

(CEA)

Bile Carcinoembryonic Antigen in Colorectal Cancer

**Jong-Woo Kim, M.D., Yong-Tae Park, M.D., Chul-Woon Chung, M.D.
Sung-Won Kwon, M.D., Hang-Seok Chang, M.D., Suk-Woo Son, M.D.
Dae-Ho Ahn, M.D. and Kyung-Po Lee, M.D.**

Department of Surgery, Pundang-CHA Hospital, Pocheon-CHA Medical College, Sungnam, Korea

Purpose: Serum level of carcinoembryonic antigen (CEA) is clinically one of the prognostic factors in the follow-up evaluation of the colorectal cancer (CRC) patient. It has been recently suggested that the bile CEA level is also useful in early detection of the liver metastasis of colorectal cancer. If the bile CEA is also correlated with the cancer progression or prognosis like as serum CEA, it will be another useful clinical parameter in the evaluation and treatment of CRC patients. Therefore this study is aimed to reveal the correlation of the bile CEA with the progression of tumor and to estimate the possibility of bile CEA as a useful clinical parameter. **Methods:** Preoperative serum levels of CEA were measured in 58 patients of CRC who were operated in Pundang CHA hospital. The levels of bile CEA were also checked with the aspiration of bile in gall bladder at laparotomy. The positive value of CEA was settled as more than 5ng/ml. **Results:** The 58 patients were classified into 29 cases of Dukes'AB group, 23 cases of Dukes'C group & 6 cases of Dukes'D group. The positive rates of serum CEA were 24.1% in AB group, 30.4% in C group & 66.7% in D group, and those of bile CEA were 44.8%, 56.5% & 83.3% individually. When group C was also divided into N₁(13 cases) & N₂ (10 cases) groups according to the number of the metastatic lymph nodes, serum & bile CEA positive rates were 15.4% & 46.1% in N₁ group, and 50% & 70% in N₂ group. Both of serum & bile CEA levels were all positive and markedly elevated in 4 hepatic metastasis cases of group D. **Conclusions:** Positive rate of bile CEA was increased according to the progression of tumor stage. Marked elevation of bile CEA was especially noted in liver metastatic cases. Therefore bile CEA can be considered as a clinical parameter in evaluation of cancer progression & prognosis like as serum CEA, and also as a useful indicator of hepatic metastasis. (JKSCP 2000;16:444-450)

Key Words: Bile CEA, Colorectal cancer, CEA,

가 (CEA) CEA가 CEA
1,2
3
4,5,6
7,8
가 CEA
CEA
(pool) 가 CEA

: 351
(: 463-070)
(Tel: 031-780-5250, Fax: 031-780-5259)
(E-mail: simone76@Netsgo.com)
1999

Table 3. CEA positive rate according to stage

	Dukes'AB (n=29)	Dukes'C (n=23)	Dukes'D (n=6)
Serum CEA	24.1% (7)	30.4% (7)	66.7% (4)
Bile CEA	44.8% (13)	56.5% (13)	83.3% (5)

Table 4. CEA positive rate according to metastatic lymph nodes of Dukes'C (n=23)

	N ₁ (LN1 3) (n=13)	N ₂ (LN 4) (n=10)
Serum CEA	15.4% (2)	50.0% (5)
Bile CEA	46.1% (6)	70.0% (7)

30.4%, D 6 4 66.7%
가 . CEA AB 29
13 44.8%, C 23 13 56.5%, D 6
5 83.3% CEA
가 (Table 3).
Dukes'C 가 1
3 N₁ 13 4 N₂ 10
, CEA N₁ 13 2
15.4%, N₂ 10 5 50% . CEA
N₁, N₂ 6 , 7 가
46.1%, 70% CEA (Table 4).
Dukes' D 4
(carcinomatosis) 2
가
CEA 4
CEA 30.3±8.1 ng/mL, 367.4±
320.1 ng/mL 2
1.4±0.2 ng/mL, 3.0±2.0 ng/mL (Table 5).

(CEA)
glycoprotein .¹¹ (adhesion
molecule)

¹²

Table 5. CEA mean value (ng/ml±SE) of Dukes'D

	Liver metastasis (n=4)	Carcinomatosis (n=2)
Serum CEA	30.3±8.1	1.4±0.2
Bile CEA	367.4±320.1	3.0±2.0

SE = standard error.

