

*Faculty of Medicine, Dentistry and Health Sciences*

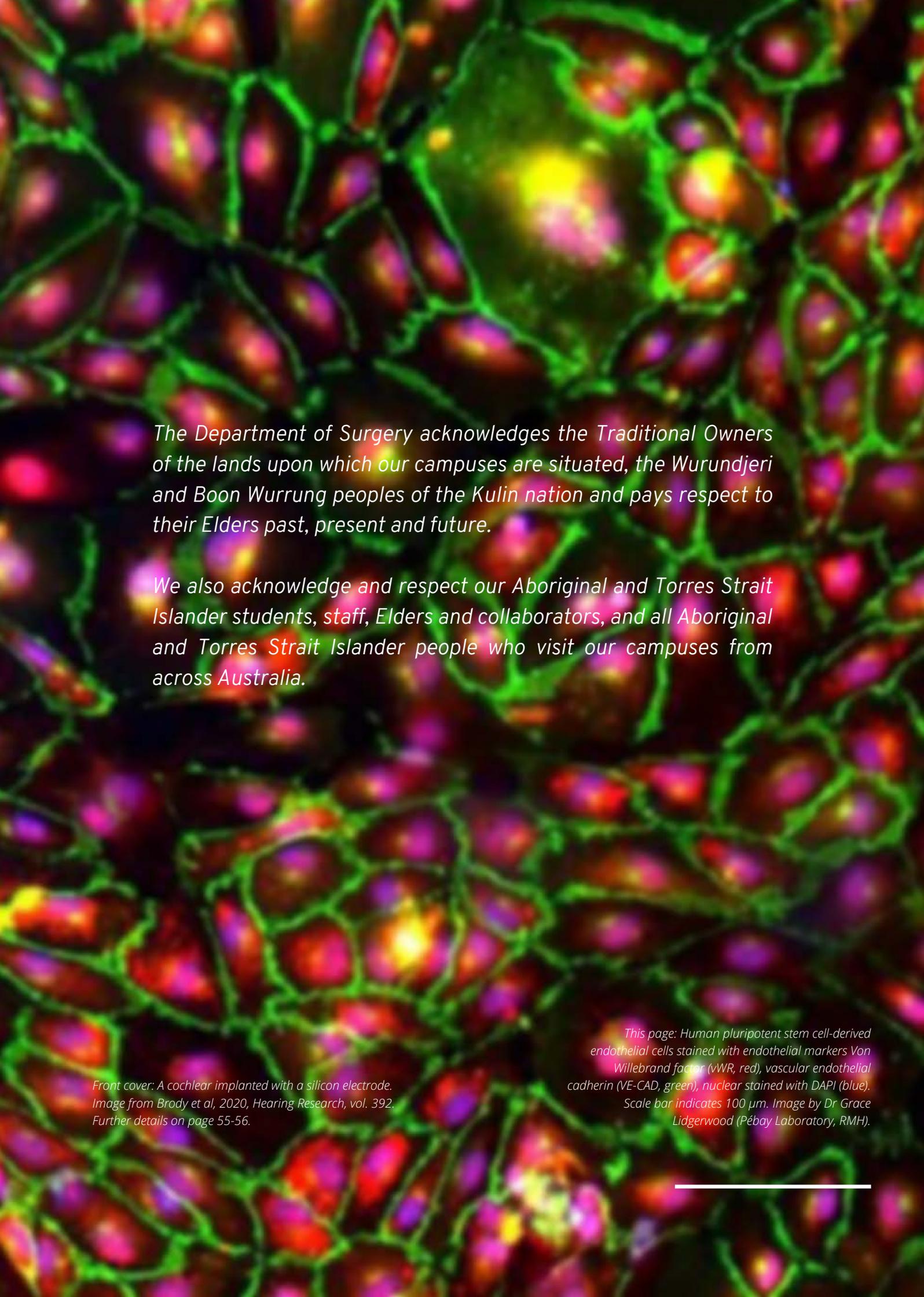
**DEPARTMENT OF SURGERY**



# **ANNUAL REPORT**

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**2019-2020**



*The Department of Surgery acknowledges the Traditional Owners of the lands upon which our campuses are situated, the Wurundjeri and Boon Wurrung peoples of the Kulin nation and pays respect to their Elders past, present and future.*

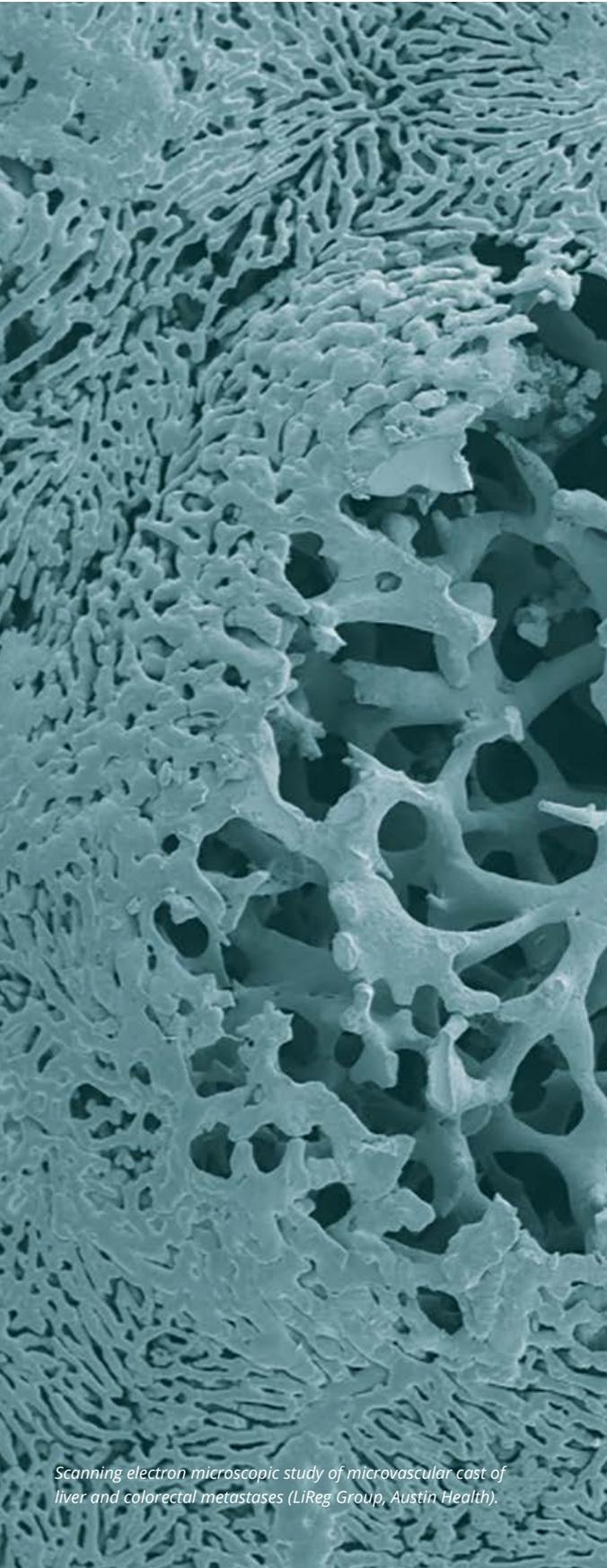
*We also acknowledge and respect our Aboriginal and Torres Strait Islander students, staff, Elders and collaborators, and all Aboriginal and Torres Strait Islander people who visit our campuses from across Australia.*

*Front cover: A cochlear implanted with a silicon electrode.  
Image from Brody et al, 2020, Hearing Research, vol. 392.  
Further details on page 55-56.*

*This page: Human pluripotent stem cell-derived endothelial cells stained with endothelial markers Von Willebrand factor (VWF, red), vascular endothelial cadherin (VE-CAD, green), nuclear stained with DAPI (blue).  
Scale bar indicates 100  $\mu$ m. Image by Dr Grace Lidgerwood (Pébay Laboratory, RMH).*

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*Scanning electron microscopic study of microvascular cast of liver and colorectal metastases (LiReg Group, Austin Health).*

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# MESSAGE FROM THE HEAD

It is my pleasure to present to you the 2020 Annual report of the Department of Surgery. This report brings together the extensive range of academic activities across the different campuses of the Department of Surgery which reflects our strong commitment to research, teaching & training, knowledge transfer and engagement.

Our academic sites at St. Vincent's Hospital, the Royal Victorian Eye and Ear Hospital, the Royal Melbourne Hospital, Royal Children's Hospital, Western Health and Sunshine Hospital, the Northern Hospital, and Austin Hospital form a collaborative network that boasts high level research in the basic and clinical sciences, bioengineering, biomaterials, medical devices, health economics and innovative surgical technique.

Through a whole of department approach, our members have built strong connections with the MD students, residents and trainees through our teaching, mentorship and research programmes, our surgeons through career development and leadership opportunities, and our patients, their careers and the broader community through our outreach work, our involvement with advocacy groups and more recently through the creation of a consumer college which seeks to engage consumers at all levels of research from general interest, external validation to study design and advisory panels.

Our department has a deep commitment to equity and diversity. A recent review of academic staff and opportunities within the Department of Surgery highlighted the need to create greater interest, opportunity and support for women in surgery. As a result we have begun a programme of engagement, mentorship and promotion of women at the student, resident, trainee and consultant levels in both the clinical and research environments. Our target is to increase the numbers of women academics in the early and mid career Levels (C,D), and also to strongly promote available Level E positions to female candidates.

In recognition of the importance of social and cultural equity, our department has begun to build indigenous research into our academic programmes. Vision and hearing research at the Royal Victorian Eye and Ear Hospital and musculoskeletal research at St. Vincent's are but three examples of how we can help to address chronic conditions in the community. These and other programmes also drive capacity building of indigenous researchers who have become important links between our department and indigenous research teams at the state and national levels. With the guidance and mentorship from colleagues at the Melbourne Poche Centre for Indigenous Health and other centres of indigenous research, the Department of Surgery aims to grow this area of research that will inform strategies that improve access and care for indigenous Australians in a safe and culturally secure environment.

Our combined efforts has driven research productivity and grant success that makes the Department of Surgery at the University of Melbourne Australia's leading academic department of surgery. Collaboration across the greater department and also embracing a multidisciplinary approach to research has allowed the creation of unique opportunities such as the Aikenhead Centre for Medical Discovery that brings together clinicians, cellular biologists and engineers to drive bioengineering solutions for human disease. This has set the scene for an even greater engagement between clinicians, researchers, patients and industry.

The future of academic surgery is bright and our report will give you a peek into this exciting future.

**PROF. PETER CHOONG**

MBBS, MD FRACS, FAOrthA, FAAHMS

SIR HUGH DEVINE CHAIR OF SURGERY

HEAD, DEPARTMENT OF SURGERY

MELBOURNE MEDICAL SCHOOL



## ABOUT DOS

### **ST VINCENT'S HOSPITAL, MELBOURNE**

Prof Peter Choong  
Sir Hugh Devine Chair of Surgery

### **ROYAL MELBOURNE HOSPITAL**

Prof Alistair Royse  
(Interim)  
James Stewart Chair of Surgery

### **AUSTIN HEALTH**

A/Prof Vijayaragavan Muralidharan  
(Interim)

### **ROYAL VICTORIAN EYE AND EAR HOSPITAL (OPHTHALMOLOGY)**

Prof Keith Martin  
Ringland Anderson Chair of Ophthalmology

### **ROYAL VICTORIAN EYE AND EAR HOSPITAL (OTOLARYNGOLOGY)**

Prof Stephen O'Leary  
William Gibson Chair of Otolaryngology

### **NORTHERN HEALTH**

Dr Russell Hodgson  
Surgical Research, Head  
(Precinct Lead Vacant)

### **WESTERN HEALTH**

A/Prof Justin Yeung

### **EPWORTH HOSPITAL**

Prof Richard de Steiger  
Victor Smorgon Chair of Surgery

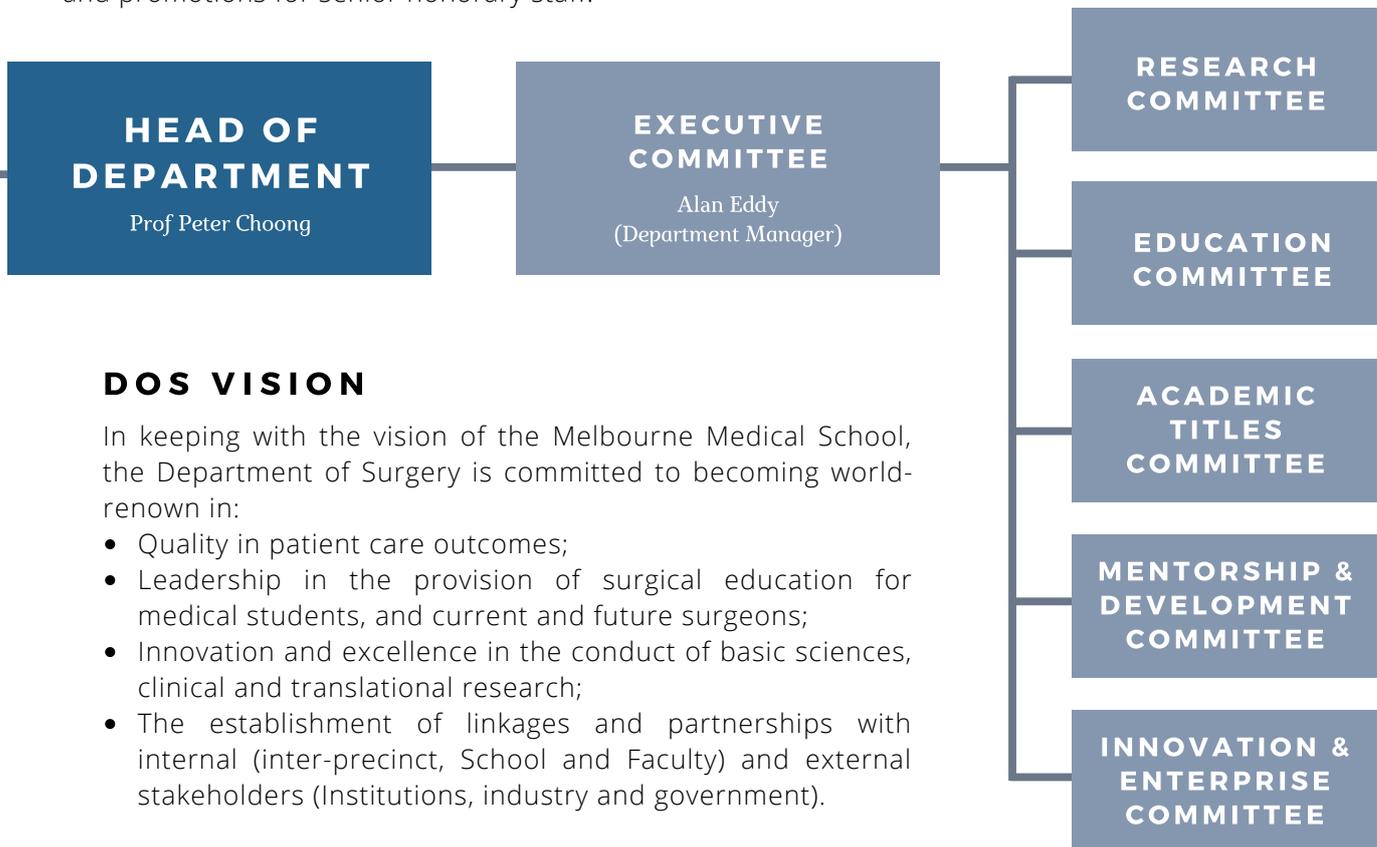
### **ROYAL CHILDREN'S HOSPITAL**

Prof Anthony Penington  
Jigsaw Chair of Plastic Surgery

# DEPARTMENT OF SURGERY

The Department of Surgery (DoS) is based across six precincts of the Melbourne Medical School (MMS), all at key hospital sites. DoS is comprised of paid academic surgeons, scientists, and professional staff, and a large body of honorary academic staff, with an Executive Committee encompassing representation from all hospital precincts. The Department forms the focus for academic activities in surgery for The University of Melbourne and members of the Department are involved in research, and in both undergraduate and postgraduate teaching in surgery across the Melbourne Medical Precinct (MMS). These are undertaken both within the department, and more broadly, on the hospital campuses.

DoS has established policies and continues to monitor their implementation through the Governance structure (page 6), which underpins all activities within the Department; this is done with the aim of harnessing the talents of members of the Department in developing and administering the protocols for research, education and training, mentorship, and appointments and promotions for senior honorary staff.



## DOS VISION

In keeping with the vision of the Melbourne Medical School, the Department of Surgery is committed to becoming world-renown in:

- Quality in patient care outcomes;
- Leadership in the provision of surgical education for medical students, and current and future surgeons;
- Innovation and excellence in the conduct of basic sciences, clinical and translational research;
- The establishment of linkages and partnerships with internal (inter-precinct, School and Faculty) and external stakeholders (Institutions, industry and government).

## DOS OBJECTIVES

The objectives of the Department of Surgery are:

- To perform **high quality research** from the interface of basic science and clinical medicine across the surgical disciplines.
- To **teach** undergraduate and postgraduate students
- To provide **research leadership** in national medical and scientific bodies
- To **engage** the community with compassion

# GOVERNANCE

## EXECUTIVE COMMITTEE

The Executive Committee provides operational and strategic oversight for the Department of Surgery. Working within the framework established in the Committee's Terms of Reference, the Executive Committee coordinates the development and management of educational strategies and innovations in training with the research interests of the Department to build surgical capacity and capability of the highest calibre. The Executive Committee aims to:

- Strengthen the Department's **research** focus and performance across the spectrum from discovery to translation
- Encourage **learning & teaching** through innovation and support **career development**
- Strengthen **clinical leadership** by advocating a greater leadership role for clinical academics on hospital campuses
- Promoting **engagement** with health services, Department of Health at the Federal and State levels



**Prof Peter Choong**  
(Chair)  
St. Vincent's Hospital



**A/Prof Michelle Dowsey**  
St. Vincent's Hospital



**Prof Stephen O'Leary**  
(Academic Titles)  
Otolaryngology



**Dr Sudanthi Wijewickrema**  
Otolaryngology



**Prof Keith Martin**  
(Innovation & Enterprise)  
Ophthalmology



**A/Prof Lyndell Lim**  
Ophthalmology



**Prof Alistair Royse**  
(Online Teaching & Training)  
Royal Melbourne Hospital



**Prof Alice Pébay**  
(Research)  
Royal Melbourne Hospital



**A/Prof Justin Yeung**  
(Education Innovation)  
Western Health



**A/Prof Vijayaragavan Muralidharan**  
Austin Health



**Prof Debra Nestel**  
Austin Health



**Prof Anthony Penington**  
(Mentorship/Career Development)  
Royal Children's Hospital



**Mr Roshan Karri**  
President, SSSM



**Ms Casey Fung**  
DoS Liaison Officer, SSSM

# GOVERNANCE

## RESEARCH COMMITTEE

Chaired by Professor Alice Pébay, the Research Committee is responsible for the development and translation of the Department's research strategy. The Committee also oversees knowledge exchange and promotion of impact strategy within the Department.

An integral part of its framework is the creation of processes that provide our researchers with greater access and participation in research, such as annual seeding grants for prioritised areas of research. These are meant to assist in the generation of pilot data that will facilitate subsequent grant applications, which are in turn supported by Committee-appointed internal panels of senior researchers. The Committee also organises the annual DoS research showcase and will soon launch a new online Departmental seminar

series. These initiatives will promote and encourage research activities within our department and beyond.

Working closely with the Department's Executive Committee to advise on relevant research strategies, the Research Committee also benefits from additional governance support and research capacity solutions.

The Committee aims to strengthen a departmental culture that encourages research collaboration across basic, clinical and translational research, and in which mentoring of early/mid-career researchers is central to the establishment and retention of excellence in research.

## ACADEMIC TITLES COMMITTEE

Academic Titles Committee is chaired by Professor Stephen O'Leary (the William Gibson Chair of Otolaryngology) at the Eye and Ear Hospital. The remit for this Committee only relates to both new and re-appointments for Honoraries at levels D and E. The completed documentation (together with a letter of support from the relevant Precinct Lead) are reviewed by the Committee to ensure that a consistency and rigor (in the appointments criteria) is applied across the entire Department for the appointment and re-appointment of academic surgeons.



**Prof Alice Pébay**  
(Chair)  
Royal Melbourne Hospital



**A/Prof Michelle Dowsey**  
St. Vincent's Hospital



**Prof Peter Choong**  
St. Vincent's Hospital



**Dr Hongjian Zhu**  
Royal Melbourne Hospital



**A/Prof Vijayaragavan Muralidharan**  
Austin Health



**Dr Justin Tan**  
Otolaryngology



**A/Prof Marcos Perini**  
Austin Health



**A/Prof Justin Yeung**  
Western Health



**Dr Russell Hodgson**  
Northern Health



**Dr Samantha Bunzli**  
Early Career Representative  
St. Vincent's Hospital



**Dr Carla Abbott**  
Early Career Representative  
Ophthalmology



**Mr Siddharth Rele**  
Student Representative  
St. Vincent's Hospital



**Prof Stephen O'Leary**  
(Chair)  
Otolaryngology



**Prof Kate Drummond**  
Royal Melbourne Hospital



**Prof Anthony Penington**  
Royal Children's Hospital



**Prof Alistair Royse**  
Royal Melbourne Hospital

# GOVERNANCE

## COMMITTEE FOR EDUCATION INNOVATION

The Committee on Educational Innovation is chaired by Associate Professor Justin Yeung from Western Health, and operates under the same governance structure as our other Departmental Committees. This committee has only been in existence for part of 2017, and since then it has established a sub-committee structure (with a wider inclusive membership) for Education Research; Continuing Professional Development (CPD) and Simulation in Education. The remit of the Committee on Educational Innovation applies to all education and training programs that have surgical elements, within the Melbourne Medical School and includes the MD program, CPD, course-work post graduate programs in Surgical Education and Surgical Science, and the HDR Master’s Degree in Surgery.

