



Breast Flap Neurotization After Autologous Free Flap Breast Reconstruction: A Prospective Trial



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Purpose

Restoration of breast sensation is an important factor to consider following autologous breast reconstruction (ABR). Flap neurotization may result in improved sensation after ABR, but current literature regarding both patient-reported outcomes and quantitative sensation after neurotization is inadequate and heterogenous. We present a prospective trial investigating the long-term outcomes of flap neurotization regarding breast sensation.

Methods

- A patient-blinded prospective study was performed
- 115 patients assigned to neurotized (NF) group or non-NF groups
 - 65 neurotized patients (n=113 flaps)
 - 50 non-neurotized patients (n=90 flaps)
- Patients were prospectively evaluated for breast sensation and quality-of-life 1-5 years after ABR
 - PSSD**: pressure-specified sensation testing at 9 locations on the breast using the AcroVal PSSD
 - BREAST-Q**: validated patient-reported questionnaire
 - Sensation questionnaire**: a sensation-specific PRO
- Continuous variables were compared using independent t-tests. Categorical variables were compared using chi-squared analyses.

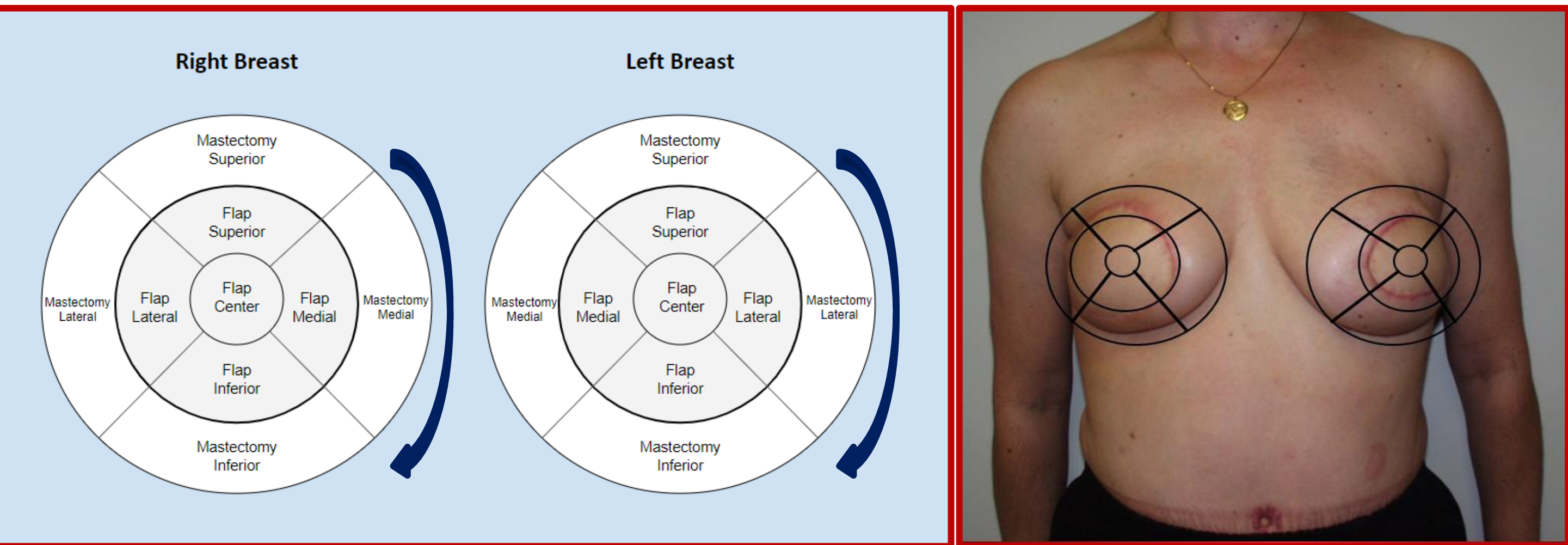


FIG. 1 – Sensation was tested on both mastectomy and flap skin areas, which were each divided into quadrants. One-point static and one-point moving pressures were measured for mastectomy skin, while only one-point static pressure was measured for flap skin.

1a. Patient demographics

	N / Median	% / IQR
Total patients	115	
Age	55.4	47.7-62.7
BMI	27.8	25.0-31.9
Race		
White	100	87%
Black	12	10%
Other	3	3%

1c. Flap demographics

	N	%
Total flaps	193	
Neurotization		
Yes	113	59%
No	90	47%
Recon timing		
Immediate	138	72%
Delayed	55	28%
Flap type		
TRAM	139	72%
DIEP	44	23%
TUG	10	5%

TABLE 1a, 1b, 1c – Demographic data

1b. Patient comorbidities

	N	%
Pre-op radiation		
No	75	65%
Yes	39	34%
Unknown	1	1%
Post-op radiation		
No	98	85%
Yes	17	15%
Laterality		
Bilateral	82	71%
Right	20	17%
Left	13	11%
Indication		
Cancer	106	92%
Prophylactic	6	5%
Unknown	3	3%
Nipple-areolar recon		
No	74	64%
Yes	41	36%

