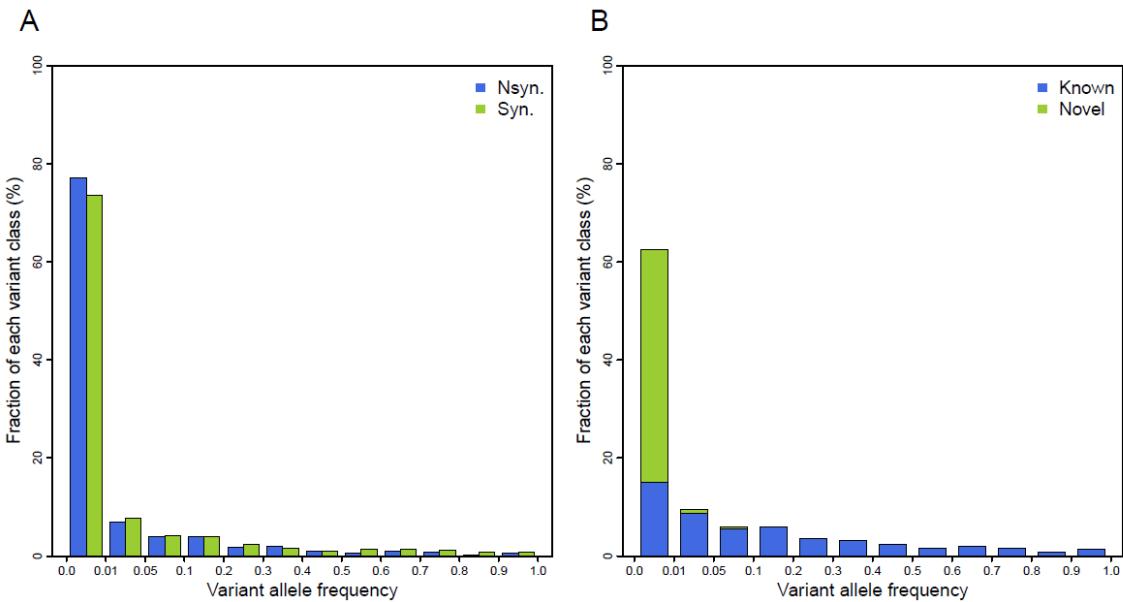
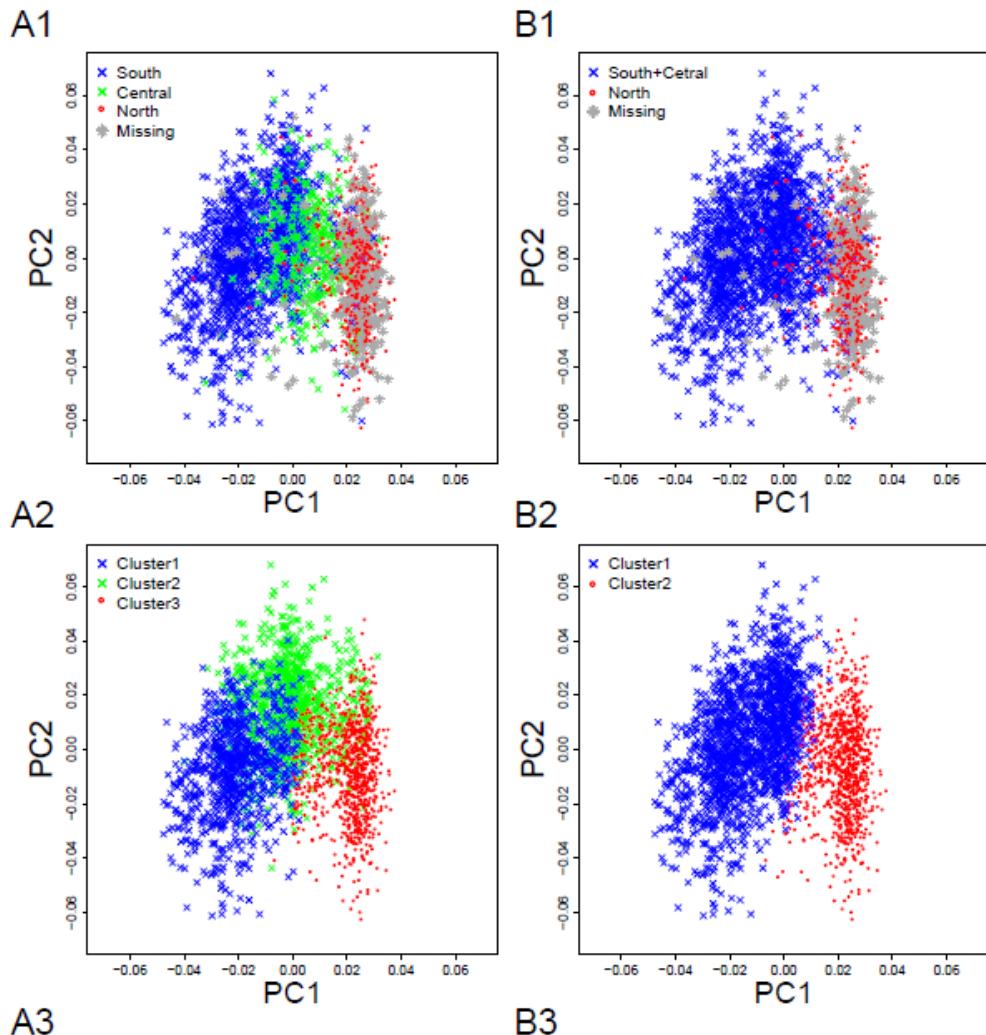


