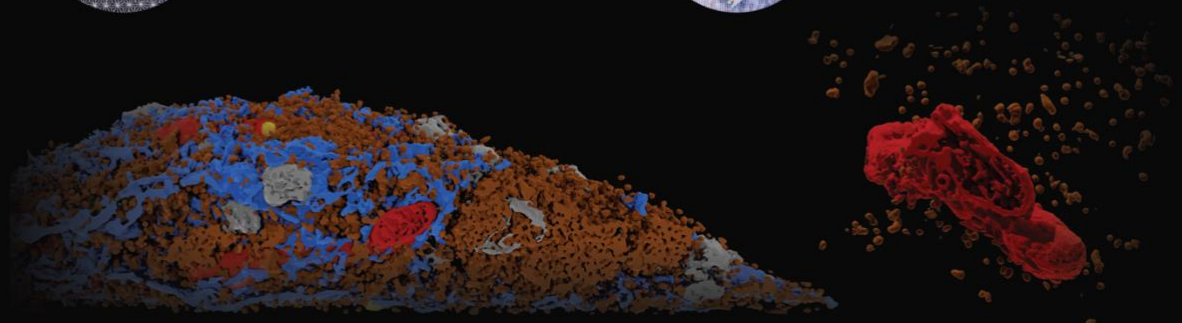
WA SYMPOSIUM

18th October

Harry Perkins Institute of Medical Research
McCusker Auditorium, QQ Block, QEII Medical Centre

Professor Justine Mintern
Melbourne University

Professor Robert Parton
University of Queensland



A full day symposium covering excellence in WA research in:

- Cell biology
- Imaging
- Cardiovascular disease
- Development
- Cancer biology
- Immunology
- Metabolism
- Genetics and genomics
- Synthethic biology
- Organelle biology

Free registration by August 1st

Register via QR code or link:
https://form.jotform.com/231161507327853

*Prizes for oral and poster presentations for ANZSCDB members only join here: www.anzscdb.org/membership-2

ANZSCDB
Australia and New Zealand Society for Cell and Developmental Biology Inc.

Annual NSW Meeting

Australia and New Zealand Society for Cell and Developmental Biology

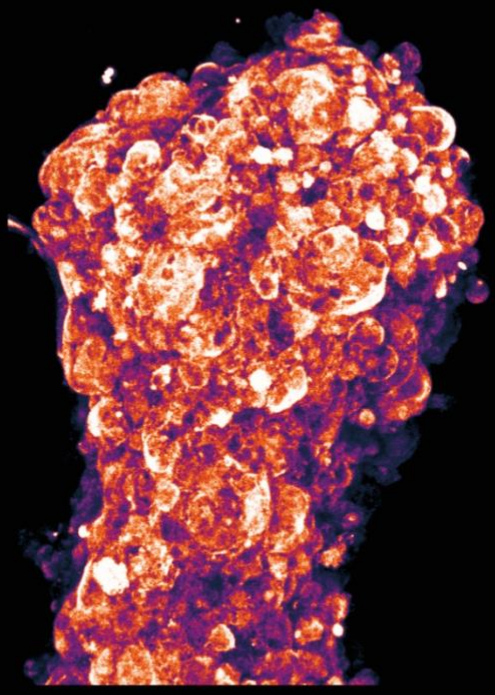
Thursday 30th November 2023, 9am-5pm (in-person)
Location: The Heydon Laurence Theatre, The university of Sydney

For AWARDS and Talks
only ANZSCDB members are eligible

Best Oral Presentation

Best Poster

Best Image in Cell and Developmental Biology
Sponsor by **ZEISS** *and*
INTELLIGENT IMAGING INNOVATION (3i)



Abstract deadline: October 18th, 2023
Information: www.anzscdb.org
Please use this QR code to register

Keynote Speakers

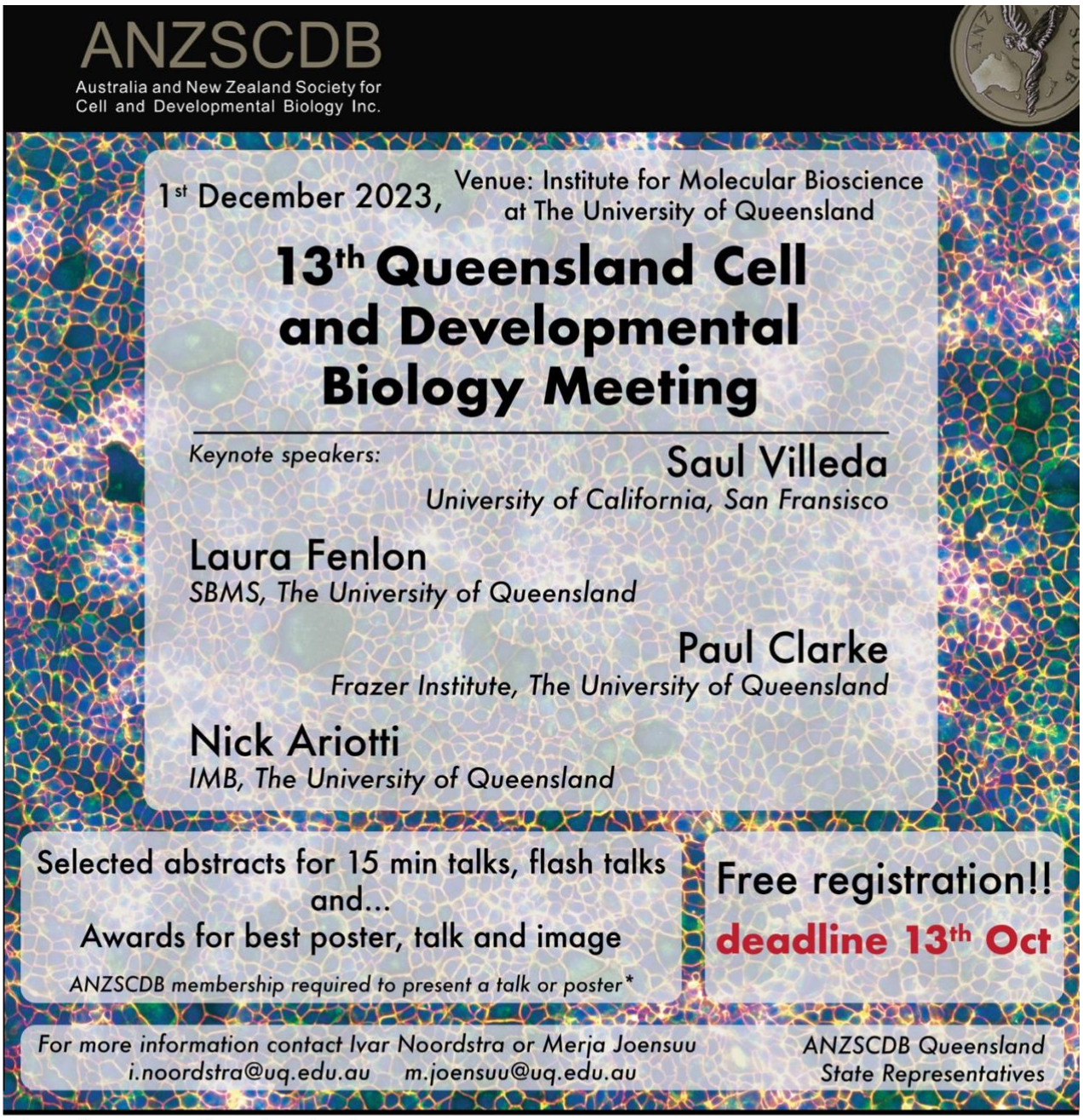
Prof. David Komander
Walter and Eliza Hall Inst. of Medical Research

Dr. Anai Gonzalez
U. of Sydney

Prof. Peter Gunning
UNSW

A/Prof. Kelly Smith
U. of Melbourne

3i MERCK Miltenyi Biotec Leica MICROSYSTEMS NewSpec
ZEISS Nikon ATA SCIENTIFIC Lastek Photonics Technology Solutions



*https://www.anzscdb.org/membership-3

Registration link:

https://form.jotform.com/231778926044868

Platinum sponsor

Nikon

Gold sponsor

Pathtech
First Choice In Science

Silver sponsors

EVIDENT | OLYMPUS

John Morris GROUP

ANZSCDB

Australia and New Zealand Society for
Cell and Developmental Biology Inc.

