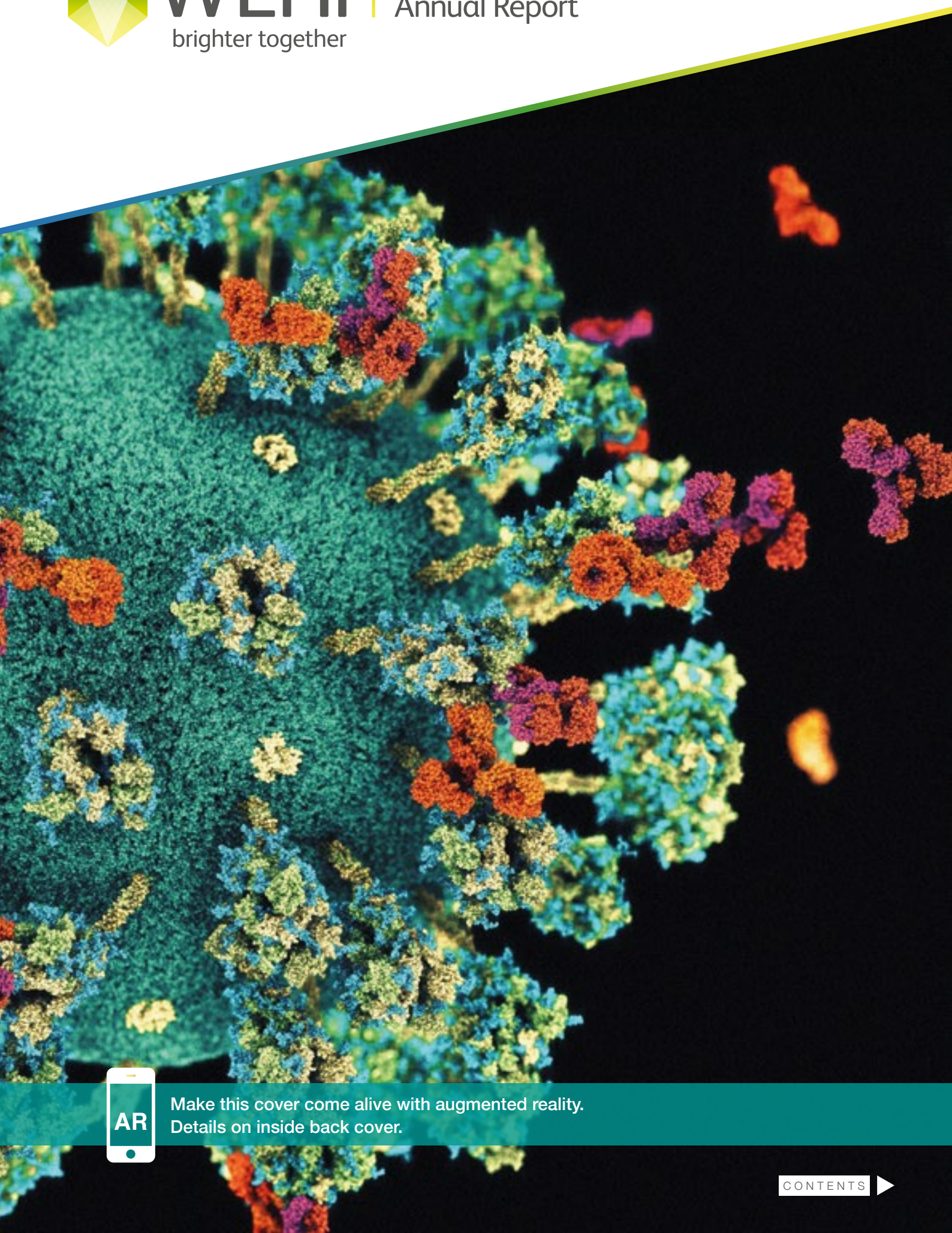
WEHI 2020 Annual Report

brighter together



AR

Make this cover come alive with augmented reality.
Details on inside back cover.

CONTENTS

Contents

The Walter and Eliza Hall Institute of Medical Research

Parkville campus

1G Royal Parade
Parkville Victoria 3052 Australia
Telephone: +61 3 9345 2555

Bundoora campus

4 Research Avenue
La Trobe R&D Park
Bundoora Victoria 3086 Australia
Telephone: +61 3 9345 2200

www.wehi.edu.au

WEHIresearch
WEHI_research
WEHI_research
WEHImovies
Walter and Eliza Hall Institute

ABN 12 004 251 423

Produced by the WEHI's Communications and Marketing department

We acknowledge the traditional owners and custodians of the land on which our campuses are located, the Wurundjeri people of the Kulin nation, and pay our respects to their elders past and present.

About WEHI

WEHI is where the world's brightest minds collaborate and innovate to make discoveries that will help us to live healthier for longer.

Our medical researchers have been serving the community for more than 100 years, making transformative discoveries in cancers, infectious and immune diseases, developmental disorders and healthy ageing. From complex, long-term medical problems to critical health challenges, we shine a light on the most pressing needs of the community.

At WEHI, we bring together people with different skills and expertise, working together for 10, 20 or even 50 years to solve some of the world's most complex health problems.

The spirit of collaboration is in our DNA. WEHI was established by a partnership between the University of Melbourne, Royal Melbourne Hospital and the Walter and Eliza Hall Trust, bringing together the brightest research minds from across the globe, remarkable clinicians focused on the health of the community and the power of philanthropy.

Our passion for improving lives drives us forward, even when breakthroughs are decades in the making. These are the ingredients that make us special; shaping scientific thought, improving the health of the community and making WEHI a collaborative and energetic place to work.

We are driven by collaboration, curiosity and creativity. We are brighter because of our collaborations with hospitals, universities, research institutes and industry, because we have the support of our community, including philanthropists, donors, bequestors, alumni and consumers.

We are committed to making a positive difference to the lives of people in Australia and around the world. We are WEHI. We are brighter together.

Our research

Cancer – understanding the basic processes that are disrupted to generate cancer cells, and how these can be targeted to treat disease.

Immune health and infection – discovering how the body fights infection, and how errors in the immune system lead to disease.

Development and healthy ageing – studying how the biological foundations laid down during gestation and childhood affect development, and how our longer life expectancy presents new challenges for our ageing population.

New medicines and advanced technologies – a powerful hub for cutting-edge technologies underpinning biomedical discoveries and for the translation of these discoveries into new medicines and diagnostics.

Computational biology – developing and applying new tools to analyse the genomes of disease-causing parasites, as well as better understanding the immune system and genetic drivers of cancer.

Our mission

Mastery of disease through discovery

Our vision

To be an innovative medical research institute that enriches society through discovery and education and improves health outcomes through translation

Our values

- Pursuit of excellence
- Integrity and mutual respect
- Collaboration and teamwork
- Creativity
- Accountability
- Contribution to society

President's report

Welcome to WEHI's *2020 Annual Report*. In reflecting on the past 12 months, could any of us have predicted how the year would unfold? I hope that as you read this report, you will sense the resilience and hope that our medical researchers bring to our community.

Many of our regular readers will have noticed a change in the look of this annual report. In 2020, WEHI revealed a new brand identity. Most noticeably, we are now WEHI – a name that is familiar to anyone who has met our teams or visited our laboratories – rather than the Walter and Eliza Hall Institute. More critically, our new brand reflects the WEHI we know and respect: a place where people come together to solve some of the world's most significant health challenges. You can read more about why we are "brighter together" on page 4.

Like so many organisations, the changing landscape of 2020 meant that ensuring financial stability was a significant focus for WEHI. Many funding bodies faced their own financial challenges, while our establishment of a new COVID-19 research program meant that typical sources of funding, which can take months through the submission process, were not suitable for the speed with which we needed to resource our research.

I would like to offer my heartfelt thanks to all WEHI's supporters who rapidly stepped in to support our COVID-19 research, as well as those who loyally continued their support of our longer-term research into other areas. As you will see from this annual report, both our COVID-19 research program, as well as our research into other infectious diseases, immune disorders, cancer, development and ageing, have all made impressive progress during the year – and in spite of the workplace challenges imposed by the pandemic.

I would like to particularly thank our new donors who responded to our request for support for COVID-19 research. We are thrilled that you have joined the WEHI community, and I look forward to ongoing engagement with you.

WEHI, along with other medical research institutes that lost revenue during the pandemic, was also a beneficiary of the Australian Government's JobKeeper Program. We were grateful for this support which allowed us to continue our research, and support our researchers, despite the uncertain times.

At the Board level, our membership remained stable in 2020 with one exception: our University of Melbourne representative, Professor Shitij Kapur, will soon take up the position of President and Principal of King's College London. As well as congratulating Shitij on this appointment, I would like to express my gratitude to him for his thoughtful and wise counsel on the WEHI Board, and his strong advocacy for the institute. I am thrilled to announce that Professor Jane Gunn will be the new University of Melbourne representative on our Board.

2021 in Australia is a time of hope. With the COVID-19 vaccine rollout having commenced here, and very well progressed in many countries around the world, I look forward to life returning to something closer to our 'past normal'. At the Board level, this means continuing to focus on the governance and oversight of WEHI, enabling our scientists to progress their mission of improving health through discovery both now and into the future.

I send my best wishes to the entire WEHI community, and I look forward to reconnecting with you soon.

Mrs Jane Hemstritch
President, WEHI

Director's report

2020 was like no other in my 35 years as a medical researcher. When I wrote my report last year, the COVID-19 pandemic had just started and we had no idea we faced an ultramarathon.

In 2020, health and medical research was in the spotlight like never before. Science has guided the Australian response to the pandemic – and I think this was why we avoided the much worse outcomes seen in other countries. Despite this, our community was heavily impacted, especially here in Victoria. As well as the tragic loss of lives and impacts on physical and mental health, the pandemic interrupted many of the simple routines and rituals of our lives.

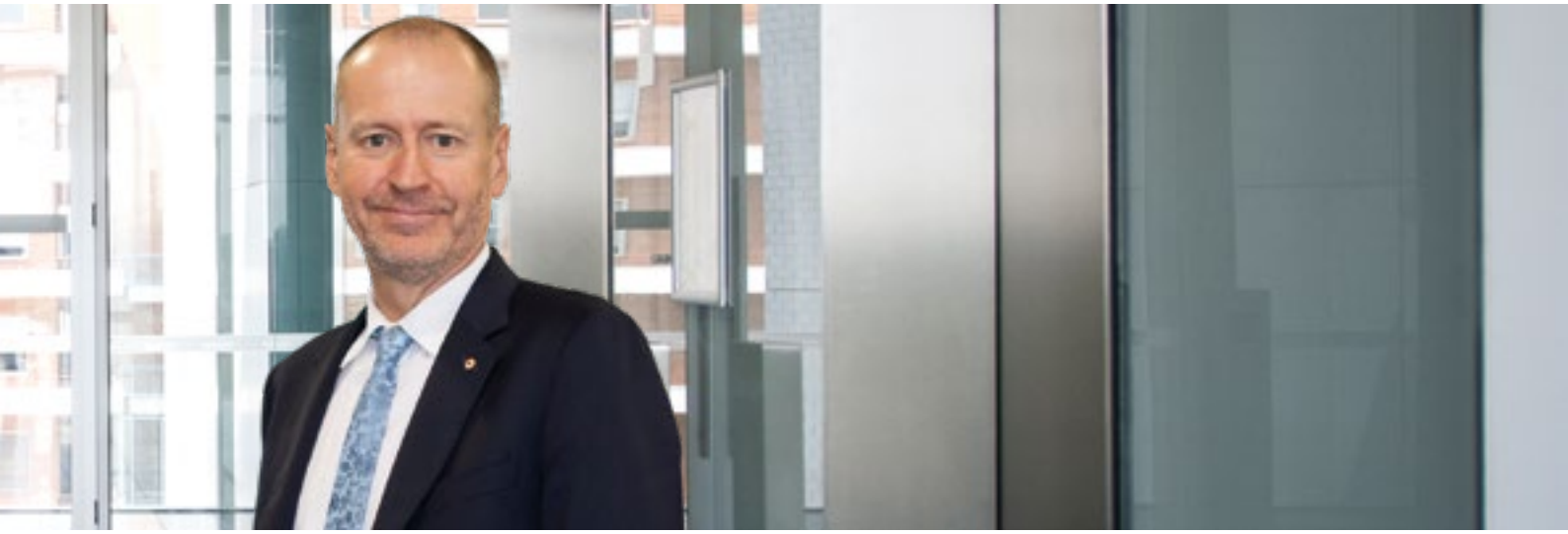
In March, WEHI farewelled one of its most esteemed alumni, Professor Ian Mackay AM. I was absolutely privileged to join nine members of Ian's family at his funeral and provide the eulogy. Ian was a brilliant clinician-scientist who improved the clinical management of autoimmune diseases. He will be remembered with the Professor Ian Mackay Travel Scholarship Fund, which he established himself with a foundation donation before his death. Vale Ian.

2020 showed us the importance of investing in infrastructure – with challenges surfacing in public health resources, medical technology manufacturing and supply chains. We also saw previous investments pay dividends. The presence of the global company CSL right here in Melbourne has meant Australia can produce its own vaccine supply, while CSL's expertise in developing biologics therapeutics has benefited local COVID-19 research (see page 15). The Australian Synchrotron allowed our researchers to study the structure of key coronavirus proteins, while co-investment in the National Drug Discovery Centre by WEHI, philanthropists and the Victorian and Australian governments accelerated the development of potential new medicines against COVID-19 (see pages 14 to 15). I hope we learn from 2020 what we need to invest in, both to mitigate future health threats as well as drive a healthy and vibrant community.

In late 2019, as part of WEHI's rebranding, we decided to switch the tag-line on WEHI's logo to "brighter together". I could not have imagined how prescient that would be. In 2020, we came together like never before. Collaboration has been at the heart of WEHI's culture since our earliest days. In 2020, collaboration not just within WEHI, but locally, nationally and internationally, has been critical for research into COVID. It led to rapid diagnostics, therapies and even a vaccine, which have been developed in less than a year – without cutting corners or jeopardising safety. As WEHI has always done, our scientists responded to this urgent need and have made meaningful contributions to the global COVID-19 research effort, drawing not only on expertise in infectious diseases, but from across the breadth of our research. You can read about some of these amazing research efforts in this report.

Working together for a common good also shone in our community in 2020. I am inspired by Victorians embracing the sacrifices that were required to protect the vulnerable. I am heartened by how our community rallied to support health and medical research across this city. And I am in awe of the way WEHI's own supporters sustained us. On behalf of every one of our 1100 staff and students – thank you.

Professor Doug Hilton AO
Director, WEHI



New name, new brand: launching a bright new era at WEHI

Collaboration, long-term discovery and a supportive culture are at the heart of what makes WEHI brighter together.

The COVID-19 pandemic shone a light on the essential role of medical research for the health of our community.

At WEHI, researchers rose to the challenge, leveraging longstanding expertise and a rich history of discoveries in virology, immunology and infectious diseases to tackle COVID-19.

It was the latest in a proud history of responding to the health needs of the community, something our researchers have been doing since WEHI was established in 1915.

Brighter together

WEHI brings together the brightest minds from around the world to collaborate, innovate and shine a light on some of humanity's biggest health challenges.

The rebrand formally adopts the abbreviation WEHI, a new image and name that Professor Doug Hilton AO said better reflected the WEHI that its staff, students and supporters know.

"What I love about this new way of representing WEHI is that it pays tribute to our heritage, while also bringing a contemporary look that reflects the dynamic medical research we are known for," Professor Hilton said.

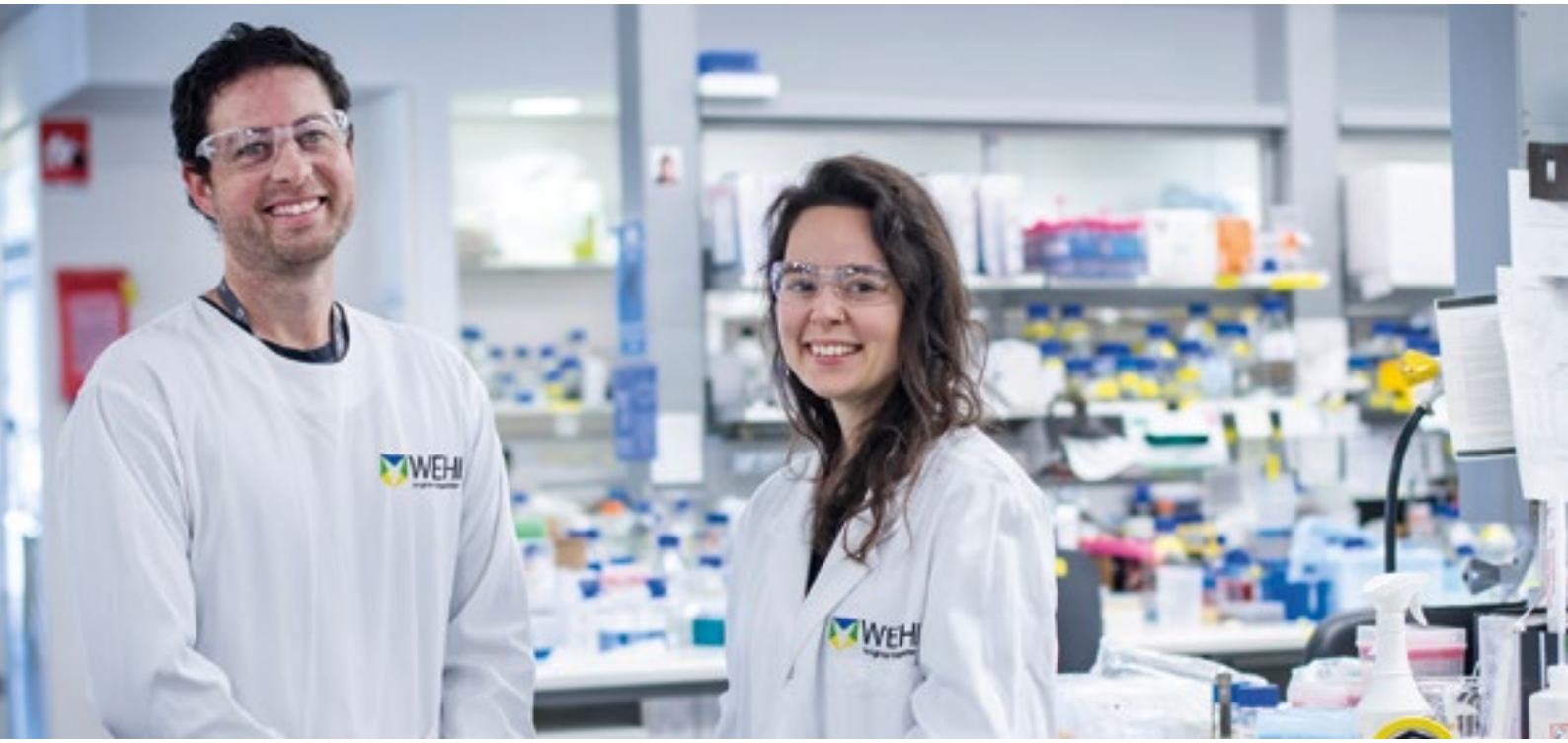
"WEHI isn't just a place where discoveries are made, it's where scientific theories are debated, investigated, pursued and celebrated. This is how we will continue to make impactful discoveries into the future."

"Our tagline – brighter together – encapsulates what I felt when working alongside Professor Don Metcalf, Professor Nick Nicola and their team, who collaborated for more than 30 years to discover and characterise the blood cell hormones colony stimulating factors, which have been life-saving for millions of people worldwide."

WEHI
brighter together

Above: WEHI's new logo captures the essence of our brand.

Below: WEHI brings the brightest minds together to solve some of humanity's biggest health challenges. Pictured: Dr Andre Samson (left) and Dr Katherine Davies (right), who were part of a team that used advanced technologies to understand an inflammatory cell death process (see page 25).



AR

Use augmented reality to watch a video that highlighted the impact of WEHI's work to our community.

Community support

WEHI Board president Mrs Jane Hemstritch said the new look would stand the institute in good stead for the future.

"WEHI is exceptional, not just for its age or its history of medical discoveries, but also for its unrelenting drive to innovate and be the best it can be."

"We wanted to create a brand that reflects the innovation and creativity we're known for and I think this new brand really hits the mark," Mrs Hemstritch said.

Supporters have welcomed and applauded the new look, including Federal Health Minister Greg Hunt who said it symbolised WEHI's commitment to evolving to meet the needs of the medical research community into the future.

"WEHI is one of the world's great medical research institutes and is fundamental in developing new treatments to address global health challenges. I look forward to its continued medical breakthroughs that will provide relief and hope to many Australians into the future," Minister Hunt said.

Collaboration and long-term discovery

WEHI has a 100-year history of achievement, from discoveries in polio and influenza that informed the development of vaccines, to fundamental immunology research that is informing immunotherapy and COVID-19 research, to discoveries about cell death that led to new anticancer drugs.

Fundamental to those successes were collaborative teams – within WEHI, across research institutes, universities, hospitals and industry – and the support of long-term partnerships with donors, consumers and government.

One thing that makes WEHI unique was its commitment to collaboration and long-term discovery, Professor Hilton said.

"I love the fact that at WEHI you see 20-year-olds working alongside 40-year-olds, 60-year-olds and 80-year-olds, all from diverse backgrounds, each respected and valued for the work they do and the ideas they bring. It's a long-term and passionate commitment to solve complex health problems in a wholehearted way. It's something I feel truly sets us apart," he said.

Responding to COVID-19

Professor Hilton said the COVID-19 pandemic had placed a focus on medical research that was almost unprecedented.

"It's been heartening to see the medical research community band together with universities, hospitals, industry, government and philanthropists, to respond to this health emergency."

"We are better and brighter when we work together – that's something that is really at the heart of the WEHI ethos."

He said the spotlight on medical research afforded an important opportunity to expand public awareness of WEHI.

"We want the community to know about the exciting fundamental discoveries we are making. We've always been bold in our work. Now we need to be bold in how we talk about WEHI and our work, raise community awareness of WEHI and, in turn, increase support for our work," Professor Hilton said.

National Drug Discovery Centre launched

WEHI's state-of-the-art facility to fast-track new medicines for Australian patients was officially opened by Australian and Victorian Ministers for Health in March 2020.

A unique resource

Based at WEHI's Parkville campus, the $75 million National Drug Discovery Centre (NDDC) is the first of its kind in Australia, providing researchers with access to specialist high-throughput screening, which is one of the first steps in translating biological discoveries into new medicines.

The advanced robotic high-throughput screening enables the rapid analysis of hundreds of thousands of test compounds to assess their potential as starting points for new medicines targeting specific proteins or biological processes, dramatically reducing the time it takes to bring new medicines to patients. Prior to the establishment of the NDDC, Australia did not have a facility that could perform work on this scale.

Researchers from Australian research institutes and small-to-medium enterprises can access the NDDC with a 90 per cent cost subsidy available from the Australian Government's Medical Research Future Fund (MRFF). During 2020, six projects that were subsidised included those investigating new treatments for type 2 diabetes, drug-resistant prostate and breast cancers, blood cancers, antibiotic-resistant infections and Prader-Willi Syndrome.

A timely concurrence

On the same day the NDDC was officially opened, the World Health Organization declared COVID-19 a pandemic. Throughout 2020 the NDDC was also used to test more than 400,000 compounds to find starting points for new drugs specifically aimed at blocking one of the SARS-CoV-2 virus's key enzymes (see page 14). This contribution to critical coronavirus research was also made possible by support from the MRFF.

Funding for a healthier future

The establishment of the NDDC was generously supported by $25 million from the Australian Government and $18 million from the Victorian Government, with a $32 million investment from WEHI, which included royalty revenue and generous seed funding from philanthropists.

WEHI director Professor Doug Hilton AO recognised the contributions of the Australian and Victorian Governments, and philanthropic donors, for bringing the NDDC to life and ensuring researchers have access to the latest technologies to advance their projects.

"We look forward to seeing these ground-breaking research projects progress in the years to come, resulting in new treatments for patients in Australia and around the world," he said.

Above: The National Drug Discovery Centre's acting Head of Screening, Dr Kym Lowes (left), and Deputy Head of Screening, Dr Kate Jarman (right)

WEHI director named 2020 Melburnian of the Year

The City of Melbourne awarded its highest accolade, Melburnian of the Year, to WEHI director Professor Doug Hilton AO for his leadership in the medical research sector and contribution to the Melbourne community.

The award was part of the 2020 Melbourne Awards, recognising people who had demonstrated acts of kindness, integrity and community spirit during the COVID-19 pandemic.

Professor Hilton said he was humbled to receive the award, and that it was a reflection of the entire WEHI team and the scientific community more broadly.

"WEHI was Melbourne's first medical research institute and, in the 105 years since it was established, has continued to play a vital role in responding to community need," he said.

"It was inspiring to see how our researchers rallied together, not only within WEHI but also with our partners around Melbourne and Australia, to respond to the COVID-19 pandemic. We are working more collaboratively than ever before and with an incredible generosity of spirit to deliver benefit to the community.

"As someone who has spent most of my life living and working in Melbourne, I'm really proud of how our community got through such a difficult period and how we have supported one another during these challenging times," he said.

Above: Professor Doug Hilton AO

Fulfilling a long-held ambition to give back to WEHI

Nearly 60 years after starting a postdoctoral fellowship at WEHI, US-born Dr Leslie Norins found himself, together with his wife Rainey, re-engaging with WEHI on their new research priority— encouraging faster progress against Alzheimer's disease.

Dr Norins sees philanthropy as a practical and impactful way of giving back to WEHI, and improving the health of current and future generations.

A formative experience

Dr Norins first became involved with WEHI in 1962, after graduating as a physician from Duke University School of Medicine in North Carolina, US. He recalls his fellowship as a formative time, being exposed to "high-level research, top staffers, Australian and WEHI friendliness". Luminary role models included "Sir Mac" (Nobel Laureate Sir Frank Macfarlane Burnet, his overall supervisor) and Dr Margaret Holmes (day-to-day supervisor). He also encountered Sir Gustav Nossal, Professor Ian Mackay and Professor Don Metcalf at seminars and in the tea room.

"What a powerhouse to influence the 'wet clay' of an impressionable young physician and new researcher."

Dr Norins went on to work at the US Government's Centers for Disease Control and Prevention (CDC) and became the youngest director of its Venereal Disease Research Laboratory, one of its largest. CDC sent him around the world visiting top immunology labs to help revive research into classic sexually transmitted diseases overlooked by modern investigators. "My first stop was WEHI," he said. "I think Sir Mac was very pleased one of his researchers had made career progress."

Dr Norins had a long-held ambition to thank WEHI for his important early training. So, following a highly successful career in medical publishing, when the timing was right for them, Dr and Mrs Norins started giving to WEHI, and have been doing so since the late 1980s. They have also decided to leave a significant lasting legacy, through a gift in their wills, which will go on to benefit future generations for many years to come.

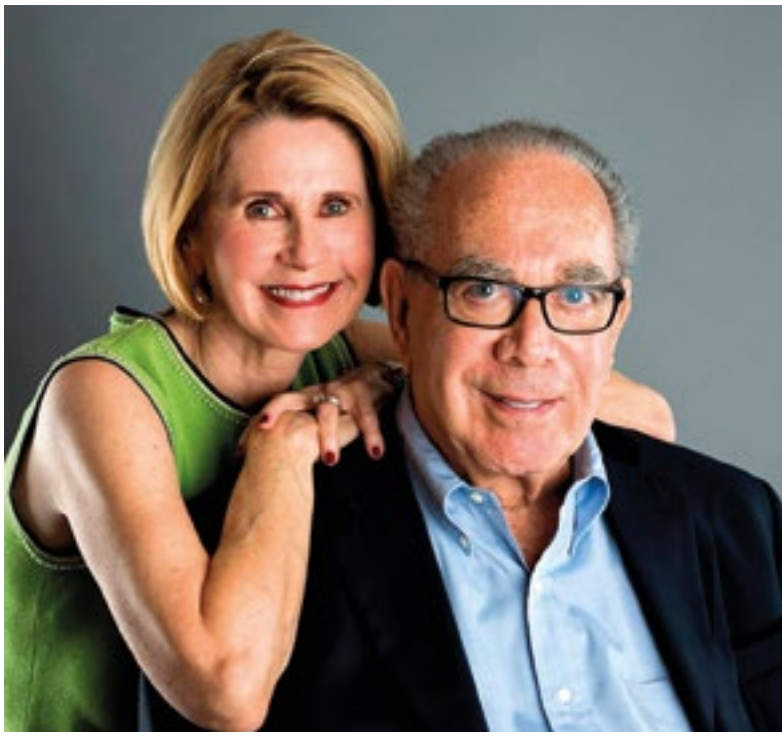
A focus on Alzheimer's disease

Dr Norins' focus has turned to Alzheimer's disease. This focus is shared by Mrs Norins, who has lost her mother and other family members to the devastating illness. "We are alarmed at its prevalence, and the fact that the cause and cure are still unknown — despite billions of dollars spent on research worldwide," he said.

Dementia, including Alzheimer's disease, is the second leading cause of death of Australians and the leading cause of death of Australian women.

In 2017, Dr and Mrs Norins established the Alzheimer's Germ Quest to stimulate and accelerate research on possible infectious causes of Alzheimer's disease. Dr Norins had conducted a two-year review of scientific literature and found evidence – largely neglected – that germs may be the root cause, or trigger, for Alzheimer's. He addressed an audience at WEHI in 2019 on the Quest, which carried a $1 million prize for persuasive proof of 'the Alzheimer's germ'. He provided examples of unexpected microbes that have been found to be the cause of other diseases, once considered mysteries.

WEHI similarly has a focus on Alzheimer's disease, assembling a specialised, multi-disciplinary team with world-leading expertise to drive research under its Healthy Development and Ageing theme. The team aims to achieve the significant breakthroughs needed to develop diagnostic approaches and targeted therapies to counter this increasingly common condition.



Above: Dr Leslie Norins (right) and his wife Mrs Rainey Norins (left) are championing innovative research into Alzheimer's disease.

Vale Professor Ian Reay Mackay AM (1922 – 2020)

In March 2020, WEHI farewelled alumnus Professor Ian Mackay AM, a pioneer of research into autoimmune diseases.

Professor Mackay, a clinician-scientist, was among the first to identify that diseases such as lupus and rheumatoid arthritis were caused by the body's immune system mistakenly attacking its own organs and tissues. His research led to a new era of 'immunosuppressive' treatments for autoimmune diseases, which diminish the immune response to reduce disease symptoms, and have saved many lives.

WEHI director Professor Doug Hilton AO said Professor Mackay was truly a scientific pioneer. "We will remember Ian's incisive mind, exacting standards and laser-like focus on solving major clinical problems. He championed WEHI's commitment to translational research and shaped the institute we have today. He is greatly missed by his colleagues and friends."

Professor Mackay's remarkable contributions will be remembered with the Professor Ian Mackay Travel Scholarship Fund, which he established himself with a foundation donation before his death. Scholarships from this fund will support the bright young immunology researchers who will be making key discoveries in the years to come. The fund will enable them to travel to scientific conferences across the globe, helping them build crucial professional and collaborative networks, and ensuring they can present their latest research to their peers.

Above: Professor Ian Mackay AM in 1966

Our supporters

The supporters who make our discoveries possible.

The advances in medical science at WEHI are made possible by our generous supporters. We are proud to acknowledge these gifts, grants and bequests received from 1 January to 31 December 2020. Gifts of $1000 or more are acknowledged, unless otherwise requested by our donors.

WEHI also acknowledges the support of the Australian Government and the Victorian Government, and the support of our community who pay the taxes that enable funding through these governments.

Centenary Donors

Anonymous (3)
The Alfred Felton Bequest
Bodhi Foundation
Brian M Davis Charitable Foundation
Mr Malcolm Broomhead AO
CSL Limited
David Winston Turner Endowment Fund
Mr Leon Davis AO and Mrs Annette Davis
DHB Foundation
The Dyson Bequest
Estate of Marion Page
Estate of Peter and Julie Alston
Estate of Ellen Corin
Mr Mike Fitzpatrick AO and Ms Helen Sykes
Mrs Jane Hemstritch
John T Reid Charitable Trusts
L.E.W. Carty Charitable Fund
Lorenzo and Pamela Galli Charitable Trust
The Metcalf family
Melbourne Water
Robert Connor Dawes Foundation
Professor Gordon K Smyth
The Stafford Fox Medical Research Foundation
Thwaites Gutch Trust of Ormond College
The University of Melbourne
The Walter and Eliza Hall Trust

Philanthropic Gifts

Gifts over $200,000

Anonymous (2)
The Alfred Felton Bequest
AWM Electrical
Professor Suzanne Cory AC and Professor Jerry Adams
Michael Heine and Family
Professor David Huang
The Stafford Fox Medical Research Foundation
The Yulgilbar Foundation

Gifts up to $200,000

Anonymous (1)
DHB Foundation
Quintessential Equity

Gifts up to $100,000

Anonymous (1)
Beck Family Foundation
Besen Family Foundation
CF Leung Memorial Trust
Associate Professor Peter Czabotar
The Dyson Bequest
The Galbraith Family Charitable Trust – The Donaldson Bequest
Professor Guillaume Lessene and Dr Romina Lessene
L.E.W. Carty Charitable Fund
Ms Jenny Tatchell
Mrs Morna Vellacott
The Walter and Eliza Hall Trust

Gifts up to $50,000

Anonymous (5)
Mrs Yvonne Butterfield
D & X Williamson Family Charitable Fund
Mr Ern Dawes OBE OAM and Mrs Nola Dawes
Mrs Meredith Evans and the late Mr Robert Evans
Mr Michael Harris and Ms Kelli Garrison
Mrs Jane Hemstritch
Mrs Elaine Mann
Phil Marks
Sir Gustav Nossal AC CBE
Mr John Peterson and Mrs Tibby Peterson
Lady Potter AC
Rae Foundation
Professor Andrew Roberts AM and Mrs Jennifer Roberts
RobMeree Foundation
Mrs Margaret Ross AM
Mrs Helen Russell
Brian Siepen, the late Dot Siepen and Family
Mr John A Simpson
The HMA Foundation
The Isabel & John Gilbertson Charitable Trust
The Roebuck Foundation
Ms Catherine Walter AM and Mr John Walter
The Watts Family

Gifts up to $10,000

Anonymous (8)
6A Foundation
Sawiyah Ali and Family
Ms Sue Clifton
Ms Ruth Crutch
The Cuthbertson Family Fund
Demak Timber and Hardware
Mr John Dyson and Ms Trudie Horsfall
Mr Graham Fredrickson
Mrs Andrea Gowers and Mr Geoff Gowers
The Helping Hand Foundation
Mr Ernst Herzig
The Hilton Family
Ms Helen Kennan
The Valda Klaric Foundation
Mr Philip Leahy and Mrs Elizabeth Leahy
Dr Darren Lockie
MJ Maughan Foundation
The McPhee Charitable Trust
Ms Claire Murray
The Ruse Family
Mrs Sam Sharman OAM
Mr John Smith
Loti and Victor Smorgon Family Foundation
Mrs Jean Williamson

Gifts up to $5000

Anonymous (10)
Ms Elizabeth Abbott
AET Foundation - Tong Family Legacy
Dr Robert Allan
Mrs Barbara Anderson
Mr Grant Beaumont
Mr Angelo Bladeni
Mrs Anita Castan

Mr Neville Castles
Ms Kaye Cleary
Mr Arthur Coates
Mr Mark Devlin and Mrs Elizabeth Devlin
Mr Matt Duckworth and Mr Nathan Duckworth
Ms Roz Edmond
Ms Kay Ehrenberg and Mr Scott Herne
Mr Cyril Evans and Mrs Pauline Evans
Mr Graham Gilpin
Mr John Graty and Mrs Barbara Graty
The Green Family
Mr Keith Harrison
Ms Jenny Ho
Mr Graham Jackson and Mrs Barbara Jackson
Mrs Caroline Johnston
Mr Brendan Madigan
Mrs Suzanne L Maple-Brown
Mrs Christine McConnell and Mr Denis McConnell
Mr James McIntyre
Mrs Olivia Quinn
Mr Shane Murphy
Mr Brian Parker
Mr Simon Pedler
Professor David Penington AC
Mrs Norma Phillips
Mrs Jan Richards and Mr Keith Richards
Ms Caroline M Richardson
Mr Dieter Rinke and Mrs Maxine Rinke
Mr Rohan Stanton
The Veith Foundation
Mr Duncan Tuck
Ms Jenny Vero and Mr Greg Vero
Dr Keith Watson
Ms Marjorie Wilks

Gifts $1000 to $2000

Anonymous (18)
Professor Emeritus Robin Anders and Dr Margot Anders
Mrs Debra Askew
Ms Andrea Baldwin
Mr Stuart Bales and Mrs Jillian Bales
The Joan Elaine Barry Memorial Fund
Mr Ian Bates
Ms Katherine I Behrend
Mr Ian Black
Professor Marnie Blewitt
Mr Geoffrey Board
Con and Trish Boekel and Family
Mr Leonard Brear
Ken Broomhead
Mr Leo Browne and Mrs Ann Browne
Mrs Bev Brownstein
Mr Leigh Bull and Mrs Sue Bull
Associate Professor Chris Burns
Dr Lawrence Carroll
Mr Richard Carter
Mrs Linda Clapp
Mr Derek Clapton and Mrs Annette Clapton
Mr Bruce Cochrane and Mrs Helen Cochrane
Associate Professor John Collins AM and Mrs Mandy Collins
Mr Stephen Crawford
Mr Bill Cropley and Mrs Elaine Cropley
Dr Judith Davey
Mr John Edward Davies
Mrs Sylvia Devine
Mrs Mayda Devlin
Dr Janice Dudley
Ms Janice Durkin
Mrs Susan Easton-Bond
Mr Lance Faulkner
Ms Janine Ferguson
Dr Sarah Garner
Mrs Sonia Gilderdale
Ms Janine Gleeson
The Goldschlager Family Charitable Foundation
Mr Anthony Hagen
Ms Vera Hardware
Ms Caitilin Hawkins
Mr Trevor Hilton
Mrs Ann Hilton-Ley
Dr W Huffam
Mrs Margaret Johnson
Jupiter Foundation
Mr Maurice Kelly and Mrs Mary Kelly
Mr Michael Kelm
Mr Zeeshan Khan
Mr George Kiossoglou and Ms Glenda Kiossoglou
Mr Ken Launder and Mrs Liz Launder
Dr Peter Adams and Dr Sheryl Lawson
Professor Vanda Lennon
Mr Phil Leung
Ms Christine Lopacinski
Dr Peter Lynch
Mrs Jane Martin
Mr Noel McKinnon
Mr John McRae
Mrs Gillian Montgomery
Mr Brian Moore
Ms Teresa Morey
Dr Merrilyn Murnane AM
Mrs Anne Naylor
Dr Myles Neri and Ms Katrina Nossal
Mrs Alison Neumaier
Mr Robert Niall
Mr David Nicholds and Mrs Janet Nicholds
Mr Patrick O'Connor and Ms Nadia Kadlof
Mr Ian O'Gillin
Mr Rory Pincott
R Sharan Investments Pty Ltd
Mr Don Rankin and Ms Megan Rankin
Mr Sean Rao
Ms Estelle Redlich
Ms Deborah Reich
Ms Catherine Riggall
Ms Judy Roach
Mr Paul Rosen
Mr Blair Sanderson
Mr Keith Satterley
Dr D Smith
Ms Jennifer Strangward
Dr Allan Sturgess
Mr Richard Sutterby
Ms Ann C Sylvester
Mrs Kay Szonert
Mr John Tagg and Mrs Dorothy Tagg
Mr PaMa Thamfoo
Mr Simon Thompson
Mr John Thornton
Mrs Jeanette Turner
Mr Robert Vance and Mrs Claire Vance
Mr John Walker QC and Mrs Angela Walker
Mr Robert Warren
Mr Robert Warren and Mrs Diane Warren
Mr Mark Whinfield
Ms Heather White
Mr Josh Wigg
Mrs Norma Wilkinson
Mrs Heather Winneke
Ms Lorraine Woolley

Community organisations

Australian Rotary Health
Berwick Opportunity Shop
CALAC (Chinese Australian League Against COVID)
Gundagai Golf Club Lady Members
Loyal Orange Trust
Rotary Club of Eltham
Rotary Club of Melbourne
Strathmore Community Bank Branch of Bendigo Bank
Twin Towns Services Community Foundation
The Victoria Golf Club Ltd

Community fundraisers

Ms Dani Breen
Ms Molly McKenzie

Companies and institutions

The Australian Cellulose Insulation Manufacturers Assoc
Hengyi Group
L2D Architects
Donald Cant Watts Corke

Gifts in Wills

(Listed by bequest amount)

Estate of Marjorie Talan
Estate of Margaret Anne Ireland
Estate of Patricia Desiree Field
Estate of Marcel Gystertus Petrus Visseren
Estate of Michael Sutherland Stansfeld
Estate of Robert Rowan Drury
Albert H Maggs Charitable Trust
The Hazel & Pip Appel Fund
Estate of Lawrence Owen Esson
Estate of Sheila Mary Helpman
Estate of Maxwell Gardiner Helpman
Alan Ambrose Murray Testamentary Trust
Irene & Ronald MacDonald Foundation
Estate of Eleanor Margrethe Albiston (The Stang Bequest)
Frederick and Winifred Grassick Memorial Fund
Estate of Ethel Mary Drummond
Estate of Florence Mary Young
Estate of Coral Francis McConnell
Estate of Alan G L Shaw
Estate of Gwynedd Thornton
Estate of Vivian H Campbell
Estate of Clara Julia Ursula Oostergetel
Estate of Roy Nicholas
The George Thomas & Lockyer Potter Charitable Trust
Estate of Lindsay James Baldy
Agnes Maude Reilly Charitable Trust
The C.H. Boden Memorial Trust
Estate of Joyce Helen Iggulden
John Frederick Bransden Charitable Trust
Estate of Vivienne Paul
Estate of Doreen Merle Taylor
The Frank Broadhurst Memorial Charitable Fund
Margaret Lewis Reilly Charitable Trust
Thomas, Annie & Doris Burgess Charity Trust

International grants

(Listed by grant amount)

Bill and Melinda Gates Foundation
Wellcome Trust, UK
Leukaemia and Lymphoma Society
National Institute of Health, US
Breast Cancer Research Foundation
Worldwide Cancer Research
Friedrich's Ataxia Research Alliance
Rivkin Center
Citizen's United for Research in Epilepsy
The Michael J. Fox Foundation for Parkinson's Research
Ludwig Institute for Cancer Research

Australian Government grants

National Health And Medical Research Council (NHMRC)
Medical Research Future Fund (MRFF)
Cancer Therapeutics CRC
CSIRO

Victorian Government grants

Victorian Cancer Agency
Victorian Medical Research Acceleration Fund
Department of Jobs, Precincts and Regions

Australian grants

(Listed by grant amount)

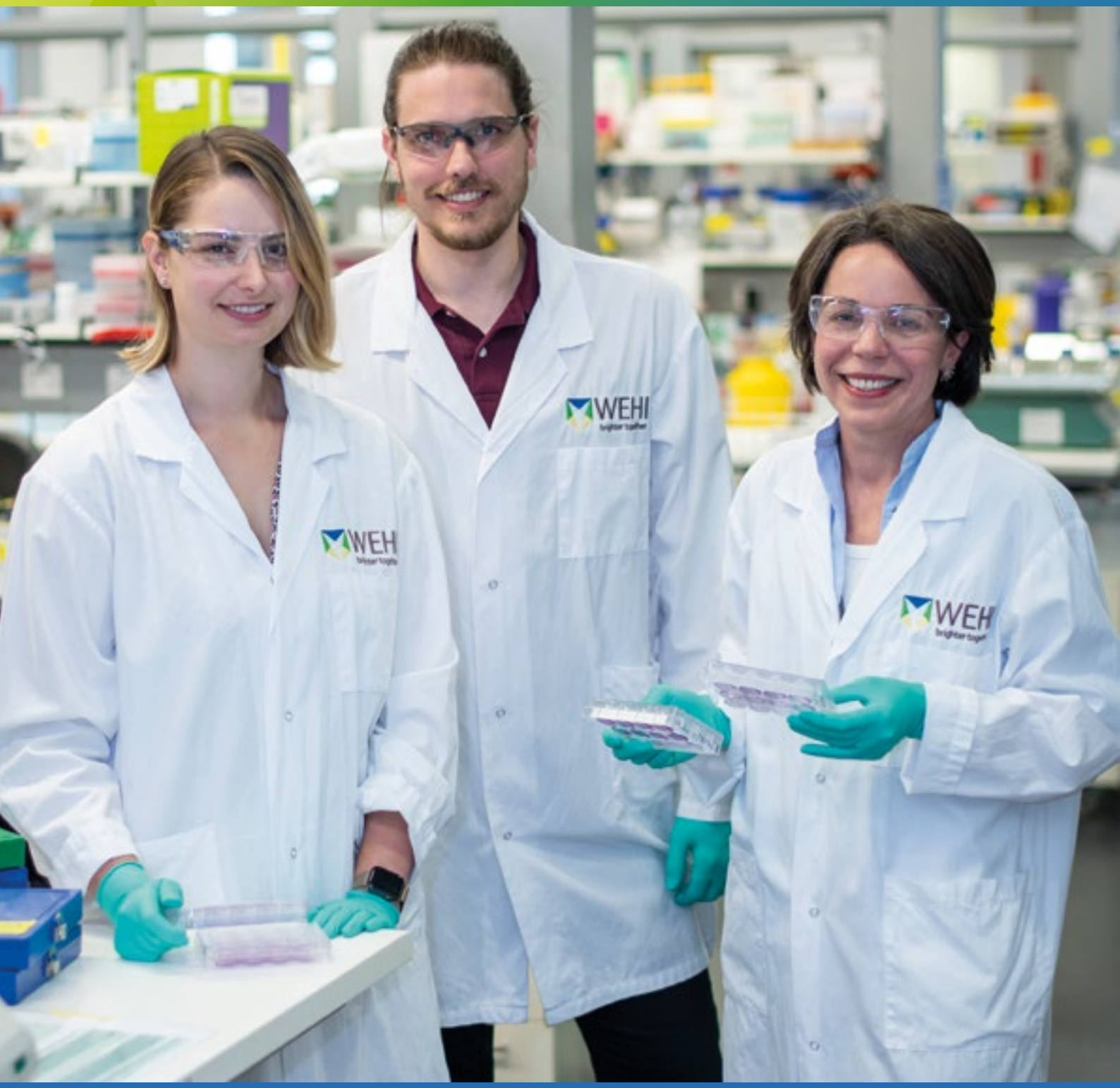
Australian Cancer Research Foundation
Colonial Foundation Limited
Juvenile Diabetes Research Foundation Australia
Cancer Council Victoria
National Breast Cancer Foundation
Victorian Comprehensive Cancer Centre
Epworth Foundation
The Harry Secomb Foundation
The Marian & E. H. Flack Trust
The Cass Foundation
Foundation for Prader-Willi Research
Percy Baxter Charitable Trust
Cerebral Palsy Alliance Research Foundation
The Sylvia and Charles Viertel Charitable Foundation
Belberry Limited
Leukaemia Foundation
Cure Cancer Australia Foundation
Drakensberg Trust
The Phyllis Connor Memorial Trust
Cure Brain Cancer Foundation
Harold and Pam Holmes Charitable Trust
National Foundation for Medical Research and Innovation (NFMRI)
The Collie Foundation
Australian Academy Of Science
Cancer Council NSW
MS Research Australia
Erica Foundation Pty Ltd
The Kids' Cancer Project
Joe White Bequest
Isabella and Marcus Foundation/ Upstream Foundation
Shake It Up Australia Foundation
The Jack Brockhoff Foundation
Cancer Australia
Cybec Foundation
Pancare Foundation
Rebecca L. Cooper Medical Research Foundation
Geok Hua Wong Charitable Trust
Lung Foundation Australia
Haematology Society of Australia and New Zealand
The Medical Advances Without Animals Trust (MAWA)/Australian Ethical Foundation (AEF)
The Thomas William Francis & Violet Coles Trust
Harold & Cora Brennen Benevolent Trust
Coeliac Australia
Janko-Inge Foundation
The Margaret Walkom Bequest
Australia New Zealand Gynaecological Oncology Group (ANZGOG)
Mito Foundation Incubator
The Clive and Vera Ramaciotti Foundation
The Jakob Frenkiel Charitable Trust
FSHD Global Research Foundation
Norman Ann & Graeme Atkins Charitable Trust
Arthritis Australia
Craig Perkins Cancer Research Foundation
Cure4 Cystic Fibrosis
Rigg Memorial Trust
Nell & Hermon Slade Trust
The William Angliss (Victoria) Charitable Fund
S.T.A.F - Rupert Ethel & Ronald Fraser & Ruby Thomas
The J Elliston Endowment

Trustee Companies

Australian Communities Foundation
Australian Executor Trustees
Equity Trustees
Mutual Trust
Perpetual Trustees
State Trustees

Exceptional science and people

Dr Sarah Best (left), PhD student Mr Jonas Hess (centre) and Associate Professor Kate Sutherland (right) led research revealing that immune cells called 'natural killer' cells could be a powerful weapon for fighting lung cancer.



Rapidly responding to the COVID-19 pandemic

2020 will be remembered for the global impact of the COVID-19 pandemic. WEHI rapidly joined the global scientific effort to understand COVID-19, and develop new approaches to prevent, diagnose and treat this disease.

COVID-19 is the disease caused by the SARS-CoV-2 virus, which is part of a broad family of coronaviruses that cause illnesses ranging from mild colds through to life-threatening diseases with pandemic potential including SARS and MERS. COVID-19 is unlikely to be the last serious coronavirus epidemic faced by humanity. WEHI's COVID-19 research program aims to develop new ways to prevent, diagnose and treat COVID-19, and also contribute discoveries that could be rapidly deployed against potential future coronavirus diseases.

WEHI's COVID-19 research builds on expertise and technologies our researchers established through research into disparate diseases including malaria, hepatitis B, rheumatoid arthritis, immunodeficiencies, cancer and Parkinson's disease. Drug discovery – spearheaded by the National Drug Discovery Centre (NDDC) – has also been a critical facet of WEHI's COVID-19 research.

Collaboration is central to WEHI's approach to research, and has been critical for our COVID-19 program, leveraging existing partnerships as well as establishing new connections with local, national and international research institutes, hospitals and industry partners.

Discovering new coronavirus drugs

Developing medicines to treat COVID-19 and future coronavirus diseases has been an important aspect of WEHI's research. This has included a search for small molecules that interfere with the COVID-19 viral machinery, as well as applying WEHI's biologics drug development platform to discover antibody-based medicines against COVID-19.

Using our established infectious diseases research facilities, our researchers tested libraries of potential antiviral medicines for their actions against the SARS-CoV-2 virus. The NDDC also enabled the screening of drug-like small molecule compounds for antiviral activity. Professor Marc Pellegrini, who leads WEHI's COVID-19 research program, said these were complementary approaches.

"Potential antiviral medicines are more limited in number, but have properties that would mean that any positive 'hits' could be rapidly progressed into clinical testing. In contrast, small molecule screens take a broader approach, so might be more likely to find compounds with activity against COVID-19, but these compounds would take longer to develop into medicines, and would need in-depth assessments for safety and pre-clinical activity," he said.

The NDDC's application program was also modified to accelerate any promising Australian COVID-19 projects.

"COVID-19 drug discovery proposals can be submitted by Australian researchers to the NDDC at any time, in contrast to other projects that have access to defined application rounds during the year. This recognises the urgency of COVID-19 research: we are keen to ensure any promising project begins as soon as possible," Professor Pellegrini said.

SARS drug offers hope

Coronaviruses, including the viruses that cause COVID-19 and SARS, all contain a protein called PLpro, which allows the virus to hijack human cells and disable their anti-viral defences. Professor David Komander said PLpro belonged to a family of proteins called 'deubiquitinases' (DUBs), which his team had studied for the past 15 years in a range of diseases.

"Deubiquitinases are a key component of coronaviruses, so in response to the COVID-19 pandemic we quickly established the VirDUB program, focussing on SARS-CoV-2 PLpro," he said.

The VirDUB team used structural biology to understand how SARS-CoV-2 PLpro interacted with human proteins, revealing how drugs could potentially inhibit the viral protein.

"Using the NDDC, we then scanned thousands of drugs and drug-like compounds to find those which could block PLpro. We discovered that compounds which had already been developed against SARS PLpro could prevent the growth of SARS-CoV-2 in pre-clinical testing in the laboratory," Professor Komander said.

The next stage of the research is to develop the compounds into medicines, and ensure they are safe for patients.

"Drugs that target PLpro may be useful not just for COVID-19 but potentially also for other coronavirus diseases that emerge in the future," he said.

Biologics therapies for COVID-19

'Biologics' medicines mimic naturally occurring proteins such as antibodies, proteins produced by immune cells to fight infection. In particular, monoclonal antibodies have emerged as powerful diagnostics and therapeutics in the past three

decades, and are now the leading treatments for a variety of human diseases, particularly for cancer, autoimmunity and chronic inflammatory diseases.

A collaborative consortium was established to develop antibody-based anti-viral medicines for COVID-19, bringing together Victoria's and Australia's foremost academic and industry leaders in infectious diseases and antibody therapeutics from WEHI, Doherty Institute, Burnet Institute, Kirby Institute, CSIRO, CSL and Affinity Bio.

Lead researcher Associate Professor Wai-Hong Tham said the consortium had assembled a suite of technologies and expertise to expedite the identification and development of biological therapeutics against SARS-CoV-2.

"Therapeutic monoclonal antibodies that prevent SARS-CoV-2 from binding to cells – the first step in the infection cycle – could have applications for preventing or treating infection in vulnerable groups such as the immunosuppressed and the elderly, and to provide immediate protection to limit outbreaks," she said.

"Our next step is to secure funding to manufacture, produce and advance our lead antibody cocktail into clinical trials in Australia."

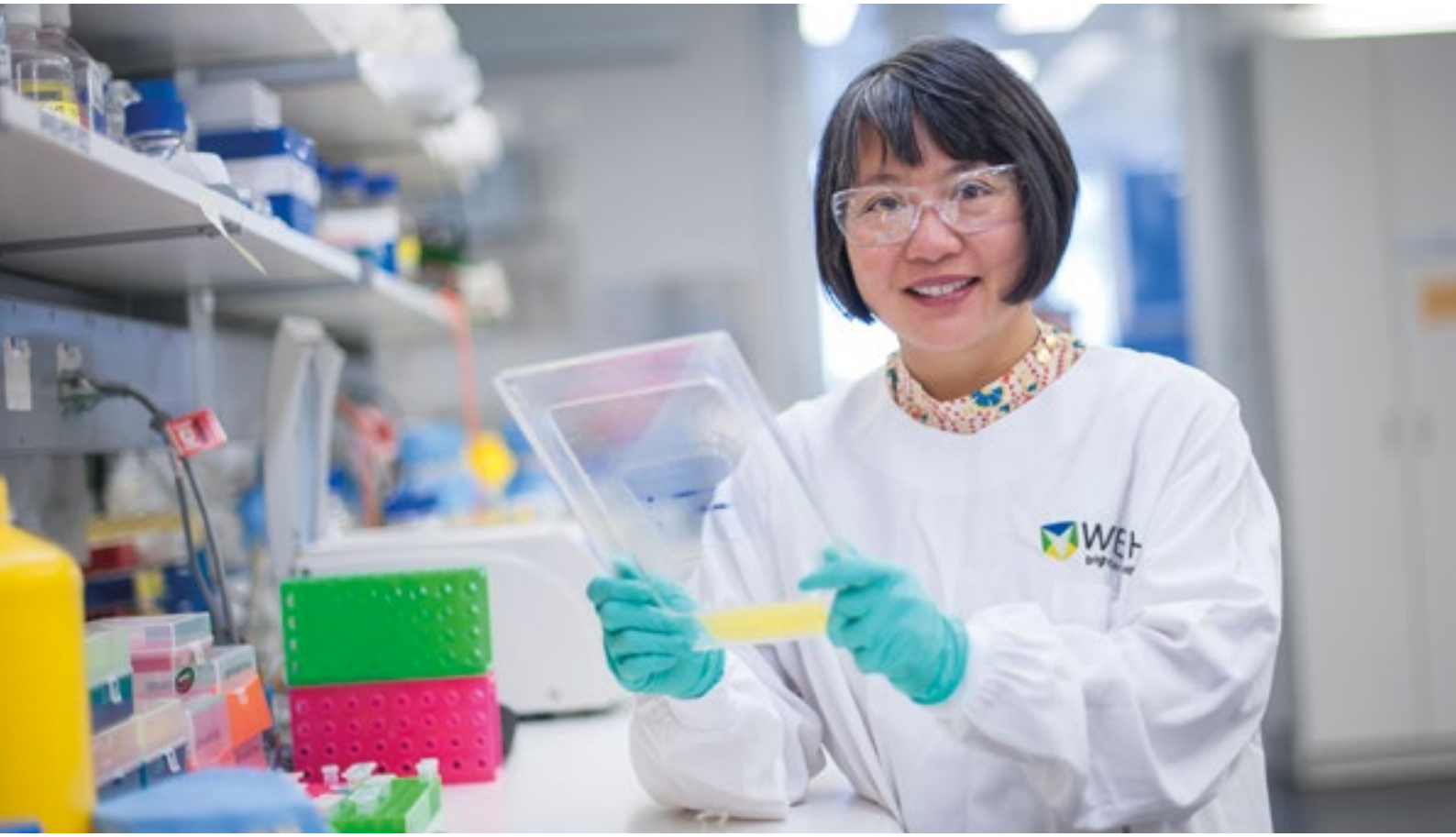
Critical funding boosts COVID-19 research

The urgency and scale of WEHI's COVID-19 research response was enabled by rapid and agile funding from both philanthropists and governments.

