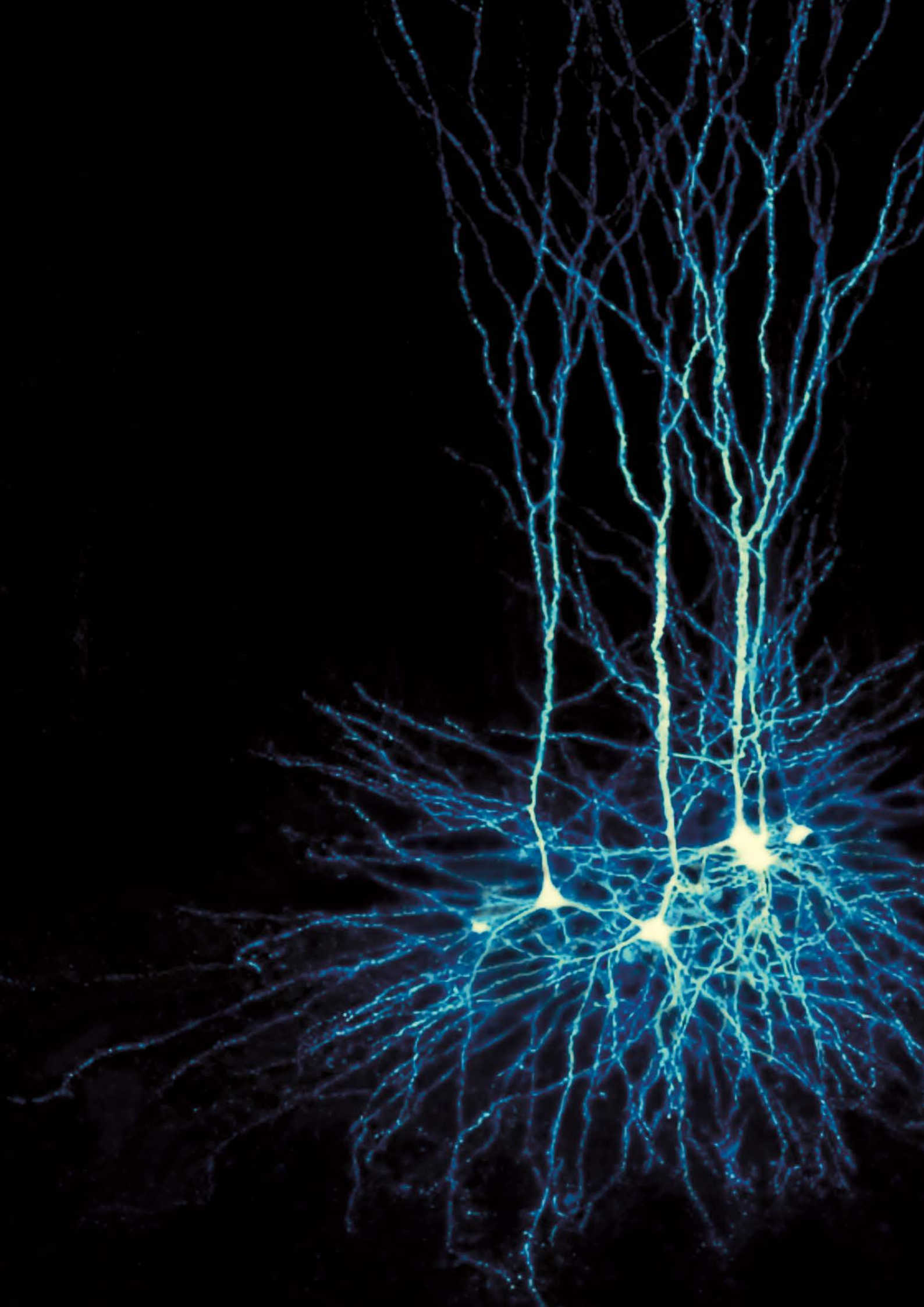


Neuroscience Institute

Research Strategy

2026 – 2030

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD





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Vision and mission

Our **vision** is an Africa where people achieve their full potential through brain health.

Our **mission** is to advance knowledge through an interdisciplinary network of researchers and clinicians, sharing skills and expertise to deepen our understanding of the human brain, and support human flourishing.

Neuroscience is the study of the nervous system, encompassing the brain, spinal cord and neuromuscular networks, and draws on a wide range of disciplines to understand the functioning of the nervous system in health and disease.

Brain health enables individuals to feel, think, learn and act, to develop and participate meaningfully in society across the lifespan, and is shaped by biological, environmental, and social factors.

Why brain research in Africa

Advancing our understanding of the brain and finding more effective treatments for conditions that affect it are among the most urgent and exciting challenges we face. Early development of the nervous system, which is critical in enabling each of us to achieve our full potential, is shaped by a wide range of genetic and environmental factors.

In Sub-Saharan Africa, brain health is shaped by one of the most complex landscapes on earth - marked by unparalleled genetic diversity and rich cultural and linguistic variation. These strengths are interwoven with an often cumulative burden of adversity including undernutrition, environmental toxins, infectious disease, and pervasive exposure to trauma and violence, all of which interact to influence brain development, resilience, and disease across the lifespan. This is especially important given the demographics of the world's population, with Africa soon to be home to half the world's children, together with an increasing population of ageing adults. Our work requires a lifespan approach and presents an opportunity for brain research to go beyond addressing clinical challenges to explore the fundamental drivers of brain health, human flourishing and creativity.

Brain capital may be seen as the combination of brain health and brain skills - the foundational abilities that enable people to function effectively. Supporting healthy brain development enhances Africa's brain capital, driving sustainable development and innovation.

A unique and dynamic demography

Sub-Saharan Africa continues to experience accelerating population growth and, as home to 500 million children and adolescents, has a younger population than any other region of the world. Although child mortality in Africa has steadily dropped over the past 30 years, with more children surviving the high-risk early years, these gains have also resulted in greater numbers of children living with chronic conditions, including developmental delay, and a greater need to understand the trajectories of lifespan health. Further, very little attention has been given to the unique brain health challenges of ageing people in Africa, including those with dementia and other neurodegenerative disorders.

Burden of disease

The burden of brain insults and injuries for children and young adults in Sub-Saharan Africa results in a spectrum of cognitive and neurological risk across the lifespan. For example, this region has the highest global rates of traumatic brain injury through road traffic accidents, assaults and falls. Sub-Saharan Africa also remains the epicentre of infectious diseases, notably HIV and TB (in particular TB meningitis), with a high resultant burden of neurodisability including epilepsy, intellectual disability and neuromotor conditions. We are committed to addressing these critical public health concerns.



A space designed to serve and connect people and disciplines

The Neuroscience Institute (NI) was established at the University of Cape Town in 2015, building on existing strengths to galvanise research around brain health. Based in a purpose-built facility on the world-renowned Groote Schuur Hospital campus, the NI is integrated with the hospital's clinical platform which includes the leading children's hospital in Sub-Saharan Africa, the Red Cross War Memorial Children's Hospital. Investigators and their students have access to exceptional clinical resources and state-of-the-art neuroscience research techniques through the NI, with a strong focus on innovation and mentorship.

We offer a vibrant and inclusive environment which encourages collaboration and discussion across disciplines. This includes clinical facilities, collaborative meeting spaces, and dedicated postgraduate work areas, alongside a neuroimaging suite spanning low-field and 3T MRI and PET/CT. Our capabilities are complemented by growing capacity in molecular diagnostics and genomics, a curated biorepository, and laboratories dedicated to neuroscience research and innovation. Through an extended network of research partners, we also provide access to a wider offering of specialised, distributed facilities, positioning the Institute as a hub for advanced, collaborative neuroscience.

We attract researchers and clinicians from across the globe, and have a steadily growing international network addressing brain health, with a focus on the needs and priorities of the people we serve. A key objective for the Institute is to build the capacity of African research institutions and scientists in our network, advancing UCT's Vision 2030 and the United Nations Sustainable Development Goals (SDGs), contributing to a better future for our continent's people.

Building on our clinical research expertise, the NI is also committed to leveraging African scholarship and creative perspectives on the mind through collaboration between scientists, artists, writers, philosophers, historians, linguists and other social scientists.





