Original Article

Comparison of Overall Survival Between Vectibix and Erbitux in the Treatment of Metastatic Colorectal Cancer: A Retrospective Cohort Study from the TriNetX Global Collaborative Networks

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Key Words
Metastatic colorectal cancer;
Vectibix;
Panitumumab;
Erbitux;
Cetuximab

Purpose. In metastatic colorectal cancer (mCRC), EGFR inhibitors such as Vectibix (panitumumab) and Erbitux (cetuximab) are standard treatments for RAS wild-type patients. Despite their widespread use, differences in efficacy remain unclear. This study analyzed TriNetX real-world data to compare overall survival between the two agents.

Methods. This study used TriNetX data from 100 healthcare organizations to compare overall survival between patients with metastatic colorectal cancer treated with Erbitux (n = 2,397) or Vectibix (n = 1,988) from 2015 to 2025. Patients were identified by ICD-10 codes (C18-C20), and cohorts were defined by treatment exposure. Propensity score matching was used to balance baseline characteristics. Hazard ratios (HR) with 95% confidence intervals (95% CI) were calculated for outcomes of effectiveness, and the Kaplan-Meier method was used to assess survival probability.

Results. Before propensity score matching (PSM), the Erbitux and Vectibix groups included 2,397 and 1,988 patients, respectively. After matching, both groups were balanced with 1,770 patients each. There was no significant difference in overall survival between the Erbitux and the Vectibix groups observed in the Kaplan-Meier analysis both before and after PSM. The median survival days was 765 days in the Erbitux group and 703 days in the Vectibix group. The estimated hazard ratio was 0.982 (95% CI, 0.899-1.072; $p = 0.964$), indicating comparable survival outcomes between the two treatment groups. Cox regression analysis in the combined Erbitux and Vectibix cohorts identified older age, Crohn's disease, ulcerative colitis and malignant neoplasm of the ascending colon as significant predictors of mortality.

Conclusions. Our findings indicate that there was no significant difference in overall survival between patients with metastatic colorectal cancer (mCRC) treated with cetuximab (Erbitux) and those treated with panitumumab (Vectibix). Further validation is needed.

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In the treatment of metastatic colorectal cancer (mCRC), epidermal growth factor receptor (EGFR) inhibitors have become a standard therapy. Erbitux (cetuximab) and Vectibix (panitumumab) are the two most commonly used EGFR monoclonal antibodies in clinical practice, and both are approved for use in RAS wild-type (WT) mCRC. Although both Vectibix and Erbitux act on EGFR, they differ in antibody structure — Vectibix is a fully human IgG2 antibody, whereas Erbitux is a chimeric IgG1. These structural distinctions may influence how each drug interacts with the immune system, potentially resulting in different side effect profiles and variations in therapeutic efficacy. The overall survival difference between Erbitux and Vectibix remains inconclusive in current research. This study, conducted using the TriNetX global federated health research network, compares the outcomes of metastatic colorectal cancer patients treated with either cetuximab (Erbitux) or panitumumab (Vectibix).

Patients and Methods

Data were collected from 100 healthcare organizations (HCOs) within the Research network (TriNetX), and the electronic medical records from 2,397 patients in the Erbitux cohort and 1,988 patients in the Vectibix cohort were analyzed. TriNetX is a cloud-based global health research and analytics platform that merges de-identified electronic health records, insurance claims, and clinical-trial data into longitudinal patient-level datasets. As of June 2025, its Global Collaborative Network spans at least 23 live countries — including the United States, Brazil, Colombia, the United Kingdom, Belgium, Bulgaria, Estonia, France, Georgia, Germany, Italy, Lithuania, Poland, Spain, Israel, Ghana, the United Arab Emirates, Australia, India, Japan, Malaysia, Singapore, and Taiwan — with additional sites in Argentina, Chile, and Mexico slated to onboard, bringing the total toward 30. Researchers, healthcare organizations, and pharmaceutical companies can securely define cohorts with granular inclusion and exclusion criteria, apply the platform's built-in propensity-score-matching algorithm to mitigate confounding, and compare outcomes across specified timeframes. Because all data are fully de-identified, most studies do not require institutional-review-board approval; routine quality audits ensure completeness and accuracy, and the dataset's validity has been documented in peer-reviewed literature.[13] All procedures in the present study adhered to the Declaration of Helsinki.