Melbourne-based company, the Hengyi Group, responded quickly to the emerging pandemic in March 2020 by donating to WEHI's new COVID-19 research program. This funding was in addition to Hengyi's support of a Centenary Fellowship in Parkinson's disease through its charitable arm, the Bodhi Foundation.

COVID-19 research projects led by WEHI were boosted by significant support from the Australian Government's Medical Research Future Fund, as well as the Victorian Government.

Below: Associate Professor Wai-Hong Tham led a consortium to develop antibody-based medicines for COVID-19.



Multidisciplinary research tackles COVID-19

WEHI's researchers have applied a diverse range of expertise towards improving the prevention, diagnosis and treatment of COVID-19.

Rapid testing platform developed

A fast, new test for infections – including the SARS-CoV-2 virus – has been developed, which could transform Australia's ability to provide targeted clinical care and respond to pandemics and biosecurity threats.

WEHI is leading the c-FIND research program, in collaboration with Melbourne Health, Murdoch Children's Research Institute, Peter MacCallum Cancer Centre, The Royal Children's Hospital and the University of Melbourne, as well as local biomedical technology company Axxin Pty Ltd.

The test rapidly and accurately detects multiple viral, bacterial or fungal genomes within minutes – much faster than existing tests that can take days or even weeks to return a result.

Associate Professor Marco Herold, whose team adapted CRISPR gene-editing technologies to develop c-FIND, said the test could improve patient diagnosis and treatment.

"In the case of COVID-19 – and future diseases with pandemic potential – rapid diagnosis would be of huge benefit, helping to quickly identify and isolate infected people, preventing the spread of the infection. We are now working with Axxin to translate c-FIND into a portable, point-of-care device," he said.

"Such a device could be used to rapidly screen for infections in healthcare, as well as at ports of entry. This would enable more rapid detection and mean infected people would receive the right treatment sooner, which could be lifesaving, particularly for cancer patients or young children, who are highly susceptible to infections."

Gold-standard trial examines potential preventative drug

Healthcare workers around the world were heavily impacted by the COVID-19 pandemic, through repeated exposure to the infection while caring for patients.

WEHI established the COVID SHIELD trial in partnership with human data science company IQVIA and healthcare providers in Victoria and New South Wales to rigorously test whether the widely used medicine hydroxychloroquine could protect healthcare workers from contracting COVID-19.

Professor Marc Pellegrini, who jointly led the study, said in pre-clinical models hydroxychloroquine appeared to interfere with SARS-CoV-2 infections.

"This led to considerable speculation about whether this drug could be used to prevent or treat COVID-19 infections. A range of clinical trials were initiated around the world to address these questions – including COVID SHIELD," he said.

"COVID SHIELD is gold-standard in its design as a multi-centre, randomised, double-blind study. Unlike many trials that treated people who were already sick with COVID-19, or had already been exposed to the virus, COVID SHIELD focussed on protecting healthy people before they were exposed – and was limited to healthcare workers, as they had a higher risk of contracting COVID-19."

The trial was co-led by WEHI's joint Head of Clinical Translation, Professor Ian Wicks, a rheumatologist with considerable experience in using hydroxychloroquine to treat autoimmune diseases.

"Hydroxychloroquine is a well-known prescription medicine that has been used for more than 50 years. Like most medicines, it has some side-effects, but these are well known and can be carefully managed. Our trial included rigorous selection criteria and close monitoring of participants to ensure their safety," Professor Wicks said.

COVID SHIELD concluded its patient recruitment in late 2020, with results expected during 2021.

Risk factors for severe COVID-19 discovered

One of the mysteries of the COVID-19 pandemic has been why some infected people become seriously ill, while others have mild or asymptomatic infections.

WEHI computational biologists Dr Chin Wee Tan and Associate Professor Melissa Davis collaborated with Queensland University of Technology, the Translational Research Institute and the University of Queensland to investigate which human genes are activated in people infected with SARS-CoV-2, using an innovative spatial transcriptomics platform.

Associate Professor Davis said the research revealed the expression of a gene called *IFI127* was associated with developing severe COVID-19.

"Looking at samples from our collaborators in Brazil, we discovered *IFI127* may be a valuable biomarker to identify those people at highest risk of progressing to severe disease – potentially allowing them to be more aggressively treated. *IFI127* is a gene involved in immune responses to viruses, so we think it could also help to explain how COVID-19 can progress to a severe form," she said.

The highly collaborative research – as part of a broader COVID-19 program at the University of Queensland – was recognised with a 2020 AusBiotech and Johnson & Johnson Innovation Industry Excellence Award.

Clinical study examines immune responses

WEHI researchers established a study to understand how immunity to COVID-19 develops, how long it lasts and what happens when immunity is lost – key information that could guide vaccination strategies.

The COVID PROFILE study is looking at immune markers in the blood of people who had recovered from COVID-19, and their close contacts who did not catch the disease. Dr Vanessa Bryant said the research aimed to answer important questions about whether people could be re-infected with SARS-CoV-2 after infection or vaccination, and how long they are protected for.

"We also hope to understand how immune responses can contribute to the severity of COVID-19, how they recover and potentially discover biomarkers for severe disease. These are critical questions in the scientific community, and will guide our responses to COVID-19 for years to come," she said.

The research arose from a similar study of immune responses to malaria (see page 18), said lead researcher Professor Ivo Mueller.

"Our team had developed computational methods that allow accurate tracking of immune responses over time, which could be rapidly adapted to understand COVID-19 immunity," he said.

COVID PROFILE – which is continuing in 2021 – is a collaboration with The Royal Melbourne Hospital, the University of Melbourne and the Doherty Institute, with funding support from the World Health Organization's UNITY study and philanthropic supporters.

Below: Clinician-scientist Professor Marc Pellegrini has led WEHI's COVID-19 research program.

Collaborations accelerate malaria research

WEHI's malaria research program takes a multidisciplinary approach to combating this mosquito-borne disease and using this knowledge to develop better prevention and treatment strategies.

Partnerships with academic, government, philanthropic and industry collaborators are critical for the progression of our malaria research.

Progress towards new drugs

A collaboration between WEHI and global biopharmaceutical company MSD, with funding support from the Wellcome Trust, has led to the discovery of a promising new class of antimalarial compounds. The compounds target an unexplored parasite pathway and could potentially overcome drug-resistant malaria, an ongoing and increasingly urgent problem, said Professor Alan Cowman AC, who leads WEHI's malaria research program.

"In preclinical testing, the lead compound killed malaria parasites in the host and prevented transmission back to the mosquito. This was very exciting to see, as current antimalarial drugs kill the malaria parasite in the blood but do not fully prevent transmission," Professor Cowman said.

"This new class of antimalarial compounds could fill a critical and widening gap in our efforts to control and eliminate malaria. We hope drug candidates based on these efforts will soon progress to human phase 1 clinical trials."

Blood test may enhance surveillance

A new diagnostic test could provide vital information about the spread of malaria in communities. A collaborative team led by researchers from WEHI, Pasteur Institute (France) and Ehime University (Japan) developed a way of measuring immune markers in the blood to detect whether – and when – a person has been infected with *Plasmodium vivax*, a parasite species that causes relapsing malaria.

Research team leader Professor Ivo Mueller said the test could enable better surveillance and deployment of resources to areas where malaria remains, as well as targeted treatment of infected individuals, who may carry 'silent' infections. "This could be a huge improvement in how *vivax* malaria is controlled and, hopefully, enable its elimination from the Asia-Pacific and Latin America," he said.

With support from a National Health and Medical Research Council (NHMRC) Development Grant, the research team are now working with Australian biotech company Axxin to develop a diagnostic test for malaria that can be deployed in the field, based on the immune markers the laboratory testing identified, said malaria researcher Dr Rhea Longley.

"Having a rapid field test for *vivax* malaria exposure will be an important aspect of our future clinical trials that will investigate how these tests can guide malaria elimination efforts," she said.

The development of a test that accurately monitors exposure to infections has also been adapted to other diseases, Professor Mueller said.

"In collaboration with the Pasteur Institute, we have developed a test that measures immune responses to COVID-19. This could be a valuable tool for monitoring disease spread in communities where insufficient virus testing efforts could be leading to undetected disease spread," he said. This research has also been incorporated into the COVID PROFILE clinical study in Melbourne (see page 17).

Above: Malaria researcher Dr Rhea Longley was joint winner of WEHI's highest honour, the 2020 Burnet Prize. She shared the honour with immunology researcher Dr Cyril Seillet, who was recognised for his studies of front-line immune cells that regulate inflammation.

Cell signalling research boosted by CSL Fellowship

Our cells are constantly communicating with each other, and errors in cell signalling contribute to a range of diseases including cancer. A five-year, $1.25 million CSL Centenary Fellowship is enabling new laboratory head Dr Alisa Glukhova's structural biology investigations into cell signalling.

Dr Glukhova, who joined WEHI in 2020, said her research focused on a signalling protein called Wnt. "Wnt travels between cells, binding receptors on the cell surface. This triggers a domino-like series of protein changes within the cell, resulting in changes in the cell's behaviour," she said.

"Wnt signalling is essential for the function of normal cells, and driving responses ranging from changes in a cell's shape and cell division, through to the cell dying. In cancer cells, Wnt signalling can control how the cancers grow and progress – and drugs targeting this pathway could be new cancer therapies."

To understand how Wnt binds to receptors, Dr Glukhova is looking at the three-dimensional structures of the proteins, using advanced technologies including X-ray crystallography and cryo-electron microscopy. Her goal is to discover new details about how Wnt binds to and signals through its receptors, potentially revealing how new drugs might block this process.

"Receiving a CSL Fellowship has given my research an enormous boost because it provides a valuable window of time and funding in which I can progress my investigations. I hope that within the next five years I will have made significant progress in understanding Wnt signalling, and that this knowledge could inform the development of better medicines for diseases such as cancer," she said.

Above: Dr Alisa Glukhova

Secrets of gene regulator revealed

WEHI researchers have shed new light on genomic imprinting in the developing embryo, revealing new clues about healthy development and disease.

Influencing gene expression

Understanding how genes are switched on and off provides insights into the function of healthy and diseased cells. A research team led by Professor Marnie Blewitt is focused on the role of a protein called SMCHD1, which switches genes off, preventing their expression. Inherited changes in SMCHD1 have been linked to rare degenerative and developmental disorders, said Professor Blewitt.

“Our goal is to reveal how SMCHD1 functions in healthy cells, as well as to better understand the diseases that are associated with changes in SMCHD1,” she said.

A study led by Professor Blewitt, PhD student Dr Iromi Wanigasuriya and Dr Quentin Gouil used advanced genomics technologies and imaging to reveal a mother’s SMCHD1 protein lingers in her developing embryo, impacting gene expression.

Dr Wanigasuriya said this was the first time SMCHD1 from the mother had been linked to a phenomenon called ‘genomic imprinting’, in which genes are differentially expressed depending on whether they are inherited from the mother or the father.

“Genomic imprinting can have long-term health impacts, and is seen in certain inherited diseases,” she said. “Our research has expanded our understanding of how SMCHD1 functions, including uncovering additional gene targets that SMCHD1 switches off.”

Structure explains protein function

A separate study used structural biology to create a three-dimensional ‘map’ of a key part of SMCHD1.

This research was led by Professor Blewitt, Associate Professor James Murphy, Dr Richard Birkinshaw, Dr Alexandra Gurzau and Associate Professor Peter Czabotar.

Associate Professor Murphy said the protein structure revealed how SMCHD1 bound to genes, and why some disease-associated changes in SMCHD1 prevent it from functioning.

“These studies have given us important new insights into how small drug-like molecules could be used to alter the function of SMCHD1. We hope this will lead to the development of new therapies for diseases associated with the protein,” he said.

Searching for new medicines

Professor Blewitt and the team are now working to develop new medicines that target SMCHD1. The project was fast-tracked thanks to an Australian Government-funded subsidy to enable access of the National Drug Discovery Centre (NDDC) at WEHI (see page 6).

“Access to the NDDC will enable us to develop drugs that modulate SMCHD1 function as potential new treatments for people with Prader-Willi Syndrome, a debilitating and incurable developmental disorder for which targeting SMCHD1 would treat the cause of disease,” Professor Blewitt said.

Above: Professor Marnie Blewitt (left), Dr Quentin Gouil (centre) and Dr Iromi Wanigasuriya (right) uncovered a new way that mothers can impact gene expression in their children.

Mucus discovery a breath of fresh air

A discovery about the chemical makeup of mucus could lead to better airway-clearing therapies for respiratory diseases such as asthma, cystic fibrosis and chronic obstructive pulmonary disease.

Understanding mucus

Mucus is secreted in the respiratory, gastrointestinal and reproductive tracts, and serves important functions such as keeping surfaces moist and acting as a barrier to infection. People with chronic respiratory diseases typically produce too much thick mucus in their lungs, making it difficult to breathe. Mucus is mostly comprised of water and mucin glycoproteins which are very long protein strands coated with glycans – a type of sugar molecule.

Associate Professor Ethan Goddard-Borger said his team revealed that proteins called 'trefoil factors' interact with mucins by recognising and binding to the unique glycan signatures on their surface.

"Trefoil factors have long been known to make mucus more viscous (thicker), and it has been postulated that this thickening occurs in respiratory diseases. However, until now we did not completely understand how the trefoil factor proteins achieved this," he said.

The team used structural and chemical biology to reveal that trefoil factors cross-linked mucin strands to make the mucus gel more rigid.

"Trefoil factors essentially 'staple' the mucin strands into a mesh: the more staples, the denser the mesh and the thicker the mucus becomes," Associate Professor Goddard-Borger said.

Improving respiratory health

Understanding what trefoil factors bind to and how they do this represents a significant leap forward in understanding mucus and how it functions in healthy and diseased airways.

"We are now investigating how to disrupt the bonds created between trefoil factors and mucin strands, to reduce the viscosity of mucus but leave enough in the lungs to allow the clearance of microbes, particles and dead cells. The development of such a technology could lead to new therapeutics for the treatment of respiratory diseases," Associate Professor Goddard-Borger said.

"Our aim is to develop new 'mucolytic' drugs that can thin mucus, so it can be more effectively cleared from the airways."

"Achieving this could make a significant impact on the quality of life and life expectancy of people struggling with debilitating respiratory conditions."

Below: Associate Professor Ethan Goddard-Borger has investigated the proteins that regulate the thickness of mucus in the airways. Associate Professor Goddard-Borger is the Brian M Davis Charitable Foundation Centenary Fellow.

Redesigning insulin to improve diabetes therapies

New, ultra-fast-acting forms of insulin are in development that could help people with diabetes better manage their condition.

Clues from cone snails

Insulin is a life-saving therapy for many people with diabetes. People with type 1 diabetes, and in some stages of type 2 diabetes, don't produce enough insulin, meaning their blood sugar levels can rise to dangerous levels. Injected insulin therapies allow a person with diabetes to control their blood sugar levels.

WEHI's Professor Mike Lawrence and Dr John Menting have used structural biology to understand how different forms of insulin bind to the insulin receptor. Current insulin therapies are relatively slow to act, meaning some people with diabetes struggle to control their blood sugar, Dr Menting said.

"The venom of marine cone snails contains a remarkably fast-acting form of insulin. In 2016, along with our colleagues at the University of Utah, we observed how cone snail venom insulin could bind to manage their condition more easily, explaining how it can act so fast," he said.

"This provided us with a 'blueprint' for modifying human insulin, so that it could act faster."

A new form of insulin

The team developed a modified version of human insulin called 'Mini-Ins' that successfully mimics the ultra-fast-acting properties of cone snail venom insulin.

Professor Lawrence said he was delighted that Mini-Ins had shown promise in preclinical trials.

"Mini-Ins rapidly lowered blood sugar levels, was well-tolerated by the immune system and lacked any propensity for long-term side-effects – all of which are vital considerations when developing new treatments for diabetes," he said.

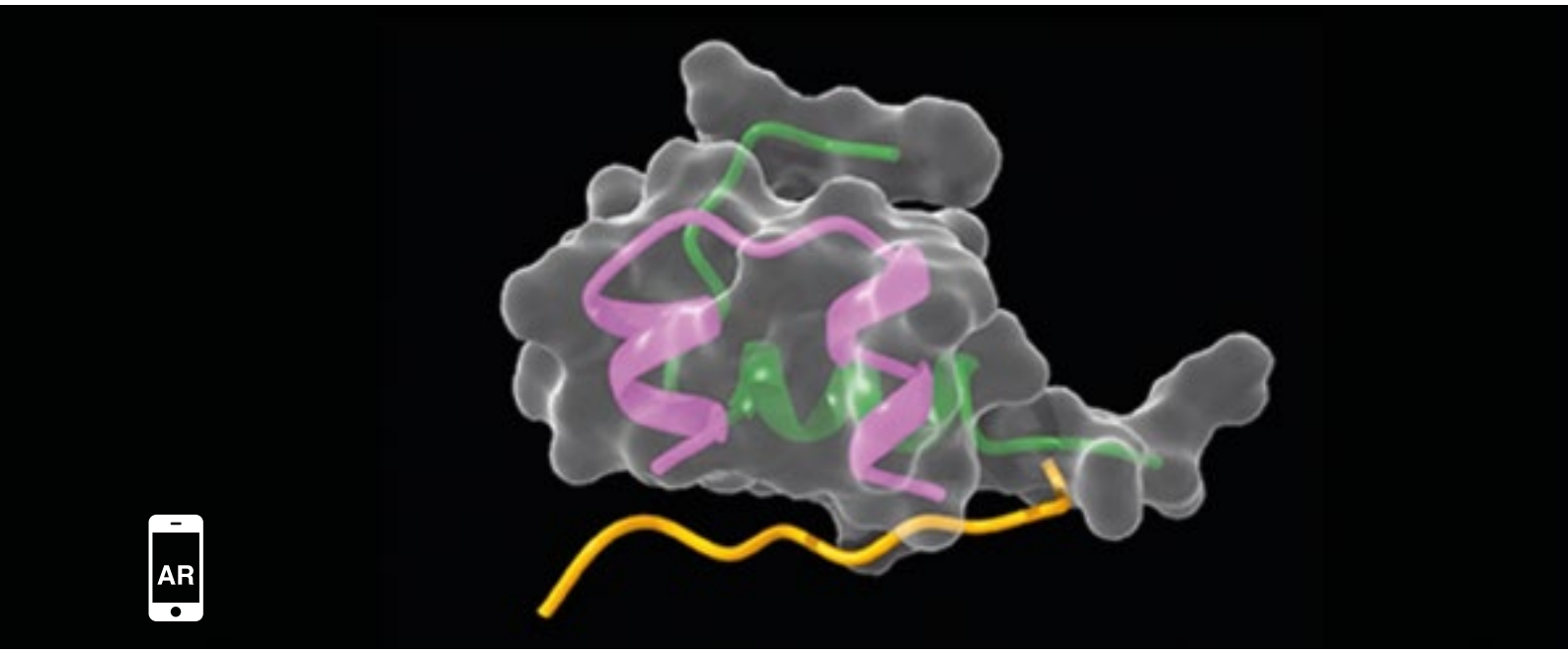
Professor Lawrence said a future version of Mini-Ins could end up being used by patients around the world.

"This research may enable the development of a safe and effective insulin treatment that works even faster than the current gold standard.

"This research may enable the development of a safe and effective insulin treatment that works even faster than the current gold standard."

"Achieving this would help people with diabetes to manage their condition more easily, which would, in turn, lead to better health outcomes."

Below: Mini-Ins (molecular structure shown below) are a modified, ultra-fast-acting form of insulin, that may lead to improved insulin therapies for diabetes.



Enhancing research through computational biology support

Computational biology and bioinformatics play a key role in fundamental and translational research at WEHI, applying mathematics, statistics and computer science to make sense of complex biomedical data and biological systems.

'Tidying up' analyses

Computational biology often relies on bespoke data analysis software. The programming language R is a widely used platform, enabling researchers to create new software packages to solve specific questions.

Dr Stefano Mangiola has developed a series of bioinformatics analysis tools in R, which are enhancing how experimental data can be analysed. He said these are contained within the software suite 'tidy transcriptomics', which makes gene expression data easier to work with.

"In 2020, we developed software that makes it more intuitive for reseachers to generate 'heatmap' visualisations of data. Also, data integration, manipulation and analysis reproducibility are facilitated by our newly designed software suite," he said.

"I've also trained researchers from around the world in tidy transcriptomics – it's fantastic to see how it is being applied to solve important questions!"

Bioinformatics support

In 2020, WEHI established a Bioinformatics Support Facility that provides advice and guidance to researchers across the institute in the design and analysis of experiments.

Head of the facility, Dr Alexandra Garnham, said the facility's statisticians worked collaboratively with researchers at all stages of a project.

"Medical research is highly reliant on technologies and approaches that generate large volumes of data. Involving a statistician early in a project can enhance the ultimate interpretation of data and ensure reliable findings," Dr Garnham said.

"We also work closely with researchers to ensure that data they have already collected can be rigorously and optimally analysed. Our facility has been playing an increasingly important role in a wide range of research discoveries."

New research computing platform

With increasing amounts of biological data generated by experiments, and more complex computational methods required to analyse this data, WEHI's reliance on high-performance computing has grown.

Research Computing provides researchers with access to suitable computer platforms and expertise to ensure the success of their research. It is a collaborative effort between WEHI's Information Technology Services and the Research Computing Platform within the Computational Biology research theme.

Dr Evan Thomas, who established and leads the Research Computing Platform, said it was an important addition to WEHI's research infrastructure.

"Our team of engineers works with individual researchers to help them to navigate computational challenges they may have. We also have a whole-organisation view that ensures WEHI's computing systems keep pace with our requirements," he said.

Above: Dr Alexandra Garnham leads WEHI's new Bioinformatics Support Facility.

Professor Gordon Smyth recognised for bioinformatics achievements

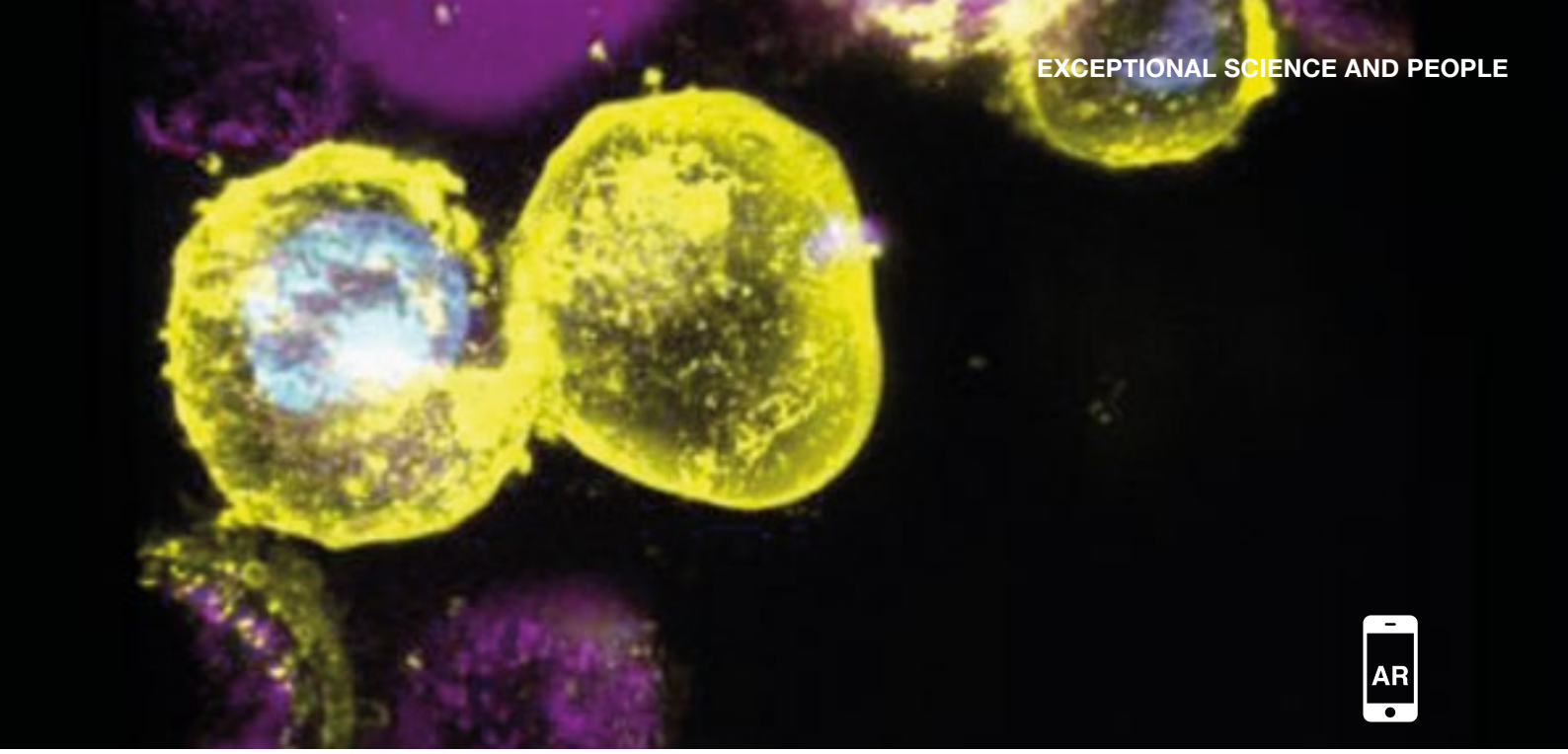
The research contributions of WEHI's joint Bionformatics division head, Professor Gordon Smyth, were recognised in 2020 with Australian Bioinformatics and Computational Biology Society's highest honour, an Honorary Senior Fellowship.

Professor Smyth is one of Australia's most highly cited medical researchers, and has been named as a Web of Science Highly Cited Researcher every year since 2013 – reflecting the widespread impact of Professor Smyth's research across a range of fields.

Professor Smyth said bioinformatics has been an exciting field to work in. "I started at WEHI in the same year as the publication of the human genome," he said. "This gave me the opportunity to develop new analytical approaches for a range of complex data sets generated by the latest genomics technologies. I have had the privilege of working with many wonderful scientific collaborators to apply new technologies to solve a range of questions in basic biology as well as diseases including cancer, immunology and blood disorders."

Among research that Professor Smyth contributed to in 2020 was the discovery that some breast cancers are susceptible to new anti-cancer agents (page 28), and the identification of a key regulator of immune B cell development (page 34).

Above: Professor Gordon Smyth



Shining a new light on inflammatory cell death

An inflammatory form of cell death called necroptosis protects our bodies from infections, but excessive necroptosis has been linked to conditions such as inflammatory bowel disease.

Observing the killer protein

Necroptosis is controlled by a protein called MLKL. A multidisciplinary team at WEHI, led by Associate Professor James Murphy, is examining how MLKL functions, with a goal of better understanding diseases involving necroptosis, and developing new treatments for these.

Dr Andre Samson used advanced imaging technologies to watch the MLKL protein in cells as they underwent necroptosis. He said this revealed how MLKL changed its location as necroptosis occurred. "We could see MLKL clumping and migrating to different parts of the cell as necroptosis progressed," Dr Samson said.

"Intriguingly, activated MLKL gathered at the junctions between neighbouring cells – potentially enabling a dying cell to trigger necroptosis in surrounding cells, which could be a form of protection against infections."

Variants suggest protein's function

Dr Joanne Hildebrand and Dr Maria Kauppi examined the connection between changes in MLKL and inflammatory diseases. Dr Hildebrand said they identified a hyperactive variant of MLKL that triggered lethal inflammation in laboratory models.

"We discovered similar variants in the human *MLKL* gene are surprisingly common – about 10 per cent of human genomes from around the world encode more easily activated, inflammatory versions of MLKL," she said.

"These variants of MLKL may be associated with human inflammatory diseases – but may also have offered an evolutionary benefit at some point of human history, perhaps helping people survive certain infectious diseases."

A puzzling structure

The three-dimensional structures of MLKL in different vertebrate species were mapped by then PhD student Dr Katherine Davies. She said corresponding proteins found in different species typically had a similar structure that had been conserved during evolution.

"To our surprise, the structures of MLKL were quite different between different species – even between closely related species. This suggests evolutionary pressures such as infections may have driven substantial changes in MLKL," she said.

"Together with the data for human variations in MLKL, this suggests MLKL is critical for cells to balance beneficial inflammation, which protects against infections, against harmful inflammation that causes inflammatory diseases."

Associate Professor Murphy said the team – which has been studying MLKL for more than a decade – had made massive advances in the field of necroptosis research.

"This will provide an enormous boost to understanding a range of inflammatory diseases. We are already working to develop new medicines that could temper MLKL-driven inflammation as potential new treatments for a range of inflammatory diseases," he said

Above: Advanced imaging has been used to visualise cells undergoing necroptosis, showing how the dying cells (yellow) swell up and rupture.

International partnerships boost efforts to combat anaemia

WEHI researchers are working with international partners to develop better approaches to reduce the global burden of anaemia.

Preventing iron deficiency

More than 1.5 billion people worldwide have anaemia, meaning their blood contains too few oxygen-carrying red blood cells or haemoglobin. Anaemia can cause short- and long-term health consequences, particularly in children and pregnant women.

Iron deficiency is the most common cause of anaemia, and worldwide almost 40 per cent of pregnant women are iron deficient. Associate Professor Sant-Rayn Pasricha, a WEHI clinician-scientist, said iron deficiency and anaemia can have serious long-term health consequences in pregnant women and their children.

"We hope (this research) will lead to significant improvements in the health of women and children."

"Iron deficiency can be cured by iron supplementation, but tragically this is not an option for many women and children," he said. "Our team is working closely with our international partners to determine the best ways to deliver iron supplements in low- to middle-income countries, as a way of improving health."

In 2020, an international research consortium led by Associate Professor Pasricha, which is investigating the impact of giving intravenous iron supplements to pregnant women, was awarded two major grants totalling more than AUD$16 million from the Bill & Melinda Gates Foundation.

"The funding will support large-scale, randomised clinical trials in Malawi and Bangladesh, examining whether the interventions could improve the health of the mothers and their babies," Associate Professor Pasricha said.

"The collaboration brings together expertise from Melbourne, Bangladesh and Malawi to consider a range of physical, psychological and developmental health factors," he said.

"We are honoured the Bill & Melinda Gates Foundation has chosen to fund this research, which we hope will lead to significant improvements in the health of women and children around the world," he said.

Joining forces with the WHO

In 2020, the World Health Organization (WHO) designated WEHI the WHO Collaborating Centre for Anaemia Detection and Control. The new centre, led by Associate Professor Pasricha, enlists WEHI researchers to advise the WHO on the best approaches to diagnose and treat anaemia. This includes implementing better strategies to prevent iron deficiency, he said.

"Being able to diagnose anaemia, and to understand and manage its causes, can provide a critical boost to the health of people of all ages. Through the new WHO Collaborating Centre for Anaemia Detection and Control, our team will provide the most up-to-date, evidence-based advice to the WHO, to ensure global programs to combat anaemia are effective and relevant to the unique circumstances of different countries," he said.

Above: A mother and her child in Bangladesh, who are participating in a WEHI-led trial of iron supplementation.

Revealing the genetic causes of neurological diseases

WEHI scientists contributed to a decades-long global effort to find the genetic mutations at the root of some rare, hereditary types of epilepsy and ataxia.

The mutations – called repeat expansions – are typically associated with neurological diseases, including ataxia, autism and familial adult myoclonic epilepsy (FAME).

Dr Haloom Rafehi, Dr Mark Bennett and Professor Melanie Bahlo developed highly specialised bioinformatics tools to identify repeat expansions, putting them at the forefront of the search for these rare disorders. The international consortium included clinicians, bioinformaticians and biologists from Australia and Europe.

Professor Bahlo said typical analysis methods could not detect repeat expansions, so they are often ignored as a cause of disease.

"We recently developed methods that revealed the genetic cause of ataxia in an Australian family. Many of these people had waited years – even generations – to know the cause of their disease and now, finally, they have an answer. Our discovery has led to a diagnostic test, which is providing important information to the members of this family," she said.

In 2020, Dr Rafehi and Dr Bennett both received significant funding to continue their research: an Australian National Health and Medical Research Council (NHMRC) Investigator Grant for Dr Rafehi; and a CURE Epilepsy Taking Flight Award for Dr Bennett. Professor Bahlo received an NHMRC Investigator grant and was elected a Fellow of the Australian Academy of Health and Medical Sciences in recognition of her contributions to improving bioinformatics analyses of genetic diseases and identification of the causes of genetic diseases.

Above: Dr Mark Bennett (left), Dr Haloom Rafehi (centre) and Professor Melanie Bahlo (right)

‘Inhibitor of apoptosis’ proteins a promising target in a range of diseases

Many diseases – especially cancers – have been linked with faults in apoptosis, a programmed form of cell death.

Elevated levels of inhibitor of apoptosis (IAP) proteins are one way diseased cells can escape apoptosis, allowing them to persist. Our researchers are investigating potential applications of drugs called Smac-mimetics, which target IAPs and reactivate apoptotic death.

Predicting breast cancer response

Cell death researcher Dr Najoua Lalaoui said clinical trials revealed cancer patients responded variably to Smac-mimetic drugs.

“Working with breast cancer clinician-scientist Professor Geoff Lindeman, we examined whether Smac-mimetics could kill breast cancers. This revealed hard-to-treat ‘triple negative’ breast cancers were particularly sensitive to these drugs, suggesting these cancers could be ideal candidates for clinical trials of Smac-mimetics – potentially leading to better treatments,” Dr Lalaoui said.

“We wanted to understand why some breast cancers were more sensitive to Smac-mimetics. We worked with a bioinformatics team led by Professor Gordon Smyth to look for whether there was a pattern of genes that were switched on or off in sensitive – but not resistant – breast cancers,” she said.

The team uncovered a ‘gene signature’ that predicted which breast cancers would respond to Smac-mimetics, Dr Lalaoui said.

“Looking at the particular genes that were expressed in the gene signature has also given us clues about why these cancers were sensitive to Smac-mimetics,” Dr Lalaoui said. “We hope this gene signature could be used to identify other cancers that are sensitive to Smac-mimetics.”

Possible applications in malaria

Targeting IAPs could be a new way to treat malaria, according to research led by Associate Professor Justin Boddey, Dr Greg Ebert and Professor Marc Pellegrini. Using a preclinical model of malaria, they discovered *Plasmodium* parasites increase the amount of IAP proteins in liver cells, Associate Professor Boddey said.

“The liver is a significant site of parasite development and reproduction, being the first organ infected by the malaria parasite after a mosquito injects it into the body. By hijacking the cell death machinery in the liver cells, the parasites enable their survival and replication,” he said.

Inhibiting the IAPs with a Smac-mimetic drug killed liver cells infected with the *Plasmodium* parasite, Dr Ebert said.

“We discovered that only malaria parasite-infected liver cells – but not uninfected cells – responded to the Smac-mimetic. These drugs could provide a new approach to clear malaria parasites, potentially preventing illness and the spread of drug-resistant parasites,” he said.

Above: Dr Najoua Lalaoui revealed Smac-mimetics could provide a new treatment hope for hard-to-treat breast cancers.

Team effort drives stomach cancer discoveries

Understanding how stomach cancer develops and progresses to invasive stages could lead to much-needed, better treatments.

Pinpointing the culprits

More than 2000 Australians are diagnosed with stomach cancer each year. Sadly most cases are detected at late stages when treatment options are limited.

A team led by Dr Lorraine O'Reilly and Dr Tracy Putoczki investigated signalling molecules that may contribute to stomach cancer. They focused on inflammatory signalling, as there is a clear link between inflammation and stomach cancer, Dr O'Reilly said.

"Using a laboratory model of stomach cancer that we had developed, we measured the amounts of different inflammatory signalling molecules – called cytokines – to see which were present in stomach cancers as they developed and progressed. This revealed high levels of four key cytokines," she said.

The next stage of the research was to inhibit these cytokines, and measure the impact on stomach cancer progression, said Dr Putoczki.

"We discovered that removing a cytokine called TNF could prevent early-stage stomach cancers from progressing to a more severe stage that, in humans, is much harder to treat," she said.

"This was an exciting finding, as there are already medicines in clinical use that block TNF, most notably for the treatment of rheumatoid arthritis. Our research suggests these therapies could be an effective and safe way to prevent the progression of stomach cancer to more invasive forms."

Boosted by consumer involvement

The involvement of research consumers – people who have lived experience of stomach cancer – was critical to the success of the research, Dr O'Reilly said.

"We valued the input of stomach cancer survivor Mr Frank Graham and his wife Ronnie, as well as Mrs Debra Clements, who nursed her husband through cancer. They conveyed to me the importance of considering current issues for cancer patients, such as early diagnosis and more effective targeted treatments. Their feedback helped me to refine the study design," she said.

Dr O'Reilly also consulted with consumers about her application to Cancer Council NSW for research funding.

"Debra, Frank and Ronnie provided invaluable feedback on my grant application, helping me to successfully secure the essential support I needed to continue my research," she said.

Mr Graham said that volunteering as a consumer at WEHI had changed his perspective on medical research.

"It's my sincere hope that one day other people won't have to go through what I've been through," he said.

"I am incredibly optimistic about the future knowing there are people like Lorraine working behind the scenes to improve medical treatments and longer-term positive outcomes for people with stomach cancer."

Below: Stomach cancer researcher Dr Lorraine O'Reilly (left) worked closely with stomach cancer survivor Mr Frank Graham (centre) and his wife and carer Ronnie (right).

Royal Society honours breast cancer researcher

Breast cancer researcher Professor Jane Visvader was elected a Fellow of the United Kingdom's Royal Society, one of only three Australians to receive this honour in 2020.

The award recognises Professor Visvader's significant contributions to breast cancer research and developmental biology, which have revealed how the breast is formed from stem cells, and the relationship between normal breast cells and cancer. Her research has underpinned the development of better ways to treat and prevent breast cancer, some of which are now in clinical trials.

Professor Visvader said she was honoured to join the Royal Society. "The society has promoted excellence in science for more than 350 years, and I am very humbled to be elected to a fellowship that includes many scientific luminaries," she said.

"I'd like to emphasise that my achievements have been shared with many people – in particular my longstanding scientific partner Professor Geoff Lindeman, as well as our many collaborators and all the talented researchers who have been part of our team.

"I'd also like to acknowledge the significant government and philanthropic funding support that has enabled me to focus on my research," Professor Visvader said.

Above: Professor Jane Visvader

Improving therapies for people with rare cancers

Though individually uncommon, collectively rare cancers account for almost one in three cancer deaths in Australia. The Stafford Fox Rare Cancer Program aims to improve the outcomes of people with rare cancers by developing better ways to match individual patients with effective treatments for their disease.

A significant challenge

Although few people may have a particular type of rare cancer, altogether there are many types of rare cancer, said Professor Clare Scott, a clinician-scientist who jointly leads the Stafford Fox Rare Cancer Program.

"Rare cancers are a significant health burden in Australia and globally. People with rare cancers often lack access to effective treatments," she said.

"Preclinical and clinical research has led to significant advances in the treatment of more common cancers, but research can be challenging to undertake for individual rare cancer types – both because of the scarcity of patients and lack of funding. Our program seeks to use innovative technologies like genomics to develop new approaches to identify effective treatments for rare cancer patients."

Clues in the genes

As part of the Stafford Fox Rare Cancer Program, Professor Tony Papenfuss and Dr Justin Bedo – who holds the Stafford Fox Centenary Fellowship in bioinformatics – have led the establishment of a new way to analyse the genomes of rare cancers. Professor Papenfuss said genomic data could potentially identify suitable treatments.

"All cancers are driven by certain genetic changes. By analysing individual patients' cancers, we can detect which cancer-associated genes have been disrupted – and can also see patterns in which genes are being used (expressed) by the cancer," he said.

"This data can be matched to other cancers with similar genetic changes or gene expression patterns, giving critical, evidence-based clues as to which treatments might be effective."

Clinical-grade analysis software

Dr Bedo said the team had developed software that enabled bioinformatics analyses of rare cancer genomes to be performed with the highest standards of reproducibility.

"Traditional bioinformatic analyses of cancer genomes have been limited by factors such as complexities in integrating different software packages, managing how data transfers from one system to another, and intensive research computing requirements," he said.

"Our program has developed a better approach to analysing individual rare cancer patients' genomes, in a highly reproducible and accurate way. The next step is to use this data to select appropriate therapies. If preclinical testing of this approach looks promising, we hope to see our bioinformatics pipeline assisting in clinical trials for rare cancer patients using genomics-led selection of treatments."

Below: Stafford Fox Centenary Fellow Dr Justin Bedo (right) with Stafford Fox Medical Research Foundation trustee Mr Paul Brotchie (centre) and his wife Ms Susan Sandford (left)

Research into cell survival proteins guides new therapies

A promising class of anti-cancer therapies called BH3-mimetics target the 'BCL-2-like' pro-survival proteins that help cancer cells stay alive and grow.

Eliminating suspects

Understanding which pro-survival proteins keep particular cancer cells alive can allow that cancer to be matched with an appropriate BH3-mimetic drug therapy.

Blood cancer researcher Dr Gemma Kelly said many B-cell lymphomas had been reported to have high levels of a BCL-2-like protein called BCL-W, suggesting this protein may promote the cancer cells' survival.

"This led to speculation that drugs targeting BCL-W could be useful for treating B-cell lymphomas," she said.

Dr Kelly and Dr Sarah Diepstraten used CRISPR gene-editing technology to ablate BCL-W in B-cell lymphomas grown in the laboratory.

"We discovered these cells can survive without BCL-W, dismissing this protein as a potential therapeutic target for these particular lymphomas. It is likely that other pro-survival proteins are much more important in these blood cancers," Dr Diepstraten said.

Preventing collateral damage

Dr Kerstin Brinkmann, Dr Stephanie Grabow and Professor Andreas Strasser investigated another BCL-2-like protein called BCL-XL, which many cancer cells rely on for their survival.

Dr Brinkmann said it was well known that BCL-XL inhibitors could deplete platelets, a serious side-effect that has limited their development as potential cancer treatments.

"We used genetic tools to investigate whether other cell types had a similar reliance on BCL-XL for their survival. This revealed BCL-XL helps kidney cells stay alive when exposed to chemotherapy or radiotherapy."

Despite concerns about the toxicity of BCL-XL inhibitors, Dr Brinkmann said there may be ways they could be safely used.

"In a laboratory model, we found short-term treatment with a BCL-XL inhibitor could be safely combined with chemotherapy or radiotherapy – raising a potential approach of using BCL-XL inhibitors to sensitise cancer cells to established therapies."

Accolades for leukaemia researcher

Clinician-scientist Professor Andrew Roberts AM is joint head of WEHI's Cancer Research and Treatments theme and Metcalf Chair of Leukaemia Research at the University of Melbourne. He has led landmark studies of how blood cancer cells can be killed by BH3-mimetics and how these drugs can be used to treat people with specific leukaemias and lymphomas.

Professor Roberts' contributions to cancer research and his service to haematology and cancer organisations were recognised in 2020 with several awards: appointment as a Member of the Order of Australia; election to the Australian Academy of Science; and jointly winning the Ramaciotti Medal for Excellence in Biomedical Research with his colleague at Royal Melbourne Hospital and Peter MacCallum Cancer Centre, Professor John Seymour.

Professor Roberts said he was honoured by the recognition. "I want to pay tribute to, and thank, the very many people that I have worked with in a team effort to improve the lives of people afflicted with cancer," he said. "The most rewarding aspect of my research is seeing blood cancer patients benefiting from new therapies."

Above: Professor Andrew Roberts AM is a clinician-scientist whose research has led to better therapies for people with blood cancers.

Advanced technologies add new cell to immune family tree

Powerful 'single cell multi-omics' technologies have driven the discovery of a previously unknown ancestor of T and B lymphocytes, which are critical cells in our immune system.

The research, undertaken through WEHI's Single Cell Open Research Endeavour (SCORE) facility, discovered a previously unrecognised cell type that could give rise to T and B lymphocytes, but not other immune cells, Dr Shalin Naik said.

"This cell occurred much earlier in lymphocyte development than we had suspected. Understanding in more detail how T and B lymphocytes develop could lead to better approaches to regenerate these cells as a treatment for certain diseases, such as immune disorders or leukaemia," Dr Naik said.

Multi-omics technologies combine different biological data sets – such as genomics, transcriptomics and proteomics – to compare different samples in more detail than is possible by looking at one data set, Dr Daniela Zalcenstein said.

"Rather than looking at data combined from many cells in a sample, we focus in on individual cells to understand the differences that exist within a larger population," she said. "We have applied this approach to study individual cells, in this case developing immune cells, to understand in more detail which cells can give rise to lymphocytes. This approach is called single cell multi-omics."

Dr Zalcenstein said this was one of the first projects tackled by SCORE, and demonstrated the power of applying new technologies to well-studied fields of research.

"SCORE is now tackling more than 100 different research questions – it's a really exciting field to be involved with," she said.

Above: Multi-omics researchers (from left) Ms Sara Tomei, Dr Shalin Naik, Dr Daniela Zalcenstein and Mr Luyi Tian

In search of the origins of blood cells

Specific proteins control the development of blood cells – including many immune cells – from stem cells. Understanding this process has explained how blood disorders, including cancers, arise.

Initiating B-cell development

B cells produce antibodies that provide immunity to infections. Each B cell produces only one type of antibody, through a complicated process of gene rearrangement of antibody genes within the cell. This process is critical for immune 'memory' and long-lasting protection against infection.

Blood cell researcher Dr Ashley Ng said that, despite a detailed understanding of the stages of B cell development, it was still not clear which proteins facilitated transition from one stage to the next.

"We looked at the role of a protein called Erg in B-cell development," Dr Ng said. "Erg is a 'transcription factor', meaning it is responsible for binding to other genes and switching them on and off."

He said preliminary data suggested Erg had the potential to influence B-cell development. By deleting Erg in developing B cells, Dr Ng was able to pinpoint its role.

"In early B cells, we showed Erg was essential for initiating antibody gene rearrangement, by switching on two other important 'regulatory' genes and working with them in turn to instigate antibody gene rearrangement," Dr Ng said.

"With this valuable new information, I will now investigate how this transcription factor network is required in other contexts, such as leukaemia development."

Platelet formation visualised

A separate study used advanced imaging technologies to reveal how platelets – tiny cells in the blood that enable clotting – are formed in our bodies. Dr Samir Taoudi, who jointly led the research team, said that while platelets were known to be produced from large precursor cells called megakaryocytes, this had only ever been visualised using cells grown in the laboratory.

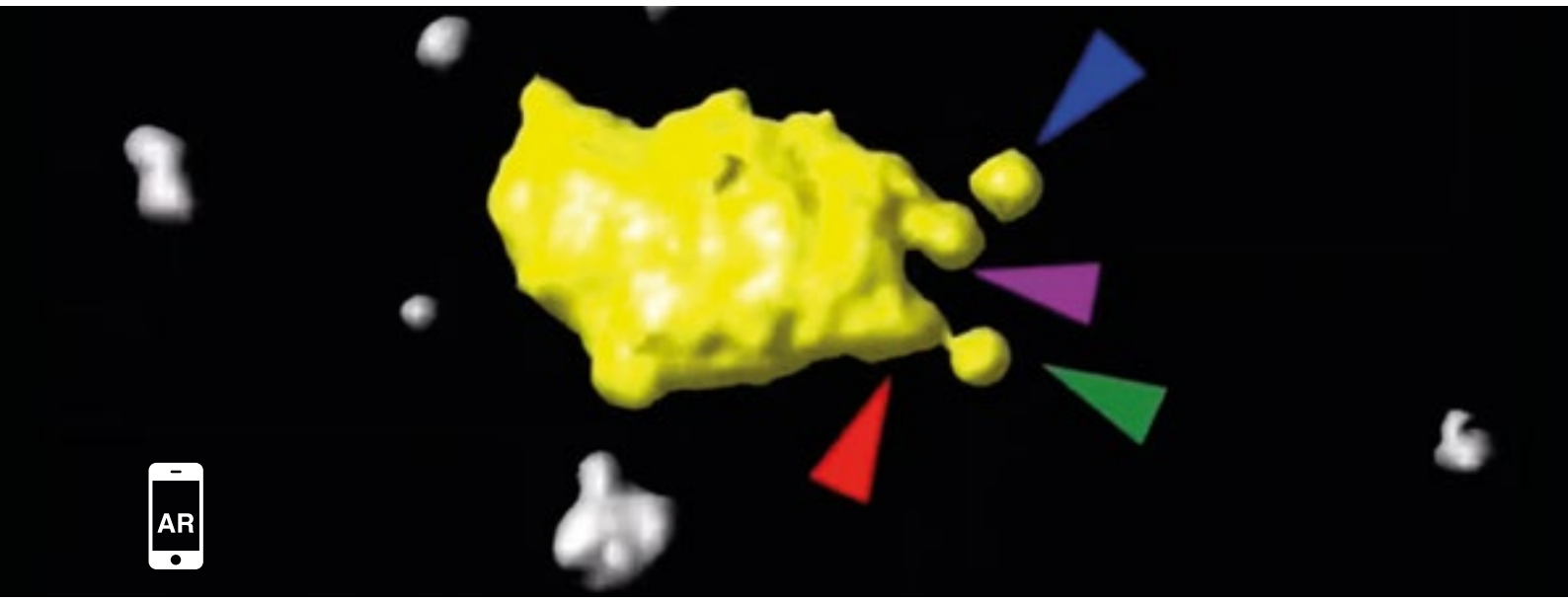
"Relying on this highly artificial setting has spawned several theories about how platelets are formed. Recent advances in three-dimensional imaging mean that we could watch platelets developing within blood-forming organs from the embryo through to adulthood. This provided definitive evidence that platelets form by 'budding' from megakaryocytes at a steady rate," Dr Taoudi said.

As well as answering a longstanding question about how platelets are formed, the research could help improve supplies of platelets used as a treatment for blood clotting disorders.

"Currently platelets transfusions are derived from blood donations, and this can lead to shortages: platelets cannot be stored for long periods, so platelet supplies are reliant on a constant supply of donated blood.

"We hope that a better understanding of how platelets form within the body could lead to better strategies for generating large volumes of platelets in the laboratory for clinical use," he said.

Below: Advanced imaging has been used to observe platelets (small yellow shapes indicated by arrows) 'budding' from a large cell (also shown in yellow) called a megakaryocyte.



Biobank boosts translational research into immune and inflammatory diseases

WEHI researchers and colleagues at The Royal Melbourne Hospital have established the Victorian Immune Diseases Biobank, a valuable resource for furthering research into autoimmune and inflammatory diseases.

Complex interactions

Autoimmune and inflammatory diseases – in which the immune system mistakenly attacks and inflames the body's own tissues – affect five per cent of Australians, while 11 per cent of Australians have asthma, an inflammatory condition affecting the airways that is also linked to the immune system.

Immune diseases are thought to be caused by complex interactions between a person's genetic risk and their exposure to environmental triggers, making these conditions challenging to understand. WEHI research spans studies of the fundamental biology of the immune system through to translational research using patient samples, and trials of new therapies that prevent misdirected immune responses.

Valuable samples

Access to tissue or blood samples from people with a particular disease is an invaluable resource for translational research.

With the consent of the patient, biobanks can store routinely collected blood or tissues, making them available to researchers into the future. WEHI joint head of Clinical Translation and rheumatologist, Professor Ian Wicks, said well-organised biobanks were an invaluable resource for translational research.

"Having a biobank of samples from people with immune and inflammatory diseases – conditions such as rheumatoid arthritis, psoriasis and inflammatory bowel disease – alongside accurate clinical information could provide a massive boost to translational research. We hope to find better biomarkers, integrate genomics and work towards more personalised therapy in immune and inflammatory diseases. We've already seen a similar impact of the Victorian Cancer Biobank on translational cancer research," he said.

Professor Wicks and Dr Charlotte Slade, who are both clinician-scientists at WEHI and The Royal Melbourne Hospital (RMH), have worked with colleagues across several specialities at RMH, including Dr Johannes Kernes (dermatology), Dr Britt Christensen (inflammatory bowel diseases) and Dr Peter Hughes (renal medicine), to establish the Victorian Immune Diseases Biobank.

A boost to immunology research

Dr Slade established a laboratory at WEHI in 2020 with the support of the Sir Clive McPherson Family Centenary Fellowship. She said the biobank would be an important boost to her research, which investigates the underlying genetic causes of complex immune diseases.

"The Victorian Immune Diseases Biobank will be an incredibly valuable tool for a range of studies that focus on developing better diagnostic and therapeutic approaches for these conditions. It will be particularly important for validating biomarkers or molecular pathways before commencing clinical trials," Dr Slade said.

"We hope that translational research involving the biobank will bring significant benefits to people living with immune and inflammatory diseases."

Above: Clinician-scientist Dr Charlotte Slade established a laboratory at WEHI in 2020, investigating the genetic causes of immune disorders.

New hope for halting motor neurone disease

WEHI researchers are working towards a potential treatment to slow the progression of motor neurone disease (MND), offering hope to people with this debilitating illness.

An inflammatory STING

Motor neurone disease (MND) is an incurable condition caused by a failure of the nerves controlling the muscles that enable us to move, speak, swallow and breathe. One in 10,000 Australians will be diagnosed with MND in their lifetime and the average life expectancy from diagnosis is just two years.

MND is caused in part by inflammation, which irreparably damages nerve cells, said Associate Professor Seth Masters who led research with Dr Alan Yu, in collaboration with the University of Melbourne and the Hudson Institute of Medical Research.

“Our research has focused on the earliest stages of how inflammation is triggered, then identifying links to disease progression,” Associate Professor Masters said.

“In this study we discovered that an immune sensor protein called STING – which we had already studied in other inflammatory diseases – is a critical driver of inflammation in MND. This was an exciting discovery, because we could then test drug-like inhibitors of STING signalling, as a first step towards potential new anti-inflammatory therapies,” he said.

When the team tested these inhibitors in the laboratory using cells taken from people with MND, they found they could prevent inflammation and keep the cells alive longer. They were also able to confirm that STING was activated in people who had died from MND.

Potential new therapies

Most people suffering from MND have an accumulation of a protein called TDP-43 within cells of the central nervous system, which triggers an inflammatory response.

Dr Yu said the team was able to ‘connect the dots’ to discover how STING was activated by high levels of TDP-43.

“We are now working to validate a biomarker of the pathway that could be detected early in the disease progression. Once this neuroinflammatory biomarker is validated, we will better understand which patients will benefit the most from treatments targetting the pathway,” Dr Yu said.

Associate Professor Masters said he hoped this research could lead to better treatments for people with established MND, who currently have very few treatment options.

“While new anti-inflammatory therapies are unlikely to cure MND, we hope they might extend life expectancy and dramatically improve quality of life for people diagnosed with MND, and potentially other neurogenerative disorders involving inflammation,” he said.

Below: Dr Alan Yu (left) and Associate Professor Seth Masters (right) have discovered a protein that drives inflammation in motor neurone disease.

Accelerating the hunt for antibody-based medicines

Antibody-based medicines are 'biologics' derived from the proteins used by our immune system to fight infection. These drugs are already in clinical use for certain inflammatory conditions, as well as cancer.

There has been intense interest in the development of antibody-based medicines to treat infections such as COVID-19 – including at WEHI (see pages 14 to 15), said Ms Kathleen Zeglinski. She was the winner of the Colman-Speed Medal in 2020, which is presented each year to WEHI's top Honours student.

"My project investigated how we can use a new technology, called Nanopore long read sequencing, to accelerate the discovery of new antibody-based medicines," she said.

