Using AI to invent therapeutics

Industry leaders in the spotlight

The engaged patient: driving structural change in health care

Realising the benefits of connected medical devices
360biolabs leverages respiratory virus experience to join fight against COVID-19

360biolabs has rapidly deployed their expertise and resources to develop assays in support of COVID-19 vaccine development and antiviral discovery. Working with the live virus provided by Doherty Institute for Infection and Immunity, 360biolabs will support clinical trials for prospective vaccines and antiviral therapies to accelerate efforts towards a cure.

Based in Melbourne, 360biolabs is Australia’s most comprehensive specialty laboratory services organisation for therapeutic, vaccine and diagnostic development. ISO accredited quality systems drive preclinical and clinical activities from custom research to full assay validation, compliant with ICH, FDA and EMA regulatory guidance.

“We have been approached by a number of global biotechnology and pharmaceutical companies searching for a specialty laboratory with extensive virology and immunology expertise to assess their potential antiviral or support a vaccine trial,” said Angela Luttick, Executive Vice President, Business Development.

The current Executive team led antiviral discovery efforts at Biota before founding 360biolabs in partnership with the Burnet Institute in 2015. The team of 40 staff at 360biolabs includes expert virologists, immunologists and chemists with many decades experience of drug and vaccine discovery and clinical development.

Chief Executive Officer at 360biolabs, Alistair Draffan, said the organisation’s expert virologists are renowned and highly respected for their experience in drug discovery, assay development, validation and screening in the respiratory virus field.

360biolabs has a suite of services and assay technologies to support antiviral and vaccine R&D including COVID-19. This includes immunology assays from ELISA, ELISPOT flow cytometry and the assessment of immunogenicity (anti-drug and neutralizing antibodies). 360biolabs’ classically trained virology team, has proven experience of every required technique including plaque reduction neutralization tests, microneutralisation, viral culture, virus subtyping and resistance characterization. Within our modern laboratories we have a dedicated suite for quantitative and qualitative PCR.

“We are excited to be able to offer this capability in our secure Physical Containment 3 (PC3) facility and are passionate about playing our part in finding a cure for this debilitating pandemic” concluded Melinda Pryor, Executive Vice President, Clinical
The world is working in an unprecedented environment: the COVID-19 pandemic has created a global health emergency that, at the time of writing, continues to escalate. The impact is widespread, but with Australia’s intelligent science, innovative talent, and strong public health system, the significant and critical contribution that life sciences delivers our country is being widely recognised in the coronavirus response.

Australia’s life sciences sector is thriving and mature, with a well-deserved global reputation as a leading location for innovations being developed into real-world solutions via industry. The treatments under development could be crucial to saving the lives of people affected by COVID-19, especially vulnerable people such as the elderly, people with compromised immune systems and those living with chronic illnesses.

AusBiotech continues to evolve and adapt in order to meet industry’s need to address opportunities and challenges, and to help the industry realise its economic potential. While there is a necessary and temporary interim between major events, AusBiotech continues to facilitate the growth of our sector by championing advocacy through membership engagement, connecting you with the latest biotech news, and raising awareness and understanding among investors.

Championing advocacy through member engagement

Preserving the Research and Development Tax Incentive

Remaining the top priority for industry and AusBiotech, the Research and Development Tax Incentive (RDTI) Bill has again been sent to a Senate Inquiry. Due to the 2019 election, the previous Bill is prorogued, and a new Bill is now before the Parliament.

The vast majority of small to medium-sized enterprises (SMEs) and companies in life sciences will be disadvantaged in their claims if the proposed changes go ahead.

It’s disappointing to find that the government is pushing ahead with plans to cut this pivotal incentive for research and development in life sciences, especially considering that the recommendations from the last Senate Inquiry were ignored in the new Bill. We hope that this Senate Inquiry can prompt a better outcome. At the time of writing, AusBiotech has lodged two submissions and the Inquiry’s report had been extended until 7 August.

In response to the new RDTI Bill, AusBiotech released a report, ‘R&D Tax Incentive: Additionality and spillovers for the life sciences industry’, illustrating for the first time the disproportionately negative effects that the biotech sector is now facing. This report was developed in response to the first Senate Inquiry’s (February 2019) recommendation that the impacts be fully understood before proceeding with any proposed RDTI changes. The new research examines, analyses and seeks to understand the additional benefits that the RDTI brings to Australian life sciences. This research is fundamental to informed decision-making.

AusBiotech will continue to advocate on behalf of its members and the broader life sciences industry to preserve the program that returns capital to innovative, value-adding Australian companies.

For more information on the RDTI, please visit ausbiotech.org/rdti.

Supporting regenerative medicine

Updated figures demonstrating the strength of the Australian regenerative medicine (RM) sector were released at the AusBiotech 2019 conference. The ‘Cellular Therapies and Regenerative Medicine in Australia’ publication reveals how the RM industry is in a healthy growth trajectory, providing an overview of the key industry milestones and activities, and highlighting the benefits of partnering in Australia.
Over the past two years, the number of cellular therapy or RM companies in Australia has doubled, and the number of research institutions involved in RM has increased from more than 30 to more than 45. The six-page publication was developed by AusBiotech with the support of its Regenerative Medicine Advisory Group (RMAG).

AusBiotech, together with RMAG, responded to the government’s Stem Cell Therapies Mission Roadmap consultation. As part of the 2019–20 budget, the government announced a commitment of $150 million over 10 years for a comprehensive research effort focusing on stem cells. The Roadmap will assist in the implementation of the Mission, including setting key priorities for funding. The funding is awarded under the Medical Research Future Fund.

Sector Snapshot 2019

The Sector Snapshot 2019 was launched at the AusBiotech 2019 conference, providing a comprehensive overview of the life sciences sector within Australia. Revealing momentous growth over the past two years, it quantifies company and employment numbers, sectors, states and gender distribution, demonstrating the social and economic impact that our sector delivers to Australia.

The Australian life sciences sector is a thriving and mature sector. The research confirmed that there was a 12 per cent growth in the number of organisations, growing from approximately 1654 to 1852; and a five per cent growth in employees, increasing from 232,213 people to 243,406 between 2017 and 2019. ASX-listed life sciences companies have also increased by 15 per cent since 2017, as there are now 161 companies compared to 140 previously reported in 2017. In terms of the economic impact of the sector, these companies have a market capitalisation of approximately $170 billion.

The substantial strength of the life sciences sector, shown in the Sector Snapshot 2019 through the growing numbers of organisations and the people employed within them, depicts an actively thriving ecosystem. With the Australian life sciences sector reaching maturity, the additional snowballing effects are beginning to be seen – more companies, more skills and more potential solutions are being developed.

Industry Position Survey 2020

To support the industry’s growth, each year AusBiotech ‘takes the pulse’ of the industry by conducting the Biotechnology Industry Position Survey to formally seek the views and policy priorities from the leaders of the industry it represents. AusBiotech is now collating the results of the survey and will launch the associated report in May.

“With the Australian life sciences sector reaching maturity, the additional snowballing effects are beginning to be seen – more companies, more skills and more potential solutions are being developed.”
AusBiotech policy updates are sent to members quarterly. For a more comprehensive overview of the policy work we are undertaking, please visit ausbiotech.org/policy-advocacy.

Facilitating global development
With the dawn of the new decade, AusBiotech travelled to J.P. Morgan 2020 to join investors and industry in engaging with global life sciences decision-makers. In a room brimming with innovative ideas and thoughtful discussion on investment, collaborations and partnerships, AusBiotech announced that a dedicated hub will be developed for Australian biotechnology leaders attending J.P. Morgan 2021, which will enable a central location for bigger and bolder conversations across the global community.

The annual J.P. Morgan Healthcare Conference is the largest and most informative healthcare investment symposium in the industry, bringing together industry leaders, emerging fast-growing companies, innovative technology creators and members of the investment community.

Focusing on growth
AusBiotech has been enabling access to talent, expertise, education and partnerships to help connect and grow the sector through a host of events.

The biggest week for biotech in 2019 combined AusBiotech National Conference 2019 and the Australia Biotech Invest & Partnering 2019, and welcomed more than 1500 industry delegates. The conference was a resounding success and included the AusBiotech Annual General Meeting (AGM) and elections; more than 450 delegates attending the sold-out conference dinner; and our second Future Forum, which focused on the future of therapeutics. Panellists spoke on a variety of emerging trends, new technologies and their impacts, including synthetic biology, cell and gene therapies, AI, and anti-ageing. Read more about AusBiotech 2019 on page 16.

AusBiotech is pleased to continue its partnership with CSIRO, connecting the sector by delivering 2020’s first BioCheers events in Victoria, New South Wales and Queensland during February. This partnership is significant as AusBiotech continues to strengthen its alliances with key stakeholders in the industry and connect inventors who work in the sector. These three events welcomed more than 450 members and non-members across the country. BioCheers events in South Australia and Western Australia were also strongly supported in March.

As part of its broader program of work to support startups and SMEs, AusBiotech delivered the first of its Regulatory Roadshow events in Sydney. It focused on medtech, included presentations by the Therapeutic Goods Administration and the AusMedtech Regulatory Affairs Expert Panel, and was attended by more than 40 delegates.

Almost 450 delegates joined AusBiotech and Medicines Australia’s New South Wales Women in Life Sciences Luncheon on 6 March 2020 to celebrate, encourage, support and further develop women in the life sciences sector in order to achieve a more equal standing, and to celebrate International Women’s Day. This year’s theme was ‘inspire, influence, involve’. The event featured a keynote from Kirsten O’Doherty, who is retiring from AbbVie, and six high-profile panellists who revealed how they have influenced change in the pursuit of gender equity through evolving life transitions and career stages, as well as how they inspired and involved others to push for progress. Read more about panellist Manuri Gunawardena, Founder of HealthMatch, and her journey on page 10. Keep an eye on your emails for more information on Queensland’s Women in Life Sciences Luncheon.
AusBiotech’s new Chair has been appointed to its Board following the decision for its previous long-serving Chair, Julie Phillips, CEO of BioDiem, to step down from the AusBiotech Board. Michelle Burke, Principal and Director, Indigo Advisory and previous Deputy Chair of AusBiotech, will take up the role. The Board also farewells Barry Thomas after five years, following his retirement from Cook Medical.

Burke has a considerable history with AusBiotech, having served on the Board since 2012, most recently as Deputy Chair. Burke is a strong promoter of industry, with an extensive knowledge of the policy environment at both a strategic and practical level. She is also the industry-nominated member on the Pharmaceutical Benefits Advisory Committee, and a member of the Australian Brain Cancer Mission Strategic Advisory Group. Burke has worked with the biotechnology sector and, more specifically, in pharmaceutical organisations for the majority of her career, including with Bristol Myers Squibb in executive commercial and market access roles.

At the AusBiotech 2019 conference, AusBiotech announced a change in Board Directors. Dr Andrea Douglas, Senior Vice President Organisation Transformation and External Affairs with CSL Limited, stepped away from the Board after many years of dedicated service. Dr Serge Scrofani, Vice President, Strategy & Corporate Development, also at CSL Limited, was elected to the Board by the AusBiotech membership. Scrofani brings to AusBiotech a global approach to Australian life sciences, and his experience in big pharma and in growth markets, including China, will help us to identify more international opportunities for AusBiotech members.

Barry Thomas, who has contributed five years of leadership and expertise to the AusBiotech Board, stepped down in December after retiring from Cook Medical. During his time, Thomas was involved in the succession planning of AusBiotech, assisting in the transition of two CEOs, and was vital in AusBiotech’s medtech advocacy.

On behalf of the AusBiotech Board and team, sincere thanks are extended to Julie Phillips, who has been a dedicated and passionate industry advocate, serving on the AusBiotech Board since 2013. Profound thanks to both Thomas and Douglas, too, for their savvy strategy and sound leadership.

Your AusBiotech Board and team can be found on page 5. 💙
AUSBIOTECH BOARD

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Bosch is one of the automotive industry’s most prestigious and trusted manufacturing partners, and it is this reputation and expertise that led to an Australian connection with the medical industry.

How did one of the world’s most prominent automotive parts manufacturers come to be Australia’s leading medical device manufacturing equipment supplier? Quite simply, it all comes down to quality, standards and a social principle to improve lives.

In 1886, Robert Bosch founded the Workshop for Precision Mechanics and Electrical Engineering in Stuttgart. This was the birth of today’s globally operated company. Right from the start, the company was characterised by innovative strength, quality and social commitment. Bosch is owned by the Robert Bosch Foundation – a charitable institution. This institution receives 92 per cent of Bosch’s profits and provides charitable work to support general medical care, international understanding, social work, training and education. The company slogan, ‘Invented for Life’, is testament to the value placed on human life by providing technology and services that improve quality of life.

Similar to the automotive industry, medical device manufacturers face a range of complicated and strict regulations and guidelines that define quality, reliability and confidentiality. With Bosch’s long history of manufacturing for the automotive industry, many of the processes and procedures for ensuring high-quality and strict standards have been established for more than 100 years.

The experience of the Bosch Australia Manufacturing Solutions (BAMS) division in delivering automotive component manufacturing machines spans more than 65 years, and has required the application of the highest standards of efficiency and quality. This has provided BAMS with the unique ability to offer the same level of efficiency and quality when applying these principles to medical device manufacturing equipment.

‘Bosch understood and readily met our requirements of maintaining the highest level of quality standards that our manufacturing system demands,’ says a recent BAMS project partner.

Synergy in product design

Bosch components that are built for the automotive industry are surprisingly similar to medical devices. Mechanical parts, electrical circuit boards, bonding, screwing and even the materials are all similar elements used across devices in both industries.

With this synergy between products, the BAMS automotive manufacturing expertise can easily be translated to the manufacturing of medical devices. With so many similarities, there is little surprise that BAMS stands apart as one of the Australian medical industry’s closest manufacturing partners.

Bosch is first and foremost a manufacturer, which provides the BAMS division with several advantages compared to typical manufacturing equipment suppliers. BAMS understands the needs of its customers, and operations and maintenance personnel, and incorporates this into the design of its equipment. Additionally, Bosch prides itself on its lean manufacturing principles, and BAMS works closely with clients throughout the project life cycle to ensure that efficient, lean solutions are delivered. The level of customer service and the quality and reliability of equipment is unmatched in the industry.
Machines that give new hope

We are the preferred supplier of advanced manufacturing solutions for the medical device industry in Australia. We work hand in hand with our customers to deliver high quality reliable solutions that are truly invented for life.

bosch-manufacturingsolutions.com.au
Technology has played an important role in engaging and powering patients with their healthcare outcomes, and with increased access to Internet of Things (IoT) and direct-to-consumer (D2C) products, this is set to continue.

During my final years of medical school, I was fortunate to work in neuro-oncology research, an area of medicine I was particularly interested in. My specific focus was glioblastoma multiforme (GBM), which has a notorious reputation as a rapid and terminal form of brain cancer.

I wasn’t surprised to hear of the interest in clinical trials for patients and their loved ones, but I was surprised by the fact that they were reaching out directly to a research lab without their clinician or treatment team acting as a conduit.

Seeing the interest of patients in exploring their options firsthand was the genesis for HealthMatch, but more broadly it stoked my interest in the structural change that was occurring in the sector with the rising engagement of patients in their own health care.

To examine the rise of patient engagement in health care, it’s important to establish that, while modern health care is a benefactor of some of the most brilliant innovation and scientific breakthroughs of the 20th and 21st centuries, healthcare systems globally – which harbour access to these fantastic treatments – are well known for their ingrained complexity, inefficiency and poor customer – read patient – service.1, 2

It’s safe to say that, at best, a patient’s experience with the healthcare system is a confusing journey.

Patients must navigate their way through a concert of appointments between various disconnected clinics and services, each juggling the responsibility of patient care. Surprisingly, the patient is often left out of the equation or not adequately informed despite the obvious importance of this.3, 4

This difficulty is compounded by the seemingly ever-increasing time and resource pressure placed upon our services, where patients’ access to treatment teams, information and appropriate counselling is diminished. With ageing and growing populations, there is a widespread realisation that this pressure will intensify with time unless there is dramatic change.5

It’s important to make a note that this is by no means a disparagement of the people working in the healthcare system. Our doctors, nurses, allied health professionals and administrative personnel, especially in Australia, are some of the highest-trained professionals who go above and beyond expectations to give great treatment in the midst of a system that is under great pressure. There is a somewhat perplexing paradigm as we are expecting more and more from these professionals operating in a system that, in places, is still relying heavily on fax machines and paper records, rather than the timesaving technology available to peers in other fields.6

Considering the confusion, inefficiency and – to some degree – dissatisfaction, it’s not surprising that patients have wanted to have more engagement in their health care.

Enter 21st-century technology
Australia has had widespread internet adoption since the final decade of the 20th century, with the rise of internet adoption no doubt contributing strongly to patients’ ability to engage in their health care. The infamous Dr Google gained notoriety for self-diagnosis, but the internet also led to a rise in accessible health education. People turned to healthcare literacy and community engagement as patients found other resources outside of their time-constrained primary care teams to ask questions.

If structural inefficiency and a need for improvement was the driver for patients to become more involved in their health care, then the internet was the catalyst that enabled this.

Although the global adoption of the internet as a health resource is clear, the scale at which it is used is still mind-boggling. Approximately seven per cent of Google’s daily searches are health-related – that’s in excess of one billion queries every day and 70,000 every minute. Ultimately, it comes down to access: the internet is free, available 24/7 and there is no queue – three factors that cannot be taken for granted in any healthcare jurisdiction.

While there are concerns over whether self-diagnosis or treatment stems from this access, it is important to wear a realist’s hat. The internet is here to stay; it’s making patients more engaged in their health care, and is contributing to healthcare literacy and driving a renewed force in patient engagement, which empirically leads to better health outcomes.

The current wave
Access to the internet seems quite trivial compared to the new wave of D2C technology focusing on the healthcare space. To give perspective, from 2013 to 2014, D2C apps

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published by pharmaceutical companies rose from 305 to 497, and this is a relatively small submarket of total health-related apps.12

The new wave of consumer health technology is broad and no doubt touches all of us. It ranges from smart watches, electronic health medical records, IoT devices (such as blood glucose monitors and blood pressure monitors), to billion-dollar meditation apps.

This isn’t just the existing industry now interacting in this space; startups and big tech companies are entering the market. Examples include Apple partnering with Mayo Clinic to use the Apple Watch in a heart disease study13, Google working with AbbVie to fight ageing-related diseases14, and Amazon working with several consumer and employee-facing plays.15

But what does this mean for the patient? Does it empower them or are we potentially running into a disconnect where too much information and too many tools will create a negative effect on outcomes? The explosion of this industry has put regulators under intense pressure and has blurred lines in respect to what constitutes a treatment/diagnostic tool, versus technology that falls outside the scope of a medical device.16

I am firmly of the opinion that patients are becoming more aware and informed than ever before. Regulators have a crucial role to play in ensuring a safe operating environment, but the new wave of D2C healthcare technology has enormous potential to bring the patient even closer to their health care.17, 18

With improved access to healthcare information comes a range of scenarios that we should be celebrating, such as:

- a patient with diabetes coming to a doctor’s appointment with well-kept and consistent records
- a patient who seeks support, knowledge-sharing and experience from others living with a chronic condition
- a patient who reads about their diagnosis and becomes actively interested in making their health better, and who works as part of the team fighting their disease.

