



INSPIRE

RESEARCH AUSTRALIA SHOWCASES HEALTH & MEDICAL RESEARCH



Research might often be a solo pursuit but there is no doubt it should have no borders just as disease has none. Imagining and preparing for the health challenges of the future is complex and it requires many minds to join together to further the very many causes and unseen but very likely challenges coming our way. If anything, Covid has sharpened our focus on what can be and indeed must be achieved if we expect to live our best quality of lives possible.

ustralia is indeed fortunate with incredible researchers and a great health system, and we have enjoyed the benefits of both for decades and so we should!

But to continue this quality and enable both our research and systems to function at their best, not only must we invest, we have to think beyond our shores. Over the past few decades Australia has reduced the challenges of geography through working closely with the world's leaders in health and medical research - and joining them as pioneers in health and medical research. There is so much to be gained, including the chance to fast track the discovery and development of pharmaceuticals and medical technologies. We have set a goal to establish Australia as a leader in life changing medical innovation. Why wouldn't we.

The last few years have shown us that now, more than ever, we must leverage each other's knowledge and breakthroughs in research and technology. Our deepening collaboration can help us achieve so much more, in terms of our health and in turn, our wealth.

We know Australia's track record in research is exemplary across the fields of research, education, and clinical practice. These are all interrelated; research informs education, which in turn influences clinical practice and patient care.

If we wish to succeed in improving outcomes for students, practitioners, patients, and populations, then we must work together in these environments. Evidence shows clinically research active hospitals have better patient care outcomes, surely that is a driver of excellence.

In this issue of INSPIRE we draw inspiration from our members where most of our research is done. ANU's work on how international networks are advancing personalised diagnosis and treatments, along with creating better health care for refugees and migrants are an excellent read. As is Flinders University's article on how Australian and French expertise is coming together to optimise breathing support for patients on ventilators, and the University of the Sunshine Coast's article on quality improvement for nursing and midwifery in the Pacific emphasises our regional neighbours and research relationships. We also showcase further international collaboration like Murdoch Children's Research Institute's monumental investment in stem cell research, and DUG's article on the evolution in highperformance computing to advance medical research into major diseases.

We even go into space with a piece from Healthy Bones Australia on their #LiftOffForBoneHealth campaign!

Following our new tradition of profiling our newest members let's welcome the Perron Institute, a global collaborator and home to WA's most successful research breakthroughs team.

There are so many examples of excellence across our amazing sector, through ensuring sustainable investment for our funding bodies, to ensure the building blocks of great research into the future. We must continue to work together to develop

pathways that embed great research into our health structures.

And we catch up with our international counterparts Research!America, Research Canada, Research Sweden and New Zealanders for Health Research who all agree that we are stronger together.

We look forward to seeing you at our 19th Annual Health & Medical Research Awards in early December, where we will celebrate and showcase the very best Australia has to offer. Our thanks to the nominators and their nominees for their incredible achievements. Ticket sales are now open - head to our website for more information.

Yours in good health

Nadia and the Research Australia Team



RESEARCH AUSTRALIA

HEALTH & MEDICAL RESEARCH

ANARDS ANARDS ANARDS ANARDS

DATE 8 December, 2022

TIME 6.00pm Welcome Reception

VENUE Metropolis Events,

Level 4/3 Southgate Ave, Southbank

DRESS Black Tie

TICKETS \$295 PER PERSON OR

\$2655 PER TABLE OF 10

BOOKINGS BOOK ONLINE HERE

ENQUIRIES E: <u>awards@researchaustralia.org</u>

or P: 02 9295 8546











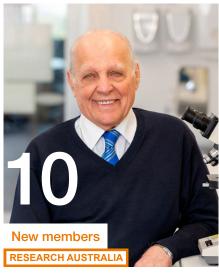




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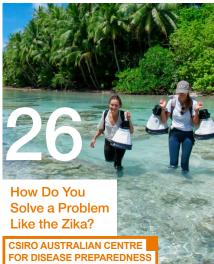




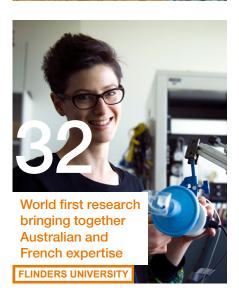














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Who can submit articles?

Any current member of Research Australia who would like to share a relevant story that affects their organisation including, philanthropic donations and their outcomes, research findings, and any other related health and medical research topic that affects the Australian population.

Submission guidelines & deadlines

For information regarding how to submit and publishing deadlines visit the Research Australia website.

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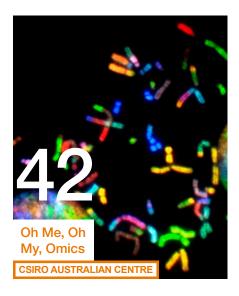


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Australian Health & Medical Research & Innovation





















Building Alliances to End Female Genital Mutilation (FGM)

UNIVERSITY OF TECHNOLOGY SYDNEY





RESEARCH ROUNDTABLE AUSTRALIA ROUND-UP **ROUND-UP**

Research Australia convenes regular special-interest roundtables throughout the year to gain insights from key experts and refine our focus on the issues that matter most to our members.

UNIVERSITY ROUNDTABLE

The Research Australia University Roundtable provides a forum for Research Australia's university members to discuss issues relating to health and medical research which are particular to universities. Membership of the Roundtable consists of individuals nominated by their university. The Roundtable meets three to four times each year.

The challenges facing early to mid career researchers (EMCRs) in terms of wellbeing, career structure and employment continued as the major focus of the Roundtable held on 7 September, attended by 39 representatives from 29 universities. A highlight was a presentation by Professor Alastair McEwan, Pro Vice Chancellor Researcher Development, University of Queensland. Professor McEwan outlined the programs and framework the University has put in place to support the development of researchers.

Another highlight was the presentation by Dan Wake, Policy Manager at Universities UK.

Dan outlined the UK's Concordat for Researcher Development, which has been in place since 2008 and was updated recently. Dan explained the core Principles (Environment and Culture; Employment; Professional and Career Development) and the Stakeholders (Research Funders; Research Organisations; Researcher Managers; Researchers). He outlined the responsibilities of each stakeholder under each principle.

Dan also talked about the resources provided under the Concordat to support development, the measures of success and the Governance Structure. He emphasised that the Concordat is one of a range of initiatives to support researchers and improve research in the UK, and that there is currently work to explore potential alignments to help reduce and coordinate reporting.

The University Roundtable will continue to explore this topic of researcher development and support at the next Roundtable in November.





EMCR WORKING GROUP

An initiative that has arisen from the University Roundtable in May but is open to all of Research Australia's membership is the Early to Mid Career Researcher Working Group (EMCRWG).

The decision to create the EMCR WG is a recognition that EMCR wellbeing and careers is an issue that urgently needs action and is going to require a converted effort across multiple fronts. The working group has the opportunity to focus on some specific issues and actions and to involve EMCRs directly.

The EMCRWG met for the first time on 24 August and the Terms of Reference were adopted. Some of the themes raised by the participants included:

- there are many initiatives happening at individual universities, but they are not generally well known beyond their own walls. There seems to be greater opportunity for sharing information.
- The relationship with an EMCR's immediate manager is critical. Many immediate managers seem ill prepared for the responsibility of managing staff.
- EMCRs are often uncertain about the terms of their employment and the expectations on them, and how to respond or complain if they feel they are not being treated fairly.
- They are similarly often unclear about the path to career progression.
- There is little focus on professional development of EMCRs by their employers.
- The short term nature of employment contracts is an issue.

The EMCR WG will meet again in late October. If you are interested in the EMCR WG, please contact Greg Mullins, Head of Policy, at greg. mullins@researchaustralia.org

PHILANTHROPY ROUNDTABLE

The Philanthropy Roundtable is convened for those Research Australia member organisations who fundraise for research, to discuss key issues affecting their fundraising capability, challenges the sector is facing and collaborative opportunities to ensure sustainable funding.

In the August Philanthropy Roundtable, we looked at how organisations are rising to the challenge of remunerating consumers for research participation and engagement. Speakers across the health and medical research pipeline took a deep dive into the role of consumers in research and discussed how and when payment of participants in research is ethically acceptable.

Research Australia was pleased to welcome over 70 representatives from across academia, medical research institutes and patient advocacy groups to this Research Australia members-only event.

This controversial topic needs to be explored more and we will be contacting members with our next steps on Consumer Remuneration.

MEMBERS

In this issue of INSPIRE we introduce newest member, the Perron Institute for Neurological and Translational Science.

BECOME A MEMBER OF RESEARCH AUSTRALIA

For more information on Research Australia and how you can join



MS ELIZABETH KOFF AM APPOINTED TO THE BOARD OF RESEARCH **AUSTRALIA**

esearch Australia has welcomed Managing Director of Telstra Health, Ms Elizabeth Koff AM, to its Board.

Chair of Research Australia Associate Professor Annette Schmiede said. "As the national peak body across all health and medical research in Australia, our Board is drawn from the leaders in our membership across our sector."

PERRON INSTITUTE FOR **NEUROLOGICAL AND** TRANSLATIONAL SCIENCE

Since its inception, Western Australia's Perron Institute for Neurological and Translational Science has developed an international reputation as an innovative and collaborative centre of excellence for medical research.

The Perth-based institute is celebrating its 40th Anniversary in 2022 and to mark this milestone as WA's longest established medical research institute, we have created a friendly and meaningful mascot, 'Ruby' the quokka.

The little marsupial's significance is that in the 1960s, Perron Institute Founder, Emeritus Professor Kakulas AO (pictured), made the momentous discovery that degenerated muscle could regenerate in the Rottnest Island quokka. This research ultimately led to the development of three groundbreaking genetic treatments for Duchenne muscular dystrophy.

Approved by the United States Food and Drug Administration, this game-changing technology is now being applied to develop treatments for other conditions such as motor neurone disease, multiple sclerosis, diabetes and COVID-19.

For forty years, the Perron Institute's scientists and clinicians have been on a quest to understand the origins of disease and develop pioneering treatments for rare muscle diseases and neurological conditions. We are in the next phase of our evolution, expanding our research into new areas of genomics and genetic data. This new stage promises many new drugs and therapies to provide a better quality of life for people suffering from life-limiting conditions, many of which have no effective treatments.

Our stroke research team has developed a neuroprotective peptide which has recently received



ethics approval to commence a Phase 1 Clinical Trial for a potential early intervention stroke treatment via Argenica Therapeutics.

With our focus on unlocking mysteries in the neurosciences field and taking our discoveries from 'bench to bedside', the Perron Institute is helping to shape the future of health care.

The Institute has an extensive network of collaborations with universities, hospitals, service organisations and other research institutes nationally and internationally. We collaborate with almost 900 researchers in 44 countries. We have over 75 PhD and Master students, and 16 research groups including stroke, Parkinson's, motor neurone disease, multiple sclerosis, epilepsy and rare muscle diseases.

For more information visit: perroninstitute.org or our socials @PerronInstitute.

"During her time as Secretary of NSW Health Ms Koff oversaw the NSW response to the Covid pandemic and advised the Government on the management of covid and the successful vaccine rollout. Elizabeth's experience in both the public and private sector will provide an invaluable contribution to our strategic focus on health and medical research advocacy."

Ms Koff said, "The pandemic demonstrated unequivocally the value of health and medical research. I am pleased to be joining the Research Australia board and contributing my support for this vital sector."

Research Australia's CEO, Nadia Levin said, "Ms Koff's appointment reflects our recognition of the importance of cooperation between public, private enterprise and government when it comes to the broader scientific research endeavour in this country.

"Ensuring that Australia's people continue to enjoy good health and a quality of life means we must make greater use of our research outcomes to drive greater health and economic impact."

Research Australia has also expressed its heartfelt thanks to outgoing Director and past Telstra Health Managing Director, Professor Mary Foley. "Professor Foley's contribution to the health and medical research community is immense and she will continue to share her deep health system expertise with Research Australia as part of our prestigious alumni group," Annette Schmiede said.

RESEARCH!AMERICA

MOVING FORWARD TOGETHER TO ADVANCE RESEARCH AND INNOVATION





ello from the other side of the world! It is a privilege for Research! America to share what we've been working on in hopes it provides context and connections to work together in the future. We face many of the same challenges and opportunities as Research Australia, albeit in different ways, and there is always more we can learn from one another.

As the COVID-19 pandemic continued to challenge our world, the Research! America alliance worked with U.S. policymakers to apply the lessons learned along the way to pandemic preparedness legislation and to step up federal investment. Research! America promoted the need to fuel research and innovation to fight current health threats and fund the research necessary to prepare for future health challenges – an effort that continues in earnest, and requires a global outlook.

Our CEO, Mary Woolley, often reminds us of U.S. President Abraham Lincoln's words, "With public sentiment, nothing can fail; without it nothing can succeed." When the public speaks out, elected officials listen. To that end, earlier this year we commissioned the 22nd edition of our Poll Data Summary, "America Speaks," which constitutes an important snapshot of public priorities as they concern science as well as medical and health research, and helps undergird out advocacy work.

We advocated for statutory and regulatory policies that align with public and private sector-fueled research and development (R&D) to advance progress against deadly and debilitating health issues. In concert with our partners, we championed increased federal funding for federal research institutes, namely: the National Institutes of Health (NIH), the Centers for Disease Control and Prevention, the U.S. Food and Drug Administration, the National Science Foundation, and the Agency for Healthcare Research and Quality.

We also built momentum to stand up the Advanced Research Projects Agency for Health (APRA-H), the proposed incubator for high-risk, high reward translational science. ARPA-H is modeled on the Defense Advanced Projects Research Agency, or DARPA, which has driven breakthrough advances for the U.S. Department of Defense for more than 60 years.

We created opportunities throughout the year for advocates to stay informed, to engage with influential experts, and to provide substantive input into public policy. These included our weekly alliance member webinars on an array of current research issues; the social mediadriven Public Health Thank You Day campaign; and the information-rich National Health Research Forum.

The Forum featured nearly 100 speakers, including more than 20 sitting and former federal officials. Other notable speakers included First Lady Dr. Jill Biden and Olympic Champion Laurie Hernandez. Dr. Biden opened the Forum by stating, "Fighting disease is... a human issue. It touches all of us. To take on illnesses like cancer, evolving superbugs, or future pandemics, we need a determined and collaborative research community united around common purpose."

We increased our commitment to supporting early career scientists by hosting our first Early Career Summit, a one-day virtual conference for early career scientists to learn more about civic engagement, science communication, and science policy. Summit participants learned tools and techniques for the promotion of their own research and engagement with their communities. We also continued our microgrants for graduate-level science policy and civic engagement initiatives.

