Application number/Title: 22593 - Retinal assessment of microvascular dysfunction and chronic disease in UK Biobank

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Keywords provided by the Applicant PI to describe the research project:

Microvascular, diabetes, kidney, cognition, cardiovascular, stroke

Application Lay Summary:

1a: AIM 1:
Evaluate retinal microvascular parameters as biomarkers for chronic kidney disease (CKD) in people with and without diabetes in the UK Biobank data.

AIM 2:
Evaluate retinal thickness as a biomarker for CKD in UK Biobank data.

AIM 3:
Evaluation of association between retinal microvascular parameters and cognitive function in UK Biobank data.

1b: This study will investigate novel, inexpensive,non-invasive biomarkers for CKD, DR and cognitive impairment. These potential biomarkers are measures of the small blood vessels of the eye (Retinal Microvascular Parameters) obtained through technology commonly used in the UK high street.

The biomarkers may provide earlier indication of individuals at increased risk of diseases with a vascular component. This may enable earlier identification and clinical stratification with more appropriate therapeutic intervention and improved medication prescription. Therefore the research will meet the UK Biobank's purpose of improving treatment and prevention.

1c: This study will use software (VAMPIRE) to quantify blood vessel parameters from retinal fundus images from a subset of the Uk Biobank population. These retinal microvascular paramenters will include vessel calibre, curvature (tortuosity), branching (bifurcation angle coefficients), and optimum space filling by the vessels (fractal dimension).

Existing retinal thickness measurements will be requested which have been previously acquired from the OCT images using custom analysis software (Topcon Advanced Boundary Segmentation [TABS]; Topcon GB). Comparisons will be made between groups according to cohort classification and the potential of retinal microvascular biomarkers evaluated.

1d: We will request data fromm 4000 participants. We aim to sample these using 2,000 individuals from each side of the estimated glomerular filtration rate (eGFR) distribution, as determined by serum creatinine, of the 68,544 participants who have undergone retinal fundus and OCT photography.

In addition, we request that this data includes outputs for those UK Biobank participants who have participated in the imaging study. This will allow us to compare and evaluate retinal parameters with those from other imaging modalities. We appreciate not all of the data we request is yet available.