BEYOND SCIENCE
Annual Report 2023

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MISSION and PURPOSE:

Fostering impact through connectivity

The Beyond Science program is a capability and connectivity building initiative for Early Career Researchers undertaking medical device research in Otolaryngology, Head and Neck surgery

It is an Australian-first initiative which fosters impact through connectivity facilitating translation The program has three pillars:

1: Project Support

Providing support to early career researchers by developing academic mentorship and stakeholder networking.

2: Facilitating Training:

Through webinars, symposiums and by facilitating uptake of courses, we contribute to the training of early career researchers. We connect them with stakeholders relevant to the deployment of their research (such as government or industry). In this way, we aim to foster in the early career researchers a better understanding of the priorities of the health system, driving better impact through innovation.

3: Advocacy:

We advocate on behalf of early career researchers to address unintended barriers in the system that stifle interdisciplinarity and capability development. We do this by communicating with various stakeholders in College, Community, Government, Industry and the University sector.

We are grateful for funding support from

Passe & Williams Foundation

NSW GOVERNMENT Health Sydney Local Health District

STRUCTURE AND GOVERNANCE:

In its second year, Beyond Science has maintained the purpose and membership of the advisory committee and the scientific board. To streamline operations, an executive group derived from the scientific board has been formed . The function of the executive is to plan strategy and impact while the scientific board provides operational expertise and project mentorship and the advisory committee provides counsel and oversees the governance of the scientific board and executive.

Beyond Science Advisory Committee
Professor Jim Patrick AO (Chair)
Professor Philip Truskett
Professor Susie Nilsson
Adjunct Professor Jean-Frederic Levesque
Dr Bridget Clancy
Anne O'Neill

Executive Committee:
Prof Gordon Wallace AO
Prof Laura Poole-Warren
Mr Stuart Anderson
Prof Jonathan Clark
Dr Julia Crawford
A.Prof Payal Mukherjee

Inaugural members of Beyond Science Board
Clinical
Associate Professor Payal Mukherjee (Co-Founder)
Associate Professor Kelvin Kong
Professor Stuart Mackay
Professor Raymond Sacks
Professor Richard Harvey
Associate Professor Raewyn Campbell
Professor Nirmal Patel
Associate Professor Daniel Novakovic
Professor Jonathon Clark
Scientific
Professor Gordon Wallace (Co-Founder)
Professor Ben Eggleton
Professor Gregg Suaning
Professor Svetha Venkatesh
Associate Professor Hamish Macdougall
Professor David McAlpine
Professor Nigel Lovell
Professor Laura Poole-Warren
Professor Jeremy Crook

Diversity:

The Beyond Science Board diversity is articulated in the skills matrix below. The Advisory Committee diversity includes representation from industry, science, clinical, philanthropy

and government. The Executive represents input from RACS, ASOHNS, Clinicians, Industry, and Engineering. Both the Executive and Advisory Committee has 50% gender diversity.

Skills Matrix

	Clinical									Scientific							
	R HAR	R SAC	K KON	S MAC	D NOV	R CAM	N PAT	P MUK	J CLA	G WAL	POOLE	G SUA	H MAC	D MCA	S VEN	J CRO	B EGG	N LOV
Clinical Experience																		
Ear			✓				✓	✓										
Nose	✓	✓	✓			✓												
Head and Neck			✓	✓	✓				✓									
Indigenous Health			✓				✓											
Rural Surgery		✓	✓															
Health Services	✓	✓	✓	✓				✓	✓									
Health Policy			✓				✓	✓										
Education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓				
Health Technology																		
3D printing				✓				✓	✓	✓		✓				✓		
Biomedical Engineering								✓	✓	✓	✓	✓		✓		✓	✓	✓
Machine Learning														✓	✓			✓
Material Sciences									✓	✓	✓	✓				✓		
Stem Cell technologies								✓			✓					✓		
Sensors and diagnostics										✓		✓	✓	✓	✓		✓	✓
Nanotechnology																✓	✓	
Medical Devices																		
Commercialisation								✓	✓			✓	✓			✓		✓
Regulatory								✓	✓		✓	✓						✓
Implementation Guidelines		✓	✓					✓			✓	✓						
Clinical Trials		✓																✓
Networks																		
International Connections		✓			✓			✓			✓						✓	✓

