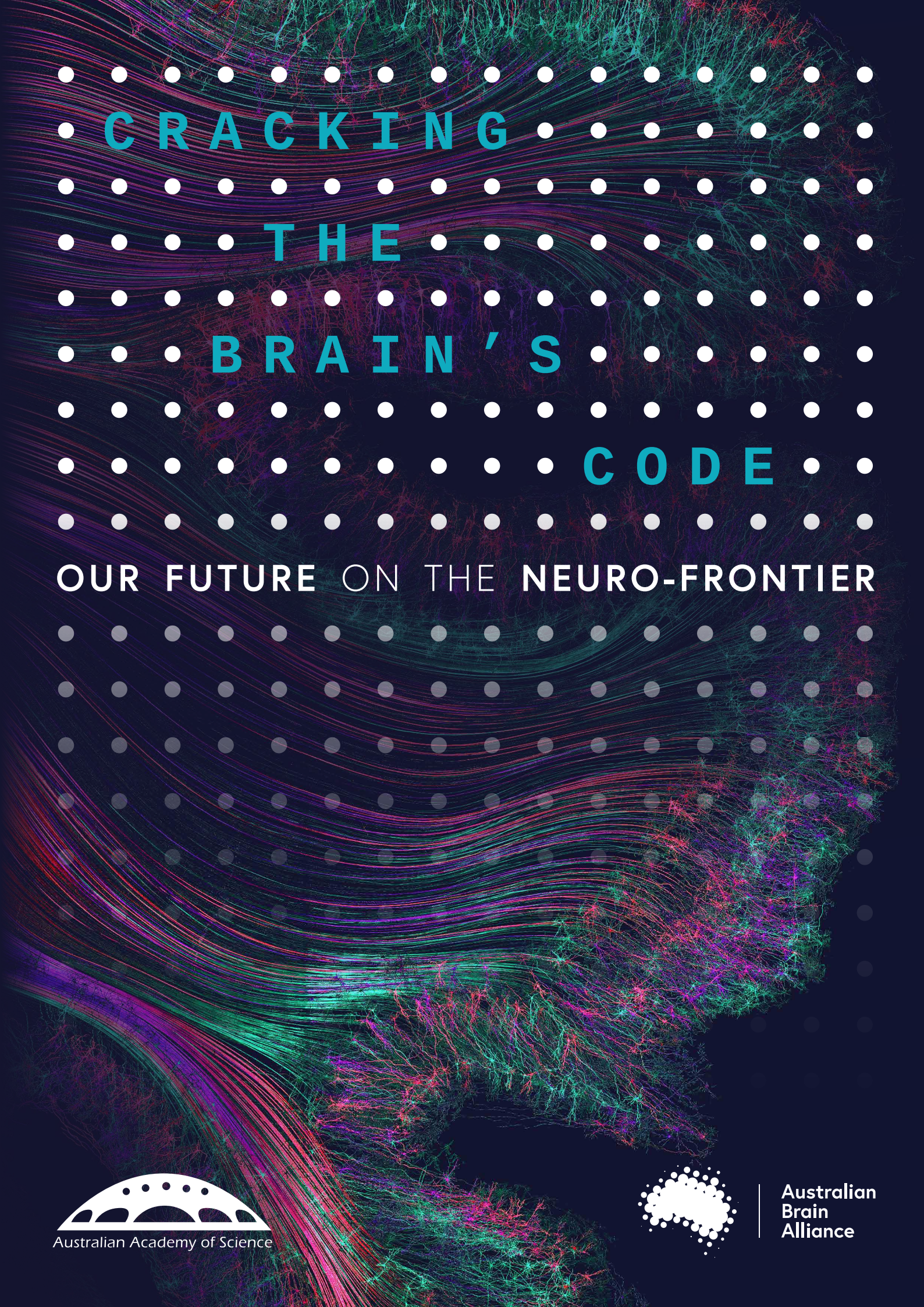
CRACKING THE BRAIN'S CODE

OUR FUTURE ON THE NEURO-FRONTIER



Australian Academy of Science

Australian Brain Alliance

We, the leaders of the brain research community in Australia, are proud to share our passion and ambition with Australians.

Every day, we are reminded of the privilege of doing science in an era of such astounding possibility.

We work closely with patients and their families. We share their stories. We understand the stakes.

We collaborate with colleagues across the world tackling fundamental questions in bold and ingenious ways.

We welcome young researchers into our field, the best and brightest of this generation, all of them seeing in brain research their best opportunity to do great things.

All of these experiences inform our vision of Australia as a nation on the neuro-frontier: conquering disease, building jobs, and helping to shape the science that shapes the world.

We invite you to join us on the neuro-frontier, in our mission to Crack the Brain's Code.

Professor Linda Richards FAA FAHMS

Australian Academy of Science

Australasian Neuroscience Society

APS Australian Psychological Society

The University Of Queensland Australia

UNSW

Australian National University
The John Curtin School of Medical Research

Western Sydney University

James Cook University Australia

The University of Newcastle Australia

Deakin University

UTS University of Technology Sydney

The University of Western Australia

RMIT University

Macquarie University

Swinburne

Australian Research Council Centre of Excellence for Integrative Brain Function

The University of Melbourne

Melbourne Neuroscience Institute

Menzies Health Institute Queensland

Griffith University

Flinders University

Monash University

Monash Institute of Clinical and Cognitive Neurosciences

Murdoch Childrens Research Institute

NeuRA Discover. Conquer. Cure.

QIMR Berghofer Medical Research Institute

HMRI

The University Of Queensland QBI
Queensland Brain Institute

ARMI Australian Regenerative Medicine Institute

The University of Sydney Brain and Mind Centre

The Florey Institute of Neuroscience & Mental Health

Harry Perkins Institute of Medical Research

perron institute for neurological and translational science

The Psychology Foundation of Australia

saluda MEDICAL

Bionic Vision Technologies

IBM Research

EMOTIV

THE GREAT MISSION OF OUR TIME

The science of the brain will define the twenty-first century.