This empowers our healthcare teams to work with engaged patients who are focused on optimal health outcomes, and enables further innovation and interest in a space that is vital to us all. Widespread adoption of consumer technology is here to stay; it leads to better outcomes and reduces the burden on our healthcare systems.19, 20

Manuri Gunawardena was a panellist at Ausbiotech and Medicine Australia’s NSW Women in Life Sciences Luncheon 2020: inspire, influence, involve. Keep an eye out for information on the QLD Women in Life Sciences Luncheon 2020 later this year.

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14  Biofourmis. ‘Biofourmis Announces Acquisition Of Biovation AG, Completing Biovitals® Platform To Deliver Precise Interventions At The Right Time To Manage Patients With Complex Chronic Conditions’, 2020.
Syneos Health is the only fully integrated biopharmaceutical organization purpose-built with a unique approach. Clinical and commercial live under the same roof with all disciplines involved in bringing new therapies to market working together with a singular goal—greatly increasing the likelihood of customer success.

Our fully integrated approach to clinical development and commercialization means we can help small Biotech firms better plan for a sale or licensing deal, whatever your exit goal may be, because we know the entire process. Through our unique Biopharmaceutical Acceleration Model™, no matter where you are in the development of your product or what your specific needs are, Syneos Health will act as a virtual pharma company, developing customized solutions that will help you achieve a better valuation for your company or product by reducing time to market, increasing efficiency and reducing cost.
An Australian biotechnology company is revolutionising antibiotic treatment with a new class of broad-spectrum synthetic antibiotics.

The growing antimicrobial resistance problem
Antibiotics, one of the most powerful tools to combat life-threatening infections, are becoming less and less effective. The rise of antibiotic-resistant bacteria, or superbugs, has outperformed the development of new antibiotics, threatening our ability to treat common infections. There is an urgent global health need for solutions to stop the threat of antibiotic-resistant infections, which cause more than 700,000 deaths worldwide annually. If left untreated, this number could rise to 10 million by 2050.

Existing antibiotics are based on scientific discoveries made more than 30 years ago. Due to the increasing resistance of bacteria, clinicians have had fewer options when treating patients on long-term drug regimens, which leads to patients requiring higher doses with potentially toxic effects.

Enter Recce Pharmaceuticals
Recce Pharmaceuticals (ASX: RCE), an Australian biotechnology company, has developed a new class of broad-spectrum synthetic antibiotics with a unique mechanism of action (MOA). The company’s lead candidate RECCE® 327 has been developed for the treatment of blood infections and sepsis derived from E. coli and S. aureus bacteria – including their superbug forms.

To date, antibiotics have been derived from natural resources, such as fungi, that inhibit a single target, including enzymes required for DNA replication during bacterial cell division. Using a ‘lock and key’ mechanism at the cellular level, traditional antibiotics lock into a specific part of the bacterial membrane and attack it. Once the bacteria mutate, the antibiotic is rendered useless – the key no longer works for that lock.

Multiple indications
Recce’s new class of antibiotics can be used according to multiple administration routes, including intravenous, topical, nasal, oral and inhaler use. This unparalleled versatility sees potential in many serious infections, most notably sepsis.

Sepsis, a life-threatening condition caused by a bacterial infection that spreads to the bloodstream, is the leading cause of death globally, and the single most expensive condition treated in US hospitals. Currently, no drug therapies exist specifically for the treatment of sepsis, and with every hour left untreated, there is a six per cent increase of mortality.

Additionally, RECCE antibiotics have been used in animal models as a topical application for a broad range of bacterial wounds, burns and skin infections. Recent animal studies show RECCE outperforming the marketed topical antibiotic for the treatment of bacterial infections in burns and wounds.

RECCE’s unique MOA
Unlike current antibiotics, Recce’s polymer-based antibiotics are wholly synthetic. RECCE 327 is increasingly viewed by experts as a potential ‘master key’. Preclinical studies show that RECCE 327 works through hydrophobic interactions that attract and bind the antibiotic to proteins of the bacterial plasma membrane. This results in the subsequent disruption of the bacterial cell wall, leading to bacterial cell lysis (bursting). This unique MOA and composition means it can overcome any attempt of bacterial mutation and can continue to kill the bacteria even with repeated use.

Based on a patented polymeric structure, RECCE 327 comprises tens of thousands of active sites, in comparison to traditional antibiotics, which usually contain less than 12 sites. To date, RECCE 327 has killed every bacterium it has been tested against, and has proven invulnerable to any attempt of the bacteria to mutate and overcome its MOA.

Potential implications against COVID-19
As a broad-spectrum antibiotic, RECCE 327 could be an effective treatment of bacterial respiratory infections. One example includes bacterial pneumonia – a co-infection commonly seen in
COVID-19. RECCE 327 has shown excellent capability as a potential to be utilised in both a curative and preventive application.

COVID-19 has highlighted the critical need for rapid development of new medical treatments. Commonly, it is the secondary bacterial infections of viruses such as COVID-19 that kill the patient.

Locally and internationally recognised
In a sign of growing global interest, RECCE 327 has been awarded Qualified Infectious Disease Product (QIDP) designation by the US Food & Drug Administration (FDA) under the Generating Antibiotic Initiatives Now (GAIN) Act, labelling RECCE 327 for fast-track designation and 10 years of market exclusivity post-approval.

Australia’s regulatory body, the Therapeutic Goods Administration (TGA), has cleared RECCE 327 for use in defined circumstances under the Special Access Scheme Category A.

RECCE 327 gives hope to the Australian medical community for patients who are becoming increasingly allergic to existing antibiotics, or who have developed antibiotic resistance and are now burdened with life-threatening infections.

Recce’s revolutionary new approach to treating bacterial infections has the potential to overcome the limitations of traditional antibiotics.

RECCE 327 is wholly owned and manufactured in Australia, and is currently in the final preclinical stages with preparations underway for first-in-human clinical trials.

No new class of antibiotics in 30 years

Source: The Pew Charitable Trusts
AusBiotech 2019

Australia’s Life Sciences Conference

BIOTECH’S BIGGEST WEEK OF 2019
Life sciences leaders and investors assembled in Melbourne for biotech’s biggest week of 2019, as the AusBiotech 2019 and the Australia Biotech Invest & Partnering 2019 conferences connected the industry.

The two premier events – run by industry, for industry – were the best yet. More than 1500 industry leaders, investors, researchers and regulatory representatives came together from 25 countries to hear more than 100 speakers and company chairs at the largest biotech gatherings in the Australian life sciences industry. The four days included plenary keynote addresses, panels, training workshops and networking opportunities, and more than 1450 one-on-one AusPartnering meetings were facilitated.

These conferences form a very special part of AusBiotech’s work towards lifting the profile of the Australian biotechnology industry, sharing new and groundbreaking knowledge, connecting companies, and creating access to greater funding sources for companies to develop world-class science into therapies, diagnostics and medical devices.

AusBiotech 2019 and Australia Biotech Invest & Partnering 2019 were held from 30 October to 1 November 2019 at the Melbourne Convention and Exhibition Centre (MCEC). The events were made possible with the support of AusBiotech’s exhibitors and partners, and the Victorian Government as the events’ host state partner.

Head to ausbiotechgalleries.org to see more photos from 2019’s biggest week in biotech.

AusBiotech 2019

World-class speakers addressed delegates at AusBiotech 2019. Keynotes included:

- Dr Elizabeth Finkel AM, Editor At Large, *Cosmos Magazine*, ‘Gene therapy revolution’

- Dr Tom Luby, Texas Medical Center (TMC), United States, ‘TMC innovation and our community approach for supporting healthcare startups’

- Millis Oration speaker Dr Melissa Little, Murdoch Children’s Research Institute, ‘Rebuilding kidney tissue from stem cells’

- Emeritus Professor Maree Smith AC, School of Biomedical Sciences, Faculty of Medicine, The University of Queensland, ‘Discovery-Translation and the Valley of Death: A personal perspective’

- Dr Shashikant Kulkarni, Baylor Genetics and Baylor College of Medicine, ‘Precision medicine implementation across the spectrum of healthcare organisations’.

Panels and breakout sessions covered global biotechnology trends and opportunities, policy updates, and industry challenges. Topics included gene therapies, regenerative medicine, medicinal cannabis, antifibrotic drugs, de-risking biotech messaging, investing in a global market, clinical trials, women in leadership in life sciences, building your board and synthetic biology.

With such a gathering of distinguished leaders, it was timely to recognise our industry’s leading lights through the annual awards ceremony. An inaugural AusBiotech Life Sciences Legacy Award was presented to Chuck Feeney in recognition of his tremendous and unprecedented support of the Australian life sciences ecosystem across many decades.

Feeney’s profoundly visionary, transformational and impactful contributions to the Australian life sciences innovation ecosystem have helped deliver more than 20 outstanding research facilities across Australia. Significantly, these research facilities have, in turn, acted as Australia’s innovation engine rooms for future generations of scientists, entrepreneurs, healthcare workers and philanthropists alike, all dedicated to delivering better healthcare options and outcomes to people globally.

The annual AusBiotech and Johnson & Johnson Innovation Industry Excellence Awards were also awarded, celebrating the highest achievers in Australian life sciences – demonstrating what is possible when vision and dedication come together. Congratulations to this year’s winners: Sue MacLeman (Chair, MTPConnect; Chair, Anatara Lifesciences Ltd; and Chair TALi Digital Limited), winner of the Industry Leadership Award; PolyNovo, winner of the Company of the Year award; and OncoRes Medical, winner of the Emerging Company of the Year award. Read more about their achievements within this edition.

To encourage emerging technologies, and continue building the life sciences pipeline, AusBiotech featured an Early Stage Investment Forum for the second consecutive year. Giving biotech and medtech startups and spin-offs the opportunity to pitch to an experienced panel of investors, the forum is one aspect of the work that AusBiotech does to help emerging science flourish during its early...
commercialisation pressure points. Congratulations to Atmo Biosciences, who won the pitching event.

Australia Biotech Invest & Partnering 2019
This full-day event provided investors and delegates with a golden opportunity to hear the latest company updates straight from the companies themselves. Keynote speakers, and 25 private and public companies, spanning early- to late-stage development, took centrestage and demonstrated the potential of life science companies to a room of delegates, including global pharmaceutical companies from around the world.

Company presentations were scheduled according to their therapeutic area, ensuring investors and brokers made the most of their time and could target the therapeutics they’re most interested in.

Keynote speakers included:

- Karimah Es Sabar, Quark Ventures LP, Canada, ‘Progressive venture capital investment in health technologies’
- Dr Niels Emmerich, AbbVie Inc., United States, ‘New ways big pharma are engaging with the VC sector’
- Dr Patrik Frei, Switzerland, ‘Valuation of biotech companies, assets and products for financing or licensing’
- Giri Tenneti, ASX Limited, ‘Market update’.

Save the date
AusBiotech 2020 and Australia Biotech Invest & Partnering 2020 will be returning to the MCEC from 28–30 October 2020, again with the support of the Victorian Government as AusBiotech’s host state partner.

For more information on AusBiotech 2020 (#AusBio20), please visit ausbiotechnc.org. For more information on Australia Biotech Invest and Partnering 2020 (#ausbioinvest), visit ausbiotechinvestment.com.au.
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During her 30-year career, MacLeman has been a successful business professional with Board, CEO, senior management, industry council and high-level experience across the medical technology, biotechnology and pharmaceuticals (MTP) sector.

MacLeman graduated with a Bachelor of Pharmacy from The University of Queensland, and started her career caring for patients as a hospital pharmacist in a large teaching hospital in Brisbane. She then moved to other senior pharmacist positions in both public and private hospitals specialising in oncology, emergency medicine and infectious diseases.

MacLeman joined the pharmaceutical industry in 1991 with Schering-Plough, later working with Amgen and Bristol-Myers Squibb. MacLeman then moved to a global Vice President role with Agenix Ltd and was then appointed CEO of her first public ASX company, EQiTX Ltd, which was an investment and project management company. She was CEO of RNA interference (RNAi) therapeutics company Benitec Biopharma. She then went on to become CEO of cancer company Progen Pharmaceuticals Ltd, overseeing its contract manufacturing subsidiary PharmaSynth Pty Ltd (now Luina Bio) and US epigenetics subsidiary EpiPharmaceuticals Inc. MacLeman was then Senior Vice President Corporate then Global Head Commercial for regenerative medicines company, Mesoblast Ltd.

MacLeman was the inaugural CEO/Managing Director of MTPConnect. MTPConnect is a not-for-profit organisation that forges stronger connections between research and industry to help maximise opportunities for Australians to not only make scientific and technological breakthroughs, but to see them developed through the proof-of-concept stage, and successfully translated and commercialised. In addition to its Growth Centre activities, MTPConnect operates three programs for the Medical Research Future Fund: the $45-million BioMedTech Horizons program, the $22.3-million Biomedical Translation Bridge program, and the $32-million Researcher Exchange and Development within Industry (REDI) initiative. MacLeman was appointed the Chair of MTPConnect in 2018.

MacLeman has been a Board member of a number of public and private entities globally, including her current appointments as Chair at MTPConnect Ltd, Anatara Lifesciences Ltd and TALI Digital Ltd, and as Non-Executive Director at Oventus Medical Ltd, Palla Pharma Ltd and veski.

MacLeman is also active on both government and academic advisory committees, including the Prime Minister’s Digital Expert Advisory Committee, the Department of Health’s Genomics Health Futures Expert Mission Advisory Committee, CSIRO’s Health and Biosecurity Advisory Committee, the DMTC, and the Australian Advisory Board on Technology and Healthcare Competitiveness – Healthcare Committee.

In addition to The University of Queensland, MacLeman has qualifications from the University of Melbourne (Masters of Marketing) and Deakin University (Masters of Law). She is a fellow of the Australian Academy of Technology and Engineering and the Australian Academy of Pharmacy Practice, and is a fellow/graduate of the Australian Institute of Company Directors.

Looking through the titles and awards, MacLeman is a talented, tenacious and dedicated advocate for our sector. She continues to give back to the MTP community through mentoring and her rare commitment to upskilling the next generation of leaders.

MacLeman’s profound contribution to the growth of Australia’s MTP sector is beyond extraordinary, and makes her an impeccable candidate and recipient of the Industry Leadership Award.

With a distinguished career in medical technology, biotechnology and pharmaceuticals, there is undeniable cause for Sue MacLeman to receive the 2019 Industry Leadership Award at the AusBiotech 2019 National Conference.
Clinical Trial Management
Established in 1995, SydPath Clinical Trials has successfully established an international reputation for the provision of high-quality central-laboratory services.

SydPath offers comprehensive trial services covering phase I-IV. Our clients include both international and domestic companies across North America, Europe, Asia and Australasia. Our varied trials experience includes pharmaceutical and biotech sponsored drug trials, blood and tissue banks and investigator-initiated research.

SydPath's state-of-the-art laboratories cover all major pathology disciplines, strategically located within St. Vincent’s Hospital Sydney, with partnering labs in Melbourne and Brisbane. This provides our clients full access to the vast research and development resources provided by one of the leading Australian teaching hospitals. All studies are managed and supported locally, maintaining the highest global standards.

Our services include:

1. Study Management
A dedicated Project Manager is assigned to each study and liaises with sponsors, investigator sites, and business development and laboratory staff throughout the course of the clinical trial to ensure that the study and client receive the best possible service.

2. Data Management
Our data management team produces clean data and comprehensive specialised reports.

SydPath’s Electronic Reporting system allows real time access to your study data via a secure online portal, which can be accessed via all popular web browsers.

3. Logistics & Specimen Management
Our Logistics and Specimen Management Team can provide all aspects of your study needs from request forms, packaging materials, kit build & supply, and other preparative equipment as requested.

4. Quality Assurance
- Fully compliant with Government regulations, including the requirements of ISO 15189.
- TGA Licensed and NATA Accredited.
- GMP (Human Blood and Blood Components) License for Serology, Molecular and Microbiology testing.

5. Customer Support
Our laboratory provides a 24hr, 7 day a week service for receipt of samples, Chemistry and Haematology services.

6. Additional Services
- Biobanking facility.
- Drug assay development & validation.
- Insurance Testing & Corporate Health Service Testing.
- Pre-employment health checks.

Laboratory specialties within SydPath:
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- Haematology & Coagulation
- Analytical Chemistry
- Drug Testing
- Anatomical Pathology
- Molecular Diagnostics
- Immunoassay
- Cytogenetics
- Routine Chemistry
- Microbiology & Infectious Diseases
- Histology
- Clinical Pharmacology & Toxicology
- Flow Chemistry
- Cryopreservation/ Biobanking
- Drug Chromatography (LCMS)
- Serology
- Cytology
- Companion Diagnostics

An effective therapeutic drug monitoring (TDM) service determines drug concentrations, informing dose adjustments to attain therapeutic targets for patients. It is a bespoke patient-centred treatment, involving a multidisciplinary team of clinicians, clinical scientists, pharmacists, pathologists and nurses, tasked with delivering a safe and personalised drug treatment. When used effectively, TDM can reduce the number of expensive and invasive diagnostic tests required, avoid unnecessary toxicity and reduce the length of hospital stay.

Often linked to a routine pathology laboratory, TDM laboratories differ greatly in their analytical approach. Pathology service laboratories are predominantly automated and use readily-available commercial kits; however, TDM requires a manual approach as all bioanalytical methods are developed in-house. Over time, these methods have evolved from immunoassays to high-performance liquid chromatography (HPLC) and gas chromatography. Currently, the use of mass spectrometry (MS) – or HPLC-MS/MS – is considered a gold standard approach to measure the concentration of drugs for which TDM is recommended. These instruments enable high throughput in pathology organisations where a centralised laboratory approach is developed.

SydPath’s clinical pharmacology laboratory invested $2.5 million in new SCIEX Mass Spectrometry instruments at the end of 2019, as part of an ongoing drive to position themselves as a Centre of Excellence in precision medicine. Paired with an energetic clinical team at St Vincent’s Hospital, the resulting TDM laboratory can now deliver maximised efficiency, quality and throughput of TDM results in Australia.

Dr Danijela Kocic, SydPath’s Scientific Head of Clinical Pharmacology and Toxicology, says that while the opportunities offered for TDM are well established, the development of analytical methods is expensive, time-consuming and complex. The reward for laboratories, however, are varied. ‘These instruments, due to their high sensitivity and specificity, require minimal sample preparation and can be further automated using robotics, combining multiple analytics into a single assay, resulting in decreased workload and improved turnaround times.’

The clinical applications are varied, too. ‘This approach is usually adopted in patients treated with narrow therapeutic index drugs, such as the aminoglycoside antibiotics. There is, however, an increasing role for TDM for drugs with a wide therapeutic index, especially in the intensive care unit (ICU) setting,’ says Kocic.

