SUPPLEMENTARY MATERIALS

Supplementary Table 1. Summary of prior studies of ER-borderline breast cancers with intrinsic subtype reported.

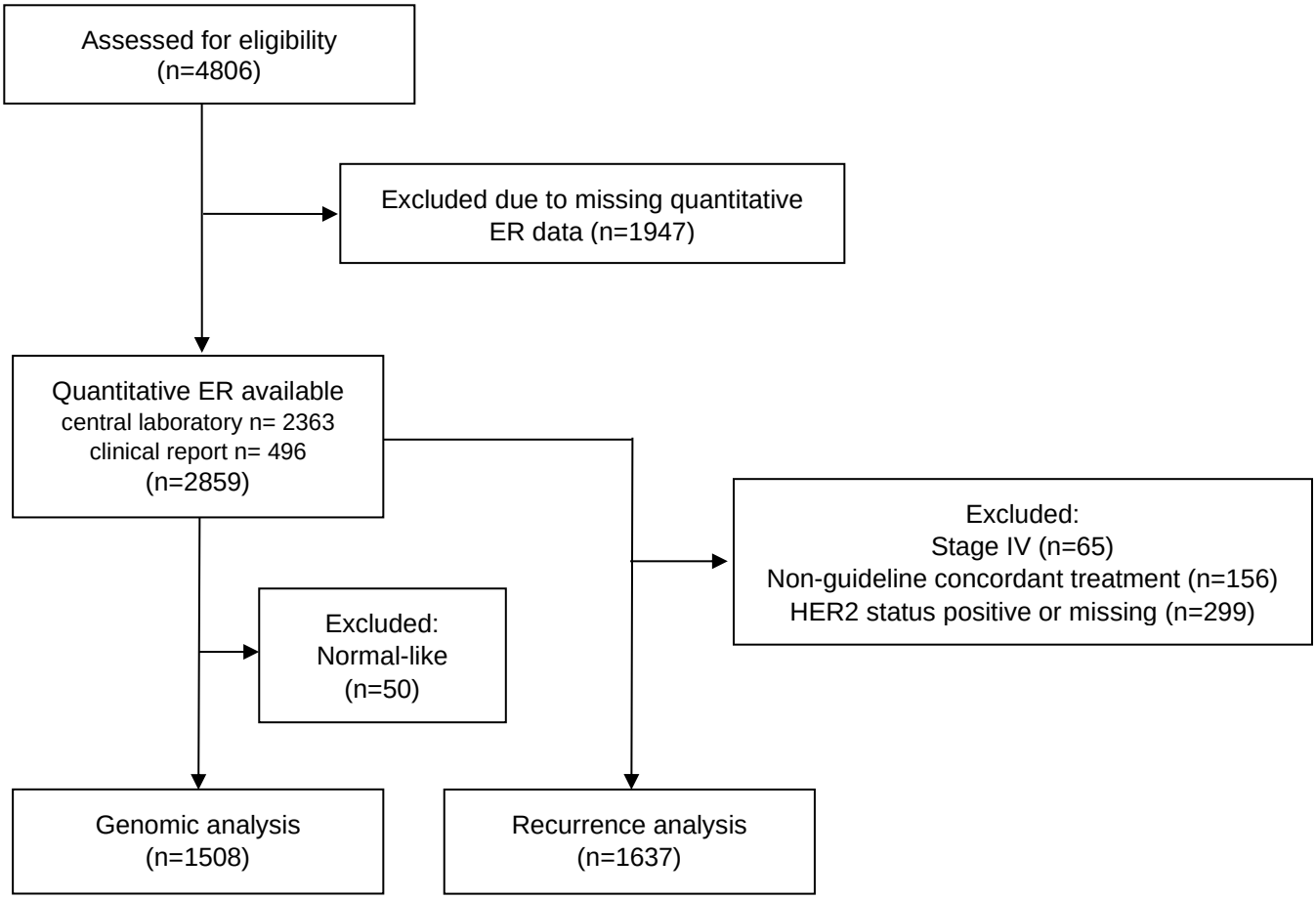
Study	**ER-borderline definition**	**ER-borderline with PAM50 available***	**Basal-like n (%)**	**HER2-enriched n (%)**	**Luminal n (%)**	**Normal-like n (%)**
Current study	ER positivity ≥ 1% and < 10%	n = 91	38 (41.7)	13 (14.3)	40 (44.0)	Excluded
Sheffield et al. 2016 (1)	ER weakly positive (Allred 3, 4, 5)	n = 60	30 (50.0)	24 (40.0)	6 (10.0)	Not reported
Cheang et al. 2016 (2)	ER positivity 1% - 9%	n = 65	7 (10.8)	32 (49.2)	21 (32.3)	5 (7.7)
Deyarmin et al. 2013 (3)	ER positivity 1 – 10%	n = 26	16 (61.5)	7 (26.9)	3 (11.5)	Excluded
Iwamoto et al. 2012 (4)	ER positivity 1 – 9%	n = 25	12 (48.0)	8 (32.0	2 (8.0)	3 (12.0)
Overall	-	n = 267	103 (38.6)	84 (31.5)	72 (27.0)	-

*Includes HER2-negative and HER2-positive tumors.

References

1. Sheffield BS, Kos Z, Asleh-Aburaya K, et al. Molecular subtype profiling of invasive breast cancers weakly positive for estrogen receptor. Breast Cancer Res Treat. 2016;155(3):483-490. doi:10.1007/s10549-016-3689-z
2. Cheang MCU, Martin M, Nielsen TO, et al. Defining Breast Cancer Intrinsic Subtypes by Quantitative Receptor Expression. Oncologist. 2015;20(5):474-482. doi:10.1634/theoncologist.2014-0372
3. Deyarmin B, Kane JL, Valente AL, et al. Effect of ASCO/CAP Guidelines for Determining ER Status on Molecular Subtype. Ann Surg Oncol. 2013;20(1):87-93. doi:10.1245/s10434-012-2588-8
4. Iwamoto T, Booser D, Valero V, et al. Estrogen Receptor (ER) mRNA and ER-Related Gene Expression in Breast Cancers That Are 1% to 10% ER-Positive by Immunohistochemistry. J Clin Oncol. 2012;30(7):729-734. doi:10.1200/JCO.2011.36.2574

Supplementary Figure 1. Flow diagram of study population



Supplementary Figure 2. ESR1 mRNA expression in estrogen receptor (ER) categories. Text on plot indicates median (interquartile range). Median ESR1 expression was statistically significantly different between ER-negative and ER-borderline (Kruskal-Wallis p-value < 0.001), between ER-positive and ER-borderline (Kruskal-Wallis p-value < 0.001), and between ER-negative and ER-positive (Kruskal-Wallis p-value < 0.001). All statistical tests were two-sided.