The human brain is a complex system: the most sophisticated machine that science has yet encountered. For thousands of years, its workings have been locked in obscurity.

Today, we are discovering just how much we have still to learn.

In the meantime, we live with the costs of conditions we struggle to treat.

Survival rates for brain cancer have not improved in the last three decades.

Dementia can be detected, not prevented or cured.

Progress against mental illness remains frustratingly slow.

And we still don't understand the basic principles of how the brain encodes, stores and retrieves information.

It is a measure of the scale of the challenge – not the need or commitment in the community.

BUT THE HORIZON OF POSSIBILITY HAS SHIFTED.

Decades of patient investment in basic science and breakthrough technologies have pulled the answers to fundamental questions within reach.

People across the globe – governments, industry and communities – are assembling the critical mass to transform the way that we research.

Brain science is becoming Big Science: pursuing ambitious missions with the focus and commitment that sent humans to the Moon.

WE ARE BEGINNING TO CRACK THE BRAIN'S CODE.

THE GLOBAL BRAINSTORM

At birth, the human brain contains approximately 100 billion neurons. By the age of three, some thousand trillion synapses – or connections – are formed. Every brain is unique: a product of our genes, our experiences and our environment.

Much of what we know about the brain was uncovered in recent decades. Tackling the challenge simply wasn't possible before.

In our lifetimes, we have seen significant advances, including the first psychiatric drugs, the ground-breaking Cochlear implant and the identification of the genes responsible for Epilepsy and Huntington's disease.

Brilliant scientists, amongst them 40 Nobel Laureates, developed technologies to examine the brain at different levels: some looking at the structures of the cells, some looking at the way we form connections, and some looking at the system through its outcome – human cognition and behaviour.

But we still lacked the tools to join the pieces: to study the brain as a living, changing, complex machine. And without those tools, we couldn't crack the code.

Until now.

The Human Genome Project showed us what might be possible if fundamental challenges in the life sciences were tackled as global missions. Scientists set out in 1990 with a goal so ambitious that many considered it impossible: to map all 3.3 billion base pairs in the human genetic assembly kit. By 2003, the impossible was achieved. A wave of discovery and innovation surged behind.

The first human genome sequence cost more than $US2.7 billion to complete. Today, it can be done for $US1000, in a matter of days. We have more than 2000 genetic tests for human conditions. Tumours can be sequenced to identify the best treatments. The first commercial gene therapies are entering the market. We are learning to match our medicines to our genes – right drug, right dose, first time, every time.

Inspired by the Human Genome Project, the United States and the European Union began to define the new agenda: blockbuster missions to crack the brain's code. Other nations, notably China, announced similarly bold commitments to brain research. Corporations and philanthropists joined with healthcare providers and patients to raise the ambition and spread the returns.

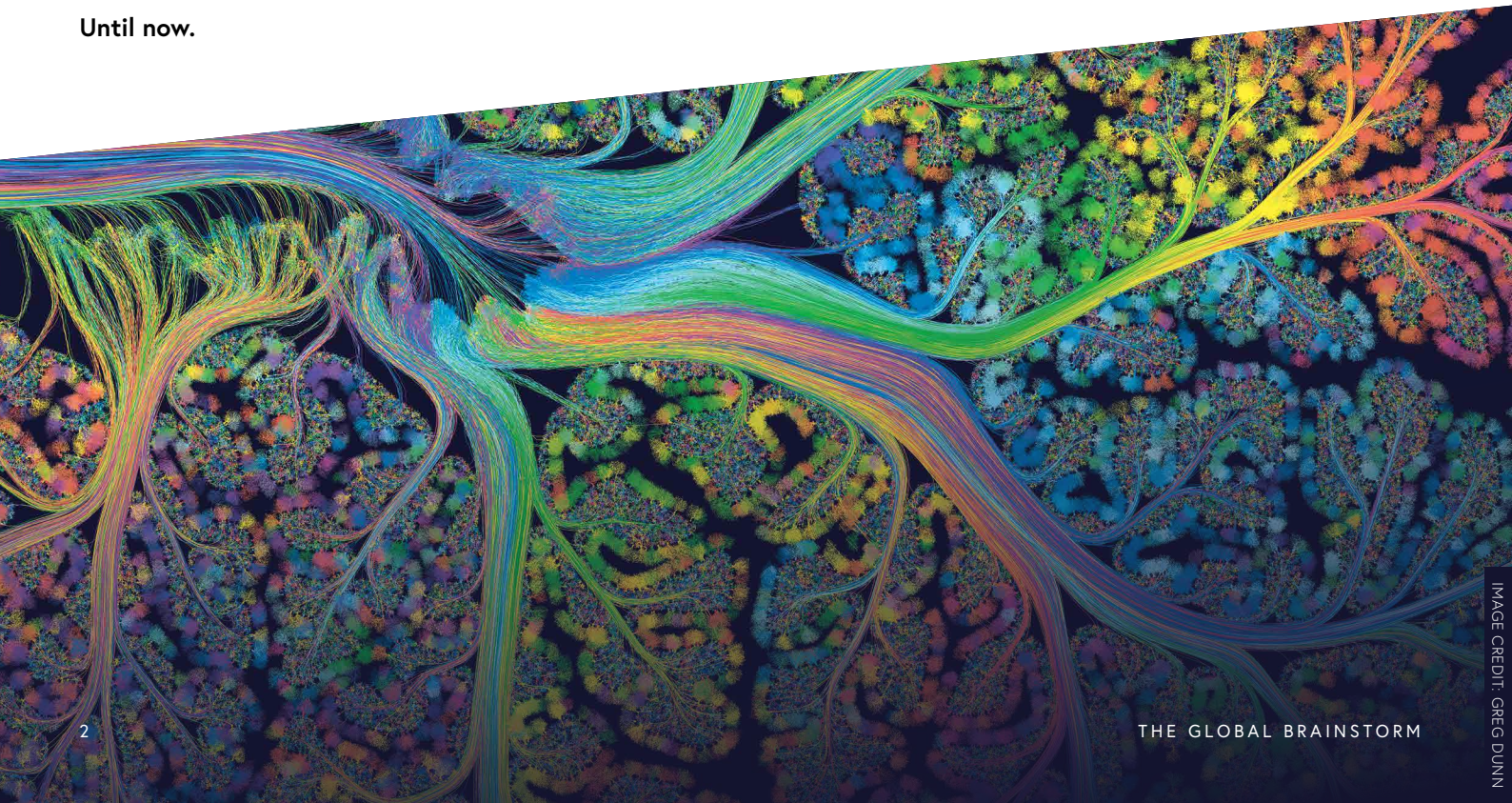


IMAGE CREDIT: GREG DUNN

GLOBAL BRAIN INVESTMENTS

BRAIN RESEARCH IS DRIVING TECHNOLOGY FORWARD.