11th ANZSCDB SA Meeting

October 18th, 2023

HB8-18
Bradley Buiding, UniSA

INVITED SPEAKERS

DR JENNIFER ZENKER
Australian Regenerative Medicine Institute

ASSOCIATE PROFESSOR KELLY SMITH
University of Melbourne

DR LACHLAN JOLLY
University of Adelaide

REGISTRATION AND ABSTRACT SUBMISSIONS NOW OPEN!

ORAL AND POSTER PRESENTATIONS FROM ANZSCDB POSTDOCTORAL AND STUDENT MEMBERS SELECTED FROM ABSTRACTS

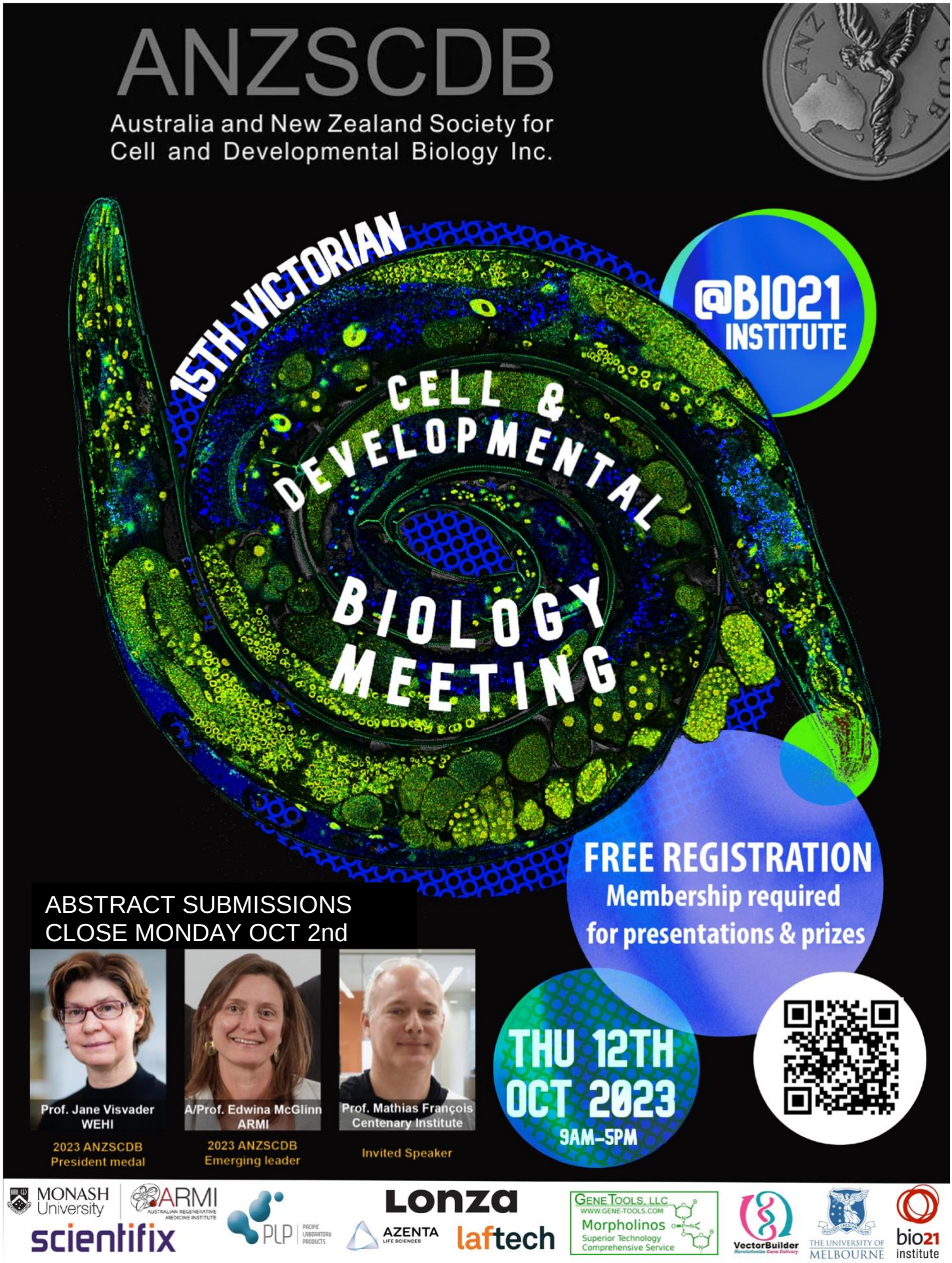
PRIZES FOR THE BEST PRESENTATIONS AND IMAGE COMPETITION.

ABSTRACT SUBMISSION CLOSES MONDAY 18TH SEPTEMBER, 2023

PLATINUM SPONSORS

GOLD SPONSORS

BRONZE SPONSOR


ANZSCDB
Australia and New Zealand Society for
Cell and Developmental Biology Inc.
15TH VICTORIAN
CELL & DEVELOPMENTAL BIOLOGY MEETING
@BIO21 INSTITUTE
FREE REGISTRATION
Membership required
for presentations & prizes
ABSTRACT SUBMISSIONS
CLOSE MONDAY OCT 2nd
Prof. Jane Visvader
WEHI
2023 ANZSCDB
President medal
A/Prof. Edwina McGlinn
ARMI
2023 ANZSCDB
Emerging leader
Prof. Mathias François
Centenary Institute
Invited Speaker
THU 12TH
OCT 2023
9AM–5PM
MONASH University
ARMI
scientifix
PLP
Lonza
AZENTA
laftech
GENE TOOLS, LLC
Morpholinos
VectorBuilder
THE UNIVERSITY OF MELBOURNE
bio21 institute

Centre for Cancer Biology Research Awards
The Centre for Cancer Biology (CCB) Research Awards ceremony was held on 25 August 2023. This annual event celebrates the outstanding achievements of the CCB staff and students, as well as ongoing support from our fantastic consumer advocates.