Ms Zeglinksi, who was supervised by WEHI's Associate Professor Matt Ritchie and CSL's Dr Arthur Hsu, studied samples generated by a collaborative team led by Associate Professor Wai-Hong Tham that is developing antibody-based medicines for COVID-19.

"It was the first time Nanopore sequencing had been applied to antibody discovery, so there was a lot of fine-tuning required, both in the lab and in the bioinformatic analyses," Ms Zeglinski said.

"It was an uphill battle, but we were able to get our method working accurately. We revealed promising antibody candidates that reflected the antibodies that are seen in people with COVID-19. It was exciting to be working in such a rapidly evolving field."

Ms Zeglinski has continued her research at WEHI, starting a PhD in 2021. "In the long run I'd love to go overseas to do a postdoc – hopefully international travel will be possible by then!"

Above: Ms Kathleen Zeglinski

2020 Graduates

Students are highly valued members of our research groups, and some will go on to become the future leaders of our sector. Our students receive world-class training in medical research and broader career skills, which equips them for a range of careers in the health and medical research sector and other fields.

Congratulations to the following students who successfully completed their studies this year.

Doctor of Philosophy, University of Melbourne

Dr Suad Abdirahman
Dr Tracy Putoczki, Associate Professor Oliver Sieber
Establishing pre-clinical models for advanced colorectal cancer

Dr Maria Bergamasco
Professor Anne Voss, Associate Professor Tim Thomas
Assessing the role of histone acetylation during development

Dr Katherine Davies
Associate Professor Peter Czabotar, Associate Professor James Murphy, Dr Emma Petrie
Mechanistic studies of MLKL-mediated cell death

Dr Caleb Dawson
Professor Jane Visavder, Professor Geoff Lindeman
Investigation of mammary gland development and resident macrophages

Dr Tirta (Mario) Djajawi
Professor David Huang, Dr Mark van Delft
Control of the intrinsic pathway of apoptosis

Dr Siavash Foroughi
Professor Peter Gibbs, Associate Professor Jeanne Tie, Professor Tony Burgess
Optimising colorectal cancer therapies using clinical registries

Dr Wasan Forsyth
Professor Marc Pellegrini, Dr Greg Ebert
Manipulation of host signalling for the characterisation and control of dengue fever

Dr Denise Heckmann
Professor John Silke, Dr Najoua Lalaoui, Associate Professor Andrew Webb, Dr Jarrod Sandow
Understanding the molecular mechanisms of AML development and treatment using phosphoproteomics

Dr Valentin Heim
Dr Ueli Nachbar, Professor John Silke
Study of endogenous NOD signalling mechanisms using affinity tag knock-in mice

Dr Stephanie Hyslop
Dr Emma Josefsson, Professor Warren Alexander
Investigating the role of platelets in lung cancer

Dr Alexandra Gurzau
Associate Professor James Murphy, Professor Marnie Blewitt
Functional and structural characterisation of the epigenetic regulator SMCHD1

Dr Isabella Kong
Associate Professor Edwin Hawkins, Professor Phil Hodgkin, Associate Professor Rhys Allan, Dr Stephin Vervoort
Manipulating the humoral immune response using epigenetic modifiers

Dr Erin Lawrence
Associate Professor Marco Herold, Professor Andreas Strasser, Associate Professor Andrew Wei
The role of mutant DNMT3a in ageing and in the regulation of normal and malignant haematopoiesis

Dr Lin Liu
Professor John Silke, Dr Najoua Lalaoui
Characterization of new regulators in TNFR1-mediated death signalling

Dr Zikou Liu
Professor John Silke, Dr Joanne Hildebrand, Associate Professor James Murphy
Investigation of MLKL ubiquitylation during necroptosis

Dr Shih-Jung (Zoe) Liu
Professor Ivo Mueller, Dr Rhea Longley
Plasmodium vivax naturally acquired immunity: patterns and influences

Dr Jonas Moecking*
Associate Professor Seth Masters, Professor Matthias Geyer (Bonn)
Investigating the molecular basis of human NLRP1 inflammasome activation

*Joint PhD degree (awarded a single degree) from the University of Melbourne and the University of Bonn

Dr Rhiannon Morris
Associate Professor Jeff Babon, Professor Doug Hilton
Molecular control of haematopoiesis via the JAK-STAT signalling pathway

Dr Emma Morrish
Professor John Silke, Dr Gabriela Brumatti
Smac-mimetic combination therapies for the treatment of cancer and infectious disease

Dr Ksenija Nesic
Professor Clare Scott, Dr Matthew Wakefield
Exploiting DNA repair defects in high-grade serous ovarian carcinoma

Dr Maria Ome-Kaius
Professor Leanne Robinson, Professor Ivo Mueller, Dr Sophie Zaloumis, Professor Stephen Rogerson
Low birthweight and infant growth among children in Papua New Guinea - effect of malaria and other infectious diseases during childhood

Dr Anna Quaglieri
Professor Terry Speed, Professor Melanie Bahlo, Associate Professor Ian Majewski
Using transcriptomics to study relapse in acute myeloid leukaemia

Dr Kitsanapong Reaksudsan
Professor Alan Cowman, Dr Tony Hodder
Aspartic proteases and their potential for transmission blocking strategies

Dr Simona Seizova
Associate Professor Chris Tonkin, Associate Professor Justin Boddey
The molecular dissection of host manipulation by *Toxoplasma gondii* bradyzoites

Dr Charlotte Slade
Dr Vanessa Bryant, Professor Phil Hodgkin, Dr Susanne Heinzel, Professor Jo Douglass
Investigating the genetic causes of primary immunodeficiency and autoimmunity

Dr Katherina Stracke
Associate Professor Aaron Jex, Associate Professor Harin Karunajeewa
Diagnostics and impacts of soil-transmitted helminth infections among populations from South-East Asia

Dr Digjaya Utama
Associate Professor Alyssa Barry, Professor Ivo Mueller, Associate Professor Diana Hansen
Host-parasite interactions in the pathogenesis of severe *Plasmodium falciparum* malaria

Dr James Whittle
Professor Jane Visvasder, Professor Geoff Lindeman
Cell survival pathways and mechanisms of response in breast cancer

Dr Jie Zhou
Professor Phil Hodgkin, Associate Professor Edwin Hawkins, Professor David Tarlinton
Intracellular competition regulates B lymphocyte differentiation

Master of Philosophy, University of Melbourne

Ms Bethany Davey
Dr Brad Sleebs, Professor Alan Cowman
Characterisation of the *Plasmodium* aspartyl proteases DNA-damage inducible protein 1 (DDI1) and Plasmepsin VII (PMVII)

Master of Research, University of Melbourne

Mr Kaiyuan Guo
Associate Professor Wai-Hong Tham, Dr Kelly Rogers
Characterisation of plasmepsin X as a cross-species antimalarial target

Ms Jingyu (Jean) Jiang
Professor Alan Cowman, Associate Professor Sant-Rayn Pasricha
Development of an editable approach to the study parasite-erythroid interactions

Mr Bolong Wu
Professor John Silke, Dr Gabrielle Brumatti
Identification of new regulators of TNFR1-induced necroptotic pathway

Ms Yuyan (Shirley) Yang
Dr Cynthia Louis, Professor Ian Wicks, Dr Angus Stock
GM-CSF regulation in inflammatory arthritis

Bachelor of Science (Honours) or Bachelor of Biomedicine (Honours), University of Melbourne

Ms Tianwei Chen
Associate Professor Marie-Liesse Asselin-Labat, Dr Clare Weeden, Associate Professor Daniel Gray
Targeting pro-survival proteins to promote anti-tumour immunity in lung adenocarcinoma

Mr Edward Dann
Professor Phil Hodgkin, Associate Professor Daniel Gray, Dr Mark Dowling
Calculating cell death: a quantitative theory of cell control in lymphocytes

Ms Emily Derrick
Associate Professor Ian Majewski, Dr Rebecca Bilardi
Mapping DNA repair networks in cancer

Mr Sebastian Hughes
Associate Professor James Vince, Dr Maryam Rashidi, Associate Professor Seth Masters
Investigating cell death and inflammasome activation in XIAP deficiency

Mr Alex Lam
Associate Professor Aaron Jex, Dr Samantha Emery
Exploring a novel microbial natural product library to reveal novel anti-protistal compounds

Ms Nipuni Padukkage
Professor Ian Wicks, Dr Katherine Martin
Investigating the function of Huntingtin Interacting Protein-1 in Neutrophil Biology

Mr Raymond Qin
Dr Joanna Groom, Dr Kelly Rogers, Dr Niall Geoghegan
Establishing experimental and analytical pipelines for three-dimensional leukocyte migration research

Mr Josh Steiner
Dr Melissa Call, Associate Professor Matthew Call
Establishing the activating mechanisms for three small molecule thrombopoietin receptor (TpoR) agonists via deep mutational scanning

Mr Jack Tovey
Dr Jacqui Gulbis, Dr Agalya Periasamy, Dr Katrina Black
Investigation of 7W: a novel braunvirinae bacteriophage models of infection and resistance

Ms Kathleen Zeglinski
Associate Professor Matt Ritchie, Dr Arthur Hsu
Applications of long-read sequencing for antibody discovery in the biopharmaceutical industry

Patents Granted in 2020

Patents protect unique inventions made by WEHI scientists. These facilitate collaborations between WEHI and commercial organisations to progress the development of new products, a key step towards clinical translation.

Patents ensure that WEHI is able to leverage its intellectual property for future financial benefits. Income received for commercial exploitation of institute intellectual property is then used to invest in further research and reward the researchers who contributed to the invention.

Apoptosis-inducing agents for the treatment of cancer and immune and autoimmune diseases

Inventors: M Bruncko, H Ding, G Doherty, S Elmore, T Hansen, L Hasvold, L Hexamer, A Kunzer, R Mantei, X Song, A Souers, G Sullivan, Z-F Tao, G Wang, L Wang, X Wang, M Wendt

Brazil, Indonesia, Mexico, Poland, Serbia, Switzerland, Vietnam

Aryl sulfonohydrazides

Inventors: J Baell, B Cleary, H Lagiakos, D Leaver, N Nguyen, B Sheikh, T Thomas, A Voss

United States

Barley with low levels of hordeins

Inventors: C Howitt, G Tanner

Japan

CD52 glycoprotein

Inventors: E Bandala Sanchez, E Goddard-Borger, L Harrison, N Packer, A Shathili

Australia

Oat avenin purification method

Inventor: G Tanner

Australia

Method of treating intracellular infection

Inventors: C G Begley, G Ebert, M Pellegrini

Canada, France, Germany, Italy, Japan, New Zealand, Russia, Spain, United Kingdom

Soluble mediator

Inventors: E Bandala Sanchez, J Dromey, L Harrison, M Rashidi, Y Zhang

France, Germany, India, Italy, South Korea, Spain, United Kingdom

Use of therapeutic agents

Inventors: L Coultas, G Dewson, E Watson

Australia, France, Germany, Italy, Ireland, Spain, Switzerland, United Kingdom

A remarkable place

WEHI's Building Services Manager Mr Mahbub Bhuiyan (left) and Reception Coordinator Ms Rosie Falcone (right) were recognised for their professionalism, commitment and resilience at the front line of the institute in 2020, being jointly awarded WEHI's 2020 Kellaway Excellence Director's Award.

Operational overview

WEHI's activities are guided by our *2019-2023 Strategic Plan*. While the COVID-19 pandemic impacted WEHI's operations, our response was guided by our long-term strategic vision and our commitment to staff and student safety, wellbeing, productivity and connectedness.

Enabling great science and supporting a vibrant workforce were two focuses for 2020 – albeit under changing workplace conditions. You can learn more about WEHI's operational responses to COVID-19 on page 44.

Support from our community

Our community has always been an integral part of WEHI's research: philanthropists and governments have been vital supporters of our scientists; consumers contribute to our research; and WEHI's goal is to see our discoveries translated into better health outcomes for our community. The wide-ranging interest in COVID-19 research, plus WEHI's new brand (see pages 4 and 5), presented opportunities to raise awareness and support for WEHI. In response, we received funding support from existing and new donors. Throughout the year, online platforms were key to engaging with our supporters to provide updates on WEHI's work.

WEHI's Centenary Fellowships program successfully concluded in 2019, raising more than $46 million to support WEHI's most promising researchers and projects. As WEHI enters a new phase of fundraising, our activities will be guided by the implementation of a new fundraising and philanthropy strategy.

Streamlining grant applications

WEHI has initiated a new program to provide targeted, structured and strategic support to researchers applying for National Health and Medical Research Council (NHMRC) funding. This program leverages the wealth of expertise within WEHI to guide applicants, ensuring they have the best chance of successfully securing funding in a highly competitive environment.

In addition, applying for competitive grant funding – particularly scarce government funding – is time-consuming for researchers and takes them away from vital lab work. And once grant funding is secured, transparent, rigorous and responsive management of funding streams and grant obligations is required to ensure all grant requirements are met.

WEHI's new Grant Management System, launched in 2020, streamlines administrative and reporting obligations to ensure grant funding is managed transparently and responsibly, while also allowing our scientists to maximise their time devoted to research rather than administration.

Enhancing collaborations, strengthening connections

WEHI's links to healthcare providers, clinicians and patients are key to making a difference to the health of Australians. We have been strengthening our relationships with hospitals in order to increase WEHI's capacity for discovery and translational research. Initiatives included a partnership with Western Health to embed research tissue coordinators and extend our clinical collaborations in cancer research, and the development of a new program to better attract and retain clinician-scientists at WEHI.

The Consumer Advisory Panel Strategic Plan was also developed to keep WEHI at the forefront of consumer engagement in medical research and to deliver even better outcomes for researchers and the community.

Productive partnerships enhance research

WEHI has a strong track record in the early capture of intellectual property and commercialisation of our research. We work closely with biopharmaceutical partners, both locally and globally, to pursue the clinical testing and translation of our discoveries, and realise the health impacts of our research. Commercial and royalty returns are a significant source of income for WEHI and help us fund more research that contributes to better health outcomes for the community.

By 2020, more than 30 projects had been commercialised, five of which had resulted in marketed innovative products while a further eight are now at the clinical trials stage. WEHI was also granted 35 patents in 2020 (see page 40), ensuring we retain control of our promising research discoveries. WEHI's Innovation Fund supports internal early-stage innovation, bridging a critical funding gap in research translation and increasing the number of projects that can be successfully commercialised. In 2020, five projects were progressed through the Innovation Fund.

Strengthening our technology-driven research

During 2020, we developed a number of technology-driven initiatives to enhance multi-disciplinary research for discovery and translation. Initiatives included an imaging strategy and genomics strategy, which will be implemented in 2021. Planning for the Centre for Biologics Discovery was also completed, which will provide a pipeline of antibodies and nanobodies for the development of therapeutics, diagnostics and tools for discovery research.

Ensuring responsible governance

During 2020, WEHI continued to expand our governance capabilities to ensure we meet our regulatory responsibilities and stakeholder and community expectations. This included the appointment of two new roles, one to support animal management and one to expand our in-house corporate legal resourcing. To support good governance and ensure transparency we have continued to develop and refine our policies, including a focus in 2020 on developing policies that supported WEHI's COVID response (see page 44).

We continue to focus on continually improving processes. In 2020, we reviewed both our risk and compliance frameworks. Findings from these reviews will be implemented in 2021.

A key element of good governance is ensuring that staff feel safe to raise concerns. In 2020, we introduced a whistleblower hotline to provide an avenue for the anonymous reporting of concerns, consistent with newly introduced whistleblower legislation.

We continue to refine our systems and procedures to ensure our research is conducted at the highest ethical standard. This included the refinement of the Animal Management System, a database developed at WEHI to support compliance, track animal usage, husbandry and breeding, incorporating animal ethics oversights and reporting.

Embedding environmental sustainability

WEHI is motivated to foster a culture of environmental sustainability as well as to meet related obligations in its operations. In 2020, the Environmental Management and Sustainability Committee was established, comprising diverse representation of WEHI staff and students. This committee will develop an Environmental Management and Sustainability Strategy that will guide WEHI's actions in areas including energy, water and waste management, sustainable procurement practices, and compliance with relevant environmental legislation. The committee will also advocate internally for environmental initiatives, and raise awareness of environmental sustainability among WEHI's staff and students.

Preparing WEHI for the future

As part of its long-term planning, WEHI undertook the 'Strategic Futures' project in 2020. The project was designed to enable WEHI to anticipate and prepare for the longer-term future. It included a series of surveys and workshops engaging external stakeholders, including the Board and alumni, along with WEHI staff and students. The workshops explored the preferred vision for WEHI in the year 2040 and identified key areas where change is required now to reach this vision. Working groups will be established to further explore the emerging themes and create recommendations prior to the development of the *2024-2028 Strategic Plan*.

Below: WEHI's Chief Operating Officer Ms Carolyn MacDonald

Responding to the COVID-19 pandemic

WEHI swiftly adapted its operations to meet the many challenges posed by the pandemic.

WEHI's response to the pandemic was guided by our values and strategic goals, and centred on the following priorities:

- providing a safe environment for our staff and students to work both onsite and at home;
- complying with all government requirements relating to the pandemic;
- safeguarding the health of the broader WEHI community, as well as the general community;
- ensuring we meet the highest standards of ethical conduct of research, especially in relation to the use of animals in research;
- minimising the impact of our changed operations on WEHI's long-term financial position and business continuity; and
- applying our research expertise to tackle COVID-19 (see pages 14-17) and, where possible, supporting ongoing non-COVID-19 research – including honouring funding and collaborative agreements.

A new way of working

To combat potential infection spread at our sites, WEHI implemented a range of hygiene measures and contact tracing systems, as well as supporting staff and students to work partially or completely from home. At the height of the pandemic in Victoria, onsite work was limited to essential workers, who at WEHI were a skeleton workforce of critical researchers (such as those undertaking COVID-19 research) and essential professional services staff.

For many years, WEHI has facilitated flexible working arrangements, but a substantial cross-organisational response was required to support and engage with our staff and students in 2020. The pandemic also led to changes in how WEHI engages with our community. The 2020 Annual General Meeting was among many events held online for the first time.

Supporting our people

The wellbeing of our staff and students was central to our COVID-19 response. Staff who were not permitted onsite, but could not fully complete their work duties from home, were financially supported by a new category of 'Pandemic Leave'.

WEHI also worked closely with the University of Melbourne to ensure our students received appropriate support, including allowing extensions to students' candidature and scholarships if their research progress had been impacted by the pandemic. WEHI also provided interim employment for PhD graduates who were unable to take up planned overseas employment.

Supporting the mental wellbeing of our staff and students was also a priority for WEHI. In addition to our long-term Employee Assistance Program, a workplace psychologist was employed by WEHI for several months.

In 2021, WEHI's COVID-19 response has continued to adapt to the ongoing pandemic, and we hope the rollout of COVID-19 vaccines will reduce the need for harsher workplace restrictions to be imposed again.

Above: COVID-19 researchers Dr Emily Eriksson (left) and Dr Vanessa Bryant (right)

Expanding connections with our alumni

In 2020, WEHI held alumni events both in person and online, which offered audiences a variety of ways to network with peers and reconnect with WEHI.

Our alumni are an important part of the WEHI community and are great ambassadors. The alumni relations program is continually seeking ways to engage alumni with WEHI's ongoing research work and achievements.

The program also creates opportunities for alumni to rekindle old friendships, share memories and catch up with current staff and students.

Staying informed

Following a highly successful parasitology reunion held in person at the Parkville campus in February, COVID-19 restrictions forced the program to rethink how we bring alumni together.

With WEHI researchers working towards better approaches to diagnose, treat and prevent the spread of coronaviruses, we held an online forum in July for alumni and supporters to learn about our COVID-19 research program (see pages 14 to 17).

At the forum, WEHI director Professor Doug Hilton spoke about how WEHI has prioritised our research during the pandemic. Professor Marc Pellegrini, who leads WEHI's COVID-19 research program, summarised the multifaceted research approach WEHI had taken to combat this disease; Dr Kym Lowes spoke about how WEHI researchers were using the National Drug Discovery Centre to uncover potential new therapeutics.

The forum aimed to provide a platform to build goodwill for WEHI amongst our alumni in the wider community. An alumna said it helped her better understand WEHI's research. "The forum clearly presented WEHI's scientific findings; there was a great Q&A session afterwards," she said.

Keeping in touch

In October, the alumni program ran an online reunion for former Honours students. One alumnus commented on the value of reconnecting with past colleagues. "Most of the ex-students knew each other, regardless of when they studied at WEHI, and were happy to chat, especially during a pandemic," he said.

Our alumni receive a special alumni-focused edition of WEHI's quarterly newsletter, *Illuminate*. They can also engage with WEHI on a dedicated Facebook page, and receive email updates on key activities including the Annual General Meeting, annual report and events throughout the year.

By shifting to a mix of in-person and online events, the alumni program has been able to offer more alumni the opportunity to engage with WEHI; in 2020 we engaged with 205 alumni at events, an increase from 129 in 2019.

With the recruitment of new alumni to the network in 2020, our alumni program has become a key aspect of WEHI's ongoing community engagement.

Below: More than 50 alumni, staff and students who worked in WEHI's parasitology research program gathered for a reunion in February 2020 (prior to the introduction of COVID-19 restrictions).

Diversity and inclusion

WEHI embraces and celebrates diversity amongst our people and recognises the importance of a positive, inclusive workplace culture to the success of our organisation.

Fostering inclusion during the pandemic

In 2020, we sought to understand and address the range of ways in which the COVID-19 pandemic impacted different groups of staff and students. We drew upon the diverse voices and experiences of our people to guide WEHI's response to the pandemic, striving to remain an inclusive, connected workplace.

Future of flex

The pandemic accelerated changes to the 'how, when and where' of work. Staff and students at WEHI reported that they valued the greater flexibility they had to manage their work-life balance and wanted to see this maintained in the future.

An online workshop was held in September to start to explore the 'future of flex' at WEHI. The workshop included a panel discussion with faculty members and discussions centred upon participant experiences of working during lockdown, and the barriers and enablers to WEHI continuing to embrace flexibility.

Supporting parents and carers during COVID-19

During Victoria's lockdowns, many children could not attend on-site schooling and childcare. WEHI commenced a partnership with KidsCo to support parents and carers during Stage 4 lockdowns. KidsCo is a school holiday program that developed a range of live online sessions designed to engage children from five to 12 years of age. The partnership saw WEHI offer 24 places per day for children of staff and students.

Progressing gender equality

The four-year Gender Action Plan 2018-2021 (GAP), developed as part of our application for the Bronze Athena SWAN award, has acted as a roadmap to gender equality at WEHI.

2020 saw the continued implementation of the GAP, and WEHI's sustained participation in the Science in Australia Gender Equality (SAGE) Athena SWAN program.

Valuing collaboration

WEHI has maintained and strengthened partnerships, both locally and nationally, through membership of the Champions of Change Coalition (formerly known as the Male Champions of Change) and Women in Science Parkville Precinct (WiSPP).

WEHI is also a member of the new Association of Australian Medical Research Institutes (AAMRI) Gender Equality, Diversity and Inclusion Committee, helping to shape and advance gender and diversity work within the medical research sector.

Celebrating International Women's Day

WEHI was honoured to welcome Ms Carly Findlay OAM to deliver our 2020 International Women's Day address.

Ms Findlay writes on disability and appearance diversity issues and received a Medal of the Order of Australia (OAM) in 2020 for her work as a disability advocate and activist.

Addressing WEHI's staff and students, Ms Findlay spoke about the importance of inclusion, visibility and hearing the voices of people with a disability, particularly with regard to the medical sector.

Encouraging bystander action against sexism and sexual harassment

WEHI was one of two Victorian workplaces selected to join a partnership with VicHealth and independent research organisation the Behavioural Insights Team (BIT) to trial innovative interventions to encourage bystander action against sexism and sexual harassment in the workplace. The Victorian Government-funded partnership will produce a set of evidence-based recommendations on how to best respond to and prevent sexism and sexual harassment.

Acknowledging the 16 Days of Activism against gender-based violence campaign

WEHI acknowledged the 16 Days of Activism campaign against gender-based violence by sharing key messages with staff and students, and through WEHI's social media accounts. Content shared internally focused on explaining the purpose of the campaign, guidance on how to access workplace support for victims and survivors of violence, and tips for how to be a bystander against disrespect towards women.

Promoting LGBTQIA+ inclusion

WEHI proudly participated in the 2020 Midsumma Pride March. WEHI director Professor Doug Hilton led the WEHI contingent in solidarity with WEHI's LGBTQIA+ staff, students and allies.

WEHI acted as the host entity for QueersInScience, a grassroots advocacy organisation for LGBTQIA+ people in science, technology, engineering, mathematics and medicine (STEMM), supporting their efforts as they expanded the network nationally.

WE-Pride: Supporting and connecting the LGBTQIA+ community

WE-Pride, WEHI's LGBTQIA+ employee-led network, continued to act as a source of connection and support to LGBTQIA+ staff and students during the pandemic, with regular virtual meetups scheduled.

WE-Pride organised and led an online workshop between members of LGBTQIA+ networks at organisations across the Parkville precinct and wider Melbourne academic community to share key learnings and ideas for running successful networks.

To mark 2020's International Day Against Homophobia, Transphobia and Biphobia (IDAHOBIT) and to break stereotypes pigeonholing the LGBTQIA+ community, WE-Pride members took part in a photo collage of their daily activities including work and diverse hobbies such as reading, baking, travelling, gardening, knitting and bird-watching.

In August, the WEHI community was invited to celebrate Wear it Purple Day, aimed at celebrating and supporting LGBTQIA+ young people. Because of COVID-19 restrictions, the WEHI Student Association organised a virtual games night and made a donation to the Wear it Purple charity in honour and recognition of WEHI's LGBTQIA+ students. WE-Pride marked this day by re-sharing the Queeries video, in which WEHI's staff and students answered questions related to challenges faced by the LGBTQIA+ community.

In December, in an attempt to bring LGBTQIA+ community and allies together, WE-Pride hosted an end-of-year picnic, the first in-person social event since COVID-19 restrictions eased.

Increasing disability awareness and inclusion

WEHI supported an employee-led initiative to set up a Disability Reference Group. The group's aims will be guided by staff and students but may focus on areas such as peer support, improving access, awareness raising and policy guidance.

WEHI became a member of the Australian Network on Disability (AND), which works to improve access and inclusion for people with a disability in the workplace.

Below: Award-winning writer, speaker and appearance activist Ms Carly Findlay OAM delivered WEHI's 2020 International Women's Day address.

Working towards reconciliation

WEHI's Reconciliation Action Plan provides a clear framework to help shape our reconciliation agenda and take us on the next stage of our reconciliation journey.

Fellowship for Indigenous researchers

In early 2020, WEHI launched a new Indigenous Visiting Research Fellowship program to provide funding support for Aboriginal and Torres Strait Islander researchers to undertake research at the institute.

The fellowship aims to support Aboriginal and Torres Strait Islander researchers to leverage the expertise of a WEHI laboratory and associated research infrastructure to advance their research and develop their scientific skills and experience.

Acknowledging National Reconciliation Week

2020 marked the 20th anniversary of Reconciliation Australia, an important shared effort to build a more just, equitable and reconciled nation.

From 27 May to 3 June, with many in our workforce still working from home, the Reconciliation Committee shared digital content, connecting staff and students to WEHI's commitment to reconciliation and instigating wider discussions on Aboriginal and Torres Strait Islander history, culture and achievements. These included live interviews, pre-recorded seminars, virtual art tours and maps of local heritage sites.

Celebrating NAIDOC Week

WEHI was privileged to celebrate NAIDOC week with a special seminar by three Aboriginal women health and medical research academics. WEHI's Associate Professor Misty Jenkins hosted the seminar with guest speakers Associate Professor Catherine Chamberlain and Dr Ngaree Blow titled 'From the bush to the bench and back to the bush'.

Creating opportunities for Aboriginal and Torres Strait Islander students

WEHI participates in internship programs that provide opportunities for Aboriginal and Torres Strait Islander students. In November, nine undergraduate students were welcomed through the CareerTrackers Indigenous Internship Program to undertake summer internships across our scientific divisions and in professional services. This is the largest cohort of students hosted at WEHI since the institute joined CareerTrackers in 2014.

WEHI also continued its partnership with the Aurora internship program with two university students interning in our laboratories in 2020.

In addition, WEHI staff were provided with the opportunity to mentor early university students who are part of the Young Indigenous Women's STEM Academy (YIWSA).

Supporting Deadly Science

WEHI's Reconciliation Committee ran a book drive to support Deadly Science's efforts to provide STEM resources to support Aboriginal and Torres Strait Islander school students across Australia. More than 450 books were donated and sent to eight schools.

Above: During the 2019–20 summer, WEHI hosted five CareerTrackers interns, (from left) Ms Bridget Dorizzi, Ms Naomi Jones, Ms Megan Kent, Ms Lilly Backshell and Mr Wayne Cawthorne.

Organisation and governance

Ms Joh Kirby is WEHI's Head of Governance, Risk and Compliance. She leads a team that support researchers, professional services and the Board through the delivery of integrated governance practices.

WEHI Board

The directors of the Walter and Eliza Hall Institute of Medical Research Board
31 December 2020

WEHI Board members 2020 (from left): Mr Terry Moran AC, Ms Marie McDonald, Mr Peter Collins, Professor Shitij Kapur, Professor Sir John Savill, Mrs Jane Hemstritch, Mr John Dyson, Professor James McCluskey AO, Mr Robert Wylie, Associate Professor Pippa Connolly, Mr Malcolm Broomhead AO.

President
Mrs Jane Hemstritch
BSc (Hons) *London University*
FICAEW FICAANZ FAICD
Appointed: October 2013
Appointed President: May 2019

Vice President
Mr Terry Moran AC
BA (Hons) *LaTrobe* FIPAA
Appointed: November 2013
Appointed Vice President: May 2019

Honorary Treasurer
Mr Robert Wylie
FCA FAICD
Appointed: April 2014
Appointed Honorary Treasurer: April 2014

Mr Malcolm Broomhead AO
BE (Civil) MBA *UQ* FIE (Aus) FAusIMM FAIM MICE (UK) FAICD
Appointed: July 2014

Mr Peter Collins
BA (Hons) *Melbourne* BTheology *MCD* Masters *Oxford and HEC Paris*
Appointed: May 2018

Associate Professor (Practice) Pippa Connolly
MEng *Leeds* GAICD CPEng FIEAust
Appointed: April 2019

Mr John Dyson
BSc *Monash* Grad Dip Fin Inv SIA
MBA *RMIT*
Appointed: May 2016

Professor Shitij Kapur
MBBS *AIIMS* PhD *Toronto* FRCPC FMedSci
Appointed: May 2017
Retired from Board: 16 December 2020

Professor Christine Kilpatrick AO
MBBS MBA MD DMedSci (Hons) *Melbourne*
FRACP FRACMA FAICD FAHMS
Appointed: May 2017

Board members not present in group photograph: Professor Christine Kilpatrick AO (top right) and Ms Carolyn Viney (bottom right).

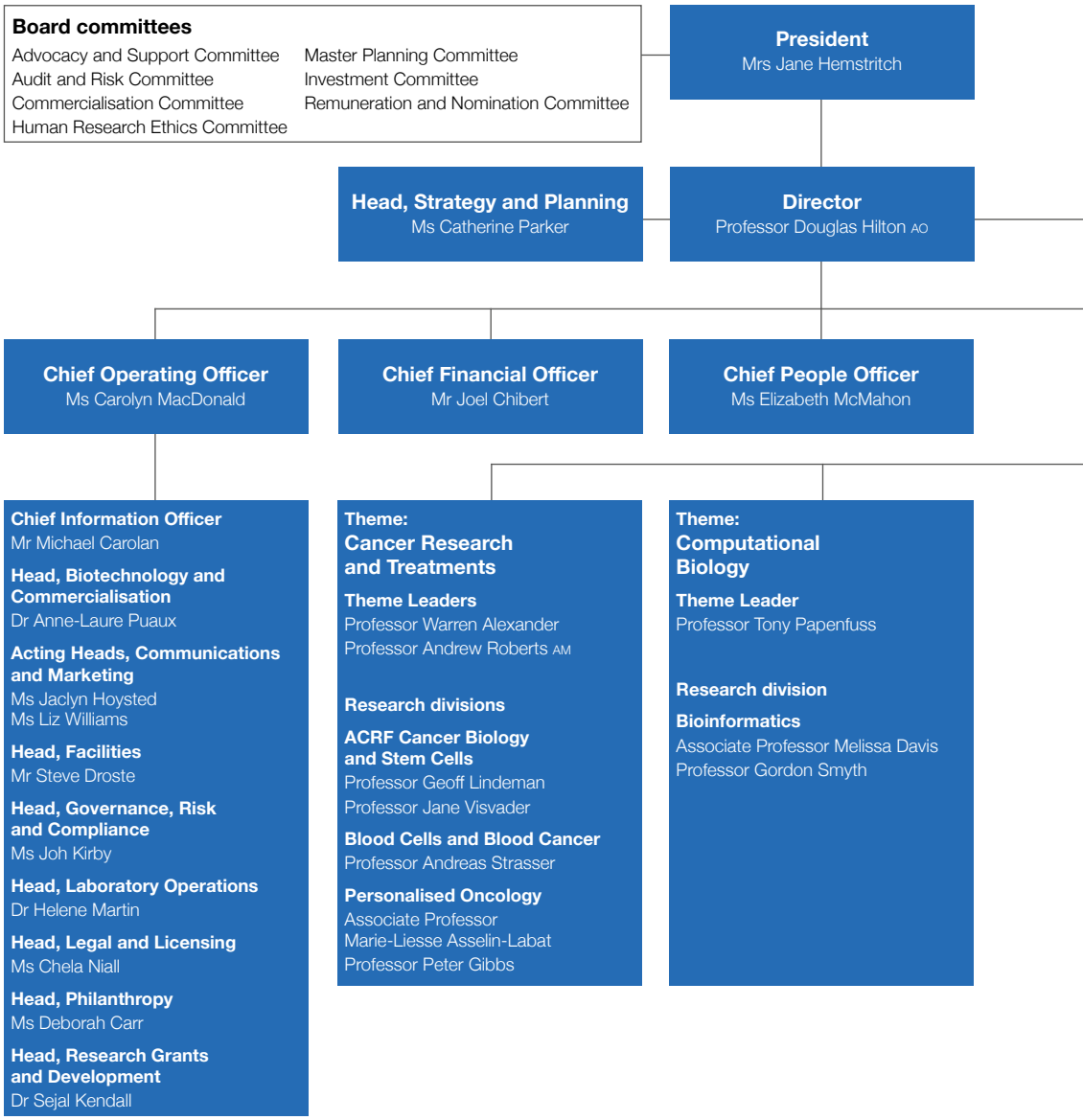
Professor James McCluskey AO
BMedSc MBBS MD *UWA* FRACP
FRCPA FAA FAHMS
Appointed: April 2011

Professor Sir John Savill
BA *Oxford* MBChB *Sheffield* PhD *London*
FRCP FRCPE FRCSEd (Hon) FRCPCH(Hon)
FASN FRSE FMedSci FRS
Appointed: June 2018

Ms Marie McDonald
BSc (Hons) LLB (Hons) *Melbourne*
Appointed: October 2016

Ms Carolyn Viney
LLB/BA *Monash*
Appointed: December 2016

WEHI organisation 31 December 2020



Laboratory heads

ACRF Cancer Biology and Stem Cells
Professor Geoff Lindeman
Professor Clare Scott
Associate Professor Kate Sutherland
Professor Jane Visvader

ACRF Chemical Biology
Associate Professor Ethan Goddard-Borger
Professor Guillaume Lessene
Associate Professor Isabelle Lucet
Dr Brad Sleebs

Advanced Technology and Biology
Dr Rory Bowden
Dr Kym Lowes
Dr Jeff Mitchell
Mr Simon Monard
Dr Kelly Rogers
Associate Professor Andrew Webb
Ms Kaye Wycherley

Bioinformatics
Associate Professor Melissa Davis
Professor Tony Papenfuss
Professor Gordon Smyth
Professor Terry Speed

Blood Cells and Blood Cancer
Professor Jerry Adams
Professor Warren Alexander
Professor Suzanne Cory AC
Associate Professor Marco Herold
Professor Douglas Hilton AO
Professor David Huang
Dr Gemma Kelly
Associate Professor Ruth Kluck
Professor Nick Nicola AO
Associate Professor Ian Majewski
Professor Andrew Roberts AM
Professor Andreas Strasser

Clinical Translation
Professor Clare Scott
Professor Ian Wicks

Epigenetics and Development
Professor Marnie Blewitt
Associate Professor Joan Heath
Associate Professor Matthew Ritchie
Dr Samir Taoudi
Associate Professor Tim Thomas
Professor Anne Voss

Management Committees

Animal Ethics Committee
Appointment and Promotion Review Committee
Biosafety Committee
Clinical Translation Standing Committee
Diversity and Inclusion Committee
Education Committee
Engagement Committee
Environmental Management and Sustainability Committee
Faculty Recruitment and Appointment Committee
Gender Equity in Science Committee
Health and Safety Committee
IT Governance Committee
Project Governance Committee
Reconciliation Committee
Risk Management Committee
Senior Technology Planning Group
Strategic Cabinet

Deputy Director, Science Strategy
Professor Alan Cowman AC

Acting Head, Scientific Education
Professor Marnie Blewitt

Theme: Infection, Inflammation and Immunity

Theme Leader
Professor John Silke

Research divisions

Immunology
Associate Professor Daniel Gray
Professor Phil Hodgkin

Infectious Diseases and Immune Defence
Professor Marc Pellegrini
Associate Professor Wai-Hong Tham

Inflammation
Associate Professor James Murphy

Theme: Healthy Development and Ageing

Theme Leader
Professor Melanie Bahlo

Research divisions

Epigenetics and Development
Professor Marnie Blewitt
Professor Anne Voss

Population Health and Immunity
Professor Ivo Mueller
Associate Professor Sant-Rayn Pasricha

Ubiquitin Signalling
Professor David Komander

Theme: New Medicines and Advanced Technologies

Theme Leader
Professor Guillaume Lessene

Research divisions

ACRF Chemical Biology
Associate Professor Isabelle Lucet

Advanced Technology and Biology
Dr Kelly Rogers

Structural Biology
Associate Professor Matthew Call
Associate Professor Peter Czabotar

Clinical Translation
Professor Clare Scott
Professor Ian Wicks

Colonial Foundation Healthy Ageing Centre
Associate Professor Andrew Webb

National Drug Discovery Centre
Dr Jeff Mitchell

Immunology
Associate Professor Rhys Allan
Dr Vanessa Bryant
Associate Professor Daniel Gray
Dr Joanna Groom
Professor Phil Hodgkin
Associate Professor Misty Jenkins
Dr Shalin Naik
Professor Stephen Nutt
Dr Charlotte Slade
Associate Professor Jason Tye-Din

Infectious Diseases and Immune Defence
Associate Professor Justin Boddey
Professor Alan Cowman AC
Dr Anna Coussens
Associate Professor Diana Hansen
Professor Marc Pellegrini
Associate Professor Wai-Hong Tham
Associate Professor Chris Tonkin

Inflammation
Dr Philippe Bouillet
Associate Professor Edwin Hawkins
Associate Professor Seth Masters
Associate Professor James Murphy
Associate Professor Sandra Nicholson
Professor John Silke
Associate Professor James Vince
Professor Ian Wicks

Personalised Oncology
Associate Professor Marie-Liesse Asselin-Labat
Professor Tony Burgess
Professor Peter Gibbs
Dr Tracy Putoczki
Associate Professor Oliver Sieber

Population Health and Immunity
Professor Melanie Bahlo
Professor Len Harrison
Associate Professor Aaron Jex
Professor Ivo Mueller
Associate Professor Sant-Rayn Pasricha
Associate Professor Leanne Robinson
Associate Professor Rosie Watson
Associate Professor Nawaf Yassi

Structural Biology
Associate Professor Jeff Babon
Associate Professor Matthew Call
Dr Melissa Call
Professor Peter Colman AC
Associate Professor Peter Czabotar
Dr Alisa Glukhova
Dr Jacqui Gulbis
Professor Mike Lawrence

Ubiquitin Signalling
Associate Professor Grant Dewson
Dr Rebecca Feltham
Professor David Komander
Dr Berhard Lechtenberg

Members of WEHI to 31 December 2020

The Royal Melbourne Hospital
University of Melbourne
Dr Susan Alberti AC
Professor Emeritus Robin Anders
Professor James Angus AO
Mr Donald Argus AC
Mr Barry Axtens
Mrs Lisa Bardas
Mr Paul Barnett
Ms Helen Barry
Mrs Ann Bates
Mr Robert Bates
Mr Lance Bauer
The Walter and Eliza Hall Trust
Dr Elsmaree Baxter
Dr Glenn Begley
Professor Claude Bernard
Mr Marc Besen AC
Professor Rufus Black
Ms Ngaree Blow
Mr Malcolm Broomhead AO
Professor Graham Brown AM
Mrs Rosalind Brown
Mrs Beverley Brownstein
Dr Gerard Brownstein
Mrs Sally Bruce
Mr Ian Brumby
Mr John Brumby AO
Dr Margaret Brumby AM
Professor Tony Burgess AC
Professor Christopher Burrell AO
Mr Greg Camm
Mr Terry Campbell AO
Ms Kate Cannon
Mr Saul Cannon
Dr Amanda Caples
Mrs Gill Carter
Mr Pat Cashin
Emeritus Professor Colin Chapman
Mr John Chatterton AM
Dr Julian Clark
Lady Susannah Clarke
Mr Peter Collins
Ms Pippa Connolly
Mrs Jacqui Cooper
Associate Professor Paul Cooper
Mr Glenn Corke
Mr Ian Coulson
Dr Nicholas Crosbie
Mrs Joan Curtis
Professor Andrew Cuthbertson AO
Mr John Dahlsen
Mr Stephen Daley
Mrs June Danks
Mrs Annette Davis
Mr Leon Davis AO
Mrs Liz Dawes
Professor Karen Day
Dr Simon de Burgh
Professor David de Kretser AC
Professor John Denton
Mrs Liz Dexter
Mr Mick Dexter
Mr Angelo Di Grazia
Mrs Helen Diamond
Ms Melda Donnelly
Professor Ashley Dunn
Mr John Dyson
Ms Roz Edmond
Dr Martin Elhay
Mr Garry Emery
Dr Peter Eng
Professor Sir Marc Feldmann
Mr Mike Fitzpatrick AO
Mrs Pauline Flanagan
Dr Sue Forrest
Professor Richard Fox
Mrs Nolene Fraser
Mr Paul Fraser
Professor Ian Frazer AC
Mrs Pamela Galli AO
Ms Kelli Garrison
Dr Andrew Gearing
Ms Louise Gehrig
Mr Barry Gilbert
Mrs Janet Gilbertson
Mr Peter Gilbertson
Ms Rose Gilder
Professor James Goding
Mr Charles Goode AC
Dr Gareth Goodier
Mrs Andrea Gowers
Mr John Grace
Mrs Maureen Grant
Mr Tony Gray
Sir Andrew Grimwade CBE
Mrs Jean Hadges
Col Tom Hall CVO, OBE
Professor Emanuela Handman
Mr Michael Harris
Mr Harry Hearn AM
Mrs Jane Hemstritch
Professor David Hill AO
Mrs Janet Hirst
Mr Darvell Hutchinson AM
Mr Jon Isaacs
The Walter and Eliza Hall Trust
Mr Murray Jeffs
Mr Jose Jimenez
Mrs Terese Johns
Professor Shitij Kapur
Ms Helen Kennan
Mr Rowan Kennedy
Mrs Margot Kilcullen
Mr Rob Kilcullen
Professor Christine Kilpatrick AO
Emeritus Professor Frank Larkins AM
Professor Richard Larkins AC
Mrs Belinda Lawson
Mr Gary Liddell

Dr Rowena MacKean OAM
Dr Alexander Macphee
Ms Eve Mahlab AO
Mrs Robyn Male
Mrs Lorrie Mandel
Mr Barrie Marshall
Mr John Marshall AM
Ms Josephine Marshall
Emeritus Professor Jack Martin AO
Mr Erich Mayer AM
Mrs Netta McArthur
Dr Neville McCarthy AO
Professor James McCluskey
Ms Marie McDonald
Professor John McKenzie AM
Mrs Kate McMahon
Mr Tim McMahon
Professor Kathryn McPherson
Professor Frederick Mendelsohn AO
Mrs Johanna Metcalf
Ms Kate Metcalf
Emeritus Professor Jacques Miller AC
Professor John Mills AO
Mr Robert Minter
The Walter and Eliza Hall Trust
Professor Christina Mitchell
Dr Graham Mitchell AO
Dr Judith Mitchell
Mr Barry Moore
Mr Terry Moran AC
Mrs Barbara Morgan
Mr Hugh Morgan AC
Dr George Morstyn
Mr John Murphy
The Walter and Eliza Hall Trust
Mr Tony Murphy
Ms Linda Nicholls AO
Dr Leslie Norins
Mrs Rainey Norins
Mr Colin North OAM
Lady Lyn Nossal
Ms Maureen O'Keefe
Mr Bill O'Shea
Professor David Penington AC
Emeritus Professor Roger Pepperell AM
Ms Gayle Petty
Emeritus Professor Jim Pittard AM
Lady Primrose Potter AC
Mr John Prescott AC
Mr John Pye
Mrs Edith Qualtrough
Mrs Cathy Quilici
Mr Denis Quilici
Professor Peter Rathjen
Ms Kate Redwood AM
Mr Dieter Rinke
Associate Professor Ken Roberts AM
Ms Linda Rodger
Mrs Mary Rodger
Mrs Ellie Rogers
Mrs Margaret Ross AM
Mr Fergus Ryan
Professor Graeme Ryan AC
Mr Colin Sakinofsky
Professor Nick Samaras
Mr Keith Satterley
Professor Sir John Savill
Professor Carl Schedvin
Ms Anne Schumacher
The Walter and Eliza Hall Trust
Mrs Carol Schwartz AM
Dr Roland Scollay
Mr Andrew Scott
Professor John Scott AO
Dr Paul Scown
Mrs Sam Sharman OAM
Ms Deborah Sims
Mrs Lousje Skala
Mr Steven Skala AO
Professor Stephen Smith
Mr Jack Smorgon AO
Mrs Sally Speed
Professor Terry Speed
Miss Ann Sprague
Mr Geoffrey Stewardson
Dr John Stocker AO
Ms Jennifer Strangward
Mr John Stratton
Ms Kate Summers
Ms Helen Sykes
Ms Jenny Tatchell
Mr Bruce Teele
Mrs Cheryl Thomas
Mr Chris Thomas AM
Ms Carolyn Viney
Mr John Walker QC
Mr Stanley Wallis AC
Mr Peter Walsh
Ms Catherine Walter AM
Mr John Walter
Mr John Warburton
Mr Robert Warren
Mrs Catherine Watt
Mr Kevin Weight
Professor Richard Wettenhall
Dr Senga Whittingham
Dr Mark Wickham
Mr David Williamson
Mr Malcolm Williamson
Professor Robert Williamson AO
Professor Ingrid Winship
Ms Sally Wood
Mr Peter Worcester
Mr Rob Wylie
Dr Quan Zhao

WEHI remembers those members who passed away in 2020

Dr Gytha Betheras AM

WEHI acknowledges the support of the following organisations, which contributed $10,000 or more to our research in 2020

WEHI is associated with the following organisations

In-kind support was received from:

2020 Board subcommittees 31 December 2020

Advocacy and Support Committee

Mr John Dyson (chair)
Ms Deborah Carr
Mr Joel Chibert
Associate Professor Paul Cooper
Mr Michael Daddo
Professor Doug Hilton AO
Mr Hugh Hodges
Ms Jaci Hoysted
Ms Caroline Johnston
Ms Andrea Lapidge
Ms Carolyn MacDonald
Ms Catherine Robson
Ms Liz Williams
Ms Kelly Rodger (minutes)

Audit and Risk Committee

Mr Robert Wylie (chair)
Mr Malcolm Broomhead AO
Mr Joel Chibert
Ms Pippa Connolly
Ms Anneke du Toit (Deloitte)
Ms Jane Hemstritch
Professor Doug Hilton AO
Ms Jayda Hindson (Deloitte)
Ms Joh Kirby
Ms Carolyn MacDonald
Mr Gery Bicos (Deloitte)
Ms Elly Maddy (Protiviti)
Ms Lauren Brown (Protiviti)
Mrs Emma Booth (minutes)

Commercialisation Committee

Ms Marie McDonald (chair)
Mr Saul Cannon
Professor Peter Colman AC
Dr Leigh Farrell
Ms Lisa Hennessy (independent member)
Professor Doug Hilton AO
Associate Professor Isabelle Lucet
Ms Carolyn MacDonald
Ms Chela Niall
Professor Nick Nicola AO
Dr Anne-Laure Puaux
Professor Sir John Savill
Professor John Silke

Human Research Ethics Committee

Mr Peter Collins (chair)
Reverend Father Michael Elligate (deputy chair)
Dr John Bonacci
Dr Vanessa Bryant
Ms Jane Fiske
Mr David Freeman
Ms Sarah Galbraith
Ms Terri Lourey
Associate Professor Ian Majewski
Professor Marc Pellegrini
Ms Bree Ridgeway
Ms Louise Steinfort
Associate Professor Jeanne Tie

Investment Committee

Mr Robert Wylie (chair)
Mr Adam Blennerhassett (JBWere)
Mr Malcolm Broomhead AO
Mr Joel Chibert
Professor Doug Hilton AO
Mr Stephen Merlicek
Mr Stephen Milburn-Pyle
Mr Curtis Reid (JBWere)
Mr Andrew Scott
Ms Fiona Trafford-Walker
Ms Karen O'Duil (minutes)

Master Planning Committee

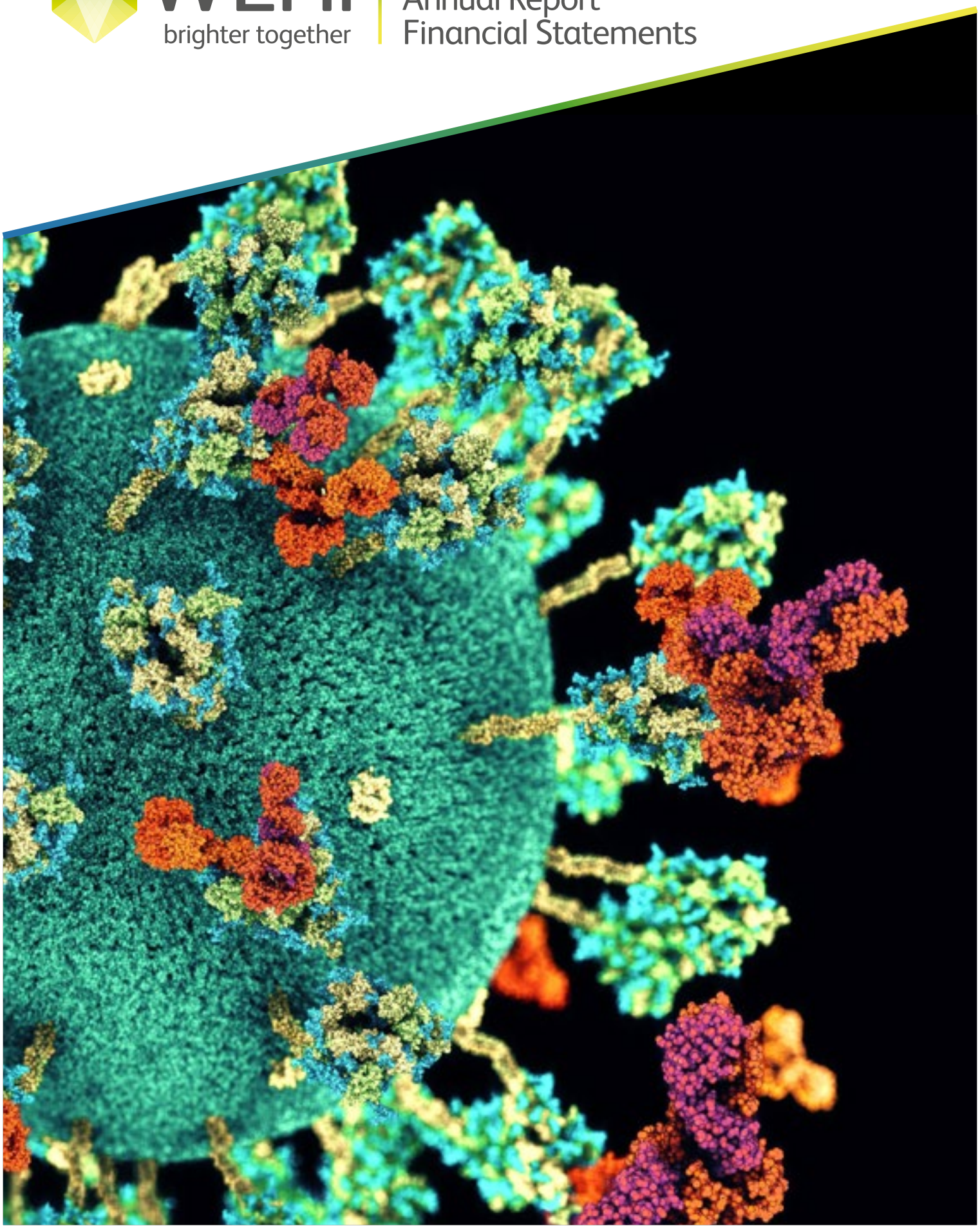
Ms Carolyn Viney (chair)
Mr Joel Chibert
Ms Pippa Connolly
Professor Alan Cowman AC
Mr Steve Droste
Professor Doug Hilton AO
Ms Carolyn MacDonald
Mr Dan McLennan (Partner Developments)
Mr Terry Moran AC
Ms Catherine Parker
Mrs Emma Booth (minutes)

Remuneration and Nomination Committee

Mr Terry Moran AC (chair)
Ms Marie McDonald
Ms Carolyn Viney

WEHI
brighter together

2020 Annual Report Financial Statements



Financial statements contents

NOTE

Statement of profit or loss and other comprehensive income for the year ended 31 December 2020

Operating revenue	Note	2020 $'000	2019 $'000
Government revenue			
National Health and Medical Research Council		40,087	39,708
Cooperative Research Centres		1,386	2,451
Other Australian Government grants	2(a)	23,316	4,139
Other Australian Government fellowships		9	-
Victorian Government grants		10,311	10,513
Foreign Government grants and fellowships		-	70
		75,109	**56,881**
Other grant revenue			
Industrial grants and contracts		13,439	8,689
Philanthropic grants and fellowships – Australia		9,870	13,399
Philanthropic grants and fellowships – International		4,649	3,343
		27,958	**25,431**
Other revenue			
Investment income	2(b)	19,996	24,156
Royalty income		1,654	7,483
General income		6,842	8,916
Donations and bequests		11,569	10,373
		40,061	**50,928**
Total operating revenue before monetisation		**143,128**	**133,240**
Royalty monetisation income (venetoclax)	5	38,961	35,633
Total operating revenue		**182,089**	**168,873**

The financial statements are to be read in conjunction with the notes to, and forming part of the financial statements.

Operating expenditure	Note	2020 $'000	2019 $'000
Scientific laboratories			
Staff costs		67,601	61,389
Apparatus and equipment		3,178	2,576
Consumable supplies		9,131	11,065
Other expenses		3,961	5,881
		83,871	**80,911**
Support laboratories			
Staff costs		14,125	13,355
Apparatus and equipment		900	989
Consumable supplies		1,347	1,287
Other expenses		1,695	1,637
		18,067	**17,268**
Professional services			
Staff costs		13,898	11,432
Furniture & equipment		74	97
Building operating costs and maintenance		5,092	5,908
Other expenses		6,202	6,308
		25,266	**23,745**
Strategic initiatives			
Staff costs		6,923	12,165
Furniture & equipment		20	105
Other expenses		8,451	3,976
		15,394	**16,246**
Allowance for credit loss (decrease) / increase	9	(30)	62
Unrealised foreign exchange loss		10,282	477
Total operating expenditure before monetisation		**152,850**	**138,709**
Royalty monetisation (venetoclax)			
Provision for net commercial income distributions and associated payments	5	2,239	10,104
Total operating expenditure		**155,089**	**148,813**
Surplus from operations		**27,000**	**20,060**
Other (loss)/income	3	(135)	297
Depreciation and amortisation - property, plant and equipment	4	(11,818)	(10,886)
Depreciation and amortisation - right of use assets	18	(53)	(55)
Gain/(loss) on financial assets taken to profit or loss (FVTPL Instruments)		816	5,261
Bequests and grants for capital works		15,626	6,435
Net surplus for the period	16(a)	**31,436**	**21,112**
Other comprehensive income			
Items that will not be reclassified subsequently to profit or loss			
Gain/(loss) on financial assets taken to equity (FVTOCI equity Instruments)	16(g)	68	59,682
Transfer derecognition of Land Lease (PPE) on initial adoption of AASB 16	16(c)	-	(16,182)
Items that may be reclassified subsequently to profit or loss			
Gain/(loss) on financial assets taken to equity (FVTOCI debt Instruments)	16(g)	322	1,508
Cumulative gain reclassified to profit or loss on sale of financial assets (FVTOCI Debt Instruments)	16(g)	137	(293)
Total comprehensive income for the year		**31,963**	**65,827**

The financial statements are to be read in conjunction with the notes to, and forming part of the financial statements.

