

The UK Biobank Imaging study



Tom Littlejohns

Nuffield Department of Population
Health

University of Oxford

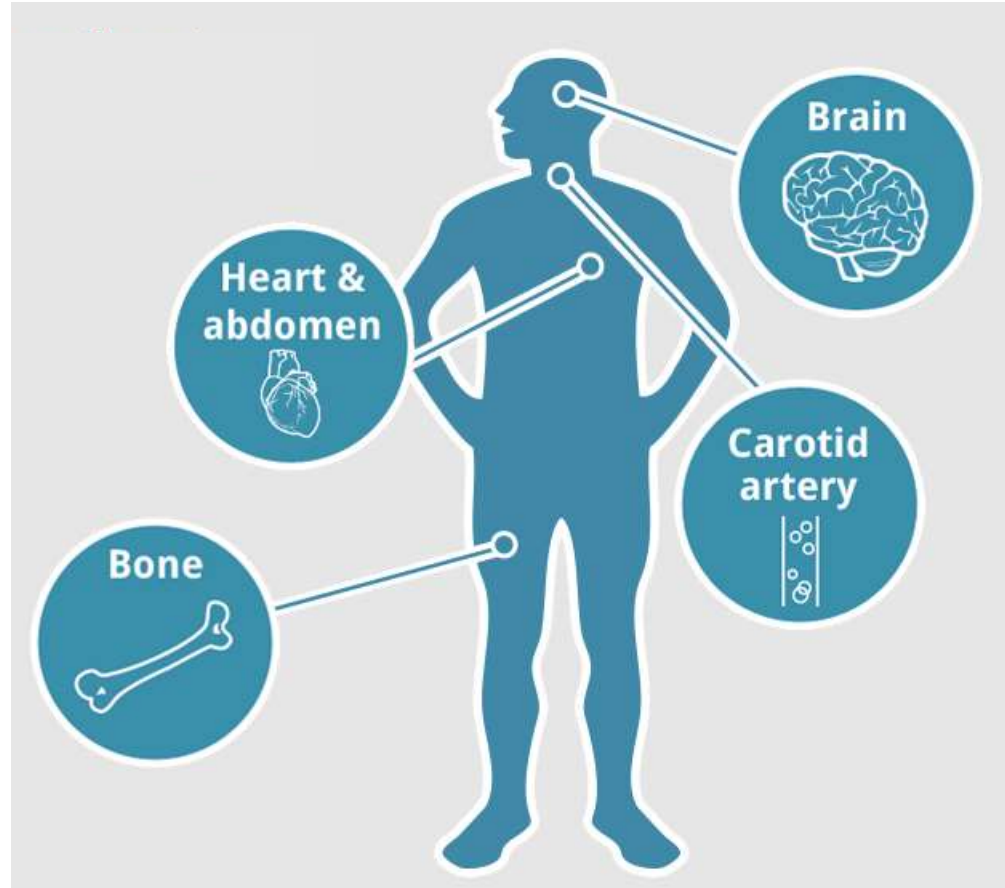


Full-body imaging study

MRI – brain, heart and body

Carotid ultrasound – measures of large artery

DXA – low dose X-ray of bones and joints



Scientific value of imaging

Imaging extends the description of **diseases**

Imaging can extend usefulness of other data by integrating with other data (e.g. lifestyle, biochemical, genetic) that have already been collected

Can be used to study how diseases develop

Large population size allows investigation of associations between imaging and non-imaging measures and many health outcomes

Can be used to compare with other data (e.g., body fat, bone density)