Exemplar Projects

In 2023, the Beyond Science founders met with the students and their supervisors who engaged with the program in 2022. A project proforma was established (Appendix 1) to identify what skills the students felt were necessary for them to progress with their project. The founders met with the Agency for clinical innovation, NSW health as well as Industry peak body, MTAA (Medical Technology Association of Australia) to formalise a way to curate projects across the translational research spectrum. Below are some exemplar projects to help describe how the program increases project impact.

Exemplar project 1: Translation to practice

Health economics of day surgery Cochlear Implants. Below is an excerpt of the project proforma of the skills requested from the platform.

2: Identify the translational stage that your project falls into

T0	FEASIBILITY: Basic Research	
T1	EFFICACY: Translation to humans	
T2	REPLICABILITY AND ADAPTABILITY: Translation to patients (Phase 2,3 clinical trials)	
T3	EFFECTIVENESS: Translation to Practice (Phase 4 trial)	X
T4	SCALABILITY: Translation to communities (Population level outcome research)	

2: What milestones have you achieved so far in striving for the ultimate impact (200 words)

We have analysed publicly available data available through the Independent Hospital Pricing Authority (IHPA) to calculate estimates of potential cost saving. Our formulae were derived in consultation with a team of Health Economists at Cochlear Limited. These provisional findings were presented at the annual ASOHNS conference in March 2023 in Brisbane to an audience of ENT surgeons, with strong feedback in support of the potential benefits of a day-stay model of care.

3: What connections/ knowledge/ network from Beyond Science will you need to achieve this impact:

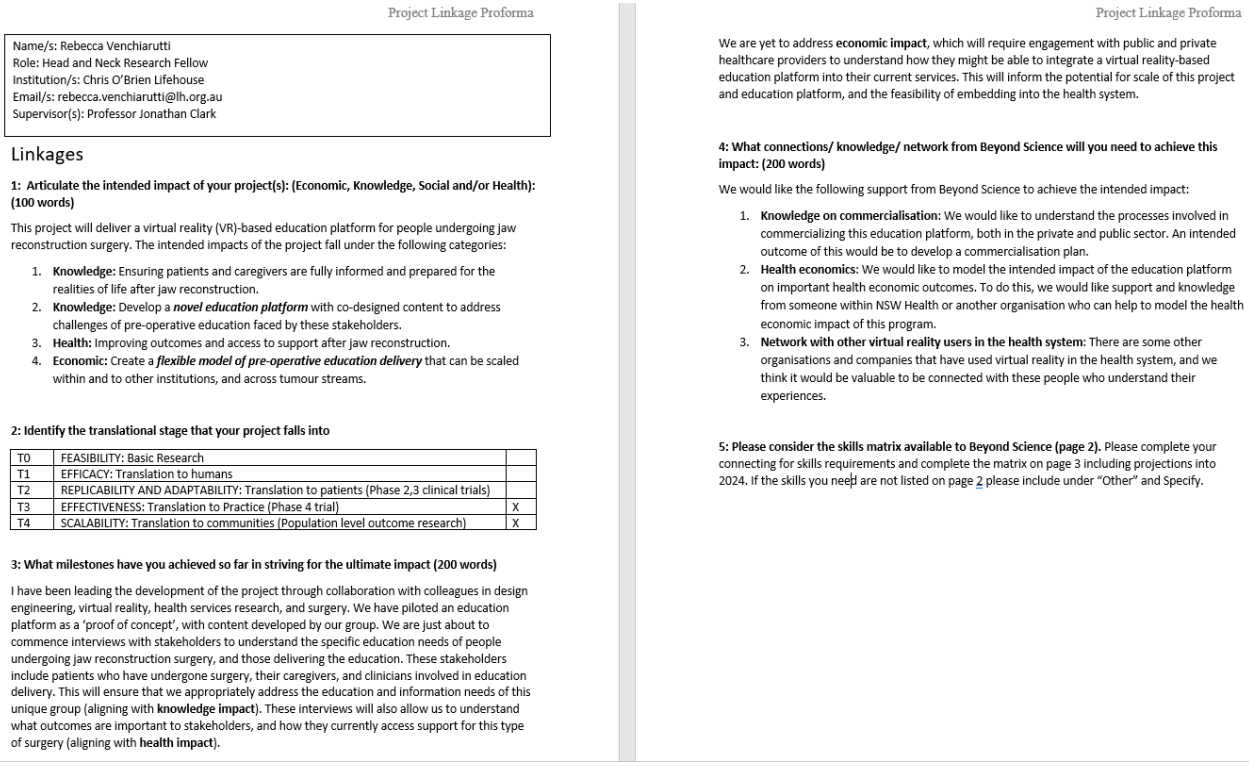
1: Access to Surgical and Anaesthesia netwoks: In order for this research to have a meaningful impact on the community and healthcare efficiency, strategies will need to be devised which facilitate implementation of day-stay models of care in NSW health networks. This will require collaboration with leaders from local health districts and treating surgical teams. Since there are only a handful of hospital performing Cochlear implantation, it would be of value to target the clinicians at these hospitals to seek participation in a trial. The Beyond Science network would be helpful in getting access to clinical champions. In addition, a frailty scale needs to be designed for clinicians to appropriately select patients for day stay surgery. This project needs assistance to access if such scales area already present that can be adapted into ENT workflow. The project needs assistance with picking a pilot site and access to state based surgical networks to see how this model can be scaled across other hospitals and different ENT procedures.

Dr Shibalik Misra is a SET 1 registrar in ENT, undertaking the project in collaboration with a health economist at Cochlear Ltd to evaluate the cost saved to the Australian public health system if Cochlear Implantation was converted to day surgery. Through the Beyond Science program, the student was able to meet with health economists in NSW health to validate the methodology. The student was connected with interstate surgeons who are implementing it and then again connected with NSW health to get advice about what is necessary to help them implement the change in the health system. Through the Beyond Science network,

collaborators were sought to develop a framework to advise government about patient selection for not just Cochlear Implants, but all major ear surgery.

Exemplar project 2: Translation to patients

Virtual reality for patient education: application in the pre-operative setting for patients undergoing free-flap jaw reconstruction surgery



Project Linkage Proforma

Name/s: Rebecca Venchiarutti
Role: Head and Neck Research Fellow
Institution/s: Chris O'Brien Lifehouse
Email/s: rebecca.venchiarutti@lh.org.au
Supervisor(s): Professor Jonathan Clark

Linkages

1: Articulate the intended impact of your project(s): (Economic, Knowledge, Social and/or Health): (100 words)

This project will deliver a virtual reality (VR)-based education platform for people undergoing jaw reconstruction surgery. The intended impacts of the project fall under the following categories:

1. **Knowledge:** Ensuring patients and caregivers are fully informed and prepared for the realities of life after jaw reconstruction.
2. **Knowledge:** Develop a ***novel education platform*** with co-designed content to address challenges of pre-operative education faced by these stakeholders.
3. **Health:** Improving outcomes and access to support after jaw reconstruction.
4. **Economic:** Create a ***flexible model of pre-operative education delivery*** that can be scaled within and to other institutions, and across tumour streams.

