

# COMPARATIVE OUTCOMES OF PROTON VERSUS PHOTON POST-MASTECTOMY RADIATION THERAPY IN PRE-PECTORAL IMPLANT-BASED BREAST RECONSTRUCTION



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## INTRODUCTION

- 80% of patients opting for breast reconstruction after mastectomy choose Implant-based breast reconstruction (IBBR)
- Pre-pectoral reconstruction has become popular due to less animation deformity, pain, and ease of surgical technique simultaneously maintaining aesthetic results
- Post-Mastectomy Radiation Therapy (PMRT) decreases local recurrence rates and increases survival in breast cancer patients
- Proton beam PMRT (PRT) has less tissue damage reducing the risk of cardiac toxicity, radiation pneumonitis, and radiation-associated secondary malignancies in patients with breast cancer
- PRT has shown comparable outcomes with traditional photon PMRT (XRT).
- However, there is a lack of outcomes data for adjuvant PRT in the setting of pre-pectoral IBBR

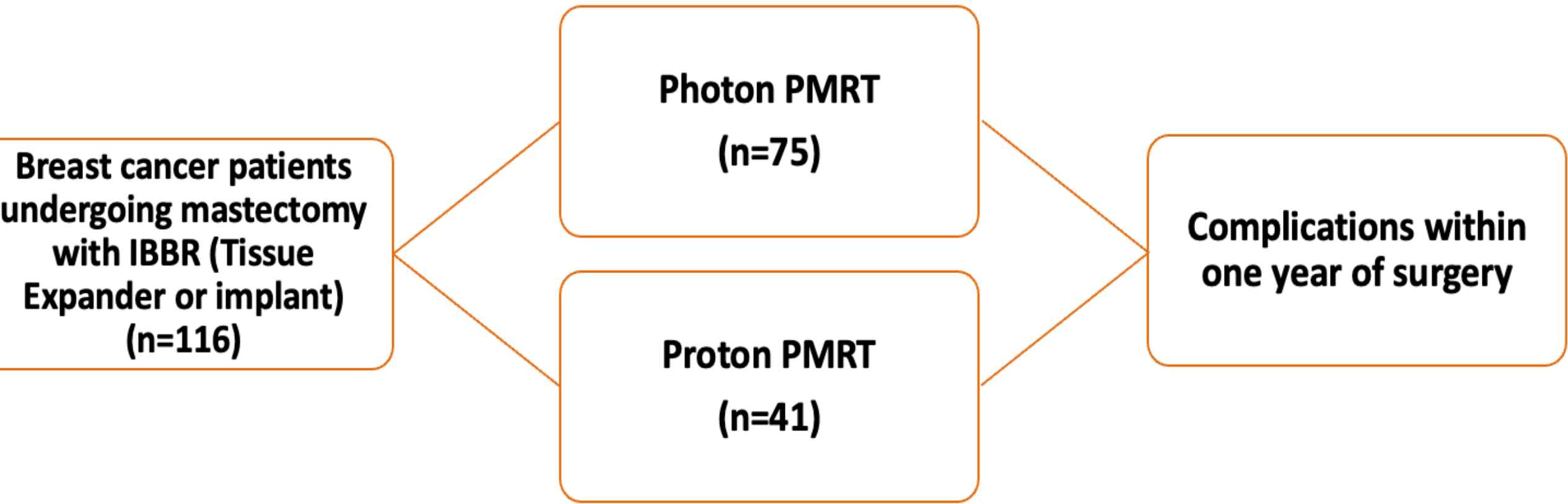
## AIM

To determine complication rates among patients having IBBR with proton (XRT) and photon PMRT (PRT) and compare the outcomes.