Countries across the globe are realising the potential of brain research to generate new and advanced technologies that have applications well beyond the treatment of disease.

UNITED STATES

Brain Initiative:
USD $4.5 Billion
2014–2023

$375M
PER YEAR FOR 12 YEARS

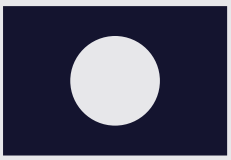
EUROPEAN UNION

Human Brain Project:
EUR €1.2 Billion
2013–2022

€120M
PER YEAR FOR 10 YEARS

JAPAN

Brain/MINDS:
JPY ¥3bn in 2014
JPY ¥4bn in 2015



CHINA

China Brain Project:
CNY ¥1tn over 15 years

KOREA

Korea Brain Research:
USD $130m per year

CANADA

CAD $240m
over six years

PRIVATE INVESTMENTS

NEURALINK

Neuralink founded by Elon Musk in 2016 is developing an implantable brain-computer interface and will sell up to 100 million USD in shares to fund it.

facebook

Facebook revealed it has a team of 60 engineers working on a brain-computer interface that will let you type with just your mind, without invasive implants.

RESEARCH & PUBLICATIONS

1.79 MILLION PUBLICATIONS → **4% ANNUAL PUBLICATION GROWTH RATE**

1.79 million articles published in 2009–2013 were considered to fall within the area of brain and neuroscience research, representing an approximate annual growth rate of 4%, totalling 16% of the world's research output during this period.

AUSTRALIA

We showed we have the know-how and the skills with the Cochlear implant, and we've got the right people for collaboration.

WITH A NATIONAL COMMITMENT, AUSTRALIA CAN THRIVE AT THE FRONTIER OF BRAIN SCIENCE.

THE QUEST TO CURE

The race to crack the code is fired by the urgency of families in pain.

In all nations, the toll of brain disease, disorders and injury is high. Conditions intimately linked to the brain are prevalent, and many remain intractable.

They are also particularly cruel.

From the jarring impact of stroke, to the "longest goodbye" of dementia, every Australian family carries the scars.

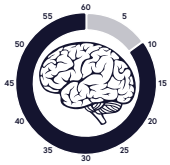
Australians have rallied in recent years to support the many members of our community affected by deadly and disabling conditions, moved by their conviction that science will find a way.

Brain research is answering the call.

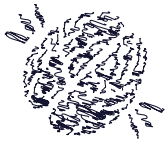
MENTAL ILLNESSES ARE THE THIRD LEADING CAUSE OF DISABILITY BURDEN IN AUSTRALIA.

ABOUT **1.2 MILLION** PEOPLE IN AUSTRALIA ARE INVOLVED IN THE CARE OF SOMEONE WITH **DEMENTIA.**

32 PEOPLE ARE DIAGNOSED WITH **PARKINSON'S DISEASE** EVERY DAY.

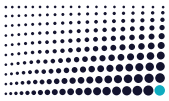


IN AUSTRALIA SOMEONE SUFFERS FROM A **STROKE** EVERY **NINE** MINUTES.



AROUND **1** IN **100** PEOPLE ARE AFFECTED BY **SCHIZOPHRENIA.**

HUNTINGTON'S DISEASE CAUSES SWELLING OF THE VENTRICLES AND ATROPHY OF CEREBRAL NERVE TISSUE.



1 IN **200** CHILDREN LIVE WITH **EPILEPSY.**

400 DEATHS PER YEAR IN AUSTRALIA FROM **MOTOR NEURONE DISEASE.**

THE QUEST TO CREATE

A **STENTRODE** IS A DEVICE SMALLER THAN A MATCHSTICK, THAT COULD ALLOW PARAPLEGICS TO WALK.

767,781 COCHLEAR **IMPLANTS** HAVE BEEN MANUFACTURED TO DATE.

IBM TRUENORTH CHIP COMBINES MILLIONS OF DIGITAL TRANSISTORS TO CREATE ARTIFICIAL 'NEURONS'.

AUSTRALIAN RESEARCHERS HAVE DEVELOPED **MRtrix3**, A PROCESSING PLATFORM FOR **NEURAL IMAGING** USED IN BRAIN SURGERY.

Brain research is a powerhouse of twenty-first century science.

Like the Space Race before it, the modern Brain Race brings together teams of scientists and technologists with expertise in many fields.

Leading scholars in the life sciences work hand-in-hand with pioneers in high-performance computing, data and analytics, advanced chemistry, nanotechnology, photonics and precision medicine.

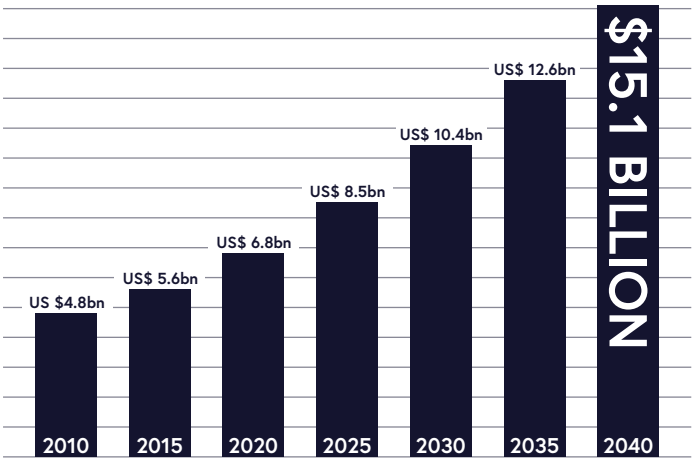
This concentration of talent and capital generates a stream of technologies with commercial potential.