**Association Analysis of the Major Histocompatibility Complex in Lupus Nephritis**

**Supplemental Figure 1. Allele frequency spectrum for variants detected by capture sequencing.** (A) Distribution of synonymous and non-synonymous variants was drawn separately. (B) 47.49% of novel variants were of low frequency (< 1%).

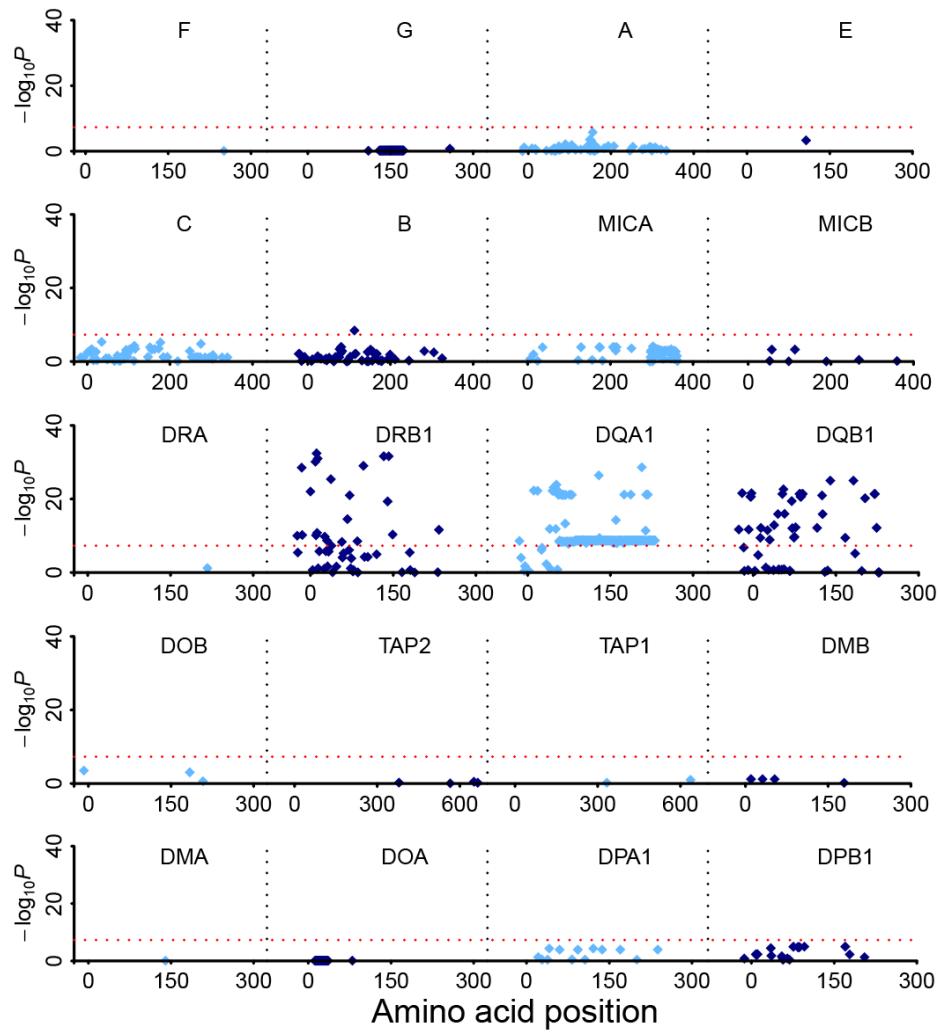


Region	Cluster 1	Cluster 2	Cluster3
Southern	675 (50.45%)	609 (45.51%)	54 (4.04%)
Northern	4 (0.96%)	62 (14.87%)	351 (84.12%)
Central	59 (15.49%)	176 (46.19 %)	146 (38.32%)
Province missing	24 (6.50%)	48 (13.01%)	297 (80.49%)
Total	762 (30.42%)	895 (35.73%)	848 (33.85%)

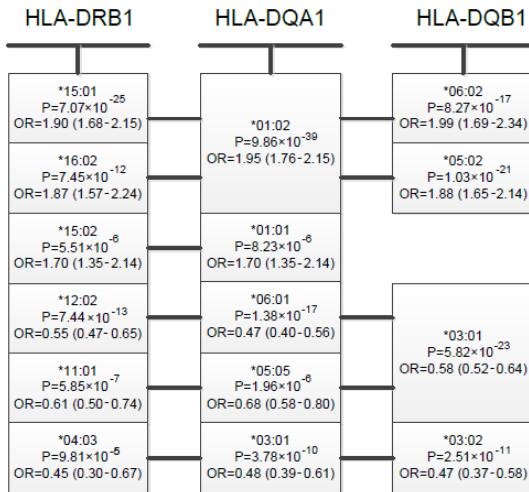
Region	Cluster 1	Cluster 2
Southern	1285 (96.04%)	53 (3.96%)
Northern	27 (6.47%)	390 (93.53%)
Central	186 (48.82%)	195 (51.18%)
Province missing	33 (8.94%)	336 (91.06%)
Total	1531(61.12%)	974 (38.88%)

**Supplemental Figure 2. Principal component analysis (PCA) for samples from the discovery stage.** The principal components were calculated using 10,096 non-MHC SNVs retained after LD pruning. The 1<sup>st</sup> and the 2<sup>nd</sup> PCs were drawn. According to previous research,<sup>1-3</sup> we applied K-means clustering to split all the samples into 2 or 3 (B2 and A2) relative homogenous genetic clusters. At K=2, we found the genetic clustering (B2) was highly consistent with geographic classification (B1): ~96% of Southern Hans were assigned to cluster1 and ~94% Northern Hans were assigned to cluster2 (B3). At K=3, the genetic clustering (A2) and geographic classification (A1) did not show such a good consistency (see statistics in A3). In this study, the geographic origin of 14.73% samples was not on record (presented as gray points in A1 and B1).

