

Correlation of Gleason Score and Tumor Size with High Resolution 3T Magnetic Resonance Image-Detected Prostate Cancer

E. Genega¹, N. Bloch², W. DeWolf³, R. Elliot¹, Y. Fu¹, M. Sanda³, A. Tomaszewski¹, A. Wagner³, I. Pedrosa², and N. Rofsky⁴

¹Pathology, BIDMC, Boston, MA, ²Radiology, BIDMC, Boston, MA, ³Urology, BIDMC, Boston, MA, ⁴Radiology, BIDMC, Boston, MA, United States

Introduction: Prostate cancer foci >5mm are generally considered as being clinically significant. Endorectal coil (ERC) magnetic resonance imaging (MR) has become important in the care of patients with prostate cancer (PCa). In this study, we histologically characterized foci of PCa with whole mount prepared radical prostatectomy specimens and correlated the findings with MR.

Methods: Twenty-one patients with biopsy proven PCa voluntarily enrolled in an IRB-approved study assessing 3T ERCMR prior to surgery. The prostate gland (PG) slices obtained after radical prostatectomy in all 21, were kept intact and sections prepared on 2"x3" slides (whole mount methodology). On each slide, GS, size (greatest 2-dimensional), and pattern of tumor growth (A= < 10% benign glands; B= ≥ 10-50% benign glands; C=small cluster of glands "alone"; D=<10 glands infiltrating between benign glands) of each tumor focus was recorded. A genitourinary (GU) pathologist was blinded to the MR results. Two MRI radiologists, blinded to pathology results, independently reviewed the ERCMR of each patient. Possible foci of carcinoma were graded on a 1-5 scale (1=no cancer; 5=positive). A score of 4 or 5 by at least one radiologist was considered a positive result. Each PG slice was spatially mapped to the corresponding MR slice for all cases.

Results: Twenty-one cases were available for review with 81 separate foci of PCa identified histologically. Of these, 43 foci were seen by MR (MR+) and 38 were not (MR-).

GS	MR positive							MR negative						
	# of foci	Tumor size		Growth pattern				# of foci	Tumor size		Growth pattern			
		≤5mm	>5mm	A	B	C	D		≤5mm	>5mm	A	B	C	D
6(3+3)	15	5	10	6	8		1	33	31	2	7	7	2	17
7(3+4)	23	1	22	10	13			5	4	1	1	1		3
7(4+3)	3	0	3	2	1									
7(4+3)5	1		1	1										
8(4+4)	1		1	1										
TOTAL	43	6	37	20	22		1	38	35	3	8	8	2	20

MRI was 93% (37/40) sensitive in detecting foci > 5mm; all GS ≥ 4+3 were MR+. Most MR- PCA foci are GS 6 (87%) and ≤5mm (92%), and more than 50% of those are present as a few cancerous glands infiltrating between benign glands. Most MR+ PCA foci were GS ≥7 (65%), ≥1cm (67%) and present as a dominant tumor nodule. MRI was 14% (6/41) sensitive in detecting PCa foci ≤5mm. Of the MR- cases, 10 foci were ≤1mm, 25 were 2-5mm and 2 were 6-7mm. No histologic reason for a 1.6cm MR- focus of PCA was found. MR reported 15 additional foci of PCa lacking pathology concordance.

Discussion. Using > 5mm in size as a criterion, high resolution 3T ERCMR is able to detect the vast majority of clinically relevant cancers with excellent sensitivity for those of higher tumor grade. This technique may be useful for guiding patient management, including "watchful-waiting" protocols.

References. 1) Stamey , et al. Cancer 1993;71(3 Suppl):933. 2) Bloch , etl. Acad Radiol 2004;11(8):863; 3) Futterer , et al. Radiology 2006;238(1):1844. 4) Kirkham , et al. Eur Urol 2006;50(6):11635.