Some technologies developed for research are translated into devices used for treating and diagnosing patients. The Australian Cochlear implant is the most famous example of a commercial neuro-technology, or brain-linked device – and having manufactured 767,781 implants to date, it remains amongst the most successful.

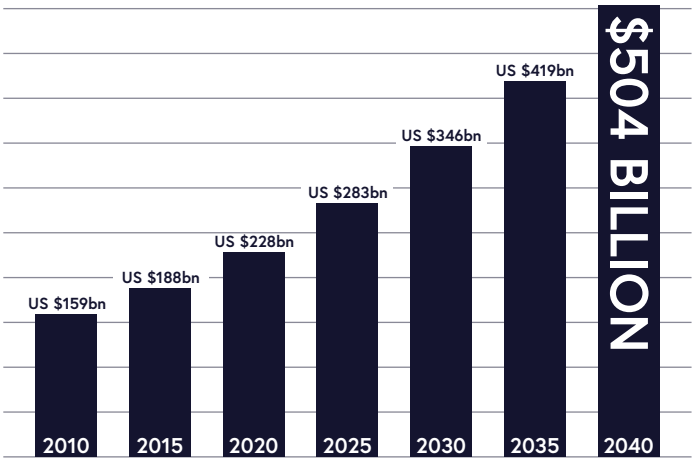
But brain technologies have applications well beyond the treatment of disease.

The next frontier in high performance computing and artificial intelligence is neuromorphic: learning from the human brain, and reverse engineering the complex structures that allow us to process, store, reason, and recall information.

Brain research is driving technology forward.



PROJECTED OUTLOOK FOR THE AUSTRALIAN **NEUROTECHNOLOGY** MARKET. US $**15.1 BILLION** BY 2040.[1]



PROJECTED OUTLOOK FOR THE GLOBAL **NEUROTECHNOLOGY** MARKET. US $**504 BILLION** BY 2040.[1]

1 Projections and economic modelling undertaken by the Australian Academy of Science, based on information and projections in NeuroInsights (2016) "The Neurotechnology Industry 2016-17 Report", NeuroInsights, San Francisco, United States of America.

HEADS UP DOWN UNDER

The Australian Brain Alliance was formed in 2016 with a defining mission:

TO POSITION AUSTRALIA FOR A CENTURY THAT WILL BE DEFINED BY **THE OUTCOMES OF BRAIN RESEARCH.**

It builds on a long record of excellence in research and innovation.

Iconic achievements such as the Cochlear implant demonstrate what our community can achieve, with public support and strategic investment.

- Our diverse population, coupled with our gold-standard hospital infrastructure, makes Australia an attractive destination for clinical trials.
- Australia's advanced research infrastructure includes assets of the calibre of the National Imaging Facility: one of only a handful of research platforms able to integrate insights from research-grade magnetic resonance imaging (MRI) tools with data from the tens of thousands of clinical MRIs performed as part of mainstream care.
- Our universities and medical research institutes can cluster research expertise with industry partners, in close proximity to patients, through "brain hubs" such as Melbourne's Parkville Precinct.
- Robust regulatory frameworks ensure that patients can have confidence in Australian-made discoveries and devices.
- Australian institutions are highly regarded as innovation partners, with a project network linking Australians into global knowledge and industry supply chains. Current collaborations include relationships with global pharmaceutical companies, the US defence technology and research agency DARPA; and prominent research institutes in the US, EU, China, Korea and Japan.

BRINGING IT HOME

CRACK THE CODE FOR **HEALTH**

The coming decade will see significant advances in the diagnosis and treatment of brain disease and disability. With a national commitment, we can transform the lives of many thousands of Australians.

An Australian Brain Initiative will:

- Maximise Australia's contribution to global progress by strategic investment in areas where our research strengths and capabilities are unique.
- Open access to promising breakthrough therapies for Australians, in Australia, by boosting our reputation as destination of choice for clinical trials.
- Develop the technology expertise to support the roll-out of new therapies into mainstream care.

CRACK THE CODE FOR **RESPONSIBLE PROGRESS**

More than any other organ, our brains define our concept of ourselves as individuals with the ability to reason, to feel, to dream and to decide. Brain research will open possibilities that will challenge us, as individuals and as a community, to reflect on what it means to be a human, living well. How should we incorporate brain science responsibly into education and law? How can patients and their families be guided to well-informed choices? What rights and responsibilities do we have as consumers of brain-linked devices? With a national commitment, we can model responsible progress to the world.

An Australian Brain Initiative will:

- Promote informed and respectful discussion of new therapies and technologies.
- Help Australians to access credible and up-to-date information.
- Represent Australian values and perspectives in the global forums promoting ethical research and technology development.

CRACK THE CODE FOR **INDUSTRY AND JOBS**

The economic opportunities of the future will be powered by the study of the brain – from brain-linked devices like the Bionic Eye, to brain-inspired technologies like artificial intelligence. With a national commitment, we can maximise the opportunities for Australian firms.

An Australian Brain Initiative will:

- Put Australian researchers and companies in the opportunity zone for first-to-market technologies, through access to global projects and platforms.
- Develop strong relationships between researchers, industry, healthcare providers and consumers in Australia.
- Provide pathways for researchers seeking to commercialise their discoveries and tools.

CRACK THE CODE FOR **NEXT-GENERATION SCIENCES**

Brain research is the epicentre of modern science. Its methods and discoveries are transforming the way that all science is practised, and its projects are highly attractive to the researchers Australia needs: talented, ambitious, and driven. With a national commitment, we can thrive at the frontier of science.

An Australian Brain Initiative will:

- Foster the next generation of brain research leaders.
- Attract early-career researchers to Australia to progress and commercialise their work.
- Position Australia at the forefront of high-growth, high-competition fields, including artificial intelligence and high-performance computing.

