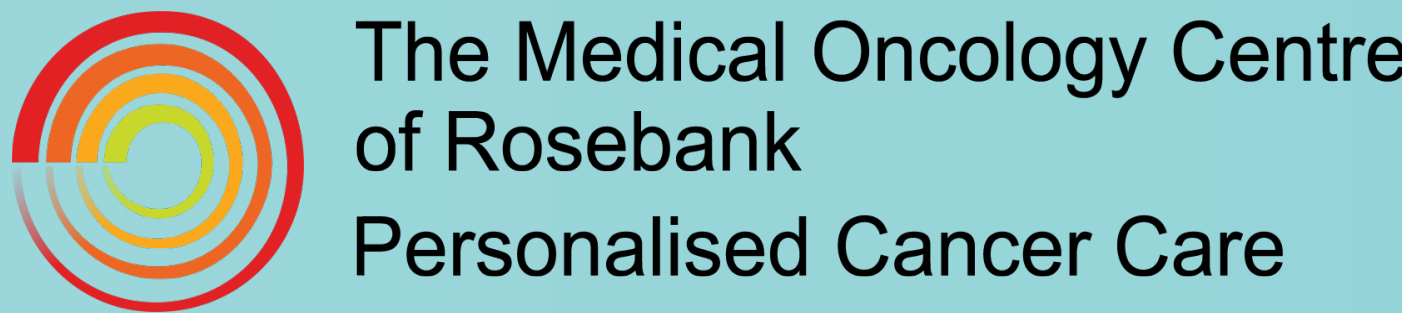


# Correlation of breast sonographic measurements and pathological complete response in triple-negative breast cancer patients undergoing neoadjuvant chemotherapy.



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## Background

- ▶ Pathological complete response (pCR) following neoadjuvant chemotherapy (NAC) is associated with long-term survival in patients with triple-negative breast cancer (TNBC).
- ▶ Ultrasound (US) offers significant information in monitoring response to NAC as a complement to conventional tumor assessment by physical examination.

## Methods

- ▶ This is a single-institution, retrospective cohort study.
- ▶ Our objective was to determine whether volumetric measurement by US, of the pre-treatment breast tumor size, post-cycle two, post-cycle four, and at completion of NAC, predicted pCR.
- ▶ Three-dimensional measurements were used to calculate the volume index (mm³).
- ▶ The percentage change between pre-treatment and cycle 2, pre-treatment and cycle 4, and pre-treatment and completion of treatment was calculated.
- ▶ Patients were treated with taxane, anthracycline, and alkylating agent-based NAC.
- ▶ Ethics approval was obtained from Pharma-Ethics, Pretoria, South Africa (ethics committee working according to the South African Ethics regulations).