Statement of financial position as at 31 December 2020

Assets	Note	2020 $'000	2019 $'000
Current assets			
Cash and cash equivalents	17(a)	70,442	69,982
Current tax assets	8	1,281	1,240
Trade and other receivables	9	57,454	51,311
Prepayments		2,254	1,670
Total current assets		**131,431**	**124,203**
Non-current assets			
Other financial assets	10	561,431	547,641
Property, plant and equipment	11	196,314	183,919
Right of use assets	18	2,683	2,736
Total non-current assets		**760,428**	**734,296**
Total assets		**891,859**	**858,499**
Liabilities			
Current liabilities			
Trade and other payables	12	18,479	10,087
Provisions	13	37,448	37,852
Unearned grants and fellowships	14	45,627	49,931
Other liabilities	15	330	264
Total current liabilities		**101,884**	**98,134**
Non-current liabilities			
Provisions	13	32,511	34,864
Total non-current liabilities		**32,511**	**34,864**
Total liabilities		**134,395**	**132,998**
Net assets		**757,464**	**725,501**
Funds			
Permanent invested funds	16(b)	202,322	198,833
General funds	16(c)	394,285	371,193
Royalty fund	16(d)	56,135	55,039
Leadership fund	16(e)	28,927	27,965
Discovery fund	16(f)	5,484	5,271
Investment revaluation reserve	16(g)	70,311	67,200
Total funds		**757,464**	**725,501**

The financial statements are to be read in conjunction with the notes to, and forming part of the financial statements.

Statement of cash flows for the year ended 31 December 2020

	Note	2020	2019
Cash flows from operating activities		**$'000**	**$'000**
Donations and bequests		11,599	10,311
General income		8,389	10,071
Receipts from granting bodies		104,139	124,754
GST paid to ATO		(5,727)	(3,232)
Payments to suppliers and employees		(144,051)	(150,797)
Royalty receipts		37,309	1,673
Dividends received		13,399	23,172
Interest and bill discounts received		7,363	7,514
Net cash from operating activities	17(b)	**32,420**	**23,466**
Cash flows from investing activities			
Payment for other financial assets		(104,000)	(73,538)
Proceeds on sale of other financial assets		83,978	58,139
Grants and donations for property, plant and equipment		14,953	5,076
Payment for property, plant and equipment		(24,246)	(12,335)
Net cash used in investing activities		**(29,315)**	**(22,658)**
Cash flows from financing activities			
Donations and bequests to permanent invested funds		673	1,359
Net cash from financing activities		**673**	**1,359**
Net increase in cash and cash equivalents		**3,778**	**2,167**
Cash and cash equivalents at the beginning of the year		**69,163**	**67,473**
Effects of exchange rate changes on the balance of cash held in foreign currencies		(2,829)	(477)
Cash and cash equivalents at the end of the year	17(a)	**70,112**	**69,163**

The financial statements are to be read in conjunction with the notes to, and forming part of the financial statements.

Statement of changes in equity

	Permanent fund	General fund	Royalty fund	Leadership fund	Discovery fund	Investment revaluation reserve	Total
Balance at 1 January 2019	**194,181**	**377,710**	**48,054**	**26,557**	**4,961**	**8,211**	**659,674**
Transfer derecognition of Land Lease (PPE) on initial adoption of AASB 16	-	(16,182)	-	-	-	-	**(16,182)**
Transfers not reflected in current year surplus	-	1,908	-	-	-	(1,908)	**-**
Surplus for the year	4,652	7,757	6,985	1,408	310	-	**21,112**
Other comprehensive income for the year							
Revaluation gain on investments for the period	-	-	-	-	-	60,897	**60,897**
Total comprehensive income / (loss) for the year	**4,652**	**(6,517)**	**6,985**	**1,408**	**310**	**58,989**	**65,827**
Balance at 31 December 2019	**198,833**	**371,193**	**55,039**	**27,965**	**5,271**	**67,200**	**725,501**
Transfers from Investment revaluation reserve on sale of investment	-	(2,584)	-	-	-	2,584	**-**
Surplus for the year	3,489	25,676	1,096	962	213	-	**31,436**
Other comprehensive income for the year							
Revaluation gain on investments for the period	-	-	-	-	-	527	**527**
Total comprehensive income for the year	**3,489**	**23,092**	**1,096**	**962**	**213**	**3,111**	**31,963**
Balance at 31 December 2020	**202,322**	**394,285**	**56,135**	**28,927**	**5,484**	**70,311**	**757,464**

The financial statements are to be read in conjunction with the notes to, and forming part of the financial statements.

Notes to the annual accounts for the year ended 31 December 2020

1. Statement of significant accounting policies

The Walter and Eliza Hall Institute of Medical Research ('WEHI') is incorporated in Victoria as a company limited by guarantee. WEHI has 227 members and the guarantee is limited to two dollars per member.

The financial statements include all the activities of The Walter and Eliza Hall Institute of Medical Research.

The principal address of WEHI is:

1G Royal Parade
Parkville, Victoria, 3052

(a) Statement of compliance

This general purpose financial report has been prepared in accordance with the Australian Accounting Standards, other authoritative pronouncements of the Australian Accounting Standards Board, International Financial Reporting Standards (IFRS) and the Australian Charities and Not-for-profits Commission Act 2012. WEHI is a not-for-profit entity and is exempt from taxation.

The financial report has been prepared on a going concern basis using historical cost conventions, except for certain financial instruments, which have been measured at fair value. Cost is based on the fair values of consideration given in exchange for assets.

WEHI has assessed the impact that the Coronavirus (COVID-19) pandemic has had, or may have on the financial statements based on known information. There does not currently appear to be either any significant impact upon the financial statements or any significant uncertainties with respect to events or conditions which may impact WEHI's ongoing financial viability as at the reporting date or subsequently as a result of the pandemic.

The financial report is presented in Australian dollars, which is WEHI's functional and presentation currency. WEHI is a company of the kind referred to in ASIC Corporations (Rounding in Financial/Directors' Reports) Instrument 2016/191 dated 24 March 2016, and in accordance with that Class Order amounts in the financial report are rounded to the nearest thousand dollars, unless otherwise indicated.

The financial statements were authorised for issue by the directors on 29 March 2021.

The principal accounting policies adopted in the preparation of the financial statements are set out below. These policies have been consistently applied to all the years presented, unless otherwise stated.

(b) Source of capital funds

WEHI is a company limited by guarantee and as such has no issued capital.

(i) Permanent Invested Funds originate from gifts and bequests, the income from which is applied as stipulated by the donor, or to general research where there is no specific stipulation. These gifts and bequests are appropriated to Capital Funds.

(ii) General Funds consist of the net accumulation of surpluses and deficits of prior years.

(iii) The Royalty Fund consists of the balance of royalties received in respect of patented inventions and not expended.

(iv) The Leadership Fund consists of donations and income earned thereon. The Leadership Fund was established in honour of Professors Gustav Nossal, Donald Metcalf, Jacques Miller and Suzanne Cory to provide named fellowships to nurture the development of outstanding young scientists with the potential to be future leaders of biomedical research.

(v) The Discovery Fund consists of donations and income earned thereon, less funds spent on research to date. The Fund was established by WEHI to support specialist research and will be applied based on the merits of submissions to WEHI Director. There are three areas of focus: early drug discovery, blue sky basic biological research and technical innovation.

(vi) The Investment Revaluation Reserve consists of gains and losses recognised through movement in the fair value of investments and other financial assets.

(c) Revenue recognition

WEHI recognises income from its main revenue/income streams, as listed below:

- Research grants
- Infrastructure grants
- Donations and bequests
- Capital grants - buildings and equipment
- Royalty Income
- Sales of goods/services

Research grants, Infrastructure grants, donations and bequests

When WEHI receives government grants, donations and bequests that are within the scope of AASB 1058 (being a transaction where the consideration paid to acquire an asset is significantly less than fair value principally to enable WEHI to further its objectives), it performs an assessment to determine if the contract is 'enforceable' and contains 'sufficiently specific' performance obligations.

In cases where there is an 'enforceable' contract with a customer with 'sufficiently specific' performance obligations, the transaction is accounted for under AASB 15 where income is recognised when (or as) the performance obligations are satisfied.

In all other cases (where the contract is not 'enforceable' or the performance obligations are not 'sufficiently specific'), the transaction is accounted for under AASB 1058, unless where WEHI has recognised this under AASB 9 Financial Instruments, as a financial liability on contract inception.

In these instances WEHI:

- Recognises the asset in accordance with the requirements of other relevant applicable Australian Accounting Standards (e.g. AASB 9, AASB 16, AASB 116 and AASB 138)
- Considers whether any other financial statement elements should be recognised ('related amounts') in accordance with the relevant applicable Australian Accounting Standard including:
  - contributions by owners (AASB 1004)
  - a lease liability (AASB 16)
  - a financial instrument (AASB 9)
  - a provision (AASB 137)
- Recognises income immediately in profit or loss for the excess of the initial carrying amount of the asset over any related amounts recognised.

Capital grants – Buildings and Equipment

For capital grants received under an enforceable agreement where it includes a transfer to enable WEHI to acquire or construct a recognisable non-financial asset to identified specifications which will be controlled by WEHI when completed, WEHI recognises a liability for the excess of the fair value of the transfer over any related amounts recognised and recognises income as it satisfies its obligations under the transfer. As the capital grants received by WEHI are primarily for buildings works and scientific equipment, WEHI recognises income as the building works are completed and as equipment is purchased/constructed (when it satisfies its obligations).

Royalty Income

Royalty income is accounted for under AASB 15 and is recognised when there is an enforceable right to receive income.

Sales of goods/services

Revenue is recognised when control of the goods has been transferred to the customer or the service/performance obligation has been provided.

(d) Property, plant and equipment

Property, plant and equipment held for use in research, or for administrative purposes, are recorded at historical cost, less accumulated depreciation. Cost comprises expenditure that is directly attributable to the acquisition of the item and subsequent costs incurred to replace parts that are eligible for capitalisation.

Depreciation is on a straight-line basis over the estimated useful life of the asset. A regular review of useful lives, depreciation rates and residual values is conducted at each year end, with the effect of any changes in estimate accounted for on a prospective basis.

Items of property, plant and equipment are derecognised upon disposal or when no further economic benefits are expected from their use or disposal. Gains and losses on disposals of items of property, plant and equipment are determined by comparing proceeds with carrying amounts and are included in the statement of comprehensive income when realised.

The following table indicates the expected useful lives of non current assets on which the depreciation charges are based.

Buildings	20 - 40 years
Plant and equipment	3 - 20 years
Furniture and fittings	5 - 20 years

(e) Financial instruments – initial recognition and subsequent measurement

A financial instrument is any contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity. Financial assets and liabilities are recognised in the statement of financial position when WEHI becomes party to the contractual provisions within the contract.

Financial assets

(i) Initial measurement and recognition

Financial assets are initially measured at fair value. Transaction costs that are directly attributable to the acquisition or issue of financial assets (other than financial assets at fair value through profit or loss) are added to or deducted from the fair value of the financial assets, as appropriate, on initial recognition. Transaction costs directly attributable to the acquisition of financial assets at fair value through profit or loss are recognised immediately in profit or loss.

Purchases or sales of financial assets that require delivery of assets within a time frame established by regulation or convention in the market place are recognised on the trade date, that is, the date that WEHI commits to purchase or sell the asset. All recognised financial assets are measured subsequently in their entirety at either amortised cost or fair value, depending on the classification of the financial assets.

(ii) Classification of financial assets

Debt instruments that meet the following conditions are measured subsequently at amortised cost:

- the financial asset is held within a business model whose objective is to hold financial assets in order to collect contractual cash flows; and
- the contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

Debt instruments that meet the following conditions are measured subsequently at fair value through other comprehensive income (FVTOCI):

- the financial asset is held within a business model whose objective is achieved by both collecting contractual cash flows and selling the financial assets; and
- the contractual terms of the financial asset give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount outstanding.

By default, all other financial assets are measured subsequently at fair value through profit or loss (FVTPL). Despite the foregoing, WEHI may make the following irrevocable election/designation at initial recognition of a financial asset:

- WEHI may irrevocably elect to present subsequent changes in fair value of an equity investment in other comprehensive income if certain criteria are met; and
- WEHI may irrevocably designate a debt investment that meets the amortised cost or FVTOCI criteria as measured at FVTPL if doing so eliminates or significantly reduces an accounting mismatch.

Financial assets at amortised cost using the effective interest method

The amortised cost of a financial asset is the amount at which the financial asset is measured at initial recognition minus the principal repayments, plus the cumulative amortisation using the effective interest method of any difference between that initial amount and the maturity amount, adjusted for any loss allowance. The gross carrying amount of a financial asset is the amortised cost of a financial asset before adjusting for any loss allowances. WEHI's cash and cash equivalents and trade receivables fall within this category.

Interest income is recognised in profit or loss and is included in the "investment income" line item (note 2).

Debt Instruments at fair value through other comprehensive income (FVTOCI)

The corporate bonds held by WEHI are classified as FVTOCI. Subsequently, changes to the carrying value due to foreign exchange, impairment and interest income are recognised in profit or loss. All other changes in the carrying value will be recognised in other comprehensive income. Upon derecognition, the cumulative gains or losses previously recognised in other comprehensive income are reclassified to profit or loss.

Equity instruments at fair value through other comprehensive income (Equity FVTOCI)

On initial recognition, WEHI may make an irrevocable election (on an instrument-by-instrument basis) to designate investments in equity instruments as at FVTOCI. Designation at FVTOCI is not permitted if the equity investment is held for trading. Investments in equity instruments at FVTOCI are initially measured at fair value plus transaction costs. Subsequently, they are measured at fair value with gains and losses arising from changes in fair value recognised in other comprehensive income and accumulated in the investments revaluation reserve. The cumulative gain or loss is not be reclassified to profit or loss on disposal of the equity investments, instead, it is transferred to retained earnings.

Dividends on these investments in equity instruments are recognised in profit or loss in accordance with AASB 9. This is included in the "investment income" line item (note 2).

Financial assets at fair value through profit or loss (FVTPL)

Financial assets that are held within a different business model other than 'hold to collect' or 'hold to collect and sell' are categorised at fair value through profit and loss. Further, irrespective of business model financial assets whose contractual cash flows are not solely payments of principal and interest are accounted for at FVTPL. WEHI's investment in hybrid instruments and managed international share fund fall within this category.

(iii) Foreign exchange gains and losses

The carrying amount of financial assets that are denominated in a foreign currency is determined in that foreign currency and translated at the spot rate at the end of each reporting period.

(iv) Impairment of financial assets

WEHI recognises a loss allowance for expected credit losses (ECL) on investments in debt instruments that are measured at amortised cost or at FVTOCI, lease receivables, trade receivables and contract assets, as well as on financial guarantee contracts. The amount of expected credit losses is updated at each reporting date to reflect changes in credit risk since initial recognition of the respective financial instrument.

WEHI recognises lifetime ECL when there has been a significant increase in credit risk since initial recognition. However, if the credit risk on the financial instrument has not increased significantly since initial recognition, WEHI measures the loss allowance for that financial instrument at an amount equal to 12-month ECL.

Lifetime ECL represents the expected credit losses that will result from all possible default events over the expected life of a financial instrument. In contrast, 12-month ECL represents the portion of lifetime ECL that is expected to result from default events on a financial instrument that are possible within 12 months after the reporting date.

(v) Term Deposits are recorded at amortised cost, with revenue recognised on an accruals basis.

(vi) Dividend revenue is recognised when the dividend is received. Interest revenue is recognised and accrued on a time proportionate basis that takes into account the effective yield on the financial asset.

(vii) Interests in jointly controlled assets or operations

In respect of any interest in jointly controlled assets, WEHI does not consolidate but recognises in the financial statements:

- its share of jointly controlled assets;
- any liabilities that it had incurred;
- its share of liabilities incurred jointly by the joint venture;
- any income earned from the selling or using of its share of the output from the joint venture; and
- any expenses incurred in relation to being an investor in the joint venture.

For jointly controlled operations, WEHI recognises: the assets that it controls and the liabilities that it incurs; expenses that it incurs; and its share of income that it earns from selling outputs of the joint venture.

Financial liabilities

(i) Initial measurement and derecognition

Financial liabilities are classified, at initial recognition, as financial liabilities at fair value through profit or loss, loans and borrowings, payables, or as derivatives designated as hedging instruments in an effective hedge, as appropriate.

All financial liabilities are recognised initially at fair value and, in the case of loans and borrowings and payables, net of directly attributable transaction costs.

WEHI's financial liabilities include trade and other payables and unearned grants and fellowships.

(ii) Subsequent measurement

For purposes of subsequent measurement, financial liabilities are classified in two categories:

- Financial liabilities at fair value through profit or loss, which WEHI does not have any
- Financial liabilities at amortised cost (Trade and other payables, Unearned grants and fellowships).

Financial liabilities at amortised cost

After initial recognition, financial liabilities at amortised cost are measured using the effective interest rate (EIR) method. Gains and losses are recognised in profit or loss when the liabilities are derecognised as well as through the EIR amortisation process.

Amortised cost is calculated by taking into account any discount or premium on acquisition and fees or costs that are an integral part of the EIR. The EIR amortisation is included as finance costs in the statement of profit or loss.

WEHI administers some of its research grant contracts on behalf of its researchers whilst retaining substantially all the risks and rewards of ownership of the funds associated with the research grants. Accordingly WEHI recognises the transferred asset, being the grant funds, in its entirety as a financial asset, and recognises an equal amount as a financial liability for the consideration received.

In subsequent periods, WEHI recognises an income as and when the funds are expended, representing the relinquishment of that portion of WEHI's obligation to refund advances of research funding previously held on the statement of financial position.

(f) Cash and cash equivalents

Cash comprises cash on hand and on-demand deposits. Cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash, which are subject to an insignificant risk of changes in value and have a maturity of three months or less at the date of acquisition.

(g) Trade and other receivables

Trade and other receivables are initially recorded at fair value and are generally due for settlement within 30 days from date of invoice. A provision for expected credit loss (ECL) is recognised in accordance with AASB 9. ECLs are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that WEHI expects to receive, discounted at an approximation of the original effective interest rate. Cash flows relating to short-term receivables are not discounted if the effect of discounting is immaterial. When a trade receivable for which a provision for expected credit loss has been recognised becomes uncollectible in a subsequent period, it is written off against the provision.

WEHI applies a simplified approach in calculating ECLs. Therefore, WEHI does not track changes in credit risk, but instead recognises a loss allowance based on lifetime ECLs at each reporting date. WEHI has established a provision matrix that is based on its historical credit loss experience, adjusted for forward-looking factors specific to the debtors and the economic environment.

(h) Trade and other payables

Trade and other payables represent amounts reflected at notional amounts owed to suppliers for goods and services provided to WEHI prior to the end of the financial year that are unpaid. Trade and other payables are non-interest bearing and have various repayment terms but are usually paid within 30 to 60 days of recognition.

(i) Research costs

Research costs are recognised as an expense when incurred and reported in the financial year in which they relate.

(j) Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST except:

(i) where the amount of GST incurred is not recoverable from the taxation authority, it is recognised as part of the cost of acquisition of an asset or as part of an item of expense; or

(ii) for receivables and payables which are recognised inclusive of GST.

The net amount of GST recoverable from, or payable to, the taxation authority is included as part of receivables or payables. Cash flows are included in the statement of cash flows on a gross basis. The GST component of cash flows arising from investing and financing activities which is recoverable from, or payable to, the taxation authority is classified within operating cash flows.

(k) Provisions

Provisions are recognised when all three of the following conditions are met:

- WEHI has a present obligation (legal or constructive) as a result of a past event
- It is probable that the organisation is required to settle the obligation
- A reliable estimate can be made of the amount of the obligation.

Provisions are not recognised for future operating losses.

The amount recognised as a provision is the best estimate of the consideration required to settle the present obligation at the end of the reporting period, taking into account the risks and uncertainties surrounding the obligation. When a provision is measured using the cash flows estimated to settle the present obligation, its carrying amount is the present value of those cash flows (where the effect of the time value of money is material).

(l) Employee benefits

Provision is made for benefits accruing to employees in respect of annual leave and long service leave, when it is probable that settlement will be required and they are capable of being measured reliably.

Provisions made in respect to annual leave and long service leave expected to be settled within 12 months, are measured at their nominal values, using the remuneration rate expected to apply at the time of settlement. These are included in the current provision for employee benefits.

Provisions made in respect to long service leave which are not expected to be settled within 12 months are measured at the present value of the estimated future cash outflows to be made by WEHI in respect of services provided by employees up to the reporting date. These are included in the non-current provision for employee benefits.

(m) Foreign currency

All transactions in foreign currency during the financial year are brought to account using the exchange rate in effect at the date of the transaction. Foreign currency monetary items at reporting date are translated at the exchange rate existing at that date and exchange differences are recognised in the net surplus or deficit in the period in which they arise.

(n) Leased assets

WEHI as lessee

WEHI assesses whether a contract is or contains a lease, at contract inception. WEHI recognises a right-of-use asset and a corresponding lease liability with respect to all lease arrangements in which it is the lessee, except for short-term leases (defined as leases with a lease term of 12 months or less) and leases of low value assets (such as tablets and personal computers, small items of office furniture and telephones). For these leases, WEHI recognises the lease payments as an operating expense on a straight-line basis over the term of the lease unless another systematic basis is more representative of the time pattern in which economic benefits from the leased assets are consumed.

Right-of-use asset

Right-of-use assets comprise the initial measurement of the corresponding lease liability, lease payments made at or before the commencement day, less any lease incentives received and any initial direct costs. They are subsequently measured at cost less accumulated depreciation and impairment losses.

If WEHI incurs an obligation for costs to dismantle and remove a leased asset, restore the site on which it is located or restore the underlying asset to the condition required by the terms and conditions of the lease, a provision is recognised and measured. To the extent that the costs relate to a right-of-use asset, the costs are included in the related right-of-use asset.

Right-of-use assets are depreciated over the shorter period of the lease term and useful life of the underlying asset. If a lease transfers ownership of the underlying asset or the cost of the right-of-use asset reflects that WEHI expects to exercise a purchase option, the related right-of-use asset is depreciated over the useful life of the underlying asset. The depreciation starts at the commencement date of the lease.

The right-of-use assets are presented as a separate line in the statement of financial position. WEHI reviews right-of-use assets for impairment annually.

Variable rents that do not depend on an index or rate are not included in the measurement of the lease liability and the right-of-use asset. The related payments are recognised as an expense in the period in which the event or condition that triggers those payments occurs and are included in "Other expenses" in profit or loss.

Lease liability

At the commencement date of the lease, WEHI recognises lease liabilities measured at the present value of the lease payments to be made over the lease term, discounted by using the rate implicit in the lease. If this rate cannot be readily determined, WEHI uses its incremental borrowing rate.

Lease payments included in the measurement of the lease liability comprise:

- Fixed lease payments (including in-substance fixed payments), less any lease incentives receivable;
- Variable lease payments that depend on an index or rate;
- The amount expected to be payable by the lessee under residual value guarantees;
- The exercise price of purchase options, if the lessee is reasonably certain to exercise the options; and
- Payments of penalties for terminating the lease, if the lease term reflects the exercise of an option to terminate the lease.

The lease liability is included within 'Trade and other payables' in the statement of financial position. The lease liability is subsequently measured by increasing the carrying amount to reflect interest on the lease liability (using the effective interest method) and by reducing the carrying amount to reflect the lease payments made.

WEHI reviews and remeasures the lease liability (and makes a corresponding adjustment to the related right-of-use asset) where required.

Concessionary leases

WEHI has several leases for premises which are provided at significantly below-market terms and conditions, principally to enable WEHI to further its medical research objectives.

WEHI is dependent on these leases as the premises are used to run its operations to deliver medical research outcomes. WEHI is restricted on the use of these premises by the lease providers and may not utilise the premises for other purposes. WEHI measures concessionary leases at cost.

A summary of concessionary leases held by WEHI is located in note 26.

WEHI as lessor

WEHI enters into sub-lease agreements as a lessor with respect to the Parkville and Bundoora premises.

Leases for which WEHI is a lessor are classified as finance or operating leases. Whenever the terms of the lease transfer substantially all the risks and rewards of ownership to the lessee, the contract is classified as a finance lease. All other leases are classified as operating leases. WEHI is currently not the lessor in any finance leases.

Rental income from operating leases is recognised on a straight-line basis over the term of the relevant lease. Initial direct costs incurred in negotiating and arranging an operating lease are added to the carrying amount of the leased asset and recognised on a straight-line basis over the lease term.

When a contract includes both lease and non-lease components, WEHI applies AASB 15 to allocate the consideration under the contract to each component.

(o) Impairment of non-financial assets

All assets are assessed annually for indications of impairment. If there is an indication of impairment, the assets concerned are tested as to whether their carrying value exceeds their possible recoverable amount. Where an asset's carrying value exceeds its recoverable amount, the difference is written-off as an expense. The recoverable amount for most assets is measured at the higher of value in use and fair value less costs to sell. Depreciated replacement cost is used to determine value in use. Depreciated replacement cost is the current replacement cost of an item of plant and equipment less, where applicable, accumulated depreciation to date, calculated on the basis of such cost.

(p) Critical accounting judgements and key sources of estimation uncertainty

In the application of WEHI's accounting policies, which are described above, management may from time to time make judgements, estimates and assumptions about the carrying values of assets and liabilities that may not be readily apparent from other sources. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances, the result of which form the basis of making the judgement. Key areas in which management has exercised judgement include the calculation of the fair value of financial assets, the carrying value of employee benefits, the carrying value of provisions for royalties and revenue recognition assessment (refer to respective notes).

(q) Comparatives

Comparative figures can be adjusted to conform to changes in presentation for the current financial period where required by accounting standards or as a result of changes in accounting policy. Where necessary, comparatives have been reclassified and repositioned for consistency with current period disclosure. No material reclassifications have been made to prior period disclosures.

(r) Impact of new and revised Accounting Standards

In the current period, WEHI has adopted all of the new and revised standards and interpretations issued by the Australian Accounting Standards Board (AASB) that are relevant to its operations and effective for the current reporting period.

AASB 15 - Revenue from contracts with customers and AASB 1058 - Income for NFP entities

In the current year, these standards became effective for WEHI with reference to the previous deferral for research grants.

WEHI has applied AASB 1058 in accordance with the modified retrospective (cumulative catch-up) method where the comparative years are not restated. Instead, WEHI has recognised the cumulative effect of initially applying AASB 1058 in relation to research grants received for the first time for the year ending 31 December 2020. WEHI has also elected to apply AASB 1058 in relation to research grants retrospectively only to contracts and transactions that are not 'completed contracts' at the date of initial application, that is, as at 1January 2020.

Research grants

AASB 1058 requires that in cases where there is an 'enforceable' contract with a customer with 'sufficiently specific' performance obligations, the transaction should be accounted for under AASB 15 where income is recognised when (or as) the performance obligations are satisfied, as opposed to immediate income recognition under AASB 1058.

WEHI has conducted an analysis of the research grant contracts and analysed the terms of each contract to determine whether the arrangement meets the enforceability and the 'sufficiently specific' criteria under AASB 15 where income is recognised when (or as) the performance obligations are satisfied. WEHI has also considered specific clauses within the contracts with regard to obligations present to return funding to the grantor or transferring to other bodies.

For those research grant contracts that are not enforceable or the performance obligations are not sufficiently specific, the transaction is accounted for under AASB 1058, unless where WEHI has recognised this under AASB 9 Financial Instruments. In this instance, WEHI recognises a financial asset and a related financial liability for the consideration received.

Based on an analysis of WEHI's research grant contracts as at 1 January 2020, WEHI notes that it administers some of its research grant contracts on behalf of its researchers whilst retaining substantially all the risks and rewards of ownership of the funds associated with the research grants. WEHI has also determined that the refund obligations present within the contracts constitute a financial liability at contract inception, and therefore this has been accounted for under AASB 9 Financial Instruments.

Accordingly, WEHI recognises the grant funds as a financial asset and recognises an equal amount as a financial liability on the statement of financial position under 'Unearned grants and fellowships'. This is subsequently recognised as income as and when the funds are expended which represents the relinquishment of that portion of WEHI's obligation to refund advances of research funding previously held on the statement of financial position.

WEHI has assessed that the adoption of AASB 1058 (Research Grants) does not have any impact on the amounts recognised in the financial statements as WEHI has always recognised a financial liability for the research grants, which is released as and when expenditure is incurred.

Financial impact of the initial adoption of AASB 1058 (Research Grants):

Impact on line items affected by the adoption of AASB 1058 (Research Grants) as compared to AASB 1054 for the year ended 31 December 2020:

	As presented under AASB 1004	AASB 1058 / AASB 9 adjustments	As presented under AASB 1058 / AASB 9
	$'000	$'000	$'000
Liabilities			
Unearned grants and fellowships - Research Grants	42,466	-	42,466

(s) Standards and interpretations issued not yet effective

At the date of authorisation of the financial report, the standards and interpretations that are relevant to WEHI, listed below, were on issue but not yet effective.

WEHI is currently performing an assessment of the financial impacts and disclosures from the application of the new standards and their amendments on the financial reports.

Standard	Effective for annual reporting periods beginning on or after	Expected to be initially applied in the financial year ending
AASB 2020-1 Amendments to AASs –Classification of Liabilities as Current or Non-current A liability is classified as current if the entity has no right at the end of the reporting period to defer settlement for at least 12 months after the reporting period. The AASB recently issued amendments to AASB 101 Presentation of Financial Statements to clarify the requirements for classifying liabilities as current or non-current. Specifically: - The amendments specify that the conditions which exist at the end of the reporting period are those which will be used to determine if a right to defer settlement of a liability exists. - Management intention or expectation does not affect classification of liabilities. - In cases where an instrument with a conversion option is classified as a liability, the transfer of equity instruments would constitute settlement of the liability for the purpose of classifying it as current or noncurrent. These amendments are applied retrospectively.	1 January 2023	31 December 2023
AASB 2020-3 Amendments to AASB 137 – Onerous Contracts – Cost of Fulfilling a Contract AASB 137 defines an onerous contract as a contract in which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it. Unavoidable cost is the lower of the cost of fulfilling the contract and any compensation or penalties arising from failure to fulfil it. AASB 137 does not specify which costs to include in determining the cost of fulfilling a contract. Consequently, AASB 137 was amended to clarify that when assessing whether a contract is onerous, the cost of fulfilling the contract comprises all costs that relate directly to the contract, which includes both the: - Incremental costs of fulfilling that contract (e.g., materials and labour); and - An allocation of other costs that relate directly to fulfilling contracts (e.g., depreciation of property, plant and equipment) An entity shall apply these amendments to contracts for which it has not yet fulfilled all its obligations at the beginning of the annual reporting period in which it first applies the amendments (the date of initial application). Comparative information is not restated. Instead, the cumulative effect of initially applying the amendments is recognised as an adjustment to the opening balance of retained earnings or other component of equity, as appropriate, at the date of initial application.	1 January 2022	31 December 2022
AASB 1060 General Purpose Financial Statements – Simplified Disclosures for For-Profit and Not-for-Profit Tier 2 Entities To reduce the cost of preparing general purpose financial statements while maintaining their usefulness, certain entities are permitted to apply reduced disclosure requirements. Those requirements are currently identified in each applicable Australian Accounting Standard. The AASB developed AASB 1060, a new simplified disclosure standard based on IFRS for Small and Medium-sized Entities, to replace the reduced disclosure requirements. These simplified disclosure requirements are now collated in a single disclosure standard.	1 January 2022	31 December 2022

2. Operating revenue	2020 $'000	2019 $'000
Operating revenue includes:		
(a) Other Australian Government grants		
JobKeeper income	19,970	-
Other Government grants	3,346	4,139
Total Other Australian Government grants	**23,316**	**4,139**

The receipts from the Federal Government's JobKeeper Program in response to the COVID-19 pandemic are accounted for as government grants under AASB 120: Accounting for government grants and disclosure of government assistance and have been presented in Other Australian Government grants.

(b) Investment income		
Recognised in surplus		
Dividends and distributions income on financial assets	12,482	19,783
Interest income on financial assets	5,643	7,332
Realised foreign exchange gain	4,284	407
	22,409	**27,522**
Less transfer to grants and fellowships	(2,413)	(3,366)
Total Investment income	**19,996**	**24,156**

3. Other (loss) / income

(Loss) / Gain on sale of investments	(135)	297
Total other income	**(135)**	**297**

4. Operating expenses

The following items of expense are included in the net surplus		
Employee benefits expense		
Employee benefits expense	102,547	98,341
Depreciation of property, plant and equipment		
Buildings	5,300	5,275
Plant and equipment	6,415	5,536
Furniture and fittings	103	75
Total depreciation	**11,818**	**10,886**

5. Venetoclax monetisation

On 14 June 2017, WEHI entered into an agreement with CPPIB Credit Europe S.a`.r.l., a wholly owned subsidiary of Canada Pension Plan Investment Board (CPPIB), for the partial sale of royalty rights in an anti-cancer treatment known as venetoclax. Venetoclax is the result of a research collaboration with Genentech, a member of the Roche Group, and Abbvie and is based on ground-breaking scientific discoveries made at WEHI over three decades ago.

The monetisation arrangement resulted in a transaction that included a cash payment of US$250 million upfront and potential future milestone payments of up to US$75 million. The upfront cash payment has been recognised as income in the statement of profit or loss and other comprehensive income for the year ended 31 December 2017. A number of significant costs associated with the monetisation income have also been included in the statement of profit or loss and on the statement of financial position.

During the year WEHI recognised the following monetisation income and associated costs:

Royalties Earned	**38,961**	**35,633**
Less associated costs:		
Net movement in provision for net commercial income distribution	(2,239)	(10,104)
Net Monetisation income	**36,722**	**25,529**

Royalty income earned for 2020 was converted to Australian dollars using the spot rate at 31 December 2020. As at the date of invoice (28 February 2021) an unrealised foreign exchange loss of $73,000 existed. The funds are expected to be received in March 2021 and a realised gain/loss will be recorded upon receipt, which will be reflected in the 2021 statement of profit or loss.

As a result of the venetoclax monetisation transaction and WEHI's net commercial income policy, commitments for payments to employees may be payable in future years, subject to Board approval. The nominal amount of the future commitments is $16,750,000. Refer to note 13 for further details.

6. Directors' remuneration

The directors of The Walter and Eliza Hall Institute of Medical Research during the period were:

P Collins	C Kilpatrick	TF Moran	JS Hemstritch
P Connolly	J McCluskey	JS Savill	RH Wylie
J Dyson	ME McDonald	C Viney	MW Broomhead

S Kapur* * Resigned in Dec 2020

The aggregate income paid or payable, or otherwise made available, in respect of the financial period, to all directors of WEHI, directly or indirectly, by WEHI or by any related party was nil (2019: nil).

Aggregate retirement benefits paid to all directors of WEHI, by WEHI or by any related party was nil (2019: nil).

	Note	2020	2019
7. Auditors' remuneration		**$**	**$**
Auditing the financial report		65,500	65,000
Non audit services*		63,733	246,947
		129,233	**311,947**

* During the year, Deloitte were engaged to provide workplace relations advice.

		2020	2019
8. Current tax assets		**$'000**	**$'000**
Franking credits receivable		1,451	2,377
Current tax liability		(170)	(1,137)
		1,281	**1,240**
9. Trade and other receivables			
Sundry debtors		3,041	9,072
Accrued income		15,484	6,668
Royalty Income receivable (monetisation)	5	38,961	35,633
		57,486	**51,373**
Allowance for credit losses		(32)	(62)
		57,454	**51,311**
Movement in the allowance for credit losses			
Balance at beginning of the year		62	191
Impairment losses recognised		(30)	62
Amounts written off during the year as uncollectible		-	(191)
Balance at end of the year		**32**	**62**
Impairment expense			
Allowance for credit losses credit / (expense)		(30)	62

10. Other financial assets	2020 $	2019 $
Investments in debt instruments classified as FVOCI		
Corporate bonds	105,426	138,866
Investments in equity instruments designated as FVOCI		
Domestic equities	238,238	227,809
International equities	113,113	86,846
Other Investments classified as FVTPL		
Domestic managed fund	9	-
International managed fund	16,637	14,884
Hybrid instruments	85,663	77,202
Total Investments	**559,086**	**545,607**
Investments in associates		
Unquoted shares	2,345	2,034
Total Investments	**561,431**	**547,641**

(a) Fair value measurements recognised in the statement of financial position

The following table provides an analysis of financial instruments that are measured, subsequent to initial recognition, at fair value, grouped into levels 1 to 3 based on:

- Level 1 fair value measurements are those derived from quoted prices (unadjusted) in active markets for identical assets or liabilities.
- Level 2 fair value measurements are those derived from inputs other than those quoted prices included within level 1 that are observable for the asset, either directly (i.e. as prices) or indirectly (i.e. derived from prices.)
- Level 3 fair value measurements are those derived from valuation techniques that include inputs for the asset that are not based on observable market data.

	Level 1	Level 2	Level 3	31 December 2020 Total
Financial assets measured at fair value	$'000	$'000	$'000	$'000
Quoted shares	367,998	-	-	367,998
Floating rate securities	85,663	85,592	-	171,255
Fixed rate securities	-	19,833	-	19,833
Unquoted shares*	-	-	2,345	2,345
Total	**453,661**	**105,425**	**2,345**	**561,431**

*As at 31 December 2020, WEHI held a 49% (2019: 49%) share of equity in Catalyst Therapeutics Pty Ltd, with a carrying value of $1,397,000 (2019: $579,000). Anaxis Pharma Pty Ltd is a wholly owned subsidiary of Catalyst Therapeutics Pty Ltd. WEHI also held a 48.5% (2019: 48.5%) share of the equity in Murigen Pty Ltd, with nil carrying value (2019: nil). WEHI's investment in VCCC is detailed in note 24.

(b) Reconciliation of level 3 fair value measurements of financial assets

	Unquoted equities	
	2020 $'000	2019 $'000
Opening balance	2,034	2,067
Revaluation	311	(33)
Closing balance	**2,345**	**2,034**

11. Property, plant and equipment

	Buildings	Work in progress	Plant and equipment	Furniture and fittings	Land Lease	Total
	$'000	$'000	$'000	$'000	$'000	$'000
Gross carrying amount						
Balance at 1 January 2019	190,530	13,786	63,088	2,047	16,200	285,651
Additions at cost	-	12,252	-	-	-	12,252
Transfers	3,661	(21,534)	17,667	91	-	(115)
Disposals	(83)	-	(5,725)	-		(5,808)
Reclassification to Equity	-	-	-	-	(16,200)	(16,200)
Balance at 31 December 2019	**194,108**	**4,504**	**75,030**	**2,138**	**-**	**275,780**
Additions at cost	-	24,195	-	-	-	24,195
Transfers	1,803	(14,935)	12,697	486	-	51
Disposals	-	-	(38)	-	-	(38)
Reclassification to Equity	-	-	-	-	-	-
Balance at 31 December 2020	**195,911**	**13,764**	**87,689**	**2,624**	**-**	**299,988**
Accumulated depreciation						
Balance at 1 January 2019	(46,969)	-	(37,903)	(1,622)	-	(86,494)
Disposals	-	-	5,519	-	-	5,519
Depreciation expense	(5,275)	-	(5,536)	(75)	-	(10,886)
Balance at 31 December 2019	**(52,244)**	**-**	**(37,920)**	**(1,697)**	**-**	**(91,861)**
Disposals		-	5	-	-	5
Depreciation expense	(5,300)	-	(6,415)	(103)	-	(11,818)
Balance at 31 December 2020	**(57,544)**	**-**	**(44,330)**	**(1,800)**	**-**	**(103,674)**
Carrying amounts						
As at 31 December 2019	**141,864**	**4,504**	**37,110**	**441**	**-**	**183,919**
As at 31 December 2020	**138,367**	**13,764**	**43,359**	**824**	**-**	**196,314**

	2020 $'000	2019 $'000
12. Trade and other payables		
Trade creditors	12,299	5,656
Accrued expenses	6,180	4,431
	18,479	**10,087**
13. Provisions		
Provision for net commercial income distribution	14,874	16,082
Provision for employee benefits*	22,574	21,770
Current provisions	**37,448**	**37,852**
Provision for employee benefits	2,221	2,204
Provision for net commercial income distribution	30,290	32,660
Non current provisions	**32,511**	**34,864**
	69,959	**72,716**

* Included in current employee provisions are $12,487,000 (2019: $13,690,000) of long service leave for which a current entitlement exists.

As a result of the venetoclax monetisation transaction and WEHI's net commercial income distribution policy relating to distributions to employees, commitments may be payable in future years.

The extent to which an outflow of funds under these commitments, will be required is dependent on staff members remaining employed by WEHI, the number of eligible employees within the distribution period and Board approval.

WEHI finalised its net commercial income distribution policy in 2018, which resulted in an increase to the nominal amounts that may be payable in future years (no amount has been recognised as a liability) below:

Potential payments by WEHI arising from royalty distributions to staff:		
Payable within 1 year	1,750	1,500
Payable between 1-5 years	6,000	6,000
Payable 5+ years	9,000	9,000
	16,750	**16,500**
Number of employees at end of financial period (full time equivalents)		
Staff	746	737
Visiting scientists	32	34
	778	**771**
14. Unearned grants and fellowships		
Grants and fellowships already committed and applicable to future periods:		
Grants	27,463	26,074
Fellowships	10,916	8,996
Capital Grants	7,248	14,861
	45,627	**49,931**
15. Other liabilities		
Monies Held in Trust:		
Staff Salary Packaging deposits	330	264
	330	**264**

16. Capital movements		2020 $'000	2019 $'000
(a) The net surplus for the financial period is $25,592,000 (2019: surplus $21,112,000)			
This has been appropriated as follows:	Note		
Transfer to Permanent Invested Fund	16(b)	3,489	4,652
Transfer to General Fund	16(c)	25,676	7,757
Transfer to Royalty Fund	16(d)	1,096	6,985
Transfer to Leadership Fund	16(e)	962	1,408
Transfer to Discovery Fund	16(f)	213	310
Total appropriations to funds		**31,436**	**21,112**
(b) Permanent Invested Fund			
Balance at beginning of period		198,833	194,181
Net surplus for period transferred from statement of profit or loss and other comprehensive income		3,489	4,652
Total Permanent Invested Fund		**202,322**	**198,833**
(c) General Fund			
Balance at beginning of period		371,193	377,710
Equity transfer on initial adoption of AASB 16		-	(16,182)
Transfers from Investment revaluation reserve on sale of investment		(2,584)	1,908
Net surplus for period transferred from statement of profit or loss and other comprehensive income		25,676	7,757
Total General Fund		**394,285**	**371,193**
(d) Royalty Fund			
Balance at beginning of period		55,039	48,054
Net surplus for period transferred from statement of profit or loss and other comprehensive income		1,096	6,985
Total Royalty Fund		**56,135**	**55,039**
(e) Leadership Fund			
Balance at beginning of period		27,965	26,557
Net surplus for period transferred from statement of profit or loss and other comprehensive income		962	1,408
Total Leadership Fund		**28,927**	**27,965**
(f) Discovery Fund			
Balance at beginning of period		5,271	4,961
Net surplus for period transferred from statement of profit or loss and other comprehensive income		213	310
Total Discovery Fund		**5,484**	**5,271**
(g) Investment revaluation reserve			
Balance at beginning of period		67,200	8,211
Revaluation gain recognised for the period (FVTOCI equity Instruments)		68	59,682
Revaluation gain recognised for the period (FVTOCI debt Instruments)		322	1,508
Transfers to profit and loss on sale of investments (FVTOCI debt Instruments)		137	(293)
Transfers to profit or loss on sale of investments (FVTOCI equity Instruments)		2,584	(1,908)
Total investment revaluation reserve		**70,311**	**67,200**
Total funds		**757,464**	**725,501**

17. Notes to statement of cash flows

	2020 $'000	2019 $'000
(a) Reconciliation of cash		
For the purposes of the statement of cash flows, cash includes cash on hand, cash at bank, monies held at trust (salary packaging bank account for staff) and investments in money market instruments, net of outstanding bank overdrafts.		
Cash at the end of the financial period as shown in the statement of cash flows is reconciled to the related items in the statement of financial position as follows:		
Cash	19,485	20,368
Deposits at call	45,957	21,279
Term Deposits	5,000	28,335
	70,442	**69,982**
Represented by:		
Cash for Institute operations (as per Cash Flow Statement)	70,112	69,163
Cash balances not available for use		
Monies Held in Trust - Staff Salary Packaging Deposits	330	819
	70,442	**69,982**
(b) Reconciliation of net surplus to net cash flows from operating activities		
Net surplus	31,436	21,112
Depreciation	11,871	10,941
(Gain) / Loss on disposal of property, plant and equipment	(5)	26
Donations and bequests moved to Permanent funds	(673)	(1,359)
Gain / (Loss) on sale of investments	135	(297)
Fair value adjustment for investments (FVTPL)	(816)	(5,261)
Increase in investments – dividend reinvestment plans	(9)	(12)
Grants and donations for capital works	(14,953)	(5,076)
Foreign exchange gain/loss	10,282	477
	37,268	**20,551**
Changes in net assets and liabilities:		
(Increase) / decrease in assets:		
Tax assets	926	3,401
Sundry debtors and prepayments	5,416	(7,428)
Income receivable	(12,141)	(31,441)
Net movement in Monies Held in Trust	555	(555)
Increase / (decrease) in liabilities:		
Trade payables	6,675	2,150
Accrued expenses	1,749	(6,834)
Tax liabilities	(967)	637
Current provisions	(404)	9,174
Other current liabilities (Grants)	(4,304)	34,710
Non-current provisions	(2,353)	(899)
Net cash provided / (used) from operating activities	**32,420**	**23,466**

(c) Non-cash financing and investing activities

During the financial period:

Dividends of $8,846 (2019: $12,225) were reinvested as part of dividend and distribution reinvestment plans.

18. Right of use assets	2020 $'000	2019 $'000
Carrying amounts		
Buildings		
At cost	3,200	3,200
Accumulated depreciation	(671)	(638)
	2,529	**2,562**
Equipment		
At cost	198	198
Accumulated depreciation	(44)	(24)
	154	**174**
Total	**2,683**	**2,736**
Buildings	33	31
Equipment	20	24
Total depreciation	**53**	**55**

Low value and short term leases

For short-term leases (lease term of 12 months or less) and leases of low-value assets, WEHI has opted to recognise a lease expense on a straight-line basis as permitted by AASB 16. The total expense relating to low value and short term leases is as follows:

Low value leases	5	11
Total	**5**	**11**

19. Economic dependency

WEHI is reliant upon grants from the Australian Government National Health and Medical Research Council for 24.9% of operating expenditure (2019: 27.7%) and the Victorian Government Department of Health and Human Services, Department of State Development, Business and Innovation for 5.7% of operating expenditure (2019: 6.4%) for support of its basic research activities.

20. Segment information

WEHI is a medical research organisation focussed on the nationally and globally significant areas of health being Cancer Research and Treatments, Healthy Development and Ageing, Infection, Inflammation and Immunity, Computational Biology and New Medicines and Advanced Technologies. All operations are predominantly in Australia.

21. Capital expenditure commitments	2020 $'000	2019 $'000
Not longer than 1 year	3,813	4,173
After 1 year but not more than 5 years	28	-
Total commitments	**3,841**	**4,173**

22. Related party disclosures

(a) Transactions with associates

WEHI received fees during the year from Catalyst Therapeutics Pty Ltd and Anaxis Pharma Pty Ltd totalling $2,722,035 (2019: $2,177,602) for services rendered on normal commercial terms.

WEHI did not receive any royalties during the year from Anaxis Pharma Pty Ltd (2019: nil).

WEHI has a loan receivable of $25,000 from Murigen Pty Ltd (2019: $25,000).

WEHI made no equity contributions during the year to Catalyst Therapeutics Pty Ltd (2019: nil).

WEHI received no return of capital during the year, from either Catalyst Therapeutics Pty Ltd or Anaxis Pharma Pty Ltd (2019: nil).

WEHI made membership contributions to the Victorian Comprehensive Cancer Centre (VCCC) totalling $138,111 (2019: $137,091) WEHI also received fees from the VCCC for collaborate initiatives undertaken during the year of $292,888 (2019: $618,594).

(b) Transactions with directors and director-related entities

During the year various Directors and Director-related entities made donations to WEHI totalling $515,450 (2019: $472,250).

(c) Compensation for key management personnel	2020 $	2019 $
The aggregate compensation of the key management personnel of WEHI is set out below:		
Short-term employee benefits	2,245,092	1,862,306
Post-tax employment benefits	355,460	334,975
* New Executive structure with additional 3 management personnel in 2020	**2,600,552**	**2,197,281**

23. Superannuation commitments

(a) Institute employees are members of a range of superannuation funds, which are divided into the following categories:

Those operative and open to membership by new employees:

UniSuper – Accumulation Super (1)

Other superannuation funds chosen by employees.

Those closed to future membership by Institute employees:

Unisuper – Defined Benefit Division

Unisuper – Accumulation Super (2)

(b) UniSuper plans

UniSuper is a multi employer superannuation fund operated by UniSuper Limited as the corporate trustee and administrated by UniSuper Management Pty Ltd, a wholly owned subsidiary of UniSuper Limited. The operations of UniSuper are regulated by the Superannuation Industry (Supervision) Act 1993.

(i) The UniSuper schemes known as the Defined Benefit Division or Accumulation Super (2) were only available to contributing members of the Walter and Eliza Hall Institute of Medical Research Superannuation Fund (1979) which closed in 2003.

(ii) The maximum contribution rate to the schemes is 25.25% of member's salary of which the member contributes 8.25% after tax and WEHI 17%.

(iii) UniSuper has advised that the Accumulation Super (2) and Defined Benefit Division plans are defined as multi-employer defined contribution schemes in accordance with AASB 119 Employee Benefits. AASB 119 Employee Benefits states that this is appropriate for a defined benefit plan where the employer does not have access to the information required and there is no reliable basis for allocating the benefits, liabilities, assets and costs between employers.

(iv) The number of members of the Walter and Eliza Hall Institute of Medical Research Superannuation Fund (1979) who became members of the UniSuper – Defined Benefit Division when the fund closed in 2003 was 204. The number of Institute employees who are members of the Defined Benefit Division as at 31 December 2020 was 66 (2019: 73).

(v) New employees who commenced after 1 July 2003 currently have a minimum contribution of 9.5% of their annual salary contributed by WEHI to Accumulation Super (1) or to a fund of their choice prescribed under the Superannuation Guarantee Charge Act (1992).

(c) The total superannuation contributions by WEHI during the period in respect to the above plans were:	**2020 $'000**	**2019 $'000**
UniSuper – Defined Benefit Division	1,455	1,560
UniSuper – Accumulation Super (2)	313	354
UniSuper – Accumulation Super (1)	8,130	7,606
Other superannuation funds	1,666	1,262
Total	**11,564**	**10,782**

24. Financial instruments

(a) Significant accounting policies

Details of the significant accounting policies and methods adopted, including the criteria for recognition, the basis of measurement and the basis on which revenues and expenses are recognised, in respect of each class of financial asset and financial liability are disclosed in note 1 to the financial statements.

(b) Significant terms, conditions and objectives of derivative financial instruments

WEHI does not enter into or trade derivative financial instruments.

(c) Capital risk management

WEHI manages its capital to ensure it will be able to continue as a going concern whilst maximising its return on investment within the risk profile maintained by WEHI. The capital structure consists of permanent funds, retained earnings and reserves.

(d) Financial risk management

WEHI minimises financial risk through the charter given to the investment sub-committee. In line with this charter, WEHI invests short term funds in an appropriate combination of fixed and floating instruments.

(e) Interest rate risk management

WEHI is exposed to interest rate risk as it invests funds at both fixed and floating interest rates. The majority of financial assets in this class are bank accounts, bank bills and fixed interest securities with varying interest rates.

(f) Interest rate sensitivity analysis

The sensitivity analysis below has been determined based on the exposure to interest rates at the reporting date and the stipulated change taking place at the beginning of the financial year and held constant throughout the reporting period. A 25 basis point variation was used as the minimum point and 100 basis point variation as the maximum point. This is consistent with the management's view of interest rate sensitivity. A change in interest rates would impact net surplus as follows:

Interest rate risk	**Minimum 25bp (+/-)**		**Maximum 100bp (+/-)**	
	Dec-20	**Dec-19**	**Dec-20**	**Dec-19**
	$000's	**$000's**	**$000's**	**$000's**
Effect on surplus - rate decrease	(605)	(675)	(2,416)	(2,700)
Effect on surplus - rate increase	605	675	2,416	2,700

(g) Equity price sensitivity analysis

The sensitivity analysis below has been determined based on the exposure to equity price risks at the reporting date.

At reporting date, if the equity prices had been 5% higher or lower:

- net surplus for the year ended 31 Dec 2020 would have been unaffected as the equity investments are classified as not held for trading and the fair value through other comprehensive (FVTOCI) election has been made under AASB 9.
- investment revaluation reserve would increase or decrease by $17.7 million (Dec 2019: $15.8 million) mainly as a result of the changes in fair value of these equity investments.

WEHI's sensitivity to equity prices has not changed significantly from the prior year.

(h) Credit risk management

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in a financial loss to WEHI. WEHI has adopted a policy of only dealing with creditworthy counter parties as a means of mitigating the risk of financial loss from defaults. WEHI's exposure is continuously monitored and reviewed. Trade receivables consist of a large number of customers including granting bodies. WEHI does not have a significant credit exposure to any single party or any group of counter parties having similar characteristics. The carrying amount of financial assets recorded in the financial statements represents WEHI's maximum exposure to credit risk.

(i) Liquidity risk management

Ultimate responsibility for liquidity risk management rests with the board of directors, who have built an appropriate risk management framework for the management of WEHI's short, medium and long-term funding and liquidity management. WEHI manages the liquidity risk by maintaining adequate cash reserves, and by continuously monitoring forecast and actual cash flows while matching the maturity profiles of financial assets. Given the current surplus cash assets, liquidity risk is minimal. WEHI does not have any interest bearing liabilities. The remaining contractual maturity for its non-interest-bearing financial liabilities is $9.84 million payable within 3 months of 31 Dec 2020 (2019: $10.087 million).

(j) Fair value

The carrying amount of WEHI's financial assets and financial liabilities recorded in the financial statements approximates their fair values. The fair value of financial assets with standard terms and conditions and traded on active liquid markets are determined with reference to quoted market prices.

(k) Interest rate risk

The following table details WEHI's exposure to interest rate risk as at 31 Dec 2020 and 31 Dec 2019.

