



THE UNIVERSITY OF  
**SYDNEY**

# The University of Sydney Drug Discovery Initiative

Annual Report 2021



THE UNIVERSITY OF  
**SYDNEY**

—  
Drug Discovery  
Initiative

# The University of Sydney Drug Discovery Initiative

## Annual Report 2021

We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.

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## From the Deputy Vice Chancellor (Research)



I am delighted to introduce the 2021 Drug Discovery Initiative Annual Report.

If 2021 taught us anything, it's that multidisciplinary collaboration between world-leading scientists, public health officials and industry will remain a vital feature for protecting the well-being of our community. That is why we have been committed to building the drug discovery community at the University of Sydney through the DDI.

Many of the greatest health challenges we face today will require finding a way to accelerate the time between basic discovery research and better community health care outcomes – and drug discovery is a critical part of that ambition.

I am grateful to the DDI leadership team for continuing to support our researchers throughout a challenging two years. With a new University strategy emerging over the course of 2022 that will place great emphasis on research excellence and dynamic partnerships with industry, government and the broader community, I know the DDI is well positioned to provide the kind of research leadership for our drug discovery community that we envisioned when it was founded.

**Professor Duncan Ivison**  
Deputy Vice Chancellor (Research)





“We are committed to bringing together the best people, technologies and tools to enable early stage drug discovery research.”

Professor Michael Kassiou  
Academic Director  
Drug Discovery Initiative

## Director's Note



Though 2021 was undeniably a challenging year, the Drug Discovery Initiative continued to adapt and thrive in evolving conditions.

Towards the end of the year, the DDI underwent its three-year centre review by an external panel, which found that our research and activities were commendable and should be continued. Following on from this, I am pleased to say that the DDI has been extended for a further five years, and I'm excited to see what we can achieve in this next stage.

Over the course of 2021, we worked with disease-focussed multidisciplinary initiatives (MDIs) to identify joint priorities and areas for collaboration. The DDI held workshops with both the Cardiovascular Initiative and the Sydney Institute for Infectious Diseases, each of which led to joint seed funding rounds. I am eager to see these exciting projects develop and to strengthen our partnerships with these MDIs and other University centres in 2022.

Our commitment to industry engagement and training is best embodied by the success of the 2021 Sydney SPARK program. Four teams participated this year, and team leader Dr Pegah Varamini was specifically chosen to present at the BIO Asia International Conference in 2021 as the Australia/New Zealand SPARK representative.

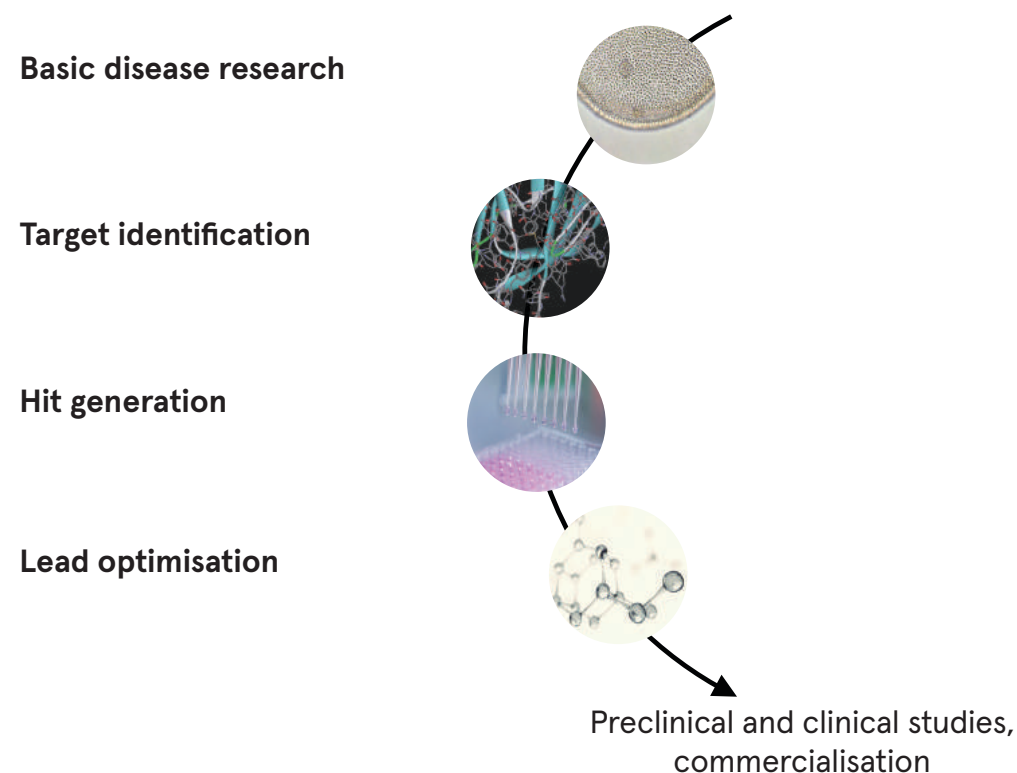
Since early career researchers and HDR students are a core part of the DDI network, we worked hard to facilitate events and opportunities for this cohort. An in-person ECR symposium in April attracted an engaged crowd of researchers eager to hear from some of the University's leading figures in the drug discovery space, and a seed funding round for EMCRs saw seven excellent projects receive funding. Meanwhile, the DDI ECR Committee, which has worked diligently to expand this network, brought two HDR representatives on board to provide students with a greater voice.

It has been fantastic to see these programs grow in 2021, and I look forward to even more events and opportunities for DDI members in 2022.

**Professor Michael Kassiou**  
Academic Director, Drug Discovery Initiative

## About the Drug Discovery Initiative

At the DDI, we are focused on designing and developing innovative tools and techniques to identify novel therapeutic targets, delivery mechanisms, and bioactive molecules with high potential for industry uptake and clinical translation.



Our research centres on the early stages of drug development, from understanding disease and identifying targets to developing lead compounds. We work closely with medical researchers, clinicians and industry to identify opportunities for progressing key compounds, tools and technologies on the drug development pathway.

### Our Vision

Our vision is to enable improved health outcomes through innovative drug discovery.

### Our Purpose

- To accelerate impactful research with genuine translational potential in areas of unmet need;
- To improve the University's reputation for drug discovery by strengthening and promoting existing capability in research and teaching excellence;
- To enhance transdisciplinary collaboration and engagement both within the University community and with our broader health industry partners;
- to increase participating researchers' competitiveness for grants, particularly major program grants; and
- To position the University as a recognised leader within the next 10 years.

