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NEW ALLELE ALERT

Genomic Full-Length Sequence of the *HLA-DRB1*14:84* Allele, Identified by PacBio Sequencing

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ABSTRACT

The genomic full-length sequence of the *HLA-DRB1*14:84* allele was identified using a PacBio sequencing approach from China.

Here, we present the first genomic full-length sequence of the *HLA-DRB1*14:84*. The sequence was detected in a bone marrow donor from the China Bone Marrow Bank. As of April 2025, a total of 3,825 HLA-DRB1 alleles have been identified and included in the IPD-IMGT/HLA Database [1]. The *HLA-DRB1*14:84* allele was first detected in a Taiwanese individual in 2009 and assigned the GenBank/ENA accession number FJ594768. But the sequence only covered exon 2 and partial CDS of *DRB1*14:84*. We here report the 13,398 bp full-length genomic sequence of *HLA-DRB1*14:84* using PacBio sequencing methods, a third-generation sequencing platform. The testing was conducted with the informed consent of the donor. In brief, the library was added to the sequencing chip and sequenced using a PacBio Sequel II high-throughput gene sequencer. Subsequently, we used the official PacBio software, Circular Consensus Sequencing (CCS), to process the HiFi data. Then we partitioned the library based on the presence or absence of barcodes. Following this, we conducted backposting, mutation detection, clustering, typing, and haplotype verification of the results [2]. Finally, the full-length sequence of the *HLA-DRB1*14:84* allele was confirmed.

The sequence of *DRB1*14:84*, a total of 13,398 bp in length, including the sequence of the 5′-upstream region, all introns, and exons 1, 3, 4, 5, and 6, is first reported here. Compared with *DRB1*14:05:01:02*, there are several nucleotide changes not only in exons but also in introns. The changes in exons are concentrated in exon 2, including T>C at nucleotide 8644 (codon GCT>GCC, synonymous mutation), G>A at nucleotide 8677 (codon GAG>GAA, synonymous mutation), C>G at nucleotide 8678, G>A at nucleotide 8679, G>C at nucleotide 8680 (codon CGG>GAC, Arginine 99 to Aspartic Acid), G>C at nucleotide 8690, A>T at nucleotide 8691 (codon GAG>CTG, Glutamic Acid 103 to Leucine) and T>C at nucleotide 8704 (codon TAT>TAC, synonymous mutation). The changes within introns include one nucleotide (T) insertion after nucleotide 3073 of intron 1 and two nucleotides (GT) insertion after nucleotide 8851 of intron 2, see Figure 1. The complete HLA typing of the donor is as follows: *HLA-A*02:01:01G*, *02:03:01G*; *-B*13:01:01G*, *38:02:01G*; *-C*03:04*, *07:02*; *-DRB1*14:84*, *15:BNK*; *-DQB1*05:01*, *DQB1*05:03*.

The full-length nucleotide sequence of this allele has been submitted to GenBank, the accession number is PV208187, and to the IPD-IMGT/HLA Database in March 2025, the accession number HWS10100607. The name was officially assigned by the World Health Organisation (WHO) Nomenclature Committee for Factors of the HLA System in January 2009. This follows the agreed policy that, subject to the conditions stated in the most recent Nomenclature Report [3], names will be assigned to new sequences as they are identified. Lists of such new names will be published in the following WHO Nomenclature Report.

```
                 -393                                                                              -314
DRB1*14:05:01:02 TTGTCAAGTG GGAAATGAAT GCTCTTACAA GGCTCAAACT TGTGAACACA TCACTGACCA GCACAGAGCT AAAATAATTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   -234
DRB1*14:05:01:02 GGGCTAAAAA TACCGCCCCA ATTAAAGTGT TTTACATGCA ACTGGTTCAA ACCTTTCAAG TACTAAAAAC AATCCTGTAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   -154
DRB1*14:05:01:02 AGAAGGAAAT TCTGTTTCAG AAGAGGACCT TCATACAGCA TCTCTGACCA GCAACTGATG ATGCTATTGA ACTCAGATGC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    -74
