# MRI Can Improve Prostate Cancer Screening by Adding Individualized Tumor Information

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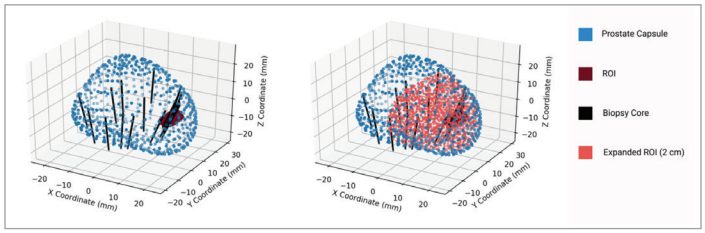
Prostate cancer presents management challenges that make it unique among solid organ cancers. "Unlike other cancers, for men it's not a matter of 'if' you get prostate cancer, it's a matter of 'when' you get prostate cancer," explains Steven Raman, MD, professor of radiology and director of the UCLA Prostate Imaging and Image Guided Treatment Program. "Over 80 percent of men over the age of 80 have some prostate cancer, which is not true of other cancers." The key to managing the disease is to know what type of prostate cancer an individual man has and how aggressively it is likely to behave, which helps determine how aggressively it should be treated. Non-aggressive prostate cancers could be managed conservatively with active surveillance and MRI, but usually are left untreated to avoid the morbidity of sexual and urinary dysfunction associated with prostate cancer treatments.

Despite the usefulness of individualized information, the standard of care for prostate cancer screening has been uniform. Men typically present with an elevated blood PSA (prostate specific antigen) level (> 4) or the presence of a nodule on digital rectal examination, both of which are nonspecific and do not differentiate between aggressive and non-aggressive prostate cancer subtypes. Typically this is followed by a transrectal ultrasound (TRUS) guided systematic biopsy of the prostate gland to try to detect prostate cancer, which can then be categorized according the Gleason grading system. However, this fails to accurately estimate individual cancer risk in up to 50 percent of patients.

"Since the early 1990s, men have been getting tested for PSA, which is a good test but not a great test because it leads to overdiagnosis," explains Dr. Raman. "It does pick up the majority of men with prostate cancer, however it doesn't discriminate between aggressive and non-aggressive subtypes." The widespread use of PSA resulted in a significant decrease in prostate cancer mortality in the 1990s, but it came at the cost of very widespread sexual and urinary morbidity and overtreatment for many other men.

This may be in the process of changing as MRI (magnetic resonance imaging) is proving to be useful in identifying the most aggressive prostate cancer tumors for biopsy and — importantly — in returning a negative result when non-aggressive tumors don't present immediate threats to men's health.

"UCLA data shows that using MRI, we can detect 80 to 90 percent of the aggressive disease (Gleason score > 7) while detecting less than 50 percent of the non-aggressive disease," states Dr. Raman. "For the last 11 to 12 years, we've also pioneered the use of MRI targeted biopsy — biopsying the most aggressive disease we see under MRI using a variety of fusion imaging techniques as well as direct MRI-guided biopsy in the MR scanner. Our most recent analysis (Fig. 1) shows that 97 percent of clinically significant prostate cancers were within 2 cm of the MRI target, requiring less extensive prostate biopsy samples.




A landmark study by Drs. Corey Arnold and Steven Raman (*Raman et al.* J Urol *2021; 206(3): 595-603*) of detailed 3D biopsy analysis of 16,459 biopsy cores in 1,000 patients showed that over 97 percent of clinically significant prostate cancers (red dots in figure above) were within 2 cm of the MRI target (brown spot), further validating the technique and decreasing the need for extensive systematic biopsies, which add risk of bleeding, infection and pain.

A recent population based study in Sweden enrolled 12,750 men to compare standard prostate cancer screening to a screening program that adds the use of MRI in detecting clinically significant disease. Men with PSA scores of 3 and higher (1,532 men met the study criteria) were randomized to receive either standard systematic TRUS biopsy or an MRI followed by a targeted TRUS biopsy and a standard systematic biopsy if the imaging indicated the presence of aggressive prostate cancer.

Clinically significant prostate cancer — defined as a Gleason score of 7 or higher following histological examination of the biopsy tissue — was detected in 21 percent of those in the MRI arm of the study, compared to 18 percent for those in the standard-of-care arm. In addition, only four percent of the men in the MRI arm detected as positive for prostate cancer but proved to have clinically insignificant disease. In the standard-of-care arm, 12 percent of those detected positive proved clinically insignificant for prostate cancer. "This study mirrors our long experience at UCLA, initially published 10 years ago," says Dr. Raman. "MRI is very good at detecting significant prostate cancer while not detecting insignificant prostate cancer."

Screening for prostate cancer is poised for a significant step forward with MRI imaging to help discriminate when biopsy is called for and when prostate disease should be monitored without invasive testing. "With the introduction of MRI, prostate cancer care has entered a whole new phase where the risk of each individual man is more personalized than it was in the past," says Dr. Raman. "Based on UCLA research, MRI is the single best marker for predicting clinically significant cancer and also predicting the underlying tumor molecular biology, including hypoxia genes. The combination of artificial intelligence, MRI and PSMA PET scans may be better than any of them alone for diagnosing prostate cancer in the near future."