Exploring the Use of Circulating Cell-free RNA in Monitoring Metabolic Diseases

Winston Koh

Molecular Engineering Lab, Agency of Science Technology & Research, Singapore

Email: Winston_Koh@bmsi.a-star.edu.sg

Diabetes is a leading cause of morbidity and mortality worldwide. However, this growing burden has not been matched with a similar expansion in therapeutic options. Current therapies for diabetes focus primarily on managing the symptoms of the disease rather than replacing or preserving β-cell mass.

In our lab, we are interested in profiling circulating nucleic acid biomarkers that contributes towards discovery of drugs that are effective and safe for metabolic intervention of pancreas. Circulating nucleic acids found in plasma have been shown to originate from apoptotic and necrotic cells, and relates to cellular turnover rates. While circulating cell-free DNA (cfDNA) levels, especially those of tumor origin, have found uses in the form of liquid biopsy for cancer patients; circulating RNA remains largely a class of under-explored and under-utilized biomarkers [1]. RNA, which, unlike DNA, are expressed at levels that differs from organ to organ in the body, and can thus be used to target specific organs of interest [2].

In our study, we explored the potential of using pancreas-specific circulating RNAs in plasma as a form of non-invasive tissue specific biomarker to quantify pancreatic health. Using a multiplex amplification strategy, we screened a range of pancreatic specific transcripts from plasma samples of patients undergoing bariatric surgery. Over the course of monitoring the recovery of this patient group undergoing bariatric surgery, our assay captured temporal changes in in pancreatic transcripts that we believe will open new ways towards administering diabetes treatment.

References:

[1] Wan, J. C. M., Massie, C., Garcia-Corbacho, J., Mouliere, F., Brenton, J. D., Caldas, C., Rosenfeld, N. Nature Reviews Cancer, 17(4), 223–238 (2017).

[2] Winston Koh, Wenying Pan, Charles Gawad, H. Christina Fan, Geoffrey A. Kerchner, Tony Wyss-Coray, Yair J. Blumenfeld, Yasser Y. El-Sayed, and Stephen R. Quake PNAS 111 (20) 7361-7366 (2014).