Study overview

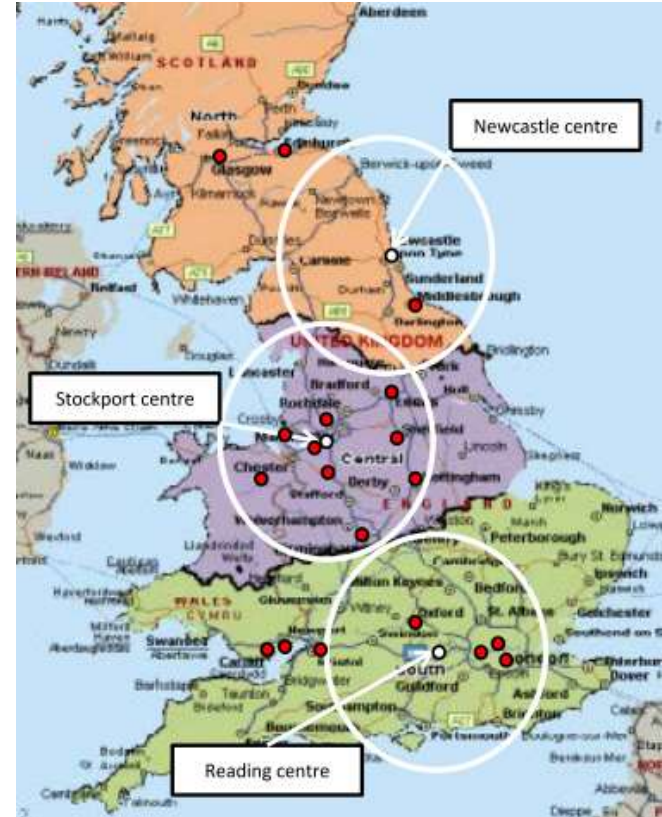
Pilot phase – 5,000 in Stockport (2014-15)

Main phase – 95,000 in Stockport, Reading, Newcastle and Bristol (2016-23)

18 people each day, 7 days per week

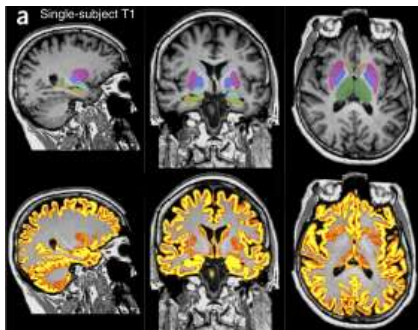
Attendance co-ordinated by Participant Resource Centre (PRC) in Cardiff

Emailed invite, phone PRC if interested, pre-screening and book attendance date

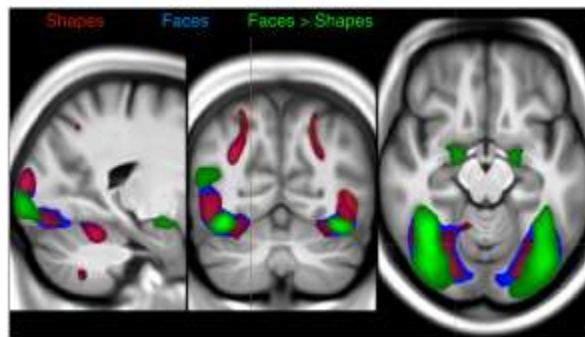


Brain

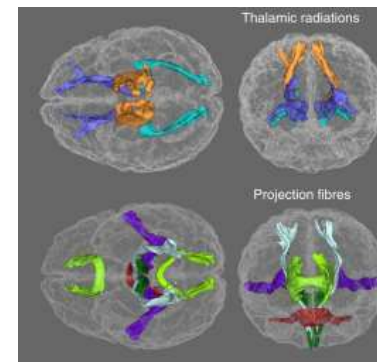
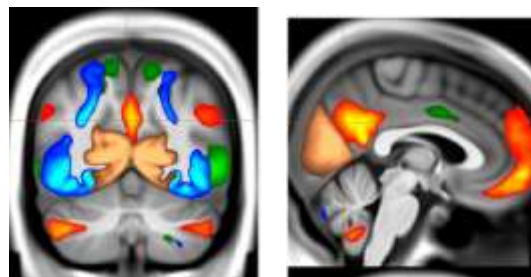
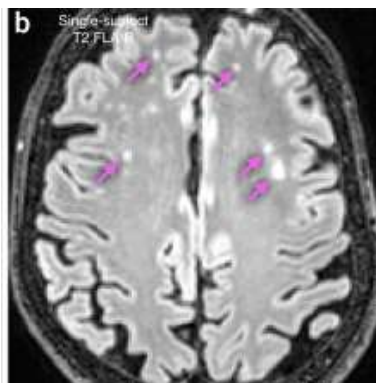
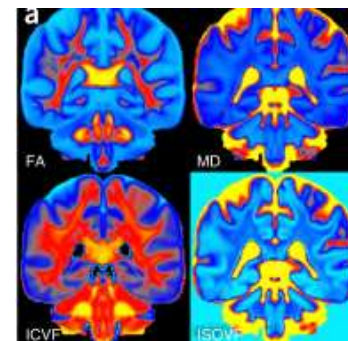
Structural



