Racial Disparities in Age at Leukemic Transformation and Temporal Progression Patterns in Myelodysplastic Syndromes: A SEER 18 Population-Based Analysis

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Background

- Myelodysplastic syndromes (MDS) are clonal hematopoietic disorders that carry a variable risk of transformation to acute myeloid leukemia (AML) — the primary driver of disease-related mortality.
- Whether the incidence, age at transformation, and temporal latency of leukemic progression differ systematically by race and ethnicity remains poorly characterized.
- Current risk-stratification tools are race-agnostic, and may therefore underestimate transformation risk in minority populations who progress earlier in life.
- Characterizing these disparities is a prerequisite for equitable, biologically informed surveillance and treatment planning.

Methods

- Retrospective population-based cohort study using the SEER 18 database (2000–2023), including all patients aged ≥20 years with a confirmed diagnosis of MDS.
- Leukemic transformation was defined as a subsequent AML diagnosis per HAEMARC multiple-primary rules.
- Race/ethnicity was classified into five groups: Non-Hispanic White (NHW), Non-Hispanic Black (NHB), Hispanic, Asian/Pacific Islander (API), and American Indian/Alaska Native (AI/AN).
- We examined mean age at transformation, the young-onset (<50 years) subgroup, and progression latency across nine pre-specified intervals (0 to 120+ months).
- Group differences in age at transformation were compared statistically, and NHW latency phases were characterized to describe the temporal course of progression.

Study Cohort

9,011	5	24 yr	≥20 y
Transformation events	Race/ethnicity groups	SEER span 2000–2023	Adults with confirmed MDS

Results

2.4×
Hispanic enrichment among young-onset (<50 y) events — 19.0% vs 8.2% of cohort

13.8%
of young-onset (<50 y) events were NHB — vs 8.1% of the overall cohort

- Mean age at transformation was significantly younger in minority groups: NHB 68.4 y, Hispanic 67.7 y, and AI/AN 68.9 y vs NHW 72.2 y (all p<0.001).
- In the young-onset (<50 y) subgroup, Hispanic patients contributed 19.0% of events despite being 8.2% of the cohort — a 2.4-fold enrichment; NHB contributed 13.8% vs 8.1% overall.

Figure 1. Transformation Events by Race/Ethnicity

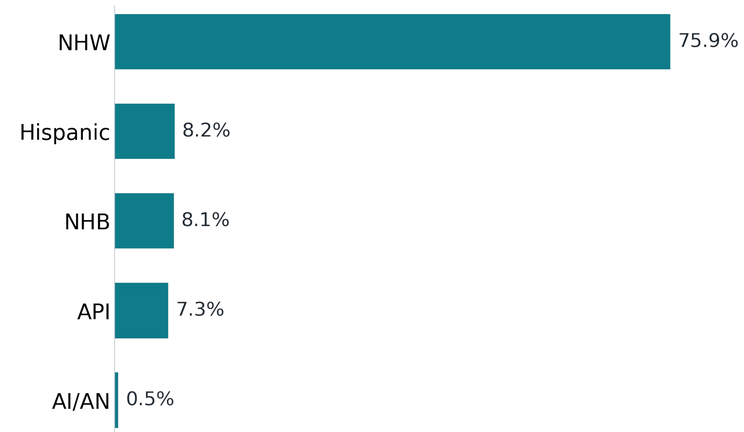

Figure 1. *Distribution of MDS (myelodysplastic syndromes)-to-AML (acute myeloid leukemia) transformation events across five racial/ethnic groups (n = 9,011). NHW (Non-Hispanic White) patients account for three quarters of all events. Counts: NHW 6,837 · Hispanic 739 · NHB (Non-Hispanic Black) 730 · API (Asian/Pacific Islander) 659 · AI/AN (American Indian/Alaska Native) 46.*

Figure 2. Mean Age at Transformation (years)

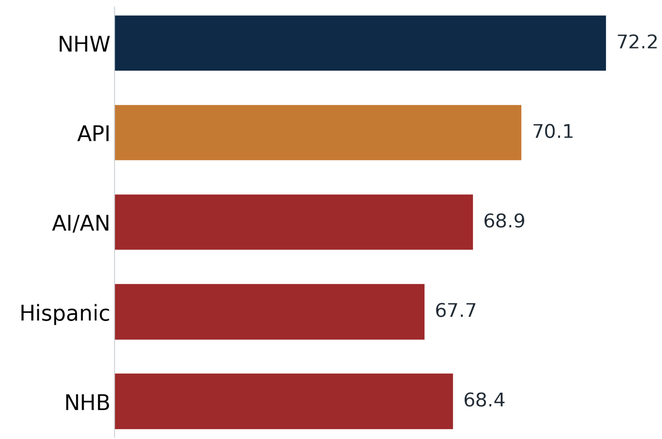

Figure 2. *Mean age (years) at leukemic transformation by racial/ethnic group. NHB (Non-Hispanic Black), Hispanic, and AI/AN (American Indian/Alaska Native) patients transform ~4 years younger than NHW (Non-Hispanic White) (all p<0.001); API (Asian/Pacific Islander) patients are intermediate at 70.1 years.*

Triphasic Latency Pattern (NHW)

- Rapid phase (0–5 months): 23.8% of transformations occur within the first half-year after MDS diagnosis.
- Subacute phase (6–47 months): 53.8% of events — the dominant window, peaking at 12–47 months (39.0%).
- Late phase (48+ months): 22.4% of events, including a clinically underrecognized long-tail group transforming at ≥120 months (4.6%).
- This triphasic structure argues against a fixed surveillance horizon: risk persists well beyond the early post-diagnosis period and extends years into follow-up.

Conclusions

- Hispanic and NHB MDS patients transform at substantially younger ages, carrying a disproportionate mid-life disease burden that race-agnostic tools miss.
- NHW transformation follows a distinct triphasic pattern with a clinically underrecognized late-transformation tail beyond ≥120 months.
- Findings support race-stratified risk models and latency-informed surveillance protocols accounting for earlier onset and sustained late risk.

KEY TAKEAWAY

Race-agnostic MDS risk tools miss earlier transformation in Hispanic and NHB patients. Race-stratified models and latency-informed surveillance — extending past the 12–47-month peak into the ≥120-month tail — are needed to close the gap.

References

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