Effective TDM ultimately ensures optimal patient outcomes. It is recommended for drugs that exhibit significant inter-individual variability, or for
which there is a known relationship between drug concentration and toxicity and/or therapeutic effect. It is particularly important for immunosuppressants, antifungals, antibiotics and antiretrovirals. SydPath’s clinical pharmacology laboratory offers routine analysis of all these groups with most tests resulted same day, or with a 24-hour turnaround.

‘Oncology is another field of medicine for which the individualisation of drugs is critical. Suboptimal use of anticancer medicines compromises patient survival. Underdosing of oncology drugs can have significant ramifications due to the potential for therapeutic failure and cancer progression. Overdosing, however, can lead to severe treatment-limiting side effects, such as agranulocytosis and neutropenia. Tailoring therapeutic regimens for individual patients in order to avoid adverse drug reactions and therapeutic failure can have a significant clinical and economic impact.’ SydPath’s clinical pharmacology laboratory is currently involved in routine TDM of Imatinib and Busulfan anticancer drugs.

Dose individualisation strategies in other fields of medicine have been shown to significantly improve health outcomes, including shorter hospitalisation and reduced side effects. With the emerging relationships between drug exposure and efficacy, the application of TDM strategies in oncology have shown that TDM is ideal for optimising anticancer treatment. Empowering clinical experts to provide dose adjustment and clinical interpretation of drug concentration measurements is crucial. The evidence basis for TDM in oncology continuously grows, and SydPath is well positioned to provide greater access to its optimal clinical application. No expense has been spared in configuring the newly acquired instruments from SCIEX, which offer the most sensitive benchtop quadrupole mass spectrometer designed for small molecule work. Equipped with multi-component IonDrive technology, consisting of advancements in ion production, ion transmission and ion detection, the instruments deliver improvements in sensitivity, robustness, and dynamic range for demanding assays. Scientists in the clinical pharmacology laboratory can further enable innovative scientific methodologies, specifically around alternative sampling strategies (microsampling) to enable optimal practice and facilitate the clinical implementation of TDM in remote areas and in practices with limited sample amount.

The use of LC-MS/MS continues to expand, and SydPath has welcomed the increased productivity that their new instrumentation has brought to the laboratory. Superior specificity, higher throughput and improved sensitivity has enabled them to deliver TDM beyond St Vincent’s clinical applications, and now services national and international clinical trials as more organisations recognise the value of this highly specialised equipment and its scientific expertise.
When bringing any new pharmaceutical product to market, safety is key. Even when there are pressing medical needs, as with COVID-19, healthcare providers must first have confidence that a new product will not cause harm to those receiving it.

The initial stage of safety testing for a new drug or vaccine generally involves toxicology studies in mice or rats. After dosing the active by a suitable pathway, researchers record morbidity or mortality and examine tissues for any damage.

At this point, data can also be collected on concentrations of an active in blood or tissues using a validated method. This is important in setting the stage for subsequent clinical studies.

For scientists who are taking the step from the test tube to in-life work and are unsure of how to proceed, one excellent option is TetraQ. We are a central research platform of The University of Queensland, based at the university’s St Lucia campus.

Helping first-time drug developers make early decisions about toxicity studies is something we pride ourselves on. Many of our studies support Australian universities and non-profits, although we also work with Australian and overseas biotech companies.

Our experience in running rodent trials spans more than 15 years. We operate a dedicated animal house with capacity for more than 500 rats and 300 mice, which are housed in individually ventilated cages that have ample floor space.

Study design options range from early-phase screening to formal good laboratory practice (GLP) toxicity aimed at supporting first-in-human trials. Depending on needs, we can offer single or repeat dosing of small molecule or protein actives over varying lengths of study.

Our staff members are experienced in oral, intravenous, intramuscular, intradermal, subcutaneous and intraperitoneal delivery. We can offer automated dosing and blood collection via a BASi Culex system for precise pharmacokinetic (PK) and pharmacodynamic sampling. In parallel, Provantis software facilitates study management and data collection.

Our National Association of Testing Authorities (NATA)-recognised site operates in conjunction with a bioanalytical facility at the Royal Brisbane and Women’s Hospital at Herston. Staff at Herston are able to assist PK studies by developing and validating methods to determine actives in fluid or tissues.

Small molecules can be quantified using state-of-the-art liquid chromatography tandem mass spectrometry (LC-MS/MS). For protein actives, enzyme-linked immunosorbent assay (ELISA) or electrochemiluminescence (ECL) immunoassay methods are used. Custom multiplex biomarkers are available on request, using Meso Scale Discovery technology.

Since our establishment in 2005, TetraQ has completed more than 500 contract studies in the preclinical and clinical space, and has successfully passed successive sponsor and NATA audits. Importantly, data generated under our Organisation for Economic Co-operation and Development (OECD) principles of GLP are accepted for Food and Drug Administration (FDA) review under the mutual acceptance of data agreement.

TetraQ is recognised for compliance with the OECD Principles of GLP.
“We can help you plan your path”

Drew Brockman
Head of Toxicology and PK Services
Congratulations to Chuck Feeney, who was awarded the inaugural AusBiotech Life Sciences Legacy Award in recognition of his tremendous and unprecedented support of the Australian life sciences ecosystem across many decades.

Often referred to as the ‘James Bond of philanthropy’ for his secrecy and success, Feeney’s profoundly visionary, transformational and impactful contributions to Australian life sciences have helped to deliver more than 20 outstanding health and medical research facilities across Australia since 1998.

For more than three decades, Feeney has been one of the world’s leading philanthropists. At a conservative figure of more A$550 million, Feeney is considered a hero to other philanthropic leaders, such as Warren Buffett and Bill Gates. Understood to be the greatest individual giver in Australian history, Feeney looks forward to relenting this honour.

The research facilities he has helped to fund have, in turn, acted as Australia’s innovation engine rooms, driving the knowledge economy for future generations of scientists, entrepreneurs, healthcare workers and philanthropists – all dedicated to delivering better healthcare options and outcomes globally.

Feeney’s key investments in scientific infrastructure in Queensland alone have resulted in key advancements in vaccine and therapeutic discovery, including a potential immunotherapy for multiple sclerosis, an ultrasound treatment for dementia, and a new drug that has the potential to dramatically slow the ageing process.

It is without doubt that Feeney’s vision, commitment and generosity towards Australia’s life sciences sector over the past decades will continue to form the bedrock of future generations of Australian life sciences leaders and innovators for many more decades to come.

Queensland Premier Annastacia Palaszczuk says she was delighted that Feeney was being honoured with the AusBiotech Life Sciences Legacy Award. ‘His Atlantic Philanthropies investment in Queensland totals around $300 million, supporting the development of some of our most iconic scientific infrastructure, including the world-renowned Queensland Brain Institute, the QIMR Berghofer Medical Research Institute, the Institute for Health and Biomedical Innovation, and the Translational Research Institute,’ she says.

‘Feeney’s contribution to the development of higher education, scientific and research infrastructure in Queensland has been nothing short of game changing, and Queensland will forever be grateful.’

The inaugural AusBiotech Life Sciences Legacy Award was accepted on behalf of Feeney by Dr Dave Kennedy, Founder of iGIVEOnepercent.org.
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OncoRes Medical’s new intraoperative imaging device provides guidance to surgeons by assisting them to delineate tumour from healthy tissue.

Breast conservation surgery (BCS) is a confronting experience for women who have been diagnosed with breast cancer. This procedure aims to remove the tumour while avoiding mastectomy – a decision, by its very nature, that is heaved by anxieties that part of the tumour may be left behind.

Thirty per cent of Australian women who receive this procedure are required to return to the theatre to remove additional tumours. This is an enormous burden on the healthcare system, and is unsettling and often terrifying for the women at the centre of it all. For them, the threat is still very real.

It makes the question of surgical accuracy deeply important. How can surgeons remove the whole tumour the first time? This is a problem that Perth-based medtech company OncoRes Medical (OncoRes) is working hard to fix.

Four years after the company’s inception at the Harry Perkins Institute of Medical Research, and with the help of $6 million sourced from the Medical Research Commercialisation Fund (MRCF), this bright team is nurturing a new breakthrough product and preparing its next move.

Meet the MEprobe (its working name, for now), a handheld, real-time, intraoperative imaging device designed to identify residual tumour during BCS. This probe allows surgeons to scan inside the surgical cavity in real time.

‘OncoRes’s probe provides real-time intraoperative guidance to surgeons by assisting them to delineate tumour from healthy tissue, ultimately...
reducing the need for further surgery. It is an elegant and clever solution based on enhancing a surgeon’s sense of touch, which is vital,’ says OncoRes CEO Dr Kath Giles.

The company’s initial ex-vivo study demonstrated that the optical coherence tomography (OCT) elastography technology, which powers the probe, detected cancer with 95 per cent accuracy. OncoRes has since engaged surgeons to test the device as part of an initial in-vivo pilot study, scanning several patients to date – with great success.

The goal now is to test the merits of the device in a critical mass of patients and progress towards regulatory approval, and the company isn’t wasting any time.

The company’s success rests heavily on the team driving it. At the helm is a dynamic trio who possess a rare blend of medical, engineering and commercial expertise – CEO Dr Kath Gile, Chief Marketing Officer and Co-Founder Professor Christobel Saunders AO, and Chief Security Officer and Co-Founder Associate Professor Brendan Kennedy. Jill Anderson, who was recently recruited to the Board, is former CEO of Cianna Medical, which developed the SCOUT wire-free radar localisation system for use in BCS and was acquired by Merit Medical. Most recently, Simon Graindorge has also joined as Chief Operating Officer, bringing operational medtech experience to the table.

In its short life, OncoRes has made quite a mark. It was awarded the AusBiotech and Johnson & Johnson Innovation Industry Excellence Emerging Company of the Year Award in 2019.

It was also named in the top five finalists of the global MedTech Innovator 2019 Accelerator class, taking out the Value Award for the best value proposition earlier in the program, too.

OncoRes is now raising its next round of funding to take it through to investigational device exemption (IDE) status. Put simply, that means more surgeons can test the device with patients – the ones ultimately set to benefit.

‘Our work is a living example of what happens when clinicians and engineers collaborate, and are given the space, resources and support to innovate – that, we believe, is incredibly worthwhile for patients and Australia’s medtech industry as a whole,’ says Giles. 📚

For more information, visit oncoresmedical.com.

L–R: Jill Anderson, Sofie De Wolf, Leslie Wise, Kath Giles and Christobel Saunders, OncoRes
With a share price rocketing up from seven cents to about $3.28 in five years, and a market capitalisation reaching a high of $2.3 billion, medical device company PolyNovo has proven itself to be one of Australia’s recent biotech stars.

The company’s success so far has come off the back off its high-tech wound dressing product, NovoSorb™ BTM, utilising a polymer technology originated from CSIRO. The polymer has been further developed by PolyNovo into novel medical devices.

NovoSorb BTM is used to regenerate the lost dermis layer of the skin. Dermal loss can occur through trauma, infection, surgical excisions or burns. In layperson’s terms, the product builds a foundation for the skin that provides elasticity, movement, ability to deposit fat, and reduce scarring and contraction when skin grafts are used alone.

“We’ve had everything from people putting their arms through a hay baler, [to people who] have been in car accidents where their forearms have been degloved,” says PolyNovo CEO and former nurse Paul Brennan. “We’ve had diabetics who haven’t lost their legs because we were able to get their injuries and wounds closed.”

While PolyNovo is now exporting to many countries around the world, however, its early days were a little rockier. ‘Originally, [PolyNovo] came out of CSIRO in 2004, but it had a complex ownership structure that lacked a focused investment strategy,’ says Brennan. ‘We got a new Board in 2014, and from there we became a single play branded as PolyNovo with a determination to commercialise our first product.’

When Brennan came on as CEO about five years ago, he was in for a surprise. ‘I was the sixth employee of PolyNovo – it was a non-branded shed in Port Melbourne, basically, and the first couple of months were a bit of a shock.’

That ‘glorified kitchen’ was also not yet accredited. Brennan, however, saw enormous potential for the technology, which these days is made in a world-class, fully accredited clean room production facility. PolyNovo also has 69 employees and counting, with plans to double the business in the next 12 months. Industry analysts estimate that PolyNovo will turn over between $22 million and $26 million this financial year. ‘It wasn’t that long ago that we broke into the ASX 300, and we had a $1 share price and $1 million a month of sales. That was only back in May [2019],’ says Brennan.

‘Now we’re in the ASX 200, we’re well on the way to significant revenues, we’ve had a market cap as high as $2.3 billion (before the global impact of COVID-19), and we’re on sale in multiple countries, including across Europe.’ That’s just the start. PolyNovo plans to use its NovoSorb polymer technology to develop products to treat hernias, reconstruct breasts and potentially target type 1 diabetes, according to Brennan.
No medical device market clearance... we’ve never had this issue before.

CMS SciDoc has established themselves as market leaders in medical device compliance with 100’s of devices cleared in markets worldwide.

The team are dedicated industry experts with extensive experience in medical devices, including software and IVDs.

As a Melbourne based company with world-wide reach, CMS SciDoc has experience in:

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- Technical documentation including design history files
- Quality systems implementation and maintenance e.g. ISO 13485, CFR part 820, MDR Article 10
- Gap analysis
- Product testing e.g. safety, EMC, sterility, biocompatibility
- Regulatory submissions (MDD, MDR, FDA, TGA, HSA etc)
- Clinical evaluation reports including literature searching and medical writing
- European authorised representative and local licence holders
- Post-market compliance and vigilance
- Auditing (regulatory, internal and supplier)

We understand the complexities of the industry and work closely with Notified Bodies and regulators to get the job done.

Our Team.
Our team consists of QMS and regulatory affairs specialists, project managers, auditors and engineers.

Our Reach.
CMS SciDoc has offices in Melbourne, Australia, Auckland, New Zealand and an extensive network affiliations within Asia, USA and Europe.

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NAVIGATING DIGITAL MEDICINE’S UNCHARTED WATERS

BY BRONWYN LE GRICE, FOUNDER AND CEO, ANDHEALTH

Australian entrepreneurs seeking to commercialise evidence-based digital health products face a unique set of challenges.
Of all the subsets of health care, digital health is the most misunderstood. It is not limited to traditional e-health frameworks based on the collection and analysis of patient and healthcare system data, nor health IT solutions, which serve to facilitate healthcare administration and service efficiencies.

At its heart, the modern digital health sector is about proven, evidence-based healthcare interventions that are driven by digital technologies. These are technology-based products and services that treat, diagnose, cure, mitigate, and/or prevent disease. But the basic premises of safety and efficacy hold just as true for digital health products as they do for novel biopharmaceuticals and medical devices. Where the path to market differs is in the challenges of an evolving regulatory landscape; in reimbursement frameworks that do not recognise digital interventions; and in the complexities of building a product that may have multiple end users, none of who will be the ultimate paying customers.

HealthXL, a global leader in digital health industry data, recently categorised1 digital health products into three broad groups:

• **Digital health** includes technologies, platforms and systems that engage consumers for lifestyle, wellness and health-related purposes, capture and store health data or support operations. They do not typically require clinical evidence or regulatory oversight.

• **Digital medicine** includes evidence-based software and/or hardware products that measure and/or intervene in human health. They all require clinical evidence and are likely to require regulatory approval.

• **Digital therapeutics** deliver evidence-based therapeutic interventions to prevent, manage or treat a medical condition. They all require clinical evidence and real-world outcomes data, and must be cleared by regulatory bodies to support their claims of safety, efficacy and intended use.

This tiered definition is helpful when it comes to understanding the level of healthcare intervention and clinical outcomes that can be delivered via digital health technologies, and also the thresholds that need to be met by entrepreneurs and innovators who wish to commercialise in this fast-growing sector.


Life-changing technologies, but who pays?

In digital health, the most successful technologies in a clinical setting are often those that capture the hearts and minds of their end users, and by doing so, deliver better health outcomes. The most successful companies have technologies that do all of this and also demonstrate a compelling commercial benefit to a paying customer.

Failure to identify a paying customer, at scale, is one of the most common reasons digital health companies fail. Driver – a company whose platform combined molecular pathology laboratories with a mobile app where patients could submit data and samples to be connected to clinical trials and treatments – raised US$90 million on its path to market. Based on a business-to-consumer (B2C) model, and with a hefty price tag of US$3000 per patient with a trailing monthly subscription fee of $20, the company shut its doors in November 2018, less than three months after its product launch.

Similarly, Arivale, a company providing personalised health advice based on genomic testing, blood analysis and microbiome analysis, was shut down in April 2019 after admitting that the cost of its service exceeded what its customers were willing to pay.

Voice of the paying customer

Right across healthcare innovation, technology push (developing a product because we can) instead of market pull (working out where market dynamics will support the right solution at a commercial scale) is a challenge for entrepreneurs and innovation programs alike. Over the past five years, a focus on early-stage innovation promotion, pitch fests and the idea that all good innovation will find a market has generated a large number of small technology startups in health, which are naive to the level of rigour and clinical evidence required to create a global digital health company.

Nearly all innovation frameworks have elements that focus on Voice of the Customer studies. In B2C organisations, this can be a great indicator of your likely market success, as your financial customer is also usually your user. But in health care – especially in digital medicine – the person using the technology is probably not going to be the person who pays for it.

Bronwyn Le Grice

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Companies need to have a deep understanding of the voice of their paying customers, as well as the voices of their users (which will often be multiple, with varied requirements, and include patients and clinicians). Clinical need itself does not necessarily create market pull. Neither does the economic impact of a disease, the cost of wastage in treating a disease, or the savings you might get if people didn’t get the disease or were better treated.

Market pull is created by a combination of clinical need and commercial rationale. It’s knowing the who, how and why of your paying customers in each of your target markets. In addition, regulatory and reimbursement pathways that might support commercial uptake are unclear, if they exist at all.

Lisa Suennen – leader of the digital and technology group within US professional services firm Manatt, and an entrepreneur and venture capitalist with 30 years’ experience – warns that for digital health firms, economics is far more important than clinical evidence.

‘Insurers care about reducing hospital re-admissions and overall costs,’ Suennen said at an ANDHealth meeting in 2019. ‘They are not going to pay for [a product] just because it is good for people.’

No shortcuts and an incomplete roadmap
We know from many internationally successful digital therapeutics companies – including WellDoc, Omada Health and Propeller Health – that healthcare utilisation studies are incredibly important, alongside compelling clinical data packages that can show clear improvement in clinical outcomes. But these companies also demonstrate that the road to market is long (often more than 10 years), far from straightforward, and requires the same amount of capital as a new drug or medical device.

What they also show is that the pathway to commercial success in digital health is varied. Value inflection points often do not necessarily hinge on clinical data, customers require complex commercial validation studies (and even then, they may not purchase), and valuations are not tied to large intellectual property portfolios. In addition, the commercialisation landscape for these types of companies is constantly changing, with new and changing regulatory hurdles, global data governance regulations, and a reimbursement environment that offers minimal support for most digital health technologies in many major jurisdictions.