	Average interest rate	Variable interest rate	Fixed Less than 1 year	Fixed 1 to 5 years	Fixed More than 5 years	Non-Interest Bearing	TOTAL
31 December 2020		$'000	$'000	$'000	$'000	$'000	$'000
Financial assets							
Cash and cash equivalents	0.16%	65,442	-	-	-	-	65,442
Tax assets		-	-	-	-	1,281	1,281
Sundry debtors		-	-	-	-	3,009	3,009
Prepayments		-	-	-	-	2,254	2,254
Accrued income		-	-	-	-	54,445	54,445
Term Deposits	1.92%	-	5,000	-	-	-	5,000
Shares		-	-	-	-	367,996	367,996
Floating rate securities	2.76%	-	13,770	94,116	63,370	-	171,256
Fixed rate securities	3.74%	-	-	14,164	5,670	-	19,834
Non listed shares		-	-	-	-	2,345	2,345
		65,442	**18,770**	**108,280**	**69,040**	**431,330**	**692,862**
Financial liabilities							
Trade payables		-	-	-	-	18,479	18,479
Other liabilities		-	-	-	-	330	330
Unearned grants and fellowships		-	-	-	-	45,627	45,627
		-	**-**	**-**	**-**	**64,436**	**64,436**

	Average interest rate	Variable interest rate	Less than 1 year	1 to 5 years	More than 5 years	Non-Interest Bearing	TOTAL
31 December 2019		$'000	$'000	$'000	$'000	$'000	$'000
Financial assets							
Cash and cash equivalents	0.74%	41,647	-	-	-	-	41,647
Tax assets		-	-	-	-	1,240	1,240
Sundry debtors		-	-	-	-	9,010	9,010
Prepayments		-	-	-	-	1,670	1,670
Accrued income		-	-	-	-	42,301	42,301
Term Deposits	1.92%	-	28,335	-	-	-	28,335
Shares		-	-	-	-	329,538	329,538
Floating rate securities	2.76%	-	24,846	117,906	57,302	-	200,054
Fixed rate securities	3.74%	-	1,522	9,080	5,413	-	16,015
Non listed shares		-	-	-	-	2,034	2,034
		41,647	**54,703**	**126,986**	**62,715**	**385,793**	**671,844**
Financial liabilities							
Trade payables		-	-	-	-	10,087	10,087
Other liabilities		-	-	-	-	264	264
Unearned grants and fellowships		-	-	-	-	49,931	49,931
		-	**-**	**-**	**-**	**60,282**	**60,282**

25. Jointly controlled operations and assets

	2020	2019
Victorian Comprehensive Cancer Centre Limited (VCCC)	10.0%	10.0%

WEHI is a Member of the Victorian Comprehensive Cancer Centre Joint Venture (the VCCC) and WEHI retains joint control over the arrangement, which it has classified as a Joint Operation. The vision for the VCCC is to save lives through the integration of cancer research, education and patient care. Through innovation and collaboration, the VCCC will drive the next generation of improvements in prevention, detection and cancer treatment. This vision will further the objectives of WEHI. The VCCC is a not-for-profit organisation and has been recognised by the Australian Taxation Office as a Health Promotion Charity.

All Members hold an equal 1/10th share in the assets, liabilities, expenses and income of the VCCC. The members own the VCCC assets as tenants in common; and are severally responsible for the joint venture costs – in the same proportions as their interests.

Interests in the VCCC are not transferrable and forfeited on withdrawal from the joint venture. Distributions are not able to be paid to Members and excess property on winding up will be distributed to other charitable organisations with objects similar to those of the VCCC.

The principal place of business for the VCCC is Level 10, 305 Grattan Street, Melbourne, Victoria.

WEHI's policy is to value its proportionate member interest based on the most recent audited accounts of the VCCC. The last audited accounts received are dated 30 June 2020.

WEHI's interest in the above jointly controlled operations is detailed below.

	2020	2019
Assets	**$'000**	**$'000**
Current Assets		
Cash and cash equivalents	1,057	1,457
Trade and other receivables	31	20
Prepayments	34	122
Total current assets	**1,122**	**1,599**
Non-current Assets		
Investment in Cancer Therapeutics CRC	2	2
Property, plant and equipment	17	22
Total non-current assets	**19**	**24**
Share of total assets	**1,141**	**1,623**
Liabilities		
Current liabilities		
Trade and other payables	127	133
Employee benefits	42	25
Total current liabilities	**169**	**158**
Non-current liabilities		
Employee benefits	24	11
Total non-current liabilities	**24**	**11**
Share of total liabilities	**193**	**169**
Net Assets	**948**	**1,454**
Share of VCCC's net assets	**948**	**1,454**

26. Concessionary leases

Lease	Description of underlying assets	Lease payments	Lease term	WEHI's dependence on leases to further its objectives	Restrictions on the use of the underlying assets specific to WEHI
Parkville crown land	The sub-lease is made on 23 Nov 2011 between Department of Health (Head landlord), and Melbourne Health (Landlord) and WEHI (Tenant). The Department of Health leases Parkville crown land to Melbourne Health for 99 years. Melbourne Health leases Parkville crown land to WEHI for 99 years payable on demand.	$104 per annum, payable on demand	99 years	The lease provides the land on which WEHI was built to perform medical research.	The crown land is used only for community purposes.
Early Learning and Child Care Centre land *	The sub-lease is made on 31 August 2018 between Department of Health (Head landlord), and Melbourne Health (Landlord) and WEHI (Tenant). The Department of Health leases the land (196 m2 in area at ground level) to Melbourne Health. Melbourne Health leases Parkville crown land to WEHI, payable on demand.	$104 per annum, payable on demand	21 years	The lease provides the land on which the Early Learning and Child Care Centre was built. This centre was constructed to address one of the most significant barriers to an ongoing career and advancement at WEHI, being access to adequate childcare.	The crown land is used only for community purposes.
Bundoora*	La Trobe University (Landlord) commenced the lease on 31 March 2000 for the former Rio Tinto Building at La Trobe University Campus, Bundoora to WEHI (Tenant).	$6.25M – paid upfront	99 years	The lease provides the premises for medical research and animal facilities for the Bundoora campus.	Assignment, sublease, mortgage or license is not permitted without La Trobe University's consent.
Wards 8 North and 8 East RMH	Melbourne Health (Landlord) commenced the lease on 16 March 2015 for the areas located on the 8th floor, main block of The Royal Melbourne Hospital to WEHI (Tenant).	nil per annum	6 years	The lease provides the area on which WEHI is located to perform medical research in conjunction with the Hospital.	Assignment, sublease, mortgage or license is not permitted without Melbourne Health's consent.
Ward 7 north RMH	Melbourne Health (Landlord) commenced the lease on 10 June 2011 for the premises on the plan known as "Ward 7 North" of The Royal Melbourne Hospital to WEHI (Tenant). The rent is payable on demand.	$1 per annum, payable on demand	21 years	The lease provides the area on which WEHI is located to perform medical research in conjunction with the Hospital.	Assignment, sublease, mortgage or license is not permitted without Melbourne Health's consent.

* The following concessionary leases are subject to sub-lease arrangements with third parties.

27. Contingent liability

WEHI may have legal claims and exposures which arise from the ordinary course of business. There is significant uncertainty as to whether a future liability may arise in respect of these items, or the amount of any such liability.

28. Events after the reporting period

The directors are not aware of any other matter of circumstance which has arisen since the end of the financial year which has significantly affected or may significantly affect the operations of WEHI, results of those operations or the state of affairs of WEHI in subsequent financial years.

Governance statement

WEHI is a Public Company Limited by Guarantee registered with the ACNC. WEHI abides by the ACNC Governance Statement.

Ultimate responsibility for the governance of the WEHI rests with the Board of Directors. This Governance Statement outlines how the Board meets that responsibility.

Achieving the Mission

The Board's primary role is to ensures that WEHI's activities are directed towards its purpose under the Constitution and its mission of 'Mastery of Disease through Discovery'. The Board ensure that these are achieved in the most efficient and effective way.

Specific Responsibilities of the Board

The Board fulfils its primary role by:

- selecting, appointing, guiding and monitoring the performance of WEHI's Director;
- approving WEHI's strategic plan developed in conjunction with the Chief Executive and Senior Management;
- approving operating and capital budgets formulated by the WEHI Director and Management;
- monitoring Management's progress in achieving the Strategic Plan;
- monitoring Management's adherence to operating and capital budgets;
- ensuring the integrity of internal control, risk management and management information systems;
- ensuring stakeholders receive regular reports, including financial reports;
- ensuring the Company complies with relevant legislation and regulations; and
- acting as an advocate for the WEHI whenever and wherever possible.

Management's Responsibility

WEHI's day-to-day operations and administration are the responsibility of the WEHI Director and Executive Management.

Board Oversight

The Board oversees and monitors Management's performance by:

- meeting at least four times during the year;
- receiving detailed financial and other reports from management at these meetings;
- receiving additional information and input from management when necessary; and
- assigning to the various Committees of the Board responsibility to oversee aspects of the WEHI's operations and administration.

Each Board Committee operates under a Charter approved by the Board. These are reviewed and updated as necessary.

Board Members

All Board Members are Non-Executive Directors and receive no remuneration for their services.

Appointments to the Board are made to ensure the Board has the right mix of skills and expertise. One Board Member is appointed by the Trustees of the Walter and Eliza Hall Trust and two Board Members are appointed by The University of Melbourne and two by The Royal Melbourne Hospital (Melbourne Health) and up to a further 13 by the Board.

The Company's Constitution specifies:

- there must be no less than 12 and no more than 18 Directors;
- Directors (except those appointed by The University of Melbourne) are appointed for a maximum of four terms of three years each, after which Directors may be reappointed annually with the unanimous agreement of all other Board Members; and
- the President or Vice President may hold office for an additional period or periods not exceeding six years.

Board and Committee Members receive advice of the terms and conditions of their appointment. Board and Committee Members' knowledge of the business is maintained by visits to the WEHI's operations and management presentations.

The performance of individual Board and Committee Members and the Board and Board Committees is assessed regularly.

Risk Management

The Board oversees WEHI's risk management system, which is designed to protect the Organisation's reputation and manage those risks that might preclude it from achieving its goals.

Management is responsible for establishing and implementing the risk management system, which assesses monitors and manages operational, financial reporting and compliance risks. The Audit and Risk Committee is responsible for monitoring the effectiveness of the risk management system between annual reviews.

Ethical Standards and Code of Conduct

Board Members, Senior Executives and staff are expected to comply with relevant laws and the codes of conduct of relevant professional and research bodies, and to act consistent with our values and integrity, compassion, fairness and honesty at all times when dealing with colleagues, and others who are stakeholders in our mission.

Involving Stakeholders

WEHI has many stakeholders, including our donors and benefactors, our staff, and students, the broader community, the government agencies who provide us funds and regulate our operations, and our suppliers.

We adopt a consultative approach in dealing with our stakeholders. We get involved in industry forums to ensure governments at all levels are aware of our concerns and our achievements and to remain abreast of industry developments.

Indemnification and Insurance

WEHI insures Directors (and the Company Secretary and Executives) against liabilities for costs and expenses incurred by them in defending any legal proceedings arising out of their conduct while acting in the capacity of Director (or Company Secretary or Executive) of the Company, other than conduct involving a wilful breach of duty in relation to the Company.

Directors' report

The Directors of WEHI submit this Annual Financial Report of the Company for the year ended 31 December 2020. In order to comply with the provisions of the Australian Charities and Not-for-Profits Commission Act 2012 the Directors report as follows:

Directors and Board Meetings

The names and particulars of the Directors of the Company during or since the end of the financial year and attendance at Board meetings in the year ended 31 December 2020 are:

		Joined Board	Meetings held while a Director	Meetings Attended
Jane S Hemstritch *Chairperson and President of WEHI*	BSc(Hons) FCA FAICD	2013	6	6
Terence F Moran AC *Vice President of WEHI*	BA(Hons)	2013	6	6
Robert H Wylie *Honorary Treasurer*	FCA FAICD	2014	6	5
Malcolm W Broomhead AO	MBA BE(Civil) FIE(Aus) FAusIMM FAIM MICE(UK) FAICD	2014	6	6
John Dyson	BSc Grad Dip Fin Inv MBA	2016	6	6
James McCluskey AO	BMedSci MBBS MD FRACP FRCPA	2011	6	6
Marie McDonald	BSc (Hons) LLB (Hons)	2016	6	6
Carolyn Viney	LLB/BA	2016	6	6
Shitij Kapur	MBBS, PhD, FRCPC, FMedSci	2017	6	4
Christine Kilpatrick AO	MBBS, MBA, MD, FRACP, FRACMA, FAICD. FAHMS, DMedSci (Hons)	2017	6	6
Pippa Connolly	MEng, CPEng, FIEAust, GAICD	2019	6	6
Peter Collins	BA(Hons) BTheolMCD, MBA and HEC	2018	6	6
Sir John Savill	BA MBChB PhD FRCP FRCPE FRCSEd (Hon) FRCPCH(Hon) FASN FRSE F.MedSci FRS	2018	6	6

The Audit and Risk Committee

The role of the Audit and Risk Committee is to assist the Board in fulfilling its statutory and fiduciary responsibilities with regard to accounting and financial reporting practices, risk management and internal control systems of the WEHI. The Committee met four times during the period under review.

Principal Activities

The WEHI's principal activity in the course of the financial year was medical research and there has been no significant change in that activity during the financial year.

Financial Results

The financial result from operations was a net surplus of $27,000,000 (31 December 2019 net surplus of $20,060,000). After allowing for the gains from the sale of investments and other grants, donations and bequests, depreciation, and amortisation the overall result for the period was a surplus of $31,436,000 (31 December 2019 surplus of $21,112,000). Tax is not applicable. The Company is Limited by Guarantee, has no share capital and declares no dividends.

Operations

A review of operations of the WEHI is included in the detailed scientific reports.

Environmental Regulations

The WEHI aims to achieve a high standard in environmental matters. The WEHI complies with the Environmental Protection Act in respect of its operations. Discharges to air and water are below specified levels of contaminants and solid waste is disposed of in an appropriate manner. Biomedical waste and sharps are disposed of through appropriately licensed contractors. The Directors have not received notification nor are they aware of any breaches of environmental laws by the WEHI.

Appreciation

The Board wishes to extend its appreciation to the Members of the various Committees (Remuneration and Nomination Committee, Human Research Ethics Committee, Investment Committee, Advocacy and Support Committee, Audit and Risk Committee, Master Planning Committee and the Commercialisation Committee) as well as the many other people including the WEHI Director, staff, students, overseas visitors and honorary workers, who work so tirelessly to advance the Company's world-wide reputation for excellence in medical research. A table of attendance at the various committees is listed below.

Committee attendance	Meetings held while a member	Meetings attended
Audit and Risk Committee		
Mr Robert Wylie (Chair)	4	3
Mr Malcolm Broomhead AO	4	4
Ms Pippa Connolly	4	4
Commercialisation Committee		
Ms Marie McDonald (Chair)	4	4
Dr Leigh Farrell	4	3
Dr Lisa Hennessey	4	4
Mr Saul Cannon	4	4
Professor Sir John Savill	4	4
Advocacy and Support Committee		
Mr John Dyson (Chair)	4	4
Dr Paul Cooper	4	4
Mr Michael Daddo	4	3
Mr Hugh Hodges	4	4
Ms Caroline Johnston	4	3
Ms Andrea Lapidge	4	4
Ms Catherine Robson	4	4
Remuneration and Nomination Committee		
Mr Terrance Moran AC	0	0
Ms Marie McDonald	0	0
Ms Carolyn Viney	0	0

Committee attendance	Meetings held while a member	Meetings attended
Human Research Ethics Committee		
Mr Peter Collins (Chair)	5	5
Rev Father Michael Elligate (Deputy Chair)	5	2
Dr John Bonacci	5	5
Dr Vanessa Bryant	5	4
Mr David Freeman	5	5
Mr John Bonacci	5	5
Dr Ian Majewski	5	3
Professor Marc Pellegrini	5	5
Dr Jeanne Tie	5	3
Ms Sarah Galbraith	5	5
Ms Terri Lourey	5	5
Ms Bree Ridgeway	5	3
Ms Louise Steinfort	5	4
Ms Jane Fiske	5	4
Investment Committee		
Mr Robert Wylie (Chair)	4	3
Mr Malcom Broomhead AO	4	4
Mr Stephen Merlicek	4	2
Mr Stephen Milburn-Pyle	4	4
Mr Andrew Scott	4	4
Ms Fiona Trafford-Walker	4	4
Master Planning sub-committee (created in 2020)		
Ms Carolyn Viney (Chair)	3	3
Ms Pippa Connolly	3	3
Mr Terrance Moran AC	3	3

Auditors' independence declaration

The Auditors' independence declaration is included on page 91 of the financial report.

Other Matters

(a) During the financial year there was no significant change in the Company's state of affairs other than that referred to in the accounts or the notes thereto. In particular Note 1 (a) includes WEHI's assessment of the impacts of the Coronavirus pandemic on its activities.

(b) There has not been any other matter or circumstance that has arisen since the end of the financial year, that has significantly affected, or may significantly affect the operations of the Company, the results of those operations, or the state of affairs of the Company in future financial years.

(c) Disclosure of information regarding likely developments in the operations of the Company in future years and the expected results of those operations is likely to result in unreasonable prejudice to the Company. Accordingly, this information has not been disclosed in this report.

(d) During the financial year the Company paid a premium in respect of a contract insuring the Directors and Officers of the Company against liability incurred as such a Director or Officer to the extent permitted by the Corporations Act 2001. The contract of insurance prohibits disclosure of the nature of the liability and the amount of the premium. The Company has not otherwise, during or since the financial year, indemnified or agreed to indemnify an Officer or Auditor of the Company or any related body corporate against a liability incurred as such an Officer or Auditor.

(e) The Company is a Company of the kind referred to in ASIC Class Order 98/100, dated 10 July 1998, and in accordance with that Class Order amounts in the Directors' report and the financial report are rounded off to the nearest thousand dollars.

Signed in accordance with a resolution of the Directors made pursuant to s.298(2) of the Corporations Act 2001.

On behalf of the Directors

Jane Hemstritch
President
Melbourne, 29 March 2021

Robert Wylie
Treasurer

Directors' declaration

Directors' Declaration - per section 60.15 of the Australian Charities and Not-for-Profits Commission Regulation 2013.

The Directors declare that in the Directors' opinion:

(a) there are reasonable grounds to believe that the registered entity is able to pay all of its debts, as and when they become due and payable; and;

(b) the financial statements and notes satisfy the requirements of the Australian Charities and Not-for-Profits Commission Act 2012.

Signed in accordance with subsection 60.15(2) of the Australian Charities and Not-for-Profits Commission Regulation 2013.

Jane Hemstritch
President
Melbourne, 29 March 2021

Robert Wylie
Treasurer

Deloitte Touche Tohmatsu
ABN 74 490 121 060

477 Collins Street
Melbourne VIC 3000
GPO Box 78
Melbourne VIC 3001 Australia

Tel: +61 (0) 3 9671 7000
Fax: +61 (0) 3 9671 7001
www.deloitte.com.au

29 March 2021

The Board of Directors
The Walter and Eliza Hall Institute of Medical Researc
1G Royal Parade
PARKVILLE VIC 3052

Dear Board Members

The Walter and Eliza Hall Institute of Medical Research

In accordance with the Subdivision 60-C of the *Australian Charities and Not-for profits Commission Act 2012*, I am pleased to provide the following declaration of independence to the directors of The Walter and Eliza Hall Institute of Medical Research.

As lead audit partner for the audit of the financial statements of The Walter and Eliza Hall Institute of Medical Research for the year ended 31 December 2020, I declare that to the best of my knowledge and belief, there have been no contraventions of:

(i) the auditor independence requirements as set out in the *Australian Charities and Not-for profits Commission Act 2012* in relation to the audit; and

(ii) any applicable code of professional conduct in relation to the audit.

Yours sincerely

Deloitte Touche Tohmatsu

DELOITTE TOUCHE TOHMATSU

Anneke du Toit
Partner
Chartered Accountants

Deloitte Touche Tohmatsu
A.B.N. 74 490 121 060

477 Collins Street
Melbourne VIC 3000
GPO Box 78
Melbourne VIC 3001 Australia

DX 111
Tel: +61 (0) 3 9671 7000
Fax: +61 (0) 3 9671 7001
www.deloitte.com.au

Independent Auditor's Report to the Members of Walter and Eliza Hall Institute of Medical Research

Report on the Audit of the Financial Report

Opinion

We have audited the financial report of Walter and Eliza Hall Institute of Medical Research ("WEHI" or the "Entity") which comprises the statement of financial position as at 31 December 2020**,** the statement of profit or loss and other comprehensive income, the statement of changes in equity and the statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies and the declaration by the Directors.

In our opinion, the accompanying financial report of the Entity is in accordance with Division 60 of the *Australian Charities and Not-for-profits Commission Act 2012* (the "ACNC Act"), including:

(i) giving a true and fair view of the Entity's financial position as at 31 December 2020 and of its financial performance for the year then ended; and
(ii) complying with Australian Accounting Standards and Division 60 of the *Australian Charities and Not-for-profits Commission Regulation 2013*.

Basis for Opinion

We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Report* section of our report. We are independent of the Entity in accordance with the auditor independence requirements of the ACNC Act and the ethical requirements of the Accounting Professional & Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants (including Independence Standards)* (the "Code") that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

The directors are responsible for the other information. The other information obtained at the date of the auditor's report comprises the Directors' Report, Governance statement, Statistical summary and Capital Funds included in the Entity's annual report for the year ended 31 December 2020 but does not include the financial report and our auditor's report thereon.

Our opinion on the financial report does not cover the other information and we do not and will not express any form of assurance conclusion thereon.

In connection with our audit of the financial report, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial report or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed on the other information that we obtained prior to the date of this auditor's report, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Deloitte.

Responsibilities of the directors for the Financial Report

The directors of the Entity are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards and the ACNC Act and for such internal control as the directors determine is necessary to enable the preparation of the financial report that gives a true and fair view and is free from material misstatement, whether due to fraud or error.

In preparing the financial report, the directors are responsible for assessing the ability of the Entity to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Entity or to cease operations, or has no realistic alternative but to do so.

Auditor's Responsibilities for the Audit of the Financial Report

Our objectives are to obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of this financial report.

As part of an audit in accordance with the Australian Auditing Standards, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial report, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Entity's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the directors.

- Conclude on the appropriateness of the directors use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial report or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Entity to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial report, including the disclosures, and whether the financial report represents the underlying transactions and events in a manner that achieves fair presentation.

Deloitte.

Auditor's Responsibilities for the Audit of the Financial Report (continued)

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Deloitte Touche Tohmatsu

DELOITTE TOUCHE TOHMATSU

Anneke du Toit
Partner
Chartered Accountants
Melbourne, 29 March 2021

Statistical summary for the year ended 31 December 2020

	2020 $'000s	2019 $'000s	2018 $'000s	2017 $'000s	2016 $'000s
Operating revenue					
Australian Government	64,798	46,298	45,057	45,163	51,079
Victorian Government	10,311	10,513	10,909	12,739	7,753
Foreign governments	-	70	22	243	1
Government revenue	**75,109**	**56,881**	**55,988**	**58,145**	**58,833**
Industrial grants and contracts	13,439	8,689	7,182	4,044	3,227
Philanthropic grants and fellowships – Australia	9,870	13,399	15,759	7,444	8,804
Philanthropic grants and fellowships – international	4,649	3,343	6,824	6,468	5,805
Investment income	19,996	24,156	30,063	12,118	13,463
Royalty income	1,654	7,483	4,027	11,059	12,328
General revenue	6,842	8,916	8,260	7,560	5,746
Donations and bequests	11,569	10,373	13,568	9,327	8,816
Royalty monetisation revenue	38,961	35,633	-	331,082	-
Non-government revenue	**106,980**	**111,992**	**85,683**	**389,102**	**58,190**
Total revenue	**182,089**	**168,873**	**141,671**	**447,247**	**117,021**
Operating expenditure					
Staff costs	102,547	98,340	90,493	85,944	80,652
Laboratory operating costs	16,134	19,870	20,038	20,756	19,025
Laboratory equipment	4,078	3,565	3,352	4,047	3,610
Building operations	5,092	5,908	5,801	4,849	4,673
Administration	11,520	8,648	6,715	3,718	5,258
Fundraising	502	620	475	487	387
Business development	2,725	1,219	1,261	997	747
Allowance for credit loss increase / (decrease)	(30)	62	188	(47)	(115)
Royalty monetisation costs	2,239	10,104	4,755	51,143	-
Unrealised foreign exchange loss / (gain)	10,282	477	(4,998)	-	-
Total expenditure	**155,089**	**148,813**	**128,080**	**171,894**	**114,237**
Results from operating activities	**27,000**	**20,060**	**13,591**	**275,353**	**2,785**
Other income					
Profit or (loss) on sale of long-term assets	(135)	297	2	5,002	8,671
Fair value gain or (loss) on investments	816	5,261	(589)	-	-
Donations and bequests capitalised to Permanent Funds	673	1,359	6,510	2,877	5,162
Grants and donations for capital works	14,953	5,076	1,198	4,330	1,733
Total other income	**16,307**	**11,993**	**7,121**	**12,209**	**15,566**
Other expenses					
Loss on impairment write-down of long-term investments	-	-	-	-	(709)
Depreciation and amortisation	(11,871)	(10,941)	(9,368)	(9,044)	(8,556)
Total other expenses	**(11,871)**	**(10,941)**	**(9,368)**	**(9,044)**	**(9,265)**
Net operating surplus	**31,436**	**21,112**	**11,344**	**278,518**	**9,086**
Capital funds					
Permanent invested capital funds	202,322	198,833	194,181	185,610	181,162
General funds	394,285	371,193	377,710	378,204	114,306
Royalty fund	56,135	55,039	48,054	44,410	34,981
Leadership fund	28,927	27,965	26,557	24,562	23,581
Discovery fund	5,484	5,271	4,961	4,545	2,682
Centenary fund	-	-	-	-	2,101
Investment revaluation reserve	70,311	67,200	8,211	40,853	34,393
Total funds	**757,464**	**725,501**	**659,674**	**678,184**	**393,206**
Capital expenditure					
Property, plant and equipment	24,195	12,252	22,029	16,078	9,960
Staff numbers: (equivalent full-time)	2020	2019	2018	2017	2016
Scientific research staff:					
– Senior faculty	85	87	80	78	78
– Postdoctoral scientists	224	213	199	183	188
– Visiting scientists	32	34	36	48	39
–Other laboratory research staff	234	235	241	241	252
Supporting staff:					
– Other support services	204	202	196	180	162
Total staff and visiting scientists	**778**	**771**	**752**	**730**	**719**
Students	**159**	**206**	**192**	**180**	**173**
Papers published	**424**	**388**	**417**	**419**	**429**

Capital Funds

Permanent Named Capital Funds

The following is a complete listing of all permanent funds held and invested by the Institute at 31 December, 2020.

*New donations of capital received in current financial period.

	2020 $
Adair John Bequest (ex DW)	402,965
Adair John Bequest (ex MF)	76,509
Alexander R Estate	160,677
Allison-Levick J & H	90,188
Alston Peter and Julie Florence Fellowship Fund	1,611,203
Amey AM Estate	38,800
Anderson KA Estate	288,411
Anderson NM Estate	17,478
Angus Dorothy Irene Estate	283,817
Anonymous	363,290
Anonymous	3,873,944
Anonymous – Tasmania	62,056
Anonymous – Victoria	7,473
Anonymous – Victoria	201,128
Arnel Florence Janet Maude Estate	58,694
Arter Myra G Estate	90,239
Ashford Ivy A Estate	35,722
Attwell Samuel E Estate	69,890
Atyeo George & Isobel Fund	51,342
Baker Alice Lillian Estate	85,075
Ballantyne JW Estate	813,564
Barfield WG Estate	55,226
*Barry Joan Elaine Memorial Fund	59,526
Bartlett Mary V Estate	39,135
*Bates Tim Memorial Diabetes Research Fund	203,327
Charles L Bartholomew Estate	162,389
Bauer Dr Franz Estate	66,841
Bell Valerie Amy	94,683
Benjamin EG Estate	62,638
Bennett LM Estate	39,616
Berry Ruby C Estate	167,146
Biderman Cyla Estate	79,777
Blain BE Estate	127,744
Bland RT Estate	384,167
Bock Lindsay William Estate	33,818
Boothman Alva Estate	785,165
Borrett M A Estate	610,251
Bran EG Estate	222,121
Brennan EM Estate	69,337
The Ruby Bryan Memorial Fund	757,540
Brittain W & VI Mem Fund	81,708
Brockhoff Nyon Trust	256,596
Brough AV Estate	88,269
Brown Isabelle A Estate	91,938
Bruce RH Estate	40,322
Buckland William Foundation Fund	236,550
Buckman Olive Estate	28,023
Bult C G Estate	510,938
Brumloop LAA Estate	88,011
Burley Stanley Estate	71,676
Burnet Sir Macfarlane Estate	146,549
Burns JC Estate	189,113
Cahill JL Estate	26,186
Callaway LJ Estate	50,143
Cambridge Beresford Estate	207,697
Carlin Freda Evelyn Estate	102,738
Carling DM Estate	183,545
Carlson Catherine Estate	92,153
Carlson Elizabeth F Estate	104,153
Carty LEW Charitable Fund	44,296
Cato EA Estate	908,776
Cato MC Estate	738,653
*Chapman Debbie Memorial Fund	19,490
Chatfield SL Estate	124,676
Claridge John PG Estate	37,161
Clark Lindesay Fund	1,008,409
Cockburn Clarice BP Estate	27,943
Cole DE Estate	801,091
Coles GO Estate	38,963
Collie Barbara Estate	155,140
Collie Betty Rae	217,537
Collie George Estate	2,434,302
Colliver Len Estate	57,341
Connolly Grace C Estate	132,040
Cormack Margaret Mary	98,505
Cory Joy & Desmond Cancer Research Fund	133,400
Coultass Hylda M Estate	132,363
Courtney Gwendoline Vera Estate	283,327
Coutts Dr ELA Estate	132,893
Coutts IBM Estate	28,180
Craven DA Memorial Fund	1,298,314
JE Craven & MA Shearer Estates	50,357,167
Crawford Duncan Estate	17,331
Criswick R M Estate	528,529
Critchlow Ronald P Estate	309,268
Crowley MM Estate	216,108
Cubbins SG Estate	92,009
Cummings ED Estate	163,816
Cutter BE Estate	17,026
Darbyshire EJ (Ted) Estate	356,314
Davey Dorothy Estate	315,268
Davidson BI Estate	26,754
Davidson EE Estate	30,365
Davis FLG Estate	60,710
Dawson Anne Marie Estate	8,117
Del Cott RAM Estate	267,626
Deryk SD Estate	72,383
Sir Harold Dew and Family Estate	862,887
Dick MRK (Ray) Estate	224,585
Dickie Phoebe Estate	46,022
Dimsey WE Estate	231,623
Dobbie Myrtle M Estate	42,273
Dodgshun GM Estate	168,020
Dossetor Catherine L Estate	36,553
Dowie S Estate	23,731
Drakensberg Trust	2,551,329
*Drury Evelyn Ann Fund	583,919
Duncan PH Estate	100,286
East James Douglas Estate	190,881
Edwards Allen Richard Estate	200,757
Edwards HHW Estate	255,799
Eisner KR	98,781
Ellis GM Estate	3,878,412
Emery Harriet Anne Estate	22,019
Eva Michael Ross Estate	4,617,329
Facey Mary Bethune Estate	16,870
Fagg Maude V Estate	104,955
Fields Ernest Estate	295,058
Findlay Winifred Gertrude Estate	147,388
Fitzgerald Sheila Mary Estate	45,132
Ford Ada Joyce Estate	20,684
Fraser K Estate	2,137,782
Galbraith DA & DV Estate	116,557
Gerdts Sheila Lesley G Estate	69,987
Gibb Geo & Bennett Wm A	432,391
Gilbert Augusta Estate	390,717
Gilder CH Estate	17,230
Gillon AM Estate	3,258,907
*Gilmore Trakka Fund	10,000
Girdwood J Estate	256,814
Goldman Sachs JB Were Foundation	792,646
Gordon H & T Estate	115,055
Graves GC Estate	28,506
Gray Bessie Mavis Fund	27,078
Gray Clara Estate	77,773
Greig Harry Douglas Estate	543,302
Grubb Walter Joseph Estate	40,203
Guest Doris Rose Estate	16,910
Hackett Dorothy Estate	6,961
Hadfield RCS Estate	122,651
Hadley AN Estate	1,223,660

Hamilton M Estate	48,963
Harrap FM Estate	144,910
Harrap LM Estate	31,248
Harris John D & Lyla Foundation	919,286
Hartlett K Estate	1,056,419
Haydon Michael JM Memorial Fund	64,636
Hearse JD	1,285,402
Hemphill Olive May Estate	71,184
Henderson AN Estate	27,143
Henderson Joan Estate	138,731
Henry MA Estate	682,155
Heron Thelma Hope Estate	101,254
Highton GAN Estate	581,943
Hill Ramon Bruce Estate	163,856
Hind Ruby F Estate	35,348
Hocking Helen Estate	386,773
Holmes EM Estate	86,493
Hope Irene Estate	455,237
Hooper Nancy Hilda	120,208
Hosier MM Estate	162,270
Hurry M Estate	32,835
Inglis Dulcie M Estate	121,503
Ironside WH Estate	71,676
Jackson Catherine M Estate	206,983
Johnson Daphne Adele Estate	8,439
Johnson Ethel Grace Estate	49,085
Johnson Sydney Robert Estate	55,999
Johnstone Reginald Ben Estate	14,946
Judd Anita Estate	64,602
Kayler-Thomson Marion Estate	55,939
Keating L Estate	1,457,268
Keats LCA Estate	1,377,976
Kellock TH Estate	1,941,955
Kendall Nanyce Douglas	50,669
Kerr HM Estate	116,630
King DM Estate	44,469
Knight FF Estate	32,468
Lang John Murray Estate	798,174
Lanigan Annie Maria (Nance) & Janet Mary Fund	43,245
Lanteri Gwen Estate	1,674,419
Larard DV Estate	13,802
Leckie Winifred Estate	231,673
Lilford VM Estate	510,907
Lins RD Estate	28,670
Little Mabel B Estate	69,939
Lyddon Pauline M Estate	1,285,908
Lyell Alexia Bequest	465,620
MacAskill WG & I	28,670
Mace Nina May Estate	310,022
MacDonald Elsie May Estate	193,431
Macindoe Jock & Diana Fund	43,006
MacIntosh Elizabeth H Estate	25,828
*Mackay, Ian	202,850
Mackie-Smith CM Estate	392,860
Macleay The Lillian & Kenneth Bequest	450,211
MacNamara Jean Fund	1,058
Mahoney Florence Cancer Fund	181,173
Malcolm Phyllis Elizabeth Estate	290,324
Maloney Kathleen Margaret Estate	23,895
Mann David Memorial Research Fund	49,656
Mansfield Trevor Geoffrey Estate	10,673
Marguccio R Estate	14,335
Mariner Barry Leonard Estate	66,237
McArthur Nellie M Estate	114,027
McCooke Miss MH Estate	360,121
McDonald Charles Thomas	19,543
McDougall Phyllis Mable Estate	135,502
McGhee ME Estate	78,056
McGregor Amy VK Estate	131,999
McGregor Elvira Ruth Estate	24,323
McGregor KB Estate	190,842
Mckay C N Fund	282,629
McKinnon Sheila May Estate	48,125
McLean Ada Myee Dutton Estate	567,662
McLennan B Estate	102,518
McNab M Estate	25,898
McNeill Sir James Fund	22,297
McRorie Ruby A Estate	83,835
Menagh Thelma Marie Estate	19,507
Miller Lorna May Estate	935,574
Miller MA Estate	67,096
Miller Violet Isabella Estate	78,081
Minney DW & NR Fund	14,335
Mitchell, Bettye Victoria Fund	4,704,415
Mitchell Doris Georgina Mildred	71,676
Mitchell G Fund	55,559
Moden FHW Estate	138,168
Moody E Vaughan Estate	1,369,493
Moon Ida Alice Estate	54,128
Mooney Carmel Mary, Estate of	180,161
Moore Phyllis Estate	14,335
Morgan DM Estate	422,737
Morris Foundation of Medical Research	181,192
Moss EE Estate	276,541
Muller FG Estate	20,468
Murray Alan Ambrose Estate	36,850
Murray Gwendoline Mary Fund	1,278,301
Must Mary Kathleen Bequest	1,120,302
Myer Dame Merlyn Estate	15,442
Myer Pam Sallmann Foundation	31,262
Nevill Melanie Joy	86,175
Newton Evelyn	20,031
Newton EM Estate	19,472
Nicholas Harold George Estate	341,852
Norins Leslie Fund	317,620
Norton M Estate	906,898
Nossal Sir Gustav Fund	336,190
Nottingham SG Estate	37,076
Palmer DE Estate	27,981
Palmer Ethel Fund	336,931
Parker Barbara Memorial Fund	76,798
Parker Mabel V Estate	86,516
Parsons Kathleen FB Estate	43,801
Patten Ralph & Etty Bequest	325,876
Patterson Gerard A Estate	20,481
Paulin Leukaemia Fund	236,320
Paulin SC Estate	29,680
Payne Henry and Charlotte Fund	1,021,391
Peterson Vera Estate	612,222
Petley Francis Estate	162,633
Pierce John Lindsay Estate	1,306,116
Pietsch Dr CH Fund	217,938
Porter Florence JA Estate	140,045
Prater Mabel Edward	14,864
Pritchard DG Estate	36,794
Pyke MA Estate	17,202
Qualtrough Research Fund	2,912,416
Rae Olive Estate	1,197,075
Reeves Jessie Estate	67,218
Reid John T Charitable Trusts	8,759,165
Reiser Erwin Estate	28,670
Richardson DLK Estate	91,672
Ricker EM Fund	82,483
Roberts JI Charitable Fund	8,744
Robertson AT Estate	14,335
Rose Norma J Estate	14,491
Ruppel FE Estate	166,172
Salemann CW Estate	14,335
Sallmann L & E Memorial Fund	27,981
Santos TS Estate	928,378
Schack Elsie Edith Estate	135,657
Scott Annie May Estate	176,815
Sharp II Estate	22,535
Shaw Eileen Coryn Estate	25,102
Shelton Edgar Estate	879,893
Sidwell OB Estate	2,067,877
Skea Lyndal and Jean Leukaemia Fund	1,090,828
Skinner Phyllis Maye Estate	90,874
Smith Elsie Violet Estate	18,313
Smorgon Robert & Jack Family Foundation	403,536
Snow Freda Estate	65,195
Spence Frank Meldrum	37,161
Spencer Stanley L Estate	19,820
Stanbrough AE Estate	114,276

Stephens L Estate	118,906
Stevens SA Estate	135,451
Stevenson Dame Hilda Estate	97,001
Stewardson Family Trust	148,668
Stewart Jean Elma	91,333
Swingler Maxwell & Mary Bequests	2,743,453
Sydserff Charles SB Estate	18,034
Syme David Farnell Estate	1,047,627
Talbot P Estate	447,553
Taws M Estate	143,352
Taws GE Arthritis Fund	27,078
Taylor Sarah McQuillan Estate	66,723
Thomas JC Estate	330,005
Thompson O Estate	31,753
Thorpe Doris EB	97,892
Tink RM Estate	332,832
Tinkler VF Estate	64,275
Tomasetti John T Estate	455,556
Thompsom LW Estate	2,370,441
Tressider Edith Kathleen Estate	588,060
Trezise KW Estate	20,659
Tropical Diseases Fund	100,629
Turnbull JG Estate	84,258
Van Leeuwen GH Estate	509,298
Vincent-Smith IG Fund	205,556
Vogel Herta & FB Estate	14,491
Walker CM Estate	236,200
Walker Dorothy Hope Estate	2,524,422
Wallace Nancy Jeanie Estate	223,783
Walsh Dr William Butler Memorial Fund	923,643
Walter Ailsa Amy Mary Estate	174,819
Warnock EMC nee Riddle Estate	1,830,706
Watson MR Estate	16,405
Waxman Elizabeth H Estate	79,004
Wedge Erica Estate	362,366
Webb NJ Estate	290,987
Weeks Thelma Estate	14,864
Wekwerth Hilda Frances Estate	35,533
West John James Estate	109,917
Westcott Ita E Estate	23,077
White Morris G Estate	46,088
Wicks LR Estate	14,335
Williams AM Estate	94,945
Williams Irene E Estate	344,764
Wilson DE Estate	89,703
Wilson MML Estate	100,943
Wilson NF Estate	14,335
Wilson V M (Sunny) Estate	147,857
Wolstonecroft WW Estate	40,934
Wright Lynette Oreti Estate	207,667
Zillman Dudley V Estate	57,619

Fellowship and Scholarship Funds

Farrant Patricia & John Scholarship Fund	233,395
*Harris Alan Scholarship Fund	122,160
JHA Munro Foundation	1,150,681
Macphee Avis Permanent Fund	58,015
Mathison G C Research Scholarship	225,250
*Metcalf Donald Scholarship Fund	1,212,082
Moffatt Edith Scholarship Fund	2,072,730
The Sir Clive McPherson Family Centenary Fellowship	7,356,503

PhD Scholarship Funds

Carty EM Fund	475,381
Mackay Dr Ian Fund	381,781
Pearl Paddy Fund	1,668,904
Speedy Pauline Scholarship Fund	605,107
Syme Colin Fund	2,392,045
Wilson Ed Memorial Fund	2,115,459
The John and Margaret Winterbottom Bequest	786,295

Other Funds

Anonymous Seminar Award	18,919
Balderstone Award	50,127
Begley - Scientific Integrity and Ethics	78,568
Gideon Goldstein Fund	1,648,897
Speedy Pauline Innovation Grant Fund	746,367

The following Estates in which the Institute had an interest, were managed during the year by Trustees. (Income received by the Institute in the financial period is treated similarly to donations and bequests):

The George Thomas & Lockyer Potter Charitable Trust

CH Boden Memorial Trust

John Frederick Bransden Memorial Fund

Frank Broadhurst Estate

Thomas, Annie & Doris Burgess Charity Trust

Miss EM Drummond Estate

Frederick and Winifred Grassick Memorial Fund

Estate of Maxwell Gardiner Helpman

Estate of Shelia Mary Helpman

The Mackie Bequest

Irene and Ronald MacDonald Foundation

Albert H Maggs Charitable Trust

Mrs AM Reilly

Miss ML Reilly

The Stang Bequest

Florence Mary Young Charitable Trust

Hazel and Pip Appel Fund

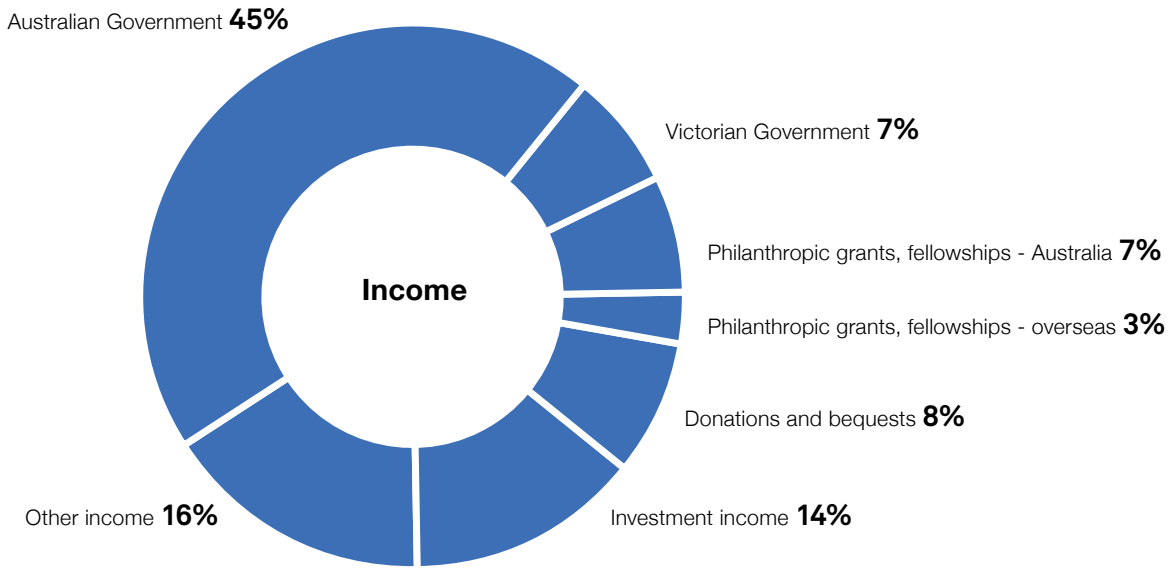
Leadership Fund

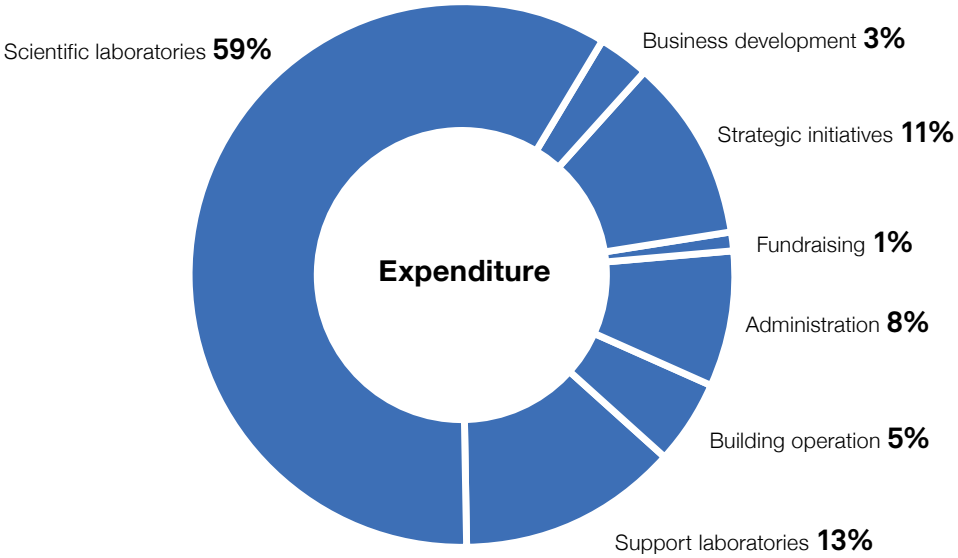
The Leadership Fund was established in honour of Professors Gustav Nossal, Donald Metcalf, Jacques Miller and Suzanne Cory to provide named Fellowships to nurture the development of outstanding young scientists with the potential to be future leaders of biomedical research. The Cory Fellowship is currently held by Misty Jenkins until 2021.

The Leadership Fund at 31 December 2020 included the following permanent funds ($10,000 and over):

Sir Harold Dew and Family Estate	8,268,705
Chugai Pharmaceutical Co Ltd	1,721,106
The Ian Potter Foundation	1,721,106
L M Archibald Estate	1,147,405
Albert H Maggs Charitable Trust	1,122,340
Helen Macpherson Smith Trust	688,442
Anonymous	573,702
Anonymous	573,702
E Vaughan Moody Estate	573,702
The Broken Hill Proprietary Company Limited	573,702
J B Were & Son Charitable Fund	573,702
Eunice L Lambert Estate	564,357
Betty Eunice Stephens Estate	386,386
National Australia Bank	344,222
Victor Smorgon Charitable Fund	252,428
The Sidney Myer Fund	206,534
Leslie D W Stewart Estate	168,857
Joe White Bequest	156,048
Krongold Foundation Pty Limited	114,741
Professor Sir Gustav Nossal	114,741
The Scobie and Claire MacKinnon Trust	114,741
The R & J Law-Smith Gift	68,845
National Mutual Holdings Limited	68,845
Pacific Dunlop Ltd	68,845
Sheila R White Estate	67,881
Coles Myer Ltd	57,369
James Kirby Foundation	57,369
Arthur Andersen & Co Foundation	45,894
Arthur Robinson & Hedderwicks	45,894
H B Kay Estate	22,949
Stephelle Pty Ltd	22,949
C M Walter	22,949

The year at a glance (Excluding monetisation and unrealised foreign exchange losses)

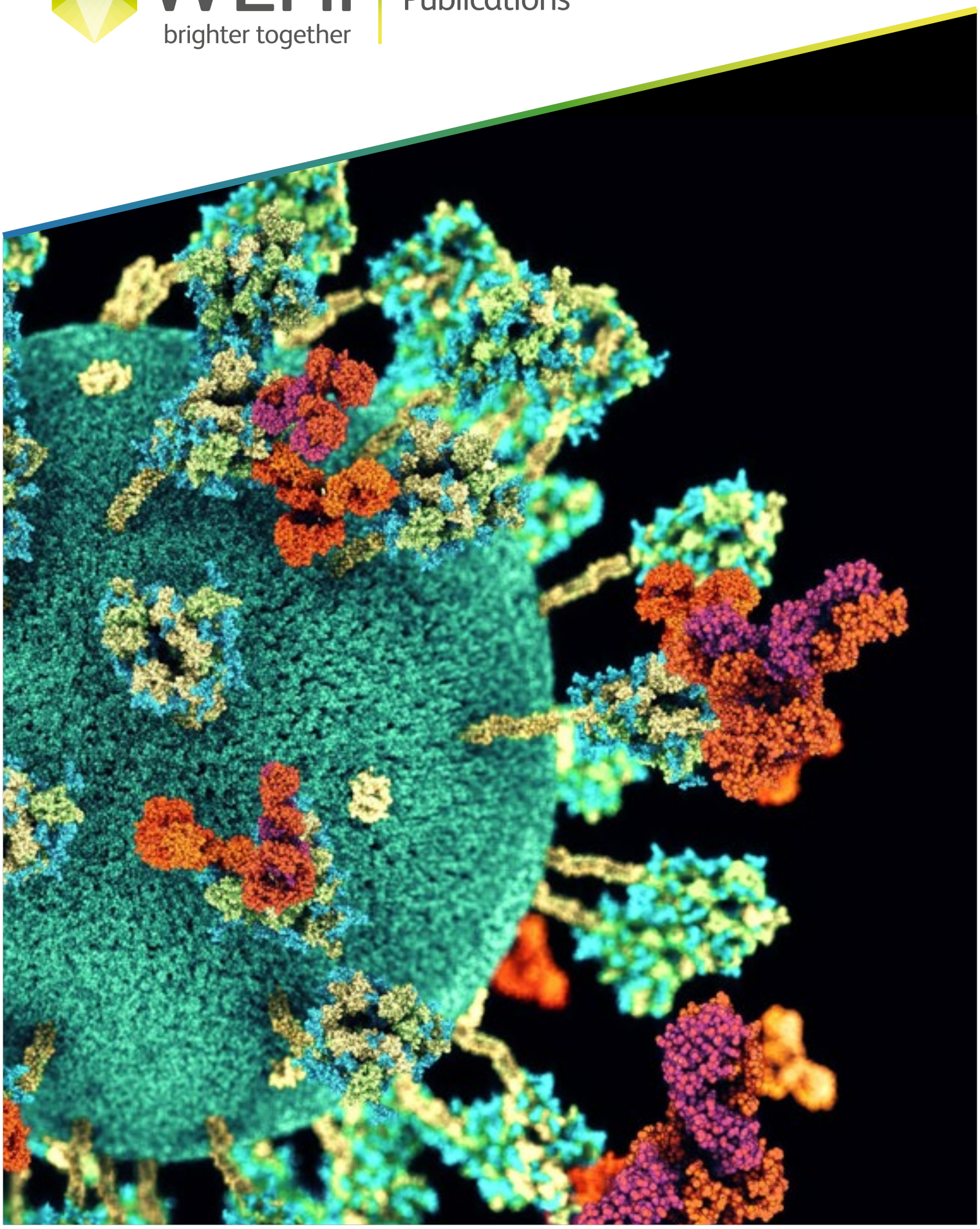




The Year In Brief	2020 $'000	2019 $'000
Income for operations	**182,089**	**168,873**
Expenditure in operations	**155,089**	**148,813**
Net surplus (deficit) from operations	**27,000**	**20,060**
Number of staff and visiting scientists	**778**	**771**
Number of postgraduate students	**159**	**206**
Total staff and students (EFT)s	**937**	**977**

WEHI
brighter together

2020 Publications



Publications

ATB Advanced Technology and Biology division
BIO Bioinformatics division
BCBC Blood Cells and Blood Cancer division
CBSC ACRF Cancer Biology and Stem Cells division
CBD ACRF Chemical Biology division
EDD Epigenetics and Development division
IMM Immunology division
IDID Infectious Diseases and Immune Defence division
INFL Inflammation division
PONC Personalised Oncology division
PHI Population Health and Immunity division
SBD Structural Biology division
USD Ubiquitin Signalling division

Number of publications:

Primary: 330
Review: 95
Books/Chapter: 5
Total: 430

Primary

1. Abdirahman SM, Christie M, Preaudet A, Burstroem MCU, Mouradov D, Lee B, Sieber OM, Putoczki TL. A biobank of colorectal cancer patient-derived xenografts. *Cancers.* 2020 12(9):2340. PONC
2. Abootalebi S, Aertker BM, Andalibi MS, Asdaghi N, Aykac O, Azarpazhooh MR, Bahit MC, Barlinn K, Basri H, Shahripour RB, Bersano A, Biller J, Borhani-Haghighi A, Brown RD, Campbell BC, Cruz-Flores S, De Silva DA, Napoli MD, Divani AA, Edgell RC, Fifi JT, Ghoreishi A, Hirano T, Hong KS, Hsu CY, Huang JF, Inoue M, Jagolino AL, Kapral M, Kee HF, Keser Z, Khatri R, Koga M, Krupinski J, Liebeskind DS, Liu L, Ma H, Maud A, McCullough LD, Meyer DM, Mifsud V, Morovatdar N, Nilanont Y, Oxley TJ, Ozdemir AO, Pandian J, Pantoni L, Papamitsakis NIH, Parry-Jones A, Phan T, Rodriguez G, Romano JG, Sabaa-Ayoun Z, Saber H, Sasannezhad P, Saver JL, Scharf E, Shuaib A, Silver B, Singhal S, Smith CJ, Stranges S, Sylaja PN, Torbey M, Toyoda K, Tsivgoulis G, Wasay M, Yassi N, Yoshimoto T, Zamani B, Zand R. Call to Action: SARS-CoV-2 and CerebrovAscular DisordErs (CASCADE). *Journal of Stroke and Cerebrovascular Diseases* 2020 29(9):104938. PHI
3. Alam MJ, Xie L, Ang C, Fahimi F, Willingham SB, Kueh AJ, Herold MJ, Mackay CR, Robert R. Therapeutic blockade of CXCR2 rapidly clears inflammation in arthritis and atopic dermatitis models: demonstration with surrogate and humanized antibodies. *mAbs.* 2020 12(1):1856460. BCBC
4. Albert MC, Brinkmann K, Pokrzywa W, Gunther SD, Kronke M, Hoppe T, Kashkar H. CHIP ubiquitylates NOXA and induces its lysosomal degradation in response to DNA damage. *Cell Death & Disease.* 2020 11(9):740. BCBC
5. Alix E, Godlee C, Cerny O, Blundell S, Tocci R, Matthews S, Liu M, Pruneda JN, Swatek KN, Komander D, Sleap T, Holden DW. The tumour suppressor TMEM127 Is a Nedd4-family E3 ligase adaptor required by Salmonella SteD to ubiquitinate and degrade MHC class II molecules. *Cell Host & Microbe.* 2020 28(1):54-68e7. USD

6. Alvarez-Diaz S, Preaudet A, Samson AL, Nguyen PM, Fung KY, Garnham AL, Alexander WS, Strasser A, Ernst M, Putoczki TL, Murphy JM. Necroptosis is dispensable for the development of inflammation-associated or sporadic colon cancer in mice. *Cell Death and Differentiation.* 2020 Nov 23. *(*epub ahead of print) PONC INFL BIO BCBC

7. Amann-Zalcenstein D, Tian L, Schreuder J, Tomei S, Lin DS, Fairfax KA, Bolden JE, McKenzie MD, Jarratt A, Hilton A, Jackson JT, Di Rago L, McCormack MP, de Graaf CA, Stonehouse O, Taoudi S, Alexander WS, Nutt SL, Ritchie ME, Ng AP, Naik SH. A new lymphoid-primed progenitor marked by Dach1 downregulation identified with single cell multi-omics. *Nature Immunology.* 2020 21(12):1574-1584. EDD IMM BCBC

8. Anton A, Kamel Hasan O, Ballok Z, Bowden P, Costello AJ, Harewood L, Corcoran NM, Dundee P, Peters JS, Lawrentschuk N, Troy A, Webb D, Chan Y, See A, Siva S, Murphy D, Hofman MS, Tran B. Use of prostate-specific membrane antigen positron-emission tomography/CT in response assessment following upfront chemohormonal therapy in metastatic prostate cancer. *BJU international.* 2020 126(4):433-435. PONC

9. Arezes J, Foy N, McHugh K, Quinkert D, Benard S, Sawant A, Frost JN, Armitage AE, Pasricha SR, Lim PJ, Tam MS, Lavallie E, Pittman DD, Cunningham O, Lambert M, Murphy JE, Draper SJ, Jasuja R, Drakesmith H. Antibodies against the erythroferrone N-terminal domain prevent hepcidin suppression and ameliorate murine thalassemia. *Blood.* 2020 135(8):547-557. PHI

10. Assafa TE, Nandi S, Smilowicz D, Galazzo L, Teucher M, Elsner C, Putz S, Bleicken S, Robin AY, Westphal D, Uson I, Stoll R, Czabotar PE, Metzler-Nolte N, Bordignon E. Biophysical characterization of,Pro-apoptotic BimBH3 peptides reveals an unexpected capacity for self-association. *Structure.* 2020 Sep 14. *(*epub ahead of print) SBD