Research!America continues to support the Science and Technology Action Committee, an initiative that has brought a diversity of thought leaders together to make the case for a far bolder approach to bolstering America's research and development capacity, including significantly increasing the percentage of the gross domestic product devoted to science investment.

In March 2022, at our annual Advocacy Awards, we recognized key congressional champions for medical and public health research and individuals and organizations whose leadership efforts have advanced America's commitment to medical, health, and scientific research and continued the fight against COVID-19.

The program featured a special discussion between Harvard T.H. Chan School of Public Health's Kizzmekia S. Corbett, PhD, and Francis S. Collins, MD, PhD, acting Science Advisor to the President Joe Biden and recipient of the John Edward Porter Legacy Award. Reflecting on an illustrious career devoted to science, Dr. Corbett asked Dr. Francis his thoughts on waning trust in science. "We need a deep investigation into how science communication can be more effective in an area where people are intrinsically resistant," said Dr. Collins, adding, "maybe we are good at quoting statistics and not good enough at telling stories, because people respond to stories."

Research! America is grateful for the opportunity to share a few stories from our year, and to continue to work with our international research associates in Australia and around the world.

Author: Taylarr Lopez, Director of Communications





esearch Canada: An Alliance for Health Discovery is a multi-stakeholder alliance often likened to the Lighthouse in the Canadian health research and innovation ecosystem, calling divergent interests from the academic, private and voluntary sectors to a common shore, lifting them up to a higher view of our collective endeavour and thereby effecting a collaborative advocacy process that simplifies and streamlines health research and innovation advocacy messaging to government.

Ultimately, our mission is to improve the health and prosperity of Canadians by championing Canada's global leadership in health research and innovation. Our philosophy is simple—health research is a shared benefit and shared responsibility, and all Canadians are its steward.

As a multi-stakeholder alliance, our more than 100 Members are drawn from all sectors dedicated to advancing science and developing innovative solutions to improve our health and well-being. Our Members are leading health research institutes, universities and their

faculties, health charities, regional health authorities, scientific societies, colleges, health professional associations and health and biosciences companies. Thanks to this wide-reaching representation, and our close relationships with countless other stakeholders from all sectors, Research Canada is uniquely positioned to educate policymakers and the public about who does what and how we do it together within our health research and innovation ecosystem.

While every country and every sector has different priorities and needs when it comes to health research and innovation, we know that we work best when we work together-whether that's doing research and innovation together or advocating together for better funding and policies in support of health research and innovation. Research Canada's position as a multi-stakeholder alliance-and that of our international Partners like Research Australia—uniquely positions us to bring stakeholders together to advocate not just for themselves, but for the ecosystem as a whole. In this way, we are able to identify some key priorities and messages that impact all components of the health research and innovation ecosystem.

No matter where we are in the world, underinvestment is not an option. As a global community, we were able to respond quickly and effectively to the emergence of COVID-19 thanks to the decades of investment in research that helped us better understand coronaviruses and how to fight-and prevent-their associated diseases. None of us should take this for granted.

As a global community, we must all commit to strengthening our health research funding enterprises to protect and improve health outcomes for all the citizens of the world, and to ensure that we are able to effectively and collaboratively respond to future public health crises.

An efficient research ecosystem requires a whole-ofgovernment and whole-of-ecosystem approach to funding and policy—and that ecosystem is a global one.

The rapid development of COVID-19 diagnostics, therapeutics and vaccines in the wake of the pandemic could not have been possible without global collaborations.

Health researchers around the world were eager to share their findings and knowledge with their international colleagues to help expedite many of the advancements and discoveries that have been made, and international and multi-sector collaborations drove the development and manufacturing of vaccines at an unprecedented speed.

Global governments, too, had to work together with each other and with vaccine manufacturers to ensure that this crucial tool in the fight against COVID-19 was made available and accessible to as many people as possible.

Diversity in Canada's—and the world's—research talent is necessary to fully tap into the best that health research and innovation can offer and ensure that our health research and health care workforces flourish.

A diverse and flourishing research ecosystem is key to generating novel discoveries and to supporting research programs that deliver impact to a wide range of communities across the globe.

It is essential to decolonization and reconciliation with the Indigenous peoples of the world, and to tackling racism, sexism and other forms of discrimination within the health research and innovation ecosystem—goals that we should all be striving for.

No matter where in the world we come from, I think we can all agree on one thing: working together will always be the best way forward.



and CEO, Research Canada



ew Zealand falls well short when it comes to the most fundamental of health and wellbeing outcomes – the right of all New Zealanders to live well to a "ripe old age".

The number of years that we live well has scarcely improved since 1990, too many of us are dying prematurely from both amenable and non-amenable causes, and Māori rates of premature mortality and many other inequitable health outcomes stand at about twice those of the rest of the population.

Given that health research and innovation is the single most important way in which we improve our health and healthcare – by identifying and implementing the best means to prevent, diagnose and treat conditions – New Zealanders for Health Research (NZHR) is concerned that our country's intent to develop New Zealand's health research capacity is ambiguous, with a health research system at crossroads represented by:

- The passing in 2022 of the Pae Ora (Healthy Futures) health reforms legislation which for the first time stipulates health research as a core function of New Zealand's health sector.
- The government's Te Ara Paerangi Future Pathways Green Paper which sets the scene for reforming New Zealand's research, science and innovation system, including health research.
- The New Zealand Health Research Strategy reaching the half-way mark of its ten year 2017 – 2027 lifespan, with no signs of an imminent refresh.
- Persistent government resistance to addressing its chronic underinvestment in health research.

The challenge presented by these crossroads is not in deciding which path to choose, but in identifying how we navigate them simultaneously. Our 2022 and sixth annual NZHR public opinion poll report¹ is intended to illuminate how to best move forward in a way that is informed by health research's primary stakeholders – the New Zealand public in general together with health sector consumers and their whānau and family.

More funding for health and medical research was among New Zealanders' top twelve issues for the government

1 After a gap year in 2021 this poll was undertaken in late May/early June 2022, a few days after Budget day on 19th May, and is the second conducted for NZHR by Kantar New Zealand. As in 2020 the poll is based on a sample of 1000 adult New Zealanders comprising a representative cross section of the population based on gender, age, geographic location and Māori/non-Māori. From 2016 to 2019 similarly stratified polls were undertaken by Roy Morgan Australia based on sample sizes of 500.

to focus on, as it has been for five out of our six polls. Seventy five percent agreed that government should invest more funding in health research, 66% said that the 2022 budget of \$173 million dedicated specifically to health research (0.8% of health care costs) is too low, and only 9% supported successive governments' practice of investing less than 1% of health care costs into health research (39% said it should be more than 2%)

New Zealanders for Health Research agrees. Since 2007/08 the government's direct specific investment in health research averaged 0.7% of health care costs. NZHR maintains that the government should be committing to lift this to at least 2.4% of health care costs over the next ten years.

The accompanying graph illustrates actual levels of health research investment since 2007 and NZHR forecasts – dropping from the current 0.79% of health care costs to 0.51% from 2025/26 onwards, when the health related national health science challenges allocations are due to expire – together with the trajectory required to achieve NZHR's ten year 2.4% target comprising annual increases of 15.24%.

To summarise, and as supported by our latest poll results, NZHR believes that a threefold investment in health research is the minimum required to:

- Improve premature amenable and non-amenable premature mortality and morbidity outcomes for Māori and non-Māori alike.
- Enable New Zealand's new health entities Te Whatu Ora, Te Aka Whai Ora and Manatū Hauora to undertake their research functions.
- Enable improved health outcomes to be recognised and securely resourced as a key priority for the new Research, Science and Innovation system.
- Create a research culture embedded within health services delivery where clinicians routinely engage in health research as a key component of their practice.
- Resource continued implementation of the New Zealand Health Research Strategy.
- Support investigator led and other research where line of sight to impact is difficult to articulate.
- Free up health and medical researchers to get on with what they're good at rather than having their time overly occupied by writing funding bids for a share of an unreasonably scarce and time limited resource.

Author: Chris Higgins, Chief Executive, New Zealanders for Health Research



esearch!Sweden was created in 2010 and is a politically independent, non-profit foundation. Our vision is that medical research organsiations and companies will develop in, or move to, Sweden and that medical advances will benefit the population as fast as possible.

Research!Sweden's mission is to inform and raise awareness about the importance of medical research for health and prosperity. We do this by providing key decision-makers with facts, policy advice, and creating a constructive discussion-climate for change. In 2014 we created the member-organization "Agenda for health and prosperity" where 35 organizations join forces to collaborate under the leadership of Research!Sweden.

The members are evenly balanced between academia, healthcare, business, federal agencies and patientorganisations. We work with a system approach and a long-term view to improve the environment for performing medical research, business, and healthcare.

Our first project was to lay a foundation for a strategy for life science in Sweden. Having all different actors around the table, sharing the analyses that Resesarch!Sweden had prepared as background material and agreeing on what needed to be prioritised at a national level was an exhausting, but necessary and very rewarding experience. Several meetings and months later we had agreed on 4 goals and 14 prioritized policy proposals. Our report included a thorough analysis as well as action plans for each proposal.

We presented the report to the three ministers of research, industry and health who all attended a conference we arranged at the Karolinska Institutet in early 2015. At that time the government had recently appointed a life sciencecoordinator who also was there to receive our report. That was the start of a constructive collaboration and the coordinator later stated publicly that he made great use of our input. He could move faster on bases of our proposals

since they had already been agreed upon by such a broad representation of the life science-actors in Sweden.

Since then, we've continued to work in a highly structured way with workshops in areas that the members decide on in yearly strategy meetings. Research!Sweden develops the results from workshops into reports and also transfers the knowledge through conferences and political meetings. That way we really make a difference in keeping policy makers alert to the advances in science and the impacts these advances have on the development in life science and healthcare. Adding to that are the policy proposals we develop for Sweden to keep a competitive edge in this field, with the end goal of increased health and prosperity.

In 2022 our focus has been on precision health. We developed and published the first Swedish definition in January and then produced a report explaining the concept and the building stones needed in order to develop and benefit from precision health. As the field is broad, and there is a need for increased understanding of what precision health is, we highlighted 10 ongoing projects in various parts of Sweden, both in the report and in a film.

The report and film have been spread through personal meetings with political decisionmakers, social media and seminars. The goal is to increase the knowledge level so that politicians better recognise the need for specific investments, regulatory changes etcetera, when such actions are proposed. Given the transformation that precision health brings about, we know structural changes will be needed and this is a way of getting there faster.

Author: Anna Nilsson Vindefjärd MBA PHD, Founder and Secretary General of Research!Sweden. www.forskasverige.se/en/

CREATING BETTER HEALTH CARE FOR REFUGES AND MIGRANTS

New global competency standards for health workers drives equity for communities on the margins of health care

his century has seen the number of migrants who are forcibly displaced grow. People who are forcibly displaced are no longer only people fleeing persecution and war.

They now include a growing number of people displaced due to the impacts of climate change. Increased weather events such as flooding, bushfires and droughts are affecting people's food security, housing stability, and livelihoods, forcing them to become climate refugees.



Refugees often arrive to a country of destination with physical and mental health issues associated with the danger in the country they left, or because of the circumstances they faced in transit. They can also develop health issues because of the living and working conditions, and cultural barriers they experience in the new country.

Additionally, a large migrant workforce moves from poorer countries to richer countries to provide domestic, manufacturing, construction or agricultural labour. This results in large numbers of people trying to access health services that are often restricted, and navigate unfamiliar health care systems in a new country.

281 million people (3.6% of the world's population) live outside the country they were born in, and many have difficulty accessing the health care they need. As a result, there is a growing need to ensure refugees and migrants receive not just quality care but also equality of care.

The Global Competency Standards for health care workers working with migrants and refugees released by the World Health Organisation (WHO) earlier this year does just that. The standards provide guidelines for operationalisation, and guidance for health organisations to build the standards into curricula.

The evidence-informed Global Competency Standards are the first ever global competency standards in this area, and are the result of a collaboration between the Australian National University (ANU) and the Migration Council of Australia - which auspices the Australian Migrant and Refugee Health Partnership.

Utilising the WHO Global Competency Framework for Universal Health Coverage, the standards for health workers were developed under five domains: people centredness, communication, collaboration, evidence-informed practice, and personal conduct.

GLOBAL COMPETENCY STANDARDS IN ACTION - A CASE STUDY

Ivan is one of the at least 12 million people who is displaced due to the ongoing war in Ukraine. He has arrived in a neighbouring country with his only son remaining in Ukraine to fight. He is 75 years old and diabetic. Just prior to the Russian invasion, his wife of 40 years passed away. His wife and son managed his medication when they lived in Ukraine so he is unfamiliar with how much medication he takes.

Upon examination, the health care worker notices he has high blood pressure. They initially try to communicate in Russian, however, the young health worker isn't fluent in Russian so calls upon a Ukrainian interpreter to help with the consultation. Through the consultation they realise that Ivan will need instructions and support in administering his medication. He is also struggling psychologically because of his wife's passing. He is feeling isolated and lonely and unsure about his or his son's future.

The health worker discusses with Ivan the foods he'll need to eat to lower his blood pressure, ensures he has written instructions and understands how to measure his glucose and administer his medication, and advises where he can access the medications he needs for free. The health worker also refers Ivan onto psychology and social support services.

After the consultation, the workers debrief. The interpreter who is originally from Ukraine has grandparents who are in the conflict zone. The consultation with Ivan has made her think about her own grandparents. The health worker provides the interpreter an ear to share her feelings, providing her emotional support.

The case study, adapted from a case provided by the WHO, demonstrates the Global Competency Standards, as follows:

People centeredness relates to the importance of quality care and continuity of care. It reflects behaviours from the health worker to empower refugees and migrants to be the agents of their own healthcare by arming them with knowledge about the health system and information to increase their health literacy.

Communication behaviours ensure health workers are mindful of language, cultural, gender and age differences and take these into account when working with migrants and refugees. This includes employing appropriate aids, such as an interpreter, to ensure the patient understands the medical information provided to them.

Collaboration encourages health workers to engage appropriate community and social supports, including legal, education, employment, and housing – all of which lead to better outcomes for the migrant or refugee. It also calls for workers to recognise that surges in demand for services need a flexible and team approach.

Evidence-informed practice promotes the reliance on evidence, or generating evidence, when responding to a migrant's or refugee's health needs in planning and delivery of care.

Personal conduct highlights the need for ethical and culturally sensitive behaviour towards migrants and refugees, and the need for self-care (physical and mental) and mutual support between health care workers.