### Our Research Mission

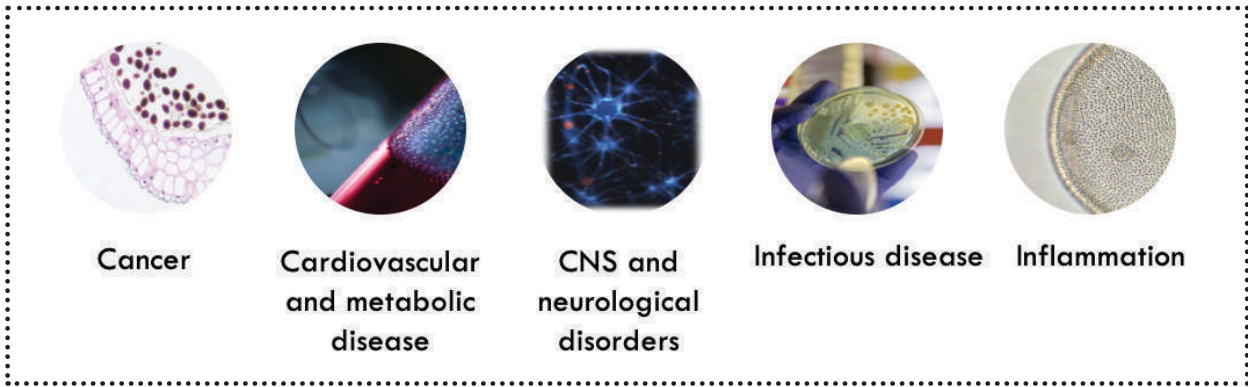
To design and develop innovative tools and techniques for identifying novel therapeutic targets, delivery mechanisms and bioactive molecules with high potential for industry uptake and translational potential.



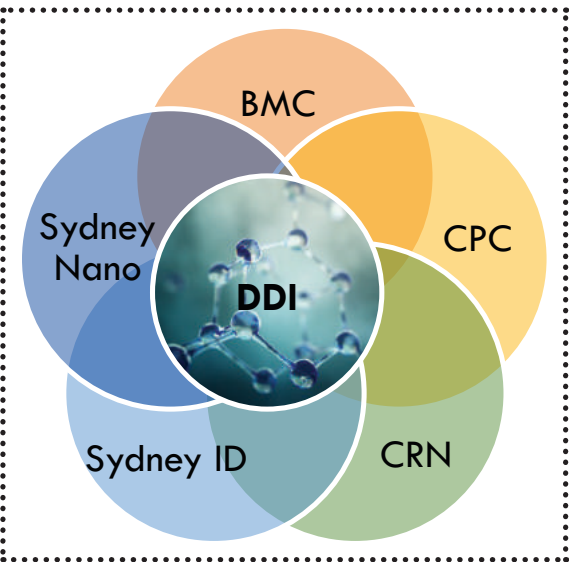


# Disease Focus Areas of the DDI

The DDI has five disease focus areas closely aligned with the priorities of the University’s major health multidisciplinary initiatives (MDIs). These disease focuse areas are:



We work closely with these MDIs through representation on our internal management group to identify area of mutual strategic importance and opportunities for joint initiatives.



The DDI also acts as a focal point for drug discovery-related research across these MDIs:

- The Brain and Mind Centre (BMC)
- The University of Sydney Nano Institute
- The Sydney Institute for Infectious Diseases (Sydney ID)
- The Cancer Research Network (CRN)
- The Charles Perkins Centre (CPC)

# Our People Internal Management Group

Our priorities, initiatives, and funding structures are directed by an Internal Management Group, chaired by the Academic Director, Professor Michael Kassiou, with representatives from each of the 8 key stakeholder groups in drug discovery research.

This group works with input from the ECR Committee to shape our academic, strategic and financial goals. The members of our Internal Management Group are:

Professor Michael Kassiou  
Academic Director

Professor Mary Collins  
Brain and Mind Centre

Professor Joel Mackay  
Faculty of Science

Professor Wojtek Chrzanowski  
Sydney Nano

A/Prof Julie Djordjevic  
Sydney ID

Dr Kristina Cook  
Cancer Research Network

Professor Phil Robinson  
Faculty of Medicine and Health

Professor Greg Neely  
Charles Perkins Centre

Professor Peter Lay  
Emeritus Professor

Professor Margaret Sunde  
Academic Director.  
Sydney Analytical



# DDI Member Highlights 2021

The University of Sydney is a growing hub of research excellence in drug discovery and its associated disciplines. This is evident in the extraordinary and diverse achievements of many DDI members over the past year, including several prestigious awards.



A/Prof Michael Bowen  
2021 Prime Minister's  
Prize for New Innovators



Prof Tony Weiss  
2021 Prime Minister's  
Prize for Innovation



Dr Yu Heng Lau  
2021 Young Tall Poppy  
Science Award



Dr Eleanor Drummond  
Alzheimer's Association  
2021 Blas Frangione Early  
Career Achievement



Dr Amandeep Kaur  
2021 J.G. Russell Award



Dr Belal Chami  
Crohn's and Colitis Foun-  
dation 2021 Litwin IBD  
Pioneers Award



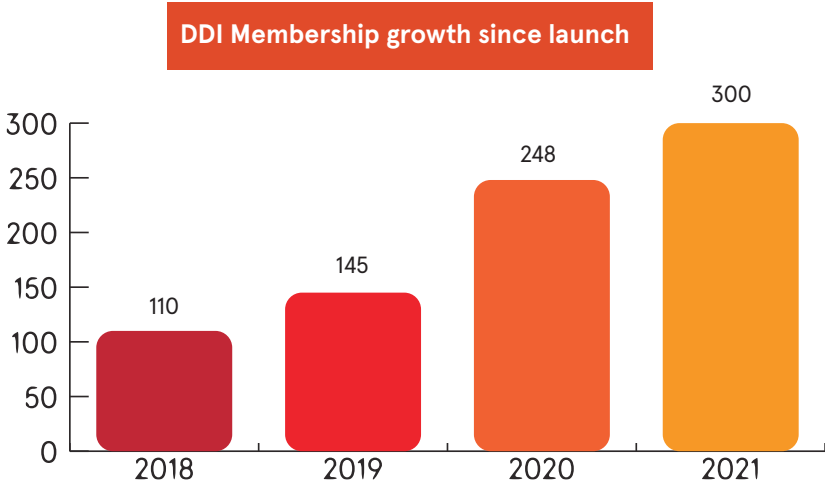
Prof Elizabeth New  
Chemosensors 2020  
Young Investigators Award



Dr Arnold Lining Ju  
MIT Technology Review's  
Innovators Under 35 Asia  
Pacific 2021

# DDI Membership Breakdown

Since the DDI's establishment in 2018, membership numbers have grown steadily to 300 as a result of net-working events, online resources, our communications strategy and word-of-mouth.



Our University of Sydney members come from a variety of faculties and schools, while external members come from government, healthcare and other universities.

DDI Members are spread across:  
11 Schools  
3 Faculties  
7 Medical Research Institutes





## Building a Community

### Communications and Resources

2021 was a year in which online resources and networks proved to be invaluable for both the DDI community and beyond.