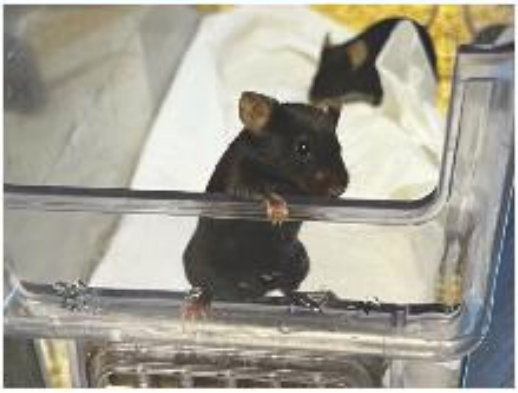
This year awards went to Jason Powell and Stuart Pitson's team for the Best Fundamental Research Publication, Natasha Harvey and Hamish Scott's teams for the Best Clinical Research Publication, Ammara Usman Farooq and Iman Lohraseb for the Best Research Publications from students, Barb McClure - Early Career Investigator award winner and Genevieve Secker – Best Research Image award winner. We also congratulated five CCB students on completing their PhD in 2022: Ammara Usman Farooq, Kay Myo Min, Ellen Potoczky, Valentina Poltavets and Sunil Sapkota. Congratulations to all recipients!
The CCB Awards were coordinated by co-convenors Claudine Bonder & Sophie Wiszniak and were kindly sponsored by the CCB, the Hospital Research Foundation, ASBMB and ASI.

2023 ANZSCDB South Australian State Meeting
Our 11th South Australian ANZSCDB scientific meeting will be held on Wednesday, October 18th 2023 at UniSA Bradley Building. This will be a one-day meeting featuring talks from A/Prof Kelly Smith from University of Melbourne (the winner of ANZSCDB Emerging Leader Award), Dr Jennifer Zenker from ARMI, Monash University and Dr Lachlan Jolly from the University of Adelaide. We will also have oral and poster presentations selected from abstracts from students and postdoctoral researchers with multiple prizes for the best presentations as well as the best research image.

The registration and abstract submission for 11th Australia and New Zealand Society for Cell and Developmental Biology (ANZSCDB) SA Meeting is still open - don't miss your chance to join SA best cell and developmental biology researchers! Registration is free but places are limited so please register now: https://tinyurl.com/anzscdb2023sa

Please send abstract submissions by 18th September 2023 to anna.oszmiana@unisa.edu.au or yasmyn.winstanley@adelaide.edu.au, ensuring that your submission incudes list of authors and affiliations, abstract title, presentation summary (300 words) and preferred format (talk/poster/either).

Australian BioResources



ABR Sales Strains Increase

ABR is in the process of re-organising space to increase our major colonies significantly by January 2024. Colonies being expanded include C57BL/6J, BALB/c, Ptp and others.

Biobanking Software Update!

ABR is still on track to offer biobanking of research samples in 2024. We are currently reviewing a new software that will link in to StuartWEB providing easy access to data for researchers.

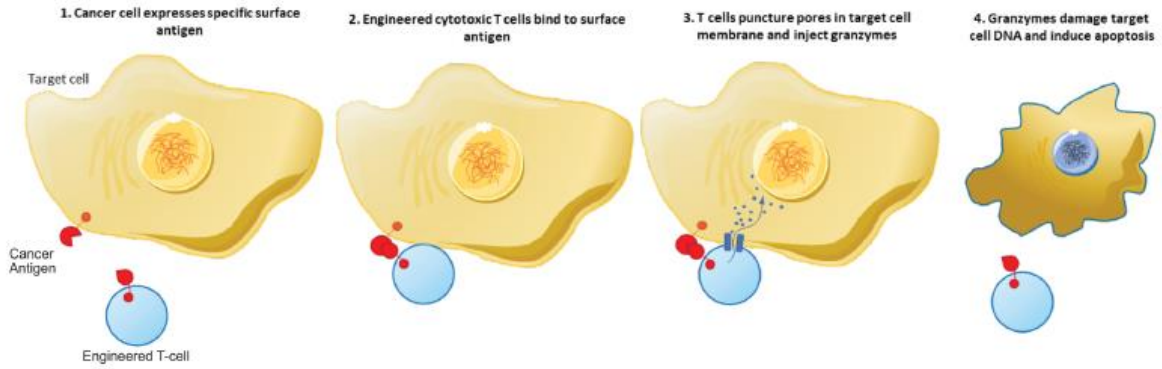
Save the date!

ABR turns 15! Come and enjoy the celebrations at our Open Day on Friday 1st December 2023. Tours of the facility will be provided on the day and it is a great opportunity to meet staff. Further details will be provided closer to the date.

Investigate the efficacy and cytotoxicity of engineered T-cells in killing target cancers.

1. Introduction

T-cells are an integral part of the specialised adaptive immune response and act to eliminate targets and prevent infection. One of the major sub-types of T-cells are the CD8+ cytotoxic killer T-cells. These cells work to detect and kill virally infected and cancerous cells, and to secrete cytokines which recruit additional immune cells to the site of attack. Detection of target cells is performed with the aid of the Major Histocompatibility Complex (MHC). During killing of target cells, the T-cell cell binds to the MHC on the target cell via their T-cell receptor (TCR) and the CD8 glycoprotein co-receptor. The T-cell cell then uses the glycoprotein, perforin, to puncture pores into the membrane of the target cell enabling the subsequently secreted granzymes to enter the cell, leading to DNA damage resulting in target cell apoptosis.



A recent development in cellular immunotherapy manipulates this mechanism to treat certain types of cancer. These T-cells are taken from the patient and modified to have the desired receptors which enable the cells to recognise and bind to specific cancerous motifs, and then to deliver cytotoxic attacks to the cancer cells. The T-cells are then grown *in-vitro* and transfused back into the patient; these treatments have proven a valuable last resort treatment against various blood cancers.

Despite cellular immunotherapy's success in treating otherwise incurable forms of blood cancer the treatment has many limitations. For example, the high cost and length of time it takes to engineer and grow these modified cells *in-vitro*, the waning efficacy of the treatment over time as the infused T-cells die or lose functionality and the cancer cells adapt to evade detection by modifying their surface antigens, known as antigen escape. In addition, current treatments struggle to infiltrate and attack solid tumours, and there is a great difficulty in translating *in-vitro* observations to patients. For example, small changes in CAR-T receptors, often show little difference in conventional *in-vitro* assays but perform radically differently in clinical trials. Thus, additional detail is required when analysing these *in-vitro* experiments to determine the interaction dynamics between target and effector cells.

Livecyte T-cell killing assays observe and quantify T-cell killing

Using timelapse imaging, T-cell killing events can be seen in real time to quantify the efficiency of a treatment, indicating how long a treatment takes to become effective, and how persistent it is. Timelapse imaging, in conjunction with single cell analysis, can also help us to identify individual cells or outliers which interact with cells differently. This allows us to discern subtle changes in killing behaviour, enabling us to more closely anticipate how a treatment will work in the clinic. The current limitation of this timelapse imaging is that the analysis, performed by manually tracking cells and logging contacts between T-cell and targets, is extremely time and labour intensive. This leaves a gap in research techniques for a tool which can automatically monitor and quantify T-cell:Target contacts, giving a greater level of information compared to readings of whole wells.

All this is achieved with Livecyte's unique combination of Quantitative Phase Imaging, a specialised technique that generates fluorescence like images from unlabelled effector cells, and standard fluorescence labels to identify target cells and their killing. T-cell dynamics are then derived by backtracking from each cell death event. The fragile effector cells are not subject to the introduction of cellular labels, which can commonly perturb function. Livecyte's single cell segmentation and tracking algorithms can automatically quantify cell proliferation, cell death, T-cell kinetics such as average T-cell contact time, number of T-cell contacts with target cells, number of T-cells attached at death, and final T-cell contact time giving a more valuable, in-depth insight into T-cell killing.

