IMPROD: Biparametric MRI Effective in Detecting Prostate Cancer

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The Improved Prostate Cancer Diagnosis–Combination of Magnetic Resonance Imaging and Biomarkers trial [IMPROD; NCT01864135] was designed to assess the accuracy of a biparametric magnetic resonance imaging (MRI) approach and targeted biopsy (TB) for patients suspected of having prostate cancer based on digital rectal examination or an elevated prostate-specific antigen (PSA) value > 2.5 ng/mL. The biparametric imaging (anatomical T2-weighted imaging combined with diffusion-weighted imaging [T2WI+DWI]) was effective in biopsy targeting for these patients. Compared with systematic core biopsies, this approach was significantly more sensitive ($P < .01$). Ivan Jambor, MD, University of Turku, Turku, Finland, presented the preliminary results from the IMPROD trial, based upon a smaller previous study [Jambor I et al. *J Magn Reson Imaging*. 2014].

In the single-center prospective IMPROD trial, men suspected of having prostate cancer were assessed using T2WI+DWI, laboratory measurements, and transrectal ultrasound (TRUS)–guided biopsy. The MRI protocol used clinically available equipment to make it simple and easy to use by other facilities; total imaging time was approximately 15 minutes. Those with lesions (Likert scale scores 3 to 5) had MRI-TBs of the dominant lesion, standard biopsies (SBs) of 12 cores, and assessment of biomarkers in 2 cores. Those without lesions (Likert scale score 1 or 2) had the same assessment without the TBs of the dominant lesion.

The primary outcome was diagnostic accuracy of T2WI+DWI. Of the 150 participants planned, 140 have been enrolled since the study began in May 2013; 130 have had MRI and biopsies. Of 130 patients who underwent MRI and biopsies, 67% (87) had prostate cancer and among this 67%, 61% (80) had significant prostate cancer defined as ≥ 2 positive biopsy cores, Gleason score > 3+3, PSA > 10 ng/mL, or PSA density > 0.2 ng/mL. Of these 80 patients, 5 had cancer diagnosed only in SB, 14 had significant cancer diagnosed only in TB (and would have been missed by SB), 56 had significant cancer diagnosed in TB and SB, and 5 had the MRI target missed by TB. The results, based on the Likert scale, are shown in Table 1.

Table 1. Cancer Severity Based on Likert Scale Scores

Likert Scale Score	Significant Prostate Cancer, n (%)	Nonsignificant Prostate Cancer, n (%)	No Prostate Cancer, n (%)
4 or 5 (n = 81)	73 (90)	2 (3)	6 (7)
3 (n = 20)	2 (10)	3 (15)	15 (75)
1 or 2 (n = 29)	5 (17)	2 (7)	22 (76)

Table 2. Primary Outcome Results

	Systematic Biopsy	Likert Score of 3 to 5	Likert Score of 4 or 5
Sensitivity	83	94*	91*
Specificity	100*	48	84*
Accuracy	89*	76	88*
Positive predictive value	100*	74	90*
Negative predictive value	78	83*	86*

Data are given in percentages.

*$P = .01$.

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The sensitivity, specificity, accuracy, positive predictive value, and negative predictive value for systematic biopsy, Likert scale scores 3 to 5, and Likert scale score 4 or 5 are summarized in Table 2.

Dr Jambor concluded by emphasizing that a relatively simple MRI (T2WI+DWI but with no image fusion and using standard clinical equipment) accompanied by a TRUS-guided biopsy was effective in detecting clinically significant prostate cancer and was significantly ($P < .01$) more sensitive than an approach using 12 systematic core biopsies to detect clinically significant prostate cancer. Dr Jambor also noted that this study will be followed by the larger multicenter Multi-IMPROD trial [NCT02241122] beginning in January 2015.