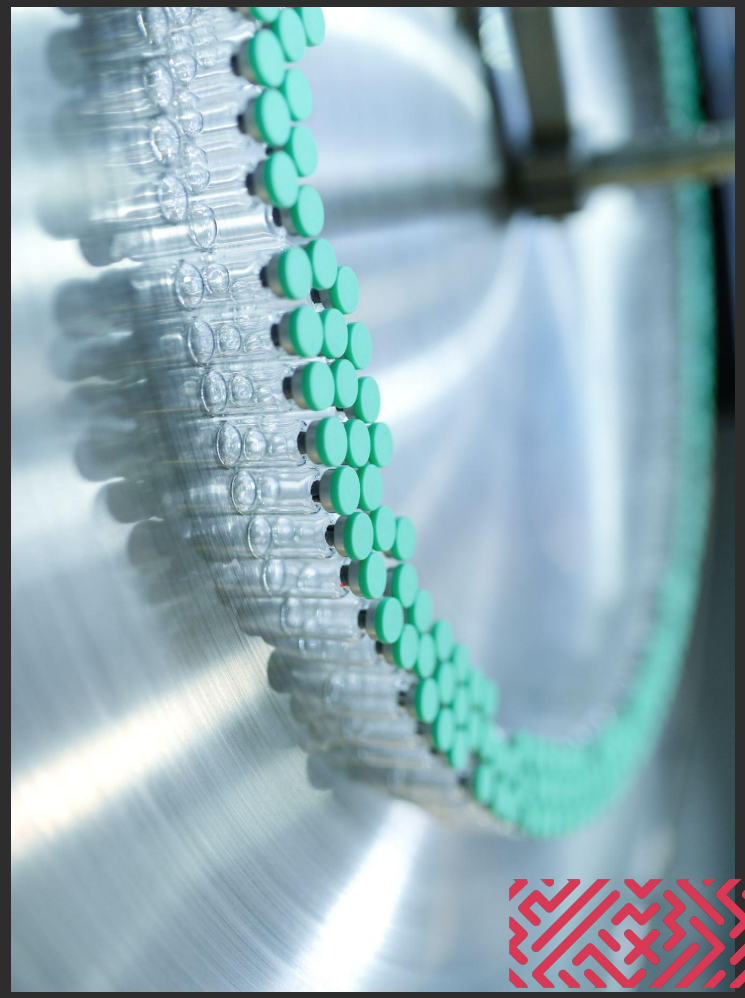
The four pillars of future leadership

Life Sciences in Australia

pwc

Executive summary



The pace of life science innovation and its impact on healthcare systems creates enormous opportunities for better health outcomes and economic prosperity.

Australia has a rich history in life sciences and over the last century Australian scientists have contributed to many life-saving and transformative discoveries. The life sciences sector is hugely productive, and the biotech sector alone contributes over $250 million to the country's gross domestic product (GDP).

Australia is not alone, and many countries see life sciences as one of the great drivers of growth in the 21st century and are investing in capabilities to enhance their attractiveness for inward investment. For Australia to continue to compete as a leading hub for science and innovation on the world stage, it needs to invest and nurture those areas where it is unique and differentiated.

This report sets out the priorities for Australia to achieve that aim – **the four pillars of future leadership in life sciences.** These pillars will serve as foundational building blocks for Australia's continued competitiveness in the sector:

1. Facilitate a thriving translational research environment
2. Enhance and nurture clinical trial proficiencies
3. Unlock the power of genomics
4. Become a leading hub for the production and use of advanced therapies

With health and science breakthroughs on the horizon, continued investment in the life sciences sector will be instrumental to keep Australia at the forefront of the global progress towards the healthcare systems of the future.

Critically we see spending in these four pillars as an investment, not a cost. By accelerating investment in these pillars, we have used economic modelling to show the significant impact they can deliver.

Highlights

Research and Development

Raise the level of investment in health related R&D to increase the sector's contribution to the Australian economy

Additional sector value to the economy

$1.4bn ▲

Clinical trials

Increase the rate of clinical trial participation to get innovative therapies to more Australians

Patient productivity gains

$2.0bn ▲

Genomics

Growth of the genomics sector through job creation and formation of spinouts from translational research

Genomics workforce economic contribution

$1.7bn

Government tax revenue

$1.4bn

Advanced Therapeutics

Elimination of some of the most common cancers through curative advanced therapies (i.e. lung, breast, leukemia and melanoma)

Patient productivity gains

$180m ▲

Quality adjusted life years

65,000

We hope this report will form a strong foundation for Australia to continue its proud history as one of the greatest places in the world to develop life-saving innovations.

Australia's rich history in life sciences

Australia has a long and established history in life sciences, developing breakthrough innovations and contributing to advancements in clinical research.

