

# basic Fibroblast Growth Factor

=Abstract=

## Serum and Urine Basic Fibroblast Growth Factor (bFGF) in Cervical Cancer Patients

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**Objectives:** Angiogenesis takes place during both physiological and pathological processes, such as tumor development. Basic FGF is one of angiogenic factors. We investigated the serum and urine bFGF levels in patients with cervical cancer in contrast to those of normal control group to assess whether the serum and urine bFGF levels are useful markers to predict therapeutic effects of the patients with cervical cancer.

**Methods:** We measured serum and urine bFGF concentrations by ELISA in 28 patients with cervical cancer, as well as 25 normal volunteers and 38 patients with cervical intraepithelial neoplasia. Especially in 22 patients with cervical cancer, we measured serum bFGF levels before and after radiotherapy or radical hysterectomy with neoadjuvant chemotherapy.

**Results:** There were statistical differences among the serum bFGF levels in patients with cervical cancer ( $28.6 \pm 30.4$  pg/ml), cervical intraepithelial neoplasia ( $8.8 \pm 11.3$  pg/ml), and normal control group ( $5.2 \pm 6.2$  pg/ml) ( $p < 0.05$ ). Patients undergoing cancer therapy had lower values than those without cancer therapy ( $p < 0.05$ ).

**Conclusion:** Serum bFGF may help in diagnosing and predicting the therapeutic effects of the patients with cervical cancer. So we suggest that serum bFGF may be useful as a dignostic and prognostic factor in cervical cancers.

*Keywords:* Serum bFGF, Urine bFGF, Cervical cancer, Angiogenesis

.1)

가

.2)

가

가

3) bFGF가

(angiogenesis) .4) , .18) In vitro bFGF가

가 , 19) , 20) , 21) bFGF

22) , 23) 24)

.56) bFGF

20) 가 , 가 (sandwich EIA)

basic fibroblast growth factor(bFGF), acidic bFGF가 가 25)

fibroblast growth factor(aFGF), vascular endothelial bFGF 가 가 ,26)

growth factor(VEGF), transforming growth factor bFGF 가 가 .27)

(TGF- ), tumor necrosis factor (TNF- ), platelet bFGF

dervied endothelial growth factor(PDGF), pleiotrophin bFGF가 가

(PTN) .7) bFGF가

가 bFGF가

.8) bFGF bFGF

가 가

.9) VEGF KDR 가

.10) 1. 1995 9 1997 6

FGF 9 .11) bFGF 25

bFGF가 가 16 18 kDa

12) 38

130 kDa bFGF

.13-14) 28

.15) 5 cc

bFGF - 20

bFGF 22

.16) heparinase 2. heparan sulfate bFGF가 1) bFGF

heparan serum 가 10% normal mouse

sulfate 가 가 bFGF

plate well 1 × (Wash Buffer) 200  
 μL 37 (incubation)  
 well 7  
 bFGF standards(0 80 fm/ml) 100 μL 가  
 plastic wrap 37 3 incubation  
 well 300  
 μL 5 well bFGF  
 Monoclonal antibody(R & D, Minneapolis, U.S.A) 100  
 μL 가 plastic wrap 1  
 . 50 × Working Conjugate  
 well 100 μL plastic wrap  
 30  
 Working Substrate well 100  
 μL , 1  
 Stop solution 100 μL 가 (spe-  
 ctrophotometer, Pharmacia, Head Office, Uppsala, Swi-  
 den) 490 nm optical density(O.D.) ,  
 2) bFGF  
 1 ml  
 creatinine 20 ml 4  
 8 3000 rpm . super-  
 natant 1.2 μ m pole size  
 4 24  
 6000 8000  
 2 lyophilization 100 μL  
 25% bovine milk protein, 100 g/ml  
 heparin, 10 g/ml mouse immunoglobulin G  
 PBS 1%가  
 bFGF enzyme  
 immunoassay  
 hydration 가  
 bFGF

$$\text{bFGF(bFGF/g creatinine)} = \frac{\text{urine level of bFGF(pg/L)}}{\text{urine level of creatinine(g/L)}}$$