On the flipside, while health care remains one of the last sectors to experience wholesale disruption, it is certainly coming. As healthcare costs rise and consumers demand more from health systems around the world, digital interventions that improve our health and wellbeing, and save the system-critical capital will be key. For our early innovators, this means navigating often uncharted waters, and linking into a growing and dynamic international digital medicine network of innovators, investors and service providers to reach their global potential.

Monetising data and other myths
Myths abound in digital health commercialisation. Here are some of the most prevalent:

Just because you have a big dataset, doesn’t mean you can monetise it. There are real dangers inherent in the notion of selling data as a key revenue stream. It’s extraordinarily hard to monetise individual level patient data and even aggregated patient data in a way that doesn’t breach the law, or at the very least a social licence.

Just because it works, doesn’t mean people will use it. A large investment in getting user experience right plays a massive role in every successful digital health product.

Just because it saves costs, doesn’t mean someone has the money or incentive to buy it. Understanding procurement – by clinicians, hospitals, payers, and pharmaceutical and medtech companies across multiple markets – is complex.

Just because it works in the lab, doesn’t mean it works in real life. Digital health products must be robust and versatile enough to work across a wide range of platforms and environments. Generating real-world evidence – commercial as well as clinical – is crucial for success.

Just because it could transform lives, doesn’t mean there is an economic model that will support a business. Disruptive technologies may not meet the approval of clinicians whose revenues might also be disrupted. It’s possible that even a great product can’t be turned into a viable business.
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We are at a turning point in the evolution of the biotechnology industry, whereby artificial intelligence (AI) will provide valuable direction in several parts of the biotechnology life cycle, leading to targeted products and treatments. AI has the potential to improve early and precise diagnosis; provide personalised health care through better patient stratification; accelerate drug discovery and the development of better treatments, when combined with successful clinical development; reveal new treatments out of clinical care routines; enable better understanding of disease aetiology; and enhance the prediction of safety and efficacy in translational medicine.

AI’s application to the biotechnology industry will lead to a sustainable, more predictable pathway for new innovations, and will create partnerships across all stakeholders within the global healthcare supply chain. The biotechnology supply chain is represented by all elements that currently work together, from the laboratory to the patient.

Clinical development
Biotechnologists are benefiting from defining their clinical development path to develop their own product strategy, incorporating knowledge of their peers’ successful plans. The key elements include assessment of approved products; products in
development; successful trial designs; guidance for key performance indicators to estimate cost, trial durations and patient enrolments; inclusion and exclusion criteria; and primary and secondary end point selection.

In addition, using historical, current and emerging standards of care, competitive drug labels can be identified and considered. More broadly, the vast existing body of knowledge can also be used to identify countries in which trials may be conducted and to recommend suitable sites.

Importantly, it needs to be a top-down approach, where the Clinical Development Plan is aligned with the target product profile (TPP) vision and supported by well-designed clinical trials.

Al will access large volumes of data gathered from international genetic screening and also scientific data of prior trials. The benefit of Al arises not from the algorithmic extraction, but by critiquing data with assessment of effectiveness of past and current patient disease treatment, management, and outcomes. The promise is that Al will then take the crucial step of proposing drug discovery programs and appropriate trial design to target specific patients.

Licensing
The biotechnology life cycle often relies on in/out licensing development program(s). Licensing as a commercial tool is generally well performed, although Al has the potential to transform this path, as well. The most unpredictable variable in this process is surprises during due diligence. When biotechnologists seek to out-license to big pharma, there is often an inherent misalignment and depth of expertise.
The big pharma teams leverage their deep clinical development and multi-jurisdictional regulatory expertise. Deficiencies are often identified during preclinical activities, associated document management and clinical development activities, which may not be well aligned with the TPP or lack of a TPP.

These inconsistencies lead to delays and requests for more data by regulators. There is no surprise within the industry about this reality, which leads to a substantial financial devaluation or even termination of discussions. AI will step in to reduce, if not eradicate, this unpredictable variable by enshrining products and services for biotechnologists to use from inception and enable assessment of live comparator licensing deals terms.

The good news is that such programs are being actively developed by major IT vendors and niche organisations. If such initiatives seek dialogue and partnership with peak biotechnology organisations, the output will remove fragmentation at this juncture of the biotechnology commercialisation supply chain.

Valuation
Biotechnology valuation – be it as part of continuous disclosure obligations or robust events, such as sale or injection of finance – will benefit from AI. The global financial services community uses very sophisticated and comprehensive data points in setting the minute-to-minute price of commodities and currency. Over the past century, their systems have developed technological advances such as satellite imagery for mineral identification for metal extraction, remote-testing technology for soil, and rare mineral extraction technology to predict sales of new phones several years into the future.

Relevant data points are needed to contribute to on-the-spot biotechnology valuation. The biggest gap lies across the two ends of the commercialisation spectrum: the design of the innovation and the use of the product by the customer. There are several elements to which analysts have blind spots and are not able to place a value on the Clinical Development Plan, or the stringency of preclinical programs and its documentation.

Regulatory
In the preclinical and clinical development arena, AI will develop tools to support an efficient regulatory strategy, and will ensure that the proposed preclinical and clinical activities will meet the requirements of regulatory authorities in the United States, Europe, China, Japan, other big markets, and, of course, Australia.

The continuing importance of confirmatory trials in local jurisdictions (in addition to Japan’s pharmaceuticals and Medical Devices Agency’s requirements) will enable AI systems to ‘scout’ within the local jurisdictions to extract expertise and resources that match the needs of structured and standardised drug development processes, and compliance with applicable quality and regulatory requirements.

Sales and marketing
The value of AI is to interrogate data, such as who pays and the dynamics with competitor product placement. For example, when a biotechnologist is developing a drug that will be significantly cheaper to a competitor, what is the impact when the existing product is sold as part of a bundle deal to a hospital? How will the hospital manage the single product versus the bundle deal?

Regrettably, it is often the case that experienced sales and marketing persons are not part of clinical development planning, or TPP positioning discussions. Their on-the-ground learning is critical and impacts all of the elements discussed in this article. AI is able to incorporate this element for the attention and consideration of the biotechnologist readily and cost-competitively.
The rate of change in the world of medical device development is incredible.

Technology is enabling devices to become more connected and more personalised, leveraging IoT and mobile connectivity, while integrated artificial intelligence is harnessing the power of learning and delivering superior automated diagnostics and decision making.

The Regulatory environment is rapidly evolving in markets across EU, US and Asia-Pacific, recognising the benefits of machine learning and the inherent power of the smart-phones that so many of us carry.

Global alignment is a good example of Regulatory evolution with increasing collaboration between Europe’s new MDRs and the Australian Regulator (TGA). The TGA, like other regulators, is continuously reviewing and evolving requirements to better serve the community. Up-classing all devices which interact with the central circulatory and nervous system to Class III is a clear example of this.

With such a dynamic regulatory and technology landscape, Hydrix has enhanced its established engineering capabilities and built a powerful offering in regulatory, clinical and quality system strategy and implementation. While these expanded offerings deliver significant value on their own, it is the seamless integration of regulatory strategy and product design that helps our clients make informed decisions sooner.

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Hydrix’s integrated regulatory, clinical, product design and development offering is de-risking and accelerating our clients’ technology commercialisation.

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- Instrument and consumable development, regulatory strategy, development of QMS, pre-submission planning and submission preparation for a Class IIb IVF product (TGA, FDA and EU)
- Product development, regulatory strategy, development of QMS, clinical trials management and submission preparation for a Class IIb orthopaedic product (TGA, FDA and EU)
- Medical Device Register (MDR) gap analysis for a Class III product currently being sold in the European market

“It’s rewarding to be guiding new product development through my clinical and regulatory insights. By identifying more effective pathways to market, I’m excited to be helping start-ups and established businesses focus on achieving commercial success for their core technology”

Michelle Knight
Clinical and Regulatory Manager, Hydrix

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Two patent applications naming artificial intelligence as the sole inventor were refused by the European Patent Office following oral proceedings on the grounds that an inventor must be a human being. Is a machine capable of truly inventive activity? If so, what are the implications for the protection of the resulting technology?

Artificial intelligence (AI) can be broadly defined as the concept of a machine performing a task that is normally accepted as requiring human intelligence. AI algorithms ‘learn’ from data, information and even from their own decisions, and are capable of extracting concepts and relationships at high speed. AI is increasingly being incorporated into drug discovery pipelines.

The most common applications use deep-learning algorithms – similar to those used in face and image recognition – which are ‘trained’ using experimental results or information on the 3D structure and binding properties of small molecules to recognise target specificities with much greater accuracy than what was previously thought possible. Use of AI in the initial stage of drug development can increase the speed, accuracy and predictability of candidate selection. A slight increase in the reliability of predictions can potentially save vast amounts of money.

Incorporating AI into drug discovery pipelines

Biotechnology companies face numerous considerations when adopting AI in the development of therapeutics. These include access to relevant high-quality data, choice of algorithm, collaborations with other biotechnology companies for data sharing and tech companies for the use of existing AI technology, ethical and privacy issues accompanying the sharing of medical data, and the need for biologists and chemists with some understanding of AI for optimisation of protocols and the evaluation of results. Ownership and inventorship considerations are of particular importance.

Who is the inventor of an AI-generated invention?

When a molecule shows promise as a therapeutic early in the development process, the relevant company generally attempts to patent it to prevent others from copying it. Patent protection is crucial to investment in innovation. A patent application is required to name at least one inventor, but who is the inventor of a therapeutic that is ‘invented’ by AI?

One applicant deliberately tested this question by naming his patented machine, DABUS, as the inventor on patent applications for two separate inventions (EP 18 275 163 and EP 18 275 174). DABUS, or ‘device for the autonomous bootstrapping of unified sentience’ is described by its owner as a type of connectionist AI. DABUS uses artificial neural networks to generate and evaluate concepts, and reinforcement learning to learn from its own successes and failures. Using a separate neural network, the applicant claims that DABUS recognised the novelty and potential inventiveness of its creations, a food container and a pulsed light source for attracting attention, before a human did.
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The designation of the inventor was questioned by the European Patent Office (EPO), and in his response the applicant quoted the UK Patents Act, which states that the inventor is the actual deviser of the invention. The applicant argued that it is dishonest not to disclose the actual deviser of the invention; failure to do so might constitute an offence in some jurisdictions; not accepting that AI could be an inventor precludes inventions created by AI from patentability; and no case law exists preventing AI from being named as an inventor.

The applications were refused following oral proceedings in November 2019 due to a failure to satisfy formal requirements; an application must state the family name, given names and full address of the inventor. The EPO argued that European patent law provides for natural and legal persons. An AI system has no rights or legal personality, meaning that it cannot transfer rights. Importantly, the EPO emphasised that the issue with naming AI as an inventor arises from a failure to meet formality requirements rather than any particular patentability issue. The EPO asserted that the concept of an inventor as a natural person was an internationally accepted standard, quoting the laws of several major jurisdictions.

Does the law need to change?
The requirement to name an inventor who is a ‘natural person’ was intended to acknowledge and protect the rights of human inventors, and originated before anyone envisaged machines capable of inventive activity. Inventorship and ownership are separate issues; the former must be determined in order to establish the latter. The inventor does not usually own the patent, but as AI is not a legal person and cannot transfer rights, companies should be mindful of potential challenges to the rights to inventions invented by AI.

Not all involvement of AI in technology development warrants inventorship for the machine. Applications in the biopharmaceutical industry often involve a machine outputting many potential candidates, which a human must then assess and evaluate. It may be relevant to determine who identified a problem to be solved – this could be a biologist, a programmer, or perhaps both. Was the problem already structured and understood by a human? AI can now autonomously generate new concepts, and evaluate their novelty and potential inventiveness. If a human cannot reasonably claim involvement, does naming a human as the inventor devalue genuine human invention?

One patentability requirement is that the invention would not have been ‘obvious’ to a person working in the relevant field before the patent was filed. Access to AI or the potential acknowledgement of AI as a hypothetical ‘person’ skilled in the field could lead to an argument for an increase in the threshold for inventiveness. Nonetheless, the availability of patent protection of AI-generated technology seems vital to incentivise innovation, promote the dissemination of information and enable the commercialisation of socially useful products.

What next?
International applications have been filed for the inventions generated by DABUS. It appears likely that these applications will be used to test the position of other patent offices, potentially prompting legal reviews. The EPO decision may also be appealed. Meanwhile, AI is revolutionising the creation of therapeutics, and its inventive capabilities are likely to increase. Inventorship and ownership of intellectual property should be discussed and preferably decided prior to AI-driven therapeutic development projects, while also looking out for relevant changes in patent law.
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In 2020, the delivery of health care through connected and digitised medical device technologies and software remains a key player in building Australia’s digital healthcare infrastructure. For healthcare stakeholders, tapping into the emerging digital health industry is inevitable and essential. To effectively realise the healthcare benefits though, privacy and cybersecurity needs to be front of mind for all, especially manufacturers, healthcare organisations and patients using the technology.

Medical devices – privacy risks and legislation to be aware of

The digitisation and connectivity of medical devices can clearly improve device function and personalise medical treatment, but with network connectivity comes cybersecurity risks that should not be ignored. Cybersecurity breaches pose harm to patients, both physically and in relation to breaching their privacy or altering their personal health data.

Participants in the digital healthcare ecosystem, particularly manufacturers and suppliers, need
to be aware of these risks and the corresponding obligations under the Therapeutic Goods Act 1989 (TGA) and the Privacy Act 1988. Noncompliance with either Act can result in significant penalty.

Under the TGA and the Therapeutic Goods (Medical Devices) Regulations 2002 (Regulations), medical devices must be cyber secure to comply with the Regulations’ Essential Principles. The Therapeutic Goods Administration has made it clear in its ‘Medical device cybersecurity guidance for industry’ that device manufacturers bear the responsibility of ensuring that cybersecurity risks are adequately considered, controlled and documented across the total product life cycle.

Manufacturers and suppliers also need to be aware that collecting (gathering, acquiring or obtaining) personal information or health information may enliven data protection obligations under the Privacy Act. Health information can be overtly sensitive information, such as medical diagnoses or lab results, or may be more unassuming like appointment and billing details or records held by a health club. Information collected over apps may also constitute health information.

Eight steps to privacy strategy and data protection
Stakeholders dealing with connected devices are expected to comply with the four Es of privacy management. These are: embedding a culture of privacy; establishing robust and effective privacy processes; evaluating privacy processes; and enhancing responsiveness to privacy issues.

To address the four Es, healthcare stakeholders – particularly those participating in the medical device market – should be across the Office of the Australian Information Commissioner’s (OAIC’s) eight-step strategy to data protection, which are contained in its ‘Guide to health privacy’.

Step 1: Developing and implementing a privacy management plan
Organisations should implement a privacy management plan that aligns its internal goals with its privacy obligations. As a starting point, the OAIC provides privacy management plan templates on its website.

Step 2: Developing clear lines of accountability for privacy management
Organisations should clearly identify who or which teams are responsible for general privacy management, as well as for addressing privacy incidents. Who these people are, as well as their responsibilities, should be communicated to all members of staff.

Step 3: Creating documented records of the types of personal information an organisation handles
Medical device organisations, in particular, need to be across the types of information they collect, how that information is received and how the information is held.
This is crucial for effective privacy management and compliance, particularly when it comes to developing an informed privacy policy, and determining the best strategies to protect against data breaches and cybersecurity threats.

Self-auditing how information is received should be a priority for organisations using or supplying medical devices. Personal information can be collected through app registration pages, via digital or face-to-face conference, through standard forms, or as data collected through wearable medical devices. From here, organisations should assess how that information is stored – electronic records, via cloud storage providers, et cetera – and then determine the best way to protect this information.

Medical device organisations using cloud storage or electronic records to hold personal information should consider cyber insurance to insure against cybersecurity threats and breaches. This is particularly important given the high-risk nature of a data breach resulting in the release of patient health information, or the implications of medical device hacking.

Step 4: Implementing processes to handle health information
Organisations should have clear and thorough processes for handling personal information. These processes should cover the information’s entire life cycle, from collection right through to storage and destruction of the information when no longer required. Processes should also be implemented for receiving and responding to patient complaints.

Step 5: Staff training
Regular staff training and developing clear, standardised staff processes for dealing with personal information should be a priority for medical device organisations.

Step 6: Creating an Australian Privacy Principles (APP) privacy policy
Under the Privacy Act, not having a privacy policy when required carries significant financial penalties. For companies, this may be up to $2.1 million, with plans by the Australian Government to increase these penalties to the greater of $10 million, to three times the value of any benefit obtained through the misuse of information, or to 10 per cent of a company’s annual domestic turnover.

As a priority, companies required to have an APP privacy policy should implement one along with a privacy collection statement.

Step 7: Taking reasonable steps to protect and secure personal information
Organisations collecting personal information have an obligation to secure and protect such information. To achieve this, the OAIC recommends implementing strategies around governance, internal practices, information and communications technology (ICT) security, third-party providers (including cloud computing), data breaches, privacy standards, and destruction and de-identification of information, where applicable.

Step 8: Develop a data breach response plan
Every organisation collecting personal information should have a data breach response plan. The response plan should address the organisation’s notification obligations under the Privacy Act, which includes notifying the Australian Information Commissioner of any data breach.

For any queries regarding this article, please contact Jake Grant at jgrant@mccullough.com.au.
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NEW AUSBIOTECH MEMBERS

Archer Materials Limited
A materials technology company developing materials in quantum computing, biotechnology, and lithium-ion batteries, and exploring for minerals in Australia. The company has strong intellectual property, broad-scope mineral tenements, world-class in-house expertise, a diverse advanced materials inventory, and access to more than $300 million of R&D infrastructure (ASX: AXE).

Marcus Dwyer
Tel: 02 8091 3240 | Email: hello@archer.com.au

bio101
bio101 is a financial services firm providing accounting, tax and company secretarial services that specialises in the life science sector. Its clients range from startups and venture capital–funded investee companies to ASX-listed life sciences companies. bio101’s focus is on providing an integrated, efficient and comprehensive financial service, allowing its clients to focus on the development of their product.

Hamish George, Director
Mobile: 0421 270 256 | Web: bio101.com

BOC
BOC is the South Pacific’s leading supplier of specialty gases. For more than a century, the company’s laboratory gases and cryogenic solutions have contributed to advances in industry and everyday life. BOC provide’s outstanding products and services for the widest range of applications – from cryogenic storage of critical samples to laboratory-grade pure gases. The company tailors engineering solutions and accredited gas mixtures with traceability and certification as reference materials to ISO 17034 to meet your needs.

Phone: 1800 658 278 | Email: scientific@boc.com | Web: boc.com.au

Carina Biotech
Carina Biotech is an Adelaide-headquartered biotechnology company researching and developing effective pan-cancer chimeric antigen receptor T cell (CAR-T) therapies to treat solid cancers. Carina’s development pipeline includes novel CAR-T cells that attack atypical solid cancer antigens, a genetic homing signal to attract CAR-T cells to solid tumours, and complementary technologies to improve the delivery of CAR-T cells to tumour sites.