DRB1*14:05:01:02 TGATTCGTTC TCCAACACTA GATTACCCAA TCCAGGAGCA AGGAAATCAG TAACTTACTC CTATAACTTG GAATGTGGGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                     |Exon 1          7
DRB1*14:05:01:02 GGAGGGGTTC ATAGTTCTCC CTGAGTGAGA CTTGCCTGCT GCTCTGGCCC CTGGTCCTGT CCTGTTCTCC AGC|ATGGTGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ---|-------
                                                                                                     87
DRB1*14:05:01:02 GTCTGAGGCT CCCTGGAGGC TCCTGCATGG CAGTTCTGAC AGTGACACTG ATGGTGCTGA GCTCCCCACT GGCTTTGGCT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                               |Intron 1                                                            167
DRB1*14:05:01:02 GGGGACACCA GAC|GTAAGTG CACATTGTGG GTGCTGAGCT ACTATGGGGT GGGGAAAATA GGGAGTTTTG TTAACATTGT
DRB1*14:84       ---------- ---|------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    247
DRB1*14:05:01:02 GCCCAGGCCA TGTACCTTAA GAAATTGTGA CGTATTTTTC AGAGATTGCC CATCTTTATC ATATGGATCC CAAATAATTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    327
DRB1*14:05:01:02 CCCCACCACA AAAGGAGCTT GGCTACTTGC CCACTCCATG AGACTTGTGT AAGGGGCCTC CATACAGGTC ATTTCTACTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    407
DRB1*14:05:01:02 AAATCTCCAC CAATAAAACC TTTGCATCAC ATGTCCTCAG GGTCTTTAGA GGATTTAGAA ATAAGGATGC TAAAATAAAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    487
DRB1*14:05:01:02 TCCCCATACA GCACTTGCCT TTATTATGTT GACTTATGTC AGACAAAAGG AGGTTTTTTC TGAAAATTTT GTGGAAGTCA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    567
DRB1*14:05:01:02 AGGGAATTTA AAGGGTCTCT CCTAAACGAT CCTGGGTTAT GTCACCCACA GGACCTTTGG TGTTGGCCCC TCTTCCTCAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    647
DRB1*14:05:01:02 ATGTGAGGAT GGACCCAGTG GCCTCCCCAT TATCTACTTT CTTTTCTTTC TGAACTCCAA TGTTTATAAA GCCTGTACCC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    727
DRB1*14:05:01:02 CTGTAGTGTA TGTAGGTTCT CTGACAGAAG TTATACTTAG TGCTCTTTCT TTCTTGTGGG GAAAAATCCC TGGAACTGAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    807
DRB1*14:05:01:02 GCTGAGATCT TTAGTACTTG GAGTCACCTT ACAGATACAG AGCATTTATG AGGTATTCTT TGGTGCCTAA AGAACTTAAG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    887
DRB1*14:05:01:02 GCATCCTCTG AAAACCTGGC CCAGGTTAGT GTTTATTATT AATCTCTTTT AACCTTTCTA TACTTGTTTC TCCTACATCT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    967
DRB1*14:05:01:02 CCTAAGTGCT CCAACTAGAC ATGACAGAAG AGATTTAACT AACGTAGTAT GAGTTATATA AAATTCTATT TTTGTAAGTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1047
DRB1*14:05:01:02 AAAAATAATC AAATATCAGA AATTTAATAA TGTTCAAACT ATATACTCTG TGTGGGGTTA CCGAGACGAT GTGGACATTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1127
DRB1*14:05:01:02 TTCACGTCTC ATAGGGCTGA AAGTCAATGA GCAAGTCCTG GGAACTCATT GTCTTACTGG GGTCTTGTCC TAAATTTCAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1207
DRB1*14:05:01:02 AGGTTCACCC ATTATGCCCT CAGCTTTCCT TAATTAGCCA TGTCTGCTTA CCTCTTCCTC CAGTTTCTCT CTTATTTTTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1287
DRB1*14:05:01:02 CCCAGCTATG TTGTTATCAT TTCCAGAAAT CTCTAAAGCT TGCACAGATC CTTAGCACTA TGAGATCCAT TGAAAGAGAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1367
DRB1*14:05:01:02 AGTTTTTTTC TTTTTGAGAT AGGGCCTGGC TCTGTCACCC AGGCTGTAGC TCAGTGGTGC GATCGAGGCT CACTGCAACC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1447
DRB1*14:05:01:02 TCTGCCTCCC ACGCTCAAGC AATCCTCCCT CCTCAGCCTC CAGAGTAGCT GAGAATACAG GCAGGCAACC ACGCCCAGCT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1527
DRB1*14:05:01:02 AATTTTTGTA ATTTTGGTAG AAATGAGATT TTGCCATGTT GCCCAGGCTG GTCTTAAACT GCTGGACTCA AGCAATCCTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   1607
DRB1*14:05:01:02 CTGCCTTGGC CTCCCAACAT GCTAGGATTA TAGATGTGAG CCACTGTGCC CAGGCAAAAA GAGATGACTC TCAATAAAAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | Alignment of the sequence of *DRB1*14:84* with the sequence of *DRB1*14:05:01:02*. Dashes indicate nucleotide identity with the *DRB1*14:05:01:02* sequence. The pipes indicate the exon and intron boundaries.