## Statistical Analysis

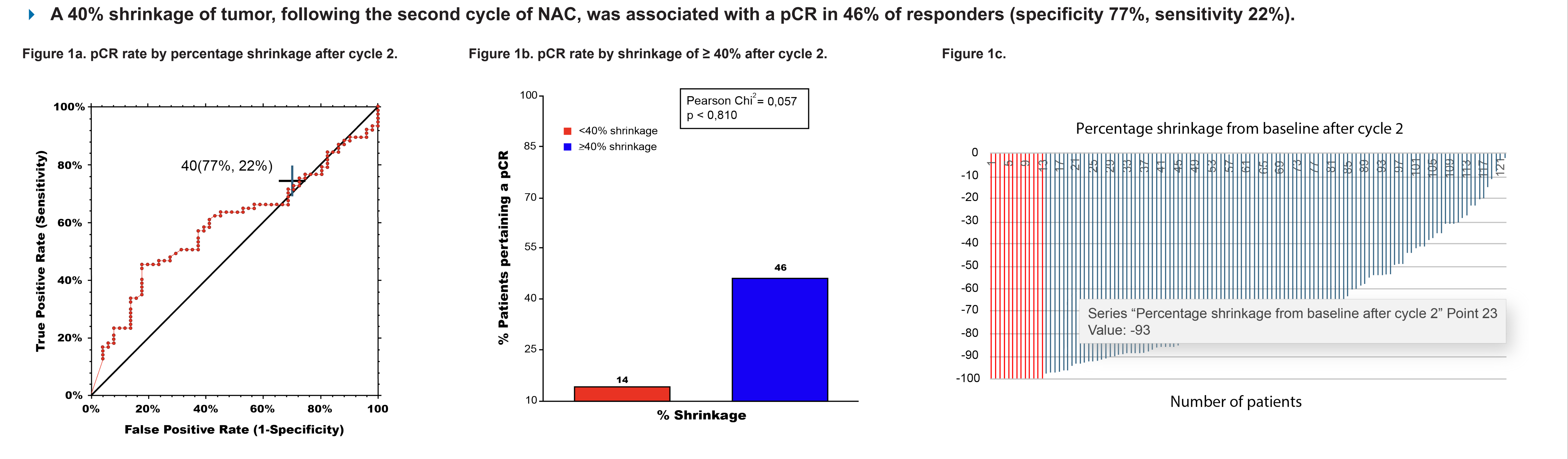
- ▶ Receiving operating characteristics (ROC) analysis was used to determine the association between pCR and percentage of tumor shrinkage.
- ▶ Fisher's exact or Chi-squared tests were used for the analysis of categorical variables, including pCR.
- ▶ Statistical analysis was performed using NCSS version 11 and statistical tests used the significance level of 0.05.

## Results

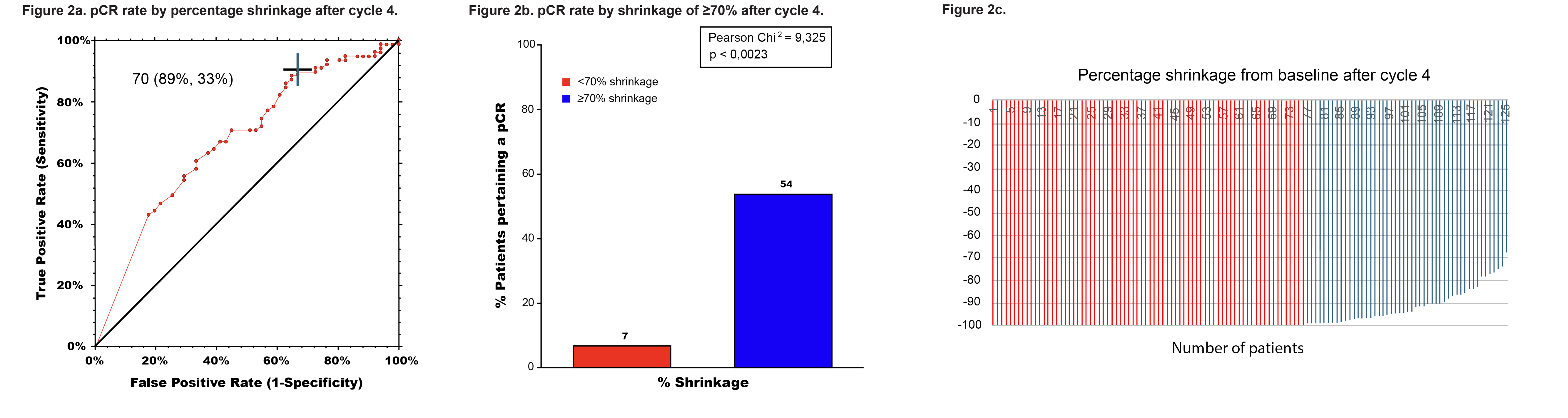
Table 1. Patient Demographics.