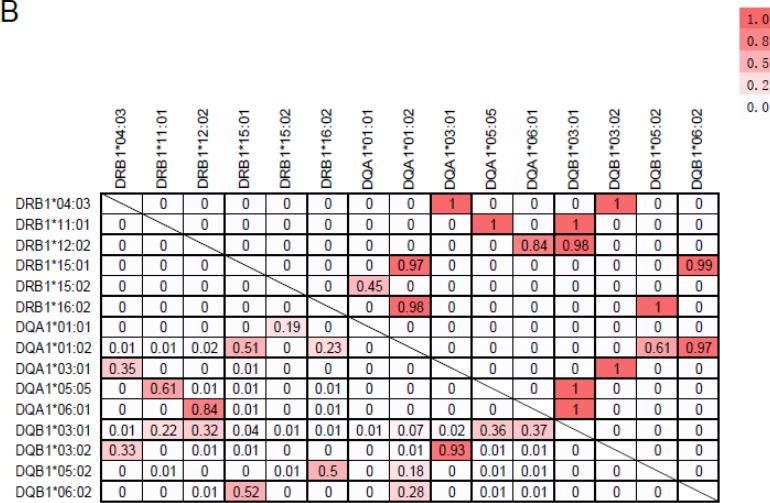


**Supplemental Figure 3. The association of amino acids in twenty classical HLA genes.** X-axis is HLA amino acid position in the protein and y-axis is the omnibus  $P$  value for each amino acid position in each gene. The red dotted line shows the genome wide significance threshold ( $5.0 \times 10^{-8}$ ).

