

# THE ROLE OF MRI IN PROSTATE CANCER MANAGEMENT: A SCOPING REVIEW OF THE EVOLVING LANDSCAPE

Elijah Potokar BS<sup>1</sup> , Granville L. Lloyd MD<sup>2,3</sup>

University of Colorado Department Anschutz School of Medicine<sup>1</sup>, University of Colorado School of Medicine Division of Urology<sup>2</sup>, Rocky Mountain Regional VA Hospital Division of Urology<sup>3</sup>, Aurora, CO, USA

## ABSTRACT

**Background:** Prostate Cancer is one of the most prevalent cancers in men and a significant cause of death globally. In recent decades, the therapeutic approach towards prostate cancer has undergone a rapid progression, as has the screening methodologies. The utilization of Magnetic Resonance Imaging (MRI) and MRI-directed biopsy has emerged as a topic of increasing clinical investigation and interest. Despite the increasing use of MRI as a fundamental tool in PCa management, there remains significant debate surrounding its optimal utilization.

**Objective:** The aim of this paper was to perform a scoping review of the literature pertaining to the utilization of MRI for the diagnosis and management of prostate cancer, its present applications, and to examine its potential as a screening modality.

**Methods:** By synthesizing data from single-center studies, multi-center studies, nationwide studies, and comprehensive meta-analyses of all pertinent published literature. Articles were selected based on study population size, journal prestige, and representation in the overall literature. Evaluation of the utility of MRI as a screening modality for prostate cancer was addressed by using the screening domains: disease/condition, the test/intervention, and the program/system (Table 1).

**Findings:** MRI has been shown to improve the detection of clinically significant prostate cancer with the average sensitivity for identifying index lesions demonstrated to be 91%. The NPV of negative MRI has been shown to be 90% in patients with a PSAD less than 0.15 ng/ml/cc, and 94% in patients with a PSAD less than 0.10 ng/ml/cc. Included studies have demonstrated a marked reduction in the detection of clinically insignificant prostate cancers with the implementation of MRI. The incorporation of MRI into PSA-based prostate cancer screening has demonstrated a significant decrease in lifetime prostate cancer-related fatalities with additional cost-effectiveness.

**Conclusions:** MRI has a wide scope of applications in the management of prostate cancer including screening, risk stratification, staging, treatment planning, and surveillance. MRI and MRI-guided biopsy improves the detection of clinically significant prostate cancer, minimizes over-treatment, and is cost-effective.

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**TABLE 1**

<b>Domain</b>	<b>Consolidated screening principles (after systematic review and modified Delphi consensus process)</b>
Disease/condition principles	<p><b>1. Epidemiology of the disease or condition</b> The epidemiology of the disease or condition should be adequately understood, and the disease or condition should be an important health problem (e.g., high or increasing incidence or prevalence, or causes substantial morbidity or mortality).</p> <p><b>2. Natural history of disease or condition</b> The natural history of the disease or condition should be adequately understood, the disease or condition is well-defined, and there should be a detectable preclinical phase.</p> <p><b>3. Target population for screening</b> The target population for screening should be clearly defined (e.g., with an appropriate target age range), identifiable and able to be reached.</p>
Test/intervention principles	<p><b>4. Screening test performance characteristics</b> Screening test performance should be appropriate for the purpose, with all key components specific to the test (rather than the screening program) being accurate (e.g., in terms of sensitivity, specificity and positive predictive value) and reliable or reproducible. The test should be acceptable to the target population and it should be possible to perform or administer it safely, affordably and efficiently.</p> <p><b>5. Interpretation of screening test results</b> Screening test results should be clearly interpretable and determinate (e.g., with known distribution of test values and well-defined and agreed cut-off points) to allow identification of the screening participants who should (and should not) be offered diagnostic testing and other postscreening care.</p> <p><b>6. Postscreening test options</b> There should be an agreed on course of action for screening participants with positive screening test results that involves diagnostic testing, treatment or intervention, and follow-up care that will modify the natural history and clinical pathway for the disease or condition; that is available, accessible and acceptable to those affected; and that results in improved outcomes (e.g., increased functioning or quality of life, decreased cause-specific mortality). The burden of testing on all participants should be understood and acceptable, and the effect of false-positive and false-negative tests should be minimal.</p>
Program/system principles	<p><b>7. Screening program infrastructure</b> There should be adequate existing infrastructure (e.g., financial resources, health human</p>

\*Components of a screening program include recruitment, testing, information access, diagnosis, referral, treatment, follow-up, patient education and support, staff training and program management and evaluation.