

Neuroscience Matters: Research in Scotland is key to future health

The BNA is a registered charity number 1103852

Why Neuroscience Matters

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**Fundamental
understanding** of our
humanity

Essential to prevent
and **treat neurological
and psychiatric
disorders**

**Provides societal
benefits**
reduced disease
burden, creates jobs,
keeps UK at forefront
of cutting-edge
research



What makes us human

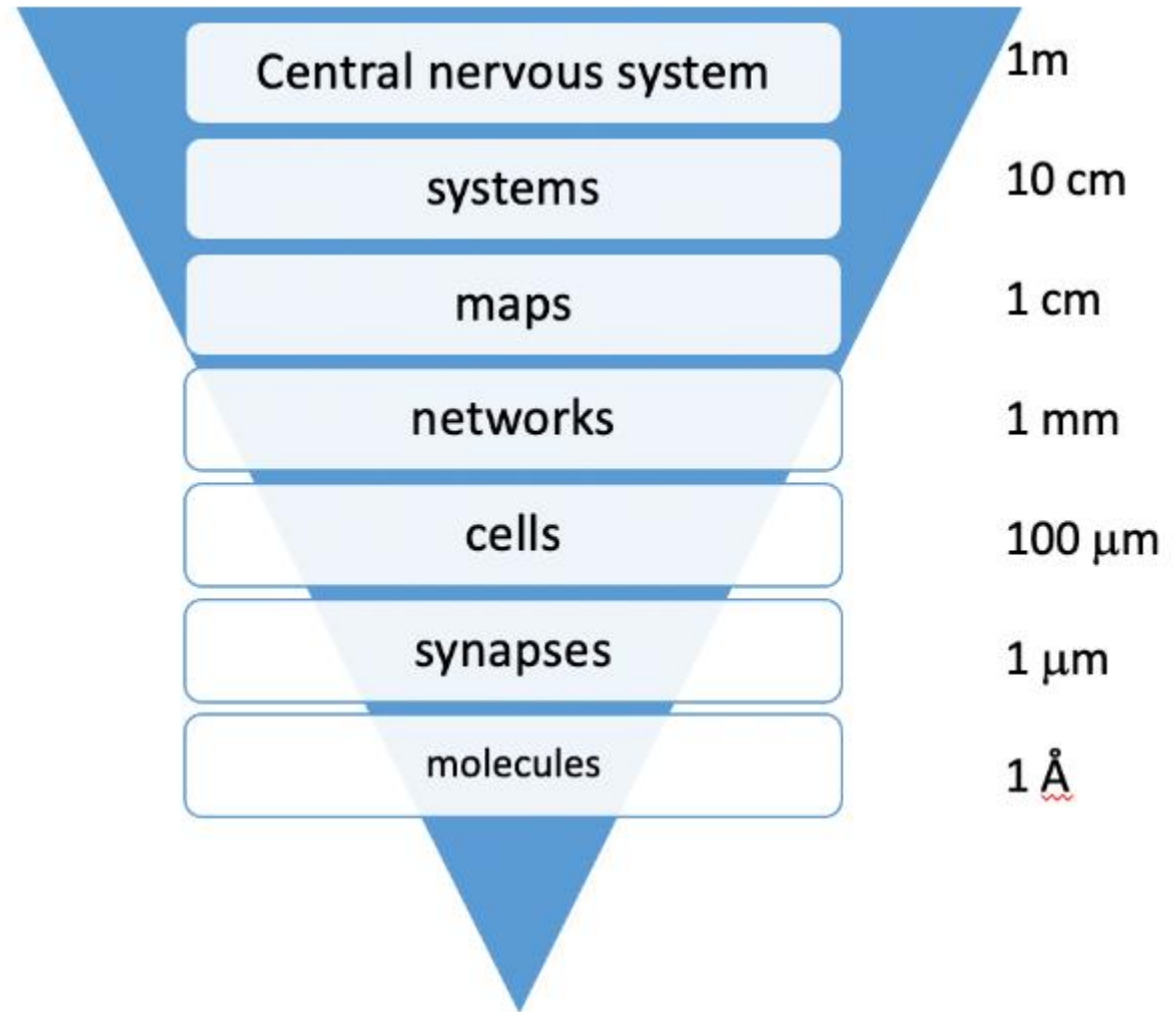
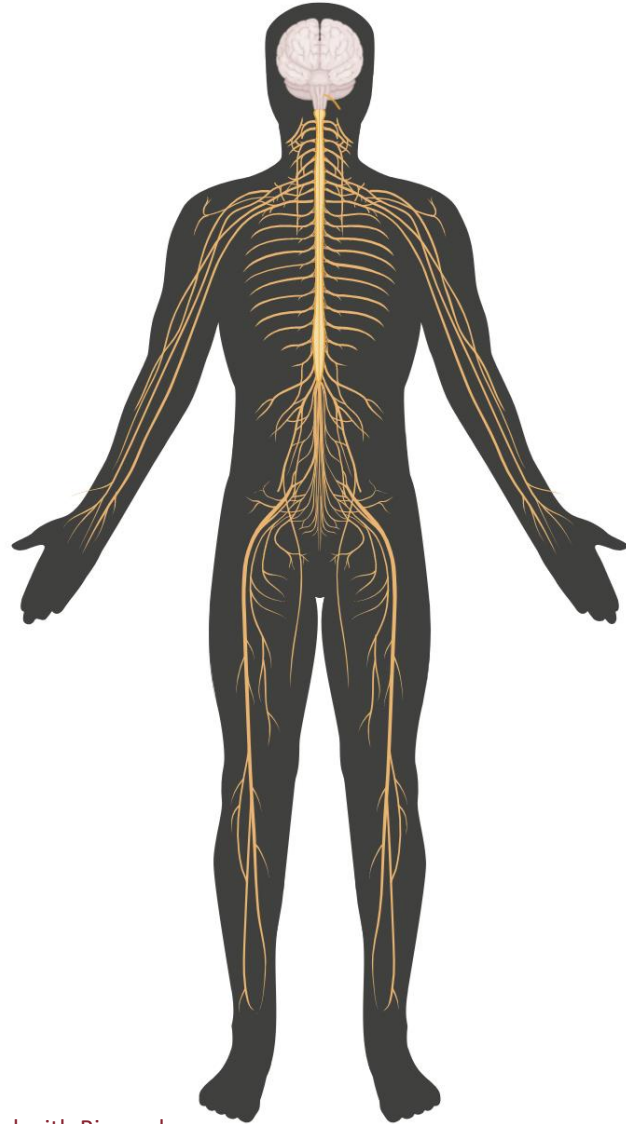
- How do we think, feel, remember?
- Challenge to understand, fix, enhance brain function