Author: Professor Christine Phillips, Associate Dean, Health Social Science, Australian National University. Co-lead of the WHO Global Competency Standards for health care workers with the Migration Council of Australia.

INTERNATIONAL NETWORKS ADVANCING PERSONALISED DIAGNOSIS AND TREATMENTS

In Australia, approximately 1.2 million people are affected by an autoimmune disease in which a person's immune system malfunctions and mistakenly attacks their own body.

mmune-system diseases are the third leading cause of morbidity and mortality in the industrialised world, surpassed only by cancer and heart diseases.

Women are up to ten times more likely to be affected by autoimmune diseases than men. These diseases tend to cluster within families and genetic studies have identified a strong but complex genetic component to autoimmunity. Over time, these conditions tend to result in cumulative impairment of health. Therefore, early diagnosis and intervention is critical for preventing potentially significant lifelong health problems.

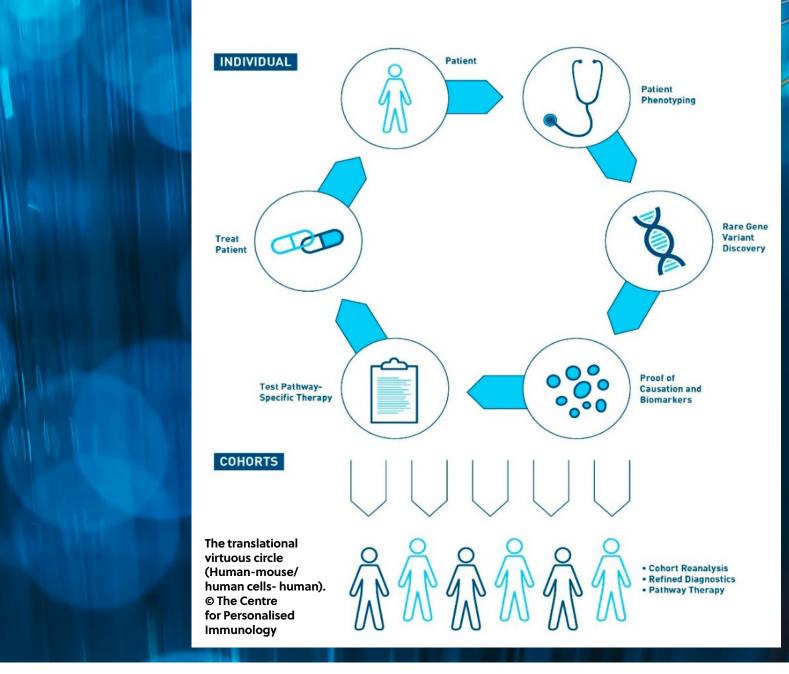
To advance the understanding of the basis of each individual's autoimmune disease, the Centre for Personalised Immunology (CPI) was established at the John Curtin School of Medical Research (JCSMR) at The Australian National University (ANU). Using a novel approach supported by advanced genomic technologies, CPI researchers look to provide a 'personalised' diagnosis for patients and find more effective treatments for their conditions.

By sequencing a patient's whole genome from their saliva or blood sample, for instance, researchers can analyse their genomic data and identify genetic variations that can contribute to the disease and through understanding of these contributions identify novel treatments.

The CPI then uses genome editing technology to replicate these mutations in human cell lines and mouse models to validate their role in disease and test treatments. This enables the CPI to identify the precise cause and effect and not just association with disease pathologies.

Recently, the CPI team undertook whole-genome sequencing of a Spanish girl diagnosed with systemic lupus erythematosus (SLE) at the age of 7 and identified, for the first time, a lupus-causing genetic variation of a gene named TLR7. CPI researchers noted that rare gene variants, which occur in less than 1% of the population, are found in most lupus patients and serve as a major cause of this disease. By identifying and understanding these variants, CPI researchers could shed light on the development of novel and more effective treatments for lupus and other autoimmune diseases.

These discoveries have led to large international cooperation in immunology research, with the CPI driving a paradigm shift by establishing and expanding an international network of clinical researchers and collaborators in 13 countries on four continents.



This major discovery in a young Spanish girl demonstrates the importance of building international partnerships to facilitate genetic studies in ethnically diverse populations," stressed Dr Simon Jiang at the CPI.

The impact of discovering unique mechanisms of autoimmunity in different ethnicities led to formation of major international collaborations such as the China-Australia Centre for Personalised Immunology, a dedicated Centre in Shanghai to adapt the CPI processes for Chinese patients with autoimmune disease. The CA-CPI has recruited over 400 patients for personalised medicine investigation.

Further, to date CPI and its international collaborators in Europe, North America and China have recruited over 1500 patients, carried out multiple genomic diagnoses, and substantially changed the lives of patients.

In Canberra, for example, researchers at the CPI sequenced the genome of a 65-year-old man, eventually diagnosing a new autoinflammatory disease and identifying the gene that caused this condition. Treated

with therapy targeted to the underlying disease process, the patient's condition has been significantly improved.

Over the past few years, CPI's approach has been expanded to many diseases with a genetic component. By understanding the genetic pathways underlying these diseases, CPI empowers clinicians worldwide to be increasingly able to choose better diagnosis and treatment options. With more resources to build up the CPI process across diseases, significant intellectual property will be established in the form of discoveries, biomarkers, knowhow and patentable inventions. Ultimately, the paradigm of international collaboration in personalised immunology will deliver long-term cost benefits to the healthcare system on a global scale.

Author: Author: Dr Simon Jiang, Researcher, The Centre for Personalised Immunology; Group leader, The John Curtin School of Medical Research, The Australian National University; Nephrologist, The Canberra Hospital.

CONSUMER-CLINICIAN CODESIGN TO IDENTIFY RESEARCH PRIORITIES FOR IBD

Overcoming barriers in using an established UK methodology for Identifying short to medium term IBD research priorities

or the estimated 100,000 Australians living with inflammatory bowel disease (IBD), the fact that there is no known cause or cure makes the need for more research abundantly clear.

The prevalence of IBD in Australia, a group of serious intestinal diseases the most common of which are Crohn's disease and ulcerative colitis, is one of the highest in the world. With so many research questions yet to be answered we asked Australians with IBD and their healthcare professionals what was important to them.

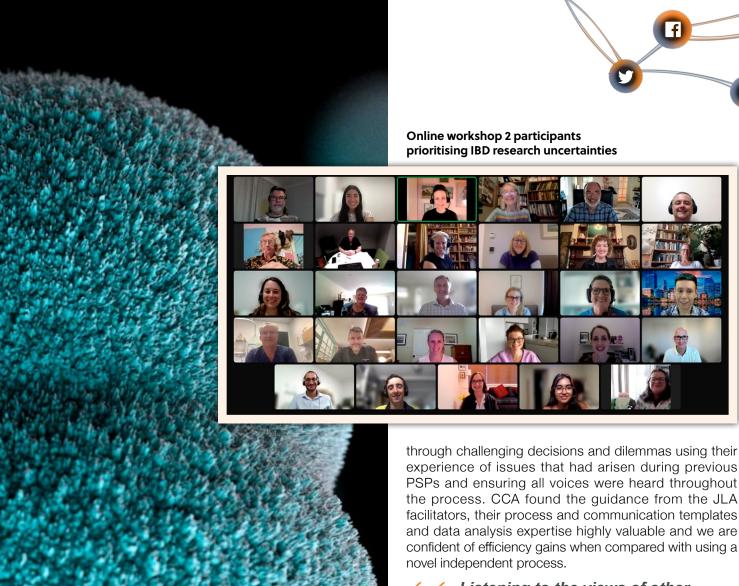
Commonly the direction of research is influenced by scientists, industry, government, peak bodies, academia, grants and philanthropic funding. The National Health and Medical Research Council is clear that high quality and meaningful contributions should be sought from consumers, healthcare professionals and clinical researchers who can ensure relevance through direct experience and insights that emerge through lived experience and clinical practice.

Crohn's & Colitis Australia (CCA) partnered with the James Lind Alliance (JLA), a UK based organisation, to determine the top 10 research priorities for IBD, as identified by people with IBD and clinicians in Australia. The JLA methodology, proven in the UK and internationally through

170 priority setting partnerships (PSPs), is designed to raise awareness of research questions which are of direct relevance and potential benefit to patients and the clinicians who treat them. The JLA process applied by CCA involved:

- 1. A national survey to gather IBD research uncertainties (890) from people living with IBD, carers, healthcare professionals and clinical researchers.
- 2. Thematic grouping of similar research uncertainties to develop summary questions. These were checked against current evidence to determine whether the question was answered by current research.
- 3. A second national survey to prioritise and rank the remaining unanswered research questions for people with IBD, carers and healthcare professionals.
- 4. Two discussion workshops for people living with IBD, carers and healthcare professionals to rank the top 17 questions and decide on the final top 10 list of research priorities for IBD in Australia.

The JLA PSP method aims to change the way research funding is granted, and to raise awareness of research questions which are of direct relevance and potential benefit to patients and the clinicians who treat them. The PSP method excludes commercial funding sources to reduce the risk of influence and bias.



through challenging decisions and dilemmas using their experience of issues that had arisen during previous PSPs and ensuring all voices were heard throughout the process. CCA found the guidance from the JLA facilitators, their process and communication templates

Listening to the views of other patients, carers and healthcare professionals was very insightful and often influenced the group's views positively"-Workshop participant

As a project using a predominantly UK and internationally implemented methodology by the JLA, unique challenges were encountered and overcome, including differences between the UK and Australia on gaining ethics approval. Ethics approval is clearly not required in the UK for this type of project but is in other countries. The position in Australia was unclear so CCA sought guidance from a Human Research Ethics Committee, who determined that the research was quality improvement and consumer engagement, therefore not requiring ethics approval.

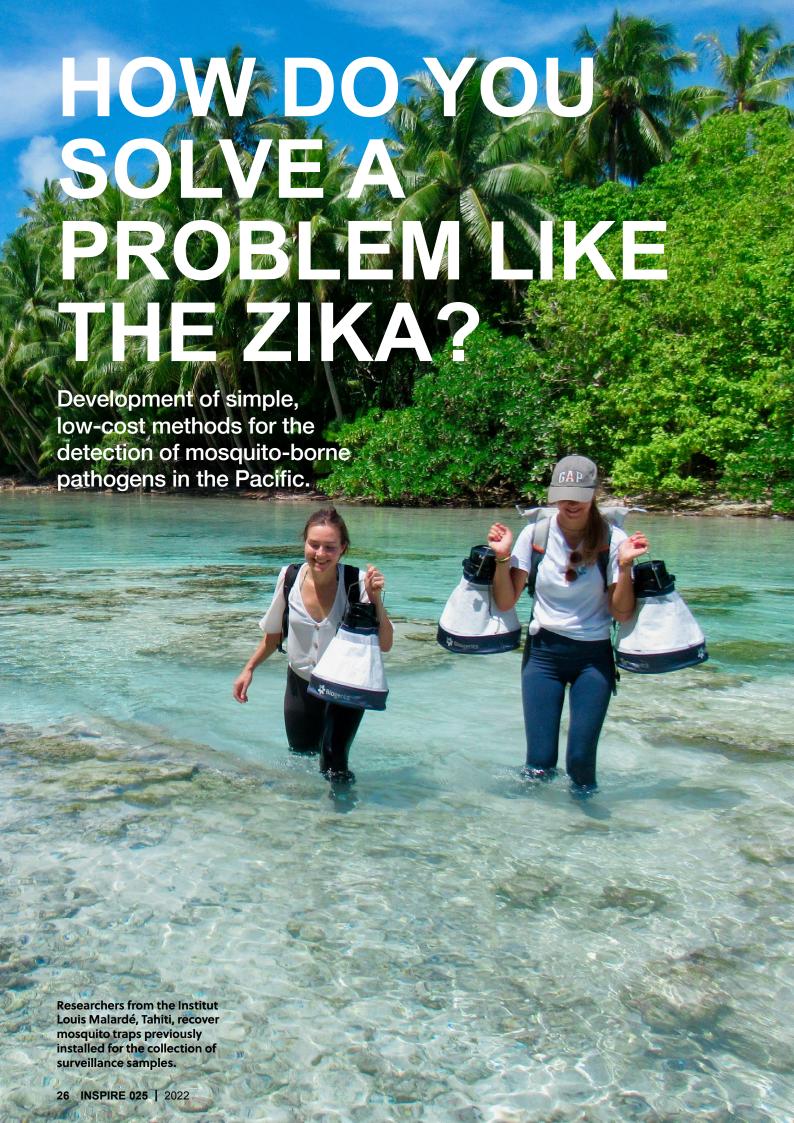
To learn more about project please visit: https:// crohnsandcolitis.org.au/research-priorities

Author: This article was prepared by Hailey Fisher on behalf of the other health professional and consumer members of the Project Advisory Committee Wayne Massuger, Dr Rimma Goldberg, Leanne Raven, Katherine Cowan, Prof Susan Connor, Dr Emma Halmos, Dr Ed Giles, Prof Antonina Mikocka-Walus, Cassandra Anslow, Marnie O'Brien, Blake Tierney, Claire Reilly, Prof Paul Pavli.

CCA is a not-for-profit organisation that receives funding from various sources and this project had a mix of commercial pharmaceutical company and philanthropic funding. The first hurdle of international collaboration for the project arose. CCA advocated that the Medicines Australia Code of Conduct support groups like CCA to receive educational grants from industry at arms-length to avoid risk of influence. Our UK partners responded, creating the 'JLA Lab' to allow organisations to complete a partnership in an experimental capacity that supports innovation and addresses stakeholder challenges, whilst maintaining the integrity and reputation of JLA PSPs.

CCA and the JLA collaborated to evaluate the impact of commercial funding on projects. Preliminary data indicates participants agreed that the commercial funding did not influence: the scope and focus of the project; the decisions made by the Steering Group; the way the project engaged with consumers and healthcare professionals; or the final selection of the Top 10 research priorities.

CCA worked hard with JLA to achieve this partnership for important reasons. The proven methodology supports fair and equitable balance of participating voices. The experienced and highly-skilled JLA facilitators who co-chaired Steering Committee meetings and facilitated participant workshops, helped navigate





uch of the world's 7.5 billion people live in countries where mosquito-borne diseases are common and problematic. For islands in the Pacific, outbreaks of diseases such as dengue, Zika, and chikungunya are relatively frequent and can have significant impacts on both the populations and economies.

Problematically, the spread of these diseases and the frequency of outbreaks are increasing. The first outbreak of Zika virus outside Africa was reported in 2007 on the island of Yap in the Federated States of Micronesia. This was followed by outbreaks of Zika and chikungunya viruses in French Polynesia in 2013 and 2014, respectively.