A decade of discovery:
Impact on the global body of knowledge

Since its establishment in 2015, the Neuroscience Institute has grown into one of Africa's most productive brain-research communities. Over the ten years from 2016 to 2026, work carried out by NI members appeared in more than 2,700 peer-reviewed publications. Of these, our members were the first or senior author, the positions that signal intellectual leadership of a study, on over 1,000 papers, cited more than 18,000 times between them, and led from Cape Town into the pages of the world's most influential journals, among them *Science, Cell, Nature Communications, Nature Genetics, The Lancet Child & Adolescent Health, Brain and World Psychiatry.*

The Institute's most distinctive contributions share a common model: access to clinically and epidemiologically distinctive African populations; deep, longitudinal and site-of-disease phenotyping; the integration of physiology, imaging, genomics and cellular neuroscience; and a commitment to translating discovery into diagnostics, treatment, classification or policy. The examples below, grouped by theme, illustrate how that model has advanced the global understanding of the brain across the lifespan.

Infectious-disease neuroscience

Tuberculous meningitis.

NI researchers have redefined how the field understands childhood tuberculous meningitis (TBM), the most devastating form of TB. Working from the clinical platform at Red Cross War Memorial Children's Hospital, Ursula Rohlwink, Anthony Figaji and colleagues showed that paediatric TBM is marked by a compartmentalised central-nervous-system immune response, distinct from that seen in blood, together with signatures of neural injury and excitotoxicity. (*Rohlwink et al., Nature Communications, 2019; Clinical Infectious Diseases, 2017*)

Getting drugs to the brain.

The same group has shown that cerebrospinal-fluid drug concentrations are not a reliable proxy for antibiotic exposure in brain tissue itself, a finding with direct implications for how TBM is treated and how future trials are designed. (*Abdelgawad et al., Antimicrobial Agents and Chemotherapy, 2023*)

HIV and the developing brain.

Catherine Wedderburn, Kirsty Donald and colleagues have demonstrated that exposure to HIV in utero can affect brain development and language even when the child remains uninfected, and that infant immune trajectories and brain metabolites help explain these differences, establishing HIV-exposed-but-uninfected children, a group numbering in the millions, as a population whose brain health can no longer be overlooked. (*Wedderburn & Donald, The Lancet Child & Adolescent Health, 2019 and 2022; BMC Medicine, 2024*)

Rethinking HIV and cognition in adults.

Sam Nightingale, John Joska and collaborators have shown that conventional criteria substantially overestimate HIV-related cognitive impairment, and have led international consensus on a new diagnostic approach; in parallel, the group has shown that task-shared psychological treatment, delivered by non-specialist health workers, can improve both depression and HIV outcomes. (*Nightingale et al., Nature Reviews Neurology, 2023; Safren et al. & Joska, Journal of the International AIDS Society, 2021*)

The basic biology of brain infections.

Rachael Dangarembizi is building a fundamental-science programme on cryptococcal meningitis, a leading cause of death in advanced HIV, using novel brain-tissue models to reveal how fungal infection drives neurodegeneration and long-term neurological injury. (*Dangarembizi et al., Trends in Neurosciences, 2023*)

> "The NI enables curiosity-driven research which unlocks neuroscience discoveries and provides new insights into human health and flourishing."

Early life, nutrition and the first thousand days

Imaging the developing African brain.

Through the Drakenstein Child Health Study and other birth cohorts, Ernesta Meintjes, Kirsty Donald and colleagues established the first early-life brain-imaging trajectories from Africa, providing reference data where almost none previously existed for the populations that will soon include half the world's children. (*Drakenstein Child Health Study; Holmes et al., PLoS ONE, 2017; Wedderburn et al., NeuroImage, 2019*)

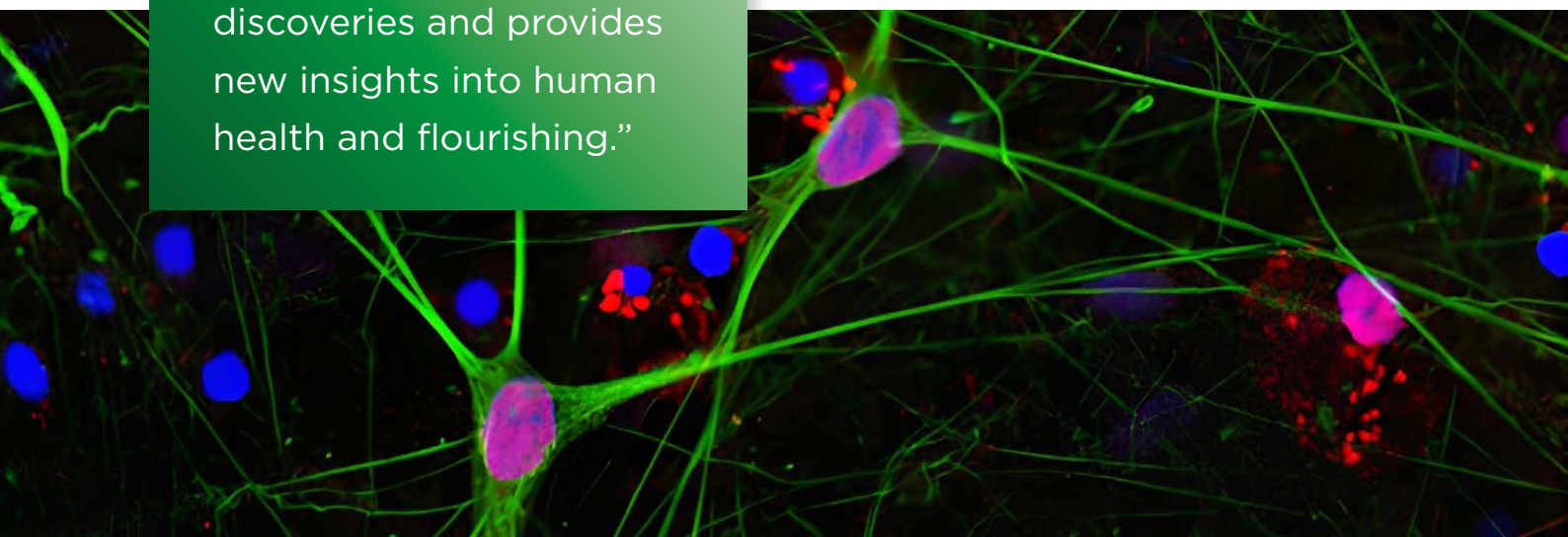
Maternal anaemia and the infant brain.

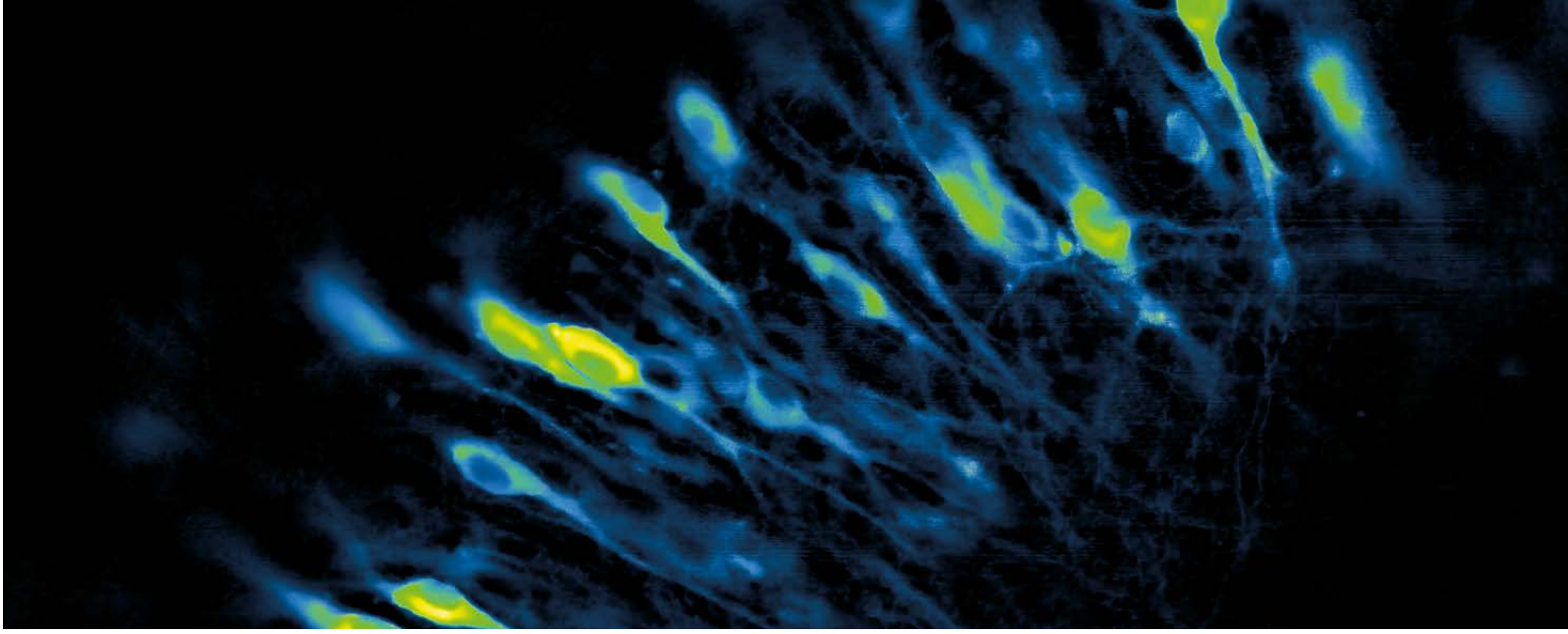
The Institute has shown that antenatal iron deficiency and maternal anaemia produce region-specific alterations in brain structure that are detectable in infancy and persist to school age, identifying pregnancy as a critical intervention window, and has validated ultra-low-field MRI as a means of measuring infant brain structure at scale in resource-constrained settings. (*Wedderburn et al., JAMA Network Open, 2022; Ringshaw & Donald, BMC Medicine, 2025 and Human Brain Mapping, 2026*)

