Possible Use of MicroRNA-488 as a Biomarker for Bad Prognosis in Type 2 Diabetes

Lee, Ming-Hao (School: Iolani School)

Type 2 Diabetes (T2D) affects millions worldwide but has an exceptionally high prevalence in Hawaii, with a rate of 9% for all residents aged 18 or older. Of that 9%, 13.1% are Native Hawaiians, and 23.0% are other Pacific Islanders, demonstrating a high degree of health disparity in Hawaii. This study aims to amend this issue by finding a biomarker to predict the bad prognosis of T2D. Such a biomarker, coupled with traditional therapeutic strategies, could help prevent the pathogenesis of the disease. Previous limited methylation data in monocytes indicated that microRNA-488 (miR-488) could be a biomarker since its promoter was hypomethylated in diabetic patients. High concentrations of miR-488 in cultured mesangial cells have been linked to diabetic nephropathy, one of the most serious complications of T2D. In this project, we increased methylation sample numbers in the study, performing microarray analysis on an additional 96 patient samples. Methylation analysis confirmed the change in the promoter of miRNA-488. To further investigate, microRNA expression in monocytes were analyzed using RT-qPCR. The results indicated that both miR-488-3p and miR-488-5p are significantly upregulated in the monocytes of T2D patients. Data shows that miR-488 is significantly upregulated in T2D patients due to changes in promoter methylation. This change caused by the disease could cause more complications, including diabetic nephropathy. Future research includes checking the expression of miRNA-488 in monocytes of patients at different stages of T2D to further characterize its time course.

Awards Won:
Second Award of $2,000