The introduction of two mosquito-borne infections in less than 12 months drew into sharp focus the impact that arthropod-borne viruses can have on both the populations and economies of Pacific Island nations.

SURVEILLANCE AND DETECTION

Surveillance of mosquitoes and early detection of pathogens can help to reduce the burden of outbreaks, as they enable intervention approaches such as mosquito control to be implemented. Current mosquito surveillance approaches involve the use of special traps to collect thousands of mosquitoes over the course of a few days. The collected mosquitoes are then transported to a laboratory where they can be tested for pathogens using approaches such as reverse transcription polymerase chain reaction (RT-PCR), where the virus sequence is amplified to detectable levels. Although effective, these techniques require specialised, expensive equipment, highly-trained personnel, and temperature-sensitive reagents.

To try to overcome some of the limitations of existing surveillance approaches, we have established the SUMOPAC (Surveillance des moustiques vecteurs et des agents pathogènes responsables de maladies infectieuses émergentes dans le Pacifique) project. In English this translates as the Vector and Pathogen Surveillance for Emerging Infectious Diseases in the Pacific project. This project, a collaboration between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia, the Institut Louis Malardé (ILM) in French Polynesia, the Institut de Recherche pour le Développement (IRD) in French Polynesia, the Ministry of Health of the Cook Islands, and the Scientific Research Organisation of Samoa (SROS), is co-funded by the collaborating institutions and the Fonds Pacifique programme of the French Government. The project aims to develop simple, low-cost methods for the surveillance of mosquitoes and associated pathogens in the field within Pacific Island countries, without the need for expensive equipment or highly-trained personnel.

To date, the project has focussed on three main areas: testing of improved mosquito traps for the collection of mosquitoes in urban and rural locations, development of approaches to identify species upon which mosquitoes have fed, and the development of loop-mediated isothermal amplification (LAMP) assays that can detect target nucleic acids with both sensitivity and specificity.

TAILORING TRAPS TO IMPROVE DETECTION

There are four main disease vector mosquito species in the Pacific region: Aedes aegypti, Aedes albopictus, Aedes polynesiensis, and Culex quinquefasciatus. Different mosquito species have different preferences when it comes to visual and odour attraction. Accordingly, a particular trap may favour the collection of one species over another. Dr Brendan Trewin and Xiaobei Wang, based at CSIRO's Dutton Park facility in Queensland have been working to test new traps using colours and attractants favoured by the mosquito species present in the region. In both laboratory and field tests within Australia, their designs are showing improvements in trapping efficacy compared to commonly used commercial traps.

The identification of animal species upon which mosquitoes feed is important for a number of reasons. It provides a clearer picture of the cycles involved in pathogen transmission, and also allows for the determination of risk for future disease introductions – e.g. sea birds that travel great distances could pick up a virus in one location and pass it on to mosquitoes in another. Dr Hervé Bossin, Dr Françoise Mathieu-Daudé, Tanagra Lambert, and Clémentine Vergnaud at ILM-IRD in Tahiti have been working to develop molecular approaches to identify the source of blood within fed mosquitoes.

BETTER PATHOGEN DETECTION

Simple, low-cost, and temperature-stable techniques for pathogen detection are important to allow for timely, 'in field' surveillance in remote communities, where sending samples for testing in centralised laboratories is often impractical. Dr Alexander McAuley, Dr Kim Blasdell, and Dr Prasad Paradkar, based at the CSIRO Australian Centre for Disease Preparedness in Geelong, Victoria, have been developing LAMP assays and low-cost sequencing techniques that can specifically detect dengue, Zika, chikungunya, Ross River, and Japanese encephalitis viruses in mosquito samples without the need for complicated and expensive equipment.

The goal of the SUMOPAC programme is to positively impact Pacific Island communities through the early detection of mosquito-borne pathogens to allow for intervention approaches to be implemented to stave off widespread outbreaks in the future.

Author: Dr Alexander McAuley (he/him) is a Research Scientist within the Human Health Programme at the CSIRO Australian Centre for Disease Preparedness in Geelong, VIC. He leads a range of projects focussing on the detection, prevention, and treatment of emerging infectious diseases.



Now one of the world's largest biotechs, a hallmark of CSL's remarkable growth has been its approach to global collaboration, which is yielding new opportunities for innovative research with strategic alliances and partners around the world.

SL sees long term, values-driven global alliances as vital to building our research and innovation capability. Our philosophy of global collaboration underpins our presence within research hubs and precincts around the world.

Strong global research networks and collaborations are integral to our R&D business, as they provide valuable opportunities for our scientists to interact, discover and innovate with external partners.

We are incredibly ambitious about what we want to achieve in the biotech space. But we know that to deliver, we need to tap into the vast pool of scientific and research talent, both existing and emerging, from around the world.

STRATEGIC GENE THERAPY ALLIANCE WITH THE SEATTLE CHILDREN'S RESEARCH INSTITUTE

Across research hubs in Australia, the US and Europe, CSL's scientists are forging discoveries across our therapeutic areas of research focus: immunology, haematology, cardiovascular and metabolic, transplant, respiratory, and vaccines. Underpinning our work in these therapeutic areas of interest are our collective capabilities across four drug discovery platforms, including Cell and Gene Therapy.

Over the past five years, our scientists and R&D experts have been developing a world-class cell and gene therapy platform. Collectively, CSL's focus is on state-of-the-art technology and the development of ex vivo hematopoietic stem-cell gene therapy, which seeks to correct the underlying cause of disease potentially leading to a cure.

In 2020, CSL announced a strategic alliance with one of the world's leading paediatric research centres, Seattle Children's Research Institute to develop stem-cell gene therapies for the life-threatening disease, Wiskott-Aldrich syndrome (WAS), along with plans to tackle other primary immunodeficiency diseases.

WAS is a debilitating disease that affects young children, caused by a mutation in the gene that produces the WAS protein in hematopoietic cells, which are critical for the development of a functional immune system.

Female carriers exhibit no clinical signs, however males experience a myriad of problems, including difficulty with



disease, as well as greater susceptibility to cancer.

Without treatment, the 1 in 100,000 males born with WAS are unlikely to survive beyond the age of ten. Currently, the only known cure for WAS is a bone marrow transplant.

Seattle Children's has pioneered research into WAS. With CSL's commitment to enhancing the quality of life for people with rare and serious diseases and aspirations in novel gene therapies, we hope to accelerate that research into clinical trials in the near future, with a therapy that can potentially correct the genetic abnormality.

ACCELERATING RESEARCH INNOVATION

The CSL Research Acceleration Initiative (RAI) establishes partnerships between CSL and global research organisations to progress the commercialisation of promising discovery programs. Each year, the team led by Dr. Marthe D'Ombrain, Senior Director and Head of Global Research Innovation at CSL, seeks to identify promising research programs around the world which will benefit most from fast-tracked collaboration and support.

In the past three years, CSL's RAI has established over 20 strategic partnerships with universities, medical research institutes, start-ups and others in the biotech space globally.

When it comes to potential partners, we keep an open mind, providing there is an alignment with our therapeutic areas and platform expertise. We know where our

strengths lie and conversely, where there may be opportunities to do more.

This strategy offers long-term benefits for CSL and our research partners, including access to international academic networks and CSL's in-house capabilities, new talent and deep subject matter expertise, as well as extending our global Research footprint.

In ten years, we want to look back and see projects advanced by CSL making a difference to the lives of patients. So we need to know that what works for us. also works for our partners and ultimately, for patients."

To solve the most complex health challenges we face today, we need to innovate across organisation and geographic boundaries to support the patients of tomorrow.

Author: Dr. Michael Wilson, Vice President, CSL Research

RECOGNISING THE CONTRIBUTION OF AUSTRALIAN RESEARCHERS

The GSK Award for Research Excellence is one of Australia's longest-standing independent medical research awards. We asked some members of our judging panel to reflect on the value of these awards, the importance of collaboration in research and to offer some insights into medical research in Australia.

ach year, GSK Australia highlights the remarkable medical research being conducted locally through the GSK Award for Research Excellence (ARE), however we rarely get to see 'behind the scenes'.

"A lot of work goes on in the background before we get to celebrate another outstanding research project," said Dr Alan Paul, GSK Australia Medical Director. "This involves the GSK ARE judges applying their skills and knowledge to help identify outstanding researchers, whose work centres on improving human health for people in Australia and across the globe.

"To acknowledge their efforts, we're hearing firsthand from our judging panel on how their work in medical research has informed their passion to further support the medical community and give back."

AUSTRALIAN RESEARCH IS 'UTTERLY EGALITARIAN'

Molecular scientist and infectious diseases researcher, Professor Brendan Crabb AC, is a winner of the 2019 GSK ARE and now sits on the judging panel.

Professor Crabb, who is Director and CEO of Burnet Institute, describes Australian research as "utterly



egalitarian" as it serves no other purpose than to improve the health of humanity.

"As my own research life in malaria can attest, Australian health and medical research often goes one step further to emphasise health issues of people who are disadvantaged, marginalised or otherwise vulnerable.

"For the GSK ARE to recognise this sort of work is not a surprise, however it is incredibly important and welcome. It says, 'everyone matters'."

Professor Crabb said research, both in Australia and globally, needed more investment to mitigate against emerging threats. Infectious diseases are now frequently in the spotlight, most recently with COVID-19, but another issue currently unfolding is antibiotic resistant bacteria.

"Solving big complex health problems takes more than any one individual or organisation, it takes a broad-based global village. And this is reflected in the operating principles of the GSK ARE. That means individuals getting to know one another across diverse disciplines, working together, supporting each other, seeking and giving advice freely."



RESEARCHERS NEED TO GO INTO THE PATIENTS' WORLD

GSK ARE judge and Chief Executive Officer at the Centre for Community Driven Research (CCDR), Dr Kate Holliday, said patient engagement was a growing priority for researchers.

"We often talk about infrastructure for clinical trials and research, but not for the community engagement part of research and that's what CCDR aims to do, so that we can implement engagement in a systematic way.

"We are developing processes that encourage researchers to go into the patients' world so that patients can talk about their experiences in a more supportive environment."

Dr Holliday said researchers were increasingly being guided by patients - what they were struggling with and what their most urgent clinical needs were.

"If you are a researcher, think about how your research addresses some of those important challenges we hear patients talking about.

"It is great to see that experts who have patient engagement and experiences front of mind, are invited and welcome to have a say when it comes to prestigious industry awards, like the GSK ARE."

OPPORTUNITY TO 'GIVE BACK'

Professor Richard Scolyer, world-leading melanoma pathologist and Co-Medical Director of the Melanoma Institute Australia, was co-winner of the 2018 GSK ARE.

Professor Scolyer said his motivation for being a GSK ARE judge was the opportunity to 'give back'.

"Australia is blessed with some incredible researchers. It's really an honour to learn about their amazing achievements by participating in the judging process."

According to Professor Scolyer, selecting an outstanding research project to be named a winner of the GSK ARE, isn't easy, trying to weigh up a particular project against another.



"In this day and age, most research that is impactful is multidisciplinary. Individuals nominated for this award tend to be working in collaboration with an outstanding group of researchers. I think that is a commonality between all these high achievers."

Professor Scolyer said considerations in judging included the impact of research in improving the lives of fellow humans.

It's usually real results, but it might be more basic science, like preclinical work, that has the potential to transform care. For example, in cancer research, understanding what the drivers are and what the causes of cancer are may have incredible impact."

Echoing Dr Holliday's views, Professor Scolyer said the Melanoma Institute Australia's research was driven by their patients. "We have a meeting every week where we discuss the most challenging clinical problems and invariably, questions come up and that's what drives our research program.

"I find it inspiring that in Australia, patients are so keen to contribute to our research, even though it is the next generation of people who will benefit."

GSK Australia looks forward to celebrating the high-calibre and ground-breaking work from Australian medical research community at the **Research Australia Health and Medical Research** Awards Night on Thursday 8 December 2022 in Melbourne.





Patients on ventilators are now part of the nightly news, thanks to COVID-19.

hile mechanical ventilation saves lives it can also lead to breathing discomfort, anxiety and poor clinical outcomes. Australian and French researchers have developed a new system that applies machine learning to quickly alert doctors to suboptimal ventilation and patient distress.

Most of us do not think about breathing – it just happens. The automatic respiratory control centre in the brainstem at the base of the brain rhythmically sends electrical signals to the respiratory muscles. The respiratory muscles are then activated to ventilate the lungs. This occurs more than 20,000 times each day.

In critical illness (due to injury or disease), extra breathing support is needed when the patient's own breathing control by the brain is not adequate to ventilate the lungs. This may occur for example, due to a load on the lungs (e.g. pneumonia) or insufficient respiratory muscle activity (e.g. with sedation). Mechanical ventilation provides external assistance to the patient, boosting ventilation to ensure oxygen levels are maintained.

Typically, the ventilator works not by taking over breathing for the patient, but by supporting breathing attempts generated by the automatic control centre.

However, the mechanical ventilation-patient interface is dynamic. Critically ill patients are unstable and breathing attempts by the patient are affected by changes in the level of consciousness, sedation, pain, fever and other factors. This results in frequent and rapid changes in the balance between the breathing efforts of the patient and the support provided by the mechanical ventilation.

Unless the breathing support provided by the ventilator is modified in parallel with patient's efforts, the patient and ventilator can become 'out of sync'. For example, the patient's breathing efforts may occur at different times to the ventilator support within the breathing cycle, or the ventilator may provide too much support (which overinflates the lungs), or too little support (that does not maintain oxygen levels).

These circumstances are very uncomfortable and distressing for the patient as they experience breathing discomfort (dyspnoea) and anxiety. This problem is often exacerbated when critically ill patients cannot communicate their distress to their caregivers. Breathing support for patients on ventilators needs to be optimised.

A 'BRAIN-VENTILATOR INTERFACE' TO OPTIMISE BREATHING SUPPORT

In addition to the automatic control of the respiratory muscles for breathing, other brain regions can send electrical signals to activate the respiratory muscles. For example, at this very moment you can voluntarily sniff, breathe in deeply or even hold your breath (for a short time anyway!).

This is due to respiratory muscle activity that originates in the motor cortex, situated at the top of your brain. Although the motor cortex can be used to activate the respiratory muscles, it is abnormal for this brain region to be active for every breath during resting breathing. When activity in the motor cortex occurs during breathing, breathing can enter conscious perception and it is usually associated with respiratory discomfort or dyspnoea.