## MENTORSHIP & DEVELOPMENT COMMITTEE

Led by Professor Anthony Penington, the Department of Surgery runs a focussed mentoring program which identifies and fosters young surgeons who are considering a career in academic surgery. Each mentoring cycle lasts for one year and matches a younger surgeon with a suitable mentor. Mentoring is directed towards developing a career path in academic surgery and solving the many problems which particularly affect surgeons in balancing busy clinical practice with research and teaching. The program is only open to surgeons in the department who are close to completion of training or in the first few years of practice.

## INNOVATION & ENTERPRISE COMMITTEE

This new Committee has been designed to encourage DoS researchers to think about the commercialisation of their research at an early stage, and to help them determine the best route to market through a combination of ‘in-house’ informal advice from those with relevant experience and University help where necessary.

*Where can you get the initial seed funding to push your idea along?  
How do you pitch your technology to investors?*

The Innovation & Enterprise Committee offers an opportunity to advise how to: move ideas along; perfect the Shark Tank pitch; navigate the labyrinth of IP protection, spin-off tech companies and business development.



**A/Prof Justin Yeung**  
*(Chair)*  
Western Health



**Prof Paul Baird**  
Ophthalmology



**Dr Krinal Mori**  
Northern Health



**A/Prof Vijayaragavan Muralidharan**  
Austin Health



**Dr James May**  
Royal Melbourne Hospital



**Ms Emma Tully**  
Royal Melbourne Hospital



**Dr Kirstie MacGill**  
Royal Children’s Hospital



**Ms Casey Fung**  
DoS Liaison Officer, SSSM



**Prof Anthony Penington**  
*(Chair)*  
Royal Children’s Hospital



**A/Prof Vijayaragavan Muralidharan**  
Austin Health



**Prof Keith Martin**  
Ophthalmology



**A/Prof Michelle Dowsey**  
St. Vincent’s Hospital



**Prof Keith Martin**  
*(Chair)*  
Ophthalmology

# TEACHING & LEARNING AT DOS

## MELBOURNE MEDICAL SCHOOL

The Faculty of Medicine, Dentistry and Health Sciences encompasses numerous Schools, of which the Melbourne Medical School (MMS) has developed a substantial international reputation. MMS comprises nine clinical departments: Clinical Pathology, General Practice, Medical Education, Medicine and Radiology, Obstetrics and Gynaecology, Paediatrics, Psychiatry, Rural Health and **Surgery**.

Based either at The University of Melbourne's Parkville campus or embedded within clinical health services throughout metropolitan Melbourne and rural Victoria, MMS staff are privileged to work alongside more than 2400 honorary appointees from the health sector who tirelessly contribute their time, knowledge and clinical expertise to the education of our students.

The School has partnerships and research collaborations with many of the 30 partner organisations in the vibrant Melbourne Biomedical Precinct, as well as national and international relationships.

MMS delivers a suite of graduate programs, including the Doctor of Medicine (MD), the first professional entry masters-level medical program in Australia. As the School's flagship program, the MD delivers a fresh approach to medical training and creates a new benchmark in 21st century medical education.

## STUDYING AT DOS

The Department of Surgery is based across the seven precincts of MMS, all at key hospital sites, as well as conducting academic activities in surgery at other hospitals. The Department has a strong emphasis on teaching and research, with educational research gaining increasing importance within the departmental philosophy. The distinctive educational Melbourne Model at the University offers degrees in three broad cycles.

- At the **Bachelor level**, students select from one of six broad degrees (offering a total of 87 major fields of study) and a limited number of specialist offerings.
- Most professional qualifications are subsequently offered at **Masters level**, where students can choose from a variety of professional or specialist graduate programs offering intensive graduate-level experiences that promote deep professional learning.
- At the **Doctoral level**, students work alongside and are nurtured by international research leaders in a broad range of fields. The Department is a proud host to the very first cohort of Doctor of Medicine candidates with many more to come, a clear indicator of the growing demand for academic development.

The Melbourne Model's curriculum combines academic breadth with disciplinary depth to strategically reposition the University in an increasingly globalised higher education framework. The University prepares its students to enter a world marked by rapid change where graduates must possess the applicable knowledge, and flexible and adaptable skills, to succeed.

The Department of Surgery offers a suite of graduate programs in Surgery, Surgery Science and Surgical Education up to Master's level, and also regularly hosts students for research training on exchange from other Australian and International Universities.

With a vibrant and highly productive research community within the University and more specifically in the Faculty of Medicine, Dentistry and Health Sciences and its partner institutions, there is tremendous scope and opportunity to develop multidisciplinary collaborations ranging from basic science discovery, clinical epidemiology, hospital services research to health economics, translational research, device and med-tech development.

# STUDENT ASSOCIATIONS



## STUDENT SURGICAL SOCIETY OF MELBOURNE (SSSM)

The Surgical Students' Society of Melbourne (SSSM) was founded in 2009 by medical students eager to share their passion for surgery. A decade on, SSSM has grown into the peak surgical interest group at The University of Melbourne, representing over 1,400 students across metropolitan, regional and rural Victoria. The society continues to work tirelessly to provide its students with high-quality surgical education, as well as a platform to enable communication between students, surgeons and other experts in the field. The missions of SSSM broadly relates to three domains:

- **Education** - to maximise access to quality surgical education for all Melbourne Medical School students, including a unique Rotating Lecture Series, practical workshops and social events.
- **Research** - to promote research amongst medical students in order to foster a passion for surgical academia from the very start of their medical journey.
- **Advocacy** - to represent and advocate for all of our students, to ensure that their surgical interests, skills and education are wholly fulfilled.

SSSM continually strives to achieve these missions in order to fulfil the vision of inspiring the next generation of world-class surgeons.

FOLLOW THEM ON:

-  [facebook.com/groups/surgicalstudents/](https://www.facebook.com/groups/surgicalstudents/)
-  [@the\\_sssm](https://twitter.com/the_sssm)
-  [www.sssmelbourne.com](http://www.sssmelbourne.com)



## STUDENT ORTHOPAEDIC & MUSCULOSKELETAL ASSOCIATION (SOMA)

Students in Orthopaedic and Musculoskeletal Academia (SOMA) brings together students nation-wide who are interested in musculoskeletal and orthopaedic health. SOMA fosters an inclusive culture of engagement with research, peer-to-peer support, teaching, and advocacy.

The group was conceived in mid-2019 at DoS to fill a growing gap in student representation within the musculoskeletal research field. With students based at different locations, engaged in various distinct types of research, it was all too easy for students to fall out of touch with one another and feel isolated. This came to the fore at the 2019 inaugural Students' Orthopaedic Research Showcase (SORS).

An affiliate of the University's Graduate Student Association (GSA) at OPUS (see page 19), SOMA began with 9 members and within 6 months garnered over 70 members.

FOLLOW THEM ON:

-  [facebook.com/SOMA\\_gradgroup/](https://www.facebook.com/SOMA_gradgroup/)
-  [@somagradgroup](https://twitter.com/somagradgroup)
-  [@somagradgroup](https://www.instagram.com/somagradgroup)
-  [www.somagradgroup.com](http://www.somagradgroup.com)

# COVID RESEARCH

*COVID-19 has impacted our way of life in almost every aspect. Health literacy and interest in protecting ones health has become more important than ever. As researchers, it's up to us to bring comprehensive, relevant, evidence-based research to the attention of the communities we serve.*

## ***Life or limb: Decision-making during the COVID-19 pandemic***

*Led by Dr Samantha Bunzli, St Vincent's Hospital, Melbourne*

A global pandemic of COVID-19 proportions is unprecedented over the last century, and the impact of this on a centre-based multidisciplinary model of care such as for sarcoma management, has not been previously described.

*How do surgical leaders within a highly specialised, resource intensive, limited service such as sarcoma surgery respond to the dramatic imposition of change to a long tradition of evidence-based best practice?*

Encompassing the three priority areas of timing of treatment, integrating adjuvant therapies, and selecting the appropriate surgical procedure, sarcoma surgery is an ideal context to study decision-making as the findings are applicable to other areas where surgery is the pivotal option.

This study, based out of the Department of Surgery - St. Vincent's Precinct, applied a robust methodology from the field of qualitative science to uncover themes that pervaded the thinking of sarcoma surgeons in their decision making.

Surgeons from 18 sites involving each continent from across the globe in various phases of the first wave of the COVID-19 pandemic were recruited to understand if there was commonality in response and how this information would help to inform future strategies for the inevitable second and subsequent waves. 17 out of 18 surgeons described a decision they had made about patient care since the start of the pandemic which was unique to them, i.e. without precedence. Common to these unique decisions was the context of uncertainty in which they took place. Uncertainty combined with limited resources and the potential for personal risk in the 'line of duty' meant no single course of action was perceived as 'superior' and participants settled on the least-worst option at a given time point.

Based on these findings, we suggest that in the context of rapidly changing standards of justice and beneficence in patient care, traditional decision-making frameworks may no longer apply. The framework of least-worst decision-making gives rise to actionable strategies which can support decision-making in sarcoma and other specialised fields of surgery, both during the current crisis and beyond.

Themes	Suggested strategies
<b>Uncertainty</b>	<ul style="list-style-type: none"> <li>Establish strategy of clear and regular communication from institutional and clinical leaders</li> <li>Establish evidence-based practice guidelines for treatment rationalisation</li> <li>Maintain multidisciplinary consultations and discussion to ensure consensus decision-making and support</li> </ul>
<b>Lack of resources</b>	<ul style="list-style-type: none"> <li>Establish prioritisation system for personnel, consumable and treatment resources</li> <li>Establish split treatment teams to reduce vulnerability of cross infection amongst clinicians and support staff</li> <li>Establish "designated survivor" status</li> <li>Ensure early communication and agreement between stakeholders within treatment teams of treatment and diagnostic strategies</li> </ul>
<b>Personal harm</b>	<ul style="list-style-type: none"> <li>Establish clear guidelines with regard to personal protective equipment</li> <li>Establish clear guidelines for institutional and personal guidelines for direct patient contact</li> </ul>
<b>Patient harm</b>	<ul style="list-style-type: none"> <li>Establish prioritisation for shared (centre versus community) services e.g. investigations, biopsy</li> <li>Minimise travel to and from treatment centres</li> <li>Broaden network of treatment facilities e.g. radiotherapy, chemotherapy.</li> <li>Maintain multidisciplinary consultations to ensure optimal care</li> <li>Ensure patient support system exists</li> </ul>
<b>Mental health &amp; Anxiety</b>	<ul style="list-style-type: none"> <li>Develop mechanisms to assess mental health of staff</li> <li>Provide clear institutional support for mental health needs of individuals and teams</li> </ul>
<b>Least-worst decisions</b>	<ul style="list-style-type: none"> <li>Maintain multidisciplinary consultations to ensure decision support</li> </ul>

*Suggested strategies to support surgical decision-making.*

# COVID RESEARCH



Led by Drs Georgina Riddiough & Daniel Cox, Austin Health

The VERITAS (the Victorian collaborative for Education, Research, Innovation, Training and Audit by Surgical trainees) collaborative undertook an Australia wide survey of surgical trainees and younger fellows to assess the broad impacts of the COVID-19 pandemic on their surgical training, wellbeing as well as other aspects of their lives. The response rate was approximately 20%.

Almost three quarters of trainees (74%) reported significant disruption as a result of roster changes.

Subsequent to these changes 83% of trainees reported a reduction in their overall income. Of particular concern to trainees and fellows was a reduction in their operating exposure, 73% of trainees and 71% of younger fellows reported a reduction in their primary operator rate. Approximately one third of trainees reported increased anxiety levels prior to the pandemic and this increased to over half of trainees during the pandemic.

Many trainees felt that an increase in their anxiety levels impacted upon their capacity to perform at work. Despite this, 80% of trainees felt well supported by their training supervisors indicating that anxiety was not necessarily due to inadequate support at work.

Furthermore, many trainees commented positively about improved online educational opportunities and more time at home with friends and family as a result of being transferred to a rotating roster. As a result of this survey VERITAS would recommend that all specialist surgical colleges carefully examine their current mental health support mechanism and consider expanding these.

For more information on VERITAS, its current projects and opportunities for collaboration please contact Dr Georgina Riddiough and Dr Daniel Cox (VERITAS Co-chairs) or A/Prof Muralidharan (Consultant Supervisor).

## Can Zinc fight COVID-19?

Led by A/Prof Joseph Ischia, Austin Health

A/Prof Joseph Ischia, along with Prof Damien Bolton and Dr Oneel Patel from Austin Health have started recruitment on a world-first trial to investigate whether intravenous zinc can assist in the fight against COVID-19.

The study is in collaboration with teams at the Austin and University of Melbourne including A/Prof Jason Trubiano (Infectious Diseases and COVID-19 Unit), A/Prof Christine McDonald (Respiratory Medicine Unit), and Prof Rinaldo Bellomo, Dr Stephen Warrilow, and A/Prof Daryl Jones (Intensive Care Unit) as well as Phebra, who has generously donated pharmaceutical grade Zinc suitable for intravenous injection.

The team has long been investigating the protective effects of intravenous zinc against organ damage induced by lack of oxygen.

*Similar to dexamethasone, zinc has anti-inflammatory properties as well as anti-viral properties identical to the promising anti-viral Remdesivir.*

There are four mechanisms by which zinc may be useful in treating COVID-19:

1. Zinc reduces viral replication of similar coronaviruses including the common cold,
2. Zinc acts as an anti-inflammatory and may protect against the cytokine storm characteristic in COVID-19,
3. Zinc has proven effective in clinical trials of reducing the severity of symptoms in patients with pneumonia and SARS (Severe Acute Respiratory Syndrome)
4. Zinc protects against low oxygen state induced by the microvasculitis that occurs with COVID-19 infection.

The study aims to evaluate whether the administration of high-dose intravenous zinc (HDIVZn) improves the clinical outcomes of hospitalised patients with COVID-19 infection. Patients are administered an intravenous zinc chloride (0.5mg/kg/d) or a placebo, once daily for 7 days. The randomised placebo controlled phase 1 study to confirm the safety and feasibility of 7 days treatment zinc (given as Zn chloride) in patients with COVID-19 has begun with 39 enrolled patients and a full follow-up is now available for all patients. Data is currently being analysed and will be published in the coming month.

The primary measure is patient oxygenation levels: the mean change in the level of required oxygenation (oxygen flow in litres/min) in non-ventilated patients vs mean change in the oxygen levels (PaO<sub>2</sub> ratio in mmHg) in ventilated patients.

If successful, this could save lives. Zinc could be a safe, cheap and effective treatment for COVID-19 particularly for high-risk elderly patients and those with poorly resourced health systems currently overwhelmed by COVID-19 such as India and Brazil.

# COVID RESEARCH

## *CovidSurg | GlobalSurg*

*Led by A/Prof Vijayaragavan Muralidharan, Austin Health; Prof Alistair Royse, Royal Melbourne Hospital; Prof Peter Choong, St. Vincent's Hospital, Melbourne; and A/Prof Justin Yeung, Western Health*

The *CovidSurg* research collaborative addresses pragmatic research questions to guide surgical care in the context of COVID-19.

Organised through the National Institute for Health Research (NIHR) Global Surgery Unit at the Birmingham University (UK), the group assembled rapidly at the beginning of the pandemic and designed an international prospective, observational cohort study to examine the effects of COVID-19 on patients' peri-operative outcomes and surgical services.

VERITAS (the Victorian collaborative for Education, Research, Innovation, Training and Audit by Surgical trainees) based in the Department of Surgery – **Austin Precinct**, was an early adopter of the study and helped lead its Asia-Pacific arm. VERITAS members worked closely with the central organising committee in the UK to disseminate the study widely across Australia, resulting in an impressive national response. (1) Seventeen Australian centres were listed as collaborating sites in the group's most recent publication in the *Journal of Clinical Oncology* [Impact Factor 32] which explored "COVID-19-free surgical pathways" to facilitate elective cancer surgery during the pandemic. (2) In recognition of VERITAS' leading role, Dr Daniel Cox (PhD Candidate, DoS Austin-Precinct, and Co-chair of the VERITAS collaborative) was named as an Australian lead for the study.

3,723 teams across 1,251 hospitals in 108 countries applied to participate in the *CovidSurg* collaborative's second study (*CovidSurg Week*). *CovidSurg Week* compares peri-operative outcomes for patients with concomitant SARS-CoV-2 infection undergoing surgery against a control group of non-infected patients. VERITAS continues to take a prominent role in this latest endeavour for the Austin Precinct while the Neurosurgery Department at the **Royal Melbourne Hospital** is also participating in the study.

Other surgical teams at **St. Vincent's Hospital, Melbourne** have also participated in *CovidSurg Week* with data collected across Hepato-Pancreato-Biliary, Upper Gastrointestinal, Cardiothoracic and Orthopaedic units. These four units have also participated in a related study investigating the outcomes of elective cancer surgery during the COVID-19 pandemic crisis (*CovidSurg Cancer*), led by Ms Salena Ward.

Data from **Western Health** was also collected for *GlobalSurg*, another international prospective multicentre cohort study looking to firstly determine the optimum time of surgery following SARS-CoV-2 infection and secondly assess and determine key global surgical indicators such as post-operative mortality which may have been affected by the pandemic.

The Colorectal Unit at Western Health will also be participating in another *GlobalSurg* study by investigating how SARS-CoV-2 infection has affected colorectal cancer treatment provision and outcomes at Western Health.

As a result of these efforts, Australian surgical researchers form the 8th largest cohort globally (in terms of local teams applying to participate) in what promises to be one of the largest surgical research studies ever conducted.

## *Mapping the immune microenvironment*

*Led by the Brain Cancer Microenvironment and Biology Group, Royal Melbourne Hospital*

Up to 30% of COVID-19 patients experience the onset of acute and chronic neurological conditions including stroke, anxiety, depression, and head "fogginess".

Together with A/Prof Vicki Lawson of the Peter Doherty Institute, the Brain Cancer Microenvironment and Biology Group at RMH are investigating changes in the immune microenvironment in COVID-19 patient brain tissue using multiplex immunohistochemistry technology, which allows the simultaneous detection of multiple proteins on a single tissue section. With precious few COVID-19 tissue samples, this latest advance in immunofluorescence maximises the amount of data acquired.

# COVID RESEARCH

## *COVID-19 Rapid Response*

*Led by Prof Alistair Royse, Royal Melbourne Hospital*

The UEG team have been quick to pivot at the beginning of the pandemic and have developed a suite of eLearning short courses for further professional development:

- *COVID-19 Lung and Cardiac Ultrasound*
- *Clinical Ethics and COVID-19*
- *Resilience Tool for Clinicians during COVID-19*
- *Communicating COVID-19: Preparing Clinicians to Tackle Challenging Questions*
- *Focused Ultrasound Simulator Education on COVID-19 Lung*

As an example, health professionals will be able to quickly upgrade their skills to perform lung ultrasound scans to diagnose COVID-19 accurately and safely, with a new online course being made available free by the University of Melbourne.

The [COVID-19 Lung and Cardiac Ultrasound](#) course is aimed at medical, nursing and paramedical staff involved in assessing the lungs as part of clinical care. Course Director Alistair Royse said: "being able to perform bedside lung ultrasounds would make a significant difference to the speed of clinical decision making."

Professor Royse said lung ultrasound could be used more frequently and conveniently than some forms of imaging such as CT scanning.

"Performing a CT scan is a large logistical exercise when you have a patient who is seriously ill, because it requires moving them from one part of a hospital to another, whilst still observing all of the infection control measures and maintaining their ventilator and drug infusions," Professor Royse said.

A lung ultrasound can be done within minutes. It is superior to a physical examination with a stethoscope and it is more sensitive than a plain chest x-ray. Participants will learn how to perform a lung ultrasound, learn the implications of specific ultrasound findings in COVID-19, and learn how to use an ultrasound encased in a plastic sheath, for tighter infection control. The rapid-fire course takes about 30 hours and includes simulation exercises.

## *Artificial intelligence for lung ultrasound*

*Led by Prof Alistair Royse, Royal Melbourne Hospital*

The UEG research team have been collaborating with machine learning or artificial intelligence (AI) experts at the Queensland University of Technology (QUT) and the Madras University of India. They have a combined grant application under the Australia - India research initiative (COVID-19 special category).

Use of lung ultrasound is exponentially growing and has been found to be very sensitive to early evidence of COVID lung involvement (more sensitive than chest X-ray). However ultrasound scanning remains partially dependent on the skill of the operator and the AI initiative is intended to provide real-time categorisation of images to assist the user in making a clear and accurate diagnosis.

The first steps of this project have been to assemble many lung ultrasound studies and then code each segment of the image in every frame of these studies accurately, to allow for mass "learning" by the computer. In this way, the computer learns to differentiate soft tissue from lung with air, lung collapse (without air), lung with fluid (oedema and pneumonia) or pleural effusions. Early inroads have been faster than expected and will be pitched at colour coding segments of the ultrasound machine screen to highlight these features. Also early work has commenced on quantifying volumes of pleural effusion.

This exciting project has the potential for incorporation into ultrasound machines providing immediate and real-time feedback and diagnosis. It is also potentially of commercial significance. Finally, improved accuracy of AI enhanced imaging should allow for greater accuracy by novice or early adopters of ultrasound technologies sooner than they may otherwise achieve an expert level of competence and this should lead to better clinical outcomes for patients.

# COVID RESEARCH

## *Aerosols and surgery*

*Led by A/Prof Peter Van Wijngaarden, CERA, RVEEH*

The COVID-19 pandemic has highlighted the increased risks from surgical procedures which generate aerosols – tiny airborne particles and droplets which can increase the likelihood of viral transmission.

Early in the pandemic, studies focused on the aerosol-generating potential of operations using high-speed bone and dental drills. Novel coronavirus has been isolated in tears and the conjunctiva; however, it has been unclear whether vitrectomy surgery generates aerosols and therefore places operating room staff at higher risk of transmission.

New research by the Centre for Eye Research Australia and RVEEH suggests that using current techniques aerosol generation is unlikely. The study, published in *Ophthalmology Retina*, measured droplet and particle levels in lab-based experiments and 18 retinal surgeries performed at the RVEEH.