- Human Brain Project (EU, 1 billion euro),
- *Brain Research Through Advancing Innovative Neurotechnologies* (BRAIN Initiative, US, over \$1.3 billion)
- Scottish Brain Health & Dementia Research Strategy
- Dementia in Scotland Strategy

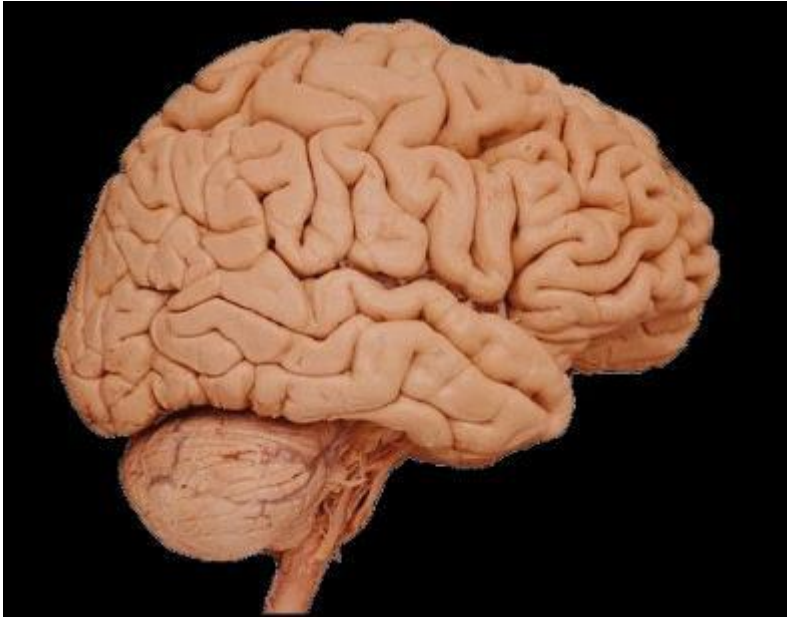


THE EUROPEAN BRAIN COUNCIL PRESENTS
BRAIN MISSION
UNDERSTAND - FIX - ENHANCE
THE SPACE RACE OF THE 21ST CENTURY

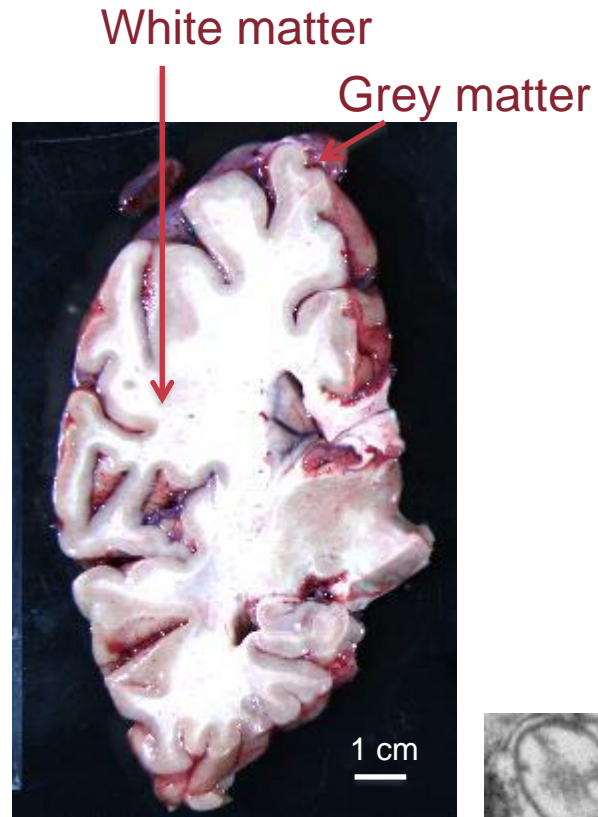
The challenge: The scales of neuroscience



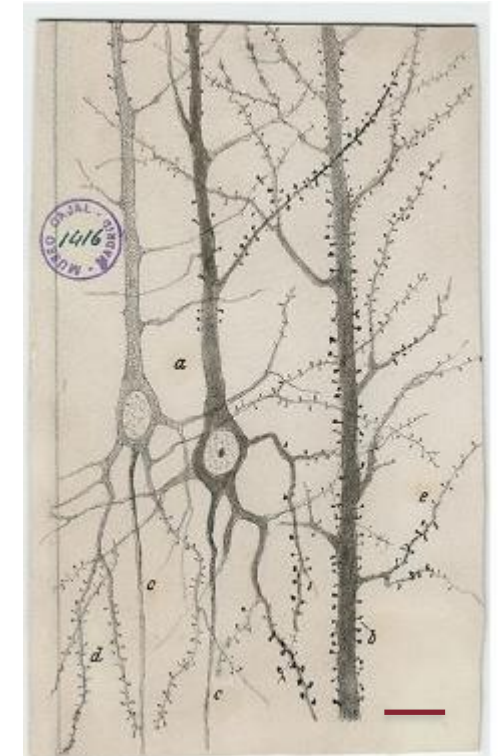
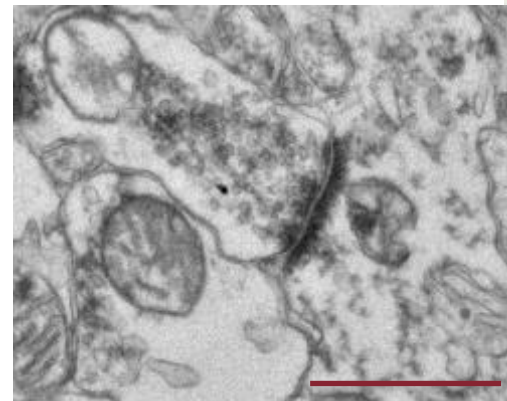
The challenge: The amazingly complex nervous system



10^{11} brain cells (100 billion)
 10^{14} synapses (100 trillion)



