Burnet Institute
Medical Research. Practical Action.

Equity Through Better Health

ANNUAL REPORT 2016

30 Years 1986-2016
Excellence, Innovation, Impact

Medical Research. Practical Action.

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Cover: *A young boy in Kokopo, Papua New Guinea*

Director and CEO: Professor Brendan Crabb AC, BSc(Hons), PhD **Deputy Directors:** Associate Professor David Anderson, BSc(Hons), PhD; Professor Michael Toole AM, MBBS, BMedSc **Company Secretary:** Mr Peter Spiller, BBus, CPA

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Burnet Institute gratefully acknowledges funds received from the Victorian Government principally under its Operational Infrastructure Support Program, and from the Federal Government principally through the Department of Foreign Affairs and Trade, and National Health and Medical Research Council (NHMRC).

A full copy of this Financial Report is available on our website or if you would prefer a printed copy, please call +61 3 9282 2111. This Financial Report has been prepared in accordance with the requirements set out in the Corporations Act, 2001 and the Australian Council for International Development (ACFID) Code of Conduct. For further information on the Code please refer to the ACFID Code of Conduct available at www.acfid.asn.au.

Burnet Institute is a member of the Association of Australian Medical Research Institutes (AAMRI), the peak body representing Australia's pre-eminent independent medical research institutes. All members of AAMRI are internationally recognised as leaders in health and medical research.

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Burnet Institute is an Australian, unaligned, independent, not-for-profit organisation that aims to achieve better health for vulnerable communities throughout the world.

OUR VISION

Equity through better health.

OUR MISSION

To achieve better health for vulnerable communities in Australia and internationally by accelerating the translation of research, discovery and evidence into sustainable health solutions.

OUR VALUES

We are passionate about social justice, equality, evidence-based research and development, and strive to deliver excellence and health solutions through innovation, collaboration and accountability.

Medical Research. Practical Action.

We believe that every person in the world has an equal right to basic healthcare. To achieve this for the world's most neglected people requires both commitment and innovation.

OUR UNIQUE APPROACH

Burnet Institute brings together a highly diverse skill base to help solve devastating health problems. This sets us apart from other organisations.

Linking medical research with public health action through our international and local field presence, our laboratories, and our mixed development and research cultures drives greater focus on the most relevant global health issues, and a greater impact as a result.

The year 2016 saw the launch of Burnet 2020, a bold strategic plan to transform the Institute into a program-led organisation, placing interdisciplinary health programs at the heart of daily decision-making. Throughout the year, Burnet's expertise in specific infectious diseases of global health significance (especially HIV, malaria, tuberculosis, and viral hepatitis), and some cancers, continued to make an impact on vulnerable communities internationally and in Australia, along with our research and public health programs in women's and children's health; alcohol, drugs and harm reduction; sexual and reproductive health; and young people's health.

Burnet Institute is a formally accredited medical research organisation with the National Health and Medical Research Council (NHMRC), and as a non-government organisation (NGO) with the Australian Department of Foreign Affairs and Trade – Australian Aid.

Burnet Institute's head office is in Melbourne, Australia and we also have offices or representatives in Myanmar, Papua New Guinea, China, Zimbabwe and Lao PDR; as well as activities in other Asian, African and Pacific countries.

Burnet Institute is named in honour of Sir Frank Macfarlane Burnet OM, AK, KBE who received the Nobel Prize for Medicine in 1960.

"I congratulate the Institute on 30 years of vital research, public health action and contribution to global health. We are very fortunate to have so many brilliant minds working here... particularly in the area of malaria research and the treatment and prevention of HIV." **– THE HONOURABLE LINDA DESSAU AC**

CELEBRATING 30 YEARS OF EXCELLENCE AND PUBLIC HEALTH IMPACT (1986-2016)

In 2016 Burnet Institute celebrated its 30th Anniversary, an exciting milestone in our history. It was a wonderful time to reflect on the groundbreaking and considerable achievements the Institute has made since its inception in 1986.

Since the formative days of the Macfarlane Burnet Centre for Medical Research (Burnet Institute) at Fairfield Infectious Diseases Hospital in Melbourne in the late 1980s, the Institute has developed into a world-renowned medical research and public health organisation. Burnet now has more than 400 scientists, public health professionals and students addressing some of the world's most devastating and challenging health issues to achieve better health for vulnerable communities.

To mark this special anniversary year our Patron-in-Chief, Victorian Governor The Honourable Linda Dessau AC hosted a special reception for Burnet at Government House, attended by more than 130 guests including our founding Director, Professor Ian Gust AO.

Burnet Institute brings expertise, research and innovation to help meet specific health challenges in our neighbourhood. I welcome the ongoing contribution of Burnet Institute to improving community health in Australia and our region.

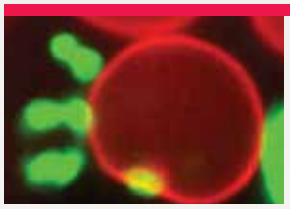
The Hon Julie Bishop MP
Minister for Foreign Affairs

The Institute has embraced the challenge of translating achievements into measurable gains in human health through its innovative programs.

Professor Ian Gust AO
Founding Director of Burnet Institute

CELEBRATING 30 YEARS OF ACHIEVEMENTS 1986 - 2016

30 Years 1986-2016
Excellence, Innovation, Impact



360biolabs

Burnet ImmunoMonitoring Facility merges with Innoviron to form 360biolabs.

2014

Burnet announces a multi-million dollar collaborative study into the effectiveness of new hepatitis C medications in a community setting.

10th year of the Sex, Drugs and Rock 'n' Roll survey of risk behaviour amongst 10,000+ young people in Melbourne.

Healthy Mothers, Healthy Babies program launched in Port Moresby, PNG.

2012

Burnet's CD4 low-cost, point-of-care HIV test showcased as one of NHMRC's best research projects of 2011.

Burnet researchers begin formal preclinical studies into a hepatitis C vaccine.

2011

Burnet receives prestigious NHMRC funding for Centre for Research Excellence into injecting drug use (CREIDU).

2010

New world-class laboratory facilities for Burnet open on Alfred Centre level 7.

2016

400+ scientists, researchers and public health professionals involved in discovery-based medical research and public health programs.

2015

Discovery of malaria-blocking immune response opens door for vaccine.

Building blocks discovered for new drug classes to prevent and treat HIV.

南京澳百生物技术有限公司
Nanjing BioPoint Diagnostic Technology

Nanjing BioPoint R&D laboratory facility officially opened in China to develop low-cost diagnostic tests.

Healthy Mothers Healthy Babies

2013

Burnet researchers move a step closer to finding a cure for HIV by luring the 'sleeping' virus out of infected cells.

PRONTO! – Australia's first shopfront rapid HIV testing clinic – opens in Melbourne. A Burnet collaboration with the Victorian AIDS Council and Victorian Department of Health.

2008

Clinical Research Laboratory accredited as a World Health Organization regional HIV drug resistance laboratory.

2007

Burnet scientists identify a version of a hepatitis C virus (HCV) viral protein providing a platform to develop a vaccine against HCV.

2006

Austin Research Institute merges with Burnet Institute.

2003

Burnet opens office in Yangon, Burma (Myanmar).

2002

The Institute moves from Fairfield to the Alfred Medical Research and Education Precinct in Melbourne, Victoria.

2001

Name changed to Macfarlane Burnet Institute for Medical Research and Public Health Ltd (Burnet).

First overseas office opens in Vientiane, Lao PDR.

2000

International Health Unit initiates HIV prevention program in PNG.

1998

Macfarlane Burnet Centre awarded United Nations Collaborating Centre status on HIV and AIDS.

1997

Burnet Institute accredited as an NGO by AusAID (now DFAT – Australian Aid) for the first time.

The Primary Health Care and Water Supply Project is Burnet's first project in China (Tibet Autonomous Region).

1995

Identification of an attenuated strain of HIV-1, a potential basis of a vaccine for HIV.

1992

Dr Nick Crofts forms the International Health Unit.

1989

Launch of the first Australian cohort study of injecting drug users – the Victorian Injecting Drug Users Cohort Study.

1986

Macfarlane Burnet Centre for Medical Research formally launched, incorporated in 1989.

Burnet Institute Directors

Professor Ian Gust AO – 1986-1992
Professor Ian McKenzie – 1991-2002 (The Austin Research Institute)
Professor John Mills AO – 1992-2002
Professor Steve Wesselingh – 2002-2007
Professor Mark Hogarth – 2007-2008
Professor Brendan Crabb AC – 2008-present

Chairs

The Hon Geoffrey Connard AM – 1986-91
Mr Graeme Hannan – 1991-2002
Mr Alastair Lucas AO – 2002-2014
Mr Robert Milne – 2014-present

CHAIR'S REPORT

I'm pleased to present this annual review, which highlights many of the activities undertaken by the Institute during 2016.

Much of the first part of the year was spent completely reviewing the Institute in the lead-up to the development of our new strategic plan. This involved extensive consultation with a broad range of internal and external stakeholders, the review of our vision and mission, our programs and organisational structure, and assessing progress against our key objectives. The aim of the review, led by Associate Professor Helen Evans AO, was to confirm our key areas of strength and identify areas of improvement. The outcome of the review was used as the basis for developing a new strategic plan that would uniquely position the Institute, map our future direction, and put in place a solid foundation for our future. A key outcome of the review was the need for improved focus, greater integration and an improved workplace. These three areas became the cornerstone for the development of our new strategic plan and organisational restructure.

In October we launched our new plan, *Burnet 2020*, which outlined our Vision of *equity through better health*, and a revised Mission of *achieving better health for vulnerable communities in Australia and internationally through accelerating the translation of research, discovery and evidence into sustainable health solutions*. In response to this revised mission we have radically restructured to form a 'new Burnet', built around key programs rather than our three Centres.

This exciting new approach will enable us to maximise our strengths with staff across the life sciences, public health and international development disciplines working together across key program areas. This will lead to a more focused, effective and efficient organisation that plays to our strengths and solidifies our unique position in the sector.

I want to thank Associate Professor Helen Evans AO, Professor Jonathan Carapetis and Professor Steve Buchsbaum for undertaking the organisational review, and all those across the organisation who played an enormous role in the development of this new strategic plan. Thank you for your extraordinary support, enthusiasm and input into what is an exciting blueprint for our future.

Financially the Institute is in a strong position as a result of our strategic investments, additional revenue received through investments in fundraising, and the positive income stream received through the tenancy of 99 Commercial Rd to Association of Australian Medical Research Institutes (AAMRI) partners. However, the cost of doing research is escalating, and these costs are not being met through grants received or by the operational infrastructure support scheme provided by the Victorian Government, which has been stagnant for the past 12 years. Through the Victorian chapter of AAMRI we are continuing to advocate to the Victorian Government for increased support to meet these costs so we can remain competitive in the face of increased pressure from other states. Medical research is a major economic contributor to Victoria, and we must invest in and support the sector if we want a strong and sustainable future for medical research institutes in this state.

In 2016 we celebrated our 30th anniversary year. Since Burnet's beginnings, we have continually focused our attention on addressing the health challenges faced by poor and vulnerable communities in Australia and internationally through our research, education and public health programs.

Our achievements over the past 30 years are due to the many talented, enthusiastic and dedicated board members and staff, past and present; to the support of governments (both State and Federal) and our collaborating partners; and to the many donors who have provided the philanthropic funding so critical to our success and sustainability. I would like to thank our Patron-In-Chief, the Governor of Victoria the Hon Linda Dessau AC, for hosting the Institute's 30th anniversary celebrations at Government House.

I was fortunate to visit our programs in Myanmar during the year and to see the tremendous work being done by our team led by country manager Dr Phone Myint Win. The Institute provides an incredible service for some of the most poor, vulnerable and marginalised communities under often challenging circumstances. Myanmar has some of the highest maternal and newborn mortality in the world; we have worked to improve access to maternal and child health services to improve outcomes for mothers and their newborns. The Institute is also running drop-in centres offering harm reduction services and treatment and care programs for people who inject drugs as well as those impacted by HIV and tuberculosis.

Thank you to my fellow Board members for your contribution during the year. Your support, insight and counsel ensure the Institute is well positioned for a strong and sustainable future and has the capacity to achieve its mission.

Thank you also to Professor Brendan Crabb AC for his outstanding leadership of the Institute. Brendan's contributions were recognised during the year with The Financial Review's *BOSS Magazine* naming him as one of Australia's true leaders of 2016 and *The Lancet* profiling his research and leadership of the Institute, as well as the work of the Institute in separate articles. This is great recognition and Brendan should be justifiably proud of his achievements and that of his team.