## *Health Services Research*

*Led by Mr Peter Larsen, CERA, RVEEH*

New research at the Centre for Eye Research Australia will tackle the backlog of undiagnosed and untreated eye conditions resulting from missed appointments during the COVID-19 pandemic.

Headed by Specsavers former Group Eye Health Director Peter Larsen in an honorary capacity – a new Health Services Research unit will examine how innovative new technologies, telemedicine and better coordination between different parts of the eye care sector could increase access to screening services, early treatment and prevent avoidable blindness. The research will target diseases where blindness can often be prevented with early treatment such as diabetic eye disease, glaucoma and age-related macular degeneration.

In Australia and around the world, cancelled elective surgeries, restrictions of optometry services to only the most urgent cases and concerns raised by ophthalmologists that patients were delaying treatment for conditions such as age-related macular degeneration – have led to predictions of an explosion of serious vision problems. Prof Keith Martin said “COVID-19 has added impetus to the need for new technologies which enable remote screening and diagnosis and reduce the need for patients to attend a clinic in person.

Our researchers are currently developing a digital app to help patients with age-related macular degeneration monitor their vision at home, an artificial intelligence screening program that can detect blinding eye diseases such as diabetic retinopathy, glaucoma and age-related macular degeneration and cardiovascular disease, and even an eye test to detect Alzheimer’s disease.

“These technologies have the potential to transform the way we deliver eye and health care, but we also need to have the right systems in place for them to be delivered.”

## *Screening cataract patients may shed light on COVID-19 rates*

*Led by Dr Joshua Foreman, CERA, RVEEH*

Writing in *Clinical & Experimental Ophthalmology*, CERA researchers argue that cataract surgery patients are good candidates for ‘sentinel surveillance’ COVID-19 screening and testing programs. They say this group of patients could provide a good indicator of the rate of transmission because they may be more susceptible to COVID-19 infection and they are also at higher risk of complications as many also have diseases such as diabetes or asthma.

“Cataract surgeries are one of the most common elective surgeries in the world, so could enable the widespread screening of a very large and representative segment of the at-risk population,” says lead author [Dr Joshua Foreman](#).

“The procedure used to conduct these surgeries can also be high-risk for surgical staff, so pre-screening could also benefit healthcare workers and patients.

“Dr Foreman explains that while in Australia some patients are pre-screened for COVID-19 this may change over time and is not always the case overseas. This makes the recommendations useful for the development of large-scale testing programs and infection control measures internationally. “Importantly, we are not suggesting that anyone who needs cataract surgery should put off seeking care – the testing process we recommend is simply a way of improving understanding of the pandemic.”

# 2019-20 AT A GLANCE

The Department of Surgery continues to engage with surgeons to train future academic clinicians who will innovate the field of surgery. The statistics here indicate the scope of the Department's research capacity.

**\$6,276,087**  
*Non-Government Grants*



**\$5,621,551**  
*Government Grants*



**13**  
*Research Fellowships*



**83**  
*Current Research Grants*



**1277**  
*Publications*



**85**<sup>DOS</sup>  
*Research Staff*



**122**  
*Total Graduate Researchers*



**41**  
*Clinical Trials Conducted*

**80**

*PhD Candidates*



**2**  
*Patents granted*

**255**

*Honorary appointments*



**29**

*Masters Students*

**13**

*DMedSc Students*

# 2019-20 HIGHLIGHTS



## *Dame Kate Campbell Fellowship*

Congratulations go to Associate Professor Michelle Dowsey from St Vincent's Hospital in the Department of Surgery who was awarded a Dame Kate Campbell Fellowship.

Associate Professor Dowsey was one of 35 Fellows appointed across Levels C, D and E recognising incredible contributions to the Medicine, Dentistry and Health Sciences (MDHS) Faculty through outstanding research and wider involvement in the local community and world stage.

## *Supporting Innovation*



Dr Christo Bester, from DoS's Otolaryngology, was awarded a UoM's Michael Hirshorn Fellowship for Commercialisation to develop technology for patients to record the health of the inner ear directly from their cochlear implant at home.

This is helping us understand why patients lose their normal cochlear function after implantation, and why they sometimes become dizzy. It is hoped this will lead to a real-time monitoring system to alert the patient and their doctors when cochlear function is compromised after implantation.



## *2019 Prime Minister's New Innovators Prize*

Dr Luke Campbell, a recent PhD graduate from Department of Surgery - Otolaryngology, was awarded the 2019 Prime Minister's New Innovator's Prize in Canberra.

The award was given for his innovation of headphones that automatically "fit" to an individual's hearing, marketed by his company, Nura.

Luke (above second left with his wife, Yoko, Prof Stephen O'Leary and Luke's father, Ian) completed his PhD research in Otolaryngology in intraoperative surgical monitoring for cochlear implantation (work which led to patents pending with Cochlear). During his candidature, Luke decided to become an entrepreneur and in 2016, was an awardee of the Melbourne Accelerator Program for the early development of his headphones. Luke's success is yet another accolade for the Faculty, Melbourne Medical School and the Department of Surgery.



## *Cartilage Regeneration*

A/Prof Claudia Di Bella, a Senior Research Fellow who leads the Cartilage Regeneration team within the Advanced Limb Reconstruction Program, has been awarded a highly competitive NHMRC-MRFF Investigator Grant to further her research program using biofabrication to regenerate healthy articular cartilage.



## *Professorial Promotion*

2019 saw academic neurosurgeon Katharine Drummond from DoS's Royal Melbourne Hospital promoted to Professorial level.

With clinical and research interests in the biology and clinical management of brain tumours, Prof Kate Drummond is Director of Neurosurgery at The Royal Melbourne Hospital and Head of Central Nervous System Tumours for the VCCC Parkville Precinct.

She is Chief Examiner in Neurosurgery for the Royal Australasian College of Surgeons and serves as Deputy-Chair of the Royal Australasian College of Surgeons, Section of Women in Surgery, and has received the RACS Medal for Services to RACS. In 2019, she was also awarded Member of the Order of Australia (AM) for services to medicine, particularly in the field of neuro-oncology and community health.

# 2019-20 HIGHLIGHTS

## *Prostate Cancer Specialist Nurses*

Dr Lih-Ming Wong from the Dept of Surgery's St Vincent's Precinct (SVHM) was the lead clinician on a successful application to the Prostate Cancer Specialist Nursing Service, a division within the Prostate Cancer Foundation of Australia. The application funds a full-time nurse for 3 years (at an estimated value of \$250,000).

The Prostate Cancer Specialist Nursing Service supports the placement of prostate cancer specialist nurses in a variety of Australian health care settings in partnership with health service providers. Prostate Cancer Specialist Nurses work within an agreed Practice Framework and Competency Standards which are based on nationally recognised best practice models. PCFA is committed to providing ongoing professional development and support for the duration of the program.



## *Green Impact at Otolaryngology*

The Otolaryngology's Green Impact Team received the Gold award, Gold Labs, and First Place overall at the 2019 Green Impact Awards, along with Project Assistant, George He, receiving the Student Champion award. The Green Impact team has long been committed to reducing their impact on the environment and were excited to join the university's Green Impact Program in 2018, placing third overall.

A Green Fund grant in 2018 has helped to replace old refrigerating units with newer, energy efficient models. Their biggest challenges were reducing waste and finding alternative solutions to traditional waste streams.

By working as a team, they are leading by example and have seen changes in the personal habits of staff and increased curiosity in the department. For example, by collecting soft plastics, they are spreading awareness of not only how and where people can give to RedCycle at home, but are highlighting just how pervasive this sort of plastic is. It has been rewarding to hear about changes and actions our colleagues are taking on at home thanks to the promotion of sustainable ideas by the Green Team.



## *Honouring our dedicated supporter*

Philanthropist, Ms Valma Angliss AM was recently presented with the prestigious Wilson Society Medal, named in honour of Sir Samuel Wilson, a pastoralist and politician.

Valma is a philanthropist who has donated generously to the robotic limb programme led by Professor Peter Choong and Associate Professor Denny Oetomo from the Dept of Mechanical Engineering. Ms Angliss' contribution to prosthetics and orthotics dates back to the 1950s. Working with limb deficient children at the Royal Children's Hospital, she has since remained dedicated to advancing research in the area.

Valma was inducted into The University of Melbourne's Wilson Society as recognition and a means of honouring individuals and organisations who have contributed \$500,000 or more to the University of Melbourne over the course of their lifetime. There are 250 generous philanthropists in the Wilson Society and we are thrilled to have Valma as one of them.

## *Treating prostate cancer*

The Urology Group at SVHM recently published a study on the application of Prostate-Specific Membrane Antigen (PSMA) PET-CT in *The Lancet*.

With support from the Movember Foundation and Prostate Cancer Foundation of Australia, the study investigated whether novel imaging using PSMA PET-CT could improve accuracy and affect management over conventional CT and bone scans which are less sensitivity when staging men with high-risk localised prostate cancer.

In the multicentre, two-arm, randomised study, the primary measure was the accuracy of first-line imaging for identifying either pelvic nodal or distant-metastatic disease defined by the receiver-operating curve using a predefined reference-standard including histopathology, imaging, and biochemistry at 6-month follow-up. The results indicated that PSMA PET-CT was a suitable replacement for conventional imaging by providing superior accuracy to the combined findings of CT and bone scanning.

# 2019-20 HIGHLIGHTS



## Major funding for AMD fight

Melbourne researchers will lead the world's most intensive investigation to uncover why some people with Age-related Macular Degeneration (AMD) are at much greater risk of losing their sight. The study, led by Professor of Ophthalmology Robyn Guymer, is the largest ever assembled to determine the causes of a high-risk form of AMD and develop new treatments to prevent vision loss. Bringing together experts in eye health, artificial intelligence, genetics, stem cell research and bioinformatics, the team includes: DoS's Professor Alice Pébay, the Department of Anatomy and Neuroscience's Professor Erica Fletcher, Professor Melanie Bahlo and Dr Brendan Ansell from the Walter and Eliza Hall Institute, and Dr Zhichao Wu from the Centre for Eye Research Australia.

The study has received a NHMRC Synergy Grant totalling \$5 million and will aim to:

- Investigate the specific genetic and other factors that put one group of people with AMD, amongst those already at high risk, at much greater risk of losing their vision
- Understand how different genetic factors influence the normal functioning of the eye
- Develop new treatments to tackle this very high-risk AMD group

Currently, all cases of AMD are lumped together as one disease but it is now clear there is at least one group of patients at increased risk of losing vision. Prof Guymer explains that "understanding what is different about the high-risk group, who can be determined by modern imaging techniques, and why this group is more likely to lose vision, is the key to saving sight". *Image courtesy of Anna Carlile.*

## MRFF Funding for SUNRRISE Australia trial

SUNRRISE (Single Use Negative pPressure dressing for Reduction In Surgical site infection following Emergency laparotomy) is an international multi-centre study being delivered by general surgery trainee collaboratives. Originating in the United Kingdom and expanding to Australia it is conducted under the umbrella of Clinical Trials Network Australia & New Zealand (CTANZ) of the Royal Australasian College of Surgeons (RACS) established to support trainee collaboratives. VERITAS is the Victorian trainee collaborative and state leader for the study based at the Austin precinct. The trial is supported by an MRFF grant (\$782,000.00) demonstrating the overarching power of trainee collaborative led clinical research.



## Cochlear Implant research wins Politzer Prize

Dr Stefan Weder, international research fellow at the Department, was awarded a gold medal Politzer Prize for 'Best paper in Clinical Science' at the 2019 World Congress in Otolaryngology in Warsaw, Poland.

His winning research on cochlear implants was titled, 'Towards a Better Understanding of Electrocochleography: Analysis of Real-time Recordings'. The Politzer Society is The International Society for Otolaryngology and Science and focuses on the latest research developments in otology and neurotology.



## Supporting communities in Tonga

A team from DoS's Otolaryngology went to Tonga to assess hearing loss and ear disease in school-aged children. This was in support of our Masters of Surgery candidate, Sepi Loparti, one of Tonga's 2 ENT surgeons who is supported by the Australian Government to study at Melbourne.



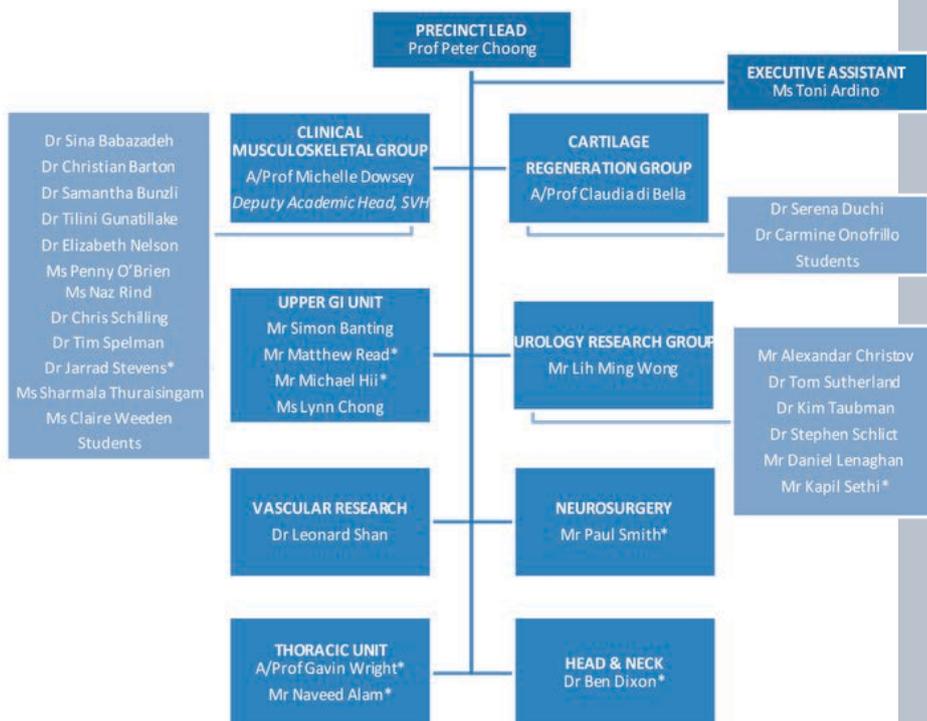
# ST VINCENT'S HOSPITAL MELBOURNE

## ABOUT US

St Vincent's Hospital, Melbourne has research affiliations with The University of Melbourne, St Vincent's Institute, O'Brien Institute and Bionics Institute. St Vincent's Hospital is linked closely with all vocational training programs and provides a strong culture of learning and support for trainees. Training is conducted at multiple sites including St Vincent's Public Hospital, St Vincent's Private Hospital, St George's Hospital (Kew) – 3rd year program, Peter MacCallum and Royal Victoria Eye and Ear Hospital.

The research at St Vincent's Hospital, addresses a spectrum of conditions including degeneration, tumour, trauma and infection, and is divided into clinical, tissue engineering, bioengineering, and robotics streams.

## ORGANISATION



**293**  
PUBLICATIONS

**27**  
SUCCESSFUL GRANTS

**5**  
FELLOWSHIPS

**14**  
RESEARCH STAFF

**\$1,636,598**  
TOTAL GRANT FUNDING

## KEY STAFF

- Prof Peter Choong  
*(Precinct Lead)*
- Ms Toni Ardino  
*Executive Assistant*
- Ms Cheryl Augustine
- Dr Sina Babzadeh
- Dr Christian Barton
- Dr Samantha Bunzli
- A/Prof Claudia di Bella
- A/Prof Michelle Dowsey
- Dr Serena Duchi
- Dr Tilini Gunatillake
- Dr Michelle Lam
- Dr Elizabeth Nelson
- Ms Penny O'Brien
- Dr Carmine Onofrillo
- Ms Veronique Price
- Ms Naz Rind
- Dr Chris Schilling
- Dr Timothy Spelman
- Ms Sharmala Thuraisingam
- Ms Claire Weeden
- Dr Lih-Ming Wong

*\*Honorary staff*

# DEPARTMENT OF SURGERY SVHM

## MUSCULOSKELETAL RESEARCH

Our approach to new discoveries is to apply a multidisciplinary research framework engaging orthopaedic surgeons, clinicians, biomedical engineers and basic biologists to address problems such as:

- Development and progression of cancer as typified by primary and secondary cancers of bone, breast, prostate and lung;
- Disease progression and drug interventions in musculoskeletal tissues;
- Repair of bone and joint defects using tissue engineering and regenerative technology;
- Clinical assessment of outcomes following joint replacement surgery and the prognostic indicators and determinants of outcome;
- Evaluation of risk and progression of musculoskeletal conditions affecting lower and upper body joints, using innovative motion sensors and custom developed software.



## Axcelda<sup>®</sup> COMMERCIALISING THERAPIES

The Department of Surgery partnered with the University of Wollongong and Swinburne University to create an industrial partnership named Axcelda. Axcelda aims to develop commercial products that will allow orthopaedic surgeons and patients to benefit from the therapeutic strategies for cartilage repair.

Amongst their stable of innovations is the *AxceldaPen* (TM), a 3D printer pen filled with stem cell *AxceldaInk* (TM) to 'draw' new cells into damaged knees (prototype in action on bottom left), opening up a world of possibilities for human body part replacements. The breakthrough technology paves the way for the Melbourne-led team eventually to repair damage to bones, muscles and tendons, and even to tissue in organs such as the heart, the liver, and the lungs. The *AxceldaPen* (TM) was developed at the BioFab3D, a dedicated 3D bioprinting facility for medical application.

For more information, visit: [www.axcelda.com](http://www.axcelda.com).

# DEPARTMENT OF SURGERY SVHM

## ADVANCED LIMB RECONSTRUCTION

### CARTILAGE REGENERATION

The Cartilage Regeneration team (*right*), led by orthopaedic surgeon A/Prof Claudia di Bella, sits within the Advanced Limb Reconstruction Program and consists of a multidisciplinary team that focuses on bioprinting strategies for the regeneration of articular cartilage.

Using the latest in cutting-edge technology, the team is developing an implantable adhesive material containing stem cells, stimulating factors and structural support (a 'scaffold') to repair injuries and regenerate the tissue. Essentially, an 'ink' that is compatible for use in the *AxceldaPen* (TM).



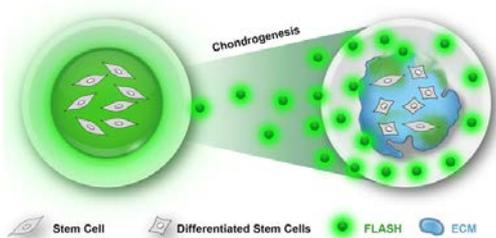
### BUILDING 3D BIOSCAFFOLDS

A/Prof di Bella has also received a Clinical Investigator Award from the prestigious Sylvia and Charles Viertel Charitable Foundation to develop a novel material that facilitates cartilage growth in collaboration with Prof Simon Moulton (Swinburne University). The project aims to create a functionalised material that efficiently delivers nutrients to cells within scaffolds, for subsequent cartilage formation (*right*).

Simultaneously, a recent collaboration with the University of Exeter (UK), will focus on developing an arthroscopic nonlinear microscopy device to measure cartilage repair in patients after the implantation of stem cells-based bioscaffolds.



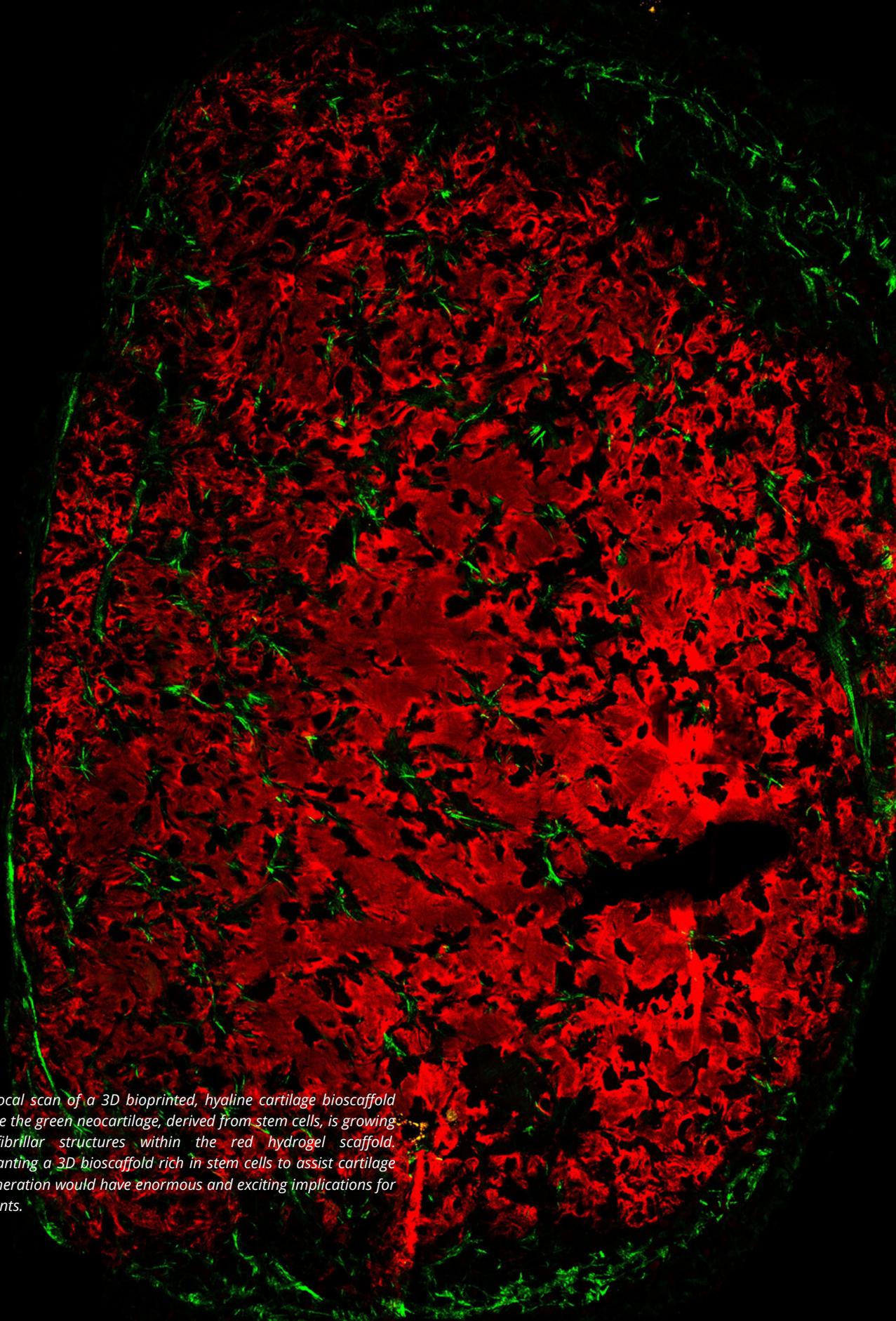
Onofrillo C et al., 2020. *Biomaterials*, In Press.  
<https://doi.org/10.1016/j.biomaterials.2020.120383>



### TRIDIMENSIONAL MODELS FOR OSTEOSARCOMA

Leveraging the technology created from the Advanced Limb Reconstruction Program, the team is now developing a new drug screening tool that will provide precise, predictable and personalised treatment options for sarcoma patients.