## METHODS

- Study Design:** Retrospective Cohort Study
- Time-Period:** January 2020 to October 2022
- Follow-up Period:** One year after surgery
- Location:** Single Institution - University of Miami

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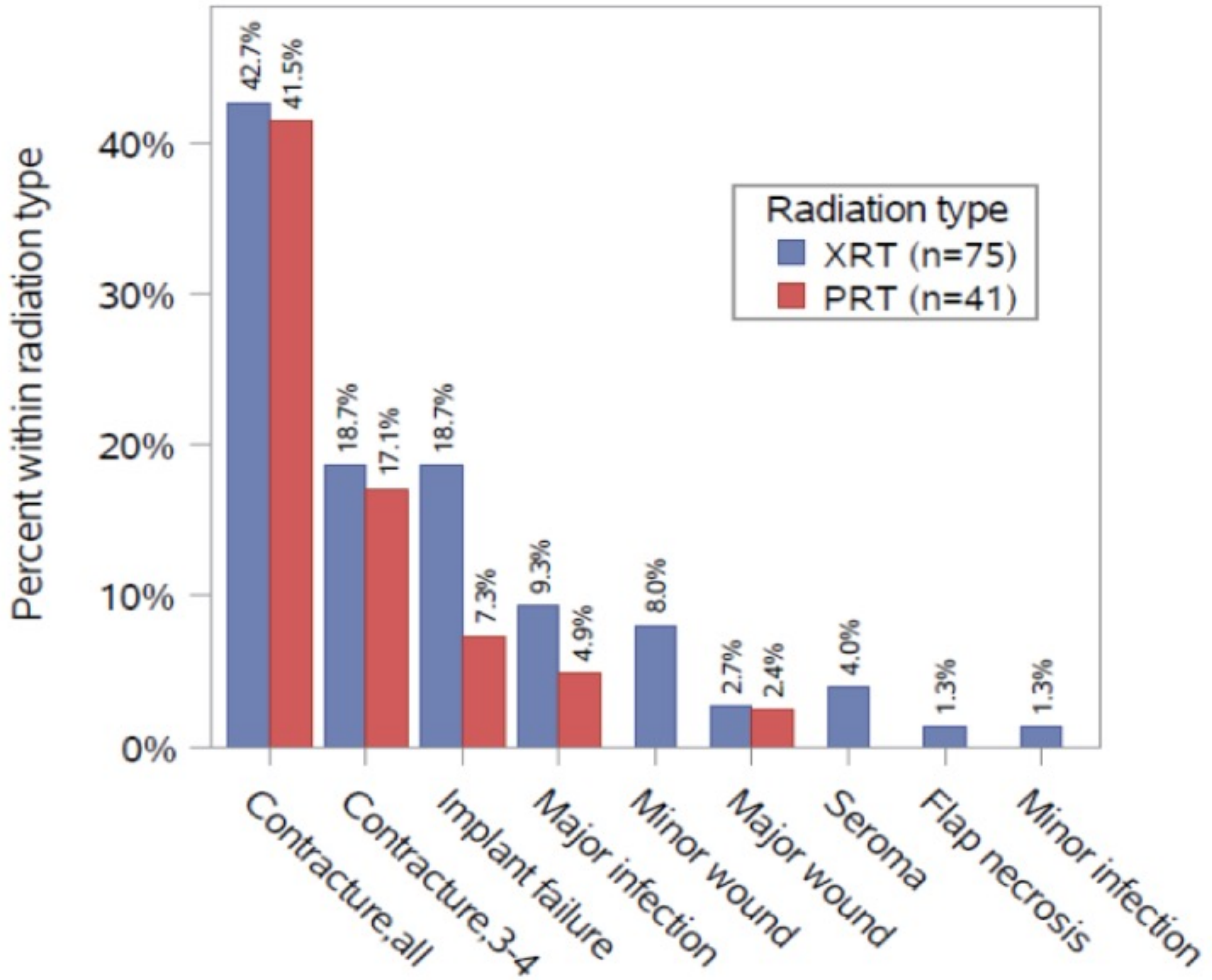