```
                                                                                                 1687
DRB1*14:05:01:02  AAGTCCTTTT TCTTAAATCA CTGTTTCTTT ATCTGTGAAT TCTTCTTCCA ACTAGAAGGA GGAGAAAGAA GTTTGCCTGT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 1767
DRB1*14:05:01:02  ATTTCTCACC AGGAGGAGAA GGGGTCTAGT GTGACATCAG AATGAAAGAG TGCTGGAGTT TGAGCCCCTT CTTGCTTTCC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 1847
DRB1*14:05:01:02  AAGATCCCCA CAGTGATCAG TTCCCATACC CTGGTTTATT CATGTAAACC ACACTTATTT TTCTTAGCAG CTACTGTGTA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 1927
DRB1*14:05:01:02  CTCGGCTCCA TTCTAGGTTC AGATCATTCT ATTTGATTAA GACAGAGAGG GTCCCGACTC TCATGGAAGT TACACAACAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2007
DRB1*14:05:01:02  TAGAGGAGAC AGACACTAAC CCAATAAGCA TTTAACAAAG AATAAAATGT TAGAGAGTCA TAGTGCACTG AAGAAAAGAC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2087
DRB1*14:05:01:02  ATCAGGTTTG TGAAGAAGAG AGACATGGAT TCATCTACTT TAGTTCATAT GTTTAGGGAG CTCTACCTGA GAAAGTGACA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2167
DRB1*14:05:01:02  TTCAGCTGAG ACAACAAAAT AAGTAGACAG TCATGAAGAT CTAATGGACG AAAGCTCCAG GGAGACCAAA TGGGGGGAAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2247
DRB1*14:05:01:02  GCCCTGGTGT GGGAAATTAT GTGGAGAGAG AGAAAGAAGG CTAGAGGGGC TGATGTATAG AAAGTAAGGA AATGGAGAGG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2327
DRB1*14:05:01:02  CAGAAGATGA GGTAGGACAC AGAGAGAAAG TCAGGAGCCT CATGATTATA GGCTCTGATG TCCACGGTAA AAAATTTGAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2407
DRB1*14:05:01:02  TTTTATTTTA TTTATTTATT TATTTATTTT ATTTTATTTA TTTATTTATT TTTTGAGATG GAGTCTCGCT TTGTTGCCCA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2487
DRB1*14:05:01:02  GGCTGGAGTG CAGTGGCGCG ATCTCAGCTC ACTGCAAGCT CCACCTCCTG GGTTCATGCC ATTCTCCTGC CTCAGCCTCC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2567
DRB1*14:05:01:02  CTAGTAGCTG GGACTACAGG CACCCGCCAC CACGCCTGGC TAATTTTTAG TATTTTTAGT AGTGAGGGCG TTTCGTCATG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2647
DRB1*14:05:01:02  TTAGCCAGGG TGGTCTCCAT CTCCTGACCT CGTGATCCAC CTGCCCCGGC CTCCCAAAGT GCTGAGACTA CAGGTGTGAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2727
DRB1*14:05:01:02  CCACCACGCC TGGCCTATTT TTTTTTTTTT TTT*GAGACG GAGTTTCGTT CTTGTTGCCC AGGCTGGAGT GCAATGGTGC
DRB1*14:84        ---------- ---------- ---------- ---T------ ---------- ---------- ---------- ----------
                                                                                                 2807
DRB1*14:05:01:02  AATCTCGGCT CACTGCAACC TTCGCCTCCC TGGTTCAAGT GATTCTCCTG CCTCAGCTTC CCAAGTATCT GAGATTACAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2887
DRB1*14:05:01:02  GCACCCACCA CCATACCTGG CTAATTTTTA TTTTTTTGTA TTTTTAGTAG ACATGGGGTA TCACCATGTT GACCATGCTG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 2967
DRB1*14:05:01:02  GTCTCGAACT CCTGACCTCA GATAATCTGT CTGCCTTGGC CTCCCAAAGT GCTGGGATTA CAGGCATGAG CCACGGCGGC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3047
DRB1*14:05:01:02  CGGACTGAAT TTTATTTAAA TAGATACGAG AAGCTACTGT ATGGTTACAA GGAGAGTCAA TTTATATTCA ATTTATTTTT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3127
DRB1*14:05:01:02  ATTTTATTTT ATTTTTTTGG TGATGGGGTC TTGCTCTGTT GCCCAGGCTA GATTGTAGTG GCACAATCTC GGCTCACTGC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3207
DRB1*14:05:01:02  AACCTCTGCC TTCTGGGTTC AGGCGATTCT CCTGACTCAG CCTACAGAGT AGCTGGGACC ACAGGTACAT GCCACCACAC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3287
DRB1*14:05:01:02  CTGGCTAAGT TTTTGTATTT TTTAGTAGAG ACAGGATTTC ACCGTGTTAG CCAGGATGGT CTCGATCTCC TGACCTCGTG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3367
DRB1*14:05:01:02  ATCCACCCAC CTTGGCCTCC CAAAGTGCAG GGATTACAGG CGTGAGCCAC TGCGCCCGGC CTATATTCAA TTTTTAAAAC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3447
DRB1*14:05:01:02  TAATTCTAGC TACTCTGTGG GGATTGGAAT GTTGGGGTTC ACAAGTGGTC AGGAAGACTA TTTAGGAGCA CAGCAGGGAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3527
DRB1*14:05:01:02  TTCTCCAGCG AAAACAGGCT TGTGGCTTCA TGGAGTGCAT TAGTGATAAA GACGGTGAAA AAGATAAAGT GGACAGACTT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                 3607
DRB1*14:05:01:02  GGCATGTATT TTTGCTTAGC TTGTTAATGA ATTACTGTAA AGGGGGTAGA ACAATCAAGC TTATTCCTAA GGATTTTGTT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | (Continued)

