Dr Etuate Saafi spends a lot of time taking a close look at diabetes using sophisticated microscopy techniques and computer imaging analysis. The HRC Postdoctoral Fellowship recipient’s long-held interest in science has earned him a wide range of awards and degrees, and more recently a Doctorate in Biological Sciences in Type 2 diabetes biomedical research. Amongst his list of peer-reviewed publications are six peer-reviewed international journal publications generated from his PhD research work. Upon joining Professor Garth Cooper’s laboratory at the University of Auckland, Dr Saafi commenced his research work in diabetes focusing on the role of the amylin hormone in mediating the death of pancreatic \(\beta\)-cells, a hormone discovered by Professor Cooper earlier in his research career. Much of Dr Saafi’s work involved molecular cell biological studies using both electron and light microscopy-based techniques. Imaging analysis on both cultured cell lines and diabetic animal models was also undertaken to obtain a greater understanding of how pancreatic \(\beta\)-cells (i) respond and interact with human amyloid fibrils, and (ii) how the ultrastructural and morphological architecture of the \(\beta\)-cells are affected when they undergo apoptosis (programmed cell death).

“We established that apoptotic cell death is triggered in pancreatic \(\beta\)-cells when exposed to human amyloid fibrils. In the “normal” non-diseased state, human amylin is a normal hormone co-secreted with insulin by the pancreatic \(\beta\)-cells to regulate healthy metabolism. Amylin’s toxicity to \(\beta\)-cells is understood to be linked to its “abnormal” tendency to form fibrils (amyloidosis) which tends to aggregate as amyloid plaques juxtaposed proximal to the \(\beta\)-cells in the diabetic patient’s pancreas. The understanding of such specific pathways in the study of disease is prerequisite to the development of therapeutics to combat the process of apoptosis and here diabetes. Similar “toxic” disease-specific protein amyloid fibrils are also implicated in the causation of apoptosis in other disorders such as Alzheimer’s disease, Huntington’s disease, Creutzfeldt-Jakob disease, Parkinson’s disease, hence there are possible overlaps in the amyloidogenic disease mechanism that may also become useful in understanding similar disorders” Dr Saafi says.

The most recent collaborative study in Professor Cooper’s laboratory, of which Dr Saafi has been a part of as an HRC Postdoctoral Research Fellow, has focused largely on heart disease (diabetic cardiomyopathy) which is the major cause of death in diabetes and is commonly characterized by hyperglycaemia and cardiovascular complications.

“It is implicated that the damage to the heart tissue which subsequently leads to eventual heart failure is caused by the over-production of harmful oxygen radical molecules such as superoxide by the endothelial cell mitochondrial electron chain under hyperglycaemic conditions during diabetes.”

“We investigated the role of transitional metals such as Copper (Cu) which is an important catalyst that facilitates the reaction pathway that produces superoxide. Using the trientine, a Cu chelator, we were able to demonstrate increased Cu removal, lowered superoxide production, and a reversal of heart tissue damage at the ultrastructural level including an overall reversal of heart failure. The therapeutic potential of this study is very promising for diabetics” says Dr Saafi.

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