



Title of PhD project	Artificial Intelligence-enabled retinal imaging for improved understanding of cardiometabolic disease progression in south India	
Supervisor	Dr Poppy Mallinson	LSHTM
Co-Supervisor	Professor Sanjay Kinra	LSHTM
Co-Supervisor	Professor Alicja Rudnicka	SGUL
Co-Supervisor	Professor Chris Owen	SGUL
Brief description of project	<p>It is increasingly recognised that the eye offers a window into understanding and predicting an individual’s risk of cardiometabolic disease. Analysis of photographs of the back of the eye reveals strong correlations between the shape and distribution of blood vessels in the retina, with blood pressure, thickness and stiffness of large arteries, body composition, and cardiometabolic disease. The advent of artificial intelligence-enabled analysis of image data has allowed this to be examined in large cohort studies in the UK. However, data from diverse populations remains scarce.</p> <p>This PhD project offers a unique opportunity to examine AI-enabled retinal blood vessel phenotypes in an Indian population facing unexplained high risk of cardiometabolic diseases. The successful applicant will relate retinal vascular information to a spectrum of cardiometabolic risk markers in order to generate novel mechanistic insights into the disease process in this population. They will have the opportunity to apply multilevel and machine learning techniques for statistical as well as predictive models. We also encourage opportunities for travel and collaboration within the supervisors’ wider research networks around UK and India.</p>	
Skills we expect a student to develop/acquire whilst pursuing this project	Use and evaluation of AI-enabled algorithms to medical imaging; knowledge around interpretation and value of retinal images in cardiometabolic pathology; skills in machine learning-based statistical methods.	
Particular <u>prior</u> educational requirements for a student undertaking this project	Essential: Strong quantitative skillset, demonstrated by Masters’ level training (e.g. epidemiology, biostatistics, data science) or equivalent.	

	Desirable: Background or interest in disease mechanisms/aetiology (in particular cardiometabolic/ cardiovascular diseases).
Project key words	Retinal vasculature Imaging Artificial intelligence Statistics Disease mechanisms Cardiometabolic disease India
Possible under 1+4 route? Master's options identified.	Yes LSHTM – MSc Health Data Science LSHTM – MSc Epidemiology LSHTM – MSc Medical Statistics
MRC Core Skills developed through this project	Quantitative skills Interdisciplinary skills
MRC LID themes	Global Health Health Data Science
Further reading	<u>Retinal Vasculometry Associations with Cardiometabolic Risk Factors in the European Prospective Investigation of Cancer—Norfolk Study</u> <u>Retinal Vascular Tortuosity and Diameter Associations with Adiposity and Components of Body Composition</u> <u>Associations of Retinal Microvascular Diameters and Tortuosity With Blood Pressure and Arterial Stiffness</u>