Functional



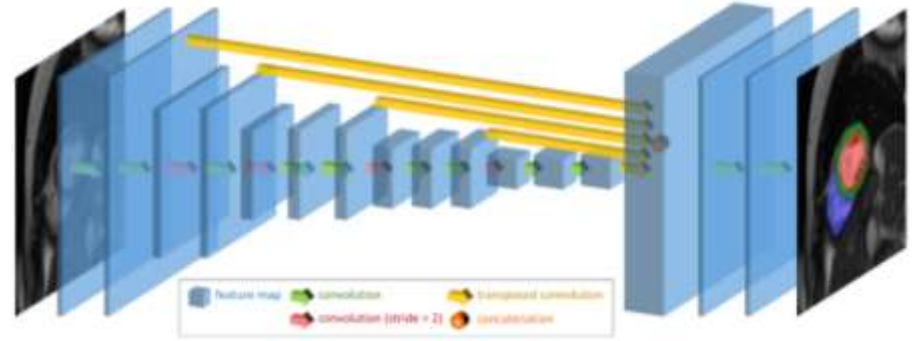
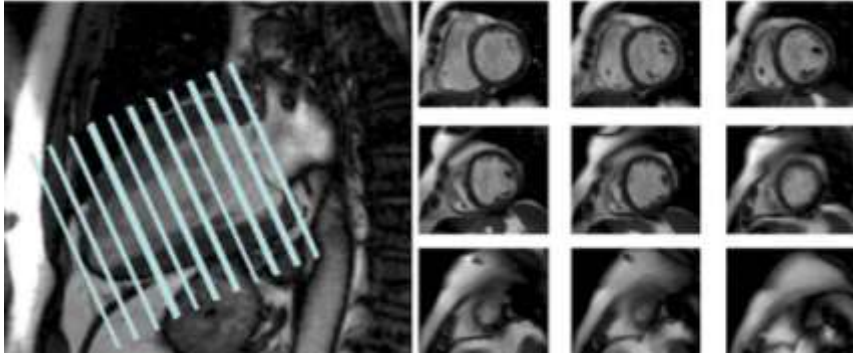
Diffusion