Method

Cell Culture: CD8+ T-cell were extracted and isolated from OT1 murine spleens and cultured for 2 days in cRPMI containing ovalbumin and IL-2. mKate labelled Moc1 target cells were maintained in complete DMEM. Moc1 target cells were plated in an 8 well channel Ibidi µ-slide at a density of 5000 cells/ well. Each column contained either OVA+ or OVA- target cells. OT1 cells were plated at T-cell: target ratios of 5:1 and 1:1. A Caspase-3 marker was utilised to indicate cell apoptosis.

Time-Lapse Imaging: High-contrast quantitative phase images were automatically captured using the Livecyte Kinetic Cytometer. Cells were imaged with an Olympus UPLXAPO 20X (NA 0.8) objective and a 500 x 500 µm field of view (FOV) per well for 48 hours at 5-minute intervals. Cells were maintained inside an environmental chamber at 37°C with 5% CO2 and 95% humidity. Fluorescent overlay images with red and green fluorescence channels were captured after each phase image.

Analysis & Results

Proliferation and cell death: Timelapse images captured every 5 min using fluorescence and QPI imaging showed significant levels of cell death in OVA+ target cells and T-cell. Livecyte's Cell Analysis Toolbox used gating, based on the apoptotic green fluorescence signal, to perform an automated Target cell death calculation. Figure 1 clearly indicates highest levels of T-cell killing in the T-cell:OVA+ 5:1 well. The well with a 1:1 ratio of T-cell to OVA+ showed moderate levels of T-cell killing. As expected, this is due to higher numbers of T-cell increasing the likelihood of T-cell - Target cell contacts occurring. There were low levels of cell death in the OVA- wells due to the T-cell being unable to recognise the target cells via the OVA protein.

In Figure 1 the OVA+ well with the highest count of T-cells showed the earliest signs of killing at roughly 2 hrs into the assay and showed the highest level of T-cell killing throughout, the 1:1 OVA+ treatment showed deaths a few hours later and at a lower rate. There were some cell death events in the OVA- treatments. This could be due to the high number of T-cell resulting in some target cell recognition.

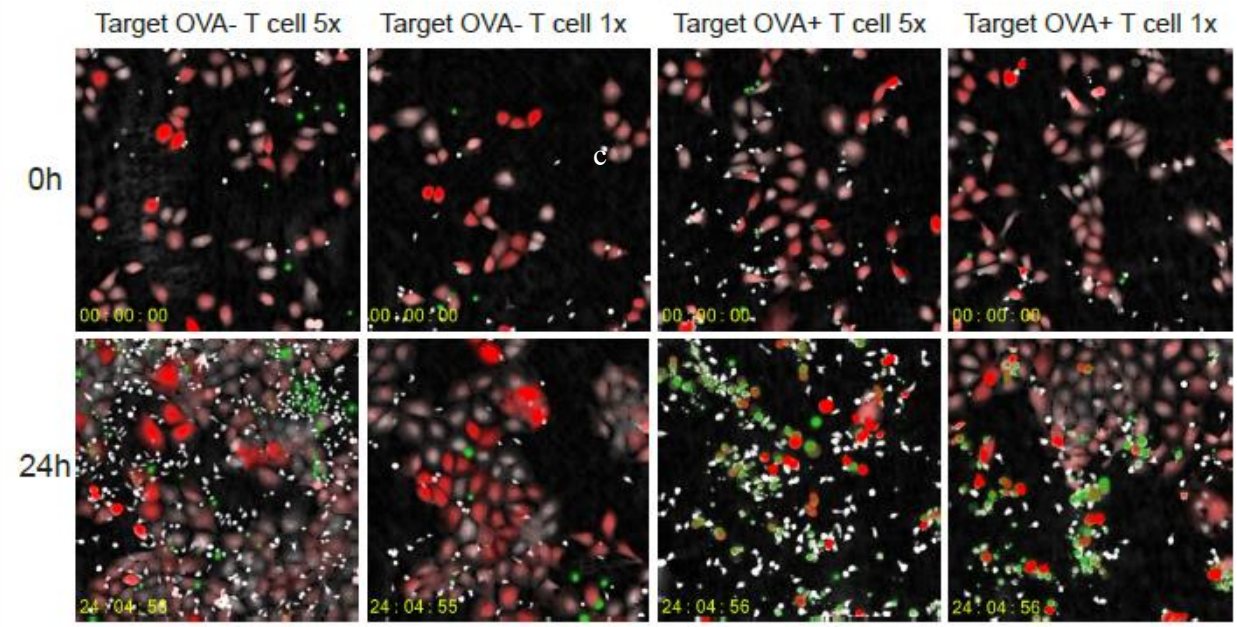


Figure 1: QPI and fluorescence images at 0 and 24 hrs

Gating was used to isolate live target cells. From this, cell count was quantified to give metrics on Target cell proliferation as seen in Figure 2.

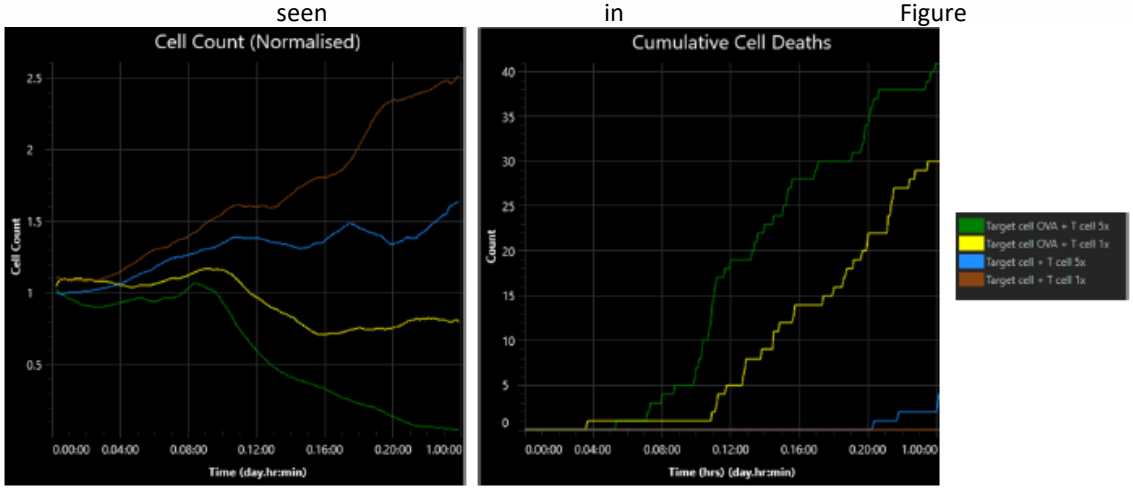


Figure 2: Target cell proliferation and Cumulative Target cell death over time.

From here we can see a clear reduction in cell count occurring roughly 8h into the assay for the OVA+ T-cell wells. The OVA+ T-cell 5x cells elicited a cell reduction response 2 hr earlier than the OVA+ T-cell 1x treatment. As these metrics quantify T-cell effectiveness over time, a measure of T-cell persistence, or the level of how long a dose of T-cells can stay active and killing, can be ascertained.

