

PD63-04

Detectable Prostate-specific antigen value between 0.01 - 0.1ng/ml following robotic-assisted radical prostatectomy (RARP): Does it correlate with future biochemical recurrence?

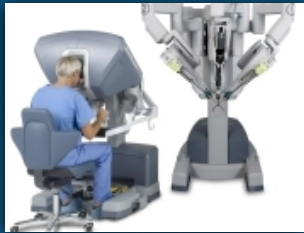
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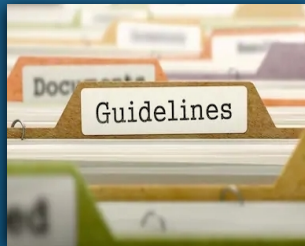
What is known?



Prostate cancer PCa is the most frequent cancer in Canadian men. In 2019, it accounted for 10% of all male cancer deaths



Robotic-assisted radical prostatectomy (RARP) is recognized as an effective management strategy for PCa patients with localized disease

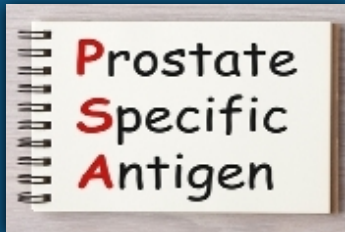


Practice guidelines recommend post-prostatectomy PSA monitoring, to detect early biochemical recurrence (BCR)



Currently, ultrasensitive PSA (uPSA) is widely used as a biomarker for detection of BCR after RARP

What is known?



Up until 1993, the lowest detectable PSA value was 0.1 ng/mL. With the development of uPSA, there is newfound access to PSA values between 0.01-0.1 ng/mL.



The impact of having a nadir and persistently detectable post-operative uPSA between 0.01-0.1ng/ml on future BCR, is still unclear.

Our aim..

To evaluate RARP patients with nadir uPSA in the range of (0.01-0.1ng/ml) for progression to BCR.

Our methods..

Data source

- Retrospective analysis of a prospectively maintained cohort
- All patients who underwent RARP between Sep. 2006 and June 2019 at CHUM



Inclusion criteria

- Patients with uPSA nadir value between 0.01-0.1 ng/ml measured in the
- 3-6 months following RARP
- At least 2 other follow-up measurements within the same range (F/U up to 12 months).