| Patient Demographics (n = 140)              |                              |         |
|---------------------------------------------|------------------------------|---------|
| Age (years)                                 |                              |         |
| Median age 50,5 years (range 26 - 85 years) |                              |         |
| Post-Menopausal                             | 77                           | 55%     |
| Pre-Menopausal                              | 63                           | 45%     |
| BMI (m²)                                    |                              |         |
| Median 27,8m2 (16,3 - 54,4m2)               |                              |         |
| Ki67 (%)                                    |                              |         |
| 15%-39%                                     | 25                           | 18%     |
| <14%                                        | 3                            | 2%      |
| >40%                                        | 111                          | 79%     |
| Tumor Size                                  |                              |         |
| 1                                           | 36                           | 26%     |
| 2                                           | 96                           | 69%     |
| 3                                           | 6                            | 4%      |
| 4                                           | 2                            | 1%      |
| Nodal Involvement                           |                              |         |
| Yes                                         | 63                           | 45%     |
| No                                          | 75                           | 55%     |
| Stage                                       |                              |         |
| 1A                                          | 8                            | 6%      |
| 1B                                          | 8                            | 6%      |
| 1B                                          | 1                            | 1%      |
| 2A                                          | 74                           | 53%     |
| 2B                                          | 37                           | 26%     |
| 3A                                          | 9                            | 6%      |
| 3B                                          | 2                            | 1%      |
| 3C                                          | 1                            | 1%      |
| Response                                    |                              |         |
| pCR                                         | 83                           | 59%     |
| No pCR                                      | 57                           | 41%     |
| Tumor Volume (mm³)                          |                              |         |
| Time point                                  | Volume (min - max)           | Std Dev |
| Pre-Treatment                               | 6 108 mm³ (35 - 131 950 mm³) | 19 088  |
| Volume 2                                    | 1 598 mm³ (0 - 52 652 mm³)   | 7 194   |
| Volume 4                                    | 342 mm³ (0 - 64 515 mm³)     | 64 515  |
| Post-Treatment                              | 0 mm³ (0 - 84 252 mm³)       | 84 252  |

ROC Curves for prediction of pCR



▶ A 70% shrinkage following four cycles of NAC was associated with a pCR in 54% of responders (specificity 89%, sensitivity 33%, p<0.0023).



▶ A 94% shrinkage upon completion of NAC was associated with a pCR in 90% of responders (specificity 90%, sensitivity 52%).