Australia's history in life sciences

1. **Dr Mark Cowley Lidwell developed the first electronic cardiac pacemaker in 1928[1]**
2. **Australian pathologist Howard Florey shared the Nobel Prize in 1945 with Ernst Chain and Alexander Fleming for his role in the development of penicillin[2]**
3. **Professor Graeme Clark invented the first bionic ear in the 1970s[3]**
4. **Professor Ian Frazer and Dr Jian Zhou developed the world's first anti-cancer vaccine, Gardasil, to protect women against four strains of the human papilloma virus (HPV) in 2006[4]**
5. **Professors Richard Scolyer and Georgina Long were recently named joint Australian of the Year for their pioneering work in using immunotherapies to treat melanoma[5]**

1 https://blueplaques.nsw.gov.au/blue-plaques/locations/dr-mark-lidwill#:~:text=Mark%20invented%20the%20world's%20first,to%20resuscitate%20a%20newborn%20baby.
2 https://www.nobelprize.org/prizes/medicine/1945/florey/biographical/
3 https://www.australiangeographic.com.au/topics/history-culture/2010/06/australian-inventions-that-changed-the-world/
4 https://www.science.org.au/learning/general-audience/history/interviews-australian-scientists/professor-ian-frazer-immunologist#:~:text=The%20work%20of%20Frazer%20with,Translational%20Research %20Institute%20(TRI).
5 https://cms.australianoftheyear.org.au/recipients/professor-georgina-long-ao-and-professor-richard-scolyer-ao

In recent years, Australia has become one of the leading countries demonstrating the benefits in clinical genomics underscored by the Genomics Health Futures Mission, with **$500 million invested in genomic research**.

The Australian biotech sector is **valued at over $250 billion**, based on ASX-listed market capitalisation, and home to **over 2,600 organisations**, achieved through strengths in early-stage scientific research, world-class innovation precincts, and its public healthcare system.[6] Whilst it has a relatively small population and market size compared to the United States, China and European markets, Australia frequently sits within the top 10 to 20 strategic markets within pharma and biotech when it comes to launching products and developing novel therapies.

Key success factors that Australia has leveraged include:

- A **healthcare system** ranked 3rd according to a 2021 report, outperforming UK, US and Germany, based on factors such as access to care, health outcomes and equity.[7]
- Cultivation of a **friendly research and manufacturing environment** through efficient processes to attract trials, an array of funding schemes and clinical networks.
- Establishment of **biomedical research precincts** across every major city, serving as collaborative hubs for research institutes, biomedical organisations, and universities.[8]
- World leading **clinical trial capabilities**, skilled workforce, specialised infrastructure, and a globally recognised regulator, the Therapeutic Goods Administration (TGA).

6 https://stockhead.com.au/health/australias-biotech-industry-is-thriving-with-asx-listed-companies-up-19-since-2019/

7 https://www.commonwealthfund.org/sites/default/files/2021-07/PDF_Schneider_Mirror_Mirror_2021_exhibits.pdf Health care system performance ranking of OECD countries.

8 https://www.cbre.com.au/insights/reports/australia-major-report-a-new-era-of-growth-in-life-sciences-australia-overview-august-2021

Raising the game

Australia's commitment to the life sciences sector is set to continue with several large programs providing funding for breakthrough innovations and improvements in the way research is conducted:

Medical Research Future Fund (MRFF) is committing

$20bn

in long-term investment to **transform health and medical innovation** in Australia[9]

Biomedical Translation Fund (BTF) is providing over

$500m

in capital to translate **biomedical discoveries into commercial products and services**[10]

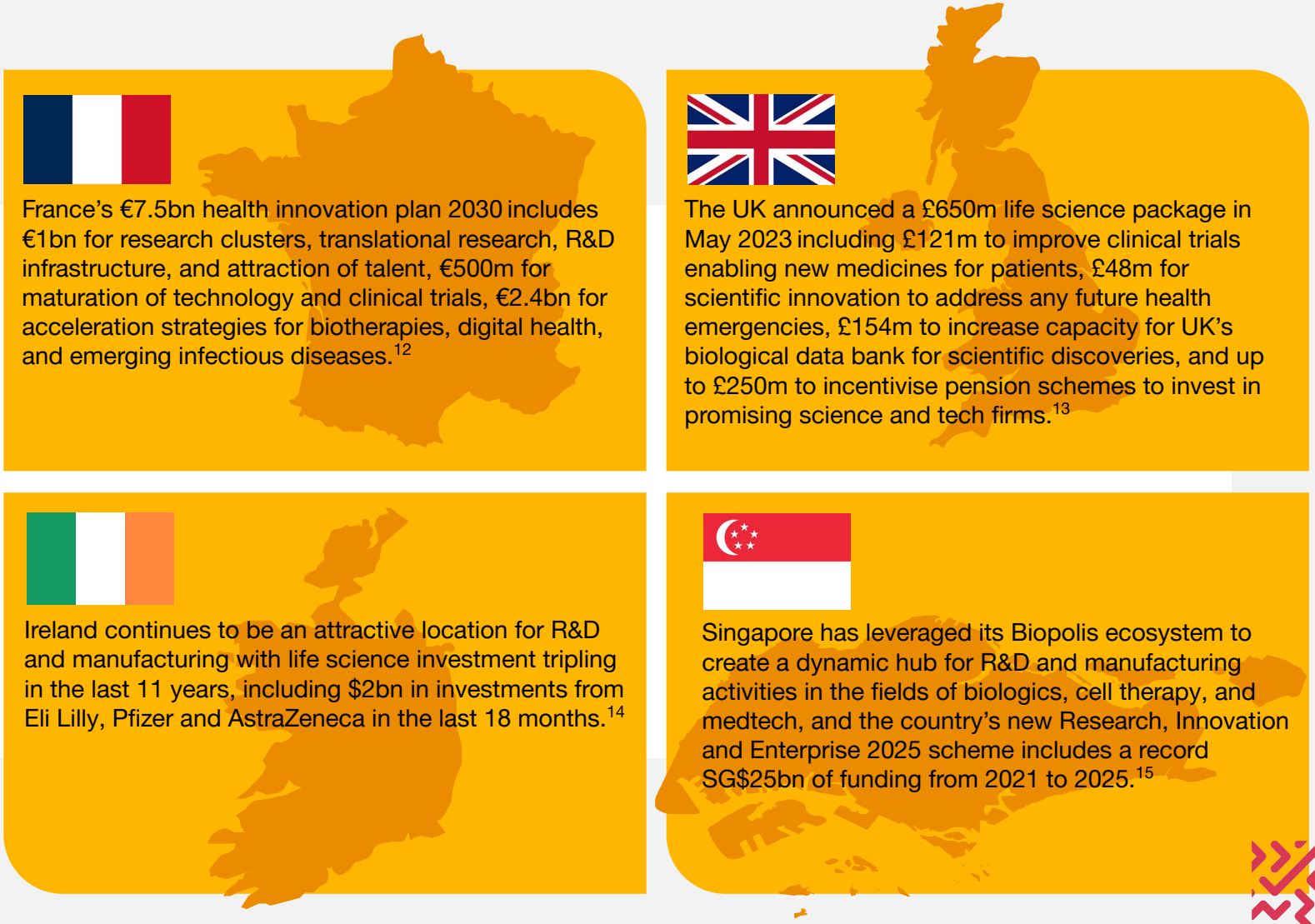
An Inter-governmental Policy Reform Group for health and medical research to **improve clinical trial access and coordination**[11]

