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Assessing Epidemiological Differences in Myelofibrosis: A Comparative Study of a Single-Center Cohort and the SEER National Database

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Background
Myelofibrosis (MF) is a rare class of BCR-ABL negative myeloproliferative neoplasms characterized by clonal proliferation of hematopoietic stem cells and progressive fibrosis of the bone marrow. This study attempts to elucidate epidemiological discrepancies in survival outcomes between MF patients at a single tertiary care center from an underserved population in the Bronx (which ranks last in health outcomes amongst 62 New York state counties) versus the Survival, Epidemiology, and End Results (SEER) national cancer registry by analyzing different population parameters.

Methods
Our retrospectively constructed single center database included 96 patients with biopsy confirmed primary or secondary MF who were age ≥20 diagnosed after 2000. 75 remained for analysis after excluding subjects without known race or date of diagnosis. The SEER [SEER research plus data, 17 registries, Nov 2022 Sub (2000-2020)] dataset comprised of 5254 patients with microscopically confirmed primary MF (ICD code: 9661.3) diagnosed between 2000 and 2015, had age of diagnosis ≥20, and whose deaths were attributable to MF diagnosis. Both cohorts were independently analyzed via log-rank testing and/or cox proportional hazards (cox-PH) regression with death as event outcome.

Results
Mean age of our single-center cohort was 65.87 years. Males [37 (49.3%)] and females [38 (50.7%)] were approximately evenly distributed. Races included non-hispanic white (NHW) [26 (34.7%)], NH black (NHB) [20 (26.7%)], NH asian and pacific islanders (NH-API) [6 (8.0%)], and hispanics of all races [23 (30.7%)]. Primary [40 (53.3%)] and secondary [35 (46.7%)] MF were approximately even. Log rank testing detected significance in race (p=.05) but not sex (p=.2) or type (p=.7). Significant univariate cox-PH findings include increased mortality within the NHB group [hazard ratio (HR) 2.69, p=.04] and increased mortality with age (HR 1.07, p=.005) (Table 1). Low event size precluded multivariate analysis.
In the SEER cohort, age was grouped into 4 categories: ≤44 years old [214 (4.1%)], 45-64 [1,590 (30.3%)], 65-84 [3,051 (58.1%)], and ≥85 [399 (7.6%)]. There were more females [3,159 (60.1%)] than males [2,095 (39.9%)]. NHW [3,995 (76.0%)] comprised the overwhelming majority of races reported, followed by NHB [441 (8.4%)], hispanic [420 (8.0%)], and NH-API [398 (7.6%)]. Median household income (MHI) data (inflation adjusted to 2021) was divided into <$70,000 and ≥$70,000 (table 2). Univariate cox-PH noted improved survival in NH-APIs (HR .75, p<.001) and MHI ≥$70K (HR .92, p=.05). However this significance disappeared upon adjustment for age and race. In multivariate cox-PH, age demonstrated significance for each category (45-64 HR 2.20; 65-84 HR 4.45; ≥85 HR 6.59, p < .001). Female patients had better survival compared to males (HR .73, p<.001) (Table 2).

Conclusion
In this comparison study of MF cohorts from an underserved tertiary center and SEER, we found differences in demographic features and their impact on disease mortality. NHW patients constitute the overwhelming majority of subjects in the SEER dataset while the tertiary cohort has nearly equal distribution of NHW, NHB, and hispanic patients. NHB patients from the single-center cohort tended to do worse while SEER showed no differential survival based on race. Possible explanations for this include differences in racial distribution, healthcare accessibility, and other socioeconomic factors. Median income in the Bronx is 36% lower than the national average and the poverty rate is 2.3x higher. Unexpectedly, no significant association was found between MHI and survival in SEER when adjusted for age and race. Also notable is that improved survival in NH-APIs per SEER data disappeared upon adjustment for age, which may suggest that the NH-API group tends to be younger at diagnosis given that age serves as a negative prognostic marker. Further research is warranted. Regarding sex, SEER data

suggests that female patients have a decreased mortality risk compared to males which is consistent with literature. Caution in interpretation is necessary given the low tertiary center sample size and the inherent limitations of the SEER dataset.