T-cell – Target cell kinetics: Livecyte Analysis software tracked every Target cell and automatically quantified each contact between target cells and T-cell. From this, metrics on the number of T-cell contacts per cell, and total T-cell-Target contact time could be measured. The system was also able to quantify the individual times of each T-cell–Target contact and the time of the final T-cell contact prior to cell death. In addition to a higher number of death events in the 5:1 OVA+ well, when we compare this to the 1:1 OVA + ratio see there is a slight increase in the cumulative T-cell contact time (the total time over which a T-cell is in contact with that individual target cell prior to that target cell's death), number of T-cell contacts with target cells prior to death (incidence number of T-cell being in contact with a target cell), and overall average T-cell contact time (mean contact time of each T-cell visit for each target cell prior to death) being higher for OVA+ wells (Figure 3).

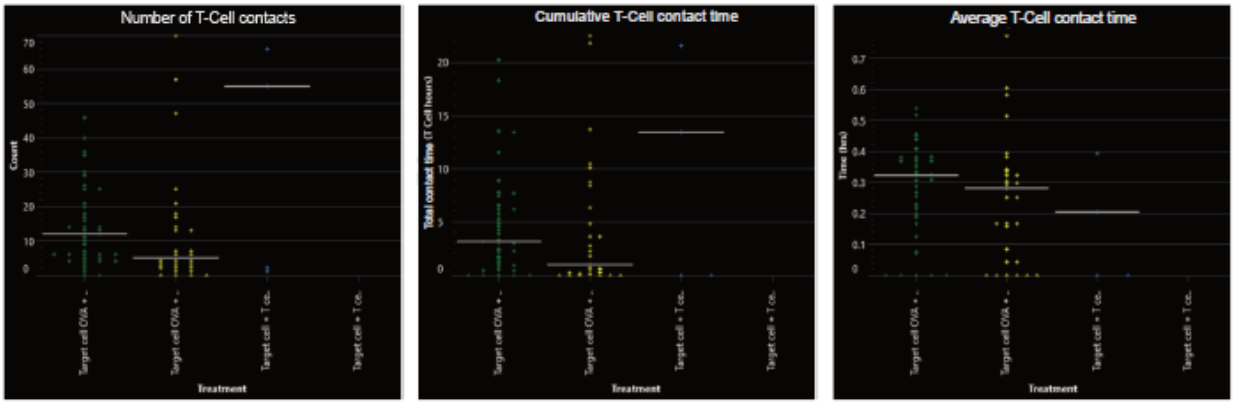


Figure 3: Number of T-cell contacts, Cumulative T-cell contact time, and Average T-cell contact time

Mechanistically, a higher E:T ratio will only increase the chances of contact, so it is unsurprising that statistically similar behaviour was observed in each population.

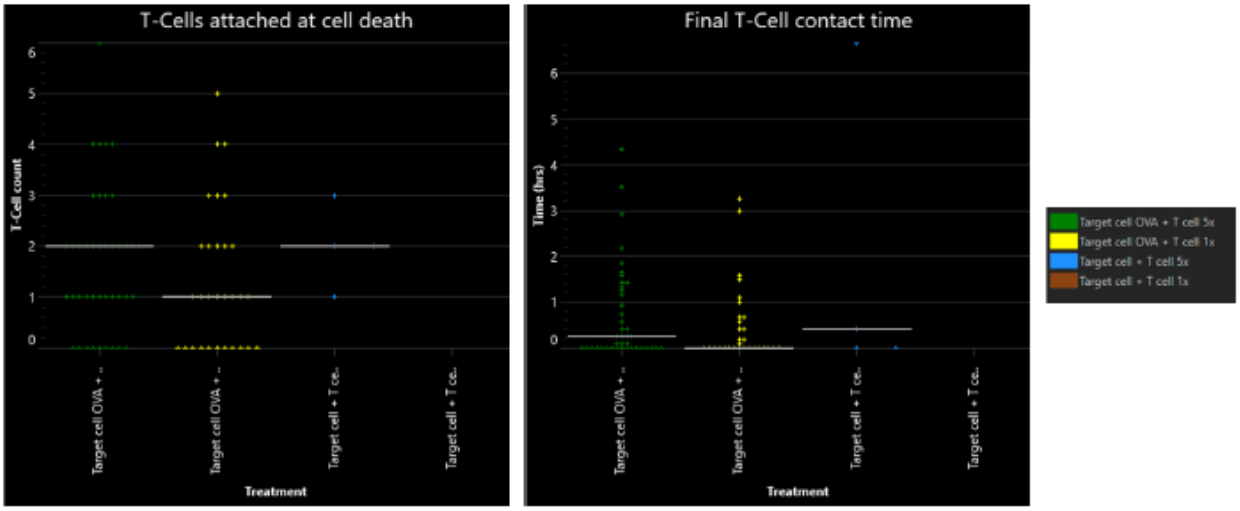


Figure 4: Number of T-cells attached at Target cell death and the Final T-cell contact time

Figure 4 shows the median Number of T-cell attached at cell death was constant (1 T-cell) for the wells showing incidences of cell death. The Final T-cell contact times ranged from almost instantaneous target death upon contact to over 34hrs and was marginally higher for wells with a higher T-cell to Target cell ratio. Overall statistical differences weren't observed between the different ratios of treatments, as the same OT1-specific cells were used, showing the same T-cell:Target cell kinetics. However, these metrics provide an opportunity to compare different T-cells which elicit different Target cell responses and observe the potency of T-cells. Research has shown that T-cell often kill target cells via an "additive cytotoxicity" mechanism, by which multiple T-cell contacts with the target result in an accumulation of sublethal DNA damage resulting in eventual apoptosis. Lower levels of T-cell contacts would indicate that each T-cell contact with a Target cell deals a greater level of DNA damage.

T-cell morphology: Livecyte was able to quantify cellular morphology of both cell types within the co-culture by gate formation. T-cell cells were selected for by a low dry mass and area. The median T-cell area and cell perimeter increased as target cell killing increased along with an increase in the median cell perimeter compared to the T-cell. This indicates spreading and flattening of the T-cell occurs when they are killing. T-cell morphology has been seen to change significantly during T-cell killing with some papers showing flattening and elongation of T-cells in-vivo when migrating and infiltrating tumours.

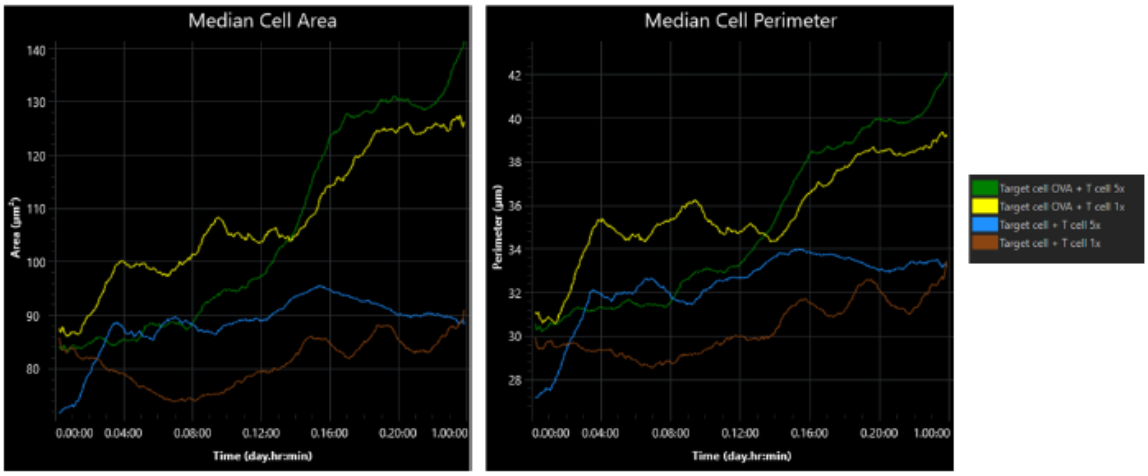


Figure 5: T-cell morphology: Median cell area and median cell perimeter over time (T-cells were gated based on low dry mass and cell area)

Target cell morphology: Target cell morphology was also quantified, giving information on target cell responses to T-cell attacks. Figure 7 clearly shows increases in median cell sphericity and area at the time points where cells begin undergoing apoptosis due to T-cell attacks. It is widely recorded that cells ball up and bleb when undergoing apoptosis, this can also be seen in the images in Figure 6 and is reflected in these results.