Collected data

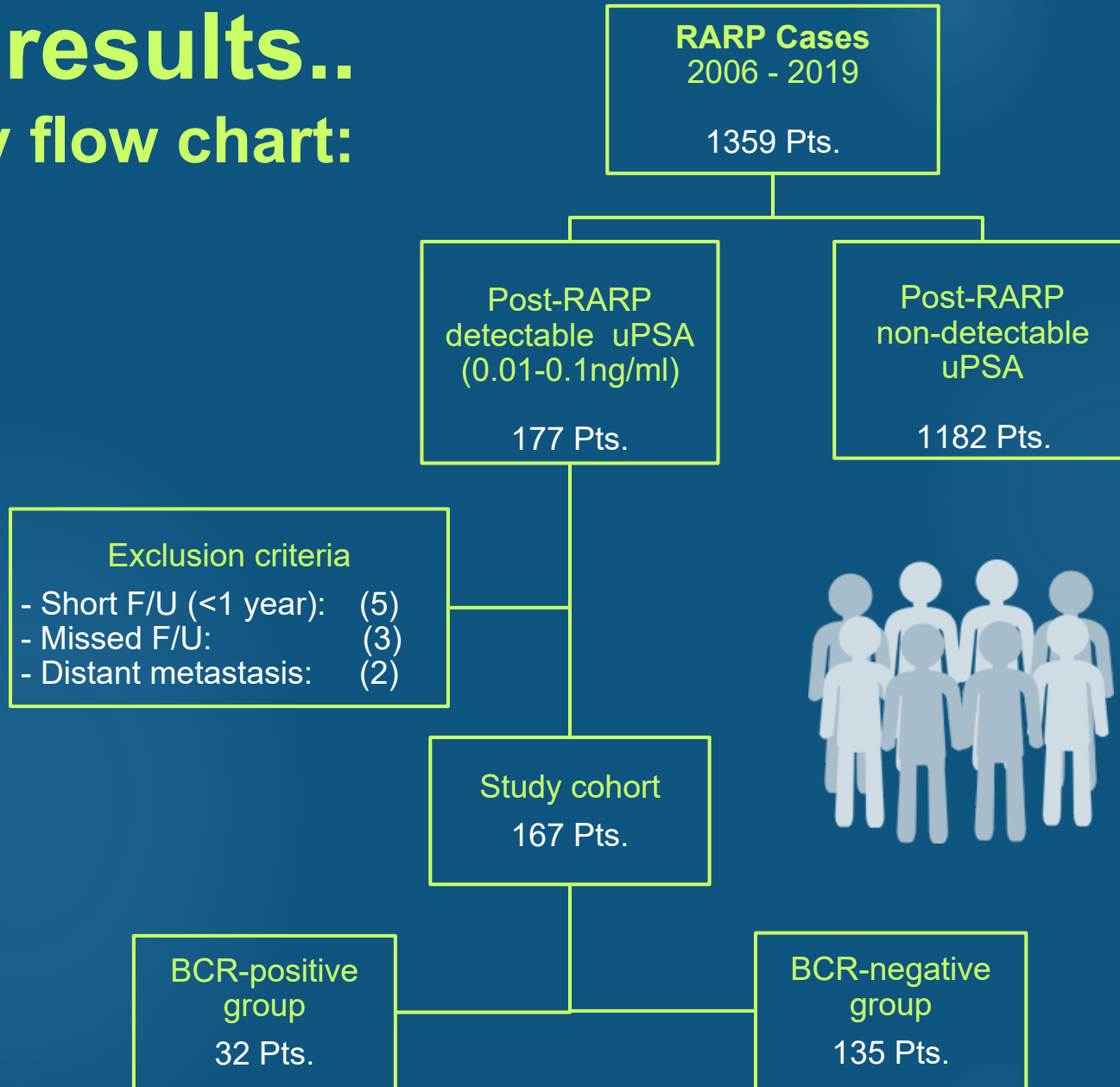
- Age, Race, BMI
- PCa family history
- Prostate Volume
- Pre-RARP PSA
- PSA density
- Clinical stage
- Biopsy pathology
- UCSF-CAPRA score
- Post RARP pathology
- Pathological stage
- CAPRA-S score
- uPSA at 3, 6, 9, 12, 18, 24, 30 and 36 months, & annually thereafter
- BCR status & Tx

Statistical analyses

- Descriptive statistics (Pearson's chi-squared test for categorical data, Mann-Whitey U test for numerical data)
- Kaplan-Meier plot for estimates of BCR-free survival.
- Cox-regression models for variables predicting BCR.
- (ROC) curves were generated for uPSA values at different follow-up times

Our results..

Study flow chart:



Our results..

Cohort characteristics

Variable		Whole Cohort 167 pts	BCR Negative group 135 pts (80.9%)	BCR Positive group 32Pts. (19.1%)	P-value
Pre-operative					
Age at diagnosis	Years, mean(SD)	60.6 (5.6)	60.2 (5.4)	62.6 (5.8)	0.008
Body Mass Index	kg/m ² , mean(SD)	27.2 (5.2)	27.2 (5.9)	26.7(3.5)	0.84
Preoperative PSA	ng/mL (SD)	6.9 (3.5)	6.7 (3.3)	7.7 (4.1)	0.24
TRUS volume	mL ³ , mean (SD)	38.5 (20)	39.6 (21.4)	33.7(12.7)	0.17
PSA density	(ng/mL/mL ³), mean (SD)	0.21(0.13)	0.20 (0.13)	0.24(0.14)	0.03
Clinical Stage	cT1c, No. (%)	124	105 (84.7)	19 (15.3)	0.01
	cT2a, No. (%)	31	23 (74.2)	8 (25.8)	
	cT2b, No. (%)	9	6 (66.7)	3 (33.3)	
	cT2c, No. (%)	2	0 (0)	2 (100)	
	cT3a, No. (%)	1	1 (100)	0 (0)	
Preoperative Gleason Score	6, No. (%)	43	38 (88.4)	5 (11.6)	0.31
	7 (3+4) , No. (%)	76	65 (85.5)	11 (14.5)	
	7 (4+3) , No. (%)	29	19 (65.5)	10 (34.5)	
	8, No. (%)	16	11 (68.8)	5 (31.2)	
	9, No. (%)	3	2 (66.7)	1 (33.3)	
Preoperative CAPRA Risk	Low, No. (%)	58	49 (84.5)	9 (15.5)	0.007
	Intermed, No. (%)	89	75 (84.3)	14 (15.7)	
	High, No. (%)	20	11 (55.0)	9 (45.0)	
	High, No. (%)	16	8 (50.0)	8 (50.0)	

Our results..

