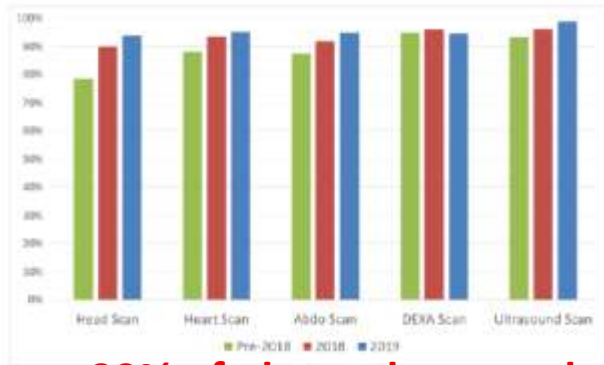


The UK Biobank Imaging Study

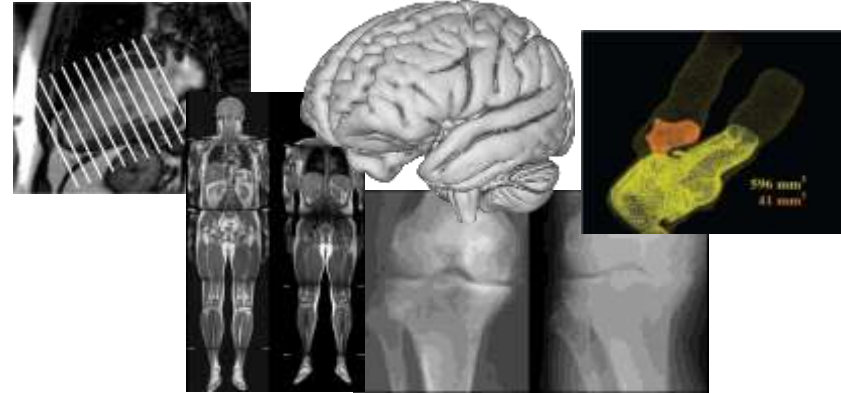
UK Biobank 2019 Scientific Conference

Paul M Matthews, on behalf of UK Biobank and the Imaging Working Group

Numbers



>90% of planned protocol consistently achieved



5 clinical imaging modalities

Participants scanned so far

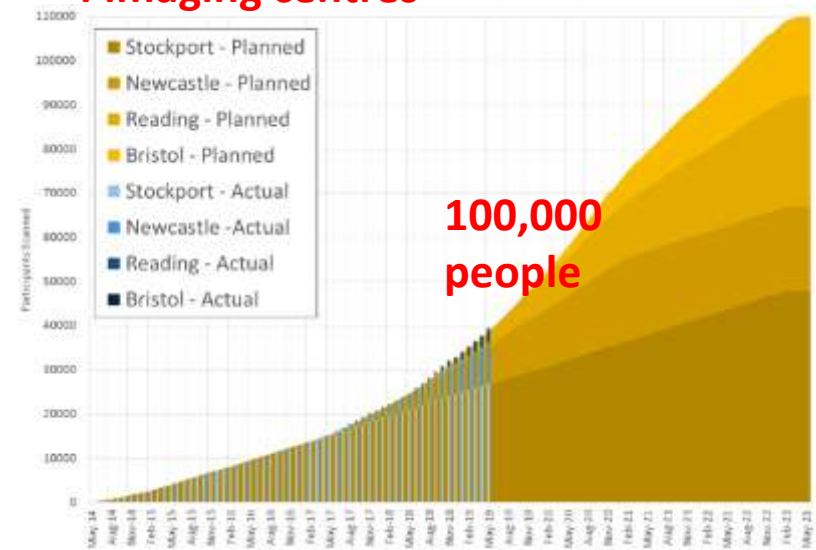
40000



- **1000** approved projects
- **60%** with image phenotype data
- **23%** with raw images