Resting

Images from Miller et al (2016), *Nat Neuro* and Cox et al (2016), *Nat Comm*

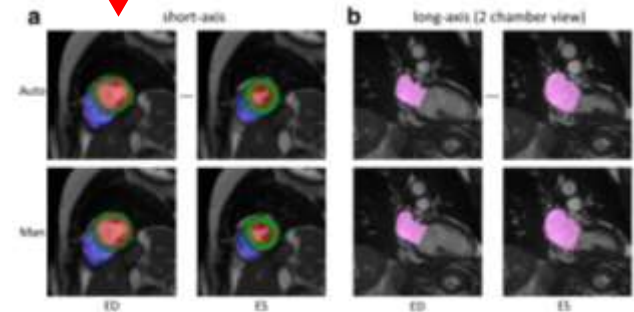
Heart



Can measure heart anatomy and function of blood flow

Novel approaches such as 3D models constructed from 2D scans

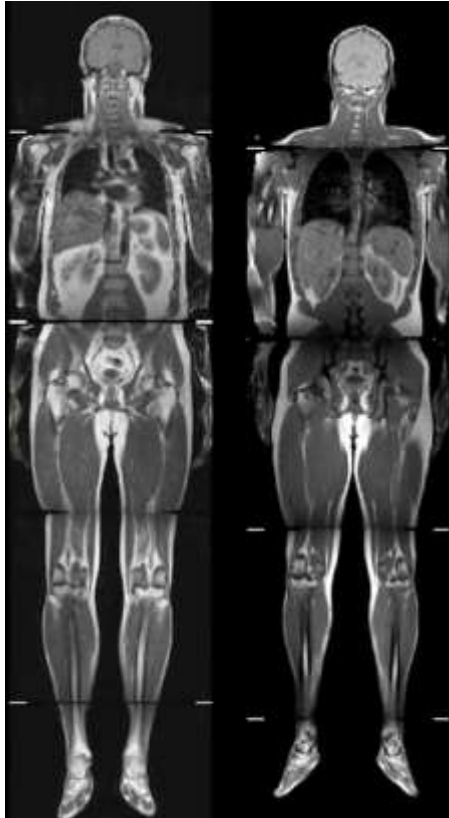
Extract novel features



5.86 litres of
internal fat



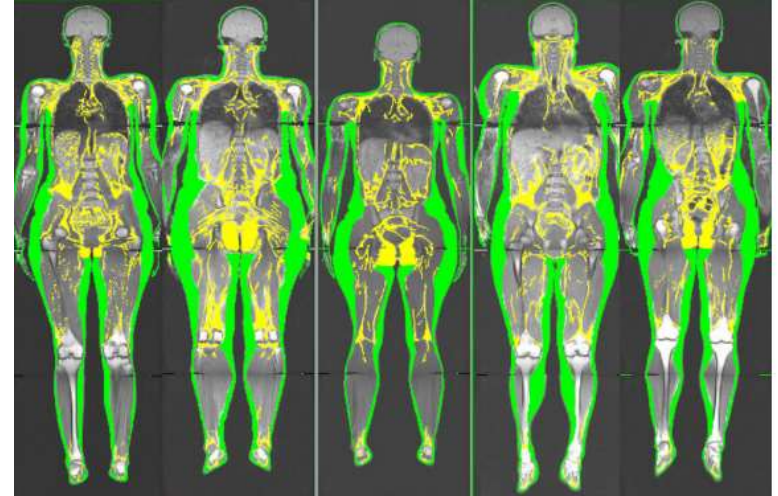
1.65 litres of
internal fat



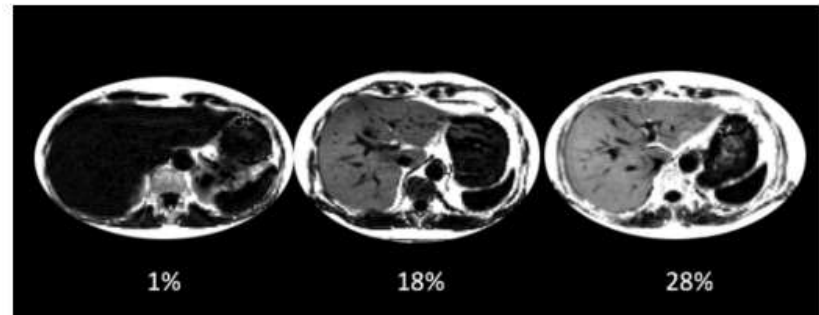
Body

Green =
subcutaneous
fat

Yellow =
internal fat



Also liver
and
pancreatic
MRI

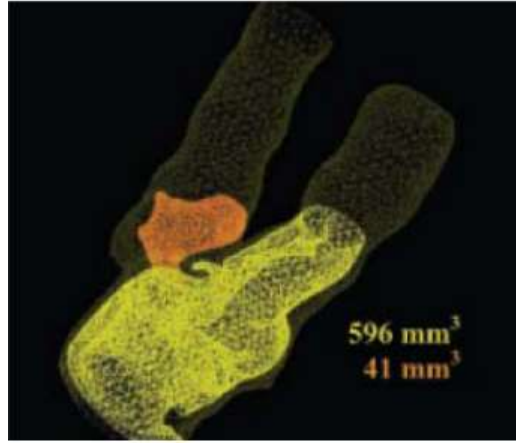


Carotid ultrasound

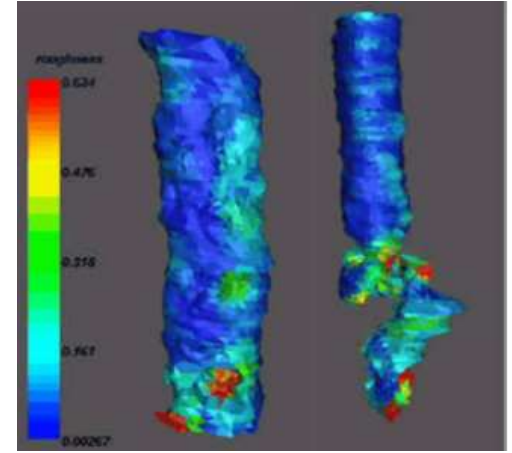


Thickness of major carotid arteries

Volume of arteries

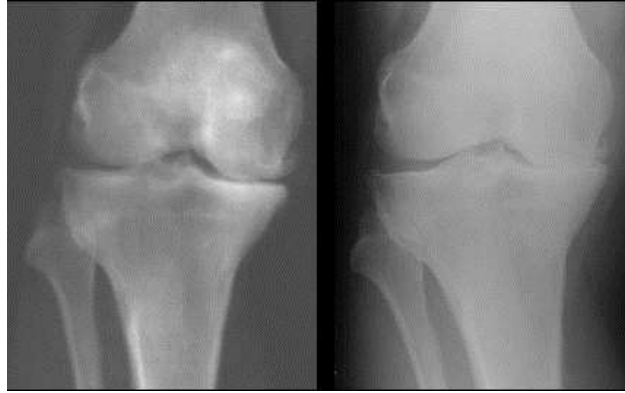


↑
Measures plaque volume



↑
Other features of carotid artery

DXA – bones and joints



Measures bone density of the spine, hip and knee

Can identify osteoarthritic changes (hip, knee) and fractures

Detailed measures of body composition (under the skin and around the organs)

Heart monitor

To detect irregular heart beats (subclinical heart arrhythmias)

Important as these may be related to future risk of heart attack and stroke and are asymptomatic

