San Antonio Breast Cancer Symposium – December 9-12, 2025

Comparative Analysis of Breast Cancer Index Testing in Hispanic and Non-Hispanic Populations

Ana Sandoval-Leon[1], Natalia Siuliukina[2], Yu Liu[2], Yolcar Chamorro[1], Naomi Dempsey[1], Mehmet Murat[1], Leanne Dumeny[1], Dana Tolman[1], Priya Bhatt[3], Lauren Carcas[1], Yi Zhang[2], Amanda K. Emmanuel Garrido[1], Delia Guaqueta[1], L. Anderson[2], Kai Treuner[2], Reshma Mahtani[1]

[1]Baptist Health South Florida. Miami Cancer Institute, Miami, FL, USA, [2]Biotheranostics, Inc. A Hologic Company, San Diego, CA, USA

Miami Cancer Institute
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PS3-08-07 Abstract #1301

Introduction

- Hispanic and non-Hispanic populations present distinct clinicopathologic features that may influence treatment response and long-term prognosis.
- The Breast Cancer Index (BCI) is a validated gene expression-based assay with two components, the Molecular Grade Index (MGI) and the two-gene ratio *HOXB13/IL17BR* (H/I), that evaluates tumor proliferation and estrogen signaling, respectively.
- Integration of the MGI and H/I components generates a prognostic BCI score that quantifies the risk of overall (0-10 years) and late (5-10 years) distant recurrence (DR).[1-2] As the predictive component of BCI, the H/I ratio has been shown to predict the likelihood of benefit from extended endocrine therapy (EET) across various treatment regimens.[3-4]
- This study evaluated differences in clinicopathological factors and compared BCI results between Hispanic patients with hormone receptor positive (HR+) breast cancer from Miami Cancer Institute (MCI) and non-Hispanic patients enrolled in the BCI Registry study.

Methods

- The MCI clinical database is an IRB-approved de-identified repository that includes clinicopathologic and molecular data from all patients undergoing BCI testing in clinical practice. For the present analysis, we focused specifically on cases from self-identified Hispanic patients, including over 30 variables per case.
- The BCI Registry study is a prospective, multi-institutional study that enrolled over 3000 patients to evaluate the long-term clinical outcome, decision impact, and medication adherence in early-stage HR+ breast cancer patients.
- Descriptive statistics and Fisher's exact test (p-values) were used to evaluate the distribution of BCI Predictive and Prognostic classifications between Hispanic and non-Hispanic patient groups.
- Breslow-Day Test (BD) was applied to evaluate the homogeneity of odds ratios across different categories, determining whether ethnicity influenced the consistency of associations within BCI Predictive and Prognostic groups, identifying variations across different subgroups.
- Cochran-Mantel-Haenszel Test (CMH) was used to assess conditional independence between ethnicity and BCI Predictive and Prognostic categories controlling for confounding variables across stratified tables.

Figure 1. REMARK diagram of MCI dataset

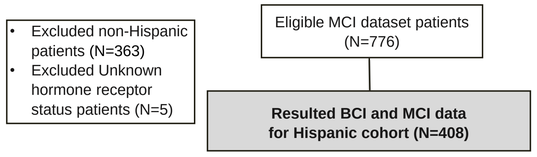
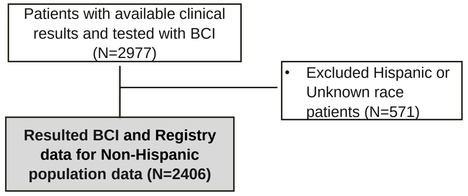