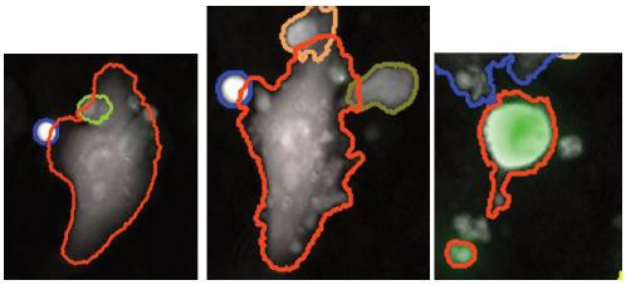


Figure 6: Target cell is attacked by multiple T cells, begins to bleb, and eventually balls up and dies several frames later

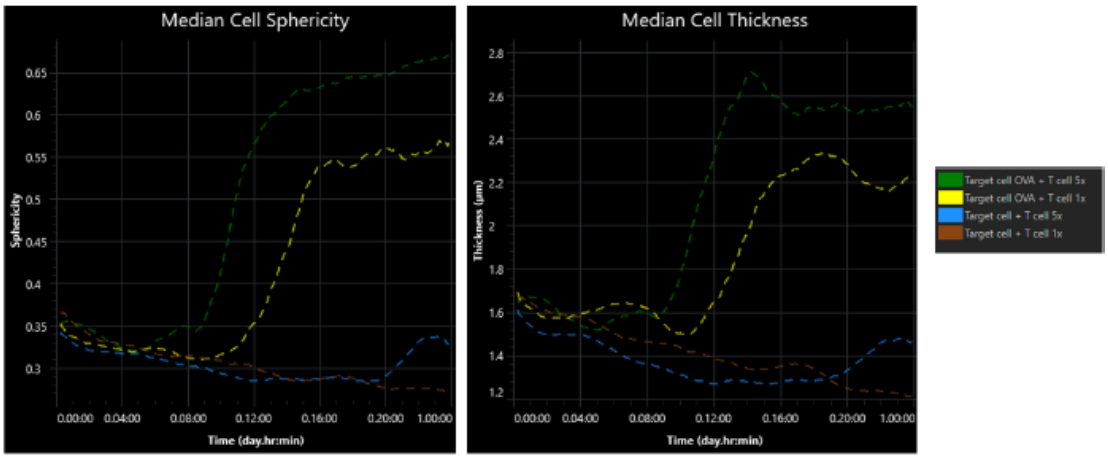


Figure 7: Target cell median sphericity and median cell area (target cells were gated for based on high red fluorescence)

Summary

Livecyte's combination of fluorescence capabilities with QPI imaging enabled automated analysis of T-cell killing, giving an enhanced level of detail not available with conventional imaging platforms. T-cell and Target Moc1 cells were automatically categorised in a co-culture and incidences of T-cell and target cell contact and when these led to cellular apoptosis were tracked. Anti-proliferative effects of the T-cell killing were quantified showing the point at which these effects began to reduce target cell count. More killing events and a quicker reduction in cell count was observed in wells with higher counts of T-cell and where OVA was expressed by target cells. T-cell and target cell morphologies were monitored showing changes between both target and T-cell wells when T-cell killing was underway. The level of understanding of T-cell function obtained far exceeds metrics obtained with conventional readers. Livecyte's cell death and T-cell:Target cell contact identification and quantification gives powerful, automated in-depth analysis, with the potential to quantify subtle differences in the efficacies of T-cells for the first time. This is achieved without fluorescent labelling of the fragile primary effector T-cells, or time intensive manual tracking. This leads to a higher level of insight about the T-cell target cell interaction and of the likelihood of cell death resulting from these behaviours.

Contact us to learn more about the Livecyte's capabilities or to request a guided demo.

ATA Scientific Pty Ltd | Ph: +61 2 9541 3500 | enquiries@atascientific.com.au | www.atascientific.com.au

References

1. Phasefocus Livecyte Application Note AN021 - T-Cell Killing Analysis (Aug 2023). Available at: https://www.phasefocus.com/resources/app-notes/

FIVE COMPELLING REASONS TO USE LIVECYTE:

1. Nothing like it https://bit.ly/3oywmE5

A huge array of analysis possibilities allow you to ask questions that no other system can answer - Dr Mat Hardman, University of Hull

2. Disrupts common theory

Livecyte was used to disprove a long held theory about how stable nevus melanocytes switch to cancerous melanoma cells - Dr Robert Judson-Torres, Huntsman Institute

3. Expect the unexpected

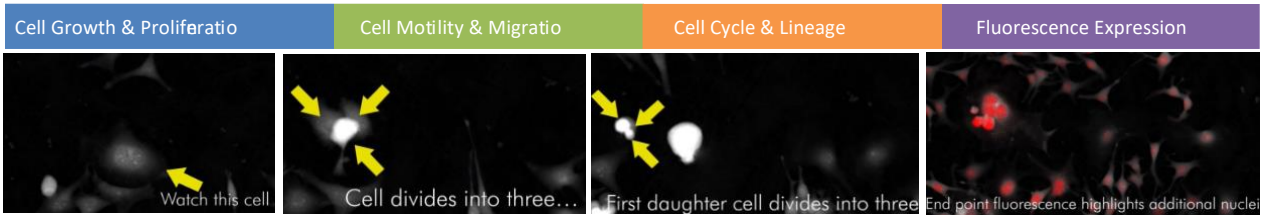
Livecyte has led to observations of unexpected cell behaviour when quantifying live-cell drug resistance - Dr Kurt Anderson and Dr Alix Le Marois, The Francis Crick Institute

4. See change as it happens

De-risks cell transplantation therapy, increasing likelihood of success - Perry Cross Spinal Research Foundation

5. Simplifying not simpler

Livecyte removes barriers to entry for junior students - Greg Perry, St George's University of London