CASE STUDIES IN SUCCESS

NEUROMORPHIC CHIPS

The adult human brain weighs less than a laptop and runs on less energy than a light bulb.

Supercomputers take up hundreds of square metres of floor space and require enough energy to power small towns. The human brain is still capable of feats of cognition, memory and learning that supercomputers struggle to match.

Brains are massively parallel: they process and store many pieces of information simultaneously. Artificial intelligence developers already draw on neuromorphic or brain-inspired programs called simulated neural networks, for tasks such as image classification and language learning. Now hardware developers are drawing on what we know about the behaviour of biological neurons to make the next-generation computer chips.

IBM's "TrueNorth" chip, for example, combines millions of digital transistors to create 1 million artificial "neurons", which communicate through 256 million artificial synapses.[1] It's the size of a postage stamp, with the brain power of a bumble bee, and is now being built into consumer devices – such as television sets that users can control by gestures.

Intel has demonstrated another neuromorphic chip, the Loihi, able to learn to recognise objects in webcam pictures for about a thousandth of the power a conventional processor would require.[2]

The next horizon is medical sensors, autonomous vehicle systems, satellites – and, combined with brain-machine interfaces, thought-controlled prosthetic limbs.[3]

STROKE

Every 9 minutes, someone in Australia suffers a stroke.

In the majority of cases, strokes are caused by blood clots that block the supply of oxygen and nutrients to the brain. The impacts can be contained if clot-busting drugs are given to the patient within a 4.5 hour window. But not all strokes are caused by clots: some result from ruptured arteries, requiring a very different response. Rapid identification of the blockage can be the difference between death or permanent disability, and recovery. In rural and remote Australia, stroke patients are 20 per cent more likely to die due to delayed diagnosis than patients in the cities.[4]

Australian researchers are developing portable and cost-effective new tools for fast and reliable diagnosis. StrokeFinder, developed by the Hunter Medical Research Institute in partnership with Medfield Diagnosis Sweden, uses advanced microwave technology to pinpoint the interrupted blood flow – in the ambulance or the emergency department.

And Australian researchers are supporting stroke patients in recovery, using a combination of brain stimulation and drug treatments to target the abnormal activity in a specific type of cell (known as astrocytes) that can occur after a brain trauma event.

STENTRODE

Imagine a device no bigger than a matchstick that allows a paralysed person to walk – just by thinking about it.

That's the promise of the bionic spinal cord, or Stentrode, a technology developed by Australian researchers in collaboration with clinicians at major Australian hospitals.

The tiny device is implanted into a blood vessel next to the motor cortex, the region of the brain that generates the neural impulses for voluntary movement. From there, it picks up the signals from the brain and codes them into a computer, which prompts an exoskeleton attached to the patient's arms or legs to move.

The same technology could be developed in the future to benefit people with other neurological conditions, including strategies to detect and modulate epileptic seizures, and suppress the tremors associated with Parkinson's Disease.

The Australian bionic spine was developed through the support of the National Health and Medical Research Council, with additional funding provided by the technology development wing of the US Armed Forces, DARPA.

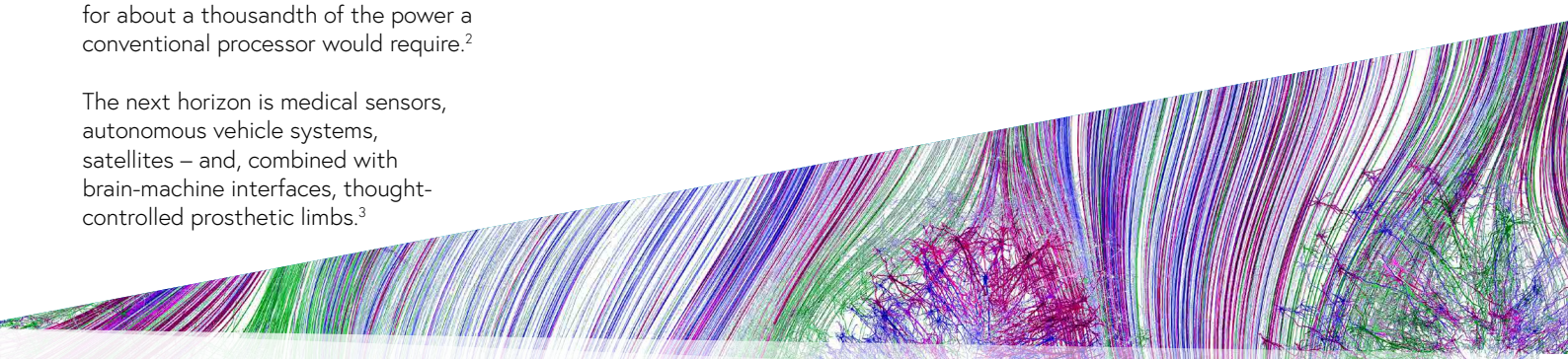


IMAGE CREDIT: GREG DUNN

1 https://news.yale.edu/2017/11/28/new-research-creates-computer-chip-emulates-human-cognition
2 https://www.technologyreview.com/s/609909/intels-new-chips-are-more-brain-like-than-ever/
3 http://medicalphysicsweb.org/cws/article/opinion/66499
4 https://www.uq.edu.au/news/article/2018/01/portable-3d-brain-scanner-set-save-lives

TRACTOGRAPHY

Brain surgery is complex and delicate.

Procedures are meticulously planned to minimise the damage to regions of the brain that allow us to see, speak and walk. In some instances, patients will remain awake during an operation to so they can talk and move their limbs to indicate function.

These procedures cannot be performed on children, and can be highly traumatic for adults.

Australia is recognised as a global leader in tractography, a technique that gives surgeons an accurate and detailed map for safe and effective operations. It combines magnetic resonance imaging (MRI) with sophisticated computer technology to identify the brain nerve fibre tracts that need to be protected to preserve vision, speech and movement.

Today, Australian open-source software is helping to improve surgical outcomes for children with epilepsy and brain tumours at the Royal Children's Hospital in Melbourne. The neurosurgery of the future will be even safer and more effective.

