

Evaluating the Value of MRI in Predicting Radical Prostatectomy Pathologic Outcomes

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INTRODUCTION AND OBJECTIVES: Prediction of pathologic outcomes of radical prostatectomy (RP) is a potentially important source of information to assist counseling, decision-making, and potentially guide operative planning. While predictions based on clinical, laboratory, and biopsy information have proved useful, we sought to evaluate whether multiparametric prostate magnetic resonance imaging (mpMRI) has a role in the prediction of pathologic outcomes.

METHODS: The Michigan Urological Surgery Improvement Collaborative (MUSIC) is a consortium of 44 diverse urology practices that maintains a prospective registry of men with prostate cancer (CaP) with high-quality, validated data abstraction. Using information at a single center (University of Michigan) matched to data from the MUSIC registry, we developed random forest models to predict pathologic outcomes--non-organ confined disease (NOCD), extraprostatic extension (EPE), seminal vesicle invasion (SVI), or lymph node involvement (LNI)--at the time of surgery. We compared models developed using traditional predictors (clinical T-stage, PSA, biopsy Gleason score, the number of positive and total cores on biopsy), mpMRI predictors (highest PI-RADS score, number of lesions, and appearance of lymph nodes), and both. We used 10-fold cross-validated (CV) area-under-the-curve (AUC) to assess model discrimination.

RESULTS: We identified 392 men who underwent RP as primary treatment for CaP between 2015 and 2018 preceded by mpMRI. Traditional predictors exhibited excellent discriminative ability for predicting pathologic outcomes (Table 1). The addition of mpMRI information to traditional predictors minimally improved the prediction of EPE, SVI, and NOCD and slightly worsened prediction of LNI.

CONCLUSIONS: The addition of mpMRI information provides minimal additional value in predicting RP pathologic outcomes beyond traditional predictors.

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Table 1. Area-under-the-curves (AUCs) for predicting radical prostatectomy pathologic outcomes using traditional versus MRI predictors.

Pathologic Outcome	Traditional predictors only	MRI predictors only	Traditional + MRI predictors
Not Organ Confined	0.71	0.70	0.73
Extracapsular Extension	0.69	0.70	0.73
Lymph Node Involvement	0.81	0.67	0.80
Seminal Vesicle Invasion	0.77	0.70	0.78