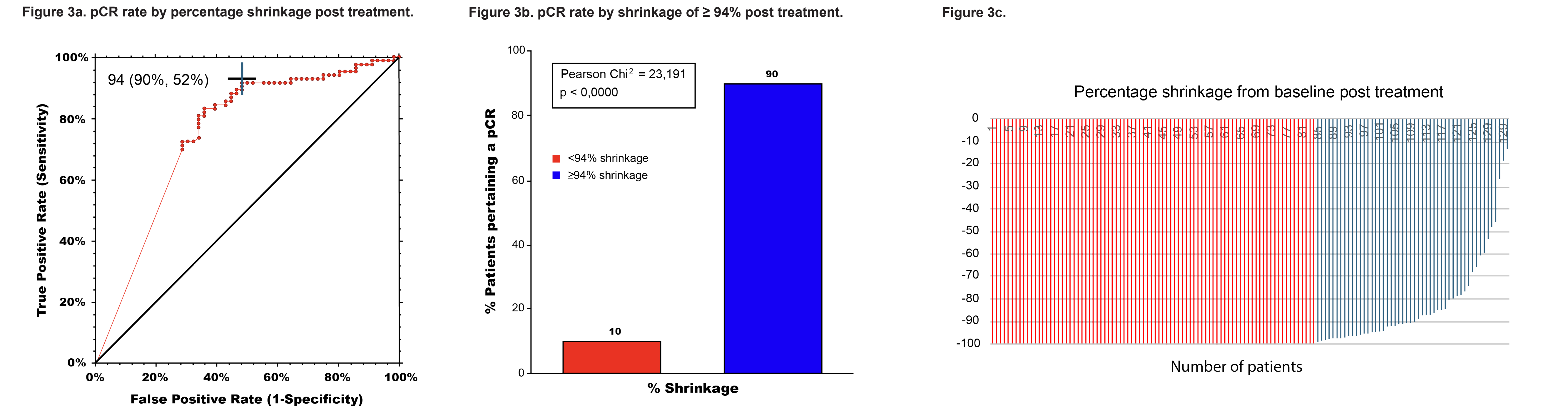


Figure 4: pCR by tumor size

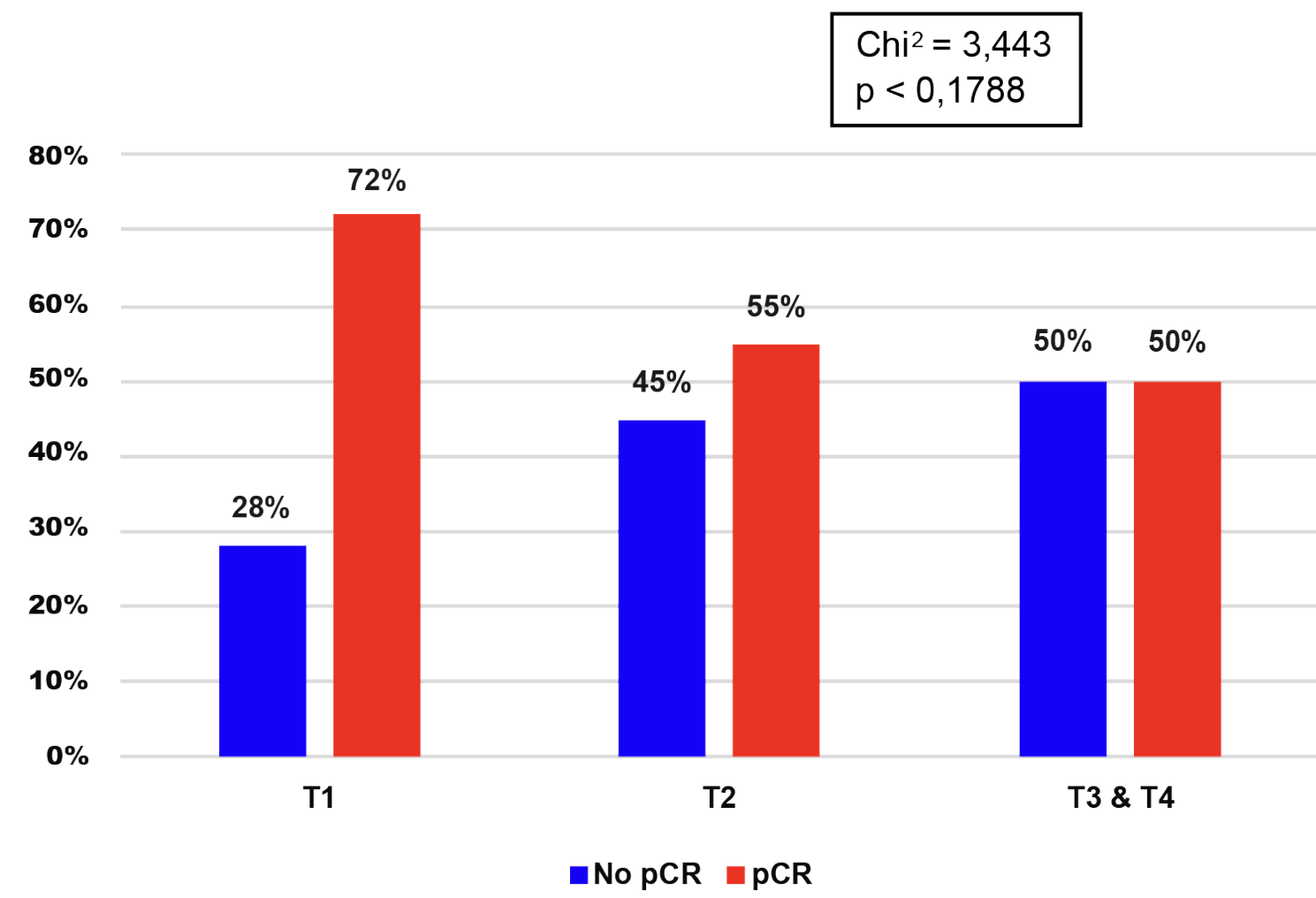


Figure 5: pCR by lymph node involvement