9 https://www.health.gov.au/our-work/medical-research-future-fund

10 https://business.gov.au/grants-and-programs/biomedical-translation-fund

11 https://www.health.gov.au/ministers/the-hon-mark-butler-mp/media/eminent-australian-to-lead-one-stop-shop-clinical-trials-reform-group

If Australia wants to continue to be recognised as a global leader in life sciences - a place where scientific innovations are made and where companies choose to invest for reasons other than market size, a place where science innovations reach patients faster than anywhere else in the world - then these investments need to be the beginning of the story. Wise to the societal, health and economic opportunities of life sciences, other countries have accelerated investment in life sciences since COVID-19.



France's €7.5bn health innovation plan 2030 includes €1bn for research clusters, translational research, R&D infrastructure, and attraction of talent, €500m for maturation of technology and clinical trials, €2.4bn for acceleration strategies for biotherapies, digital health, and emerging infectious diseases.[12]

The UK announced a £650m life science package in May 2023 including £121m to improve clinical trials enabling new medicines for patients, £48m for scientific innovation to address any future health emergencies, £154m to increase capacity for UK's biological data bank for scientific discoveries, and up to £250m to incentivise pension schemes to invest in promising science and tech firms.[13]

Ireland continues to be an attractive location for R&D and manufacturing with life science investment tripling in the last 11 years, including $2bn in investments from Eli Lilly, Pfizer and AstraZeneca in the last 18 months.[14]

Singapore has leveraged its Biopolis ecosystem to create a dynamic hub for R&D and manufacturing activities in the fields of biologics, cell therapy, and medtech, and the country's new Research, Innovation and Enterprise 2025 scheme includes a record SG$25bn of funding from 2021 to 2025.[15]

12 https://frenchhealthcare.fr/health-innovation-plan-2030-e7-5-billion-to-return-france-to-its-position-as-leader-in-healthcare-in-europe/
13 https://www.gov.uk/government/news/chancellor-reveals-life-sciences-growth-package-to-fire-up-economy
14 https://www.ft.com/content/706578ed-6d66-4b16-9112-5026b77cdb95
15 https://www.fiercebiotech.com/biotech/20-years-singapore-still-searches-its-biotech-success-story

Despite our proud history of innovation and health outcomes, there are still areas where Australia can do better when it comes to innovation and outcomes:

- Australia lags behind countries such as US, UK and Singapore in government investment for health R&D as a percent of GDP.[16]
- Penetration of Australian patients in global studies in 2021 was poor (1.3%), with Australia lagging behind seven countries including US, UK, Germany and France (all above 2%).[16]
- Several countries outperform Australia in university-industry collaborations for the number of interinstitutional publications, contributing to Australia's low level of research commercialisation.[17]
- Expansion of manufacturing for advanced therapeutic research is constrained by a lack of skilled personnel and limited training programs.[18]

As we begin to look at 2030 and what can be achieved in the next five to six years, now is a pivotal moment for the Australian life sciences ecosystem. Building off its strengths in innovation, leading regulatory practices and strong science and technology capabilities, Australia has an opportunity to unleash the full potential of its life sciences sector.

