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NEW ALLELE ALERT

HLA Immune Response Genetics WILEY

The novel HLA-DQB1 allele, *HLA-DQB1*04:72*, detected in a potential hematopoietic stem cell donor

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Identification of the novel *HLA-DQB1*04:72* allele that differs from *DQB1*04:02:01:06* by two nucleotide substitutions.

KEYWORDS
HLA-DQB1, *HLA-DQB1*04:72*, new HLA allele, NGS

The *HLA-DQB1*04:72* locus is one of the most polymorphic genes in human genome. As April 2022, a total of 2230 *HLA-DQB1* alleles have been recorded in the IPD-IMGT/HLA Database.[1,2] We describe here the identification of the new *HLA-DQB1*04:72* allele, discovered during the typing of potential donors of hematopoietic stem cells recruited by National bone marrow donor registry named after Vasya Perevoshchikov, Russian Federation.

Genomic DNA was prepared from whole blood using a commercial kit, according to the manufacturer's instructions (QIAGEN, Germantown, Maryland). HLA typing for HLA-A, -B, -C, -DRB1, and -DQB1 loci were performed using commercial by Holotype kit (Omixon, Hungary). The sequencing was performed on the platform Illumina MiSeq (Illumina, San Diego, CA) and was analyzed with the HLA Twin software (version 4.1.0, Omixon, Inc., Budapest, Hungary) and IPD-IMGT/HLA Database version 3.37.0.

The novel *DQB1*04:72* allele differs from *DQB1*04:02:01:06* by two nucleotide substitutions: the first in intron 1 a substitution (T > G) at position 1372 and the second in exon 3 a nonsynonmous substitution (C > T) at position 515 (codon 140) resulting in an amino acid change (Threonine to Isoleucine) (Figure 1). The extended HLA typing of the individual with *DQB1*04:72* is *A*02:01:01G, 23:01:01G; C*06:02:01G, 07:01:01G; B*49:01:01G, B*57:01:01G; DRB1*04:04:01G, 11:01:01G; DQB1*03:01:01G*.

The novel *HLA-DQB1* allele was officially designated as *HLA-DQB1*04:72* by the World Health Organization (WHO) Nomenclature Committee Factors of the HLA System in November 2020.[2] The nucleotide sequence has been submitted to GenBank with accession number MT658792 and to the IPD-IMGT/HLA Database with accession number HWS10060679.

AUTHOR CONTRIBUTIONS

Shamil Nizamov participated in the performance of the research and participated in data analysis. Raushania Gaifullina contributed to collection of the data. Elena Shagimardanova and Anastasiia Ananeva contributed to the design of the study and participated in the writing of the paper. All authors read and approved the final version of the manuscript.

Exon 3

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AA Codon                              100                 105                 110
DQB1*04:02:01:06   TG GAG CCC ACA GTG ACC ATC TCC CCA TCC AGG ACA GAG GCC CTC AAC CAC
DQB1*04:72         -- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

AA Codon                        115                 120                 125
DQB1*04:02:01:06   CAC AAC CTG CTG GTC TGC TCA GTG ACA GAT TTC TAT CCA GCC CAG ATC
DQB1*04:72         --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

AA Codon                    130                 135                 140
DQB1*04:02:01:06   AAA GTC CGG TGG TTT CGG AAT GAC CAG GAG GAG ACA ACT GGC GTT GTG
DQB1*04:72         --- --- --- --- --- --- --- --- --- --- --- --- -T- --- --- ---

AA Codon                145                 150                 155
DQB1*04:02:01:06   TCC ACC CCC CTT ATT AGG AAC GGT GAC TGG ACC TTC CAG ATC CTG GTG
DQB1*04:72         --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

AA Codon           160                 165                 170                 175
DQB1*04:02:01:06   ATG CTG GAA ATG ACT CCC CAG CGT GGA GAC GTC TAC ACC TGC CAC GTG
DQB1*04:72         --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---

AA Codon                        180                 185
DQB1*04:02:01:06   GAG CAC CCC AGC CTC CAG AAC CCC ATC ATC GTG GAG TGG C
DQB1*04:72         --- --- --- --- --- --- --- --- --- --- --- --- --- -
```

FIGURE 1 Sequence alignment of the exon 3 sequence of *HLA-DQB1*04:72* compared to the most homologous allele *HLA-DQB1*04:02:01:06*, dashes (−) show identity to the *DQB1*04:02:01:06* allele. The DNA sequence of *HLA-DQB1*04:72* is identical *HLA-DQB1*04:02:01:06* except in codon 140 where ACT of *DQB1*04:02:01:06* is substituted by ATT in *DQB1*04:72*.

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CONFLICT OF INTEREST

The authors have declared no conflicting interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the IPD-IMGT/HLA Database at https://www.ebi.ac.uk/ipd/imgt/hla/alleles/allele/?accession=HLA24147.

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REFERENCES

1. Robinson J, Barker DJ, Georgiou X, Cooper MA, Flicek P, Marsh SGE. IPD-IMGT/HLA Database. *Nucleic Acids Res*. 2020; 48:D948-D955.
2. Marsh SGE, Albert ED, Bodmer WF, et al. Nomenclature for factors of the HLA system. *Tissue Antigens*. 2010;75:291-455.

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