The project aims to develop a 3D printable system to characterise patient-specific tumour development and its response to drugs in a three-dimensional environment that mimics the bone tissue.



*Confocal scan of a 3D bioprinted, hyaline cartilage bioscaffold where the green neocartilage, derived from stem cells, is growing as fibrillar structures within the red hydrogel scaffold. Implanting a 3D bioscaffold rich in stem cells to assist cartilage regeneration would have enormous and exciting implications for patients.*

# DEPARTMENT OF SURGERY SVHM

## UROLOGY RESEARCH GROUP

### DIAGNOSING AND LOCATING PROSTATE CANCER

Led by Mr Lih-Ming Wong

Multiparametric MRIs (mpMRI) of the prostate prior to biopsy is now standard of care due to the strong evidence indicating its excellent sensitivity to detect clinically significant prostate cancer. mpMRI utilises differences in tissue density and vascularity to differentiate between cancerous and normal tissue.

18F-PSMA-PET/CT uses a tracer to target an overexpressed protein on prostate cancer cells with far less interference from inflammation. There is mounting evidence showing that PSMA-PET/CT can better detect small amounts of prostate cancer that has escaped the prostate, over pre-existing traditional imaging techniques.

This study assesses the effectiveness of mpMRI and PSMA-PET/CT, separately and in combination, to revolutionise the detection of clinically significant prostate cancer. It is possible that PSMA-PET/CT may be superior to mpMRI and supplant its diagnostic role, in which case, PSMA-PET/CT may be so accurate to enable clinicians to do away with prostate biopsies completely.

For men who are unable to have mpMRI, PSMA-PET/CT may be a viable alternative. For those who have anxiety provoking PSA levels and positive mpMRI scans, but present negative prostate biopsies, PSMA-PET/CT may provide some reassurance for patients and clinicians alike.

This study is supported by the Epworth Medical Foundation, Cyclotek and General Electric with participants from St Vincent's Health Melbourne, Melbourne Health, Epworth Health, Pacific Radiology Christchurch New Zealand and Sydney Adventist Hospital, Northshore (scheduled for 2021).

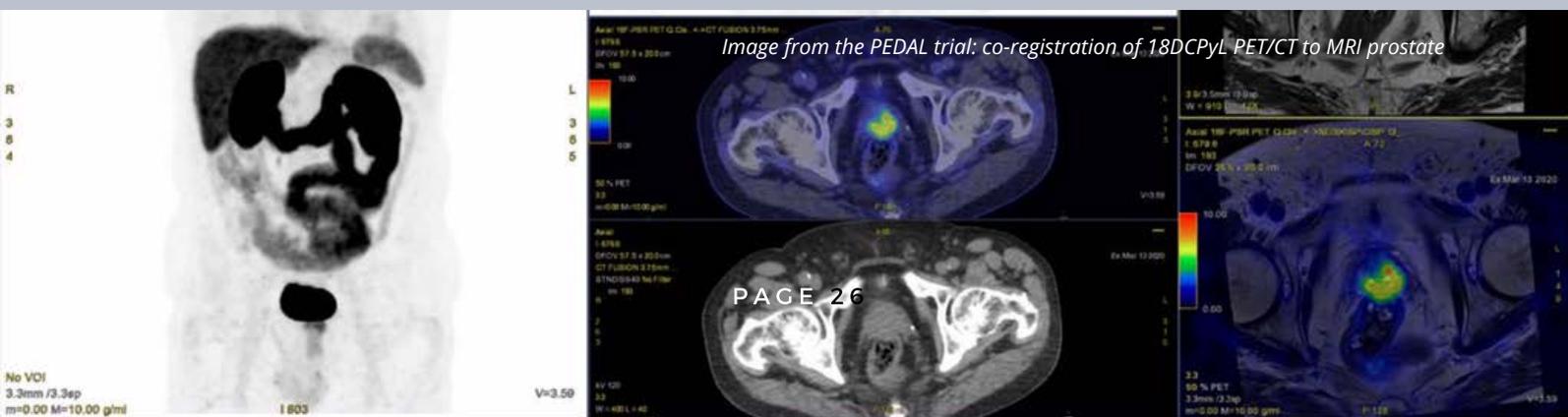
### POSITIVE mpMRI BUT NEGATIVE BIOPSY: WHAT'S NEXT?

For a group of men who indicate an abnormal Magnetic Resonance Imaging (MRI) of their prostate, this would normally suggest the presence of cancer. Contradicting this is a prostate biopsy that does not demonstrate prostate cancer. The discord between imaging and biopsy result produces a conundrum for clinicians and patients.

*Was the MRI wrong in describing cancer when it isn't there, or did the biopsy not take a sample from the correct location?*

This study explores this issue by using PSMA-PET/CT to image the prostate. If the PSMA-PET/CT imaging concurs with the MRI abnormality, the patient can then proceed to a MRI-guided biopsy.

With support from a St Vincent's Research Endowment Fund, the study is being conducted across St Vincent's Health Melbourne, Melbourne Health and Austin Health.



# DEPARTMENT OF SURGERY SVHM



## SUREFLO2 FLOW INDICATOR OXYGEN MASK

Specialist anaesthetist Dr Matthew Matusik and neurosurgeon Mr Paul Smith have reinvented the oxygen mask to ensure better outcomes for patients, carers and healthcare workers.

Sureflo2 is a dynamic gas flow indicator for supplemental oxygen therapy featuring an orange indicator which allows healthcare workers to see that oxygen is actually flowing. Ensuring an oxygen supply to patients is critical, but mechanical and human errors can occur, resulting in poorer patient outcomes. Healthcare workers are also at higher risk of transmission of infectious diseases when working with outdated masks.

In March 2020, the Sureflo2 Flow Indicator Oxygen Mask received CE certification and TGA approval a month later. The mask is now being used across the St. Vincent's Hospital network and has been featured in the media at the time of its release in May 2020. The masks are manufactured in Melbourne and won two Good Designs Awards – *Gold Winner* and *Best in Class*.

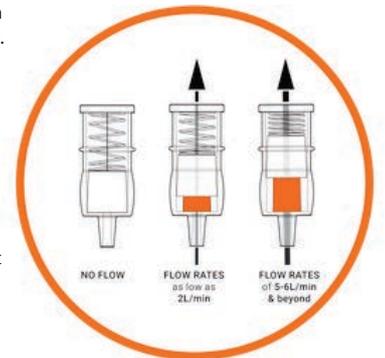
For more information, visit: <https://www.sureflo2.com/>



Paul Smith and Matthew Matusik



- 1 Connect mask to oxygen source and activate flow. (Standard 6L/min to approx FIO2)
- 2 Confirm flow by visualising orange indicator within the Sureflo2 mask.
- 3 If orange indicator is not visible, check system for interruption or source for gas exhaustion.
- 4 Fit mask to patient's face until secure and comfortable



# DEPARTMENT OF SURGERY SVHM

## PROM OF VASCULAR SURGERY

Vascular consultant surgeon Mr Leonard Shan and his team has been investigating patient-reported outcomes and quality of life of patients undergoing cardiovascular interventions. Patient Reported Outcome Measures (PROM) are critical to outcomes assessment because they help provide a complete picture of postoperative outcomes. This promotes a patient-centered model of care and improves the quality and safety of vascular surgery.

However, there is a paucity of PROM data in vascular surgery and lack of consensus on how to incorporate PROM into clinical practice. The lack of PROM data has also limited current economic evaluations of vascular procedures because they have not factored in the patient's experience. Increasing vascular patient numbers necessitates more accurate economic evaluation to preserve the long-term viability of vascular surgical services.

Leonard will be undertaking a PhD with Professor Peter Choong and Mr Mark Westcott in 2021 to assess whether PROM in vascular surgery are necessary to make treatment decisions which are in the patient's best interest and allocate healthcare resources effectively.

## ACADEMY OF SURGEONS

Under the Department of Surgery, St Vincent's Hospital Melbourne is working to establish an Academy of Surgeons. Led by Mr Lih-Ming Wong and Mr Michael Hii, this program aims to foster an environment of surgical fellowship, education and mentorship for aspiring young surgeons. Surgeons interested in education, research, and/or mentoring are appointed to honorary academic positions within the Department to represent each surgical speciality.

Support from the Department will ensure provision of administration and governance support, networking opportunities, funding for events and academic mentorship from senior members. The Academy will host career nights for interns and residents, small group mentoring sessions, clinical school lectures and exam assistance. By supporting the existing activities of the St Vincent's Surgical Student Society and Surgical Resident Society, this program will facilitate near-peer mentoring between consultants, registrars, residents and medical students.

Engaging our surgical community with more opportunities for networking, mentoring and professional development is a vital step towards a more resilient and progressive environment at St. Vincent's.

Medical Centre  
CMMI  
55 Victoria Parade



Through to Main Hospital

Emergency



# DEPARTMENT OF SURGERY SVHM

## UPPER GASTROINTESTINAL UNIT

The Upper GI Research Group are a multidisciplinary team working on numerous projects at any one time using the latest technology and methodologies:

### 1. Preventing complications with AI

Laparoscopic cholecystectomy is one of the most commonly performed surgical procedures worldwide. This procedure carries a small, but significant risk of mortality and morbidity from bile duct injuries during the procedure. In collaboration with machine learning experts from the University of Melbourne, Professor James Bailey and Dr Katherine Davey, this project will use predictive algorithms to reduce the rate of bile duct injury through better identification of critical anatomical structures and the development of a training tool for post-surgery analysis.

### 2. Predictive biomarkers for oesophageal adenocarcinoma

In collaboration with Professor Tim Underwood of The University of Southampton, the team is designing and aiming to deliver a bespoke panel of biomarkers to predict a response to neoadjuvant treatment options in oesophageal adenocarcinoma. If successful, this may improve outcomes for non-responders to current neoadjuvant treatments by allowing them to proceed straight to surgery, avoiding the morbidity and mortality risks of chemotherapy/chemoradiotherapy.

### 3. High intensity interval training for patients undergoing major foregut cancer surgery (HIIT Cancer RCT)

This study investigates the effect of an in-hospital High Intensity Interval Training (HIIT) program in Upper Gastrointestinal (UGI) and Hepatobiliary (HPB) patients undergoing major foregut cancer surgery in a randomised controlled trial (RCT).

In-hospital exercise intervention is a novel concept and the HIIT protocol was selected because of its potential to maximise cardiorespiratory fitness improvements effectively in a short period of time. We hypothesise that HIIT prescribed in immediate post-operative period is safe and will not only minimise the decline of patient's physiological function but improve their quality of life (QoL) and perceived impression of recovery as well.

### 4. The impact of sarcopenia following surgical treatment for oesophagogastric cancers

Patients with oesophagogastric cancers tend to undergo body composition changes and develop sarcopenia (fat-free mass loss). Sarcopenia may have implications for treatment, outcomes and overall survival, and existing sarcopenia may worsen from cancer and/or surgical treatment.

This study is designed to characterise short and long-term body composition changes following neoadjuvant chemo or radiotherapy alone or in combination with surgical intervention for upper gastrointestinal (UGI) cancers. It will allow us to assess the impact of sarcopenia on outcomes and provide pilot information of when to start intervention to prevent/reverse sarcopenia.

We wish to determine if DXA imaging is an effective or more accurate tool of body composition measurement, which will have significant prognostic implications for UGI cancer patients receiving UGI medical and/or cancer surgical treatments.

### 5. Body composition after weight loss surgery

Bariatric surgery results in significant weight loss over a long period of time, with a large proportion of the weight lost contributed by fat mass in the initial post-operative period. However, a small but significant loss of bone density following bariatric surgery has been reported, though no detrimental health problems have been noted. Several bariatric surgeons recommend patients to undergo a very low calorie diet prior to surgery in order to enhance weight loss results post-surgery. Yet only sparse evidence exists to support the value of a strict diet plan in order to modify body composition prior to surgery.

This study evaluates patients' body mass composition with DXA (dual-energy X-ray absorptiometry) imaging pre-operatively, and post-operatively at 6 monthly time intervals. Results from the study will determine the most efficacious procedure, as well as identifying and quantifying the patients' risk of regain in fat mass, loss of bone mineral density or sarcopenia.

### 6. Akynzeo® (Netupitant/Palonosetron) vs standard postoperative options: which one is better?

Postoperative nausea and vomiting (PONV) are common in the setting of weight loss surgery and can be detrimental to patient recovery. Combination antiemetic (anti-nausea) strategies have been shown to be more effective than single therapy to target the high incidence of PONV after keyhole surgery. The proposed randomised controlled trial will evaluate the efficacy of Akynzeo® (netupitant/ palonosetron) to prevent PONV in patients with morbid obesity following weight loss surgery at St Vincent's Private Hospital.

# DEPARTMENT OF SURGERY SVHM

## UPPER GASTROINTESTINAL UNIT

### 7. Do synbiotics reduce post-operative infections in foregut surgery?

Surgeries of the foregut are often associated with a high incidence of postoperative infections and patients with hepatobiliary or upper gastro-intestinal cancers have preoperative dysbiosis. This patient cohort could benefit significantly from interventions aimed at improving their microbiota and clinical outcomes.

Perioperative administration of synbiotics (a combination of probiotics and prebiotics) has been associated with a relative risk reduction in postoperative infectious complications of 50% for patients undergoing general surgery. A randomised, placebo-controlled, double-blinded trial will be conducted to assess the effectiveness of perioperative synbiotic administration on reducing postoperative infections in major foregut surgery patients.

### Other studies in this research unit include:

- Exploring the role of cardiopulmonary exercise testing as a risk stratification tool for patients undergoing oesophagectomy
- Pathophysiology of gastroesophageal reflux, Barrett's oesophagus and oesophagogastric cancer
- Developing a standardised operative technique program for robotic assisted minimally invasive oesophagectomy

The SVHM team is the second Australian UGI surgical unit to be accepted into Esodata, the international dataset from which the oesophageal Tumor-Node Metastasis (TNM) staging system is established. The team has also been recognised by OESO & Stanford University as an international centre of excellence in the treatment of oesophageal disease.



# DEPARTMENT OF SURGERY SVHM

IMPROVING CLINICAL OUTCOMES



OPUS is a NHMRC Centre for Research Excellence in Total Joint Replacement with a vision to improve the evidence-based treatment of patients with severe osteoarthritis. Taking full advantage of the unique multidisciplinary collaboration of surgeons, health economists, statisticians, general practitioners and physiotherapists, OPUS is working towards its mission by focusing on five streams that have been designed to improve and streamline the OA journey.

This is a more personalised approach to produce better patient outcomes rather than a 'one size fits all' management program for all people with OA.

## Q STREAM ONE

DEVELOPING A TOOL TO IDENTIFY THE MOST APPROPRIATE OA PATIENTS FOR TJR.  
Which patients would benefit the most from surgery and who will not?

## ▮ STREAM TWO

IDENTIFYING PATIENT AND SURGEON PERCEPTIONS OF RISK AND DECISION-MAKING.  
How can we align patient expectations with patient satisfaction?

## 👤 STREAM THREE

DEVELOPING NON-SURGICAL ALTERNATIVES FOR OA PATIENTS.  
What are the most effective alternatives for patients?

## 📍 STREAM FOUR

REDESIGNING A RECOVERY PROGRAM FOR TJR.  
Can we reduce readmissions, complications and length of stay? Can we accelerate recovery while satisfying patient safety and meeting expectations?

## 💰 STREAM FIVE

IDENTIFYING COST EFFICIENCIES AND ELIMINATING WASTE IN THE OA JOURNEY.  
Will our interventions cut costs to give meaningful policy changes?

## ABORIGINAL & TORRES STRAIT ISLANDER HEALTH

Osteoarthritis is a leading cause of inactivity and commonly co-exists with other chronic conditions that disproportionately affect Aboriginal and Torres Strait Islander Peoples (hereinafter referred to as Aboriginal Australians). Aboriginal Australians are more likely to experience osteoarthritis than non-Aboriginal Australians but seek care at less than half the expected rate. To address this mismatch, ECCO was formed to engage Aboriginal voices to understand and meet the needs of Aboriginal Australians with osteoarthritis.

To learn more about OPUS and ECCO, visit: <https://opus-tjr.org.au/>



# DEPARTMENT OF SURGERY SVHM

IMPROVING CLINICAL OUTCOMES

## TACKLING OPIOID OVERUSE

The Consortium Against the overuse of Opioids in Surgery (CAOS) was established in August 2019, with the sole aim of reducing the harms associated with opioid use among surgical patients.

The founding of the consortium was led by OPUS leads Professor Peter Choong and Associate Professor Michelle Dowsey. By drawing on the expertise, access to data resources and local networks of each of its core members, CAOS aims to inform opioid prescribing policy and improve clinical practice. Early work has seen several publications from Consortium members issuing a call to action and joint seed funding from the Departments of Surgery and Population & Global Health to build this new research program.

*To find out more on CAOS activities and the latest research news, visit: [www.opioid-caos.org](http://www.opioid-caos.org).*

## OPUS FORUM

The OPUS Forum is a biennial symposium that brings together musculoskeletal researchers, health practitioners and research students to share, learn and advance osteoarthritis research.

The inaugural OPUS Forum in 2019 was an opportunity to lay the groundwork for OPUS to tackle the redesign of OA management.

2021 will once again bring the extensive musculoskeletal research community together both virtually and in-person to consolidate and evaluate the progress made while showcasing the latest research from upcoming talents.

*For details on the upcoming Forum, visit: <https://opus-tjr.org.au/forum-2021>*

## CONSUMER AND COMMUNITY INVOLVEMENT

Consumer and community involvement remains a challenging element of medical research for a number of reasons. The toughest barrier is the resources required for such an undertaking.

OPUS has overcome these challenges to establish a formalised Consumer and Community Involvement Program that works directly with the community to complement the research conducted at OPUS.

Meaningful engagement begins by working with consumer participants from project conception to completion and results dissemination. We engage with our consumer base at different levels of research involvement, provide formalised training for participants and a support network so participants aren't siloed. The returns are invaluable as consumers:

- Advocate for the interests of consumers
- Present consumer views, values and concerns
- Provide balance to discussions
- Ensure the research team considers consumer consultation wherever appropriate throughout research development

The consumer experience at OPUS is punctuated with events such as the Student Orthopaedic Research Showcase and the biennial OPUS Forum where our consumers and the wider community are invited to attend, present, learn about the latest research, discuss our research impact, network with peers and researchers and advocate for consumer involvement.

*For more information on the CCIP, visit: <https://opus-tjr.org.au/programs/ccip>*

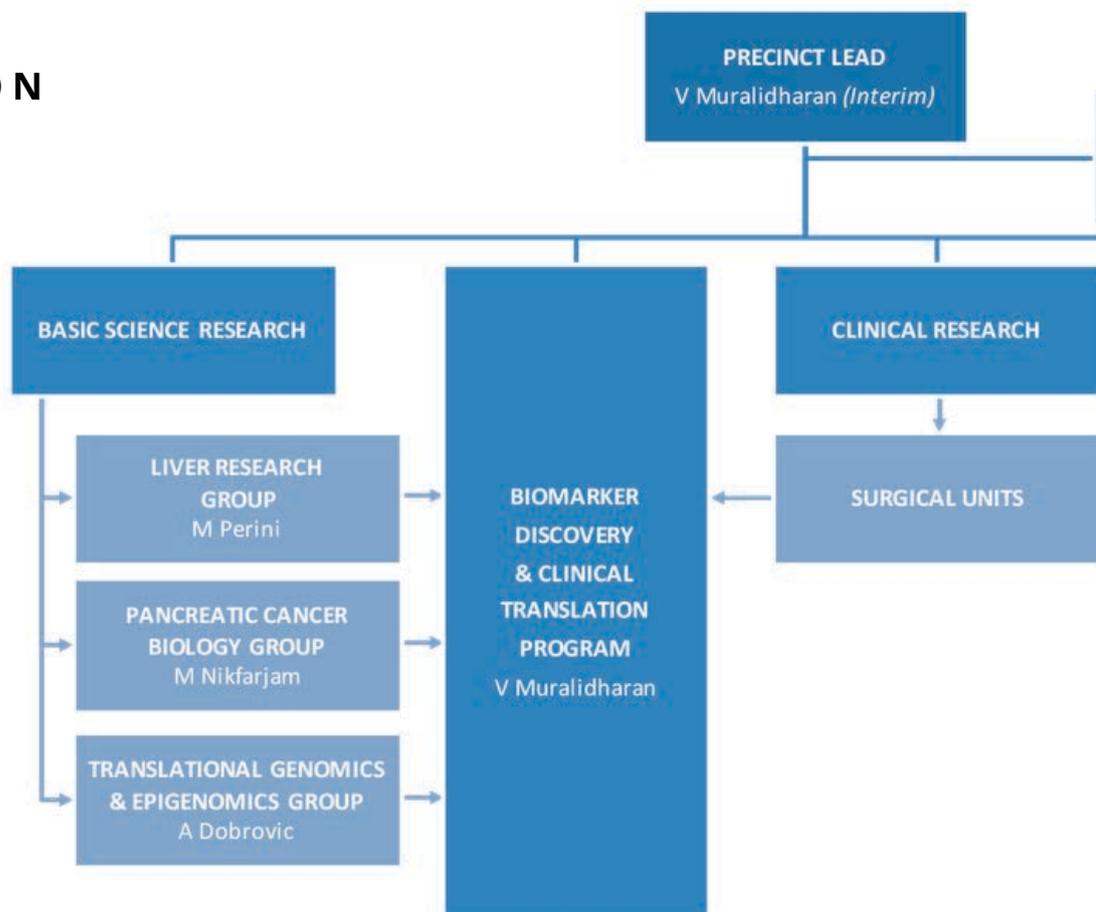


# AUSTIN HEALTH

## ABOUT US

The Austin precinct of the Department of Surgery has broad expertise in research from the basic sciences through translational genomics and clinical research. Our major focus is to improve the early detection, surveillance and treatment of a wide variety of cancers and in developing our understanding of the molecular mechanisms behind them. We have built an international reputation for research into hepatobiliary and pancreatic malignancies, liver transplantation and ischaemia reperfusion in renal surgery. Our research portfolio is now evolving to include research groups from all surgical specialties. The Austin Precinct is ably supported by exceptional clinical research emanating from leading clinical research groups in intensive care, anaesthesia, emergency, radiology and a large number of specialty surgical units.

