Marie Bashir Institute

Tackling infections, locally and globally
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Cover image: H1N1 flu virus
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Our leadership structure

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MBI is a virtual institute comprised of a central organisational structure with a core executive, a management board, a multidisciplinary advisory board and node leaders.
Messages from our patron and director

Patron: Dame Marie Bashir AD, CVO
Fifty years ago, people believed humans had won the fight against infectious diseases. However, controlling infectious diseases remains one of the major health challenges of the 21st century, a challenge not only for countries where the burden of disease is highest, but worldwide – because infectious diseases have no respect for international borders.

It is indeed a deeply felt privilege to have my name associated with an institute at which fine professionals meet this challenge with considerable commitment, innovation and scientific skill.

Director: Professor Tania Sorrell AM
I am delighted to introduce MBI’s vision to support a vibrant academic community to help prevent the health and socioeconomic consequences of emerging and re-emerging infectious diseases.

A new multidisciplinary Master of Health Security was launched in 2016, and our research nodes (showcased in this booklet) provide broad thematic focus linking academics across faculties to unlock latent synergies. We trust that you will share our sense of excitement for the research, education, community engagement and advocacy work done by MBI. Thank you for your support.
The Marie Bashir Institute is committed to meeting the challenge of emerging and re-emerging infectious diseases by:

- leading in cross-disciplinary research into emerging and re-emerging infectious diseases
- increasing capacity within Australia and Asia-Pacific nations to detect and respond to infectious disease outbreaks in humans and animals
- informing and assisting in the development of policies and strategies to prevent, contain and control emerging and re-emerging infectious diseases.

The institute encourages a comprehensive approach to infection, immunity and biosecurity, linking pathogens, hosts (humans and animals), engineered systems and the natural environment in a one planet, one health framework.
Our vision

We are committed to research and knowledge exchange that will improve understanding of the complex interactions that fuel the emergence and spread of infectious diseases, especially in the Asia-Pacific region.

We aspire to combat and mitigate the resulting health and socioeconomic impacts of these infections. We support multidisciplinary and cross-faculty initiatives that stimulate creative interaction, to generate novel insights and practical solutions.
Research nodes

The Marie Bashir Institute fosters cross-faculty collaboration by supporting multidisciplinary research nodes in strategic themes.

These include:
- antimicrobial resistance
- central nervous system infections
- politics and ethics of infection
- healthy food systems
- integrated primary care
- mass-gathering medicine
- zoonoses.

The institute also supports research in critical infections, pathogen genomics, tuberculosis and other disease-specific areas.

Centres of research excellence

The institute incorporates a number of these centres. The newly funded Centre of Research Excellence in Emerging Infectious Diseases addresses:
- pathogen emergence and spread – prevention and mitigation of risks
- rapid, targeted public health responses to emerging infectious disease threats
- integrating early warning and risk assessment with rapid mitigation and response strategies
- translation into effective practice and policy.

For more examples, please visit:
- sydney.edu.au/mbi/CREs
Antimicrobial resistance

Rising rates of antimicrobial resistance herald a new threat.

The antimicrobial resistance research node brings together investigators from chemistry, biological sciences, medicine, geography, pharmacology, agriculture and veterinary science to help ensure the availability of effective antimicrobial therapies into the future.

Projects include:
- identifying new tuberculosis drugs from natural products
- monitoring drug-resistant golden-staph infections in companion animals
- investigating optimal antibiotic regimens in the critically ill
- exploring stakeholder attitudes to antimicrobial resistance
- fungicide use in agriculture and drug-resistance in human fungal infections.

“A post-antibiotic era means, in effect, an end to modern medicine as we know it. Things as common as strep throat or a child’s scratched knee could once again kill.”

Margaret Chan
Director-General,
World Health Organization

Above right: Methicillin resistant Staphylococcus aureus (MRSA), often referred to as ‘golden staph’.
Central nervous system infection, inflammation and immunity

Encephalitis (inflammation of the brain) is a devastating disease that serves as a potential marker of new or emerging infections.

Projects include:
- the Australian Childhood Encephalitis Study to understand the causes and impacts of acute encephalitis in children
- bridging the gap from the cradle to the mosh pit: studying the links between childhood encephalitis and brain disorders in adolescents
- veterinarians as sentinels for zoonoses, eg *Bartonella* infections and diseases caused by mosquitoes, flies and ticks
- national and international collaborations including United States Centers for Disease Control and Prevention (for example, Zika virus).