CHRONIC PAIN

Today one in five Australians lives with chronic pain, and one in three Australians over the age of 65.

The drugs available to treat it – aspirin, ibuprofen and opioids – vary in efficacy from patient to patient, often with negative side effects.

Australian brain imaging research is helping scientists to map the pain centre regions of the brain – knowledge now being combined with cognitive therapy approaches to help patients manage their pain.

Other Australian advances include brain stimulation devices. The Evoke Spinal Cord Stimulator, developed by Saluda Medical, is a precision medical device that records and monitors nerve activity, and automatically provides a therapeutic dose of brain stimulation in real time. It is the world's first closed-loop spinal cord "pacemaker", housed within the patient's body and not reliant on input from an external computer. Early clinical trials suggest it could offer a drug-free solution to millions of people worldwide living with debilitating chronic pain.

MEET THE BRAINS BEHIND AUSTRALIA

Australian Academy of Science
The Academy works with its 520 Fellows and with partners in government, industry, media and the community sector to provide independent and authoritative scientific advice, to build awareness and an understanding of science, to promote international scientific engagement, and to champion, celebrate and support excellence in Australian science.

Australian Psychological Society
Representing over 23,000 members, the APS is the peak body for psychologists in Australia. The APS advocates for the profession of psychology, supporting high standards, promoting community wellbeing, and providing benefits to support members.

Australasian Neuroscience Society
The Australasian Neuroscience Society is the academic society for scientists and physicians who study the brain and nervous system, and are actively involved in research and teaching.

Queensland Brain Institute, The University of Queensland
Home to more than 450 scientists and 42 laboratory leaders, QBI researchers have a world leading reputation for making important advances in fundamental neuroscience and in diseases such as ageing dementia, schizophrenia and motor neurone disease.

University of New South Wales
UNSW Brain Sciences is comprised of researchers from the basic neurosciences, psychiatry, psychology, drug and alcohol, neurology, neurosurgery, biomedical engineering and mathematics. UNSW Brain Sciences aims to facilitate cross-disciplinary research to enhance understanding of normal and abnormal brain functioning, as manifest in mental illness and neurological disorders.

The John Curtin School of Medical Research, Australian National University
The John Curtin School of Medical Research excels in ground-breaking, multidisciplinary translational medical research in fields including neuroscience, immunology, genomics, mental health, infectious diseases, obesity and metabolic disorders.

The University of Newcastle
Built on the principles of equity, excellence and engagement, the University of Newcastle has a reputation as a world-class institution making an impact within its own region, throughout Australia and across the globe.

University of Technology Sydney
UTS has a bold vision to be a world-leading university of technology. UTS is known for its industry focus, practice-based teaching and learning and real world research. UTS prepares its students to become global thinkers, leaders and innovators.

Deakin University
Deakin University offers a personalised experience, enhanced by innovative digital engagement. Deakin leads by creating opportunities to live and work in a connected, evolving world. The university is ranked 5 stars for world-class facilities, research and teaching, as well as employability, innovation and inclusiveness.

The University of Western Australia
UWA is one of Australia's leading universities and has an international reputation for excellence in teaching, learning and research.

Western Sydney University
The Western Sydney University is building on its reputation for resilience and flexibility to cement a student-centred and research-led culture at its core.

RMIT University
RMIT University enjoys an international reputation for excellence in professional and vocational education, applied research, and engagement with the needs of industry and the community.

Macquarie University
Macquarie University aims to be distinctive, progressive, and transformational in its research into infant and child development, social and emotional functioning in old age, and understanding how human beings feel, learn, think and behave.

Swinburne University
Swinburne's desire to innovate and bring about positive change motivates its belief that the ability to understand, predict and explain human behaviour is integral to improving lives in today's society.

Flinders University
For over 50 years, Flinders has been a centre of inspiring achievement, boasting pioneer multidisciplinary research into understanding the brain, spinal cord and peripheral nervous system in health and disease.

James Cook University
James Cook University aims to bring together researchers in biology and medicine, as well as clinicians and health workers from across the northern region, whose research has implications for the prevention, detection or treatment of diseases.

Centre for Integrative Brain Function
CIBF seeks to better understand how the brain interacts with the world by focusing on the brain's intricate structure and functions that underlie attention, prediction and decision-making. To achieve this goal, CIBF facilitates collaborations amongst Australia's leading brain researchers in the fields of brain anatomy and physiology, neuronal networks, neural circuits, brain systems, human behaviour and neurotechnologies.

Melbourne Neuroscience Institute, The University of Melbourne
The MNI draws on the astounding breadth of neuroscience research activity at the University of Melbourne and is the principal body for the promotion of cross-disciplinary research in the neurosciences at the University of Melbourne.

Monash Institute of Clinical and Cognitive Neurosciences, Monash University
Built on specialist expertise in characterising human behaviour, genetics and neurobiology, MICCN makes use of Monash University's state-of-the-art research platforms in imaging science, computational biology, genetics and clinical delivery to develop integrated models of human disease that cover traumatic brain injury, post-traumatic stress disorder, neurodegeneration, mental health and neurodevelopmental disorders.

Murdoch Children's Research Institute
MCRI is the largest child health research institute in Australia and one of the top five worldwide, dedicated to making discoveries that prevent and treat childhood conditions. Many MCRI researchers are also clinicians at the Royal Children's Hospital in Melbourne allowing for the quick transformation of research discovery into practical treatments for children in hospital.

NeuRA
A leader in brain and nervous system research, NeuRA's goal is to prevent, treat and cure brain and nervous system diseases, including degenerative brain diseases such as Parkinson's and Alzheimer's, mental illnesses such as bipolar disorder and schizophrenia, neurological disorders including obstructive sleep apnoea, nerve damage and chronic pain, and rehabilitation after stroke and spinal cord injury.

QIMR Berghofer Medical Research institute
QIMR Berghofer is focused on improving health by developing new diagnostics, better treatments and prevention strategies, specifically in the areas of cancer, infectious diseases, mental health and complex disorders.