Environmental toxins across development

Prenatal alcohol exposure.

Kirsty Donald, Ernesta Meintjes, Fleur Warton and colleagues have shown that even modest prenatal alcohol exposure can drive structural brain changes detectable from infancy and persisting into school entry, and, importantly, that maternal choline supplementation during pregnancy can mitigate some of these effects, pointing toward a low-cost preventive intervention. (*Donald et al., Metabolic Brain Disease, 2016; Warton et al., Alcoholism: Clinical and Experimental Research, 2021*)





Trauma and acquired brain injury

Predicting outcomes after paediatric head injury.

In a region with some of the highest rates of traumatic brain injury in the world, Anthony Figaji and colleagues have demonstrated that cerebrovascular pressure reactivity is a strong and independent predictor of outcome after severe paediatric TBI, alongside biomarkers of evolving brain injury, findings that are reshaping how injured children are monitored and treated in intensive care. (*Smith & Figaji, Critical Care Medicine, 2023*)

Genomics and African brain health

Unique genomic insight from African populations.

As a senior contributor to the landmark Xhosa schizophrenia study, Dan Stein and NI colleagues helped show that rare, damaging variants in synaptic genes contribute to schizophrenia in the South African Xhosa population, a result that reset global understanding of the disorder's genetic architecture and underscored why African genomes matter to world science. (*Gulsuner, Stein et al., Science, 2020*)

Diagnosing neurodevelopmental disorders in African settings.

Through the NeuroDev study, Kirsty Donald and collaborators have advanced the phenotypic and genomic characterisation of neurodevelopmental disability in African children, delivering molecular diagnoses to families who have historically had no access to them while improving the ancestral representation of the global genomic databases on which precision medicine depends. (*de Menil et al., Neuron, 2019*)

Ethical stewardship of African genomic data.

Jantina de Vries and colleagues have produced some of the field's most influential scholarship on the governance of genomic and biobanking research in Africa, shaping how consent, data sovereignty and benefit-sharing are handled across the continent and beyond. (*De Vries et al., BMC Medical Ethics, 2017; Munung et al., Journal of Medical Ethics, 2016*)

Mechanistic and cellular neuroscience

Why seizures resist first-line drugs.

Richard Burman, Joseph Raimondo and colleagues have shown that activity-dependent accumulation of chloride inside neurons helps explain how status epilepticus becomes resistant to benzodiazepines, a discovery of direct relevance to emergency seizure care worldwide. (*Burman & Raimondo, Brain, 2019; Nature Reviews Neurology, 2022*)

A cell atlas of the maturing human cortex.

Dorit Hockman, Joseph Raimondo and colleagues produced a cell-resolved atlas showing how the human temporal cortex matures after birth, a foundational resource built on tissue from local neurosurgical collaborations. (*Steyn & Hockman, Nature Genetics, 2024*)

From single neurons to behaviour.

Combining human and animal studies, David Terburg, Jack van Honk and colleagues established the basolateral amygdala as essential for rapid escape from threat, linking a specific brain circuit to a fundamental survival behaviour. (*Terburg & van Honk et al., Cell, 2018*)

Mind, consciousness and the classification of mental illness

New theories of consciousness and affect.

Mark Solms has advanced internationally debated accounts of consciousness, bringing the hard problem of consciousness into dialogue with the free-energy principle and reconnecting affective neuroscience with the clinical tradition. (*Solms, Frontiers in Psychology, 2019*)

Reshaping how the world classifies mental disorders.

Dan Stein was among the most influential voices in global psychiatric nosology over the decade, helping shape the definition of conditions such as obsessive-compulsive disorder for the field and contributing to the conceptual foundations and diagnostic frameworks, including ICD-11, used in clinics around the world. (*Stein et al., Nature Reviews Disease Primers, 2019; World Psychiatry, 2022*)

Across infections, early-life development, environmental toxins, trauma, genomics, cellular mechanism and the study of the mind, these contributions share a single logic: turning the distinctive populations, clinical platform and scientific diversity of our setting into knowledge that is at once locally relevant and globally transformative. Just as importantly, each advance has trained the next generation of African neuroscientists who will carry the work forward.