'Abnormal' activation of the motor cortex for breathing control can be detected by recording brain activity, known as electroencephalography (EEG). While theoretically this presents an opportunity to determine when critically-ill patients and their mechanical ventilators become 'out of sync', traditional methods to identify abnormal motor cortex activity during breathing are slow (>5 minutes) and imprecise.

A system that detects altered brain activity needs to be fast, accurate and specialised for intensive care. In collaboration, French and Australian researchers are developing a 'brain-ventilator interface' that rapidly detects inadequate ventilation and dyspnoea. The team of clinicians, signal processing experts and respiratory physiologists are developing, testing, and refining the technology to make this possible.

The new technology uses machine learning. The premise of machine learning is you 'teach' the machine a scenario and it can then detect when there is a deviation from that scenario. For a 'brain-ventilator interface', the machine learning algorithm will be taught the optimal scenario, i.e. the 'EEG signature' when ventilation is optimal and the patient is comfortable.

The machine can then test on-going EEG. If the patient and ventilator become 'out of sync', the control of breathing by the brain will change and the EEG signature will deviate from the established optimal scenario.

The machine will detect this change and sound an alarm for a review of the ventilator settings by a clinician. This will re-establish the correct balance between the patient and ventilator and minimise the duration of both inadequate ventilation and respiratory discomfort for the patient. Once refined and implemented, this interface will improve patient care and health outcomes in hospitals.

Author: Dr Anna Hudson, Senior Research Fellow, **Flinders University**



elebrated ESA Astronaut Samantha Cristoforetti left earlier this year to return to the International Space Station for her second mission, Minerva, spending 4 months in space.

Samantha was launched in a new SpaceX Crew Dragon capsule called Freedom alongside her Crew-4 crew mates and NASA astronauts. On Station, she is USOS Lead, responsible for all activities within the US Orbital Segment for the duration of her mission. This segment includes the US, European, Japanese and Canadian modules and components of the Space Station.

Through the #LiftOffForBoneHealth campaign, Samantha Cristoforetti will advocate for bone health and remind us that, in space or on earth, we must exercise to maintain strong bones and muscles.

Samantha is encouraging people all over the world to engage in regular weight-bearing and resistance exercises that will help them build and maintain strong bones for life. 'As an astronaut, I know that a tailored exercise program before, during, and after my space mission will be critical to keeping me strong and fit. Without intensive load-bearing and resistance exercises designed to counteract bone





multimodal osteoporosis pr evention and treatment on Earth.

That's why it's so important that we all make bone and muscle strength our personal mission, and why I hope to inspire people of all ages, and especially younger women, to stay fit through regular load-bearing exercises as part of a bonehealthy lifestyle."

IOF President Professor Cyrus Cooper praised the European Space Agency for their support. 'I would like to thank the European Space Agency and ESA Astronaut Samantha Cristoforetti for their participation in this important public health campaign which will serve to highlight the importance of weight-bearing and resistance exercise as a critical cornerstone of osteoporosis prevention.'In Australia over 183,000 fractures related to osteoporosis occur annually and account for up to 67% of the overall cost of the disease. Healthy Bones Australia CEO, Greg Lyubomirsky says 'we need to focus on preventing unwanted fractures and being proactive with evidence-based activity we know can help protect our bones.'Philippe Halbout, IOF CEO says 'The International Osteoporosis Foundation is delighted that IOF member societies around the world are supporting the dissemination of this unique public health campaign. We thank Healthy Bones Australia for their outreach to the local community in Australia.'

'It's so important to alert the population at large about the importance of load bearing exercise and good nutrition for bone health. With ESA Astronaut Samantha Cristoforetti's impactful messages, including from space and via social media, we've been able to reach out to younger people as well as older adults. It's an exciting campaign, and we're so grateful to the European Space Agency and to Samantha Cristoforetti for their extraordinary support.'

During the mission Samantha will also support various European and international experiments in orbit. These include an experiment investigating the regulation of muscle tone in microgravity to help improve medical approaches to muscle rehabilitation.

Samantha speaks about bone health in space for #LiftOffforbone campaign https://youtu.be/ **CIMfkCoQwsU**

loss, an astronaut can lose one to two percent of bone density every month while in space. People on Earth face a similar risk as they age, and as a result, one out of three women and one out of five men over the age of 50 go on to experience a bone fracture due to osteoporosis.'Bone loss is one of the major consequences of microgravity in long-duration space flights and can seriously undermine the health of astronauts after returning to Earth. One of the main countermeasures for bone loss is exercise. Establishing an effective training program is essential for the future of long-duration spaceflights as well as for



The realm of high-performance computing (HPC) has long been dominated by traditional users such as physicists, quantum chemists, and aerospace scientists.

upercomputers were built to run large computational models as fast as possible, with the science revolving around mathematics and the methods evolving over decades. As the complexities of the models grew, supercomputers grew faster and more powerful. Problems were solved at a much finer resolution.

NEW USERS SHAKE UP SUPERCOMPUTING.

But the world is changing at an unprecedented pace. With the advent of big data, new players like those involved in fintech, bioinformatics and healthcare entered the field of supercomputing.

Non-traditional HPC users in these research fields often don't operate by conventional rules; they use completely new and dynamic languages to process data. Apart from having unstructured methods, their computational approaches are also evolving rapidly; old mathematical methods are being stretched and applied in ways never before imagined.

Pouring in from specialised machines, this deluge of data needs to be processed in novel ways to extract meaningful value and insights.

As a consequence, the supercomputing facilities that run them are being forced to evolve and adapt too. New hardware and software products have been innovated to change our relationship with data; bigger brains are built into conventional computing hardware to enable bigger science carried out at bigger scales.

DUG INNOVATES TO SCALE UP HPC CAPABILITIES.

With over 19 years of international experience, Australiaheadquartered, global company DUG Technology (DUG) designs, owns and operates a network of some of the largest and greenest supercomputing installations on Earth.

DUG offers private, cloud-based HPC as a service (HPCaaS)-pure performance in a secure, provisioned, and supported environment, powered by patented green technology that reduces energy consumption by up to 51%.

DUG's differentiated capability in HPCaaS offers users a complete stack. This includes high-speed networks with low latency and innovative solid-state-drive-based storage systems that revolutionise DUG's relationship with dataregardless of size and access pattern used.

With speed, scale, and simplicity front of mind, DUG can handle non-traditional workloads that are typically the Achilles heel of legacy HPC systems, such as those in the bioinformatics sector.

Coupled with an Australian-based HPC support team providing domain-specific expertise, as well as professional services such as code onboarding and optimisation, algorithm development, predictive analytics and modelling, and on-demand software support, DUG



enables the HPC while users are empowered to focus on their science.

SUPERCHARGING MEDICAL RESEARCH.

The Harry Perkins Institute of Medical Research is a worldleading, Western-Australian-based medical research centre, dedicated to conducting innovative research into the diseases that most affect the WA community and the world at large.

Harry Perkins' research mainly involves bioinformatics, with the goal of understanding and extracting healthadvancing knowledge from laboratory experiments such as genome sequencing to achieve medical breakthroughs.

With a diverse range of research activities, ever-evolving workflows and mountains of data, they sought a flexible compute and storage system designed to let them store, process and analyse data their way.

For instance, advanced computing techniques are used to search for disease mutations. They can also help analyse the behaviours of a particular cell type that may be causing disease or enable researchers to observe the range of cells present in a patient's tumour.

Just a decade ago, the standard approach was to take a tumour chunk and look at the average measurements of all cells. With technological advancements and HPC evolving to address bioinformaticians' needs, it's now possible to get details about the biology of each cell, look at trajectories of cell development, or decode the messages cells send to each other. In essence, HPC today empowers researchers to extract information from a dizzying number of cells concurrently, assisting them in the development of better, more targeted treatments for major diseases.

"Sequencing cells in cancer research generates colossal amounts of genomic data where the analysis requires complex access patterns," said Professor Alistair Forrest, Associate Director - Scientific Strategy at the Harry Perkins Institute of Medical Research. "With current resources, storing such data and processing these workloads poses a daunting challenge."

"To support the multiplicity of our throughput requirements, what we need is a fully supported HPC system designed to let us store, process, and analyse data our way," added Professor Forrest.

A proof-of-concept project quickly showcased the unique HPC proposition DUG had developed, accelerating Harry Perkins' complex workflows and increasing their efficiency.

With unlimited HPC scale and the support of domainspecific experts at their fingertips, Harry Perkins researchers were free to implement and run all their existing workflows, gaining the confidence to conduct science at record speeds that they previously could have only dreamed of. Professor Forrest said:

Trusting the technology to the experts at DUG, we can now get back to our number one priority—saving lives."

DUG's experience and expertise in HPC delivered a stepchange in Harry Perkins' computing capabilities. This productivity boost allowed them to reduce project cycles from months to weeks, accelerating the translation of their life-saving research and the commercialisation of their IP assets, thus giving Harry Perkins a competitive advantage in the bioinformatics and healthcare sectors.

To learn more about how DUG can help turbocharge your bioinformatics workflows, drop an email to info@dug.com to get in touch.



BRISBANE HOSTS INTERNATIONAL **HEALTHCARE EXPERTS**

Representatives from low-, middle- and high-income countries come together to share research evidence around key healthcare quality and safety issues.

ore than 1000 delegates from around the world will gather in Brisbane on October 17-20 for the International Society for Quality in Health Care's (ISQua) 38th annual conference. Guided by a mission to bring low, middle and high income countries together to improve the quality and safety of

healthcare for all, this is a unique assembly.

With over 55 countries represented by delegates and presenters, alongside speakers from the World Health Organization, the conference is a forum for sharing knowledge, building capacity and achieving sustainable change through international collaboration.

Professor Jeffrey Braithwaite, Founding Director of the Australian Institute of Health Innovation (AIHI) at Macquarie University, is President of ISQua and a long-term advocate for sharing research capability and knowledge globally.

Patient safety and patient-centred care are at the heart of ISQua's mission and will be fundamental in discussions at the conference. World-renowned keynote speakers will present under the theme: Designing for the Future-Community, Resilience, and Sustainability.

Key topics of global interest to be presented by AIHI researchers include: consumer involvement in research;



the emerging role of human factors and ergonomics to improve systems for staff and patients; understanding why some healthcare interventions work and others don't; and patient safety investigations.

HOW TO INVOLVE CONSUMERS IN RESEARCH

As one of the largest surveys of its kind undertaken in Australia, the Consumer Sentiment Survey by AIHI, the National Health and Medical Research Council (NHMRC) Partnership Centre for Health System Sustainability and the Consumers Health Forum of Australia delivered important insights into this country's views of the health system. While 5,100 adults responded to the survey, most importantly, the survey itself was designed with the input of consumers. Presenters at the ISQua conference will share the results of the survey and discuss how this kind of resource can inform policy and practice, having been purpose-designed to identify critical improvements, such as affordability and equitable access to care.

HOW TO MAINTAIN FUNCTION IN THE **FACE OF DIFFICULTY**

If the pandemic has taught health systems around the world anything, it is the need for healthcare to be able to function effectively in the face of complexity and uncertainty. Researchers will share evidence on how human factors and ergonomics can improve the design of healthcare technologies, systems and processes.

WHY SOME INTERVENTIONS WORK, AND **OTHERS DO NOT**

Large-scale improvement programs of evidence-based interventions hold the promise of systems transformation by standardising care. However, health systems don't always benefit in the ways intended. Implementation science as a field aims to improve the uptake of evidence into practice and ease the implementation of interventions across multiple settings or organisations. During this workshop, researchers will share examples of when implementation strategies have worked (or not), in what context, for whom and why, and explore tactics for improvement. There'll be insights into how contextual and social factors can either undermine or advance efforts, plus a discussion on how to achieve success when



scaling up and sustaining system-wide innovations. The presenters will draw on evidence from several research projects including value-based healthcare initiatives with NSW Health.

HOW TO IMPROVE PATIENT SAFETY INVESTIGATIONS

While understanding how to reduce the incidence of preventable harm in hospitals is a recognised and ongoing challenge around the world, investigating these incidents when they occur is equally important. This session will explore examples of innovations in the way adverse events are investigated, including recommendations to place independent experts, including consumers, on investigation panels. Researchers from AIHI and The Centre for Resilience in Healthcare at the University of Stavanger, Norway, will describe their research on including families in investigations.

SUPPORTING COLLABORATION FOR GLOBAL IMPACT

ISQua is a leading international organisation dedicated to improving the quality and safety of healthcare through a global community of members and partners and the annual conference is an important part of achieving that mission. Every region in the world will be represented, including delegates from Indonesia, Taiwan, Korea, India, The United States, Brazil, the United Kingdom, Canada, Japan, Soth Africa, Nigeria and Ghana.

Healthcare professionals in attendance reap the educational benefits by obtaining CPD points from The Royal Australian College of General Practitioners and The Australian College of Rural & Remote Medicine.

Discounts are available for conference registration for groups (10 or more), students and patients as well as for low- and middle-income countries. Visit isqua.info/conference or contact conference@ isqua.org for more information.

Author: Professor Jeffrey Braithwaite, Founding Director, Australian Institute of Health Innovation, Macquarie University and President of the International Society for Quality in Health Care



FOUR DECADES OF **COLLABORATION TO** DEVELOP A SAFE AND **EFFECTIVE NEONATAL** ROTAVIRUS VACCINE FOR THE WORLD'S CHILDREN



Rotavirus was discovered in 1973 by Professors Ruth Bishop and Ian Holmes with researchers at the University of Melbourne and the Royal Children's Hospital.

Rotavirus is the most common cause of severe gastroenteritis in infants with an estimated 200,000 deaths worldwide each year. Despite safe and effective rotavirus vaccines and a recommendation by the World Health Organization to include rotavirus vaccines in national immunisation programs, an estimated 65 million children remain unvaccinated.

Currently, available rotavirus vaccines are given to infants from six to eight weeks of age, leaving newborns at risk of infection, especially in low and middle-income countries. The collaboration between MCRI, UGM and PT BioFarma has developed a rotavirus vaccine that can be administered at birth. The RV3 vaccine was developed from an asymptomatic strain of rotavirus found in healthy babies that offered protection against severe gastroenteritis.

Rotavirus vaccination administered at birth may offer several benefits, including providing early protection against severe rotavirus gastroenteritis, the opportunity for higher coverage due to administration at a time when families are accessing healthcare services, and avoiding possible barriers to vaccine uptake.

We hope that administering RV3 at birth will contribute to increased rotavirus vaccine uptake by taking advantage of the opportunity when mother and baby have contact with health services," says University of Melbourne Professor Julie Bines, who leads the MCRI's Enteric Diseases Group and RV3 Rotavirus Vaccine Program.