```
                                                                                                     3687
DRB1*14:05:01:02  TTGACAAATA AGTGGGTGGT AGTGTTGTTT ATTGAGATAG GAAAAACTAT GGGAGGAAAT TATTTGAAGT GGGTGGTTGG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     3767
DRB1*14:05:01:02  AAATAAAAGT TTTGTTTAAA TTTGAGATGA TTTATTGACA TTTATGTGGA GCAATCAGAA GGTCAATGGC ATTTAAGAGA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     3847
DRB1*14:05:01:02  CTCATGGTGA GGCTAGGGCT TCAAGTATTT ATGTTGGCGG CATCAATACA TGTAGTGTGT TAAATTCCAG GGAGTGGAAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     3927
DRB1*14:05:01:02  AGGATACATA GGGAGATGGA TTGTGTGGAG AAAAAAGAAC AGGGCACAGG CCAGCAAAGG GGGCTGAGAA AGAGCCCAGG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4007
DRB1*14:05:01:02  GATGTTGGAG AAAAATCAAG AGAACATGAT GCGTGTACGT CAAGGAAAAT AGATTTTTTT CAAGGAGAAG GGAGAGGCCA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4087
DRB1*14:05:01:02  ATTGTGGTGA GTACCTATAA GAGGAGGGGG AAGTGAGAAC GTGACAGAGA AGCAAGTGCT GGGTTTGGTG GAGTTGATAT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4167
DRB1*14:05:01:02  TTGCAGTCAG TGGAGTATCC AGGGAGGAAA CTGGATTGGA CAATTTGAAG AGCGAGTAGA AGTGAGGATG AGGTTAAGGT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4247
DRB1*14:05:01:02  TGACTGTTTT GAGTAGAGAG CTTCAGGGAA GGACTGCACT CTGGGTTCAG GGGGCCAGCT GGATCAAAAG GAAAAGGCTA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4327
DRB1*14:05:01:02  AAGAGGCTGA AGAGAAGCAG GAGGACCTGT GAACCAGAGA TGCTCAGTCA TTATTAGCGA GGAAATACTA GAGAGCCCCT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4407
DRB1*14:05:01:02  GTGTGCAGTG ATGACTACTC ATGCAGAAGG TCACACAGCC AATATTTAAC ACAGCCAGTA TTTCACACAG CTAATATTTA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4487
DRB1*14:05:01:02  TTAGTGACAT AGAATATACC AGTTATTACT CTAGGTCATG AGAATGGAGT GATAAATAAA ATGAATCCGG TCGCCATCAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4567
DRB1*14:05:01:02  TATATGCCAT GTAACATTTT GCAGTGACTG TGTACCAGGC CTGTGAATTT CAGTATGCAA TTTCAATAAT GATCCTGCTG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4647
DRB1*14:05:01:02  TATCTGTGGT GTTTAAAAAC ATATACATCT CTGGAATCTA AAATTGAGAG GTTATAAGTA AAACCCAGTA TTACAAATTG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4727
DRB1*14:05:01:02  AGTGCTGGAA ATCAGATTGC AGTTTAAATC TGAGCATATA GAAAGTCCCT TTCTTCTATG TCAGCAGATG CCTTTTGTGT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4807
DRB1*14:05:01:02  GAGGTTTAGC TGGACTGCAT TATTAGACAT AAACAAGTGT TTCTGCCCTA TGTTTTCAGA ATGACAATTC TTTATGAAAC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4887
DRB1*14:05:01:02  TAATAGAAGA ACAGAAGACA ACTGCAAAAT CATGATGGAG ATAGTAATTG CTTTAGAATT AAGGAATACA AAAAATAATG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     4967
DRB1*14:05:01:02  TGAGCTGTAG TTATAGGGAT CATAAAAGTT TAAATGGGAA TGTATTTGAG TATGTGATCA GTGCTAAGAA GAGTCATCAT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5047
DRB1*14:05:01:02  TTAATTTTAC ACTTAACAGT AATCTCGTGA GGATTACGCT ATTATTAAAT GCATTTGATA GATTACAAAA AGGCTTATGG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5127
DRB1*14:05:01:02  TTGGTAAAAA TTGACCCAAG TAGAAGAGAT CATGTTTTTA TTCAGGTTTT CTGATTCTAG AGTTTGAGAG TTTGTCCATC
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5207
DRB1*14:05:01:02  ATTAGTGAGT AGTGACTATA TTGTGTCTGA ATTATTGACA GAATTTCTGA TATTCATATG TACCAGGTTG TTTCTTAGAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5287
DRB1*14:05:01:02  TGGGGATAGA GATGCAAGGG CTGCTAGTTC CGATGTATTG GGGAAACTTT CATTCATTTT GCATTTATCA TTTTAAAAGT
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5367
DRB1*14:05:01:02  TCTGTATGTC TATAATGGTC ATGTGTTGAA GAACACAAGG AAGTATTAAA TCACTCCTTC TTCTAAGGTT TGACTAGCAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5447
DRB1*14:05:01:02  GTTGGGCTAG AGTTACCAAA TAAAATACAT GTTCCTAGTG AAATCTGAAT TTCAGATACA AAACCATAAT TTATTGAAAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5527
DRB1*14:05:01:02  TCCAAATTTA ACTGGGCATC CTCTGGTTTT ATTTGCCACA TCTGTCAACC CTAAATGTGA CACATGGACA TGGATTACAG
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                     5607
DRB1*14:05:01:02  TGCTAACCAT GCAAGCCACG GTGACAGCAA CTTCACACAT GTTTATTTTT AACTCTCTCT GTAAGAAAGT GCTTAGATAA
DRB1*14:84        ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | (Continued)

```
