Correlation between diameter of prostate cancer foci on multiparametric prostate MRI and whole mount histopathology: Stratified by PI-RADS and Gleason Score

Pooria Khoshnoodi[1], Nelly Tan[1], Daniel J. A. Margolis[1], Wei-Chan Lin[1], Somrach Thamtorawat[1], David Y. Lu[2], Jiaoti Huang[2], Robert E. Reiter[3], and Steven S. Raman[1]
[1]Radiology, University of California, Los Angeles, Los Angeles, California, United States, [2]Pathology, University of California, Los Angeles, Los Angeles, California, United States, [3]Urology, University of California, Los Angeles, Los Angeles, California, United States

Target Audience: Radiologists, Urologists

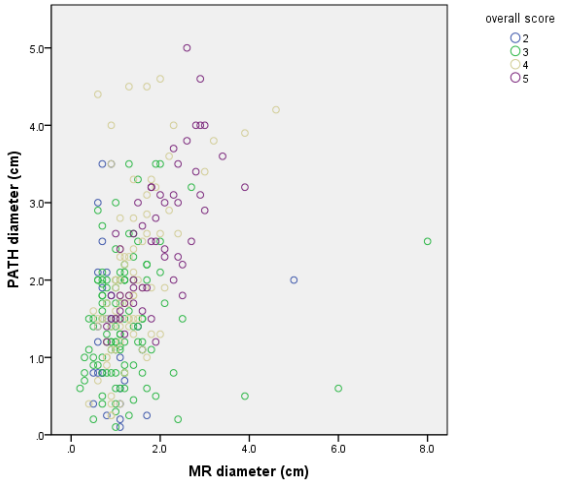
Purpose: To correlate diameter of prostate cancer (CaP) region of interest (ROI) on multi-parametric prostate MR imaging (MP-MRI) with diameter of concordant foci at whole mount histopathology (WMHP) stratified by PI-RADS and Gleason score (GS).

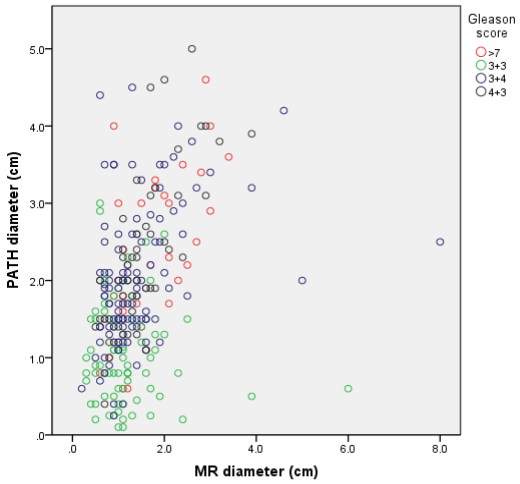
Methods: A HIPPA-compliant, IRB approved study of 254 consecutive men who underwent prostate MP-MRI before radical prostatectomy (RP) from October 2010 to September 2014 was performed. MP-MRI and WMHP features were obtained. The index tumor was defined as the lesion with the highest GS or largest tumor if multiple foci had the identical GS. A genitourinary radiologist and pathologist reviewed each case to match each MRI ROI to the concordant foci on WMHP. Maximal diameter of corresponding tumor measured on WMHP and MRI. Correlation scatter plots were drawn and Pearson correlation coefficient rho (ρ) was calculated to determine strength of correlation between size of tumors stratified by GS and PI-RADS. A p-value of 0.05 was considered significant.

Results: The 254 patients had 279 CaP foci on WMHP matched with MP-MRI ROIs concordantly. The 201 tumors out of 279 were index tumors. Of 279 CaP foci, GS was 6(3+3) in 79 (28.31%), 7(3+4) in 117 (41.94%), 7(4+3) in 50 (17.92%) and ≥8 in 33(11.83%). Of 279 CaP foci, overall PI-RADS of ROI at MR was 2 in 28 (10.04%), 3 in 113 (40.50%), 4 in 84 (30.11%) and 5 in (19.35%). The average maximal tumor diameter was 1.40cm on MP-MRI and 1.84cm on WMHP. The average maximal index tumor diameter was 1.48 cm on MP-MRI, and 2.12cm on WMHP. The Pearson correlation coefficient (ρ) between the MR tumor diameter size and the WMHP size was 0.45 and 0.49 for total tumors and index tumors respectively ($p<0.05$). The rho between the tumor diameter on MR and WMHP were 0.42, 0.67 and 0.61 for tumors with GS=3+4, GS=4+3 and GS≥8 respectively ($p<0.05$). Rho was 0.28, 0.52 and 0.73 for tumors with overall PI-RADS of 3, 4 and 5 respectively ($p<0.05$).

Discussion: Although CaP tumor size or volume has not been described an independent prognostic or aggressiveness factor, some studies showed tumor diameter and volume can predict biochemical recurrence (BCR) after RP. MP-MRI also consistently underestimates tumor volume on WMHP which has implications for focal therapy.[1-4]We found that there is a moderate to strong correlation between the size of the CaP diameter seen on MP-MRI and on WMHP. This correlation becomes significantly stronger (rho>0.5) with increased PI-RADS scores on MP-MRI and Gleason Scores on WMHP.

Conclusion: Size of index and non-index tumors on MP-MRI correlates with WMHP. This correlation becomes stronger for lesions with higher PI-RADS or Gleason Scores. However, true size is consistently underestimated.





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