With face-to-face events greatly reduced, we continued to build our online presence and provide a range of platforms through which researchers, external partners, potential students, and members of the community can discover more about the DDI and identify potential collaborators as well as funding and training opportunities.



#### External website

- Our external website acts as a point-of-contact for both external partners and potential members
- Through this site, we receive regular enquiries and membership applications

#### Microsoft Teams ECR + HDR channel

- Launched a Microsoft Teams channel in 2021 specifically for collaboration and networking between ECR + HDR members
- Membership to this channel now exceeds 130



#### DDI Sharepoint page

- Our Sharepoint page provides regular updates on current funding and event opportunities
- Popular series of DDI researcher spotlights
- Capabilities database currently in progress

#### Social media

- LinkedIn – 458 connections with 65% external to the University
- Twitter – 401 followers, 50% increase in 2021



## Breaking Good



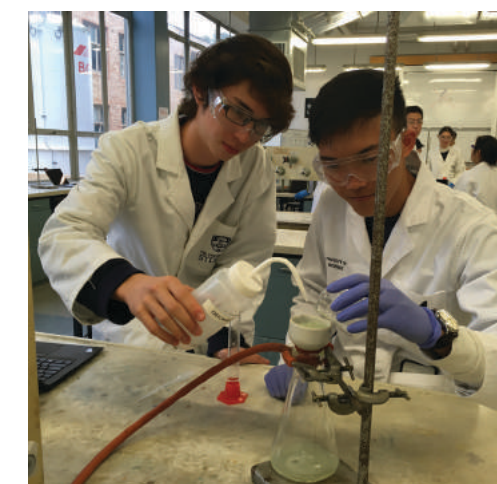
Directed by Associate Professor Alice Motion, Breaking Good is an international citizen science initiative run in collaboration with the DDI. It works to empower members of the broader public to participate in drug discovery projects and scientific research.

As the leader of the DDI's Outreach and Communication program, Alice has utilised Breaking Good to facilitate hands-on workshops and online events for both high school and HDR students.

In 2021, a teacher-led E\$SENTIAL MEDICINE\$ unit was conducted in partnership with Asquith Girls High School. In total, 90 students worked with their teachers in undertaking research into the accessibility, affordability and availability of the World Health Organisation's list of essential medicines.

Furthermore, undergraduates at the University of Sydney synthesised 11 compounds which were tested against *Madurella mycetomatis*, the main fungal causative agent of the disease mycetoma. From this testing, the Breaking Good team learned that a 2-pyridine ring is essential for activity.

The DDI looks forward to continuing to collaborate with Breaking Good in 2022 on a range of projects that aim to improve awareness and engagement with STEM and medical research concepts.





## The DDI ECR Committee

Higher Degree by Research (HDR) students and Early Career Researchers are an integral element of the DDI network. The Early Career Researchers (ECR) Committee ensures that this faction are well represented and supported in DDI actions and events.

Chaired by Dr Michael Gotsbacher, the Committee ensures HDR students and ECRs are represented and have an impact on the DDI's strategic plans; plans and organises professional development workshops for this cohort; communicates events and activities for ECRs and HDR students in the represented areas; and takes a leadership role in developing the DDI's HDR student community.



Dr Michael Gotsbacher  
School of Medical Sciences



Dr Xuyu Liu  
Heart Research Institute



Dr Elizabeth Cairns  
Lambert Initiative



Dr Jiadai Wu  
School of Chemical &  
Biomolecular Engineering



Dr Mark White  
School of Chemistry



Dr Belal Chami  
Charles Perkins Centre



Dr Aster Pijning  
Centenary Institute



Rhianne Scicluna  
HDR Representative



Sam Lane  
HDR Representative



Dr Han Shen  
Westmead Institute for  
Medical Research

In 2021, we put a call out for HDR students to join our ECR Committee with the aim of helping the DDI to better facilitate opportunities and events for this cohort. From an outstanding group of applicants, two inaugural HDR Representatives were selected: Sam Lane and Rhianne Scicluna.

Together, they will be working to represent the interests of HDR students on the DDI ECR Committee while getting an inside look at how the DDI works to connect drug discovery researchers from across the University.

“By having so many different schools represented on the DDI ECR Committee, we’re able to hear from a wider number of perspectives.”

Dr Michael Gotsbacher  
Chair  
DDI ECR Committee



# 2021 DDI ECR Showcase



On 21 April 2021, the Drug Discovery Initiative was delighted to hold its first in-person event since COVID-19 restrictions began. The Early Career Researcher Showcase attracted more than 70 attendees and provided them with the opportunity to hear from some of the leading figures in the drug discovery space.

Dr Samuel Banister (pictured presenting below), Professor Renae Ryan and Professor Paul Witting were on hand to deliver insightful, engaging keynote speeches about their personal experiences with the various stages of the drug discovery process.

Following this, each of the 2020 DDI ECR award winners presented a brief, illuminating insight into their research projects. To facilitate networking and collaboration between attendees, a novel speed-networking session took place to great effect. The symposium was rounded out by a more traditional, informal networking session.



# 2021 DDI ECR Awards

The DDI ECR Awards were established by the ECR Committee in 2020 with the goal of acknowledging and rewarding research achievements of our HDR and ECR members across all areas of drug discovery.

The following researchers were selected as winners at the 2021 DDI ECR Awards:

**Honours/HDR Category:**

- Kiyan Afzali
- Karishma Patel

**ECR-1 Category:**

- Dr Andrew Montgomery
- Dr Charlotte Franck and Dr Alex Norman (shared)

# DDI ECR and HDR Teams Channel



In 2021, the DDI ECR Committee established a Microsoft Teams channel specifically for the DDI's HDR and ECR members.

Through this channel, researchers are able to connect with like-minded researchers, quickly browse the resources, equipment and opportunities the DDI has to offer, or even just chat socially.

Since this channel's establishment in September 2021, its membership has continued to grow and now exceeds 130.

DDI Membership - Fast Facts

24% are HDR students

27% are early-career researchers

49% are mid-career researchers or higher  
(greater than 10+ years post-PhD)



## Enabling Research

The DDI facilitates, enables and advances research projects at the University of Sydney with high potential for translation. This is underpinned by access to state-of-the-art infrastructure, some of which is unique in Australia, and is guided by input and advice from industry and clinical advisory groups.