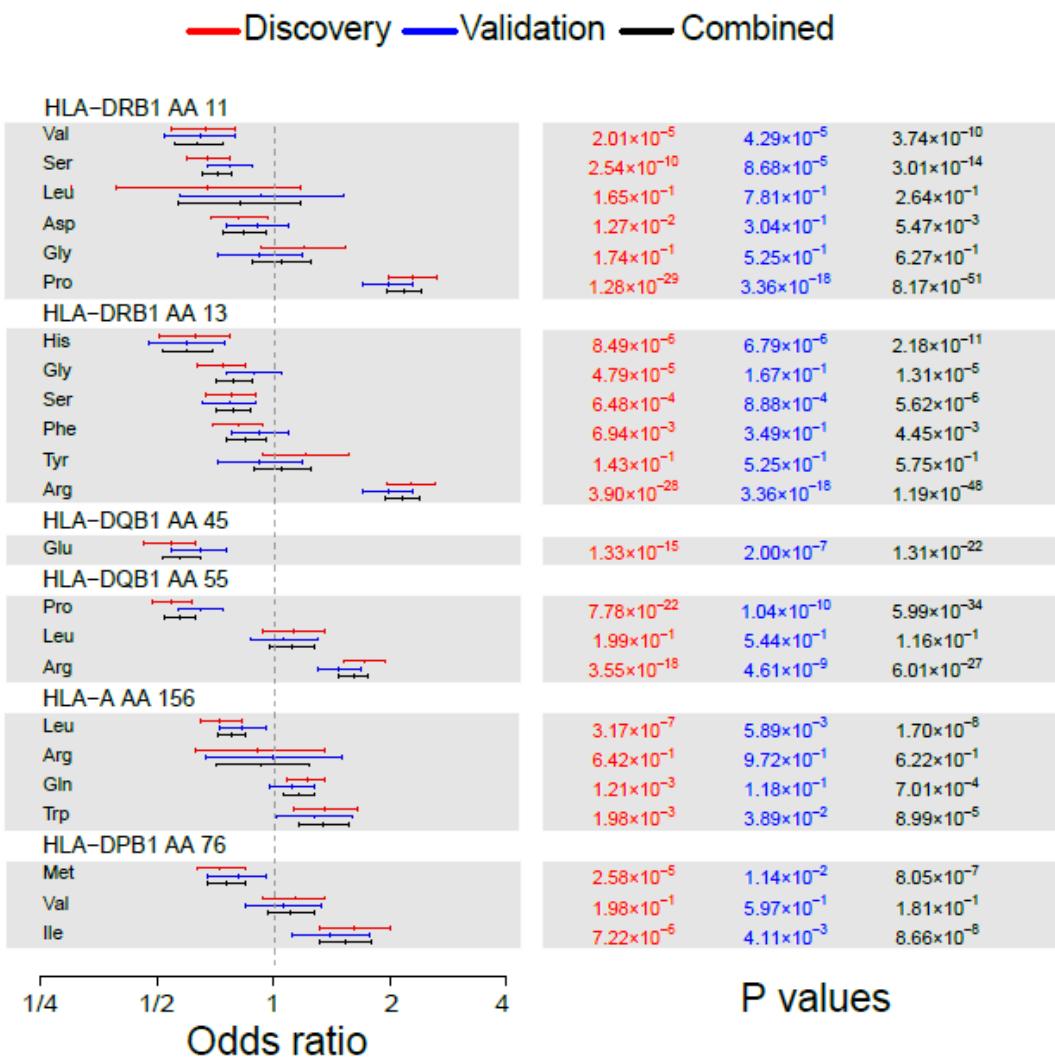
A



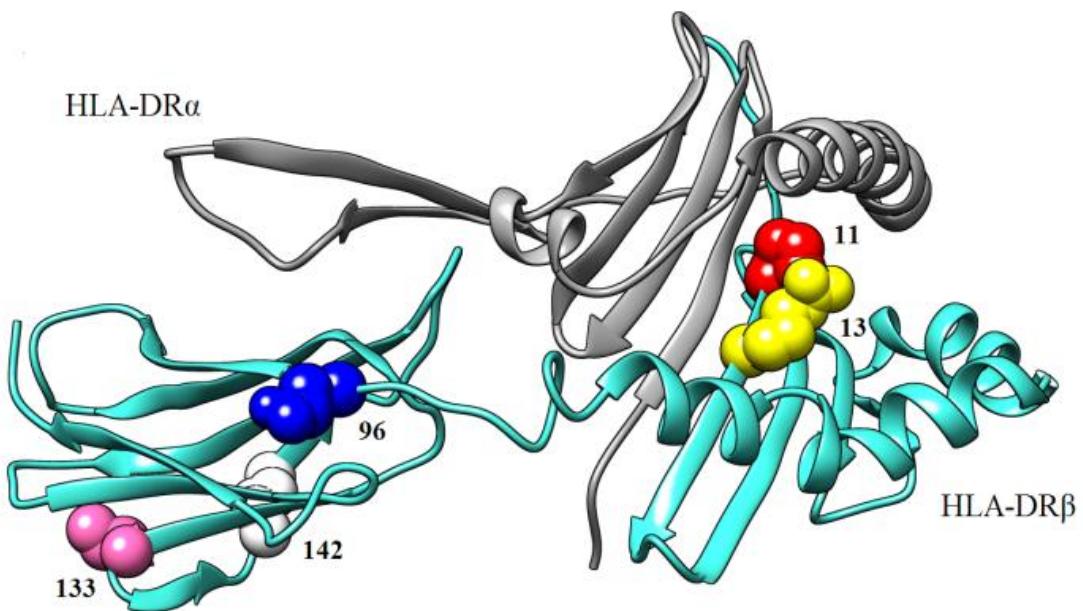
B



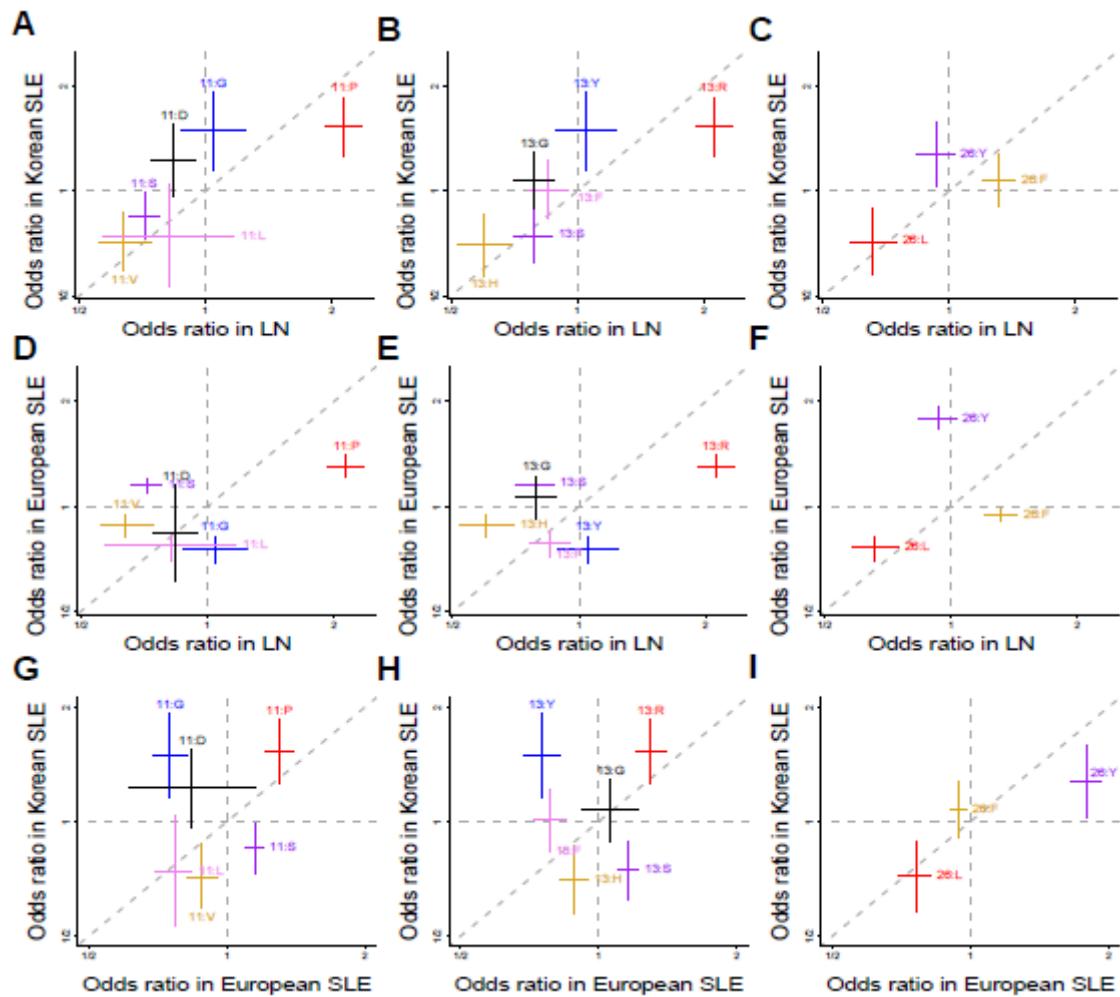
**Supplemental Figure 4. The haplotype structure and the LD relationship between HLA-DRB1, HLA-DQA1 and HLA-DQB1 alleles.** (A) Haplotype structure between HLA-DRB1, HLA-DQA1 and HLA-DQB1 alleles. (B) LD relationship between HLA-DRB1, HLA-DQA1 and HLA-DQB1 alleles.