3 countries

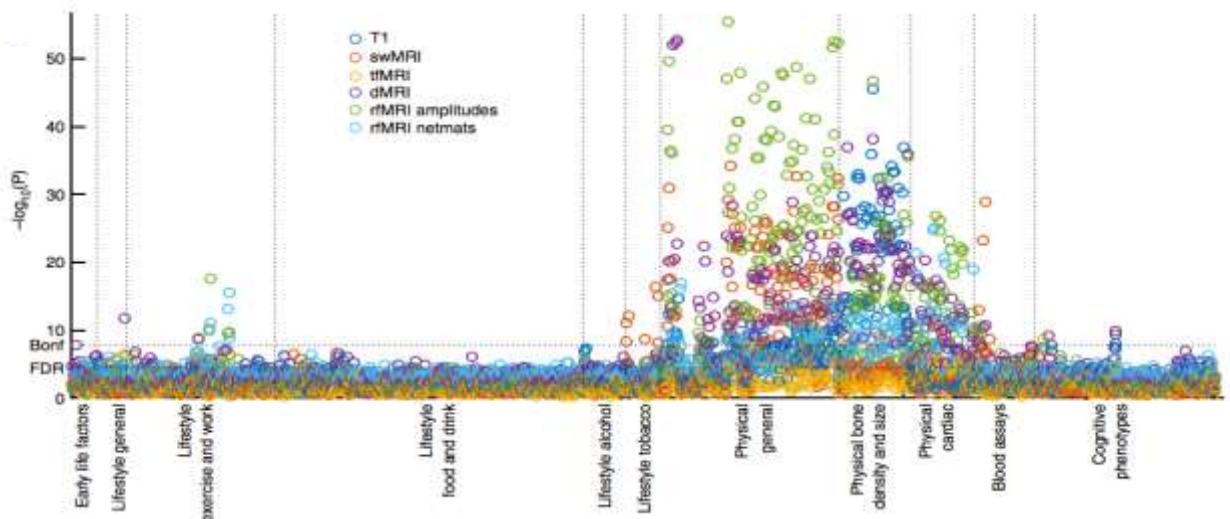
4 imaging centres



100,000 people

Uniqueness

Brain



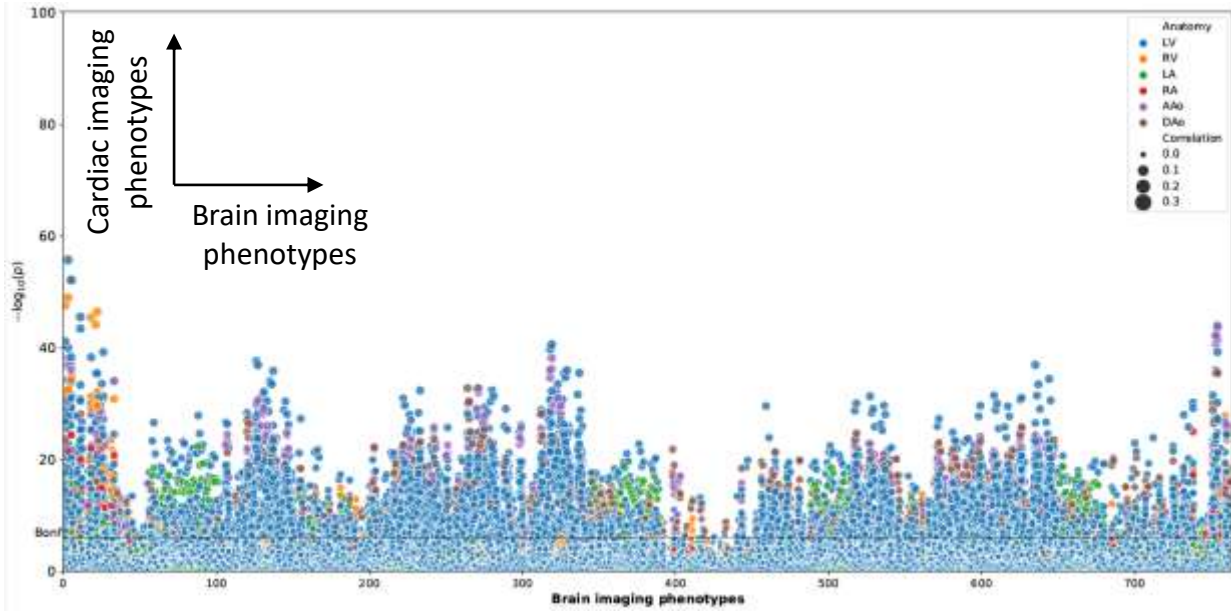
Environment
Multimodal

Lifestyle
Quality control
Size
Clinical history
Clinical outcomes
Precision phenotypes
Medications