11. Azarpazhooh MR, Morovatdar N, Avan A, Phan TG, Divani AA, Yassi N, Stranges S, Silver B, Biller J, Tokazebani Belasi M, Kazemi Neya S, Khorram B, Frydman A, Nilanont Y, Onorati E, Di Napoli M. COVID-19 pandemic and burden of non-communicable diseases: An ecological study on data of 185 countries. *Journal of Stroke and Cerebrovascular Diseases.* 2020 29(9):105089. PHI

12. Azimi I, Robitaille M, Armitage K, So CL, Milevskiy MJG, Northwood K, Lim HF, Thompson EW, Roberts-Thomson SJ, Monteith GR. Activation of the ion channel TRPV4 induces epithelial to mesenchymal transition in breast cancer cells. *International Journal of Molecular Sciences.* 2020 21(24):9417. CBSC

13. Badart M, Barnes EM, Cording AP, Gilmer S, Billinghurst ID, Edupuganti V, Lessene G, Bland A, Bower R, Rana Z, Ferguson S, Opel Reading H, Cook G, Rosengren R, Krause K, Gamble A, Ashton J, Hawkins BC. Synthesis and biological evaluation of (-) and (+)-spiroleucettadine and analogues. *ChemMedChem.* 2020 Dec 15. *(*epub ahead of print) CBD

14. Balic JJ, Albargy H, Luu K, Kirby FJ, Jayasekara WSN, Mansell F, Garama DJ, De Nardo D, Baschuk N, Louis C, Humphries F, Fitzgerald K, Latz E, Gough DJ, Mansell A. STAT3 serine phosphorylation is required for TLR4 metabolic reprogramming and IL-1beta expression. *Nature Communications.* 2020 11(1):3816. INFL

15. Balka KR, Louis C, Saunders TL, Smith AM, Calleja DJ, D'Silva DB, Moghaddas F, Tailler M, Lawlor KE, Zhan Y, Burns CJ, Wicks IP, Miner JJ, Kile BT, Masters SL, De Nardo D. TBK1 and IKKepsilon act redundantly to mediate STING-I-induced NF-kappaB responses in myeloid cells. *Cell Reports.* 2020 31(1):107492. INFL USD IMM

16. Bandala-Sanchez E, Bediaga NG, Naselli G, Neale AM, Harrison LC. Siglec-10 expression is up-regulated in activated human CD4(+) T cells. *Human Immunology.* 2020 81(2-3):101-104. PHI

17. Barr AM, Silva A, Prato S, Belz GT, Maraskovsky E, Baz Morelli A. Therapeutic ISCOMATRIX adjuvant vaccine elicits effective anti-tumor immunity in the TRAMP-C1 mouse model of prostate cancer. *Cancer Immunology Immunotherapy.* 2020 69(10):1959-1972. IMM

18. Bedford JG, Heinlein M, Garnham AL, Nguyen THO, Loudovaris T, Ge C, Mannering SI, Elliott M, Tangye SG, Kedzierska K, Gray DHD, Heath WR, Wakim LM. Unresponsiveness to inhaled antigen is governed by conventional dendritic cells and overridden during infection by monocytes. *Science Immunology.* 2020 5(52):eabb5439. IMM

19. Bedford JG, Infusini G, Dagley LF, Villalon-Letelier F, Zheng MZM, Bennett-Wood V, Reading PC, Wakim LM. Airway exosomes released during influenza virus infection serve as a key component of the antiviral innate immune response. *Frontiers in Immunology.* 2020 11:887. ATB

20. Bedő J, Di Stefano L, Papenfuss AT. Unifying package managers, workflow engines, and containers: Computational reproducibility with BioNix. *GigaScience.* 2020 9(11):giaa121. BIO

21. Belvedere S, Gouil Q, Thompson C, Solomon J. Computed tomography angiography in the assessment of great saphenous vein as conduit for infrainguinal bypass surgery. *Vascular and Endovascular Surgery.* 2020 54(4):313-318. EDD

22. Bennett MF, Oliver KL, Regan BM, Bellows ST, Schneider AL, Rafehi H, Sikta N, Crompton DE, Coleman M, Hildebrand MS, Corbett MA, Kroes T, Gecz J, Scheffer IE, Berkovic SF, Bahlo M. Familial adult myoclonic epilepsy type 1 SAMD12 TTTCA repeat expansion arose 17,000 years ago and is present in Sri Lankan and Indian families. *European Journal of Human Genetics* 2020 28(7):973-978. PHI BIO

23. Best SA, Hess J, Souza-Fonseca-Guimaraes F, Cursons J, Kersbergen A, Dong X, Rautela J, Hyslop SR, Ritchie ME, Davis MJ, Leong TL, Irving L, Steinfort D, Huntington ND, Sutherland KD. Harnessing natural killer immunity in metastatic small cell lung cancer. *Journal of Thoracic Oncology.* 2020 15(9):1507-1521. CBSC BIO EDD IMM

24. Best SA, Vandenberg CJ, Abad E, Whitehead L, Guiu L, Ding S, Brennan MS, Strasser A, Herold MJ, Sutherland KD, Janic A. Consequences of Zmat3 loss in c-MYC- and mutant KRAS-driven tumorigenesis. *Cell Death & Disease.* 2020 11(10):877. CBSC ATB BCBC

25. Bhuva DD, Cursons J, Davis MJ. Stable gene expression for normalisation and single-sample scoring. *Nucleic Acids Research.* 2020 48(19):e113. BIO

26. Black KA, He S, Jin R, Miller DM, Bolla JR, Clarke OB, Johnson P, Windley M, Burns CJ, Hill AP, Laver D, Robinson CV, Smith BJ, Gulbis JM. A constricted opening in Kir channels does not impede potassium conduction. *Nature Communications.* 2020 11(1):3024. SBD CBD

27. Blombery P, Thompson E, Nguyen T, Birkinshaw RW, Gong J, Chen X, McBean M, Thijssen R, Conway T, Anderson MA, Seymour JF, Westerman DA, Czabotar PE, Huang DCS, Roberts AW. Multiple BCL2 mutations co-occurring with Gly101Val emerge in chronic lymphocytic leukemia progression on venetoclax. *Blood.* 2020 135(10):773-777. SBD BCBC

28. Body A, Wong R, Shapiro J, Jalali A, McLachlan SA, Ananda S, Lipton L, Cooray P, Gibbs P, Lee B, Lee M. Use and outcomes of chemotherapy for metastatic pancreatic cancer in Australia. *Internal Medicine Journal.* 2020 Oct 11. *(*epub ahead of print) PONC

29. Bonelli R, Woods SM, Ansell BRE, Heeren TFC, Egan CA, Khan KN, Guymer R, Trombley J, Friedlander M, Bahlo M, Fruttiger M. Systemic lipid dysregulation is a risk factor for macular neurodegenerative disease. *Scientific Reports.* 2020 10(1):12165. PHI

30. Boyle ST, Poltavets V, Kular J, Pyne NT, Sandow JJ, Lewis AC, Murphy KJ, Kolesnikoff N, Moretti PAB, Tea MN, Tergaonkar V, Timpson P, Pitson SM, Webb AI, Whitfield RJ, Lopez AF, Kochetkova M, Samuel MS. ROCK-mediated selective activation of PERK signalling causes fibroblast reprogramming and tumour progression through a CRELD2-dependent mechanism. *Nature Cell Biology.* 2020 22(7):882-895. ATB

31. Braun M, Aguilera AR, Sundarrajan A, Corvino D, Stannard K, Krumeich S, Das I, Lima LG, Meza Guzman LG, Li K, Li R, Salim N, Jorge MV, Ham S, Kelly G, Vari F, Lepletier A, Raghavendra A, Pearson S, Madore J, Jacquelin S, Effern M, Quine B, Koufariotis LT, Casey M, Nakamura K, Seo EY, Hölzel M, Geyer M, Kristiansen G, Taheri T, Ahern E, Hughes BGM, Wilmott JS, Long GV, Scolyer RA, Batstone MD, Landsberg J, Dietrich D, Pop OT, Flatz L, Dougall WC, Veillette A, Nicholson SE, Möller A, Johnston RJ, Martinet L, Smyth MJ, Bald T. CD155 on tumor cells drives resistance to immunotherapy by inducing the degradation of the activating receptor CD226 in CD8(+) T cells. *Immunity.* 2020 53(4):805-823.e15. IMM

32. Brinkmann K, Waring P, Glaser SP, Wimmer V, Cottle DL, Tham MS, Nhu D, Whitehead L, Delbridge AR, Lessene G, Smyth IM, Herold MJ, Kelly GL, Grabow S, Strasser A. BCL-XL exerts a protective role against anemia caused by radiation-induced kidney damage. *EMBO Journal.* 2020 39(24):e105561. ATB CBD BCBC

33. Brohus M, Arsov T, Wallace DA, Jensen HH, Nyegaard M, Crotti L, Adamski M, Zhang Y, Field MA, Athanasopoulos V, Baró I, Ribeiro de Oliveira-Mendes BB, Redon R, Charpentier F, Raju H, DiSilvestre D, Wei J, Wang R, Rafehi H, Kaspi A, Bahlo M, Dick IE, Chen SRW, Cook MC, Vinuesa CG, Overgaard MT, Schwartz PJ. Infanticide vs. inherited cardiac arrhythmias. *Europace : European pacing, arrhythmias, and cardiac electrophysiology : journal of the working groups on cardiac pacing, arrhythmias, and cardiac cellular electrophysiology of the European Society of Cardiology.* 2020 Nov 17. *(*epub ahead of print) PHI

34. Brown LM, Lonsdale A, Zhu A, Davidson NM, Schmidt B, Hawkins A, Wallach E, Martin M, Mechinaud FM, Khaw SL, Bartolo RC, Ludlow LEA, Challis J, Brooks I, Petrovic V, Venn NC, Sutton R, Majewski IJ, Oshlack A, Ekert PG. The application of RNA sequencing for the diagnosis and genomic classification of pediatric acute lymphoblastic leukemia. *Blood Advances.* 2020 4(5):930-942. BCBC

35. Buck ML, Mitchell RA, Murphy MA, Wang YY. Conservative management of recurrent enterogenous cysts of the cervical spine: A case report. *Journal of Clinical Neuroscience.* 2020 80:261-263. PONC

36. Burns AL, Sleebs BE, Siddiqui G, De Paoli AE, Anderson D, Liffner B, Harvey R, Beeson JG, Creek DJ, Goodman CD, McFadden GI, Wilson DW. Retargeting azithromycin analogues to have dual-modality antimalarial activity. *BMC Biology.* 2020 18(1):133. CBD

37. Campbell BCV, Ma H, Parsons MW, Churilov L, Yassi N, Kleinig TJ, Hsu CY, Dewey HM, Butcher KS, Yan B, Desmond PM, Wijeratne T, Curtze S, Barber PA, De Silva DA, Thijs V, Levi CR, Bladin CF, Sharma G, Bivard A, Donnan GA, Davis SM. Association of reperfusion after thrombolysis with clinical outcome across the 4.5- to 9-hours and wake-up stroke time window: A meta-analysis of the EXTEND and EPITHET randomized clinical trials. *JAMA Neurology.* 2020 Nov 2. *(*epub ahead of print) PHI

38. Campbell BCV, Mitchell PJ, Churilov L, Yassi N, Kleinig TJ, Dowling RJ, Yan B, Bush SJ, Thijs V, Scroop R, Simpson M, Brooks M, Asadi H, Wu TY, Shah DG, Wijeratne T, Zhao H, Alemseged F, Ng F, Bailey P, Rice H, de Villiers L, Dewey HM, Choi PMC, Brown H, Redmond K, Leggett D, Fink JN, Collecutt W, Kraemer T, Krause M, Cordato D, Field D, Ma H, O'Brien B, Clissold B, Miteff F, Clissold A, Cloud GC, Bolitho LE, Bonavia L, Bhattacharya A, Wright A, Mamun A, O'Rourke F, Worthington J, Wong AA, Levi CR, Bladin CF, Sharma G, Desmond PM, Parsons MW, Donnan GA, Davis SM, EXTEND-IA TNK Part 2 Investigators. Effect of intravenous tenecteplase dose on cerebral reperfusion before thrombectomy in patients with large vessel occlusion ischemic stroke: The EXTEND-IA TNK part 2 randomized clinical trial. *JAMA.* 2020 323(13):1257-1265. PHI

39. Carmichael CL, Wang J, Nguyen T, Kolawole O, Benyoucef A, De Maziere C, Milne A, Samuel S, Gillinder KR, Hediyeh-Zadeh S, Vo ANQ, Huang Y, Knezevic K, McInnes WRL, Shields BJ, Mitchell H, Ritchie ME, Lammens T, Lintermans B, Van Vlierberghe P, Wong N, Haigh K, Thoms JAI, Toulmin E, Curtis DJ, Oxley EP, Dickins RA, Beck D, Perkins AC, McCormack MP, Davis MJ, Berx G, Zuber J, Pimanda JE, Kile BT, Goossens S, Haigh JJ. The EMT modulator SNAI1 contributes to AML pathogenesis via its interaction with LSD1. *Blood.* 2020 136(8):957-973. BiO EDD

40. Celentano A, Yap T, Paolini R, Yiannis C, Mirams M, Koo K, McCullough M, Cirillo N. Inhibition of matrix metalloproteinase-2 modulates malignant behaviour of oral squamous cell carcinoma cells. *Journal of Oral Pathology & Medicine.* 2020 Jan 11. *(*epub ahead of print) PONC

41. Chamnanphon M, Gaedigk A, Puangpetch A, Pasomsub E, Chantratita W, Longley RJ, Sattabongkot J, Chariyavilaskul P, Sukasem C. Pharmacogene variation in Thai *Plasmodium vivax* relapse patients treated with a combination of primaquine and chloroquine. *Pharmacogenomics and Personalized Medicine.* 2020 13:1-12. PHI

42. Chan WF, Coughlan HD, Iannarella N, Smyth GK, Johanson TM, Keenan CR, Allan RS. Identification and characterization of the long non-coding RNA Gm13218 as a novel regulator of Gata3. *Immunology and Cell Biology.* 2020 Sep 24. *(*epub ahead of print) BIO IMM

43. Chappaz S, Law CW, Dowling MR, Carey KT, Lane RM, Ngo LH, Wickramasinghe VO, Smyth GK, Ritchie ME, Kile BT. Germline heterozygous mutations in Nxf1 perturb RNA metabolism and trigger thrombocytopenia and lymphopenia in mice. *Blood Advances.* 2020 4(7):1270-1283. EDD BIO

44. Chen K, Birkinshaw RW, Gurzau AD, Wanigasuriya I, Wang R, Iminitoff M, Sandow JJ, Young SN, Hennessy PJ, Willson TA, Heckmann DA, Webb AI, Blewitt ME, Czabotar PE, Murphy JM. Crystal structure of the hinge domain of Smchd1 reveals its dimerization mode and nucleic acid-binding residues. *Science Signaling.* 2020 13(636):eaaz5599. EDD SBD INFL ATB BCBC

45. Chua CC, Roberts AW, Reynolds J, Fong CY, Ting SB, Salmon JM, MacRaild S, Ivey A, Tiong IS, Fleming S, Brown FC, Loo S, Majewski IJ, Bohlander SK, Wei AH. Chemotherapy and venetoclax in Elderly Acute Myeloid Leukemia Trial (CAVEAT): A phase Ib dose-escalation study of venetoclax combined with modified intensive chemotherapy. *Journal of Clinical Oncology.* 2020 38(30):3506-3517. BCBC

46. Chua NK, Brown AJ. Lipid sensing tips the balance for a key cholesterol synthesis enzyme. *Journal of Lipid Research.* 2020 61(11):1363. USD

47. Cipponi A, Goode DL, Bedo J, McCabe MJ, Pajic M, Croucher DR, Rajal AG, Junankar SR, Saunders DN, Lobachevsky P, Papenfuss AT, Nessem D, Nobis M, Warren SC, Timpson P, Cowley M, Vargas AC, Qiu MR, Generali DG, Keerthikumar S, Nguyen U, Corcoran NM, Long GV, Blay JY, Thomas DM. MTOR signaling orchestrates stress-induced mutagenesis, facilitating adaptive evolution in cancer. *Science.* 2020 368(6495):1127-1131. BIO

48. Clayer E, Dalseno D, Kueh A, Lacey D, Tsai M, Carr E, Wimmer VC, Bouillet P. Severe impairment of TNF post-transcriptional regulation leads to embryonic death. *iScience.* 2020 23(11):101726. INFL BCBC ATB

49. Clucas D, Brittenham G, Pasricha SR. Evaluation of iron deficiency anemia. *Gastroenterology.* 2020 Dec 30. *(*epub ahead of print) PHI

50. Cmero M, Yuan K, Ong CS, Schroder J, PCWAG Evolution Heterogeneity Working Group, Corcoran NM, Papenfuss T, Hovens CM, Markowetz F, Macintyre G, PCAWG Consortium. Inferring structural variant cancer cell fraction. *Nature Communications.* 2020 11(1):730. BIO

51. Conduit C, de Boer RH, Lok S, Gibbs P, Malik L, Loh Z, Yeo B, Greenberg S, Devitt B, Lombard J, Nottage M, Collins I, Torres J, Nolan M, Nott L. Real-world impact of anti-HER2 therapy-related cardiotoxicity in patients with advanced HER2-positive breast cancer. *Asia-Pacific Journal of Clinical Oncology.* 2020 16(6):356-362. PONC

52. Cook L, Munier CML, Seddiki N, Hardy MY, Anderson RP, Zaunders J, Tye-Din JA, Kelleher AD, van Bockel D. Circulating gluten-specific, but not CMV-specific, CD39(+) regulatory T cells have an oligoclonal TCR repertoire. *Clinical & Translational Immunology.* 2020 9(1):e1096. IMM

53. Cowan AD, Smith NA, Sandow JJ, Kapp EA, Rustam YH, Murphy JM, Brouwer JM, Bernardini JP, Roy MJ, Wardak AZ, Tan IK, Webb AI, Gulbis JM, Smith BJ, Reid GE, Dewson G, Colman PM, Czabotar PE. BAK core dimers bind lipids and can be bridged by them. *Nature Structural & Molecular Biology.* 2020 27(11):1024-1031. ATB INFL SBD USD CBD

54. Cui W, Franchini F, Alexander M, Officer A, Wong HL, M IJ, Desai J, Solomon BJ. Real world outcomes in KRAS G12C mutation positive non-small cell lung cancer. *Lung Cancer.* 2020 146:310-317. PONC

55. Damgaard RB, Jolin HE, Allison MED, Davies SE, Titheradge HL, McKenzie ANJ, Komander D. OTULIN protects the liver against cell death, inflammation, fibrosis, and cancer. *Cell Death and Differentiation.* 2020 27(5):1457-1474. USD

56. Dans MG, Weiss GE, Wilson DW, Sleebs BE, Crabb BS, de Koning-Ward TF, Gilson PR. Screening the medicines for Malaria Venture Pathogen Box for invasion and egress inhibitors of the blood stage of *Plasmodium falciparum* reveals several inhibitory compounds. *International Journal for Parasitology.* 2020 50(3):235-252. CBD

57. Davies KA, Fitzgibbon C, Young SN, Garnish SE, Yeung W, Coursier D, Birkinshaw RW, Sandow JJ, Lehmann WIL, Liang LY, Lucet IS, Chalmers JD, Patrick WM, Kannan N, Petrie EJ, Czabotar PE, Murphy JM. Distinct pseudokinase domain conformations underlie divergent activation mechanisms among vertebrate MLKL orthologues. *Nature Communications.* 2020 11(1):3060. SBD INFL ATB CBD

58. Davis JE, Handunnetti SM, Ludford-Menting M, Sharpe C, Blombery P, Anderson MA, Roberts AW, Seymour JF, Tam CS, Ritchie DS, Koldej RM. Immune recovery in patients with mantle cell lymphoma receiving long-term ibrutinib and venetoclax combination therapy. *Blood Advances.* 2020 4(19):4849-4859. BCBC

59. Dawson CA, Pal B, Vaillant F, Gandolfo LC, Liu Z, Bleriot C, Ginhoux F, Smyth GK, Lindeman GJ, Mueller SN, Rios AC, Visvader JE. Tissue-resident ductal macrophages survey the mammary epithelium and facilitate tissue remodelling. *Nature Cell Biology.* 2020 22(5):546-558. CBSC BIO

60. Degeling K, Wong HL, Koffijberg H, Jalali A, Shapiro J, Kosmider S, Wong R, Lee B, Burge M, Tie J, Yip D, Nott L, Khattak A, Lim S, Caird S, Gibbs P, M IJ. Simulating progression-free and overall survival for first-line doublet chemotherapy with or without bevacizumab in metastatic colorectal cancer patients based on real-world registry data. *PharmacoEconomics.* 2020 38(11):1263-1275. PONC

61. Delconte RB, Guittard G, Goh W, Hediyeh-Zadeh S, Hennessy RJ, Rautela J, Davis MJ, Souza-Fonseca-Guimaraes F, Nunes JA, Huntington ND. NK cell priming from endogenous homeostatic signals is modulated by CIS. *Frontiers in Immunology.* 2020 11:75. IMM BIO

62. Deo P, Chow SH, Han ML, Speir M, Huang C, Schittenhelm RB, Dhital S, Emery J, Li J, Kile BT, Vince JE, Lawlor KE, Naderer T. Mitochondrial dysfunction caused by outer membrane vesicles from Gram-negative bacteria activates intrinsic apoptosis and inflammation. *Nature Microbiology.* 2020 5(11):1418-1427. INFL

63. Dezfouli M, Bergstrom S, Skattum L, Abolhassani H, Neiman M, Torabi-Rahvar M, Franco Jarava C, Martin-Nalda A, Ferrer Balaguer JM, Slade CA, Roos A, Fernandez Pereira LM, Lopez-Trascasa M, Gonzalez-Granado LI, Allende-Martinez LM, Mizuno Y, Yoshida Y, Friman V, Lundgren A, Aghamohammadi A, Rezaei N, Hernandez-Gonzalez M, von Dobeln U, Truedsson L, Hara T, Nonoyama S, Schwenk JM, Nilsson P, Hammarstrom L. Newborn screening for presymptomatic diagnosis of complement and phagocyte deficiencies. *Frontiers in Immunology.* 2020 11:455. IMM

64. Diepstraten ST, Chang C, Tai L, Gong JN, Lan P, Dowell AC, Taylor GS, Strasser A, Kelly GL. BCL-W is dispensable for the sustained survival of select Burkitt lymphoma and diffuse large B-cell lymphoma cell lines. *Blood Advances.* 2020 4(2):356-366. BCBC

65. Dilrukshi Herath HMP, Taki AC, Nguyen N, Garcia-Bustos J, Hofmann A, Wang T, Ma G, Chang BCH, Jabbar A, Sleebs BE, Gasser RB. Synthetic kavalactone analogues with increased potency and selective anthelmintic activity against arvae of *Haemonchus contortus in vitro*. *Molecules.* 2020 25(8):E2004. CBD

66. DiNardo CD, Tiong IS, Quaglieri A, MacRaild S, Loghavi S, Brown FC, Thijssen R, Pomilio G, Ivey A, Salmon J, Glytsou C, Fleming SA, Zhang Q, Ma H, Patel KP, Kornblau SM, Xu Z, Chua CC, Chen X, Blombery P, Flensburg C, Cummings N, Aifantis I, Kantarjian H, Huang DCS, Roberts AW, Majewski IJ, Konopleva M, Wei AH. Molecular patterns of response and treatment failure after frontline venetoclax combinations in older patients with AML. *Blood.* 2020 132(11):791-803. BCBC

67. Djajawi TM, Liu L, Gong JN, Huang AS, Luo MJ, Xu Z, Okamoto T, Call MJ, Huang DCS, van Delft MF. MARCH5 requires MTCH2 to coordinate proteasomal turnover of the MCL1:NOXA complex. *Cell Death and Differentiation.* 2020 27(8):2484-2499. BCBC SBD

68. Dobano C, Bardaji A, Arevalo-Herrera M, Martinez-Espinosa FE, Botto-Menezes C, Padilla N, Menegon M, Kochar S, Kochar SK, Unger H, Ome-Kaius M, Rosanas-Urgell A, Malheiros A, Castellanos ME, Hans D, Desai M, Casellas A, Chitnis CE, Severini C, Mueller I, Rogerson S, Menendez C, Requena P. Cytokine signatures of *Plasmodium vivax* infection during pregnancy and delivery outcomes. *PLoS Neglected Tropical Diseases.* 2020 14(5):e0008155. PHI

69. Dobson-Stone C, Hallupp M, Shahheydari H, Ragagnin AMG, Chatterton Z, Carew-Jones F, Shepherd CE, Stefen H, Paric E, Fath T, Thompson EM, Blumbergs P, Short CL, Field CD, Panegyres PK, Hecker J, Nicholson G, Shaw AD, Fullerton JM, Luty AA, Schofield PR, Brooks WS, Rajan N, Bennett MF, Bahlo M, Landers JE, Piguet O, Hodges JR, Halliday GM, Topp SD, Smith BN, Shaw CE, McCann E, Fifita JA, Williams KL, Atkin JD, Blair IP, Kwok JB. *CYLD* is a causative gene for frontotemporal dementia - amyotrophic lateral sclerosis. *Brain.* 2020 143(3):783-799. PHI

70. Doerflinger M, Deng Y, Whitney P, Salvamoser R, Engel S, Kueh AJ, Tai L, Bachem A, Gressier E, Geoghegan ND, Wilcox S, Rogers KL, Garnham AL, Dengler MA, Bader SM, Ebert G, Pearson JS, De Nardo D, Wang N, Yang C, Pereira M, Bryant CE, Strugnell RA, Vince JE, Pellegrini M, Strasser A, Bedoui S, Herold MJ. Flexible usage and interconnectivity of diverse cell death pathways protect against intracellular infection. *Immunity.* 2020 *53*(3):533-547e7. IDID BCBC ATB BIO INFL

71. Dolzhenko E, Bennett MF, Richmond PA, Trost B, Chen S, van Vugt J, Nguyen C, Narzisi G, Gainullin VG, Gross AM, Lajoie BR, Taft RJ, Wasserman WW, Scherer SW, Veldink JH, Bentley DR, Yuen RKC, Bahlo M, Eberle MA. ExpansionHunter Denovo: a computational method for locating known and novel repeat expansions in short-read sequencing data. *Genome Biology.* 2020 21(1):102. PHI

72. Dong L, Vaux DL. Glucocorticoids can induce BIM to trigger apoptosis in the absence of BAX and BAK1. *Cell Death & Disease.* 2020 11(6):442. INFL

73. Douville C, Cohen JD, Ptak J, Popoli M, Schaefer J, Silliman N, Dobbyn L, Schoen RE, Tie J, Gibbs P, Goggins M, Wolfgang CL, Wang TL, Shih IM, Karchin R, Lennon AM, Hruban RH, Tomasetti C, Bettegowda C, Kinzler KW, Papadopoulos N, Vogelstein B. Assessing aneuploidy with repetitive element sequencing. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(9):4858-4863. PONC

74. Dragoljevic D, Lee MKS, Louis C, Shihata W, Kraakman MJ, Hansen J, Masters SL, Hanaoka BY, Nagareddy PR, Lancaster GI, Wicks IP, Murphy AJ. Inhibition of interleukin-1β signalling promotes atherosclerotic lesion remodelling in mice with inflammatory arthritis. *Clinical & Translational Immunology.* 2020 9(11):e1206. INFL

75. Dubuisson A, Fahrner JE, Goubet AG, Terrisse S, Voisin N, Bayard C, Lofek S, Drubay D, Bredel D, Mouraud S, Susini S, Cogdill A, Rebuffet L, Ballot E, Jacquelot N, Thomas de Montpreville V, Casiraghi O, Radulescu C, Ferlicot S, Figueroa DJ, Yadavilli S, Waight JD, Ballas M, Hoos A, Condamine T, Parier B, Gaudillat C, Routy B, Ghiringhelli F, Derosa L, Breuskin I, Rouanne M, André F, Lebacle C, Baumert H, Wislez M, Fadel E, Cremer I, Albiges L, Geoerger B, Scoazec JY, Loriot Y, Kroemer G, Marabelle A, Bonvalet M, Zitvogel L. Immunodynamics of explanted human tumors for immuno-oncology. *EMBO Molecular Medicine.* 2020 13(1):e12850. IMM

76. Ebert G, Lopaticki S, O'Neill MT, Steel RWJ, Doerflinger M, Rajasekaran P, Yang ASP, Erickson S, Ioannidis L, Arandjelovic P, Mackiewicz L, Allison C, Silke J, Pellegrini M, Boddey JA. Targeting the extrinsic pathway of hepatocyte apoptosis promotes clearance of *Plasmodium* liver infection. *Cell Reports.* 2020 30(13):4343-4354 e4. IDID INFL

77. Elsum I, Massey L, McEwan C, LaGrappe D, Kowal E, Savarirayan R, Baynam G, Jenkins M, Garvey G, Kelaher M. A community-based co-designed genetic health service model for Aboriginal Australians. *PLoS One.* 2020 15(10):e0239765. IMM

78. Emery-Corbin SJ, Hamey JJ, Ansell BRE, Balan B, Tichkule S, Stroehlein AJ, Cooper C, McInerney BV, Zadeh SH, Vuong D, Crombie A, Lacey E, Davis MJ, Wilkins MR, Bahlo M, Svard SG, Gasser RB, Jex AR. Eukaryote-conserved methylarginine is absent in diplomonads and functionally compensated in *Giardia*. *Molecular Biology and Evolution.* 2020 37(12):3525-3549. PHI BIO

79. Erlichster M, Bedo J, Skafidas E, Kwan P, Kowalczyk A, Goudey B. Improved HLA-based prediction of coeliac disease identifies two novel genetic interactions. *European Journal of Human Genetics* 2020 28(12):1743-1752. BIO

80. Fachal L, Aschard H, Beesley J, Barnes DR, Allen J, Kar S, Pooley KA, Dennis J, Michailidou K, Turman C, Soucy P, Lemacon A, Lush M, Tyrer JP, Ghoussaini M, Moradi Marjaneh M, Jiang X, GEMO Study Collaborators, EMBRACE Collaborators, K ConFab Investigators, HEBON Investigators, ABCTB Investigators, includes Lindeman GJ, Visvader JE, Scott C. Fine-mapping of 150 breast cancer risk regions identifies 191 likely target genes. *Nature Genetics.* 2020 52(1):56-73. CBSC

81. Fan Z, Devlin JR, Hogg SJ, Doyle MA, Harrison PF, Todorovski I, Cluse LA, Knight DA, Sandow JJ, Gregory G, Fox A, Beilharz TH, Kwiatkowski N, Scott NE, Vidakovic AT, Kelly GP, Svejstrup JQ, Geyer M, Gray NS, Vervoort SJ, Johnstone RW. CDK13 cooperates with CDK12 to control global RNA polymerase II processivity. *Science Advances.* 2020 6(18):eaaz5041. ATB

82. Fang M, Rustam Y, Palmieri M, Sieber OM, Reid GE. Evaluation of ultraviolet photodissociation tandem mass spectrometry for the structural assignment of unsaturated fatty acid double bond positional isomers. *Analytical and Bioanalytical Chemistry.* 2020 412(10):2339-2351. PONC

83. Faux MC, King LE, Kane SR, Love C, Sieber OM, Burgess AW. APC regulation of ESRP1 and p120-catenin isoforms in colorectal cancer cells. *Molecular Biology of the Cell.* 2021 32(2):120-130. (epub 2020 Nov 25) PONC

84. Favuzza P, de Lera Ruiz M, Thompson JK, Triglia T, Ngo A, Steel RWJ, Vavrek M, Christensen J, Healer J, Boyce C, Guo Z, Hu M, Khan T, Murgolo N, Zhao L, Penington JS, Reaksudsan K, Jarman K, Dietrich MH, Richardson L, Guo KY, Lopaticki S, Tham WH, Rottmann M, Papenfuss T, Robbins JA, Boddey JA, Sleebs BE, Sabroux HJ, McCauley JA, Olsen DB, Cowman AF. Dual plasmepsin-targeting antimalarial agents disrupt multiple stages of the malaria parasite life cycle. *Cell Host & Microbe.* 2020 27(4):642-658 e12. IDID ATB BIO USD CBD

85. Fedele PL, Liao Y, Gong JN, Yao Y, van Delft MF, Low MSY, Tai L, Herold MJ, Jackson JT, Teh CE, Tan T, O'Reilly LA, Tellier J, Grigoriadis G, Huang DCS, Shi W, Nutt SL, Willis SN. The transcription factor IRF4 represses proapoptotic BMF and BIM to licence multiple myeloma survival. *Leukemia.* 2020 Nov 4. *(*epub ahead of print) BCBC IMM INFL

86. Fernandez-Becerra C, Bernabeu M, Castellanos A, Correa BR, Obadia T, Ramirez M, Rui E, Hentzschel F, Lopez-Montanes M, Ayllon-Hermida A, Martin-Jaular L, Elizalde-Torrent A, Siba P, Vencio RZ, Arevalo-Herrera M, Herrera S, Alonso PL, Mueller I, Del Portillo HA. *Plasmodium vivax* spleen-dependent genes encode antigens associated with cytoadhesion and clinical protection. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(23):13056-13065. PHI

87. Ferraro NM, Strober BJ, Einson J, Abell NS, Aguet F, Barbeira AN, Brandt M, Bucan M, Castel SE, Davis JR, Greenwald E, Hess GT, Hilliard AT, Kember RL, Kotis B, Park Y, Peloso G, Ramdas S, Scott AJ, Smail C, Tsang EK, Zekavat SM, Ziosi M, Aradhana, TOPMED Lipids Working Group, Ardlie KG, Assimes TL, Bassik MC, Brown CD, Correa A, Hall I, Im HK, Li X, Natarajan P, GTEx Consortium, Lappalainen T, Mohammadi P, Montgomery SB, Battle A, includes Hickey PF. Transcriptomic signatures across human tissues identify functional rare genetic variation. *Science.* 2020 369(6509):eaaz5900. ATB

88. Fettke H, Kwan EM, Docanto MM, Bukczynska P, Ng N, Graham LK, Mahon K, Hauser C, Tan W, Wang XH, Zhao Z, Zheng T, Zhou K, Du P, Yu J, Huang Y, Jia S, Kohli M, Horvath LG, Azad AA. Combined cell-free DNA and RNA profiling of the androgen receptor: clinical utility of a novel multianalyte liquid biopsy assay for metastatic prostate cancer. *European Urology.* 2020 78(2):173-180. PONC

89. Fettke H, Steen JA, Kwan EM, Bukczynska P, Keerthikumar S, Goode D, Docanto M, Ng N, Martelotto L, Hauser C, Southey MC, Azad AA, Nguyen-Dumont T. Analytical validation of an error-corrected ultra-sensitive ctDNA next-generation sequencing assay. *BioTechniques.* 2020 69(2):133-140. PONC

90. Flensburg C, Sargeant T, Oshlack A, Majewski IJ. SuperFreq: Integrated mutation detection and clonal tracking in cancer. *PLoS Computational Biology.* 2020 16(2):e1007603. BCBC

91. Foers AD, Dagley LF, Chatfield S, Webb AI, Cheng L, Hill AF, Wicks IP, Pang KC. Proteomic analysis of extracellular vesicles reveals an immunogenic cargo in rheumatoid arthritis synovial fluid. *Clinical & Translational Immunology.* 2020 9(11):e1185. INFL ATB

92. Foers AD, Garnham AL, Smyth GK, Proudman SM, Cheng L, Hill AF, Pang KC, Wicks IP. Circulating small non-coding RNA biomarkers of response to triple DMARD therapy in Caucasian women with early rheumatoid arthritis. *Journal of Rheumatology.* 2020 47(12):1746-1751. INFL BIO CBSC ATB EDD

93. Fola AA, Kattenberg E, Razook Z, Lautu-Gumal D, Lee S, Mehra S, Bahlo M, Kazura J, Robinson LJ, Laman M, Mueller I, Barry AE. SNP barcodes provide higher resolution than microsatellite markers to measure *Plasmodium vivax* population genetics. *Malaria Journal.* 2020 19(1):375. PHI

94. Foroughi S, Wong HL, Tie J, Wong R, Lee M, Lee B, Jones I, Skinner I, Burgess AW, Gibbs P. Characteristics and outcomes of participants in colorectal cancer biomarker trials versus a real-world cohort. *Acta Oncologica* 2020 Dec 30. *(*epub ahead of print) PONC

95. Galeano Nino JL, Pageon SV, Tay SS, Colakoglu F, Kempe D, Hywood J, Mazalo JK, Cremasco J, Govendir MA, Dagley LF, Hsu K, Rizzetto S, Zieba J, Rice G, Prior V, O'Neill GM, Williams RJ, Nisbet DR, Kramer B, Webb AI, Luciani F, Read MN, Biro M. Cytotoxic T Cells swarm by homotypic chemokine signalling. *eLife.* 2020 9:e56554. ATB

96. Gan L, Sun J, Yang S, Zhang X, Chen W, Sun Y, Wu X, Cheng C, Yuan J, Li A, Corbett MA, Dixon MP, Thomas T, Voss AK, Gecz J, Wang GZ, Bonni A, Li Q, Huang J. Chromatin-binding protein PHF6 regulates activity-dependent transcriptional networks to promote hunger response. *Cell Reports.* 2020 30(11):3717-3728e6. EDD

97. Gao L, Moodie M, Mitchell PJ, Churilov L, Kleinig TJ, Yassi N, Yan B, Parsons MW, Donnan GA, Davis SM, Campbell BCV, Investigators E-IT. Cost-effectiveness of Tenecteplase before thrombectomy for ischemic stroke. *Stroke.* 2020 51(12):3681-3689. PHI

98. Geistlinger L, Csaba G, Santarelli M, Ramos M, Schiffer L, Turaga N, Law C, Davis S, Carey V, Morgan M, Zimmer R, Waldron L. Toward a gold standard for benchmarking gene set enrichment analysis. *Briefings in Bioinformatics.* 2021 22(1):545-556. (epub 2020 March 9) EDD

99. Ghoreishi A, Arsang-Jang S, Sabaa-Ayoun Z, Yassi N, Sylaja PN, Akbari Y, Divani AA, Biller J, Phan T, Steinwender S, Silver B, Zand R, Basri HB, Iqbal OM, Ranta A, Ruland S, Macri E, Ma H, Nguyen TN, Abootalebi S, Gupta A, Alet M, Lattanzi S, Desai M, Gagliardi RJ, Girotra T, Inoue M, Yoshimoto T, Isaac CF, Mayer SA, Morovatdar N, Nilanont Y, Nobleza COS, Saber H, Kamenova S, Kondybayeva A, Krupinski J, Siegler JE, Stranges S, Torbey MT, Yorio D, Zurrú MC, Rubinos CA, Shahripour RB, Borhani-Haghighi A, Napoli MD, Azarpazhooh MR. Stroke care trends during COVID-19 pandemic in Zanjan Province, Iran. From the CASCADE Initiative: statistical analysis plan and preliminary results. *Journal of Stroke and Cerebrovascular Diseases.* 2020 29(12):105321. PHI

100. Gisatulin M, Dobricic V, Zuhlke C, Hellenbroich Y, Tadic V, Munchau A, Isenhardt K, Burk K, Bahlo M, Lockhart PJ, Lohmann K, Helmchen C, Bruggemann N. Clinical spectrum of the pentanucleotide repeat expansion in the RFC1 gene in ataxia syndromes. *Neurology.* 2020 95(21):e2912-e2923. PHI

101. Gnanasekaran S, Bandala-Sanchez E, Kolic M, Churilov L, Rogers SL, McAuley AK, Sandhu SS, Qureshi S, Lim LL, Wickremasinghe SS. The association between intravitreal ranibizumab therapy and serum cytokine concentrations in patients with diabetic macular edema. *Molecular Vision.* 2020 26:246-256. PHI

102. Goh W, Scheer S, Jackson JT, Hediyeh-Zadeh S, Delconte RB, Schuster IS, Andoniou CE, Rautela J, Degli-Esposti MA, Davis MJ, McCormack MP, Nutt SL, Huntington ND. Hhex directly represses BIM-dependent apoptosis to promote NK cell development and maintenance. *Cell Reports.* 2020 33(3):108285. IMM BIO

103. Gómez-Aleza C, Nguyen B, Yoldi G, Ciscar M, Barranco A, Hernández-Jiménez E, Maetens M, Salgado R, Zafeiroglou M, Pellegrini P, Venet D, Garaud S, Trinidad EM, Benítez S, Vuylsteke P, Polastro L, Wildiers H, Simon P, Lindeman G, Larsimont D, Van den Eynden G, Velghe C, Rothé F, Willard-Gallo K, Michiels S, Muñoz P, Walzer T, Planelles L, Penninger J, Azim HA, Jr., Loi S, Piccart M, Sotiriou C, González-Suárez E. Inhibition of RANK signaling in breast cancer induces an anti-tumor immune response orchestrated by CD8+ T cells. *Nature Communications.* 2020 11(1):6335. CBSC

104. Gorringe KL, Cheasley D, Wakefield MJ, Ryland GL, Allan PE, Alsop K, Amarasinghe KC, Ananda S, Bowtell DDL, Christie M, Chiew YE, Churchman M, DeFazio A, Fereday S, Gilks CB, Gourley C, Hadley AM, Hendley J, Hunter SM, Kaufmann SH, Kennedy CJ, Kobel M, Le Page C, Li J, Lupat R, McNally OM, McAlpine JN, Pyman J, Rowley SM, Salazar C, Saunders H, Semple T, Stephens AN, Thio N, Torres MC, Traficante N, Zethoven M, Antill YC, Campbell IG, Scott CL. Therapeutic options for mucinous ovarian carcinoma. *Gynecologic Oncology.* 2020 153(3):552-560. BIO CBSC

105. Grant ZL, Whitehead L, Wong VHY, He Z, Yan RY, Miles AR, Benest AV, Bates DO, Prahst C, Bentley K, Bui BV, Symons RC, Coultas L. Blocking endothelial apoptosis revascularises the retina in a model of ischemic retinopathy. *Journal of Clinical Investigation.* 2020 130(8):4235-4251. EDD ATB

106. Gresle MM, Jordan MA, Stankovich J, Spelman T, Johnson LJ, Laverick L, Hamlett A, Smith LD, Jokubaitis VG, Baker J, Haartsen J, Taylor B, Charlesworth J, Bahlo M, Speed TP, Brown MA, Field J, Baxter AG, Butzkueven H. Multiple sclerosis risk variants regulate gene expression in innate and adaptive immune cells. *Life Science Alliance.* 2020 3(7):10.26508/lsa.202000650. PHI BIO

107. Gruenberg M, Moniz CA, Hofmann NE, Koepfli C, Robinson LJ, Nate E, Monteiro WM, de Melo GC, Kuehn A, Siqueira AM, Nguitragool W, Bassat Q, Lacerda M, Sattabongkot J, Mueller I, Felger I. Utility of ultra-sensitive qPCR to detect *Plasmodium falciparum* and *Plasmodium vivax* infections under different transmission intensities. *Malaria Journal.* 2020 19(1):319. PHI

108. Guillerey C, Stannard K, Chen J, Krumeich S, Miles K, Nakamura K, Smith J, Yu Y, Ng S, Harjunpaa H, Teng MWL, Engwerda C, Belz GT, Smyth MJ. Systemic administration of IL-33 induces a population of circulating KLRG1(hi) type 2 innate lymphoid cells and inhibits type 1 innate immunity against multiple myeloma. *Immunology and Cell Biology.* 2021 99(1):65-83. (epub 2020 Sep 18) IMM

109. Halbroth BR, Sebastian S, Salman AM, Ulaszewska M, Gola A, Longley RJ, Janse CJ, Khan SM, Hill AVS, Spencer AJ. Preclinical development and assessment of viral vectors expressing a fusion antigen of *Plasmodium falciparum* LSA1 and LSAP2 for efficacy against liver-stage malaria. *Infection and Immunity.* 2020 88(2):e00573-19. IMM

110. Hamadani JD, Hasan MI, Baldi AJ, Hossain SJ, Shiraji S, Bhuiyan MSA, Mehrin SF, Fisher J, Tofail F, Tipu S, Grantham-McGregor S, Biggs BA, Braat S, Pasricha SR. Immediate impact of stay-at-home orders to control COVID-19 transmission on socioeconomic conditions, food insecurity, mental health, and intimate partner violence in Bangladeshi women and their families: an interrupted time series. *Lancet Global Health.* 2020 8(11):e1380-e1389. PHI

111. Harding AL, Bediaga N, Galligan A, Colman PG, Fourlanos S, Wentworth JM. Factors that predict glycaemic response to sodium-glucose linked transporter (SGLT) inhibitors. *Internal Medicine Journal.* 2020 Feb 24. *(*epub ahead of print) PHI

112. Harmsen RAG, Aam BB, Madhuprakash J, Hamre AG, Goddard-Borger ED, Withers SG, Eijsink VGH, Sørlie M. Chemoenzymatic synthesis of Chito-oligosaccharides with alternating N-d-Acetylglucosamine and d-Glucosamine. *Biochemistry.* 2020 59(48):4581-4590. CBD

113. Hayward KS, Johnson L, Yassi N. Emerging stroke clinicians and scientists: an Australasian experience. *Stroke.* 2020 51(2):e21-e23. PHI

114. Heim VJ, Dagley LF, Stafford CA, Hansen FM, Clayer E, Bankovacki A, Webb AI, Lucet IS, Silke J, Nachbur U. A regulatory region on RIPK2 is required for XIAP binding and NOD signaling activity. *EMBO Reports.* 2020 5(21):e50400. INFL ATB CBD USD

115. Hickey JT, Timmins RG, Maniar N, Rio E, Hickey PF, Pitcher CA, Williams MD, Opar DA. Pain-free versus pain-threshold rehabilitation following acute hamstring strain injury: a randomized controlled trial. *Journal of Orthopaedic and Sports Physical Therapy.* 2020 50(2):91-103. ATB

116. Hickey SM, Nitschke SO, Sweetman MJ, Sumby CJ, Brooks DA, Plush SE, Ashton TD. Cross-coupling of amide and amide derivatives to umbelliferone nonaflates: synthesis of coumarin derivatives and fluorescent materials. *Journal of Organic Chemistry.* 2020 85(12):7986-7999. CBD

117. Hildebrand JM, Kauppi M, Majewski IJ, Liu Z, Cox AJ, Miyake S, Petrie EJ, Silk MA, Li Z, Tanzer MC, Brumatti G, Young SN, Hall C, Garnish SE, Corbin J, Stutz MD, Di Rago L, Gangatirkar P, Josefsson EC, Rigbye K, Anderton H, Rickard JA, Tripaydonis A, Sheridan J, Scerri TS, Jackson VE, Czabotar PE, Zhang JG, Varghese L, Allison CC, Pellegrini M, Tannahill GM, Hatchell EC, Willson TA, Stockwell D, de Graaf CA, Collinge J, Hilton A, Silke N, Spall SK, Chau D, Athanasopoulos V, Metcalf D, Laxer RM, Bassuk AG, Darbro BW, Fiatarone Singh MA, Vlahovich N, Hughes D, Kozlovskaia M, Ascher DB, Warnatz K, Venhoff N, Thiel J, Biben C, Blum S, Reveille J, Hildebrand MS, Vinuesa CG, McCombe P, Brown MA, Kile BT, McLean C, Bahlo M, Masters SL, Nakano H, Ferguson PJ, Murphy JM, Alexander WS, Silke J. A missense mutation in the MLKL brace region promotes lethal neonatal inflammation and hematopoietic dysfunction. *Nature Communications.* 2020 11(1):3150. INFL BCBC IDID PHI SBD

118. Hildebrand MS, Jackson VE, Scerri TS, Van Reyk O, Coleman M, Braden RO, Turner S, Rigbye KA, Boys A, Barton S, Webster R, Fahey M, Saunders K, Parry-Fielder B, Paxton G, Hayman M, Coman D, Goel H, Baxter A, Ma A, Davis N, Reilly S, Delatycki M, Liegeois FJ, Connelly A, Gecz J, Fisher SE, Amor DJ, Scheffer IE, Bahlo M, Morgan AT. Severe childhood speech disorder: Gene discovery highlights transcriptional dysregulation. *Neurology.* 2020 94(20):e2148-e2167. PHI

119. Hossain MS, Commons RJ, Douglas NM, Thriemer K, Alemayehu BH, Amaratunga C, Anvikar AR, Ashley EA, Asih PBS, Carrara VI, Lon C, D'Alessandro U, Davis TME, Dondorp AM, Edstein MD, Fairhurst RM, Ferreira MU, Hwang J, Janssens B, Karunajeewa H, Kiechel JR, Ladeia-Andrade S, Laman M, Mayxay M, McGready R, Moore BR, Mueller I, Newton PN, Thuy-Nhien NT, Noedl H, Nosten F, Phyo AP, Poespoprodjo JR, Saunders DL, Smithuis F, Spring MD, Stepniewska K, Suon S, Suputtamongkol Y, Syafruddin D, Tran HT, Valecha N, Van Herp M, Van Vugt M, White NJ, Guerin PJ, Simpson JA, Price RN. The risk of *Plasmodium vivax* parasitaemia after *P. falciparum* malaria: An individual patient data meta-analysis from the WorldWide Antimalarial Resistance Network. *PLoS Medicine.* 2020 17(11):e1003393. PHI

120. Hyslop SR, Alexander M, Thai AA, Kersbergen A, Kueh AJ, Herold MJ, Corbin J, Gangatirkar P, Ng AP, Solomon BJ, Alexander WS, Sutherland KD, Josefsson EC. Targeting platelets for improved outcome in KRAS-driven lung adenocarcinoma. *Oncogene.* 2020 39(29):5177-5186. CBSC BCBC

121. Iyer S, Uren RT, Dengler MA, Shi MX, Uno E, Adams JM, Dewson G, Kluck RM. Robust autoactivation for apoptosis by BAK but not BAX highlights BAK as an important therapeutic target. *Cell Death & Disease.* 2020 11(4):268. BCBC USD

122. Jackson JT, O'Donnell K, Light A, Goh W, Huntington ND, Tarlinton DM, McCormack MP. Hhex regulates murine lymphoid progenitor survival independently of Stat5 and Cdkn2a. *European Journal of Immunology.* 2020 50(7):959-971. IMM

123. Jacob L, Witteveen A, Beumer I, Delahaye L, Wehkamp D, van den Akker J, Snel M, Chan B, Floore A, Bakx N, Brink G, Poncet C, Bogaerts J, Delorenzi M, Piccart M, Rutgers E, Cardoso F, Speed T, van 't Veer L, Glas A. Controlling technical variation amongst 6693 patient microarrays of the randomized MINDACT trial. *Communications Biology.* 2020 3(1):397. BIO

124. Jarva MA, Dramicanin M, Lingford JP, Mao R, John A, Jarman KE, Grinter R, Goddard-Borger ED. Structural basis of substrate recognition and catalysis by fucosyltransferase 8. *Journal of Biological Chemistry.* 2020 295(19):6677-6688. CBD ATB

125. Jarva MA, Lingford JP, John A, Soler NM, Scott NE, Goddard-Borger ED. Trefoil factors share a lectin activity that defines their role in mucus. *Nature Communications.* 2020 11(1):2265. CBD

126. Jenkins NL, James SA, Salim A, Sumardy F, Speed TP, Conrad M, Richardson DR, Bush AI, McColl G. Changes in ferrous iron and glutathione promote ferroptosis and frailty in aging *Caenorhabditis elegans*. *eLife.* 2020 9:e56580. BIO

127. Jimenez-Duran G, Luque-Martin R, Patel M, Koppe E, Bernard S, Sharp C, Buchan N, Rea C, de Winther MPJ, Turan N, Angell D, Wells CA, Cousins R, Mander PK, Masters SL. Pharmacological validation of targets regulating CD14 during macrophage differentiation. *EBioMedicine.* 2020 61:103039. INFL

128. Ju Y, Kelly HG, Dagley LF, Reynaldi A, Schlub TE, Spall SK, Bell CA, Cui J, Mitchell AJ, Lin Z, Wheatley AK, Thurecht KJ, Davenport MP, Webb AI, Caruso F, Kent SJ. Person-specific biomolecular coronas modulate nanoparticle interactions with immune cells in human blood. *ACS Nano.* 2020 14(11):15723-15737. ATB

129. Jung M, Gao J, Cheung L, Bongers A, Somers K, Clifton M, Ramsay EE, Russell AJ, Valli E, Gifford AJ, George J, Kennedy CJ, Wakefield MJ, Topp M, Ho GY, Australian Ovarian Cancer Study, Scott CL, Bowtell DD, de Fazio A, Norris MD, Haber M, Henderson MJ. ABCC4/MRP4 contributes to the aggressiveness of Myc-associated epithelial ovarian cancer. *International Journal of Cancer.* 2020 147(8):2225-2238. BIO CBSC

130. Juno JA, Tan HX, Lee WS, Reynaldi A, Kelly HG, Wragg K, Esterbauer R, Kent HE, Batten CJ, Mordant FL, Gherardin NA, Pymm P, Dietrich MH, Scott NE, Tham WH, Godfrey DI, Subbarao K, Davenport MP, Kent SJ, Wheatley AK. Humoral and circulating follicular helper T cell responses in recovered patients with COVID-19. *Nature Medicine.* 2020 26(9):1428-1434. IDID

131. Kang EY, Cheasley D, LePage C, Wakefield MJ, da Cunha Torres M, Rowley S, Salazar C, Xing Z, Allan P, Bowtell DDL, Mes-Masson AM, Provencher DM, Rahimi K, Kelemen LE, Fasching PA, Doherty JA, Goodman MT, Goode EL, Deen S, Pharoah PDP, Brenton JD, Sieh W, Mateoiu C, Sundfeldt K, Cook LS, Le ND, Anglesio MS, Gilks CB, Huntsman DG, Kennedy CJ, Traficante N, Australian Ovarian Cancer Study, DeFazio A, Kaufmann S, Churchman M, Gourley C, Stephens AN, Meagher NS, Ramus SJ, Antill YC, Campbell I, Scott CL, Kobel M, Gorringe KL, G AMuT Collaborators. Refined cut-off for TP53 immunohistochemistry improves prediction of TP53 mutation status in ovarian mucinous tumors: implications for outcome analyses. *Modern Pathology* 2021 34(1):194-206. (epub 2020 Jul 28) BIO CBSC

132. Kanjanapan Y, Lok SW, Gibbs P, De Boer R, Yeo B, Greenberg S, Barnett F, Knott L, Richardson G, Wong R, Nottage M, Collins IM, Torres J, Lombard J, Johns J, Harold M, Malik L. Impact of prior (neo)adjuvant trastuzumab (NAT) exposure on the efficacy of HER2-targeted therapy for metastatic breast cancer. *Breast Cancer Research and Treatment.* 2020 184(1):87-95. PONC

133. Kaspi A, Ziemann M. mitch: multi-contrast pathway enrichment for multi-omics and single-cell profiling data. *BMC Genomics.* 2020 21(1):447. PHI

134. Kato Y, Steiner TM, Park HY, Hitchcock RO, Zaid A, Hor JL, Devi S, Davey GM, Vremec D, Tullett KM, Tan PS, Ahmet F, Mueller SN, Alonso S, Tarlinton DM, Ploegh HL, Kaisho T, Beattie L, Manton JH, Fernandez-Ruiz D, Shortman K, Lahoud MH, Heath WR, Caminschi I. Display of native antigen on cDC1 that have spatial access to both T and B cells underlies efficient humoral vaccination. *Journal of Immunology.* 2020 205(7):1842-1856. IMM

135. Kattenberg JH, Gumal DL, Ome-Kaius M, Kiniboro B, Philip M, Jally S, Kasian B, Sambale N, Siba PM, Karl S, Barry AE, Felger I, Kazura JW, Mueller I, Robinson LJ. The epidemiology of *Plasmodium falciparum* and *Plasmodium vivax* in East Sepik Province, Papua New Guinea, pre- and post-implementation of national malaria control efforts. *Malaria Journal.* 2020 19(1):198. PHI

136. Kattenberg JH, Razook Z, Keo R, Koepfli C, Jennison C, Lautu-Gumal D, Fola AA, Ome-Kaius M, Barnadas C, Siba P, Felger I, Kazura J, Mueller I, Robinson LJ, Barry AE. Monitoring *Plasmodium falciparum* and *Plasmodium vivax* using microsatellite markers indicates limited changes in population structure after substantial transmission decline in Papua New Guinea. *Molecular Ecology.* 2020 29(23):4525-4541. PHI

