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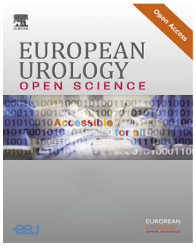

European Association of Urology

Research Letter: Open Science

The True Utility of Predictive Models Based on Magnetic Resonance Imaging in Selecting Candidates for Prostate Biopsy

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Early detection of clinically significant prostate cancer (csPCa) has improved since the introduction of magnetic resonance imaging (MRI) and guided biopsies for this purpose; however, suspicion of PCa is still based on elevated serum prostate-specific antigen and/or abnormal digital rectal examination. At present, the decision to perform a prostate biopsy primarily depends on the Prostate Imaging-Reporting and Data System (PI-RADS) score for lesions observed on MRI. Prostate biopsy is typically avoided when negative MRI (PI-RADS <3) is reported owing to its high negative predictive value; nevertheless, uncertain scenarios remain [1]. Predictive models based on MRI (MRI-PMs) are appropriate tools for improving the selection of candidates for prostate biopsy when risk calculators (RCs) are available; however, external validation is essential to ensure accurate prediction [2].

Alberts et al [3] adjusted the Rotterdam MRI-RC using data for 961 men with PCa suspicion who were recruited in Düsseldorf and four Dutch cities and underwent systematic biopsies ± MRI-guided biopsies in the case of PI-RADS v1 ≥3 lesions. High-grade PCa (Gleason score ≥ 3 + 4) was detected in 35.9%. The recent validation of the Rotterdam MRI-RC in the PRECISION trial population required recalibration and model adaptation of the risk threshold to achieve proper predictions [4].

The Barcelona RC was designed, after MRI-PM development and external validation, using data for 2486 men with suspected PCa from the Barcelona metropolitan area, with csPCa (grade group ≥2) detection of 37.6% [5]. The Barcelona RC uses the same predictors as the Rotterdam MRI-RC in addition to PCa family history and PI-RADS v.2 (https://mripcaprediction.shinyapps.io/MRIPCaPrediction/). The Barcelona RC incorporates the new option of selecting the proper risk threshold and it is the first to analyse risk according to PI-RADS categories. The authors concluded that the global efficiency of RCs does not translate to a true utility for each PI-RADS category [5].

We performed a brief comparison of the Rotterdam MRI-RC and the Barcelona RC using data for 567 men from the Barcelona metropolitan area who underwent 3-T multiparametric MRI and 12-core TRUS systematic biopsy with or without two to four MRI-guided biopsies (in cases of PI-RADS ≥3). The csPCa detection rate was 40.9%. The area under the receiver operating characteristic curve was 0.866 (95% confidence interval [CI] 0.836–0.898) for the Rotterdam MRI-RC and 0.888 (95% CI 0.861–0.951) for the Barcelona RC (p = 0.016, Fig. 1A), with specificity for 95% sensitivity of 34.2% (95% CI 29.2–34.6%) and 57.6% (95% CI 52.1–62.9%), respectively (p < 0.001). The Barcelona RC exhibited a global net benefit over the Rotterdam MRI-RC (Fig. 1B). The Barcelona RC showed a net benefit over the Rotterdam MRI-RC for men with a PI-RADS 3 or 4 lesion; however, neither RC exhibited clinical usefulness for men with negative MRI or a PI-RADS 5 lesion (Supplementary Fig 1).

We suggest that locally developed and validated MRI-RCs are more efficient than external RCs. This is mainly because of variations in the incidence of csPCa and the mix of PI-RADS and population characteristics. Nevertheless, the true clinical utility of MRI-RCs must be analysed against each PI-RADS category.

Conflicts of interest: The authors have nothing to disclose.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.euros.2022.06.002.

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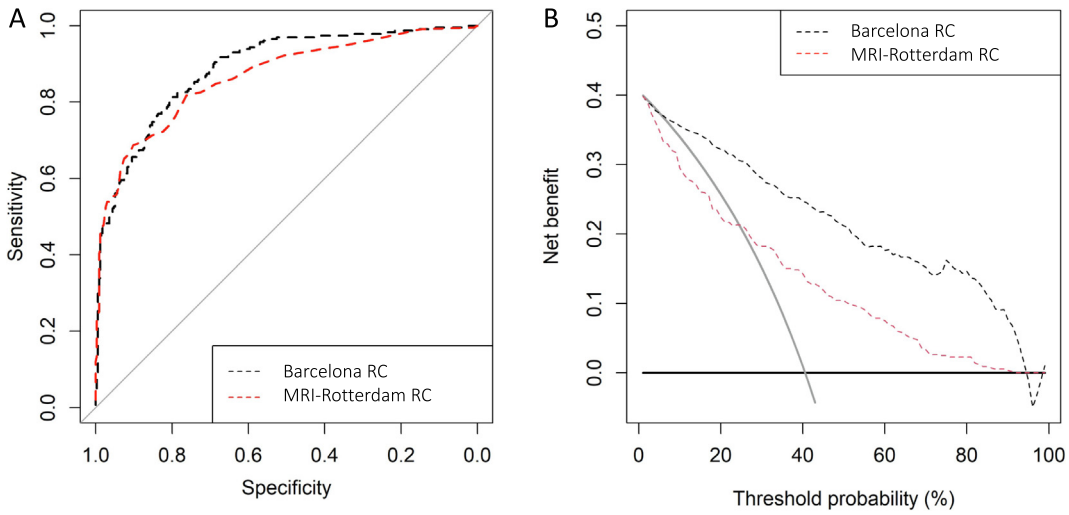

Fig. 1 – (A) Receiver operating characteristic curves showing the efficacy of the Barcelona RC and the MRI-Rotterdam RC for detection of clinically significant prostate cancer detection. (B) Decision curve analysis for both models showing the net benefit over a biopsy-all strategy. MRI = magnetic resonance imaging; RC = risk calculator.

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