

1016 - The ability of Prostate HistoScanning™ to identify low volume prostate cancer tumour foci

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Introduction

To date, imaging has not been particularly helpful in characterizing prostate cancer tumour foci, particularly if the foci in question are those less than 0.5cc in volume. At present the best available method is a multisequence MRI scan that incorporates T2 and T1 dynamic phases in conjunction with diffusion maps and spectroscopy. The best results in the literature show positive predictive value of 86% and 77% for lesions measuring 0.2 and 0.5cc, respectively [1]. Recently, a novel computer aided ultrasound based technology (Prostate HistoScanning™) was described [2] showing a high accuracy in predicting the volume of the index tumour.

Aim

To establish the extent to which Prostate HistoScanning™ (PHS) can predict volumes of prostate cancer foci in the range of 0.2 cc and 0.5 cc.

Methods

13 patients awaiting radical prostatectomy for prostate cancer were evaluated by PHS prior to surgery. The PHS evaluation involves analysis of the backscattered raw signal obtained by trans-rectal ultrasound of prostate. This backscattered signal is subjected to specific tissue characterization algorithms (Figure 1) that may help to determine the presence or absence of prostate cancer. PHS exploits the altered tissue characteristics such as texture and density of the tissue, in a 3 dimensional manner (Figure 2). Measurement of the tumour volumes by PHS was compared to volumes estimated by histological review of whole mounted prostate, step-sectioned at 5mm intervals.