                                                                                                    5687
DRB1*14:05:01:02 TTTAGGGATA AAAAGATAGA CATTGCTTGA TCCAGGGTGC ACACCTCTCT GCCACCATTT CTAAAGGGCA AAGGGAGATT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    5767
DRB1*14:05:01:02 TCCGCAGGTC TTGCTCACAG TCTGGGGAGC TGCTCATTTT TGTAAAGTGT CTGTATGAGA ATGTCATTTT CTTGGTTTCC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    5847
DRB1*14:05:01:02 TCCTTTACGA GGGGACTTGA CTACAAAACC AAGAGTTCTG CCTCTGGCCA AGGCTGGTAA TTTGATGCCT GCTAGTATTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    5927
DRB1*14:05:01:02 TTGGGAGTGG GAGACTGAAA GAAATGAGTT AGTTGGGGCA TTTAACGGGA ATAAAATAGC TGTGGTTGTG ATTCATTACT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6007
DRB1*14:05:01:02 ACAGATAATT AGTGGACCAG TGGCAGAGAA ATTAAGAAAA AAGATGATGT GAACGATAAA TGATATGATT AGTGACTGCT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6087
DRB1*14:05:01:02 TGGTAAGGCA AGGAAATCAT TAAATCTTGG TTCTCATCAA GTTCATTTTC TGGAAAGATA GCACTGTATT GGGAGCAGAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6167
DRB1*14:05:01:02 TTCTACAAAA CCTTCTTTTT ACATAGGACC AAGATTTTCA ACAAATATTT TTCAATGCAA TTCTCAGCTG CTCCATAACT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6247
DRB1*14:05:01:02 AATAGTAGCT TGTTCAACAC AGATTTTTTC AGATGATTCA CACCTGTGGT ACTTACCCAG GGATGGTTCA CCACCCCTCC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6327
DRB1*14:05:01:02 CTTCCCTCTC ATCATCGTTG GGGAACGGTG ACAATGTTTG GAACAATTTT TGGTTGTCAC AAACAGGGGT TTCTTCTGAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6407
DRB1*14:05:01:02 ATTCAATGAG TAGAAGCCAG GGACACTGCT AGAGAACCCA CAATGTTCAG AACAGCCTCT GCCATCAACA AGGAATTATC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6487
DRB1*14:05:01:02 TGGTCCAAAA TGTCAATAGT GCTGAGGCTA AGAGCACTGG TTCACACTGT GCTCTTTCTA AAAATTCTAG ACTCACATCT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6567
DRB1*14:05:01:02 GTTATACACT CACCACACAG TTTAGTCTTT TATTTTTGCT TGTTTCATTA TAAACAATTA GACAGTTGCA TAAATTCAAC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6647
DRB1*14:05:01:02 CACTTTCTTG TTGAATCCAT TTAGTCAATG CAAGCTCAAT ATTTTCATAT TTATTTTTTG CCTTATGCAA TATTTTTCAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6727
DRB1*14:05:01:02 CATTTTCATG AGTTGTCGGT CATCACTATC TCTATTAACT TTCAACAACT TGCCCTTGTA AGTCACAAAT AGTGATGCTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6807
DRB1*14:05:01:02 CTGAAATTAT TTCTCACTAA CATGCCTCAG ATTTCTGTAG TGATTCTACA TTTGATATTA TTCACAATGT AAAATGCTTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6887
DRB1*14:05:01:02 TATTTATTCA TTTCGCTTTT ACCCAAGGAT TATTTTTAAG TTATTTTGTC GTTTTCACAC TTCAAACATA AAGACAAAAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    6967
DRB1*14:05:01:02 CATCAAAAAT ATAGTGTTTT ACATATGTGC ATATTTTCAC ACATATATGT ATGTATATTT ATATGTATTG AAACTACAGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7047
DRB1*14:05:01:02 AGCACATGTC ACCAATAAGA GCTCTGAGAC ACCTTCGACC ACTTACCCTT ATCAGATGAG TTGTGGAAAC AAGTTTTTTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7127
DRB1*14:05:01:02 AACTGAATTT CTGAGTTTTG TGGATTTAGA AATGCAAAGG AAGGTTTGTG GACATTCACA GGGATCATGA TTTTATTCTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7207
DRB1*14:05:01:02 CTTAAAACTC TTCTATACTT TCCAATTGTC CTTAGTATAA ATCCAAAATC CTAACACCAC CCAAGAGGCT TTTCAATACC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7287
DRB1*14:05:01:02 TGGCTCCTGT GATTTCTCCG GGCTAATCTT TTACCCTCCT TCCCCTCAGC CTCTCTGCTT TAGTGAACTT TCTCCTAGTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7367
DRB1*14:05:01:02 TTTTGAAGAA GTTCATCAAT TCAAGCTTTT GTACATGGGA TTTCCTAAAC CTGAAATGTG CCTCCCGTTT TGTCCAAACA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7447
DRB1*14:05:01:02 GACACGGGCT CCACTCTGCC CCCTGGCTCA CACCTGCTTA ACCTGTCAAG TCACATCTGA ACCGTCACTA TTAAGAGGGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7527
DRB1*14:05:01:02 CCTTCTCTGG CACCCTAATG TAATTGAGAT CATCCTATTA TTCTCTGTTC TAGAACTCCA CACTTCCGAC ATTTCTCATT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7607
DRB1*14:05:01:02 CCTGTCTAAG CTCTTGTGTG TTTGGTGTTG GGCCATCACT TTCACTGCTC TTTAAGCTCC CCCAGCGGAG TGGAGAGGTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | (Continued)

```
                                                                                                    7687
DRB1*14:05:01:02 TGTTTTCCCT CGTTTGGATT CCTAGAGGCA GCGCAGACCA GGCACAAGGT CAGCACTAAG GAAGGGTTCA CAGGATGAAC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7767