One brain, many questions: How our research connects

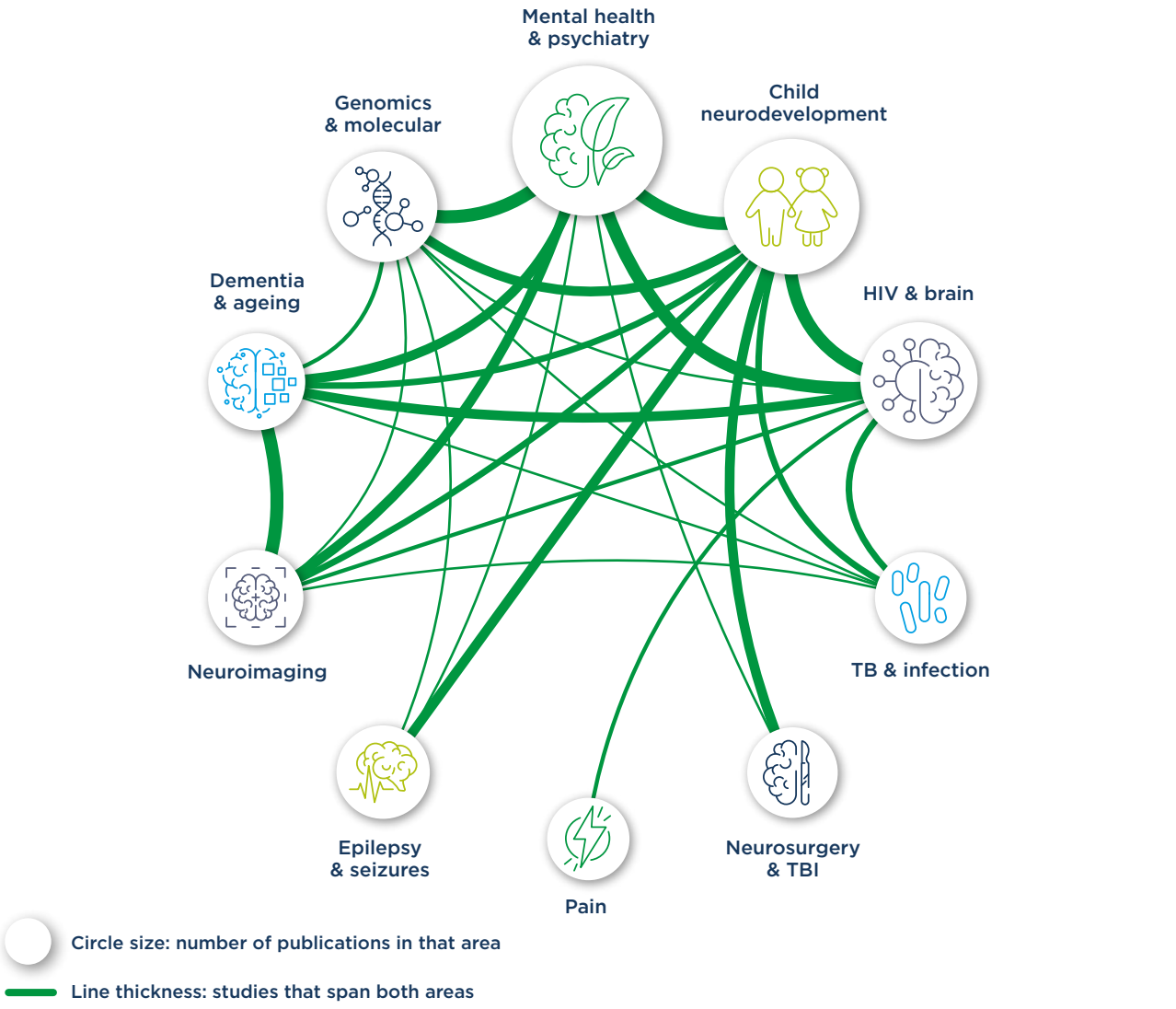


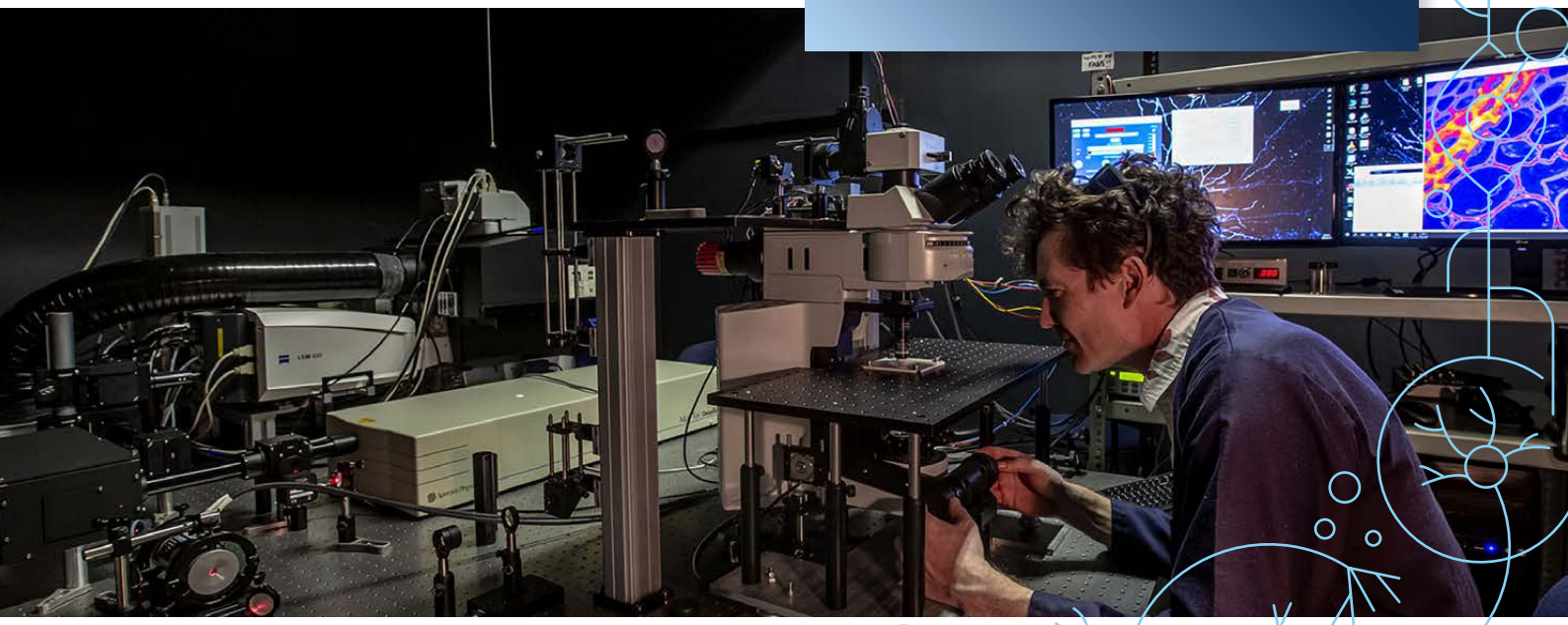
Figure 1: **A decade of interconnected research.** The Institute's publication areas (2016–2026), sized by number of publications and linked by the number of studies that span both areas. A single study often crosses several areas, so the fields overlap and connect into one research community.

A conceptual framework to enable this

The Neuroscience Institute's conceptual framework emerges from the dynamic intersection of our defined research priorities, research tools that enable discovery and our core values, building on a decade of success: a body of world-leading, member-led research that gives this strategy both its foundation and its momentum.

Grounded in **values** that are ethical, community-centred and interdisciplinary, our conceptual framework positions **neuroscience across the lifespan** at the centre, recognising that brain health is shaped by biological, psychological and social forces from early development throughout growth and ageing. Our **research priorities** — including genetics, trauma, infections, nutrition, toxins, psychosocial context and creativity — are addressed through **enabling platforms and tools** such as neuroimaging, artificial intelligence and machine learning, bioinformatics and multi-omics, mechanistic and computational neuroscience, and behavioural and cognitive science.

> "These elements support a unifying goal: to generate impact and innovation that advance brain health and promote human flourishing in Africa and beyond."



Core values

The core values of the Neuroscience Institute are **ethics**, **community**, and **interdisciplinarity**. We value fairness, dignity and scientific integrity in our interactions with patients and research participants, many of whom are vulnerable. This requires consideration of power dynamics and historical inequalities which impact the research process. We partner with communities and the public to shape relevant research, while nurturing an inclusive, collaborative community of researchers and clinicians with a strong commitment to African capacity building. By developing research questions and programmes across clinical and basic science, and including the social sciences, humanities and creative arts, we broaden how brain health challenges are understood and addressed, leading to new insights at the nexus of research disciplines.