Results

All patients

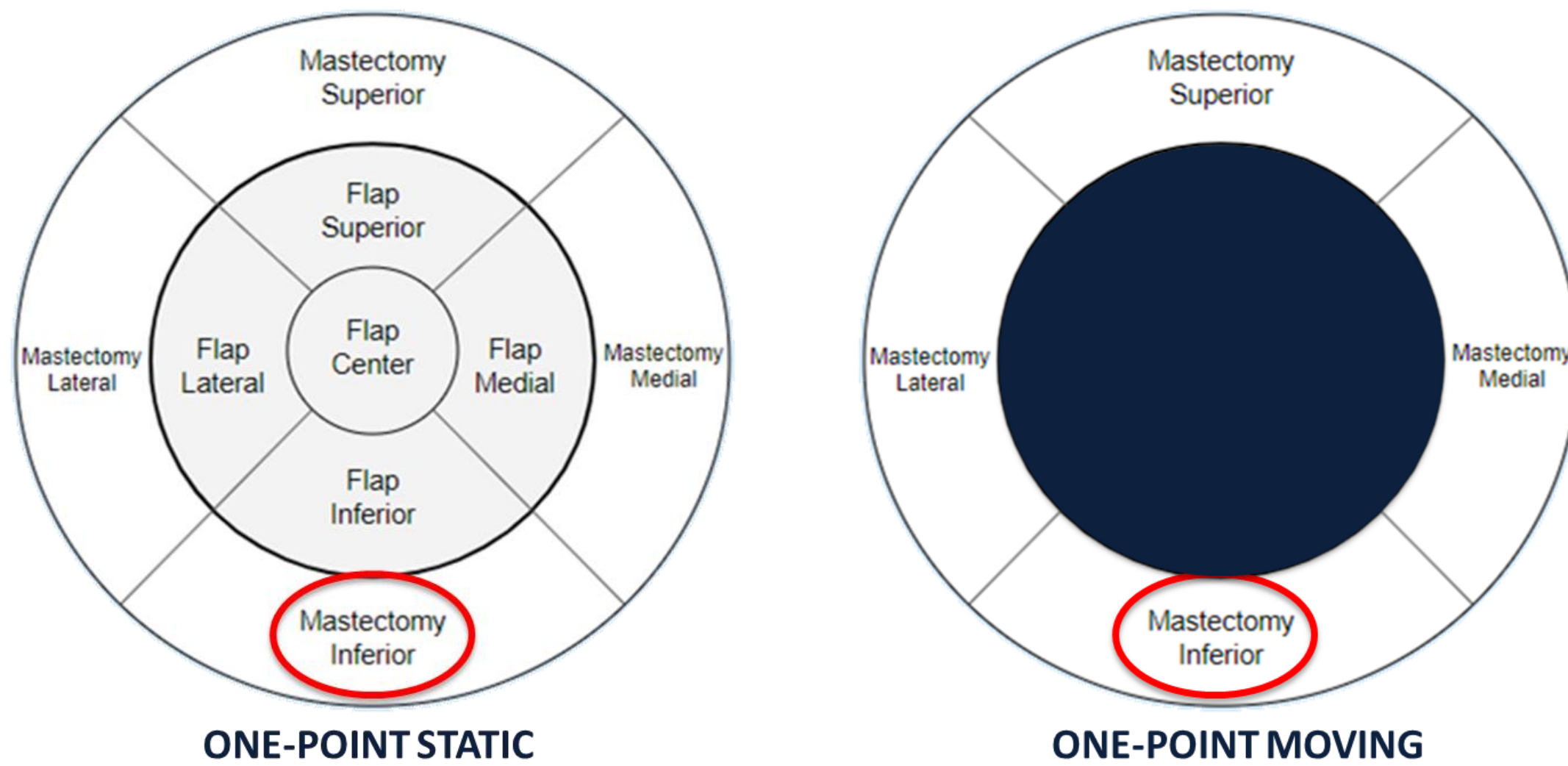


FIG. 2 – Neurotized patients had significantly lower pressure-specified sensory thresholds for both one-point moving and one-point static stimulus at the *mastectomy inferior* site when compared across all follow-up windows ($p<0.02$).