Although rotavirus vaccines are licensed in Indonesia, there is low uptake in the private market and rotavirus vaccines have not yet been included in the Indonesian national immunisation program. Barriers to administering rotavirus vaccines include cost, limited public understanding of the severity of rotavirus, the timing of administration, safety concerns and religious barriers.

Through this collaboration, PT BioFarma is leading a large-scale production of a halal rotavirus vaccine. This is a priority in countries with a large Muslim population, such as Indonesia.

The international collaboration began through initial prevalence studies to examine the burden of disease in Indonesia with Professor Yati Soenarto from UGM; continued in the development of oral rehydration and zinc therapy used to treat severe gastroenteritis; and culminated in clinical trials of the RV3 vaccine by MCRI, UGM and PT Bio Farma.

This collaboration has been dedicated to innovation spanning four decades to achieve the ultimate goal to give hope that more children can live healthy lives," says Professor Julie Bines.

Clinical trials of the RV3 vaccine conducted in Indonesia, Malawi, New Zealand, and Australia show that the vaccine is safe and effective. A phase IIb trial conducted in partnership with UGM involving 1649 Indonesian babies found the vaccine was well-tolerated and protected from severe rotavirus disease up to 18 months of age. In collaboration with the Malawi-Liverpool-Wellcome Trust Clinical Research Programme, MCRI found that a reduced dose of RV3 produced the same immune response as a higher dose in a study among 711 babies conducted in Malawi.

The aim of this international collaboration is the manufacture of the RV3-BB vaccine in Indonesia by PT BioFarma under a licence from MCRI.

Currently, PT BioFarma is conducting a phase 3 clinical trial of the RV3 vaccine in Indonesia and the results are expected in 2023. These results will guide the strategy to include the rotavirus vaccine in the national immunisation program in Indonesia.

Authors: Professor Julie Bines, MCRI's Enteric Diseases Group and RV3 Rotavirus Vaccine Program leader, University of Melbourne Jane Hawtin, Program Manager, Melbourne Children's Global Health, Murdoch Children's **Research Institute**

Anne Nattembo, Communications Officer, Melbourne Children's Global Health, Murdoch **Children's Research Institute**

Can omics approaches improve the testing of vaccines and therapies for COVID-19 and Disease X?

he emergence of SARS-CoV-2 and the associated rush to develop effective vaccines and therapies has highlighted the need for improved pipelines for their development and testing in response to emerging infectious diseases.

Preclinical and clinical testing of medical countermeasures is usually a long process of determining efficacy and safety in animal models and small groups of humans before a product is approved for general use.

At the preclinical testing stage, developers are primarily asking whether a given vaccine or therapy works against the disease as intended. For vaccines, this usually involves the characterisation of immune responses (e.g. antibody and T-cell responses), and the determination of protection against severe disease. The data obtained in these studies is then used to support applications for clinical trials in humans.

Whilst these approaches provide information about particular aspects of the body's response to vaccination or treatment, it results in an incomplete picture. We are now in the time of the omics – a time where it is possible to determine the response of every gene and every protein to a particular stimulation.

This is the focus of research funded by the US Food and Drug Administration (FDA), and led by Dr Gough Au, Dr Alexander McAuley, and Andrew Boomer, researchers from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Health & Biosecurity, Australian Animal Health Laboratory, Land & Water, Data61, and Manufacturing business units. They are working with collaborating institutions across Australia (Barwon Health, University of New South Wales, James Cook University, The Peter Doherty Institute, and Swinburne University), the United States (NIH-NCATS and the University of Texas Medical Branch), India (BITS-Pilani), and the United Kingdom (the University of Oxford) to analyse samples collected in research and preclinical studies involving the testing of COVID-19 vaccines and therapies.

International partners involved in the project provide critical samples and expertise. NIH-NCATS and the University of Texas Medical Branch are using complex 3D models of human tissues and other appropriate models to assess the efficacy of drug and antibody therapies against COVID-19 infection. Researchers from the University of Oxford, who were involved in the development of the AstraZeneca COVID-19 vaccine, are facilitating the sharing of samples collected during the testing of their vaccine,



the disparate datasets into a model of the response

to COVID-19 vaccines and therapies, Dr Laurence

determining significant differences from insignificant

To aid in analysis of the datasets, as well as integrating

Thomas Nguyen at CSIRO's Dutton Park facility standing next to a mass spectrometer instrument used for the analysis of lipids and metabolites.

differences can be almost impossible.

Wilson and Dr Carol Lee at CSIRO's eHealth division in Westmead, NSW, are using CSIRO's high-performance computing facilities to analyse the data using artificial intelligence and machine learning approaches to reveal the most important responses following treatment. It is expected that this project will result in a clearer understanding of the most important host responses during effective vaccination against or treatment for

COVID-19. The result of this will be an ability to determine whether future vaccines and therapies are likely to be effective based on whether they induce a similar response. Patterns associated with ineffective treatments can also be identified. Taken together, these results will help in the assessment of efficacy even when animal models do not closely represent the disease seen in humans. This is important as in these circumstances the usefulness of traditional efficacy outputs, such as reduction in disease severity and virus titre, may be ambiguous. The understanding of the "bigger picture" with regards to SARS-CoV-2 infection means that patients can be more confident that the treatments they are being given are backed by the most up-to-date science.

Author: Dr Alexander McAuley (he/him) is a Research Scientist within the Human Health Programme at the **CSIRO Australian Centre** for Disease Preparedness in Geelong, VIC. He leads a range of projects focussing on the detection, prevention, and treatment of emerging infectious diseases.

while BITS-Pilani are providing significant expertise in advanced computing approaches to data analysis.

Samples from domestic and international studies are analysed in different ways. Transcriptomics analyses to determine differential gene expression in target cells are performed by Dr Nagendra Singanallur Balasubramanian and Dr Petrus Jansen van Vuren at the CSIRO Australian Centre for Disease Preparedness (ACDP) in Geelong, Victoria.

Proteomics analyses to determine differential protein levels in cells and in the blood are performed by Jian-Wei Liu at CSIRO's Black Mountain Campus in the ACT. Dr David Beale and Thomas Nguyen at CSIRO's Dutton Park Campus in Queensland are analysing metabolites released from cells and lipids involved in signalling. Each resulting dataset provides insight into the response of the host to treatment, allowing a holistic overview to be obtained.

The resulting omics datasets are huge and, whilst not every gene or protein produced will be significantly differentially expressed, there are frequently tens of thousands of different factors to be analysed. This results in a 'can't-see the wood for the trees' situation whereby

AMONUMENTAL INVESTMENT INTO STEM CELL MEDICINE

The Murdoch Children's Research Institute is one of three world-leading research institutes that have been backed by the Danish Novo Nordisk Foundation to deliver innovative stemcell driven therapies to transform the lives of people with incurable disease.



MP, at the launch of reNEW.



he Novo Nordisk Foundation — one of the largest Foundations in the world — has made an unprecedented donation of 300 million Euros to establish a collaborative translational research centre for stem cell medicine.

Led by newly-appointed CEO Professor Melissa Little from the Murdoch Children's Research Institute (MCRI), the Novo Nordisk Foundation Center for Stem Cell Medicine (dubbed reNEW) was established as a tripartite consortium across three international sites: the University of Copenhagen in Denmark; Leiden University Medical Center in The Netherlands; and Murdoch Children's in Australia. Together, these three world-leading institutes will combine their strengths in biomedical research excellence to develop innovative stem cell therapies for incurable diseases.

We are living in a world where the global population is the highest it has ever been and life-expectancy is (arguably) at its peak. But, despite promising advances in medical technologies and healthcare, these ageing populations are dealing with a concerning rise in chronic illnesses, including chronic kidney disease, cancer, diabetes, and Parkinson's disease.

The rising incidence of incurable disease worldwide is exposing major gaps in our healthcare systems. An ongoing challenge for the biomedical research sector is a barrier to push discovery-based science to research outcomes. Indeed, the commercialisation pipeline is increasingly slow, risky, and costly, with more than 95% of products failing to reach the market.

The Novo Nordisk Foundation wants to accelerate this bench-to-clinic pipeline to help more people living with chronic disease. To that aim, they have committed EUR\$30M every year for the next 10 years to establish the reNEW Stem Cell Medicine Center. This pledge marks the biggest donation made by the NNF and their first investment into an international tripartite consortium as a dedicated step to overcome commercialisation barriers and achieve targeted research outcomes from stem cell medicine.

"Stem cell medicine truly promises to be a game changer when it comes to addressing some of the major health challenges facing the world today... whether in the form of new medical technology or new forms of treatment for the benefit of patient"- Mads Kragsgaard Thomsen, CEO of the Novo Nordisk Foundation.

Stem cell medicine refers to the use of stem cells to model human diseases, regenerate tissues and create 'designer cells' that can improve our ability to diagnose, treat, and even prevent human disease. As opposed to animal models, human stem cell-derived models offer a more accurate replica of human tissues and organs for

non-invasively studying disease mechanisms. They offer the opportunity for preclinical testing of drugs, including predictive technology of individual responses, that will usher in the era of personalised medicine. Such stem cell medicines will be transformative, representing a genuine medical frontier as well as offering an exciting opportunity for economic growth.

reNEW will build upon the research expertise of the three Centers in disease modelling, gene editing, and regenerative medicine, to expedite the innovation of novel stem cell therapies for both adult and paediatric diseases. Each Center or "Node" of the international consortium will offer research expertise, facilities, and technologies, to provide a mutually-reinforcing, collaborative network.

The reNEW research faculty include a carefully chosen team of experienced leaders in cell and gene therapy, as well as a new generation of emerging scientific superstars to build critical mass for delivering targeted research outcomes.

The concept of reNEW was the pioneering vision of Professor Little, Chief Scientist at the Murdoch Children's, located at the Royal Children's Hospital in Melbourne. Amongst many accolades, Professor Little is internationally renowned for her expertise in kidney development and regeneration using pluripotent stem cells, and was until recently the President of the International Society for Stem Cell Research.

reNEW will enable outcomes across the breadth of stem cell medicine
— new drugs based on stem cell disease models, cell and tissue therapies, and also gene editing — and take research outcomes all the way to clinic." – Professor Melissa Little, CEO and Executive Director of reNEW.

Professor Little's capacity to govern and oversee the NNF Stem Cell Medicine Center is underpinned by more than 30 years of laboratory and leadership experience. Her belief is that reNEW will not only build capacity for targeted research outcomes but also attract international investment.

"This is a unique model and fantastic opportunity, that will put Australia on the map for regenerative medicine". – Professor Little.

Author: Katherine Gill, Philanthropy Manager, **Murdoch Children's Research Institute,** Victoria, Australia.

RALIAN

The trailblazing REMAP-CAP study has relied on a unique design and strong international partnerships to rapidly identify effective treatments for critical illness caused by COVID-19, saving countless lives around the world.

n the aftermath of the 2009 swine-flu pandemic, researchers at Monash University's School of Public Health and Preventive Medicine wondered how the medical community could be better prepared to deal with critically ill patients during the next respiratory pandemic. The result of those musings was the Randomised, Embedded, Multi-factorial, Adaptive Platform Trial for Community-Acquired Pneumonia (REMAP-CAP) study.

Initial funding back in 2015 permitted the launch of the randomised controlled trial, which then lay in wait for five years until the arrival of a respiratory pandemic.

ENTER COVID-19.

In the little over two years since the trial switched into 'pandemic-mode', it's rolled out into more than 300 study sites across 26 countries, and involves more than a thousand research collaborators globally.

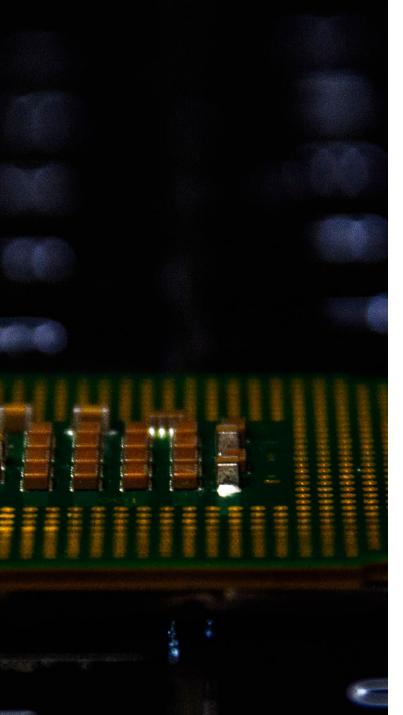
Founding Chair and Intensivist Professor Steve Webb

says, "It's been an incredible ride. Our study findings have directed the optimal care of critically ill patients in Australia and globally, saving tens of thousands of lives, reducing the length of intensive care unit and hospital stays, and freeing up vital resources in a time of acute need."

The team has delivered world-first evidence around the effectiveness of IL-6 inhibitors tocilizumab and sarilumab in critically ill patients, and of blood thinning agents in noncritically ill ward patients. They've also provided worldfirst evidence around the absence of effectiveness of the much-hyped convalescent plasma, and blood thinners in critically ill patients. This last finding has led to a global withdrawal of anticoagulants in that cohort, and is of particular impact; their use was found to have potentially fatal consequences.

Data provided to the World Health Organization around corticosteroid efficacy has been incorporated into international guidelines.

A key component of REMAP-CAP's success has been the



A key part of the trial's 'secret sauce' is the unique study design that allows cheaper, faster generation of high-quality medical evidence, and adapts to answer multiple urgent questions simultaneously. This has underpinned the fast evaluation of treatments to reduce death and organ failure in critically ill patients. The novel design has since been incorporated into other NHMRC- and MRFF-funded trials in golden staph blood infection, cystic fibrosis, pre-term birth, and prevention of surgical wound infections.

Professor Webb is particularly proud of the study's generalisability to low- and middle-income countries due to recruitment in India, Pakistan, and Nepal. South Africa and Malaysia are about to commence recruitment.

"That expansion was due to generous funding from The Minderoo Foundation. They've provided financial support specifically for this aspect of the study, which I think is a wonderful opportunity to generate evidence that applies to citizens of those countries," he says.

"It's also been a great way to enhance research capacity in those countries, as researchers there learn from being involved in such a large-scale collaborative trial. This will stand them in good stead in future, with new skills being applied to other clinical trials; including trials designed and led by researchers from low- and middle-income countries."

Health economics researcher Dr Lisa Higgins was in large part responsible for managing another key consequence of the global nature of the study, namely wrangling huge volumes of inbound data for analysis. "Inclusivity was so important to this study, and that meant creating a system that could accommodate data from the wide variety of information capture platforms already in use around the world," she says. "We accepted data from patient registries, from e-health records, and via traditional clinical trials data management platforms. It was a complex undertaking, but extremely worthwhile, and we've learnt a lot along the way."