Cohort characteristics

Variable		Whole Cohort 167 pts	BCR Negative group 135 pts (80.9%)	BCR Positive group 32Pts. (19.1%)	P-value
Post-operative					
Pathological Stage	pT2a, No. (%)	11	11 (100)	0 (0)	0.16
	pT2b, No. (%)	16	10 (62.5)	6 (37.5)	
	pT2c, No. (%)	81	67 (82.7)	14 (17.3)	
	pT3a, No. (%)	61	41 (67.2)	10 (32.8)	
	pT3b, No. (%)	8	6 (75.0)	2 (25.0)	
Post-operative Gleason Score	6, No. (%)	23	22 (95.6)	1 (4.4)	0.41
	7 (3+4) , No. (%)	100	81 (81.0)	19 (19.0)	
	7 (4+3) , No. (%)	26	21 (80.8)	5 (19.2)	
	8, No. (%)	9	4 (44.4)	5 (55.6)	
	9, No. (%)	9	7 (77.8)	2 (22.2)	
Extracapsular extension	Positive, No. (%)	55	45 (81.8)	10 (18.2)	0.82
Seminal vesicle invasion	Positive, No. (%)	8	6 (75.0)	2 (25.0)	0.66
Margin	Positive, No. (%)	47	30 (63.8)	17 (36.2)	0.000
Lymph node invasion	Positive, No. (%)	2	1 (50.0)	1 (50.0)	0.34
Postoperative CAPRA-S Risk	Low, No. (%)	75	65 (86.6)	10 (13.4)	0.003
	Intermed, No. (%)	76	62 (81.6)	14 (18.4)	
	High, No. (%)	16	8 (50.0)	8 (50.0)	

Our results..

Cohort mean follow-up time: 60.2 months (range 12-144 months)