16 https://www.gov.uk/government/publications/life-sciences-sector-data-2023 (Life science competitiveness indicators 2023: data tables)

17 https://www.investment.nsw.gov.au/assets/Uploads/files/IPC/NSW-Innovation-and-Productivity-Scorecard-2022-v2.pdf

18 https://www.ausbiotech.org/documents/item/768

The four pillars for future leadership

If Australia is to be the proving ground for the world's latest life sciences innovation, then it must build off its current strengths and invest in differentiating capabilities, relative to its global peers. Given Australia's geographic location and relatively small market size, it doesn't make sense to set an aspiration as the biotech capital of the world emulating the likes of Boston, California, and the London triangle. But it can chart a path to being one of the greatest places to deliver life science innovation in the southern hemisphere. We interviewed industry experts and conducted independent research to formulate recommendations that will enable Australia to remain a pioneer amongst life sciences economies, building off its inherent strengths and emerging innovations in the sector.

There are four pillars that we believe will serve as foundational building blocks for Australia's continued competitiveness in the life sciences sector.

1. **Facilitate a thriving translational research environment** through renewed funding mechanisms that support bench to bedside goals for innovations either invented in Australia or brought to the country for development.
2. **Enhance and nurture clinical trial proficiencies** to ensure the world's most innovative technologies and medicines reach Australia's patients first.
3. **Unlock the power of genomics** to propel healthcare towards a truly predictive and preventative system.
4. **Become a leading hub for the production and use of advanced therapies** changing the way we treat disease.

Australia already has a strong reputation in these areas but faces strong competition from other geographies looking to compete for investment, hence it is our belief that these areas need sustained commitment and innovative funding mechanisms to deliver on the potential of the sector.

1. Facilitate a thriving translational research environment

Translational research is a process by which innovations and discoveries identified in a basic research setting, such as the laboratory, are accelerated towards clinical use, and therefore directly benefit human health. In other words, it is research which accelerates bench to bedside goals. A thriving translational research environment can lead to a faster path to market for innovations, faster adoption into clinical practice, IP generation and inward investment from companies looking to develop their innovations in Australia.

Australia is a world leader in medical research. However, it still has challenges in moving new ideas through the research pipeline to become new products that improve health.[19] Historically, Australia has had a low level of sector investment into translational research, compared to global leaders.

- Noting a spike in 2021 due to COVID-19, Australia's R&D spend has reduced in recent years, at 1.8% of GDP in 2019, 30% lower than the OECD average.[20]
- Government investment in health R&D was 0.08% of GDP in 2021, behind key life science leaders such as the US, UK, and Japan at 0.19%, 0.15% and 0.11% respectively.[21]
- Even with the highest per capita rate of science and engineering publications (0.23% compared to the UK at 0.16%)[22], Australia struggles to attract international investment, with only 3% of life sciences foreign direct investment in 2022, compared to Ireland, Singapore and UK with 19%, 8% and 5% respectively.[21]

The UK's Biomedical Catalyst program, which offers government funding to de-risk early-stage innovation can be a model to emulate when it comes to accelerating innovation.[23] There is also an opportunity to make big bets when it comes to investment and prioritisation in key clinical areas or research platforms. Advanced therapies, data and AI, and innovation in genomics are all creating new commercial opportunities and we are now starting to see the benefits of long-term investment by countries like the UK and US in cancer and Alzheimer's disease.

For Australia to compete on the word stage it will need sustained investment in health-related R&D funding. Australia's 2nd 10 year MRFF plan outlines a pathway for investment in research translation including $2.125 billion of investments in medical research commercialisation, national critical research infrastructure, preventative and public health research, primary health care research, rapid applied research translation and research data infrastructure.[24] This is exciting progress and reflects an urgent need to address Australia's status as a great place to commercialise life science innovation.

19 https://www.health.gov.au/our-work/medical-research-future-fund/mrff-research-themes/research-translation
20 https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm
21 https://www.gov.uk/government/publications/life-sciences-sector-data-2023 (Life science competitiveness indicators 2023: data tables)
22 https://ncses.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field
23 https://iuk.ktn-uk.org/programme/biomedical-catalyst/
24 https://www.health.gov.au/sites/default/files/documents/2022/09/medical-research-future-fund-2nd-10-year-investment-plan-2022-23-to-2031-32_0.pdf

2. Enhance and nurture clinical trial proficiencies

Australia has an established clinical trial landscape, with strengths in early-stage medical research and high-quality patient care. Australia's regulatory body (TGA) is considered to be comparable to the FDA and EMA from a global standards point of view, creating reliable transparent conditions for patient recruitment and trial activity. Australia's R&D Tax Incentive offers tax offsets for eligible R&D expenditure including clinical trials of up to 43.5%.

Consequently, $1.4 billion was spent on clinical trials in 2019 and the sector now generates more export revenue than construction, intellectual property charges and government services.[25,26] Recent figures from 2021 further demonstrate Australia's strength in early-stage trials hosting 107 and 169 industry-initiated phase 1 & 2 clinical trials, only trailing behind the US (505 and 1016), China (343 and 478), and Spain for phase 2 (194).[27]

Despite this strong reputation and beneficial outcomes, the number of clinical trials conducted in Australia has remained relatively flat for phase 1 and 2 clinical trials, whilst phase 3 trials reduced by 41% between 2018 and 2021. This period marks a particularly volatile time due to the implementation of COVID-19 measures, however countries like Japan and Spain reduced by only 20% and 30% respectively. This is a period where Australia, being one of the relatively least impacted countries by COVID-19 in terms of hospital utilisation, could have otherwise increased its share of global clinical trials.[28]

Geographical location, population size, and climate factors make clinical trial economics for global multinational companies difficult. Increasing patient recruitment per site by improving patient engagement, clinician awareness and speeding up governance approval processes can all act to make Australia a more attractive location.

