

# TUMOR BUDDING AND TUMOR INFILTRATING PATTERNS: CORRELATION WITH LYMPH NODE INVOLVEMENT IN COLORECTAL CANCER

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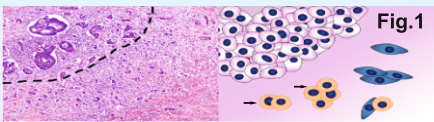
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## INTRODUCTION

**Tumor Budding (TB):** Defined as single tumor cells or clusters of up to four cells at the invasive front of the tumor.

**Significance:** TB is an independent prognostic factor in colorectal cancer (CRC) and is classified by the International Consensus Conference on Tumor Budding (ITBCC)[1] Fig1

- o **Bd1** (Low Budding): 0-4 buds
- o **Bd2** (Intermediate Budding): 5-9 buds
- o **Bd3** (High Budding): 10 or more buds



**Biological Role:** TB is associated with epithelial-mesenchymal transition (EMT), contributing to migration, stromal lysis, and vascular invasion.

**Tumor Infiltrating Patterns (TIP) [2]:**

Examined at low-power magnification and categorized as:

- o **TIPa** (Expansile) Fig2 A,C - well circumscribed invasive margin.
- o **TIPb** (Intermediate/Infiltrative) Fig2 B,D - medium to large-sized glands invaded and the tumor border is not distinct.



## METHODS

➤ **Study Design:** Retrospective analysis of 60 CRC patients who underwent surgery.

➤ **Assessment:**

- Hematoxylin and eosin (H&E) stained slides from all patients, diagnosed and operated between 2020 and 2024, were reevaluated for Tumor budding (TB) and Tumor invasive patterns (TIP). From at least 10 individual fields one hotspot (measuring 0.785 mm<sup>2</sup>) identified at the invasive front of the tumor- counting the number of buds results in a score that can be classified as Bd1 (0-4 buds, low budding), Bd2 (5-9 buds, intermediate budding) or Bd3 (10 or more buds, high budding).
- TB- graded as low, intermediate, or high, while TIP categorized as TIPa (expansile) and TIPb (intermediate/infiltrative).

➤ **Statistical Analysis:** SPSS IBM 29.0.10, Chi-square tests, Fisher exact test were used to determine correlations of TB and TIP with lymph node involvement, LVI and PNI.

## RESULTS

➤ In our study of **60 CRC** patients (55% male, median age 54 years), tumor budding was observed in **80%** of cases.

➤ Nodal positivity was significantly associated with increasing tumor budding: **42% in low budding, 88% in intermediate, and 100% in high budding cases** ( $p=0.018$ ,  $\chi^2=11.1$ ).

➤ Tumor budding is a **strong predictor of nodal** involvement, with the odds of nodal positivity increasing more than **14-fold with higher tumor budding** (**OR=14.240, 95% CI: 1.679–120.767**,  $p=0.015$ ), and also significantly predicted LVI positivity (**OR=0.228, 95% CI: 0.067–0.773**,  $p=0.018$ ).

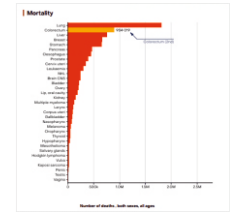
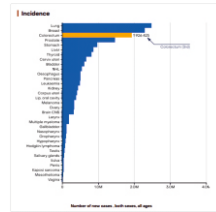
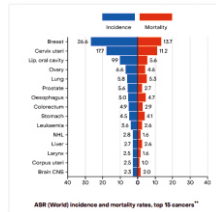
➤ Tumor Infiltrating Pattern (TIP) showed no significant association with LVI or nodal status.

## OBJECTIVE

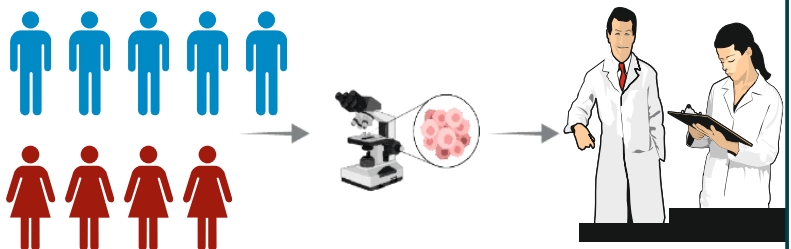
To estimate the correlation between **TB, TIP and lymph node involvement, Lymphovascular invasion (LVI), Perineural invasion (PNI)** in CRC.

## CONCLUSION

- The degree of tumor budding is significantly correlated with lymph node involvement in colorectal cancer.
- Both tumor budding and invasive growth patterns should be considered crucial prognostic factors for guiding treatment strategies in CRC.
- Despite advancements in molecular pathology, tumor morphology remains crucial for understanding tumor behavior and prognosis.



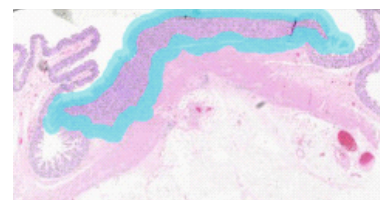
## GLOBOCON 2022



60 CRC patients

TB and TIP assessment

TWO pathologists



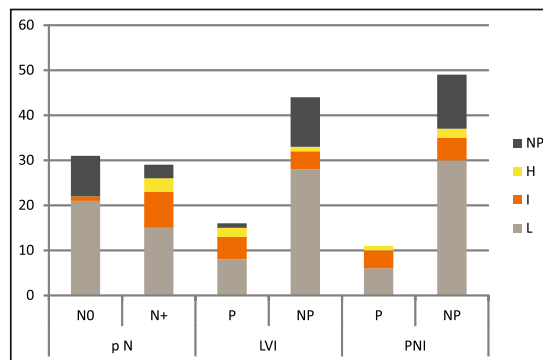
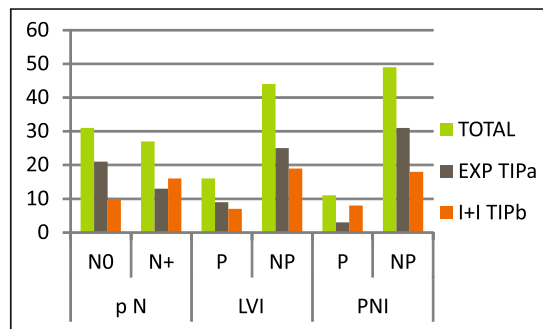
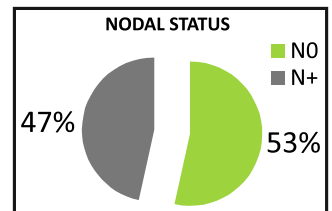
Invasive front detection

TB and TIP assessment



COLON - 41  
RECTUM - 13

LOCATION



Correlating TB, TIP with N status, LVI, PNI

Scan here for  
References and Discussion