Having won the 2022 Trial of the Year Award from the Australian Clinical Trials Alliance, the study team aren't resting on their laurels. The trial is continuing to expand its list of international study sites, and investigate new therapies, switching back to its 'interpandemic mode'.

Professor Webb says, "It's been a privilege to be part of the global response to COVID-19, generating evidence that has saved lives. I'm delighted with the success of our new methodology in producing results that are faster and cheaper than previous methods. We're looking forward to seeing it applied to other vital medical research."

and drove the international expansion when COVID-19 hit. He says, This global response was the result of many years of preparation and collaboration with key critical care

rapid recruitment of patients early in the pandemic from

many different regions. This reduced the time to results,

and provided confidence that the results were broadly

applicable to patients across different health systems

Senior investigator and Intensivist Professor Alistair Nichol

was integral to the planning of the study from the start,

globally.

researchers and research institutes. That paved the way for hospitals around the world to quickly engage in COVID-19 research at their most desperate hours, safely offering patients new treatments in a supervised framework."

Author: Professor Steve Webb, Founding Chair of REMAP-CAP, Intensivist, and Monash **University** Professor of Critical Care Research

GLOBAL **ENGAGEMENT: ACCRUAL AND DEPLOYMENT** OF KNOWLEDGE TO ADVANCE MATERIALS FOR MEDICINE

At the ARC Centre of Excellence for Electromaterials Science we have established effective global knowledge accrual and deployment to progress the use of advanced materials for medicine.

hen we instigated collaborative activities the intention was to accrue knowledge in the most effective way possible by being an active member of the global research community. While this still remains an important element of our collaborations, another dimension, the effective deployment of that knowledge throughout the globe, has emerged.

There is no doubt that recent advances in materials. particularly in the area of organic conductors, are having a huge impact on emerging medical technologies. Our work on the fundamentals of organic conductors and biological interactions was accelerated by international collaborators in our laboratory. Prof. Malcolm Smyth (Dublin City University (DCU), Ireland) helped us establish a foray into the use of conducting polymers as biosensors. Studies revealed that even complex biomolecular interactions based on antigens and antibodies can be controlled via electrical stimulation. This finding was to propel a range of studies into the effects of electrical stimulation on other biological entities including DNA, enzymes and living cells.

Prof. Ric Kaner (UCLA, USA) joined us on a Fulbright Fellowship in 2015 to develop pioneering approaches to processing these amazing materials. Our early studies laid the platform for our further work with Prof. Graeme Clark, Bionic Ear inventor, in using these materials to improve neural communications. We discovered that the



use of these materials as a conduit for electrical stimulation greatly enhances neural activity when compared to the use of more conventional metallic electrodes.

The scene was then set to pivot and deploy these fundamental findings. Our work with colleagues in Ireland (Prof. Robert Forster - DCU) has pioneered the use of bipolar electrochemistry to enable wireless electrical communication with living cells through conducting polymers with a view to stimulating cardiac cells. This work also involves collaboration with Prof. Xu-Feng Huang at the University of Wollongong to use this wireless stimulation system to treat deficiencies in neural cells arising from schizophrenia.

These same materials have been shown to be effective conduits for the use of electrical stimulation to condition stem cells that promote hair regrowth in a collaboration with researchers at Yokohama National University in Japan.

In another endeavour, global collaborations on research into nanostructured carbons have converged to enable a number of advances in bionics and electroceuticals.1 Our visiting Fulbright Fellow (Prof. Ric Kaner) returned to UCLA, but our collaborative links remained strong and he was then doing some amazing work with graphene single sheets of carbon. Our early work with Ric indicated that graphene was special when it came to electrically communicating with nerve cells. We created what was probably the world's thinnest electrode (just a few carbon layers thick) at that time. We discovered something that was (and still is) amazing - we could electrically communicate with nerve cells through this structure.

These studies spurred us on to produce more scalable methods for graphene production. Dan Li who had been working in Ric's lab joined our team at UOW. Dan discovered some simple chemistries that greatly enhanced the processability of graphene to form stable aqueous dispersions.

In other studies, fundamental understanding of graphene and its polymer-like properties was being elaborated with Philippe Poulin (CNRS, Bordeaux, France). This knowledge enabled us to build novel approaches to processing and to fabricate long lengths of micron dimensional graphene fibres.

We built on these discoveries to develop fibre spinning strategies and produce very fine fibres with amazing mechanical properties – we could tie these fibre electrodes in knots without influencing electrical properties. These



amazing properties led to them being known as sutrodes, materials you could knot like a suture and could be used as electrodes.

These fundamental advances led to us deploying sutrodes to another global collaborator, Prof. Mario Romero-Ortega (University of Texas, Houston, USA). Mario used the sutrodes to interrogate nerves that were previously "incommunicado", providing unprecedented insights to those of us engaged in the developing field of electroceuticals. Mario was able to access the four individual nerves that enter the spleen and obtain information relating to neural communication with the spleen, thus providing insights into how electrical stimulation might be used to regulate the immune response.

In the above examples, the ability to utilise the amazing properties of recently discovered materials is coupled to the ability to develop innovative means of fabrication to create structures containing them. We have worked with our collaborators around the globe to achieve this.

For some time now, we have been conscious of the fact that the most impactful research is enabled by connecting dots between those with needs and those who can accrue the knowledge to meet these needs. We must also have a human chain of connections that can deploy the knowledge accrued if impact is to be realised to maximise global benefit.

Author: Professor Gordon Wallace is an Australian Laureate Fellow and the Executive Director of the ARC Centre for Excellence for Electromaterials Science (ACES). He is also Founder and Director of the Intelligent Polymer Research Institute (IPRI) at the University of **Wollongong** and Director of the Australian National Fabrication Facility (ANFF) Materials Node.

¹ Electroceuticals - use of electrical stimulation to treat disease.



A RIDDLE WHICH POINTS TO A 'CLUELESS' SOLUTION

Sparing sufferers and their loved ones from Parkinson's disease is a heartfelt quest now one step closer to reality thanks to the painstaking dedication of Professor Robert Harvey and colleagues.

Clueless' hardly sounds like the answer to a pressing scientific problem, let alone for conditions that involve neurological pathways.

However, that's precisely the conclusion University of the Sunshine Coast researcher Professor Robert Harvey has arrived at - encouraged the protein CLUH (informally known as 'Clueless') could be key to a range of medical conundrums.

While Professor Harvey's most recently-published research pertains to Parkinson's disease, he sees potential links to epilepsy, vision disorders, and heart disease.

"Working together with Professor Ming Guo at the University of California, Los Angeles (UCLA), we found



the 'Clueless' protein could control the division of mitochondria in fruit flies," Professor Harvey says.

"Disrupted division of mitochondria – also referred to as mitochondrial fission – has also been linked to other neurodegenerative diseases and serious conditions including cancer, cardiovascular disease and childhood development disorders.

In our recent research, when we increased the activity of 'Clueless' it started to rescue mitochondrial and tissue defects. It was an important finding in an animal model.

"I've been working on Parkinson's disease since around 2004 and taught about neurological disorders most of my career, so this was an exciting opportunity to make a difference by uncovering a genetic cause of this devastating condition."

Placing a high emphasis on research translation throughout his career, Professor Harvey is eager to take his research about 'Clueless' to the next level.

Could 'Clueless' provide insight to identify other genes which are formative in disease development and prevention, or could it provide a possible target for medication?

Professor Harvey has a track record of demonstrated success working on a rare childhood disorder – startle disease – a condition which evokes sometimes-fatal seizures in newborn humans, dogs and cattle.

We worked for many years finding mutations in genes for three different synaptic proteins," Professor Harvey says. The great thing about this disorder is there is a known treatment which has excellent results in patients."

"It goes to show that a genetic diagnosis can lead to a bespoke treatment."

INTERNATIONAL QUEST

The quest for answers has guided Professor Harvey around the world, having originally undertaken his PhD in Natural Sciences (Biochemistry) at the University of Cambridge, England.

Prior to his time in Australia, he also carried out further studies in Germany, and has collaborated across international borders on multiple projects.

"It is an honour to be involved in research on the genetic basis of neurological disorders, as it has profound impact in the real world," Professor Harvey said.

"Often a definitive genetic diagnosis means that affected individuals and families can access disability funding and receive support via connections with other families.

"I believe both national and international collaboration is essential in the global scientific community achieving maximum advances and impact.

"By working together, we become more than the sum of our parts and can achieve substantial breakthroughs."

Much of the work undertaken by Professor Harvey and colleagues is painstaking and methodical, with precise attention to detail required.

Despite all the ground-breaking work he has participated in, he acknowledges that one of the traits which has served him best throughout his career has been resisting the urge to jump too far ahead.

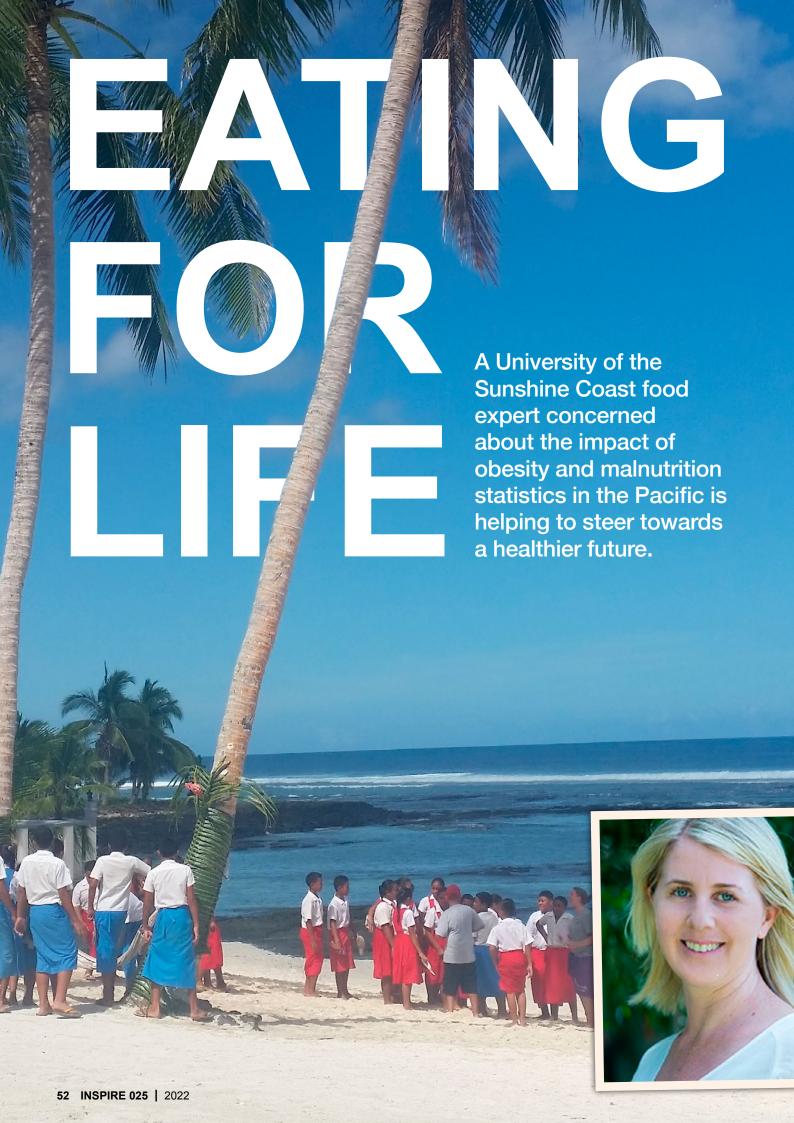
"One of the main qualities that I have learnt is patience," he says.

The story of 'Clueless' has taken nearly 12 years to get to this stage. The struggle for answers requires persistence, and so does the struggle for funding.

"As somebody who is also a member of the Australian Research Council (ARC) College of Experts and a reviewer for the National Health Medical Research Council (NHMRC), I bear witness to the highly competitive nature of research funding.

"All scientists wish there could be more funding available so that important 'blue sky' research could be conducted across a much broader range of topics."

Author: Professor Robert Harvey specializes in pathophysiology and is the Discipline Lead for Biomedical Science at The University of the Sunshine Coast. He has called UniSC home since 2017 and, as well as being the UniSc Lead at the Sunshine Coast Health Institute laboratories, he is a member of the USC Science in Australia Gender Equity (SAGE) SAT team. Professor Harvey is also currently a Field Chief Editor of the open access journal Frontiers in Molecular Neuroscience.





Encouraging healthy eating habits throughout the Pacific region is a passion of Dr Sarah Burkhart's that has potential to extend and improve the lives of Australia's neighbours for generations to come.

niversity of Sunshine Coast researcher Dr Burkhart is chair of the Pacific School Food Network, an international collaboration working to transform school food environments through advocacy, networking, mobilisation of resources, and sharing research and practice..

"The Pacific School Food Network has a strong focus on school food environments," Dr Burkhart says.

"We aim to bring together stakeholders from education, agriculture, health and nutrition to support school-food-related activities, for example nutrition curriculum, school gardens and the supply of healthy food in schools across the region.

"What excites me about this network is our multi-sector approach across universities, NGOs, development partners, health professionals, teachers, policy makers and the agricultural sector, encompassing multiple countries across the Pacific Islands region.

"We are working to change the conversation about food. Extended family is important in these communities, so if we can enhance school food environments, it has enormous potential across generations."

"The organisation came together after Pacific representatives attended the Global Child Nutrition Forum event in late 2019, having completed a scoping report on behalf of the Food and Agriculture Organisation of the United Nations," Dr Burkhart says.

The purpose of the scoping report was to analyse the potential for School Nutrition Education Programmes (SNEPs) across 14 Pacific Island countries and determine recommendations for the future.

The publication identified the ripple effect that could be created by addressing nutritional attitudes in childhood.

"Nutrition during childhood and adolescence can have a significant impact on short and long-term health outcomes," Dr Burkhart wrote.

"The behaviours one learns during this time can set the scene for adulthood. In all regions of the Pacific children are required to attend school and this setting provides a unique opportunity to educate and motivate a sizeable proportion of the community.

"Children and adolescents are well-placed to influence

their family and community, while teachers, school staff and the wider school community are also impacted by nutrition education."

MULTIPLE BARRIERS TO OVERCOME

Some of the barriers to healthier school food environments in the past varied from the constraints imposed by geography, finances and technology in the Pacific region, through to limited opportunities for teachers and other community leaders to upskill.