3)  
 bFGF bFGF  
 Anova with multiple comparison  
 bFGF Wilcoxon signed rank test

1. bFGF  
 bFGF 28.6 ± 30.4  
 pg/ml  
 bFGF가 (p  
 < 0.05) 8.8 ± 11.3  
 pg/ml  
 (Table 1, p > 0.05).

bFGF Fig. 1

2. bFGF  
 bFGF 275.8 ± 234.2  
 pg/g 216.6 ±  
 162.1 pg/g 184.1 ± 139.8 pg/g  
 (Table 1).

3. bFGF  
 11 45.5 ±  
 7.3 b

Table 1. Serum bFGF levels of each groups

	Case(n)	serum bFGF(Mean ± S.D.)	urine bFGF(Mean ± S.D.)
Normal	21	5.2 ± 6.2 pg/ml*	184.1 ± 139.8 pg/g
CIN	38	8.8 ± 11.3 pg/ml	216.6 ± 162.1 pg/g
Cervical cancer	28	28.6 ± 30.4 pg/ml*	275.8 ± 234.2 pg/g

\*p < 0.05 Anova with multiple comparison  
 CIN=cervical intraepithelial neoplasia

SCCA7†  
 23.5 ± 28.7 pg/ml      12.4 ± 10.8  
 pg/ml      (Table 2, p < 0.05,  
 Fig. 2) CEA    31.0 ± 8.9 pg/ml    29.9 ± 11.8 pg/ml  
 bFGF      33.1 ± 32.5  
 pg/ml      18.6 ± 11.8 pg/ml  
 (Table 2, p < 0.05, Fig. 3).

Table 2. Comparison of serum bFGF levels according to management and clinicopathologic characteristics in cervical cancer patients

	Case (n=22)
Age	45.5 ± 7.3
Stage	
b	14
a	8
Tumor	
< 4 cm3	10
> 4 cm3	12
Histology	
Keratinizing, large cell	8
Nonkeratinizing, large cell	10
Small cell	4
Tx	
Radiotherapy	18
Operation with adjuvant chemotherapy	4
Before treatment (mean ± S.D.)	
Serum bFGF	33.1 ± 32.5 pg/ml
SCCA	23.5 ± 28.7 pg/ml*
CEA	31.0 ± 8.9 pg/ml
After treatment (mean ± S.D.)	
Serum bFGF	18.6 ± 11.8 pg/ml
SCCA	12.4 ± 10.8 pg/ml*
CEA	29.9 ± 11.8 pg/ml

\*p < 0.05 Wilcoxon signed rank test

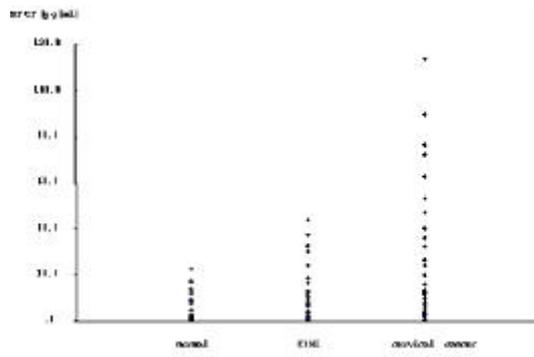


Fig. 1. The circulating levels of serum bFGF in normal controls, patients with CIN and cervical cancer. The cut off level of serum bFGF concentrations was decided to be 17.6 pg/ml, which was calculated as the mean+2SD of normal controls (not shown).

