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PROSTATE CANCER

Increasing the potential of prostate biopsies with bioimpedance spectroscopy

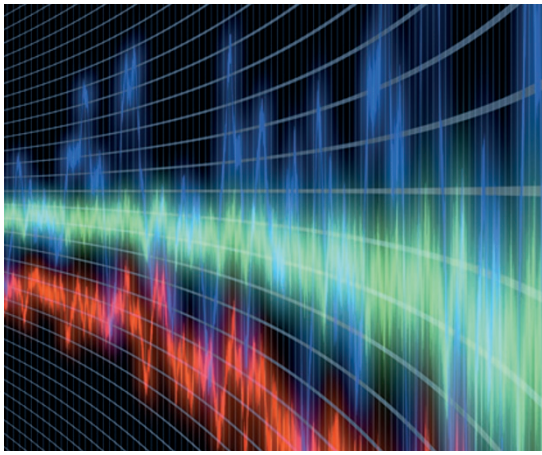
Integrating electrical impedance spectroscopy (EIS) into the 12-core biopsy protocol could improve the identification of prostate cancer, according to new research published in *Prostate*.

Currently used biopsy methods—12-core prostate biopsies guided by transrectal ultrasonography (TRUS)—sample <1% of the prostate and often give an inaccurate assessment, but advanced imaging alternatives are relatively expensive and time-consuming. To address this issue, researchers in New Hampshire have modified the 12-core biopsy needle to measure prostate tissue bioimpedance.

Bioimpedance is the resistance to electric current shown by biological tissues; it is affected by tissue morphology, which is altered during cancer growth. Increased bioimpedance in prostate cancer relative to benign tissue was first demonstrated in 1999, but although EIS devices have been evaluated for needle guidance in small *ex vivo* studies, the technology is yet to transfer to the clinic.

The current study followed a TRUS-guided 12-core biopsy protocol, with EIS measurement at each biopsy site prior to firing the needle, in 36 *ex vivo* prostates, obtained immediately after radical prostatectomy. EIS profiles were compared to histological assessments of the tissue cores; of 432 cores, 367 were benign, 39 contained cancer and 26 were adipose, stroma or extraprostatic tissue. Optimal frequency of the current was determined for discriminating cancer tissue, which showed significantly higher impedance, from benign tissue.

The EIS measures had high negative predictive value for identifying benign tissue cores, but lower positive predictive value, which could be due to limited cancer cores for comparison or could reflect EIS sampling of the area surrounding the biopsy.



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The investigators hope that *in vivo* trials will follow and propose a protocol for EIS-enhanced biopsy. They envisage real-time analysis, with additional biopsies of tissues surrounding sites of increased impedance, thus focusing attention on areas more likely to contain tumours.

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Original article Mishra, V. *et al*. Electrical property sensing biopsy needle for prostate cancer detection. *Prostate* doi:10.1002/pros.22695