

## VEGF and bFGF

### Significance of Preoperative Serum VEGF and bFGF Levels in Colorectal Cancer Patients

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**Purpose:** Angiogenesis related to tumor invasion and metastasis may be accelerated by numerous factors that are released from tumor cells, tumor-associated inflammatory cells, or the extracellular matrix. Vascular endothelial growth factor (VEGF) and basic fibroblast growth factor (bFGF) are angiogenesis promoters, and are suspected to be key molecules in cancer progression. In colorectal cancer, tumor VEGF has been shown to be well correlated with relapse-free survival. The aim of this study was to determine the relationship between serum VEGF and bFGF levels with the various indices of colorectal cancer.

**Methods:** Preoperative serum VEGF and bFGF levels were measured prospectively in 76 colorectal cancer patients, and compared with equivalent levels in healthy controls. Patients with a history of radiation therapy or chemotherapy within 6 months were excluded.

**Results:** The cut-off values of VEGF and bFGF were 244 pg/ml and 3.9 pg/ml, respectively. Patients with colorectal cancer showed a significantly higher level of serum VEGF and bFGF. In comparison with the control group, the serum VEGF level was significantly elevated in the advanced T stage group, the high UICC stage patients, and the hematogenous metastasis cases. Serum bFGF was also elevated in the advanced UICC TNM stage patients. The serum levels of VEGF and bFGF were well correlated with each other (P < 0.0002).

**Conclusion:** In colorectal cancer cases, serum bFGF and VEGF levels may be correlated with stage, except in early

cancer stages. Therefore serum VEGF and bFGF levels may be used as predictive factors in advanced colorectal cancer. (J Korean Surg Soc 2002;62:480-485)

**Key Words:** VEGF, bFGF, Colorectal cancer

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가 가  
가 가  
angiopoietin-1, angiogenin, ephrin-B2, VEGF (vascular endothelial growth factor), bFGF (basic fibroblast growth factor), TGF beta 1 (transforming growth factor beta 1), angiogenesis factor VIII (1-3) VEGF bFGF  
VEGF (dimer heparin-binding glycoprotein) 가  
가  
(fibrinogen)  
(fibrin gel meshwork) (4) bFGF 가  
(mitogenic loop)  
VEGF

가 (5) VEGF bFGF

가 VEGF, bFGF

가

1998 8 6

76

EDTA 2 ml

Quantitative sandwich enzyme immunoassay technique (R & D systems, Minneapolis, MN, USA)

VEGF

bFGF

50 VEGF, 33

bFGF 가

3 3

UICC

student t-test

Kaplan-Meier

P 0.05

log-rank test

1) (Table 1)

76 가 40 , 가

36 가 57.8 , 가 52.5 .

27 , 49 . UICC

TNM 1 6 , 2 29 , 3

25 , 4 16 4 16 가 11 (21%)

가 4 , 2 ,

2 , 1 . TNM 3

17 가 16

. TNM 4 6

4 1

Table 1. Patient characteristics

No of patients	76
Age (mean)	
Male	57.8±8.6 (29 / 76)
Female	52.5±15.1 (19 / 78)
Location of tumor	
Cecum	2
Ascending colon	8
Hepatic flexure	3
Transverse colon	2
Splenic flexure	1
Descending colon	1
Sigmoid colon	10
Rectum	49

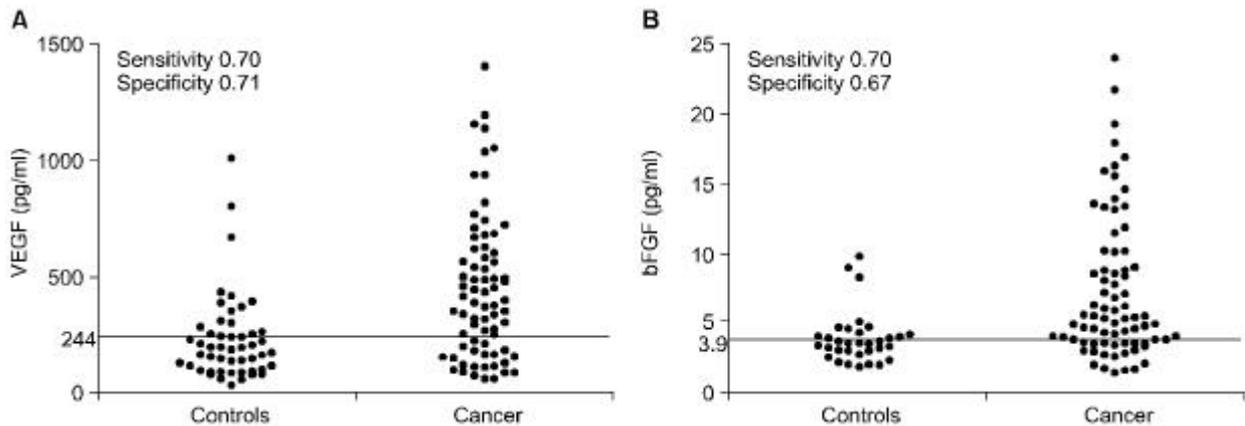


Fig. 1. Sensitivity and specificity of VEGF (A, cut-off : 244) and bFGF (B, cut-off : 3.9).