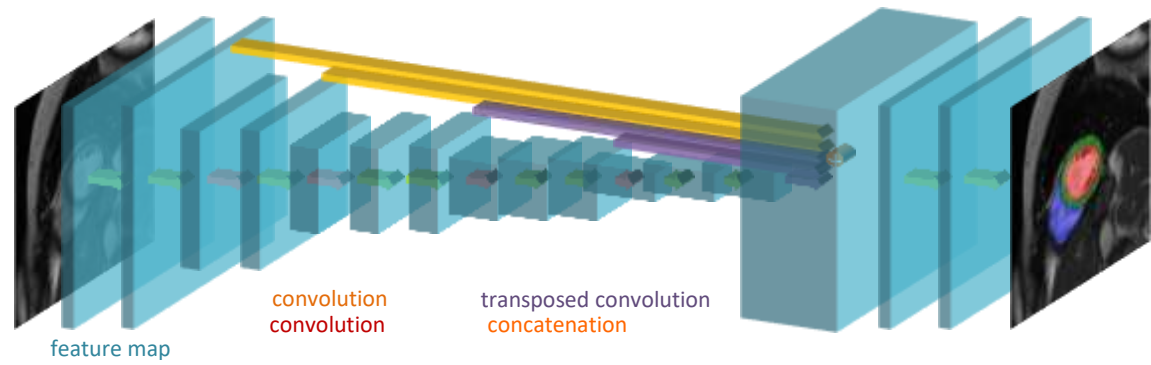
Mass univariate correlations

- 2500 brain imaging derived phenotypes
- 11,000 individual characteristics

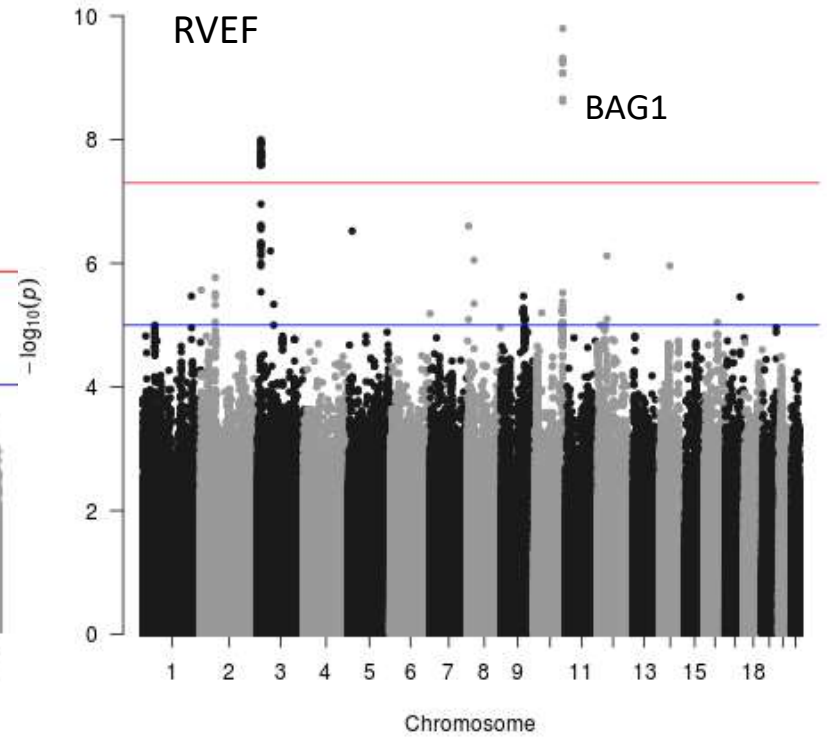
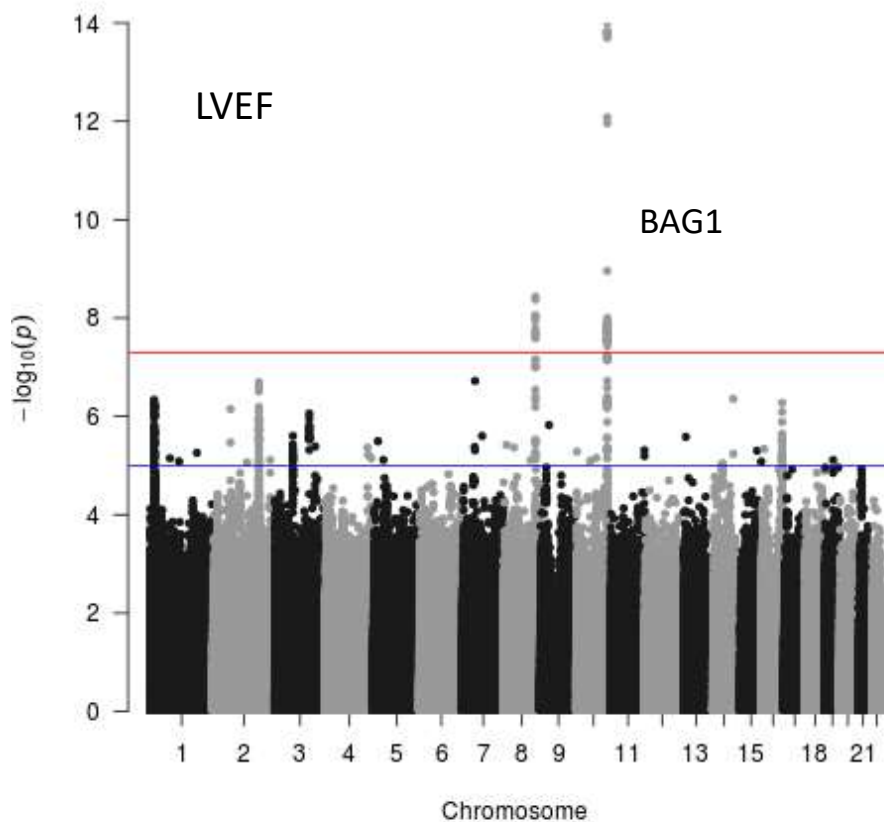
Heart-Brain



