

(01-1993-176-0)

1999 2 24

1999 4 15

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_____ : (prostate specific antigen, PSA) , PSA
가

_____ : 1993 4 1998 5
45 50Gy 14 20
63 70Gy 13 66 26
PSA 3.0ng/ml

_____ : PSA 4.0 2.1(±0.9) , 1.9 20 19 (95%) PSA 0.6
가 12
2 5.3(±2.7) , 5.0 PSA 가 10ng/ml 8
PSA 가 10ng/ml 12

PSA (nadir PSA) 0.2 1.8ng/ml 19 0.8(±0.5)ng/ml, 0.6ng/ml PSA
6 23 13.5(±4.3) , 14.0
_____ : PSA 2 가 PSA 가 12
6 20 가

_____ : , (PSA), PSA , PSA

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_____ : 2 7) PSA , PSA
1998 2 3 가 , PSA
1) 가 가 가 , 7 (3,8)

가 가 가 , PSA .2,3,9,10)
가 가 가 , PSA .6) PSA

(prostate specific antigen, PSA)
glycoproteinserine protease 1993 4 1998 5

Table 1. Patient Characteristics

Characteristics	No. of patients
Age	48-78yr (median; 68yr)
Stage	
A	4
B	12
C	4
Gleason's score	
2-4	8
5-7	11
8-10	1
Initial PSA (ng/ml)*	
3-10	8
10-20	6
20-30	3
30-40	3

*normal PSA; below 3 ng/ml

68 Whitmore-Jewett staging system
 score A, B, C Gleason's score
 1 2 3 4 5 6 7 8 9 10
 10 ng/ml 20ng/ml 30 ng/ml 40ng/ml
 3 (Table 1).
 PSA PAP(prostate alkaline phosphatase)
 ultrasonography, TRUS),
 20
 (TRUS- guided needle biopsy)
 Gleason's score
 PSA
 (immunoradiometric assay) ELSA-PSA2 kit
 3.0ng/ml
 6MV 10MV X
 1.8Gy, 5
 (four fields box technique)
 45 50Gy 14
 20Gy 가 63 70Gy
 7 9
 PSA
 1 3

1 4 6
 6 12
 13
 66 26
 19 (95%) PSA 가 20
 12
 5.3(±2.7) 5.0
 19 2
 8 17 (89%), 12
 19 (100%)
 PSA 가 2
 10ng/ml PSA 가
 19 가 4 PSA 가 PSA
 가 23 PSA 가 1
 29 25 가
 1 45
 27 PSA 가 가 2
 40 53
 PSA 가 가 1
 14 PSA 가 가 30
 PSA

$$PSA(t) = a + b \times \exp - (\ln 2 / T_{1/2}) \times t$$
 T1/2
 PSA (baseline PSA value) , a + b
 PSA (5,11)
 0.6
 4.0 2.1(±0.9) 1.9
 PSA 가 19
 (Table 2). PSA
 PSA
 PSA
 (nadir PSA) 0.5 ng/ml 가 10 , 0.5 1.0ng/ml
 3 , 1.0 1.5 ng/ml 5 , 1.5 2ng/ml
 1 , 3.6ng/ml 가 1 PSA 가
 19 PSA 0.2 1.8ng/ml
 0.8(±0.5)ng/ml, 0.6ng/ml PSA
 6 23
 13.5(±4.3) 14.0
 PSA
 8 (85%) , 12 20 19 (95%)
 PSA

1 가 PSA , 가 , 가, PSA) .14) PSA PSA

가 DNA PSA 가 PSA PSA

19 83.1 , 58.5

1.56% 32

Ritter 5) PSA 1.5 50% PSA

가 , 18 90%

PSA 가 , PSA

2.6(± 1.3) , 2.6 ,

2.1(± 0.9) , 1.9

PSA 1.1(± 1.1)ng/ml,

0.9ng/ml , 0.8(± 0.5)ng/ml,

0.6ng/ml

PSA

1 3 , ,

PSA

PSA , PSA

가 PSA ,

가 , .6)

PSA , PSA

12 30 PSA 가

12 PSA 가

PSA 가

PSA

PSA

13) , 0.5ng/ml Critz

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Pattern of Decrease of Prostate Specific Antigen after Radical Radiotherapy for the Prostate Cancer

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Purpose: Prostate specific antigen (PSA) is a useful tumor marker, which is widely used as a diagnostic index and predictor of both treatment and follow-up result in prostate cancer. A prospective analysis was carried out to obtain the period of PSA normalization and the half life of PSA and to analyze the factors influencing the period of PSA normalization. The PSA level was checked before and serially after radical radiotherapy.

Materials and Methods: Twenty patients with clinically localized prostate cancer who underwent radical external beam radiotherapy were enrolled in this study. Accrual period was from April 1993 to May 1998. Median follow-up period was 26 months. Radiotherapy was given to whole pelvis followed by a boost to prostate. Dose range for the whole pelvis was from 45 Gy to 50 Gy and boost dose to prostate, from 14 Gy to 20 Gy. The post-irradiation PSA normal value was under 3.0 ng/ml. The physical examination and serum PSA level evaluation were performed at 3 month interval in the first one year, and then at every 4 to 6 months.

Results: PSA value was normalized in nineteen patients (95%) within 12 months. The mean period of PSA normalization was 5.3 (± 2.7) months. The half life of PSA of the nonfailing patients was 2.1 (± 0.9) month. The nadir PSA level of the nonfailing patients was 0.8 (± 0.5) ng/ml. The period of PSA normalization had the positive correlation with pretreatment PSA level ($R^2=0.468$). The nadir PSA level had no definite positive correlation with the pretreatment PSA level ($R^2=0.175$). The half life of serum PSA level also had no definite correlation with pretreatment PSA level ($R^2=0.029$).

Conclusion: The PSA level was mostly normalized within 8 months (85%). If it has not normalized within 12 months, we should consider the residual disease in prostate or distant metastasis. In 2 patients, the PSA level increased 6 months or 20 months before clinical disease was detected. So the serum PSA level can be used as early diagnostic indicator of treatment failure.

Key Words: Prostate cancer, Radical radiotherapy, Prostate specific antigen (PSA), PSA half life, Nadir PSA level