



Australian Government

Chief Scientist

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**AMERICAN CHAMBER OF COMMERCE IN AUSTRALIA
BIOTECHNOLOGY LUNCHEON**

A moment in time for Australian biotechnology

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Thank you for the opportunity to address you today.

I'd like to start by acknowledging the Gadigal people, the Traditional Owners of the land on which we meet. The knowledge of Australia's First Nations peoples has much to offer the science and research community – and their insights have been valuable to me in my work as Australia's Chief Scientist as I have been working on the refresh of Australia's science and research priorities for the Government.

I'm also pleased to see the significant focus on biotechnology around the country at the moment, including at events such as this. I often feel that new science is a long time in the fermentation phase – and then the moment comes where the science and research align with a change in capability or technology and with attention and investment, then it all comes together and we get acceleration. Biotech is at that moment now.

We have a long history of breakthrough discoveries in this area. We're ranked in the top 10 countries in the world across some of the biotech fields – genome and genetic sequencing, novel antibiotics and antivirals, nanobiotechnologies and synthetic biology. As you know, Australia was the incubator for lifechanging global breakthroughs, including the Gardasil vaccine for HPV, the spray-on skin that revolutionised the treatment of burns, and the Cochlear implant. Our scientific institutions rank in the world's top 1 per cent in 15 individual fields of research including clinical medicine. This reputation and our quality of life attract and retain skilled talent from across the globe. Tony's [Anthony Weiss, Professor of Biochemistry and Molecular Biotechnology at the University of Sydney] work on developing a tropo-elastin is an example of the excellent work that comes out of our universities, which can, with the right support and settings, become hugely successful. Australian scientists from the Peter Doherty Institute were the first to grow the COVID virus in culture. We have a deep foundation in science and research – and a history of connecting that work in universities to real-world applications that are life-changing.

Now, we have that second component in the mix – new capabilities and technologies that are creating convergence across different sectors, and this has the potential to really accelerate biotechnology. I'm referring to the RNA breakthroughs accelerated by the pandemic, new abilities to edit the genome including through technologies

such as CRISPR, new ability to see at tiny scales and understand cellular interactions through advances in sensing technologies. Biosensors will enable monitoring of biological processes inside the human body, but they also have applications in agriculture and animal husbandry, in monitoring food and water for contaminants, and for smart materials that have the ability not only to self-monitor for corrosion or faults, but to self-repair – an area that I find particularly fascinating.

We have new science in the use of non-animal models that is changing the way we test new drugs and will help find alternatives, for example, to foetal bovine serum, which is commonly used in animal cell culture systems. We've also made fast advances in data analytics and machine learning – with quantum technologies being the next cab off the rank. Quantum will bring transformative changes to many aspects of our society – including health. These digital capabilities will allow molecules to be designed and tested in the virtual realm, vastly truncating that long process of new drug development; you might have seen that Moderna has now paired up with IBM to develop quantum computing options for mRNA therapeutics. Australia, of course, has significant expertise in these new capabilities.

So, we have great foundations. We have convergence with new technologies, and we have that third important component – attention and investment. The pandemic accelerated RNA science, but that's not all it did. It accelerated a sense of urgency around sovereign manufacturing. The geopolitical landscape has focussed attention on high-tech manufacturing and on reliable and sustainable supply chains. We have alignment with our international partners who are, like us, investing in biotech capability across their economies – and are looking to build on collaborations in Australia. I'm sure Anne [Anne Harris, Managing Director of Pfizer Australia and New Zealand] will be able to tell us more about that today and I'm looking forward to hearing what she has to say.

The climate challenge is accelerating research and investment in recycling and reuse technologies, in sustainable alternatives, and in sequestration. Biotechnology, especially synthetic biology, has become a powerful tool for environmental pollution remediation, plastic recycling, and new industrial chemicals. When I was in Perth last week, I learned about a technique that uses seaweed to create an alternative to plastic. There is work underway on biotech applications in mining, and developing

biofuels from microalgae and common crops. So the climate challenge is a real accelerator for biotechnologies. A little over half of the biotechnology activity in Australia at the moment is focussed on human health, but there is a great opportunity to develop other sectors that will have equal impact.

