REAL-WORLD MORTALITY TRENDS IN HEMATOLOGIC MALIGNANCIES FOLLOWING THE INTRODUCTION OF CAR-T CELL THERAPY: A 20-YEAR U.S. POPULATION-BASED STUDY

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Introduction

Chimeric Antigen Receptor T-cell (CAR-T) therapy works by inserting bioengineered receptors into the host's T-cells, rendering them capable of recognizing cancer-specific antigens, triggering targeted tumour cell destruction. Approved by the FDA in 2017 for ALL and DLBCL, CAR-T therapy has since become a transformative treatment for relapsed/refractory B-cell cancers, including MCL, FL, and multiple myeloma.

Aim

To assess the real-world impact of CAR-T cell therapy on mortality outcomes in patients with hematologic malignancies across the United States over a 20-year period, with a focus on identifying overall trends and disparities in survival following the therapy's clinical implementation.

Objectives

To evaluate national mortality trends for CAR-T-indicated hematologic malignancies before and after the introduction of CAR-T therapy, to determine changes in age-adjusted mortality rates over time using statistical trend analysis, stratifying these trends by demographic factors such as race, sex, and geographic region, and identifying disparities.

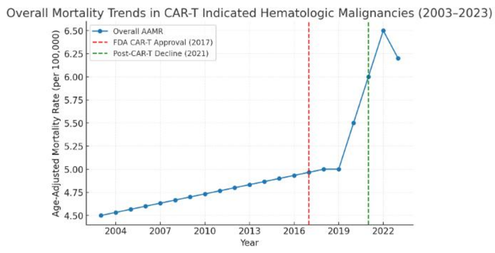
Methods

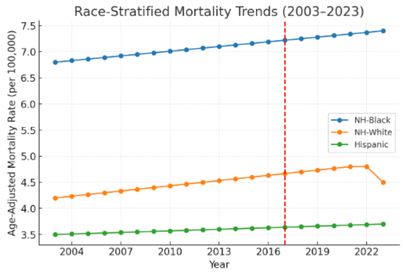
The CDC WONDER database was queried using ICD-10 codes C82, C83.1, C83.3, C90.0, and C91.0 to obtain age-adjusted mortality rates (AAMR) between 2003 and 2023.

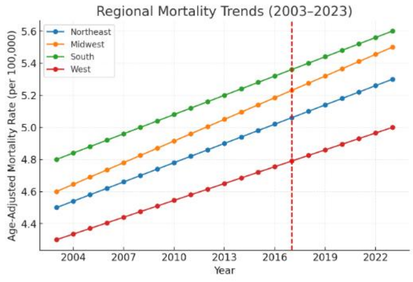
Trends were analyzed using Joinpoint regression to estimate annual percent change (APC) and average annual percent change (AAPC) with 95% confidence intervals (CI), stratified by year, race, sex, and census region.

Results

- 286,124 deaths were recorded across B-ALL, DLBCL, MCL, FL and MM between 2003 and 2023.
- National AAMRs rose through 2018 (p=0.3), accelerated sharply between 2018 to 2021 (p<0.001), followed by a significant downturn from 2021 to 2023 (p<0.01).
- Non-Hispanic (NH) Blacks experienced the highest AAMRs (AAMR: 7.32, 95% CI: 7.25, 7.39), followed by NH-Whites (AAMR: 4.66, 95% CI: 4.64, 4.68).
- Mortality rates for NH Whites have been down-trending since 2021 (p<0.01), the NH Black individuals did not experience a significant trend change for the study period (p = 0.11).
- The AAPC for Northeast was recorded at 1.44 vs. 1.81 and 1.77 for the Midwestern and the Southern regions.







Summary

While overall mortality from CAR-T-targetable hematologic malignancies initially rose following therapy approval, recent declines suggest emerging population-level benefits. Addressing gaps in racial and regional access to CAR-T therapy is essential for its widespread adoption and maximal impact on survival outcomes across diverse patient populations.

Discussion

This study shows a recent decline in mortality from CAR-T-indicated hematologic malignancies, suggesting early population-level benefits of CAR-T therapy. However, persistent racial and regional disparities—especially among non-Hispanic Black individuals—highlight unequal access to this treatment. Addressing these gaps is essential to ensure broader and more equitable impact.

References

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