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Do you have an item for our next newsletter?

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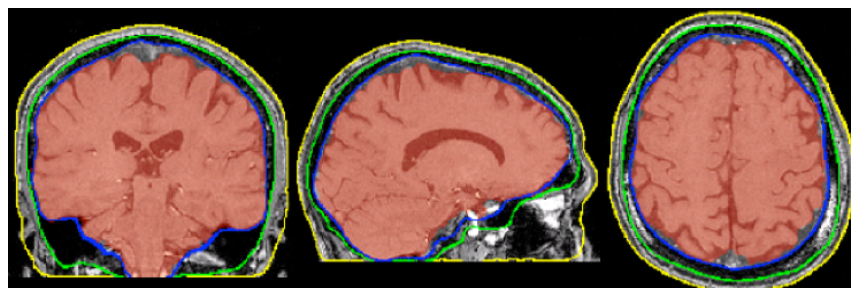


Imaging study launched

UK Biobank launches world's biggest body scanning project to shed new light on major diseases.

The world's largest health imaging study, funded by the Medical Research Council, Wellcome Trust, and the British Heart Foundation (BHF) was launched last month. It will create the biggest collection of scans of internal organs, and transform the way scientists study a wide range of diseases, including dementia, arthritis, cancer, heart attacks and strokes.

The £43m study will involve imaging the brain, heart, bones, carotid arteries and abdominal fat of 100,000 current participants of UK Biobank, a visionary project set up in 2006 by the MRC & Wellcome Trust to create a research resource of half a million people across the UK to improve health.



The multi-organ scans will be analysed alongside the vast data already collected from UK Biobank participants. This extra layer of data, for all health scientists to access, will give new perspectives on the best way to prevent and treat multi-faceted conditions like arthritis, coronary heart disease, Alzheimer's disease and osteoporosis. It will also spark novel ways to analyse and interpret scans, with potential benefits for research as well as for the investigation of patients in the future.

An initial study of 8,000 participants has just been completed at a purpose-built scanning facility at UK Biobank's headquarters in Stockport, which is now being used for the main study. The people scanned do not receive any feedback about their health, unless potentially serious abnormalities are spotted during the imaging. Imaging will include:

- MRI measures of abdominal fat volume including in the liver and pancreas

- MRI assessment of heart chamber diameter, the volume of blood flow, and how the heart changes as it pumps blood around the body, thickness of the heart wall and the size, shape and stiffness of the thoracic aorta, the vessel that delivers blood from the heart
- MRI measures of brain structure and function, volumes of grey matter and the mapping of major brain connections
- Dual-energy X-ray absorptiometry measures of bone density, osteoarthritic change at spine, hip and knee, fractures in the spine, and fat distribution throughout the body
- Ultrasound assessment of two major arteries, the carotid arteries, that run either side of the neck to the brain

Recruitment will continue in the north west of England, and will roll out to the south (Reading) and the north (Newcastle) over the coming year.

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 -

UKBB Eye & Vision Consortium in FT

Research by the Eye & Vision consortium has been highlighted in a special report by the Financial Times.



The report features the retinal vascular morphometry work done by Chris Owen and his team at St. Georges as well as the retina & cognition work lead by Paul Foster & Praveen Patel at Moorfields Eye Hospital and UCL Institute of Ophthalmology.

The full report is available download [here](#).

Annual Meeting Agenda

The following are scheduled to present at the next annual meeting:

- ◆ **Prof Steffen Pettersen** - Cardiac imaging
- ◆ **Miss Cathy Egan** - MacTel analysis
- ◆ **Dr Sarah Barman** - QUARTZ vasculometry update
- ◆ **Prof Stephen Smith** - Brain imaging
- ◆ **Dr Sarah Mackie** - Giant Cell Arteritis & Polymyalgia: Clinical dataset update
- ◆ **Mr Praveen Patel** - OCT data update
- ◆ **Dr Tomas Fitzgerald PhD** - High Dimensional Analysis of Retinal OCT Data
- ◆ **Dr Thomas Littlejohns** - UK Biobank general progress update & plans
- ◆ **Prof Chris Hammond/ Pirro Hysi** - Genetics update
- ◆ **Miss Swan Kang** - Corneal biomechanics and cardiac disease
- ◆ **Mr Pearse Keane** - Google/ Deepmind & AI projects
- ◆ **Prof Andrew Lotery** - Consortium governance & management

New Members

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

Mr Dan GORE

Moorfields Eye Hospital, London

Google working with UKBB OCT data

An application for a project lead by Mr Phillip Nelson of Google Research has been approved by UK Biobank. A summary of the research below to be conducted:

Retinal imaging in the form of fundus photography and OCT are well-established diagnostic tools for eye diseases such as diabetic retinopathy, glaucoma and age-related macular degeneration. It has also been suggested as a prognostic tool for the severity of systemic disease such as diabetes, stroke, and dementia. Our work centers around using machine learning and computer vision to (1) automate the detection of eye diseases which are currently diagnosed via retinal imaging and (2) identify novel features in retinal imaging that may be predictors or early signs of eye disease as well as systemic disease.

