UK Biobank Eye & Vision Consortium

Issue 9 | July 2016

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Do you have an item for our next newsletter?

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UK Biobank Annual Meeting 2016

The UK Biobank annual meeting was held on 13th June at QEII Centre, London and included updates on various aspects of on-going research as well as discussion between participants.

Below is a summary of several of the key presentations:

Mental health

- Matthew Hotopf (KCL) developed a comprehensive web-based platform for gathering mental health data including current and lifetime disorders for UKBB
- Several issues around mental health data including, the difficulty of just using a questionnaire to identify complex diagnoses such as psychotic disorders
- Having an emphasis on record linkage to primary and secondary care data would help overcome these challenges
- Currently, the questionnaire does not cover other disorders such eating disorders and personality disorders

- The full picture of record linkage is also incomplete without primary care records
- The positive predictive value of psychotic disorders is very good, but less robust for substance use disorders and anxiety disorders

Prof Paul Foster speaking on behalf of the UK Biobank Eye & Vision Consortium. Click here to watch full presentation.

Dementia

- Tim Wilkinson (Edinburgh) set up a validation study to identify the scalability and feasibility of dementia outcomes in UK Biobank
- The overall positive predictive value was found to be 93%
- They are now looking to extend this process by updating the data from Edinburgh as well as branch out to other areas such as Glasgow
- Primary care data is a promising and accurate source for picking up dementia cases that hospital records miss

Cancer

- Standard information includes type of cancer, date of diagnosis, histology and morphology information
- This will soon be augmented with stage and grade of the cancer, tumour size, and types of treatment by the end of this year
- Since the end of the study, there have been 4,000 new cases of prostate cancer, with breast cancer showing the second highest incidence rate
- Cancer rates in men also appear to be greater than in women, and the rates in UK Biobank appears to be a little lower than that of the general population.
- Ongoing research is looking at body fat measures and biomarkers for cancer, gene-environment interactions, risk prediction (using genetics and lifestyle data) as well as factors that determine cancer survival.

UKBB Eye & Vision at Alzheimer's Conference

The Retina and Cognition research group recently submitted an abstract for presentation at the Alzheimer's Association International Conference (AAIC) in Toronto.

The abstract titled "*Retinal Nerve Fiber Layer Thinning Associated with Poor Cognitive Function Among a Large Cohort, UK Biobank*" has demonstrated a significant association between thinner RNFL and poor cognition.

Due to the the high-profile nature of the presentation, **Dr Fang Ko** has been awarded a prestigious AAIC travel grant to present at the meeting and the Alzheimer's Association has highlighted our abstract for news media at the AAIC.

The conference will take place 24th-28th July.

- Future work aims to refine strategies for retrieval of specimens, obtaining biopsy material to confirm diagnoses and sub-classify types of cancers on molecular basis.

Genetic data and high BMI

- Mendelian randomisation and gene-environment interaction analyses have been used to study the causes and consequences of high BMI
- In particular, researchers have studied the question of whether high BMI may cause changes in socio-economic status (SES)
- Genetic data is useful to answer this question because the standard epidemiological relationship between BMI and SES may be confounded
- A BMI genetic risk score was developed and the association between this and 5 measures of SES was studied
- The known association between higher BMI and lower SES was seen
- Initially, no clear link was seen between genetic risk score and BMI
- However, dividing participants by sex, significant genetic associations were seen – specifically that overweight women seem more disadvantaged

UK BiLEVE

- This genotyping project looks at extremes of lung function
- The aim was to understand the aetiology of chronic obstructive pulmonary disease (COPD)
- Spirometry tests 275,939 individuals that met strict guidelines for inclusion and were divided into 'non-smokers' and 'heavy smokers'
- Participants with forced expiratory volume in 1 second (FEV1) at extreme low and extreme

PUBLICATION NEWS

Role of Educational Exposure in the Association Between Myopia and Birth Order. Guggenheim JA, Williams C, on behalf of the UK Biobank Eye and Vision Consortium. Oct 2015. ***JAMA Ophthalmol*** - Link to PDF

Frequency and Distribution of Refractive Error in Adult Life: Methodology and Findings of the UK Biobank Study. Cumberland PM, Bao Y, Hysi PG, Foster PJ, Hammond CJ, Rahi JS, UK Biobank Eyes & Vision Consortium. Oct 2015. ***PLoS ONE*** - Link to PDF

Laser refractive surgery in the UK Biobank study: Frequency, distribution by sociodemographic factors, and general health, happiness, and social participation outcomes. Cumberland PM, Chianca A, Rahi JS, for the UK Biobank Eyes & Vision Consortium. Dec 2015. ***J Cataract Refract Surg*** - Link to PDF

Spectral-Domain Optical Coherence Tomography Imaging in 67 321 Adults. Patel PJ, Foster PJ, Grossi CM, Keane PA, Ko F, Lotery A, Peto T, Reisman CA, Strouthidis NG, Yang Q, on behalf of the UK Biobank Eye and Vision Consortium. Dec 2015. ***Ophthalmology*** - Link to PDF

Associations with Intraocular Pressure in a Large Cohort. Results from the UK Biobank. Chan MPY, Grossi CM, Khawaja AP, Yip JLY, Khaw KT, Patel PJ, Khaw PT, Morgan JE, Vernon SA, Foster PJ on behalf of the UK Biobank Eye and Vision Consortium. Jan 2016. ***Ophthalmology*** - Link to PDF

Automated retinal image quality assessment on the UK Biobank dataset for epidemiological studies. Welikala RA, Fraz MM, Foster PJ, Whincup PH, Rudnicka AR, Owen CG, Strachan DP, Barman SA, on behalf of the UK Biobank Eye and Vision Consortium. Jan 2016. ***Computers in Biology and Medicine*** - Link to PDF