Value



AI for high-volume image phenotype extraction



Cardiac structures in the healthy population are influenced by polymorphisms in genes causing cardiomyopathies

Value

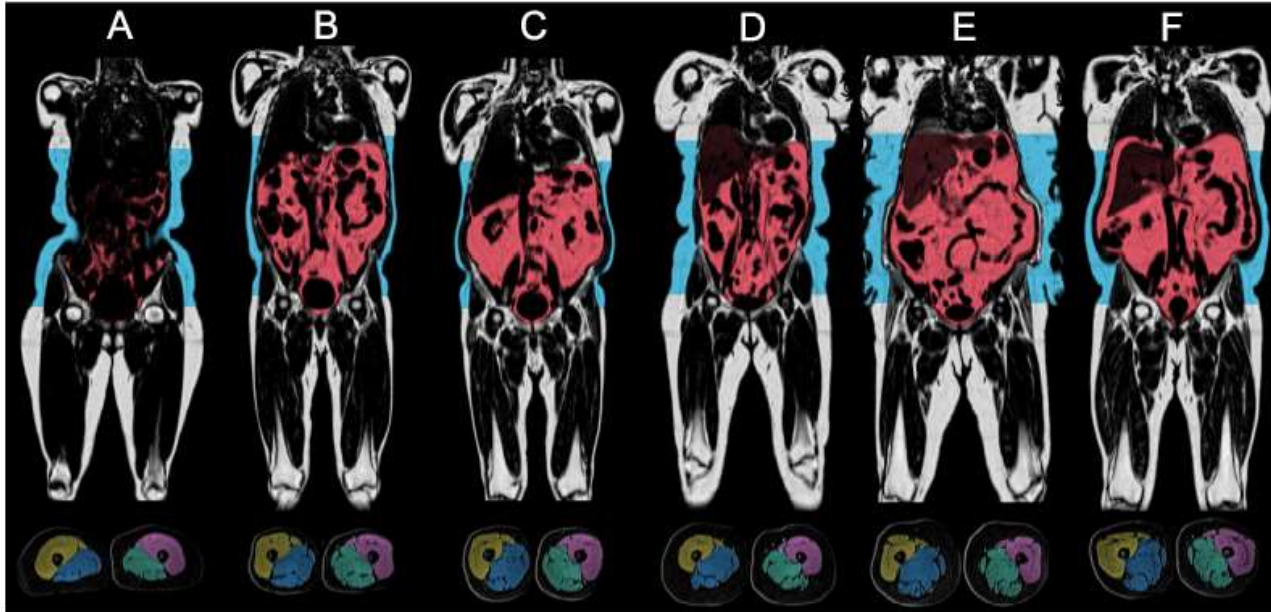


Artificial intelligence and a simple eye scan can predict major cardiovascular events