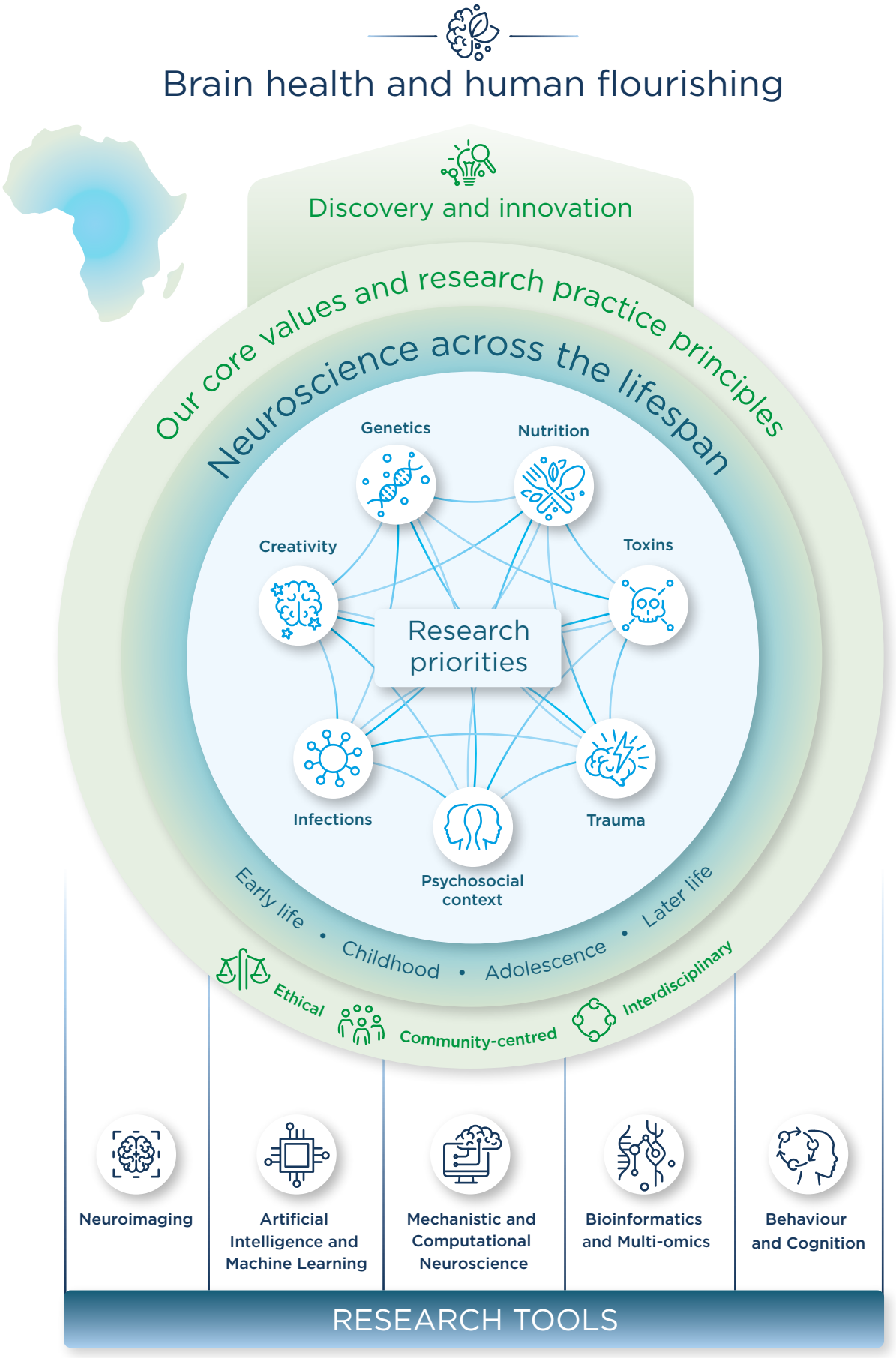


Figure 2: The Neuroscience Institute Conceptual Framework

Neuroscience across the lifespan

A unique aspect of the NI is the extent to which our work covers the entire human lifespan, recognising that brain health is a dynamic, continuous process from before birth through to older age. By integrating basic science, clinical research, population health and data science, we seek to understand how biological, environmental and social factors interact to shape brain development, resilience and vulnerability over time. This approach enables us to identify critical windows for intervention, design more effective treatments, and inform policies that support human flourishing across diverse African contexts.

Early life and childhood

The earliest stages of brain development lay the foundation for lifelong health, learning and wellbeing. Our research in early life focuses on the period spanning pregnancy, infancy and early childhood, when the brain is most rapidly developing and most sensitive to both opportunity and risk. We investigate factors such as nutrition, trauma, infection, environmental exposures and early caregiving, with the goal of improving outcomes, reducing the burden of neurodevelopmental disorders, and informing scalable interventions that support children and families across the continent.



Adolescence

Adolescence represents a second critical window of brain plasticity, marked by cognitive, emotional and social change. The Institute's work in this area examines the neurobiological and psychosocial processes that shape mental health, risk-taking, learning and resilience during the teenage years. By combining longitudinal cohort studies, neuroimaging, clinical research and community engagement, we aim to generate evidence that supports healthier transitions to adulthood and informs interventions in education, mental health and youth wellbeing.

Healthy ageing

As populations live longer, promoting brain and neurological health in later life has become an urgent scientific and societal priority. Our healthy ageing research focuses on understanding the biological and social determinants of cognitive decline, dementia and neurodegenerative disease within African populations that remain underrepresented in global research. Through multidisciplinary studies spanning biomarkers, imaging, clinical care and public health, we aim to advance early detection, prevention and person-centred care, helping older adults maintain independence, dignity and quality of life.

Research priorities

Genetic and genomic foundation

Africa has the greatest human genetic diversity of any continent, offering an unparalleled opportunity to understand why individuals and populations differ in their vulnerability, resilience and response to brain injury and disease. The Institute prioritises research that identifies the genetic and molecular drivers of developmental, psychiatric, cognitive and neurodegenerative trajectories in African populations. By integrating genomics with clinical, environmental and neuroimaging data, we aim to generate insights that are locally relevant yet globally transformative, advancing more precise and equitable models of brain health across the lifespan.

Central to this work is a strong commitment to ethical stewardship of African genomic data. We recognise that our genetic diversity is both a scientific asset and a shared heritage that must be protected. Our approach embeds neuroethics, data sovereignty, community partnership and responsible data governance at every stage of the research lifecycle. We prioritise equitable collaboration, capacity building on the continent and the fair sharing of benefits arising from discovery, ensuring that advances in neuroscience both respect and directly serve African populations.

Nutrition

Nutrition is a central determinant of brain development and lifelong brain health, with effects beginning in the prenatal period. At the same time, risks such as malnutrition and micronutrient deficiencies continue to affect brain development from early life through to older age. Iron is particularly critical, given its role in myelination, neurotransmitter function, and energy metabolism. Other micronutrients, including iodine, zinc, folate, and essential fatty acids, also influence key neural processes. Our research focuses on defining the timing and mechanisms of these effects, integrating biological, neuroimaging, and developmental data to identify windows for targeted, scalable intervention.

Toxins

Sub-Saharan Africa experiences high levels of foetal and early-life exposure to environmental toxins, including alcohol, methamphetamine and nicotine. These exposures can disrupt brain development, alter lifelong cognitive and behavioural trajectories, and increase vulnerability to later neurological and psychiatric disease. The Institute's work seeks to characterise the timing, mechanisms and long-term consequences of toxic exposures, identify early markers of risk and resilience, and generate evidence that informs prevention strategies and policy responses aimed at reducing substance-related harm across the lifespan.

Infections

Infectious diseases remain a major driver of neurological risk in Sub-Saharan Africa. HIV is highly neurotropic, and tuberculosis, particularly TB meningitis, continues to cause severe and often lifelong brain injury. With the region at the global epicentre of these conditions, our long-term goal is prevention through deeper mechanistic understanding. The Institute advances research to improve early detection, refine risk stratification and develop interventions that reduce neurological injury and long-term sequelae, including the potential contribution of chronic infection and inflammation, exposure without infection and immune dysregulation to later neurodegenerative processes.

Trauma

Trauma resulting from road traffic accidents, falls and interpersonal violence is a leading cause of death and neurological disability in Sub-Saharan Africa, with rates higher than in any other region globally. Our research focuses on the complex cascade of biological, physiological and psychosocial mechanisms that follow traumatic injury. By integrating acute clinical research, imaging, biomarkers and rehabilitation science, we aim to strengthen both primary and secondary prevention, limit long-term disability and improve functional outcomes for individuals and families affected by trauma.

Psychosocial context

Brain health is shaped not only by biology but by the complex interplay of social, economic and environmental forces. Across many African settings, poverty, unemployment and inequality have increased exposure to violence and heightened the burden of depression, anxiety, injury and post-traumatic stress. The Institute's research recognises the brain as embedded within broader human systems and prioritises integrated approaches that combine safe and effective treatments, behavioural strategies and community-engaged interventions. Central to this work is building trust and culturally grounded partnerships that enable individuals and communities to safely share sensitive lived experiences.

Creativity

Creativity and innovation are fundamental to human adaptability, learning and wellbeing, yet they remain underexplored within African neuroscience. By taking creative approaches to neuroscience, we can surface meaningful new questions. The Institute recognises that investigating the frontiers of neuroscience requires collaboration beyond the traditional boundaries of science and medicine. By integrating neuroscience with locally grounded arts, humanities and digital technologies, we aim to better understand how creative processes support resilience and human flourishing, and how they can be harnessed in both clinical and community settings.



Research tools

The Neuroscience Institute's research enterprise is underpinned by an integrated suite of tools. Our approach prioritises longitudinal, contextually relevant measurement of brain development, mental health and cognitive function across the lifespan. We are particularly focused on designing and validating tools that are robust in resource-constrained African settings, ensuring that screening and diagnostic methods are both scientifically rigorous and practically scalable. We invest in shared platforms and open-access technologies to democratise high-quality neuroscience research and accelerate translation into real-world impact.

Imaging

Providing access to the full range of imaging techniques is a cornerstone of the Institute's strategy to visualise the living brain in health and disease. Working in close partnership with the Cape Universities Body Imaging Centre (CUBIC), we leverage advanced MRI and PET/CT technologies to map brain structure, function and metabolism across diverse populations. CUBIC represents a unique collaborative platform linking academia, industry and national research bodies, supported by dedicated physicists, radiographers and clinical specialists. Together with the NI's Imaging Science research group, this capability enables high-quality, multimodal imaging studies that inform early detection, precision diagnosis and longitudinal tracking of neurological and psychiatric conditions.

Complementing these capabilities, the Institute is expanding access to ultra-low-field MRI technologies that offer more accessible imaging solutions for resource-constrained settings. These platforms have the potential to extend advanced neuroimaging into rural facilities and research environments that have historically lacked access to conventional high-field systems.

