# ROLE OF RESIDUAL CANCER BURDEN IN PREDICTING LONG TERM OUTCOMES OF BREAST CANCER AFTER NEO-ADJUVANT CHEMOTHERAPY FOLLOWED BYSURGERY: AN AMBISPECTIVE STUDY

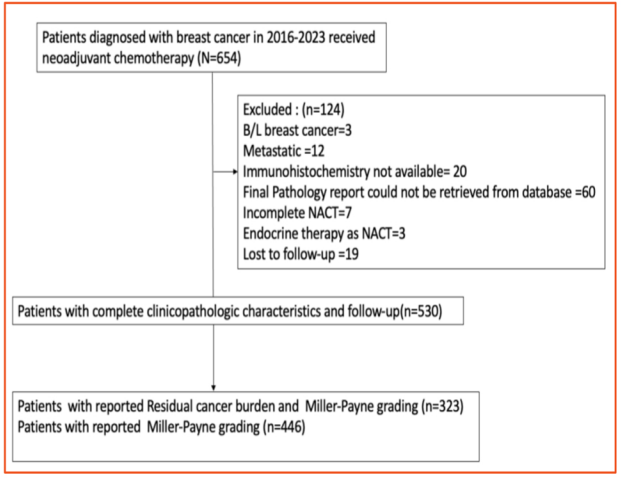
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## Introduction

- NACT offers several advantages: improving operability, increasing the feasibility of breast-conserving surgery, reducing axillary surgery, and allowing in-vivo assessment of treatment response.
- Pathological complete response (pCR), defined as the absence of residual invasive disease in the breast and axilla.
- Several pathological grading systems—such as Miller-Payne, Pinder, AJCC, Neo-Bioscore, and MNPI—attempt to stratify prognosis after NACT but have limitations.
- The Residual Cancer Burden (RCB) scoring system, introduced in 2007, integrates breast and nodal disease into a continuous, reproducible index and has shown superior prognostic accuracy.
- This study aimed to evaluate the role of RCB in predicting long-term survival outcomes in breast cancer patients treated with NACT and to compare its performance with the Miller-Payne grading system across molecular subtypes.




## Material and Methods

**Primary Objective**

- To study the role of RCB in predicting 5 year-survival outcomes of breast cancer patients after NACT followed by surgery.

**Secondary Objectives**

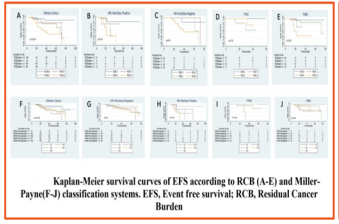
- To assess the role of RCB in stratifying prognosis of patients with different molecular class in terms of EFS, DRFS and OS rate.
- To compare RCB and Miller Payne criteria scoring system in predicting 5 year survival.

**Study Design**

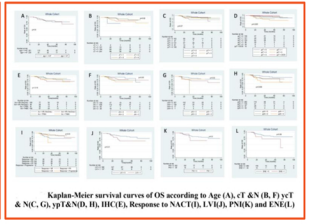
- Ambispective observational study

## Results

- The rate of 6-years EFS, DRFS and OS were 87%, 90% and 92.6%. In General, the high RCB and low Miller-Payne Grade classes were associated with low rates of EFS, DRFS and OS.
- 6-year EFS for RCB-0 was 96.6% vs RCB-3(71.1%) with HR of 9.83 (p=0.000, CI, 3.3329.04), however there was no statistically significant difference between 0/pCR and RCB1(p=0.07).
- For the Miller-Payne system, the prognosis of patients with G5 was good. The lower the G grade, the worse the prognosis.
- On subgroup analysis, HR-/Her2 Neu positive and TNBC were associated with worse 6-year EFS rate of 79.8% and 85.3% in comparison to HR+/Her2 Neu Negative (95.1%) with increased HR, 1.91(p=0.041, CI, 1.023.56) and 1.34 (p=0.307, CI, 0.76-2.39) respectively.
- Patients with triple positive breast cancer (TPBC) were having good EFS rate in comparison to HR+/Her2 Neu Negative with HR 0.54 (p=0.213, CI, 0.20-1.42), but it was not statistically significant.



Kaplan-Meier survival curves of EFS according to RCB (A-E) and Miller-Payne(F-J) classification systems. EFS, Event free survival; RCB, Residual Cancer Burden



Kaplan-Meier survival curves of OS according to Age (A), cT &N (B, F) ycT & N(C, G), ypT&N(D, H), IHC(E), Response to NACT(I), LVI(J), PNI(K) and ENE(L)

- 6-year DRFS for RCB-0 was 97.5% vs RCB-2(89.9%) vs RCB-3(78.9%) with HR 4.18 (p<0.03, CI, 1.1-15.4) and 9.99 (p<0.001, CI, 2.8-35.3) respectively, however there was no statistically significant difference between 0/pCR and RCB-1(p=0.17).
- For the Miller-Payne system, the prognosis of patients with G5 was good. The lower the G grade, the worse the prognosis.
- Rate of OS of patients with RCB-0, RCB2 and RCB-3 were 97.5%, 94% and 86.7% with HR of 2.27 (p=0.247, CI, 0.56-9.18) and 5.57(p=0.010, CI, 1.5-20.62) respectively.
- In our study we have found that the initial tumour size cT, cN, IHC, ycT, ycN, presence of LVI, PNI and ENE were important predictor of RCB score with p<0.05.
- On multivariate analysis, IHC, post chemo tumour size (ycT) and presence of LVI were found to have the ability to predict the RCB score with significant p value (<0.001). Her2 Neu Positive and TNBC were associated with low RCB score suggesting higher response rate with odds ratio <1, while ycT and presence of LVI were associated with increased RCB score with odds ratio >1.
- Factors such as age, gender, marital status, breastfeeding and menopausal status were not affected the RCB score significantly

## Discussion

- Higher RCB scores were strongly associated with poorer survival outcomes across the cohort.
- Six-year OS declined from 97.5% (RCB-0) to 94% (RCB-2) and 86.7% (RCB-3), with HR 2.27 and 5.57 respectively. Similar gradients were seen for EFS (96.6% vs 71.1%, HR=9.83) and DRFS (97.5% vs 78.9%, HR=9.99).
- No significant difference was observed between RCB-0 and RCB-1, consistent with prior studies.
- RCB outperformed Miller-Payne in EFS, DRFS and OS prediction across most molecular subtypes, with significantly higher C-index values (p=0.04 for EFS).

## Conclusion

- The RCB score demonstrated superior and consistent prognostic accuracy over the Miller-Payne system for predicting EFS, DRFS, and OS, especially in TNBC and HER2-positive subtypes. Overall, RCB emerged as a robust independent predictor, supporting its broader clinical use in personalised post-NACT treatment planning

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**References:**

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