

Background

At our comprehensive breast center, bilateral breast magnetic resonance imaging (MRI) with and without intravenous (IV) contrast and computer-aided detection (CAD) are routinely ordered as part of the preoperative evaluation for localized invasive breast cancer and ductal carcinoma in situ (DCIS). Contrarily, current published evidence suggests that routine preoperative MRI may not be necessary¹. This study aimed to evaluate how MRI contributes to the accuracy of preoperative staging in breast malignancy by comparing tumor dimensions on MRI, mammography, and ultrasound to the final surgical pathology report. Secondary objectives included assessing the rate of re-excision for positive surgical margins and the rate of additional biopsies indicated after MRI. Finally, we assessed whether the inclusion of MRI in standardized preoperative workflows introduces a delay in time to surgery.

Methods

1 Study Design

- 377 randomly selected patients, single institution (2014–2024)
- Preop MRI for invasive breast cancer/DCIS
- Excluded: neoadjuvant chemo recipients

2 Imaging vs. Pathology

- MRI, mammography, ultrasound vs. surgical path
- Histology: IDC, ILC, or DCIS
- Assessed over/under/accurate estimation

3 Concordance Analysis

- Intra-class Correlation Coefficient (ICC)
- Bland–Altman plots for agreement
- Post-MRI biopsy rate and accuracy

4 Surgical Benchmarking

- Diagnosis-to-resection time
- Re-excision rate for positive margins
- Compared with national benchmarks

Results

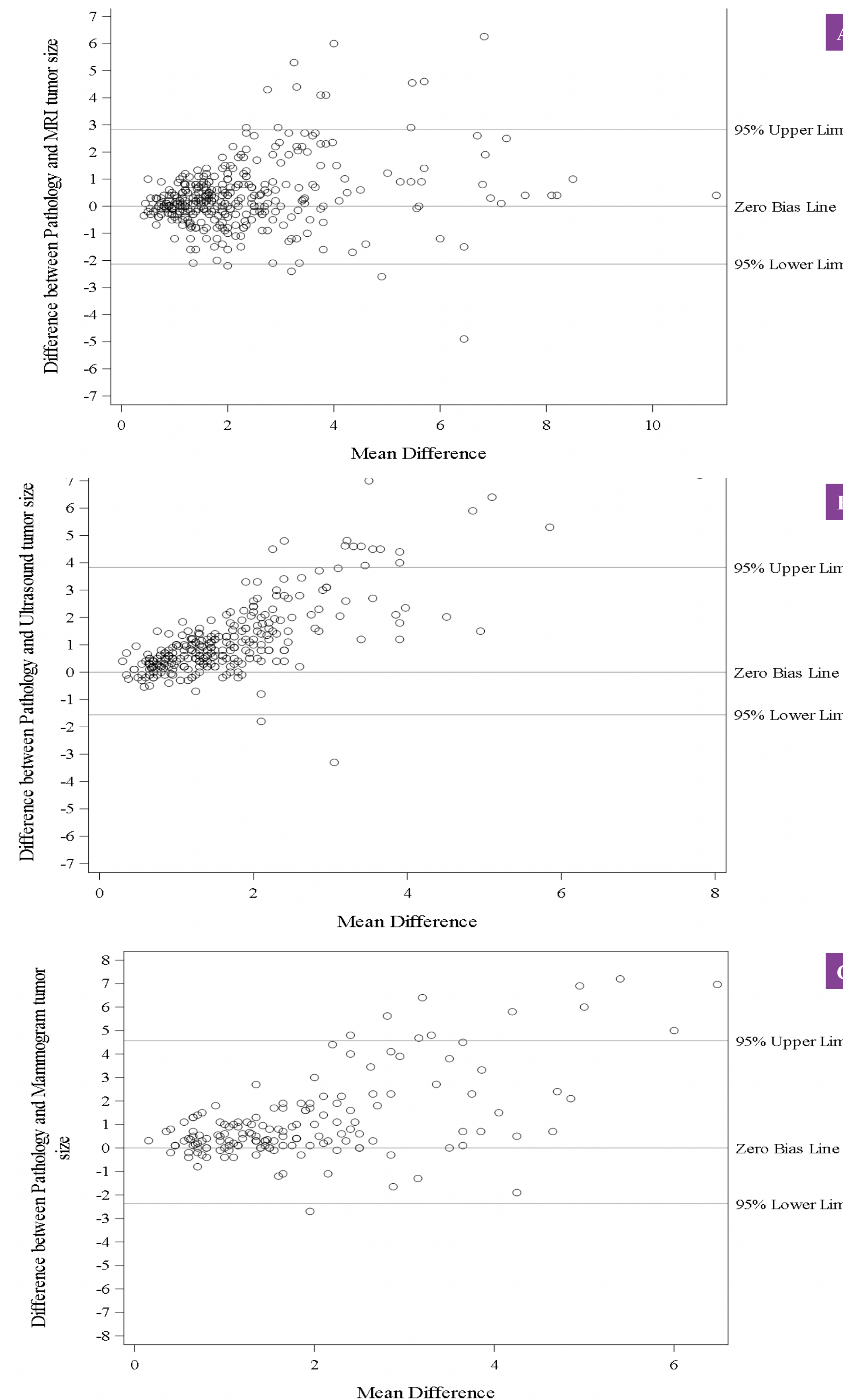


Figure 1A–C. Bland–Altman plots comparing tumor size measured by (A) MRI, (B) ultrasound, and (C) mammogram to surgical pathology. MRI demonstrated moderate reliability (ICC = 0.70), while ultrasound (ICC = 0.12) and mammogram (ICC = 0.18) showed poor reliability.

Results

Table 1. Pre-operative MRI concordance by tumor category. Invasive tumors showed better reliability (ICC=0.74) vs. pure DCIS (ICC=0.48); invasive-only tumors had the highest concordance (ICC=0.83).

Tumor Category	n	ICC
Invasive only (no DCIS)	120	0.827
Invasive with DCIS	201	0.656
DCIS only (no invasive)	68	0.477
All invasive (± DCIS)	321	0.734

Table 2. Post-MRI Outcomes and Management

11.4% (n=43)	additional biopsies prompted by pre-operative MRI
39.5% (n=17)	of MRI biopsies changed surgical management
14.0% (n=53)	returned to surgery for re-excision (positive margins)

Conclusion

Pre-operative breast MRI showed greater concordance with surgical pathology compared to mammography and ultrasound, particularly for invasive cancers. This supports MRI’s role in improving local pre-surgical planning and accuracy. While MRI led to additional biopsies in 11.4% of patients, over one-third resulted in meaningful changes to surgical management, indicating that MRI findings were often clinically relevant. The re-excision rate of 14% compares favorably with national benchmarks of under 20%, suggesting MRI may help reduce incomplete resections². However, its limited accuracy in pure DCIS and potential to increase interventions underscore the need for selective use. Overall, MRI provides the greatest benefit in invasive disease when integrated thoughtfully into preoperative workflows.

References

1. Bansal GJ, Emanuel S. The role of breast MRI in newly diagnosed breast cancer: An evidence-based review. *The American Journal of Surgery*. 2021;222(3):525-529.
2. Morrow M, Abrahamse P, Hofer TP, et al. Trends in reoperation after initial lumpectomy for breast cancer: addressing overtreatment in surgical management. *JAMA Oncology*. 2017;3(10):1352-1357.