As illustrated in Fig. 1, we identified adults (≥ 18 years) of any sex who were diagnosed with colorectal cancer (CRC) between 1 January 2015 and 28 February 2025. Patients were captured by ICD-10-CM codes

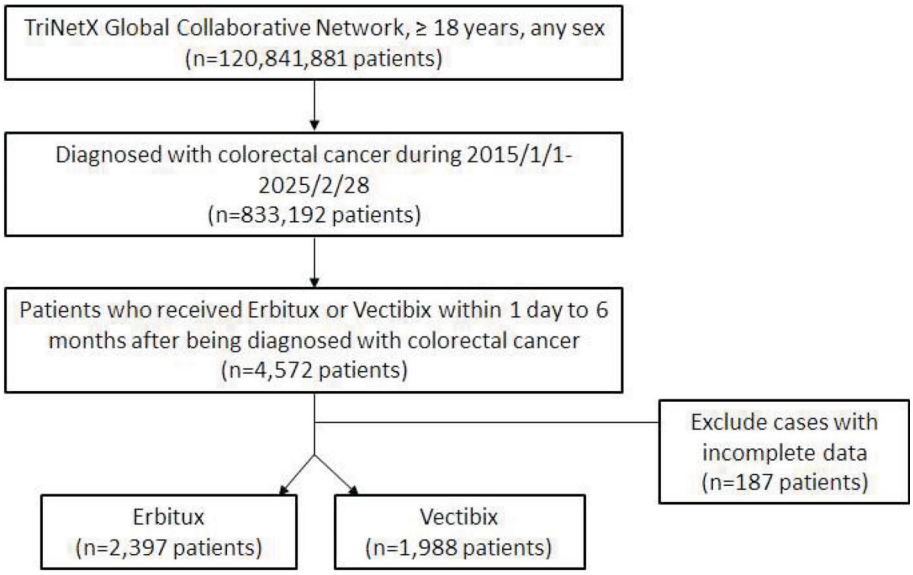

Fig. 1. Patients selection algorithm.

C18 (malignant neoplasm of colon), C19 (rectosigmoid junction), and C20 (rectum), yielding an initial dataset of 833,192 individuals. The index date for first-line therapy was defined as the initiation of systemic treatment within six months after diagnosis. Two mutually exclusive treatment cohorts were constructed: the Erbitux cohort comprised patients who received cetuximab without concomitant panitumumab or bevacizumab, whereas the Vectibix cohort comprised patients who received panitumumab without cetuximab or bevacizumab. Of the 4,572 patients who satisfied these exposure criteria, 4,385 with complete data were retained for the final analysis. The primary outcome was overall survival (OS). OS was defined as the duration from the index date to the date of death from any cause, or censored at the end of study, whichever happened first. Propensity score matching was applied to balance baseline demographics and comorbidities between cohorts. Demographics included age at index, male/female, whether Hispanic or Latino, whether White, whether unknown race. Comorbidities were identified using ICD-10-CM: K55-K64 for other disease of intestines, ICD-10-CM: K70-K77 for diseases of liver, ICD-10-CM: I10-I1A for hypertensive diseases, ICD-10-CM: I10-I15 for hypertensive diseases, ICD-10-CM: I20-I25 for ischemic heart diseases, ICD-10-CM: I60-I69 for cerebrovascular diseases, ICD-10-CM: E08-E13 for diabetes mellitus, ICD-10-CM: E70-E88 for metabolic disorders, ICD-10-CM: G00-G99 for diseases of the nervous system, ICD-10-CM: J00-J99 for diseases of the respiratory system, ICD-10-CM: M00-M99 for diseases of the musculoskeletal system and connective tissue. We also applied a Cox proportional hazards model to evaluate the impact of each covariate on overall survival. Covariates included male, age at index, diabetes mellitus, smoking and tobacco use, Crohn's disease (ICD-10-CM: K50), ulcerative colitis (ICD-10-CM: K51), malignant neoplasm of ascending colon (ICD-10-CM: C18.2), malignant neoplasm of transverse colon (ICD-10-CM: C18.4), malignant neoplasm of descending colon (ICD-10-CM: C18.6), malignant neoplasm of rectosigmoid junction (ICD-10-CM: C19), malignant neoplasm of sigmoid colon (ICD-10-CM: C18.7), malignant neoplasm of rectum (ICD-10-CM: C20).

Measure of association analysis

The measure of association analysis compares how often a specific outcome occurs in two patient cohorts. It reports the number of patients in each cohort, how many had the outcome within a set time, and the risk (patients with outcome divided by total patients). It also shows the risk difference, risk ratio, and odds ratio between the cohorts. A bar chart displays the outcome risk for both groups.

