Why Do Eyes Matter?

• The population is aging
• In people aged $\geq 75$ years
  • 10% are partially sighted
  • 2% are blind
• In 2009-10, there were 5.95 million patient visits to UK eye departments (7.1% of total)
• Each year, 330,000 cataract operations are performed
Eyes and Vision in UKBB

- Moorfields/UCL invited to design eye module
  - 10 minutes maximum
  - £500,000/minute

- Piggy-backed eye study
  - Visual acuity
  - Auto-refraction
  - IOP/Corneal biomechanics
  - Fundus photo/OCT
UKBB Eye and Vision Data

**Visual acuity test types —**

Part 1: Test charts for clinical determination of distance visual acuity — Specification

**Standard measure of vision used to assess**
- Fitness to drive
- Suitability for cataract surgery
- “Sight impaired” status
- Linked to mortality rate
UKBB Eye and Vision Data

Autorefractor Measures

• Spectacle prescription

• Curvature of the cornea
Eye Pressure and Corneal Biomechanics

Eye pressure is the major modifiable risk factor for glaucoma.

Corneal biomechanics influences accuracy of IOP measures.

Cornea is 90% collagen.
UKBiobank- IOP Method

Signal Plot
UKBB Eye and Vision Data
Macular OCT images were available for processing from 134,642 eyes of 67,321 patients.

134,611 images were successfully processed with 31 images failing (success: 99.98% of images).

Average time taken to process each images was 128 seconds.
QUARTZ RETINAL VASCULOMETRY SYSTEM
(in progress)

Kingston
Sarah Barman

St Georges
Chris Owen
Alicja Rudnicka
UK Biobank Baseline Eye Data

On 129,761 people
- Visual Acuity
- Autorefraction & keratometry
- Intraocular pressure
- Corneal biomechanics

On 87,642 people
- Retinal photographs & HD-OCT
72 Consortium members

22 Health science centres across Scotland, Wales, Northern Ireland and England

Bristol
Cambridge
Cardiff
City, London
Dundee
Edinburgh
Essex
Gloucester NHS
Kings, London
Kingston
Leeds
Liverpool
Manchester
Moorfields NHS
Newcastle
Nottingham
Queens, Belfast
Southampton
St Georges
UCL – Institute of Ophthalmology
UCL – Institute of Child Health
UEA

http://www.ukbiobankeyeconsortium.org.uk/
Research Groups

Nutrition & Eye

Over the past two decades, there has been substantial progress in linking nutrition to sight-threatening diseases such as age-related macular degeneration (AMD), glaucoma, and diabetic retinopathy. Read More

Genetics

The science of genetics is transforming medicine, and as a consequence, everyday life. Genetic risk factors are rapidly being identified for many diseases of later life. Read More

Refractive Error

Refractive error is an umbrella term for short-sight, long-sight and astigmatism and other defects of the optical systems of the eye. Read More

Retinal Image Grading

The baseline examination in UK Biobank resulted in the collection of 68,151 paired colour retinal photographs and optical coherence tomography (OCT) scans from people aged 40 and 60. Read More

Outcomes Adjudication & Record Linkage

The Eyes and Vision Outcomes Adjudication Project is one of the 5 adjudication projects developing methods for the long term follow up of the UK Biobank (UKB) Cohort, through centrally managed proc

Cataract

Cataract is the leading cause of blindness in the world. Read More

Giant Cell Arteritis & Polymyalgia

Both giant cell arteritis (GCA) and polymyalgia rheumatica (PMR) are rheumatologic diseases which appear to have an autoimmune basis. Read More

Retina & Cognition

Researchers have already examined the relationship between the retinal nerve fibre layer and neurocognitive diseases such as multiple sclerosis (Karpova et al, 2007; Green et al, 2008; Parkinso

Retinal Detachment

Rhegmatogenous retinal detachment (RRD) is a common sight threatening condition that affects over 70,000 people annually in the UK. Read More

Retinal Vascular Morphometry

Examination of the eye is an effective way of assessing an individual's health. Diabetes and high blood pressure and a multitude of other disease have signs that show up in an eye examination. Read More

Visual Acuity

There are major gaps in our knowledge about the visual health of adults in the UK. Read More

Funding

Moorfields Eye Hospital Special Trustees

NHS
National Institute for Health Research

Fight for Sight
Pioneering eye research

Moorfields Eye Hospital Special Trustees
The Consortium
- We are a group of scientists and clinicians with an interest in eyes, vision and diseases which affect sight
- We represent leading UK Universities and Hospitals
- The consortium management is based at Moorfields Eye Hospital and The UCL Institute of Ophthalmology in London

Retina Vascular Morphometry
Automated analysis of retinal blood vessels from a digital photograph

About UK Biobank
UK Biobank is a major national health resource, and a registered charity in its own right, with the aim of improving the prevention, diagnosis and treatment of a wide range of serious and life-threatening illnesses.

Funding
The UK Biobank parent study was established by the Wellcome Trust medical charity, Medical Research Council, Department of Health, Scottish Government and the Northwest Regional Development Agency.

What we do
- We use data from UK Biobank to study what causes eye disease and vision loss and investigate how these can be controlled and prevented
- Research into the causes of disease help to develop new, more effective treatments

Read More

http://www.ukbiobankeyeconsortium.org.uk/
• One of the world’s largest ophthalmic datasets
• Large UK-based consortium facilitating analysis of data
• Industry-academic collaboration has helped to convert raw images into data
• Development of UKBB offers novel insights into eye disease in the UK and worldwide

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