2) VEGF, bFGF

VEGF cut-off 244 pg/ml 70%,  
71% , bFGF cut-off 3.9 pg/ml  
70%, 67% (Fig. 1).

3) VEGF, bFGF

UICC TNM 1 VEGF, bFGF  
가 가 (Fig. 2A, B).  
VEGF TNM 가  
(P=0.0005) bFGF  
(P=0.3292).  
T VEGF, bFGF  
(Fig. 2C, D) VEGF T1, T2

가 , T3, T4  
가 (P<0.0001).  
bFGF T1, T2  
T3, T4

4)

VEGF bFGF  
P=0.1404, P=0.9949  
가 가  
가 (P=0.0001).  
가 가 (P=0.066,  
Fig. 3).

5) VEGF bFGF

VEGF bFGF =0.4141, P=  
0.0002 가  
(Fig. 4).

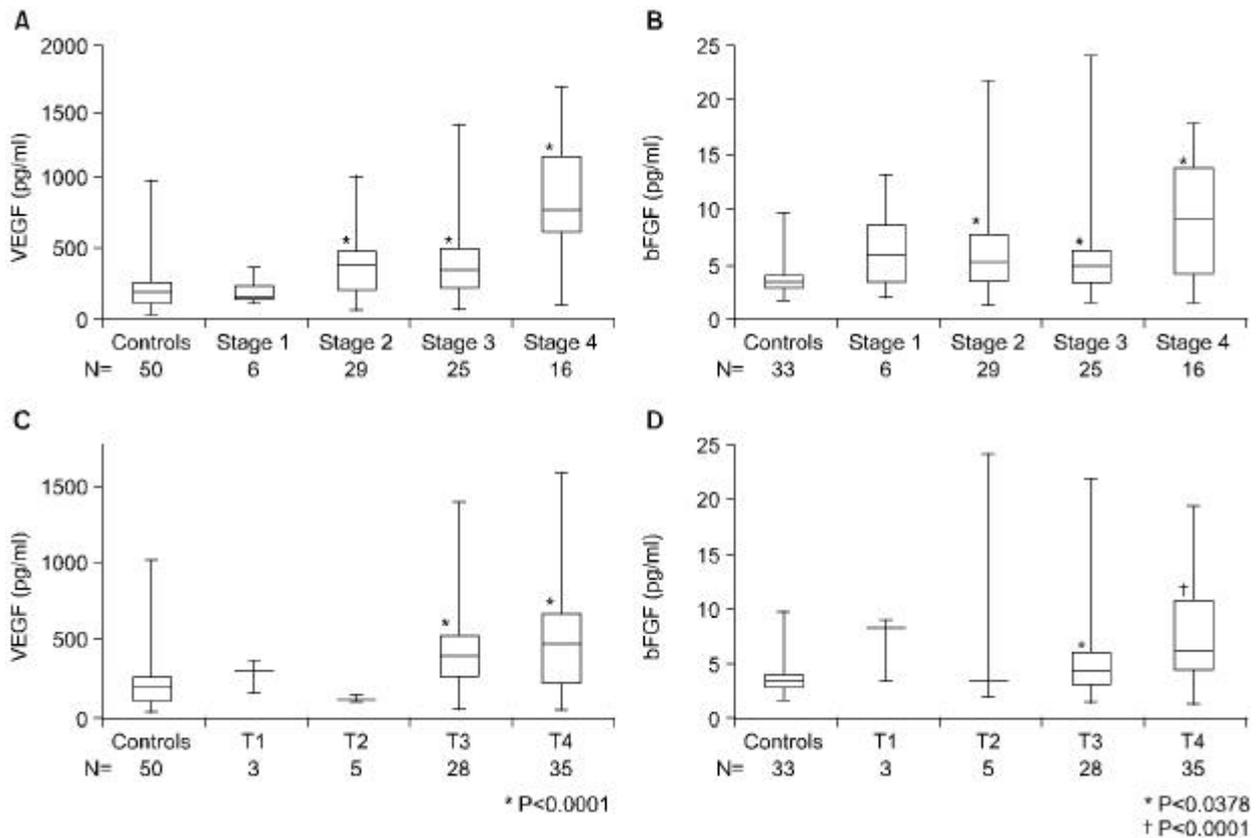


Fig. 2. VEGF, bFGF compared with controls according to UICC, T stages. Except stage 1 (UICC), T1 and T2, all UICC stages (A, B) and T stages (C, D) showed a significant elevation in VEGF and bFGF compared to controls.