## RESULTS

|                                            | XRT n(%)          | PRT n(%)          | p value  |
|--------------------------------------------|-------------------|-------------------|----------|
| Age (years) Median (p25, p75)              | 50 (43, 59)       | 41 (36, 50)       | <0.0001* |
| BMI (kg/m <sup>2</sup> ) Median (p25, p75) | 28.5 (24.1, 32.3) | 25.5 (22.6, 30.9) | 0.141    |
| Race                                       |                   |                   |          |
| White                                      | 67 (89.3)         | 31 (75.6)         | 0.051    |
| African American/Asian                     | 8 (10.7)          | 10 (24.4)         |          |
| Ethnicity                                  |                   |                   |          |
| Hispanic                                   | 63 (84)           | 27 (65.9)         | 0.025*   |
| Non-Hispanic                               | 12 (16)           | 14 (34.1)         |          |
| Current smoker                             | 3 (4)             | 0 (0)             | --       |
| Implant type                               |                   |                   |          |
| DTI                                        | 31 (41.3)         | 23 (56.1)         | 0.128    |
| TE                                         | 44 (58.7)         | 18 (43.9)         |          |
| Type of Mastectomy                         |                   |                   |          |
| Skin Sparing (Peri-areolar)                | 69 (92)           | 27 (65.9)         | 0.002*   |
| Skin Sparing (Wise pattern)                | 2 (2.7)           | 4 (9.8)           |          |
| Nipple-sparing                             | 4 (5.3)           | 10 (24.4)         |          |
| Stage                                      |                   |                   |          |
| DCIS                                       | 4 (5.3)           | 0 (0)             | 0.322    |
| Stage I                                    | 11 (14.7)         | 4 (9.8)           |          |
| Stage II                                   | 34 (45.3)         | 16 (39)           |          |
| Stage III                                  | 25 (33.3)         | 20 (48.8)         |          |
| Stage IV                                   | 1 (1.3)           | 1 (2.4)           |          |

| Complication            | XRT n(%)  | PRT n(%)  | P value |
|-------------------------|-----------|-----------|---------|
| Any complications       | 45 (60)   | 20 (48.8) | --      |
| Minor infection         | 1 (1.3)   | 0 (0)     | 1.000   |
| Any wound               | 8 (10.7)  | 1 (2.4)   | 0.156   |
| Major wound             | 2 (2.7)   | 1 (2.4)   | 1.000   |
| Minor wound             | 6 (8)     | 0 (0)     | 0.088   |
| Flap necrosis           | 1 (1.3)   | 0 (0)     | 1.000   |
| Seroma                  | 3 (4)     | 0 (0)     | 0.551   |
| Re-operation            | 15 (20)   | 3 (7.3)   | 0.071   |
| Implant failure         | 14 (18.7) | 3 (7.3)   | 0.099   |
| Implant exposure        | 4 (5.3)   | 0 (0)     | 0.296   |
| Contracture, all grades | 32 (42.7) | 17 (41.5) | 0.902   |
| Contracture grade 3-4   | 14 (18.7) | 7 (17.1)  | 1.000   |

| Models         |                  | Univariable        |       | Multivariable      |        |
|----------------|------------------|--------------------|-------|--------------------|--------|
|                |                  | OR (95%CI)         | P     | OR (95%CI)         | P      |
| Stage          | 3-4 vs 0-2 (ref) | 2.61 (0.98, 7.01)  | 0.056 | 3.40 (1.21, 9.57)  | 0.021* |
| Radiation type | XRT vs PRT (ref) | 3.71 (1.02, 13.53) | 0.047 | 4.84 (1.27, 18.46) | 0.021* |



- XRT was associated with more complications
- XRT was a significant predictor for a higher risk of  $\geq 2$  complications compared to PRT after adjusting stage
- Stage 3-4 were significant predictors of  $\geq 2$  complications

## CONCLUSION

- Compared to traditional XRT, PRT had fewer complications
- Individual complication rates were not significantly different, but PRT had a significantly lesser number of complications
- This may offer a safer radiation alternative and may encourage a shift toward its broader utilization in clinical practice

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