## ORGANISATION



## EDUCATION & TRAINING

Surgical education is one of the cornerstones of the departmental philosophy. Austin precinct hosts the largest General Surgery training hub in Victoria along with other sub-specialties. This opens up vast research opportunities for students and trainees. Austin precinct is the birthplace of Master of Surgical Education and is home to a surgical education group driving educational research.

The Austin precinct is a national leader in the development of surgical trainee organisations; these groups not only give trainees some agency in shaping their training, but also enable them to develop some of the non-technical competencies that will be vital in their careers as future surgeons. The development of a trainee association (Austin Northern Surgical Trainee Association – ANSA), a junior doctors surgical-interest group (ASPIRE) and a successful trainee-led research collaborative (VERITAS) are examples of empowering students and trainees.

 **272**

PUBLICATIONS

 **10**

SUCCESSFUL GRANTS

 **1**

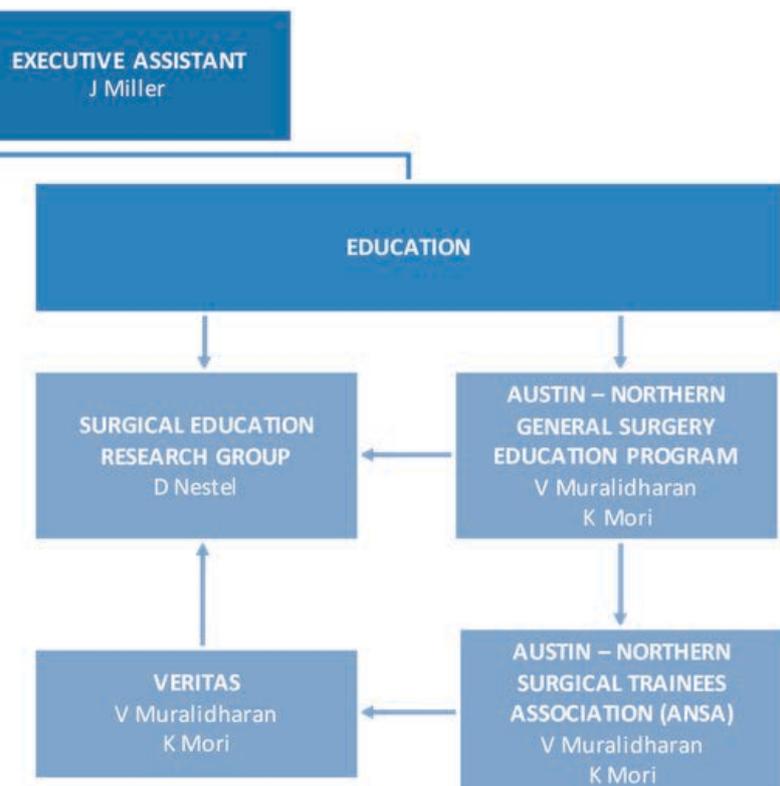
FELLOWSHIPS

 **18**

RESEARCH STAFF

 TOTAL GRANT FUNDING

**\$1,072,151**



### KEY STAFF

A/Prof Vijayaragavan Muralidharan  
*(Precinct Lead, Interim)*

Ms Julie Miller  
*(Executive Assistant)*

- Dr Jianguo An
- Mr Zi Qing Chai
- Prof Christopher Christophi
- A/Prof Alex Dobrovic
- Ms Chelsea Dumesny
- Dr Theodora Fifis
- Mr Michael Fink
- Dr Hong He
- Prof Robert Jones
- Prof Debra Nestel
- A/Prof Mehrdad Nikfarjam
- Dr Oneel Patel
- A/Prof Marcos Perini
- Dr Katrina Walsh
- Dr Yang Yang
- Mr Fan Zhang

# DEPARTMENT OF SURGERY AUSTIN HEALTH

## BIOMARKER DISCOVERY & CLINICAL TRANSLATION PROGRAM



*Led by A/Prof Vijayaragavan  
Muralidharan*

Patient-centered individualised therapies using cost effective diagnostic techniques is the strategic focus of this program. The program was established to empower collaboration between scientists, geneticists, clinicians, allied health, computer scientists and health economists with the aim of developing truly individualised therapeutic streams in the diagnosis, management and surveillance of various disease processes.

Early collaboration between liver surgeons, transplant physicians and computational scientists under Prof James Bailey in the Department of Engineering demonstrated the use of machine learning algorithms to be far superior to the clinical scores used to predict outcomes of donor organs in liver transplantation.

Another success by liver surgeons and nuclear medicine physicians demonstrated the superiority of FDG-PET response to systemic therapy in predicting long term outcomes after surgery for colorectal liver metastases.

The foundation of the program is based on collaborative work by clinicians in the HPB & Transplant Surgery Unit, Department of Gastroenterology and Hepatology and the Transgenomics & Epigenomics Laboratory (TGEG).

The initial direction was within the realms of liver transplantation leading to the development of circulating cell free DNA assays that appear to detect acute rejection after liver transplantation earlier than changes in liver biochemistry. Current focus on the use of organ specific methylation patterns of DNA and the ability to measure mitochondrial DNA will enable widening of the horizons of clinical applications and support all surgical specialties.

The program provides the over arching structure that links the research groups within the Precinct including the translational groups (LiReg, PCBRG, TGEG) as well as educational (SERG) and trainee collaboratives (VERITAS).

# DEPARTMENT OF SURGERY AUSTIN HEALTH

## LIVER RESEARCH GROUP (LIREG)



*Led by A/Prof Marcos Perini*

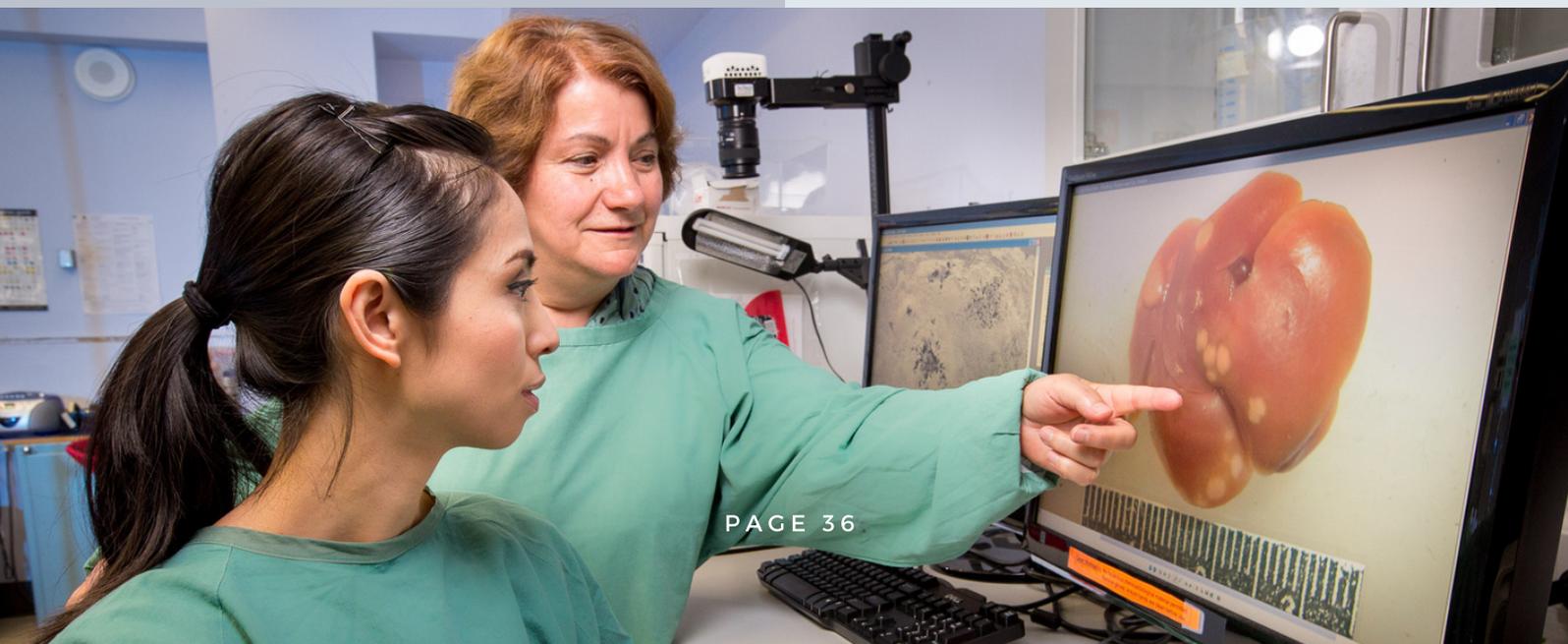
The liver is the largest solid organ in the body and is unique in its ability to regenerate almost indefinitely. Malignancies in the liver may be primary liver cancer or secondary spread from other primaries, particularly colorectal cancer. Combined, these represents one of the most common malignant disease processes around the world.

A potential cure may be possible by a combination of surgical resection, systemic therapy, loco-regional therapies and immunotherapies. Combined with the ability of the liver to regenerate this provides numerous treatment options and combinations. The main clinical dilemma is to achieve systemic control and remove residual tumour from the liver while preserving or regenerating adequate liver reserve for survival.

There is a complex relationship between cancer biology (tumour growth), normal physiology (liver regeneration) and the impact of systemic therapy on both. These are orchestrated by intricate interactions between cytokines release, growth factors and immune cell infiltration.

The major research direction is aimed at understanding cellular signalling pathways of carcinogenesis and liver regeneration towards translational application in the clinical setting. Specific areas of research include the interaction between the tumour and the normal liver cells (hepatocytes, immune cells, vessels and lymphatics), the capacity for liver regeneration in different clinical scenarios (post resection, new drugs) and the use of patient-derived liver cancer cell organoids as an ex-vivo model for studying tumour-immune responses, efficacy of novel therapeutics, genotyping and testing.

The group has national recognition for their expertise in murine models of liver tumours and novel translational models including patient derived organoids (next page).



# DEPARTMENT OF SURGERY AUSTIN HEALTH

## PANCREATIC CANCER BIOLOGY RESEARCH GROUP (PCBRG)



*Led by A/Prof Mehrdad Nikfarjam*

The Pancreatic cancer biology research group is focused on world class research into pancreatic ductal adenocarcinoma, with a particular interest in the identification of novel methods to improve treatment response, overcome resistance to chemotherapy and positively impact on survival. An array of research projects utilises various animal models of pancreatic cancer to replicate the disease in humans, an essential step prior to clinical translation.

This unique team consist of surgeons, clinicians and researchers collaborating at both national and international levels. The research team lead by A/Prof Nikfarjam, a HPB surgeon and Dr Hong He, a senior research fellow with over 20 years of experience in cancer biology, molecular mechanisms and signalling in targeted therapy in cancer research.

The group's main interests include identifying key molecules responsible for the initiation, growth and metastasis of pancreatic cancer. In addition, the group develops and tests new chemical compounds in cancer cell lines and pancreatic cancer models to develop novel therapies.

The current research focuses on several themes. These included targeting P-21 activated kinase, the effect of arsenic, the role of chemokines and the therapeutic effect of cannabis on pancreatic cancer. Another focus is in identifying biomarkers relating to pancreatic cancer.

Members of the group are recognised for their participation in national pancreatic cancer trials, work closely with pharmaceutical companies on drug development and develop initiatives for early detection of pancreatic cancer. This places them in an excellent position to support rapid clinical translation. The group collaborates with numerous groups to further the understanding of the biology of pancreatic cancer and to improve treatment outcomes.

The research group had nine peer reviewed publications, one International presentation and a press release in the 2019/2020 financial year. The group is funded by research grants from University of Melbourne, Early Seeding Grant, Pancare Foundation, Austin Medical Research Fund and Tour De Cure.



# DEPARTMENT OF SURGERY AUSTIN HEALTH

## SURGICAL EDUCATION RESEARCH GROUP (SERG)



Led by Prof Debra Nestel

The SERG has grown from the success of the Graduate Programs in Surgical Education, a co-badged degree between the Department of Surgery and the Royal Australasian College of Surgeons. We have had over 40 graduates at Masters' level with at least half the graduates taking a research path. Internationally, this positions the SERG's leadership role in developing and researching innovative approaches to surgical education and training. The focus of research includes deepening understanding of intra-operative learning, of widening access to surgical training, of exploring under-performance and its management.

A feature of the SERG is its critical examination of what most members of the Department do as part of their daily practice – surgical education, so it is woven into everything we do. Already during COVID-19 we've proven we can work effectively and exclusively online. Our research cohort now comprises ten students all of whom will undertake work that proceeds to publication and more importantly continues to transform surgical education practice ensuring quality and safety for all. The SERG also works closely with the research group in Department of Medical Education.

The SERG lead, Professor Debra Nestel was recently appointed Editor-in-Chief of BMJ STEL, an international journal publishing research on the simulation and technology-enhanced learning in the health professions and services.

Students from SERG have featured heavily in the Academy of Surgical Educators studio sessions:

- *First steps into the operating theatre – a qualitative study of learning in the operating theatre from the perspective of the novice*, Dr Vivian Yu, FRACS
- *Remediation of surgical trainees*, Dr Henry To
- *The struggling urology trainee: A qualitative study into the underperformance of trainees*, Dr Kathryn McLeod
- *Evaluation of SEAM in general surgery: Opinions on an e-learning curriculum*, Dr Rhiannon Boussonis

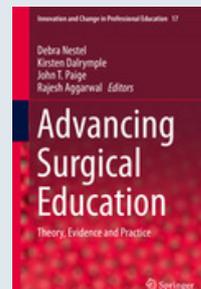
### TOP PUBLICATIONS

#### ***Why do women leave surgical training? A qualitative and feminist study***

The Lancet published Dr Rhea Liang's thesis work on women's experiences of surgical training focusing on their reasons for leaving. A qualitative study through a feminist lens, the work has already led to structural changes in surgical training with benefits not just for women but all surgical trainees. Dr Liang continues her studies exploring diversity and inclusion in surgical training and practice this time through a broader lens of intersectionality.

Liang, R., Dornan, T., & Nestel, D. (2019). Why do women leave surgical training? A qualitative and feminist study. *The Lancet*, 393, 541-549.

#### ***Advancing Surgical Education - Theory, Evidence and Practice***



Several members of the SERG have disseminated their research and other scholarship in an edited book on surgical education. Examples of the works include Prof John Collins on selection into surgical education and training, Dr David Bartle on cognitive neuroscience and design of surgical education, Prof Adrian Anthony and A/Prof Vijayaragavan Muralidharan with a status report on contemporary surgical education and A/Prof Stephen Tobin on entrustable professional activities. Nestel, D., Dalrymple, K., Paige, J., & Aggarwal, R. (Eds.) (2019). *Advancing Surgical Education - Theory, Evidence and Practice*. Singapore: Springer Science+Business Media.

# DEPARTMENT OF SURGERY AUSTIN HEALTH

## TRANSLATIONAL GENOMICS & EPIGENOMICS LABORATORY (TGEG)



Led by A/Prof Alex Dobrovic

Translational genomics refers to the use of genetic and genomic techniques to enable personalised medicine. The group has an international reputation in droplet digital PCR and utilise the transformative power of new technologies to generate new research opportunities.

The TGEG are an Australian leader in developing and utilising methodologies as judged by both by publications and by translation of research into practice.

Translating research into practice is also facilitated by the accreditation of our laboratory for genetic testing (NATA/RCPA). The group demonstrates enormous creativity to research that is highly focused on clinical relevance supported by partnership with clinical colleagues who benefit from the groups' scientific and methodological leadership. The close relationship of key clinicians further enables research to be translated into better treatment and care.

A key application is sequential monitoring to allow patients to be managed with a more nuanced approach.

The principal expertise is in the frontier areas of circulating DNA and DNA methylation, in particular:

1. DNA methylation for predictive biomarkers and as a toolbox of genetic markers
  2. Circulating free DNA for diagnostics and monitoring in cancer and organ transplantation
- These areas synergise as developing DNA methylation markers for circulating DNA is becoming the principal area of the labs' research. The overall aim is to enable the clinical utilisation of this expertise in organ transplantation and cancer.

TGEG is currently funded by a five-year NHMRC grant and a three-year NBCF grant in breast cancer. The lab is also funded on a per test basis by the Austin Hospital New Technologies, Clinical Practice & Innovation Committee, for real-time monitoring of the treatment of lung cancer and melanoma using mutation detection methodology.

### TOP PUBLICATIONS

#### ***Personalised immunosuppression after transplantation***

This project uses donor-specific circulating DNA to monitor graft rejection in liver transplant recipients with four key publications related to this methodology in high impact journals to date (Goh et al. 2016, 2017, 2018, 2019). Our next step is to test DNA methylation markers specific for the liver as an alternative to the donor-specific DNA markers that I have been using up to now. This has the potential to revolutionize organ transplant management with a simple readily performed digital PCR assay. We are also assessing mitochondrial DNA as a marker of tissue damage.

Goh SK, Do H, Testro A, Pavlovic J, Vago A, Lokan J, Jones RM, Christophi C, Dobrovic A, Muralidharan V. (2019) The Measurement of Donor-Specific Cell-Free DNA Identifies Recipients With Biopsy-Proven Acute Rejection Requiring Treatment After Liver Transplantation. *Transplant Direct*. 21;5(7):e462.

AUSTIN HEALTH



*The Pancreatic Cancer Biology Research Group (PCBRG) led by A/Prof Mehrdad Nikfarjam*



*Translational Genomics & Epigenomics Laboratory led by A/Prof Alex Dobrovic*



*Surgical Education Research Group led by Prof Debra Nestel*

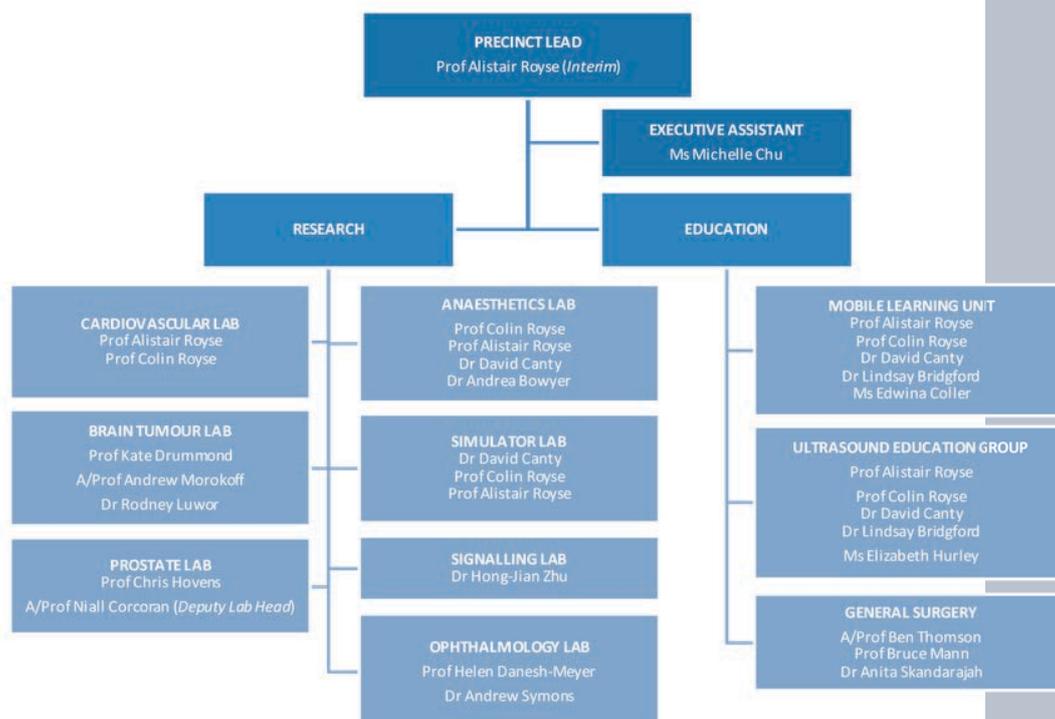


# THE ROYAL MELBOURNE HOSPITAL

## ABOUT US

The Department of Surgery at the Royal Melbourne Hospital has a very wide and diverse research interest ranging from cardiovascular medicine including arterial coronary bypass surgery, prostate, colorectal and brain cancer, clinical ultrasound and simulator-based education research. The Department maintains a large eLearning education platform in the form of the Ultrasound Education Group as well as the Mobile Learning Unit. The scientists, clinicians and educators operate at a local, national and international level. We are located at the Parkville Precinct, with strong linkages to other world-renowned research institutes within the area.