Disclosures Verma: *Novartis:* Other: Scientific Advisor; *Bakx:* Current equity holder in private company, Other: Scientific Advisor; *Stelexis:* Current equity holder in private company, Honoraria, Other: Scientific Advisor; *Eli Lilly:* Research Funding; *Curis:* Research Funding; *Medpacto:* Research Funding; *Incyte:* Research Funding; *GSK:* Research Funding; *BMS:* Research Funding; *Prelude:* Research Funding; *Acceleron:* Other: Scientific Advisor; *Celgene:* Other: Scientific Advisor; *Janssen:* Honoraria; *Throws Exception:* Current equity holder in private company.

Table 1:

Tertiary Center Myelofibrosis Cohort

Variable	Overall[1] Total N = 75	Log-Rank Analysis				Univariate Regression Analysis	
		Observed Events N =27	Expected Events	Chi-square	p-value	Unadjusted HR (95% CI)[2]	p-value
Age (years)	65.87 (11.72)	27 (100%)				1.07 (1.02 - 1.12)	**0.005**
Sex				1.5	0.2		
Male	37 (49.3%)	14 (52%)	10.9			—	—
Female	38 (50.7%)	13 (48%)	16.1			0.61 (0.28 - 1.33)	0.217
Race*				7.8	**0.05**		
NH White	26 (34.7%)	9 (33%)	11.59			—	—
NH Black	20 (26.7%)	10 (37%)	5.35			2.69 (1.03 - 7.04)	**0.04**
NH Asian or Pacific Islander	6 (8.0%)	0 (0%)	2.57			NC[3]	NC[3]
Hispanic (All Races)	23 (30.7%)	8 (30%)	7.48			1.45 (0.54 - 3.88)	0.46
Myelofibrosis Type				0.2	0.7		
Primary	40 (53.3%)	14 (52%)	15.1			—	—
Secondary	35 (46.7%)	13 (48%)	11.9			1.18 (0.55 - 2.56)	0.669

[1]Mean (SD); n (%)
[2]HR = Hazard Ratio; CI = Confidence Interval
[3]Non-convergence; due to 0 observed events
*NH = Non-Hispanic

Table 2:

SEER Myelofibrosis Cohort

Variable	Overall[1] N = 5254	Regression Analysis			
		Unadjusted HR (95% CI)[2]	p-value	Adjusted HR (95% CI)[2]	p-value
Age Categories (years)					**<0.001**
≤44	214 (4.1%)	—		—	
45-64	1,590 (30.3%)	2.24 (1.63 - 3.08)	**<0.001**	2.20 (1.60 - 3.03)	**<0.001**
65-84	3,051 (58.1%)	4.48 (3.27 - 6.13)	**<0.001**	4.45 (3.24 - 6.09)	**<0.001**
≥85	399 (7.6%)	6.70 (4.73 - 9.50)	**<0.001**	6.59 (4.65 - 9.35)	**<0.001**
Sex					**<0.001**
Male	2,095 (39.9%)	—		—	
Female	3,159 (60.1%)	0.74 (0.67 - 0.81)	**<0.001**	0.73 (0.67 - 0.80)	**<0.001**
Race*					0.137
NH White	3,995 (76.0%)	—		—	
NH Black	441 (8.4%)	0.91 (0.77 - 1.08)	0.262	1.08 (0.91 - 1.28)	0.373
NH Asian or Pacific Islander	398 (7.6%)	0.75 (0.63 - 0.90)	**0.001**	0.86 (0.72 - 1.03)	0.096
Hispanic (All Races)	420 (8.0%)	1.01 (0.86 - 1.20)	0.862	1.11 (0.94 - 1.31)	0.214
Median Household Income**					0.133
<$70,000	2,429 (46.0%)	—		—	
≥$70,000	2,825 (54.0%)	0.92 (0.84 - 0.99)	**0.050**	0.93 (0.86 - 1.02)	0.133

[1]n (%)
[2]HR = Hazard Ratio; CI = Confidence Interval
*NH = Non-Hispanic
**Inflation adjusted to 2021

Figure 1

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