Survival analysis

The Kaplan-Meier analysis estimates the chance of an outcome over time using daily intervals. Patients who leave the cohort during the period are censored, meaning they are excluded after their last recorded data. The summary shows the number of patients in each cohort, how many had the outcome, median survival time (days until survival drops below 50%, or "–" if it doesn't), and survival rate at the end of the time window. Additional results include the log-rank test, hazard ratio, and a test for proportionality.

Ethics in research

Our study was approved by the Institutional Review Board (IRB) of Taichung Veterans General Hospital (number: CE25400A). Given information for patient identification was not provided on the TriNetX platform, the IRB waived the requirement for informed consent.

Results

Baseline characteristics of study subjects before and after propensity score matching

Before propensity score matching, there were 2397 patients in the Erbitux group and 1988 in the Vectibix group. As presented in Table 1, after matching, both groups were balanced to include 1770 patients each for further analysis. The average follow-up duration was 654 days for Erbitux and 586 days for Vectibix

Table 1. Baseline characteristics of study subjects before and after propensity score matching

	Before matching			After matching		
	Erbitux group (n = 2397) n% or mean ± SD	Vectibix group (n = 1988) n% or mean ± SD	*p* value	Erbitux group (n = 1770) n% or mean ± SD	Vectibix group (n = 1770) n% or mean ± SD	*p* value
Demographic data						
Age at index (y/o)	60.7 ± 12.9	60.0 ± 13.2	0.099	60.3 ± 13.1	60.2 ± 13.2	0.794
Male	1,346 (59.0%)	1,171 (58.9%)	0.944	1,047 (59.2%)	1,039 (58.7%)	0.785
Race or ethnicity						
White	1,067 (46.9%)	1,117 (56.2%)	< 0.001	927 (52.4%)	936 (52.9%)	0.762
Unknown race	502 (22%)	341 (17.2%)	< 0.001	324 (18.3%)	331 (18.7%)	0.762
Not Hispanic or Latino	1,285 (56.3%)	1,287 (64.7%)	< 0.001	1,107 (62.5%)	1,095 (61.9%)	0.677
Diagnosis						
Other diseases of intestines	1,152 (50.5%)	1,186 (59.7%)	< 0.001	1,003 (56.7%)	1,004 (56.7%)	0.973
Diseases of liver	546 (23.9%)	637 (32%)	< 0.001	517 (29.2%)	510 (28.8%)	0.795
Diseases of peritoneum and retroperitoneum	273 (12.0%)	298 (15.0%)	0.004	245 (13.8%)	237 (13.4%)	0.695
Hypertensive diseases	822 (36.0%)	880 (44.3%)	< 0.001	733 (41.4%)	736 (41.6%)	0.918
Ischemic heart diseases	295 (12.9%)	294 (14.8%)	0.079	263 (14.9%)	248 (14.0%)	0.473
Cerebrovascular diseases	114 (5.0%)	114 (5.7%)	0.286	98 (5.5%)	98 (5.5%)	1
Diabetes mellitus	385 (16.9%)	403 (20.3%)	0.004	331 (18.7%)	332 (18.8%)	0.966
Metabolic disorders	937 (41.1%)	1,008 (50.7%)	< 0.001	844 (47.7%)	834 (47.1%)	0.736
Diseases of the nervous system	949 (41.6%)	1,069 (53.8%)	< 0.001	894 (50.5%)	878 (49.6%)	0.591
Diseases of the respiratory system	817 (35.8%)	855 (43.0%)	< 0.001	727 (41.1%)	708 (40%)	0.515
Diseases of the musculoskeletal system and connective tissue	871 (38.2%)	928 (46.7%)	< 0.001	778 (44.0%)	774 (43.7%)	0.892

before matching, and 668 days and 582 days, respectively, after matching (Table 2). Before propensity score matching, there were significant baseline differences between the Erbitux and Vectibix groups across several characteristics. Although age (Erbitux: 60.7, Vectibix: 60.0; $p = 0.099$) and sex distribution ($p = 0.944$) were similar, the proportion of White patients was significantly higher in the Vectibix group than in the Erbitux group ($p < 0.001$). These included diseases of intestines, disease of liver, hypertensive disease, metabolic disorders, disorders of the nervous and musculoskeletal systems ($p < 0.001$), diseases of peritoneum and retroperitoneum ($p = 0.004$), diabetes mellitus ($p = 0.004$).