## ORGANISATION



 **425**  
PUBLICATIONS

 **18**  
SUCCESSFUL GRANTS

 **2**  
FELLOWSHIP

 **19**  
RESEARCH STAFF

 **\$6,642,846**  
TOTAL GRANT FUNDING

## KEY STAFF

Prof Alistair Royce  
*(Precinct Lead, Interim)*

Ms Michelle Chu  
*(Executive Assistant)*

Dr Lindsay Bridgford  
Dr David Canty  
A/Prof Niall Corcoran  
Prof Anthony Costello  
Prof Helen Danesh-Meyer  
Prof Richard De Steiger  
Prof Katharine Drummond  
Prof Christopher Hovens  
Ms Josie Iaria  
Prof Andrew Kaye  
Dr Rodney Luwor  
Dr Theo Mantamadiotis  
A/Prof Andrew Morokoff  
Dr Hong Nguyen  
Dr Thanh Nguyen  
Prof Colin Royce  
Prof Alice Pébay  
Dr Andrew Symons  
Dr Stanley Stylli  
Dr Anita Skandarajah  
Dr Hongjian Zhu

# DEPARTMENT OF SURGERY RMH

We have enjoyed great academic success in the last 12 months:

- Prof Alistair Royse was chief investigator for two blood transfusion triggers in cardiac surgery (TRICS-IV) grants from MRFF AUD\$ 950,770 and the Canadian CHIR CAN\$ 861,000.
- Prof Kate Drummond was awarded a University of Melbourne inaugural Melbourne Medical School Strategic Grant for Outstanding Women.
- A/Prof Andrew Morokoff was awarded a Cure Brain Cancer Foundation grant for \$200,000 over 2 years for a circulating biomarker project.
- A/Prof Andrew Morokoff was awarded a University of Melbourne Research Excellence award for his role in the Stentrode team project, a minimally invasive brain-computer interface.
- Dr Stan Stylli was awarded a MRFF research grant for \$384,000 for his project on targeting Invadopodia.
- Dr Andrew Gogos is completing his PhD investigating the role of a novel stem cell pathway YAP/hippo in GBM. He created a YAP knockdown cell line using the new CRISPR/Cas9 technology which showed in a mouse model a marked response in preventing glioma growth.
- Dr Ruth Mitchell, neurosurgeon, completed and is writing up her PhD on the structure of the Epidermal Growth Factor Receptor, work done with Professor Tony Burgess at the Walter and Eliza Hall Institute. She was also awarded a Nobel Prize for her work with ICAN (International Campaign to Abolish Nuclear Weapons).
- Dr Chenkai Ma completed and submitted his PhD on microRNA blood analysis and their potential as a “liquid biopsy” for brain tumours.
- Dr Hong Nguyen was awarded a \$20,000 University of Melbourne development grant.

## BRAIN TUMOUR BIOLOGY

The research programs undertaken in the Department of Surgery focuses on the biology and treatment of gliomas, the most common form of brain tumour, with glioblastoma multiforme (GBM) the most aggressive of all. Despite decades of considerable research, treatment has not altered significantly and the median survival remains at 9 - 12 months.

Our team of scientists and Masters and PhD students are undertaking research across a multitude of areas using primary patient-derived samples to further investigate what we see as the key hope, that genetic markers may be identified that can be used to facilitate therapy.

## BREAST CANCER SURGERY

Collaborative research with the Peter McCallum Cancer Clinic is examining the genomic markers affecting breast cancer, and in particular synergise in germline and somatic mutation testing.

Additionally, the PROSPECT trial is prospectively examining post-operative radiotherapy omission from the treatment protocol, in selected patients with early breast cancer after surgery. These trials are being supported by the National Breast Cancer Foundation, and the Cancer Care Council of Victoria.

# DEPARTMENT OF SURGERY RMH

## ARTERIAL CORONARY BYPASS SURGERY

Approximately 95% of coronary bypass surgery (CABG) performed world-wide involves the use of one or more saphenous vein grafts (SVG). This practice occurs despite the blood pressure and flow in the coronary circulation being higher than that experienced by veins in the leg. SVG is prone to a predictable and ubiquitous failure over time from the development of progressive atherosclerosis. However, arterial grafts that are used, such as the left internal mammary artery (LIMA) or radial artery (RA) appear to be resistant to this progressive late failure. Very large-scale studies by the Royal Melbourne researchers identify a lower survival in the longer term when SVG is used – even one single SVG graft.

Royal Melbourne is the leading centre internationally for the adoption of “total arterial revascularisation” (TAR) whereby SVG is completely avoided, where the TAR rate has exceeded 85% since 1996. Prof Royse has been the leader in advocating TAR and its achievement by the use of various reconstruction techniques.

## PROSTATE CANCER

Prostate cancer in the Western world represents a Clinical paradox. The prostate is the most cancer prone internal organ yet in only 10%, this is the cause of death. When it does cause death the common mechanism is primarily related to metastatic disease. The research from Royal Melbourne laboratory leverages large scale genomic analysis looking for why some prostate cancers metastasize, whereas others do not.

The Prostate research group is focused on three main goals:

- i) Deciphering the genomic drivers of metastatic potential in prostate cancer
- ii) Tracking the dissemination of cancer cells from the primary organ to distant sites
- iii) To further the clinical translation of a small molecule that targets the Tau protein in the brain to treat neurodegenerative diseases.

Our ongoing work aims to directly assess the prognostic potential of the metastatic signatures by linking genomic signatures to clinical outcomes, potentially having a transformative effect on clinical prognosis in prostate cancer.



# DEPARTMENT OF SURGERY RMH

## SIGNALLING PATHWAYS

The Cancer Signalling Research Laboratory has focused on cancer development regulation by TGF- $\beta$  signalling and exosomes in 2019.

### TGF- $\beta$ Signalling

1. TGF- $\beta$  signalling acts as a double-edged sword during breast cancer metastasis, positively for tumour cell dissemination into circulation but negatively for metastasis seeding. Completed mechanistic study in vitro and confirmed it in vivo, close to completion of therapeutic outcomes.
2. Expansion of TGF- $\beta$  signalling pathways in glioblastoma drives tumour cell endothelialisation and consequent GBM recurrence. This project has now moved to exploring new therapeutic opportunities.
3. Detection of single tumour cells and live molecular signalling in mouse breast and GBM tumour models.
4. Development of a novel membrane anchoring protein therapy targeting cancer TGF- $\beta$  signalling. It has now moved to mouse breast cancer model for validation after completing in vitro work.

### Exosomes

1. Exosomes derived from cancer associated fibroblasts (CAFs) restores TGF- $\beta$  signalling in colon cancer with high microsatellite instability (MSI-H) and defective TGF- $\beta$  type II receptor.
2. Exosomes mediate amplification of TGF- $\beta$  signalling in breast cancer cells, leading to invasion and metastasis. New therapeutic opportunities arise from the project: targeting exosome traffic and up taking for cancer treatment.

## QUALITY OF POST-OPERATIVE RECOVERY

Quality of recovery after surgery is a major research interest of Prof Colin Royse; which is now being headed by Dr Andrea Bowyer after the successful completion of her PhD. This includes clinical trials and observational studies to identify patterns of recovery, interventions to improve recovery, and to use recovery measurement as part of real-time patient and practitioner feedback.

## STEM CELL MODELLING

In 2019, Prof Alice Pébay relocated her laboratory to the medical building on the Parkville campus and became a joint appointee of the Department of Surgery (RMH) and the Department of Anatomy and Neuroscience. Prof Pébay's laboratory aims at using patient-specific human induced pluripotent stem cells (iPSCs) to model selected human neurodegenerative diseases of the eye and brain, to uncover fundamental molecular mechanisms involved, to identify novel treatment targets for vision loss and neurodegeneration and functionally validate and translate these research findings.

The last twelve months have been highly successful for the future of Prof Pebay's research having been awarded a NHRMC SRFA grant (2019), a NHMRC Synergy grant (2020) and MRFF Funding (Inaugural Stem Cell Mission 2020).

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*A wound assay of human pluripotent stem cell-derived retinal pigment epithelial (RPE) cells, cytoskeletal marker Vimentin (red), proliferation marker Ki67 (green), nuclear stain with DAPI (blue). Scale bar indicates 100  $\mu$ m. Image by Dr Grace Lidgerwood (Pébay Laboratory).*

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# ULTRASOUND EDUCATION GROUP



## ABOUT UEG

*The UEG develop and administer graduate courses in clinical ultrasound at a certificate, diploma or master's level, which is well subscribed both within Australia and Internationally.*

UEG comprises of academics, including Prof Alistair Royse (Cardiothoracic surgeon, Deputy Director of Surgery), Prof Colin Royse (Anaesthetist) and Dr David Canty (Anaesthetist, Senior Lecturer), who supervise higher research degree students, undergraduate medical students performing research projects, and post-graduate clinicians pursuing active research and education projects.

Research themes include a wide range of ultrasound including transoesophageal echocardiography for cardiac surgery, clinical point of care diagnostic ultrasound of heart, lungs, abdomen, vascular, invasive procedures, postoperative quality of recovery in all types of surgery, and medical education.

The courses developed by the UEG are unique in that they are extremely efficient, implementing a state-of-the-art on-line interactive eLearning software and platforms for both educational delivery as well as student enrolment, tracking and engagement.

## ULTRASOUND EDUCATION FOR THE MEDICAL SCHOOL

The Ultrasound Education group commenced training in clinical ultrasound for the medical students. The first courses were delivered in 2019 with all 280 Royal Melbourne, Western and Northern MD4 students completing a course in peripheral ultrasound guided vascular access. This course was very favourably received.

Additionally, the MD2 students at the Austin Hospital underwent a pilot ultrasound training program which included basic cardiac, lung and DVT scanning. This proved to be exceptionally popular and is leading to a wider implementation of ultrasound training programs being integrated progressively into the MD program over the next few years.

## CLINICAL ULTRASOUND RESEARCH

Under the direction of Prof Colin Royse, Dr David Canty and Dr Lindsay Bridgford, there are streams of research involving clinical ultrasound where there are a number of trials being conducted to investigate the utility and outcomes of focused cardiac and whole-body ultrasound (such as including lung and deep vein thrombosis) on length of stay and others outcome measures. The reach of these programs includes perioperative medicine, internal medicine and emergency medicine. Two PhD students are involved (Dr Ximena Cid and Dr Andrew Wang) along with Honours students.

# ULTRASOUND EDUCATION GROUP

## CLINICAL ULTRASOUND RESEARCH

Dr David Canty has been leading the research focus on practical or “hands on” based ultrasound training. This has led to a new “educational research” stream, attracting students and honoraries resulting in publications, equipment grants and conference invitations. Novel educational pedagogy concepts developed are primarily aimed at increasing efficiency of delivery of practical skills training, which “creates time” for development and expansion. Commencing in 2013 this new program has resulted in development of over a dozen new courses delivered in Victoria, Queensland and North America with over 1,500 enrolments and a new Ultrasound Simulation Lab based at the Parkville Precinct. This has cemented our department as the dominant point of care ultrasound provider in the Southern hemisphere.

Leveraging the novel and sophisticated eLearning pedagogy from the existing on-line graduate courses in clinician-performed ultrasound (Certificate, Diploma and Masters) and point of care workshops (iHeartScan), David and his team created a teaching model that combines interactive

eLearning, for delivery of knowledge, with ultrasound simulators, for delivery of skills training, resulting in training in transthoracic echocardiography that is almost entirely self-directed. In addition to a dramatic reduction in cost and time in course delivery, an unexpected surprise was that students who completed the self-directed course were better at obtaining ultrasound images on humans than students who underwent conventional supervised hands-on teaching.

This original teaching style has emerged in the spotlight during the The COVID-19 pandemic due to the social distancing restrictions that prevent conventional supervised practical training of ultrasound on patients and even human volunteer models. Two courses in lung ultrasound were produced, an online (knowledge learning) and simulator based (knowledge and practical skill learning) lung ultrasound course. The online course has had over 10,000 enrolments already and the simulator course is already being conducted at two hospitals, involving our research students and honorary staff.



## NOVEL TECHNOLOGY

Ultrasound technology is being revolutionised at the Royal Melbourne Hospital (RMH) with a new ultra light-weight portable device that enables scans quickly and easily via the smartphone.

Called the Butterfly IQ, the device creates ultrasound waves using a mini disc situated on a computer chip. This allows a much larger range of frequencies (using only one probe), requires much less energy to create ultrasounds and is much cheaper to produce. Prof Alistair Royse said: "The fact it connects with your phone is revolutionary in communicating between teams and departments around the hospital".

The benefits of the portable device are endless: it can aid the detection of fluid in the chest or lung collapse, as a heart ultrasound, for investigating clots in the leg, to help guide placement of a needle into an artery or vein by imaging the passage of the needle through the tissues in real-time.



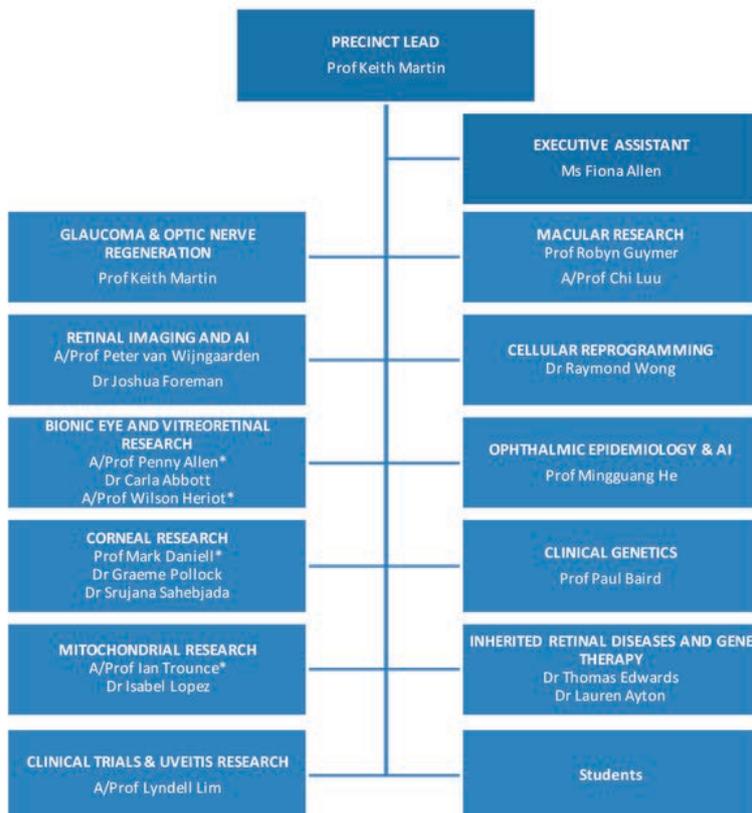
# THE ROYAL VICTORIAN EYE & EAR HOSPITAL

*Centre for Eye Research Australia*

## ABOUT US

Ophthalmology research is co-located at the Centre for Eye Research Australia (CERA) and the Royal Victorian Eye & Ear Hospital and has a strong reputation for its clinical and translational focus. Ranked amongst the top five ophthalmology research groups globally, its ultimate goal is to find solutions for blinding eye diseases that affect Australians and to pioneer vision regeneration programs to give hope to people who have lost their sight.

## ORGANISATION



 **302**  
PUBLICATIONS

 **21**  
SUCCESSFUL GRANTS

 **5**  
FELLOWSHIPS

 **21**  
RESEARCH STAFF

 TOTAL GRANT FUNDING  
**\$4,108,000**

## KEY STAFF

- Prof Keith Martin  
*(Precinct Lead)*
- Ms Fiona Allen  
*(Executive Assistant)*
- Dr Carla Abbott
- Dr Lauren Ayton
- Prof Paul Baird
- Dr Thomas Edwards
- Dr Joshua Foreman
- Prof Robyn Guymer
- Prof Mingguang He
- Ms Liying Li
- A/Prof Lyndell Lim
- A/Prof Chi Luu
- Dr Graeme Pollock
- Dr Srujana Sahebajada
- Dr Maria Isabel Lopez Sanchez
- A/Prof Peter Van Wijngaarden
- Dr Raymond Wong

# DEPARTMENT OF SURGERY RVEEH

CENTRE FOR EYE RESEARCH AUSTRALIA

## RESTORING SIGHT

The optic nerve serves as an essential component that connects our eyes to the brain, transmitting electrical signals from the back of the eye to the brain so it can interpret them as images.

As glaucoma develops, the optic nerve is progressively damaged, leading to a gradual loss of peripheral vision and if left untreated, can lead to blindness. Glaucoma treatment is largely aimed at lowering eye pressure to protect the optic nerve and prevent further damage. Yet despite the best available treatments, vision continues to deteriorate for about 15 per cent of patients.

Prof Keith Martin, The University of Melbourne's Ringland Anderson Professor of Ophthalmology and CERA's new Managing Director, has been striving to develop therapies to protect and repair the optic nerve. In collaboration with Prof James Fawcett (*University of Cambridge*), they are looking to gene therapy to potentially restore lost vision by improving the 'transport system' within nerve fibres. Protrudin, a protein involved in the endoplasmic reticulum, a major protein synthesis and transportation organelle in nerves, may have a key role.

"We've found that if we increase the amount of protrudin or change the way it's working, we can improve transportation along the nerve fibres," says Prof Martin, "and getting the right molecules to the right place at the right time can improve the ability of that nerve to repair."

Prof Martin's team is elucidating the mechanisms by which protrudin functions, but they are seeing "the strongest regeneration of any technique" explored. Their research is supported by funding from UK charity Fight for Sight.



*Prof Keith Martin. Image: Anna Carlile*

# DEPARTMENT OF SURGERY RVEEH

## CENTRE FOR EYE RESEARCH AUSTRALIA

### EYE SCAN SHEDS NEW LIGHT ON ALZHEIMER'S DISEASE

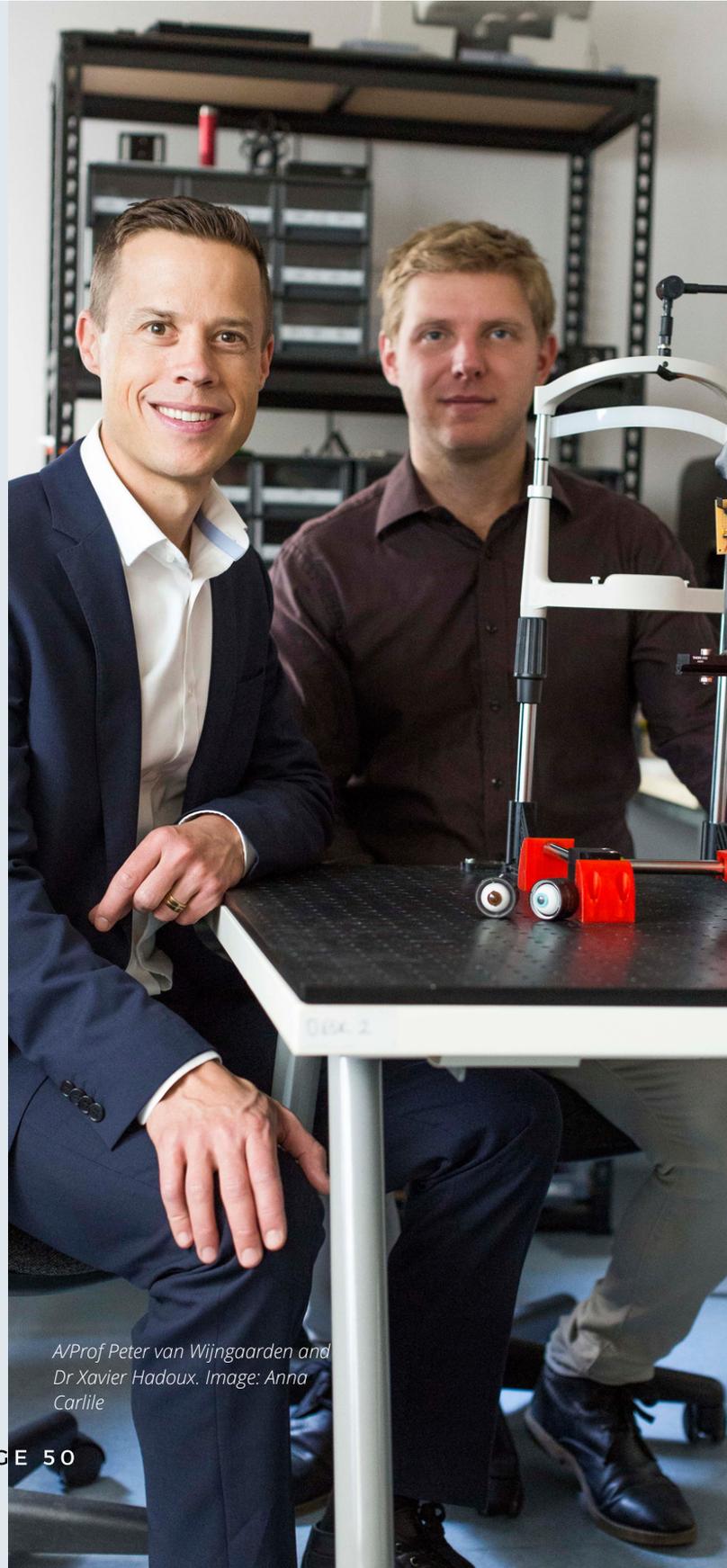
New research led by CERA and The University of Melbourne has demonstrated that a quick, non-invasive eye scan can identify changes in the retina that could be used to diagnose Alzheimer's disease.

In a recent publication in Nature Communications, A/Prof Peter van Wijngaarden and Dr Xavier Hadoux have detailed how the latest in eye scanning technology can accurately identify people with high levels of amyloid beta, a protein that accumulates in the brain and retina in people with Alzheimer's disease up to 20 years before the onset of symptoms. Current tests for the disease include spinal fluid tests (lumbar puncture) or brain PET scans and require the injection of a radioactive tracer. "The existing tests are invasive, expensive and not easily accessible. They are generally reserved for people in clinical trials or those with atypical forms of the disease," says A/Prof van Wijngaarden.

The eye scan uses hyperspectral imaging, a specialised form of technology often used in satellites to scan the earth looking for mineral deposits, to shine a rainbow-colored light into the eye.

"Our study shows that there are differences between the way the light is reflected from the retinas of people with amyloid beta deposits in the brain and from the retinas of people with lower levels of the protein," says Dr Hadoux.