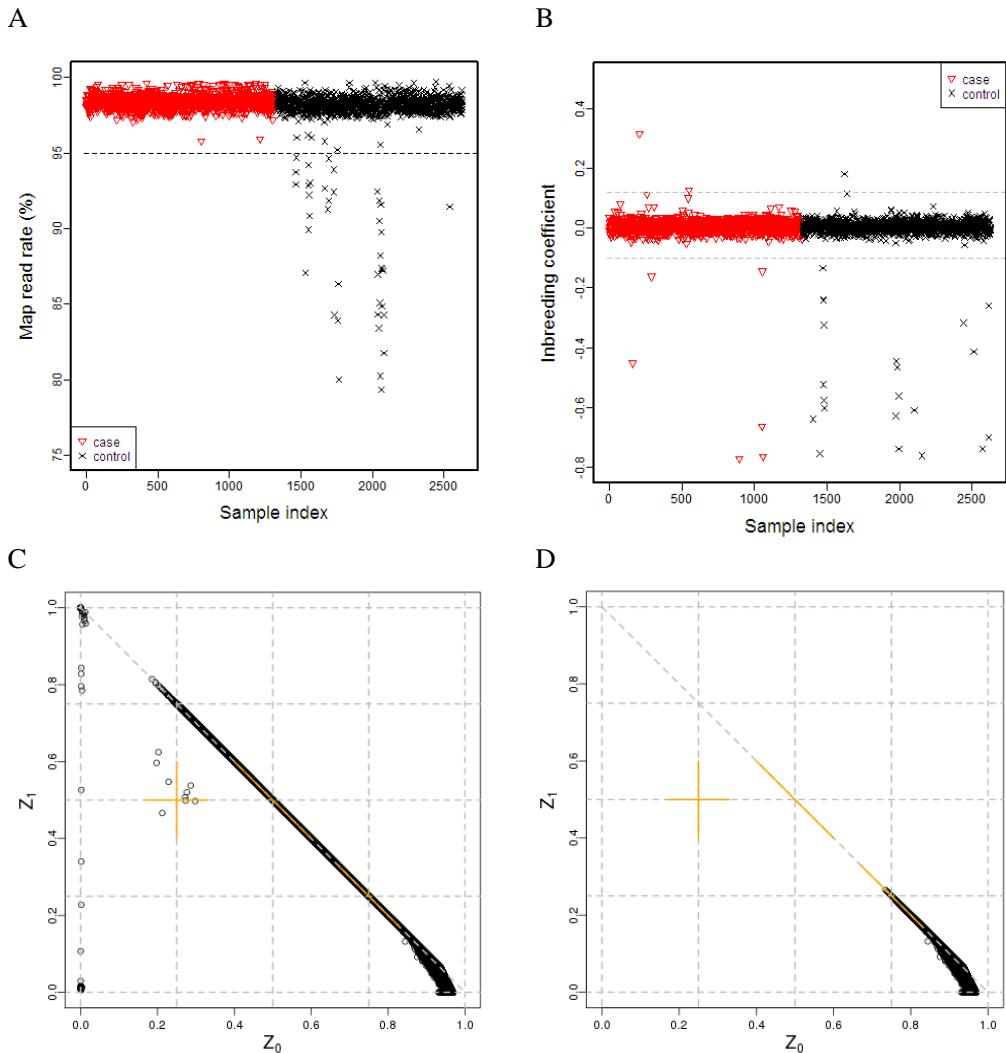
**Supplemental Figure 5. Odds ratios and 95% confidence intervals of each residue at amino acid position 11 and 13 of *HLA-DR $\beta$ I*, amino acid position 45 and 55 of *HLA-DQ $\beta$ I*, amino acid position 156 of *HLA-A* and amino acid position 76 of *HLA-DP $\beta$ I*.**



**Supplemental Figure 6.** Three-dimensional ribbon model for the HLA-DR protein (DR-11-13-96-133-142).



**Supplemental Figure 7. Correlation of effect estimates of amino acid positions 11, 13 and 26 in *DR $\beta$ 1* in lupus nephritis in a Chinese Han population and in systemic lupus erythematosus (SLE) populations from Korea (A-C), Europe (D-F) and between SLE populations from Korea and Europe (G-I).** Korean SLE data was derived from the study by Kwangwoo Kim et al.<sup>4</sup> Haplotypes were grouped to generate the frequency of amino acid residues, then a  $2 \times 2$  contingency table was produced and the crude ORs were calculated. European SLE data was derived from the study by Morris DL et al.<sup>5</sup> For each amino acid position, the *HLA-DR $\beta$ 1* alleles were re-categorized by their residues and crude ORs were calculated using meta-analysis based on the inverse variance model.