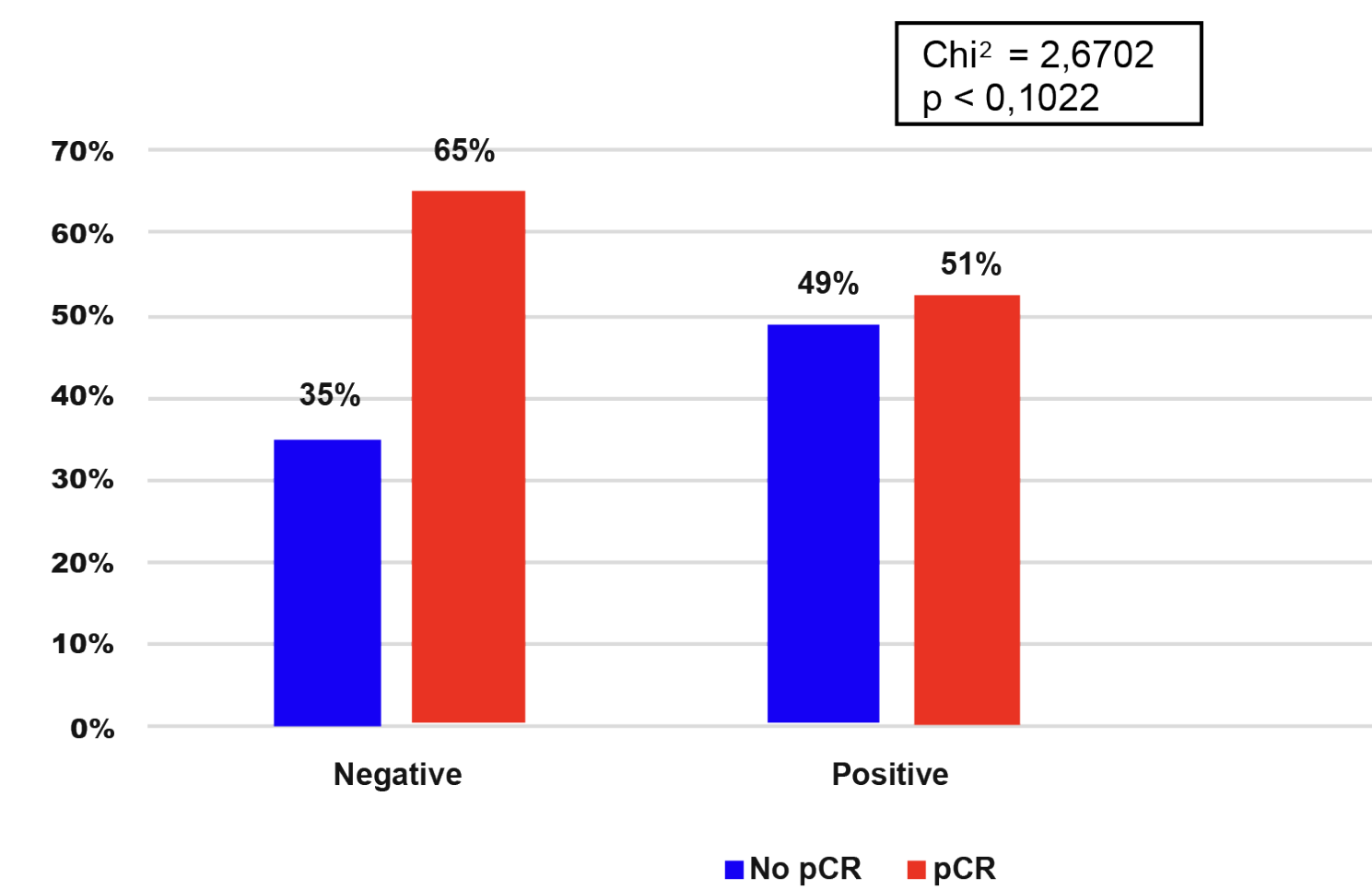


Figure 6: pCR by 70% shrinkage following four cycles of NAC

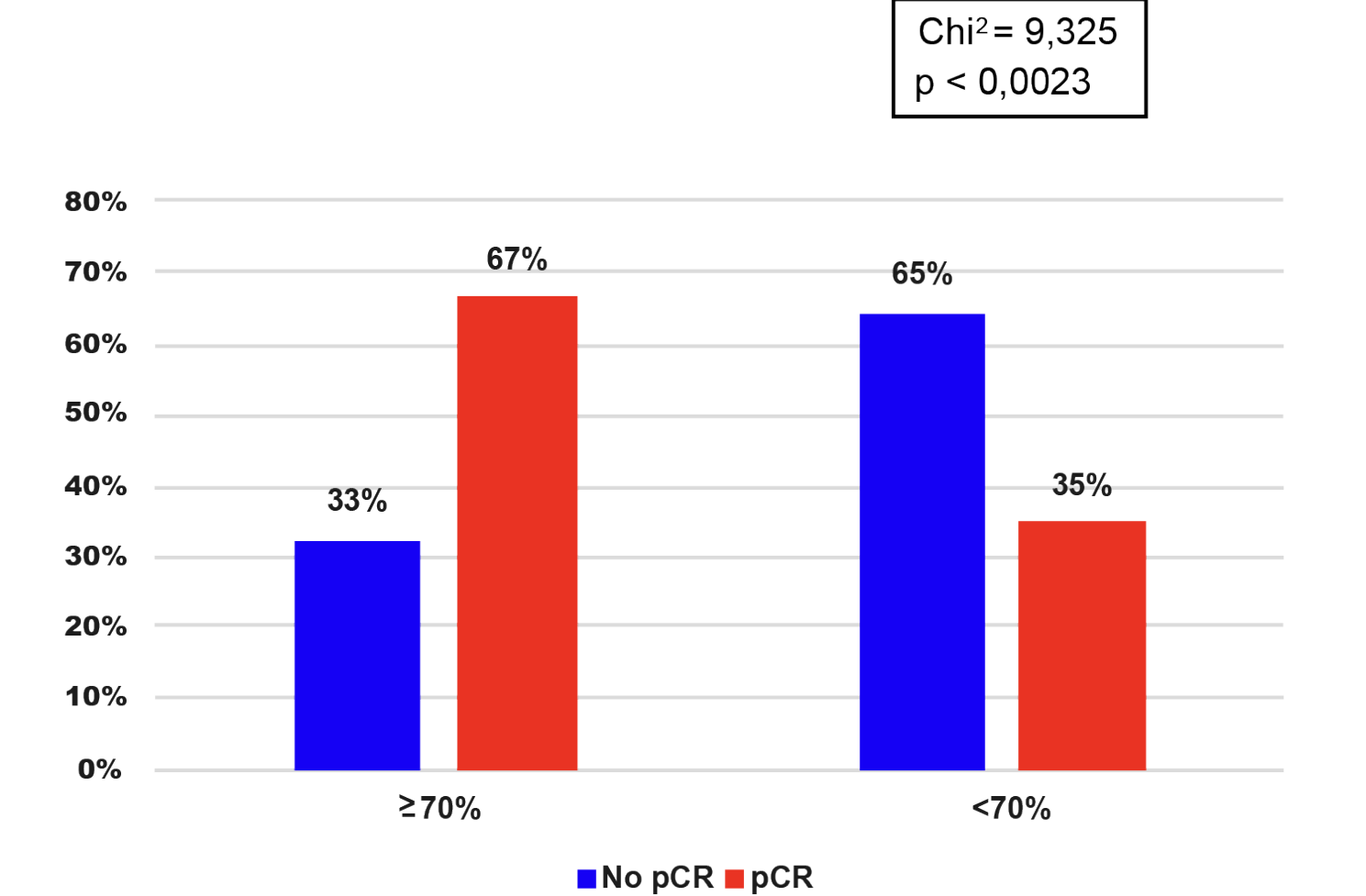