I would like to welcome two new board members to the Institute, Mr Leigh Jasper who commenced in June 2016 and Ms Alison Larsson in January 2017. Both bring an enormous depth of expertise and enthusiasm to the Board. Leigh is CEO of Aconex and brings significant expertise in project and process management. Alison is a former banking executive with extensive experience in financial services and risk management. I look forward to working with both Leigh and Alison.

I would like to thank Ms Mary Waldron and Ms Louise Pratt who left the board during the year for their contribution to the Institute. Mary's expertise in financial management was especially valuable and we greatly appreciated her input and strategic advice. Louise left the board following her re-election to the Senate. Her counsel and support was valued enormously.

Thank you to all those who support the Institute financially. Your support of our programs is critically important and enables us to undertake many new programs allowing us to generate new ideas to tackle some of the world's biggest health issues. A special welcome to those who joined the Burnet family for the first time in 2016; we value and appreciate your support and help as we work towards a healthier world.

Mr Robert Milne
Chair

IN APPRECIATION

THANK YOU TO EVERYONE WHO SUPPORTED US IN 2016:

Gifts in wills

Gifts in wills are the lifeblood of Burnet's capacity to address some of the greatest health challenges facing humanity.

We thank the late Jean Alison Duncan, Gerald Addison Brook Riley, Alan George Lewers Shaw, and Winifred Daisy Stevens for their special support of Burnet's work through gifts in their will.

Trusts and Foundations

Thank you to the charitable trusts that support us:

- Bell Charitable Fund
- CASS Foundation
- Colonial Foundation Limited
- Harold Mitchell Foundation
- Ian Potter Foundation
- Joe White Bequest
- June Canavan Foundation
- Margaret Walkom Bequest
- Marshall Fund (a charitable fund account of Lord Mayor's Charitable Foundation)
- Nancy E Pendergast Charitable Trust Fund
- Peter Falvey Foundation
- Rebecca L Cooper Medical Research Foundation
- State Trustees Australia Foundation – Ruby C Thomas and Ronald R Fraser
- Orloff Family Charitable Trust
- William Angliss Charitable Fund

Corporates

Thank you to the corporations that support us:

- Arnold Bloch Leibler
- Ashurst
- Bank of South Pacific Ltd
- Cockram Construction
- Lynton Crabb Photography
- Macquarie Group
- Piper Alderman
- Tropicana Ltd

"It has been a tremendously exciting time for the Institute over the past 12 months. Not only was 2016 our best year yet, it was also the year we chartered a new course via the development of Burnet 2020."

PROFESSOR BRENDAN CRABB AC, DIRECTOR AND CEO, BURNET INSTITUTE

DIRECTOR'S REPORT

The Institute will move away from a structure historically based around three Centres, to focus on programs that truly reflect our mission, build on our expertise and address global health priorities.

2016 was an even bigger year than usual with the development of Burnet 2020, our new strategic plan. Burnet 2020 involves a sharp focus on setting ambitious goals and refining the approach we use to achieve them. Our vision is one that centres on progressing human development through promoting more equitable access to health. Our mission is to achieve this through the application of research and evidence in all their forms. The Burnet 2020 approach has our laboratory-based researchers, public health professionals and international development specialists all working together across the new program themes of Maternal and Child Health; Behaviours and Health Risks; Disease Elimination; and expansion programs of Healthy Ageing; and Health Security. This approach will see a much greater sharing of ideas and innovation, and strategies developed that deal with significant issues such as elimination of HIV, malaria and hepatitis viruses, the major epidemic of and security risk associated with multidrug-resistant tuberculosis in our region, and many other global health issues such as the significant problem of stunting among children in resource-poor communities. Collaboration across disciplines is the key to being an efficient and effective organisation, and this must be core to how we operate as an Institute, underpinned by an effective organisational support service. The formal transition to the new organisational structure began on 1 March 2017.

Our peer-reviewed publications are at an all-time high and the level of competitive grant funding continues to increase. We have continued to more than double the national average of funding from the NHMRC, with more than AUD$15million granted over the last 12 months. I extend my congratulations to all those who had grant successes and especially our Deputy Director (Programs) Professor Margaret Hellard on being awarded a AUD$7 million program grant toward the elimination of hepatitis C. This is a tremendous boost for the Institute and its elimination program.

Significant progress has been made in the area of hepatitis C elimination. The release of direct-acting antiviral drugs on the Pharmaceutical Benefits Scheme (PBS) in March 2016 has meant that thousands of Australians now have access to treatment, which has a more than 95 per cent cure rate. Studies underway at the Institute are examining the most effective way to roll out treatment programs among those currently infected and engage those most at risk of infection. We are on track to eliminate this virus from Australia by 2026. The development of a vaccine for hepatitis C is also progressing well under the guidance of Associate Professor Heidi Drummer, and this will provide a critical step to prevent infection or reinfection with this virus.

We have made significant progress with our Healthy Mothers, Healthy Babies program in PNG. By the end of 2016, more than 500 of 700 women had been enrolled in the first phase of the research program and more than 400 followed through to the delivery of their newborn baby. Over the course of this unique program, the dedicated team in Kokopo has performed hundreds of health checks and home visits in the communities of East New Britain. This has been a remarkable achievement in conditions that have been very challenging at times, including remote locations, floods, and impassable roads. Preliminary data analyses is now underway and starting to reveal alarmingly high rates of serious preventable health conditions such as anaemia, malnutrition, malaria, genital tract infections and others among East New Britain's mothers and babies. Once enrolment is completed in July 2017 we will commence the formal analysis of the data and start communicating results to our key in-country partners and policymakers, and to collaborators, colleagues, and supporters in Australia and PNG. I want to thank our amazing team in PNG for their remarkable achievements and our donors for support of this major research program, especially our Principal Supporter, Bank South Pacific.

We have been conscious of the need to address the issue of gender equity across the Institute and have established a committee to work towards ensuring the Institute is a gender-inclusive workplace. The Institute has signed up to the Athena SWAN (Scientific Women's Academic Network) program run through Science in Australia Gender Equity (SAGE), a national program promoting gender equity and gender diversity in science, technology, engineering, mathematics and medicine (STEMM). The Athena SWAN program provides a systematic framework to collect and analyse data, and identify plans of action to ensure gender diversity is embedded within the organisation. Through this process we will develop policies and implement practices that promote gender equity and diversity across the Institute's activities.

I would like to thank our Chair, Rob Milne for his tremendous support and his fellow Board members for the extraordinary amount of work they do, often behind the scenes. All Board members provide their services voluntarily and their commitment and contribution to the Institute is very much appreciated and valued.

I do want to thank all staff here in Australia and those based overseas for their tremendous contributions during the year. In addition to what we might call "business as usual", there really was a significant ask for many across the Institute as we reviewed our performance and effectiveness and developed our new strategic plan. Thank you to all staff for your input into this process and for the additional hours required as we framed our new strategy and developed a new organisational structure to enable it to become operational. It has been a time of significant change for the Institute and I want to thank everyone for their support.

Professor Brendan Crabb AC
Director and CEO

YEAR AT A GLANCE

$42+ million
spent on improving health for poor and vulnerable people

227
peer-reviewed publications

A record $15+ million
in grants and fellowships

400+
scientists & public health professionals

Burnet 2020

Burnet Institute unveiled its ambitious new strategic blueprint, Burnet 2020, to make a greater contribution and impact in improving the health of vulnerable communities in Australia and globally.

Burnet 2020 heralds a bold and exciting new era in the Institute's 30-year history. The Institute is moving away from a structure historically based around three Centres to focus on programs that truly reflect our mission, build on our expertise, and address global health priorities.

Launched in October 2016 following extensive internal and external consultation, and a major review led by Burnet Board member Associate Professor Helen Evans AO, the new strategic plan uniquely positions the Institute, maps our future direction, and builds a solid foundation for our new integrated, program-led organisation.

The formal transition of the Institute to the new structure began on 1 March 2017, placing interdisciplinary health programs at the heart of daily decision-making.

Burnet 2020 fully exploits our international and local field presence, our world-class laboratory research, and our mixed development and research cultures, to drive greater focus on the most relevant global health issues, and to have greater impact as a result.

The new multidisciplinary programs – Maternal and Child Health, Disease Elimination, Behaviours and Health Risks, and expansion programs Healthy Ageing and Health Security – are aimed at the prevention, detection and treatment of diseases of global significance. Staff within these programs will be supported by cross-cutting communities of practice, the disciplines of Life Sciences, Public Health, and International Development, and underpinned by an effective organisational support service.

"The multidisciplinary programs will harness our remarkable, highly diverse skill base to help solve devastating health problems, and have greater impact as a result," Burnet Institute Director and CEO, Professor Brendan Crabb AC said.

Burnet 2020 also heralded a new Vision for the Institute, *Equity through better health*, and a revised Mission, *Achieving better health for vulnerable communities in Australia and internationally through accelerating the translation of research, discovery and evidence into sustainable health solutions.*

"This really is a landmark moment for us, and a new approach to address the issues that are most important to us to achieve our vision and mission," Professor Crabb said.

> "We believe that every person in the world has an equal right to basic healthcare. To achieve this for the world's most neglected people requires both commitment and innovation."
>
> **– PROFESSOR BRENDAN CRABB AC**

NEW THEMATIC PROGRAMS

MATERNAL AND CHILD HEALTH

PROGRAM GOAL

EQUITY IN MATERNAL AND CHILD HEALTH.

DISEASE ELIMINATION

PROGRAM GOAL

THE ELIMINATION OF HIV, VIRAL HEPATITIS AND MALARIA AS PUBLIC HEALTH THREATS.

BEHAVIOURS AND HEALTH RISKS

PROGRAM GOAL

PROMOTE IMPROVED HEALTH AND WELLBEING BY REDUCING HARMS RELATED TO ALCOHOL AND OTHER DRUGS, AND SEXUAL AND MENTAL HEALTH.

HEALTHY AGEING

PROGRAM GOAL

HEALTHY AGEING FROM BIRTH AND IMPROVED PHYSICAL, MENTAL AND SOCIAL WELLBEING IN VULNERABLE COMMUNITIES.

HEALTH SECURITY

PROGRAM GOAL

IMPROVED HEALTH SECURITY IN OUR REGION THROUGH STRENGTHENED PUBLIC HEALTH SYSTEMS AND REDUCED VULNERABILITY TO INFECTIOUS DISEASE THREATS.

LEADERSHIP

CHAIR

Mr Robert L. Milne

DIRECTOR AND CHIEF EXECUTIVE OFFICER

Professor Brendan Crabb AC

DIRECTORS

Mr Robin Bishop

Professor Peter Colman

Mr Ross E. Cooke

Associate Professor Helen Evans AO

Mr Ben Foskett

Mr Garry Hounsell

Mr Leigh Jasper

Professor Sharon Lewin

Professor Christina Mitchell

Ms Mary Padbury

Ms Louise Pratt

Professor Michael Toole AM

Ms Mary Waldron

Mr Michael Ziegelaar

DEPUTY DIRECTORS

Associate Professor David Anderson

Professor Michael Toole AM

ASSOCIATE DIRECTORS

Professor Suzanne Crowe AM

Professor Margaret Hellard

EXECUTIVE MANAGEMENT

Professor Brendan Crabb AC
Director and CEO

Associate Professor David Anderson
Deputy Director, and
Head, Business Development

Professor Michael Toole AM
Deputy Director

Professor Suzanne Crowe AM
Associate Director

Professor Margaret Hellard
Associate Director, and
Head, Centre for Population Health

Professor Paul Dietze
Deputy Head, Centre for Population Health

Professor Robert Power
Head, Centre for International Health

Professor James Beeson
Head, Centre for Biomedical Research

Associate Professor Heidi Drummer
Deputy Head, Centre for Biomedical Research

Mr Geoff Drenkhahn
Chief Operating Officer

Mr Paul Rathbone
Executive Officer, and
Head, Public Affairs and Development

Mr Peter Spiller
Chief Financial Officer, and
Company Secretary

Mr Paul Duffy
Head, Human Resources

SENIOR MANAGEMENT

Associate Professor Bruce Loveland
Head, Research Support and Facilities

Mr Mark Tennent
General Manager, Centre for International Health

Dr Margarete White
Manager, Occupational Health and Safety

Mr Dyson Simmons
Chief Information Officer

2016 AWARDS

THE FENNER AWARD

Associate Professor Heidi Drummer

Associate Professor Heidi Drummer's landmark research into developing a hepatitis C vaccine was recognised with the Institute's prestigious Fenner Award for 2016. The award is named in honour of Australian virologist, the late Professor Frank Fenner AC, and presented to a Burnet Institute staff member whose work has made a major contribution towards our mission of achieving better health for poor and vulnerable communities. Associate Professor Drummer is Deputy Head of Burnet's Centre for Biomedical Research.