A lack of food preparation facilities and limited space for gardening also added to the challenges. Multiple countries reported that the availability of imported, highly-processed foods made school education programmes difficult to implement.

"In the Pacific region there are considerable issues related to chronic undernutrition, micronutrient deficiencies and obesity – also referred to as 'the triple burden of disease'," Dr Burkhart says.

"Many of the highest obesity rates in the world pertain to the Pacific Islands. Much is likely due to changes to food systems in these areas. As globalisation and urbanisation occur in the Pacific, traditional diets are consumed less frequently, while the availability and consumption of highlyprocessed foods has increased.

"Climate change, severe weather events and changes in farming practices also impact the availability of local, nutritious foods."

Dr Burkhart is also working to develop a learning and teaching resource toolkit for Pacific Island teachers, alongside the Food and Agriculture Organisation of the United Nations office in the Pacific Islands and UniSC colleagues.

Another project is underway to scope the potential for local food systems to provide for Pacific Island schools, alongside partners The Alliance for Biodiversity International and CIAT, and The Pacific Community, funded by the Australian Centre for International Agricultural Research (ACIAR).

Author: Dr Sarah Burkhart is a Senior Lecturer in Nutrition and Dietetics in the School of Health and Behavioural Sciences, and the Australian Centre for Pacific Islands Research at The University of the Sunshine Coast. She is a Registered Nutritionist with the Nutrition Society of Australia (NSA), and co-founder and current Chair of the Pacific School Food Network. Dr Burkhart is also a member of the Society for Nutrition Education and Behavior (SNEB) and is currently Chair for the SNEB Division for International Nutrition Education and Chair-elect for the SNEB Sustainable Food Systems Division.



UTS is collaborating with African, Asian and Australian researchers to develop a community of practice of researchers, mentorship and capacity-building workshops for early career researchers and a program of work focused on delivering rigorous evidence for prevention and clinical care.

GM is a deeply rooted cultural practice associated with adverse health outcomes. It is associated with obstetric complications, and serious immediate and long-term physical, sexual and psychosocial complications resulting in painful injuries, disability and death.

This practice affects more than 200 million women and girls globally. In 2022 alone, there are 4.2 million girls who are at risk. FGM occurs in more than 40 countries throughout Africa, the Middle East and Asia and in countries of migration including Australia where there are an estimated 53,000 migrant and refugee girls and women with FGM. This practice is against the law in Australia and many other countries around the world.

The Sustainable Development Goal target 5.3.2 focuses on the elimination of all harmful practices, including FGM. It







has led to the development of programs to prevent FGM and care for affected women and girls. UTS has been at the forefront of forging local, national and international partnerships with affected communities, health providers, peak bodies and researchers to identify evidence for change. There have been numerous calls for the need to co-ordinate research efforts and use resources efficiently to provide a comprehensive picture of what works to prevent FGM, and how and why to inform decision-making.

Intervention research is required to answer complex questions about the effectiveness, appropriateness and feasibility of interventions. We also need to understand the mechanisms that support the successful implementation of FGM prevention programs and policies at community, national and regional levels to change attitudes and behaviours and support health professionals to care for affected women and girls.

UTS is leading an initiative with key stakeholders from the African Centre for the Abandonment of FGM at the University of Nairobi funded by the Australia Africa Universities Network. This has involved virtual workshops that have brought together 37 researchers from sub-Saharan Africa and the middle east north African (MEANA) region to discuss research priorities and capacity-building needs. Researchers have collaborated on a number of publications including with colleagues in Iraq and Kenya and are working towards funded research projects.

A Delphi survey as part of this initiative identified early career researchers' top five capacity development needs: skills in systematic reviews and scoping reviews, qualitative methods, spatial analysis, statistical analysis of demographic and health survey data, and translation of findings into policy and practice. In response, a series of 14 workshops have been run for early-career researchers, including PhD students and lecturers at institutions across the regions. Worksop facilitators have involved key researchers in the area from across the world including Kandala Ngianga-Bakwin at the University of the Witwatersrand in South Africa, Caroline Kabiru from the African Population & Health Research Centre, Kenya and Patricia Akweongo at the University of Ghana.

UTS has also provided capacity-building workshops for Malaysian researchers facilitated by the Asian Pacific Resource and Research Centre for Women and the British Charity, Orchid that identified research approaches and questions and identified the need for supporting early career researchers. Joint publications have also resulted in clarifying the agenda in Sri Lanka and the region.

In Australia, UTS has partnered with the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) to create a continuing professional education model for health professionals and participated in the development of NSW Health clinical guidelines to provide sensitive and culturally appropriate, evidence-based antenatal, intrapartum and postnatal care for women and their families affected by FGM.

NHMRC funding has been received to expand upon this to develop a tool to support midwives counseling pregnant women with FGM during care interactions.

This will address current gaps in tools and guidelines and be co-designed with women in Sydney in collaboration with the NSW Health Program on FGM and shared with stakeholders nationally.

Author: Professor Angela Dawson is a public health social scientist with expertise in maternal and reproductive health service delivery to priority populations in Australia and low and lower-middle-income countries.



STRENGTHENING NURSING AND MIDWIFERY ACCREDITATION, EDUCATION, AND LEADERSHIP IN THE PACIFIC

The key challenges impacting the quality of nursing and midwifery and regional health outcomes across the South Pacific include limited numbers of educators, outdated curricula, education programs that do not match health security needs, and limited continuing professional development (CPD) opportunities.



espite making up approximately 75% of the Pacific's health workforce (WHO 2015), nurses and midwives have not had a concomitant influence on health policy. Health workforce hierarchies, gender power differentials and lack of confidence and skill all play a part in limiting nurses' contributions.

A Quality Improvement Program has been developed by 22 Pacific Island Countries (PICs) through the South Pacific Chief Nursing and Midwifery Officers Alliance (SPCNMOA) in partnership with the World Health Organisation Collaborating Centre for Nursing, Midwifery, and Health Development at the University of Technology, Sydney (WHO CC UTS). This program aims to assist nursing councils and educational institutions across the Pacific region to improve nursing and midwifery education and training.

The program's key activities are aligned with the WHO Global Strategic Directions for Nursing and Midwifery (SDNM) 2021-2025, policy priorities developed by regional Government Chief Nursing and Midwifery Officers (GCNMO), and extensive regional research. In addition, the program's activities contribute to Sustainable Development Goal targets #3 (Good Health and Wellbeing), #4 (Quality Education) and #17 (Partnerships).

The program is guided by an evidence-based roadmap funded by WHO and approved by a steering committee composed of chief nurses or their equivalents from 12 PICs. WHO and the Australian Nursing and Midwifery Accreditation Council (ANMAC) will fund the next steps for this project. High-level support for the program has been demonstrated at key regional forums and institutional bodies, including the 14th Pacific Health Ministers Meeting in March 2022.

PROGRESS AND ACHIEVEMENTS

The Quality Improvement Program encompasses a regional strategy to strengthen health in the Pacific and enable an effective regional response to the WHO SDNM 2021-2025 Policy Priorities. It incorporates several actions in support of Policy Priorities 3.1:

Establish and strengthen senior leadership positions for nursing and midwifery workforce governance and management and input into health policy; and 3.2: Invest in leadership skills development for midwives and nurses.

Actions in support of these Priorities include the provision of support to the government chief nursing and midwifery officers, the creation of Pacific Leadership Program (PLP) for succession planning, the creation of mechanisms for data reporting, and the convening of stakeholders for data sharing and policy dialogue.

The Pacific Leadership Program aims to build leadership capacity within the Pacific region by providing nursing and midwifery professionals seeking to enter senior leadership positions with a skills development program and exposure to expertise on policy development, human resources for health (HRH) management, regulation, research, and data literacy.

Originally running from 2009 – 2017, the PLP has been reestablished in 2022 with 6 PIC countries and 17 Fellows.

WHO CC UTS and the SPCNMOA have co-produced a draft guide on requirements for authorship in regional health research.

The guide assists researchers in adopting ethical, impactful, and culturally appropriate frameworks within their research agendas. The evidence informing the development of the guide is grounded in deep consultation and collaboration with key regional partners and stakeholders.

The SPCNMOA has continually developed strong regional relationships amongst its members and supported their representation at global forums, including the World Health Assembly (WHA).

The SPCNMOA has also been involved with key regional organisations, including the Asian Pacific Emergency Disaster Nursing Network, and has played a significant role in supporting regional cooperation, collaboration, and communication amongst PICs during the COVID-19 pandemic. Finally, the SPCNMOA was instrumental in reviewing and defining the original roles and responsibilities of GCNMOs later developed by the WHO.

FUTURE DIRECTIONS

It is time to embed chief nursing and midwifery officers in regional health policy development and leadership. For many years, the SPCNMOA and WHO CC UTS have been at the forefront of supporting nurses and midwives in the region and amplifying their vital perspectives and expertise.

Author: Michele Rumsey AM RN FACN PhD (final examination)

THE LAST WORD



It's to our advantage, it's our responsibility and it's gratifying. But it's not always easy or what the sector rewards.

edical research is an inherently collaborative activity. As more sophisticated tools become available to explore health problems, so too does the need for collaboration.

The likelihood that one person, one research group or even one country can provide the multidisciplinary expertise required to address a complex health issue continues to diminish. Ever more frequently, the team best placed to answer a research question is likely to include people based outside of Australia.

Already, almost every medical research proposal deriving from Australia cites work done overseas and usually from multiple jurisdictions. At the same time, only a small proportion of awarded grants have more than token overseas collaboration, and fewer still have funds earmarked for overseas expenditure. There is a prevalent view, and some direction from funders, that international collaboration with overseas grant expenditure is a disadvantage. While the desire for local funding to support local researchers is understandable, the consequence of introspection is missed opportunities for knowledge gain, innovation and impact.

Missed opportunities are particularly large for industry engagement, with most of the world's research industry located thousands of kilometres away. Collaborating with academics in the United States and Europe who are geographically collocated with the main commercial funders, can be a highly effective way of engaging with industry partners. Some local funding schemes are designed specifically to support participation in overseas research initiatives, and they are commendable, but too few. While government tax breaks provided for local medical research expenditure are much cited, there is scepticism regarding the long-term value that these schemes bring to the wider Australian research sector.

At the same time many of the world's most pressing health problems, and the greatest opportunities to avert disease burden at scale, lie offshore. In addition to addressing the many important health issues affecting the Australian population, the 'Lucky Country' has a responsibility to look beyond its borders. There have been some outstanding contributions of Australian researchers to global health, but once again support schemes that explicitly target overseas disease burden are few. There is a widely held view that mainstream funding sources view such projects unfavourably, unless there is very clear spin off benefit for Australia, and all the research expenditure is local.

When support is achieved, successful delivery of international collaborative projects can be highly rewarding, but it's not without challenges. Many Australian organisations lack the legal and operational capacity to effectively engage with overseas partners. Overseas partners, particularly those in less developed settings in the global south, are even less well equipped. There are significant cultural, political and financial differences to be resolved and ensuring an equitable partnership can be difficult. The research landscape is competitive by design and delivering a balanced project with truly equal representation for all involved is not easy. The decolonisation of international research is a recently identified priority but understanding of how to deliver it is nascent.

As for local collaborative projects, the key to successful international collaboration is the personalities involved. The leaders on each side must want to work together. A good project and adequate funding support are important but without solid interpersonal relationships success is far from assured. International collaborations also require much more work than local collaborations – language differences, time differences and cultural differences all require extra effort. That's before the trials of different regulatory systems and governance processes arise. These need to be recognised up front, planned for and covered in the budget. It's also vital to have a clear

understanding about the expectations of each party and the core participants – misunderstandings about leadership roles, authorship positions and budget lines can be seriously problematic and open discussion from the outset is essential.

Despite the challenges, the rewards are huge, and Australia must build its international collaborative research agenda. Australian researchers will remain competitive only if they look beyond national borders and build an infrastructure that is outward facing. Australia is world-leading in its medical research capacity but alone is too small to stay at the forefront of medical innovation. While some might see today's turbulent world as a signal for introversion, the opposite is true. Never has there been such a need for open-hearted international collaboration. The global good delivered by medical research makes it possible to transcend geopolitical tensions and researchers must capitalise on this. For the good of patients, the good of the nation and the good of the world.



Author: Bruce Neal is Executive Director at The George Institute for Global Health Australia, Professor of Medicine at UNSW Sydney and Professor of Clinical Epidemiology at Imperial College London. The George Institute specialises in the conduct of large-scale translational research projects done with collaborators all around the globe.



GRIFFITH UNIVERSITY ON THE GLOBAL STAGE FOR INNOVATIVE VACCINE DEVELOPMENT

As the world continues to traverse a global pandemic, the development of internationally relevant vaccines remains at the forefront of medical research.

Griffith Health's Dean (Research) Professor Bonnie Barber said: "Griffith's research is contributing to health and medical breakthroughs, impacting countless lives for the better."

"Our virologists and immunologists have been working under a global spotlight fighting zika virus, chikungunya, dengue and COVID-19," she said.

Recent advances in technology have brought the promise of gene therapy closer to being realised, offering hope to those born with as little as one unwanted variance.

Eminent health expert Professor Nigel McMillan is overseeing a team using technology to repair genes in living cells and living organisms using a tiny payload.

"This technology means we no longer have to replace whole genes."

Prof McMillan's work also extends to the current COVID-19 pandemic focusing on gene-silencing technology to identify new and repurpose antiviral drug treatments targeting the virus.

COVID-19 is also a central focus for Professor Suresh Mahalingam who is working on a next generation vaccine to provide broad spectrum protection against all variants, including Omicron, with the hope of starting human trials within the next few months.

Prof Mahalingam said the vaccine works as a nasal spray to build up immunity in the lining of the nasal cavity and throat, the body's first line of defence against infections.

"The spray has been two-and-a-half years in the making which is considered warp speed in the vaccine world as most can take around 10 years to develop and implement."

Griffith continues to pave the way through its Clinical Trials Unit (CTU), a core research facility supporting staff in their research.

Since its inception, the CTU has housed and supported five malaria-focused clinical studies enabling the progression of the Malaria Vaccine Development Program at Griffith.

CTU Director Professor Evelin Tiralongo said that the CTU has also conducted more than 45 trials for commercial clients in various disease states.

"Given the pandemic we're also proud to have established a track record with global vaccine companies such as Sanofi Pasteur, Novavax, Moderna, GSK and Pfizer, and be involved in trialling various new vaccines for COVID-19, Influenza, RSV and Meningococcal Disease."

Griffith's commitment to supporting ground-breaking medical research is exemplified in its continued sponsorship of the Griffith University Discovery Award.

Discover more:

griffith.edu.au/griffith-health



