

Improving Health and Reducing Disparities in Minority Populations with Precision Medicine and Pharmacogenomics

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Introduction

Problem: There is marked underrepresentation of minority groups in the field of pharmacogenomics and precision medicine.

Objective: The primary objective is to assess the need for inclusion of minority groups in genetic testing for use in pharmacogenomics and precision medicine. The goal of increased inclusion of minority groups would hopefully lead to better outcomes of health (physical, mental, and social wellbeing) with the purpose of reducing health disparities.

Methods

Study type: systematic review. The data that was analyzed pertains to genetic testing, variants, mutations, and alleles. The use of genotypic and phenotypic data with precision medicine and the use of genetic testing was used to analyze medication administration strategies use to adjust disease treatment modalities. Health disparities and the correlation to minority ethnic groups were also analyzed.

Study sample: adult men and women of all ages, all ethnicities/races, studies that analyzed genetic testing, studies that analyze health disparities

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Background

- **Precision medicine** is a field that includes **pharmacogenomics**. It is an innovative approach used to adjust treatment regimens including medication doses and frequencies, to ensure that the medication is absorbed and maintained within the therapeutic range.² It can be used to predict adverse reactions and toxicities, increase patient outcomes, quality of life, and more.
- **Pharmacogenomics** is the study of how the genes of an individual person will affect their response to medications.³
- **Health disparities** affect socially disadvantaged populations, these populations experience preventable differences that pertain to the increased incidence of injury, chronic disease, violence, decreased optimal health opportunities and premature death.
- Factors that contribute to health disparities include poverty, environmental threat, insufficient healthcare access, individual factors (race/ethnicity, culture, beliefs, age, health, etc.), or behavioral factors (nutrition, exercise, substance use, etc.)⁴

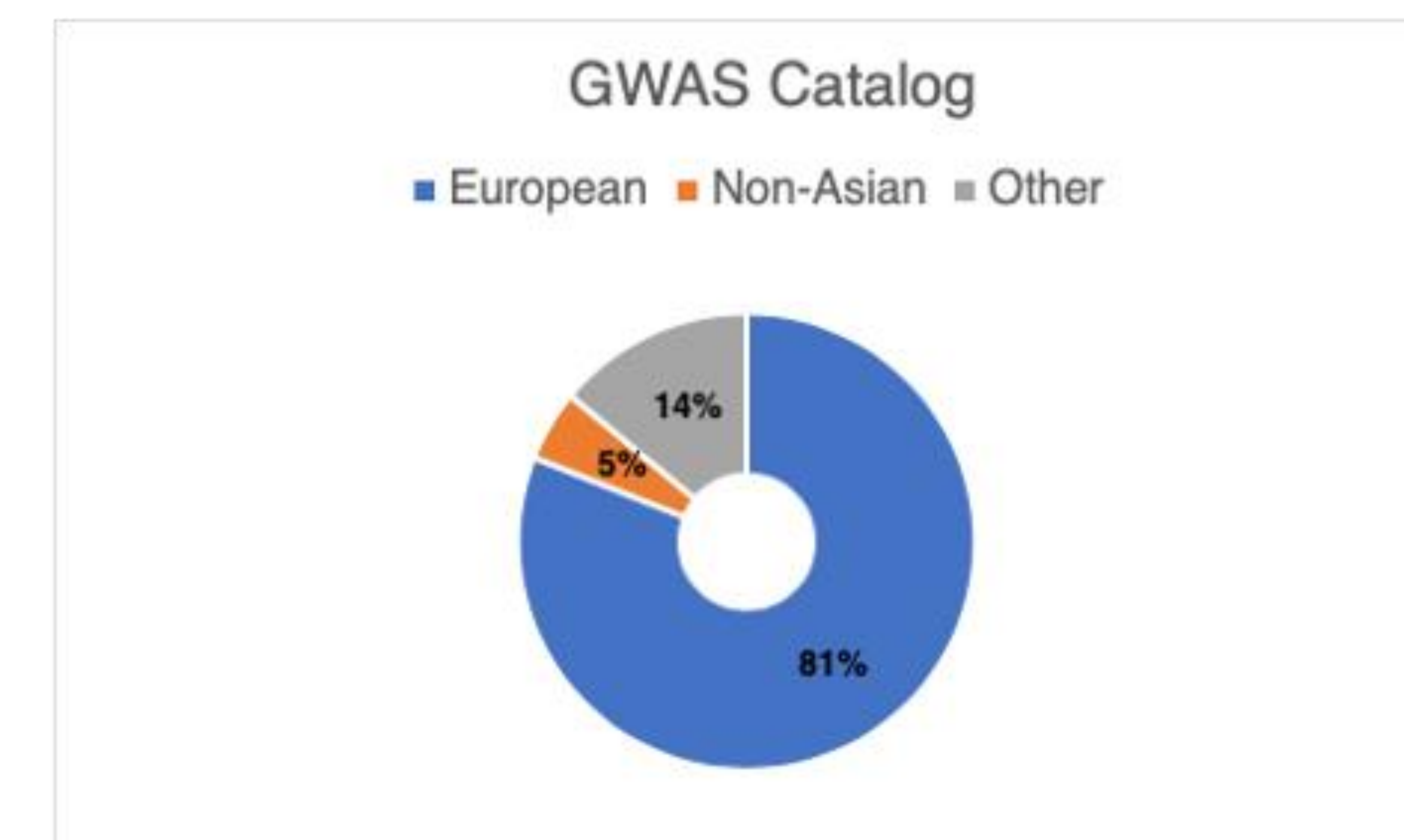
Discussion/Results

PCSK9: In knowing that coding variants for PCSK9 inhibitors are carried at a higher frequency in African Americans than Europeans, it is important to acknowledge that inclusion and representation is responsible for the recognition of the PCSK9 receptor as an LDL target and a new drug class. This example is a great demonstration that supports the inclusion and representation of minority groups adding pivotal benefits, not only for the benefit of the minority group but in patients of all ethnicities.

Warfarin: A current limitation to predicted warfarin dosing is the application to the population of patients who are multiracial or multi-ethnic. Since dosing algorithms are tailored for Caucasians, they only benefit that particular patient population. CYP2C9*8 is the highest allele frequency in African Americans, which highlights the importance of at least including CYP2C9*8 into pharmacogenetic-based dosing algorithms in drugs that are metabolized by CYP2C9.¹⁴ The testing omission creates racial disparity in African Americans which puts the patient at increased risk of warfarin adverse effects, the biggest one being increased bleeding.

Data

Genome Wide Association Studies (GWAS) Catalog, data contains 81% of the genetic data pertained in GWAS come from individuals of European descent, with only 5% coming from non-Asian minority populations.⁶



Conclusion

- Inclusion of minorities in the GWAS has helped the field of precision medicine and pharmacogenomics make exceptional advances which leads to positive impacts on the health of patients. Real efforts should be implemented with a focus on prioritizing inclusion. These efforts must include cultural, geographic, linguistic, and genetic diversity, especially in Asian Americans and Hispanics. The healthcare system must gain the trust of underrepresented groups to help increase patient participation and willingness to adhere to precision medicine interventions.¹⁵