GUST-MCKENZIE MEDAL

Dr Elissa Kennedy

Dr Elissa Kennedy was awarded the 2016 Gust-McKenzie Medal for her global public health research, which focuses on adolescent sexual and reproductive health policy and programming in low-and middle-income countries. The medal is awarded to a mid-career Burnet Institute staff member for excellence in research and/or public health. Dr Kennedy is a women's and children's health specialist.

TRAVEL AWARDS

Eight talented researchers received Travel Awards to enable them to attend conferences or undertake further study:

HAROLD MITCHELL POSTDOCTORAL FELLOWSHIPS
Dr Tom Angelovich
Jaworowski Laboratory
Centre for Biomedical Research

HAROLD MITCHELL POSTGRADUATE TRAVEL FELLOWSHIP
Kerryn Moore
Fowkes Laboratory
Centre for Biomedical Research and
Centre for Population Health

PAULINE SPEEDY TRAVEL FELLOWSHIP
Vashti Irani
Beeson and Richards Laboratories
Centre for Biomedical Research

MILLER FOUNDATION PUBLIC HEALTH TRAVEL FELLOWSHIPS
Rebecca Winter
Centre for Population Health

Hannah King
Drummer/Poumbourios Laboratory
Centre for Biomedical Research

GEOFFREY CONNARD TRAVEL FELLOWSHIP
Dr Anna Hearps
Jaworowski Laboratory
Centre for Biomedical Research

CROCKETT-MURPHY TRAVEL AWARD
Sakaiah Luana and Rebecca Gabong
Team Leader and Deputy, Home Management of Malaria Team, PNG
Centre for International Health

Dr Jack Richards, Head of the Malaria and Tropical Diseases Group, was the inaugural winner of a new Burnet Institute award, **the Gust Translational Fellowship**, for his work developing novel point-of-care diagnostics. The fellowship was established with a gift to the Institute by Professor Ian Gust AO, founding Director of Burnet Institute, and his wife Dr Diane Long. It supports translational research activities by early career researchers.

Burnet Institute's founding Director, Professor Ian Gust AO, was awarded Research Australia's prestigious **Peter Wills Medal** for 2016 in recognition of a lifetime of commitment to medical research and public health.

Professor David Wilson was awarded the 2016 **Gustav Nossal Medal** for Global Health by the Australian Academy of Science, in recognition of his work in mathematical modelling to influence global health funding.

Associate Professor Freya Fowkes received the 2016 **Georgina Sweet Award** for Women in Quantitative Biomedical Science from the University of Melbourne.

COMMUNITY ENGAGEMENT

Victorian Health Minister The Hon Jill Hennessy MP and Associate Professor Edwina Wright at World AIDS Day.

Burnet's Dr Sarah Jarvis explains her research at Student Information Night.

'Gloveman' with Burnet researcher Bridget Draper at Midsumma Carnival.

Associate Professor Helen Evans AO, keynote at Burnet's International Women's Day luncheon.

Professor Robert Power at a donor function.

Professor Margaret Hellard at the Eliminate Hep C conference.

Foreign Minister The Hon Julie Bishop MP at Burnet's launch of its Disease Elimination strategy in Canberra.

Professor Paul Dietze at the CREIDU Colloquium.

The Hon Dame Quentin Bryce AD CVO delivered an inspiring 2016 Burnet Oration. She is pictured here with Professor Brendan Crabb AC and Her Excellency The Hon Linda Dessau AC, Governor of Victoria.

Dr Jacqueline Flynn speaks to students on the Day of Immunology tour.

Vashti Irani talks about malaria research on Radio Australia.

HIV Prevention in Myanmar on World AIDS Day.

Burnet's expertise across disciplines means we can take a diverse approach to tackling infectious disease through basic, discovery, translational and operational research.

INFECTIOUS DISEASES

Malaria, HIV and tuberculosis are preventable infectious diseases, yet remain among the leading causes of mortality in low-resource countries in our region. Globally, 37 million people are living with HIV, over 10 million new cases of TB were diagnosed last year and malaria claimed more than 400,000 deaths, mostly children.

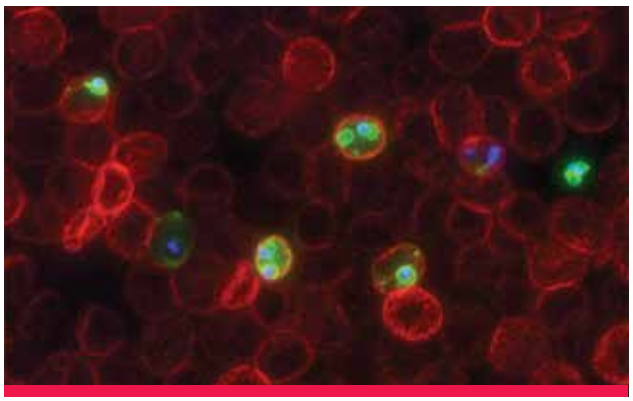
Major advances in hepatitis C

Approximately 230,000 Australians are infected with hepatitis C virus (HCV), which causes progressive liver disease and cancer. In 2016 former Federal Minister for Health, the Hon Susan Ley MP, made a landmark decision to list new direct-acting antivirals for HCV treatment on the pharmaceutical benefit scheme. To coincide with this announcement and World Hepatitis Day, Burnet Institute launched its HCV Elimination strategy and hosted the Eliminate Hep C Symposium. This highly successful event reviewed trends in HCV diagnosis, treatment and prevention in Australia and overseas. Burnet aims to help reduce HCV prevalence in Australia by 50 per cent by 2020 and will collaborate on this with the Kirby Institute. In addition, the Viral Entry and Vaccines Laboratory began a research and development collaboration with German company Artes Biotechnology GmBh, on a low-cost HCV vaccine.

Zika virus declared a "Public Health Emergency of International Concern"

In 2016 the WHO declared that Zika virus infection was a world health emergency. Zika belongs to the same family of viruses that cause dengue fever and yellow fever, and was initially thought to cause only mild infections. Since 2003 however, the spread of Zika virus throughout the Pacific and into South America has accompanied an alarming increase in infants born with microcephaly. In response, Burnet researchers reviewed current literature and published their findings in the journal *BMC Medicine*, highlighting research areas that require urgent attention to halt the epidemic. Burnet will expand its research efforts into monitoring Zika infections across PNG, Myanmar and Timor-Leste.

Image: *Malaria parasite invading red blood cells.*



Understanding the microbiome in pregnant women and the impact on birth outcomes

The human microbiome is the collection of microorganisms that cover different sites in the body, including the gut and vagina. Microbiomes can be considered healthy or diseased, with imbalances in the vaginal microbiome implicated in poor sexual and reproductive health outcomes. Burnet is building the technical capacity to characterise the microbiome and understand its role in diseases of significant burden in vulnerable populations. We will investigate the role of disturbances in the vaginal microbiome in poor birth outcomes, including preterm births, as part of our Healthy Mothers, Healthy Babies (HMHB) program in PNG. Towards achieving this goal, Joshua Hayward received funding from the Harold Mitchell Postgraduate Travel Fellowship to visit the lab of Jacques Ravel at the Institute for Genome Sciences USA to train in the laboratory methods and computational biology techniques needed to analyse the vaginal microbiome. Dr Philippe Boeuf was selected to present at the prestigious Theo Murphy Frontiers of Science symposium, focusing on the microbiome and its role in health. Professor Gilda Tachedjian was invited to present her lab's work on the role of the vaginal microbiome in HIV susceptibility at the Microbiome Congress in Kuala Lumpur, and at the Australian HIV AIDS Conference in Adelaide.

Burnet expands partnerships to eliminate malaria

Malaria Elimination is the major goal of the WHO's Global Technical Strategy 2016-2030. Burnet's programs in PNG and Myanmar continued to help decrease rates of malaria, strengthened by new projects in Bangladesh, Cambodia and Vietnam. Projects led by Professor James Beeson, Associate Professor Freya Fowkes, Dr Jack Richards and Ms Lisa Davidson include strengthening basic health care systems by engaging with village health workers, deploying novel diagnostic tools to identify infected individuals, and using cutting-edge global positioning system technologies to locate hotspots of transmission. Burnet continues to monitor drug-resistant parasites in South East Asia, while Professor Brendan Crabb AC and Dr Paul Gilson pursue exciting new compounds that may build the next generation of antimalarial drugs.

PRINCIPALS:
Associate Professor Heidi Drummer, Dr Jack Richards

ALCOHOL, OTHER DRUGS AND HARM REDUCTION

Burnet uses behavioural and clinical research to mitigate the adverse health effects of harmful alcohol and other drug use, drawing from treatment and community-based harm reduction programs based on sound evidence.

Alcohol use among young African refugees

This study aimed to describe motivations for drinking, experiences of alcohol-related problems and strategies for managing drinking among young marginalised African refugees in Melbourne. In interviews, participants reported exposure to multiple negative consequences of alcohol consumption, including breakdown of family relationships, homelessness, violence, contact with the justice system and poor health. Key motivations for heavy alcohol consumption were trauma, boredom, frustration and to interact socially. These findings highlight the need for targeted, peer-based harm reduction education. In line with Burnet's focus on evidence-informed intervention development, we continue to use research information and program evaluation to inform our harm reduction work locally and in countries such as Myanmar.

Impact of stockpiling needle and syringes by people who inject drugs in Australia

A major research focus has been individual-level needle and syringe coverage: the extent to which people who inject drugs (PWID) have access to a clean needle and syringe for every injection. We have shown how PWID in Australia stockpile or store needles and syringes which, when incorporated into coverage measures, shows Australian PWID may have better access to clean needles and syringes than previously thought. We have also shown how Australian PWID sometimes use multiple needles and syringes for a given injection, a practice which is preferable to re-using needles during injecting episodes. In 2017 we hope to extend this work to examine factors related to individual-level needle and syringe coverage in our harm reduction programs in Myanmar.

Delivering harm reduction services in Myanmar

Harm reduction continues as a key focus for our work in Myanmar, providing services to people who inject drugs at our five drop-in centres. We have expanded our outreach work to include part-time Satellite Peers, who are recruited and work directly from hotspots in Yangon. We have compared the Satellite Peer Educator model with the Peer Outreach Worker model, which is focused on drop-in centres. Despite being part-time and with limited months in operation, the Satellite Peer Educator model resulted in improvements across significant indicators. These included: numbers of drug users contacted, rates of HIV testing and counselling, numbers of needles and syringes distributed, quantity of condoms provided, and drug substitution referrals to relevant treatment settings. It was also found that Satellite Peers accessed drug users with limited help-seeking experience, less connectedness, and higher-risk behaviours.

PRINCIPALS:
Professor Robert Power, Professor Paul Dietze

IMMUNISATION, VACCINES AND IMMUNITY

Developing vaccines against infectious diseases including malaria, tuberculosis, hepatitis C, hepatitis B and HIV, or for cancer, requires a deep understanding of how key elements of the immune system interact.

International immunisation

Strengthening immunisation programs remained a focus and was a key component of the second Healthy Mothers, Healthy Babies study. We developed an innovative immunisation session checklist and started trialling it in rural Myanmar, aiming to increase both quality of care and families' understanding of vaccination services. This has attracted interest from the WHO because if successful it could improve services and increase community engagement in many resource-constrained settings.

Burnet staff Professor Mike Toole AM and Dr Chris Morgan continued to provide expert advice to WHO in support of global immunisation. One highlight of 2016 was the international landmark in polio eradication that saw all countries switch to newer forms of polio vaccine, made possible by global progress in eradicating one of the three strains of poliovirus.

Malaria vaccine

The 2016 World Malaria Report estimated over 215 million cases of malaria and 438,000 deaths in 2015, with most deaths among children in sub-Saharan Africa. Major gains in reducing malaria's global burden have been made; however, it continues to be a major cause of mortality and morbidity globally.

Burnet researchers are working to understand human immunity to malaria with a view to developing an effective vaccine which could save millions of lives. Their work continues in collaboration with researchers from the Kenya Medical Research Institute, Queensland Institute of Medical Research, London School of Hygiene and Tropical Medicine, La Trobe University and Walter and Eliza Hall Institute.

Hepatitis C vaccine

Hepatitis C virus is estimated to chronically infect three per cent of the world's population, causing 500,000 deaths each year. Direct-acting antivirals (DAAs) are highly effective at curing HCV. However, a vaccine is needed to prevent new infection and reinfection in those treated with DAAs.

In July 2016, Burnet's Associate Professor Heidi Drummer and her team joined forces with ARTES Biotechnology GmBH in Germany to develop a low-cost, world-first HCV vaccine by combining Burnet's HCV technologies with ARTES's novel virus-like particle platform.

HepSeeVax was showcased at the 5th China Jiangsu Conference for International Technology Transfer & Commercialization (CITTC) meeting in Nanjing, the Eliminate Hep C Symposium in Melbourne and the 10th Australasian Viral Hepatitis Conference.