Dr Jane Rathjen, Head of Business Development
Tel: 0404 062 734 | Email: jane@carinabiotech.com | Web: www.carinabiotech.com

CK Cell Technologies Pty Ltd
Founded in 2016 as a private company dedicated toward developing iPSC- and MSC-based clinical applications. The company has developed and patented techniques with applications across a number of endeavours involving stem cells, conditioned media and exosomes. Moving to good manufacturing practice (GMP) in 2020, the company will be at the forefront of innovations, breakthroughs and development into clinical phases of lifesaving technologies of stem cell–derived wound healing therapeutics and Alzheimer’s diagnostics.

Sam Berberian, Operations Manager
Mobile: 0415 424 585 | Email: sam.b@ckcelltechnologies.com | www.ckcelltechnologies.com
Coulter Partners
Coulter Partners is a board- and senior-level global executive search firm focused exclusively on life sciences. The company is a trusted adviser on leadership in the pharmaceuticals, biotechnology, medical technology, diagnostics, health technology, CRO and services sectors. The company’s Australian director, Steven Johnson, began his career in the pharmaceutical industry before moving into life sciences executive search in Asia and Australia more than 20 years ago. Coulter Partners employs 100 people in 14 offices across Asia, Australia, Europe and the United States.

Steven Johnson
Mobile: 0438 640 574 | Email: s.johnson@coulterpartners.com

Fluffy Spider Technologies
Fluffy Spider Technologies is a boutique software and user interface (UI) and user experience (UX) design house. The company specialises in embedded device and cloud software for the medical technology industry, partnering with clients to take products to market. The team of professionals is based in Sydney and has more than 20 years’ experience commercialising concepts and bringing embedded device ideas into consumer hands. The company’s unique collaborative approach results in high-quality bespoke solutions for startups and tier 1 companies worldwide.

Robi Karp, Chief Executive Officer
Ultimo, Sydney | Tel: 02 9281 9055 | Mobile: 0414 622 233 | Web: www.fluffyspider.com

Francis Health
Established in 2002, Francis Health is an internationally networked partnership, bringing the best minds together to work with its clients to tailor solutions. The company delivers enduring improvements in performance, and is known for immersing itself in clients’ organisations and making positive changes across the health, pharmaceutical and biotechnology sectors. Francis Health’s clients span the health and life sciences ecosystem across Australia and the world. The company understands that sustainable change comes from helping people think and behave differently.

Dr Neil Deacon, Senior Manager, Pharma and Life Sciences Lead
Mobile: 0402 551 014 | Email: neil.deacon@francishealth.com.au | Web: francishealth.com.au

Healthcare Logistics Australia
Active in the healthcare market for more than 20 years as a third-party logistics (3PL) and fourth-party logistics (4PL) healthcare distribution provider, Healthcare Logistics Australia has a proven track record of delivering practical solutions for a variety of healthcare partners that’s based on a foundation of robust quality systems and a commitment to excellence. The company offers a wide menu of services tailored to the individual needs of its customers. These services include warehousing, distribution, clinical trial logistics support, secondary packaging and more.

Theunis (TC) van den Berg, Key Account Manager
Tel: 1300 364 586 | Email: theunis.vandenberg@hcl.com.au | Web: www.hcl.com.au

Hemideina
Hemideina is a hearing solutions company with a mission to revolutionise hearing treatment for severe to profound deafness. The company is developing the Hera Wireless Implant – a discreet, miniature cochlear implant system, based on its bio-inspired, proprietary signal processing technology. Hemideina believes everyone should enjoy a life without limits – that’s why its solution is designed to provide a discreet treatment, with the aim of improving patient outcomes and enabling active lifestyles.

Liz Williams, Chief Executive Officer
Mobile: 0400 580 175 | Email: liz@hemideina.com
NEW AUSBIOTECH MEMBERS

Illingworth
Illingworth offers a unique combination of patient-centric services to facilitate worldwide participation in clinical trials. Illingworth’s bespoke solutions include mobile research nursing, patient concierge and medical photography. Mobile research nursing takes the clinical trial visits to the patient in their home, school or workplace. Patient concierge supports patients in getting to site visits when they are required, which may include travel bookings and reimbursements. Medical photography uses imagery or video footage to monitor an end point.

Kevin Wightman, Director of Business Development
Tel: 03 6387 7117 | Mobile: 0434 566 667 | Web: www.illingworthresearch.com

Recce Pharmaceuticals
Recce Pharmaceuticals Ltd is pioneering the development of a new class of broad-spectrum synthetic antibiotics. Lead candidate, RECCE® 327, has been developed for the treatment of sepsis derived from E. coli and S. aureus bacteria, as well as multi-drug resistant bacterial infections. The FDA has awarded RECCE® 327 Qualified Infectious Disease Product (QIDP) designation under the Generating Antibiotic Incentives Now (GAIN) Act – labelling it for fast-track designation, plus 10 years of market exclusivity post approval.

James Graham, Executive Director
Tel: 02 8075 4585

Tessara Therapeutics
Tessara Therapeutics is a biotechnology company developing RealBrain™ technology – manufactured 3D human mimetic brain tissue – for drug discovery and therapeutic uses. RealBrain™ is an unprecedented model in which to recapitulate brain physiology and disease phenotypes, replacing inadequate and expensive existing cell and animal models. Tessara aims to commercialise RealBrain™ as the new gold standard, preclinical test system for drug target identification, validation and characterisation of lead compounds for neurological and neurodegenerative diseases.

Dr Christos Papadimitriou, Chief Executive Officer
Mobile: 0499 249 176 | Email: christos.p@tessaratx.com | Web: www.tessaratetherapeutics.com

Yuhan
Headquartered in the dynamic city of Seoul, Yuhan Corporation is South Korea’s largest pharmaceutical company by revenue. In keeping with the spirit of Yuhan’s commitment to open innovation, Yuhan ANZ was established in 2019 in Adelaide, South Australia, as a wholly owned subsidiary. Throughout Australia and New Zealand, Yuhan is actively seeking opportunities to support, invest in, and co-develop innovative new technologies and products that are destined to improve human health and wellbeing across the globe.

Dr Lee Farrand, Chief Executive Officer
Email: lfarrand@yuhan-anz.com

Become a member of AusBiotech to strengthen your connections in the Australian life sciences industry, benefit from longstanding relationships across government, industry and academia, shape advocacy efforts and help foster a sustainable and globally competitive sector.