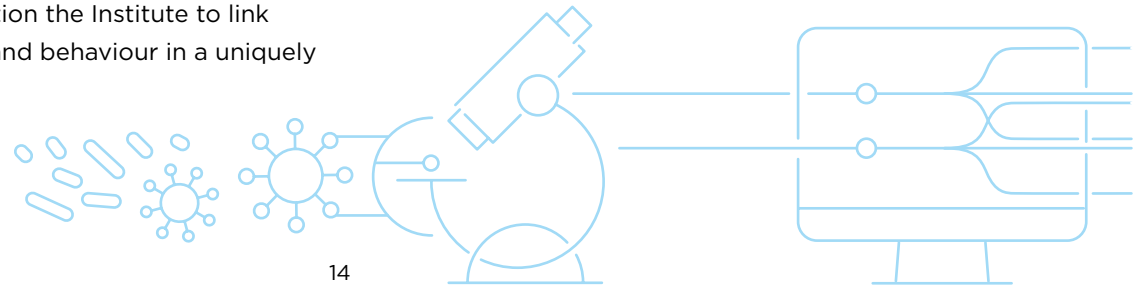
Our advanced microscopy platforms provide insight into brain structure and function beyond what is visible in vivo. Using state-of-the-art fluorescence and calcium imaging approaches, our researchers interrogate neuronal and glial dynamics in tissue and cell culture models, enabling mechanistic discovery that complements human imaging studies. Together, these multiscale imaging capabilities position the Institute to link molecules, cells, circuits and behaviour in a uniquely integrated manner.

Mechanistic and Computational Neuroscience

Brain health is shaped at the scale of neurons, synapses and circuits, where genetic, environmental and experiential influences exert their effects on cognition and behaviour. The Institute's cellular neurophysiology platform, anchored by the first advanced patch-clamp electrophysiology facility in Southern Africa, enables direct recording from single neurons and synapses, including in live human cortical tissue provided through our neurosurgical collaborations. A parallel investment in biophysical modelling and theoretical neuroscience translates these measurements into quantitative, mechanistic accounts of brain function across the lifespan.

Bioinformatics and Multi-omics

Africa's genetic diversity offers a powerful opportunity to generate globally significant insights into brain development, vulnerability and resilience. The Institute applies contemporary bioinformatics and multi-omics approaches to interrogate biological systems. Using next-generation sequencing technologies, including whole genome sequencing, bulk and single-cell RNA sequencing, and chromatin accessibility profiling, our researchers investigate the molecular drivers of neurological processes. These efforts are supported by strong computational pipelines that enable integration of multimodal datasets and translation into clinically meaningful knowledge.



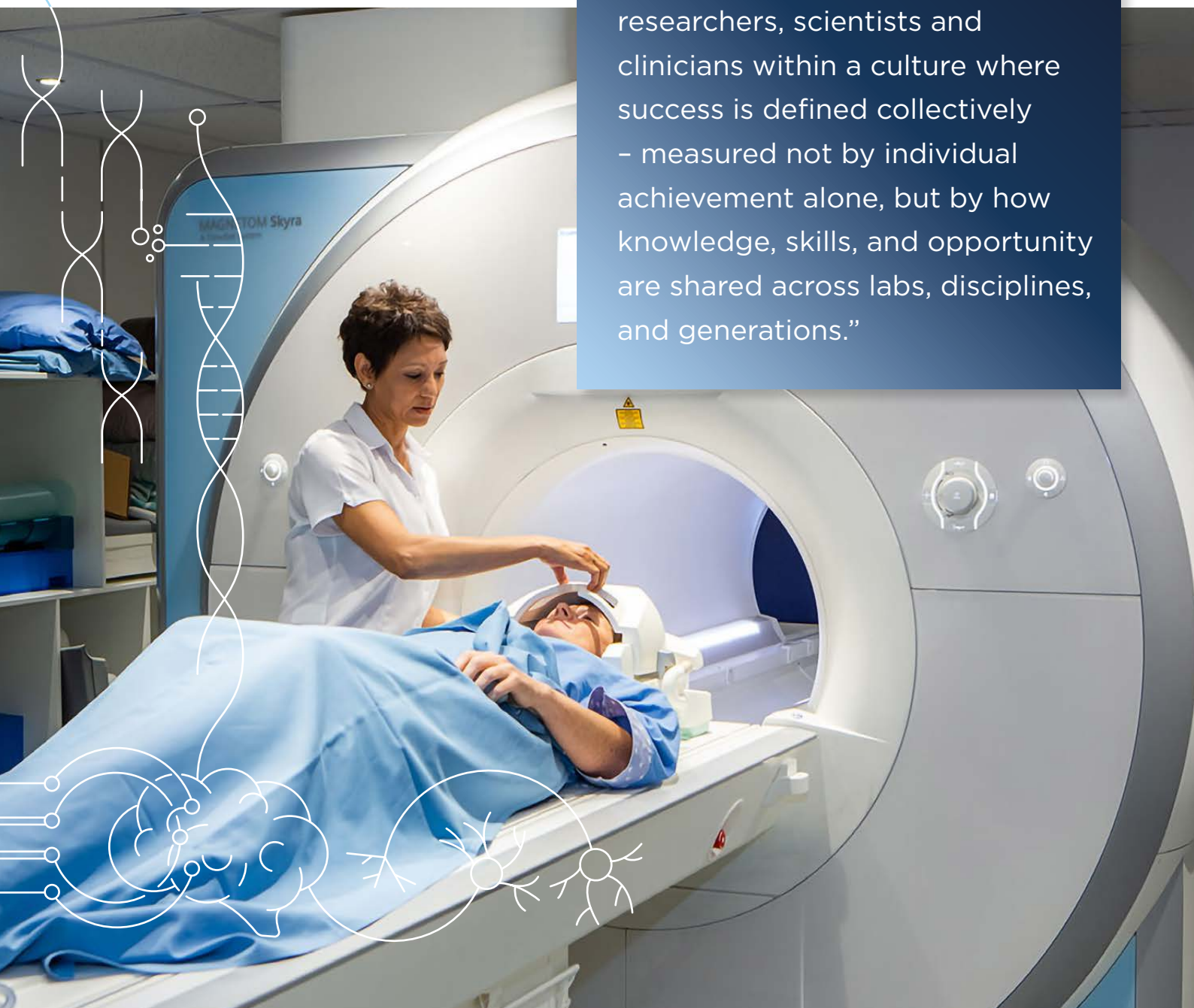
Artificial Intelligence and Machine Learning

As neuroscience datasets grow in scale and complexity, artificial intelligence (AI) and machine learning (ML) are becoming essential tools for discovery and clinical translation. The Institute is advancing AI-driven methods to analyse neuroimaging, multi-omics, electrophysiological, behavioural and clinical data. Our focus includes building locally relevant algorithms, improving early detection of neurological and mental health conditions, and enabling scalable decision-support tools for resource-constrained health systems. By combining computational expertise with deep clinical insight, we aim to harness AI responsibly to improve brain health across African contexts.

Behaviour and Cognition

Understanding brain function ultimately requires careful measurement of behaviour, cognition and lived experience. Our researchers employ a wide range of neuropsychological, neurocognitive and psychosocial assessment tools, with a strong emphasis on cultural validity and real-world applicability in African settings. Our work includes longitudinal cohort studies, digital and low-cost assessment innovations, and community-engaged research that captures the social context of brain health. By linking behavioural phenotyping with biological and imaging data, we aim to generate a uniquely integrated understanding of human brain function across the lifespan.

> “The NI has an opportunity to identify and nurture exceptional researchers, scientists and clinicians within a culture where success is defined collectively – measured not by individual achievement alone, but by how knowledge, skills, and opportunity are shared across labs, disciplines, and generations.”





Five critical questions

Our unique setting, with a young, genetically diverse population facing high exposure to brain insults and trauma, and world-class clinical and research facilities, allows us to address overarching challenges which have global relevance to the field of neuroscience.

To make discoveries in African neuroscience, our work needs to remain grounded in a curiosity about how the brain works. By posing overarching questions to this intellectual community we bring together deep disciplinary perspectives, unlocking new ways of approaching longstanding challenges.

1. Brain mechanisms

What biological pathways underpin brain and neurological health, development and disorders in our context?

Neurodevelopment and brain health outcomes in Africa are shaped by interacting biological and psychosocial risks, including infection, injury, nutrition, sleep and stress. Yet the pathways underlying vulnerability and resilience in these contexts remain poorly understood.

2. Brain and behavioural measurement

How can we accurately measure brain function, behaviour and lived experience in our populations?