Cohort 5-year BCR-free survival rate was 86%

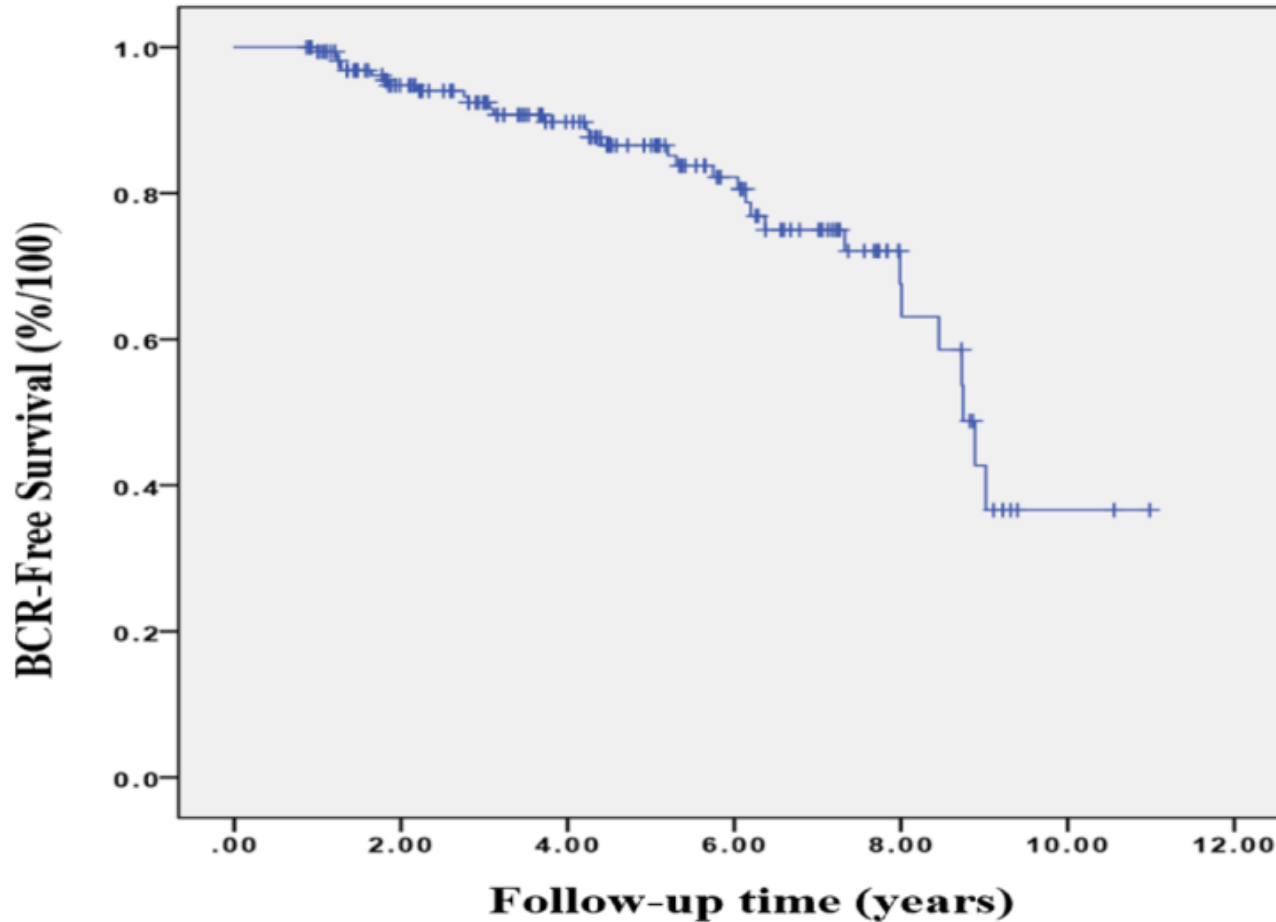
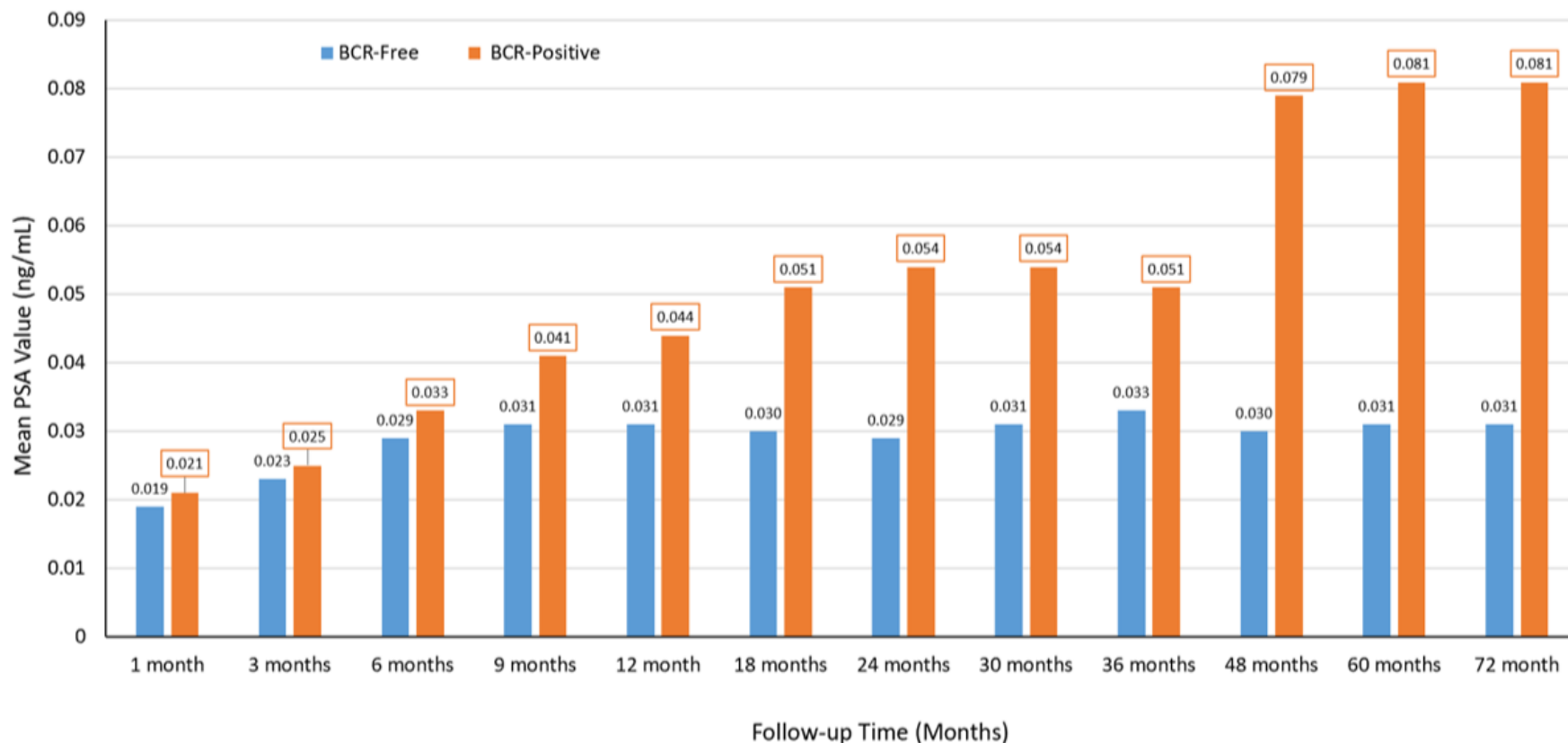