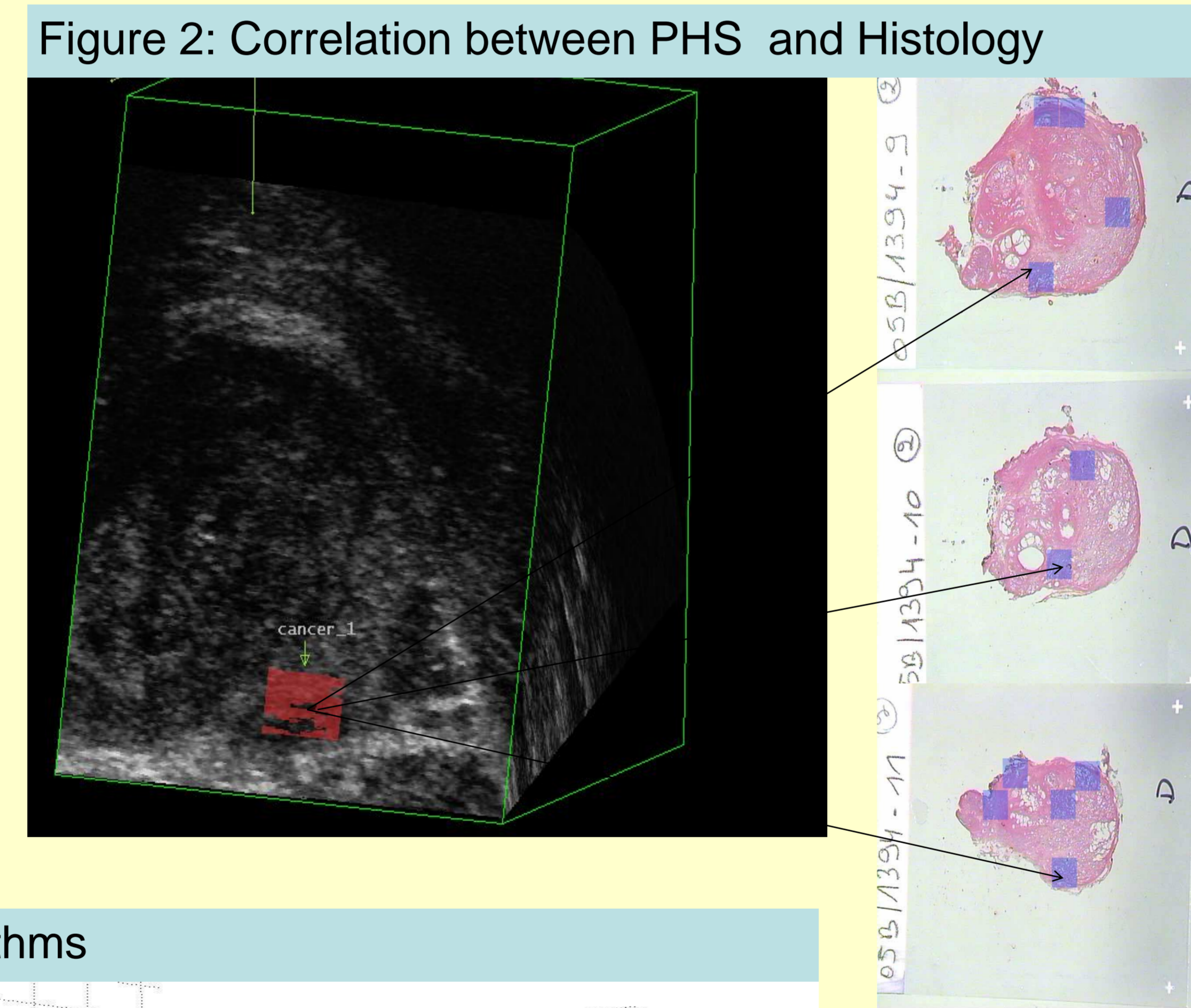
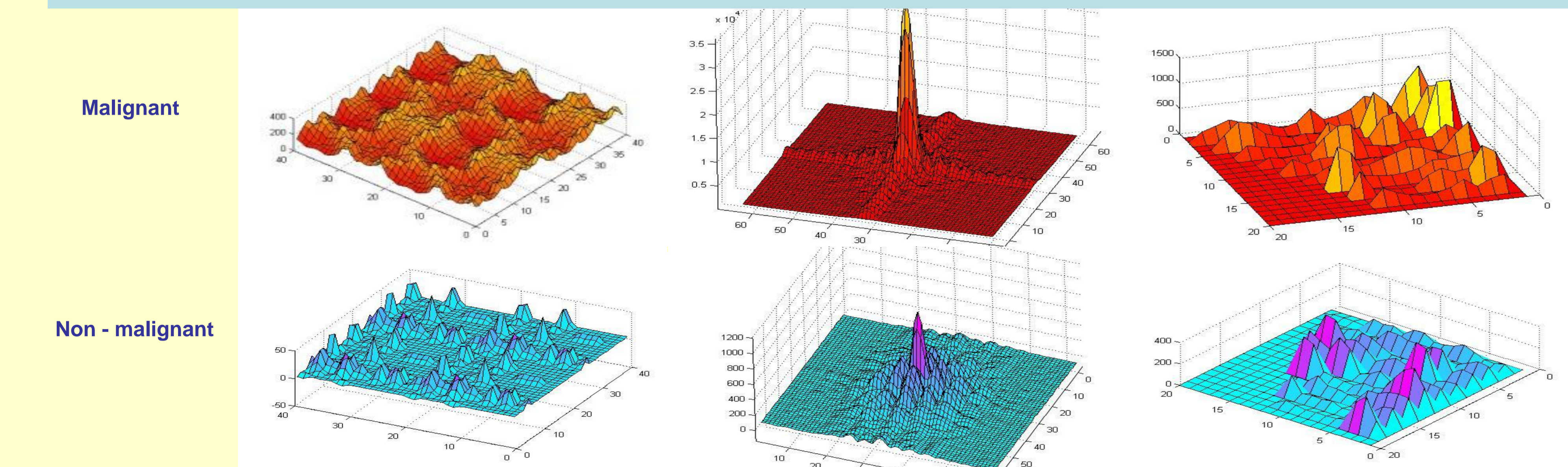


Figure 1: HistoScanning Characterization Algorithms



Results

A total of 181 cancer lesions were identified at histopathology. The majority (161) of these lesions were <0.2cc and may be considered clinically indolent or insignificant. All 20 cancerous lesions with a volume ≥ 0.2cc at histology were correctly matched by PHS except for 1* lesion of size 0.2cc at histology. All 12 cancerous lesions with a volume ≥ 0.5cc at histology were correctly matched by PHS (Table 1). Accordingly, the ability of PHS to predict foci of ≥ 0.2cc was 95% and 100% for foci ≥ 0.5cc (Table 2). PHS indicated 1 focus of 0.23cc that was not found at histology.

Table 1 : Cross-tabulation of predicted cancer lesions volumes by blinded PHS versus actual volume of cancer lesions as identified by Histopathology

Tumour Volume as estimated by PHS	Tumour volume by Histopathology (cc)			Total
	< 0.2	0.2 - 0.49	≥ 0.5	
Below PHS study threshold	161	1*	-	162
0.2 - 0.49 cc	0	4	0	4
≥ 0.5 cc	0	3	12	15
Total	161	8	12	181