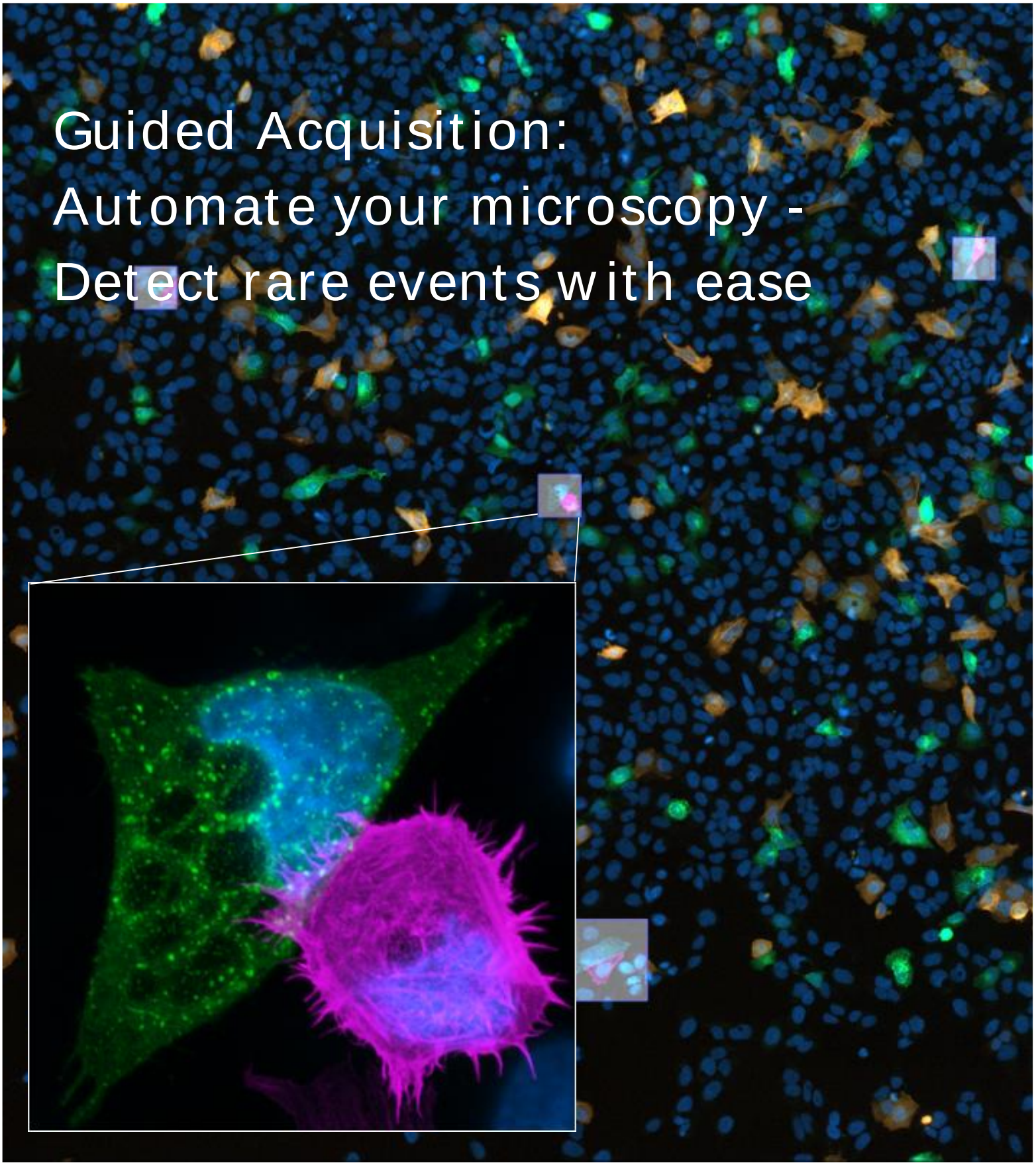
Uncover strange behaviours. See more at vimeo.com/Phasefocus

NEW Livecyte T-Cell killing assay quantifies effector-target cell interactions at the single cell level

- ✓ Generate multiple outputs with one experiment
- ✓ Ptychography technology removes the need for expensive lasers reducing running costs unlike other systems
- ✓ Leverage powerful tracking algorithms to explore population heterogeneity and track single cell lineage
- ✓ High-contrast label-free imaging, correlative fluorescence and auto image analysis from standard 96-well plate assays

Register your interest for a demo today!

ATA Scientific Pty Ltd | enquiries@atascientific.com.au | www.atascientific.com.au | +61 2 9541 3500



ZEN Guided Acq https://www.atascientific.com.au/awards-events-training/current-award/
for Life Sciences Applications

ZEISS

zeiss.com/ZEN

Seeing beyond

ZEN Module Guided Acquisition

Automate your microscopy, detect rare events with ease

Rare event detection in high demand

In life science research it is often necessary to selectively examine specific objects from a large population, e.g. to identify and selectively image a few dividing cells in a petri dish, to trace one specific neuron in a sectioned brain slice, or to acquire a 3-dimensional volume of cultured organoids with a certain size and shape. Such experiments are usually time consuming and prone to bias depending on the individual operator, especially if the events happen rarely. The ZEN Module Guided Acquisition has been designed to simplify this process by combining microscopy automation with image analysis. It can be used with multiple ZEISS imaging platforms such as Axio Observer 7 with scanning stage, Celldiscoverer 7, or LSM 980 with Airyscan 2.

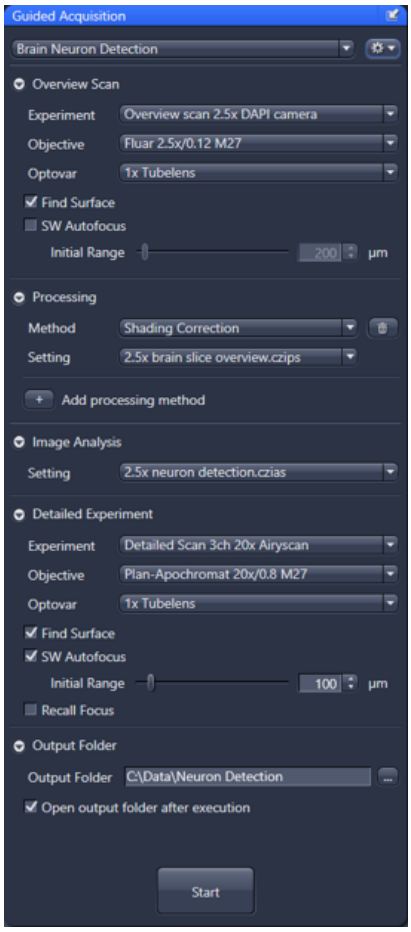
Guided Acquisition Workflow

1. Scan a large area with low magnification and fast imaging modality

2. Perform a pre-defined image analysis to detect objects of interest

3. Acquire detailed images for every detected object using specified settings

Once the Guided Acquisition workflow is optimized for a given sample, all settings can be saved and reused for another similar sample with one simple click.



- Low magnification
- Large area
- High throughput

- Image Analysis
- High specificity
- High efficiency

- High resolution
- Multi-dimension
- Full flexibility

1. Overview Scan

The purpose of the overview scan is to quickly tile-scan large areas using low magnification objectives and fast imaging settings (e.g. single DAPI channel using a camera with short exposure time and 2x2 binning). The image quality of this overview scan must be just good enough, for the following image analysis step to reliably detect the objects of interest. Imaging parameters for the overview scan can be adjusted and saved into one
"Experiment" setting. The focusing strategy can be specified as part of the "Experiment" setting complemented by additional Guided Acquisition options. Both the hardware focusing device Definite Focus 2 and Software Autofocus can combined for highest flexibility. An optional image processing step allows to perform, e.g. Airyscan processing or shading correction, of the overview scan prior to Object Detection if necessary.

2. Object Detection

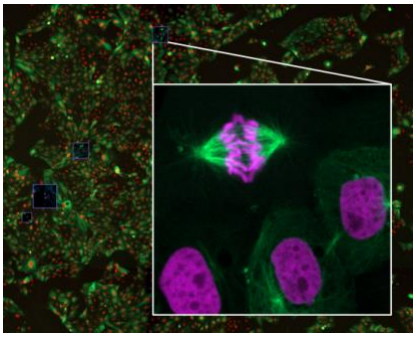
For the detection of objects of interest in the overview scan, Guided Acquisition uses the powerful and flexible ZEN Image Analysis module. Objects are isolated by image segmentation, using algorithms based on global thresholding, local variance, or Machine Learning (requires additionally the ZEN Intellesis module).