2: Identify the translational stage that your project falls into

T0	FEASIBILITY: Basic Research	
T1	EFFICACY: Translation to humans	
T2	REPLICABILITY AND ADAPTABILITY: Translation to patients (Phase 2,3 clinical trials)	
T3	EFFECTIVENESS: Translation to Practice (Phase 4 trial)	X
T4	SCALABILITY: Translation to communities (Population level outcome research)	X

3: What milestones have you achieved so far in striving for the ultimate impact (200 words)

I have been leading the development of the project through collaboration with colleagues in design engineering, virtual reality, health services research, and surgery. We have piloted an education platform as a 'proof of concept', with content developed by our group. We are just about to commence interviews with stakeholders to understand the specific education needs of people undergoing jaw reconstruction surgery, and those delivering the education. These stakeholders include patients who have undergone surgery, their caregivers, and clinicians involved in education delivery. This will ensure that we appropriately address the education and information needs of this unique group (aligning with **knowledge impact**). These interviews will also allow us to understand what outcomes are important to stakeholders, and how they currently access support for this type of surgery (aligning with **health impact**).

Project Linkage Proforma

We are yet to address **economic impact**, which will require engagement with public and private healthcare providers to understand how they might be able to integrate a virtual reality-based education platform into their current services. This will inform the potential for scale of this project and education platform, and the feasibility of embedding into the health system.

4: What connections/ knowledge/ network from Beyond Science will you need to achieve this impact: (200 words)

We would like the following support from Beyond Science to achieve the intended impact:

1. **Knowledge on commercialisation:** We would like to understand the processes involved in commercializing this education platform, both in the private and public sector. An intended outcome of this would be to develop a commercialisation plan.
2. **Health economics:** We would like to model the intended impact of the education platform on important health economic outcomes. To do this, we would like support and knowledge from someone within NSW Health or another organisation who can help to model the health economic impact of this program.
3. **Network with other virtual reality users in the health system:** There are some other organisations and companies that have used virtual reality in the health system, and we think it would be valuable to be connected with these people who understand their experiences.

5: Please consider the skills matrix available to Beyond Science (page 2). Please complete your connecting for skills requirements and complete the matrix on page 3 including projections into 2024. If the skills you need are not listed on page 2 please include under "Other" and Specify.

Dr Rebecca Venchiarutti's project was to develop a clinical trial evaluating the use of Virtual Reality (VR) to familiarise rural and regional patients with the metropolitan centre where cancer care will be evaluated. The project was undertaken with Beyond Science Scientific board members, Dr Hamish Macdougall and Prof Jonathan Clark. The project was discussed at the start of the year with her supervisors and then again ACI NSW.

ACI NSW organised 2 meetings which was attended by ACI and the co-founders of the program. The first meeting was with clinicians undertaking analogous research (also collaborating with Dr Hamish Macdougal) in Dubbo base hospital and advice was given about strategies to set up the clinical trial. The second meeting was arranged with Cancer Institute NSW. Project feedback was given to consider the requirements of the trial to consider barriers to scaling this project such as identifying a payer in the health system, if the trial did demonstrate a positive outcome. Through the executive, the student will be paired with a mentor and a collaborator from the business school to work on the commercial component of the project. Feedback to the cancer institute is expected in 6 months.

Exemplar project 3: Commercialisation

Dr Emma Charters is a speech pathologist developing a device to address trismus called "Restorabite". During the meeting with the students early in 2023, this project was identified as an appropriate project to undergo the AUSCEP program (Australian Clinician Entrepreneurship Program) trialled by MTP Connect. The project has been successfully been awarded a patent and also received the BIG IDEA award for successful commercialisation

The Big Idea 2023

28 Jul 2023

Restorabite device wins District commercialisation challenge.