Many tools used in high-income settings are considered the 'gold standard' for screening and diagnosing neurodevelopment or mental health conditions, yet do not translate well to our settings. By working directly with communities and learning from colleagues across Africa, we are developing innovative tools to measure behaviours and brain function in such settings.

3. Interventions and system change

How can we improve the effectiveness and scalability of our interventions in an African context?

For our interventions to be effective and scalable, our research into brain health has to be relevant to African communities and consider complex determinants and healthcare systems. Effective and scalable interventions therefore require prevention-focused, context-responsive approaches that strengthen resilience as well as treat disorders.

4. Ethics of neuroscience

What constitutes ethical and socially just research and practice in relation to brain health?

The surge of technological advances in science and health requires us to be proactive in shaping ethical neuroscience research. We are developing new protocols to guide research design, protecting our populations while making breakthrough scientific advances, towards a more just society.

5. Mind, imagination and social cognition

How do imagination, social behaviour, language and self-awareness arise from and in turn shape the human mind?

The capacities that enable humans to imagine, create, communicate, empathise and organise socially are central to wellbeing and identity, yet remain poorly understood across diverse cultural settings. By integrating neuroscience with the social sciences, humanities and creative arts, we investigate how people imagine, relate, create meaning and engage with rapidly changing technologies and social settings, and how these processes influence brain health and human flourishing.

> “The Neuroscience Institute is strengthening its capacity to translate African neuroscience into meaningful clinical, societal and policy impact.”

Impact and innovation

We will achieve this impact by building pathways that support African research leadership and capacity across the continent, enabling researchers to move from discovery toward implementation through collaboration, training and knowledge sharing. This requires us to develop strong partnerships for drug discovery, medical technology development, and clinical innovation.

We bridge the long arc of discovery science to policy change through communication and public engagement, to empower the public with an understanding of evidence-based research. Recognising the importance of public trust, we are co-developing our research agenda with our stakeholders and expanding storytelling and science communication to connect research more directly with the communities it serves.



Translating strategy into action

This strategy rests on a proven foundation. Over the past decade our members have led more than 1,000 peer-reviewed studies and helped place African neuroscience at the centre of global discovery. The next five years are about converting that momentum into enduring contributions to brain health, in Africa and for the world.

Key areas of contribution over the next five years

African-led discovery on the world's neglected brain conditions.

With the region at the epicentre of HIV, tuberculosis and TB meningitis, the Institute is positioned to deliver the mechanistic understanding, biomarkers and treatment advances that reduce infection-driven brain injury and neurodisability. Our work on the brain's response to infection, and on the long shadow that early-life infection and inflammation cast over later neurodegeneration, addresses questions that can only be answered here yet matter everywhere.

Brain health across the whole lifespan.

From the first thousand days to healthy ageing, the Institute is positioned to define the critical windows in which nutrition, toxins, injury and infection shape lifelong outcomes, and to translate that knowledge into scalable prevention. With Africa soon home to half the world's children alongside a rapidly growing population of older adults, our lifespan approach, and our focus on the neglected question of ageing and dementia on the continent, will generate evidence the rest of the world increasingly needs.

Equitable genomics and precision brain medicine.

Africa holds the greatest human genetic diversity on earth. Over the next five years the Institute is positioned to turn that diversity into globally significant insight, diversifying the reference databases on which precision medicine depends and delivering molecular diagnoses to families who have never had them, while setting the standard for the ethical stewardship of African genomic data.

From the single cell to the whole patient.

Close collaborations between our clinical disciplines and fundamental, experimental and computational neuroscience have given rise to a rare advantage, a set of human systems for studying the brain at cellular and molecular resolution that exist in very few places worldwide and nowhere else on the continent: living human brain tissue across the lifespan, complemented by human brain organoids. This capability is already producing landmark science, from a cell atlas of human cortical maturation to the finding that human cortical neurons keep maturing far more slowly than in other species. Our researchers now aim to lead the first effort to map the connectome of the developing human cortex with international collaborators.

Responsible neuroscience and artificial intelligence.

As neuroscience datasets grow in scale and complexity, the Institute is positioned to lead in applying artificial intelligence and computational modelling to neuroimaging, neurogenomics and mental-health screening in ways that are locally relevant and ethically grounded. By aligning with UCT's artificial-intelligence initiative and embedding neuroethics, we can help ensure that the global turn to AI in brain health is shaped by, and genuinely serves, African populations.

From discovery to clinic, policy and public trust.

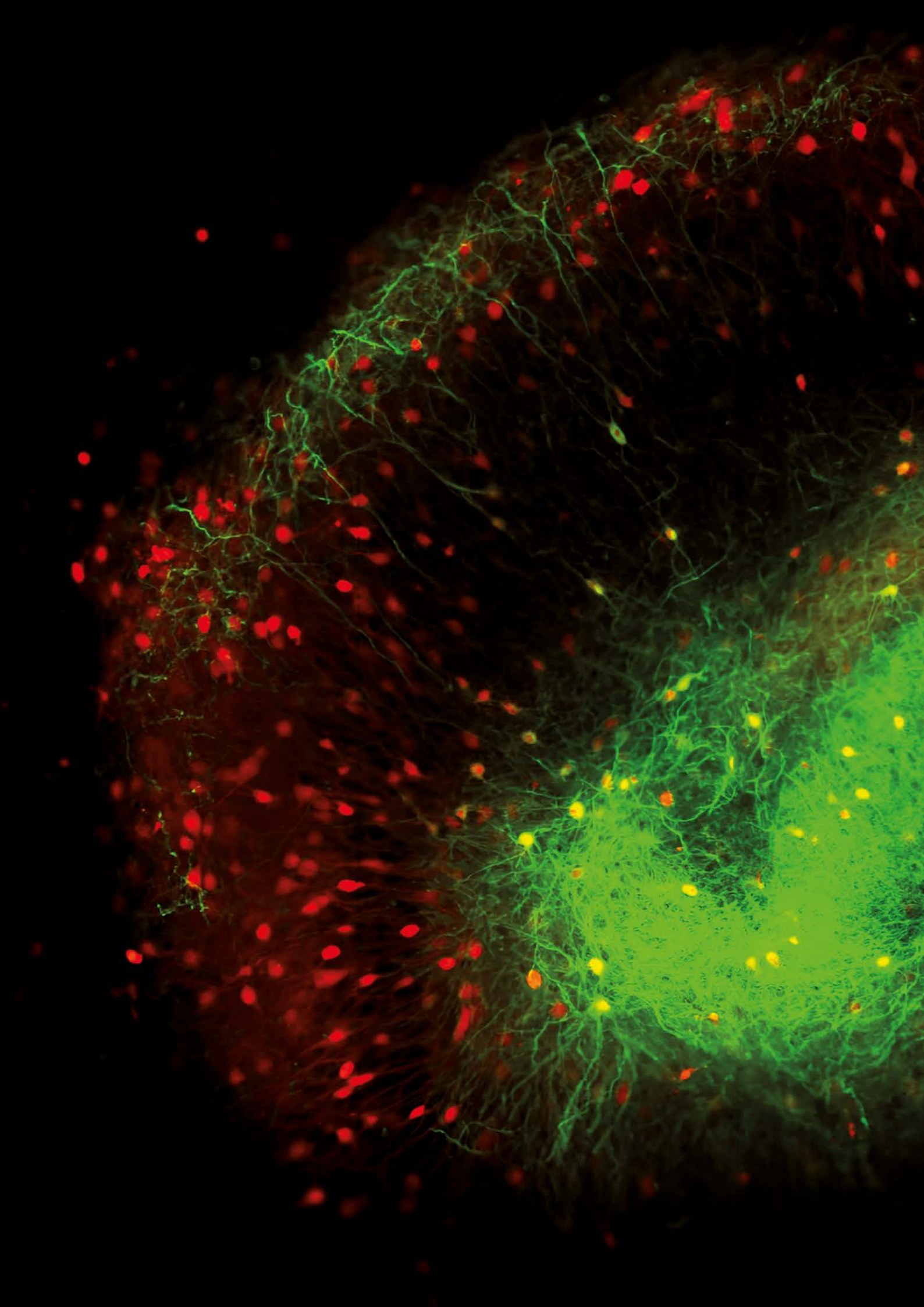
The Institute is positioned to shorten the arc from laboratory to clinic to community, through partnerships for drug discovery, medical-technology development and clinical innovation, through task-shared and community-engaged interventions that are effective and scalable in real health systems, and through science communication and public engagement that build the trust on which lasting impact depends.