Risk factor(s) or model used for the prediction	AUC (95% CI)
Age only	0.66 (0.61,0.71)
SBP only	0.66 (0.61,0.71)
BMI only	0.62 (0.56,0.67)
Gender only	0.57 (0.53,0.62)
Current smoker only	0.55 (0.52,0.59)
<u>Algorithm only</u>	<u>0.70 (0.65,0.74)</u>
Age + SBP + BMI + gender + current smoker	0.72 (0.68,0.76)
Algorithm + age + SBP + BMI + gender + current smoker	0.73 (0.69,0.77)
SCORE ^{6,7}	0.72 (0.67,0.76)
Algorithm + SCORE	0.72 (0.67,0.76)

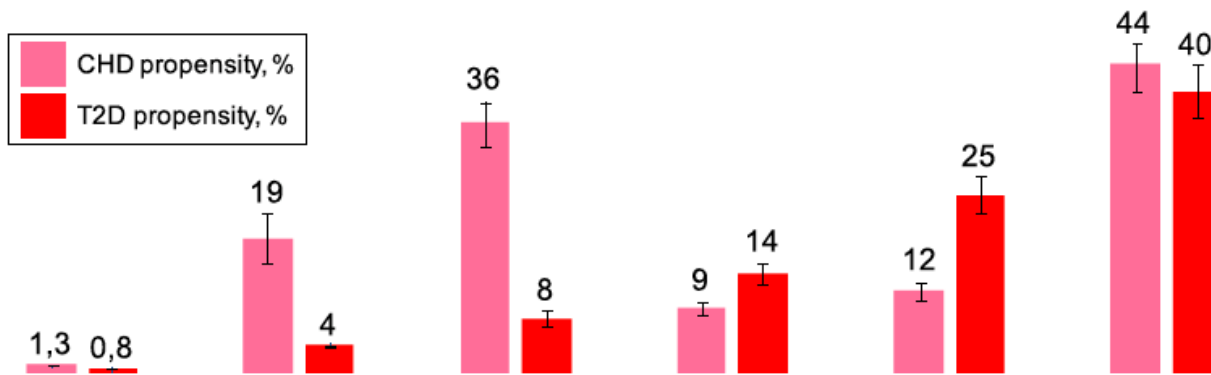
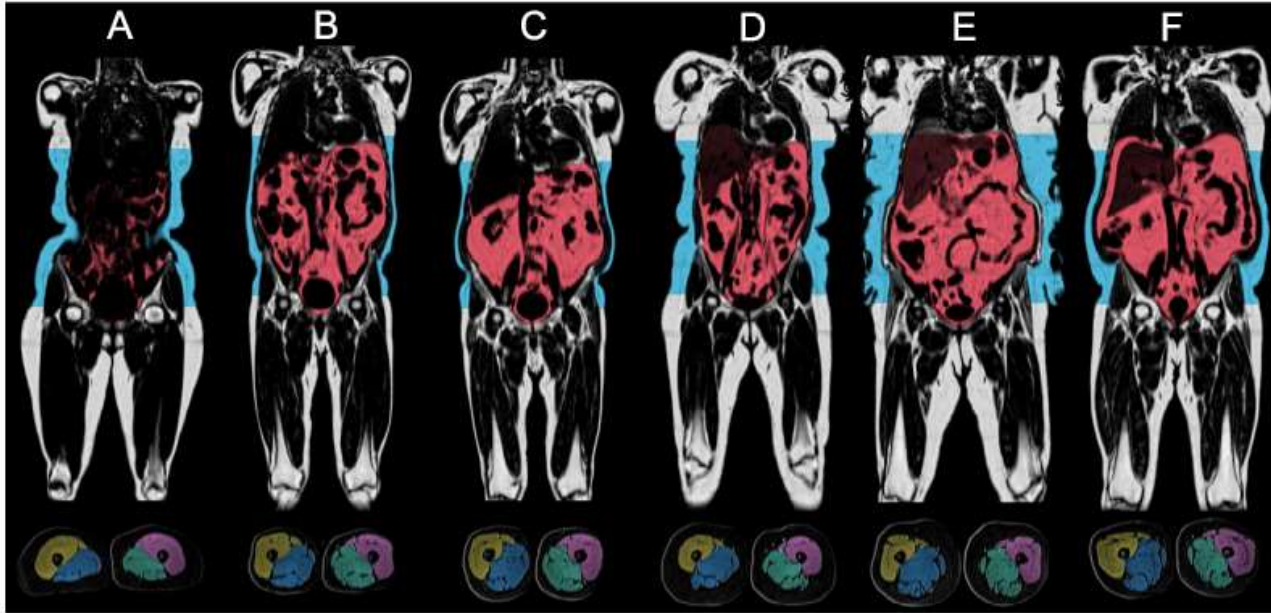
Value