After propensity score matching, these differences were no longer statistically significant, with balanced distributions across all baseline variables, including age ($p = 0.794$), sex ($p = 0.785$), race and ethnicity, and all listed comorbid conditions (all p-values > 0.05). The matching process successfully balanced baseline characteristics, allowing for more reliable comparisons between the treatment groups.

Table 2. Follow-up time

	Before matching		After matching	
	Erbitux group	Vectibix group	Erbitux group	Vectibix group
Mean follow-up (days)	654.841	586.700	668.332	582.216
Standard deviation	729.046	638.652	746.831	639.952

There was no significant difference in overall survival between the Erbitux and Vectibix groups observed in the Kaplan-Meier analysis before matching. As shown in Fig. 2, the survival probability was compared between patients treated with Erbitux (purple line) and Vectibix (green line). The median survival days was 765 days in the Erbitux group and 703 days in the Vectibix group. The estimated hazard ratio was 0.982 (95% CI, 0.899-1.072; $p = 0.964$), indicating comparable survival outcomes between the two treatment groups.

After propensity score matching, the median survival days was 731 days in the Erbitux group and 740

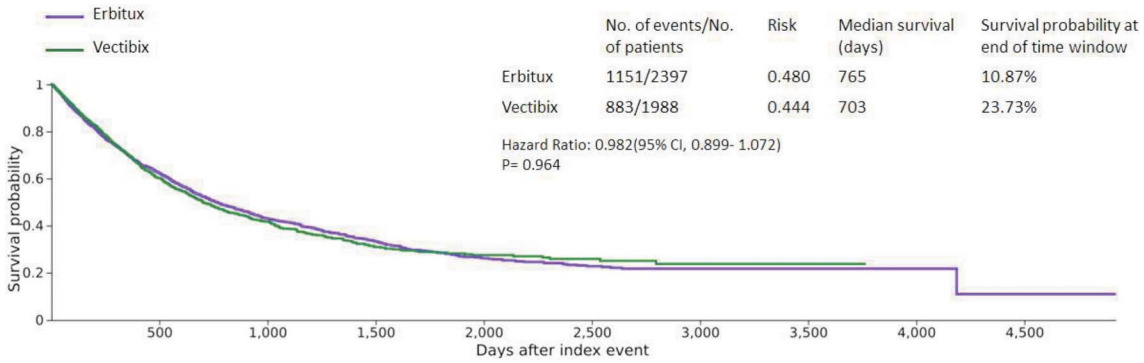

Fig. 2. Overall survival (before matching).

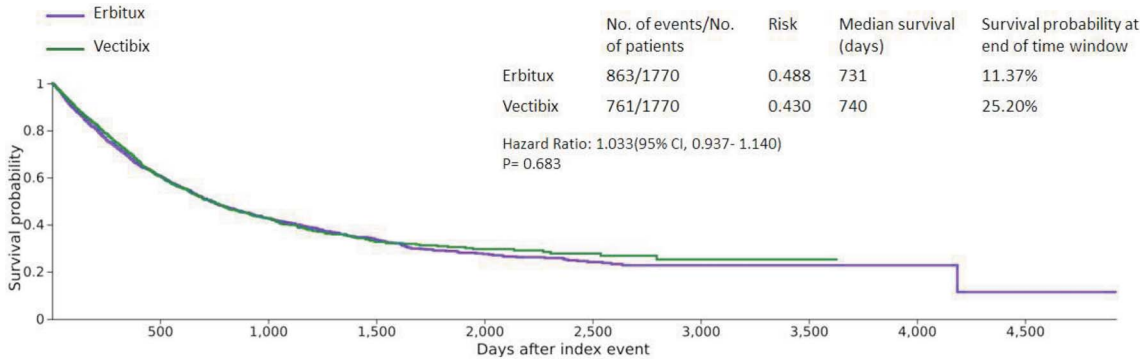

Fig. 3. Overall survival (after matching).

days in the Vectibix group. The overall survival after matching revealed that treatment with panitumumab was not associated with a statistically significant improvement in overall survival compared to cetuximab (HR = 1.033; 95% CI, 0.937-1.140; $p = 0.683$), suggesting therapeutic equivalence between the two anti-EGFR monoclonal antibodies in this cohort.