Figure 1: Kaplan-Meier curve of BCR-free survival as a function of years post-operatively.

Our results..

Mean uPSA value in the ultrasensitive PSA range (0.01-0.1 ng/mL) at each follow-up visit between BCR negative and BCR positive groups ($p < 0.001$)



The distribution of PSA values at each follow up visit did not show significant differences between BCR-negative and BCR-positive groups at 1, 3, 6 months visits ($p = 0.9, 0.5$ and 0.43 , respectively). Starting at 9 months visit and up to 84 months visit, values were statistically significant between both groups ($p = 0.02, 0.003, <0.001, <0.001, <0.001, <0.001, <0.001, 0.001, 0.001, 0.021$ for the 9, 12, 18, 24, 30, 36, 48, 60, 72 and 84 months visit respectively).

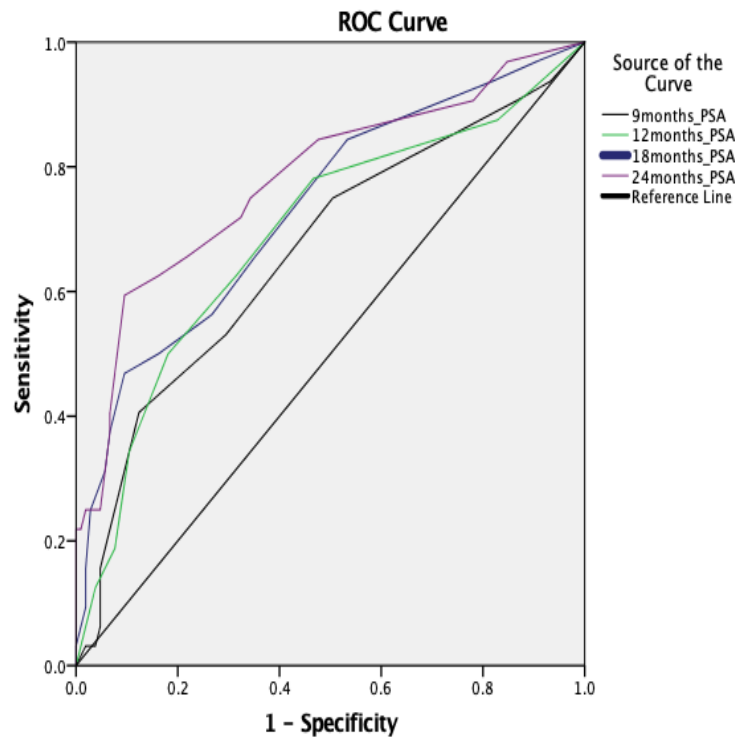
Our results..