PRINCIPALS:
Dr Chris Morgan, Professor James Beeson

2 out of 3
newborn deaths in PNG are **preventable**

500+ women
enrolled in Study 1

350+
mother and baby pairs seen **at delivery**

Babies examined at
1, 6 and 12 months
postpartum

5 hospitals
and health centre local partners

"What would cause outrage in Australia happens here on a daily basis and it is difficult for everyone to see this happen. HMHB gives people hope for the future." **– RESEARCH PROJECT MANAGER, HMHB, DR ELIZABETH PEACH**

Australia's nearest neighbour, Papua New Guinea (PNG) has one of the highest rates of maternal and newborn death in the world. More than 5,000 babies perish before their first birthday, and 1500 women die from childbirth-related causes each year.

Burnet's groundbreaking research program, Healthy Mothers, Healthy Babies (HMHB) based in Kokopo, East New Britain aims to improve life-saving health care for women and children in the region.

The HMHB collaborative research program, funded from philanthropic support, is in its third year. In 2016 Burnet reached a major milestone tracking 500 women from their first antenatal clinic visit through to delivery, and assessing mother and baby up to 12 months after birth. They are tested for anaemia, malaria, and other infections and infant growth and development are assessed. The HMHB research team has also evaluated health services immediately after birth and throughout infancy in partnership with the East New Britain Provincial Health Authority, PNG Institute of Medical Research, and health facilities. The Kokopo-based team of Pele Melepia and Lucy Au, guided by Burnet's

Below: *Blood and other samples from pregnant mums and their babies are being analysed in the Kokopo lab.*

Below: *Part of the maternal delivery area in an East New Britain hospital.*

MATERNAL AND CHILD HEALTH

Burnet Institute's maternal and child health program involves research, health development and capacity-building in several countries in the Asia-Pacific region, and the development of new tools such as vaccines and diagnostics.

Dr Chris Morgan, conducted more than 20 in-depth interviews and focus group discussions, visited 11 child immunisation sessions and completed data collection. HMHB Research Project Manager Dr Elizabeth Peach said early research results showed that while many of the women interviewed attended care during pregnancy, very few went on to seek postnatal care.

Our team in East New Britain

The Kokopo-based HMHB team more than doubled in size this year and now comprises several research officers, two laboratory staff, three drivers, one database manager and three project management staff. Generous donations from a Burnet HMHB Lab Appeal enabled more equipment to be purchased for the laboratory, based at St Mary's Hospital Vunapope in East New Britain.

Working with partners and communities

The HMHB team has been involved in community-based awareness and engagement activities across the Province. HMHB team leader Ms Pele Melepia and community engagement officer Mr Dukduk Kabiu presented to six local level government committees, as well as on radio and in public forums, on the urgent need to improve maternal and child health in PNG, and how the HMHB program will help. The team appreciates ongoing support from community leaders, local and provincial level government, healthcare facility staff and local advisory groups.

Burnet investigators Professor James Beeson, Dr Chris Morgan and Dr Liz Peach travelled to Goroka in July to meet with investigators Professor Peter Siba, Dr Willie Pomat, Dr Leanne Robinson, Ms Nelly Saweri and other researchers from the PNG Institute of Medical Research to discuss progress and opportunities for collaborative research.

Malaria in pregnancy

Pregnant women are particularly susceptible to malaria and in many regions of the world it is a major cause of poor pregnancy outcomes, such as premature delivery, low birth weight, and anaemia. Ongoing studies of pregnant women in PNG have identified immune responses that appear to protect against malaria, revealing potential approaches for malaria vaccine development. Other research has yielded insights into placental inflammation caused by malaria, and how this negatively affects outcomes. This knowledge may identify potential therapeutics and interventions.

Accelerating HIV testing and treatment among infants

Early infant diagnosis of HIV and timely treatment can reduce mortality and morbidity in young children, however many infants born to HIV-infected mothers are not tested for HIV. Burnet is addressing this by trialling a novel early infant diagnostic test, the Xpert® HIV-1 Qualitative assay, in PNG and Myanmar.

Addressing under-nutrition in Lao PDR

Chronic under-nutrition among children is 44 per cent generally, spiking to 60 per cent in some rural districts. In 2017, Burnet researchers are implementing a three-year trial in 233 villages of nutrition interventions at 18 months to prevent child stunting (poor growth and development), or poor growth and development.

Provision of pregnancy and newborn care by auxillary midwives in Myanmar

Auxillary midwives (AMW) are local female volunteers who serve Myanmar with maternal and child health care, including assistance at deliveries, and are particularly valuable in remote areas. Dr Kyu Kyu Than is assessing the practices and training of AMWs, which may help strengthen training by identifying key gaps in knowledge and practice.

PARTNERS:

Papua New Guinea Institute of Medical Research

East New Britain Provincial Government

National Department of Health

The University of Papua New Guinea

Kirby Institute

PRINCIPAL SUPPORTER:

BSP

SEXUAL AND REPRODUCTIVE HEALTH

Sexual and reproductive health (SRH) problems contribute significantly to the global burden of ill health. Increasing global efforts are needed to achieve access to quality SRH services for all women and men, including adolescents and those who are marginalised.

mHealth to prevent unintended pregnancy among female sex workers in Kenya

Reducing unmet need for contraception could prevent 52 million unintended pregnancies, 70,000 maternal deaths, and 500,000 newborn deaths annually. Unmet need is a particular concern for female sex workers, with approximately one quarter of sex workers in Kenya experiencing an unintended pregnancy each year. Mobile phones offer a promising means of accessing this population given their high prevalence in Kenya. In collaboration with research partners (International Centre For Reproductive Health – Kenya and FHI360) and with female sex workers, we developed an mHealth intervention consisting of 70 SMS and six role model stories aimed at reducing unintended pregnancy.

Scale-up of HIV pre-exposure prophylaxis (PrEP) in Victoria

With The Alfred hospital and other community and research partners, Burnet has been integrally involved in this project that has seen around 2500 people commence PrEP (using HIV treatment drugs for HIV prevention) through our clinical partner sites in only four months. This internationally significant project is anticipated to reduce new HIV infections among gay men in Victoria by about a third. The innovative Australian Collaboration for Coordinated Enhanced Sentinel Surveillance (ACCESS), which Burnet developed and leads, will monitor the impact of PrEP.

Susceptibility of Female-to-Male Transmitted/Founder HIV to vaginal microbiota acid metabolites

The majority of HIV infections result from heterosexual transmission typically established by a single transmitted/founder virus; however the role of vaginal microbiota (VMB) acid metabolites in modulating HIV transmission originating in women is unknown. Studies by Muriel Aldunate from the Tachedjian Laboratory have revealed that subtype C transmitted/founder HIV strains from linked heterosexual transmission pairs from a cohort in South Africa are less susceptible to inactivation by VMB metabolites than non-transmitted strains from the HIV-infected female donor. The reduced susceptibility of transmitted/founder HIV strains may be a trait that enables survival of HIV shed into the vagina and could increase the probability of female-to-male transmission during sexual intercourse, or mother-to-child transmission during vaginal birth. This study was presented at the 11th International Workshop on HIV Transmission, Chicago.

PRINCIPALS:
Professor Gilda Tachedjian
Associate Professor Mark Stoové
Associate Professor Stanley Luchters

YOUNG PEOPLE'S HEALTH

Young adulthood can be a time when sexual risk behaviours, mental health conditions and experimentation with alcohol and other drugs emerge. Burnet is responding with innovative research and programs to reduce young people's risk.

Impact of pornography

There is widespread public concern that increased access to pornography impacts negatively on young people's health and wellbeing. As part of Burnet's long-standing *Sex, Drugs and Rock'n'Roll* study in 2016, 1000 young people aged 15 to 29 years were surveyed about the impact of pornography on their lives. The study showed that in Australia the average age at first viewing pornography was 13 years for young men and 16 years for young women. Of those surveyed, more than 80 per cent of young men and 20 per cent of young women viewed pornography at least weekly.

Some participants stated that they used pornography for sexual education, as it provided the opportunity to see the "mechanics of sex" for the first time. Some found this education "helpful" and "liberating"; others noted a problematic understanding of what "sex should be like". Some identified their pornography use as "problematic", while others identified pornography usage as a positive form of "stress relief".

Alcohol and other drug use among young people in the Solomon Islands

There has been little research about the use of alcohol and other drugs among young people in the Pacific Islands. This project investigated the prevalence of alcohol and other substance use in a survey of young people in the Solomon Islands. Use of licit and illicit alcohol, tobacco and betel nut was found to be common. The results of this study and recommendations for future health programs are being discussed with local stakeholders and target population members.

Alcohol advertising on social media

Burnet's researchers investigated the presence and impact of alcohol advertising on social media sites, such as Facebook. Our research has shown that alcohol advertising is extremely common on these platforms, with 25 per cent of young people 'liking' an alcohol marketing page. Liking these pages was shown to be associated with higher alcohol consumption. Also of concern was that underage participants were as likely as older participants to report seeing these pages on their social media platforms. In addition, young people in our research identified that content of advertisements on social media often violated alcohol advertising restrictions.

PRINCIPAL:
Dr Megan Lim

CENTRE FOR

BIOMEDICAL RESEARCH

CENTRE HEAD: Professor James Beeson | DEPUTY CENTRE HEAD: Associate Professor Heidi Drummer

Through integrating discovery-based research, translational research and clinical and population research, we aim to achieve new advances in treatments, vaccines, diagnostic tests and prevention strategies to address diseases of major global significance.

Highlights

Major achievements in 2016 across key themes of research were reflected in many high-quality publications, successes in national and international funding, and advances in development of vaccines, therapeutics and diagnostics.

- **Dr Jack Richards** was awarded the institute's inaugural Gust Translational Fellowship. This award recognises his outstanding work towards effective control and eventual elimination of malaria.

- **Associate Professor Freya Fowkes** received the prestigious Georgina Sweet Award for Women in Quantitative Biomedical Science from the University of Melbourne. Associate Professor Fowkes investigates malaria's relationship with clinical disease, and drug-resistant malaria.

- **Associate Professor Heidi Drummer** was honoured with the Institute's most significant prize, the Frank Fenner Award, for her outstanding achievements in hepatitis and HIV research, and for the development of an exciting vaccine candidate for hepatitis C.

- **Professor Brendan Crabb AC** was named in the prestigious Australian Financial Review's Annual List of True Leaders.

- **Professor Suzanne Crowe AM** received the Academic Icon award from the University of Malaya.

- **Dr Michelle Boyle** received the Australian Institute of Policy and Science Young Tall Poppy Science Award for achievements in malaria research, leadership and communication.

- Burnet welcomed **Dr Leanne Robinson** as Senior Research Fellow and Research Group Leader, in a joint position with the PNG Institute of Medical Research, where she heads the Vector-Borne Diseases Unit, and the Walter and Eliza Hall Institute. PNG-based Dr Robinson will play a key role in the institute's new Disease Elimination and Maternal and Child Health Programs, and in the overall PNG program.

- At the end of 2016 Burnet acknowledged the outstanding achievements of **Professor Melissa Churchill** during 27 years at the Institute, particularly in HIV research. Melissa has taken up a new professorial appointment at RMIT University, but is staying linked to Burnet as an associate.

- Burnet's researchers continued to demonstrate their productivity and innovation through the publication of over 100 papers in international journals, including some of the world's best, and several publications received considerable media coverage.

Grants

Researchers sustained strong success in winning national funding to support their important work. Professor Gilda Tachedjian was awarded a highly prestigious Senior Research Fellowship of the NHMRC. Major NHMRC grants were obtained by Dr Andy Poumbourios and Associate Professor Heidi Drummer for HIV vaccines; Associate Professor Gilda Tachedjian to develop new HIV drugs and investigate pathogenic filoviruses (2 grants); Professor Brendan Crabb AC and Dr Paul Gilson on research towards new malaria drugs; Associate Professor Heidi Drummer as a co-investigator on hepatitis C vaccines with Associate Professor Joe Torresi at the Peter Doherty Institute, and Dr Jack Richards as a co-investigator with Dr Chris MacRaild at Monash University on malaria vaccines. Dr Michelle Boyle received a New Investigator grant on human immunity to malaria.