Figure 2. REMARK diagram of BCI Registry dataset



Results

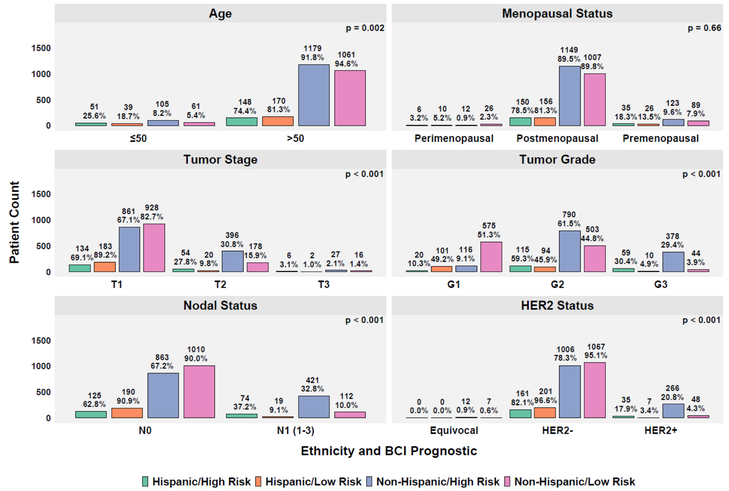
Table 1. Clinical characteristics

	Hispanic (MCI cohort) N = 408	Non-Hispanic (BCI Registry) N = 2,406	p-value
Age			<0.001
≤50	90 (22.2%)	166 (6.9%)	
>50	316 (77.8%)	2,240 (93.1%)	
Unknown	2	0	
Race			<0.001
Asian	0 (0.0%)	56 (2.3%)	
Black	6 (1.7%)	221 (9.2%)	
White	393 (98.3%)	2,129 (88.5%)	
Unknown	9	0	
Body Mass Index (BMI)			0.965
Obese	129 (40.2%)	961 (41.0%)	
Overweight	108 (33.6%)	776 (33.1%)	
Underweight/Normal	84 (26.2%)	607 (25.9%)	
Unknown	87	62	
Menopausal Status*			<0.001
Perimenopausal	16 (4.2%)	38 (1.6%)	
Postmenopausal	306 (79.9%)	2,156 (89.6%)	
Premenopausal	61 (15.9%)	212 (8.8%)	
Unknown	25	0	
Tumor Stage			0.057
T1	317 (79.5%)	1,789 (74.3%)	
T2	74 (18.5%)	574 (23.9%)	
T3	8 (2.0%)	43 (1.8%)	
Unknown	9	0	
Tumor Grade			0.8
G1	121 (30.3%)	691 (28.8%)	
G2	209 (52.4%)	1,293 (53.7%)	
G3	69 (17.3%)	422 (17.5%)	
Unknown	9	0	
Nodal Status			0.8
N0	315 (77.2%)	1,873 (77.8%)	
N1 (1-3)	93 (22.8%)	533 (22.2%)	
HER2 Status			0.052
HER2-	362 (89.6%)	2,073 (86.2%)	
HER2+	42 (10.4%)	314 (13.1%)	
Unknown/Uncertain	4	19 (0.7%)	
Surgery			0.698
Lumpectomy	255 (62.5%)	1,526 (63.5%)	
Mastectomy	153 (37.5%)	876 (36.5%)	
Unknown	0	4	
Adjuvant endocrine therapy			<0.001
Aromatase Inhibitor (AI)	261 (65.4%)	1,768 (73.9%)	
Switch Therapy	79 (19.8%)	308 (12.9%)	
Tamoxifen	59 (14.8%)	318 (13.2%)	
Unknown	9	12	

Significant difference in age, race, menopausal status and adjuvant endocrine therapy regimens

- Hispanic were significantly younger (≤50y: 22.2% vs 6.9%; premenopausal:15.9% vs 8.8%).
- Hispanic were less likely to take AI (65.4% vs 73.9%), but more likely to switch ET (19.8% vs 12.9%)

Figure 3. Clinicopathological features in ethnic groups stratified by BCI Prognostic



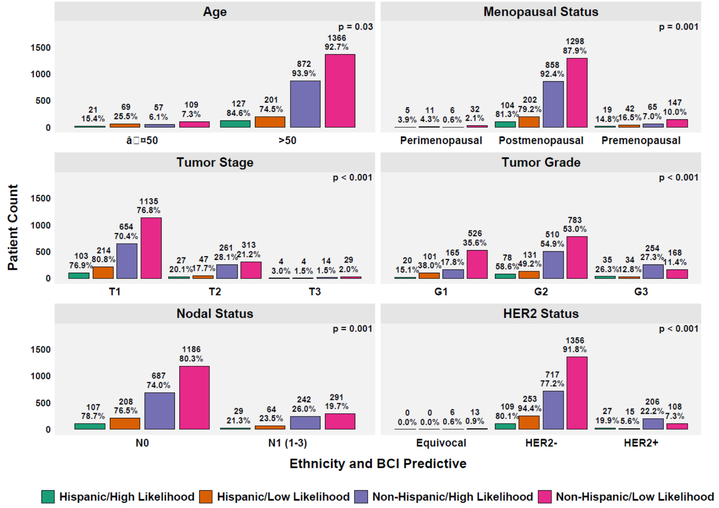
- BD test was non-significant for all clinical factors, except for surgery type (BD, p = 0.002), when evaluated for their relationship with BCI Prognostic, indicating no heterogeneity across ethnic groups. Thus, CMH test was performed to evaluate significance of these relationships (clinical factors vs. BCI Prognostic) across the ethnic groups (Hispanic vs non-Hispanic).
- The CMH test revealed that tumor stage, tumor grade, nodal status, HER2 status and surgery type show highly significant associations (p <0.001), indicating strong overall associations with late DR across ethnic groups.
- Age and race have moderate significance (p = 0.002, p = 0.018), suggesting they may also influence late DR risk.
- Menopausal Status (p = 0.66), BMI (p = 0.37) and Adjuvant therapy (p = 0.69) showed no associations.