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# INDEX

**By James Fletcher, Investment Adviser, Evans & Partners**

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<th>ASX</th>
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<th>First List Date</th>
<th>M Cap $m</th>
<th>Last Price $</th>
<th>Yr H $</th>
<th>Yr L $</th>
<th>EPS c</th>
<th>PER</th>
<th>Asset B (c)</th>
<th>Div (c)</th>
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<tbody>
<tr>
<td>Acrux Limited</td>
<td>ACR</td>
<td>Transdermal drug delivery platform technology</td>
<td>29-Sep-04</td>
<td>21.76</td>
<td>0.11</td>
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<td>Actinogen Medical Limited</td>
<td>ACW</td>
<td>Developer of lead candidate Xanamem for treatment of neurodegenerative disorders including Alzheimer’s</td>
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<td>22.32</td>
<td>0.02</td>
<td>0.07</td>
<td>0.01</td>
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<td>Adalta Limited</td>
<td>1AD</td>
<td>Drug discovery and development using its technology platform to generate a promising new class of protein therapeutics, known as i-bodies</td>
<td>22-Aug-16</td>
<td>10.49</td>
<td>0.06</td>
<td>0.24</td>
<td>0.07</td>
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<td>Adherium Limited</td>
<td>ADR</td>
<td>Developer of digital technologies to monitor medication use in chronic respiratory conditions</td>
<td>26-Aug-15</td>
<td>10.44</td>
<td>0.02</td>
<td>0.06</td>
<td>0.02</td>
<td>-4.40</td>
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<td>Admedus Ltd</td>
<td>AHZ</td>
<td>Tissue engineering and vaccine development for herpes and HPV</td>
<td>24-Mar-04</td>
<td>24.17</td>
<td>3.40</td>
<td>13.00</td>
<td>3.57</td>
<td>-99.00</td>
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<td>Aft Pharmaceuticals Limited</td>
<td>AFP</td>
<td>Develops, licences and sells a range of medical products globally</td>
<td>22-Dec-15</td>
<td>3.90</td>
<td>3.60</td>
<td>3.60</td>
<td>1.90</td>
<td>10.83</td>
<td>33</td>
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<td>Allegro Orthopaedics Limited</td>
<td>AMT</td>
<td>Prosthetic implant tools</td>
<td>05-Dec-07</td>
<td>12.94</td>
<td>0.13</td>
<td>0.28</td>
<td>0.08</td>
<td>-1.18</td>
<td>-11</td>
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<td>Altery Therapeutics Limited</td>
<td>ATH</td>
<td>Altery Therapeutics Limited (formerly Prana Biotechnology Limited) is an Australian biotechnology company which focuses to commercialise research into Parkinsonian movement disorders, Alzheimer’s disease, Huntington’s disease and other neurodegenerative disorders</td>
<td>28-Mar-00</td>
<td>13.39</td>
<td>0.01</td>
<td>0.05</td>
<td>0.01</td>
<td>-1.66</td>
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<td>Althea Group Holdings Limited</td>
<td>AGH</td>
<td>An independent health technology service provider focused on the sales and distribution of medicinal cannabis products along with the development of a manufacturing and cultivation facility</td>
<td>21-Sep-18</td>
<td>32.34</td>
<td>0.20</td>
<td>1.45</td>
<td>0.18</td>
<td>-6.73</td>
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<td>Amplia Therapeutics Limited</td>
<td>ATX</td>
<td>Amplia Therapeutics Limited (formerly Innate Immunotherapeutics Limited) is an Australian pharmaceutical company that is advancing a pipeline of focal adhesion kinase (FAK) inhibitors for cancer and fibrosis</td>
<td>23-Dec-13</td>
<td>3.99</td>
<td>0.06</td>
<td>0.34</td>
<td>0.06</td>
<td>-4.70</td>
<td>-1</td>
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<td>Analytica Limited</td>
<td>ALT</td>
<td>eHealth devices. PeriCoach system for stress urinary incontinence</td>
<td>25-Oct-00</td>
<td>7.04</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.03</td>
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<td>Anatara Lifesciences Ltd</td>
<td>ANR</td>
<td>Natural, plant-based therapeutics for gastrointestinal diseases</td>
<td>16-Oct-14</td>
<td>11.47</td>
<td>0.19</td>
<td>0.60</td>
<td>0.16</td>
<td>-5.35</td>
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<td>Ansell Limited</td>
<td>ANN</td>
<td>Ansell Limited is involved in the development, manufacturing, sourcing, distribution and sale of gloves and protective personal equipment in the industrial and medical end markets</td>
<td>20-Nov-85</td>
<td>3.330.81</td>
<td>26.88</td>
<td>33.43</td>
<td>24.34</td>
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<td>Anteotech Ltd</td>
<td>ADO</td>
<td>Multi-component coatings for solid phase of immunoassays for biomarker development</td>
<td>07-Apr-00</td>
<td>24.01</td>
<td>0.02</td>
<td>0.04</td>
<td>0.01</td>
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<td>Antisense Therapeutics Limited</td>
<td>ANP</td>
<td>Drug discovery and development. Antisense compounds for multiple sclerosis (MS), Duchenne muscular dystrophy (DMD) and ataxia</td>
<td>20-Dec-01</td>
<td>21.51</td>
<td>0.04</td>
<td>0.15</td>
<td>0.03</td>
<td>-1.38</td>
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<td>Apam Animal Health Limited</td>
<td>AHX</td>
<td>Vet technology for real-time animal health monitoring including on-farm welfare assessments</td>
<td>15-Dec-15</td>
<td>50.99</td>
<td>0.40</td>
<td>0.60</td>
<td>0.40</td>
<td>3.00</td>
<td>13</td>
<td>-25</td>
<td>1.60</td>
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<tr>
<td>Archer Materials Limited</td>
<td>AXE</td>
<td>Archer Materials Limited (formerly Archer Exploration Limited) has focus on the development of the Group's advanced materials with a key focus on integrating graphite and graphene in key growth areas of reliable energy, human health and quantum technology</td>
<td>14-Aug-07</td>
<td>38.24</td>
<td>0.18</td>
<td>0.25</td>
<td>0.07</td>
<td>-1.25</td>
<td>-14</td>
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<td>Auscann Group Holdings Ltd</td>
<td>ACB</td>
<td>Cultivation, manufacture and distribution of medicinal cannabis products. Targeting medications for neuropathic and chronic pain</td>
<td>03-May-89</td>
<td>57.07</td>
<td>0.18</td>
<td>0.53</td>
<td>0.17</td>
<td>-1.96</td>
<td>-9</td>
<td>12</td>
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<td>Australian Pharmaceutical Industries Limited</td>
<td>API</td>
<td>An Australian health and beauty services company. API provides wholesale product delivery services, retail services, marketing programs and business advisory services to customers</td>
<td>16-Jun-97</td>
<td>546.85</td>
<td>1.11</td>
<td>1.57</td>
<td>1.06</td>
<td>11.20</td>
<td>10</td>
<td>49</td>
<td>7.75</td>
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<tr>
<td>Australian Primary Hemp Limited</td>
<td>APH</td>
<td>Australian Primary Hemp Limited (formerly Alchemia Limited) engages in hemp growing and production services as well as handling in all areas of the hemp value chain.</td>
<td>23-Dec-03</td>
<td>4.41</td>
<td>0.09</td>
<td>0.35</td>
<td>0.08</td>
<td>-11.67</td>
<td>-1</td>
<td>5</td>
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<tr>
<td>Avecho Biotechnology Limited</td>
<td>AVE</td>
<td>Avecho Biotechnology Limited (formerly Phosphagenics Limited) is a research-based biotechnology company that discovers and develops new ways to enhance the delivery, effectiveness, and/or tolerability of proven pharmaceutical, consumer and animal health products</td>
<td>11-Aug-93</td>
<td>4.73</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.05</td>
<td>6</td>
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<tr>
<td>Avita Medical Ltd</td>
<td>AVH</td>
<td>Skin regeneration technology for the treatment of wounds, scars and skin defects</td>
<td>11-Aug-93</td>
<td>895.57</td>
<td>0.46</td>
<td>0.87</td>
<td>0.15</td>
<td>-2.76</td>
<td>-16</td>
<td>6</td>
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<tr>
<td>Bard1 Life Sciences Limited</td>
<td>BD1</td>
<td>BARD1 Life Sciences Ltd is an Australian life sciences company focused on developing and commercialising non-invasive diagnostic tests for early detection of cancer</td>
<td>18-Apr-91</td>
<td>31.45</td>
<td>0.02</td>
<td>0.06</td>
<td>0.01</td>
<td>-0.14</td>
<td>-16</td>
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<td>Benitec Biopharma Limited</td>
<td>BLT</td>
<td>Development of a proprietary therapeutic technology platform to provide long-lasting silencing of disease-causing genes</td>
<td>17-Feb-97</td>
<td>9.32</td>
<td>0.03</td>
<td>0.15</td>
<td>0.03</td>
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<td>Bio-Gene Technology Ltd</td>
<td>BGT</td>
<td>Insecticide product development. ‘Qicide’ and ‘FLAVOCIDE’ focused on insect control in agriculture and animal health</td>
<td>29-Nov-17</td>
<td>15.94</td>
<td>0.12</td>
<td>0.32</td>
<td>0.08</td>
<td>-1.55</td>
<td>-7</td>
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<td>Bionomics Limited</td>
<td>BNO</td>
<td>Small molecule developer in areas of cancer and CNS disorders</td>
<td>21-Dec-99</td>
<td>22.33</td>
<td>0.04</td>
<td>0.20</td>
<td>0.03</td>
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<td>-5</td>
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<td>Biotron Limited</td>
<td>BIT</td>
<td>Antiviral drug developer, HIV and hepatitis</td>
<td>24-Jan-01</td>
<td>80.72</td>
<td>0.10</td>
<td>0.19</td>
<td>0.05</td>
<td>-0.58</td>
<td>-17</td>
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<td>Bioxyne Limited</td>
<td>BXN</td>
<td>Gut and immune health probiotic products, including a patented probiotic range</td>
<td>14-Dec-00</td>
<td>6.40</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
<td>-0.22</td>
<td>-5</td>
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<td>Bod Australia Limited</td>
<td>BDA</td>
<td>A vertically integrated developer, manufacturer, distributor and marketer of plant-based natural health supplements and beauty solutions</td>
<td>27-Oct-16</td>
<td>13.71</td>
<td>0.15</td>
<td>0.72</td>
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<td>-8.73</td>
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<td>Botanix Pharmaceuticals Ltd</td>
<td>BOT</td>
<td>Developer of therapeutics for skin diseases including acne, psoriasis, dermatitis</td>
<td>24-Jan-85</td>
<td>68.09</td>
<td>0.07</td>
<td>0.29</td>
<td>0.07</td>
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<td>BPH Energy Ltd</td>
<td>BPH</td>
<td>Commercialising a portfolio of Australian biomedical technologies emerging from collaborative research from universities, medical institutes and hospitals</td>
<td>06-Aug-04</td>
<td>3.34</td>
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<td>BTC Health Ltd</td>
<td>BTC</td>
<td>Bipharmaceutical company focused on product development and commercialisation</td>
<td>29-Aug-00</td>
<td>19.44</td>
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<td>0.16</td>
<td>0.07</td>
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<td>Cann Group Limited</td>
<td>CAN</td>
<td>Research and development and cultivation to facilitate the supply of medicinal cannabis</td>
<td>04-May-17</td>
<td>102.54</td>
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<td>Cannpal Animal Therapeutics Limited</td>
<td>CP1</td>
<td>Pet pharmaceutical company developing cannabinoid-based medicines for cats, dogs and horses</td>
<td>25-Oct-17</td>
<td>10.71</td>
<td>0.10</td>
<td>0.20</td>
<td>0.09</td>
<td>-1.95</td>
<td>-5</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Capitol Health Limited</td>
<td>CAJ</td>
<td>Provider of diagnostic imaging services to the Australian healthcare market</td>
<td>09-Jun-06</td>
<td>189.95</td>
<td>0.25</td>
<td>0.31</td>
<td>0.20</td>
<td>2.35</td>
<td>10</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Cardiex Limited</td>
<td>CDX</td>
<td>Cardiex Limited (formerly AcCor Medical Holdings Limited) is an ASX-listed public company with operations in medical technology, wearable devices, and telehealth, providing digital and device-based solutions for large-scale population health disorders with significant market scale</td>
<td>09-Nov-05</td>
<td>12.05</td>
<td>0.02</td>
<td>0.05</td>
<td>0.02</td>
<td>-0.53</td>
<td>-4</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Catapult Group International Ltd</td>
<td>CAT</td>
<td>A global sports analytics company that provides elite sporting organisations and athletes with detailed, real-time data and analytics to monitor and measure athletes</td>
<td>19-Dec-14</td>
<td>188.99</td>
<td>0.97</td>
<td>2.25</td>
<td>0.77</td>
<td>-4.20</td>
<td>-23</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>CCP Technologies Limited</td>
<td>CT1</td>
<td>CCP Technologies Limited engages in the Internet of Things (IoT) product development and product management in Australia and internationally</td>
<td>08-Oct-87</td>
<td>22.70</td>
<td>0.02</td>
<td>0.05</td>
<td>0.00</td>
<td>-0.22</td>
<td>-9</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Cellmed Limited</td>
<td>CDY</td>
<td>Development of therapies targeting migraine in cancer, fibrosis and chronic inflammatory disease</td>
<td>09-Dec-05</td>
<td>12.07</td>
<td>0.10</td>
<td>0.29</td>
<td>0.10</td>
<td>-4.58</td>
<td>-2</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Clinuvel Pharmaceuticals Limited</td>
<td>CUV</td>
<td>Developer for treatment of UV-related skin disorders. Lead product SCENESSE completed Phase III clinical trials for prevention of phototoxicity in adult patients with erythropoietic protoporphyria (EPP)</td>
<td>13-Feb-01</td>
<td>746.59</td>
<td>14.81</td>
<td>45.88</td>
<td>14.62</td>
<td>31.30</td>
<td>47</td>
<td>118</td>
<td>2.50</td>
</tr>
<tr>
<td>Clover Corporation Limited</td>
<td>CLV</td>
<td>Supplies science-based oil products to the medical food market for infants and children</td>
<td>30-Nov-99</td>
<td>350.91</td>
<td>2.18</td>
<td>3.31</td>
<td>1.65</td>
<td>6.12</td>
<td>36</td>
<td>27</td>
<td>2.38</td>
</tr>
<tr>
<td>Cochlear Limited</td>
<td>COH</td>
<td>Manufacture and sale of cochlear implant system for impaired hearing</td>
<td>04-Dec-95</td>
<td>10,322.06</td>
<td>216.11</td>
<td>254.40</td>
<td>164.00</td>
<td>529.40</td>
<td>41</td>
<td>653</td>
<td>330.00</td>
</tr>
<tr>
<td>Cogstate Ltd</td>
<td>CGS</td>
<td>Diagnosis and therapeutic products for neurodegenerative diseases (also Alzheimer’s and Parkinson’s)</td>
<td>13-Feb-04</td>
<td>68.40</td>
<td>0.40</td>
<td>0.59</td>
<td>0.15</td>
<td>-2.58</td>
<td>-15</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Compumedics Limited</td>
<td>CMP</td>
<td>Designs and manufactures technologies for the diagnosis of sleep disorders, neurodiagnostics solutions and brain research technologies through the Compumedics Neuroscan brand</td>
<td>21-Dec-00</td>
<td>88.58</td>
<td>0.44</td>
<td>0.96</td>
<td>0.32</td>
<td>-1.90</td>
<td>23</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Creso Pharma Limited</td>
<td>CPH</td>
<td>Development and production of cannabis- and hemp-derived therapeutic products and treatments for humans and pets</td>
<td>20-Oct-16</td>
<td>13.72</td>
<td>0.06</td>
<td>0.60</td>
<td>0.07</td>
<td>-10.47</td>
<td>-1</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Cronos Australia Limited</td>
<td>CAU</td>
<td>A medicinal cannabis company that plans to enter the medicinal cannabis market in Australia with both THC and CBD products</td>
<td>07-Nov-19</td>
<td>4.62</td>
<td>0.09</td>
<td>0.42</td>
<td>0.08</td>
<td>-3.40</td>
<td>-3</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>Croplogic Limited</td>
<td>CLI</td>
<td>Technology platform that improves crop yield</td>
<td>12-Sep-17</td>
<td>12.91</td>
<td>0.03</td>
<td>0.09</td>
<td>0.01</td>
<td>-3.34</td>
<td>-1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Cryosite Limited</td>
<td>CTE</td>
<td>Collection, processing and long-term storage of blood stem cells</td>
<td>09-May-02</td>
<td>3.28</td>
<td>0.07</td>
<td>0.07</td>
<td>0.03</td>
<td>4.27</td>
<td>2</td>
<td>-1</td>
<td>-</td>
</tr>
<tr>
<td>CSL Limited</td>
<td>CSL</td>
<td>Development, manufacture and marketing of pharmaceutical and diagnostic products</td>
<td>08-Jun-94</td>
<td>127,362.78</td>
<td>313.83</td>
<td>342.75</td>
<td>189.14</td>
<td>633.83</td>
<td>50</td>
<td>968</td>
<td>407.37</td>
</tr>
<tr>
<td>Cyclopharm Limited</td>
<td>CYC</td>
<td>Manufacturer and distributor of radiopharmaceuticals for imaging technology. Lead product is Technegas, a lung ventilation imaging drug</td>
<td>18-Jan-07</td>
<td>66.50</td>
<td>0.80</td>
<td>1.51</td>
<td>0.85</td>
<td>-4.28</td>
<td>-19</td>
<td>23</td>
<td>1.00</td>
</tr>
<tr>
<td>Cynata Therapeutics Limited</td>
<td>CYP</td>
<td>Stem cell and regenerative medicine platform technology, Cymerus, for production of mesenchymal stem cells</td>
<td>20-Dec-07</td>
<td>77.26</td>
<td>0.73</td>
<td>1.87</td>
<td>0.70</td>
<td>-7.94</td>
<td>-9</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Dimerix Limited</td>
<td>DXB</td>
<td>Development of therapeutic treatments identified using drug discovery platform, Receptor-Heteromer Investigation Technology</td>
<td>04-Feb-93</td>
<td>25.41</td>
<td>0.14</td>
<td>0.18</td>
<td>0.07</td>
<td>-2.72</td>
<td>-5</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Dorsavi Ltd</td>
<td>DVL</td>
<td>Motion analysis device technologies for clinical, elite sports and OHS</td>
<td>11-Dec-13</td>
<td>3.93</td>
<td>0.02</td>
<td>0.10</td>
<td>0.01</td>
<td>-3.89</td>
<td>-0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Ebos Group Limited</td>
<td>EBO</td>
<td>Distributor of healthcare products</td>
<td>06-Dec-13</td>
<td>3,534.27</td>
<td>20.85</td>
<td>24.50</td>
<td>19.70</td>
<td>96.30</td>
<td>22</td>
<td>15</td>
<td>91.74</td>
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<tr>
<td>Issuer Name</td>
<td>ASX</td>
<td>Principal Activity</td>
<td>First List Date</td>
<td>M Cap $m</td>
<td>Last Price $</td>
<td>Yr H $</td>
<td>Yr L $</td>
<td>EPS c</td>
<td>PER</td>
<td>Asset B (c)</td>
<td>Div (c)</td>
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</tr>
<tr>
<td>Ecofibre Limited</td>
<td>EOF</td>
<td>Ecofibre Limited is focused on selectively owning or controlling specific parts of the hemp value chain, in targeted geographies</td>
<td>29-Mar-19</td>
<td>222.73</td>
<td>1.46</td>
<td>3.90</td>
<td>1.45</td>
<td>-2.41</td>
<td>61</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Ellex Medical Lasers Limited</td>
<td>ELX</td>
<td>Production of ophthalmic instruments for treatment of impaired vision</td>
<td>12-Sep-94</td>
<td>88.31</td>
<td>0.58</td>
<td>0.90</td>
<td>0.53</td>
<td>-4.00</td>
<td>-15</td>
<td>26</td>
<td>-</td>
</tr>
<tr>
<td>Esense-Lab Ltd</td>
<td>ESE</td>
<td>Create ‘virtual plants’ with commercial and medicinal applications. First plant targeted for re-engineering is cannabis</td>
<td>14-Feb-17</td>
<td>1.33</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
<td>-1.14</td>
<td>-1</td>
<td>-1</td>
<td>-</td>
</tr>
<tr>
<td>EVE Investments Limited</td>
<td>EVE</td>
<td>An investment company with a focus on technology enterprise investment opportunities</td>
<td>08-Apr-04</td>
<td>14.90</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.13</td>
<td>-3</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Factor Therapeutics Limited</td>
<td>FTT</td>
<td>Development of wound care therapeutics. Lead therapeutic VF-001 is a targeted growth factor being developed to treat venous leg ulcers</td>
<td>19-Mar-04</td>
<td>2.61</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
<td>0.16</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Farmforce Limited</td>
<td>FFC</td>
<td>FarmForce Limited is a contract sales organisation (CSO) offering innovative sales solutions to the Australian pharmaceutical industry</td>
<td>27-Oct-15</td>
<td>7.73</td>
<td>0.06</td>
<td>0.17</td>
<td>0.06</td>
<td>-3.13</td>
<td>-2</td>
<td>-3</td>
<td>-</td>
</tr>
<tr>
<td>Fisher and Paykel Healthcare Corporation Limited</td>
<td>FPH</td>
<td>A New Zealand–based company engaged in designing, developing, manufacturing and marketing of products and systems for use in respiratory care, acute care, surgery and the treatment of obstructive sleep apnea</td>
<td>21-Nov-01</td>
<td>13,318.13</td>
<td>24.05</td>
<td>26.02</td>
<td>14.00</td>
<td>38.95</td>
<td>62</td>
<td>130</td>
<td>24.35</td>
</tr>
<tr>
<td>FYI Resources Limited</td>
<td>FYI</td>
<td>An ASX-listed resources company with a focus on the exploration and development of strategic commodity projects</td>
<td>20-Jan-94</td>
<td>11.92</td>
<td>0.05</td>
<td>0.09</td>
<td>0.04</td>
<td>-1.66</td>
<td>-3</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>G Medical Innovations Holdings Limited</td>
<td>GMV</td>
<td>Remote healthcare monitoring technology. Develops and markets clinical and consumer medical-grade health monitoring solutions</td>
<td>10-May-17</td>
<td>19.86</td>
<td>0.05</td>
<td>0.37</td>
<td>0.04</td>
<td>-5.71</td>
<td>-1</td>
<td>-4</td>
<td>-</td>
</tr>
<tr>
<td>Genetic Signatures Limited</td>
<td>GSS</td>
<td>Molecular diagnostics company focused on development and commercialisation of its proprietary platform technology, 3Base</td>
<td>31-Mar-15</td>
<td>130.94</td>
<td>1.02</td>
<td>1.35</td>
<td>0.91</td>
<td>-3.78</td>
<td>-27</td>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>Genetic Technologies Limited</td>
<td>GTG</td>
<td>Molecular diagnostics specialising in women's health. Lead product BREVAGen plus is a risk assessment test for non-hereditary breast cancer</td>
<td>30-Jul-87</td>
<td>24.38</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.22</td>
<td>-2</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Gi Dynamics Inc</td>
<td>GID</td>
<td>EndoBarrier; endoscopically delivered treatment for the management of obesity and type two diabetes</td>
<td>07-Sep-11</td>
<td>9.13</td>
<td>0.00</td>
<td>0.05</td>
<td>0.01</td>
<td>-1.35</td>
<td>-0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Holista CollTech Limited</td>
<td>HCT</td>
<td>Development and commercialisation of food ingredients and irvine collagen</td>
<td>26-Feb-04</td>
<td>26.90</td>
<td>0.09</td>
<td>0.24</td>
<td>0.04</td>
<td>-0.28</td>
<td>-34</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>ICS Global Limited</td>
<td>ICS</td>
<td>ICS Global Limited is involved in medical billing services. ICS primary operating business is in the United Kingdom</td>
<td>23-Dec-99</td>
<td>19.47</td>
<td>1.83</td>
<td>2.45</td>
<td>0.85</td>
<td>13.49</td>
<td>14</td>
<td>37</td>
<td>9.00</td>
</tr>
<tr>
<td>IDT Australia Limited</td>
<td>IDT</td>
<td>Manufacturer of pharmaceuticals and clinical trial management services</td>
<td>24-Sep-93</td>
<td>26.00</td>
<td>0.10</td>
<td>0.25</td>
<td>0.10</td>
<td>-2.00</td>
<td>-5</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Imagination Biosystems Limited</td>
<td>IBX</td>
<td>Detection and localisation of cancer and other diseases using nano particle technology. Proprietary MagSense bio-imaging detection technology</td>
<td>22-Jun-17</td>
<td>8.69</td>
<td>0.02</td>
<td>0.08</td>
<td>0.02</td>
<td>-1.00</td>
<td>-2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Immuron Limited</td>
<td>IMC</td>
<td>Oral immunotherapy products that target the human gut immune system and gut microbiome</td>
<td>30-Apr-99</td>
<td>20.38</td>
<td>0.09</td>
<td>0.28</td>
<td>0.10</td>
<td>-2.85</td>
<td>-3</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Immutep Limited</td>
<td>IMM</td>
<td>Developer of novel immunotherapy agents treatments for cancer and autoimmune disease. Lead product candidate is etflagimod alpha for breast cancer and melanoma</td>
<td>23-Jun-88</td>
<td>115.53</td>
<td>0.29</td>
<td>0.50</td>
<td>0.21</td>
<td>-4.47</td>
<td>-6</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>ImpediMed Limited</td>
<td>IPD</td>
<td>Diagnostic devices for lymph oedema, muscle wasting and metabolic disorders utilising biopendence technology</td>
<td>24-Oct-07</td>
<td>33.73</td>
<td>0.06</td>
<td>0.34</td>
<td>0.06</td>
<td>-5.75</td>
<td>-1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Impression Healthcare Limited</td>
<td>IHL</td>
<td>A manufacturer and distributor of professionally made home-impression custom-fit dental products</td>
<td>23-May-07</td>
<td>32.28</td>
<td>0.04</td>
<td>0.11</td>
<td>0.02</td>
<td>-0.58</td>
<td>-7</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Imugene Limited</td>
<td>IMU</td>
<td>Developer of HER-2+ gastric and breast cancer immunotherapies</td>
<td>02-Dec-93</td>
<td>77.76</td>
<td>0.02</td>
<td>0.06</td>
<td>0.01</td>
<td>-0.25</td>
<td>-8</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Issuer Name</td>
<td>ASX</td>
<td>Principal Activity</td>
<td>First List Date</td>
<td>M Cap $m</td>
<td>Last Price $</td>
<td>Yr H $</td>
<td>Yr L $</td>
<td>EPS c</td>
<td>PER</td>
<td>Asset B (c)</td>
<td>Div (c)</td>
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</tr>
<tr>
<td>Incitec Pivot Limited</td>
<td>IPL</td>
<td>A manufacturer and distributor of industrial explosives, industrial chemicals and fertilisers to the agriculture and mining industries</td>
<td>28-Jul-03</td>
<td>3,355.96</td>
<td>2.17</td>
<td>3.70</td>
<td>2.03</td>
<td>9.50</td>
<td>23</td>
<td>94</td>
<td>4.70</td>
</tr>
<tr>
<td>Invex Therapeutics Ltd</td>
<td>IXC</td>
<td>A biopharmaceutical company, focused on the research and development of exenatide as an efficacious treatment for neurological conditions</td>
<td>05-Jul-19</td>
<td>28.12</td>
<td>0.80</td>
<td>1.69</td>
<td>0.52</td>
<td>-2.02</td>
<td>-40</td>
<td>19</td>
<td>-</td>
</tr>
<tr>
<td>Invon Limited</td>
<td>IVN</td>
<td>Developer of treatments for inflammatory diseases</td>
<td>15-Feb-10</td>
<td>38.50</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
<td>-0.02</td>
<td>-35</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Intronucleus Limited</td>
<td>IVQ</td>
<td>Provider of bio-analytic solutions including in vitro cell-based testing technologies and image analytics software for use in digital pathology</td>
<td>14-Dec-94</td>
<td>34.71</td>
<td>0.06</td>
<td>0.08</td>
<td>0.05</td>
<td>-1.36</td>
<td>-4</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>IQ3Corp Limited</td>
<td>IQ3</td>
<td>A corporate finance and advisory firm that provides capital raising and corporate advisory services to listed and unlisted companies in the life sciences industry</td>
<td>18-May-15</td>
<td>10.39</td>
<td>0.07</td>
<td>0.29</td>
<td>0.10</td>
<td>-2.28</td>
<td>-3</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Jayex Healthcare Limited</td>
<td>JHL</td>
<td>A provider in the United Kingdom and Australia of integrated healthcare services delivery platforms, incorporating the Company’s four interconnected and proprietary technologies</td>
<td>17-Dec-15</td>
<td>2.29</td>
<td>0.01</td>
<td>0.08</td>
<td>0.01</td>
<td>-0.60</td>
<td>-2</td>
<td>-3</td>
<td>-</td>
</tr>
<tr>
<td>Kazia Therapeutics Limited</td>
<td>KZA</td>
<td>Development of anti-cancer drugs</td>
<td>01-Sep-94</td>
<td>39.69</td>
<td>0.55</td>
<td>0.80</td>
<td>0.32</td>
<td>-15.45</td>
<td>-4</td>
<td>-1</td>
<td>-</td>
</tr>
<tr>
<td>Konakt Limited</td>
<td>KKT</td>
<td>Konakt Limited is the provider of organisational health and risk management return-to-work solutions services in Australia</td>
<td>04-Jun-87</td>
<td>69.43</td>
<td>-</td>
<td>0.67</td>
<td>0.13</td>
<td>1.54</td>
<td>-</td>
<td>-17</td>
<td>1.00</td>
</tr>
<tr>
<td>LBT Innovations Limited</td>
<td>LBT</td>
<td>Automated systems for the preparation, screening, interpretation and streaking of microbiological specimens</td>
<td>31-Jul-06</td>
<td>25.91</td>
<td>0.11</td>
<td>0.25</td>
<td>0.06</td>
<td>-2.65</td>
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<tr>
<td>Lifespot Health Ltd</td>
<td>LSH</td>
<td>Medical diagnostic and monitoring technology using smartphones. BodyTel system for management of chronic diseases and My-Lifespot system for skin disease diagnosis</td>
<td>11-Jan-17</td>
<td>2.63</td>
<td>0.03</td>
<td>0.09</td>
<td>0.03</td>
<td>-2.93</td>
<td>-1</td>
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<tr>
<td>Living Cell Technologies Limited</td>
<td>LCT</td>