Another important aspect of the attention and investment being given to medical technologies in Australia is the opportunity it gives us to take bench science into clinical trials. This helps to attract international businesses to Australia, making us a go-to destination for early-phase trials. In 2021, 11% of global clinical trials investigating cell and gene therapies were conducted in Australia despite Australia only having 0.3 per cent of the world's population, and 95,000 Australians participated in trials in 2019. Our great diversity and multicultural inclusion in clinical trials benefits scientific discovery.

I'm going to add a fourth component to the list. On top of the strength of our science, combined with new technologies and capabilities, and attention and investment, Australia has other strengths that are unique to the world.

These strengths lie in our biodiversity – the potential that is contained in Australia's flora and fauna, and the knowledge of Australia's First Nations peoples that will co-develop a way for us to unlock that potential. The use of spinifex to develop new medical gels at the University of Queensland (UQ) is just one example of this. Spinifex and spinifex resin have been used by Indigenous Australians for thousands of years, for treating wounds and attaching spearheads, as well as for weaving and other uses. Now, the Australian Institute for Bioengineering and Nanotechnology at UQ is using the unique properties of spinifex to develop nanofibres that are stronger, longer and thinner than other nanofibres. One of the applications is new medical gels that can flow through a needle without resistance. It's a great example of where the innovation at our universities can come together with the knowledge of Indigenous leaders to create unique-to-the-world applications. It's only one example.

The ARC Centre of Excellence for Innovations in Peptide and Protein Science is another research initiative that is leveraging the unique Australian environment. They're looking for and testing new proteins and peptides from Australian plants and animals – that can be put to new uses in health, agriculture and industry.

So, as I say, the stars are aligned. All of those factors are coming together to accelerate and advance biotechnology – and to create a moment in time for this sector – we’re already seeing this with the growth in the number of biotech companies just in the past few years. It’s clear that innovative Australian biotechnology ventures have the capacity to develop impactful and disruptive solutions to complex problems. We have an alignment of need, opportunity, investment and capability. I know this opportunity is not lost on the sector, on people such as yourselves, and on governments around the country. The task in front of us now is to capitalise on the investment around the country, and on the strength and breadth of the clinical and research activity to scale the biotechnology industry.

Of course, there are challenges. Bringing science from discovery to scale and impact is never easy. I know this from my own research career and my time with the CSIRO where we were focussed on taking an excellent piece of research, then identifying the real-world benefits, and then attracting the commercial interest and investment. It’s a complex pathway, but by no means insurmountable.

I’ve been exploring what I can do to bring all this expertise, activity and ambition together to ensure our medical and research excellence is translated to impact – and to scale. One of my roles is chairing the Expert Advisory Group that is advising on the creation of an RNA Sector Development Plan. The purpose of the sector development plan is to ensure Australia makes the most of new investments in most states and territories to manufacture mRNA vaccines here – including the Moderna facility – to build an RNA research and development eco-system. Australia will be one of very few countries in the world with an end-to-end mRNA manufacturing capability. This is an excellent opportunity to develop additional RNA technologies to address human and animal diseases. So we’re looking at how to improve commercialisation, build the right skills, make the most of enabling infrastructure, and translate our world-class research. We’re working on a “Team Australia” approach that will be showcased at Bio2023 in Boston. There will be a significant delegation from Australia, both federal and state, and I know some of this audience will be among that group.

Our ambition is to have a clear front door for international engagement. To come together in a coordinated way that makes us more investable, and to ensure the

sector is ready for the speed of change. This is a hugely dynamic area. Personalised health, new ways of modelling and testing therapies, new forms of fuel, more sustainable materials, new approaches to recycling – all of this is approaching quickly over the horizon. When we add the meteoric rise in capability from machine learning and quantum technologies, we're not talking about an iterative change. We're talking about disruptive, transformative changes.

I know those words are used a lot at the moment. But if we are prepared to really take hold of this future and approach it with both ambition and imagination, I have great confidence in our ability in Australia to capitalise on the convergence that we're seeing in capability, science and investment, for biotechnology to be the \$250 billion life and game changer.

Thank you.