If successful, this work will help improve the detection of eye diseases and potentially other systemic diseases. Automated detection also has the potential of increasing efficiency and reducing costs.

Using labeled fundus and OCT images as the main inputs, we will train computer algorithms to automatically predict image labels using machine learning and computer vision.

We are requesting data from all patients that have had the retinal imaging performed. Per the UK Biobank look-up tool, this consists of 67,711 patients that make up the collection of 68,151 paired

colour retinal photographs and optical coherence tomography (OCT) scans.

PUBLICATION NEWS

Visual Function, Social Position, and Health and Life Chances - The UK Biobank Study. Cumberland PM & Rahi JS, on behalf of the UK Biobank Eye and Vision Consortium. July 2016. **JAMA Ophthalmology.** - [Link to PDF](#)

Associations with Retinal Pigment Epithelium Thickness Measures in a Large Cohort: Results from the UK Biobank. Ko F, Foster PJ, Strouthidis NG, Shweikh Y, Yang Q, Reisman CA, Muthy ZA, Chakravarthy C, Lotery AJ, Keane PA, Tufail A, Grossi CM, Patel PJ, on behalf of the UK Biobank Eye & Vision Consortium. Oct 2016. **Ophthalmology.** - [Link to PDF](#)

The Accuracy and Reliability of Crowdsourced Annotations of Digital Retinal Images. Mity D, Zutis K, Dhillon B, Peto T, Hayat S, Khaw KT, Morgan JE, Moncur W, Trucco E, Foster PJ, on behalf of the UK Biobank Eye & Vision Consortium. Sep 2016. **Translational Vision Science & Technology.** - [Link to PDF](#)

Optical Coherence Tomography in the UK Biobank Study - Rapid Automated Analysis of Retinal Thickness for Large Population-Based Studies. Keane PA, Grossi CM, Foster PJ, Yang Q, Reisman CA, Chan K, Peto T, Thomas D, Patel PJ, on behalf of the UK Biobank Eye & Vision Consortium. Oct 2016. **PLoS ONE** - [Link to PDF](#)

PROFILE

Professor Stephen Smith,
Professor of Biomedical Engineering,
FMRIB, Oxford



Professor Stephen Smith is Professor of Biomedical Engineering and head of the Analysis Group at The Oxford University Centre for Functional Magnetic Resonance Imaging of the Brain (FMRIB). The Analysis Group, which he started in 1997, now comprises about 30 research fellows, postdocs, students and support staff, carrying out functional and structural brain image analysis and statistics research. The group has produced the brain image analysis software package FSL (FMRIB Software Library) which is widely used in many laboratories across the world.

Recent personal research has concentrated on resting state networks, showing that these correspond closely to explicit functional networks as seen in task FMRI (Smith, PNAS, 2009), showing new networks on the basis of distinct temporal dynamics (Smith, PNAS, 2012), and most recently relating functional networks to behaviour and lifestyle (Smith, NatureNeuroscience, 2015). Currently, the FMRIB Analysis Group is playing a major role in the Human Connectome Project (Smith, TICS 2013; Smith, NeuroImage 2014), UK Biobank Imaging, and the Developing Human Connectome Project.

Professor Smith leads the brain imaging component of the UK Biobank imaging study. "The brain imaging data is incredibly rich - we have one kind of image that tells us about brain anatomy, another that tells us about complex patterns of brain activity, and yet another that tells us about the brain's 'wiring'." He says that further value will be added because of advances that will take place in the way in which these complex images are analysed.

"UK Biobank will be by far the largest brain imaging study ever conducted. It will not only provide valuable insight into common conditions like dementia, but also capture early markers of more rare neurological disorders like motor neuron disease (ALS). We aim to discover new early signs and risk factors of disease, in the hope that earlier targeted treatment, or changes in lifestyle, could prevent major diseases from ever happening," he said.

Prof Smith will be speaking at our annual meeting on 7th February 2017.