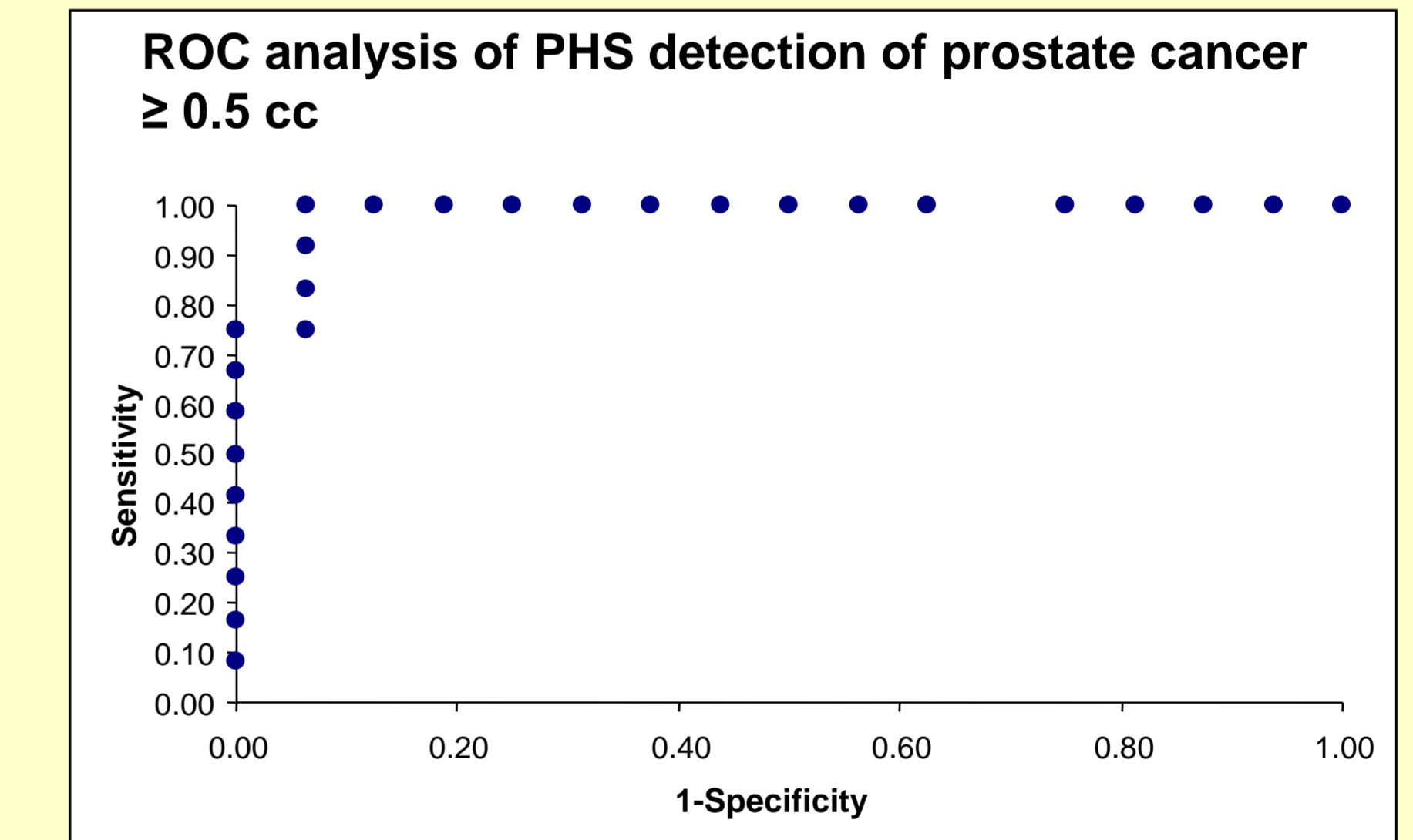
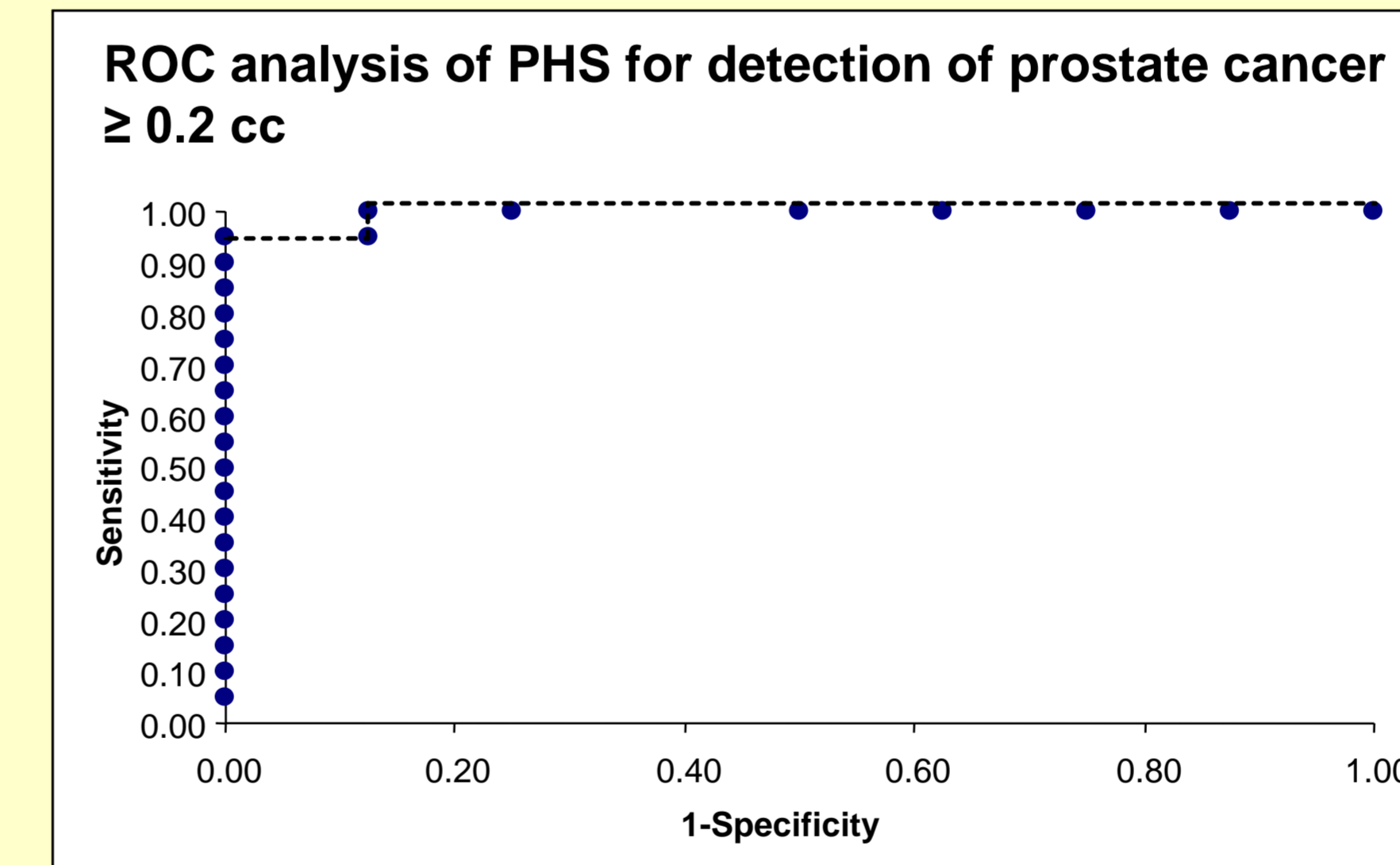