As shown in Table 3, the Cox proportional hazards analysis of the combined Erbitux and Vectibix cohorts identified four covariates significantly associated with increased mortality: older age at index, Crohn's disease, ulcerative colitis, and malignant neoplasm of the ascending colon. Older age at index was associated with higher mortality (HR = 1.008, 95% CI 1.004-1.011; $p < 0.0001$). Likewise, the presence of Crohn's disease significantly increased the risk of death (HR = 1.50, 95% CI 1.023-2.200; $p = 0.0380$). Ulcerative colitis conferred an even greater risk (HR = 2.01, 95% CI 1.466-2.755; $p < 0.0001$). Finally, malignant neoplasm of the ascending colon was also linked to elevated mortality (HR = 1.28, 95% CI 1.113-1.472; $p = 0.0005$). Other variables, including male sex (HR = 1.056, $p = 0.2416$), smoking and tobacco use (HR = 1.059, $p = 0.8427$), malignant neoplasm of transverse colon (ICD-10-CM: C18.4), malignant neoplasm of descending colon (ICD-10-CM: C18.6), malignant neoplasm of sigmoid colon (ICD-10-CM: C18.7), malignant neoplasm of rectosigmoid junction (ICD-10-CM: C19), malignant neoplasm of rectum (ICD-10-CM: C20) did not show a significant relationship with mortality. These findings highlight older age at index, Crohn's disease, ulcerative colitis as significant predictors of mortality in the combined Erbitux and Vectibix cohorts. Moreover, compared to other tumor locations, patients diagnosed with a malignant neoplasm of the ascending colon had significantly poorer overall survival.

Discussion

Our findings demonstrated that in patients with mCRC, overall survival did not differ significantly between the Erbitux and Vectibix treatment groups

Table 3. Cox proportional hazards model result: combined Erbitux and Vectibix cohort

Covariate	Hazard ratio	Coefficient	Standard error	z	$p > \|z\|$	95% cofidnece interval
Male	1.056	1.054	0.046	1.171	0.242	(0.964, 1.156)
Age at index	1.008	0.008	0.002	4.147	0.000	(1.004, 1.011)
Diabetes mellitus	1.030	0.030	0.059	0.508	0.611	(0.918, 1.156)
Crohn's disease	1.500	0.405	0.195	2.074	0.038	(1.023, 2.200)
Ulcerative colitis	2.010	0.698	0.161	4.338	0.000	(1.466, 2.755)
Malignant neoplasm of ascending colon	1.280	0.247	0.071	3.467	0.001	(1.113, 1.472)
Malignant neoplasm of transverse colon	1.080	0.077	0.099	0.779	0.436	(0.890, 1.310)
Malignant neoplasm of descending colon	0.955	-0.046	0.083	-0.554	0.580	(0.812, 1.124)
Malignant neoplasm of sigmoid colon	0.948	-0.054	0.051	-1.043	0.297	(0.857, 1.048)
Malignant neoplasm of rectosigmoid junction	0.990	-0.010	0.049	-0.214	0.830	(0.900, 1.089)
Malignant neoplasm of rectum	1.063	0.061	0.048	1.270	0.204	(0.967, 1.168)

(HR = 0.982; 95% CI, 0.899-1.072; $p = 0.964$). A meta-analysis, which collected relevant records from six search engines, identified no significant difference in overall survival between the Erbitux arm and the Vectibix arm in the treatment of KRAS wild-type metastatic colorectal cancer ($p = 0.14$).[2] In a nationwide database study who received cetuximab or panitumumab as first-line targeted agent-based therapy (case number 318 vs. 1749), overall survival and conversion surgery rates were similar between the cetuximab [hazard ratio (HR) = 0.96] and panitumumab groups (HR = 1.00) among patients with metastatic colorectal cancer.[1] Furthemore, a 2024 Australian multicentre cohort of left-sided, RAS-wild-type mCRC treated with first-line EGFR inhibitor either cetuximab and panitumumab as first-line therapy found survival outcomes did not differ significantly (median OS 30.1 months vs. 38.2 months, HR 0.99, $p = 0.98$).[3] According to several studies, the effect of Erbitux and Vectibix on overall survival may differ under certain conditions — for example, whether patients have previously received bevacizumab. In a retrospective study involving two institutions, panitumumab demonstrated a more favorable median overall survival compared to cetuximab in patients who had received bevacizumab within the preceding six months (median overall survival, 13.3 vs. 11.5 months; $p = 0.043$).[4] These findings are also supported by another combined analysis based on individual patient data from the ASPECCT and WJOG6510G trials, which reported a survival advantage associated with panitumumab compared to cetuximab in mCRC patients with prior exposure to bevacizumab (median overall survival, 12.8 vs. 10.1 months; $p = 0.0031$).[5] However, our study enrolled patients who received Erbitux or Vectibix as first-line therapy after their colorectal cancer diagnosis and had no prior exposure to bevacizumab, making our inclusion criteria distinct from those of the aforementioned study.