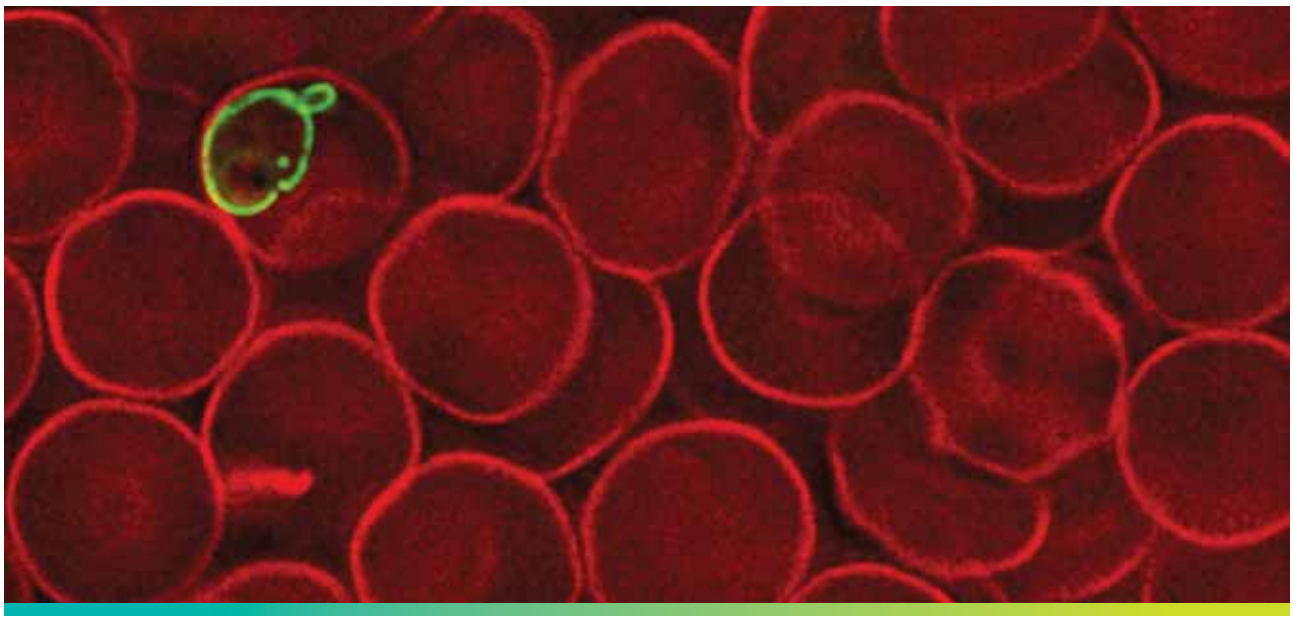
Professor Mark Hogarth received a grant and award from the Rebecca L Cooper Medical Research Foundation.

The Drummer/Poumbourios Lab received an Austrade grant under the Australasian Tropical Medicine Commercialisation scheme for their proof of concept study for a prophylactic Hepatitis C vaccine.

Researchers were also highly successful in the Australian Centre for HIV and Hepatitis funding round. Successful grants were awarded to Associate Professor Heidi Drummer to work on a hepatitis C vaccine, Dr Andy Poumbourios to work on HIV vaccines, Associate Professor David Anderson to develop hepatitis C point-of-care testing and Professor Mark Hogarth to develop anti-HIV antibodies. Dr Michelle Boyle received grants from the Channel Seven Foundation and the AMP Tomorrow Fund for research into malaria immunity.

Dr Gaoqian Feng and Dr Ricardo Ataide were successful in obtaining research grants from the CASS Foundation for research aimed at new approaches for developing malaria vaccines and research on severe malaria and identification of novel treatment strategies

Below: *Malaria researcher, Dr Ricardo Ataide oversees an experiment with PhD student, Katherine O'Flaherty.*



Awards

Staff awards

- Professor Suzanne Crowe AM was awarded the prestigious 'Best CROI (Conference on Retroviruses and Opportunistic Infections) presentation' by the National AIDS Treatment Advocacy Project for her talk *Immunopathogenesis of metabolic complications in treated HIV infection*.
- Dr Clovis Palmer received the Positive Advocate Award from Living Positive Victoria.
- Michelle Boyle received the AMREP Biomedical Research Early-Career Researcher Best Paper Award and the AMREP Research Prize for Basic Research, and a presentation prize at the Molecular Approaches to Malaria international conference.

Student awards

- Riya Palchaudhuri (Anderson Lab) – two travel grants, from Monash Institute of Medical Engineering and a CROI Young Investigator Scholarship to attend CROI 2016 in Boston, where she presented a poster on 'The impact of monocyte metabolism on serious non-AIDS events in HIV+ individuals'.
- Jasper Cornish (Gugasyan Lab) – APA PhD scholarship and the Monash Nairn Prize in Immunology.
- Muriel Aldunate (Tachedjian Lab) – Monash Postgraduate Publication Award.
- Jessica Anania (Hogarth Lab) – Best Presentation Award at the International FASEB Conference on Immunoreceptors, USA, for her study 'A new Fc receptor for human and non-human primates has altered signalling and cell localization'. Also, the Senior Medical Staff Prize for Basic Science/Laboratory-based Research at the AMREP research week for 'A novel splice variant of FcγRIIa in human and non-human primates has altered signalling and cell localisation'.
- Alicia Chenoweth (Hogarth Lab) – 2nd prize and Liriye Kurtovic (Beeson Lab) – 3rd prize for poster presentations, and Dr Ricardo Ataide (Fowkes Lab) – No-Bell Prize at the Monash Central Clinical School Postgraduate Symposium.
- Dr Ulrich Terheggen (Beeson Lab) – Doctor of Medical Science.

OUR WORKING GROUPS

ANDERSON LABORATORY: Diagnostics Development

BEESON LABORATORY: Malaria Immunity and Vaccines

CHURCHILL LABORATORY: HIV Neuropathogenesis

CROSBY LABORATORY: Hepatitis B Antivirals

CROWE LABORATORY: International Clinical Research

DRUMMER/POUMBOURIOS LABORATORY: Virus Entry and Vaccines

FFRENCH LABORATORY: Viral Immunology

FOWKES LABORATORY: Malaria and Infectious Diseases Epidemiology

GILSON/CRABB LABORATORY: Malaria Research and Drug Discovery

GORRY LABORATORY: HIV Molecular Pathogenesis

GUGASYAN LABORATORY: Lymphocyte Biology

HOGARTH LAB: Inflammation, Cancer and Infection

JAWOROWSKI LABORATORY: Infection, Inflammation and Innate Immunity

PALMER LABORATORY: Immunometabolism in HIV and Inflammatory Diseases

RICHARDS LABORATORY: Malaria and Tropical Diseases

TACHEDJIAN LAB: Retroviral Biology and Antivirals

TANNOCK LABORATORY: Influenza

WRIGHT GROUP: Strategies for HIV prevention & management of acute and chronic HIV infection

RESEARCH HIGHLIGHTS

Increasing prevalence of silent mutations in HIV

Drug-resistant HIV is a threat to effective treatment and achieving UNAIDS targets for eliminating AIDS by 2030. Burnet previously reported that 'silent' mutations altering the genetic code but not the amino acid composition of the key HIV drug target, known as reverse transcriptase, were more common in drug-treated individuals and could raise the fitness of drug-resistant virus. We found that the prevalence of these mutations was decreasing in drug-treated individuals from 1997–2014, but increasing in drug-naïve individuals. This suggests that drug-resistant HIV harbouring silent mutations has the potential to be transmitted and to persist in treatment-naïve individuals.

Increasing Prevalence of Synonymous Mutations K65K and K66K in HIV-1 subtype B reverse transcriptase. Telwatte S, Brumme CJ, Hearps AC, Latham CF, Hayward JA, Sonza S, Sluis-Cremer N, Harrigan PR, Tachedjian G *AIDS*. 2016 Sep; 30(18):2787-2793

New malaria drugs with multiple targets

Malaria kills almost half a million people a year. To treat the infection, drugs such as artemisinin are needed to kill and eliminate parasites. Concerningly, malaria has become resistant to almost all current drugs, and drug combinations are now needed for clinical efficacy. Recently, Burnet developed novel drugs that kill malaria with two completely different mechanisms, which will make it harder for resistance to develop. Burnet aims to improve efficiency of these new drugs and to develop them as future medicines.

Identification of inhibitors that dually target the new permeability pathway and dihydroorotate dehydrogenase in the blood stage of *Plasmodium falciparum*. Dickerman BK, Elsworth B, Cobbold SA, Nie CQ, McConville MJ, Crabb BS & Gilson PR. *Scientific Reports*. 2016 Nov 22.

Rapid evaluation of protective antibodies in infectious disease, vaccination and cancer

Burnet developed a novel, rapid and simple method to predict potency of antibody responses. It has broad application, predicting the quality of responses in vaccines, identifying optimised therapeutic monoclonal antibody (MAb) drugs, and predicting adverse autoinflammatory antibodies in autoimmunity and allergic disease. Using specially engineered dimers of Fc-receptors, the method detects antibodies only when they are in a state where they activate white blood cell functions, such as killing of cancer cells or infected cells or activation of inflammation. This approach has wide application in the development of therapeutics, vaccines, and diagnostics.

Dimeric FcgammaR Ectodomains as Probes of the Fc Receptor Function of Anti-Influenza Virus IgG. Wines BD, Vanderven HA, Esparon SE, Kristensen AB, Kent SJ, Hogarth PM *J Immunol*. 2016 Jul; 197(4):1507-1516

Preventing primary immune disorders

Individuals who lack a normally functioning immune system are susceptible to opportunistic infections by many organisms. Treatment with intravenous antibodies can successfully reduce the infectious burden, however a significant number of patients have non-infectious complications including autoimmune disease and cancer. Burnet has established that a gene called NFkB1 is critical for regulating the function of B lymphocytes, the cells that produce antibodies for protective immunity. In the absence of NFkB1, B lymphocytes made excessive amounts of the inflammatory factor interleukin-6 (IL-6), which stimulated the B lymphocytes to produce auto-antibodies that target and destroy vital organs. These findings may lead to improved management of patients with immune disorders.

NFkappaB1 is essential to prevent the development of multiorgan autoimmunity by limiting IL-6 production in follicular B cells. de Valle E, Grigoriadis G, O'Reilly LA, Willis SN, Maxwell MJ, Corcoran LM, Tsantikos E, Cornish JK, Fairfax KA, Vasanthakumar A, Febbraio MA, Hibbs ML, Pellegrini M, Banerjee A, Hodgkin PD, Kallies A, Mackay F, Strasser A, Gerondakis S, Gugasyan R *J Exp Med*. 2016 Mar; 213(4):421-461

Quantifying immunity to malaria vaccine candidates in populations

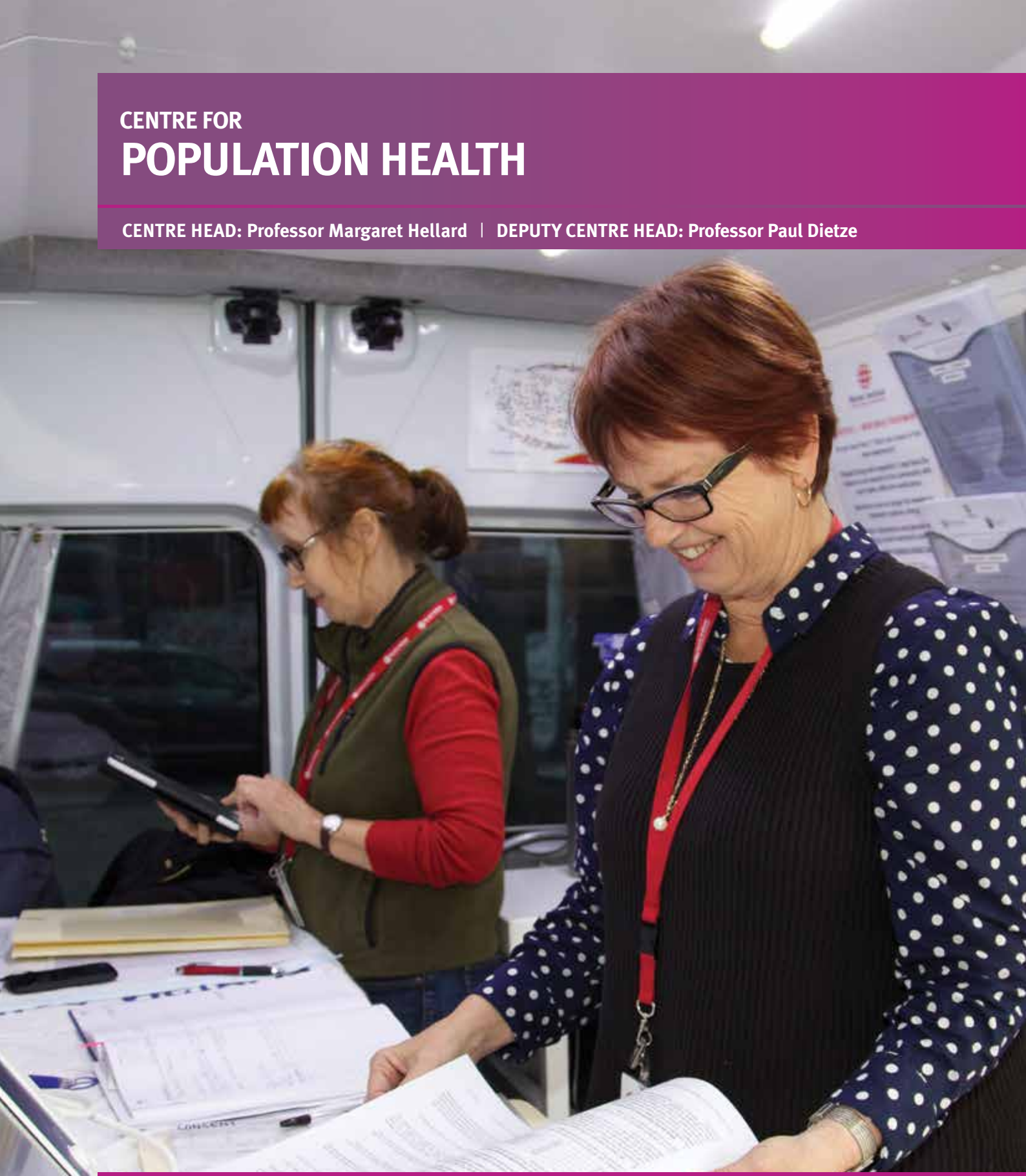
The variable sequence, or polymorphisms, of many malaria vaccine candidates presents major challenges to achieving highly efficacious vaccines and overcoming 'vaccine escape'. Burnet developed a novel approach with genetically engineered malaria to identify a major target of human antibodies that neutralise malaria blood-stage infection, and revealed that patterns of immunity to malaria strains differ between populations. These findings provide new insights and strategies to guide rational vaccine design.