In partnership with the Brain and Mind Centre, this theme brings together a number of groups working on infectious and immunological disorders affecting the brain and nervous system.

- sydney.edu.au/brain-mind
Politics and ethics of infection

Infectious diseases are not only caused by bacteria, viruses and parasites. They are also shaped by social, economic, political, legal and cultural conditions.

In many instances these conditions are inseparable from the success or otherwise of the biomedical goals contained in disease prevention, control and treatment strategies.

This node draws from expertise across the University in ethics, history, political science, sociology, anthropology, philosophy, public health, clinical sciences and public policy. The key aim is to produce research that critically examines and explores infections in their broadest context and seeks to have significant impact across practice, systems and policies at local, state, federal and international levels.

Projects include:
- ethical challenges in dealing with new surveillance and diagnostic technologies
- community perceptions of antibiotic resistance and human-animal interactions
- ending tuberculosis in Australia and the region: identifying ethical and culturally appropriate solutions
- exploring historical, social and cultural contexts of mosquito-borne diseases.
Healthy food systems

Delivering sufficient, safe, ethical and nutritious food in a sustainable manner is one of the world’s greatest challenges.

Access to safe and nutritious food is central to individual wellbeing, healthy communities and a healthy planet. In partnership with the Charles Perkins Centre, this research node brings together experts in nutrition, diversity and safety.

- sydney.edu.au/perkins/research/current-research/healthy-food-systems

It also links to the Australia and New Zealand Fresh Produce Safety Centre.

- www.freshproducersafety-anz.com

Projects include:
- enhanced nutrition security through family poultry and crop integration in Africa
- ongoing surveillance for food-borne illness
- a fresh look at selenium to reduce *Salmonella* infections in broiler chickens
- ecological impact of pesticide and biocide use in agriculture.

Increasing animal-source foods in Southeast Asia.  
Strengthening food and nutrition security in Tanzania.
“In the next 50 years we will need to produce as much food as has been consumed throughout human history – more grain than produced since the Egyptians, more fish than eaten to date, more milk than from all the cows that have ever been milked on every frosty morning humankind has ever known.”

Dr Megan Clark AC
Former Chief Executive of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2009–14)
Integrated primary healthcare

Chronic diseases (both infectious and non-communicable) are the leading cause of premature death in low- and middle-income countries.

Chronic disease programs are often siloed and co-morbidities (additional disorders or diseases co-occurring with a primary disease or disorder) are ignored.

This multidisciplinary team is developing a program of research to strengthen the evidence base for integrated primary healthcare, locally and globally. The node combines a new academic community focused on the delivery of integrated chronic disease management at the primary healthcare level, and has strong links with the George Institute for Global Health.

Projects include:
- use of mobile devices to guide integrated chronic disease management by primary healthcare providers and accredited social health activists in India
- workshops to explore options for integrated care in Pacific Island nations
- linking tuberculosis care and cardiovascular disease risk reduction.

− georgeinstitute.org.au
Mass-gathering medicine

The largest mass gathering on Earth is the Islamic pilgrimage that brings three to four million people from all over the world to Mecca (Makkah), Saudi Arabia, every year.

Known as the Hajj pilgrimage, all Muslims aspire to perform it at least once in their lifetime. It provides a highly conducive environment for the transmission and global spread of infectious diseases – and it also provides a perfect opportunity for researchers to study these infections and the risk factors associated with transmission.

This node examines the risk of acquiring an infection while attending a mass gathering, together with policy interventions to protect personal and public health.

Projects include:
- effectiveness of face masks in the prevention of respiratory virus infection among Hajj pilgrims
- protection offered by different meningitis vaccines
- monitoring mobile genetic elements associated with drug-resistant infections.
Most human infectious diseases are of zoonotic origin. Many factors influence the emergence of zoonotic infections including the evolution of pathogens, ever-growing human and animal populations (particularly production and companion animals), and ecological disturbance.

This node brings together experts in veterinary epidemiology, public health, infectious diseases, social sciences, ecology and environmental sciences to conduct research on zoonotic pathogens, to investigate drivers of emerging zoonotic diseases, and to develop measures for preventing and predicting new zoonoses.

Zoonoses projects include:
- identifying non-Hendra brain infections in horses
- Q fever: How common is it and how can we best prevent it?
- *Brucella suis*: occurrence in pigs, dogs and people in New South Wales
- rabies incursion risk to northern Australia
- brucellosis in India – using vets as sentinels.

