

# **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
- 80C (and some even colder)

Total > 15 million aliquots/ mini samples





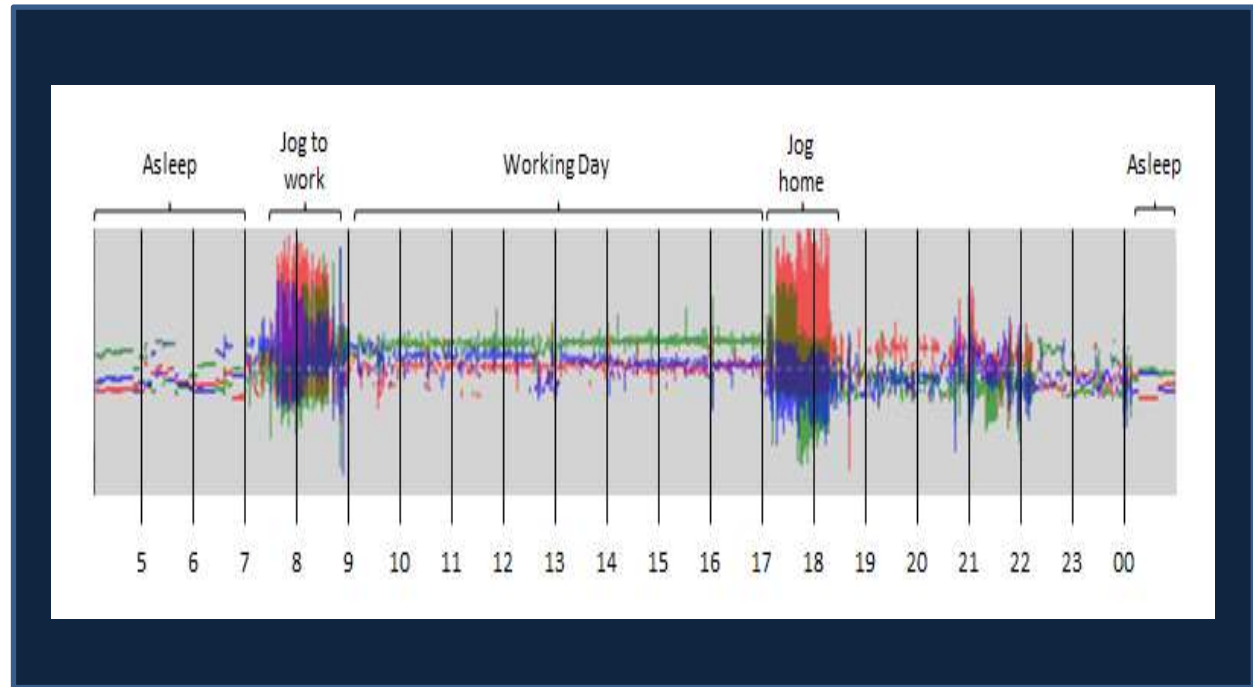
The screenshot shows the BBC News website interface. At the top, there is a navigation bar with 'BBC' logo, 'Sign in', and various news categories like News, Sport, Weather, iPlayer, TV, Radio, and More. A search bar is also present. Below the navigation bar, the word 'NEWS' is prominently displayed in a red banner, along with a 'Find local news' button. Underneath, there are sub-navigation links for Home, UK, World, Business, Politics, Tech, Science, Health, Education, Entertainment & Arts, and Video & Audio. The main content area features a 'Health' sub-section with the article title 'Rare 'healthy' smokers' lungs explained' by James Gallagher, dated 28 September 2015. A large photograph of a man with white hair, wearing a blue checkered shirt and holding a lit cigarette, is the central focus. Below the photo, the article text begins with 'The mystery of why some people appear to have healthy lungs despite a lifetime of smoking has been explained by UK scientists.' To the right of the main article, there are two sidebars: 'Top Stories' and 'Features'. The 'Top Stories' sidebar lists three items: 'Migrants break down Macedonia fence' (23 minutes ago), 'France starts clearing Calais 'Jungle'' (1 hour ago), and 'DiCaprio finally wins first Oscar' (7 hours ago). The 'Features' sidebar shows a thumbnail image of a woman holding a sign with a question mark, with the headline 'Did he say yes or no?' and a sub-headline 'The woman who has just made a leap-year proposal'.

