INTERREADER AGREEMENT IN MULTIPARAMETRIC MRI REPORTING USING PROSTATE IMAGING REPORTING AND DATA SYSTEM VERSION 2.1

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Abstract

INTRODUCTION AND OBJECTIVE: Prostate Imaging Reporting and Data System (PI-RADS) was introduced to standardize interpretation and reporting of prostate MRI across readers. However, prior studies reported only moderate reproducibility of PI-RADS, with poor to moderate agreement in lesion detection. The purpose of our study is to evaluate the agreement among readers with different expertise in detecting suspicious lesions at prostate multiparametric MRI using Prostate Imaging Reporting and Data System (PI-RADS) version 2.1.

METHODS: We evaluated 200 consecutive biopsy naïve or previous negative biopsy men who underwent MRI for clinically suspected prostate cancer (PCa). Of them, 132 patients underwent prostate biopsy. Seven radiologists (four dedicated uro-radiologists and three non-dedicated abdominal radiologists) reviewed and scored all MRI examinations according to PI-RADS v2.1. Agreement on index lesion detection was evaluated with Conger's k coefficient, agreement coefficient 1 (AC1), percentage of agreement (PA) and indexes of specific positive and negative agreement. Clinical and radiological features that may influence variability were evaluated.

RESULTS: Agreement in index lesion detection among all readers was substantial (AC1: 0.738; 95%CI: 0.695-0.782); dedicated radiologists showed higher agreement compared to non-dedicated readers. Clinical and radiological parameters that positively influenced agreement were PSA density ≥0.15 ng/ml/cc, pre-MRI high risk for PCa, positivity threshold of PI-RADS score >3, PZ lesions, homogeneous signal intensity of the PZ and subjectively easy interpretation of MRI. Positive specific agreement was significantly higher among dedicated readers, up to 93.4% (95%CI: 90.7-95.4) in patients harboring csPCa. Agreement on absence of lesions was excellent for both dedicated and non-dedicated readers (respectively: 85.1% [95%CI 78.4-92.3]; and 82.0% [95%CI 77.2-90.1]).

CONCLUSIONS: Agreement on index lesion detection among radiologists of various experience is substantial to excellent using PI-RADS v2.1. Concordance on absence of lesions is excellent across readers' experience.

Research summary

- Overall good concordance among readers for index lesion detection

  - Higher concordance between experienced readers

- Excellent agreement in the subgroup of men harboring csPCa

- Agreement on absence of lesions was excellent across reader experience

- Factors may affect the agreement (clinical and radiological, TP vs FP)

- Suitability of k coefficients in prostate MRI image analysis is questionable: alternative indexes should be investigated (AC1, proportion of positive/negative agreement)