Workforce capabilities, particularly the number of clinical trial research associates and coordinators remains a constraint.[25] Investing in training programs and career paths can help to improve the quality and number of qualified skilled clinicians, along with retaining healthcare workers within the sector.

Adoption of digital health tools and technologies can help to improve the patient experience, facilitate access to hard-to-reach populations thus improving equitable access to trials, and facilitate more decentralised approaches to conducting clinical trials helping to overcome some of the geographic barriers that exist

25 https://www.mtpconnect.org.au/images/MTPConnect_Australia's%20Clinical%20Trials%20Sector%20report%202021.pdf

26 Department of Foreign Affairs and Trade, Trade and Investment at a Glance, 2020

27 https://www.abpi.org.uk/facts-figures-and-industry-data/clinical-trials/global-data/global-rankings-number-of-industry-clinical-trials-initiated-in-2021-by-country-by-phase/

28 https://www.abpi.org.uk/facts-figures-and-industry-data/clinical-trials/global-data/

3. Unlock the power of genomics

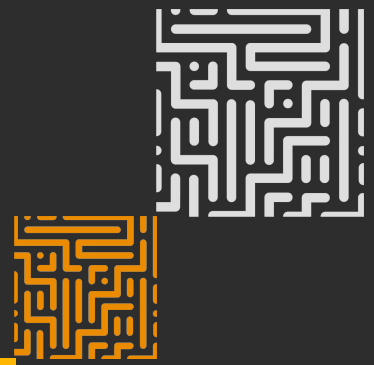
Since the human genome was first sequenced in 2003, emerging technologies in the collection, sequencing, and analysis of genomic data, such as Next-Generation Sequencing (NGS), have driven down the cost of DNA sequencing, unlocking huge potential in scientific discovery and health outcomes.[29] This reduction in cost has launched the industry forward improving accessibility, enabling a multitude of commercially available genetic tests, and large-scale nationally driven genomic projects. In addition, breakthroughs in areas such as single-cell sequencing, spatial genomics, CRISPR-Cas9 and epigenomic technologies are transforming our understanding of disease and the potential to diagnose and treat previously incurable conditions such as sickle cell disease.[30] Through genomics, we can now end the diagnostic odyssey faced by many patients and families for the diagnosis and treatment of rare and complex diseases.[31]

Announced in 2018, The Genomics Health Futures Mission (GHFM) is investing $500 million over 10 years in genomics research under the Medical Research Future Fund (MRFF). The program will look to improve testing and diagnosis for genetic diseases, help personalise treatment options to improve health outcomes, and reduce unnecessary interventions and associated health costs for all Australians.[32] This will build on already successful programs including:

- Victorian Clinical Genetics Services, which provided genomic testing for 290 families with undiagnosed, critically-ill infants, resulting in 136 new diagnoses of rare genetic diseases[33]
- Mackenzie's Mission research study, which offered a reproductive genetic carrier screening to over 9,000 couples across Australia, identifying 1 in 50 couples had an increased risk of having a child with one of the 750 conditions screened[34]

29 3Billion blog: https://3billion.io/blog/whole-genome-sequencing-cost-2023#:~:text=The%20cost%20of%20a%20human,today%20it%20is%20approximately%20%24600.
30 FDA news release: https://www.fda.gov/news-events/press-announcements/fda-approves-first-gene-therapies-treat-patients-sickle-cell-disease
31 https://pubmed.ncbi.nlm.nih.gov/31023718/
32 MRFF Genomics Health Futures Mission strategic documents: https://www.health.gov.au/resources/publications/mrff-genomics-health-futures-mission-strategic-documents?language=en
33 https://www.vcgs.org.au/
34 Mackenzie's Mission | Home: mackenziesmission.org.au

Amongst the growth, excitement and opportunity offered in genomics, it is still a relatively nascent market with many commercial, structural, and regulatory elements yet to be defined. There are also several hurdles to overcome to achieve clinical adoption at scale and realise wider economic, health and societal returns.



Genomic expertise

Low genomic literacy amongst healthcare providers and a lack of educational programs means adoption of genomics in clinical practice can be slow.

Establishing training and education programs for genomic counsellors in the return of result journey and patient treatment plans will be essential to meet the future demands of clinical genomic testing.

Genomic data

Lack of standardised practices for the collection, analysis and interpretation of genomic data can lead to a fragmented system with different hospital networks adopting different approaches, making it hard to scale beyond local ecosystems.

Ensuring a singular approach across Australia's federated network of state healthcare systems will be needed to ensure Australia benefits from the scale of a national data set of clinical genomic information.

Funding and reimbursement

Many genomic tests are novel, and it will take time to demonstrate clinical utility, validity, and cost effectiveness. In many cases there is a lack of a fit-for-purpose funding model for genomic diagnostics, creating access inequities and limiting uptake.

Establishing a rapid and agile mechanism to determine value and reimbursement for novel tests will be essential to ensure patients have access to the most innovative genomic tests.

Regulations and guidelines

In some cases, there can be limited regulatory controls to address ethical concerns and potential misuse of genomic results. Uncertainty around policies relating to access to or the potential invalidation of insurance (life, health, disability) remains a deterrent.