# 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](mailto:andrew.trehearne@ukbiobank.ac.uk)
- Web site [www.ukbiobank.ac.uk](http://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

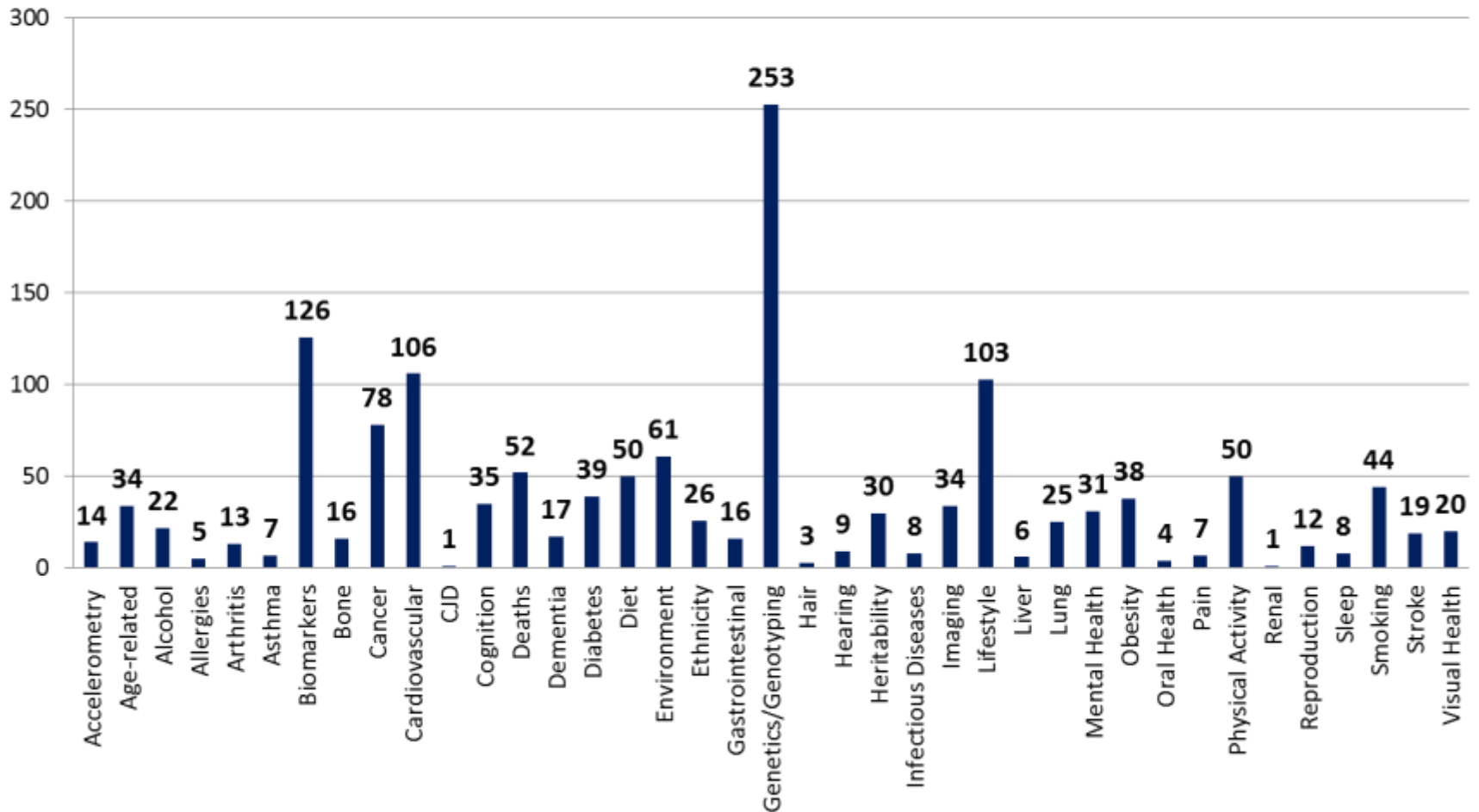
# Access to UK Biobank for research

- 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!**

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Web: [www.ukbiobank.ac.uk](http://www.ukbiobank.ac.uk)

Twitter: @uk\_biobank

Funding bodies:

Supported by:

**wellcome**trust



**DiABETES UK**  
CARE. CONNECT. CAMPAIGN.



# UK Biobank imaging study underway

Low dose X ray  
of the bones  
and joints





# UK Biobank imaging study underway

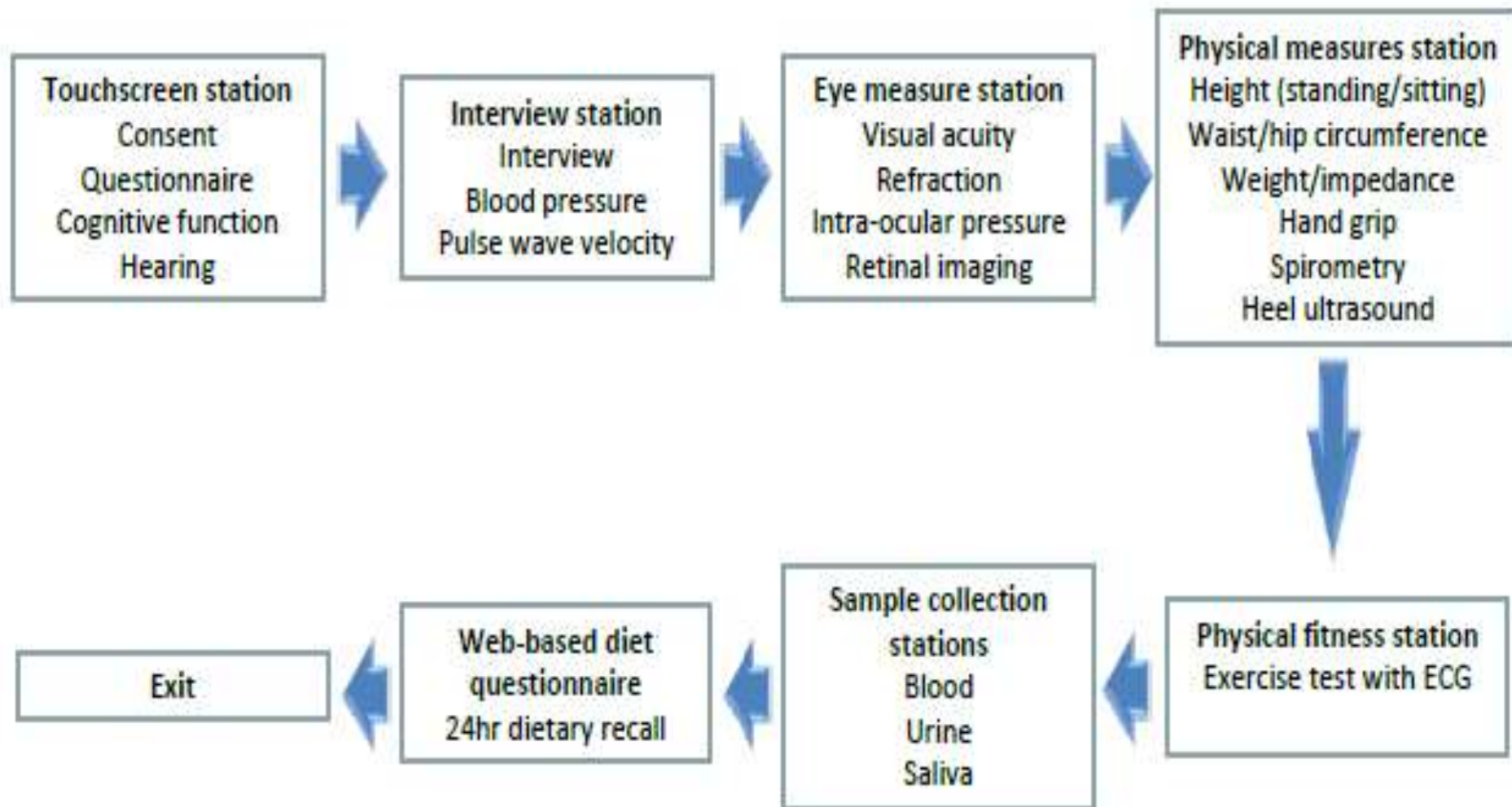
Ultrasound scan  
of the neck to  
examine and  
measure blood  
vessels



# 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





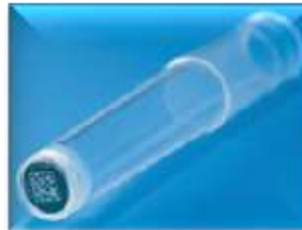
# UK Biobank samples



**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 (√)

# Biomarkers being measured

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## Cardiovascular:

### Cholesterol

Direct LDL-cholesterol

HDL-Cholesterol

Triglyceride

Apolipoprotein A

Apolipoprotein B

C-reactive Protein

Fibrinogen

D-dimer

### Lipoprotein (a)

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## Cancer:

SHBG

### Testosterone

Oestradiol

IGF-I

## Bone and joint:

### Vitamin D

Rheumatoid factor

Alkaline Phosphatase

Calcium

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## Liver:

Albumin

Direct Bilirubin

Total Bilirubin

Gamma glutamyltransferase

Alanine aminotransferase

Aspartate aminotransferase

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## Diabetes:

HbA1c

### Glucose

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## Renal:

Creatinine

Cystatin C

Total protein

Urea

## Phosphate

Urate

Creatinine (urine)

## Sodium (urine)

## Potassium (urine)

Albumin (urine)

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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