<td>Developer of live cell therapy products for treatment of neurological and metabolic disorders</td>
<td>01-Sep-04</td>
<td>8.00</td>
<td>0.01</td>
<td>0.06</td>
<td>0.01</td>
<td>-0.33</td>
<td>-4</td>
<td>1</td>
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<tr>
<td>Mach Technologies Limited</td>
<td>MTT</td>
<td>Imaging IT solutions, 3D printing and holographic projection provider</td>
<td>30-Nov-05</td>
<td>97.81</td>
<td>0.56</td>
<td>0.95</td>
<td>0.17</td>
<td>-1.70</td>
<td>-33</td>
<td>13</td>
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<tr>
<td>Mayne Pharma Group Limited</td>
<td>MYX</td>
<td>Pharmaceutical commercialisation and manufacturing. Development of oral drug delivery systems</td>
<td>29-Jun-07</td>
<td>461.74</td>
<td>0.31</td>
<td>0.74</td>
<td>0.25</td>
<td>-20.44</td>
<td>-1</td>
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<tr>
<td>MedAdvisor Limited</td>
<td>MDR</td>
<td>Mobile and web apps for individuals and carer to manage all aspects of prescription medication use</td>
<td>26-May-11</td>
<td>87.31</td>
<td>0.39</td>
<td>0.61</td>
<td>0.27</td>
<td>-4.22</td>
<td>-9</td>
<td>6</td>
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<tr>
<td>Medibio Limited</td>
<td>MEB</td>
<td>Diagnostic tests for depression and other mental health disorders</td>
<td>29-Jan-01</td>
<td>5.97</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
<td>-1.34</td>
<td>-0</td>
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<tr>
<td>Medical Developments International Limited</td>
<td>MVP</td>
<td>Medical and veterinary equipment including pain management, resuscitation and asthma management products</td>
<td>15-Dec-03</td>
<td>393.64</td>
<td>5.82</td>
<td>11.78</td>
<td>4.25</td>
<td>1.77</td>
<td>329</td>
<td>3</td>
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<tr>
<td>Madigard Limited</td>
<td>MGZ</td>
<td>Retractable safety devices for injection and blood collection</td>
<td>05-Feb-04</td>
<td>3.45</td>
<td>0.02</td>
<td>-</td>
<td>-</td>
<td>0.23</td>
<td>9</td>
<td>0</td>
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<tr>
<td>Madlab Clinical Limited</td>
<td>MDC</td>
<td>Research and development of novel bio-therapeutics to improve health outcomes in chronic diseases such as chronic kidney disease and obesity</td>
<td>14-Jul-15</td>
<td>47.81</td>
<td>0.20</td>
<td>0.56</td>
<td>0.20</td>
<td>-5.39</td>
<td>-4</td>
<td>5</td>
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<tr>
<td>Mamphasys Limited</td>
<td>MEM</td>
<td>Cell and protein separation systems</td>
<td>14-May-07</td>
<td>33.93</td>
<td>0.04</td>
<td>0.10</td>
<td>0.02</td>
<td>-0.21</td>
<td>-20</td>
<td>0</td>
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<tr>
<td>Masoblast Limited</td>
<td>MSB</td>
<td>Commercialisation of adult stem cell technology</td>
<td>16-Dec-04</td>
<td>827.17</td>
<td>1.62</td>
<td>3.21</td>
<td>1.19</td>
<td>-21.34</td>
<td>-8</td>
<td>-9</td>
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<tr>
<td>Mgc Pharmaceuticals Ltd</td>
<td>MXC</td>
<td>Innovator in phytocannabinoid-based medicines within the biopharmaceutical industry</td>
<td>21-Dec-06</td>
<td>26.65</td>
<td>0.02</td>
<td>0.07</td>
<td>0.02</td>
<td>-1.14</td>
<td>-1</td>
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<tr>
<td>Micro-X Limited</td>
<td>MX1</td>
<td>Develops and manufactures a range of mobile X-ray imaging systems for medical applications</td>
<td>22-Dec-15</td>
<td>40.00</td>
<td>0.14</td>
<td>0.40</td>
<td>0.13</td>
<td>-4.64</td>
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<td>Issuer Name</td>
<td>ASX</td>
<td>Principal Activity</td>
<td>First List Date</td>
<td>M Cap $m</td>
<td>Last Price $</td>
<td>Yr H $</td>
<td>Yr L $</td>
<td>EPS c</td>
<td>PER</td>
<td>Asset B (c)</td>
<td>Div (c)</td>
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<tr>
<td>MMJ Group Holdings Limited</td>
<td>MMJ</td>
<td>Aims to commercialise medical cannabis and high-value based cannabis therapeutics</td>
<td>22-Jan-15</td>
<td>19.97</td>
<td>0.08</td>
<td>0.31</td>
<td>0.08</td>
<td>1.13</td>
<td>7</td>
<td>23</td>
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<tr>
<td>Monash IVF Group Limited</td>
<td>MVF</td>
<td>Assisted reproductive technologies, genetic testing and ultrasound services</td>
<td>26-Jun-14</td>
<td>175.66</td>
<td>0.69</td>
<td>1.54</td>
<td>0.70</td>
<td>7.80</td>
<td>9</td>
<td>36</td>
<td>5.10</td>
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<tr>
<td>MyFiziq Limited</td>
<td>MYQ</td>
<td>Smartphone app to provide accurate circumference measurements to assist with management of diabetes and weight</td>
<td>17-Aug-15</td>
<td>16.81</td>
<td>0.14</td>
<td>0.34</td>
<td>0.13</td>
<td>-5.53</td>
<td>-2</td>
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<tr>
<td>Nanollose Limited</td>
<td>NC6</td>
<td>Uses industrial organic and agricultural waste products to produce plant-free cellulose for use in the food and medical industries</td>
<td>18-Oct-15</td>
<td>3.00</td>
<td>0.04</td>
<td>0.13</td>
<td>0.04</td>
<td>-2.07</td>
<td>-2</td>
<td>1</td>
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<tr>
<td>Nanosonics Limited</td>
<td>NAN</td>
<td>Ultrasound probe disinfection - trophon device</td>
<td>17-May-07</td>
<td>1,652.99</td>
<td>6.04</td>
<td>7.73</td>
<td>3.99</td>
<td>4.07</td>
<td>148</td>
<td>34</td>
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<tr>
<td>Neuren Pharmaceuticals Limited</td>
<td>NEU</td>
<td>Biopharmaceutical therapies for brain injury, neurodegenerative and neurodevelopmental disorders</td>
<td>03-Feb-05</td>
<td>159.77</td>
<td>1.45</td>
<td>3.04</td>
<td>0.98</td>
<td>-10.80</td>
<td>-13</td>
<td>14</td>
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<tr>
<td>Neurotech International Limited</td>
<td>NTI</td>
<td>Development and commercialisation of technological solutions for the diagnosis and treatment of neurological conditions. Flagship device is Mente Autism</td>
<td>04-Nov-16</td>
<td>0.70</td>
<td>0.00</td>
<td>0.04</td>
<td>0.00</td>
<td>-2.99</td>
<td>-0</td>
<td>0</td>
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<tr>
<td>Next Science Limited</td>
<td>NXS</td>
<td>Next Science Limited is a medical technology with a research and development centre in Florida, United States</td>
<td>18-Apr-19</td>
<td>154.62</td>
<td>1.62</td>
<td>4.73</td>
<td>1.24</td>
<td>-8.65</td>
<td>-19</td>
<td>10</td>
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<tr>
<td>Noxopharm Limited</td>
<td>NOX</td>
<td>Development of drugs to make radiotherapy more effective. NOX66 is the company’s pipeline product</td>
<td>09-Aug-16</td>
<td>25.13</td>
<td>0.17</td>
<td>0.74</td>
<td>0.16</td>
<td>-11.19</td>
<td>-2</td>
<td>-4</td>
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<tr>
<td>NuFarm Limited</td>
<td>NUF</td>
<td>Crop protection and specialist seed company. Manufacturing and marketing of products to help farmers protect crops against damage</td>
<td>10-Nov-88</td>
<td>1,541.56</td>
<td>4.21</td>
<td>6.94</td>
<td>3.61</td>
<td>10.38</td>
<td>41</td>
<td>181</td>
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<tr>
<td>Nyrada Inc</td>
<td>NYR</td>
<td>A preclinical stage, drug development company. The company specialises in the development of novel small molecule drugs pertaining to the underlying pathological processes involved in cardiovascular, neurodegenerative and chronic inflammatory diseases</td>
<td>16-Jan-20</td>
<td>10.27</td>
<td>0.12</td>
<td>0.31</td>
<td>0.14</td>
<td>-</td>
<td>-</td>
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<tr>
<td>OBJ Limited</td>
<td>OJB</td>
<td>Developer of transdermal drug delivery technology in pharmaceutical and cosmetic industries</td>
<td>29-May-00</td>
<td>27.14</td>
<td>0.30</td>
<td>0.40</td>
<td>0.26</td>
<td>-0.12</td>
<td>-250</td>
<td>0</td>
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<tr>
<td>OncoSI Medical Ltd</td>
<td>OSL</td>
<td>Brachytherapy device that implants a dose of beta radiation into a pancreatic tumour</td>
<td>15-Aug-05</td>
<td>60.55</td>
<td>0.11</td>
<td>0.22</td>
<td>0.02</td>
<td>-1.08</td>
<td>-10</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Oneview Healthcare PLC</td>
<td>OVE</td>
<td>Software platform for patients in hospital and aged care facilities including dietary services and care management</td>
<td>17-Mar-16</td>
<td>15.42</td>
<td>0.09</td>
<td>0.41</td>
<td>0.09</td>
<td>-19.19</td>
<td>-0</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Optima Limited</td>
<td>OPT</td>
<td>Developer of novel therapy OPT-302 for treatment of eye diseases</td>
<td>18-Apr-91</td>
<td>654.05</td>
<td>2.28</td>
<td>4.15</td>
<td>0.57</td>
<td>-6.79</td>
<td>-34</td>
<td>27</td>
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<tr>
<td>Optiscan Imaging Limited</td>
<td>OIL</td>
<td>Microscopic imaging technologies for medical markets</td>
<td>08-Aug-97</td>
<td>7.64</td>
<td>0.02</td>
<td>0.06</td>
<td>0.02</td>
<td>-0.53</td>
<td>-3</td>
<td>0</td>
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<tr>
<td>Oppy Limited</td>
<td>OPL</td>
<td>Oppy Limited (formerly ShareRoot Ltd) provides biopharma and health organisations access to emerging AI-assisted technologies and professional guidance to understand and improve healthcare design, development and delivery</td>
<td>07-Mar-96</td>
<td>2.43</td>
<td>0.08</td>
<td>0.30</td>
<td>0.05</td>
<td>-20.53</td>
<td>-0</td>
<td>0</td>
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<tr>
<td>Orthocell Limited</td>
<td>OCC</td>
<td>Soft tissue cellular therapies for restoration of tendon and cartilage injuries</td>
<td>12-Aug-14</td>
<td>52.64</td>
<td>0.27</td>
<td>0.78</td>
<td>0.11</td>
<td>-4.90</td>
<td>-6</td>
<td>12</td>
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<tr>
<td>Osprey Medical Inc</td>
<td>OSP</td>
<td>Technologies to reduce the amount of dye injected into patients during heart catheterisation procedures - DyeVert PLUS Contrast Reduction System</td>
<td>02-May-12</td>
<td>6.05</td>
<td>0.01</td>
<td>0.17</td>
<td>0.01</td>
<td>-11.94</td>
<td>-4</td>
<td>5</td>
<td>-</td>
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<tr>
<td>Oventus Medical Limited</td>
<td>OVN</td>
<td>Medical devices for sleep apnoea treatment incorporating Oventus Airway Technology</td>
<td>19-Jul-16</td>
<td>45.69</td>
<td>0.35</td>
<td>0.94</td>
<td>0.20</td>
<td>-7.96</td>
<td>-4</td>
<td>5</td>
<td>-</td>
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<tr>
<td>Painchak Ltd</td>
<td>PCK</td>
<td>Smartphone app to provide pain assessment for those who are unable to communicate</td>
<td>01-May-12</td>
<td>91.13</td>
<td>0.09</td>
<td>0.37</td>
<td>0.03</td>
<td>-1.26</td>
<td>-7</td>
<td>1</td>
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<tr>
<td>Issuer Name</td>
<td>ASX</td>
<td>Principal Activity</td>
<td>First List Date</td>
<td>M Cap $m</td>
<td>Last Price  $</td>
<td>Yr H $</td>
<td>Yr L $</td>
<td>EPS c</td>
<td>PER</td>
<td>Asset B (c)</td>
<td>Div (c)</td>
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<tr>
<td>Palla Pharma Limited</td>
<td>PAL</td>
<td>Palla Pharma Limited (formerly TPI Enterprises Limited) is involved in the production and distribution of narcotic raw material for supply to international pharmaceutical markets, and the production and distribution of poppy seed for supply to international culinary markets</td>
<td>13-Aug-15</td>
<td>88.16</td>
<td>0.65</td>
<td>1.39</td>
<td>0.69</td>
<td>-8.66</td>
<td>-8</td>
<td>43</td>
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<tr>
<td>Papyrus Australia Limited</td>
<td>PPY</td>
<td>Sustainable technology that produces products from the trunk of the banana palm</td>
<td>15-Apr-05</td>
<td>3.35</td>
<td>0.01</td>
<td>0.03</td>
<td>0.00</td>
<td>-0.08</td>
<td>-15</td>
<td>0</td>
<td>-</td>
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<tr>
<td>Paradigm Biopharmaceuticals Limited</td>
<td>PAR</td>
<td>Biopharmaceutical company focused on repurposing the drug 'pentosan polysulphate sodium' for the treatment of inflammation</td>
<td>19-Aug-15</td>
<td>419.37</td>
<td>1.98</td>
<td>4.50</td>
<td>1.26</td>
<td>-10.50</td>
<td>-19</td>
<td>39</td>
<td>-</td>
</tr>
<tr>
<td>Paragon Care Limited</td>
<td>PGC</td>
<td>Provider of medical equipment, devices and consumables to the healthcare market</td>
<td>15-Oct-99</td>
<td>57.44</td>
<td>0.17</td>
<td>0.52</td>
<td>0.15</td>
<td>-2.71</td>
<td>-6</td>
<td>-8</td>
<td>110</td>
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<tr>
<td>Patrys Limited</td>
<td>PAB</td>
<td>Developing novel antibody therapies for a range of oncology indications</td>
<td>13-Jul-07</td>
<td>15.02</td>
<td>0.01</td>
<td>0.04</td>
<td>0.01</td>
<td>-0.28</td>
<td>-4</td>
<td>0</td>
<td>-</td>
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<tr>
<td>Pharmast Limited</td>
<td>PAA</td>
<td>Developer of targeted cancer therapeutics for humans and animals. Specialise in repurposing marketed drugs</td>
<td>05-Oct-01</td>
<td>22.65</td>
<td>0.07</td>
<td>0.17</td>
<td>0.03</td>
<td>-0.86</td>
<td>-8</td>
<td>2</td>
<td>-</td>
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<tr>
<td>Pharmaxis Ltd</td>
<td>PKS</td>
<td>Drug discovery to treat inflammatory and fibrotic diseases using amino oxidase inhibitor chemistry platform</td>
<td>10-Nov-03</td>
<td>31.18</td>
<td>0.08</td>
<td>0.31</td>
<td>0.08</td>
<td>-4.47</td>
<td>-2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>PolyNove Limited</td>
<td>PNV</td>
<td>Developer of biodegradable polymers for use in medical devices. Lead product is NovoSorb technology in the treatment of burns, surgical wounds and negative pressure wound therapy</td>
<td>26-Nov-98</td>
<td>1,117.24</td>
<td>1.79</td>
<td>3.29</td>
<td>0.70</td>
<td>-0.56</td>
<td>-319</td>
<td>4</td>
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<tr>
<td>Precise Therapeutics Limited</td>
<td>PTX</td>
<td>Developer of anti-cancer drugs. Lead drug candidate PTX-200</td>
<td>19-Dec-86</td>
<td>11.83</td>
<td>0.03</td>
<td>0.15</td>
<td>0.03</td>
<td>-1.23</td>
<td>-3</td>
<td>2</td>
<td>-</td>
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<tr>
<td>Pro Medicus Limited</td>
<td>PME</td>
<td>Provider of radiology information systems and diagnostic imaging</td>
<td>10-Oct-00</td>
<td>1,752.54</td>
<td>16.62</td>
<td>38.39</td>
<td>14.60</td>
<td>21.33</td>
<td>78</td>
<td>28</td>
<td>10.50</td>
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<tr>
<td>Probactec Limited</td>
<td>PBP</td>
<td>Manufacturer, marketer and distributor of prescription and over-the-counter pharmaceuticals, medicines and consumer health products</td>
<td>14-Nov-06</td>
<td>142.08</td>
<td>1.93</td>
<td>2.48</td>
<td>1.50</td>
<td>-1.77</td>
<td>-109</td>
<td>21</td>
<td>4.00</td>
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<tr>
<td>Proteomics International Laboratories Ltd</td>
<td>PIQ</td>
<td>Focused on proteomics. Developed a platform technology for discovering diagnostic tests based on the differences in the protein make-up of people</td>
<td>16-Apr-15</td>
<td>20.67</td>
<td>0.23</td>
<td>0.44</td>
<td>0.23</td>
<td>-1.68</td>
<td>-13</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>PYC Therapeutics Limited</td>
<td>PYC</td>
<td>Development of intracellular biological therapeutics using its Functional Penetrating Phylomers (PPP)</td>
<td>30-Mar-05</td>
<td>149.50</td>
<td>0.05</td>
<td>0.07</td>
<td>0.02</td>
<td>-0.22</td>
<td>-22</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Race Oncology Ltd</td>
<td>RAC</td>
<td>Development of chemotherapy drug Bisantrene for cancer, particularly Acute Myeloid Leukaemia</td>
<td>13-Jul-16</td>
<td>37.14</td>
<td>0.31</td>
<td>0.49</td>
<td>0.04</td>
<td>-3.48</td>
<td>-9</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Recce Pharmaceuticals Ltd</td>
<td>RCE</td>
<td>Development of synthetic antibiotics to address the threat of antibiotic resistance</td>
<td>15-Jan-16</td>
<td>38.64</td>
<td>0.28</td>
<td>0.60</td>
<td>0.15</td>
<td>-2.88</td>
<td>-10</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Regeneus Ltd</td>
<td>RGS</td>
<td>Cellular therapies focusing on osteoarthritis and other inflammatory conditions, cancer and wound healing</td>
<td>19-Sep-13</td>
<td>18.06</td>
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<td>ResApp Health Limited</td>
<td>RAP</td>
<td>Developer of mobile medical applications for the diagnosis and management of respiratory diseases</td>
<td>12-Jan-05</td>
<td>66.07</td>
<td>0.09</td>
<td>0.42</td>
<td>0.06</td>
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<td>-10</td>
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<tr>
<td>ResMed Inc</td>
<td>RMD</td>
<td>Developer, manufacturer and distributor of medical equipment for diagnosis and management of sleep-disordered breathing</td>
<td>25-Nov-99</td>
<td>8,834.55</td>
<td>22.80</td>
<td>26.60</td>
<td>13.56</td>
<td>45.28</td>
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<td>Resonance Health Limited</td>
<td>RHT</td>
<td>Non-invasive medical imaging software services. MRI for liver fat, liver iron concentration, iron levels in bone marrow</td>
<td>23-Oct-87</td>
<td>49.58</td>
<td>0.11</td>
<td>0.28</td>
<td>0.07</td>
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<td>-58</td>
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<td>Respiri Limited</td>
<td>RSH</td>
<td>Devices for detecting and monitoring respiratory disorders</td>
<td>14-Jul-00</td>
<td>41.16</td>
<td>0.07</td>
<td>0.18</td>
<td>0.06</td>
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<td>-7</td>
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<td>Rhinomed Limited</td>
<td>RNO</td>
<td>Nasal, respiratory and breathing technologies. Mute, a nasal device to assist with breathing through the nose, and Turbine, a nasal dilator</td>
<td>21-Sep-07</td>
<td>18.61</td>
<td>0.10</td>
<td>0.41</td>
<td>0.11</td>
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<td>-2</td>
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<td>Rhythm Biosciences Limited</td>
<td>RHY</td>
<td>Development of an affordable blood test for the early detection of colorectal cancer 'ColoSTAT'</td>
<td>07-Dec-17</td>
<td>7.96</td>
<td>0.07</td>
<td>0.22</td>
<td>0.06</td>
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<tr>
<td>Ridley Corporation Limited</td>
<td>RIC</td>
<td>Production of animal nutrition solutions including feed ingredients, and marketing and provision of rural products</td>
<td>13-Aug-87</td>
<td>264.57</td>
<td>0.84</td>
<td>1.41</td>
<td>0.78</td>
<td>2.50</td>
<td>34</td>
<td>59</td>
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<tr>
<td>Roots Sustainable Agricultural Technologies Ltd</td>
<td>ROO</td>
<td>Developing and commercialising technologies to address problems faced by agriculture including plant climate management and shortage of water for irrigation</td>
<td>07-Dec-17</td>
<td>2.56</td>
<td>0.02</td>
<td>0.12</td>
<td>0.02</td>
<td>-4.42</td>
<td>-0</td>
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<tr>
<td>Roto-Gro International Limited</td>
<td>RGI</td>
<td>Automated farming system for producing high-quality plants indoors, including medicinal cannabis, pharmaceuticals and food products</td>
<td>10-Feb-17</td>
<td>11.12</td>
<td>0.07</td>
<td>0.31</td>
<td>0.08</td>
<td>-6.60</td>
<td>-1</td>
<td>2</td>
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<td>Scdev Ltd</td>
<td>SDO</td>
<td>Research, development and commercialisation of polymers for dairy and food product manufacturing</td>
<td>02-May-02</td>
<td>70.43</td>
<td>0.52</td>
<td>0.95</td>
<td>0.06</td>
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<td>-19</td>
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<td>SDI Limited</td>
<td>SDI</td>
<td>Research and development, manufacturing and marketing of specialist dental materials</td>
<td>07-Nov-85</td>
<td>95.09</td>
<td>0.78</td>
<td>1.05</td>
<td>0.69</td>
<td>6.48</td>
<td>12</td>
<td>42</td>
<td>2.70</td>
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<td>Sienna Cancer Diagnostics Limited</td>
<td>SDIX</td>
<td>Clinical translation of biomarkers using novel diagnostic technologies. First on-market product is based on technology for the detection of the biomarker telomerase</td>
<td>03-Aug-17</td>
<td>11.85</td>
<td>0.03</td>
<td>0.08</td>
<td>0.03</td>
<td>-1.13</td>
<td>-3</td>
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<tr>
<td>Sigma Healthcare Limited</td>
<td>SIG</td>
<td>A full line wholesale and distribution of pharmaceutical products through the pharmacy and grocery sales channels</td>
<td>30-Oct-02</td>
<td>529.68</td>
<td>0.52</td>
<td>0.75</td>
<td>0.48</td>
<td>2.70</td>
<td>19</td>
<td>34</td>
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<td>Simavita Limited</td>
<td>SVA</td>
<td>Wearable and disposable technologies for elderly incontinence</td>
<td>20-Feb-14</td>
<td>9.74</td>
<td>0.02</td>
<td>0.09</td>
<td>0.01</td>
<td>-1.27</td>
<td>-1</td>
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<tr>
<td>SomnoMed Limited</td>
<td>SOM</td>
<td>Specialises in products for sleep apnoea. Lead product SomnoMed mandibular advancement splint (MAS)</td>
<td>27-Aug-04</td>
<td>153.87</td>
<td>2.38</td>
<td>3.44</td>
<td>1.40</td>
<td>-5.58</td>
<td>-43</td>
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<tr>
<td>Sonic Healthcare Limited</td>
<td>SHL</td>
<td>Laboratory medicine/pathology, radiology/diagnostic imaging and primary care medical services</td>
<td>30-Apr-87</td>
<td>13,106.77</td>
<td>29.01</td>
<td>32.07</td>
<td>24.00</td>
<td>124.00</td>
<td>23</td>
<td>-267</td>
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<td>Starpharma Holdings Limited</td>
<td>SPL</td>
<td>Developer of dendrimer products. Lead product VivaGel for bacterial vaginosis. Dendrimer-enhanced docetaxel in clinical development for solid tumours</td>
<td>28-Sep-00</td>
<td>353.92</td>
<td>0.95</td>
<td>1.45</td>
<td>0.89</td>
<td>-3.62</td>
<td>-26</td>
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<td>Stemcell United Limited</td>
<td>SCU</td>
<td>Growth, reproduction and extraction of plants stem cells for medical and healthcare products</td>
<td>13-Jun-00</td>
<td>7.70</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
<td>-0.33</td>
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<td>Suda Pharmaceuticals Ltd</td>
<td>SUD</td>
<td>Oro-mucosal sprays for drug delivery treatment of off-patient drugs</td>
<td>24-Jan-02</td>
<td>7.11</td>
<td>0.05</td>
<td>0.19</td>
<td>0.05</td>
<td>-12.41</td>
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<tr>
<td>TALi Digital Limited</td>
<td>NHL</td>
<td>TALi Digital Limited (formerly Novita Healthcare Limited) is a tech company focused on development of software solutions to address neurological conditions in early childhood through its TALi platform</td>
<td>23-Sep-04</td>
<td>13.49</td>
<td>0.02</td>
<td>0.11</td>
<td>0.01</td>
<td>-0.56</td>
<td>-3</td>
<td>1</td>
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</tr>
<tr>
<td>Tali Digital Limited</td>
<td>TDI</td>
<td>Cognitive training program for children with attention difficulties</td>
<td>23-Sep-04</td>
<td>13.49</td>
<td>0.02</td>
<td>0.11</td>
<td>0.01</td>
<td>-0.56</td>
<td>-3</td>
<td>1</td>
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</tr>
<tr>
<td>Tbg Diagnostics Limited</td>
<td>TDL</td>
<td>Development, manufacture and marketing of molecular diagnostic kits, instruments and services</td>
<td>22-Dec-95</td>
<td>5.66</td>
<td>0.03</td>
<td>0.05</td>
<td>0.02</td>
<td>0.35</td>
<td>7</td>
<td>6</td>
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<tr>
<td>Telix Pharmaceuticals Limited</td>
<td>TLX</td>
<td>Development and commercialisation of molecularly-targeted radiation in the management of prostate, renal and glioblastoma (brain) cancer</td>
<td>15-Nov-17</td>
<td>276.25</td>
<td>1.13</td>
<td>1.95</td>
<td>0.65</td>
<td>-11.94</td>
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<tr>
<td>THC Global Group Limited</td>
<td>THC</td>
<td>Development and delivery of medical cannabis</td>
<td>04-May-17</td>
<td>35.90</td>
<td>0.22</td>
<td>0.63</td>
<td>0.25</td>
<td>-8.78</td>
<td>-2</td>
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<tr>
<td>Total Brain Limited</td>
<td>TTB</td>
<td>Provider of international database for human brain function</td>
<td>28-Aug-01</td>
<td>37.91</td>
<td>0.35</td>
<td>1.20</td>
<td>0.19</td>
<td>-53.50</td>
<td>-1</td>
<td>100</td>
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<tr>
<td>Universal Biosensors Inc</td>
<td>UBI</td>
<td>Specialist medical in-vitro diagnostic tests for point-of-care, blood test C-reactive protein test</td>
<td>13-Dec-06</td>
<td>28.39</td>
<td>0.16</td>
<td>0.26</td>
<td>0.15</td>
<td>-2.73</td>
<td>-6</td>
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<td>Uscom Limited</td>
<td>UCM</td>
<td>Non-invasive medical devices in the field of cardiac, vascular and pulmonary monitoring</td>
<td>10-Dec-03</td>
<td>38.16</td>
<td>0.24</td>
<td>0.53</td>
<td>0.10</td>
<td>-1.60</td>
<td>-15</td>
<td>2</td>
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<tr>
<td>Vectus Biosystems Limited</td>
<td>VBS</td>
<td>Drug discovery and development company. Lead product VR0004 has anti-hypertensive properties, and anti-fibrotic activity in the heart and kidneys</td>
<td>23-Feb-16</td>
<td>13.84</td>
<td>0.59</td>
<td>0.85</td>
<td>0.33</td>
<td>-9.14</td>
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<tr>
<td>Issuer Name</td>
<td>ASX</td>
<td>Principal Activity</td>
<td>First List Date</td>
<td>M Cap $m</td>
<td>Last Price $</td>
<td>Yr H $</td>
<td>Yr L $</td>
<td>EPS c</td>
<td>PER</td>
<td>Asset B (c)</td>
<td>Div (c)</td>
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</tr>
<tr>
<td>Virtus Health Limited</td>
<td>VRT</td>
<td>Assisted reproductive services, diagnostics, genetic testing and day hospitals</td>
<td>11-Jun-13</td>
<td>266.09</td>
<td>3.09</td>
<td>5.28</td>
<td>3.26</td>
<td>35.81</td>
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<tr>
<td>Vita Life Sciences Limited.</td>
<td>VLS</td>
<td>A pharmaceutical and healthcare company, mainly engaged in formulating, packaging, sales and distribution of over the counter (OTC) medicines, health supplements, vitamins and investments</td>
<td>23-Aug-07</td>
<td>35.48</td>
<td>0.65</td>
<td>0.84</td>
<td>0.56</td>
<td>5.73</td>
<td>11</td>
<td>38</td>
<td>3.43</td>
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<tr>
<td>Volpara Health Technologies Limited</td>
<td>VHT</td>
<td>Research, development and manufacturing company that provides digital health solutions for personalised breast cancer screening</td>
<td>27-Apr-16</td>
<td>250.16</td>
<td>1.15</td>
<td>2.17</td>
<td>1.00</td>
<td>-7.38</td>
<td>-16</td>
<td>-16</td>
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<tr>
<td>Wattle Health Australia Limited</td>
<td>WHA</td>
<td>Health and wellness products with scientific and nutritional benefit</td>
<td>15-Mar-17</td>
<td>96.65</td>
<td>0.49</td>
<td>0.87</td>
<td>0.32</td>
<td>-7.77</td>
<td>-6</td>
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<td>XRF Scientific Limited</td>
<td>XRF</td>
<td>Manufacturer and marketer of instrumentation for scientific industries, including commercial laboratories</td>
<td>31-Oct-06</td>
<td>23.42</td>
<td>0.17</td>
<td>0.28</td>
<td>0.15</td>
<td>2.00</td>
<td>9</td>
<td>14</td>
<td>1.00</td>
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<tr>
<td>Zelira Therapeutics Limited</td>
<td>ZLD</td>
<td>Investing in research and clinical trials to study medical cannabis for a variety of ailments</td>
<td>28-Jul-03</td>
<td>34.79</td>
<td>0.03</td>
<td>0.09</td>
<td>0.04</td>
<td>-0.54</td>
<td>-6</td>
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Data current at 13 March 2020. This information has been collated by company reports released to the ASX and contains general information only. It does not constitute financial product advice. Evans and Partners Pty Ltd and AusBiotech make no assertions as to the merits of any investment opportunities in the companies referred to in these articles.

