# Evaluating the Effectiveness of Artificial Intelligence in Prostate Cancer Detection using Biparametric Magnetic Resonance Imaging: A Comparative Study

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## Abstract

*Background and Aim:* Prostate cancer is a leading cause of cancer-related mortality among men worldwide. Biparametric magnetic resonance imaging (bpMRI) plays a crucial role in early detection and evaluation of prostate lesions. Artificial intelligence (AI) has emerged as a promising tool for optimizing diagnostic workflows. This study aimed to assess the effectiveness of the commercial AI software Mediaire© in identifying suspicious prostate lesions on bpMRI, comparing its performance with interpretations by experienced radiologists and evaluating its potential to enhance early prostate cancer detection through concordance with human evaluations. *Materials and Methods:* A retrospective analysis was conducted on prostate bpMRI scans performed at the Imaging Center of the University of Medicine and Pharmacy Craiova between January 2024 and February 2025. The study included 181 bpMRI scans from patients who presented for diagnostic evaluation rather than post-treatment monitoring. The AI software Mediaire analyzed the scans, and its findings were compared to the independent assessments of two radiologists specializing in prostate imaging. *Results:* Of the 181 bpMRI scans analyzed, Mediaire's AI accurately identified prostate lesions in 132 cases (73%). The software proved beneficial in 94 cases (52%) by reducing lesion identification time by 10-15% and prompted a reassessment of initial diagnoses in seven cases (4%). Among the 49 errors recorded by Mediaire's AI, 57% occurred in the transitional zone and 43% in the peripheral zone. Error distribution included 36% false-negative findings, 21% false-positive findings, 20% PI-RADS (Prostate Imaging-Reporting and Data System) overestimations, and 23% PI-RADS underestimations. *Conclusion:* Integrating AI into radiological evaluations demonstrated its potential to streamline prostate lesion identification and reduce diagnostic time. Although AI showed encouraging results in lesion detection, further refinements are necessary to enhance its accuracy, particularly in specific prostate zones. The study highlights AI's role as a supportive tool, complementing the expertise of radiologists. *Limitations:* The study's main limitation was the exclusion of contrast-enhanced images due to Mediaire's software constraints, which may affect the broader applicability of the results. Contrast enhancement can improve risk stratification in a limited percentage of cases compared to non-contrast examinations. Further software refinements could enhance PI-RADS scoring, but contrast enhancement remains an important factor in certain diagnostic scenarios.

**Keywords:** Prostate Cancer; **bip**arametric Magnetic Resonance Imaging (bpMRI); Artificial Intelligence (AI); PI-RADS.