Electron micrograph of human synapse scale bar 0.001 mm



The Beautiful Brain
Drawings of Santiago
Ramon y Cajal, scale
bar ~ 0.01 mm



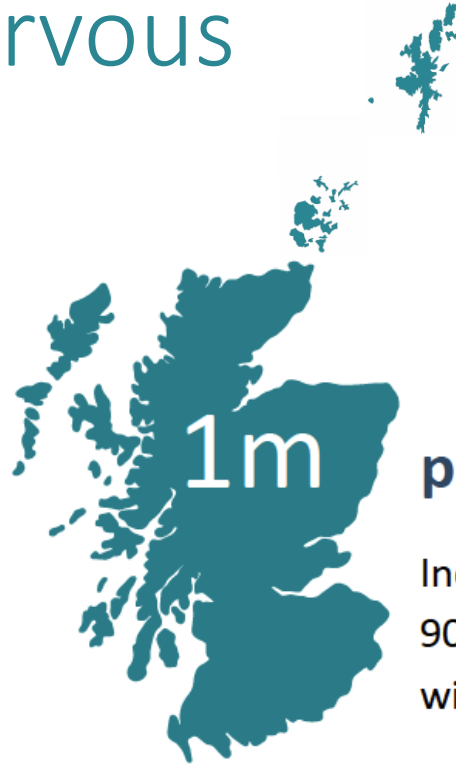
CC-BY NASA Hubble telescope image galaxy Arp 273

10^{14} synapses (100 trillion) in your brain. In our galaxy there are ~100-300 billion stars ($\sim 10^{11}$)

Defeating brain & nervous system disorders

Neurological disorders one of the leading causes of disability globally

Over 1 billion people live with mental health disorders



people with a neurological condition

Including within Scotland an estimated:
90,000 with dementia, 58,000 with epilepsy, 15,750 with MS, 12,400 with Parkinson's, 400 with MND.¹

1 in 3 people in Scotland are estimated to be affected by mental illness in any one year²



Defeating brain & nervous system disorders - challenges

Complexity of the brain makes tackling these diseases very difficult

Chronic under-funding compared to other biomedical fields

Lack of capacity and “brain drain”



Defeating brain & nervous system disorders - challenges

Brain disorders cost **over 100 billion pounds** per year in the UK alone

Feinberg et al 2013 J Psychopharmacol
[10.1177/0269881113495118](https://doi.org/10.1177/0269881113495118)

£2.9 billion

Estimated cost of dementia every year in Scotland³

Defeating brain & nervous system disorders

Research WORKS

Spinal Muscular Atrophy (SMA)
fatal motor neuron disease in 1:10,000 people

1990s-2000s genetic cause discovered

Advances in antisense oligonucleotide technology - creation of a treatment to fix gene expression



Treatment extends lifespan of babies with SMA and helps them reach motor milestones

<https://www.theguardian.com/society/2021/jun/01/baby-boy-is-first-to-receive-18m-treatment-for-spinal-muscular-atrophy-on-nhs>