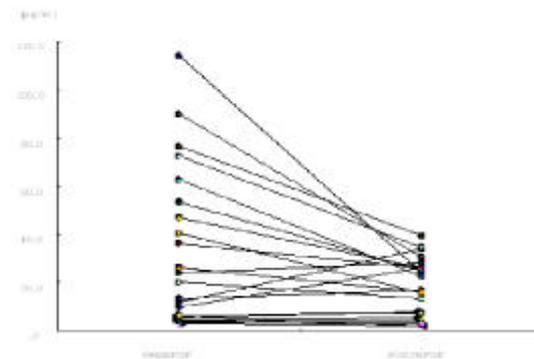


Fig. 2. Decrease in the circulating levels of serum SCCA after therapy in cervical cancer patients.

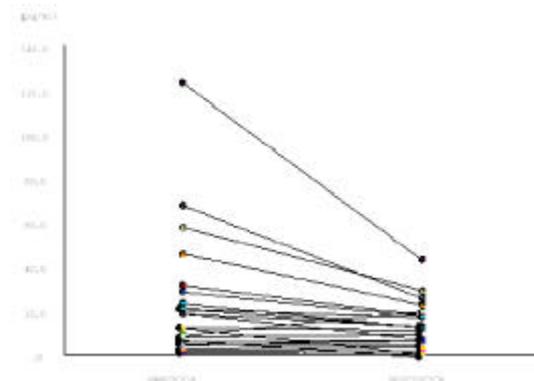


Fig. 3. Decrease in the circulating levels of serum bFGF after therapy in cervical cancer patients.

28)

가

가 . 가 bFGF urokinase type plasminogen  
가 activator 가  
.29)  
collagen,  
.30) laminin, integrin 가  
FGF .38)  
.11,13)  
FGF acidic FGF(FGF1), basic FGF(FGF2),  
FGF3 4( hst, int2 ), FGF5,  
FGF6, FGF7( ), FGF8( 가 .29)  
), FGF9( ), FGF10 mm  
FGF 14가 가 . FGF 2 cm 가  
가 heparin .5)  
tyrosine kinase FGF .8-10)  
.17)  
bFGF 146 , 가  
.31) bFGF 가  
.32) 가 .37)  
, , 가  
, .83,404)  
.33) bFGF bFGF  
bFGF가 .9,18) bFGF가 ,19)  
, .20) 21)  
.22) , .24) .4) Kaposi .23)  
.34,35) bFGF heparinase bFGF  
heparan sulfate 가 가  
17) .9)  
bFGF heparane bFGF mRNA  
sulfate .18) bFGF .19)  
36) 가 .19,21,23) 가 bFGF mRNA  
56) 가 가 bFGF 가  
. bFGF  
가 bFGF가 .16)  
CA-153,  
CEA가  
가 .37) bFGF

12.4 ± 10.8 pg/ml, 18.6 ± 11.8 pg/ml

bFGF .26)

bFGF bFGF Sliutz 4) bFGF가

.27) bFGF가 bFGF

가 bFGF가 10 bFGF가

가 .42) bFGF 9.57 pg/ml

가 bFGF가 가 bFGF

bFGF가 가 bFGF가

bFGF 가 .254) bFGF가

bFGF 가 가 bFGF .48) bFGF

.33) bFGF .434) bFGF가

bFGF .45) bFGF

bFGF .27)

5.2 ± 6.2 pg/ml, 8.8 ± 11.3 pg/ml, 28.6 ± 30.4 pg/ml

bFGF가 가

bFGF bFGF가 가

bFGF mRNA 가 bFGF

bFGF bFGF가 가

.46) bFGF .42)

bFGF가 가 bFGF

bFGF 184.1 ± 139.8

SCCA pg/ml, 216.6 ± 162.1 pg/ml, 275.8 ± 234.2 pg/ml

bFGF

SCCA CEA

bFGF SCCA bFGF가 bFGF

23.5 ± 28.7 pg/ml, 33.1 ± 32.5 pg/ml

가

가

SCCA가

bFGF가

bFGF

가

가 가

28

bFGF

가

b

22

bFGF가

가

SCCA가

bFGF

- References -

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