There are several covariates that may influence mortality risk in patients treated with Ertibux or Vectibix. In our cohort, older age, Crohn's disease, ulcerative colitis, and tumors arising in the ascending colon each independently predicted higher mortality among patients treated with cetuximab or panitumumab. These observations are consistent with previous work. A multicenter analysis showed that patients aged ≥ 60 years fare worse than younger patients, a disparity partly explained by a higher reliance on best-supportive care and less-intensive treatment regimens in older individuals.[12] Regarding inflammatory bowel disease (IBD), a systematic review reported a 33% increase in overall mortality for IBD-associated colorectal cancer (CRC) compared with non-IBD-associated CRC (HR = 1.33, 95 % CI 1.20-1.47),[6] and a study of 7,202 CRC cases confirmed this adverse effect even after adjusting for stage or restricting the analysis to medically verified IBD.[7] A nationwide population-based cohort reached the same conclusion, demonstrating elevated mortality among CRC patients with underlying IBD.[8] Finally, numerous reports have shown that right-sided colon cancers have a poorer prognosis than left-sided

lesions;[9-11] our finding that malignant neoplasm of the ascending colon confers an increased hazard of death aligns with this established right-versus-left survival disparity.

This study has several limitations intrinsic to its retrospective cohort design and reliance on TriNetX data. Because the analysis is retrospective, causal inferences cannot be firmly drawn and selection bias may persist. Key clinical details were unavailable in the ICD-coded electronic health records — such as ECOG performance status, cancer stage, number of metastatic sites, surgical procedures (e.g., primary-tumor resection, metastasectomy), histopathology, combination regimens (chemotherapy, other targeted agents, or immunotherapy), treatment cycles, drug dosages, KRAS mutation status, BRAF mutation status — leaving important confounders unmeasured; off-label drug use also went undetected. Platform constraints prevented a full multivariable model, so residual confounding may remain despite propensity-score matching. These shortcomings highlight the need for prospective studies that integrate detailed clinical, treatment, and molecular data to confirm and extend our findings.

Conclusion

In conclusion, our findings indicate that there was no significant difference in overall survival between patients with metastatic colorectal cancer (mCRC) treated with cetuximab (Erbitux) and those treated with panitumumab (Vectibix). Further studies are warranted to confirm this observation.

Declaration of Interests

We declare no competing interests.

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原　著

利用 TriNetX 資料庫，比較治療轉移性結腸直腸癌使用 Vectibix 與 Erbitux 的整體存活率

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目的　在轉移性結腸直腸癌的治療中，表皮生長因子受體抑制劑，如 Vectibix (維必施) 與 Erbitux (爾必得舒)，為 RAS 野生型患者的標準治療選擇，但其兩者之療效差異仍不明確。本研究利用 TriNetX 資料庫，對上述兩種藥物進行整體存活率的比較分析。

方法　本研究使用 TriNetX 資料庫，比較 2015 年至 2025 年間接受 Erbitux 或 Vectibix 治療之轉移性大腸直腸癌患者的整體存活率。患者根據 ICD-10 診斷碼 (C18-C20)，進行篩選與納入分析，並依據所接受的治療分為兩組。為調整兩組之間的基準特徵，採用傾向分數配對進行調整。效益結果以風險比及其 95% 信賴區間表示，並利用 Kaplan-Meier 法估計存活機率。

結果　在傾向分數配對前，Erbitux 組與 Vectibix 組分別包含 2,397 與 1,988 名患者；配對後，兩組皆平衡為 1,770 名患者。在傾向分數配對 (PSM) 前後的 Kaplan-Meier 分析中，Erbitux 組與 Vectibix 組的整體存活率並無顯著差異。Erbitux 組的中位存活時間為 765 天，Vectibix 組為 703 天。估計風險比為 0.982 (95% 信賴區間：0.899-1.072，$p = 0.964$)，顯示兩組治療的存活結果相當。Cox 迴歸分析進一步指出，合併 Erbitux 與 Vectibix 組分析後，年紀較大、克隆氏病、潰瘍性結腸炎及升結腸惡性腫瘤為顯著的死亡預測因子。

結論　本研究結果顯示，Erbitux 或 Vectibix 於治療轉移性大腸直腸癌 (mCRC) 患者，其整體存活率並無顯著差異；然而，仍需進一步研究加以驗證。

關鍵詞　轉移性結腸直腸癌、維必施、爾必得舒。