Table 2 : Level of confidence urologists may have in predicting the presence of prostate cancer foci with the help of PHS

PHS Foci volume estimate	Correlation with foci volume as assessed at Histology		Correlation with number of foci detected at Histology	
	Foci ≥ 0.2 cc	Foci ≥ 0.5 cc	Foci ≥ 0.2 cc	Foci ≥ 0.5 cc
≥0.2 cc	95%*	NR	95%**	NR
≥0.5 cc	NR	100 %	NR	100%

NR – Not Relevant. * One lesion of 0.2cc at histology (PHS estimated as 0.18cc). ** One focus of 0.23cc by PHS not found at histology

Conclusions

PHS can identify the presence of and estimate the volume of small cancerous lesions within the prostate when compared with the histological examination of the whole gland. This study indicates that PHS has the potential for higher levels of sensitivity and specificity than those conferred by the best existing imaging modalities. These early results show that HistoScanning is a promising method of characterizing prostate cancer of small volumes. Further studies are required both in this setting and in areas of screening, directing biopsies, staging, therapy, triaging and surveillance.

References : [1] A.P. Kirkham, M. Emberton and C. Allen, How good is MRI at detecting and characterising cancer within the prostate?, *Eur Urol* 50 (2006), p. 1163.

[2] Braeckman J, Autier P, Garbar C, Marichal MP, Soviany C, Nir R, Nir D, Michielson D, Bleiberg H, Egevad L, Emberton M. Computer aided ultrasonography (HistoScanning): a novel technology for locating and characterising prostate cancer. *BJUI* 2007.