

UK Biobank: an update

Prof Cathie Sudlow, Chief Scientist

500,000 participants

22 recruitment centres

89% England

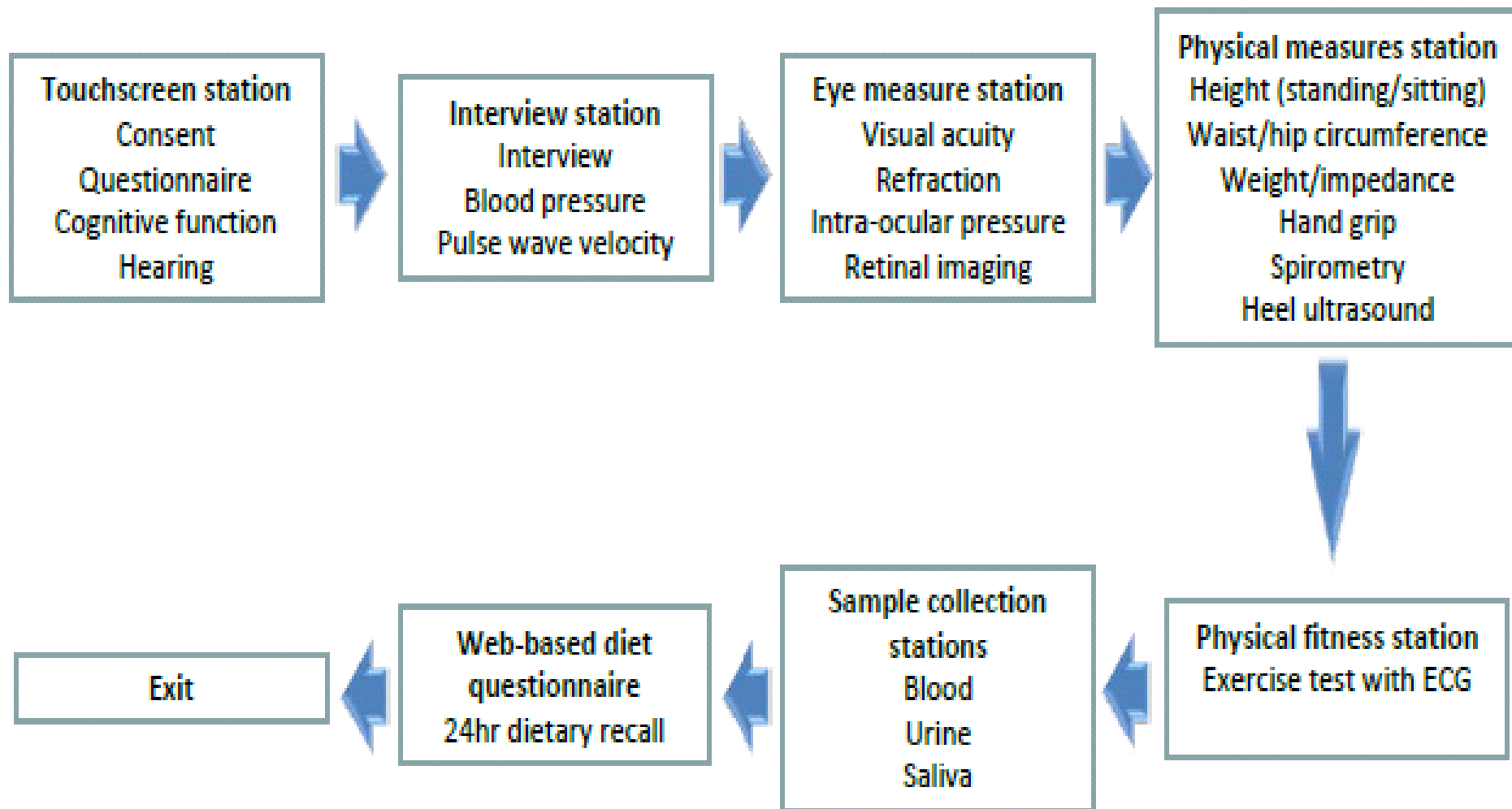
7% Scotland

4% Wales



Participant characteristics

- 46% male
- 57% aged 40-59; 43% aged 60-69
- Less socioeconomically deprived than UK average but all strata represented
- 85% urban
- 94.5% white; 5.5% other ethnicities



UK Biobank samples



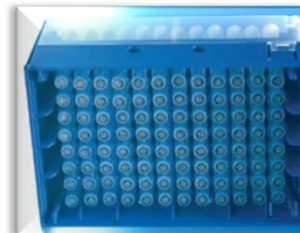
**700
Participants
per day**



**4,900
Vacutainers
per day**



**25,000
aliquots produced
per day**



**15 million
0.85ml aliquots**

- Blood
 - whole blood
 - serum
 - plasma
 - red cells
 - buffy coat

- Urine

- Saliva

Total > 15 million aliquots



Follow-up of half a million people....