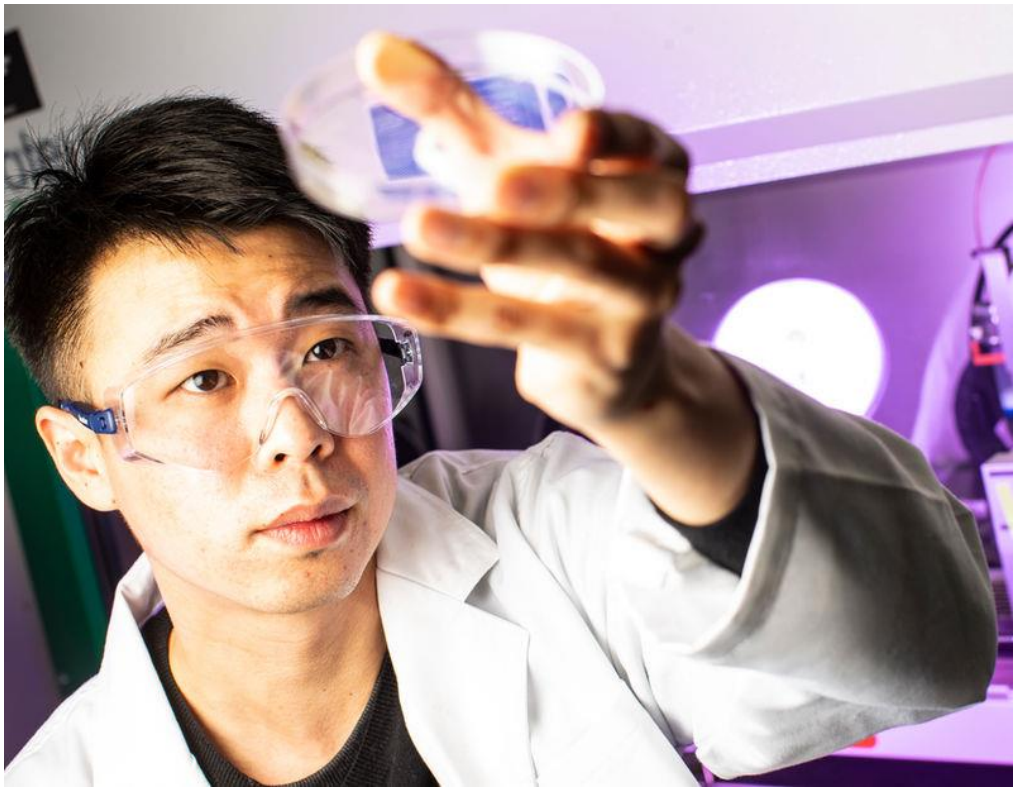
SydneyConnect Image: Dr Emma Charters and Prof Robyn Ward AM

Exemplar Project 4: Commercialisation

3D printing low-cost prosthetic ear: Dr Sepidar Sayyar is a post doc researcher undertaking a a study funded by a prior Australia India Council grant to design and manufacture 3D print facial prosthetics using low-cost silicon printer. The study is currently in clinical trial to demonstrate feasibility in patients. During the Connecting the dots event in 2023, the researcher was advised to engage with the CICADA medical devices commercialisation training program funded by NSW health. Through the course, the researcher was networked with stakeholders in state and federal bodies who are involved in funding medical devices. This project was a Eureka Prize finalist in 2022.

Exemplar project 5: Discovery

3D bioprining a living cartilage ear: Dr Johnson Chung is a post doc researcher and biomedical engineer whose special research interest is 3D bioprinting living cartilage for the ear to treat a condition called microtia. This discovery based project received initial funding from the Passe Williams Foundation. The project went through the CICADA training platform and was successful in $7M of MRFF funding through the Stem cell research scheme. The leadership skills that the Beyond Science program has assisted with, and the network building formed through the connecting the dots events, has opened up new career opportunities for Dr Chungt, who has successfully accepted a role in the TGA to work in the area of regulation of biofabricated medical devices.



