

# **Raman Spectroscopy detection of clinically significant prostate cancer: unraveling new trends within a clinical trial**

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Prostate cancer is a significant healthcare problem in Australia and New Zealand where incidence and mortality rates are among the highest of the world [1]. The current gold standard for diagnosis of prostate cancer involves a highly invasive systematic transrectal or transperineal tissue biopsy. A growing part of the clinical community now recognises the interest of early diagnosis of clinically relevant cancers (ISUP grade 2 and higher) against ISUP1 tissue. ISUP1 has a relatively indolent course, with cancer-specific deaths or metastases occurring in less than 1% of men [2]. Despite optimized utilization of mpMRI, the incidence of negative or clinically non-significant PCa following prostate biopsy remains very high. Early cancer grading could help avoid unnecessary suffering, morbidity and over-treatment for men with an ISUP1 diagnosis. Raman Spectroscopy (RS) is robust, portable, minimally invasive and has already been shown to be excellent for detecting prostate cancer on specimen from radical prostatectomies [3]. RS could also be used during prostate biopsy procedures for real-time prostate cancer diagnosis.

We utilise of a thin handheld fibre optic probe to perform RS measurements on fresh prostate biopsy cores seconds after collection. Results have already shown that we can detect clinically significant prostate cancer tissue (Gleason pattern 4 and 5) with 90% sensitivity and 78% specificity. Our current work focuses on exploration of our clinical trial data to extract new information and unravel different patterns including trends in ethnicities (with a main focus on Māori and Pacific Peoples), patient age, PSA levels and Gleason patterns. We anticipate our findings will lead towards a better understanding of different trends in prostate cancer diagnosis.

- [1] M.B.B. Culp et al., "Recent Global Patterns in Prostate Cancer Incidence and Mortality Rates," *European Urology*, **77**, 1, 38–52, 2020
- [2] S.E. Eggener et al., "Low-Grade Prostate Cancer: Time to Stop Calling It Cancer," *Journal of Clinical Oncology*, 1–6, 2022
- [3] K. Aubertin et al., "Combining high wavenumber and fingerprint Raman spectroscopy for the detection of prostate cancer during radical prostatectomy," *Biomedical Optics Express*, **9**, 9, 4294–4305, 2018.