

## **The role of MRI in localized prostate cancer**

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Anatomic staging remains the most important prognostic factor in most malignancies, and it typically guides treatment selection. Clinical staging of prostate cancer with digital rectal examination poorly captures the true anatomic extent of disease, especially in the era of prostate-specific antigen detected cancers.

In last years, multiparametric-MRI (mpMRI), using multiple sequences (T1- T2, dynamic contrast enhancement (DCE), and diffusion weighted imaging (DWI) with apparent diffusion coefficient (ADC) maps, has improved the sensitivity and specificity of MRI to detect and characterize prostatic lesions and the way of interpreting these images has been standardized in the PiRads system.

Little is known regarding the predictive value of MRI prior to radiation therapy of prostate cancer, but in recent years several studies have demonstrated a significant impact of the information derived from the mpMRI in T-stage shifting, in the ability to detect extracapsular extension or seminal vesicle invasion, to detect dominant intraprostatic lesions (DIL), and ability to predict aggressiveness.

Prostate-MRI has demonstrated an important role in patients with suspected prostate cancer and previous negative biopsies, in order to guide repeated biopsies to regions of radiologic suspicion of disease.

MRI-guided prostate biopsy detects more clinically significant prostate cancer and fewer insignificant Gleason score 6 cancers than TRUS-guided biopsy. This a crucial consideration before recommending Active Surveillance.

With better imaging techniques to recognize the location and burden of disease, pretreatment mpMRI images now provide clues to better understand the mechanisms that contribute to tumor progression following a course of definitive radiotherapy.

Based on the idea that local relapse after radiotherapy is often in the site of initial DIL, this concept has driven high interest in dose escalation to these areas of high burden of disease, and several phase II studies have been published recently.

Multiparametric-MRI has also the ability to detect local failure after radical prostatectomy. In this case, the detection of macroscopic disease in the prostate bed, allows for a more accurate treatment planning to ensure appropriate dose coverage to regions of visible disease.

In conclusion, prostate-MRI provides opportunities to increase both diagnostic and prognostic accuracy and to improve treatment planning strategies. Its value in low-risk patients is to improve selection of patients for active surveillance and detect patients harboring more aggressive disease. For intermediate-risk patients MRI information could help to differentiate between favorable vs unfavorable disease. In high-risk patients, it can provide useful information to guarantee appropriate tumor coverage.