Understanding mitochondrial dysfunction in diabetic kidney disease: different cell perspectives.

Project Description

Project duration:	Honours
Description:	Diabetic kidney disease (DKD) is the leading cause of end stage renal disease globally, affecting between 30-40% of patients with diabetes, drastically increasing patients' risk for cardiovascular mortality and death. Current treatment regimens slow but don't prevent disease, as such, there is a clinical need for therapies that prevent or ameliorate DKD. Mitochondrial dysfunction has been identified as one of the main pathways contributing to the pathogenesis of DKD but different components of the kidney have very different metabolic preferences, different mitochondrial densities and respond differently to the change in metabolic fuels available in diabetes. We have been trialling a novel redox modulating agent that shows efficacy at improving diabetic kidney disease in animal models, but the mechanism of action is not yet understood. In this project we wish to examine the effects of diabetes and glucose modulation (mimicking the increased glucose variability experienced by patients with diabetes) on different renal cell populations in the context of other important factors present in the diabetic milieu (inflammatory cytokines, growth factors). Here, we wish to both further our understanding of the effects of diabetes on mitochondrial function in the different cell types that populate the kidney and to discover the mechanism of action of our redox therapy in diabetic kidney cells.
Expected outcomes and deliverables:	This project will provide the student with key laboratory skills including working in a PC2 facility, cell culture, mitochondrial assays such as seahorse, mitosox (live cell imaging), ROS quantification, qPCR, ELISA, immunofluorescence staining and microscopy, cell viability. Statistical skills will also be developed as part of this project. We like to encourage and facilitate students publishing a review article during their honours year and as such the student will be presented the opportunity to gain experience in scientific writing should they wish.
Suitable for:	Enthusiasm for research, ability to work independently and an interest in diabetes and associated complications are encouraged. Previous laboratory experience, understanding of statistics will be an advantage but are not essential.

Primary Supervisor:	Dr Amelia Fotheringham and Professor Josephine Forbes
Further info:	Please don't hesitate to get in touch if you're interested in this project.
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