We'd like to measure electrical activity of the heart continuously for 2 weeks for 20,000 participants

Is water resistant, does not interfere with day to day activities and does not need charging

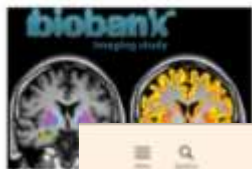


Some shaving possibly involved....

By far the largest imaging study ever



Massive U.K. Brain-Mapping Project Releases First Results
The UK Biobank imaging study aims to track brain health in 50,000 individuals as part of a long-running effort to understand how diseases develop.



Brexit: Are you worried about your retirement?
If you have a



Biggest body scanning study provides 'window into the brain'
First data from UK Biobank imaging project finds links between anatomy and cognitive decline

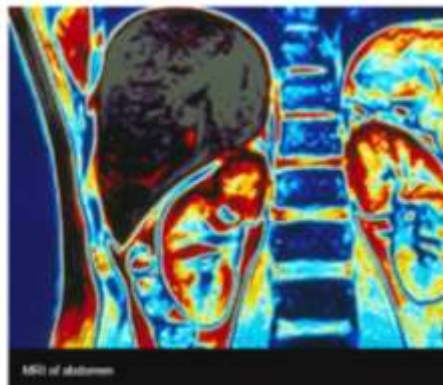


Brain scans from the UK Biobank imaging project (© 2016)



World's biggest scanning project to detect diseases
Fergus Walsh
Medical correspondent

© 2 May 2014



First brain scans available from world's largest imaging study
Five thousand brain scans from the UK Biobank imaging project are now available for use by the research community.