We engage with members of the drug discovery community within and external to the University to facilitate the integration and alignment of partnerships through our seed funding schemes, communication platforms, networking events and scientific workshops. In 2021, these initiatives included:



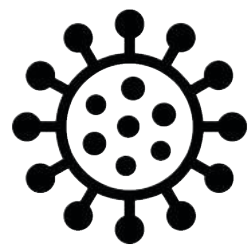
2020/2021 Sydney SPARK  
Mentorship Program



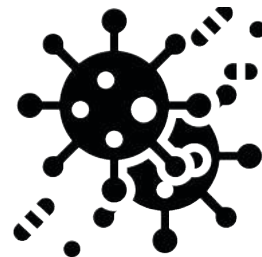
DDI 2021 EMCR  
Seed Funding



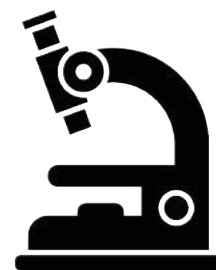
DDI and CVI  
Partnership Grants



COVID Seed Funding +  
Discussion Group

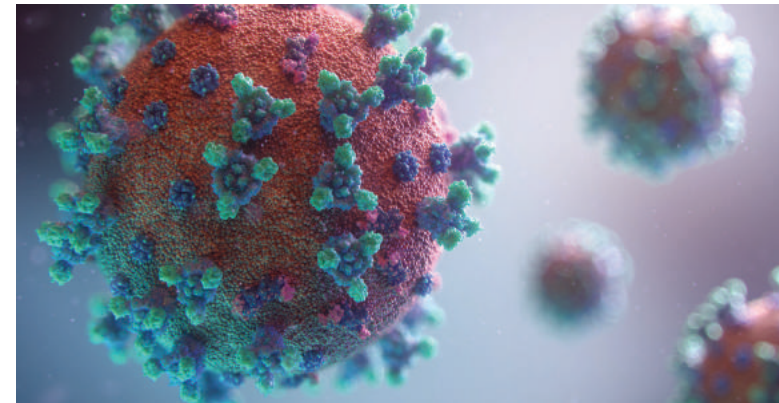


DDI and Sydney ID  
Seed Funding



Drug discovery capabilities

## DDI Seed Funding in 2020



In 2020, the DDI joined forces with Sydney ID (formerly known as the Marie Bashir Institute) to support and unite drug discovery efforts related to COVID-19.

It was recognised that rapid outcomes are critical in this field due to the urgent need for effective therapeutics, and that the global research efforts in this area mean that research must be published quickly to avoid others publishing first. With these considerations, the DDI invested in several approaches to accelerate the COVID-19 drug discovery pipeline.

### DDI and Sydney ID Seed Funding Round

Following a workshop to identify priorities and areas for collaborations, a joint seed funding call was issued by the DDI and Sydney ID with four projects selected:

#### 4 projects funded by the DDI and Sydney ID

##### Prof Richard Payne

*Discovery of Potent SARS-CoV-2 Entry Inhibitors via mRNA Display*

##### Dr Jason Low

*Further development of COVID-19 targeted monoclonal antibodies as therapeutic and diagnostic reagents*

##### A/Prof Tim Newsome

*Therapeutic targeting of TGF- $\beta$  and Smad3 in SARS-CoV-2 infection*

##### A/Prof Thomas Grewal

*Cholesterol accumulation in late endosomes/lysosomes to reduce coronavirus infection*





## DDI Seed Funding in 2020

### Two new platforms for COVID-19 drug discovery

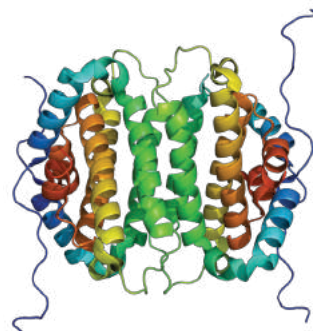
In addition to the seed funding scheme, the DDI also funded the establishment of two platforms to overcome roadblocks in COVID-19 drug discovery at the University:

#### Protein Production

*Production and purification of ACE2, Receptor-binding domain and spike proteins*

Key outcomes:

- 3 collaborative publications involving several COVID-19 drug discovery groups members and using protein for the DDI platform have been accepted for publication [ACS Central Science 2021;7(6):1001-1008; Molecules 2020 Nov 18;25(22):5392; NPJ Vaccines. 2021 Nov 30;6(1):143]
- Several publications are currently in preparation.

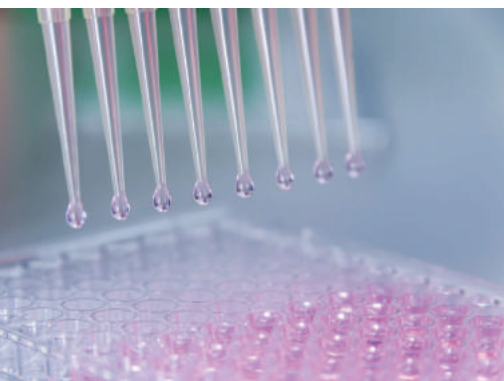


#### High-Throughput Drug Screening

*A pseudovirus assay to assess the ability of drugs to target and inhibit SPIKE-ACE-2 mediated viral entry*

Key outcomes:

- One publication accepted for publication [ACS Central Science 2021;7(6):1001-1008] with another accepted and yet to be published [Microbiology Spectrum]
- A successful NHMRC Ideas grant (APP2012769) led by Dr Nicole Messina from MCRI Melbourne included this platform. In addition, DDI members Prof. Jamie Triccas and Dr Megan Steain were listed as was Chief Investigator B and Associate Investigator, respectively.