In a collaboration with investigators from the Healthy Brain Project at the Florey Institute of Neuroscience and Mental Health, the team – through Enlighten Imaging, a start up company incubated at CERA – has also received funding from the Medical Research Future Fund to take their technology from the lab to the eye clinic.



*A/Prof Peter van Wijngaarden and  
Dr Xavier Hadoux. Image: Anna  
Carlile*

# DEPARTMENT OF SURGERY RVEEH

CENTRE FOR EYE RESEARCH AUSTRALIA

## GENE THERAPY: AN EYE ON THE FUTURE

Advances in gene therapy are bringing new hope of treating eye diseases that have for many years been considered untreatable.

Until recently, someone with an inherited retinal disease like retinitis pigmentosa or Stargardt's disease was told there was nothing that could be done to help them, but now around the world there are several active clinical trials for ocular gene therapies which could potentially stop vision loss from progressing – or even restore some sight. Dr Tom Edwards, a clinician-scientist and a vitreoretinal surgeon, was involved in a world-first gene therapy trial at the University of Oxford and is now continuing his research at CERA with the hope of helping Australian patients.

In its simplest form, gene therapy involves using a modified virus to deliver a correct copy of a gene into the eye to make up for the lost function caused by genetic mistakes in the patient's own cells. Sometimes it also involves inserting a gene that is known to protect cells from degeneration and disease.

Using this technology, CERA is investigating its application in inherited retinal diseases and glaucoma to better understand the genes that cause these diseases. Dr Edwards says CERA's co-location and partnership with the Royal Victorian Eye and Ear Hospital has been critical to making this bench-to-bedside research program possible.

A new Ocular Genetics Clinic at the hospital is bringing patients and researchers closer together.

"Patients seen in the Ocular Genetics Clinic can be linked to researchers at CERA who are studying their specific genetic eye disease," he says. "There are not many places where patients would have such direct access to researchers."

The clinic, along with a new natural history study of inherited retinal diseases between CERA and the University of Melbourne, will be key avenues for gaining a better understanding of genetic eye diseases in Australia. Dr Edwards says the overall goal is to combine this expertise and infrastructure to develop a Centre for Ocular Gene and Cell Therapy in Melbourne to "give Australians access to new gene therapies and increase the pool of eligible patients for local clinical trials".

*Left: Dr Sloan Wang, medical student Daniel Liu and Dr Tom Edwards. Image: Anna Carlile*



# DEPARTMENT OF SURGERY RVEEH

CENTRE FOR EYE RESEARCH AUSTRALIA

## REPROGRAMMING THE RETINA

For people with inherited retinal diseases such as retinitis pigmentosa, a genetic 'mistake' cause the light sensing cells in the retina to stop functioning, leading to vision loss and blindness. Once these cells are lost, there is currently no effective way to restore sight.

CERA's Cellular Reprogramming Unit, led by Dr Raymond Wong, is working to unravel the mysteries of the retina and develop treatments for eye disease using cellular reprogramming and stem cell technologies.

In collaboration with colleagues from the Institute for Molecular Bioscience at the University of Queensland and the Garvan Institute of Medical Research, the team moved one step closer as they released the world's most detailed gene map of the human retina – and received an Ideas Grant from the National Health and Medical Research Council to support their cellular reprogramming research.

The team's genetic map of the human retina provides the foundational knowledge of the factors that enable healthy vision. It can also help us understand the genetic signals that cause a cell to stop functioning, leading to vision loss and blindness. Dr Wong explains that "this understanding is the first step to better identifying what causes disease and ultimately developing treatments.

"Using the map, the team is exploring the conversion of cells into new photoreceptors to restore sight by repurposing retinal cells to promote retinal regeneration. The work will provide pre-clinical evidence of the potential of this therapy to treat photoreceptor loss, as seen in retinitis pigmentosa and other inherited retinal diseases including Stargardt's disease and age-related macular degeneration.

## SOLVING THE MYSTERIES OF MITOCHONDRIA

Dr Isabel Lopez Sanchez has helped forge a global effort to solve the mystery of how mitochondria – the tiny powerpacks in cells – can lead to vision loss and blindness.

CERA's newest Principal Investigator Dr Lopez Sanchez has been leading research into Leber's Hereditary Optic Neuropathy (LHON) – a rare disease that can lead to sudden vision loss and blindness as a result of mitochondrial changes that impede retinal ganglion function. Dr Lopez Sanchez previously spent time in 2019 at Sweden's esteemed Karolinska Institute as a Wenner-Gren Fellow laying the groundwork for an international collaboration into mitochondrial disorders.

"Karolinska leads the way in identifying and providing diagnoses to patients with genetic bases to their diseases," says Dr Lopez Sanchez.

At Karolinska, Dr Lopez Sanchez shared CERA's advances in patient sample collection, and developed expertise in molecular biology techniques including CRISPR gene editing. She now employs these techniques to test for genetic factors and generate cell lines 'in-vitro' at CERA.

Individual mitochondrial diseases are quite rare but there are similarities in genetic causes and clinical outcomes.

"If we understand one disease better then we can get more insights in what's happening in other disorders."

# DEPARTMENT OF SURGERY RVEEH

## CENTRE FOR EYE RESEARCH AUSTRALIA

### CLOSING THE GAP IN REGIONAL & REMOTE AUSTRALIA

Up to 500,000 Australian adults suffer from vision impairment or blindness. Indigenous Australians are at particular risk, experiencing up to three times higher rates of vision impairment and blindness and much higher rates of late-stage diabetic retinopathy compared to non-Indigenous Australians.

New research funded by an NHMRC Partnership Grant is testing the clinical effectiveness of an artificial intelligence-based technology in providing much-needed eye screening services for people who are currently missing out, including Indigenous Australians and regional and remote communities.

Primary care services in regional and remote Australia - including a team from the Nganampa Health Council and The Fred Hollows Foundation in the APY lands - are taking part in a trial, which uses an algorithm developed by researchers, led by Prof Mingguang He, to test for signs of common blinding eye diseases including diabetic retinopathy, when applied to standard retinal photographs.

Seconds after taking a photo of the eye, a report will be generated from the AI system indicating whether the patient needs to be referred to a specialist for further assessment and treatment. Importantly, the team will be evaluating how the technology is accepted by patients and health professionals compared to standard care.

"Vision impairment and blindness are major public health problems in Australia, with up to 50 per cent of major eye diseases remaining undiagnosed," says Prof He.

"An active screening program is required to identify these cases, particularly in regional and remote areas where eye health services are lacking." Artificial intelligence could close the significant gap in eye care services and considerably increase early diagnosis of the four most common blinding eye diseases and reduce the burden of vision loss in the Australian communities that need it the most."



*Prof Mingguang He. Image: Anna Carlile*



# THE ROYAL VICTORIAN EYE & EAR HOSPITAL

## Otolaryngology

### ABOUT US

The Royal Victorian Eye and Ear Hospital is a world leader in the treatment of hearing loss and ear (otological) surgery. The Department remains at the fore-front of research into cochlear implantation, and the preservation of hearing and balance function while operating on the inner ear.

The direct interface that we have between lab-based or clinical research, and direct otolaryngology patient care leads to highly productive translational research outcomes. Laboratory research seeks to understand the biological response of the inner ear to surgery and other types of stress, and applies drug delivery, gene therapy and regenerative strategies to the protection of restoration of hearing and vestibular function.

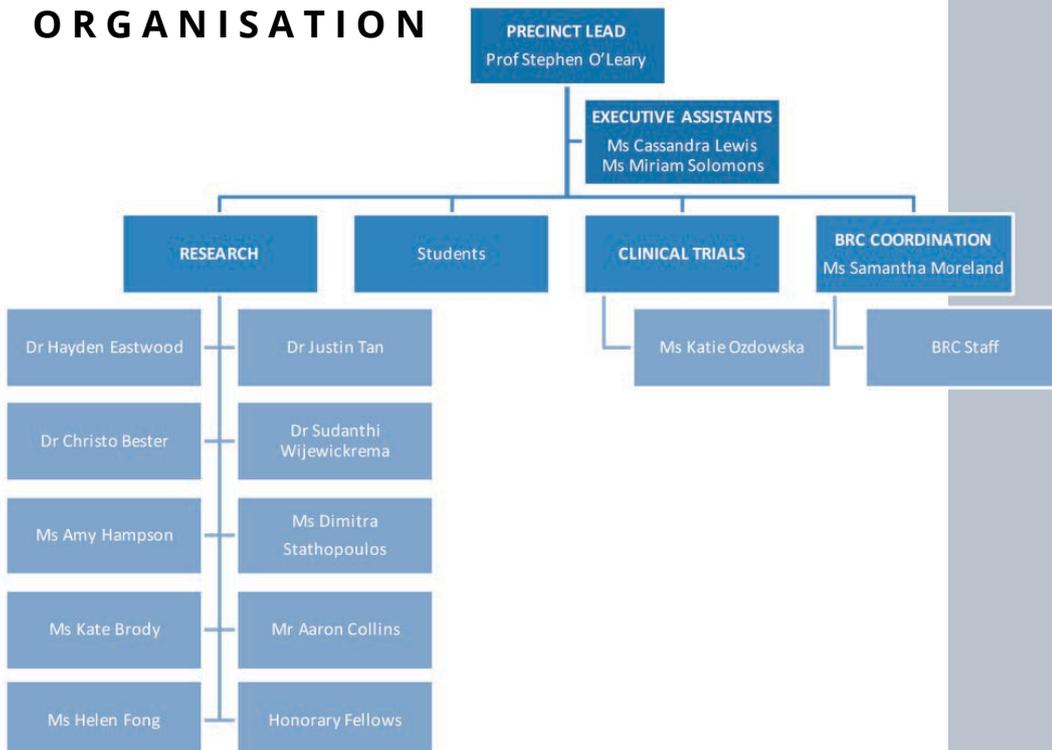
 **27**  
PUBLICATIONS

 **7**  
SUCCESSFUL GRANTS

 **12**  
RESEARCH STAFF

 TOTAL GRANT FUNDING  
**\$407,723**

### ORGANISATION



### KEY STAFF

Prof Stephen O'Leary  
*(Precinct Lead)*

Ms Cassandra Lewis  
Ms Miriam Solomons  
*(Executive Assistants)*

Dr Christo Bester  
Ms Kate Brody  
Ms Amy Brown  
Mr Aaron Collins  
Ms Selena Deev  
Dr Hayden Eastwood  
Dr Jean-Marc Gerard  
Ms Ming Helen Feng  
Ms Amy Hampson  
Ms Vinće Kalang  
Ms Samantha Moreland  
Ms Katie Ozdowska  
Ms Elizabeth Rose  
Ms Dimitra Stathopoulos  
Dr Justin Tan  
Dr Sudanthi Wijewickrema  
Ms Cassie Wrigglesworth  
Mr Dong Zhang

# DEPARTMENT OF SURGERY RVEEH

## EAR NOSE & THROAT

### IMPROVING COCHLEAR IMPLANT SURGERY

Using post-operative CT scans the position and shape of an electrode array can be calculated and compared to post surgery outcomes. From this work it is thought that a “deeper” insertion, an implant pushed further into the cochlea, may counter-intuitively lead to better hearing outcomes. The thought behind this is that as the individual electrodes on the implant are closer to the modiolus the amount of stimulation decreases leading to a more efficient device. This work is being repeated on multiple electrode types in historical data to gain further clarity and insights to this preliminary reasoning.

### NOVEL HEARING PROTECTION DRUGS

Professor Stephen O’Leary and Dr Justin Tan are collaborators with Monash University on a multi-disciplinary project to investigate the role of proteases and their inhibitors on hearing. Patients with mutations in an inhibitor gene, Serpinb6, loses their hearing between 10 and 20 years of age and their hearing continues to deteriorate as they become older. Through this collaboration, we are the first to use mouse models to demonstrate that this deafness originates in the inner ear associated with the death of multiple cell types when this inhibitor is absent. With support of Cochlear and the Victorian Government, we are currently investigating the therapeutic use of small molecule mimetics of this inhibitor to treat hearing loss.

### HEARING LOSS AFTER COCHLEAR IMPLANTATION

We are pioneering the use of intra-operative monitoring of hearing function during cochlear implantation to actively preserve this function in theatre. As part of this monitoring, we often see a sudden drop in cochlear output, which we hypothesise is due to a trauma occurring to the inner ear. We have demonstrated that drops of a certain size are correlated with greater losses of hearing post-operatively, and we are now investigating whether the detection of these drops can be used to proactively prevent or reverse trauma during implantation. Continuous improvements are always being made to this system. Of note in these improvements is the ability to measure several different types on electrical impedance which each contain information about the health and environment of the cochlea. Preliminary results are also present for an automated early warning system for surgeons to know when something damaging may be occurring. Alongside this is a limited capability for the prediction of adverse events during surgery, potentially opening a window of time to prevent damage. These results are preliminary at present but show many exciting avenues for continued research.

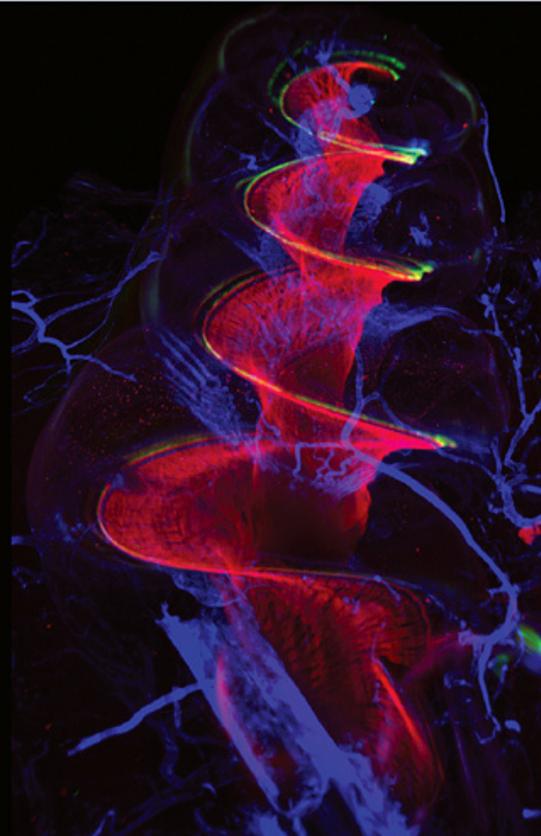
Our system has been adopted by Cochlear Limited, patented, and released as commercial research software with global release by Cochlear Ltd.

# DEPARTMENT OF SURGERY RVEEH

EAR NOSE & THROAT

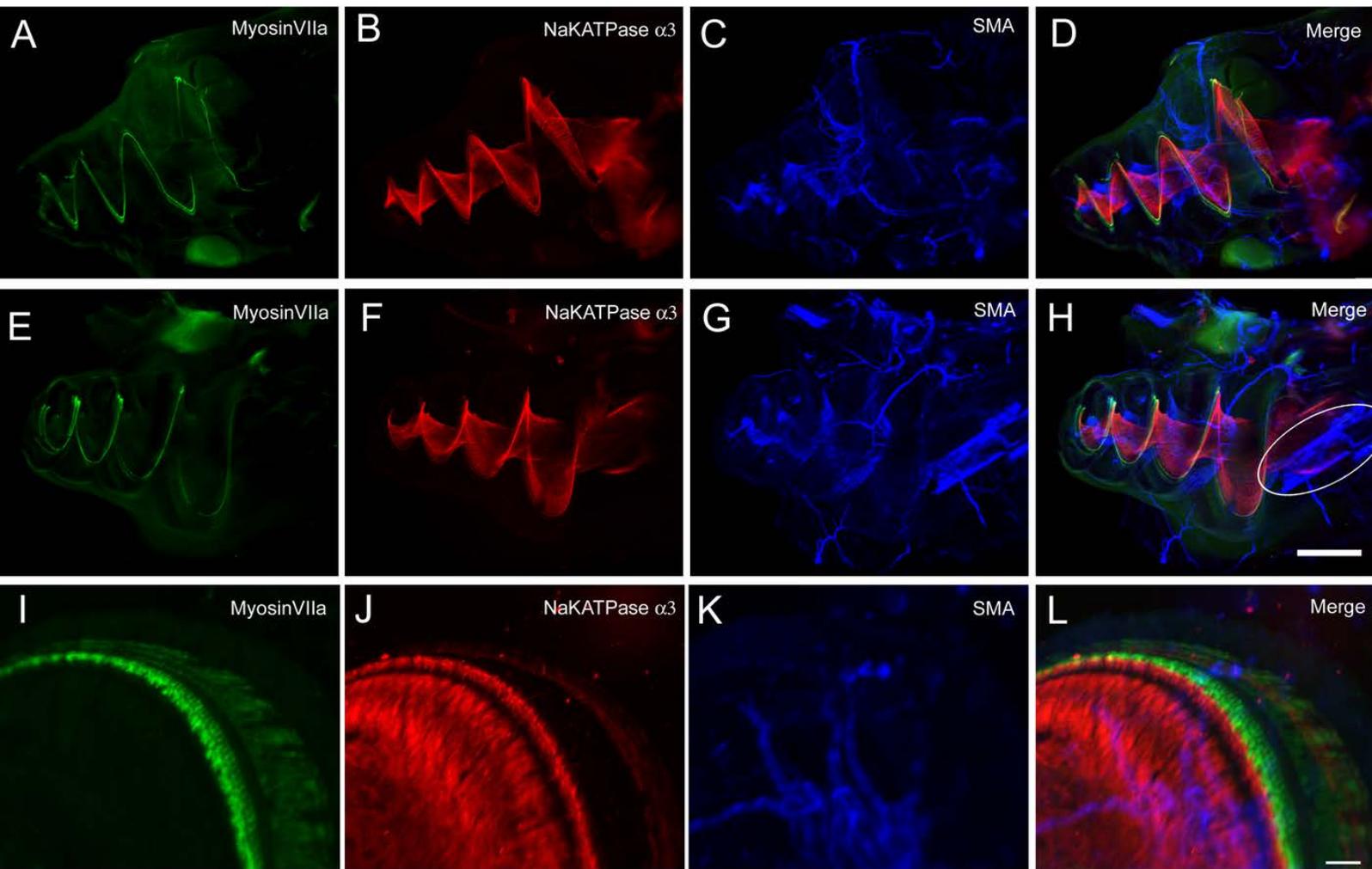
Hearing Research is one of the highest impact journals in the field of hearing science. In 2020 the work of the Hearing Protection and Regeneration Laboratory, based at RVEEH, was featured on the cover of Hearing Research not once, but twice! Once for the novel application atomic force microscopy to the basilar membrane after cochlear implantation (Choong et al, 2020, Hearing Research, vol. 385, p. 107846), and another in the July issue (right, Brody et al, 2020, Hearing Research, vol. 392, p. 107956).

The team in the Hearing Protection group, led by Kate Brody, Amy Hampson and Prof Stephen O'Leary, have developed a technique using immunofluorescent labelling of the whole cochlea, which for the first time, allows the cochlear implant to remain *in situ* so the tissue around the implant remains undisturbed. In addition, the health of hair cells and neuronal tissue can be studied within the same cochlea. Read on for more!



# DEPARTMENT OF SURGERY RVEEH

EAR NOSE & THROAT



## HEARING RESEARCH: NOVEL IMAGING OF THE INNER EAR

A cochlea implanted with a silicon electrode. This figure displays binding of antisera raised against Myosin VIIa, labelling both inner and outer hair cells within in the organ of Corti. Also, an antibody against NaKATPase alpha 3, labelling the afferent neurons within the spiral ganglia and neural projections and binding of antisera raised against smooth muscle actin (SMA). SMA labels both the arterioles within the cochlea and fibroblasts that transiently express this protein during the wound healing process. SMA is observed to surround the implant in this cochlea.

**Figure A-D)** Triple labelling of an un-implanted cochlea, and **E-H)** a cochlea implanted with a silicon electrode. This figure displays binding of antisera raised against Myosin VIIa, labelling both inner and outer hair cells within in the organ of Corti (**A&E**); binding of antisera raised against NaKATPase alpha 3, labelling the afferent neurons within the spiral ganglia and neural projections (**B&F**); and binding of antisera raised against smooth muscle actin (SMA), labelling both the arterioles within the cochlea (**C&G**) and fibroblasts that transiently express this protein during the wound healing process (**G**). At two weeks post-implantation, SMA is observed to surround the electrode (**G**). Merged images are displayed (**D&H**), with the myo-fibrotic tissue response marked by the oval. Scale bar for A-H: 600  $\mu$ m. **I-L)** High magnification (12x) of hair cell and neuronal contacts showing morphological detail in the middle turn of the implanted cochlea. Scale bar for I-L: 30  $\mu$ m.

# DEPARTMENT OF SURGERY RVEEH

## EAR NOSE & THROAT

### VIRTUAL REALITY SURGERY SIMULATION

The Department of Otolaryngology is home to the Virtual Reality Surgical Simulation laboratory.

This is a multi-disciplinary project from the Faculties of Medicine, Dentistry and Health Sciences, Engineering and Education, spanning across surgery, education and computer science fields. The project seeks to define the role of simulation in surgical training. Virtual reality (VR) surgery is the way in which surgeons of tomorrow will be taught. VR surgery involves immersion into a 3D world where the “patient” can be touched and operated on.

Our team has developed a virtual reality surgical environment for ear surgery that was the recipient of the University's Knowledge Transfer Award for 2008. The group has also developed a prototype for dental simulation. We are involved in exciting research that will determine how best to train surgeons in VR, and provide real-time feedback to trainees. In 2020, the Department's virtual reality surgical simulator was embedded in an online short course by the University and was mandated as compulsory training by the Royal Australasian College of Surgeons.

### ABORIGINAL EAR HEALTH

Otolaryngology has an interest in ear infection (otitis media) amongst Indigenous Australians, as this leads to early childhood hearing loss. Although the surgery to correct chronic otitis media has a high success rate, Indigenous Australians do not benefit at the same rate as the general population of Australia.

To understand why this is, we have been developing an objective measurement system to quantify the ossicular movement amongst Indigenous Australians. This system uses a small magnet attached to the inner ear bones during the surgery to remedy the Otitis Media and takes a repeatable objective measure of the mobility. The benefit to this is such that each surgeon has a different sensitivity in their hands, and this will remove all subjectivity. The magnet is removed before the end of the surgery and results are compared to audiology tests before and after the surgery.