A novel approach to identifying patterns of human invasion-inhibitory antibodies guides the design of malaria vaccines incorporating polymorphic antigens. Drew DR, Wilson DW, Elliott SR, Cross N, Terheggen U, Hodder AN, Siba PM, Chelimo K, Dent AE, Kazura JW, Mueller I, Beeson JG. *BMC Medicine*. 2016 Sep 23;14(1):144

CENTRE FOR

POPULATION HEALTH

CENTRE HEAD: Professor Margaret Hellard | DEPUTY CENTRE HEAD: Professor Paul Dietze



We aim to improve the health of the community, both regionally and globally, by conducting high-quality, policy-relevant and innovative research to address major public health problems linked to infectious diseases, drug use and related behaviours.

Elimination

A key focus of the Centre's work in 2016 was elimination. Our projects aimed to provide an evidence base for the elimination of preventable infectious diseases such as HIV, hepatitis C, hepatitis B and malaria in our region and globally, as well as harms associated with alcohol use, other drug use, and sexual risk behaviour. Our work recognises that many diseases and risk behaviours are intimately interlinked, requiring a multidisciplinary and cohesive approach to eliminating these global health problems.

Highlights

- Burnet Institute's **Professor Margaret Hellard** was awarded an AUD$7 million NHMRC Program Grant to further research into new highly effective direct-acting antiviral (DAA) medications aimed at significantly reducing the burden of hepatitis C virus (HCV) in Australia.
- **Professor David Wilson**, Head of Infectious Disease Modelling won an Australian Academy of Science 2016 Gustav Nossal Medal for Global Health for outstanding and innovative research in the use of mathematical modelling to influence global health funding decisions.
- Head of Malaria and Infectious Disease Epidemiology Group, **Associate Professor Freya Fowkes** won the prestigious 2016 Georgina Sweet Award for Women in Quantitative Biomedical Science.
- A new **Eliminate Hep C Strategy** was launched by Burnet addressing the WHO's global elimination targets and builds upon ground breaking basic biomedical research, modelling and analysis, which has demonstrated both the feasibility and public health benefit of eliminating hepatitis C.
- Burnet Institute and The Kirby Institute signed a **Memorandum of Understanding** to work together on eliminating hepatitis in Australia by 2026, and engaging with agencies for research and program funding.
- The ground breaking **PrEPX study**, providing people at risk of HIV with access to the life changing medication Pre-exposure prophylaxis (PrEP), was expanded into some Victorian regional cities.
- Thousands of people attended the **2016 Midsumma Carnival**, where Burnet staff and the Victorian AIDS Council offered PRONTO! rapid HIV testing.
- Burnet's 2016 **Sex, Drugs and Rock 'n' Roll survey** of more than 1000 Australians aged 15-29 years found that 80 per cent of male participants intentionally watched pornography daily, almost daily or weekly over the past year.
- Cancer Council Victoria and Burnet Institute's **Screening for Hepatitis in At-Risk Populations (SHARP)** new pilot project trialled four new interventions to help diagnose hepatitis B in GP clinics, with early diagnosis and treatment considered crucial to reduce the risk of liver cancer.
- **Dr Anna Bowring** received an NHMRC Early Career Fellowship to assess and compare methodologies for identifying and reaching vulnerable adolescent girls and young women and female sex workers in sub-Saharan Africa to determine the most effective methods of HIV prevention and treatment service delivery.

Optima

The Disease Modelling Group has grown substantially this year. Their work, particularly using the Optima epidemic and economic tool for resource allocation to maximise the impact of countries' disease responses, has expanded from HIV and AIDS, and hepatitis C, to include malaria, childhood nutrition and tuberculosis.

The group has completed 30 HIV country studies in Asia, Eastern Europe, Latin America and the Caribbean, the Middle East and North Africa, West and Central Africa, and Southern Africa. Analyses showed that better targeting of investment in these countries could offer 10–30 per cent declines in HIV infections and deaths within 3-5 years. Based on this work, numerous countries have begun to see gains. This work continues in partnership with the US-based Centres for Disease Control and the World Bank.

The Disease Modelling Group led the United Nations Office on Drugs and Crime HIV/HCV consensus statement on harm reduction for all UN member states, and contributed to planning for addressing hepatitis C disease burdens in Australia and in World Health Organization committees.

Optima Nutrition, which models the effects of nutrition-specific interventions on children for their first 1000 days of life, was also developed. When applied to Bangladesh it showed a seven per cent reduction was possible in the number of new cases of stunting, with current resourcing. This work will expand into broader maternal and child health initiatives in 2017.

Optima-TB commenced in collaboration with University College London and the World Bank, applying the Optima approach to several countries to improve targeting of efforts to combat the growing prevalence of drug-resistance.

OUR WORKING GROUPS

ALCOHOL AND OTHER DRUGS
Co-Heads: Professor Paul Dietze and Dr Peter Higgs

HIV
Head: Associate Professor Mark Stoové

INFECTIOUS DISEASE MODELLING
Head: Professor David Wilson

INFECTIOUS DISEASES SURVEILLANCE
Manager: Ms Carol El-Hayek

JUSTICE HEALTH
Head: Associate Professor Mark Stoové

MALARIA & INFECTIOUS DISEASES EPIDEMIOLOGY
Head: Associate Professor Freya Fowkes

SEXUAL HEALTH & YOUNG PEOPLE'S HEALTH
Head: Dr Megan Lim

VIRAL HEPATITIS
Head: Professor Margaret Hellard

PATH

The PATH cohort study focuses on the trajectories of recently released prisoners with a history of injecting drug use. Participants are recruited in the weeks before release from prison and followed during this highly vulnerable period in their lives, to investigate what helps those who successfully avoid returning to drug use, crime or prison.

The PATH team completed recruiting the cohort from three Victorian prisons in mid-2016, and the team will track 410 participants for two years after prison release. Currently, the follow-up rate is above 70 per cent, a significant achievement. Many participants exit prison into immediate homelessness and hardship – the PATH team has devised innovative ways of keeping in contact with participants via social media and liaison with service providers, family members and friends.

Record linkage for participants has begun, enabling Burnet to track post-prison use of services over time – hospitals, ambulances, general practitioners – and trajectories through the criminal justice system. The results of blood-borne virus tests collected from participants complement the data.

PrEPX

PrEPX is a Burnet-supported landmark study, led by The Alfred hospital, of the population-level impact of a new HIV prevention strategy known as pre-exposure prophylaxis (PrEP). It involves HIV-negative people using HIV treatment medications to reduce their risk of acquiring HIV.

The Victorian State Government is providing AUD$1.4 million towards this 20-month study, with Victorian Minister for Health, the Hon Jill Hennessy MP, launching PrEPX in 2016. The study intends to provide PrEP to 2,600 people at high risk of HIV and to assess its safety, feasibility, acceptability and effectiveness.

Burnet Institute is a proud partner in PrEPX and provides crucial data collection and management capacity, primarily through the ACCESS surveillance network.

The rapid scale-up of PrEP through clinics with high caseloads of gay and bisexual men is expected to reduce HIV transmissions in this population by about one third.

Above: *(L-R) VAC CEO Simon Ruth, Professor Margaret Hellard, Victorian Health Minister the Hon Jill Hennessy MP, Associate Professor Edwina Wright at the PrEPX study launch.*

Above left: *Researchers Dr Brendan Quinn (left), Tim Patton and Jason Asselin at the 2017 Midsumma Carnival in Melbourne.*

Left: *Dr Alisa Pedrana and Dr Peter Higgs supporting the #AustHepCFree by 2026 campaign.*

CENTRE FOR

INTERNATIONAL HEALTH

CENTRE HEAD: Professor Robert Power

We respond to health priorities in developing countries through the provision of technical advice and support, organisational capacity building, applied research, policy analysis and development, and training and education programs.

Our expertise spans prevention and care of infectious diseases, women's and children's health, sexual and reproductive health, harm reduction, primary health care, and the strengthening of national health systems.

Highlights

- **Professor Steve Graham** and **Professor Mike Toole AM** among the Chief Investigators of a consortium awarded a AUD$2 million grant to advance research into the prevention, detection and treatment of multidrug-resistant malaria and TB in Southeast Asia and the Pacific.

- Burnet Institute and the School of Medicine and Health Science at the University of Papua New Guinea signed a **Memorandum of Understanding** to enhance academic collaboration, joint research, project tenders and grant applications.

- Burnet Institute and the Oil Search Foundation Limited (OSF) announced a **new partnership** in pursuit of improved health services and outcomes for the people of Papua New Guinea.

- Burnet Director and CEO **Professor Brendan Crabb AC** and Chair **Mr Rob Milne** hosted a delegation to Myanmar to visit several of the Institute's projects, staff and volunteers.

- An ambitious **Disease Elimination Strategy** launched to eliminate the four major diseases – HIV, malaria, TB and viral hepatitis – that disproportionately affect vulnerable communities in Australia and our region.

- Burnet researchers, **Dr Elissa Kennedy** and **Dr Peter Azzopardi** contributed to the landmark report, *Our future: a Lancet commission on adolescent health and wellbeing*, identifying the major challenges confronting adolescents globally.

- In a Burnet-led project in Zimbabwe, the **Nyagundi Maternity Waiting Home** was opened in Mutare Rural District, Manicaland Province. Maternity Waiting Homes host pregnant women, reducing perinatal mortality by increasing access to birth support services in remote areas.

- Burnet's **Healthy Mothers, Healthy Babies (HMHB)** study in PNG nominated by global development social enterprise platform, Devex, as one of a handful of Australian projects that is set to innovate the future of health care markets.

- In partnership with The Fred Hollows Foundation and HelpAge International, Burnet hosted a panel discussion at the **Women Deliver 2016 Conference** in Copenhagen, *Older Women Deliver Too: a life course approach to women's and children's health*.

- The development of new skills for the gathering of evidence and data was the focus of a special **Burnet and Australian NGO Cooperation Program (ANCP) workshop** for several of the Institute's overseas-based project staff and collaborators.

Above: *The new 'TB Pals' peer support team for TB patients undergoing treatment in Daru, PNG.*

Infectious diseases and harm reduction

In partnership with the Nossal Institute and Mahidol University in Thailand, Burnet improved malaria prevention, diagnosis and treatment in eastern Indonesia through a DFAT Australian Awards Indonesia program. Indonesian government policymakers and malaria experts visited Melbourne in 2016 to learn about malaria elimination. In the Home Management of Malaria project in PNG's East New Britain Province community-based staff brought new rapid diagnostic tests and modern antimalarial medicines to families in rural villages, in a bid to reduce severe disease and illness among children younger than five years of age. The Burnet RID-TB project in Western Province, PNG, supported Provincial Health to address both drug-sensitive and drug-resistant TB, while the WHO's Department of Maternal, Newborn, Child and Adolescent Health engaged Burnet to set priorities for global research.

Women and children's health

In August, in partnership with collaborators from Kenya, South Africa and the USA, and with NHMRC funding, Burnet began enrolling participants in a trial to improve the health and wellbeing of female sex workers in resource-constrained settings with an intervention delivered by mobile phone. In the Pacific, Burnet is conducting qualitative research to explore whether managing menstruation is a barrier to education and employment. The study covers Fiji, the Solomon Islands and PNG and works with local research partners in each country. This year we completed our four-year Better Vision Healthy Ageing Program in Sri Lanka, funded by the Fred Hollows Foundation. This program included completion of an ambitious cluster-randomised controlled trial of over 1000 elders to assess the impact of elders' clubs on their quality of life.