DRB1*14:05:01:02 GCGGTGGGTG CTGTTTAAGG AACCGGTAAA CGTGTGGGAT GAGAGAAGGA GCAGAGAGTG TCTTTGGGGT GGAGGCTCCC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7847
DRB1*14:05:01:02 AGGAGGAGGC GGCGCGGGCT GCGGTGCGGG GCGGATCCTC CTCCAGCTCC TGCTTGGAGG TCTCCAGAAC AGGCTGGAGG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    7927
DRB1*14:05:01:02 TAGGGAGGGG GGTCCCAAAA GCCTGGGGAT CAGACGTGGT TTTCCCGCCT GGTCCCTCAG GCCCCCTTTC GCCTCAGGAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8007
DRB1*14:05:01:02 GACAGAGGAG GAGCCCCTGG GCTGCAGATG GTGGGCGTTG CGGCGGGGGC CGGTTAAGGT TCCCAGTGCC TGCACCCCGC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8087
DRB1*14:05:01:02 CCAGGGAGCC CCGGATGGTG GCGTCACTGT CAGTGTCTTC TCAGGAGGCC GCCTGTGTGA CTGGATCGTT CGTGTCCCCA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                    |Exon 2                                                                         8167
DRB1*14:05:01:02 CAGCACGTTT CTTGGAGTAC TCTACGTCTG AGTGTCAATT CTTCAATGGG ACGGAGCGGG TGCGGTTCCT GGACAGATAC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8247
DRB1*14:05:01:02 TTCCATAACC AGGAGGAGTT CGTGCGCTTC GACAGCGACG TGGGGGAGTA CCGGGCGGTG ACGGAGCTGG GGCGGCCTGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8327
DRB1*14:05:01:02 TGCTGAGTAC TGGAACAGCC AGAAGGACCT CCTGGAGCGG AGGCGGGCCG AGGTGGACAC CTATTGCAGA CACAACTACG
DRB1*14:84       ---C------ ---------- ---------- ------AGAC ---------C T--------- ---C------ ----------
                                                     |Intron 2                                      8407
DRB1*14:05:01:02 GGGTTGTGGA GAGCTTCACA GTGCAGCGGC GAGGTGAGCG CGGCGCGGGG CGGGGCCTGA GTCCCTGTGA GCTGGGAATC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8487
DRB1*14:05:01:02 TGAGTGTGTG TGTGTGTGTG TGTGTGTGTG TGTGTGTGTG TGTGTGTGTG T**GAGAGAG AGAGAGAGAG AGAGACAGAG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- -GT------- ---------- ----------
                                                                                                    8567
DRB1*14:05:01:02 AGAGAGAGAG CGCCATCTGT GAGCATTTAG AATCCTCTCT ATCCTGAGCA AGGAGTTCTG AGGGCACAGG TGTGTGTGTA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8647
DRB1*14:05:01:02 GAGTGTGGAT TTGTCTGTGT CTGTGAGGCT GTTGTGGGAG GGGAGGCAGG AGGGGGCTGC TTCTTATTCT TGGAGGACTC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8727
DRB1*14:05:01:02 TGTGGGGAGG TGACAAGGGA GGTGGGTGCG GGCGGCTGGA GAGAGAGGTG ACCTTGATTG TCCTGGGTCC TTAGAGATGC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8807
DRB1*14:05:01:02 AGGGAAGGGA AATGTAAGGG GTGTGTGGTT GGGGTGAAGG TTTAGGGGAG GAGAGCTGAG GGGTAAGGAA GGTTTGGGAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8887
DRB1*14:05:01:02 AATGTGAGGA GGCCGGTTCC AGACTGTCCC TGGCACACAC CCTTCATGTA ATCTCTGAAA TAAAAGTGTG TGCTGTTTGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    8967
DRB1*14:05:01:02 TTGTAAAAGC ATTAGATTAA TTTCTAGGGG AATTGAGGAG ACCTCTGAGG CATCTCTGAA GCTTCTTTAG GTCTAAATTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9047
DRB1*14:05:01:02 CTTGCTAGTT TTTTGTTTTT TATTGTGTAT ATTTTTACAT AGTAGAAATG ACTGTGAAAC TAACTTTTTG AATTAAAGTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9127
DRB1*14:05:01:02 TTAACACAGT TACTATTTTA TTATAATGCT AATAGTTTTC TAGTAGTTAC ATATTATTCT TTTATATATA ATAGTTGTGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9207
DRB1*14:05:01:02 CACAACTTAC CTCACTTTCC CCTTTGTTGA CCTTTATTAT GACATTCACC AAAAGTTGAA AATGTATGTT TCTGGTTAAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9287
DRB1*14:05:01:02 TTTTAATTTA TATTTTTTTC ATTTATAATT CTTTTGAATT ATTTTGACCT ATTTATTGGC CAGTTTTAAT AACTGCTGTA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9367
DRB1*14:05:01:02 AGAATTCCCT ATTGTATTTG GTAGGGAATG GACAATGATC TACTGCCTAA TATCTCGAGG GCTTAGTATT TTTCTCAGTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9447
DRB1*14:05:01:02 ACTTTGTGGG TTCTTTGTAC TGTGAGATTA TTAACACTTT ATTGATATTT GATTCAGCAT TTGCTCCAGT TTGTGGTTTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9527
DRB1*14:05:01:02 TATGTTGATT TTGAAAATTC TTTTCCATGT TAAGAATTTG AACATTTTTA TATAATAAAA TATGTTGCAA AATTTTTATT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9607
DRB1*14:05:01:02 AATGATTTAC AATCCATCTT AAATCTGCCA TTTTGTGGTA TTGTTGTCTC CAGGTTTCTC CTTACTTCTA AAAAAAATTG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | (Continued)