Optimising the best approach to ethical patient consent will be key to establishing patient trust.

4. Become a leading hub for the production and use of advanced therapeutics

Advanced therapeutics (ATs) are an emerging class of medicinal products harnessing stem cells to repair, regenerate or replace damaged cells or tissues. These regenerative therapies, encompassing cell and gene, tissue engineering and immunotherapies, will revolutionise disease treatment by unlocking the potential to restore the human body, dramatically improving disease prognosis and patient outcomes.

Australia has established a growing cell and gene (C&G) sector, led by The Cell and Gene Catalyst (The Catalyst), establishing over 45 research centres across Australia, R&D tax incentives to attract international investment and cross-sector partnerships between research and academia.[35] The Federal Government has pledged further investment of $150 million for a 10-year Australian Stem Cell Therapies Mission, aiming to accelerate the development of stem cell and tissue-based therapies and build a health and commercial sector to deliver these treatments to the community.[36]

In recent years, Australia has established milestone partnerships with leading international biopharmaceutical companies within mRNA therapy. Partnerships with Moderna, estimated at up to $2 billion, and BioNTech have been signed to develop clinical-grade mRNA manufacturing facilities. Yet Australia is still playing catch up with leading countries when it comes to manufacturing capabilities and international investment. The UK, as an exemplar in this space, bolsters well-established C&G manufacturing infrastructure and a strong presence of AT companies drawing in international investment:

- Attracted around £5.5 billion in investments for C&G manufacturing infrastructure from UK companies, with a total C&G cleanroom footprint of 16,536m2 in 2022. In contrast, Australia has just over 3,700m^2 as of 2021,[37] approximately 60% of the UK's footprint when standardised per capita
- Grown the number of AT companies from 22 to more than 90 in the past decade, with over £1 billion invested by international companies since 2018.[38]

35 https://www.ausbiotech.org/documents/item/395
36 https://www.health.gov.au/sites/default/files/2023-12/mrff-stem-cell-therapies-mission-implementation-plan.pdf
37 https://www.ausbiotech.org/documents/item/768
38 https://catapult.org.uk/our-work/case-studies/powering-up-the-cell-and-gene-therapy-industry-in-the-uk/

The barriers faced by Australia's regenerative medicine sector are well documented, including talent shortages and infrastructure capacity challenges. If we want to continue to attract leading biopharmaceutical and med tech companies to our shores and further our role in driving the world's leading innovations, it is imperative Australia:

Invests in manufacturing and research infrastructure to enable greater R&D and clinical trial activity.

Facilitates knowledge exchange through investment incubation facilities and cross-sector partnerships to scale Australia's talent pool in key fields across C&G manufacturing and advanced therapeutics.

Implements programs to drive skill development and training in advanced manufacturing to ensure we have a ready supply of GMP (Good Manufacturing Practice) qualified scientists who can deliver on the growth and scale of the emerging sector.

The economic value of a thriving life sciences sector

The success of Australia's life sciences leadership rests on its ability to align its healthcare and life sciences spending with its priorities. If Australia wants to enable better health and wellbeing for all Australians, now and for future generations, it needs to set ambitious spending targets for healthcare, including R&D. The alternative is to risk lower innovation in medicines discovery and reduced economic productivity. It is imperative that we see funding in the sector as an investment not a cost. Investment that drives health, societal and economic benefits for Australians.

1 Increase in government funding for health R&D

The Australian Government has stated that supporting innovation, research and commercialisation is a state and national responsibility. Ongoing federal and state government support for growth and development across medical technologies, digital health, biotechnologies and the pharmaceutical sector remains critical for the future growth of this sector.[39] In 2021, Australia spent 0.08% of its GDP on health R&D, significantly behind other countries such as the UK, who spent 0.15% of its GDP on health-related R&D.[40]

If Australia were to match this level of investment by the year 2033, an additional $1.37 billion in economic value could be delivered by the sector. This benefit would be achieved through the delivery and outcomes of R&D activities such as job creation in science and research sectors, a healthier and more productive workforce, and tax revenue generated from job growth and newly established local and international companies.[41]

$1.37bn
additional economic value in GDP could be realised.

39 https://www.aph.gov.au/Parliamentary_Business/Committees/House/Health_Aged_Care_and_Sport/Newdrugs/Report/section?id=committees%2Freportrep%2F024755%2F77353
40 https://www.gov.uk/government/publications/life-sciences-sector-data-2023
41 ABHI, ABPI, BIA, BIVDA, PwC, The economic contribution of the UK life Sciences industry, March 2017. (https://www.abpi.org.uk/media/1371/the_economic_contribution_of_the_uk_life_sciences_industry.pdf)

