Exosomal microRNA: Potential urinary and plasma based biomarkers for the diagnosis and prognosis of prostate cancer.

Samuel Brennan[1], Nham Tran[2], Aled Clayton[3], Jason Webber[3], Paul Cozzi[4], Rosetta Martiniello-Wilks[1,2]

[1]Translational Cancer Research Group, School Life Sciences, Faculty of Science, University of Technology Sydney (UTS), Australia; [2]Centre for Health Technologies UTS; [3]Institute of Cancer & Genetics, School of Medicine, Cardiff University, Cardiff, United Kingdom, [4]Faculty of Medicine, University of New South Wales, Sydney, Australia.

Introduction: Non-invasive diagnostic tests for prostate cancer (PCa) are urgently needed, as measuring serum prostate specific antigen (PSA) has limitations of poor specificity and sensitivity and provides little long-term predictive information. Given the interest in exosomal RNA content in various cancers, we explored the potential utility of exosomal RNA as a basis for a diagnostic and prognostic tool for PCa.

Methods: A panel of candidate exosomal microRNA (exomiR) biomarkers were established by performing an Affymetrix microRNA microarray using RNA extracted from several PCa cell lines (LNCaP, PC3, DU145 and VCaP) and transformed normal prostate epithelia (PNT2). These candidates were validated by qPCR. We then proceeded to gather urine and plasma samples from PCa patients before and following prostate removal surgery, and from healthy volunteers. After extensive optimisations in both body fluids we can present 3 methodologies for the extraction of exosomal miRNA from urine and plasma.

Results: PCa exosomes are highly enriched with miRNAs. We have identified a panel of exomiRs that differentiate cancerous from normal prostate cells. Importantly, these exomiRs were able to define the androgen dependence status of our cell lines by qPCR analysis. We are currently attempting to translate these findings to the clinic by testing the utility of our unique exomiR panel in the detection of PCa in human urine and plasma. Our preliminary data indicates that our candidate exomiR biomarker panel can differentiate between normal and PCa donor urine/plasma.

Conclusions: Exosomal RNAs show great promise as diagnostic/prognostic biomarkers for PCa and will hopefully fill a significant gap in the clinical care of PCa patients.