Predicting risks of metabolic disorders using body composition imaging



Value

Predicting risks of metabolic disorders using body composition imaging

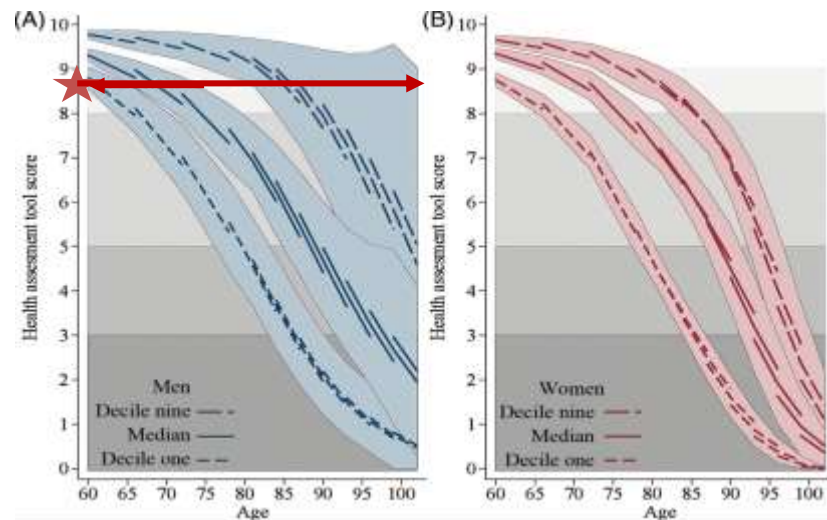


Next steps

Defining outcomes risk trajectories

	Whole cohort n=500,000	Imaging study n=100,000
Neurodegenerative conditions		
Dementia	43,000	8,500
Parkinson's Disease	9,500	2,000
Other conditions		
Stroke	28,500	5,500
MI	22,000	4,500
COPD	31,500	6,500

Incident cases predicted by 2026



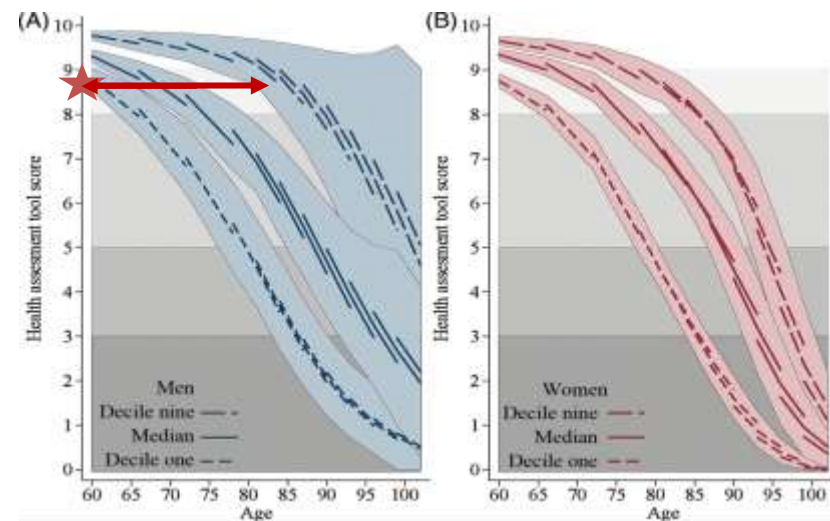
Next steps

Defining outcomes risk trajectories

	Whole cohort n=500,000	Imaging study n=100,000
Neurodegenerative conditions		
Dementia	43,000	8,500
Parkinson's Disease	9,500	2,000
Other conditions		
Stroke	28,500	5,500
MI	22,000	4,500
COPD	31,500	6,500

