

# Pre-operative staging of prostate cancer with HistoScanning™ facilitates nerve-sparing prostatectomy and may increase complete excision of prostate cancers

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## Introduction

Many surgeons aim to improve post radical prostatectomy patient outcomes, erectile function and urinary continence, whilst maintaining oncological outcomes with negative surgical margins. The planning of the surgical approach is done by careful patient selection, and by the use of all the available pre-operative information on tumour grade and location from biopsy. Improved knowledge of cancer size and location from imaging can aid in planning these intra- and extrafascial nerve-sparing radical prostatectomy approaches and other nerve (and organ) sparing treatment approaches for prostate cancer. Prostate HistoScanning™ (PHS) is a novel tissue characterisation modality utilising computer-aided analysis of the raw data radiofrequency signal from 3D-TRUS to visualize foci of cancer within the prostate. In this study we assess the utility of Prostate HistoScanning™ in the pre-operative work-up and planning of nerve sparing approach for patients undergoing radical prostatectomy in a single UK centre. We hypothesized that pre-operative Prostate HistoScanning™ analysis may further inform the planning to allow minimised operative removal of peri-prostatic and prostatic fascia, when deemed safe, and modify the nerve-sparing approach, which in the long term this should lead to an optimized functional outcome (not the subject of this study). We further hypothesized that this would be achieved whilst maintaining or reducing incomplete surgical excision rates.

## Patients and Method

Suitable patients scheduled for radical prostatectomy underwent preoperative 3D-TRUS performed by an experienced operator, and HistoScanning™ analysis in addition to standard pre-operative clinical assessment and 3 Tesla diffusion weighted MRI (3T DW MRI). Each prostatic lobe was assessed separately for suitability of a nerve-sparing approach based on the HistoScanning™ analysis. Wide excision, extra-fascial and intra-fascial nerve sparing approaches were used for high, intermediate and low risk cancer, respectively. Radical prostatectomy specimens were processed centrally by experienced histopathologists using 5mm whole mount step sectioned analysis. Specimens were analysed for positive resection margins and the results compared with a matched historical cohort.

## Results

A total of 25 patients (50 prostate lobes) underwent optimized staging with Prostate HistoScanning™. Descriptive statistics are displayed in Table 1. Compared to standard 3T DW MRI and clinical staging, the nerve-sparing approach was changed in 23 prostate lobes (46%) (Table 2). A trend for reduced use of intra-fascial and extrafascial nerve-sparing was apparent after refined staging with HistoScanning™. Likewise, use of wide excision increased by 120% from 6 to 14 prostatic lobes. This was reflected in reduced positive margin rates. For pT2 (n=15) and pT3 (n=10) tumours positive resection margin rate was 6.6% and 30%, respectively for the Prostate HistoScanning™ cohort (Table 1) in contrast to 23% and 56%, respectively for a matched historical cohort.

**Table 1: Descriptive statistics for study cohort**

		% of patients	Number of patients
Age (years)	median	63	n/a
PSA (ng/ml)	median	9.83	n/a
Biopsy Gleason Grade	6	56	14
	7	44	11
Clinical stage	T1c	64	16
	T2c	28	7
	T3a	8	2
MRI radiological stage	Organ-confined	94	24
	Minimal ECE	6	1
D'Amico risk group	Low	40	10
	Intermediate	48	12
	High	12	3
Biopsy core involvement median		43	n/a
Post-op Gleason score	6	20	5
	7	80	20
Tumour volume (cc)	median	2.29	n/a
Pathological stage	pT2c	60	15
	pT3a	24	6
	pT3b	12	3
	pT4	4	1
Positive surgical margins rate	pT2	6.6	1
	pT3	30	3

**Table 2: Planned nerve-sparing approach based on pre-operative risk group and MRI and actual nerve-sparing approach after refined staging with HistoScanning™ for all prostatic lobes (n=50)**

Nerve-sparing	Planned (MRI/D'Amico)		Adjusted (HistoScanning™)		Change		Use of approach
	No:	%	No:	%	No:	%	
Intra-fascial	20	40	17	34	3	15	decreased
Extra-fascial	24	48	19	38	5	20	decreased
Wide excision	6	12	14	28	8	120	increased
<b>Total</b>	<b>50</b>		<b>50</b>		<b>16</b>	<b>46</b>	

## Conclusion

Refined optimized pre-operative staging with Prostate HistoScanning™ may reduce positive surgical margin rates and may make extra- and intra-fascial nerve sparing radical prostatectomy oncologically safer in this unscreened cohort of patients with large tumour volumes. This could translate to prostate HistoScanning™ use for pre-operative radical prostatectomy approach planning and may also enable better decision making regarding safe ablation margins for focal treatments, however this would need further assessment in larger prospective trials.