UK Biobank imaging study
UK Biobank imaging study: 100,000 participants (complete end-2022)

- MRI - brain, heart, body
- Carotid ultrasound – measures of large artery
- DXA - low dose X-ray of bones and joints
Why - what’s the 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)

Created a new scientific vision, as nothing on this scale as been done before
Brain imaging

- Navigate the brain in a new way
- Can measure volumes and shapes of different parts of the brain
- Identify how the major brain pathways are connected
- Compare essential circuits
- Zoom into a region to explore the cells that comprise it and their functions
Population variation of total brain volume with age

Total brain volume (normalised)

Age at imaging assessment

$r=0.57$
Measures of cardiac structure and function

• Can measure anatomical structure of heart chambers
• Can measure function of blood flow through the heart
• Detailed enough to identify individuals with subtle differences
Automated cardiac MRI ejection fraction measures to identify high risk population groups
Carotid ultrasound

Provides measures of:
• Thickness of major carotid arteries
• Volume of arteries
• Plaque
DEXA imaging

- 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)
Body MRI: Similar age, gender, BMI & % body fat, but different amounts of internal fat

5.86 litres of internal Fat

1.65 litres of internal fat
Continuous ECG monitoring on 20,000 participants

- To detect irregular heart beats (subclinical heart arrhythmias)
- Important as these may be related to future risk of heart attack and stroke
- Large-scale evidence needed on these ‘silent’ arrhythmias
- We’d like to measure electrical activity of the heart continuously for 2 weeks for 20,000 participants
Logistics

- Pilot phase: 5,000 people in 1 centre (2014-5)
- Main phase: 95,000 people in 4 bespoke centres (2016-2022)
- 23,000 already scanned
- Repeat imaging in 10,000 planned
- 18 people each day, 7 days per week for 6 years!
Improving the health of future generations

237665

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

Get in touch