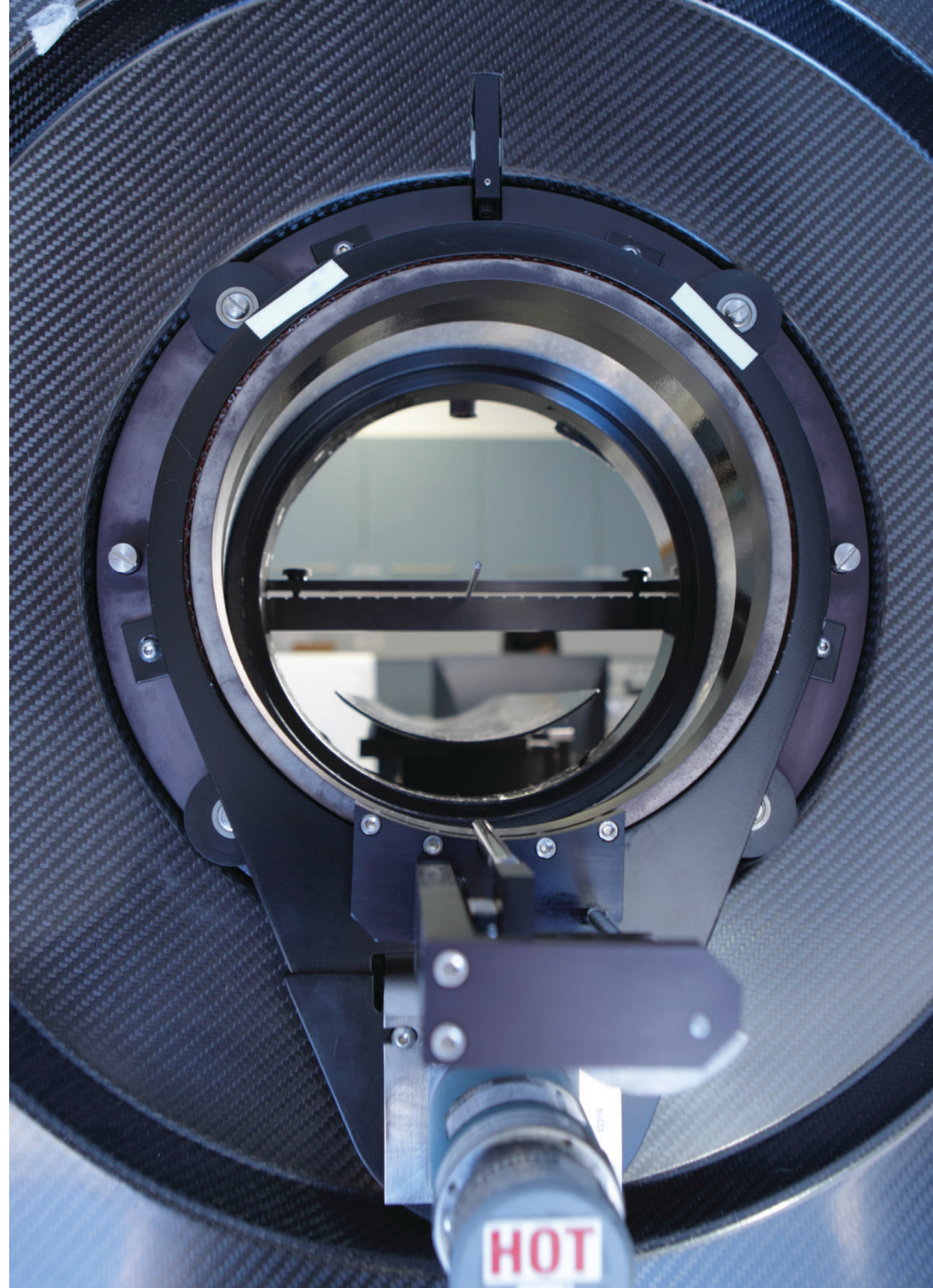


2020 DDI Seed Funding – Key Outcomes

4 publications

6 conference abstracts

More than \$1 million leveraged funding

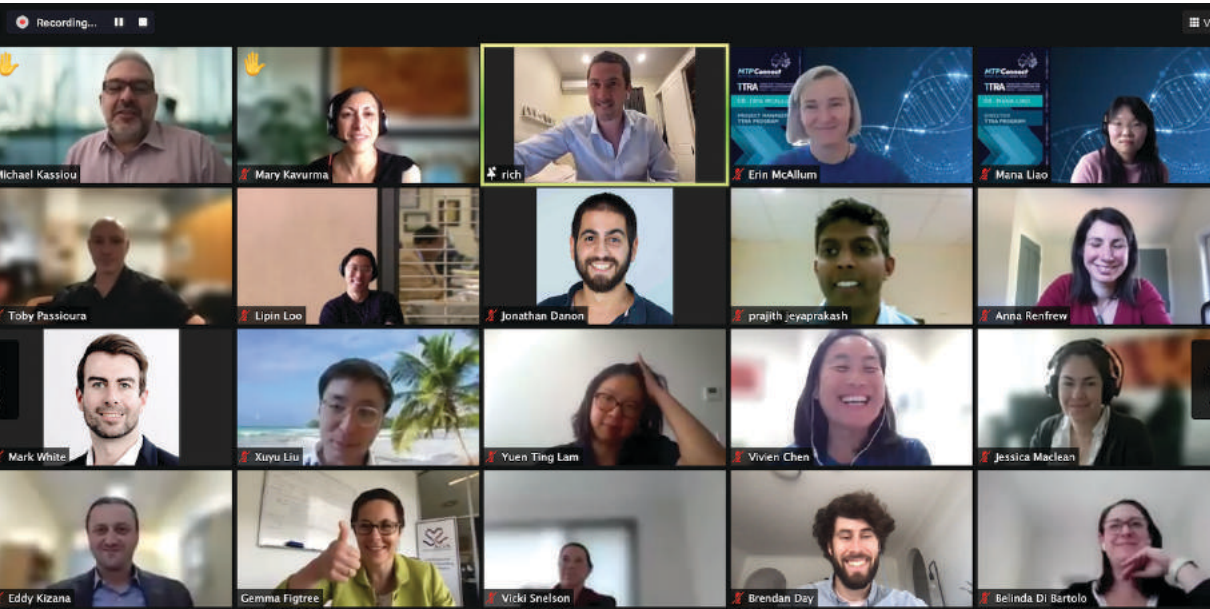




# Engaging with MDIs

Building on the success of the 2020 COVID-19 program with Sydney ID, the DDI continued to work with disease-focussed MDIs at the University in 2021 to identify joint priorities and areas for collaboration and translation.

In September 2021, we held an online drug discovery workshop in partnership with the Cardiovascular Initiative that was attended by more than 100 participants. Following this workshop, a DDI CVI Partnership Grants scheme was launched to identify and assist innovative cardiovascular drug discovery research projects.



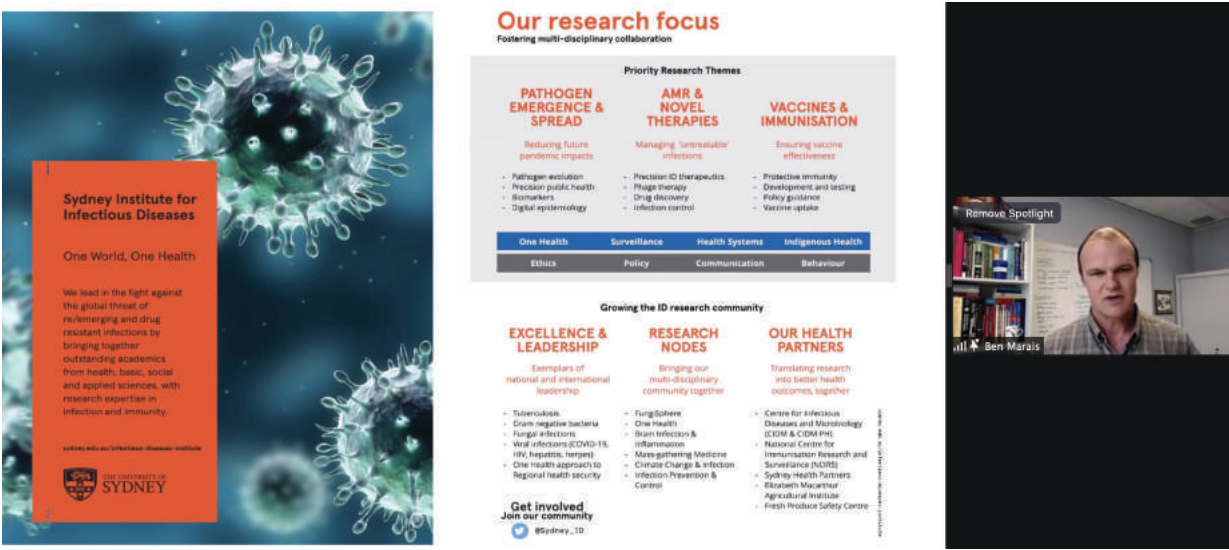
4 selected projects receiving \$20,000 each in seed funding

