

## PHARMACOGENETICS VARIABILITY IN DRUG METABOLISM AMONG DIFFERENT POPULATIONS

Fathima Rashidha M. K.

Vitebsk State Medical University  
Vitebsk, Republic of Belarus

**Relevance.** Pharmacogenetics examines how genetic variations influence individual responses to drugs. Differences in metabolic enzyme activity can lead to treatment failure or toxicity, emphasizing the importance of personalized medicine. With the rise of genetic testing, understanding population variability in pharmacogenes is crucial for safe prescribing.

**Aim.** This article aims to review and summarize the impact of genetic polymorphisms on drug metabolism and therapeutic response among different ethnic populations. The review seeks to identify clinically relevant genetic variants that affect drug pharmacokinetics and pharmacodynamics, and to understand how these variants differ in frequency and impact across various ethnic groups. The ultimate goal is to provide insights that can inform personalized prescribing practices, improve drug safety, and enhance therapeutic efficacy in diverse populations.

**Materials and Methods.** A literature-based analytical review was conducted using PubMed, ScienceDirect, and FDA pharmacogenomic databases. Keywords included “pharmacogenetics,” “CYP450 polymorphism,” “drug metabolism,” and “ethnic variability.” Studies from 2018–2024 were reviewed, focusing on genes CYP2D6, CYP2C9, and CYP3A4. Data were organized according to enzyme type, population frequency, and clinical relevance.

**Results.** Substantial interethnic variability was identified in drug-metabolizing enzyme expression. Poor metabolizers of CYP2D6 substrates were more common among European populations, while ultra-rapid metabolizers were prevalent in African groups.

Table 1. CYP450 Polymorphism Frequency and Clinical Implications

Enzyme	Population Group	Common Phenotype	Drugs Affected	Clinical Implication
CYP2D6	European	Poor metabolizer (~7-10%)	Antidepressants, beta-blockers	Reduced efficacy, toxicity risk
CYP2C9	Asian	Intermediate metabolizer (~15%)	Warfarin, NSAIDs	Dose adjustment required

Enzyme	Population Group	Common Phenotype	Drugs Affected	Clinical Implication
CYP3A4	African	Ultra-rapid metabolizer (~20%)	Antiepileptics, steroids	Reduced therapeutic levels

**Discussion.** Genetic variation in metabolic enzymes can greatly alter drug concentration and response. Routine genotyping could improve treatment safety by enabling dose individualization. However, cost and limited access to testing restrict widespread use in developing countries.

**Conclusion.** Pharmacogenetic diversity significantly affects clinical outcomes and drug safety. Integrating pharmacogenetic data into clinical guidelines can improve personalized therapy and reduce adverse drug reactions.

#### References

1. Daly, A. K. Pharmacogenetics and Personalized Medicine / A. K. Daly // *Fundam Clin Pharmacol* Fundam Clin Pharmacol. – 2002. – Vol. 16, № 5. – P. 337-42.
2. Pharmacogenomic Biomarkers in Drug Labeling. – URL: <https://www.fda.gov/media/124784/download?attachment> (дата обращения: 20.09.2025).
3. Zhou, Y. Ethnic Variability in CYP450 Enzymes and Its Clinical Significance / Y. Zhou // *Pharmacogenomics J.* – 2022. – P. 1.
4. Insights into pharmacogenetics, drug-gene interactions, and drug-drug-gene interactions / L. E. Russel, K. G. Claw, K. M. Aagaard [et al.] // *Drug Metabolism Reviews* – 2025. – Vol. 57, iss. 3. – P. 272-290.
5. Pharmacogenetic Panel Testing: A Review of Current Practice and Potential for Clinical Implementation / R. Mosch, van der Lee M, H. J. Guchelaar, J. J. Swen // *Annual Review of Pharmacology and Toxicology.* – 2025. – Vol. 65, № 1. – P. 91-109.

## IMMUNOMODULATING EFFECT OF AMINO Guanidine IN EXPERIMENTAL PERITONITIS

Husakouskaya E. V., Maksimovich N. Ye., Shiny P. P.,  
Atthanayaka M. G. S. A., Kaduboda A. M. M., Minich V. R.

Grodno State Medical University  
Grodno, Republic of Belarus

**Relevance.** Mortality from peritonitis remains quite high, despite significant advances in modern medicine in the diagnosis and treatment of urgent surgical conditions [1, 2, 3]. Although the mandatory standard of treatment for peritonitis is surgical intervention combined with antibacterial therapy [1], adequate pathogenetic therapy is also of great importance [4]. However, insufficient knowledge of the mechanisms of inflammation in the abdominal cavity, in particular the mechanisms regulating leukocyte phagocytic activity, indicates the need for further clarification.