Predicting Benign Prostate Pathology on Magnetic Resonance Imaging/Ultrasound Fusion Biopsy in Men with a Prior Negative 12-core Systematic Biopsy: External Validation of a Prognostic Nomogram

Marc A Bjurlin [1], Audrey Renson [2], Soroush Rais-Bahrami [3], Matthew Truong [4], Andrew B Rosenkrantz [5], Richard Huang [6], Samir S Taneja [7]

Affiliations expand

Abstract

Background: Magnetic resonance imaging (MRI) of the prostate after a prior negative biopsy may reduce the need for unnecessary repeat biopsies.

Objective: To externally validate a previously developed nomogram predicting benign prostate pathology on MRI/ultrasound (US) fusion-targeted biopsy in men with a Prostate Imaging Reporting and Data System (PI-RADS) 3-5 region of interest and a prior negative 12-core systematic biopsy, and update this nomogram to improve its performance.

Design, setting, and participants: A total of 2063 men underwent MRI/US fusion-targeted biopsy from April 2012 to September 2017; 104 men with a negative systematic biopsy followed by MRI-US fusion-targeted biopsy of a PI-RADS 3-5 region of interest (58%) met the study inclusion criteria.

Outcome measurements and statistical analysis: An MRI-based nomogram that had previously been developed in a multi-institutional clinical setting was externally validated. Predictive characteristics were age, prostate volume, MRI PI-RADS score, and prostate-specific antigen (PSA). Bayesian logistic regression was used to update the previous model.

Results and limitations: Median age of the external validation cohort was 68 yr, PSA was 7.2ng/ml, and biopsy confirmed benign pathology in 30% (n=31), suggesting a lower baseline risk compared with the nomogram development cohort. Receiver operating characteristic curve analysis showed areas under curve (AUCs) from 0.77 to 0.80 for nomogram validation. An updated model was constructed with improved calibration and similar discrimination (AUC 0.79).

Conclusions: Age, prostate volume, PI-RADS, and PSA predict benign pathology on MRI/US fusion-targeted biopsy in men with a prior negative 12-core systematic biopsy. The validated and updated nomogram demonstrated high diagnostic accuracy and may further aid in the decision to avoid a biopsy in men with a prior negative biopsy.

Patient summary: We externally validated a clinically useful tool that predicts benign prostate pathology on magnetic resonance imaging/ultrasound fusion-targeted biopsy in men with a prior negative 12-core systematic biopsy and updated this predictive tool to improve its performance in patient counseling regarding the need for a repeat biopsy.