**Dr Aaron Gilmour, Dr Clara Tran and Dr Seakcheng Lim**  
*Creating mature cardiomyocytes from patient-derived induced pluripotent stem cells to assess anti-arrhythmic drugs*

**Dr Matthew Graus and Dr Paul Coleman**  
*Developing the next generation of senolytic drugs for cardiovascular diseases*

**Dr Praveesuda Michael, Dr Marie Besnier, Dr Yuan Lam, Dr Richard Tan and Dr Nianji Jang**  
*Unlocking cardiovascular disease by engineering patient-specific blood vessel mimics*

**Dr Xuyu Liu and Dr Daniel Ford**  
*A PROTAC-based bioengineering platform for more efficacious antiplatelet drug discovery*



Another workshop, convened in partnership with the Sydney Institute for Infectious Diseases, was held in October on the topic of antimicrobial drug discovery. This workshop featured an excellent, diverse lineup of speakers including keynote speakers Dr Branwen Morgan of the CSIRO and BioDiem CEO Julie Phillips.

A joint seed funding program from the DDI and Sydney ID was initiated after this workshop, with seven outstanding projects each selected.

7 selected projects receiving \$20,000 each in seed funding

**Dr Emma Peel**  
*Antimicrobial peptide discovery in two frog species*

**A/Prof Julianne Djordjevic**  
*Exploiting inositol polyphosphate kinases for antifungal drug development using novel inhibitor scaffolds*

**Professor Paul Groundwater**  
*Addressing resistant Gram-negative pathogens through the potentiation of the activity of clinically approved antibiotics*

**Dr Kenya Fernandes**  
*Adapting fungal strategies to deliver antifungal agents*

**Professor Paul Witting**  
*Screening nitroxides for antimicrobial activity in two models of infection*

**Dr Charlotte Franck**  
*Discovery of Antiviral Cyclic Peptides Targeting the Main Protease of SARS-CoV-2 via mRNA Display*

**Professor Rachel Codd**  
*The active and selective import of anticancer agents as a potential antibacterial mechanism*

# DDI Seed Funding in 2021



In addition to the targeted seed funding programs held in conjunction with the CVI and Sydney ID, the DDI also held an independent seed funding for early- to mid-career researchers at the University working in the drug discovery space.

This funding program drew 17 applications from which 7 outstanding projects were funded – 2 led by researchers 0-3 years post-PhD (ECR-1), and 5 led by researchers 3-10 years post-PhD (ECR-2).

## 7 EMCR-led projects funded by the DDI

### Dr Andrew Montgomery (ECR-1)

*Hit-to-lead optimisation of small molecules that reduce toxic TDP-43 inclusions in cellular models of frontotemporal dementia*

### Dr Daniel Ford (ECR-1)

*Novel Cyclic Peptides Targeting FXII for the Treatment of Diabetic Wounds*

### Dr Lipin Loo (ECR-2)

*Characterization of LRSBP: A novel SARS-CoV-2 spike protein receptor that suppresses infection*

### Dr Mark White (ECR-2)

*Promoting blood vessel formation in hypoxic tissue by manipulating a novel oxygen sensing pathway*

### Dr Jason Low (ECR-2)

*Targeting cMYC: A new assault on an unconquered summit*

### Dr Han Shen (ECR-2)

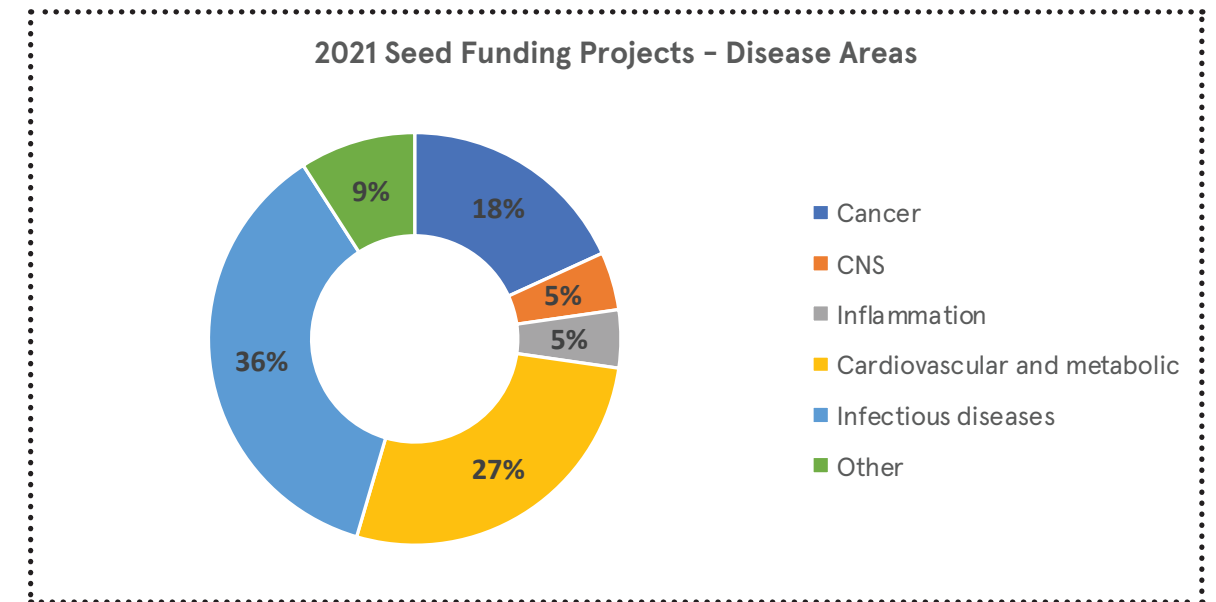
*Identifying effective drugs to target hypoxia with high-throughput screening*

### Dr Yu Heng Lau (ECR-2)

*Fragment-directed cyclic peptide inhibitors for the treatment of adolescent bone cancer*

# DDI Seed Funding in 2021

Projects in all five of the DDI's disease focus areas received seed funding in 2021.



The DDI's emphasis on providing support for early-career researchers is evident in the fact that 73% of the projects that received seed funding from the DDI in 2021 are led by an ECR (less than 10 years post-PhD, relative to opportunity). In addition, all projects include at least one ECR Investigator.

The role of the DDI as a central point of connection for disparate areas of drug discovery saw 78% of successful projects feature Investigators from 2 or more Schools, while 39% have at least 1 external collaborator.



\*Medical Research Institute



## Engaging with Industry

At the DDI, we understand that our members are looking for connections both in the University and from industry. During 2021, we made sure to have an industry and/or government presence at all DDI events. Brandon Capital representatives attended our ECR Showcase; members of MTP Connect's Targeted Translation Research Accelerator presented at the DDI/CVI workshop; and Dr Branwen Morgan of the CSIRO and BioDiem CEO Julie Phillips were keynote speakers at the joint DDI-Sydney ID workshop.