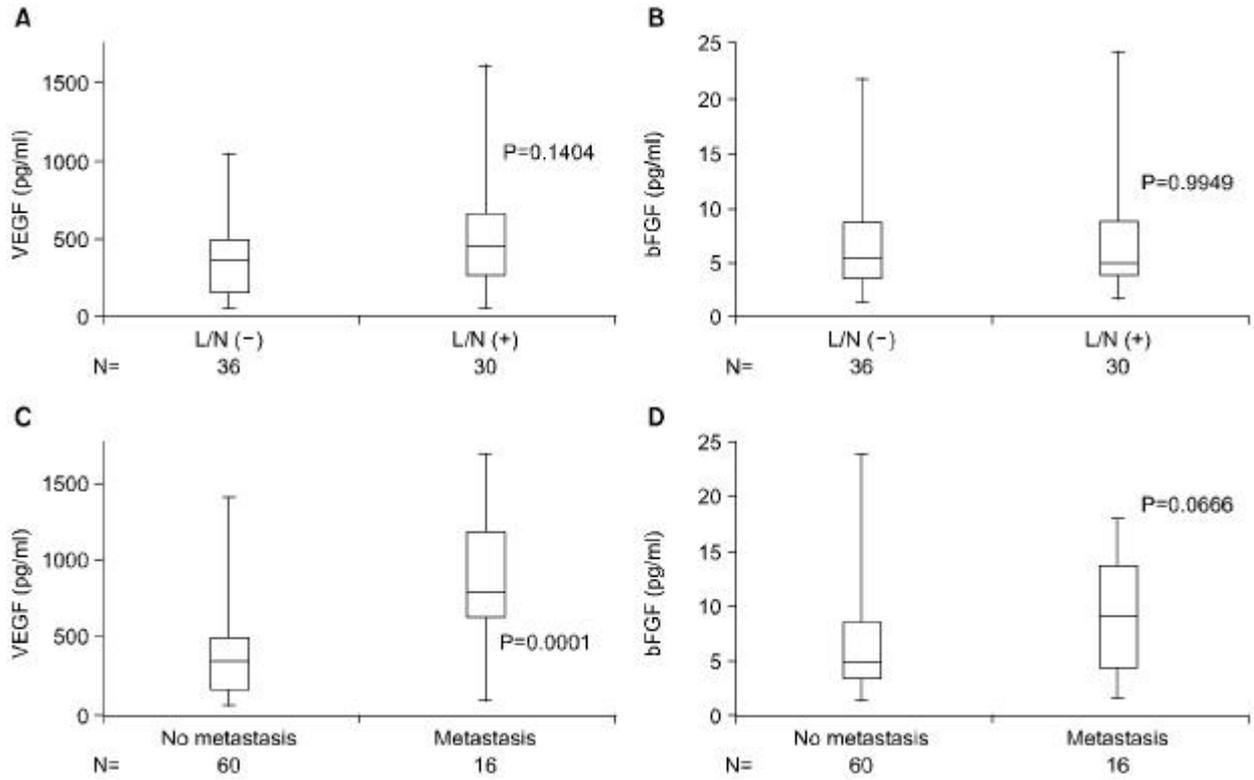


Fig. 3. VEGF bFGF comparison according to Lymph node status (A, B) and metastasis (C, D).

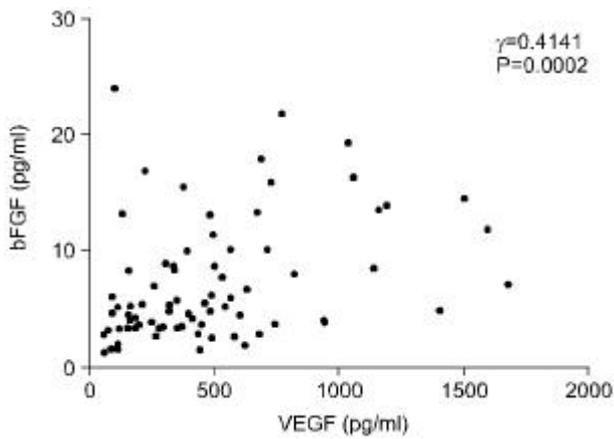


Fig. 4. Correlation between VEGF & bFGF.

(6,7) cytokine

Folkman (8)

1974 TAF (tumor angiogenesis factor)가

VEGF bFGF

VEGF 32 42 kd  
flt-1 KDR

가

VEGF

VEGF (9) VEGF

(10-15)

bFGF 18 kd

(chemotaxis)

(6)

(heparin sulfate) VEGF, bFGF 가

136, Kumar (16) 108 T, UICC VEGF가

614, Duker, Werther (17) 91 Dukes D sVEGF (soluble VEGF)가

34, Chung (18) 61 VEGF가

VEGF, bFGF 가

VEGF

KDR, VEGF 가

가 VEGF가 VEGF가

VEGF VEGF bFGF cut-off VEGF 244 pg/ml, bFGF 3.9 pg/ml

Yamamoto (19) cut-off 180 pg/ml VEGF bFGF

Werther (18) 95 percentile 465 pg/ml VEGF 465 pg/ml

VEGF bFGF VEGF가

VEGF가 bFGF 가

가 가

VEGF bFGF TNM 1

가 가 VEGF

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