CEA가
,
CEA Kupffer cell
hepatocyte .
7,8
CEA CEA
13 CEA
1 7 .
CEA
가
CEA가
14
CEA
가
가
1,3,15-17 CEA 가
12,18
CEA가
CEA Sugarbaker¹⁹
가 CEA CEA
CEA
CEA CEA가
가
(pool)
가 ,
12 ,
CEA 9

CEA
 1 1.5% CEA 9%
 CEA²⁰
 CEA²¹
 CEA 가
 CEA 가
 Yeatman⁹ (occult metastasis)
 CEA
 CEA가
 가
 4.7 259 , 1 cm³
 CEA 9 41 ng/mL
 가
 가
 CEA가
 ,
 CEA
 10
 3 , 3 ,
 4
 CEA 가
 CEA (cut-off value)
 Paul¹⁰
 5 ng/ml
 ganuzzi²³ 10 ng/ml
 20 ng/ml
 CEA
 CEA
 CEA
 CEA 가
 CEA가

(Table 2).
 Dukes'D
 AB Dukes'C CEA
 (P=0.031 & P=0.020)
 CEA
 CEA^{2,24,25}
 ,
 CEA
 CEA
 58 18 31%
 CEA 31 53.4%
 CEA 37.3±
 22.8 ng/ml CEA 8.9±2.0 ng/ml
 (Table 1) Yeatman⁹
 (sensitivity) CEA
 CEA가 가
 CEA 가
 CEA
 Dukes'A B 5 30%, Du-
 kes'C 30 50% , Dukes'D 50 90%
 90 100%
 CEA²⁶⁻²⁸
 21.4% , Dukes'C CEA 30.4%, Du-
 kes'D 66.7%
 가 가 (Table 5).
 CEA AB 8.8±
 3.4 ng/mL, C 5.9±1.4 ng/mL, D 20.7±8.0 ng/mL
 CEA 가
 (P=0.108). Dukes'AB
 CEA 가 0.5 84.8 ng/ml Dukes'C
 CEA 0.5 30.5 ng/ml
 CEA 44.8%,
 56.5% 83.3%
 가
 (Table 3).
 CEA
 AB 13.9±3.4 ng/mL, C 12.3±1.7 ng/mL, D
 245.9±216.5 ng/ mL CEA
 Dukes'AB 13.9±3.4

ng/ml Dukes'C 12.3 ± 3.4 ng/ml

CEA 가

2

CEA가

CEA (P=0.006) CEA

가

CEA

CEA

CEA

CEA

가

(pearson's correlation: P=0.761, r=0.041).

가

CEA

Dukes'C

(sensitivity)

(specificity)

3

N₁

4

N₂

(screening)

가

CEA

(Table 4),

CEA

가

가

가

CEA 가

CEA

CEA 가

가

N₁ 4.7 ± 1.5 ng/mL, N₂ 7.1 ± 3.0 ng/

^{5,6,31}

CEA

mL

CEA

N₁ 15.0 ± 6.1 ng/mL, N₂

가

67 79%

9.4 ± 3.2 ng/mL

CEA

가

4 6

CEA

가

가

가

³⁰

CEA

N₁

CEA

CEA 가 0.5 68.5 ng/ml N₂

0.5 28.3 ng/ml

가

CEA

(P=0.052 & P=

가 CEA

0.111).

가

가 가

Dukes'D

, 6

CEA가

가

4

, 2

³³

CEA가

(carcinomatosis)

2

CEA

,

4

CEA

가 11.5

45.9 ng/ml

30.3 ± 8.1 ng/ml ,

CEA

40.0 1327.7 ng/ml

CEA

CEA

367.4 ± 320.1 ng/ml (Table 5).

가

Dukes'C

CEA

가

Dukes'D

^{29,30}

CEA 가

CEA 가

CEA

CEA

CEA

12

가

12

CEA

CEA

CEA

가

가 가

CEA

가

CEA가

가 가 .