### Sydney SPARK Program

First developed at Stanford University, SPARK is a translational research and education program that provides training, mentorship, and milestone funding to research teams. A key aim of the program is to increase the value of intellectual property generated by researchers at the University of Sydney by providing seed funding and mentorship.

In 2020/2021, the DDI supported the research costs of four teams and a professional team to run the program. Team leader Dr Pegah Varamini was personally invited by Professor Michael Wallach, director of SPARK Oceania, to present her research on triple-negative breast cancer therapeutics at the 2021 BIO Asia International Conference as the Australia/New Zealand SPARK representative. Dr Varamini described this experience as a "unique and rewarding" opportunity that "led to further engagement with industry for our project".



#### 4 projects funded as part of Sydney SPARK

##### Dr Pegah Varamini

*Novel approaches for targeted delivery of therapeutic agents to triple negative breast cancer cells*

##### Dr Nicholas Hunt

*Oral insulin and liraglutide nanomedicines for use in diabetes*

##### Dr Shiyang Jia

*A novel ocular gene delivery system (LTV1) for the treatment of Stargardt's macular degeneration*

##### Dr Michael Morris

*Control of fertility in humans*



"Being a SPARK participant was a fantastic experience. The knowledge I gained regarding all aspects of drug development and the commercialisation pathway is priceless."

**Dr Pegah Varamini**  
Cancer researcher  
Sydney SPARK participant

## DDI Capabilities

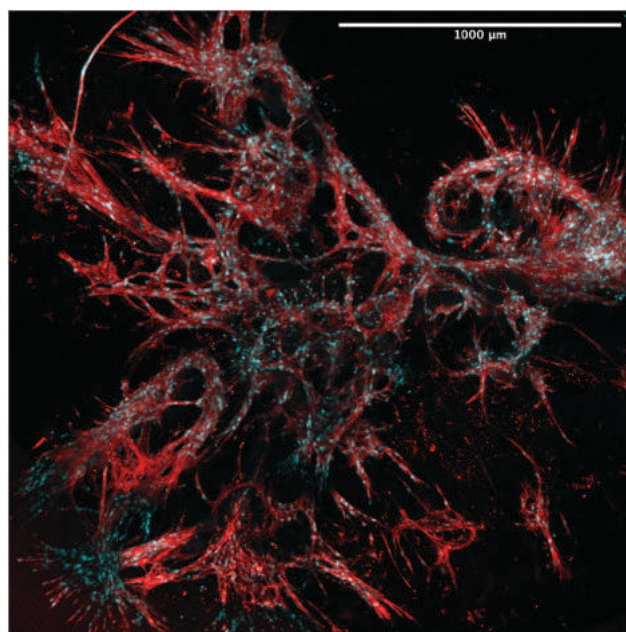
In addition to funding individual projects, the DDI also seeds the establishment of new capabilities, such as the COVID-19 platforms, that can contribute to many different research programs. Several new capabilities with wide-reaching applications were funded in 2021.

### Transferrin/Transferrin Receptor Cycle Platform

This project, led by Emeritus Professor Peter Lay, will further develop a biolayer interferometry assay to model Transferrin to Transferrin Receptor binding (Tf/TfR1), which is involved in the transport of many viruses into cells. This assay will enable in-vitro modelling of Tf/TfR1-mediated virus entry into cells to screen novel cyclic peptide (RaPID) technology to deliver inhibitors of viral entry into cells via this pathway.

### Computational Modelling Facility

The use of computer-aided drug design and screening has increased the rate at which druggable leads are identified. As part of a new initiative headed by Professor Dai Hibbs, we are now able to bring state-of-the-art computational software/hardware to DDI members. The two computers acquired by the DDI are top-of-the-line workstations that can screen compounds rapidly and also aid in the rational optimisation of the druggable lead. Additionally, a cutting-edge GPU-based workstation is available, which will allow for rapid molecular dynamics experiments to further understanding of structure-activity relationships, and free energy perturbation calculations, which aims to give increased confidence in docking/screening results.



Hoechst VE-Cadherin

and more in-vivo-like environment enabled by the RASTRUM platform, to search for novel therapies and better understand the pathogenesis of Alzheimer's Disease," Sam says.

### RASTRUM™ 3D Cell Culture Platform

In 2021, the DDI purchased a RASTRUM 3D Cell Culture Platform, housed in the Sydney Analytical Drug Discovery node. This platform enables the generation of physiologically representative and highly reproducible 3D cell models (mono-cultures and co-cultures, HTP models and organoid models) that can be used for drug screening, personalised medicine and investigative biological studies to study a range of disease.

DDI HDR Representative Sam Lane is one such researcher who is using and benefitting from the RASTRUM platform, as he is currently developing protocols using the Rastrum to facilitate vasculogenesis of iPSC-derived endothelial cells in novel 3D hydrogels.

"I aim to harness the higher throughput,

## Drug Discovery Infrastructure Grant Success

### LIEF Success

The state-of-the-art facilities at the Sydney Analytical drug discovery node received a significant boost last year with two ARC LIEF grants:

### Infrared and Raman spectrometer for rapid imaging

Led by Emeritus Professor Peter Lay, the Rapid Molecular (Bio)material Imaging by Infrared and Raman Microscopies project aims to generate new fundamental knowledge on: cell heterogeneity and dynamic processes; technologies for optimising cell printing; understanding toxicity of microplastics; and protocols for measuring materials of technological relevance.

### Integrated technology platform

A second project led by Professor Richard Payne aims to build an integrated technology platform for the identification, synthesis, purification and confirmatory testing of bioactive peptides with unprecedented speed and efficiency.

The DDI recognises the importance of state-of-the-art facilities to enable world class research, and is looking to continue to support and invest in new infrastructure and expertise in the field of drug discovery research.





“It is terrific to see the breadth of achievements accomplished by such a diverse cohort of researchers working together.”

Professor Michael Kassiou  
Academic Director  
Drug Discovery Initiative

## Acknowledgments and Closing Remarks

As this Annual Report has clearly demonstrated, 2021 was another successful year for the Drug Discovery Initiative.

It is terrific to see the breadth of achievements accomplished by such a diverse cohort of researchers working together across different Schools and Faculties. Facilitating collaboration between disparate groups of drug discovery researchers is central to the DDI's purpose and will continue to be a point of emphasis moving forward.

I am particularly excited to watch the projects that received seed funding for 2022 grow throughout the year, and to see how the DDI's new capabilities enhance and add to the countless innovative research programs being conducted at the University.

My thanks go to Professor Duncan Ivison, who stepped down as the University's Deputy Vice Chancellor (Research) in March 2022. Duncan has played a pivotal role in clarifying and supporting the DDI's vision since its founding in 2018, and his enthusiasm will be missed. I greatly look forward to continuing this work with Professor Kathy Belov, the Interim Deputy Vice Chancellor (Research), as well as Professor Emma Johnston, who will assume the role this coming July.

