Reg. No. 200604393R

Research Theme: Translational biomarker research, diabetes vascular complications	
Research Project Title: **Translational biomarker research for prediction of diabetic vascular complications in diabetes mellitus patients**	
Principal Investigator/Supervisor: **Newman Sze**	
Co-supervisor/ Collaborator(s) (if any):	
Project Description	

Diabetic vascular complications induced by high levels of blood glucose (hyperglycaemia) are a major cause of morbidity and mortality in patients with diabetes mellitus (DM). Hyperglycaemia induces vascular damages by increasing intracellular oxidative stress and promoting inflammation, leading to elevated risk of myocardial infarction (MI), retinopathy, nephropathy, neuropathy, and stroke. Predicting clinical course in DM patients is currently based on measurements of fasting glucose concentration, oral glucose tolerance, or blood levels of glycated hemoglobin (HbA1c). While glycemic index is an important risk factor for diabetic complications, this measure alone does not provide clinically useful information about ongoing vascular pathology.

DM induced vascular pathology is triggered by a combination of high glucose level, oxidative stress, lipid-profile, hypertension, environmental stresses and genetic factors that promote degenerative protein modifications (DPMs) such as proteins' oxidation, glycation, carbamylation and advanced glycation end products (AGEs). Over the past decade, we have used advanced proteomic technologies to study DPM-based biomarkers in blood plasma and tissue samples from patients with ischemic heart disease, stroke and vascular dementia, 25-50% of whom presented with a background of diabetes. These diabetic patients displayed high levels of DPMs affecting proteins with anti-oxidant properties or roles in lipid transport and metabolism.

Building on the novel observation, this project aims to translate the basic laboratory discovery to clinical uses. To do this, we will apply omics and systems biology, molecular and cell biology, and biochemical methods to study cell lines and animal models, and clinical samples to understand the molecules mechanism of DM progression to vascular complications and translating the biomarker candidates to clinical uses.

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