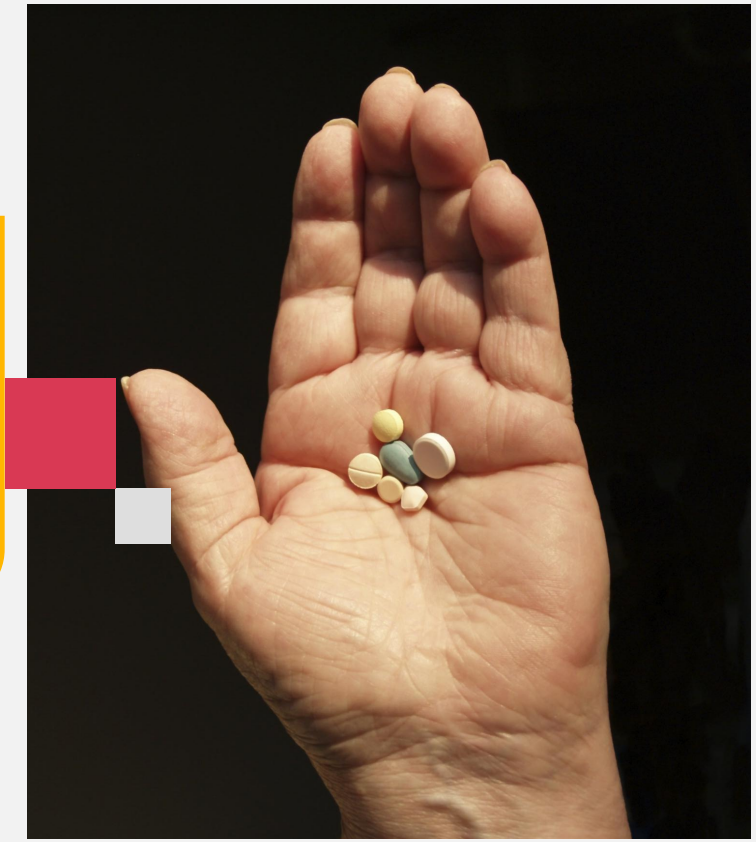
2 Increase in clinical trial participation

One of the key components of health-related R&D is investment in clinical trial capabilities. Clinical research can have a broad range of impacts. Not only does it improve patient lives and help address health inequalities, but it also has wider social and economic value. As those treated become healthier, they become more productive, as workers and consumers.

Economic benefits also include income from commercial clinical research and from the use of pharmaceutical products free of charge in trials. In 2019, it was estimated around 95,000 Australians participated in clinical trials, roughly 0.37% of the population.[42] However, the UK has a participation rate of approximately 1.3%.[43] Recognising recent investments to improve participation rates, such as the Clinical Trial Activity Initiative, if Australia were to match the UK's participation rate by 2033, projected benefits per year could amount to:

$2.0bn

in **patient productivity gains from a greater number of hours** worked by participants who benefited from clinical trials



42 https://www.mtpconnect.org.au/images/MTPConnect_2021_AustraliasClinicalTrialsSectorReport.pdf

43 https://www.bms.com/assets/bms/gb/en_gb/images/Bristol%20Myers%20Squibb_PwC_Life%20Sciences%202030_vFinal%20March%202022.pdf

3 Growth in the value of Australia's genomics sector

Australia has cultivated a strong genomics sector, through partnerships with international companies, and government investments in multiple flagship programs.[44] These flagship programs have been instrumental at demonstrating the important health outcomes that can be gained as well as the cost effectiveness of adopting genomics in clinical practice. Furthermore, we believe that the continued growth and adoption of genomics will drive significant economic productivity in Australia. The translation of clinical research and genomic technology innovations will lead to the creation of new life sciences companies, and the rapid increase in the use of genomics in both research and clinical practice will require a genomics workforce of far greater scale then we have today.

By 2033, Australia's genomics workforce is expected to more than triple across the sector, including from the rise of spinouts, through advancements in our understanding of disease, development of new genomic technologies, and utilisation of high-quality genomic data. In 2033, the sector is expected to generate:

$1.67bn
in **economic contributions** from labour force participation of the genomics workforce