With this we hope to understand what exactly is causing Indigenous Australians to experience disproportionate success rates to guide future policy to improve detection, prevention, management and follow up of Aboriginal and Torres Strait Islander people diagnosed with ear disease and other ENT dysfunction.



NORTHERN HOSPITAL

Northern Health

# NORTHERN HOSPITAL

## ABOUT US

Melbourne University already has very strong links with Northern Health through the teaching partnership – The Northern Clinical School with medical students in the MD program. These students form an important pipeline for our staff into the future and many will be involved in research projects enhancing those research links.

A major focus of the research we carry out is what we call health services research: *How do we improve the systems of health care delivery? New models of care, use of technology to provide more cost-effective care.*

We also need to look at how we get teams of health professionals working across the primary care and hospital sector to investigate smarter ways of keeping patients out of hospital and seriously developing a disease prevention agenda. This will require significant input from all Schools in the Faculty of Medicine, Dentistry and Health Science and the Schools of Medicine and Population Health.

## KEY STAFF

Vacant  
*(Precinct Lead)*

Ms Martine Batchelder  
*(Executive Administrator)*

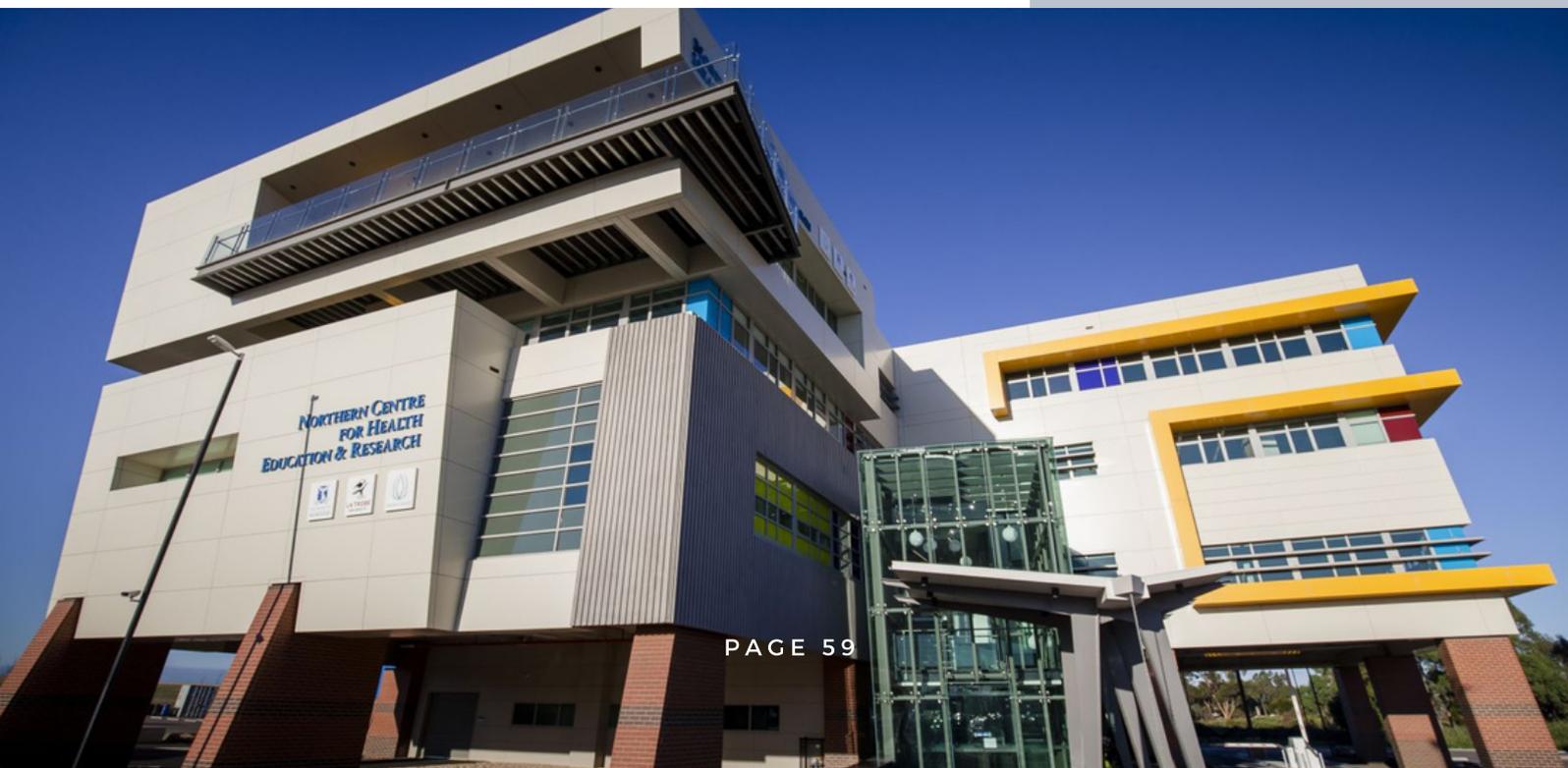
Dr Candy Cheng  
*(Honorary)*

Dr Yuen Chiu Kang  
*(Honorary)*

Dr Rodrigo Plens Teixeira  
*(Honorary)*

Dr Prassannah Satasivam  
*(Honorary)*

Dr Neil Strugnell  
*(Honorary)*





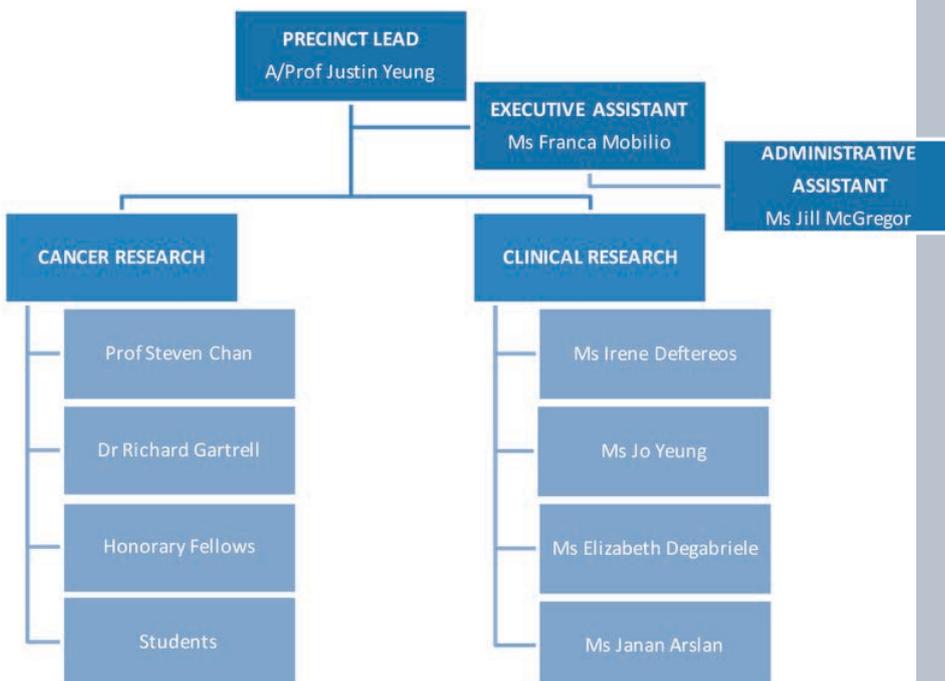
Western Health

# WESTERN HEALTH

## ABOUT US

The Department of Surgery at Western Health is geographically located across two campuses; Footscray Hospital which bears a significant clinical load, and Sunshine Hospital where the Department is located in the Western Centre for Health Research and Education (WCHRE) that provides a range of purpose built, state-of-the-art teaching and research facilities. The WCHRE is home to researchers, academics and educators from Western Health, Victoria University, and the University of Melbourne. WCHRE plays a pivotal role in researching diseases that affect local communities, positioning Western Health as a leader in related academic and research fields.

## ORGANISATION



 **33**  
PUBLICATIONS

 **4**  
SUCCESSFUL GRANTS

 **6**  
RESEARCH STAFF

 **TOTAL GRANT FUNDING**  
**\$180,000**

## KEY STAFF

- A/Prof Justin Yeung  
*(Precinct Lead)*
- Ms Franca Mobilio  
*(Executive Assistant)*
- Ms Jill McGregor  
*(Administrative Assistant)*
- Prof Steven Chan
- Dr Richard Gartrell
- Ms Irene Deftereos
- Ms Janan Arslan
- Ms Jo Yeung
- Ms Elizabeth Degabriele

# DEPARTMENT OF SURGERY WESTERN HEALTH

## GASTROINTESTINAL CANCER

The Academic Department of Surgery at Western Health is led by Associate Professor Justin Yeung. Our key research focus is on the optimisation of cancer treatment outcomes following gastrointestinal cancer surgery.

We have a multidisciplinary research team and this allows us to consider aspects of cancer treatment which have been previously ignored including nutritional and musculo-skeletal optimisation and how cancer therapy interacts with these factors.

We are keen to introduce innovative methods of assessing how gastrointestinal cancer and its treatment affects the quality of life outcomes in our culturally diverse patient cohort.

### PROMS AND E-PLATFORM

Patient Reported Outcome Measures (PROMs) are utilised at Western Health with colorectal cancer patients during their treatment journey as a means to assess patient quality of care and health status from their own perspective.

The Department has been working on improving the process: partnering with the Peter MacCallum Cancer Centre to help identify how we can include non-English speaking patients, and working with Western Health and an industry partner to trial a prototype ePROM platform in patients with colorectal cancer.

### IMPROVING CLINICAL OUTCOMES

Another focus for our Department is to develop novel methods of identifying at-risk patients at an early stage in their diagnosis so that we can optimise their prehabilitation management and improve their postoperative outcomes.

We are leading a strong collaborative research program across Victoria that includes Departments in Aged Care, Anaesthetics, Allied Health and Oncology to identify at-risk groups who have had Gastrointestinal surgery over the last several years. Common risk factors can be used in a number of our research programs:

- To identify more appropriate treatment options prior to colorectal cancer therapy in order to improve on clinical outcomes
- To develop a novel AI program which will allow us to accurately identify at risk surgical patients prior to their planned surgery
- To introduce a program of prehabilitation to those at-risk of frailty and assess the feasibility of this intervention

# DEPARTMENT OF SURGERY WESTERN HEALTH MEDICAL EDUCATION

## TAKING IT ONLINE

Supporting our medical students' education during COVID-19 at Western Health has never been more important. We have developed several innovative programs which have been piloted at Western Health. For example, with the junior surgical staff we have developed a weekly 2 hour teaching and mentorship program for MD2 surgery students from Melbourne Medical School. The topics covered include clinical examination as well as practical subjects such as CV development skills, information about career prospects and how to approach a referee for a reference. In addition, to help support clinical skills training, several surgical skills videos have been developed to help medical students across the precincts.

A *Pathway to Progression in Surgery* online course with the University of Melbourne Mobile Learning Unit has also been launched which helps provide skills to trainee surgeons as well as medical students in professional development and career advancing techniques including interview skills, how to develop a research project and how to prepare for a conference presentation.

For more information, visit:

<https://mdhs-study.unimelb.edu.au/short-courses/mms-short-courses/pathway-to-career-progression-surgery/overview>



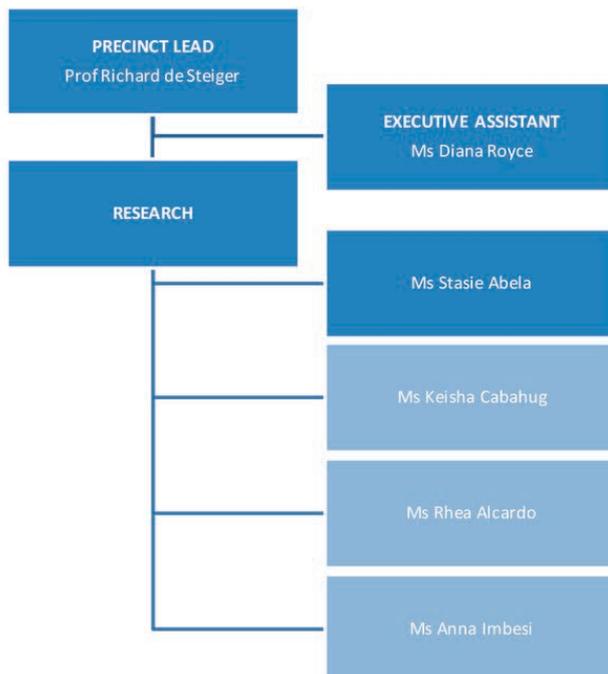
# EPWORTH HEALTHCARE

## ABOUT US

The Department of Surgery, Epworth HealthCare, University of Melbourne is relatively new and considerable time has been invested in forging collaborations with other University of Melbourne departments and external institutions. The principal research interests at Epworth Healthcare are focused on musculoskeletal disease and the department is striving to recruit patients in the private sector into numerous high-quality clinical trials.

The major aim of the department is to establish the Epworth Healthcare Surgical Research and Innovation Centre which will support all aspects and types of Surgical Research Projects but primarily focus on musculoskeletal disease.

## ORGANISATION



## KEY STAFF

Professor Richard de Steiger  
*(Precinct Lead)*

Ms Diana Royce  
*(Executive Assistant)*

Ms Stasie Abela  
*(Clinical Research Nurse/  
Research Assistant)*

Ms Keisha Cabahug  
*(Clinical Research Nurse/  
Research Assistant)*

Ms Rhea Alcardo  
*(Clinical Research Nurse/  
Research Assistant)*

Ms Anna Imbesi  
*(Clinical Research Nurse/  
Research Assistant)*

Professor Nikolajs Zeps  
*Director of Research  
and Development*

# DEPARTMENT OF SURGERY EPWORTH

## JOINT REPLACEMENT SURGERY

### CLINICAL TRIALS

Epworth Healthcare has the largest volume of orthopaedic procedures in the state and the largest number of joint replacements performed annually in Australia. The department is increasingly recruiting large numbers of patients for clinical trials:

#### CRISTAL

A cluster randomised, crossover, non-inferiority trial of aspirin compared to low molecular weight heparin for venous thromboembolism (VTE) prophylaxis and safety in hip or knee arthroplasty, a registry nested study.

VTE is a common complication following joint replacement surgery. This multicentre study aims to determine the relative effectiveness and safety of aspirin compared to LMWH in preventing VTE in elective hip and knee replacement surgery patients. The study is a registry nested, cluster-randomised crossover non-inferiority trial with the end point symptomatic VTE.

#### ASAP

Multicentre Randomised Double-Blind Placebo Controlled Trial of Combination Vancomycin and Cefazolin Surgical Antibiotic Prophylaxis. This is a national trial to recruit over 4,000 patients for which Epworth HealthCare Richmond will recruit the largest number of patients. This trial examines the addition of Vancomycin to the standard antibiotic prophylaxis regime for patients undergoing hip and knee joint replacements. This trial will seek to answer the question whether the addition of Vancomycin to the standard perioperative antibiotic will reduce the infection rate in joint replacement, currently one of the major issues facing implant surgery.

### PATIENT EDUCATION FOR SURGERY

Ongoing research at Epworth over several years has investigated the use of multimedia technology to prepare patients for surgery and to aid their post-operative recovery. Modules have been developed for hip and knee replacement, cardiac surgery, obstetrics, and spinal surgery is currently under development. One study, led by researcher PhD Candidate Jo McDonall demonstrated that a multimedia intervention (MyStay) improved patient participation in an acute postoperative setting, determined by patient-reported measures of recovery, reduction in post-operative pain and also reduced length of stay in the multimedia intervention group. The modules are now embedded in Epworth's Pont of Care and future research will examine other surgical interventions.

### EMERGING PROJECTS

- Factors influencing short and long term outcomes of anterior cruciate ligament reconstruction.  
*Lead Investigator: Prof Julian Feller*
- A Prospective Multicentre Longitudinal Cohort Study of the myMobility Platform for recovery after TKR.  
*Lead Investigator: Mr Camdon Fary*
- Pain App prototype has been developed and clinical trials across several surgical disciplines will commence shortly.  
*Lead Investigator Mr A Beischer*

# DEPARTMENT OF SURGERY EPWORTH

## RESEARCH COLLABORATIONS

### ARC TRAINING CENTRE FOR MEDICAL IMPLANT TECHNOLOGIES (CMIT)

Epworth is a major contributor to the University of Melbourne Technology Grant under the direction of Prof Peter Lee, Department of Mechanical Engineering. Epworth has developed guidelines for a registry for 3D printed devices. Part of the research platform is to develop PhD programs for engineers that enable them to undertake all facets associated with the development of new devices. Epworth will be devising protocols for both the development and regulation of new implantable devices and has co-operated with the TGA for the introduction of new regulatory guidelines for the introduction of 3D custom and patient matched devices. In future the aim is to introduce new surgical devices for clinical trials within Epworth HealthCare.

### SYNOVIAL KNEE ARTHRITIS RESEARCH (SKAR): TOWARDS A RATIONAL STRATEGY FOR OSTEOARTHRITIS THERAPY

This is a successful collaboration with Professor John Hamilton and Dr Andrew Cook of the Department of Medicine, University of Melbourne. Previous research between the Chief Investigators has established a mechanism for analysing synovial tissue samples from patients undergoing treatment for end stage osteoarthritis. This study collects tissue from patients with arthritic knees and controls to determine the presence of GM-CSF in patients with end-stage arthritis compared to patients with no arthritis. An animal arthritis model is then used to determine the effect of GM-CSF blockade.

### DATA LINKAGE

Prof de Steiger has a longstanding role as Deputy Director of the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR) and he is Clinical Investigator on a number of projects with the aim of enhancing joint replacement outcomes. An NHMRC grant has enabled linkage of the AOANJRR to other existing health data, including MBS and PBS data, state-based hospital data and the Australian Cancer Database (ACD).

These data linkages will provide the AOANJRR with the capacity to undertake extensive and detailed analysis on the outcomes of joint replacement surgery in Australia by better understanding the rate of major local and systemic complications at a national, regional and hospital level and, the impact of a large variety of factors on the occurrence rate of these complications. A major focus of the research is the evaluation and treatment of periprosthetic joint infection.



# ROYAL CHILDREN'S HOSPITAL

## ABOUT US

The Royal Children's Hospital, the Murdoch Childrens Research Institute and the University of Melbourne, together make an interwoven, symbiotic relationship delivering high quality clinical services underpinned by research and education.

Collectively the independent entities contribute to a paediatric health sciences precinct which is greater than the sum of the parts. The presence of each benefits the other, ensuring the primary focus of each entity is achieved.

The delivery of innovative, high quality paediatric care is unsustainable without the input of research and education. World standard research into paediatric diseases and education of medical students and other health care professionals in paediatric health is not possible without access to a paediatric clinical environment. Hence the interdependence of the three partners.

## KEY STAFF

Prof Anthony Penington  
*(Lead)*

Ms Caron Israelsohn  
*(Executive Assistant)*

*Prof Anthony Penington.  
Image by Little Red Photography*

# DOS HONORARY STAFF

Excellence at the Department of Surgery would not be possible without the contributions of Honorary Staff who work tirelessly to participate in high quality research and train the future of Australia's medical workforce.

The following pages list all of the Department's Honorary Staff.

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## HONORARY TITLES TO LEVEL B

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 Peter Skillington, *Fellow, Royal Melbourne Hospital*  
 Nilesh Srivastav, *Fellow, Royal Melbourne Hospital*  
 Emma Stuart, *Fellow, Royal Melbourne Hospital*  
 Ryan Stuchbery, *Fellow, Royal Melbourne Hospital*  
 Stanley Stylli, *Fellow, Royal Melbourne Hospital*  
 Ray Swann, *Clinical Fellow, Royal Melbourne Hospital*  
 Mei Tan, *Clinical Fellow, Royal Melbourne Hospital*  
 Laura Vella, *Fellow, Royal Melbourne Hospital*  
 Kristine Wardle, *Clinical Fellow, Royal Melbourne Hospital*  
 Jessica Wong, *Fellow, Royal Melbourne Hospital*  
 Yang Yang, *Clinical Fellow, Royal Melbourne Hospital*  
 Ravi Asopa, *Fellow, St Vincent's Hospital*  
 Simon Banting, *Fellow, St Vincent's Hospital*  
 Romane Blanchard, *Fellow, St Vincent's Hospital*  
 Lynn Chong, *Fellow, St Vincent's Hospital*  
 Jayesh Desai, *Fellow, St Vincent's Hospital*  
 Rodney Dilley, *Fellow, St Vincent's Hospital*  
 James Keck, *Fellow, St Vincent's Hospital*  
 Shiang Lim, *Fellow, St Vincent's Hospital*  
 Catherine Ngan, *Clinical Fellow, St Vincent's Hospital*  
 Brendan O'Brien, *Fellow, St Vincent's Hospital*  
 Trisha Peel, *Fellow, St Vincent's Hospital*  
 Rajeev Shukla, *Fellow, St Vincent's Hospital*  
 Jonathan Sivakumar, *Fellow, St Vincent's Hospital*  
 Christopher Thomas, *Fellow, St Vincent's Hospital*  
 James Thomas, *Fellow, St Vincent's Hospital*  
 Simon Tsao, *Fellow, St Vincent's Hospital*  
 Kiryu Yap, *Fellow, St Vincent's Hospital*  
 Michael Yii, *Fellow, St Vincent's Hospital*  
 Neil Strugnell, *Fellow, Northern Health*  
 Joanne Chionh, *Clinical Fellow, Western Health*  
 Julian Choi, *Clinical Fellow, Western Health*  
 Wai-Ting Choi, *Clinical Fellow, Western Health*  
 Michael Hong, *Fellow, Western Health*  
 Bill Karanatsios, *Fellow, Western Health*  
 Toan Pham, *Clinical Fellow, Western Health*

## HONORARY TITLES TO LEVEL A

Jonathan Goh, *Clinical Tutor, Ophthalmology*  
 Aisha Arayne, *Clinical Tutor, Western Health*

An electronic version of this report is available at:  
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