Below: *Maternity Waiting Home opened in Mutare Rural District, Manicaland Province in Zimbabwe.*

Above: *Our team In Yangon, Myanmar celebrate Burnet's 30th Anniversary.*

Myanmar program

Burnet continued its focus on supporting communities to address infectious diseases and future programing in young people's health. Burnet's HIV prevention programs are now expanding to account for co-morbidities of TB and hepatitis C.

We undertook a formative study of attitudes to reproductive health of young people, their teachers, parents, health workers and community leaders. This study is now informing a five-year multi-sectoral project to improve reproductive health.

Papua New Guinea program

Burnet's ongoing contribution to communities in East New Britain included working with local authorities to strengthen malaria control efforts. The Home Management of Malaria Program has tested over 20,000 people in three of the Province's four districts. More than half were found to be positive for malaria and received treatment, with over 300 of those aged less than five. Burnet developed and implemented an education package for pregnant women and their partners, and trained the trainers to facilitate provincial ownership of this program.

We continue to expand our reach in PNG through new partnerships with organisations such as the National Department of Education, the Oil Search Foundation and Plan International, and new provinces including the Autonomous Region of Bougainville. Burnet responded to the major tuberculosis (TB) outbreak in South Fly District in Western Province with a TB peer counselling team for TB patients.

Below: *A Burnet-designed interactive health kit for young men in Papua New Guinea, called Tau Durua (We Care).*

Education and training

Burnet continued postgraduate teaching in partnership with Monash University and the Nossal Institute for Global Health, delivering nine Master of Public Health units, supervising nine external PhD students and two Burnet staff undertaking doctorates. Burnet partnered with Kunming University (KMU) in China, to provide KMU staff and students with training on facilitation skills.

Other activities

The Tibet Health Capacity Building Program is in its fourth year of implementation. The Program trained 1,600 people last year, bringing the total number trained to 7,114.

Burnet implemented five Australian NGO Cooperation Program projects in PNG, Myanmar and Zimbabwe. In line with DFAT's Performance Framework, 80 per cent of activities specifically addressed gender issues, including women's empowerment.

In Zimbabwe Burnet continues to invest in maternal and child health services. Key donors the Drakensburg Trust, Peter Falvey Foundation and the Very Good Foundation (formerly SBA Foundation) visited supported rural health clinics.

Burnet's partnership approach has yielded positive results and secured new initiatives with International Women's Development Agency, Water Aid and Menzies School of Health Research. Throughout the year Burnet worked tirelessly to maintain and grow a diverse portfolio of international work, with more than 50 contracts worth in excess of AUD$40m.

MANAGEMENT TEAM

Professor Robert Power
Mr Mark Tennent
Ms Kellie Woiwod
Dr Elissa Kennedy
Ms Mary-Ann Nicholas
Mr Chad Hughes
Associate Professor Stanley Luchters

BUSINESS DEVELOPMENT, INNOVATION AND RESEARCH

'Medical Research, Practical Action' drives our commitment to translational research that delivers tangible improvements to health outcomes, especially in areas that address our mission to improve the health of vulnerable communities worldwide.

Burnet's translational activities from biomedical programs include research and development, technology licensing and start-up ventures. We also facilitate collaborations with public health programs in key areas of biomedical innovation; provide research administration with our funding partners including the NHMRC, National Institutes of Health (NIH, United States), and trusts and foundations and offer legal support.

Burnet continued to be strongly competitive in translational research funding from the Australian Centre for HIV and Hepatitis Virology (ACH2), receiving five grants totalling $455,000 over 12 months. Significant progress was also achieved with two Burnet innovations that have received support during previous ACH2 rounds, with the VISITECT® CD4 test (now licensed to Omega Diagnostics) entering clinical evaluations in South Africa, and the VL-Plasma device licensed to Burnet spinoff Nanjing BioPoint and entering the manufacturing phase (see below).

360 biolabs

360biolabs is an expert contract service provider bringing together virology and immunology in a quality-assured environment. We are passionate about using cutting-edge thinking and technology to support development of therapeutics, vaccines and diagnostics. In 2016, our first full year of operations, significant expansion occurred in both our laboratory footprint and assay technologies under ISO/IEC 17025 & 15189 accreditation (including the addition of bioanalysis to support pharmacokinetic endpoints). We worked on over 30 projects with a wide range of organisations, from academic groups to major pharmaceutical companies supporting early research and development projects, and advanced clinical studies in a wide range of disease areas. In 2017 we will build on this success, with preparation for several drug and vaccine trials underway.

8 patent families

4 new provisional patents

Left: *The BioPoint VL-Plasma separator can be taken apart in the lab, post-sampling in the field.*

Nanjing BioPoint

Collaborative research and development between Burnet spin-off company, Nanjing BioPoint Diagnostics Technology Co. Ltd., and Burnet Institute has led to development of advanced prototypes of the first in-house product: a point-of-care test for liver disease (ALT), patent pending. The company also completed fit-out of manufacturing facilities, ready for manufacture of the ALT test and other tests.

With manufacturing facilities coming on stream, Nanjing BioPoint was also perfectly placed for Burnet's manufacture and commercialisation of a simple device for separation and collection of plasma from whole blood at the point of care, using a novel method for plasma separation developed at Burnet, combined with a novel disposable cartridge developed in collaboration with Axxin Ltd, Melbourne. The device, to be marketed as VL-Plasma®, has been licensed to Nanjing BioPoint and prototypes for clinical studies are being produced in early 2017 at BioPoint's facilities in Nanjing.

Burnet Deputy Director, and President and CEO of Nanjing BioPoint, Associate Professor David Anderson said the facilities, growing research and development and manufacturing capacity of Nanjing BioPoint would facilitate translation of Burnet's innovations into commercially viable products while addressing significant unmet medical needs.

"Our development of new diagnostics is always driven by medical need, and the plasma separator or VL-Plasma® device is a perfect example of our integrated approach to solve critical problems – in this case to increase access to HIV viral load testing for populations in resource-constrained settings," Associate Professor Anderson said.

"By combining the deceptively simple plasma separation method with a cleverly designed cartridge from Axxin to facilitate use in the field and the laboratory, we expect to improve access to essential HIV monitoring services for around 20 million patients worldwide."

New opportunities

Burnet researchers continue to develop novel technologies with potential as diagnostics, vaccines and therapeutics. Further funding is sought to progress these technologies so they reach target markets in resource-poor countries. These include:

- **Novel HIV Vaccine –** Burnet is continuing to progress our lead vaccine candidate and plans to enter formal preclinical studies in 2017.
- **A Post Biotic to reduce inflammation in the female reproductive tract –** Our technology aims to reduce cervicovaginal inflammation and thus reduce the risk of these infections, which disproportionately affect young women in resource-poor countries.

Access Point of Care initiative

Burnet's Access Point of Care mission is to enhance the impact of novel and existing technologies, particularly diagnostics, to address unmet healthcare needs and improve the health of the world's most disadvantaged populations. Access Point of Care brings expertise across the Institute from diagnostic development to field trials and implementation, working closely with Nanjing BioPoint and other established diagnostic partners and partners in country.

In 2016 Burnet continued to make positive progress towards the development of an improved point-of-care test for active syphilis, with funding from Saving Lives at Birth and the Thrasher Research Fund. We are working with the National Centre for Sexually Transmitted Disease Control, part of the CDC in Nanjing, to conduct a laboratory evaluation of the test in early 2017.

HepSeeVax

HepSeeVax Pty Ltd, a wholly-owned Burnet Institute company, is developing the world's first vaccine to prevent Hepatitis C virus (HCV) infection. In July 2016, Burnet Institute and ARTES Biotechnology GmbH in Germany joined forces to develop a low-cost HCV vaccine by combining Burnet's HCV technologies with ARTES' novel virus-like particle platform. Led by Associate Professor Heidi Drummer and her team, work on the HepSeeVaxDelta3™ technology has resulted in the filing of two further provisional patents, adding to three major patent families providing broad coverage of the technology across a range of territories worldwide.

An Australian Tropical Medicine Commercialisation Grant was awarded through Austrade and the Department of Industry, Innovation and Science to conduct a proof-of-concept study testing the lead HepSeeVaxDelta3™ vaccine candidate in a mouse model engrafted with humanised liver. Support was also won from the ACH2 to develop an enhanced method for manufacturing the HepSeeVaxDelta3™ technology.

EDUCATION AND TRAINING

Education is a priority at Burnet Institute, with undergraduate, Honours and Postgraduate (Masters and PhD) positions in a range of research projects. Burnet Institute's location within the Alfred Medical Research and Education Precinct (AMREP) enables students to work across multiple research areas.

Research student projects

In 2016, 77 students participated in biomedical laboratory-based projects, epidemiology and field-based research. Supervisors and their research teams successfully trained and mentored 14 Honours students enrolled across two universities:

- Monash University, 11
- University of Melbourne, 3

Seven Masters students who trained at Burnet were enrolled through national universities:

- University of Melbourne, 5
- RMIT, 1
- James Cook University, 1

Burnet's PhD program continues to grow in size and reputation, with 56 students enrolled in eight universities:

- Monash University, 33
- University of Melbourne, 17
- RMIT University, 1
- University of New South Wales, 1
- Deakin University, 1
- Federation University, 1
- La Trobe University, 1
- Ghent University, 1

Students and supervisors are supported by Burnet's Research Students Committee, which is linked with senior scientists. Students continue to have a significant impact on the Institute's research output, with 47 of 227 peer-reviewed scientific publications in 2016 involving one or multiple students as authors. Several students received travel awards and awards based on their poster or oral presentations at major national and international conferences. Burnet students who completed or submitted their PhD this year are pursuing careers in research through postdoctoral positions at leading institutes and universities, or actively engaging in industry. Burnet thanks Education Officer Dr Raffi Gugasyan for his contribution in 2016.

Postgraduate international public health studies

Burnet continues to coordinate and deliver 10 accredited postgraduate international public health units for Monash University's Master of Public Health and Master of International Health. These courses encompass the breadth of Burnet's global health expertise including women's and children's health, infectious diseases, nutrition, alcohol and other drugs, refugee health, health economics and primary health care. They focus on key communication, training and field skills for global health practitioners and researchers. The courses attract domestic and international postgraduate students as well as short course participants from government and non-government organisations in Asia, Africa and the Pacific, with 171 enrolments in 2016.

PhD students

Burnet's PhD program continues to flourish, with 56 students enrolled.

Burnet places a major emphasis on postgraduate study, providing high-quality research and training in immunology and infectious disease, and in areas of public and international health. Recent PhD students investigated HIV entry and replication, malaria, tuberculosis, drug misuse, sexual health, and HIV therapy in PNG.

Congratulations to students who were awarded their PhDs:

Muriel Aldunate
The anti-HIV activity of lactic acid and short chain fatty acids associated with eubiosis and bacterial vaginosis.

Anna Bowring
Exploring risk and opportunity to improve the health of behaviourally bisexual men in Vientiane, Laos.

Kate Cantwell
Ambulance demand: Random events or predictable patterns?

Janet Gare
Antiretroviral therapy in Papua New Guinea: Biological and social factors contributing to HIV treatment failure and drug resistance.

Katherine Harvey
Phosphorylation of apical membrane antigen 1: A key event in erythrocyte invasion by *Plasmodium falciparum*.

Joshua Hayward
Retroviruses and restriction factors of bats.

Tim Spelman
Using real-world data to define MS outcomes and optimise treatment strategies.

James Trauer
Mathematical modeling for programmatic responses to tuberculosis in the Asia-Pacific.

Anna Wilkinson
Prevention of HIV in Victoria's vulnerable populations: The impact of early and regular testing.

"Completing my PhD at Burnet has allowed me to see how my work in the laboratory can directly impact key affected populations. Burnet's strong ties with malaria-affected communities in the Asia-Pacific provided a unique opportunity to explore malaria transmission and immunity in south-east Myanmar and other regions of the Greater Mekong, which will inform malaria elimination framework in these regions."

PHD CANDIDATE, KATHERINE O'FLAHERTY
MALARIA AND INFECTIOUS DISEASE EPIDEMIOLOGY GROUP

EDUCATION IN NUMBERS

77 students

56
PhD students

7
Masters students

14
Honours students

9 accredited postgraduate international public health units

3 centres

171
enrolments in public health courses

227
peer-reviewed publications in 2016

PHILANTHROPY

Thank you to members of our community, philanthropic trusts and foundations, and corporations for your generosity. Your support of the Institute has enabled us to help tackle major global health problems, save lives and create a healthier world.

