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I will begin this Vertical Transmission by hoping that you and your families are all healthy and well, and coping during this very confused and frightening time. Microbiology and public health are certainly at the forefront of community and government attention at this time, and rapid solutions are being sought to deal with the SARS-CoV-2 pandemic. Unfortunately, funding for discovery research that will provide the required solutions for this and other microbial threats is lacking. For this reason, the ASM Executive (Dena Lyras, Roy Robins-Browne, Kate Seib, Anthony Baker, Rebecca LeBard), together with Mark Schembri, Jonathan Iredell, Priscilla Johanesen, Enzo Palombo, Cheryl Power, and Deborah Williamson, have prepared the following statement to share with you and the broader community on this matter.

Discovery research: a foundation for pandemic preparation that we must not neglect

The SARS-CoV-2 pandemic has infected 4.71 million people worldwide, resulting in over 315 000 deaths. The USA and UK have had 1.52 million and 244 000 infections, with the devastating outcome of over 89 932 and 34 636 deaths, respectively, as of 18 May. These numbers are increasing every day. The global mortality figures are so large that it is easy to lose sight of the fact that each of those deaths represents someone's friend, family member, mother, father or child; someone who is dearly loved and will be missed. By contrast, the effects of the pandemic in Australia have thankfully been relatively minor, with 'only' 7056 cases and 99 deaths.

We might consider that we are lucky in Australia, but it is not luck that has protected us. Our relatively low infection rate is the result of an evidence-based and co-ordinated Federal and State response. Central to this response has been the involvement of diverse members of our scientific community – epidemiologists, clinical microbiologists and microbiology scientists, nurses, GPs and hospital clinicians – who have worked to identify and treat people with infections, and to minimise community transmission. They are our heroes and deserve our gratitude every day. For the first time in living memory, science is constantly in the media, and the work of our scientists is highlighted daily in news and social media outlets. Indeed, the value of discovery research has never been more apparent. And rightly so – scientists will discover and deliver solutions to the SARS-CoV-2 pandemic, and the foundational backbone of these outcomes will come from basic discovery research across many fields, including microbiology, that was initiated well before we knew anything about the virus.

What about the next infectious diseases public health crisis? History shows us the value of discovery research related to infectious diseases. There is no better example than that of life-saving vaccines - smallpox has been eradicated worldwide, most regions have eliminated polio and other past scourges are historical footnotes. In fact, vaccines have been so effective that people have forgotten how devastating infectious diseases can be, with an increasing 'anti-vaxxer' movement facilitating the re-emergence of infectious diseases we had conquered. SARS-CoV-2 is a deadly reminder that infectious threats can emerge unexpectedly and can silently spread around the world before we can control them, wreaking the havoc we are seeing now. Distressingly, it was recently revealed that Australian researchers had been close to developing a potential universal coronavirus vaccine a decade ago but their efforts were halted by a termination in their funding. Sadly, this is a common story – promising research is halted because of a lack of funding for discovery research once the crisis is over. Furthermore, continuity in funding for discovery research is lacking. We invest huge resources to tackle new research problems, but this is generally short term.

Tackling infectious diseases, including pandemic preparedness, requires continual effort. Waiting until a threat has developed into a full-blown emergency is too late. Preparedness starts with discovery research. The past 20 years has seen the unexpected emergence of pathogenic viruses, including SARS, MERS, swine flu, Zika and SARS-CoV-2. But the next pandemic could be caused by bacteria (e.g. bubonic plague re-emerged in China last year), fungi (e.g. the worldwide expansion of *Candida auris*) or parasites (e.g. drug-resistant malaria). Antimicrobial resistance is also one of the biggest threats to global health and will impact every aspect of medical care, including cancer treatments and all surgeries. Infection threats are increasing and we must be prepared for any of these possibilities. Scientists correctly predicted the emergence of new coronaviruses and are not surprised by the current situation. Likewise, the other microbial threats cannot be ignored. We must be prepared for the inevitability that they will become bigger problems – history (and epidemiology) tells us they will.

The value of discovery research in the context of infectious diseases is not immediately obvious and its importance is therefore undervalued. We simply don't believe a pathogenic microbe will infect us, infections happen to other people. When infections arise, we and authorities can't believe there is no treatment and no cure; it's just a microbe after all - remember the underwhelming 'it's just a flu' attitude of world leaders at the start of the current pandemic. But as SARS-CoV-2 has shown us, without the development of the necessary toolbox in advance, microbes quickly get the upper hand and leave us stunned at the rapidity of their spread.

In recent years, the quantum of research funds has remained static (at CPI) and has not increased as needed to maintain a thriving research environment. The number of competitive applications has increased yet these applications are mostly not funded, with an 11.1% funding rate for our major medical discovery research funds, NHMRC Ideas grants. NHMRC Investigator Grants, designed to fund medical researchers at all career stages, have a 13.2% success rate. We spend millions of dollars educating and training our scientists and researchers and then do not support them in the research efforts that will bring the future solutions we will surely need, and there is no support mechanism in place to protect researchers through periods of vulnerability. It takes years of effort and funding to build expert research teams; without a mechanism for continuity these teams are dismantled rapidly, and their skills lost to the community which has supported them. They will simply not be there when we may desperately need them. In addition to this, the 'brain drain' is often discussed, because many talented researchers leave Australia when they realise they cannot build careers or meaningful research programs here. We are therefore losing our intellectual capital and talent. Those that remain here spend up to a third of their time applying for funds, at the expense of conducting critical research.

The lack of consistent funding is eroding discovery research. What will happen when the next crisis hits? We seem to have been 'lucky' this time. . .so far. But the SARS-CoV-2 pandemic has exposed our fragility in the face of infectious disease, and it is far from over. The current pandemic has shown that funding bodies can act rapidly when necessary, and funding can be made available and distributed promptly. However, it is unclear whether COVID-19 funding is diverting more funds away from other discovery research efforts, highlighting the need for distinct pandemic preparedness policies within the government's strategic research priorities. Moving away from peer-reviewed and investigator-initiated science to increased political governance risks the diversity and depth that we need to face future unknown risks, from global warming to infectious diseases. Cancelling peer-reviewed grant schemes to pay for short-term crisis management is dangerous policy indeed, and now is not the time to undermine the foundations of Australia's medical and scientific research.

The wastage of health and research dollars during the swine flu pandemic was well documented. The Australian Government Review of Australia's Health Sector Response to Pandemic (H1N1) 2009: Lessons Identified (https://www1.health.gov.au/internet/publications/publishing.nsf/Content/review-2011-l/$File/lessons%20identified-oct11.pdf), emphasised the need for 'robust science-based decision-making' and concluded 'Pandemics are unpredictable and therefore there is a need to remain flexible and adaptable to respond to all levels of threat to the health of Australia's population'. A brief bonanza in specific funding tends to promote a large amount of opportunistic research at the expense of diverse high-quality research that may serve the nation much better in the future. Australia's research capacity is part of our nation's critical infrastructure and deserves our support and respect. It is very easily damaged and will take a long time to rebuild. We degrade it at our peril.

New vaccines and drugs cannot be discovered and developed overnight, as evidenced by the current scenario with COVID-19, and to make these breakthroughs requires a nationwide, public shift in the prioritisation of research funding. Australian research needs strong and consistent funding to ensure that fundamental discovery research, which is the basis of all new medical advances, is properly supported to enable us to make the inventions today that will safeguard our health in the future. The current pandemic may be a catalyst for this change.