Incident cases predicted by 2026

+ demographic,
lifestyle and clinical
data



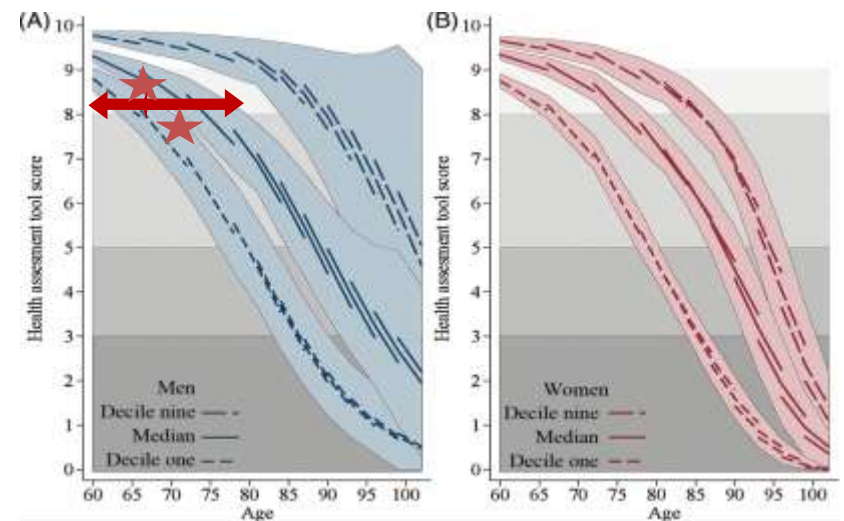
Next steps

Defining outcomes risk trajectories

	Whole cohort n=500,000	Imaging study n=100,000	DPUK Repeat imaging n=10,000
Neurodegenerative conditions			
Dementia	43,000	8,500	1,000
Parkinson's Disease	9,500	2,000	200
Other conditions			
Stroke	28,500	5,500	600
MI	22,000	4,500	400
COPD	31,500	6,500	600

Incident cases predicted by 2026

+ demographic, lifestyle and clinical data + 2 yr interval re-imaging (10K)



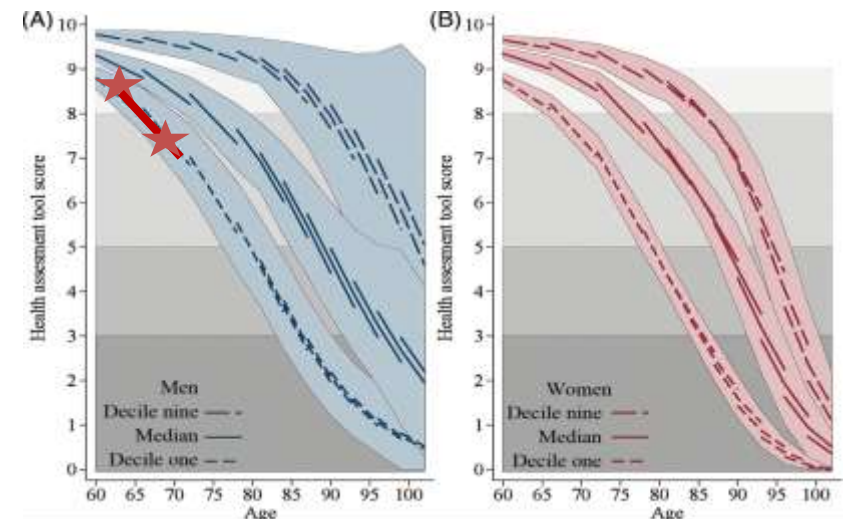
Next steps

Defining outcomes risk trajectories

	Whole cohort n=500,000	Imaging study n=100,000	DPUK Repeat imaging n=10,000	Proposed repeat imaging (with additional funding) n=70,000
Neurodegenerative conditions				
Dementia	43,000	8,500	1,000	6,000
Parkinson's Disease	9,500	2,000	200	1,500
Other conditions				
Stroke	28,500	5,500	600	4,000
MI	22,000	4,500	400	3,000
COPD	31,500	6,500	600	4,500

Incident cases predicted by 2026

+ demographic, lifestyle and clinical data + 2 yr interval re-imaging (10K) + 2.5-7 yr interval re-imaging (60K)



UK Biobank and the Imaging Enhancement are huge team efforts: acknowledging the Funders and Imaging Working Group and the many other advisors

biobank

Prof. Sir Rory Collins, CEO

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Supported by:
wellcometrust



DIABETES UK
CARE. CONNECT. CAMPAIGN.



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