I would also like to thank the Internal Management Group for providing their invaluable input in helping to determine the DDI's priorities, initiatives and funding programs. Of course, the realisation of these objectives would not be possible without the work of the DDI ECR Committee, which has ensured that our growing HDR and ECR community remain well-represented in the DDI's strategic plans.

**Professor Michael Kassiou**  
Director, Drug Discovery Initiative



# Appendix

## The Drug Discovery Initiative management team

Academic Director  
Professor Michael Kassiou

Executive Officer  
Dr Anna Renfrew

Communications Officer  
Brendan Day

### Internal Management Team

- Professor Michael Kassiou, Academic Director
- Professor Mary Collins, Brain and Mind Centre
- Professor Greg Neely, Charles Perkins Centre
- Professor Wojtek Chrzanowski, Sydney Nano Institute
- Associate Professor Julie Djordjevic, Sydney Institute for Infectious Diseases
- Dr Kristina Cook, Cancer Research Network
- Professor Philip Robinson, Faculty of Medicine and Health
- Professor Peter Lay, Emeritus Professor
- Professor Joel Mackay, Faculty of Science
- Professor Margaret Sunde, Academic Director, Sydney Analytical

### The DDI Early Career Researcher Committee

- Dr Michael Gotsbacher (Chair), School of Medical Sciences
- Dr Belal Chami, Charles Perkins Centre
- Dr Elizabeth Cairns, the Lambert Initiative
- Dr Jiadai Wu, School of Chemical and Biomolecular Engineering
- Dr Mark White, School of Chemistry
- Dr Xuyu Lui, the Heart Research Institute
- Dr Aster Pijning, the Centenary Institute
- Dr Han Shen, Westmead Institute for Medical Research
- Rhianne Scicluna, PhD candidate, Bowen Lab; HDR Representative
- Sam Lane, PhD student, Kassiou Group; HDR Representative

## 2020/2021 Sydney SPARK participants

- Dr Pegah Varamini: Novel approaches for targeted delivery of therapeutic agents to triple negative breast cancer cells
- Dr Shiyang Jia: A novel ocular gene delivery system (LTV1) for the treatment of Stargardt’s macular degeneration
- Dr Nicholas Hunt: Oral insulin and liraglutide nanomedicines for use in diabetes
- Dr Michael Morris: Control of fertility in humans

### 2021 DDI Early- to Mid-Career Researcher Seed Funding recipients

- Dr Andrew Montgomery: Hit-to-lead optimisation of small molecules that reduce toxic TDP-43 inclusions in cellular models of frontotemporal dementia
- Dr Daniel Ford: Novel Cyclic Peptides Targeting FXII for the Treatment of Diabetic Wounds
- Dr Han Shen: Identifying effective drugs to target hypoxia with high-throughput screening-a new approach to overcome radioresistance of Diffuse Intrinsic Pontine Gliomas
- Dr Lipin Loo: Characterization of LRSBP: A novel SARS-CoV-2 spike protein receptor that suppresses infection
- Dr Jason Low: Targeting cMYC: A new assault on an unconquered summit
- Dr Mark White: Promoting blood vessel formation in hypoxic tissue by manipulating a novel oxygen sensing pathway
- Dr Yu Heng Lau: Fragment-directed cyclic peptide inhibitors for the treatment of adolescent bone cancer

## 2021 DDI and Cardiovascular Initiative Partnership Grant recipients

- Dr Aaron Gilmour, Dr Clara Tran and Dr Seakcheng Lim: Creating mature cardiomyocytes from patient-derived induced pluripotent stem cells to assess anti-arrhythmic drugs
- Dr Matthew Graus and Dr Paul Coleman: Developing the next generation of senolytic drugs for cardiovascular diseases
- Dr Praveesuda Michael, Dr Marie Besnier, Dr Yuan Lam, Dr Richard Tan, Dr Nianji Jang: Unlocking cardiovascular disease by engineering patient-specific blood vessel mimics
- Dr Xuyu Liu and Dr Daniel Ford: A PROTAC-based bioengineering platform for more efficacious antiplatelet drug discovery

### 2021 DDI and Sydney Institute for Infectious Diseases Antimicrobial Drug Discovery Seed Funding recipients

- Professor Paul Witting: Screening nitroxides for antimicrobial activity in 2 models of infection
- Professor Rachel Codd: The active and selective import of anticancer agents as a potential antibacterial mechanism
- Professor Paul Groundwater: Addressing Resistant Gram Negative Pathogens Through the Potentiation of the Activity of Clinically Approved Antibiotics
- Dr Emma Peel: Antimicrobial peptide discovery in two frog species
- Dr Kenya Fernandes: Adapting fungal strategies to deliver antifungal agents
- Associate Professor Julie Djordjevic: Exploiting inositol polyphosphate kinases for antifungal drug development using novel inhibitor scaffolds
- Dr Charlotte Franck: Discovery of Antiviral Cyclic Peptides Targeting the Main Protease of SARS-CoV-2 via mRNA Display

## 2021 DDI Member Highlights

- Associate Professor Michael Bowen: 2021 Prime Minister’s Prize for New Innovators
- Professor Tony Weiss: 2021 Prime Minister’s Prize for Innovation
- Dr Yu Heng Lau: 2021 Young Tall Poppy Science Award
- Dr Eleanor Drummond: Alzheimer’s Association 2021 Blas Frangione Early Career Achievement
- Dr Amandeep Kaur: 2021 J.G. Russell Award
- Dr Belal Chami: Crohn’s and Colitis Foundation 2021 Litwin IBD Pioneers Award
- Professor Elizabeth New: Chemosensors 2020 Young Investigators Award (awarded in 2021)
- Dr Arnold Lining Ju: MIT Technology Review’s Innovators Under 35 Asia Pacific 2021



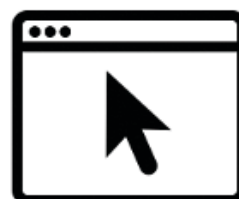
# The Drug Discovery Initiative

## How to stay connected



### Twitter

@Sydney\_DDI



### Website

[sydney.edu.au/research/centres/drug-discovery-initiative.html](http://sydney.edu.au/research/centres/drug-discovery-initiative.html)



### LinkedIn

[linkedin.com/in/sydney-drug-discovery-initiative](https://linkedin.com/in/sydney-drug-discovery-initiative)



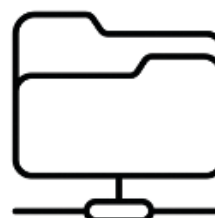
### Mailing list

Sign up for our mailing list to receive regular updates



### Email

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### Sharepoint

[unisyd.sharepoint.com/sites/ddi](http://unisyd.sharepoint.com/sites/ddi)