Milestones achieved 2023:

√ 1. Governance:
- Ensure roles and responsibilities met
- Review governance as program grows
  - An executive committee (of the scientific board) was established to streamline program operations (Appendix 1)
  - The scientific board was expanded to increase regional diversity

√ 2. Meetings:
- Advisory Committee met three times
- Clinical and Scientific Leaders annual meeting was held
- Executive formed in July met twice: agreement to meet quarterly

√ 3. Events
- Webinar series launched: 1st webinar: click here
- Annual Symposium: Connecting the Dots 22nd July (program Appendix 2)
- Section of Academic Surgery meetings
  - May: Develop a career in academic surgery
    - Beyond Science program discussed in this meeting: click here
  - November: Annual academic surgery meeting
    - Focus on interdisciplinarity: click here
  - Beyond Science also dedicated a session in an International meeting:
    - 45th Annual International Conference of the IEEE, Engineering in Medicine and Biology Society 24-27 July 2023 – ICC Sydney

√ 4. Project development and partnerships
- The cofounders met will students and supervisors to discuss priorities for each group as well as individual students
- A framework was developed to identify projects to connect with stakeholders including ACI (NSW health) and MTAA (industry)
- Based on project proforma, 6 exemplar projects were identified, co-founders met with the students and stakeholders to monitor progress and gave feedback
- Projects identified with commercial potential, were encouraged through NSW health funded CICADA program and MTP connect funded AUSCEP program (1 scientist and 1 clinician completed respective course)

√ 5. Communication Plan
- Website and ebook to be refreshed in 2024
- Surgeon's Month: Innovation Award
- Comms plan: Promotion of activities through social media and LinkedIn
  - Discussion with RACS comms, further implementation in 2024

√ 6. Sustainability Plan:
- Support for innovation network continues to align with other state and federal initiatives
  - Discussion with interstate ENT network for national plan

√ 7. Reporting:
- Annual reporting to Garnett Passe
- 4 monthly presentations to RPA IAS
- Annual reporting to partner and stakeholder institutions

Connecting the dots event brought together state and federal collaborators in science, surgery, industry, government and philanthropy to raise the importance of interconnectivity in research translation. Training in interdisciplinary research was seen as key to support the early and midcareer researchers.

Connecting the dots: Students were split into 4 groups to facilitate mentorship: career development, entrepreneurship, engagement with Federal bodies, policy and system engagement

APPENDIX 1

BEYOND SCIENCE OHNS

COMMERCIALISATION AND TRANSLATION

Terms of Reference for Advisory Committee

Background:

In October 2020, MTPConnect published a landmark workforce survey identifying deficiencies in the Australian Medical Biotechnology, Pharmaceutical and Digital health sector. Amongst the two main areas identified relevant to surgery were research and industry skills. Surgeon-innovators have an important role in health technology: not only from discovery to commercialization, but in ensuring that health technologies are optimally and ethically implemented. This includes defining safety and regulatory standards, balancing patient outcomes against health care costs, and working with policy makers to ensure that funding is both sustainable and promotes equitable access to technology.

Where do surgeons learn these skills? Despite a rich history of biomedical innovation in Australia, there are limited training opportunities for surgeons to develop these skills. Within NSW, there are no formal surgeon-scientist training pathways in Otolaryngology, Head and Neck Surgery. Our limited understanding of technology commercialisation has impeded our ability to translate fundamental scientific breakthroughs to the bedside. Therefore, as research becomes more and more technology focused, developing these industry-ready skills will be essential so that Australian Otolaryngology and Head and Neck surgery will continue to deliver innovations to the community.

Beyond Science is a roadmap for delivering research and industry skills for surgeons. Starting with Otolaryngology and Head and Neck surgery, it aims to incrementally develop a comprehensive Australian-first College run statewide medical technology translation program for Surgeon-Innovators. This program is being jointly funded by the Garnett Passe and Rodney Williams Memorial Foundation and the Sydney Local Health District.