Arthur Morgan, first person in the UK treated with SMA drug

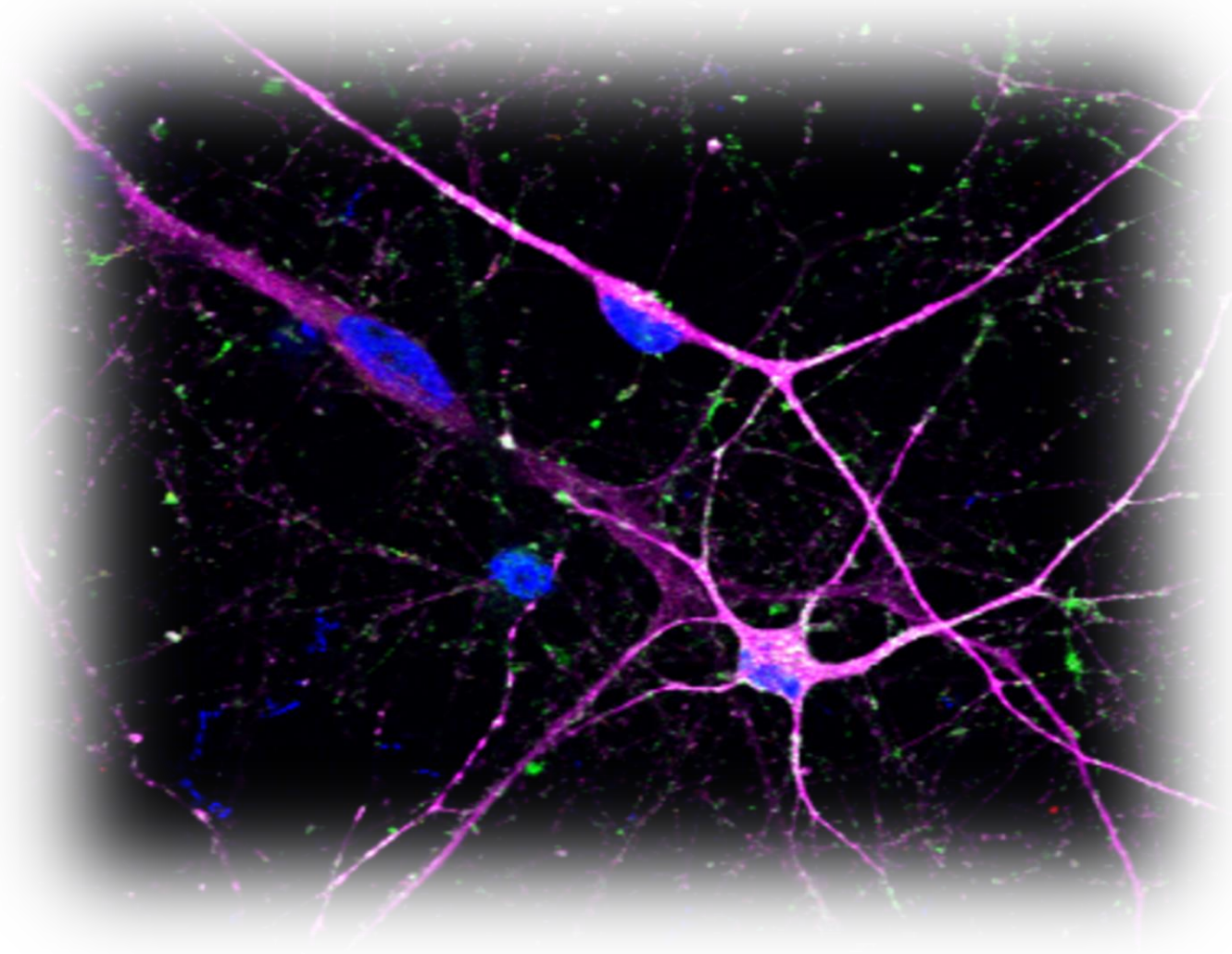


Societal benefits of Neuroscience

Enhances
knowledge and
Scottish science
reputation

Improves the
long-term health
of people in
Scotland

Keeps Scotland
at forefront of
cutting-edge
research



Keeping the Scotland at the forefront of scientific and medical advances

Fuelling developments in neurodegen disease research

Promoting Brain Health

Bringing high tech-jobs and investment to Scotland



Scottish Brain Sciences

- Pioneering new international brain sciences research organisation
- Gives people the opportunity to join the world's first Brain Health Community
- Shaping future neurological wellbeing of people now and in generations to come.



You can help neuroscience

Fundamental understanding of our humanity

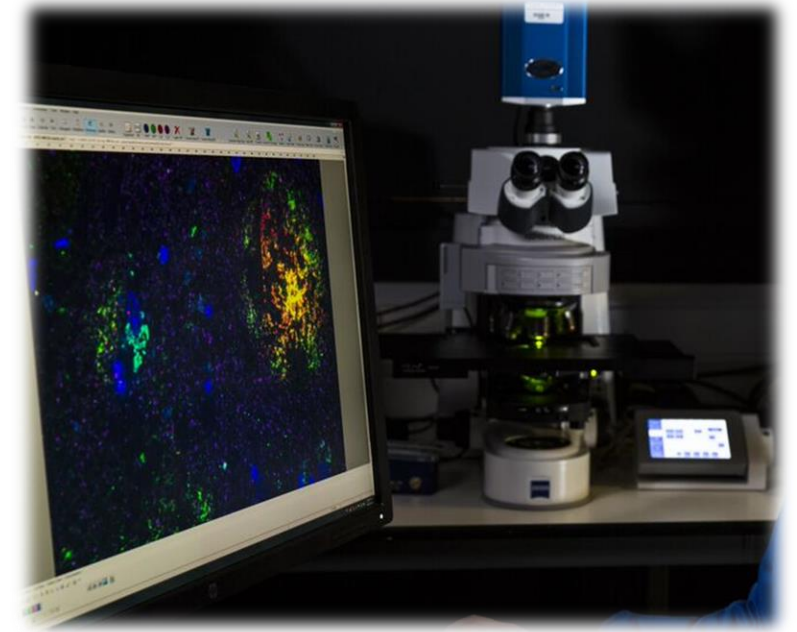
Essential to prevent and treat neurological and psychiatric disorders

Provides societal benefits

Access to the *best minds and international collaborative funding*

Boost funding to help tackle Scotland's key future health challenges

Accelerate Scottish neuroscience research and spread public health messages about preventing brain disorders



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THANK YOU



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