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## BACKGROUND

- Local recurrence of prostate cancer (CaP) following radical prostatectomy (RP) may be diagnosed utilizing dynamic contrast enhanced (DCE) pelvic magnetic-resonance imaging (MRI) in conjunction with transrectal ultrasound-guided prostatic fossa biopsy (TRUSbx)
- Novel, 3-dimensional ultrasound (3-D u/s) tissue differentiation analysis (HistoScanning™ - HS) accurately detected cancer foci of >or=0.50 mL in patients undergoing prostatectomy
- In the setting of potential local recurrence, HS imaging may enhance visualization of a recurrence and aid in precise biopsy targeting

## METHODS

- Prospective data collection for 9 patients (see Table 1)
- Biochemical failure and detectable masses on pelvic DCE MRI
- Mean pre-biopsy PSA: 2.27 ng/mL (range 0.2-4.3)
- Underwent 3-D U/S of the prostate fossa in conjunction with ultrasound-guided biopsy (see Table 1).
- With IRB approval and after real time TRUS biopsy, the 3-D U/S data set was analyzed using HS image analysis software and correlated with biopsy and MRI.

## RESULTS

Five of the nine men had biopsy-proven local recurrence of their CaP at the site of the DCE MRI abnormality (see Table 2). All five of these men had detectable signal in the region of DCE MRI abnormality on HS analysis ranging from 0.03 to 1.91 cm3 in size. One of the four men with a negative biopsy had detectable HS signal volume of 0.57 cm3.

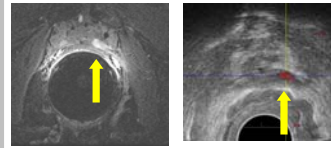
Table 1: Patient Demographics at time of RP

Patient	Preoperative PSA (ng/mL)	Gleason Score	Pathologic Stage	RP Age (years)
1	10.2	4+4	T1aND	53.7
2	0.7	3+4	T1aND	53.7
3	9.9	4+5	T1aNDpT1	61.6
4	7.8	3+4	T1aND	61.6
5	-	3+4	T2aNDpT1	62.5
6	0.7	5+4	T1aNDpT1	55.9
7	4	4+5	T1aNDpT1	64.2
8	2.3	3+4	T1aNDpT1	59.5
9	6	3+4	T1aND	57.7

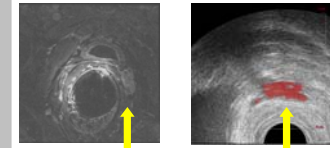
Table 2: Biochemical Recurrence

Patient	RP (years)	PSA	MRI nodular size (mL)	Ultrasound volume (mL)	HistoScan Volume (mL)	TRUSbx Pathology
1	2.3	1.6	0.2	0.36	0.03, 0.05	4+4
2	2.1	0.22	0.3	0.18	-	Benign
3	3.7	3.2	4.7	4.3	1.91	"poorly differentiated"
4	10.4	0.41	0.1	0.2	-	4+4
5	6	0.27	0.1	-	-	Benign
6	5.4	0.94	1.5	3.8	0.2	"locally recurrent"
7	7.8	4.5	1.4	0.36	0.3	4+4
8	1.9	0.22	0.1	0.08	0.07	Benign
9	5.6	1.3	0.8	0.47	0.38, 0.11	4+4

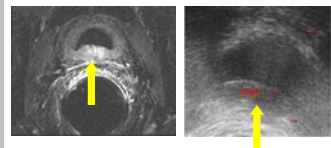
## Patient 1



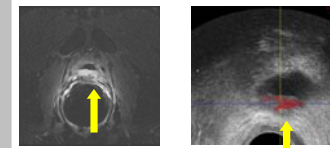
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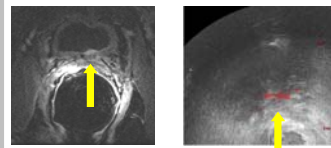
## Patient 6



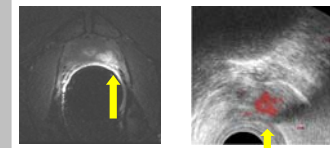
## Patient 7



## Patient 8



## Patient 9



## DISCUSSION

There are many factors which limit our ability to detect and obtain tissue diagnoses for locally recurrent prostate cancer. DCE pelvic MRI offers an excellent image of the pelvis, although this imaging modality is costly and cumbersome as a means for prostate fossa biopsy. Once a suspicious lesion has been identified, tissue diagnosis can be obtained via transrectal or transperineal ultrasound guided needle biopsy. However, many lesions visible on MRI may be difficult to visualize with transrectal ultrasound.

There are three significant areas in which HS image processing may improve this procedure. First, it may improve the ultrasound detection of local recurrence (sensitivity). All five patients in our series with positive biopsies had corresponding HS signal at the site of biopsy. It may be that this technology can replace DCE MRI of the pelvis in detection of local recurrence. Additionally, it may help more accurately guide biopsies of vesicourethral anastomotic region. Lastly, it may add additional accuracy and precision to focal ablative therapies such as interstitial laser, HIFU and cryoablation.

The search for the ideal prostate and prostatic fossa imaging modality continues with the goal of improving diagnosis, more accurate biopsies, and enhancing the accuracy and precision of focal therapies. In this small series, HS image processing appears to add important and useful information in the subgroup of CaP patients with the potential for local recurrence following RP.

## CONCLUSIONS

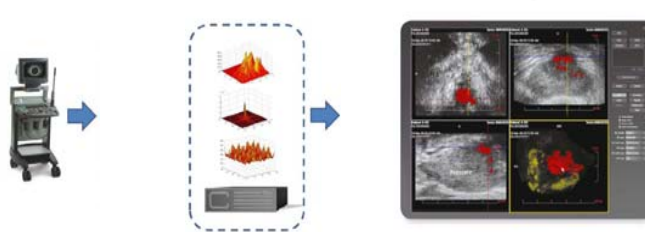
- HistoScanning™ image processing correlated highly with DCE MRI abnormalities and locally recurrent cancer detected by TRUS bx.
- This novel imaging technique shows promise for precise guidance of prostate fossa biopsies, targeting of salvage and focal therapies.

## REFERENCES

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Data acquisition      Data Analysis      HistoScanning results



HistoScanning Fact Sheet. Advanced Medical Diagnostics s.a. 2008.