Australasian Cognitive Neuroscience Society
An academic society focused on the scientific study of the biological or brain foundations of mental processes and behaviour, ACNS represents members in psychology, neuroscience, cognitive science, psychiatry, neurology, linguistics, computer science, and philosophy, all with an interest in the relationships between the brain, mind, and behaviour.

Australian Regenerative Medicine Institute, Monash University
One of the largest regenerative medicine and stem cell research hubs in the world, the Australian Regenerative Medicine Institute is dedicated to unlocking the regenerative capabilities of the human body and exploring the development and maturation of the visual brain, determining which brain areas enable residual vision following significant brain injury, and understanding the cellular and systemic effects that occur following stroke.

Brain and Mind Centre, University of Sydney
The University of Sydney's Brain and Mind Centre takes a patient-centred approach to understanding and treating conditions of the brain and mind, bringing people together to integrate clinical practice and research to pioneer new systems of care.

The Florey Institute of Neuroscience and Mental Health
The Florey is the largest brain research group in the Southern Hemisphere, working on a range of serious diseases including stroke, epilepsy, Alzheimer's disease, Parkinson's disease, multiple sclerosis, Huntington's disease, motor neurone disease, traumatic brain and spinal cord injury, depression, schizophrenia, mental illness and addiction. The Florey is a world leader in imaging technology, stroke rehabilitation and epidemiological studies.

Harry Perkins Institute of Medical Research
One of Australia's leading adult medical research centres, Harry Perkins Institute researchers collaborate to defeat major neurogenetic diseases impacting Australia, such as Huntington's and MS.

Hunter Medical Research Institute
A world-class institute with 1500 medical researchers spanning basic neuroscience, psychology, clinical mental health, neurology and allied health, Hunter researchers work to understand the intricate mechanisms underpinning human cognition, brain and nervous system disorders, mental health and wellbeing.

Perron Institute
The Perron Institute for Neurological and Translational Science, Western Australia's longest established medical research institute, undertakes cutting edge research on stroke, Parkinson's, muscular dystrophy and multiple sclerosis. This multidisciplinary approach enables Perron to translate research outcomes into treatments aimed at providing a better quality of life for millions with devastating neurological conditions.

The Psychology Foundation of Australia
The Psychology Foundation of Australia is a grouping of research-oriented schools of Psychology formed to defend rigorous academic and scientific standards in the teaching, research and training in the discipline of Psychology and its professional practice within Australia.

Saluda Medical
Established in 2013 with the goal of commercialising four years of research from NICTA, Australia's information communications technology centre of excellence, Saluda's world-class engineers, clinicians and seasoned professionals bring breakthrough medical technologies to life.

Bionic Vision Technologies
Bionic Vision Technologies is a national consortium of researchers working together to develop bionic eye devices. The aim of this technology is to restore the sense of vision to people with vision impairment due to retinitis pigmentosa and age-related macular degeneration.

EMOTIV
EMOTIV is a bioinformatics company advancing understanding of the human brain using electroencephalography (EEG). EMOTIV's mission is to empower individuals to understand their own brain and accelerate brain research globally.

IBM Research Australia
One of IBM's 12 global research labs, IBM Research Australia combines both research and development, working closely with clients and pursuing research that focuses on conceiving, designing and building next-generation systems that will transform health and life sciences, analytics, resource management, and financial services.

FROM OUR BRAIN CHAMPIONS

INGRID SCHEFFER AO FAHMS FAA

Paediatric Neurologist, Austin Health
Prime Minister's Prize for Science Award recipient

It's my patients that need an Australian Brain Initiative.

To solve the holy grail of brain disease – how can we stop severe diseases of the brain before they even start?

To answer that question, we need science.

Basic science and basic research into better understanding the brain - that is the way forward.

The only way we're going to make a difference in treating terrible diseases of the brain – from Epilepsy to Parkinson's, Stroke to Motor Neurone Disease is through more basic scientific research into cracking the brain's code.

SAM BERKOVIC AC FAHMS FAA

Director, Epilepsy Research Centre
Clinical Neurologist
Prime Minister's Prize for Science Award recipient

Australian science punches above its weight, particularly in the area of brain science.

Australia has the greatest potential – we have the technology, we have the ideas – we have a demonstrable track record in the cochlear implant; we have the right people and the right tools for collaboration.

An Australian Brain Initiative would co-ordinate our efforts even further, and supercharge them. It would take Australian brain science to the next level.

With a national commitment, Australia can thrive at the neuro-frontier.

DEBRA LANE

Patient Advocate, Western Australia

In November 2015 I was diagnosed with a brain tumour.