```
                                                                                                    9687
DRB1*14:05:01:02 CATTTATTGA GAGTCTGCTA GTGTTAGGGA TTTTCCTGGG CATAAGCACC CCAAGTGACG AGTCCCAGAC ACTGCCTTAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9767
DRB1*14:05:01:02 TCCAAATGTG ATTCTGGAAA GAAAAATCAT TTTACAATGA TAGGCCTAAT AATAATTAAG CTTGTGTTGC ATGGGAGATG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9847
DRB1*14:05:01:02 CATTGATCAG CTAAATGTAA ATATAAGAAC TTTCAAAACT AAAATGACGT TCCTTAATCC TTCTCTCTGC TTTATGAATC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                    9927
DRB1*14:05:01:02 ATGCTTTTCT GGGAAAGTAA AAATTTGGAG AATCATTTCT GTCTGTCCCA CCTTCCCAGG GGCAGAACCA TTTCTGTAGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10007
DRB1*14:05:01:02 GTTCTAAGGT GTGAGTGCAT GGCAGTAGTA TTCCTAAAAA TTCATATTCG GTTTCGTCAT GTACCCAACT CTGTCCCGTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10087
DRB1*14:05:01:02 ATCTATCCAC ATTGTTTTAA ATCATATATT TCTGTCAAGG TGTACAAGGA TGATAAATAG GTGCCAAGTG GAGCACCCAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10167
DRB1*14:05:01:02 GTGTGATGAG CCCCCTCACA GTGGAATGGA GTGTGAAGCT TTATGACCTC ATAAATTGAA GGTTATCTTC AGTCATTGTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10247
DRB1*14:05:01:02 TTATATATTT TACATGCATT AATCCTCATA TAATCCCAAG AGGTAAATTA GTATAATTAT CCTTCATTAT AGGTGACAAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10327
DRB1*14:05:01:02 GTTGAGACAC AGAAGAATCA AACTCTTAAG GCAGACCTTG GATTTGAACC AGGCAACCTG GCTCAGATAT CCGTTTTAAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10407
DRB1*14:05:01:02 TACTACACTC TGTACTTTCA AAGATTTGTA AACACTTTGA CAATGCATGA CAATTTCAAG CTATGAAGAA ACAAACACAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10487
DRB1*14:05:01:02 TTTTTCACAA TATCTCTCAA ATCTAATGGG TCCTCACTAT CAAGATTAAG TTCCAGGCTG ATGACACTGT AAGGCCACAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10567
DRB1*14:05:01:02 GGCCAGCTGT GCTGGAGGCC TGGTCAAGGT CAGAGCCTGG GTTTGCAGAG AAGCAGACAA ACAGCCAAAC AAGGAGACTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                Exon 3                             10647
DRB1*14:05:01:02 ACTCTGTCTT CATGACTCAT TCCCTCTACC TTTTTTCTCC TAGTCCATCC TAAGGTGACT GTGTATCCTT CAAAGACCCA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10727
DRB1*14:05:01:02 GCCCCTGCAG CACCACAACC TGCTGGTCTG TTCTGTGAGT GGTTTCTATC CAGGCAGCAT TGAAGTCAGG TGGTTCCGGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10807
DRB1*14:05:01:02 ATGGCCAGGA AGAGAAGACT GGGGTGGTGT CCACAGGCCT GATCCACAAT GGAGACTGGA CCTTCCAGAC CCTGGTGATG
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   10887
DRB1*14:05:01:02 CTGGAAACAG TTCCTCGGAG TGGAGAGGTT TACACCTGCC AAGTGGAGCA CCCAAGCGTG ACAAGCCCTC TCACAGTGGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                      Intron 3                                                                     10967
DRB1*14:05:01:02 ATGGAGTGAG CAGCTTTCTG ACTTCATAAA TTTCTCACCC ACCAAGAAGG GGACTGTGCT CATCCCTGAG TGTCAGGTTT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11047
DRB1*14:05:01:02 CTCCTCTCCG ACATCCTATT TTCATTTGCT CCATGTTCTC ATCTCCATCA GCACAGGTCA CTGGGGGTAGC CCTGTAGGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11127
DRB1*14:05:01:02 GTTTCTAGAA ACACCTGTAC CTCCTGGAGA AGCAGTCTCG CCTGCCAGGC AGGAGAGGCT GTCCCTCTTT TGAACCTCCC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11207
DRB1*14:05:01:02 CATGATGTCA CAGGTCAGGG TCACCCACCC TCCCCGGGCT CCAGGCACTG CCTCTGGGTC TGAGACTGAG TTTCTGGTGC
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11287
DRB1*14:05:01:02 TGTTGATCTG AGTTATTTGT TGTGATCTGG GAAGAGGAGA AGTGTAGGGG CCTTCCTGAC ATGAGGGGAG TCCAATCTCA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11367
DRB1*14:05:01:02 GCTCTGCCTT TTATTAGCTC TGTCACTCTA GACAAACTAC TTAGCCTCAT TGAGTCTCAG GCTTTCTGTG GATCAGATGT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11447
DRB1*14:05:01:02 TGAACTCTTG CCTTACATCA AGGCTGTAAT ATTTGAATGA GTTTGATGTC TGAACCTTGT AACTGTTCAG TGTGATTTGA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                   11527
DRB1*14:05:01:02 AATCCTTTTT TTCTCCAGAA ATGGCTAGTT ATTTTAGTTC TTGTGGGGCA GACTTCTTCC CCATTTTCAA AGCTCTGAAT
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                         Exon 4    11607
DRB1*14:05:01:02 CTTAGAGTCT CAATTAAAGA GGTTCAATTT GGAATAAGCA TCACTAAACC TGGCTTCCTC TCTCAGGAGC ACGGTCTGAA