Table 2. Ethnicity Groups stratified by BCI Prognostic and BCI Predictive

	Hispanic (N = 408)	Non - Hispanic (N = 2,406)	p-value
BCI Prognostic Risk			
High Risk	199 (48.8%)	1,284 (53.4%)	0.087
Low Risk	209 (51.2%)	1,122 (46.6%)	
Primary Prediction			0.046
High Likelihood	136 (33.3%)	929 (38.6%)	
Low Likelihood	272 (66.7%)	1,477 (61.4%)	
BCI Prognostic and Predictive categories			0.13
High Risk/High Likelihood	101 (24.8%)	730 (30.3%)	
High Risk/Low Likelihood	98 (24.0%)	554 (23.0%)	
Low Risk/High Likelihood	35 (8.6%)	199 (8.3%)	
Low Risk/Low Likelihood	174 (42.6%)	923 (38.4%)	

- BCI Prognostic results showed a lower proportion of Hispanic patients at High Risk for late DR than non-Hispanic patients (48.8% vs 53.4%, p=0.087).
- BCI (H/I) Predictive followed a similar pattern, with fewer Hispanic patients categorized as High Likelihood of EET benefit compared to non-Hispanic patients (33.3% vs 38.6%, p = 0.046).
- BCI Prognostic and BCI Predictive results reveal a greater percentage of Hispanic patients classified as Low Risk/Low Likelihood of EET benefit (42.6% vs 38.4%), while fewer Hispanic patients fell into High Risk/High Likelihood of EET benefit (24.8% vs 30.3%) compared to non-Hispanic patients.

Figure 4. Clinicopathological features in ethnic groups stratified by BCI Predictive



- BD test was non-significant for all clinical factors when evaluated for their relationship with BCI Predictive, indicating no heterogeneity across ethnic groups (Hispanic vs non-Hispanic).
- The CMH test demonstrated highly significant associations for menopausal status and nodal status (p = 0.001), tumor stage, tumor grade, HER2 status (p <0.001), indicating strong overall associations of these factors with benefit of EET.
- Age (p = 0.03) and surgery type (p = 0.013) demonstrated moderate significance, suggesting the potential impact of these factors on extended endocrine therapy benefit.
- Race (p = 0.64), BMI (p = 0.07) and Adjuvant Therapy (p =0.99) showed weaker associations.

Conclusions

- In this cohort, Hispanic patients were predominantly White, tended to be younger and had a higher likelihood of being premenopausal at diagnosis when compared to non-Hispanic patients.
- Hispanic patients were less likely to benefit from extended endocrine therapy as assessed by BCI results.
- Significant associations were found for the association between age, menopausal status, tumor stage, tumor grade, nodal status, HER2 status and surgery type versus BCI Predictive categories indicating these factors might have an impact on the benefit of EET.
- Age, race, tumor stage, grade, nodal status, HER2 status, and surgery type show significant associations with BCI Prognostic groups, indicating that these clinical factors are consistently associated with late distant recurrence (DR) when adjusting for ethnicity.
- These findings highlight important demographic and therapy response differences between ethnic groups and underscore the need for further investigation into personalized risk assessment and treatment equity.

1. Sgroi D et al. *Lancet Oncol* 2013;14(11):1067-1076. **2.** Sgroi D et al. *J Natl Cancer Inst* 2013;105:1036-1042. **3.** Zhang Y et al. *Clin Cancer Res* 2013;19:4196-4205. **4.** Noordhoek I et al. *Clin Cancer Res* 2021;27(1):311-319.

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