Roles and Responsibilities of this group

The Program Directors shall establish an Advisory Committee (AC) to provide ongoing input into the research programs with critical input into the positioning of the program's activities to grow and support other areas of surgery.

- Review the Program's performance 4 monthly against key performance indicators.
- Provide strategic advice on program opportunities.
- Facilitate connections with national and international initiatives in industry, academia and non-academic research groups.

- Advise the Program Directors on their strategic plan, particularly in reference to research and industry training through activities such as Global Engagement, Commercialisation, Communications and Training.
- Monitor and endorse outcomes obtained throughout the study, and
- Provide advice to ensure that the solutions developed are aligned with health services priorities and health needs of ENT patients.

Members of the AC commit to:

- Attend all scheduled Advisory Committee meetings, where possible.
- Undertake necessary preparation for meetings.
- Complete agreed-upon tasks in between meetings, if required.
- Where appropriate, liaise with the broader community regarding the work of the Advisory Committee.

Selection criteria

The Advisory Committee membership will consider interdisciplinary balance and diversity, when inviting additional members to ensure there is representation from a diverse group of expert stakeholders in Otolaryngology Research

Term

The Program Directors, in consultation with the Advisory Committee (AC) Chair, will appoint members to the Committee for a term of 2 years.

The term for each AC member is subject to renewal which will be conducted upon discussion with the Chair.

The AC Chair will be appointed by the Program Directors for a term of 3 years and subject to renewal.

Meetings

The AC will meet three times each year, in March and July and November following each Scientific Board meeting.

Quorum

The AC shall have a quorum which is equal to half the committee members.

_____ _____

Advisory Committee Member Date

_____ _____

Payal Mukherjee Gordon Wallace

APPENDIX 2

Beyond Science's Connecting the Dots Program
Date and Time: 22 July 2023, 9:30am
Venue: Australian Institute for Innovative Materials (AIIM), LKM Theatre
LKM Theatre

9:30am	Payal Mukherjee, Beyond Science (5 mins) *Welcome and Introductions*
Session 1	
Chair: Dr Michelle Atkinson and Laurencia Villalba	
9:35am	Prof David Currow, University of Wollongong (10 mins) *Opening Statements and Acknowledgement to Country*
9:45am	Lea Kirkwood, Agency for Clinical Innovation NSW (15 mins) *Creating Impact Through Research*
10:00am	Darren Saunders, Deputy Chief Scientist and Engineer (15 mins) *Bench to Bedside: What does it take?*
10:15am	Robyn Langham, Chief Health Officer, TGA (15 mins) *Understanding Regulation to Accelerate Translation*
10:30am	Johnathan Clark, Chris O'Brien Lifehouse (15 mins) *Better Connectivity - How We Can Improve*
10.45am	Bruce Ashford, ISHLA (15 mins) *The Cost of Neglect*
11:00am	***Break***
Session 2	
Chair: A.Prof Raewyn Campbell and Prof Jeremy Crook	
11:30am	Eileen Wallace, University of Wollongong (5 mins)

	POC Skin Regeneration
11:35am	Zhi Chen, University of Wollongong (5 mins) *The Bioengineered Cornea*
11:40am	Johnson Chung, University of Wollongong (5 mins) *Ear Cartlidge Regeneration*
11:45am	Hai Xin, Chris O'Brien Lifehouse (5 mins) *Ex Vivo Preservation of Ovine Periosteum Using a Perfusion Bioreactor System*
11:50pm	Sepidar Sayyar, University of Wollongong (5 mins) *Print Your Imaginations: From Ears to Sensors!*
11:55pm	Richard Fox, AHREF (5 mins) *Updates on Virtual Reality Surgical Planning*
12:00pm	Emma Charters, Chris O'Brien Lifehouse (5 mins) *Jaw Dropping New Evidence for Patients with Trismus*
12:05pm	Al-Rahim Habib, University of Sydney (5 mins) *DrumBeat.ai: Artificial intelligence to triage ear disease*