James Fletcher can be contacted at jfletcher@evansandpartners.com.au or on 03 9235 9716.
This quarter’s top ASX healthcare sector performers

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<th>ASX Code</th>
<th>Company Name</th>
<th>Last Price</th>
<th>Quarter Return %</th>
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<tr>
<td>RAC</td>
<td>Race Oncology Ltd</td>
<td>$0.30</td>
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<tr>
<td>UCM</td>
<td>Uscom Limited</td>
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<td>BIT</td>
<td>Biotron Limited</td>
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<td>CT1</td>
<td>Ccp Technologies Ltd</td>
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<td>CAN</td>
<td>Cann Group Ltd</td>
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<td>CTE</td>
<td>Cryosite Limited</td>
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<td>AXE</td>
<td>Archer Materials</td>
<td>$0.18</td>
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<td>GTG</td>
<td>Genetic Technologies</td>
<td>$0.01</td>
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<td>AFP</td>
<td>Aft Pharmaceuticals</td>
<td>$3.60</td>
<td>24</td>
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<tr>
<td>HCT</td>
<td>Holista CollTech Ltd</td>
<td>$0.09</td>
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<tr>
<td>IMI</td>
<td>Immutep Ltd</td>
<td>$0.27</td>
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<tr>
<td>FPH</td>
<td>Fisher &amp; Paykel H.</td>
<td>$22.92</td>
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<td>DXB</td>
<td>Dimerix Ltd</td>
<td>$0.13</td>
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<tr>
<td>WHA</td>
<td>Wattle Health Au Ltd</td>
<td>$0.49</td>
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<tr>
<td>CGS</td>
<td>Cogstate Ltd</td>
<td>$0.35</td>
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<tr>
<td>MDR</td>
<td>Medadvisor Limited</td>
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<td>MXC</td>
<td>Invex Ther</td>
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<tr>
<td>CSL</td>
<td>CSL Limited</td>
<td>$293.87</td>
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<tr>
<td>VBS</td>
<td>Vectus Biosystems</td>
<td>$0.59</td>
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<tr>
<td>CAJ</td>
<td>Capitol Health</td>
<td>$0.24</td>
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This year’s top ASX healthcare sector performers

<table>
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<th>ASX Code</th>
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<th>Year Return %</th>
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<td>SDV</td>
<td>Scidev Ltd</td>
<td>$0.51</td>
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<tr>
<td>RAC</td>
<td>Race Oncology Ltd</td>
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<tr>
<td>KKT</td>
<td>Konekt Limited</td>
<td>$0.66</td>
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</tr>
<tr>
<td>CT1</td>
<td>Ccp Technologies Ltd</td>
<td>$0.02</td>
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<tr>
<td>M7T</td>
<td>Mach7 Tech Limited</td>
<td>$0.55</td>
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<td>OPT</td>
<td>Opthea Limited</td>
<td>$2.25</td>
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<td>AVH</td>
<td>Avita Medical Ltd</td>
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<tr>
<td>PNV</td>
<td>Polynovo Limited</td>
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<tr>
<td>CLI</td>
<td>Crologic</td>
<td>$0.03</td>
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<tr>
<td>AXE</td>
<td>Archer Materials</td>
<td>$0.18</td>
<td>133</td>
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<tr>
<td>PAA</td>
<td>Pharmaust Limited</td>
<td>$0.07</td>
<td>122</td>
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<tr>
<td>PCK</td>
<td>Painchek Ltd</td>
<td>$0.08</td>
<td>122</td>
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<tr>
<td>IHL</td>
<td>Imhealth Ltd</td>
<td>$0.04</td>
<td>100</td>
</tr>
<tr>
<td>MEM</td>
<td>Memphsysys Ltd</td>
<td>$0.04</td>
<td>100</td>
</tr>
<tr>
<td>PYC</td>
<td>PYC Therapeutics</td>
<td>$0.05</td>
<td>100</td>
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<tr>
<td>ICS</td>
<td>ICSGlobal Limited</td>
<td>$1.67</td>
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<td>LBT</td>
<td>LBT Innovations</td>
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<td>OCC</td>
<td>Orthocell Limited</td>
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<td>AFP</td>
<td>Aft Pharmaceuticals</td>
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<tr>
<td>RCE</td>
<td>Recce Pharmaceutical</td>
<td>$0.26</td>
<td>73</td>
</tr>
</tbody>
</table>

Data current at 13 March 2020. This information has been collated by company reports released to the ASX and contains general information only. It does not constitute financial product advice. Evans and Partners Pty Ltd and AusBiotech make no assertions as to the merits of any investment opportunities in the companies referred to in these articles. James Fletcher can be contacted at jfletcher@evansandpartners.com.au or on 03 9235 9716.
Scinogy began in Victoria in 2016. How would you describe the company today?

The founders of Scinogy collectively have more than 100 years’ product design experience that, together with our knowledge of cell manufacturing, has led to the development of a revolutionary technology allowing clinical researchers to progress their new therapies.

To be successful against global competitors, it meant that we had to have the right high-quality product, be nimble and be able to deliver at a competitive price.

Scinogy is intentionally lean, with a philosophy of strategic outsourcing. We avoided spending capital on infrastructure, instead choosing to leverage the expertise at the Monash Health Translation Precinct (MHTP) and Planet Innovation’s ISO 13485 manufacturing facility.

Together with our distribution partner, Thermo Fisher Scientific, we are now delivering our products to a growing range of international clients. Scinogy’s first product, Rotea, is changing the way cell therapies are manufactured. It is exciting to see the growing range of therapies for diseases like cancer, stroke and cerebral palsy, knowing that Rotea will help make them more accessible.

How does Melbourne’s ecosystem support Scinogy’s mission to optimise the manufacturing of cell therapies?

Companies recognise that the manual processes being used to develop cell therapies are not easily scalable, transferable or commercially viable.

We are working very closely with the Hudson Institute of Medical Research to characterise and optimise the performance of Rotea.

This partnership was crucial for us to demonstrate the significant cost reductions with manufacturing cell therapies using Rotea, while still meeting the high-quality clinical standards required.

The Hudson Institute is a leader in stem cell research, and part of the MHTP. It’s a unique health hub, having a full research pipeline on-site, from basic research right through to clinical trials. Having access to such resources right on our doorstep has been crucial.

Victoria also has world-class manufacturing services that allow us to secure production facilities locally. The combination of research and manufacturing capabilities has been vital to the commercialisation of Rotea and the future of Scinogy.

What role does government play in fostering an innovative business environment?

The Victorian Government is an important partner for Scinogy. Its previous support for the sector has meant that critical facilities, such as the MHTP, were available to us. Together with Planet Innovation, it has supported access to a new clean room for the manufacturing of Rotea’s single-use sterile kits.

Through its Boost your Business program, we have been supported to access further specialist R&D skills with Monash University.

The Victorian Government remains in close contact with us as we grow as a company. It has a long history of supporting the development of innovative health products, including regenerative medicine.

This has been an important part of our decision in choosing Melbourne as the right place to base and grow Scinogy’s operations.
Melbourne is a highly sought-after destination by global and local medical technology companies. We offer access to a skilled design and manufacturing supply chain, key R&D infrastructure and a favourable clinical environment to validate your products - all in one of the world’s most liveable cities.

Find out how our medical technology ecosystem and the Victorian Government can work with you to transform your idea or discovery into a market ready product!

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djpr.vic.gov.au/biotech
• Single point of access for all regulatory advice for Australia
• Speedy start-up time for Australian clinical trials (Phase I–IV) – including drugs, devices, GMO/cell therapies and AI/Machine Learning studies
• Ethics outcomes within 30 days of committee meeting (Phase II–IV)
• Start-up to full study management options
• Ethics approval from single HREC for all Australian states (except Northern Territory)
• St Vincent’s Hospital Melbourne not required to be a participating site
• Post approval management services that facilitate all post-approval project submission and ongoing ethics management

ST VINCENT’S HREC MEETING EVERY 2 WEEKS!

We are proud to be part of the VCT Gateway

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