Neuroscience and mental health.



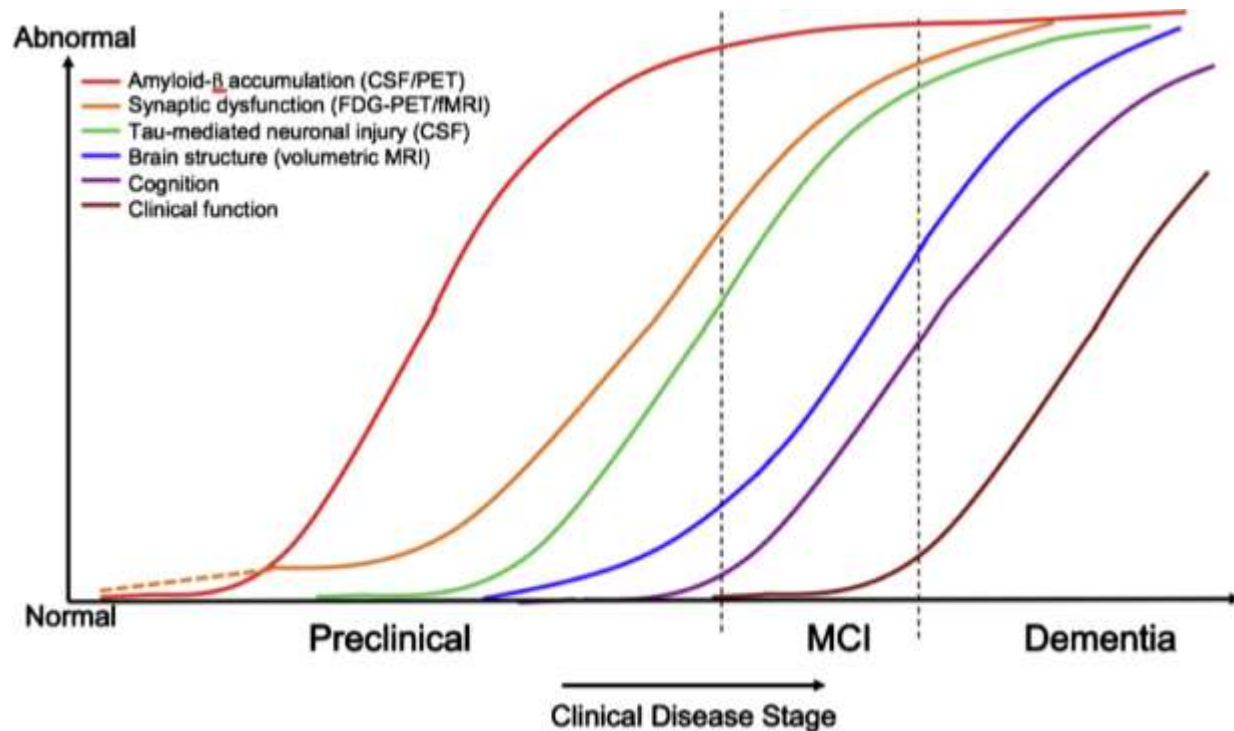
World's largest medical imaging study will scan 100,000 Britons
Volunteers will have their hearts, brains, bones and body fat scanned to help doctors find links between diseases, and ways to detect illnesses early on.



Person lying in an MRI scanner, with a monitor displaying brain scan images.