137. Ke F, Lancaster GI, Grabow S, Murphy AJ, Strasser A. Combined reduction in the expression of MCL-1 and BCL-2 reduces organismal size in mice. *Cell Death & Disease.* 2020 11(3):185. BCBC

138. Kealy L, Di Pietro A, Hailes L, Scheer S, Dalit L, Groom JR, Zaph C, Good-Jacobson KL. The histone methyltransferase DOT1L is essential for humoral immune responses. *Cell Reports.* 2020 33(11):108504. IMM

139. Kee D, Parker C, Bae S, Tucker KM, Harrison M, Tohidi-Esfahani I, Black M, Delahunty R, Ananda S, Friedlander M, Cunliffe HE, Gibbs P, Desai J, Trotman J, Scott CL. CART-WHEEL.org: An ethically approved online database for patient-entered data to facilitate rare cancer research. *JCO Clinical Cancer Informatics.* 2020 4:136-146. PONC CBSC

140. Keenan CR, Iannarella N, Naselli G, Bediaga NG, Johanson TM, Harrison LC, Allan R. Extreme disruption of heterochromatin is required for accelerated haematopoietic aging. *Blood.* 2020 135(23):2049-2058. IMM PHI

141. Kelly HG, Tan HX, Juno JA, Esterbauer R, Ju Y, Jiang W, Wimmer VC, Duckworth BC, Groom JR, Caruso F, Kanekiyo M, Kent SJ, Wheatley AK. Self-assembling influenza nanoparticle vaccines drive extended germinal center activity and memory B cell maturation. *JCI Insight.* 2020 5(10):e136653. IMM

142. King LE, Zhang HH, Gould CM, Thomas DW, Whitehead LW, Simpson KJ, Burgess AW, Faux MC. Genes regulating membrane-associated E-cadherin and proliferation in adenomatous polyposis coli mutant colon cancer cells: High content siRNA screen. *PLoS One.* 2020 15(10):e0240746. ATB PONC

143. Klein O, Kee D, Markman B, Michael M, Underhill CR, Carlino MS, Jackett L, Lum C, Scott CL, Nagrial A, Behren A, So JY, Palmer J, Cebon JS. Immunotherapy of Ipilimumab and Nivolumab in patients with advanced neuroendocrine tumours: a subgroup analysis of the CA209-538 clinical trial for rare cancers. *Clinical Cancer Research.* 2020 26(17):4454-4459. CBSC

144. Klemm T, Ebert G, Calleja DJ, Allison CC, Richardson LW, Bernardini JP, Lu BG, Kuchel NW, Grohmann C, Shibata Y, Gan ZY, Cooney JP, Doerflinger M, Au AE, Blackmore TR, van der Heden van Noort GJ, Geurink PP, Ovaa H, Newman J, Riboldi-Tunnicliffe A, Czabotar PE, Mitchell JP, Feltham R, Lechtenberg BC, Lowes KN, Dewson G, Pellegrini M, Lessene G, Komander D. Mechanism and inhibition of the papain-like protease, PLpro, of SARS-CoV-2. *EMBO Journal.* 2020 39(18):e106275. USD IDID ATB CBD

145. Kobayashi T, Lam PY, Jiang H, Bednarska K, Gloury RE, Murigneux V, Tay J, Jacquelot N, Li R, Tuong ZK, Leggatt G, Gandhi MK, Hill MM, Belz GT, Ngo S, Kallies A, Mattarollo SR. Increased lipid metabolism impairs NK cell function and mediates adaptation to the lymphoma environment. *Blood.* 2020 136(26):3004-3017. IMM

146. Kochan N, Yazgı Tütüncü G, Giner G. A new local covariance matrix estimation for the classification of gene expression profiles in high dimensional RNA-Seq data. *Expert Systems with Applications.* 2021 167:114200. (epub 2020 Nov 2) BIO

147. Kommoss FK, Cheasley D, Wakefield MJ, Scott CL, Campbell IG, Gorringe K, Gilks CB. Primary mucinous ovarian neoplasms rarely exhibit a germ cell histogenesis. *Histopathology.* 2020 Nov 5. *(*epub ahead of print) BIO CBSC

148. Kong IY, Rimes JS, Light A, Todorovski I, Jones S, Morand E, Knight DA, Bergman YE, Hogg SJ, Falk H, Monahan BJ, Stupple PA, Street IP, Heinzel S, Bouillet P, Johnstone RW, Hodgkin PD, Vervoort SJ, Hawkins ED. Temporal analysis of Brd4 displacement in the control of B cell survival, proliferation, and differentiation. *Cell Reports.* 2020 33(3):108290. IMM PONC INFL

149. Korhonen PK, Gasser RB, Ma G, Wang T, Stroehlein AJ, Young ND, Ang CS, Fernando DD, Lu HC, Taylor S, Reynolds SL, Mofiz E, Najaraj SH, Gowda H, Madugundu A, Renuse S, Holt D, Pandey A, Papenfuss AT, Fischer K. High-quality nuclear genome for *Sarcoptes scabiei*-A critical resource for a neglected parasite. *PLoS Neglected Tropical Diseases.* 2020 14(10):e0008720. BIO

150. Kosasih HJ, Davidson NM, Bjelosevic S, Morrish E, Brennan MS, Oshlack A, Johnstone RW, Brumatti G, Khaw SL, Ekert PG. MLL-TFE3: a novel and aggressive KMT2A fusion identified in infant leukemia. *Blood Advances.* 2020 4(19):4918-4923. INFL BCBC

151. Krais JJ, Wang Y, Bernhardy AJ, Clausen E, Miller JA, Cai KQ, Scott CL, Johnson N. RNF168-mediated ubiquitin signaling inhibits the viability of BRCA1 null cancers. *Cancer Research.* 2020 80(13):2848-2860. CBSC

152. Kretschmer L, Flossdorf M, Mir J, Cho YL, Plambeck M, Treise I, Toska A, Heinzel S, Schiemann M, Busch DH, Buchholz VR. Differential expansion of T central memory precursor and effector subsets is regulated by division speed. *Nature Communications.* 2020 11(1):113. IMM

153. Kumarasingha R, Ioannidis LJ, Abeysekera W, Studniberg S, Wijesurendra D, Mazhari R, Poole DP, Mueller I, Schofield L, Hansen DS, Eriksson EM. Transcriptional memory-like imprints and enhanced functional activity in gammadelta T cells following resolution of malaria infection. *Frontiers in Immunology.* 2020 11:582358. IDID BIO PHI

154. Kumari S, Semira C, Lee M, Lee B, Wong R, Nott L, Shapiro J, Gibbs P. Resection of colorectal cancer liver metastases in older patients. *ANZ Journal of Surgery.* 2020 90(5):796-801. PONC

155. Lacaze P, Sebra R, Riaz M, Tiller J, Revote J, Phung J, Parker EJ, Orchard SG, Lockery JE, Wolfe R, Strahl M, Wang YC, Chen R, Sisco D, Arnold T, Thompson BA, Buchanan DD, Macrae FA, James PA, Abhayaratna WP, Lockett TJ, Gibbs P, Tonkin AM, Nelson MR, Reid CM, Woods RL, Murray AM, Winship I, McNeil JJ, Schadt E. Medically actionable pathogenic variants in a population of 13,131 healthy elderly individuals. *Genetics in Medicine.* 2020 22(11):1883-1886. PONC

156. Lai J, Mardiana S, House IG, Sek K, Henderson MA, Giuffrida L, Chen AXY, Todd KL, Petley EV, Chan JD, Carrington EM, Lew AM, Solomon BJ, Trapani JA, Kedzierska K, Evrard M, Vervoort SJ, Waithman J, Darcy PK, Beavis PA. Adoptive cellular therapy with T cells expressing the dendritic cell growth factor Flt3L drives epitope spreading and antitumor immunity. *Nature Immunology.* 2020 21(8):914-926. IMM

157. Lalaoui N, Merino D, Giner G, Vaillant F, Chau D, Liu L, Kratina T, Pal B, Whittle JR, Etemadi N, Berthelet J, Grasel J, Hall C, Ritchie ME, Ernst M, Smyth GK, Vaux DL, Visvader JE, Lindeman GJ, Silke J. Targeting triple-negative breast cancers with the Smac-mimetic birinapant. *Cell Death and Differentiation.* 2020 27(10):2768-2780. INFL BIO CBSC ATB EDD

158. LaMonte GM, Rocamora F, Marapana DS, Gnadig NF, Ottilie S, Luth MR, Worgall TS, Goldgof GM, Mohunlal R, Santha Kumar TR, Thompson JK, Vigil E, Yang J, Hutson D, Johnson T, Huang J, Williams RM, Zou BY, Cheung AL, Kumar P, Egan TJ, Lee MCS, Siegel D, Cowman AF, Fidock DA, Winzeler EA. Pan-active imidazolopiperazine antimalarials target the *Plasmodium falciparum* intracellular secretory pathway. *Nature Communications.* 2020 11(1):1780. IDID

159. Lau E, McCoy P, Reeves F, Chow K, Clarkson M, Kwan EM, Packwood K, Northen H, He M, Kingsbury Z, Mangiola S, Kerger M, Furrer MA, Crowe H, Costello AJ, McBride DJ, Ross MT, Pope B, Hovens CM, Corcoran NM. Detection of ctDNA in plasma of patients with clinically localised prostate cancer is associated with rapid disease progression. *Genome Medicine.* 2020 12(1):72. BIO

160. Lau KX, Mason EA, Kie J, De Souza DP, Kloehn J, Tull D, McConville MJ, Keniry A, Beck T, Blewitt ME, Ritchie ME, Naik SH, Zalcenstein D, Korn O, Su S, Romero IG, Spruce C, Baker CL, McGarr TC, Wells CA, Pera MF. Unique properties of a subset of human pluripotent stem cells with high capacity for self-renewal. *Nature Communications.* 2020 11(1):2420. EDD IMM ATB BCBC

161. Law CW, Zeglinski K, Dong X, Alhamdoosh M, Smyth GK, Ritchie ME. A guide to creating design matrices for gene expression experiments. *F1000Research.* 2020 9:1444. EDD BIO

162. Lee S, Lawrence M, Love MI. Fluent genomics with plyranges and tximeta. *F1000Research.* 2020 9:109. SBD

163. Lee S, Zhang AY, Su S, Ng AP, Holik AZ, Asselin-Labat ML, Ritchie ME, Law CW. Covering all your bases: incorporating intron signal from RNA-seq data. *NAR Genomics and Bioinformatics.* 2020 2(3):lqaa073. EDD BCBC PONC

164. Lelliott EJ, Mangiola S, Ramsbottom KM, Zethoven M, Lim L, Lau PKH, Oliver AJ, Martelotto LG, Kirby L, Martin C, Patel RP, Slater A, Cullinane C, Papenfuss AT, Haynes NM, McArthur GA, Oliaro J, Sheppard KE. Combined BRAF, MEK, and CDK4/6 inhibition depletes intratumoral immune-potentiating myeloid populations in melanoma. *Cancer Immunology Research.* 2020 9(2):136-146. (epub 2020 Dec 10) BIO

165. Lew TE, Anderson MA, Lin VS, Handunnetti SM, Came NA, Blombery P, Westerman DA, Wall M, Tam CS, Roberts AW, Seymour JF. Undetectable peripheral blood MRD should be the goal of venetoclax in CLL, but attainment plateaus after 24 months. *Blood Advances.* 2020 4(1):165-173. BCBC

166. Li J, Epa R, Scott NE, Skoneczny D, Sharma M, Snow AJD, Lingford JP, Goddard-Borger ED, Davies GJ, McConville MJ, Williams SJ. A sulfoglycolytic Entner-Doudoroff pathway in *Rhizobium leguminosarum* bv. *trifolii* SRDI565. *Applied and Environmental Microbiology.* 2020 86(15):e00750-20. CBD

167. Li X, Guo X, Zhu Y, Wei G, Zhang Y, Li X, Xu H, Cui J, Wu W, He J, Ritchie ME, Weiskittel TM, Li H, Yu H, Ding L, Shao M, Luo Q, Xu X, Teng X, Chang AH, Zhang J, Huang H, Hu Y. Single-cell transcriptomic analysis reveals BCMA CAR-T cell dynamics in a patient with refractory primary plasma cell leukemia. *Molecular Therapy.* 2021 29(2):645-657. (epub 2020 Dec 3) EDD

168. Lidgerwood GE, Senabouth A, Smith-Anttila CJA, Gnanasambandapillai V, Kaczorowski DC, Amann-Zalcenstein D, Fletcher EL, Naik SH, Hewitt AW, Powell JE, Pébay A. Transcriptomic profiling of human pluripotent stem cell-derived retinal pigment epithelium over time. *Genomics Proteomics & Bioinformatics.* 2020 Dec 8. *(*epub ahead of print) ATB IMM

169. Lim Y, De Bellis D, Sandow JJ, Capalbo L, D'Avino PP, Murphy JM, Webb AI, Dorstyn L, Kumar S. Phosphorylation by Aurora B kinase regulates caspase-2 activity and function. *Cell Death and Differentiation.* 2021 28(1):349-366. (epub 2020 Aug 18) ATB INFL

170. Lin VS, Lew TE, Handunnetti SM, Blombery P, Nguyen T, Westerman DA, Kuss BJ, Tam C, Roberts AW, Seymour JF, Anderson MA. BTK inhibitor therapy is effective in patients with CLL resistant to venetoclax. *Blood.* 2020 135(25):2266-2270. BCBC

171. Lin Y, Cao Y, Kim HJ, Salim A, Speed TP, Lin DM, Yang P, Yang JYH. scClassify: sample size estimation and multiscale classification of cells using single and multiple reference. *Molecular Systems Biology.* 2020 16(6):e9389. BIO

172. Liu H, Wilson KR, Schriek P, Macri C, Blum AB, Francis L, Heinlein M, Nataraja C, Harris J, Jones SA, Gray DHD, Villadangos JA, Mintern JD. Ubiquitination of MHC Class II is required for development of regulatory but not conventional CD4(+) T cells. *Journal of Immunology.* 2020 205(5):1207-1216. IMM

173. Liu M, Lu B, Zeng P, Huang B, Xu Y, Liang H, Yang D, Yang S, Luo HB, Lew AM, Masters SL, Geng L, Zeng H, Zhang Y. Compound heterozygous mutations of *IL12RB1* in a patient with selective defects in Th17 differentiation. *Journal of Clinical Immunology.* 2020 40(4):647-652. IMM INFL

174. Liu X, Li Z, Liu S, Sun J, Chen Z, Jiang M, Zhang Q, Wei Y, Wang X, Huang YY, Shi Y, Xu Y, Xian H, Bai F, Ou C, Xiong B, Lew AM, Cui J, Fang R, Huang H, Zhao J, Hong X, Zhang Y, Zhou F, Luo HB. Potential therapeutic effects of dipyridamole in the severely ill patients with COVID-19. *Acta Pharmaceutica Sinica B.* 2020 10(7):1205-1215. IMM

175. Loering S, Cameron GJ, Bhatt NP, Belz GT, Foster PS, Hansbro PM, Starkey MR. Differences in pulmonary group 2 innate lymphoid cells are dependent on mouse age, sex and strain. *Immunology and Cell Biology.* 2020 Dec 8. *(*epub ahead of print) IMM

176. Loft M, Wong HL, Kosmider S, Lee M, Tie J, Wong R, Jones IT, Croxford M, Steel M, Faragher I, Guerrieri M, Christie M, Gibbs P. Real world outcomes for neoadjuvant capecitabine versus infusional 5-fluorouracil in the treatment of locally advanced rectal cancer. *Internal Medicine Journal.* 2020 Sep 8. *(*epub ahead of print) PONC

177. Loi SM, Eratne D, Goh AMY, Wibawa P, Farrand S, Kelso W, Evans A, Watson R, Walterfang M, Velakoulis D. A 10 year retrospective cohort study of inpatients with younger-onset dementia. *International Journal of Geriatric Psychiatry.* 2021 36(2):294-301. (epub 2020 Sep 16) PHI

178. Longley RJ, White MT, Takashima E, Brewster J, Morita M, Harbers M, Obadia T, Robinson LJ, Matsuura F, Liu ZSJ, Li-Wai-Suen CSN, Tham WH, Healer J, Huon C, Chitnis CE, Nguitragool W, Monteiro W, Proietti C, Doolan DL, Siqueira AM, Ding XC, Gonzalez IJ, Kazura J, Lacerda M, Sattabongkot J, Tsuboi T, Mueller I. Development and validation of serological markers for detecting recent Plasmodium vivax infection. *Nature Medicine.* 2020 26(5):741-749. PHI IDID

179. Loughman A, Ponsonby AL, O'Hely M, Symeonides C, Collier F, Tang MLK, Carlin J, Ranganathan S, Allen K, Pezic A, Saffery R, Jacka F, Harrison LC, Sly PD, Vuillermin P, B. I. S. Investigator Group. Gut microbiota composition during infancy and subsequent behavioural outcomes. *EBioMedicine.* 2020 52:102640. PHI

180. Louis C, Guimaraes F, Yang Y, D'Silva D, Kratina T, Dagley L, Hediyeh-Zadeh S, Rautela J, Masters SL, Davis MJ, Babon JJ, Ciric B, Vivier E, Alexander WS, Huntington ND, Wicks IP. NK cell-derived GM-CSF potentiates inflammatory arthritis and is negatively regulated by CIS. *Journal of Experimental Medicine.* 2020 217(5):e20191421. INFL ATB BIO IMM SBD BCBC

181. Love MI, Soneson C, Hickey PF, Johnson LK, Pierce NT, Shepherd L, Morgan M, Patro R. Tximeta: Reference sequence checksums for provenance identification in RNA-seq. *PLoS Computational Biology.* 2020 16(2):e1007664. ATB

182. Low JT, Christie M, Ernst M, Dumoutier L, Preaudet A, Ni Y, Griffin MDW, Mielke LA, Strasser A, Putoczki TL, O'Reilly LA. Loss of NFKB1 results in expression of tumor necrosis factor and activation of STAT1 to promote gastric tumorigenesis in mice. *Gastroenterology.* 2020 159(4):1444-1458e15. INFL PONC BCBC

183. Lu B, Liu M, Wang J, Fan H, Yang D, Zhang L, Gu X, Nie J, Chen Z, Corbett AJ, Zhan MJ, Zhang S, Bryant VL, Lew AM, McCluskey J, Luo HB, Cui J, Zhang Y, Zhan Y, Lu G. IL-17 production by tissue-resident MAIT cells is locally induced in children with pneumonia. *Mucosal Immunology.* 2020 13(5):824-835. IMM

184. Luo MJ, Palmieri M, Riffkin CD, Sakthianandeswaren A, Djajawi TM, Hirokawa Y, Shuttleworth V, Segal DH, White CA, Nhu D, Lessene G, Lee M, Gibbs P, Huang DCS, Sieber OM, Gong JN. Defining the susceptibility of colorectal cancers to BH3-mimetic compounds. *Cell Death & Disease.* 2020 11(9):735. PONC BCBC CBD

185. Mack HG, Kowalski T, Lucattini A, Symons RA, Wicks I, Hall AJ. Genetic susceptibility to hydroxychloroquine retinal toxicity. *Ophthalmic Genetics.* 2020 41(2):159-170. INFL

186. Mahdi LK, Huang M, Zhang X, Nakano RT, Kopp LB, Saur IML, Jacob F, Kovacova V, Lapin D, Parker JE, Murphy JM, Hofmann K, Schulze-Lefert P, Chai J, Maekawa T. Discovery of a family of mixed lineage kinase domain-like proteins in plants and their role in innate immune signaling. *Cell Host & Microbe.* 2020 28(6):813-824e6. INFL

187. Manning J, Windley SP, Sandow JJ, Shah SS, Western P, Wilhelm D, Kumar S. Identification of novel interacting partners of the NEDD4 ubiquitin ligase in mouse testis. *Journal of Proteomics.* 2020 223:103830. ATB

188. Mansfield CA, Metcalfe KA, Snyder C, Lindeman GJ, Posner J, Friedman S, Kathleen Cuningham Foundation Consortium for Research into Familial Breast Cancer, Lynch HT, Narod SA, Evans DG, Liede A. Preferences for breast cancer prevention among women with a *BRCA1* or *BRCA2* mutation. *Hereditary Cancer in Clinical Practice.* 2020 18:20. CBSC

189. Martini C, Thompson EJ, Hyslop SR, Cockshell MP, Dale BJ, Ebert LM, Woods AE, Josefsson EC, Bonder CS. Platelets disrupt vasculogenic mimicry by cancer cells. *Scientific Reports.* 2020 10(1):5869. CBSC

190. Mazhari R, Brewster J, Fong R, Bourke C, Liu ZSJ, Takashima E, Tsuboi T, Tham WH, Harbers M, Chitnis C, Healer J, Ome-Kaius M, Sattabongkot J, Kazura J, Robinson LJ, King C, Mueller I, Longley RJ. A comparison of non-magnetic and magnetic beads for measuring IgG antibodies against *Plasmodium vivax* antigens in a multiplexed bead-based assay using Luminex technology (Bio-Plex 200 or MAGPIX). *PLoS One.* 2020 15(12):e0238010. PHI

191. Mazzola L, Oliver KL, Labalme A, Baykan B, Muona M, Joensuu TH, Courage C, Chatron N, Borsani G, Alix E, Ramond F, Touraine R, Bahlo M, Bebek N, Berkovic SF, Lehesjoki AE, Lesca G. Progressive myoclonus epilepsy caused by a homozygous splicing variant of SLC7A6OS. *Annals of Neurology.* 2020 89(2):402-407. PHI

192. McNeil JJ, Gibbs P, Orchard SG, Lockery JE, Bernstein WB, Cao Y, Ford L, Haydon A, Kirpach B, Macrae F, McLean C, Millar J, Murray AM, Nelson MR, Polekhina G, Reid CM, Richmond E, Rodriguez LM, Shah RC, Tie J, Umar A, van Londen GJ, Ronaldson K, Wolfe R, Woods RL, Zalcberg J, Chan AT, Aspree Investigator Group. Effect of aspirin on cancer incidence and mortality in older adults. *Journal of the National Cancer Institute.* 2020 Aug 11. *(*epub ahead of print) PONC

193. McRae HM, Eccles S, Whitehead L, Alexander WS, Gecz J, Thomas T, Voss AK. Downregulation of the GHRH/GH/IGF-1 axis in a mouse model of Borjeson-Forssman-Lehman Syndrome. *Development.* 2020 147(21):dev187021. EDD ATB BCBC

194. McWilliam HEG, Mak JYW, Awad W, Zorkau M, Cruz-Gomez S, Lim HJ, Yan Y, Wormald S, Dagley LF, Eckle SBG, Corbett AJ, Liu H, Li S, Reddiex SJJ, Mintern JD, Liu L, McCluskey J, Rossjohn J, Fairlie DP, Villadangos JA. Endoplasmic reticulum chaperones stabilize ligand-receptive MR1 molecules for efficient presentation of metabolite antigens. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(40):24974-24985. ATB

195. Mehlhoff JD, Stearns FW, Rohm D, Wang B, Tsou EY, Dutta N, Hsiao MH, Gonzalez CE, Rubin AF, Ostermeier M. Collateral fitness effects of mutations. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(21):11597-11607. BIO

196. Meikle TG, Keizer DW, Babon JJ, Drummond CJ, Separovic F, Conn CE, Yao S. Physiochemical characterization and stability of lipidic cubic phases by solution NMR. *Langmuir.* 2020 36(22):6254-6260. SBD

197. Meikle TG, Keizer DW, Babon JJ, Drummond CJ, Separovic F, Conn CE, Yao S. Chemical exchange of Hydroxyl groups in lipidic cubic phases characterized by NMR. *Journal of Physical Chemistry B.* 2021 125(2):571-580. (epub 2020 Nov 30) SBD

198. Meretoja A, Yassi N, Wu TY, Churilov L, Sibolt G, Jeng JS, Kleinig T, Spratt NJ, Thijs V, Wijeratne T, Cho DY, Shah D, Cloud GC, Phan T, Bladin C, Moey A, Aviv RI, Barras CD, Sharma G, Hsu CY, Ma H, Campbell BCV, Mitchell P, Yan B, Parsons MW, Tiainen M, Curtze S, Strbian D, Tang SC, Harvey J, Levi C, Donnan GA, Davis SM. Tranexamic acid in patients with intracerebral haemorrhage (STOP-AUST): a multicentre, randomised, placebo-controlled, phase 2 trial. *Lancet Neurology.* 2020 19(12):980-987. PHI

199. Metcalfe KA, Price MA, Mansfield C, Hallett DC, Lindeman GJ, Fairchild A, Posner J, Friedman S, Snyder C, Kathleen Cunningham Foundation Consortium for Research into Familial Breast Cancer, Lynch HT, Evans DG, Narod SA, Liede A. Predictors of long-term cancer-related distress among female BRCA1 and BRCA2 mutation carriers without a cancer diagnosis: an international analysis. *British Journal of Cancer.* 2020 123(2):268-274. CBSC

200. Metcalfe RD, Aizel K, Zlatic CO, Nguyen PM, Morton CJ, Lio DS, Cheng HC, Dobson RCJ, Parker MW, Gooley PR, Putoczki TL, Griffin MDW. The structure of the extracellular domains of human interleukin 11 alpha-receptor reveals mechanisms of cytokine engagement. *Journal of Biological Chemistry.* 2020 295(24):8285-8301. PONC

201. Millen R, Hendry S, Narasimhan V, Abbott R, Croxford M, Gibbs P, Tie J, Wong H-L, Jones I, Kosmider S, Byrne D, Zalcberg J, Fox S, Desai J, Visvanathan K, Ramsay RG, Tran B. CD8+ tumor-infiltrating lymphocytes within the primary tumor of patients with synchronous de novo metastatic colorectal carcinoma do not track with survival. *Clinical & Translational Immunology.* 2020 9(7):e1155. PONC

202. Miotto O, Sekihara M, Tachibana SI, Yamauchi M, Pearson RD, Amato R, Gonçalves S, Mehra S, Noviyanti R, Marfurt J, Auburn S, Price RN, Mueller I, Ikeda M, Mori T, Hirai M, Tavul L, Hetzel MW, Laman M, Barry AE, Ringwald P, Ohashi J, Hombhanje F, Kwiatkowski DP, Mita T. Emergence of artemisinin-resistant *Plasmodium falciparum* with *kelch13* C580Y mutations on the island of New Guinea. *PLoS Pathogens.* 2020 16(12):e1009133. PHI

203. Mitchell ML, Tonkin-Hill GQ, Morales RAV, Purcell AW, Papenfuss AT, Norton RS. Tentacle transcriptomes of the speckled anemone (Actiniaria: Actiniidae: *Oulactis* sp.): venom-related components and their domain structure. *Marine Biotechnology.* 2020 22(2):207-219. BIO

204. Moecking J, Laohamonthonkul P, Chalker K, White MJ, Harapas CR, Yu CH, Davidson S, Schaale KH, Hu D, Eng C, Huntsman S, Calleja DJ, Horvat JC, Hansbro PM, O'Donoghue RJJ, Ting JP, Burchard EG, Geyer M, Gerlic M, Masters SL. NLRP1 variant M1184V decreases inflammasome activation in the context of DPP9 inhibition and asthma severity. *Journal of Allergy and Clinical Immunology.* 2020 Dec 27. *(*epub ahead of print) INFL

205. Morokoff A, Jones J, Nguyen H, Ma C, Lasocki A, Gaillard F, Bennett I, Luwor R, Stylli S, Paradiso L, Koldej R, Paldor I, Molania R, Speed TP, Webb A, Infusini G, Li J, Malpas C, Kalincik T, Drummond K, Siegal T, Kaye AH. Serum microRNA is a biomarker for post-operative monitoring in glioma. *Journal of NeuroOncology.* 2020 149(3):391-400. BIO ATB

206. Morrish E, Copeland A, Moujalled DM, Powell JA, Silke N, Lin A, Jarman KE, Sandow JJ, Ebert G, Mackiewicz L, Beach JA, Christie EL, Lewis AC, Pomilio G, Fischer KC, MacPherson L, Bowtell DDL, Webb AI, Pellegrini M, Dawson MA, Pitson SM, Wei AH, Silke J, Brumatti G. Clinical MDR1 inhibitors enhance Smac-mimetic bioavailability to kill murine LSCs and improve survival in AML models. *Blood Advances.* 2020 4(20):5062-5077. INFL ATB IDID BCBC

207. Morrish E, Mackiewicz L, Silke N, Pellegrini M, Silke J, Brumatti G, Ebert G. Combinatorial treatment of Birinapant and Zosuquidar enhances effective control of HBV replication In vivo. *Viruses.* 2020 12(8):901. INFL IDID

208. Motazedian A, Bruveris FF, Kumar SV, Schiesser JV, Chen T, Ng ES, Chidgey AP, Wells CA, Elefanty AG, Stanley EG. Multipotent RAG1+ progenitors emerge directly from haemogenic endothelium in human pluripotent stem cell-derived haematopoietic organoids. *Nature Cell Biology.* 2020 22(1):60-73. BCBC

209. Moujalled DM, Hanna DT, Hediyeh-Zadeh S, Pomilio G, Brown L, Litalien V, Bartolo R, Fleming S, Chanrion M, Banquet S, Maragno AL, Kraus-Berthier L, Schoumacher M, Mullighan CG, Georgiou A, White CA, Lessene G, Huang DCS, Roberts AW, Geneste O, Rasmussen L, Davis MJ, Ekert PG, Wei A, Ng AP, Khaw SL. Cotargeting BCL-2 and MCL-1 in high-risk B-ALL. *Blood Advances.* 2020 4(12):2762-2767. BCBC BIO CBD

210. Mulazzani E, Zolyniak N, Noe E, Mulazzani M, Azad SC, Kümpfel T, Kraft E. Clinical and psychological phenomenology of pain in autoinflammatory diseases. *BMC Rheumatology.* 2020 4(1):71. IMM

211. Munkhbaatar E, Dietzen M, Agrawal D, Anton M, Jesinghaus M, Boxberg M, Pfarr N, Bidola P, Uhrig S, Hockendorf U, Meinhardt AL, Wahida A, Heid I, Braren R, Mishra R, Warth A, Muley T, Poh PSP, Wang X, Frohling S, Steiger K, Slotta-Huspenina J, van Griensven M, Pfeiffer F, Lange S, Rad R, Spella M, Stathopoulos GT, Ruland J, Bassermann F, Weichert W, Strasser A, Branca C, Heikenwalder M, Swanton C, McGranahan N, Jost PJ. MCL-1 gains occur with high frequency in lung adenocarcinoma and can be targeted therapeutically. *Nature Communications.* 2020 11(1):4527. BCBC

212. Myers KA, Bennett MF, Hildebrand MS, Coleman MJ, Zhou G, Hollingsworth G, Cairns A, Riney K, Berkovic SF, Bahlo M, Scheffer IE. Transcriptome analysis of a ring chromosome 20 patient cohort. *Epilepsia.* 2021 62(1):e22-e28. (epub 2020 Nov 18) PHI

213. Namvar A, Blanch AJ, Dixon MW, Carmo OMS, Liu B, Tiash S, Looker O, Andrew D, Chan LJ, Tham WH, Lee PVS, Rajagopal V, Tilley L. Surface area-to-volume ratio, not cellular viscoelasticity, is the major determinant of red blood cell traversal through small channels. *Cellular Microbiology.* 2021 23(1):e13270. (epub Sep 27 2020) IDID

214. Narasimhan V, Wright JA, Churchill M, Wang T, Rosati R, Lannagan TRM, Vrbanac L, Richardson AB, Kobayashi H, Price T, Tye GXY, Marker J, Hewett PJ, Flood MP, Pereira S, Whitney GA, Michael M, Tie J, Mukherjee S, Grandori C, Heriot AG, Worthley DL, Ramsay RG, Woods SL. Medium-throughput drug screening of patient-derived organoids from colorectal peritoneal metastases to direct personalized therapy. *Clinical Cancer Research.* 2020 26(14):3662-3670. PONC

215. Nedeva C, Menassa J, Duan M, Liu C, Doerflinger M, Kueh AJ, Herold MJ, Fonseka P, Phan TK, Faou P, Rajapaksha H, Chen W, Hulett MD, Puthalakath H. TREML4 receptor regulates inflammation and innate immune cell death during polymicrobial sepsis. *Nature Immunology.* 2020 21(12):1585-1596. IDID BCBC

216. Ng AP, Coughlan HD, Hediyeh-Zadeh S, Behrens K, Johanson TM, Low MSY, Bell CC, Gilan O, Chan YC, Kueh AJ, Boudier T, Feltham R, Gabrielyan A, DiRago L, Hyland CD, Ierino H, Mifsud S, Viney E, Willson T, Dawson MA, Allan RS, Herold MJ, Rogers K, Tarlinton DM, Smyth GK, Davis MJ, Nutt SL, Alexander WS. An Erg-driven transcriptional program controls B cell lymphopoiesis. *Nature Communications.* 2020 11(1):3013. BCBC BIO IMM ATB INFL

217. Ng F, Venkatraman V, Parsons M, Bivard A, Sharma G, Churilov L, Desmond P, Davis SM, Yassi N, Campbell B. Gradient of tissue injury after stroke: rethinking the infarct versus noninfarcted dichotomy. *Cerebrovascular Diseases.* 2020 49(1):32-38. PHI

218. Ng SS, De Labastida Rivera F, Yan J, Corvino D, Das I, Zhang P, Kuns R, Chauhan SB, Hou J, Li XY, Frame TCM, McEnroe BA, Moore E, Na J, Engel JA, Soon MSF, Singh B, Kueh AJ, Herold MJ, Montes de Oca M, Singh SS, Bunn PT, Aguilera AR, Casey M, Braun M, Ghazanfari N, Wani S, Wang Y, Amante FH, Edwards CL, Haque A, Dougall WC, Singh OP, Baxter AG, Teng MWL, Loukas A, Daly NL, Cloonan N, Degli-Esposti MA, Uzonna J, Heath WR, Bald T, Tey SK, Nakamura K, Hill GR, Kumar R, Sundar S, Smyth MJ, Engwerda CR. The NK cell granule protein NKG7 regulates cytotoxic granule exocytosis and inflammation. *Nature Immunology.* 2020 21(10):1205-1218. BCBC

219. Nguyen HV, Vandenberg CJ, Ng AP, Robati MR, Anstee NS, Rimes J, Hawkins ED, Cory S. Development and survival of MYC-driven lymphomas require the MYC antagonist MNT to curb MYC-induced apoptosis. *Blood.* 2020 135(13):1019-1031. BCBC INFL

220. Nguyen W, Jacobson J, Jarman KE, Blackmore TR, Sabroux HJ, Lewin SR, Purcell DF, Sleebs BE. Optimization of 5-substituted thiazolyl ureas and 6-substituted imidazopyridines as potential HIV-1 latency reversing agents. *European Journal of Medicinal Chemistry.* 2020 195:112254. CBD

221. Ni Y, Yap T, Silke N, Silke J, McCullough M, Celentano A, O'Reilly LA. Loss of NF-kB1 and c-Rel accelerates oral carcinogenesis in mice. *Oral Diseases.* 2020 27(2):168-172. INFL

222. Orchard SG, Lockery JE, Gibbs P, Polekhina G, Wolfe R, Zalcberg J, Haydon A, McNeil JJ, Nelson MR, Reid CM, Kirpach B, Murray AM, Woods RL, Aspree Investigator Group. Cancer history and risk factors in healthy older people enrolling in the ASPREE clinical trial. *Contemporary Clinical Trials.* 2020 96:106095. PONC

223. Ordureau A, Paulo JA, Zhang J, An H, Swatek KN, Cannon JR, Wan Q, Komander D, Harper JW. Global Landscape and Dynamics of Parkin and USP30-dependent ubiquitylomes in iNeurons during mitophagic signaling. *Molecular Cell.* 2020 77(5):1124-1142 e10. USD

224. Owen KL, Gearing LJ, Zanker DJ, Brockwell NK, Khoo WH, Roden DL, Cmero M, Mangiola S, Hong MK, Spurling AJ, McDonald M, Chan CL, Pasam A, Lyons RJ, Duivenvoorden HM, Ryan A, Butler LM, Mariadason JM, Giang Phan T, Hayes VM, Sandhu S, Swarbrick A, Corcoran NM, Hertzog PJ, Croucher PI, Hovens C, Parker BS. Prostate cancer cell-intrinsic interferon signaling regulates dormancy and metastatic outgrowth in bone. *EMBO Reports.* 2020 21(6):e50162. BIO

225. Palencia-Campos A, Aoto PC, Machal EMF, Rivera-Barahona A, Soto-Bielicka P, Bertinetti D, Baker B, Vu L, Piceci-Sparascio F, Torrente I, Boudin E, Peeters S, Van Hul W, Huber C, Bonneau D, Hildebrand MS, Coleman M, Bahlo M, Bennett MF, Schneider AL, Scheffer IE, Kibæk M, Kristiansen BS, Issa MY, Mehrez MI, Ismail S, Tenorio J, Li G, Skålhegg BS, Otaify GA, Temtamy S, Aglan M, Jønch AE, De Luca A, Mortier G, Cormier-Daire V, Ziegler A, Wallis M, Lapunzina P, Herberg FW, Taylor SS, Ruiz-Perez VL. Germline and mosaic variants in PRKACA and PRKACB cause a multiple congenital malformation syndrome. *American Journal of Human Genetics.* 2020 107(5):977-988. PHI

226. Pasricha SR, Gheorghe A, Sakr-Ashour F, Arcot A, Neufeld L, Murray-Kolb LE, Suchdev PS, Bode M. Net benefit and cost-effectiveness of universal iron-containing multiple micronutrient powders for young children in 78 countries: a microsimulation study. *Lancet Global Health.* 2020 8(8):e1071-e1080. PHI

227. Pellegrino SA, Chan S, Simons K, Kinsella R, Gibbs P, Faragher IG, Deftereos I, Yeung JM. Patterns of surveillance for colorectal cancer: Experience from a single large tertiary institution. *Asia-Pacific Journal of Clinical Oncology.* 2020 Oct 20. *(*epub ahead of print) PONC

228. Penno MA, Oakey H, Augustine P, Taranto M, Barry SC, Colman PG, Craig ME, Davis EA, Giles LC, Harris M, Haynes A, McGorm K, Morahan G, Morbey C, Rawlinson WD, Sinnott RO, Soldatos G, Thomson RL, Vuillermin PJ, Wentworth JM, Harrison LC, Couper JJ, Endia Study Group. Changes in pancreatic exocrine function in young at-risk children followed to islet autoimmunity and type 1 diabetes in the ENDIA study. *Pediatric Diabetes.* 2020 21(6):945-949. PHI

229. Pennycuick A, Teixeira VH, AbdulJabbar K, Raza SEA, Lund T, Akarca AU, Rosenthal R, Kalinke L, Chandrasekharan DP, Pipinikas CP, Lee-Six H, Hynds RE, Gowers KHC, Henry JY, Millar FR, Hagos YB, Denais C, Falzon M, Moore DA, Antoniou S, Durrenberger PF, Furness AJ, Carroll B, Marceaux C, Asselin-Labat ML, Larson W, Betts C, Coussens LM, Thakrar RM, George J, Swanton C, Thirlwell C, Campbell PJ, Marafioti T, Yuan Y, Quezada SA, McGranahan N, Janes SM. Immune surveillance in clinical regression of preinvasive squamous cell lung cancer. *Cancer Discovery.* 2020 10(10):1489-1499. PONC

230. Pepey A, Souris M, Vantaux A, Morand S, Lek D, Mueller I, Witkowski B, Herbreteau V. Studying land cover changes in a malaria-endemic Cambodian district: considerations and constraints. *Remote Sensing.* 2020 12(18):2972. PHI

231. Pepin G, De Nardo D, Rootes CL, Ullah TR, Al-Asmari SS, Balka KR, Li HM, Quinn KM, Moghaddas F, Chappaz S, Kile BT, Morand EF, Masters SL, Stewart CR, Williams BRG, Gantier MP. Connexin-dependent transfer of cGAMP to phagocytes modulates antiviral responses. *mBio.* 2020 11(1):pii: e03187-19. INFL

232. Perin S, Buckley RF, Pase MP, Yassi N, Lavale A, Wilson PH, Schembri A, Maruff P, Lim YY. Unsupervised assessment of cognition in the Healthy Brain Project: Implications for web-based registries of individuals at risk for Alzheimer's disease. *Alzheimers & Dimentia.* 2020 6(1):e12043. PHI

233. Petrie EJ, Birkinshaw RW, Koide A, Denbaum E, Hildebrand JM, Garnish SE, Davies KA, Sandow JJ, Samson AL, Gavin X, Fitzgibbon C, Young SN, Hennessy PJ, Smith PPC, Webb AI, Czabotar PE, Koide S, Murphy JM. Identification of MLKL membrane translocation as a checkpoint in necroptotic cell death using Monobodies. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(15):8468-8475. INFL SBD ATB

234. Phoa AF, Recasens A, Gurgis FMS, Betts TA, Menezes SV, Chau D, Nordfors K, Haapasalo J, Haapasalo H, Johns TG, Stringer BW, Day BW, Buckland ME, Lalaoui N, Munoz L. MK2 Inhibition Induces p53-dependent senescence in glioblastoma cells. *Cancers.* 2020 12(3)INFL

235. Pierotti CL, Tanzer MC, Jacobsen AV, Hildebrand JM, Garnier JM, Sharma P, Lucet IS, Cowan AD, Kersten WJA, Luo MX, Liang LY, Fitzgibbon C, Garnish SE, Hempel A, Nachbur U, Huang DCS, Czabotar PE, Silke J, van Delft MF, Murphy JM, Lessene G. Potent inhibition of necroptosis by simultaneously targeting multiple effectors of the pathway. *ACS Chemical Biology.* 2020 15(10):2702-2713. CBD INFL BCBC SBD

236. Pietrzak HM, Ioannidis LJ, Hansen DS. IgM(+) memory B cells induced in response to *Plasmodium berghei* adopt a germinal centre B cell phenotype during secondary infection. *Parasitology.* 2020 147(9):994-998. IDID

237. Pilgrim CHC, Te Marvelde L, Stuart E, Croagh D, Deutscher D, Nikfarjam M, Lee B, Christophi C. Population-based analysis of treatment patterns and outcomes for pancreas cancer in Victoria. *ANZ Journal of Surgery.* 2020 90(9):1677-1682. PONC

238. Poh AR, Dwyer AR, Eissmann MF, Chand AL, Baloyan D, Boon L, Murrey MW, Whitehead L, O'Brien M, Lowell CA, Putoczki TL, Pixley FJ, O'Donoghue RJ, Ernst M. Inhibition of the SRC kinase HCK impairs STAT3-dependent gastric tumor growth in mice. *Cancer immunology Research.* 2020 8(4):428-435. ATB PONC

239. Popovici J, Roesch C, Carias LL, Khim N, Kim S, Vantaux A, Mueller I, Chitnis CE, King CL, Witkowski B. Amplification of Duffy binding protein-encoding gene allows *Plasmodium vivax* to evade host anti-DBP humoral immunity. *Nature Communications.* 2020 11(1):953. PHI

240. Potts KS, Farley A, Dawson CA, Rimes J, Biben C, de Graaf C, Potts MA, Stonehouse OJ, Carmagnac A, Gangatirkar P, Josefsson EC, Anttila C, Amann-Zalcenstein D, Naik S, Alexander WS, Hilton DJ, Hawkins ED, Taoudi S. Membrane budding is a major mechanism of in vivo platelet biogenesis. *Journal of Experimental Medicine.* 2020 217(9):e20191206. EDD CBSC INFL BCBC ATB IMM

241. Poulos RC, Hains PG, Shah R, Lucas N, Xavier D, Manda SS, Anees A, Koh JMS, Mahboob S, Wittman M, Williams SG, Sykes EK, Hecker M, Dausmann M, Wouters MA, Ashman K, Yang J, Wild PJ, deFazio A, Balleine RL, Tully B, Aebersold R, Speed TP, Liu Y, Reddel RR, Robinson PJ, Zhong Q. Strategies to enable large-scale proteomics for reproducible research. *Nature Communications.* 2020 11(1):3793. BIO

242. Prall OWJ, Nastevski V, Xu H, McEvoy CRE, Vissers JHA, Byrne DJ, Takano E, Yerneni S, Ellis S, Green T, Mitchell CA, Murray WK, Scott CL, Grimmond SM, Hofmann O, Papenfuss A, Kee D, Fellowes A, Brown IS, Miller G, Kumarasinghe MP, Perren A, Nahm CB, Mittal A, Samra J, Ahadi M, Fox SB, Chou A, Gill AJ. RAF1 rearrangements are common in pancreatic acinar cell carcinomas. *Modern Pathology.* 2020 33(9):1811-1821. CBSC BIO

243. Preston SP, Doerflinger M, Scott HW, Allison CC, Horton M, Cooney J, Pellegrini M. The role of MKK4 in T cell development and immunity to viral infections. *Immunology and Cell Biology.* 2020 Nov 11. *(*epub ahead of print) IDID

244. Price T, Burge M, Chantrill L, Gibbs P, Pavlakis N, Shapiro J, Sjoquist K. Trifluridine/tipiracil: A practical guide to its use in the management of refractory metastatic colorectal cancer in Australia. *Asia-Pacific Journal of Clinical Oncology.* 2020 16 Suppl 1:3-12. PONC

245. Priebbenow DL, Leaver DJ, Nguyen N, Cleary B, Lagiakos HR, Sanchez J, Xue L, Huang F, Sun Y, Mujumdar P, Mudududdla R, Varghese S, Teguh S, Charman SA, White KL, Shackleford DM, Katneni K, Cuellar M, Strasser JM, Dahlin JL, Walters MA, Street IP, Monahan BJ, Jarman KE, Jousset Sabroux H, Falk H, Chung MC, Hermans SJ, Downer NL, Parker MW, Voss AK, Thomas T, Baell JB. Discovery of acylsulfonohydrazide-derived inhibitors of the lysine acetyltransferase, KAT6A, as potent senescence-inducing anti-cancer agents. *Journal of Medicinal Chemistry.* 2020 63(9):4655-4684. EDD

246. Quaglieri A, Flensburg C, Speed TP, Majewski IJ. Finding a suitable library size to call variants in RNA-Seq. *BMC Bioinformatics.* 2020 21(1):553. BIO BCBC

247. Quaife M, Houben R, Allwood B, Cohen T, Coussens AK, Harries AD, van Kampen S, Marx FM, Sweeney S, Wallis RS, Menzies NA. Post-tuberculosis mortality and morbidity: valuing the hidden epidemic. *Lancet Respiratory Medicine.* 2020 8(4):332-333. IDID

248. Rafehi H, Szmulewicz DJ, Pope K, Wallis M, Christodoulou J, White SM, Delatycki MB, Lockhart PJ, Bahlo M. Rapid diagnosis of Spinocerebellar ataxia 36 in a three-generation family using short-read whole-genome sequencing data. *Movement Disorders.* 2020 35(9):1675-1679. PHI

249. Reifel KM, Swan BK, Jellison ER, Ambrozak D, Baijer J, Nguyen R, Monard S, Lyon G, Fontes B, Perfetto SP. Procedures for flow cytometry-based sorting of unfixed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infected cells and other infectious agents. *Cytometry Part A* 2020 97(7):674-680. ATB

250. Romijn LB, Almet AA, Tan CW, Osborne JM. Modelling the effect of subcellular mutations on the migration of cells in the colorectal crypt. *BMC Bioinformatics.* 2020 21(1):95. PONC

251. Rudebeck EE, Cox RP, Bell TDM, Acharya R, Feng Z, Gueven N, Ashton TD, Pfeffer FM. Mixed alkoxy/hydroxy 1,8-naphthalimides: expanded fluorescence colour palette and *in vitro* bioactivity. *Chemical Communications.* 2020 56(50):6866-6869. CBD

252. Rusilowicz-Jones EV, Jardine J, Kallinos A, Pinto-Fernandez A, Guenther F, Giurrandino M, Barone FG, McCarron K, Burke CJ, Murad A, Martinez A, Marcassa E, Gersch M, Buckmelter AJ, Kayser-Bricker KJ, Lamoliatte F, Gajbhiye A, Davis S, Scott HC, Murphy E, England K, Mortiboys H, Komander D, Trost M, Kessler BM, Ioannidis S, Ahlijanian MK, Urbe S, Clague MJ. USP30 sets a trigger threshold for PINK1-PARKIN amplification of mitochondrial ubiquitylation. *Life Science Alliance.* 2020 3(8):e202000768. USD

253. Sadleir LG, de Valles-Ibanez G, King C, Coleman M, Mossman S, Paterson S, Nguyen J, Berkovic SF, Mullen S, Bahlo M, Hildebrand MS, Mefford HC, Scheffer IE. Inherited RORB pathogenic variants: Overlap of photosensitive genetic generalized and occipital lobe epilepsy. *Epilepsia.* 2020 61(4):e23-e29. PHI

254. Saha I, Jaiswal H, Mishra R, Nel HJ, Schreuder J, Kaushik M, Singh Chauhan K, Singh Rawat B, Thomas R, Naik S, Kumar H, Tailor P. RelB suppresses type I Interferon signaling in dendritic cells. *Cellular Immunology.* 2020 349:104043. IMM

255. Samson AL, Zhang Y, Geoghegan ND, Gavin XJ, Davies KA, Mlodzianoski MJ, Whitehead LW, Frank D, Garnish SE, Fitzgibbon C, Hempel A, Young SN, Jacobsen AV, Cawthorne W, Petrie EJ, Faux MC, Shield-Artin K, Lalaoui N, Hildebrand JM, Silke J, Rogers KL, Lessene G, Hawkins ED, Murphy JM. MLKL trafficking and accumulation at the plasma membrane control the kinetics and threshold for necroptosis. *Nature Communications.* 2020 11(1):3151. INFL CBD ATB SBD PONC CBSC

256. Sanij E, Hannan KM, Xuan J, Yan S, Ahern JE, Trigos AS, Brajanovski N, Son J, Chan KT, Kondrashova O, Lieschke E, Wakefield MJ, Frank D, Ellis S, Cullinane C, Kang J, Poortinga G, Nag P, Deans AJ, Khanna KK, Mileshkin L, McArthur GA, Soong J, Berns E, Hannan RD, Scott CL, Sheppard KE, Pearson RB. CX-5461 activates the DNA damage response and demonstrates therapeutic efficacy in high-grade serous ovarian cancer. *Nature Communications.* 2020 11(1):2641. CBSC BCBC BIO

257. Scheinberg T, Goodwin A, Ip E, Linton A, Mak B, Smith DP, Stockler MR, Strach MC, Tran B, Young AL, Zhang AY, Mahon KL, Horvath LG. Evaluation of a mainstream model of genetic testing for men with prostate cancer. *JCO Oncology Practice.* 2020 Sep 24. *(*epub ahead of print) PONC

258. Schenk RL, Gangoda L, Lawlor KE, O'Reilly LA, Strasser A, Herold MJ. The pro-survival Bcl-2 family member A1 delays spontaneous and FAS ligand-induced apoptosis of activated neutrophils. *Cell Death & Disease.* 2020 11(6):474. BCBC INFL

259. Schmidt A, Anton A, Shapiro J, Wong S, Azad A, Kwan E, Spain L, Muthusamy A, Torres J, Parente P, Parnis F, Goh J, Joshua AM, Pook D, Gibbs P, Tran B, Weickhardt A. Treatment outcomes for patients with metastatic castrate-resistant prostate cancer following docetaxel for hormone-sensitive disease. *Asia-Pacific Journal of Clinical Oncology.* 2020 Sep 24. *(*epub ahead of print) PONC

260. Schubert AF, Nguyen JV, Franklin TG, Geurink PP, Roberts CG, Sanderson DJ, Miller LN, Ovaa H, Hofmann K, Pruneda JN, Komander D. Identification and characterization of diverse OTU deubiquitinases in bacteria. *EMBO Journal.* 2020 39(15):e105127. USD

261. Sejic N, George LC, Tierney RJ, Chang C, Kondrashova O, MacKinnon RN, Lan P, Bell AI, Lessene G, Long HM, Strasser A, Shannon-Lowe C, Kelly GL. BCL-XL inhibition by BH3-mimetic drugs induces apoptosis in models of Epstein-Barr virus-associated T/NK-cell lymphoma. *Blood Advances.* 2020 4(19):4775-4787. BCBC CBD

262. Sharma A, Choi JSY, Stefanovic N, Sharea AA, Simpson DS, Mukhamedova N, Jandeleit-Dahm K, Murphy AJ, Sviridov D, Vince JE, Ritchie RM, de Haan JB. Specific NLRP3 inhibition protects against diabetes-associated atherosclerosis. *Diabetes.* 2021 70(3):772-787. (epub 2020 Dec 15) INFL

263. Sharma M, Abayakoon P, Lingford JP, Epa R, John A, Jin Y, Goddard-Borger ED, Davies GJ, Williams SJ. Dynamic structural changes accompany the production of dihydroxypropanesulfonate by sulfolactaldehyde reductase. *ACS Catalysis.* 2020 10(4):2826-2836. CBD

264. Sheikh AA, Groom JR. Transcription tipping points for T follicular helper cell and T-helper 1 cell fate commitment. *Cellular & Molecular Immunology.* 2020 Sep 30. *(*epub ahead of print) IMM

265. Shukla L, Luwor R, Ritchie ME, Akbarzadeh S, Zhu HJ, Morrison W, Karnezis T, Shayan R. Therapeutic reversal of radiotherapy injury to pro-fibrotic dysfunctional fibroblasts in vitro using adipose-derived stem cells. *Plastic and Reconstructive Surgery Global Open.* 2020 8(3):e2706. EDD

266. Sidwell T, Liao Y, Garnham AL, Vasanthakumar A, Gloury R, Blume J, Teh PP, Chisanga D, Thelemann C, de Labastida Rivera F, Engwerda CR, Corcoran L, Kometani K, Kurosaki T, Smyth GK, Shi W, Kallies A. Attenuation of TCR-induced transcription by Bach2 controls regulatory T cell differentiation and homeostasis. *Nature Communications.* 2020 11(1):252. IMM BIO

267. Sleebs BE, Jarman KE, Frolich S, Wong W, Healer J, Dai W, Lucet IS, Wilson DW, Cowman AF. Development and application of a high-throughput screening assay for identification of small molecule inhibitors of the *P. falciparum* reticulocyte binding-like homologue 5 protein. *International Journal for Parasitology Drugs and Drug Resistance.* 2020 14:188-200. CBD ATB IDID

268. Smith NA, Clarke OB, Lee M, Hodder AN, Smith BJ. Structure of the *Plasmodium falciparum* PfSERA5 pseudo-zymogen. *Protein Science.* 2020 29(11):2245-2258. IDID

269. Smith-Anttila CJA, Mason EA, Wells CA, Aronow BJ, Osborne PB, Keast JR. Identification of a sacral, visceral sensory transcriptome in embryonic and adult mice. *eNeuro.* 2020 7(1):ENEURO.0397-19.2019. BCBC

270. Soon MSF, Lee HJ, Engel JA, Straube J, Thomas BS, Pernold CPS, Clarke LS, Laohamonthonkul P, Haldar RN, Williams CG, Lansink LIM, Moreira ML, Bramhall M, Koufariotis LT, Wood S, Chen X, James KR, Lonnberg T, Lane SW, Belz GT, Engwerda CR, Khoury DS, Davenport MP, Svensson V, Teichmann SA, Haque A. Transcriptome dynamics of CD4(+) T cells during malaria maps gradual transit from effector to memory. *Nature Immunology.* 2020 21(12):1597-1610. IMM

271. Spagnol V, Oliveira CAB, Randle SJ, Passos PMS, Correia C, Simaroli NB, Oliveira JS, Mevissen TET, Medeiros AC, Gomes MD, Komander D, Laman H, Teixeira FR. The E3 ubiquitin ligase SCF(Fbxo7) mediates proteasomal degradation of UXT isoform 2 (UXTV2) to inhibit the NF-kappaB signaling pathway. *Biochimica et Biophysica Acta General Subjects.* 2021 1865(1):129754(epub 2020 Sep 30) USD

272. Stamberger H, Hammer TB, Gardella E, Vlaskamp DRM, Bertelsen B, Mandelstam S, de Lange I, Zhang J, Myers CT, Fenger C, et al includes Bennett MF. NEXMIF encephalopathy: an X-linked disorder with male and female phenotypic patterns. *Genetics in Medicine.* 2021 Nov 4. *(*epub ahead of print) PHI

273. Stringer JM, Winship A, Zerafa N, Wakefield M, Hutt K. Oocytes can efficiently repair DNA double-strand breaks to restore genetic integrity and protect offspring health. *Proceedings of the National Academy of Sciences of the United States of America.* 2020 117(21):11513-11522. EDD