Additional filtering refines the list of detected objects based on their intensity, size or shape. Image analysis can be performed on both multi-channel fluorescent images and RGB color images, with various bit-depths. For downstream Detailed Acquisition, the location (X/Y scanning stage coordinates) and size (X/Y bounding box) of the detected objects is automatically recorded.

3. Detailed Acquisition

The third step consists of a different set of "Experiment" settings, typically with high magnification, high resolution, and multiple dimensions, which is performed for each detected object. If the size of a detected object is larger than a single field of view, a tile scan will be automatically configured, based on its bounding box size. All objects that were previously detected by the image analysis step will be acquired sequentially based on their stage coordinates. For each object, a different focus offset can be defined to accommodate samples with differing depths.
At the end of the workflow, all images (overview scan and detailed acquisitions) and settings (experiment, processing and analysis settings, and tables of detected objects) will be stored in one folder for easy access.

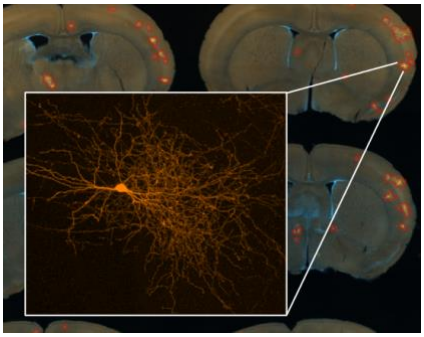
Guided Acquisition in Action



Mitotic Cell Detection from Petri Dish

In this example, porcine kidney cells (LLC-PK1) were cultured in a 35 mm glass bottom petri dish. The nuclei were labeled with Histone 2B mCherry, and microtubles with tubulin mEmerald. The goal was to detect the mitotic cells in the population. The experiment was performed using ZEISS Celldiscoverer 7. The overview scan was acquired with a Plan-Apochromat 5x/0.35 objective, 1x magnification changer, and the Axiocam 506 mono; the detailed acquisition was performed with a Plan-Apochromat 50x/1.2 water immersion objective, 0.5x magnification changer, and Airyscan MPLX HS mode. Image Analysis was performed on the nuclear channel, where mean intensity and area were used to detect the mitotic cells.

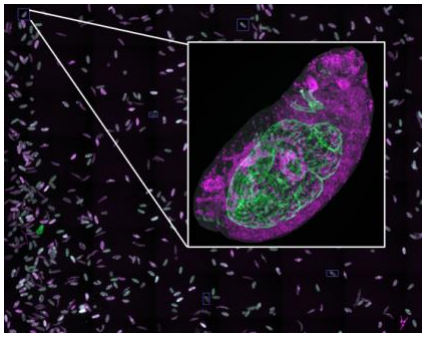
Sample obtained from ZEISS Oberkochen demo lab



Labeled neuron detection from mouse brain sections

In this example, 15 sectioned mouse brains were prepared on a standard microscope glass slide. The nuclei were labeled with DAPI, and the cells-of-interest are cortical interneurons which express membrane Tdtomato by low titre retroviral infection. The experiment was conducted using ZEISS Celldiscoverer 7. The overview scan was acquired with a Plan-Apochromat 5x/0.35 objective, 0.5x magnification changer, and the Axiocam 506 mono; the detailed acquisition was performed with a Plan-Apochromat 20x/0.95 objective, 0.5x magnification, Airyscan MPLX HS mode, and Z-stacks (figure shows maximum intensity projection of the detected neuron). Image Analysis was performed on the neuronal channel, where mean and range of intensity were used for detection.

Sample courtesy of Dr. L. Lim, Katholieke Universiteit Leuven/VIB Center for Brain & Disease Research, Belgium

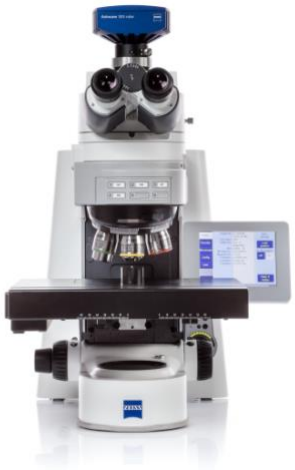


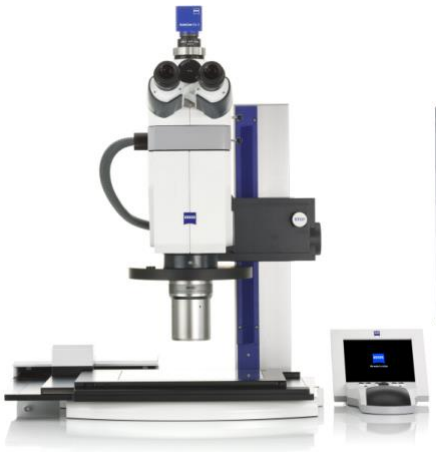
Drosophila embryo detection with lateral oriented gut structure from a prepared slide

In this example, a group of fixed drosophila embryos were prepared on a standard microscope glass slide. Longitudinal visceral muscles (one type of gut muscles) were labeled with Alexa 488, and Cut (one type of homeodomain transcription factor) with Cy3. The experiment was performed using ZEISS Celldiscoverer 7. The overview scan was acquired with a Plan-Apochromat 5x/0.35 objective, 0.5x magnification changer, and the Axiocam 506 mono; the detailed acquisition was performed with a Plan-Apochromat 20x/0.95 objective, 0.5x magnification changer, Airyscan MPLX HS mode, and Z-stacks (figure shows maximum intensity projection of the detected embryo). Image Analysis was performed on the gut structure, where green positive embryos were detected first by mean intensity, then filtered by geometric features to identify those with preferred lateral orientation.

Sample courtesy of Dr. G. Wolfstetter, University of Gothenburg, Germany

Guided Acquisition is available for multiple platforms





Hardware Requirements:
Axio Observer Z1/7
Axio Imager M1/M2/Z1/Z2
Axio Examiner
Axioscope 7
Axio Zoom.V16
Celldiscoverer 7 (with LSM 900)
LSM 800 (with Airyscan)
LSM 800 MAT
LSM 900 (with Airyscan 2)
LSM 900 MAT
LSM 980 (with Airyscan 2)
Scanning stage is required for all stands
Motorozed objective nosepiece is recommended
Definite Focus 2 is recommended for Axio Observer 7

Software Requirements:
ZEN blue 3.1 and above
ZEN blue 3.2 is required for overview image processing and detector parcentricity correction
ZEN module Image Analysis is required
ZEN module Tile & Position is recommended
ZEN module autofocus is recommended for software autofocus
ZEN module Intellesis is recommended for machine learning based image segmentation
Additional automation possible via the ZEN module Macro Environment
Seamless integration with ZEN Connect and Direct Processing modules

Definite Focus 2 is recommended for Axio Observer 7

*Front page image shows Guided Acquisition for detection of cell-cell interaction between mammalian U2OS cells expressing late endosome (Rab5-mEmerald) or actin (lifeAct-tdTomato). Sample from ZEISS Oberkochen demo lab

Carl Zeiss Microscopy GmbH
07745 Jena, Germany
microscopy@zeiss.com
zeiss.com/microscopy