Childhood febrile illness and the risk of myopia in UK Biobank participants. Guggenheim JA, Williams C, on behalf of the UK Biobank Eye and Vision Consortium. Feb 2016. ***Eye*** - Link to PDF

Accuracy and Utility of Self-report of Refractive Error. Cumberland PM, Chianca A, Rahi JS, on behalf of the UK Biobank Eye and Vision Consortium. May 2016. ***JAMA Ophthalmology.*** - Link to PDF

high values, as well as the middle of the distribution, were selected

- 43 novel GWAS signals for lung function were detected, bringing the total to 97 variants
- Researchers have followed up these 97 variants in 10 different populations of European ancestry
- When categorising participants based on the number of risk variants that they carry, it was found that individuals in the highest decile had more than 3 x the risk of COPD

Next UKBB Eye & Vision Consortium Annual Meeting:

TUESDAY 7TH FEBRUARY 2017

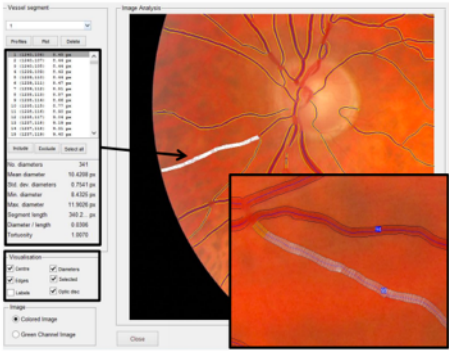
Wellcome Collection
183 Euston Road, London NW1 2BE

- If you wish to attend, please save this date -

Retinal Vasculometry Update

The QUARTZ retinal vasculometry group at St. Georges & Kingston have recently obtained funding from the British Heart Foundation to relate retinal vessel morphometry measures to cardiovascular risk and outcomes in the UK Biobank cohort. The automated system (QUARTZ) has extracted arteriole and venular maps for 80% in initial, and they hope to improve this further, nearer to 85%. They have made a commitment to UK Biobank to provide summary measures of vessel morphometry to the scientific community by the end of 2017.

This is very encouraging news, and will add an important new dimension to the UKBB Eye and Vision data, that will relate strongly to systemic health and disease.



Retinal Image Grading by NetwORC UK

The Retinal Image Grading group will begin to grade the retinal images from UK Biobank within weeks. The colour digital photographs

and OCT images for 68,151 participants contained by UKBB provide a rich research resource, but these require detailed grading of disease features to yield analysable data. Their aim is to perform an initial "disease / no disease" grading, then study detailed features of diabetic retinopathy, age-related macular degeneration, glaucoma, vitreoretinal interface disorders and anomalous optic disc where present in participants with retinal photographs. Lifestyle measures, cardiovascular health, blood pressure, medication usage, anthropometry, adiposity and relevant biomarkers will allow extensive analysis of the cross-sectional relationships. between risk factors and prevalent disease.

The group are now in the final stages of contractual agreement with UK Biobank for the release of images.

New Members

We would like to welcome these new members to the E&V consortium:

Dr Veronique VITART

Prof Alison HARDCASTLE

Dr Pirro HYSI

Dr Axel PETZOLD

Dr Yalin ZHENG

Dr Veronique VITART - University of Edinburgh

"Our main approach is to decipher the genetic basis of natural variation in quantitative traits (QTs) associated with diseases and conditions, as QTs are more amenable to analysis than the disease as a whole. We study cross-sectional cohorts of diverse populations recruited from Croatia and Scotland, in which a range of traits were collected from medical examinations, questionnaires and biochemical assays. Our main analysis tool, single trait, single marker genome-wide association study (GWAS), has resulted in the successful association of many common genetic variants, of relevance to a wide range of complex diseases"

Prof Alison HARDCASTLE - UCL Institute of Ophthalmology

"The research focus of our lab is inherited eye disease, from gene discovery to defining cellular function through to development of potential therapies. Our molecular genetic, functional and phenotypic studies have continually resulted in new discoveries that influence patient care. We have defined genetic mechanisms of disease and function of disease proteins in the retina, lens, cornea and developing eye, and have harnessed technological advances in next generation sequencing and stem cell biology to address our research questions."

Dr Pirro HYSI - King's College London

Dr Pirro Hysi is an EU Marie Curie fellow at Kings College London. He is a member of the academic ophthalmology team with specialist expertise in genetic epidemiology and statistical genetics. Dr Hysi has been a prime mover in many high profile genome wide association studies exploring the aetiology of myopia and glaucoma. He is developing methodologies aimed at better identification and analysis of structural variations in the genome. These variations can be compared bio-informatically against the databases of known physiologic pathways, to better understand the pathophysiology of eye disease.

Dr Axel PETZOLD - UCL Institute of Neurology

"I received my PhD in Biochemistry with Ed Thompson (University College London). I trained as a neurologist in France (Lyon), Germany (Munich) and the United Kingdom (London). I work as consultant neurologist at Moorfields Eye Hospital London UK, the UCL Institute of Neurology and the VU Medical Center Amsterdam. My research interest is on axonal degeneration mainly in multiple sclerosis and optic nerve disease but also other diseases and models I can learn from."

Dr Yalin ZHENG - University of Liverpool

"I am an Associate Professor/Senior Lecturer in Ophthalmic Imaging at the Department of Eye and Vision Science, University of Liverpool. I received a PhD in Image Processing and Computer Vision from the School of Electronics and Computer Science, University of Southampton in 2003. Since then I have been working at the forefront of medical imaging technologies across a diverse spectrum of research and commercially oriented projects in both academia and industry."