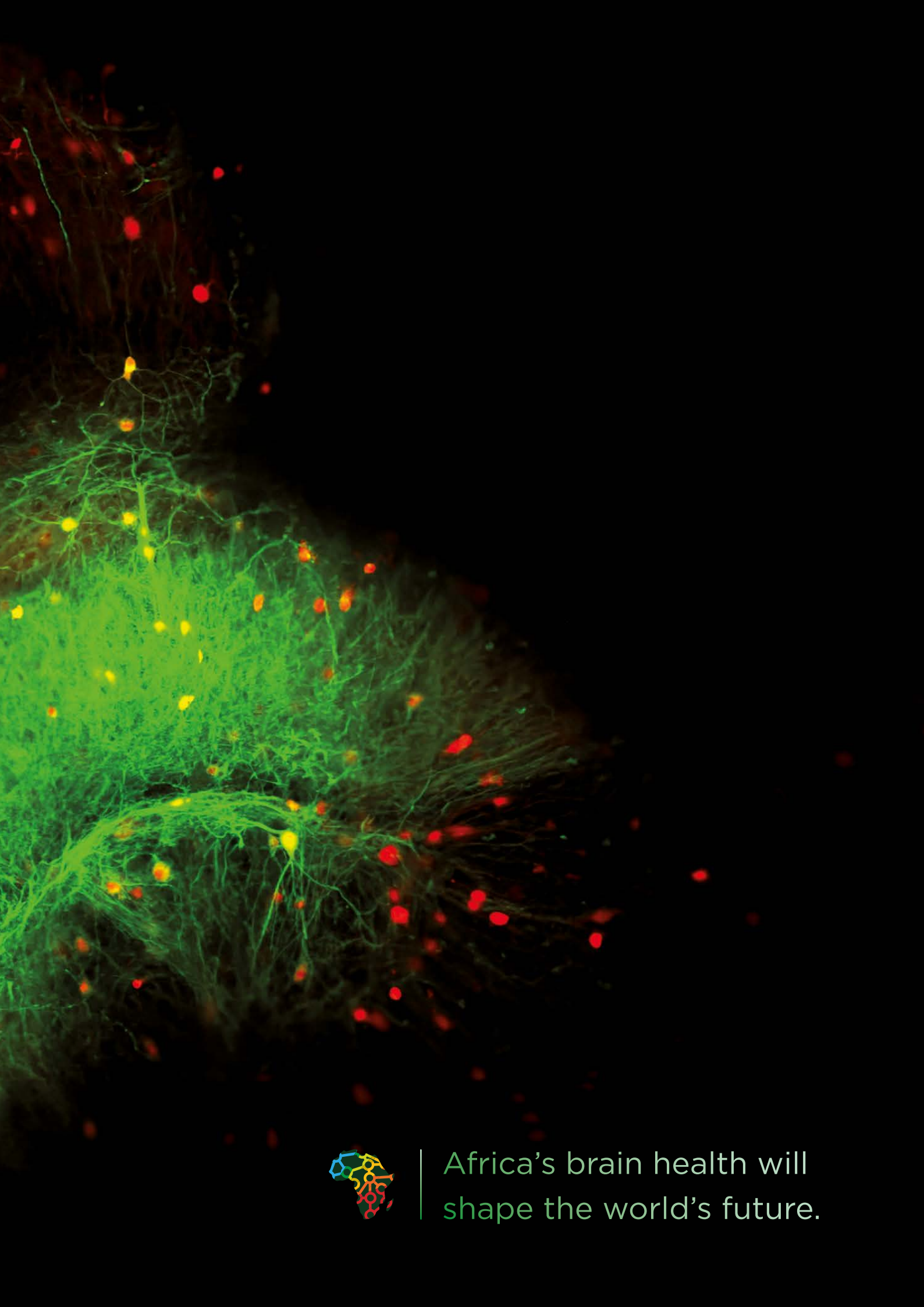
From areas of contribution to sustained delivery

Realising these contributions requires targeted investment across the whole NI research ecosystem: its people, its platforms and its interdisciplinary programmes. We understand the conditions for interdisciplinary innovation, namely intellectual leadership, space and equipment, mentorship at every career stage, and sustained research funding. Through expanded fellowship pathways we are already training the next generation of African neuroscientists, so that targeted investment today becomes durable brain capital tomorrow.

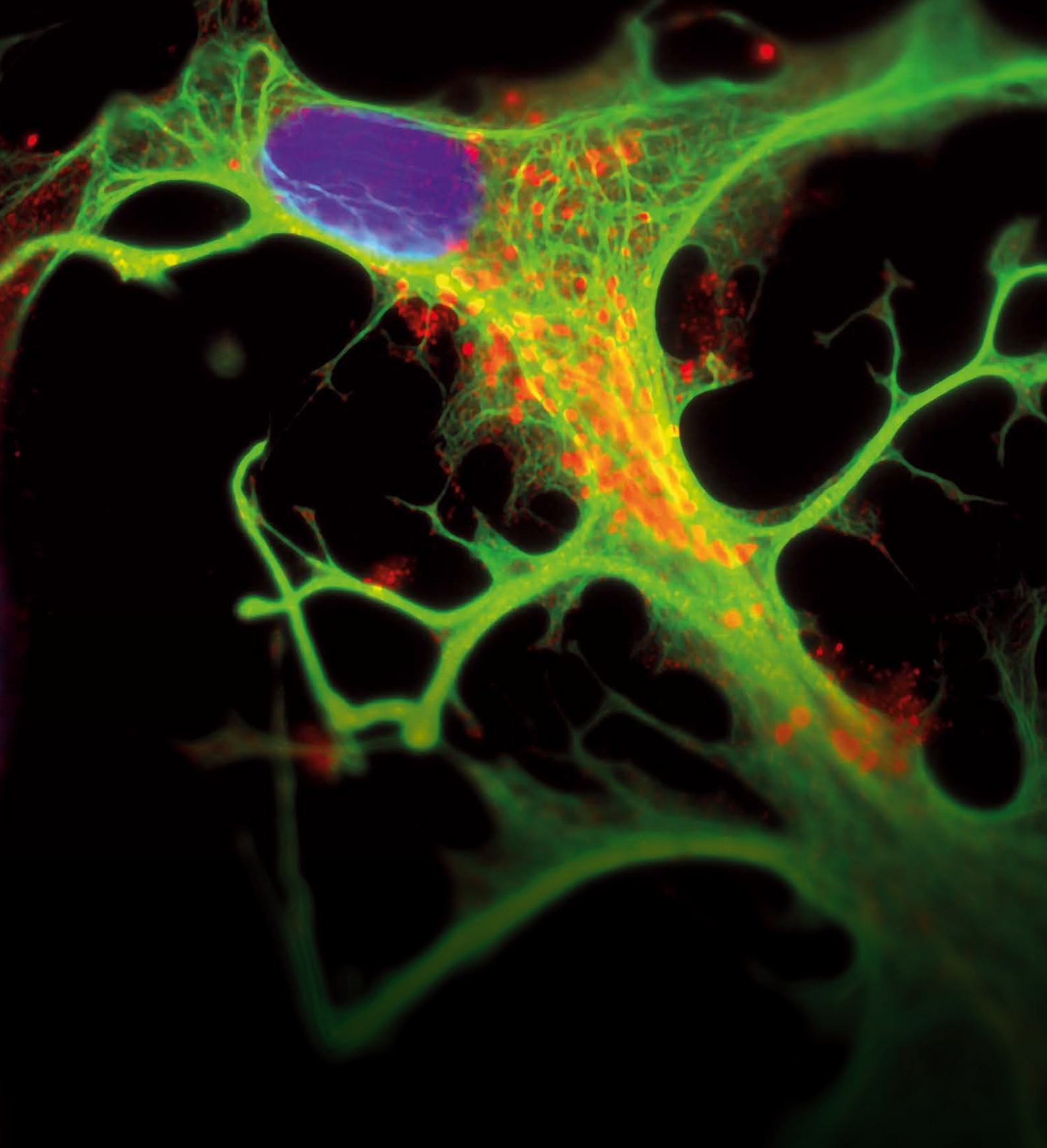
> "We have a proven model, and we are ready to scale. We welcome the partnership of research funders and science philanthropists in advancing this strategy, growing Africa's brain capital and ensuring the continent is a site of world-class research and an enduring generator of discoveries and ethical frameworks for global neuroscience."







Africa's brain health will shape the world's future.



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