DRB1*14:84       ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

FIGURE 1 | (Continued)

```
                                                                                                        11687
DRB1*14:05:01:02    TCTGCACAGA GCAAGATGCT GAGTGGAGTC GGGGGCTTTG TGCTGGGCCT GCTCTTCCTT GGGGCCGGGC TGTTCATCTA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                      |Intron 4                                                         11767
DRB1*14:05:01:02    CTTCAGGAAT CAGAAAG|GTG AGGAGCCTTT GGTAGCTGGC TCTCTCCATA GGCTTTTCTG GAGGAGGAAC TATGGCTTTG
DRB1*14:84          ---------- -------|--- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        11847
DRB1*14:05:01:02    CTGAGGTTAG TTCTCAGTAT ATGAGTGGCC CTGAATAAAG CCTTTCTTTC CCCAAACGGC TCTAATGTCC TGCTAATCCA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        11927
DRB1*14:05:01:02    GAAATCATCA GTGCATGGTT ACTATGTGAA AGCATAATAG CTTGTGGCCT GCAGAGACAA GAGGAAGGTT AACAAGTAGG
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12007
DRB1*14:05:01:02    GGTCCTTTGG TTTGAGATCT TGGAGCAGAT TAAGGAAGAG CCACTAAGAC TAATGGAATT ACACTGGATC CTGTGACAGA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12087
DRB1*14:05:01:02    CACTTCACCC TTCATGGGTC ACATGGTCTG TTTCTGCTCC TCTCTGCCCT GGCTGGTGTG GGTTGTAGTG ACAGAGAACT
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12167
DRB1*14:05:01:02    CTCCGGTGGG AGATCTGGGG CTGGGACATT GTGTTGGAAG ACAGATTTGC TTCCATAAAT TTTAAGTGTA TATATTTTCC
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                 |Exon 5                       |Intron 5                                12247
DRB1*14:05:01:02    TCTTTTTCCC AG|GACACTCT GGACTTCAGC CAAGAG|GTAA TACCTTTTAA TCCTCTTTTA GAAACAGATA CGGTTTCCCT
DRB1*14:84          ---------- --|-------- ---------- ------|---- ---------- ---------- ---------- ----------
                                                                                                        12327
DRB1*14:05:01:02    AGTGAGAGGT GAAGCCAGCT GGACTTCTGG GTCGGGTAGG GACTTGCAGA ACTTTTCTGT CTTAGGAGAG GTTTCTAAAT
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12407
DRB1*14:05:01:02    GCACCAATCA GTGCTCTGTA AAAACACACC CATTGGCACT CTGTGGCTAG ATAGATGTTT GTAAAATGGA CTAATCAGCA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12487
DRB1*14:05:01:02    CTCTGTAAAA TGGAGCAATC CACACTCTGT AAAATGGGCC AATCAATGCT CTTTAAAATG GACCAATCAG CAGGACATGG
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12567
DRB1*14:05:01:02    GCGGGGACAA ATAAGGGAAT ACAAGCTGGC CACCCCAGCC AGCAGCAGCA ACCCGCTCAG GTCGCCTTCC ATGCTGTGGA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12647
DRB1*14:05:01:02    AGCTTTGTTC TTTTGCTCTT CACAATAAAT CTTGCTGTTG CTCACTCTTC GGGTCTGTGC CACCTTTAAG AGCTGTAACA
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12727
DRB1*14:05:01:02    CTCACTGTGA AGATTCGCGG CTTCATTCTT GAAGTCAGCA AAACCACGAA CCCACCGGAA GGAACAAACT CTGGACACAC
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12807
DRB1*14:05:01:02    TAGAATTGAT GGTAGAGGTG ATAAGGCATG AGACAGAAAT AATAGGAAAG ACTTTGGATC CAAATTTCTG ATCAGGCAAT
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12887
DRB1*14:05:01:02    TTACACCAAA ACTCCTCCTC TCCACTTAGA AAAGGCCTGT GCTCTGTGGG ACTATTGGCT CTGGGAGACT CAGGAACTTG
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                                                                        12967
DRB1*14:05:01:02    TTTTTCTTCT TCCTGCAGTG CTCTCATCTG AGTCCCTGAA AGAGAGGAAA AGAAACTGTT AGTAGAGTCA GGTTGAAAAC
DRB1*14:84          ---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
                                                      13005
                                           |Exon 6
DRB1*14:05:01:02    AACACTCTCC TCTGTCTTTT GCAG|GATTCC TGAGCTGA
DRB1*14:84          ---------- ---------- ----|------ --------
```

FIGURE 1 | (Continued)

Author Contributions

Yu-Li Zhu analysed the sequencing data, wrote the manuscript, and developed the figure. Ying-Chun Wang collected the peripheral blood of this volunteer donor for China Marrow Donor Program. Zhi-Hui Feng sequenced by PacBio sequencing approach. Shu-Xian Jiao and Shu-Tao Pang revised the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in IPD-IMGT/HLA at https://www.ebi.ac.uk/ipd/imgt/hla/, reference number HWS10100607.

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