REFERENCES

1. Midiri G, Amanti C, Consorì F. Usefulness of preoperative CEA levels in the assessment of colorectal cancer patients stage. *J Surg Oncol* 1983;22:257-61.
2. Wolmark N, Fisher B, Wieand S. The prognostic significance of preoperative carcinoembryonic antigen levels in colorectal cancer. *Ann Surg* 1984;199:375-8.
3. Zamcheck N, Kupchick HZ. Carcinoembryonic antigen (CEA) In Compendium of assay for immunodiagnosis of human cancer. *Dev Cancer Res* 1979;1:27-31.
4. Holyoke ED, Cooper EH. CEA as monitor of gastrointestinal malignancy. *Cancer* 1975;35:830-5.
5. Ashton WS, Sariego J, Byrd M. A multivariate analysis of colon cancer, preoperative carcinoembryonic antigen levels and patient survival. *Contemp Surg* 1993;43:11-6.
6. Sener SF, Imperato JP, Chmiel J. The use of cancer registry data to study preoperative carcinoembryonic antigen level as an indicator of survival in colorectal cancer. *CA* 1989;39:50-5.
7. Thomas P, Zamcheck N. Role of the liver in clearance and excretion of circulating carcinoembryonic antigen (CEA). *Dig Dis Sci* 1983;28:216-22.
8. Shuster J, Silverman M, Gold P. Metabolism of human carcinoembryonic antigen in xenogenic animals. *Cancer Research* 1973;33:65-8.
9. Yeatman T, Bland K, Copeland E, Hollenbeck J, Souba W, Vogel S, et al. Relationship between colorectal liver metastases and CEA levels in gall bladder bile. *Ann Surg* 1989;210:505-12.
10. Paul M, Jelle V, Mulder C, van Kamp G, Cuesta M, Meijer S. The use of biliary CEA measurements in the diagnosis of recurrent colorectal cancer. *Eur J Surg Oncol* 1997;23:419-23.
11. Bibins B, Meeker W, Griffin WO. Carcinoembryonic antigen (CEA) levels and histology in colon cancer. *J Surg Res* 1975;18:257-68.
12. Benchimol S, Fuks A, Jothy S, Beauchemin N, Shirotaq K, Stanners C. Carcinoembryonic antigen, a human tumor marker, functions as an intercellular adhesion molecule. *Cell* 1989;57:327-33.
13. Begent RH. The value of carcinoembryonic antigen in clinical practice. *Br J Hosp Med* 1987;April:335-40.
14. Midiri G. CEA tissue staining in colorectal cancer patients. *Cancer* 1985;55:2624-30.
15. Henning P, Axel S, Manfre J, Heyman H. Comparison of tumor markers CEA, TPA and CA 19-9 in colorectal carcinoma. *Cancer* 1987;59:223-8.
16. Goslin R, O'Brien M, Steele G. Correlation of plasma CEA and CEA tissue staining in poorly differentiated colorectal cancer. *Am J Med* 1981;71:246-51.
17. Thynne GS, O'Connell MJ. The preoperative carcinoembryonic antigen test in the diagnosis, staging and prognosis of colorectal cancer. *Cancer* 1986;58:606-8.
18. Goldenberg DM, Sharkey RM, Primus FJ. Immunocytochemical detection of carcinoembryonic antigen in conventional histopathology specimens. *Cancer* 1978;42:1546-50.
19. Sugarbaker PH. Carcinoembryonic antigen (CEA) assays in obstructive colorectal cancer. *Ann Surg* 1976;184:752-7.
20. Thomas P. Studies on the mechanisms of biliary excretion of circulating glycoproteins. *Biochem J* 1980;192:837-43.
21. Freed DLJ, Talor G. Carcinoembryonic antigen in feces. *Br Med J* 1972;1:85-7.
22. Novelli F, Trias M, Molina R, Filella X. Detection of occult liver metastases in colorectal cancer by measurement of biliary carcinoembryonic antigen. *Anticancer Research* 1997;17:2743-6.
23. Paganuzzi M, Onetto M, De Paoli M, Castagnola M, De Salvo L, Civalleri D, et al. Carcinoembryonic antigen (CEA) in serum and bile of colorectal cancer patients with or without detectable liver metastases. *Anticancer Research* 1994;14:1409-12.
24. Hohenberger P, Schlag PM, Gerneth T, Herfarth C. Pre- and postoperative carcinoembryonic antigen determinations in hepatic resection for colorectal metastases: predictive value and implications for adjuvant treatment based on multivariate analysis. *Ann Surg* 1994;219:135-40.
25. Dahr P, Morre T, Zamcheck N, et al. Carcinoembryonic antigen (CEA) in colon cancer. *JAMA* 1972;221:31-8.
26. Goslin R, Steele GJ, Macintyre J. The use of preoperative plasma CEA levels for the stratification of patients after curative resection of colorectal cancers. *Ann Surg* 1980;192:747-55.
27. Wanebo HJ, Rao B, Pinsky CM. The radioimmunoassay of circulating carcinoembryonic antigen of human digestive system. *Proc Mantl Acad Sci* 1969;64:164-8.
28. Stirret LA, Yuhl ET, Cassen B. Clinical application of hepatic radioactivity surveys. *Am J Gastroenterol* 1954;21:2157-60.
29. Tabuchi Y, Deguchi H, Imanishi K, Saitoh Y. Carcinoembryonic antigen levels of peripheral and draining venous blood in patients with colorectal cancer. *Cancer* 1992;69:2411-15.
30. Wanebo H, Rao B, Pinsky CM. Preoperative carcinoembryonic antigen level as a prognostic indicator in colorectal cancer. *N EN J Med* 1978;299:448-58.
31. Herra MA, Chu TM, Holyoke ED. Carcinoembryonic antigen (CEA) as a prognostic and monitoring test in