2-5 year subgroup

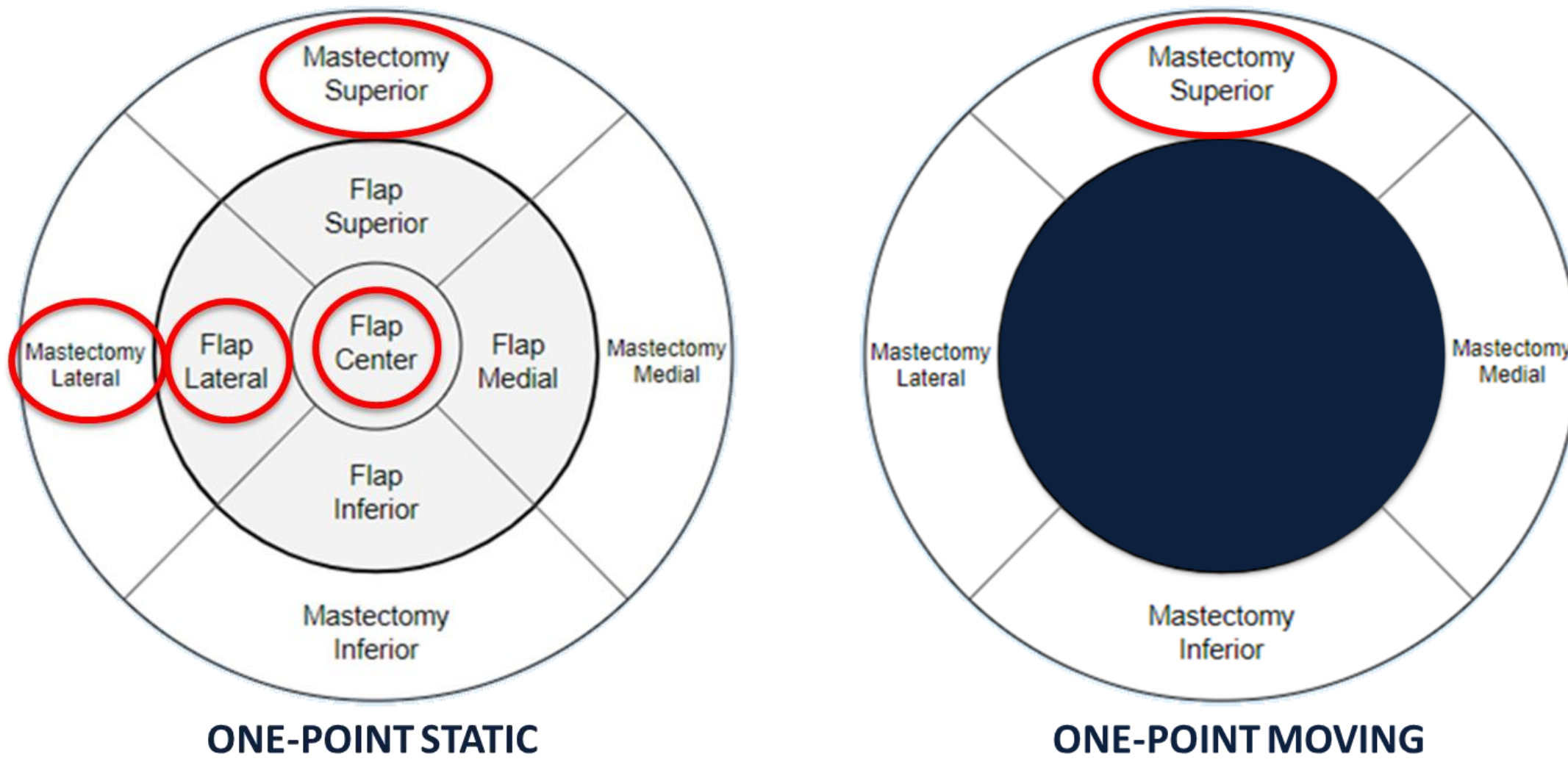


FIG. 3 –The improved sensation afforded by neurotization was more significant among the 2-5 year subgroup, among whom neurotized patients had significantly lower PSSD thresholds at four testing sites, *mastectomy superior*, *mastectomy lateral*, *flap lateral*, and *flap center* ($0.011<p<0.039$).

Neurotization **significantly improved** both patient-reported **psychological wellbeing** and **sexual wellbeing** after free flap breast reconstruction ($0.02<p<0.04$). While there was a small difference in quantitative sensation between neurotized and non-neurotized patients at 1 year after ABR, **the improved protective sensation afforded by neurotization was significantly more pronounced** among the 2-5 year subgroup, with improved sensation at 4 of 9 testing locations on the breast as compared to non-neurotized patients ($0.011<p<0.039$).

Conclusions

Breast sensation affects the daily lives of breast reconstruction patients and is an important long-term outcome to consider following ABR. Neurotization is associated with improved protective sensation as well as improved patient-reported outcomes such as improved psychological and sexual wellbeing in the long-term after ABR.

BREAST-Q Domain	Non-NF avg	NF avg	p
Psychological Wellbeing	66.8	85.0	0.025
Sexual Wellbeing	52.6	76.8	0.039
Breast Satisfaction	65.8	81.0	0.11
Surgeon Satisfaction	100.0	96.0	0.191
Physical Wellbeing: Abdomen	76.2		0.368
Information Satisfaction	77.3	83.3	0.423
Physical Wellbeing: Chest	78.1		0.521

TABLE 2 – Patient-reported outcome measures for each BREAST-Q domain. Neurotized patients reported significantly greater satisfaction with both psychological and sexual wellbeing as compared to non-neurotized patients.