COMPREHENSIVE

SCALABLE

COST EFFECTIVE

All participants:

- registered with a GP in the NHS

- consented to linkage to health-related records

NHS provides majority of healthcare in UK

National datasets about healthcare & health outcomes exist

....so link to these datasets.....

Follow-up through health records

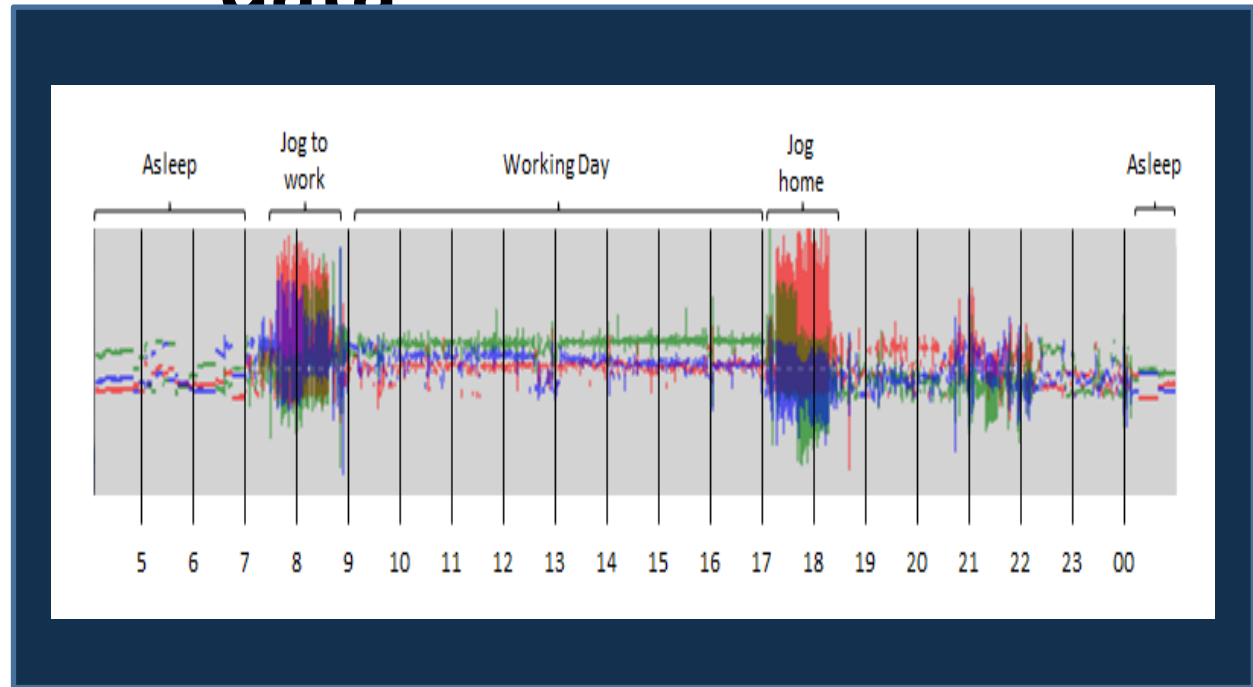
Key national sources :

- Death registrations ✓
- Cancer registrations ✓
- Hospital episode data ✓
- Primary care data (✓)

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

Collection of seven day physical activity data



Data obtained from 60,000 of a planned 100,000 participants

Analyses of samples underway

- Biomarker measures in all 500,000 participants
 - To be completed during 2016
- Planned panel of infectious biomarkers

Biomarkers being measured

Cardiovascular:

Cholesterol
Direct LDL-cholesterol
HDL-Cholesterol
Triglyceride
Apolipoprotein A
Apolipoprotein B
C-reactive Protein
Fibrinogen
D-dimer
Lipoprotein (a)

Cancer:

SHBG
Testosterone
Oestradiol
IGF-I

Bone and joint:

Vitamin D
Rheumatoid factor
Alkaline Phosphatase
Calcium

Liver:

Albumin
Direct Bilirubin
Total Bilirubin
Gamma glutamyltransferase
Alanine aminotransferase
Aspartate aminotransferase

Diabetes:

HbA1c
Glucose

Renal:

Creatinine
Cystatin C
Total protein
Urea
Phosphate
Urate
Creatinine (urine)
Sodium (urine)
Potassium (urine)
Albumin (urine)

Genotyping Timeline

- Affymetrix Axiom array – 820,967 markers*
 - Incl. specific markers, rare variants & GW coverage
- March 2015 - Release of QA'd genome wide data for the first 150,000
- Mid 2015 - Imputation on the first 150,000
- Late 2015 - QA'd Genome wide data for entire cohort
- Spring 2016 - Full imputation

* List available online at www.ukbiobank.ac.uk

** Timelines all provisional

UK Biobank imaging study underway

Magnetic resonance imaging (MRI) scans of the brain, heart and abdomen



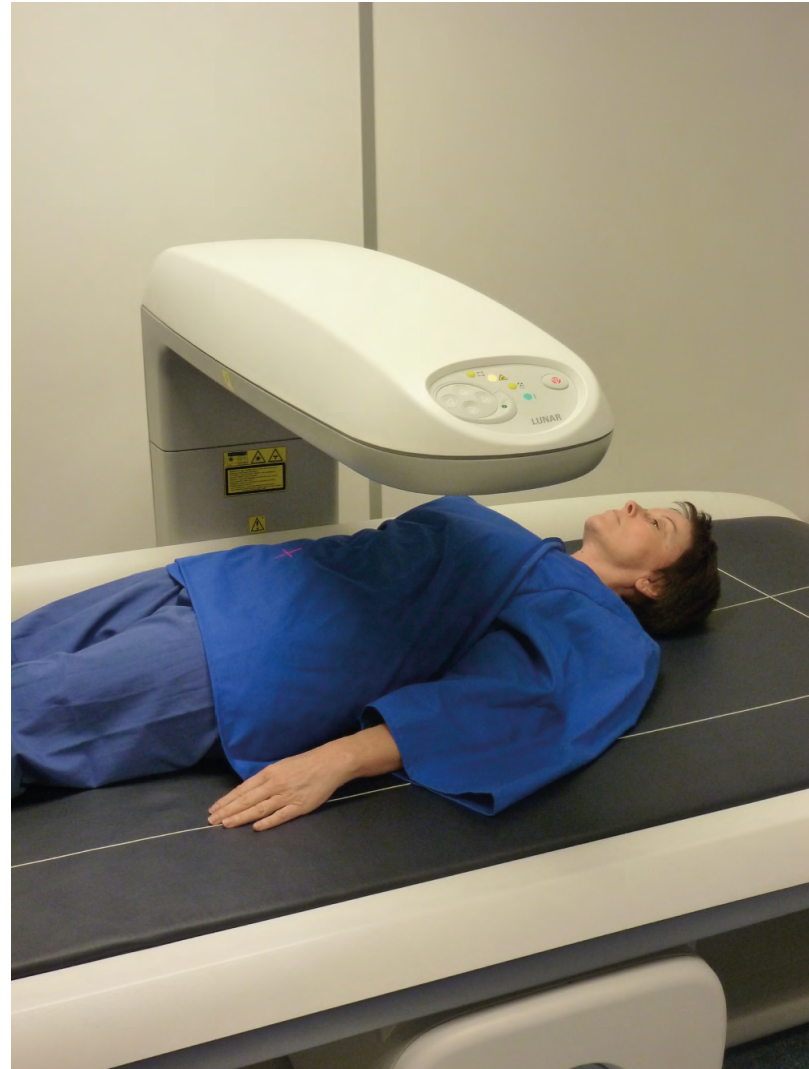
UK Biobank imaging study underway

Ultrasound scan
of the neck to
examine and
measure blood
vessels



UK Biobank imaging study underway

Low dose X ray
of the bones
and joints



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

Access to UK Biobank for research

- Launched April 2012
- Over 1000 registered researchers
- Almost 300 research applications considered
- Over 80 projects underway/completed
 - investigating the causes of diseases in middle and old age
 - predominantly from UK academic institutions
- 23 research papers now published

Funding bodies:

Supported by:

wellcometrust



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