Association Between Elevated Pretreatment CEA Levels and Survival Outcomes of Treatments in Young Patients with Colorectal Adenocarcinoma: A SEER-Based Analysis

[1]Matthew Bilotti, [2,3]Sameh Hany Emile, MBBCh, MSc, MD, [2]Anjelli Wignakumar, MBBS, BSc (Hons), [1]Cameron Perrone, [1]Spencer Barnes, [2]Cesar Valdivieso, MD, [2]Steven D. Wexner, MD, PhD (Hon)

[1]Florida Atlantic University, Charles E. Schmidt College of Medicine, [2]Ellen Leifer Shulman and Steven Shulman Digestive Disease Center, Cleveland Clinic Florida, Weston, FL; [3]Colorectal Surgery Unit, General Surgery Department, Mansoura University Hospitals, Mansoura, Egypt

Matthew Bilotti
Student Researcher
Department of Colorectal Surgery
Cleveland Clinic Florida
mbilotti2023@health.fau.edu

Cleveland Clinic
Digestive Disease Institute

Background

- **The incidence of colorectal cancer (CRC) has risen among individuals <45 years.**
- **Elevated carcinoembryonic antigen (CEA) is a poor prognosticator in CRC, however, its role in patients with early-onset cancer remains unclear.**

The aim of this study was to investigate the association between elevated CEA levels and 5-year cancer-specific survival (CSS) in young-onset CRC patients.

Methods

- **Study Design:** Retrospective cohort study using SEER database (2000-2020)
- **Population:** 7,766 CRC patients aged <45 years, with data on pretreatment CEA
- **Analysis:** Comparison of 5-year CSS based on elevated versus normal CEA levels, adjusting for tumor characteristics and treatment
- **Primary Outcome:** 5-year CSS
- **Statistical Tests:** Kaplan-Meier survival curves, log-rank tests, and multivariate Cox regression

Results

Table 1: Kaplan Meier Survival Results

	Normal Pretreatment CEA 5 Year-CSS	Elevated Pretreatment CEA 5 Year-CSS	Normal Pretreatment CEA Restricted 5 Year-CSS (months)	Elevated Pretreatment CEA Restricted 5 Year-CSS (months)
Entire Cohort	88.3%	78.2%	56.9	53.7
Stage I CRC tumor	96%	80.4%	59.1	54.5
Stage II CRC tumor	92.4%	87.3%	58.2	56.6
Stage III CRC tumor	82.9%	73.4%	55.4	52.2
No systemic therapy	94%	85.4%	58.2	54.3
Neoadjuvant systemic therapy	84.4%	73%	56.2	52.5
Adjuvant systemic therapy	86.2%	76.4%	56.3	53.5
No radiation therapy	89.9%	78.9%	57.2	53.8
Neoadjuvant Radiotherapy	85%	80.1%	56.8	54.5
Adjuvant radiotherapy	80.4%	69.3%	55.5	50.8
No resection of a contiguous organ	89.3%	79.95	57.2	54.3
Resection of a contiguous organ	82.9%	71.1%	55.3	50.7

Figure 1: Entire Cohort Kaplan Meier

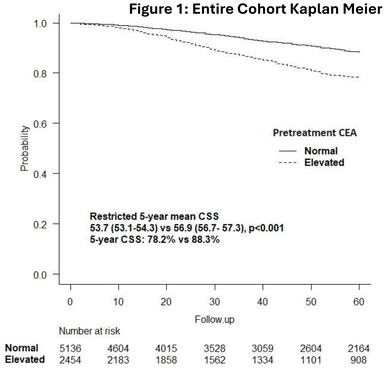
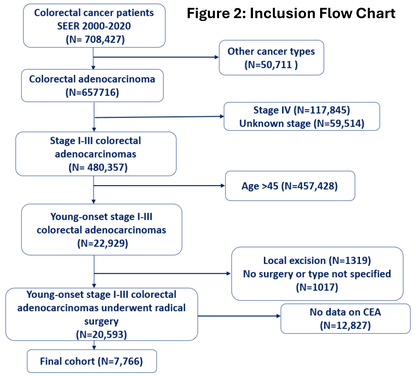


Figure 2: Inclusion Flow Chart



Patient Characteristics:

- 7,766 patients, aged <45 years, predominantly white (76%) males (53.2%), with 32.7% having elevated CEA **(Figure 2).**
- Elevated CEA levels were more common in rectal cancers and linked to more aggressive disease

Key Findings

•Elevated CEA was associated with **significantly reduced 5-year CSS (78.2% vs. 88.3%) (Figure1).**
•The negative impact was most significant in patients receiving **adjuvant radiotherapy** and **neoadjuvant systemic therapy (Table 1)**.
•**Stage I patients with elevated CEA** had the largest reduction in survival (80.4% vs. 96%) **(Table 1).**
•Other independent factors for worse CSS were **black race** (HR: 1.649, p<0.001), **stage III disease** (HR: 2.24, p<0.001), **mucinous histology** (HR: 1.58. p<0.001), **signet-ring cell histology** (HR: 2.71, p<0.001**), poorly differentiated carcinomas** (HR: 2.01, p=0.001**), undifferentiated carcinomas** (HR: 1.74, p=0.036), **perineural invasion** (HR: 2.30, p<0.001**), neoadjuvant radiation therapy** (HR: 1.58, p=0.004), and **neoadjuvant systemic therapy** (HR: 2.07, p=0.013).

Conclusions

Elevated Pretreatment CEA:

- Independently reduced 5-year CSS in young-onset CRC
- Has a significant negative impact in stage I disease, with larger reductions in survival observed with **adjuvant radiotherapy** and **neoadjuvant systemic therapy**.

Clinical Implications:

- Physicians should consider personalized treatment for young-onset CRC with elevated CEA, potentially including more aggressive surveillance or therapy, especially for stage I CRC patients.