UK Biobank: A potted history

Andrew Trehearne, UK biobank
Leeds, March 2016
500,000 participants

22 recruitment centres

44,000 from Leeds area

On time and within budget
You may remember

- Follow your health
- Lots of questions about your health and wellbeing
- Weighed and measured you

Later

- Eye measures & photos
- Hearing
- ECG
- Cognitive function
- More diet

Email – do more!
Storage and retrieval

• Blood
• Urine
• Saliva

• -80°C (and some even colder)

Total > 15 million aliquots/ mini samples
Rare 'healthy' smokers' lungs explained

By James Gallagher
Health editor, BBC News website

28 September 2015 | Health

The mystery of why some people appear to have healthy lungs despite a lifetime of smoking has been explained by UK scientists.

The analysis of more than 50,000 people showed favourable mutations in people's DNA enhanced lung function and masked the deadly impact of smoking.

The Medical Research Council scientists say the findings could lead to new drugs to improve lung function.
Analyses of samples underway

- Genotyping of all 500,000 participants
  - Looking at 800,000 parcels of DNA measured

- Blood-based measures in all 500,000 participants
  - Hormones, cholesterol, Vit D, calcium, glucose

- Planned panel of infectious biomarkers
Collection of seven day physical activity data
Follow-up of half a million people….

All participants:
registered with a GP in the NHS
consented to linkage to health-related records

NHS provides majority of healthcare in UK

….so link to these datasets…..

A question…

Tumour samples? Scans?
UK Biobank imaging study underway

Magnetic resonance imaging (MRI) scans of the brain, heart and abdomen
The resource is being used
Thank you!

- Ask questions now
- Ask questions during the meeting
- Ask questions at the end
- Email me: andrew.trehearne@ukbiobank.ac.uk
- Web site www.ukbiobank.ac.uk
Participant characteristics

- 46% male
- 57% aged 40-59
- 43% aged 60-69
- 85% urban
- 94.5% white; 5.5% other ethnicities
Follow-up through questionnaires

• Building on the success of the online dietary questionnaire

• To assess outcomes we can’t find out about through linking to health records:
  – Cognitive function
  – Occupation
  – Mental health
  – Quality of life
Access to UK Biobank for research

• Launched April 2012
• Over 2,000 registered researchers
• Hundreds research applications considered
• Projects underway/completed
  – investigating the causes of diseases in middle and old age
  – predominantly from UK academic institutions
• Research papers now being published
Submitted Access Applications by areas of interest
submitted between 30.03.2012 to 21.10.2015
(please note that applications could be in more than one grouping)
Total of 381 applications (at various stages of adjudication/approval)
Thank you!
Thank you!

Thank you!
Thank you!

Thank you!

Thank you!
Web:  www.ukbiobank.ac.uk
Twitter:  @uk_biobank
UK Biobank imaging study underway

Low dose X ray of the bones and joints
UK Biobank imaging study underway

Ultrasound scan of the neck to examine and measure blood vessels
UK Biobank imaging study underway

• Imaging centre constructed at coordinating centre in Stockport

• Imaging assessments progressing well
  – >2,000 participants scanned
  – Target of 18 participants per day achieved
  – ~25% of invited participants have attended
  – Imaging data quality excellent
UK Biobank samples

- 700 Participants per day
- 4,900 Vacutainers per day
- 25,000 aliquots produced per day
- 15 million 0.85ml aliquots
Follow-up through health records

Key national sources:

- Death registrations ✓
- Cancer registrations ✓
- Hospital episode data ✓
- Primary care data (✓)
<table>
<thead>
<tr>
<th>Biomarkers being measured</th>
<th>Cardiovascular:</th>
<th>Bone and joint:</th>
<th>Renal:</th>
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<tbody>
<tr>
<td><strong>Cholesterol</strong></td>
<td><strong>Vitamin D</strong></td>
<td><strong>Creatinine</strong></td>
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<tr>
<td>Direct LDL-cholesterol</td>
<td><strong>Rheumatoid factor</strong></td>
<td><strong>Cystatin C</strong></td>
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<tr>
<td>HDL-Cholesterol</td>
<td><strong>Alkaline Phosphatase</strong></td>
<td><strong>Total protein</strong></td>
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<td>Triglyceride</td>
<td><strong>Calcium</strong></td>
<td><strong>Urea</strong></td>
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<td>Apolipoprotein A</td>
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<td><strong>Phosphate</strong></td>
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<tr>
<td>Apolipoprotein B</td>
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<td><strong>Urate</strong></td>
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<tr>
<td>C-reactive Protein</td>
<td><strong>Liver:</strong></td>
<td><strong>Creatinine (urine)</strong></td>
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<td>Fibrinogen</td>
<td><strong>Albumin</strong></td>
<td><strong>Sodium (urine)</strong></td>
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<td>D-dimer</td>
<td><strong>Direct Bilirubin</strong></td>
<td><strong>Potassium (urine)</strong></td>
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<tr>
<td>Lipoprotein (a)</td>
<td><strong>Total Bilirubin</strong></td>
<td><strong>Albumin (urine)</strong></td>
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<td><strong>Gamma glutamyltransferase</strong></td>
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<td><strong>Alanine aminotransferase</strong></td>
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<td><strong>Aspartate aminotransferase</strong></td>
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<td><strong>Diabetes:</strong></td>
<td><strong>Glucose</strong></td>
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<td>IGF-I</td>
<td><strong>HbA1c</strong></td>
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Successes

• Resource is being used – wide range of research/emulated: Precision Medicine Initiative

• Expert groups – collaboration/working together, time given for free/international

• Different experts working together – engineers/IT/doctors/social scientists/epidemiologists

• Innovation – BIG data

• Communication – commitment to keep in touch/press coverage/newsletters/digital/ethics