

Necessity of a Turkish National HLA CWD Catalog: Inadequacy of Global Databases and a Proof-of-Concept Study

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Abstract

Objective: Common and Well-Documented (CWD) allele catalogs serve as global references for resolving ambiguous HLA typing. However, they may fail to represent the genetic diversity of specific populations like Türkiye. This proof-of-concept study aims to demonstrate the inadequacy of global catalogs in reflecting local diversity and to emphasize the critical need for a Turkish National CWD catalog based on Next-Generation Sequencing (NGS) data.

Materials and Methods: High-resolution (8-digit) HLA-A, -B, -C, -DRB1, and -DQB1 loci genotyping was performed using NGS in 142 healthy unrelated donors from the Eskişehir region. Allele frequencies were calculated using the Expectation-Maximization (EM) algorithm. The obtained genetic profile was compared with the Global CIWD 3.0.0 catalog (European and MENA datasets) and national catalogs of Germany, China, Russia, and Brazil.

Results: Although the Turkish population shares features with European and Middle Eastern populations, it exhibits a unique profile. Out of 228 distinct alleles identified at 8-digit resolution, 76 (33.3%) were not recorded in the Global CIWD 3.0.0 EU and MENA datasets. While representation was high at low resolution, it dropped dramatically at high resolution. Comparisons with other national catalogs revealed significant differences, confirming the necessity of local data. Additionally, 8-digit analysis showed that G-grouping masks dominant subtypes (e.g., A*02:01:01:01).

Conclusion: Global HLA catalogs are insufficient to represent the high-resolution genetic diversity of the Turkish population. Relying solely on global data may lead to overlooking optimal donors for Turkish patients. Establishing a dynamic National HLA CWD Catalog is a scientific and clinical necessity to improve donor matching accuracy, reduce ambiguous typing costs, and support disease association studies

Keywords: HLA Antigens, gene frequency, population groups, CIWD, catalog

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