Cox proportional hazard regression models with univariate and multivariate hazard ratios (HR) for variables predicting BCR

	Univariate analysis			Multivariate analysis		
	HR	CI	P-value	HR	CI	P-value
Age at diagnosis	1.09	1.01-1.17	0.018	1.06	0.98-1.15	0.17
Black Race	21.6	0.001-702.8	0.56	-----	-----	----
Positive Family history	2	0.13-31.9	0.62	-----	-----	-----
PSA density	2.78	0.33-23.2	0.35	-----	-----	----
Preoperative Gleason sum	1.68	1.04-2.71	0.03	1.6	0.86-3	0.14
Clinical stage	1.53	1.03-2.29	0.03	1.24	0.79-1.95	0.35
Postoperative Gleason sum	1.45	0.93-2.25	0.09	0.86	0.49-1.5	0.6
Pathological stage	1.27	0.87-1.85	0.2	-----	-----	-----
Positive lymph nodes	4.36	0.58-12.93	0.15	-----	-----	-----
Extra-capsular extension	1.26	0.58-2.7	0.56	-----	-----	-----
Positive margin	2.38	1.18-4.78	0.015	1.6	0.48-3.4	0.2
Seminal vesical invasion	1.04	0.25-4.36	0.96	-----	-----	-----
PSA 9 months (continuous)	5.7	2.6-8.43	0.003	2.7	1.6-3.82	0.013

Our results..

Receiver operating characteristic (ROC) curve of uPSA values at 9,12,18, and 24 months post-RARP



ROC curve data showing PSA cut-off points (0.01-0.1 ng/mL) at follow-up times of 9, 12, 18, 24 months							
PSA at follow-up time	PSA cut-off points (ng/mL)	Sensitivity (%)	Specificity (%)	Area Under the Curve (AOC)	Asymptotic Significance	Asymptotic 95% Confidence Interval	
						Lower Bound	Upper Bound
9 months	0.00	93.8	6.2	0.653	$p=0.08$	0.540	0.767
	0.01	90.6	12.5				
	0.02	75.0	48.2				
	0.03	53.1	69.6				
	0.04	40.6	86.6				
	0.05	28.1	90.2				
	0.06	15.6	93.7				
	0.07	6.3	94.6				
	0.08	3.1	95.5				
	0.09	3.1	97.3				
12 months	0.00	93.8	8.9	0.684	$p=0.001$	0.573	0.796
	0.01	87.5	17.0				
	0.02	78.1	51.8				
	0.03	62.5	66.1				
	0.04	50.0	81.1				
	0.05	34.4	89.3				
	0.06	18.8	92.0				
	0.07	12.5	95.5				
	0.08	6.3	98.2				
	0.09	3.1	99.1				
18 months	0.00	96.9	10.7	0.737	$p<0.001$	0.634	0.839
	0.01	93.8	19.6				
	0.02	84.4	47.3				
	0.03	65.6	64.3				
	0.04	56.3	75.0				
	0.05	50.0	84.8				
	0.06	46.9	91.1				
	0.07	37.5	93.7				
	0.08	31.3	94.6				
	0.09	25.0	97.3				
24 months	0.00	96.9	15.2	0.780	$p<0.001$	0.680	0.881
	0.01	90.6	21.9				
	0.02	84.4	52.4				
	0.03	75.0	65.7				
	0.04	71.9	67.6				
	0.05	65.6	78.1				
	0.06	62.5	83.8				
	0.07	59.4	90.5				
	0.08	40.6	93.3				
	0.09	37.5	93.3				

Limitations...

- **Retrospective study**
- **Small sample size**
- **Single center experience**
- **Variability of assays used to measure uPSA between laboratories**

Conclusion

Our study results demonstrated

- In our cohort the a considerable number of men have detectable uPSA values ranging between 0.01-0.1ng/ml post-RARP.
- They can still be followed regularly and closely to avoid patients' anxiety and salvage radiotherapy.
- It was found that higher uPSA in the detectable range (0.01-0.1ng/ml) at 9 months post-RARP predicted future biochemical recurrence.
- Further studies with larger sample sizes will be required to corroborate the previous results to determine their reliability.



Thank you