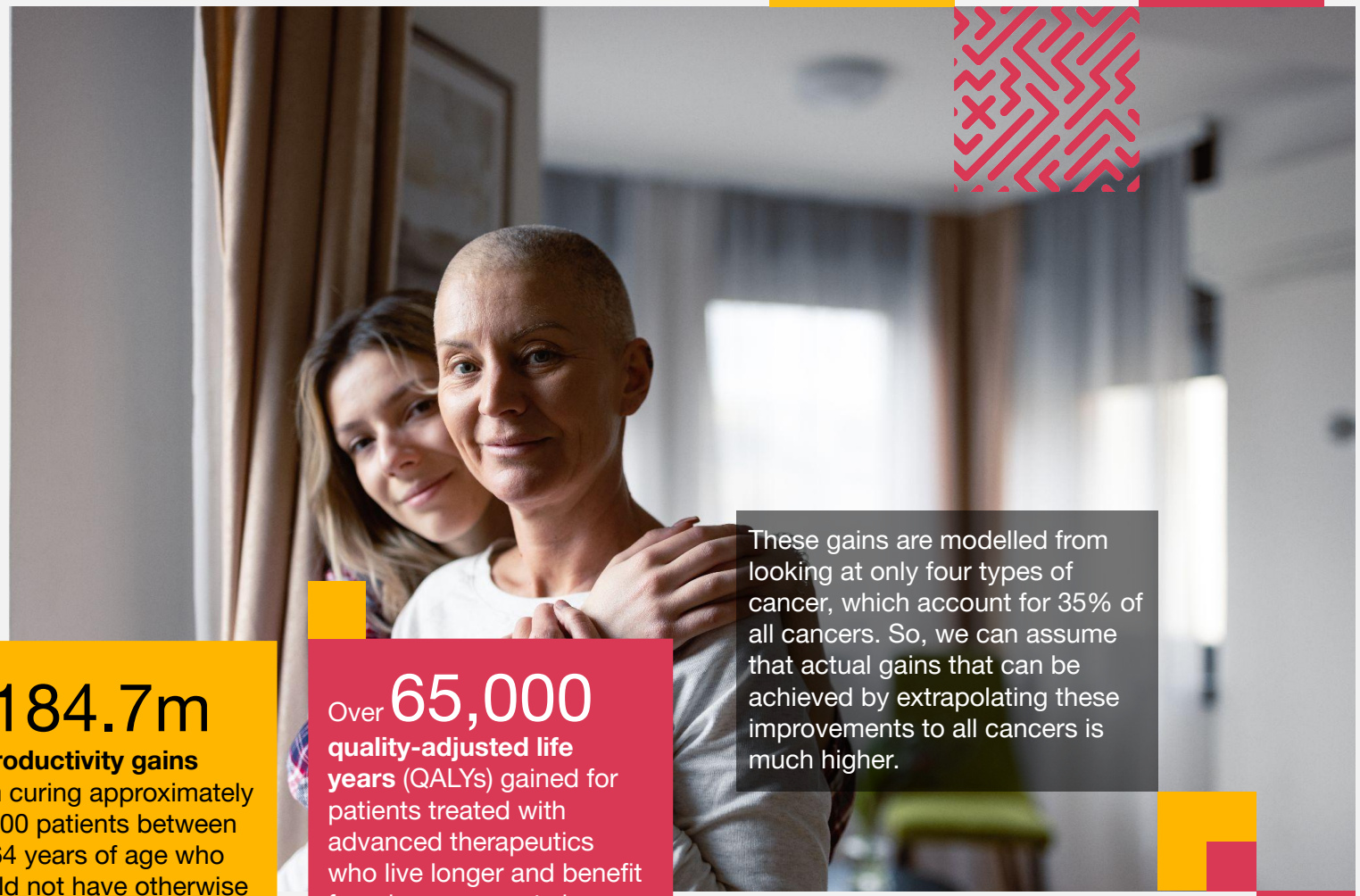
$1.37bn
in **government tax revenue** from companies delivering genomic products and services, and the genomics workforce across industry, research, support services, and healthcare services

44 Marketsandmarkets: Genomics Market Global Forecast to 2028

4 Increase in advanced therapeutics capabilities

Almost two in five Australians will be diagnosed with cancer by the age of 85 and there are over one million people alive in Australia who are either currently living with or have lived with cancer.[45] Globally, there were over 26,000 trials in oncology registered in 2022.[46] Cancer accounts for a large proportion of AT R&D, with advancements in cell and gene therapies poised to improve survival rates and eliminate cancer recurrence. There is an enormous opportunity for Australia to improve the health of its people by being at the forefront developing innovative therapies to treat cancer.

Taking leukemia, melanoma, lung, and breast cancer as a sample set, if Australia were to utilise advanced therapeutics to eliminate the incidence and reoccurrence of these cancers by 2033, expected benefits would include:



$184.7m

in **productivity gains** from curing approximately 17,100 patients between 15-64 years of age who would not have otherwise survived their battle with cancer in 2033

Over **65,000** **quality-adjusted life years** (QALYs) gained for patients treated with advanced therapeutics who live longer and benefit from improvements in quality of life

These gains are modelled from looking at only four types of cancer, which account for 35% of all cancers. So, we can assume that actual gains that can be achieved by extrapolating these improvements to all cancers is much higher.

45 https://www.aihw.gov.au/reports/cancer/cancer-in-australia-2021/summary

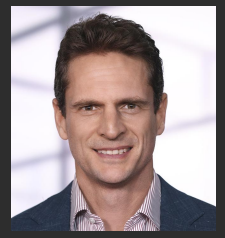
46 https://www.who.int/observatories/global-observatory-on-health-research-and-development/monitoring/number-of-trial-registrations-by-year-location-disease-and-phase-of-development

A call to accelerate the sector

The advancements in technology, adoption of genomics, and increased use of advanced therapies can fundamentally change the way healthcare is delivered. We are on the cusp of realising a truly personalised healthcare model where treatment and care can be predictive and preventative. The benefits are significant, and Australia stands to gain from improved health outcomes, a more productive workforce, and a better quality of life for its citizens.

Australia has been at the forefront of many significant scientific advancements in the last 100 years and has rightly earned a reputation for being an attractive place to develop life-saving innovations. We believe that sustained investment in the four pillars presented in this report, alongside coordinated collaboration between government, industry, and the healthcare system, is essential for Australia to remain one of the best locations in the world to deliver life sciences innovation.

PwC Australia contacts



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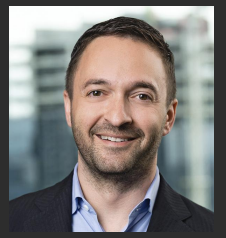

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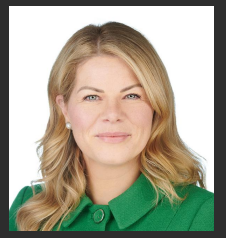

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