

Treatment of localized prostate cancer using magnetic resonance imaging-controlled ultrasound therapy

Rajiv Chopra, Scientist, Sunnybrook Health Sciences Centre, Toronto, Canada

Widespread PSA screening and transrectal biopsy has led to an increase in the diagnosis of localized prostate cancer in younger men, and at an earlier stage of disease. While treatment at this stage is associated with good long-term survival rates, existing therapies are burdened with high complication rates to sexual, urinary and bowel function. Furthermore, diagnosis of prostate cancer is based on sampling of less than 1% of the glandular volume, and many men are overtreated for a disease that is clinically insignificant. Improvements to the localization of prostate cancer within the gland would lead to better decisions with respect to treatment. The introduction of minimally-invasive treatments for localized prostate cancer with reduced complications would also be an attractive option for patients and healthcare providers.

Our group has been exploring the role of MRI in both the diagnosis and treatment of localized prostate cancer for over a decade. Multi-parametric MRI has been shown to provide good spatial localization of disease through a combination of multiple complementary tissue parameters. In this realm, our group has been exploring the potential of integrating tissue stiffness measurements through a technique known as MR elastography. Current efforts are focused on translating endorectal MRE into preliminary human evaluation. With respect to treatments, our focus for the past 10 years has been on the development of MRI-guided transurethral ultrasound therapy, a minimally-invasive approach for the delivery of high-intensity ultrasound to the gland. This technology has been translated from concept to clinic by our research group, and preliminary results indicate the approach is feasible, and has the potential for precise thermal destruction of the whole prostate, or sub-volumes within the gland.

This seminar will describe our efforts to exploit MRI for both diagnostic and therapeutic applications in prostate cancer management.