Geographic Patterns of Melanoma Discordant Incidence-Mortality Patterns: A State-Level Trend and Spatial Analysis

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Overview

Through a retrospective epidemiological analysis using data from the NPCR-SEER Program and NCHS databases, we evaluated spatiotemporal patterns in state-level discordant incidence-morality to identify regions potentially affected by overdiagnosis or uneven access to dermatologic care.

Background

- **Melanoma incidence has risen substantially** in recent decades, while **mortality rates remain stable**.
- This **discordant incidence-mortality pattern** may indicate **overdiagnosis** or result from a **combination of true increasing cancer occurrence and improvement in therapeutics**.
- **Overdiagnosis** is the detection of indolent diseases unlikely to become symptomatic or life-threatening
- Prior studies examined demographic trends in overdiagnosis, but **geographic variation remains underexplored**.

Methods

- Incidence data from National Program of Cancer Registries (NPCR) and Surveillance, Epidemiology, and End Results (SEER) database were used, along with mortality data from the National Center for Health Statistics (NCHS) databases
- Population: White melanoma patients diagnosed between 2001-2019
- Primary metric was the discordant incidence-mortality, defined as the difference between annual incidence and mortality
- Joinpoint regression was performed to calculate Average Annual Percent Change (AAPC).
- Spatial autocorrelation was assessed via Local Indicator of Spatial Association (LISA) to identify DIM clusters and outliers, enabling classification of spatial patterns as nationwide (absence of spatial autocorrelation), region-specific (presence of clusters), or state-particular (presence of outliers).

Results

Figure 1

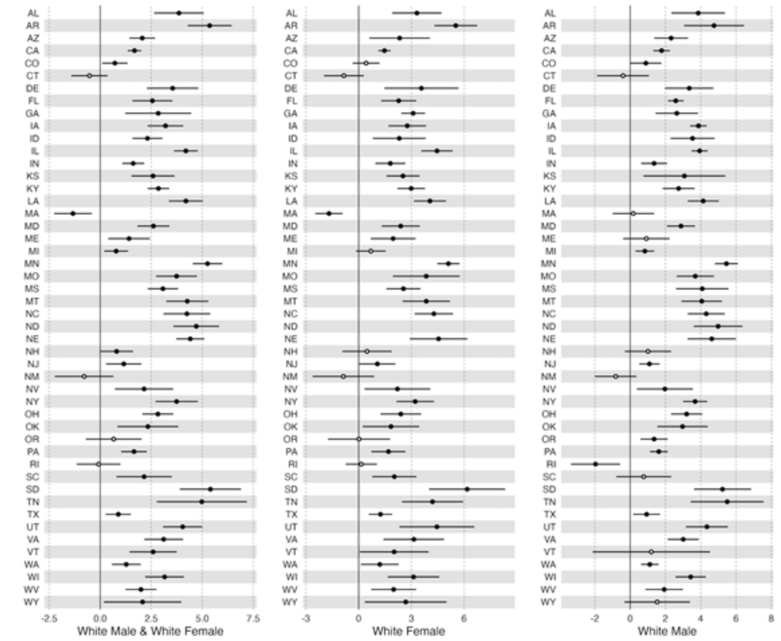

Fig. 1: Average Annual Percent Change (AAPC) in the melanoma DIM proxy by sex: combined (left), white females (center), and white males (right). Bars show 95% confidence intervals. Hollow dots=non-significant; filled dots=significant AAPCs. ND females excluded due to insufficient data.

Figure 2

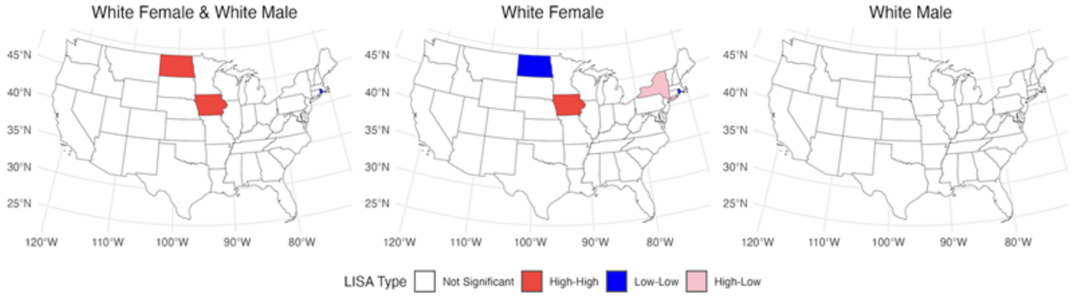

Fig. 2: Clustering of AAPC in the melanoma DIM metric by sex: combined (left), white females (center), and white males (right).

Key Findings

- **Pronounced geographic heterogeneity in discordant incidence-mortality** temporal patterns was evident.
- **Mean AAPC across all states is 2.551%**, with comparable trends in sex-stratified analyses.
- There was evidence of **increasing discordant incidence-mortality trends across almost all states, except Massachusetts and Rhode Island** which showed downward trends.
- Clusters of accelerated discordance widening was concentrated in **North Dakota, Iowa, and neighboring states.**

Conclusion

- Increasing discordant incidence-mortality trends may reflect **enhanced melanoma detection capabilities** through superior screening or greater accessibility to dermatological resources.
- The identified regional clusters of accelerated discordance widening necessitate **targeted review of regional healthcare infrastructure, reporting methodologies, and population-level risk factors to determine appropriate interventions**.
- Additional **multivariate analysis and alternative discordant incidence-mortality metrics** warrant further evaluation.

References

Supplementary Data