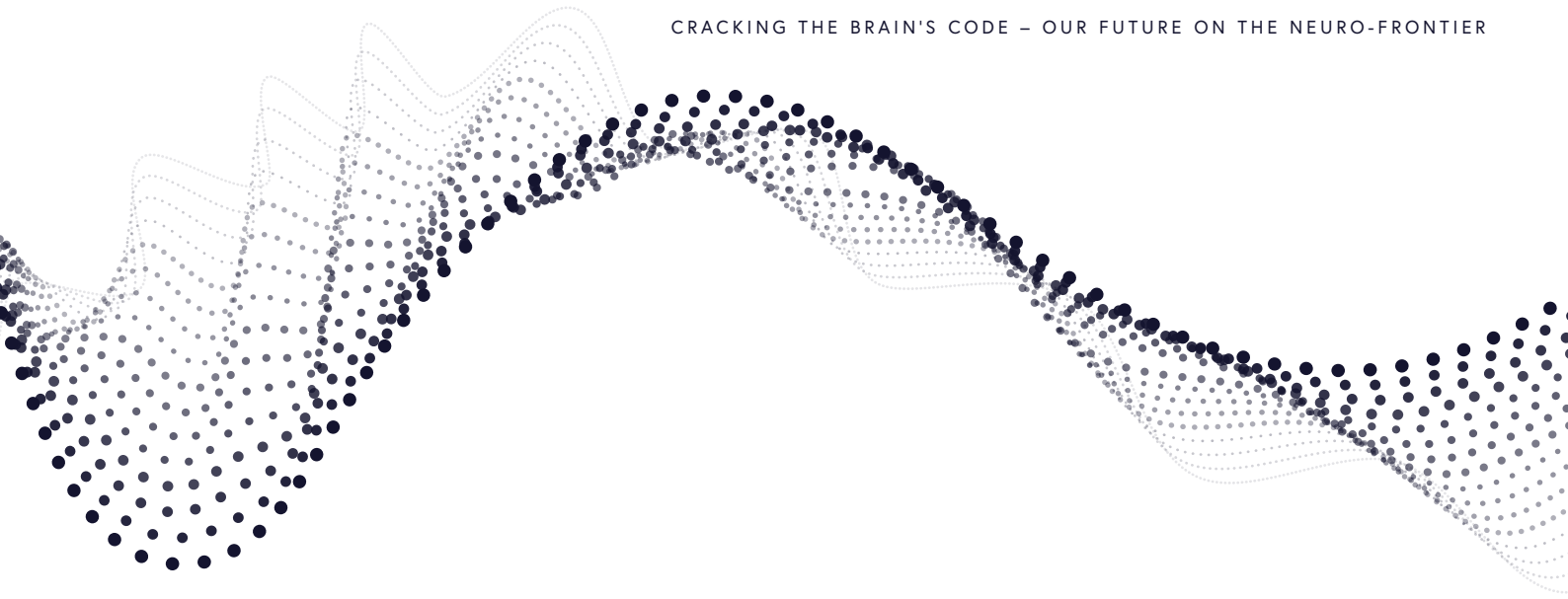
My son has schizophrenia, my dad has Inclusion-Body Myositis (IBM), and my father-in-law (now deceased) had Motor Neurone Disease (MND).

These are all neurological conditions of the brain.

Research into better understanding the brain will help create treatments for people like me, my son, dad and father-in-law, who are living with devastating diseases like this.

It's why I signed up as a brain champion.

It's why we need to crack the brain's code.

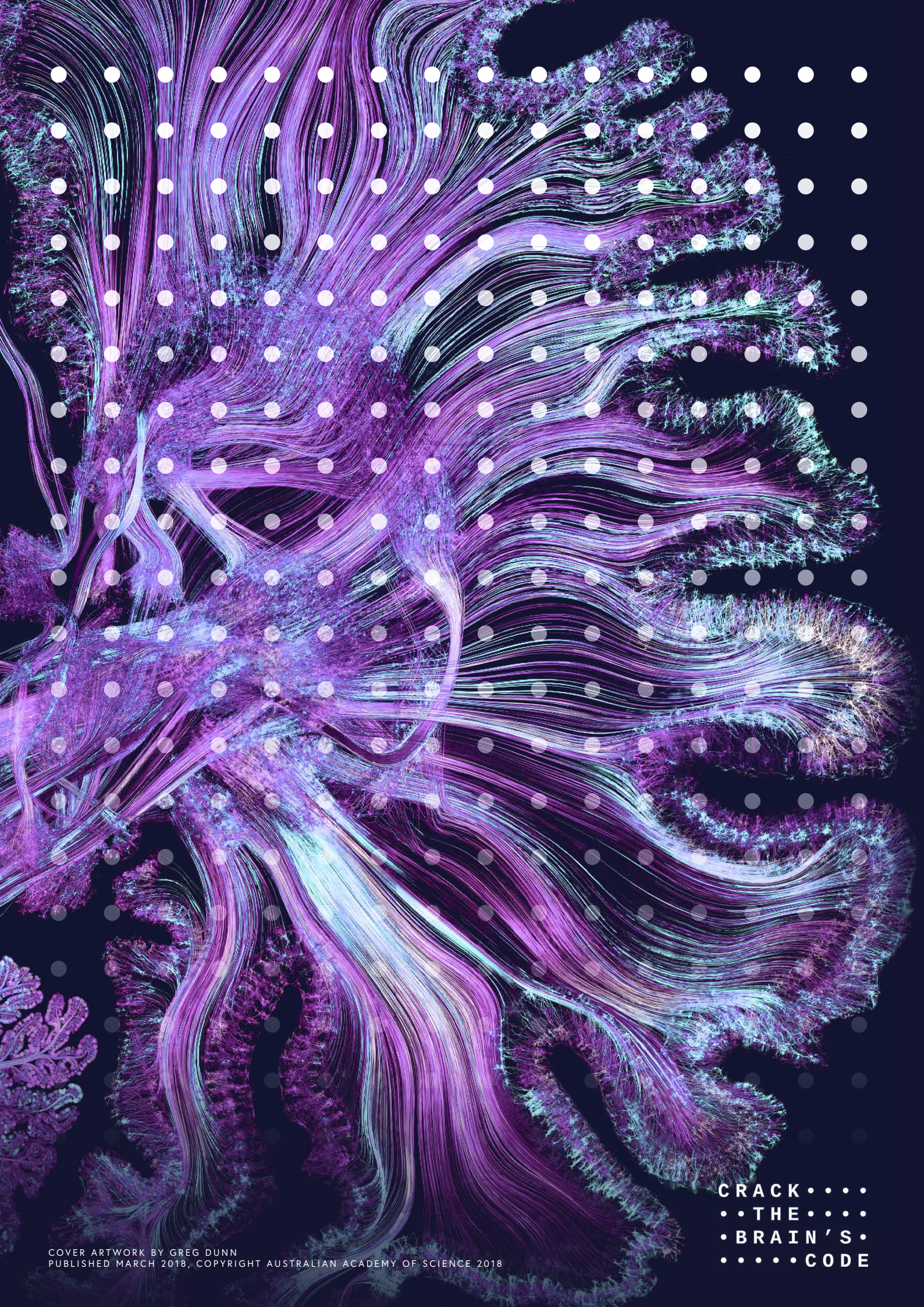


Australian
Brain
Alliance

HELP CRACK THE BRAIN'S CODE

BECOME A BRAIN CHAMPION TODAY

brainscode.org.au



COVER ARTWORK BY GREG DUNN