Zoonoses are diseases that can be transmitted between animals and humans.
Critical and drug-resistant infections
Critical bacterial infections often share mobile genetic elements that encode for drug resistance, which previously defeated our attempts at surveillance and control. This is changing, with new tools providing a deeper understanding and allowing us to train a new generation of researchers, clinicians and policymakers in their application.

Pathogen genomics
The NSW Pathogen Genomics initiative is a partnership between the Marie Bashir Institute and the Centre for Infectious Diseases and Microbiology – Public Health, funded by the NSW Government. It supports the application of novel advances in pathogen genomics, metagenomics and transcriptomics to guide outbreak investigations and improve public health control.

Research themes include:
- genomic surveillance and reconstruction of transmission pathways
- pandemic risk assessment and exploring how pathogens adapt.

Tuberculosis
Among infectious diseases, tuberculosis (TB) is the planet’s biggest killer. Researchers are investigating:
- novel vaccines and other strategies for TB prevention
- better targeted public health responses
- improved management of children with TB
- discovery of new drugs to treat drug-resistant TB
- the ethical and legal barriers to TB control.
Members of the Marie Bashir Institute teach infectious diseases, immunology and biosecurity in various undergraduate and postgraduate programs at the University of Sydney, including the following master’s programs:

- Health Security
- Complex Systems
- Infection and Immunity
- HIV, STIs and Sexual Health
- Public Health
- International Public Health
- Veterinary Public Health
- Veterinary Public Health Management.

There are many opportunities to undertake higher degree research (a master’s degree or PhD) with our academics. Please email us at mbi@sydney.edu.au

We coordinate regular seminars and offer short professional courses in topics related to infectious diseases. For more information on available courses, please see:

- sydney.edu.au/mbi
Master of Health Security

This exciting new multidisciplinary master’s program is led by the Faculty of Arts and Social Sciences.

The Master of Health Security (MHlthSec) draws on expertise from faculties across Veterinary Science, Health Sciences, Agriculture and Environment, Medicine, Nursing, Law and Business, and the schools of Social and Political Sciences and Public Health, to train a new generation of professionals.

These professionals will have a multidisciplinary skill set to guide effective responses to disease outbreaks and cross-border threats, including their multifaceted social and economic consequences.

Three specialisation streams are available:

- Human and Animal Health
- Biodefence and Biosafety
- Agrosecurity.

For admission requirements and further details, please see:

- sydney.edu.au/courses/programs/postgrad-health-security

Email:
health.security@sydney.edu.au
Rotavirus
Developing the cocoa value chain in Bougainville
Cocoa production supports the livelihoods of two-thirds of the population in the Autonomous Region of Bougainville.

Optimising cocoa farming output requires greater engagement of farming families, especially women and children, to improve health outcomes and address labour shortages compounded by malnutrition and ill health. This project addresses these constraints using a holistic, multidisciplinary approach.

Limiting the spread of drug-resistant tuberculosis in Vietnam
The University of Sydney, in collaboration with the University of NSW, has a strong tuberculosis (TB) research group in Vietnam. Current trials include active investigation of the general population, which aims to identify infectious patients before they spread the infection to others in the community.

A household study is investigating whether preventive therapy given to close contacts of patients with drug-resistant TB can break the transmission chain of these resistant infections.
Communication and advocacy

Source of reliable information
Just as we prioritise research and education, it is important that the Marie Bashir Institute contributes to informed public discourse and has a positive impact on Australia and the world. We provide local and global media expertise on infectious disease matters of public importance.

Advocacy
The institute plays an important advocacy role and collaborates with many international organisations to help reduce the negative impact of infectious diseases. To develop a more holistic planetary health agenda, we have created a national forum to progress One/Eco Health Policy within Australia, with a focus on emerging infectious diseases.

Examples of disease-specific advocacy include assistance to establish the Australian TB Caucus and the Australasian TB Forum.

Check us out on social media:
Twitter: @MarieBashirInst
Facebook: Marie Bashir Institute at the University of Sydney
Get involved
Join our community. We welcome your involvement, whether you are an academic or student at the University of Sydney, or an external party interested in our work. Email us at mbi@sydney.edu.au

For more information, please visit:
− sydney.edu.au/mbi

Support us
You can support our community of researchers, educators and professional experts in the fight against emerging and re-emerging infectious diseases. Donations of more than $2 are tax deductible. Funds can be earmarked to support any of our research, education, or capacity-building initiatives that aim to prevent, detect and control infectious diseases of national and global importance.

More information
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