274. Tang J, Chisholm SA, Yeoh LM, Gilson PR, Papenfuss AT, Day KP, Petter M, Duffy MF. Histone modifications associated with gene expression and genome accessibility are dynamically enriched at *Plasmodium falciparum* regulatory sequences. *Epigenetics & Chromatin.* 2020 13(1):50. BIO

275. Teh CE, Gong JN, Segal D, Tan T, Vandenberg CJ, Fedele PL, Low MSY, Grigoriadis G, Harrison SJ, Strasser A, Roberts AW, Huang DCS, Nolan GP, Gray DHD, Ko ME. Deep profiling of apoptotic pathways with mass cytometry identifies a synergistic drug combination for killing myeloma cells. *Cell Death and Differentiation.* 2020 27(7):2217-2223. IMM BCBC CBSC

276. Teh CE, Robbins AK, Henstridge DC, Dewson G, Diepstraten ST, Kelly G, Febbraio MA, Gabriel SS, O'Reilly LA, Strasser A, Gray DHD. MCL-1 is essential for survival but dispensable for metabolic fitness of FOXP3(+) regulatory T cells. *Cell Death and Differentiation.* 2020 27(12):3374-3385. IMM USD BCBC INFL

277. Teyra J, Kelil A, Jain S, Helmy M, Jajodia R, Hooda Y, Gu J, D'Cruz AA, Nicholson SE, Min J, Sudol M, Kim PM, Bader GD, Sidhu SS. Large-scale survey and database of high affinity ligands for peptide recognition modules. *Molecular Systems Biology.* 2020 16(12):e9310. INFL

278. Thijssen R, Alvarez-Diaz S, Grace C, Gao MY, Segal DH, Xu Z, Strasser A, Huang DCS. Loss of RIPK3 does not impact MYC-driven lymphomagenesis or chemotherapeutic drug-induced killing of malignant lymphoma cells. *Cell Death and Differentiation.* 2020 27(8):2531-2533. BCBC

279. Thomalla G, Boutitie F, Ma H, Koga M, Ringleb P, Schwamm LH, Wu O, Bendszus M, Bladin CF, Campbell BCV, Cheng B, Churilov L, Ebinger M, Endres M, Fiebach JB, Fukuda-Doi M, Inoue M, Kleinig TJ, Latour LL, Lemmens R, Levi CR, Leys D, Miwa K, Molina CA, Muir KW, Nighoghossian N, Parsons MW, Pedraza S, Schellinger PD, Schwab S, Simonsen CZ, Song SS, Thijs V, Toni D, Hsu CY, Wahlgren N, Yamamoto H, Yassi N, Yoshimura S, Warach S, Hacke W, Toyoda K, Donnan GA, Davis SM, Gerloff C, EOS Investigators. Intravenous alteplase for stroke with unknown time of onset guided by advanced imaging: systematic review and meta-analysis of individual patient data. *Lancet* 2020 396(10262):1574-1584. PHI

280. Thurgood P, Suarez SA, Pirogova E, Jex AR, Peter K, Baratchi S, Khoshmanesh K. Tunable harmonic flow patterns in microfluidic systems through simple tube oscillation. *Small.* 2020 16(43):e2003612. PHI

281. Tichkule S, Jex AR, van Oosterhout C, Sannella AR, Krumkamp R, Aldrich C, Maiga-Ascofare O, Dekker D, Lamshöft M, Mbwana J, Rakotozandrindrainy N, Borrmann S, Thye T, Schuldt K, Winter D, Kremsner PG, Oppong K, Manouana P, Mbong M, Gesase S, Minja DTR, Mueller I, Bahlo M, Nader J, May J, Rakotozandrindrain R, Adegnika AA, Lusingu JPA, Amuasi J, Eibach D, Caccio SM. Comparative genomics revealed adaptive admixture in *Cryptosporidium hominis* in Africa. *Microbial Genomics.* 2021 7(1):10.1099/mgen.0.000493. (epub 2020 Dec 23) PHI

282. Tie J, Cohen JD, Lo SN, Wang Y, Li L, Christie M, Lee M, Wong R, Kosmider S, Skinner I, Wong HL, Lee B, Burge ME, Yip D, Karapetis CS, Price TJ, Tebbutt NC, Haydon AM, Ptak J, Schaeffer MJ, Silliman N, Dobbyn L, Popoli M, Tomasetti C, Papadopoulos N, Kinzler KW, Vogelstein B, Gibbs P. Prognostic significance of post-surgery circulating tumor DNA in non-metastatic colorectal cancer: individual patient pooled analysis of three cohort studies. *International Journal of Cancer.* 2021 148(4):1014-1026. (epub 2020 Oct 6) PONC

283. Tomezsko PJ, Corbin VDA, Gupta P, Swaminathan H, Glasgow M, Persad S, Edwards MD, McIntosh L, Papenfuss AT, Emery A, Swanstrom R, Zang T, Lan TCT, Bieniasz P, Kuritzkes DR, Tsibris A, Rouskin S. Determination of RNA structural diversity and its role in HIV-1 RNA splicing. *Nature.* 2020 582(7812):438-442. BIO

284. Tong L, Wu PY, Phan JH, Hassazadeh HR, Tong W, Wang MD, SEQC Consortium, includes Smyth G, Liao Y. Impact of RNA-seq data analysis algorithms on gene expression estimation and downstream prediction. *Scientific Reports.* 2020 10(1):17925. BIO

285. Tran BM, Flanagan DJ, Ebert G, Warner N, Tran H, Fifis T, Kastrappis G, Christophi C, Pellegrini M, Torresi J, Phesse TJ, Vincan E. The hepatitis B virus pre-core protein p22 activates Wnt signaling. *Cancers.* 2020 12(6):E1435. IDID USD

286. Travers A, Jalali A, Begbie S, Semira C, Kosmider S, Ananda S, Wong R, Lee M, Shapiro J, Burge M, Yip D, Torres J, Ma B, Nott L, Dean A, Tie J, Khattak A, Lim S, Wong HL, Gibbs P. Real-world treatment and outcomes of metastatic colorectal cancer patients with a poor or very poor performance status. *Clinical Colorectal Cancer.* 2020 11(1):1452. PONC

287. Trevelyan SJ, Brewster JL, Burgess AE, Crowther JM, Cadell AL, Parker BL, Croucher DR, Dobson RCJ, Murphy JM, Mace PD. Structure-based mechanism of preferential complex formation by apoptosis signal-regulating kinases. *Science Signaling.* 2020 13(622)INFL

288. Trevis KJ, Brown NJ, Green CC, Lockhart PJ, Desai T, Vick T, Anderson V, Pua EPK, Bahlo M, Delatycki MB, Scheffer IE, Wilson SJ. Tracing autism traits in large multiplex families to identify endophenotypes of the broader autism phenotype. *International Journal of Molecular Sciences.* 2020 21(21):E7965. PHI

289. Trotman J, Opat S, Gottlieb DJ, Simpson D, Marlton P, Cull G, Munoz J, Tedeschi A, Roberts AW, Seymour JF, Atwal SK, Yu Y, Novotny W, Holmgren EB, Tan Z, Hilger J, Huang J, Tam C. Zanubrutinib for the treatment of patients with Waldenstrom macroglobulinemia: three years of follow-up. *Blood.* 2020 136(18):2027-2037. BCBC

290. Trussart M, Teh CE, Tan T, Leong L, Gray DH, Speed TP. Removing unwanted variation with CytofRUV to integrate multiple CyTOF datasets. *eLife.* 2020 9:e59630. BIO IMM

291. Tullett KM, Tan PS, Park HY, Schittenhelm RB, Michael N, Li R, Policheni AN, Gruber E, Huang C, Fulcher AJ, Danne JC, Czabotar PE, Wakim LM, Mintern JD, Ramm G, Radford KJ, Caminschi I, O'Keeffe M, Villadangos JA, Wright MD, Blewitt ME, Heath WR, Shortman K, Purcell AW, Nicola NA, Zhang JG, Lahoud MH. RNF41 regulates the damage recognition receptor Clec9A and antigen cross-presentation in mouse dendritic cells. *eLife.* 2020 9:e63452. SBD EDD IMM BCBC

292. Tye-Din JA, Daveson AJM, Goldstein KE, Hand HL, Neff KM, Goel G, Williams LJ, Truitt KE, Anderson RP, RESET CeD Study Group. Patient factors influencing acute gluten reactions and cytokine release in treated coeliac disease. *BMC Medicine.* 2020 18(1):362. IMM

293. Tyebji S, Hannan AJ, Tonkin CJ. Pathogenic infection in male mice changes sperm small RNA profiles and transgenerationally alters offspring behavior. *Cell Reports.* 2020 31(4):107573. IDID

294. Utzschneider DT, Gabriel SS, Chisanga D, Gloury R, Gubser PM, Vasanthakumar A, Shi W, Kallies A. Early precursor T cells establish and propagate T cell exhaustion in chronic infection. *Nature Immunology.* 2020 21(10):1256-1266. BIO IMM

295. Valpadashi A, Callegari S, Linden A, Neumann P, Ficner R, Urlaub H, Deckers M, Rehling P. Defining the architecture of the human TIM22 complex by chemical crosslinking. *FEBS Letters.* 2021 595(2):157-168. (epub 2020 Nov 13) USD

296. Vanyai HK, Prin F, Guillermin O, Marzook B, Boeing S, Howson A, Saunders RE, Snoeks T, Howell M, Mohun TJ, Thompson B. Control of skeletal morphogenesis by the Hippo-YAP/TAZ pathway. *Development.* 2020 147(21):dev187187. EDD

297. Vasanthakumar A, Chisanga D, Blume J, Gloury R, Britt K, Henstridge DC, Zhan Y, Torres SV, Liene S, Collins N, Cao E, Sidwell T, Li C, Spallanzani RG, Liao Y, Beavis PA, Gebhardt T, Trevaskis N, Nutt SL, Zajac JD, Davey RA, Febbraio MA, Mathis D, Shi W, Kallies A. Sex-specific adipose tissue imprinting of regulatory T cells. *Nature.* 2020 570(7800):581-585. IMM BIO

298. Verstappen GM, Ice JA, Bootsma H, Pringle S, Haacke EA, de Lange K, van der Vries GB, Hickey P, Vissink A, Spijkervet FKL, Lessard CJ, Kroese FGM. Gene expression profiling of epithelium-associated FcRL4(+) B cells in primary Sjogren's syndrome reveals a pathogenic signature. *Journal of Autoimmunity.* 2020 109:102439. ATB

299. Vinit R, Timinao L, Bubun N, Katusele M, Robinson LJ, Kaman P, Sakur M, Makita L, Reimer L, Schofield L, Pomat W, Mueller I, Laman M, Freeman T, Karl S. Decreased bioefficacy of long-lasting insecticidal nets and the resurgence of malaria in Papua New Guinea. *Nature Communications.* 2020 11(1):3646. PHI

300. Visser LJ, Aloise C, Swatek KN, Medina GN, Olek KM, Rabouw HH, de Groot RJ, Langereis MA, de Los Santos T, Komander D, Skern T, van Kuppeveld FJM. Dissecting distinct proteolytic activities of FMDV Lpro implicates cleavage and degradation of RLR signaling proteins, not its deISGylase/DUB activity, in type I interferon suppression. *PLoS Pathogens.* 2020 16(7):e1008702. USD

301. Vuillermin PJ, O'Hely M, Collier F, Allen KJ, Tang MLK, Harrison LC, Carlin JB, Saffery R, Ranganathan S, Sly PD, Gray L, Molloy J, Pezic A, Conlon M, Topping D, Nelson K, Mackay CR, Macia L, Koplin J, Dawson SL, Moreno-Betancur M, Ponsonby AL, Institute JCV, Group BISI. Maternal carriage of *Prevotella* during pregnancy associates with protection against food allergy in the offspring. *Nature Communications.* 2020 11(1):1452. PHI

302. Wang J, Bediaga N, Mallone R, Larger E, Harrison LC, Wentworth JM, ImMaDiab Study Group. Validation in the general population of a C-peptide estimate equation to measure beta cell function in recent-onset type 1 diabetes. *Acta Diabetologica.* 2021 58(1):115-117. (epub 2020 Sep 17) PHI

303. Wang J, Xu Y, Chen Z, Liang J, Lin Z, Liang H, Xu Y, Wu Q, Guo X, Nie J, Lu B, Huang B, Xian H, Wang X, Wu Q, Zeng J, Chai C, Zhang M, Lin Y, Zhang L, Zhao S, Tong Y, Zeng L, Gu X, Chen ZG, Yi S, Zhang T, Delfouneso D, Zhang Y, Nutt SL, Lew AM, Lu L, Bai F, Xia H, Wen Z, Zhang Y. Liver immune profiling reveals pathogenesis and therapeutics for biliary atresia. *Cell.* 2020 183(7):1867-1883e26. IMM

304. Wanigasuriya I, Gouil Q, Kinkel SA, Tapia Del Fierro A, Beck T, Roper EA, Breslin K, Stringer J, Hutt K, Lee HJ, Keniry A, Ritchie ME, Blewitt ME. *Smchd1* is a maternal effect gene required for genomic imprinting. *eLife.* 2020 9:e55529. EDD

305. Wee K, Hediyeh-Zadeh S, Duszyc K, Verma S, Nanavati B, Khare S, Varma A, Daly RJ, Yap AS, Davis MJ, Budnar S. Snail induces epithelial cell extrusion by regulating RhoA contractile signaling and cell-matrix adhesion. *Journal of Cell Science.* 2020 133(13):jcs235622. BIO

306. Wentworth JM, Bediaga NG, Gitelman SE, Evans-Molina C, Gottlieb PA, Colman PG, Haller MJ, Harrison LC. Clinical trial data validate the C-peptide estimate model in type 1 diabetes. *Diabetologia.* 2020 63(4):885-886. PHI

307. Wentworth JM, Colman PG, Zafgen Study Group. The methionine aminopeptidase 2 inhibitor ZGN-1061 improves glucose control and weight in overweight and obese individuals with type 2 diabetes: a randomized placebo-controlled trial. *Diabetes Obesity & Metabolism.* 2020 22(7):1215-1219. PHI

308. Wentworth JM, Fourlanos S, Colman PG, Harrison LC. A pilot study of the feasibility of empagliflozin in recent-onset type 1 diabetes. *Metabolism Open.* 2020 5:100021. PHI

309. Whittle JR, Vaillant F, Surgenor E, Policheni AN, Giner G, Capaldo BD, Chen HR, Liu HK, Dekkers JF, Sachs N, Clevers H, Fellowes A, Green T, Xu H, Fox SB, Herold MJ, Smyth GK, Gray DHD, Visvader JE, Lindeman GJ. Dual targeting of CDK4/6 and BCL2 pathways augments tumor response in estrogen receptor positive breast cancer. *Clinical Cancer Research.* 2020 26(15):4120-4134. CBSC IMM BIO BCBC

310. Williams DS, Mouradov D, Newman MR, Amini E, Nickless DK, Fang CG, Palmieri M, Sakthianandeswaren A, Li S, Ward RL, Hawkins NJ, Skinner I, Jones I, Gibbs P, Sieber OM. Tumour infiltrating lymphocyte status is superior to histological grade, DNA mismatch repair and BRAF mutation for prognosis of colorectal adenocarcinomas with mucinous differentiation. *Modern Pathology* 2020 33(7):1420-1432. PONC

311. Wilson DH, Jarman EJ, Mellin RP, Wilson ML, Waddell SH, Tsokkou P, Younger NT, Raven A, Bhalla SR, Noll ATR, Olde Damink SW, Schaap FG, Chen P, Bates DO, Banales JM, Dean CH, Henderson DJ, Sansom OJ, Kendall TJ, Boulter L. Non-canonical Wnt signalling regulates scarring in biliary disease via the planar cell polarity receptors. *Nature Communications.* 2020 11(1):445. IDID

312. Wolfe R, Wetmore JB, Woods RL, McNeil JJ, Gallagher H, Roderick P, Walker R, Nelson MR, Reid CM, Shah RC, Ernst ME, Lockery JE, Tonkin AM, Abhayaratna WP, Gibbs P, Wood EM, Mahady SE, Williamson JD, Donnan GA, Cloud GC, Murray AM, Polkinghorne KR, Group AI. Subgroup analysis of the ASPirin in Reducing Events in the Elderly randomized clinical trial suggest aspirin did not improve outcomes in older adults with chronic kidney disease. *Kidney International.* 2020 Sep 10. *(*epub ahead of print) PONC

313. Xia Y, Yassi N, Raniga P, Bourgeat P, Desmond P, Doecke J, Ames D, Laws SM, Fowler C, Rainey-Smith SR, Martins R, Maruff P, Villemagne VL, Masters CL, Rowe CC, Fripp J, Salvado O, Group AR. Comorbidity of cerebrovascular and alzheimer's disease in aging. *Journal of Alzheimer's disease : JAD.* 2020 78(1):321-334. PHI

314. Xiong X, Menting JG, Disotuar MM, Smith NA, Delaine CA, Ghabash G, Agrawal R, Wang X, He X, Fisher SJ, MacRaild CA, Norton RS, Gajewiak J, Forbes BE, Smith BJ, Safavi-Hemami H, Olivera B, Lawrence MC, Chou DH. A structurally minimized yet fully active insulin based on cone-snail venom insulin principles. *Nature Structural & Molecular Biology.* 2020 27(7):615-624. SBD

315. Xu F, Jex A, Svard SG. A chromosome-scale reference genome for *Giardia intestinalis* WB. *Scientific Data.* 2020 7(1):38. PHI

316. Xu T, Nicolson S, Sandow JJ, Dayan S, Jiang X, Manning JA, Webb AI, Kumar S, Denton D. Cp1/cathepsin L is required for autolysosomal clearance in *Drosophila*. *Autophagy.* 2020 Oct 28. *(*epub ahead of print) ATB

317. Xu Y, Kirk NS, Venugopal H, Margetts MB, Croll TI, Sandow JJ, Webb AI, Delaine CA, Forbes BE, Lawrence MC. How IGF-II binds to the human type 1 insulin-like growth factor receptor. *Structure.* 2020 28(7):786-798e6. SBD ATB

318. Yassi N, Hilal S, Xia Y, Lim YY, Watson R, Kuijf H, Fowler C, Yates P, Maruff P, Martins R, Ames D, Chen C, Rowe CC, Villemagne VL, Salvado O, Desmond PM, Masters CL. Influence of comorbidity of cerebrovascular disease and amyloid-beta on alzheimer's disease. *Journal of Alzheimer's Disease* 2020 73(3):897-907. PHI

319. Yeetong P, Chunharas C, Pongpanich M, Bennett MF, Srichomthong C, Pasutharnchat N, Suphapeetiporn K, Bahlo M, Shotelersuk V. Founder effect of the TTTCA repeat insertions in SAMD12 causing BAFME1. *European Journal of Human Genetics.* 2020 Sep 24. *(*epub ahead of print) PHI

320. Yeung L, Anderson JML, Wee JL, Demaria MC, Finsterbusch M, Liu YS, Hall P, Smith BC, Dankers W, Elgass KD, Wicks IP, Kwok HF, Wright MD, Hickey MJ. Leukocyte tetraspanin CD53 restrains alpha3 integrin mobilization and facilitates cytoskeletal remodeling and transmigration in mice. *Journal of Immunology.* 2020 205(2):521-532. INFL

321. Yi X, Xue L, Thomas T, Baell JB. Action plan for hit identification (APHID): KAT6A as a case study. *Future Medicinal Chemistry.* 2020 5(423-437) EDD

322. Young ND, Harris TJ, Evangelista M, Tran S, Wouters MA, Soares da Costa TP, Kershaw NJ, Gasser RB, Smith BJ, Lee EF, Fairlie WD. Diversity in the intrinsic apoptosis pathway of nematodes. *Communications Biology.* 2020 3(1):478. PONC

323. Yu CH, Davidson S, Harapas CR, Hilton JB, Mlodzianoski MJ, Laohamonthonkul P, Louis C, Low RRJ, Moecking J, De Nardo D, Balka KR, Calleja DJ, Moghaddas F, Ni E, McLean CA, Samson AL, Tyebji S, Tonkin CJ, Bye CR, Turner BJ, Pepin G, Gantier MP, Rogers KL, McArthur K, Crouch PJ, Masters SL. TDP-43 triggers mitochondrial DNA release via mPTP to activate cGAS/STING in ALS. *Cell.* 2020 183(3):636-646e18. INFL IDID ATB

324. Yunis J, Redwood AJ, Belz GT, Stevenson PG. Membrane association of a model CD4(+) T cell vaccine antigen confers enhanced yet incomplete protection against Murid Herpesvirus-4 infection. *Immunology and Cell Biology.* 2020 98(4):332-343. IMM

325. Zhan Y, Kong I, Chopin M, Macri C, Zhang JG, Xie J, Nutt SL, O'Keeffe M, Hawkins ED, Morand EF, Lew AM. Plasmacytoid dendritic cells from parent strains of the NZB/W F1 lupus mouse contribute different characteristics to autoimmune propensity. *Immunology and Cell Biology.* 2020 98(3):203-214. IMM USD

326. Zhang X, Yang L, Szeto P, Abali GK, Zhang Y, Kulkarni A, Amarasinghe K, Li J, Vergara IA, Molania R, Papenfuss AT, McLean C, Shackleton M, Harvey KF. The Hippo pathway oncoprotein YAP promotes melanoma cell invasion and spontaneous metastasis. *Oncogene.* 2020 39(30):5267-5281. BIO

327. Zhang Y, Mui JW, Arumaperuma T, Lingford JP, Goddard-Borger ED, White JM, Williams SJ. Concise synthesis of sulfoquinovose and sulfoquinovosyl diacylglycerides, and development of a fluorogenic substrate for sulfoquinovosidases. *Organic & Biomolecular Chemistry.* 2020 18(4):675-686. CBD

328. Zhao H, Smith K, Bernard S, Stephenson M, Ma H, Chandra RV, Phan T, Bladin CF, Churilov L, Crompton D, Dewey HM, Wijeratne T, Cloud G, Thijs V, Kleinig TJ, Ng JL, Williams C, Alemseged F, Ng F, Mitchell PJ, Parsons MW, Yassi N, Davis SM, Campbell BCV. Utility of severity-based prehospital triage for endovascular thrombectomy: ACT-FAST validation study. *Stroke.* 2021 52(1):70-79. (epub 2020 Dec 22) PHI

329. Zhen J, Stefanolo JP, Temprano MP, Tedesco S, Seiler C, Caminero AF, Enrique d-M, Huguet MM, Vivas S, Niveloni SI, Bercik P, Smecuol E, Uscanga L, Trucco E, Lopez V, Olano C, Mansueto P, Carroccio A, Green PHR, Day A, Tye-Din J, Bai JC, Ciacci C, Verdu E, Lebwohl B, Pinto-Sanchez MI. The risk of contracting COVID-19 is not increased in patients with celiac disease. *Clinical Gastroenterology and Hepatology* 2021 19(2):391-393. (epub 2020 Oct 12) IMM

330. Zhou L, Liu T, Huang B, Luo M, Chen Z, Zhao Z, Wang J, Leung D, Yang X, Chan KW, Liu Y, Xiong L, Chen P, Wang H, Ye L, Liang H, Masters SL, Lew AM, Gong S, Bai F, Yang J, Pui-Wah Lee P, Yang W, Zhang Y, Lau YL, Geng L, Zhang Y, Cui J. Excessive deubiquitination of NLRP3-R779C variant contributes to very-early-onset inflammatory bowel disease development. *Journal of Allergy and Clinical Immunology.* 2021 147(1):267-279. (epub 2020 Dep 15) INFL IMM

Review/Book/Chapter

331. Abbott RC, Cross RS, Jenkins MR. Finding the keys to the CAR: identifying novel target antigens for T cell redirection immunotherapies. *International Journal of Molecular Sciences.* 2020 21(2):515. IMM

332. Alemao CA, Budden KF, Gomez HM, Rehman SF, Marshall JE, Shukla SD, Donovan C, Forster S, Yang IA, Keely S, Mann ER, El Omar EM, Belz GT, Hansbro PM. Impact of diet and the bacterial microbiome on the mucous barrier and immune disorders. *Allergy.* 2020 Aug 6. *(*epub ahead of print) IMM

333. Amarasinghe SL, Su S, Dong X, Zappia L, Ritchie ME, Gouil Q. Opportunities and challenges in long-read sequencing data analysis. *Genome Biology.* 2020 21(1):30. EDD

334. Anderson MA, Seymour JF. Tumor lysis syndrome: still the Achilles heel of venetoclax in treatment of CLL? *Leukemia & Lymphoma.* 2020 61(10):2286-2288. BCBC

335. Anderton H, Wicks IP, Silke J. Cell death in chronic inflammation: breaking the cycle to treat rheumatic disease. *Nature Reviews Rheumatology.* 2020 16(9):496-513. INFL

336. Azarpazhooh MR, Amiri A, Morovatdar N, Steinwender S, Rezaei Ardani A, Yassi N, Biller J, Stranges S, Tokazebani Belasi M, Neya SK, Khorram B, Sheikh Andalibi MS, Arsang-Jang S, Mokhber N, Di Napoli M. Correlations between COVID-19 and burden of dementia: An ecological study and review of literature. *Journal of the Neurological Sciences.* 2020 416:117013. PHI

337. Baker TL, Sun M, Semple BD, Tyebji S, Tonkin CJ, Mychasiuk R, Shultz SR. Catastrophic consequences: can the feline parasite Toxoplasma gondii prompt the purrfect neuroinflammatory storm following traumatic brain injury? *Journal of Neuroinflammation.* 2020 17(1):222. IDID

338. Baldi AJ, Clucas D, Pasricha SR. Anemia and water, sanitation, and hygiene (WASH)-is there really a link? *American Journal of Clinical Nutrition.* 2020 112(5):1145-1146. PHI

339. Baldi AJ, Larson LM, Pasricha SR. Balancing safety and potential for impact in universal iron interventions. *Nestle Nutrition Institute Workshop Series.* 2020 93:51-62. PHI

340. Bedoui S, Herold MJ, Strasser A. Emerging connectivity of programmed cell death pathways and its physiological implications. *Nature Reviews Molecular cell biology.* 2020 21(11):678-695. BCBC

341. Belz GT. Elucidating specificity opens a window to the complexity of both the innate and adaptive immune systems. *Viral Immunology.* 2020 33(3):145-152. IMM

342. Belz GT, Denman R, Seillet C, Jacquelot N. Tissue-resident lymphocytes: weaponized sentinels at barrier surfaces. *F1000Research.* 2020 9:10.12688/f1000research.25234.1. IMM

343. Blyth AJ, Kirk NS, Forbes BE. Understanding IGF-II action through insights into receptor binding and activation. *Cells.* 2020 9(10):2276. SBD

344. Brooks AJ, Putoczki T. JAK-STAT signalling pathway in cancer. *Cancers.* 2020 12(7):1971. PONC

345. Carrelha J, Lin DS, Rodriguez-Fraticelli AE, Luis TC, Wilkinson AC, Cabezas-Wallscheid N, Tremblay CS, Haas S. Single-cell lineage tracing approaches in hematology research - technical considerations. *Experimental Hematology.* 2020 89:26-36. IMM

346. Chan WF, Johanson TM, Allan RS. Three-dimensional genome rewiring during the development of antibody-secreting cells. *Biochemical Society Transactions.* 2020 48(3):1109-1119. IMM

347. Chandler NJ, Call MJ, Call ME. T cell activation machinery: form and function in natural and engineered immune receptors. *International Journal of Molecular Sciences.* 2020 21(19):7424. SBD

348. Chin KS, Yassi N, Churilov L, Masters CL, Watson R. Prevalence and clinical associations of tau in Lewy body dementias: A systematic review and meta-analysis. *Parkinsonism & Related Disorders.* 2020 80:184-193. PHI

349. Cotton TR, Lechtenberg BC. Chain reactions: molecular mechanisms of RBR ubiquitin ligases. *Biochemical Society Transactions.* 2020 48(4):1737-1750. USD

350. Crotty F, Watson R, Lim WK. Nursing homes: the titanic of cruise ships - will residential aged care facilities survive the COVID-19 pandemic? *Internal Medicine Journal.* 2020 50(9):1033-1036. PHI

351. Daveson AJM, Tye-Din JA, Anderson RP. Editorial: inaccuracies in attribution of symptoms due to gluten-not just in those with self-reported noncoeliac gluten sensitivity. Authors' reply. *Alimentary Pharmacology & Therapeutics.* 2020 51(3):403-404. IMM

352. Davey AS, Call ME, Call MJ. The influence of chimeric antigen receptor structural domains on clinical outcomes and associated toxicities. *Cancers.* 2020 13(1):38. SBD

353. de Koning-Ward TF, Boddey JA, Fowkes FJI. Molecular approaches to Malaria 2020. *Cellular Microbiology.* 2021 23(3):e13289. (epub 2020 Nov 16) IDID

354. Degeling K, Vu M, Koffijberg H, Wong HL, Koopman M, Gibbs P, M IJ. Health economic models for metastatic colorectal cancer: a methodological review. *PharmacoEconomics.* 2020 38(7):683-713. PONC

355. Duckworth BC, Groom JR. Mechanisms of regulate gene expression during immune cell differentiation and development: Conversations that count: Cellular interactions that drive T cell fate. *Immunological Reviews.* 2021 Feb 14. *(*epub ahead of print) IMM

356. Easteal S, Arkell RM, Balboa RF, Bellingham SA, Brown AD, Calma T, Cook MC, Davis M, Dawkins HJS, Dinger ME, Dobbie MS, Farlow A, Gwynne KG, Hermes A, Hoy WE, Jenkins MR, Jiang SH, Kaplan W, Leslie S, Llamas B, Mann GJ, McMorran BJ, McWhirter RE, Meldrum CJ, Nagaraj SH, Newman SJ, Nunn JS, Ormond-Parker L, Orr NJ, Paliwal D, Patel HR, Pearson G, Pratt GR, Rambaldini B, Russell LW, Savarirayan R, Silcocks M, Skinner JC, Souilmi Y, Vinuesa CG, National Centre for Indigenous Genomics, Baynam G. Equitable expanded carrier screening needs indigenous clinical and population genomic data. *American Journal of Human Genetics.* 2020 107(2):175-182. IMM

357. Emery-Corbin SJ, Gruttner J, Svard S. Transcriptomic and proteomic analyses of *Giardia intestinalis*: Intestinal epithelial cell interactions. *Advances in Parasitology.* 2020 107:139-171. PHI

358. Fung KY, Nguyen PM, Putoczki TL. Emerging roles for interleukin-18 in the gastrointestinal tumor microenvironment. *Advances in Experimental Medicine and Biology.* 2020 1240:59-72. PONC

359. Good-Jacobson KL, Groom JR. Hhex drives B cells down memory lane. *Nature Immunology.* 2020 21(9):968-969. IMM

360. Gurzau AD, Blewitt ME, Czabotar PE, Murphy JM, Birkinshaw RW. Relating SMCHD1 structure to its function in epigenetic silencing. *Biochemical Society Transactions.* 2020 48(4):1751-1763. INFL EDD SBD

361. Han J, Wu J, Silke J. An overview of mammalian p38 mitogen-activated protein kinases, central regulators of cell stress and receptor signaling version 1; peer review: 2 approved]. *F1000Research.* 2020 9:10.12688/f1000research.22092.1. INFL

362. Hansen DS. Identifying barriers to career progression for women in science: Is COVID-19 creating new challenges? *Trends in Parasitology.* 2020 36(10):799-802. IDID

363. Harrison LC, Wentworth JM. Prevention of autoimmune disease: the type 1 diabetes paradigm. Chapter 10. In: Rose NR, Mackay IR. eds. *The Autoimmune Diseases (Sixth Edition).* Academic Press; 2020. 1391-1413. PHI

364. Ho GY, Ananda S, Vandenberg CJ, McNally OM, Tie J, Gorringe KL, Bowtell DD, Pyman J, Wakefield M, Scott CL. Glucagonoma masquerading as a mucinous cancer of the ovary: lessons from cell biology. In: Ho GY, Frentzas S. eds. *Gynaecological malignancies - updates and advances.* London, U.K.: InTech Open; 2020. 10.5772/intechopen.92554. CBSC PONC BIO

365. Horton MB, Hawkins ED, Heinzel S, Hodgkin PD. Speculations on the evolution of humoral adaptive immunity. *Immunology and Cell Biology.* 2020 98(6):439-448. IMM

366. Huang Q, Cao W, Mielke LA, Seillet C, Belz GT, Jacquelot N. Innate lymphoid cells in colorectal cancers: a double-edged sword. *Frontiers in Immunology.* 2020 10:3080. IMM

367. Immunological Genome Project, includes Allan R, Johanson TM, Nutt SL, Tellier J. ImmGen at 15. *Nature Immunology.* 2020 21(7):700-703. IMM

368. Jex AR, Svärd S, Hagen KD, Starcevich H, Emery SJ, Balan B, Nosala C, Dawson SC. Recent advances in functional research in *Giardia intestinalis*. *Advances in Parasitology.* 2020 107:97-137. PHI

369. Josefsson EC, Vainchenker W, James C. Regulation of platelet production and life span: role of Bcl-xL and potential implications for human platelet diseases. *International Journal of Molecular Sciences.* 2020 21(20):7591. CBSC

370. Karanatsios B, Prang KH, Verbunt E, Yeung JM, Kelaher M, Gibbs P. Defining key design elements of registry-based randomised controlled trials: a scoping review. *Trials.* 2020 21(1):552. PONC

371. Karunajeewa H, James R. Primaquine for *Plasmodium vivax* malaria treatment. *Lancet.* 2020 395(10242):1971-1972. PHI

372. Kelly GL, Strasser A. Toward targeting antiapoptotic MCL-1 for cancer therapy. *Annual Review of Cancer Biology.* 2020 4:299-313. BCBC

373. King EFB, Cobbold SA, Uboldi AD, Tonkin CJ, McConville MJ. Metabolomic analysis of T*oxoplasma gondii* Tachyzoites. In: Tonkin CJ ed. *Toxoplasma gondii. Methods in Molecular Biology,* vol 2071. Humana New York, NY, 2020. 435-452. IDID

374. Kivelä L, Caminero A, Leffler DA, Pinto-Sanchez MI, Tye-Din JA, Lindfors K. Current and emerging therapies for coeliac disease. *Nature Reviews Gastroenterology & Hepatology.* 2020 Nov 20. *(*epub ahead of print) IMM

375. Kloehn J, Krishnan A, Tonkin CJ, McConville MJ, Soldati-Favre D. Chapter 10 - Metabolic networks and metabolomics. In: Weiss LM, Kim K. eds. *Toxoplasma gondii The Model Apicomplexan - Perspectives and Methods.* (Third Edition). London: Academic Press; 2020. 451-497. IDID

376. Leong TL. Delayed access to lung cancer screening and treatment during the COVID-19 pandemic: are we headed for a lung cancer pandemic? *Respirology* 2021 26(2):145-146. (epub 2020 Dec 15) PONC

377. Lin VS, Xu ZF, Huang DCS, Thijssen R. BH3 mimetics for the treatment of B-cell malignancies-insights and lessons from the clinic. *Cancers.* 2020 12(11):3353. BCBC

378. Liow E, Tran B. Precision oncology in urothelial cancer. *ESMO Open.* 2020 5(Suppl 1):e000616. PONC

379. Liu L, Lalaoui N. 25 years of research put RIPK1 in the clinic. *Seminars in Cell & Developmental Biology.* 2020 Sep 13. *(*epub ahead of print) INFL

380. Lyons AB, Heinzel S. Chromosome social distancing and crowd control: the dual role of Ki67. *Immunology and Cell Biology.* 2020 98(8):712-714. IMM

381. Marapana D, Cowman AF. Uncovering the ART of antimalarial resistance. *Science.* 2020 367(6473):22-23. IDID

382. Marceaux C, Asselin-Labat ML. Étude des premiers événements contribuant à l'implantation des cellules cancéreuses dans une niche métastatique [Study of early events influencing the settlement of cancer cells in metastatic niches]. *Medecine Sciences.* 2020 36(2):109-112. PONC

383. McArthur L, Sakthivel D, Ataide R, Chan F, Richards JS, Narh CA. Review of burden, clinical definitions, and management of COVID-19 cases. *American Journal of Tropical Medicine and Hygiene.* 2020 103(2):625-638. PHI

384. Metcalfe RD, Putoczki TL, Griffin MDW. Structural understanding of interleukin 6 family cytokine signaling and targeted therapies: focus on interleukin 11. *Frontiers in Immunology.* 2020 11:1424. PONC

385. Meza Guzman LG, Keating N, Nicholson SE. Natural killer cells: tumor surveillance and signaling. *Cancers.* 2020 12(4)INFL

386. Michie J, Kearney CJ, Hawkins ED, Silke J, Oliaro J. The immuno-modulatory effects of inhibitor of apoptosis protein antagonists in cancer immunotherapy. *Cells.* 2020 9(1):pii: E207. IMM INFL

387. Miller JFAP. The function of the thymus and its impact on modern medicine. *Science.* 2020 369(6503)IMM

388. Mitchell RA, King JA, Goldschlager T, Wang YY. The impact of COVID-19 on pituitary surgery. *ANZ Journal of Surgery.* 2020 90(6):963-964. PONC

389. Morrish E, Brumatti G, Silke J. Future therapeutic directions for Smac-Mimetics. *Cells.* 2020 9(2):406. INFL

390. Naik SH. Dendritic cell development at a clonal level within a revised 'continuous' model of haematopoiesis. *Molecular Immunology.* 2020 124:190-197. IMM

391. Ng J, Sutherland KD. NOTCH your usual suspect: MYC charged with controlling neuroendocrine cell-fate in small cell lung cancer. *Cancer Cell.* 2020 38(1):17-20. CBSC

392. Nikpour M, Teh B, Wicks IP, Pellegrini M. Correspondence regarding research letter to the editor by Mathian et al, 'Clinical course of coronavirus disease 2019 (COVID-19) in a series of 17 patients with systemic lupus under long-term treatment with hydroxychloroquine'. *Annals of the Rheumatic Diseases.* 2020 May 29. *(*epub ahead of print) INFL IDID

393. Nutt SL, Chopin M. Transcriptional networks driving dendritic cell differentiation and function. *Immunity.* 2020 52(6):942-956. IMM

394. Nutt SL, Keenan C, Chopin M, Allan RS. EZH2 function in immune cell development. *Biological Chemistry.* 2020 401(8):933-943. IMM

395. Paludan SR, Pradeu T, Masters SL, Mogensen TH. Constitutive immune mechanisms: mediators of host defence and immune regulation. *Nature Reviews Immunology.* 2020 Aug 11. *(*epub ahead of print) INFL

396. Pasricha SR, Tye-Din J, Muckenthaler MU, Swinkels DW. Iron deficiency. *Lancet* 2021 397(10270):233-248. (epub 2020 Dec 4) PHI IMM

397. Pereira-Salgado A, Kwan EM, Tran B, Gibbs P, De Bono J, M IJ. Systematic review of efficacy and health economic implications of real-world treatment sequencing in prostate cancer: where do the newer agents enzalutamide and abiraterone fit in? *European Urology Focus.* 2020 Apr 6. *(*epub ahead of print) PONC

398. Perucca P, Bahlo M, Berkovic SF. The genetics of epilepsy. *Annual Review of Genomics and Human Genetics.* 2020 31:205-230. PHI

399. Pires Amaral M, Migliari Branco L, Strasser A, Dixit VM, Ramalho Bortoluci K. Paradise revealed III: why so many ways to die? Apoptosis, necroptosis, pyroptosis, and beyond. *Cell Death and Differentiation.* 2020 27(5):1740-1742. BCBC

400. Poirier JT, George J, Owonikoko TK, Berns A, Brambilla E, Byers LA, Carbone D, Chen HJ, Christensen CL, Dive C, Farago AF, Govindan R, Hann C, Hellmann MD, Horn L, Johnson JE, Ju YS, Kang S, Krasnow M, Lee J, Lee SH, Lehman J, Lok B, Lovly C, MacPherson D, McFadden D, Minna J, Oser M, Park K, Park KS, Pommier Y, Quaranta V, Ready N, Sage J, Scagliotti G, Sos ML, Sutherland KD, Travis WD, Vakoc CR, Wait SJ, Wistuba I, Wong KK, Zhang H, Daigneault J, Wiens J, Rudin CM, Oliver TG. New approaches to small cell lung cancer therapy : from the laboratory to the clinic. *Journal of Thoracic Oncology* 2020 15(4):520-540. CBSC

401. Potts MA, McDonald JA, Sutherland KD, Herold MJ. Critical cancer vulnerabilities identified by unbiased CRISPR/Cas9 screens inform on efficient cancer Immunotherapy. *European Journal of Immunology.* 2020 50(12):1871-1884. BCBC CBSC

402. Prasanna T, Wong R, Price T, Shapiro J, Tie J, Wong HL, Nott L, Roder D, Lee M, Kosmider S, Jalali A, Burge M, Padbury R, Maddern G, Carruthers S, Moore J, Sorich M, Karapetis CS, Gibbs P, Yip D. Metastasectomy and BRAF mutation; an analysis of survival outcome in metastatic colorectal cancer. *Current Problems in Cancer.* 2021 45(1):100637. (2020 epub Aug 14) PONC

403. Ramesh S, Park S, Call MJ, Im W, Call ME. Experimentally guided computational methods yield highly accurate insights into transmembrane interactions within the T cell receptor complex. *Journal of Physical Chemistry. B.* 2020 124(46):10303-10310. SBD

404. Rashidi M, Wicks IP, Vince JE. Inflammasomes and cell death: common pathways in microparticle diseases. *Trends in Molecular Medicine.* 2020 26(11):1003-1020. INFL

405. Reed JH, Verstappen GM, Rischmueller M, Bryant VL. When B cells break bad: development of pathogenic B cells in Sjogren's syndrome. *Clinical and Experimental Rheumatology.* 2020 38 Suppl(126(4)):271-282. IMM

406. Roberts AW. Therapeutic development and current uses of BCL-2 inhibition. *Hematology. American Society of Hematology Education Program.* 2020 2020(1):1-9. BCBC

407. Salem ME, Puccini A, Tie J. Redefining colorectal cancer by tumor biology. *American Society of Clinical Oncology Educational Book. .* 2020 40:1-13. PONC

408. Seillet C, Brossay L, Vivier E. Natural killers or ILC1s? That is the question. *Current Opinion in Immunology.* 2021 68:48-53. (epub Oct 14 2020) IMM

409. Selak T, Mitchell R. Accidental injection of propofol into a lumbar drain: The Role of ISO 80369-6 Compliant Neuro Connectors. *Journal of Neurosurgical Anesthesiology.* 2020 Jul 8. *(*epub ahead of print) PONC

410. Shortman K. Dendritic cell development: A personal historical perspective. *Molecular immunology.* 2020 119:64-68. IMM

411. Simpson DS, Gabrielyan A, Feltham R. RIPK1 ubiquitination: Evidence, correlations and the undefined. *Seminars in Cell & Developmental Biology.* 2020 Sep 23. *(*epub ahead of print) INFL USD

412. Siva S, Udovicich C, Tran B, Zargar H, Murphy DG, Hofman MS. Expanding the role of small-molecule PSMA ligands beyond PET staging of prostate cancer. *Nature Reviews Urology.* 2020 17(2):107-118. PONC

413. Smibert OC, Allison CC, Doerflinger M, Pellegrini M, Rischin D, Thai A, Slavin MA, Kotton CN. Pseudotumor presentation of CMV disease: diagnostic dilemma and association with immunomodulating therapy. *Transplant Infectious Disease.* 2020 Nov 29. *(*epub ahead of print) IDID

414. Stamp N, Mitchell R, Flemming S. Social media and professionalism among surgeons: Who decides what's right and what's wrong? *Journal of Vascular Surgery.* 2020 72(5):1824-1826. PONC

415. Stavru F, Riemer J, Jex A, Sassera D. When bacteria meet mitochondria: the strange case of the tick symbiont *Midichloria mitochondrii*. *Cellular Microbiology.* 2020 22(4):e13189. PHI

416. Stracke K, Jex AR, Traub RJ. Zoonotic Ancylostomiasis: An update of a continually neglected zoonosis. *American Journal of Tropical Medicine and Hygiene.* 2020 103(1):64-68. PHI

417. Strasser A, Vaux DL. Cell death in the origin and treatment of cancer. *Molecular Cell.* 2020 78(6):1045-1054. BCBC INFL

418. Sutherland KD, Vissers JHA. Balancing the count: harmonizing panel-based tumor mutational burden assessment. *Joural of Thoracic Oncology.* 2020 15(7):1106-1109. CBSC

419. Tie J, Vogelstein B, Gibbs P. Circulating tumor DNA as a prognostic marker in stage III colon cancer-Reply. *JAMA Oncology.* 2020 6(6):932-933. PONC

420. To YH, Lee B, Wong HL, Gibbs P, Tie J. Circulating tumour DNA to guide treatment of gastrointestinal malignancies. *Visceral Medicine.* 2020 36(5):388-396. PONC

421. Tonkin CJ. ed. *Toxoplasma gondii Methods and Protocols* Methods in Molecular Biology vol 2017. New York, NY: Humana New York , NY; 2020 IDID

422. van Duijneveldt G, Griffin MDW, Putoczki TL. Emerging roles for the IL-6 family of cytokines in pancreatic cancer. *Clinical Science.* 2020 134(16):2091-2115. PONC

423. Verdon DJ, Mulazzani M, Jenkins MR. Cellular and molecular mechanisms of CD8(+) T cell differentiation, dysfunction and exhaustion. *International Journal of Molecular Sciences.* 2020 21(19):7357. IMM

424. Vince JE. Receptor interacting protein kinases in cell death and inflammatory signalling. *Seminars in Cell & Developmental Biology.* 2021 109:68-69. (epub 2020 Oct 29) INFL

425. Voss AK, Strasser A. The essentials of developmental apoptosis. *F1000Research.* 2020 9:148. EDD BCBC

426. Waters R, Ndengane M, Abrahams MR, Diedrich CR, Wilkinson RJ, Coussens AK. The *Mtb*-HIV syndemic interaction: why treating *M. tuberculosis* infection may be crucial for HIV-1 eradication. *Future virology.* 2020 15(2):101-125. IDID

427. Wei AH, Roberts AW, Spencer A, Rosenberg AS, Siegel D, Walter RB, Caenepeel S, Hughes P, McIver Z, Mezzi K, Morrow PK, Stein A. Targeting MCL-1 in hematologic malignancies: Rationale and progress. *Blood Reviews.* 2020 44(100672):100672. BCBC

428. Weir A, Hughes S, Rashidi M, Hildebrand JM, Vince JE. Necroptotic movers and shakers: cell types, inflammatory drivers and diseases. *Current Opinion in Immunology.* 2021 68:83-97. (epub Nov 4 2020) INFL

429. Williams SJ, Goddard-Borger ED. alpha-glucosidase inhibitors as host-directed antiviral agents with potential for the treatment of COVID-19. *Biochemical Society Transactions.* 2020 48(3):1287-1295. CBD

430. Yassi N, Flicker L, Campbell BCV. Brain frailty and small vessel disease for stroke outcome prediction: Are we there yet? *Neurology.* 2020 94(5):191-192. PHI

WEHI
brighter together

Help stop Parkinson's disease

Parkinson's disease is a neurodegenerative condition, with many debilitating symptoms that worsen over time.

More than 80,000 Australians live with Parkinson's disease. While current therapies can help to reduce symptoms, there is presently no cure.

For most people, the trigger for Parkinson's disease is not known. The death of certain nerve cells causes the symptoms of Parkinson's disease, which include progressive difficulty in controlling body movement, as well as impacts on other body systems including the bowel, bladder, sense of smell, cognition and emotional wellbeing. Parkinson's disease can also lead to dementia.

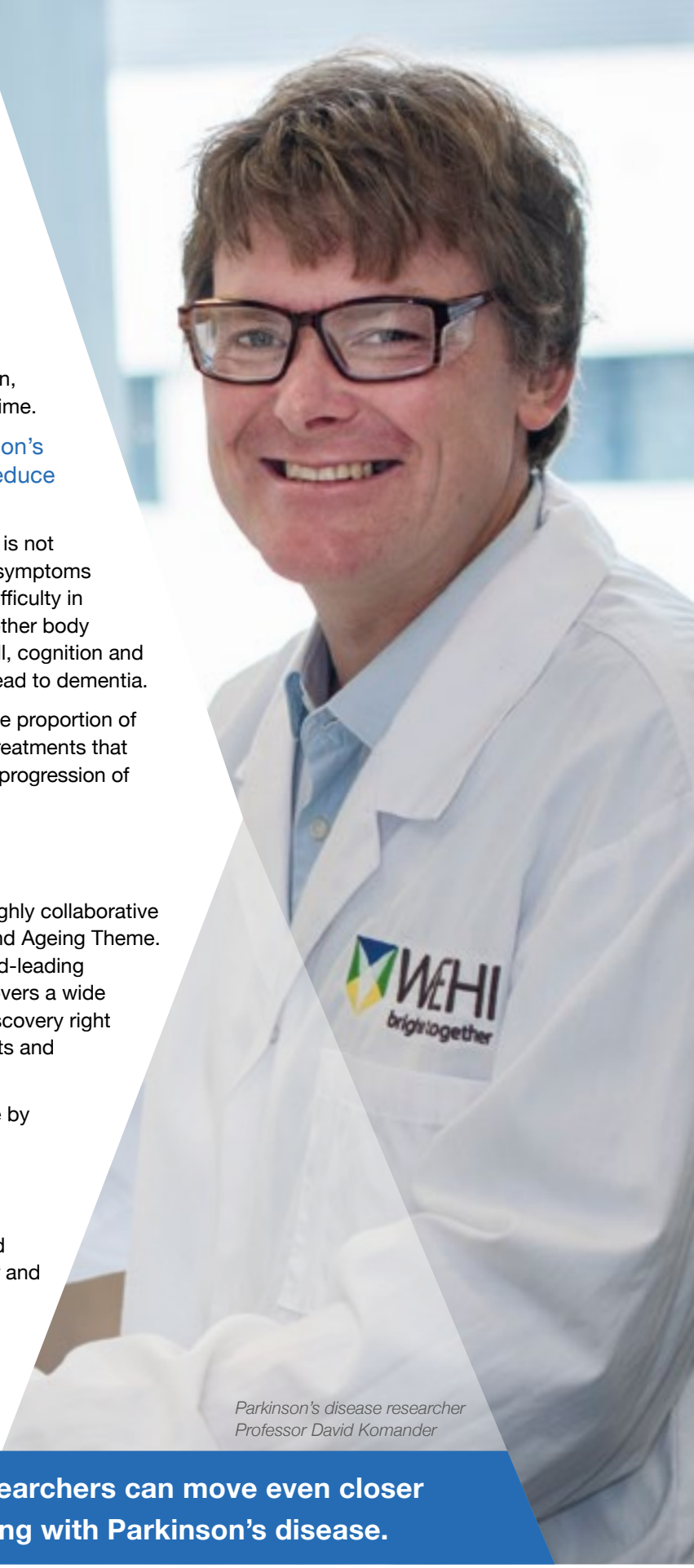
By the time Parkinson's disease is diagnosed, a large proportion of nerve cells have already been lost. While there are treatments that can alleviate some symptoms, nothing can stop the progression of Parkinson's disease.

WEHI is committed to discovering the causes of Parkinson's disease and how to stop it.

To take on this challenge, WEHI has assembled a highly collaborative research program within its Healthy Development and Ageing Theme. The multidisciplinary research team – including world-leading biologists, clinicians, chemists and statisticians – covers a wide spectrum of medical research, from fundamental discovery right through to the development and testing of treatments and diagnostic approaches.

WEHI's researchers are tackling Parkinson's disease by investigating its:

- cause – understanding the complex causes of nerve cell death;
- diagnosis – applying scientific knowledge and state-of-the-art technologies to enable earlier and more accurate detection and diagnosis; and
- treatment – alleviating the devastating symptoms and stopping nerve cells from dying.



Parkinson's disease researcher Professor David Komander

With your vital support, WEHI's researchers can move even closer to improving the lives of people living with Parkinson's disease.

For more information about supporting WEHI please contact:

Ms Deborah Carr
Head of Philanthropy

03 9345 2100 or carr.d@wehi.edu.au

W **www.wehi.edu.au**
WEHIresearch
WEHI_research
WEHI_research
WEHImovies
Walter and Eliza Hall Institute

Please, help stop Parkinson's disease

Parkinson's disease is one of the most common neurodegenerative diseases in Australia – and it is becoming more common. Better approaches for diagnosing and treating this complex condition are urgently needed.

WEHI has assembled a highly collaborative and multidisciplinary team to tackle Parkinson's disease, ranging from fundamental discoveries about its biology right through to developing vital new diagnostics and treatments.

Your financial support will enable WEHI's researchers to move closer to providing much-needed relief and hope to those impacted by this debilitating disease.

To donate today, please complete and return this coupon.

Parkinson's disease researcher Dr Sylvie Callegari

You can also call the Fundraising and Philanthropy Team on 03 9345 2403 or visit wehi.edu.au

Yes, I want to help stop Parkinson's disease

☐ $100 ☐ $250 ☐ $500 ☐ $1000 ☐ $2500 **My choice $** .....

☐ **Cheque** (made payable to The Walter and Eliza Hall Institute of Medical Research)

☐ **Visa** ☐ **MasterCard** ☐ **American Express**

Card No

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry date

☐☐ / ☐☐

Cardholder's name .....

Cardholder's signature .....

Title ..... **First name** ..... **Last name** .....

Address .....

..... **State** ..... **Postcode** .....

Phone ..... **Mobile** .....

Email .....

☐ I would like to join a discovery tour to see laboratories in action

☐ Please send me information on making a gift to WEHI in my will

☐ I have made a gift to WEHI in my will

☐ I would like my donation to remain anonymous

Your support helps us improve lives

Mailing address for all donations:

Walter and Eliza Hall Institute
of Medical Research

Reply Paid 84760 (no stamp required)
Parkville Vic 3052

WEHI
brighter together

The Walter and Eliza Hall Institute
of Medical Research
ABN 12 004 251 423

To make a secure online donation visit www.wehi.edu.au/donate

Alternatively, you can make a donation or discuss how you can become involved by calling us on (03) 9345 2403.

WEHI protects your privacy in accordance with the Information Privacy Principles of the Information Privacy Act 2000. WEHI's privacy policy is available at www.wehi.edu.au.

Augmented reality

Unlocking the experience is easy:

Step 1:
Search for the free WEHI AR app on the Apple or Google Play store, and download to your smartphone or tablet. If you downloaded a previous verion of the app, you may need to update it. (Check store for phone and OS requirements.)

Links to the app are also provided at wehi.edu.au/wehiar

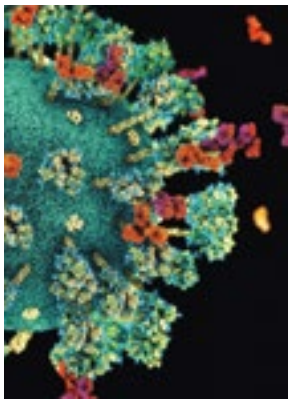
Step 2:
Open the WEHI AR app and allow camera access. NB: The app cannot work without access to your smartphone's camera. If permission is rejected or missed, you will need to grant access in your phone's system preferences before you can use the app.

Step 3:
Hold your mobile device over the cover image while the app is active and watch the cover image come to life.

Want more?
There are additional augmented reality experiences embedded in images on pages 5, 22, 25 and 34. Just look for the augmented reality symbol.

Questions?
Email communityrelations@wehi.edu.au or visit wehi.edu.au/wehiar

What is augmented reality?
Augmented reality is an interactive experience adding layers of digital information such as videos, graphics and sound to our view of the real world.



Cover image

Antibodies binding the SARS-CoV-2 virus. Animation by Dr Drew Berry, WEHI.TV

COVID-19 is caused by the SARS-CoV-2 virus. In this image, which is based on scientific data, antibodies – an important part of our immune defences – are shown in orange and purple, binding to 'spike proteins' on the surface of SARS-CoV-2 virus (shown in teal and yellow). Spike proteins are critical for SARS-CoV-2 to enter human cells, and this can be blocked by specific antibodies – breaking the infection cycle.

WEHI researchers are part of a consortium that is developing an 'antibody cocktail' that prevents SARS-CoV-2 from entering cells, which may have applications for preventing or treating COVID-19. You can read more about this research towards antibody-based 'biologics' therapies for COVID-19 on pages 14 and 15.

All photos used in this annual report were taken following the recommended social distancing and mask-wearing guidelines applicable at the time of the photo.