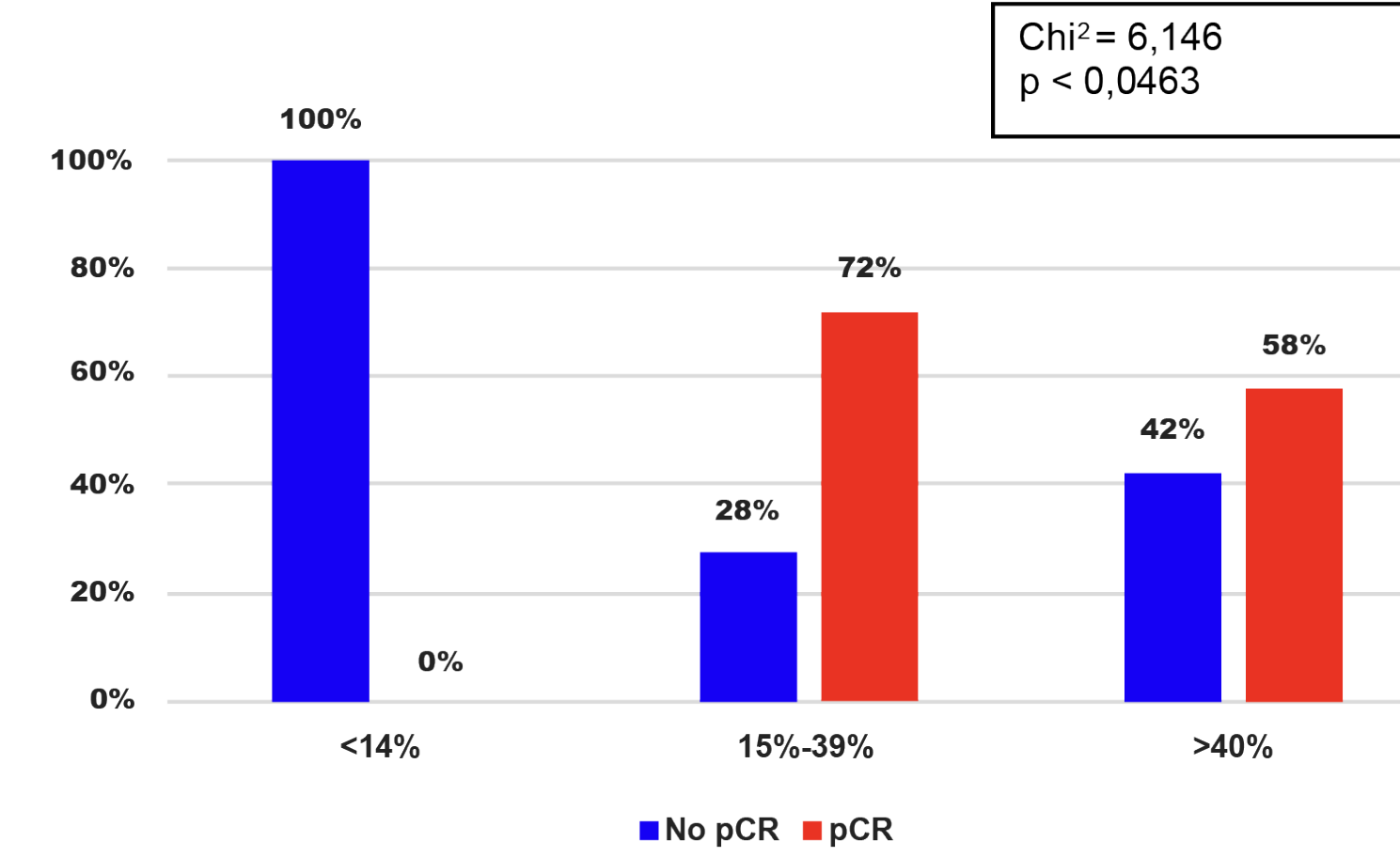


Figure 7: pCR by Ki-67



## Conclusions

- ▶ The breast US is a useful, non-expensive, non-invasive test to monitor TNBC pts undergoing NAC.
- ▶ Measurement of the tumor by serial US is a useful predictor of pCR in these patients.