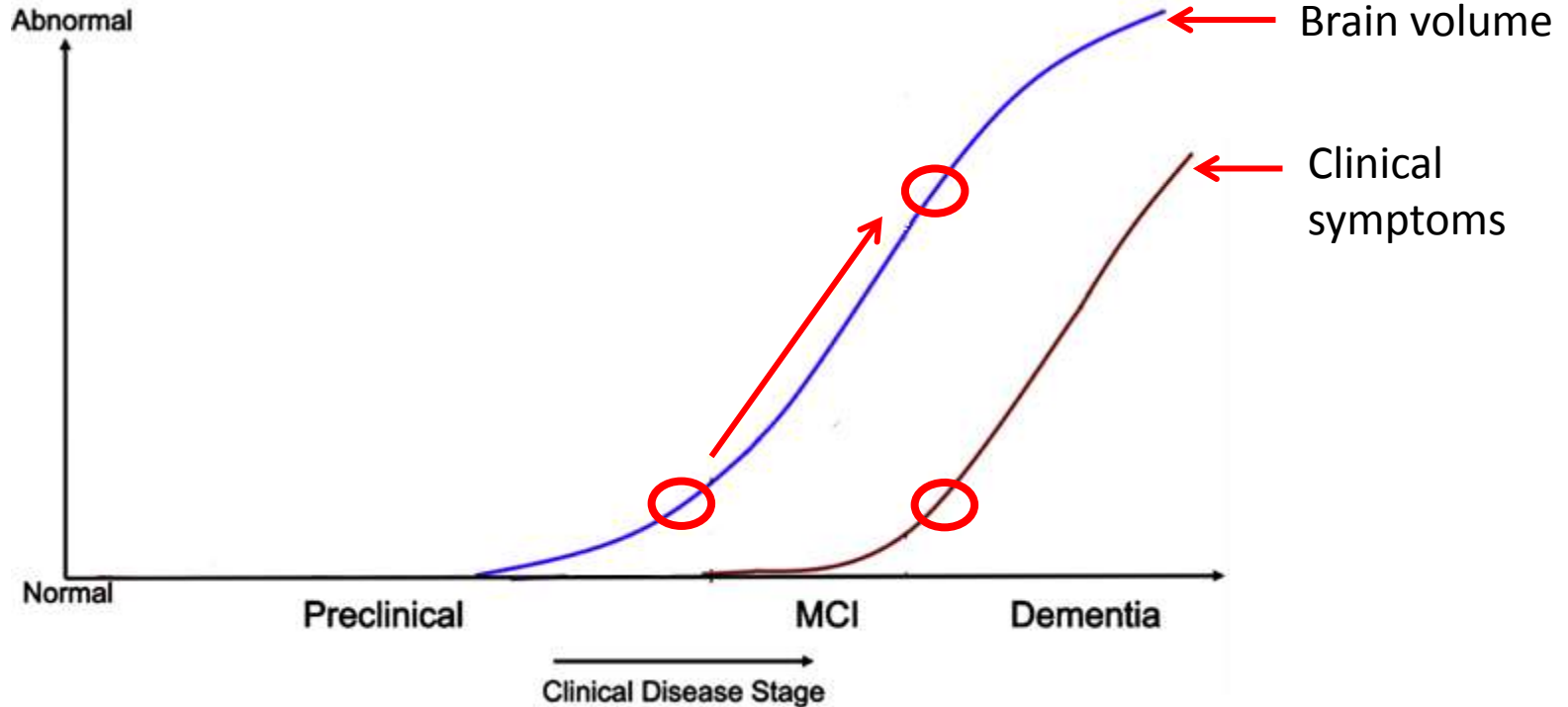
Plans for repeat in 10,000 participants

Re-invite 10,000 participants 2-3 years after their initial scan



Plans for repeat in 10,000 participants

Re-invite 10,000 participants 2-3 years after their initial scan



Improving the health of future generations

3

2

9

4

1

Participants scanned
so far - help us make
it to 100,000!

[Get in touch](#)