Above: *Healthy Mothers, Healthy Babies researchers Dr Liz Peach and Ms Kerryanne Tokmun analyse data from Study 1 in Kokopo, PNG.*

Right: *Burnet Director and CEO Professor Brendan Crabb AC is presented with a cheque for PGK 250,000 from Bank South Pacific.*

Healthy Mothers, Healthy Babies

Healthy Mothers, Healthy Babies (HMHB) achieved several milestones in 2016 thanks to your support. More than 500 women have now been recruited into the first study, which aims to address the incredibly high proportions of women and newborns who die during or soon after childbirth. More than 400 women have been followed through labour and the first month after birth. Already we're finding startling statistics and discovering large numbers of women diagnosed with treatable anaemia and infectious diseases such as malaria and STIs. We're also looking at the quality of care women and their newborns receive and finding ways this can be improved. We have many individuals who support HMHB and in 2016 also welcomed Principal Supporter Bank South Pacific, Macquarie Foundation, June Canavan Foundation, SP Brewery, Minerals Resource Development Corporation, Kumul Petroleum, Tropicana Ltd, Arnold Bloch Leibler and Air PNG.

Left:
Malaria researcher Dr Sarah Charnaud examines results in the laboratory.

Women in science

Dr Sarah Charnaud is a malaria scientist with a big career ahead. She recently completed a self-funded training program with Homeward Bound, heading to the Antarctic with 70 other women to develop leadership skills. We know that the number of women who progress to leadership positions throughout the science sector is small compared to the numbers who begin a career in science. Burnet is committed to gender equity and ensuring women are not disadvantaged in their careers. We're grateful for the support of many donors and thanks to your help we will be able to provide workplace flexibility so where possible parents can work from home, travel to attend conferences, and ensure their research continues while on parental leave. Thank you for your support in helping fund greater opportunities for women in science to achieve full leadership potential.

Malaria vaccine

Malaria is a complex disease and despite many decades of research and development it has proven challenging to develop a vaccine capable of long-term immunity. With your support Burnet researchers are a step closer to developing such a vaccine, which could make death from malaria a thing of the past. We have antigens that produce a strong immune response, important for an ideal vaccine. We have discovered that antibodies need the help of another protein in the blood to stop malaria, and are now working to progress this to the next stage. With your help we can ultimately prevent people dying from malaria.

"It is very encouraging to know that Burnet is committed to medical research and reaching out to respond to health needs in Australia and overseas, especially in poor communities."

DONORS, RONALD AND CHRISTINE MCCULLOCH

BURNET'S COMMITMENT TO gender equity

Burnet Institute is stepping up its commitment to gender equity in science through its participation in the Science in Australia Gender Equity (SAGE) Pilot of Athena SWAN in Australia.

SAGE, a joint initiative between the Australian Academy of Sciences and the Australian Academy of Technology and Engineering is a program of activities designed to improve gender equity and diversity in Science, Technology, Engineering, Mathematics and Medicine (STEMM). Athena SWAN (Scientific Women's Academic Network) is a highly regarded UK program providing an evaluation and accreditation framework for gender equity issues in STEMM.

Burnet Institute has been accepted into Cohort 2 of the SAGE pilot of the Athena SWAN Awards as a Bronze level applicant and is one of 40 participating institutions and organisations across Australia. The Athena SWAN program involves a process of self-evaluation through data collection, a critical analysis of the data, identification of reasons for exclusion and under-representation, and implementation of a four-year strategic plan to address each organisation's unique issues surrounding equal participation and promotion of people in the workplace, regardless of gender.

As a Bronze participant, Burnet Institute's Gender Equity Committee has formed a self-evaluation team (SAT) to undertake the formal ongoing assessment and analysis of data over a three-year period in preparation for the Bronze Level Award application.

In 2016 we hosted SAGE Executive Director, Dr Wafa El-Adhami and Head of Strategy and Engagement, Dr Saraid Billiards at a special staff briefing in Melbourne to discuss the evaluation process.

Burnet Institute Gender Equity Committee

Chaired by Associate Professor Heidi Drummer, the Committee comprises representatives from across the Institute, including Director and CEO, Professor Brendan Crabb AC. The Committee has developed gender equity-related objectives and initiatives including drafting the Institute's first stand-alone Gender Equity Policy, launching a web page focused on gender equity, and creating an internal web resource for staff and students to access resources and links for training and education relating to gender equity. Formed in 2015, the Committee was chaired by Dr Alison Greenway until July 2016. Burnet Institute would like to thank Dr Greenway for her hard work throughout this formative period.

The 10 Athena SWAN principles:

1. Academia cannot reach its full potential unless it can benefit from the talents of all
2. Advancing gender equality in academia
3. Addressing unequal gender representation across disciplines and functions
4. Tackling the gender pay gap
5. Removing obstacles to a sustainable career
6. Addressing negative consequences of short-term contracts
7. Tackling discriminatory treatment of transgender people
8. Action from all levels, especially senior leadership
9. Sustainable structural and cultural changes
10. Considering the intersection of gender and other factors.

FINANCIAL SUMMARY

In 2016, the Institute spent more than AUD$42 million on improving health for vulnerable communities in Australia and internationally.

The Statements of Financial Position and Comprehensive Income provided in this section have been extracted from the audited general purpose financial statements of the consolidated operations of the Burnet Institute. The summary financial information does not include all the information and notes normally included in a statutory financial report.

The statutory financial report (from which the summary financial information has been extracted) has been prepared in accordance with Australian Accounting Standards

(AASBs) adopted by the Australian Accounting Standards Board (AASB) and the Corporations Act 2001.

The financial result for the year was a deficit of AUD$1,013,131 (2015: deficit $1,787,661).

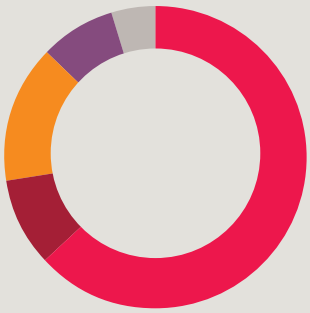
Depreciation and amortisation amounted to $2,517,272 (2015: $2,506,610). Income tax is not applicable. The 2016 consolidated result includes an AUD$710,053 deficit (2015: $918,818 deficit) from the BioPoint subsidiary companies.

Burnet continues to demonstrate a strong internal culture that is built around having a clear sense of purpose and influence in health, development and medical research. Success indicators are underscored by the Institute's ever improving publication record and NHMRC success rate. The Institute will continue to explore strategic and operational opportunities that will address the inherent challenge of generating the appropriate levels of indirect funding to support our core medical research and public health grants.

The property business continues to operate as a self-sustainable activity.

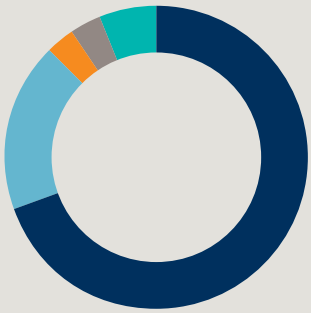
For a full copy of the 2016 audited general purpose financial report please contact Burnet Institute on +61 3 9282 2111, email info@burnet.edu.au or visit www.burnet.edu.au.

INCOME 2016



- Competitive Grants / Contracts ($26.5m)
- Operational Infrastructure ($4.0m)
- Fundraising ($6.2m)
- Investments ($3.4m)
- Other ($1.9m)

EXPENDITURE 2016



- Research / Public Health ($29.9m)
- Facilities & Admin ($7.8m)
- Fundraising ($1.3m)
- Business Development ($1.4m)
- Amortisation / Depreciation ($2.5m)

Consolidated Statement of Comprehensive Income

(FOR THE YEAR ENDED 31 DECEMBER)

	NOTE	2016 $'000	2015 $'000
Operating revenue	3	37,154	34,630
Other income	3	4,417	4,420
Research and development laboratory consumables expenses		(3,351)	(2,756)
Personnel expenses	4	(21,480)	(20,575)
Depreciation and amortisation expenses		(1,232)	(1,222)
Depreciation and amortisation expenses – property management		(1,285)	(1,285)
Research and development non-laboratory expenses		(8,256)	(9,601)
Other expenses from ordinary activities	5	(6,141)	(4,345)
Results from operating activities		(174)	(734)
Financial income	7	306	362
Financial expenses	7	(1,145)	(1,416)
Net finance costs		(839)	(1,054)
(Deficit) Before Income Tax		(1,013)	(1,788)
Income tax expense		–	–
(Deficit) after income tax		(1,013)	(1,788)
(Deficit) after income tax attributable to:			
Members of the Company		(862)	(1,593)
Non-controlling interests		(151)	(195)
(Deficit) after income tax		(1,013)	(1,788)
Other comprehensive income			
Foreign currency translation differences – foreign operations		(67)	150
Total comprehensive (loss) for the Period		(1,080)	(1,638)
Total comprehensive income/(loss) attributable to:			
Members of the Company		(915)	(1,475)
Non-controlling interests		(165)	(163)
Total comprehensive (loss) for the period		(1,080)	(1,638)

Consolidated Statement of Financial Position

(AS AT 31 DECEMBER)

	NOTE	2016 $'000	2015 $'000
Current assets			
Cash and cash equivalents		13,908	17,133
Trade and other receivables	8	3,791	2,910
Investments	9	2,100	–
Inventories		30	28
Other Assets - prepayments		442	481
Total current assets		20,271	20,552
Non-current assets			
Lease receivables		1,732	1,818
Investments	9	3,400	2,265
Property, plant and equipment	10	61,117	62,525
Total non-current assets		66,249	66,608
Total assets		86,520	87,160
Current liabilities			
Trade and other payables		2,731	2,294
Borrowings	11	703	496
Current tax liabilities - FBT		52	75
Provisions	12	2,793	2,838
Deferred income	13	13,039	11,933
Total current liabilities		19,318	17,636
Non-current liabilities			
Borrowings	11	33,319	33,450
Provisions	12	1,434	1,162
Deferred income	13	8,347	9,176
Derivatives	14	2,480	3,034
Total non-current liabilities		45,580	46,822
Total liabilities		64,898	64,458
Net assets		21,622	22,702
Equity			
Retained (deficit)/earnings		(1,624)	1,111
Building reserve		23,004	21,131
Foreign Currency Translation Reserve		158	225
Non-controlling interests		84	235
Total equity		21,622	22,702

The Macfarlane Burnet Institute for Medical Research and Public Health Limited is a signatory to the Australian Council for International Development (ACFID) Code of Conduct. The Code requires members to meet high standards of corporate governance, public accountability and financial management. In accordance with the ACFID code of conduct, the Institute had nil balances in the following categories as at the end of the financial year which are required to be disclosed separately:

- Current Assets: assets held for sale, and other financial assets;
- Non-Current Assets: trade and other receivables, other financial assets, investment property, intangibles, and other non-current assets;
- Current Liabilities: other financial liabilities and other current liabilities;
- Non-Current Liabilities: trade and other payables, other financial liabilities and other non-current liabilities.

Burnet Institute International Development Activities Operating Statement *(FOR THE YEAR ENDED 31 DECEMBER)*

	2016 $'000	2015 $'000
Revenue		
Donations and gifts – monetary	–	84
Donations and gifts – non-monetary	–	–
Bequests and legacies	–	–
Grants:		
• DFAT	4,730	6,163
• Other Australian	1,455	1,108
• Other Overseas	3,495	3,626
Investment Income	–	–
Other Income	1,579	1,562
Revenue for international political or religious proselytisation programs	–	–
Total revenue	11,259	12,543
Expenditure		
International aid and development programs expenditure		
International programs:		
• Funds to international programs	11,092	11,575
• Program support costs	870	808
Community education	–	–
Fundraising costs:		
• Public	–	–
• Government, multilaterals and private	–	–
Accountability and administration	388	400
Non-monetary expenditure	–	–
Total international aid and development programs expenditure	12,350	12,783
Expenditure for international political or religious proselytisation programs	–	–
Domestic programs expenditure	253	702
Total expenditure	12,603	13,485
(Shortfall)/Excess of revenue over expenditure	(1,344)	(942)

Notes:
No single appeal or form of fundraising for a designated purpose generated 10% or greater of the Burnet Institute's total income.

This operating statement represents IFRS financial information and is extracted specifically for the operations of the Centre for International Health as required by the ACFID Code of Conduct.

The deficit represents the Burnet Institute's additional financial contribution to the program.

ACFID MEMBER

The Macfarlane Burnet Institute for Medical Research and Public Health Limited is a signatory to the Australian Council for International Development Code of Conduct. The Code requires members to meet high standards of corporate governance, public accountability and financial management. More information about the ACFID Code of Conduct can be obtained from ACFID.

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Burnet Institute
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