**Supplemental Figure 8. The mapping rate (A), inbreeding coefficient (B) and cryptic relationships (C and D) in lupus nephritis.** The inbreeding coefficient and cryptic relationships were calculated using 10,096 non-MHC SNVs retained after LD pruning. The dotted lines in plots A and B represent the threshold used to define outliers. Relatedness was inferred by estimating the pairwise probability of sharing 0, 1 or 2 IBD alleles (denoted as  $Z_0Z_1$  and  $Z_2$ ,  $Z_0 + Z_1 + Z_2 = 1$ ). Inferential criteria were adopted from Manichaikul et al.<sup>6</sup> (C) The relatedness of all the sequencing samples is displayed. (D) No sample pair had a relationship of 2nd degree or closer after the removal of contaminated, duplicated or closely related samples.

**Supplemental Table 1. Summary of capture sequencing in the discovery stage**

	Targeted sequencing		
	Cases	Controls	Total
# of individuals (# of females)	1,331 (1,127)	1,296 (1,078)	2,627 (2,205)
Raw bases <sup>a</sup> (Gb)	1.53 ± 0.36	1.56 ± 0.37	1.54 ± 0.36
Mapped bases <sup>a</sup> (Gb)	1.50 ± 0.35	1.52 ± 0.36	1.51 ± 0.35
Mapped bases on MHC <sup>a</sup> (Gb)	0.28 ± 0.06	0.28 ± 0.05	0.28 ± 0.06
Mapped bases on targets <sup>a</sup> (Gb)	0.76 ± 0.15	0.77 ± 0.15	0.76 ± 0.15
Capture specificity <sup>a</sup> (%)	61.03 ± 7.87	60.91 ± 7.97	60.97 ± 7.92
Average sequencing depth <sup>b</sup> (fold)	63.04 ± 11.18	64.50 ± 11.46	63.76 ± 11.34
Average sequencing depth on MHC <sup>b</sup> (fold)	48.26 ± 8.63	49.09 ± 8.86	48.67 ± 8.75
Fraction of target covered ≥ 1X <sup>c</sup> (%)	98.87 ± 0.16	98.85 ± 0.11	98.86 ± 0.14
Fraction of target covered ≥ 4X <sup>c</sup> (%)	98.21 ± 0.30	98.18 ± 0.24	98.20 ± 0.27
Fraction of target covered ≥ 8X <sup>c</sup> (%)	96.96 ± 0.62	96.96 ± 0.64	96.96 ± 0.63
Fraction of target covered ≥ 16X <sup>c</sup> (%)	92.12 ± 1.98	92.25 ± 2.16	92.18 ± 2.07
Fraction of target covered ≥ 1X <sup>d</sup> (%)	94.05 ± 0.56	93.90 ± 0.63	93.98 ± 0.60
Fraction of target covered ≥ 4X <sup>d</sup> (%)	89.98 ± 0.93	89.77 ± 1.11	89.87 ± 1.03
Fraction of target covered ≥ 8X <sup>d</sup> (%)	85.50 ± 1.68	85.29 ± 2.03	85.40 ± 1.87
Fraction of target covered ≥ 16X <sup>d</sup> (%)	74.95 ± 3.62	74.92 ± 4.13	74.93 ± 3.88

<sup>a</sup> All sequencing reads were included in the calculation.

<sup>b</sup> Duplicate reads were removed in the calculation.

<sup>c</sup> The fraction of target covered was calculated on ~5Mb non-MHC region and ~ 4.97 Mb MHC region.

<sup>d</sup> The fraction of target covered was calculated on ~4.97 Mb MHC region.

**Supplemental Table 2. Summary of HLA alleles and amino acid variants typed in the discovery stage**

Gene	No. of alleles called at 4-digit or higher resolution	% of alleles called at 4-digit or higher resolution	No. of variable AA <sup>a</sup> positions	No. of 4-digit alleles					No. of AA variants				
				all	freq> 0.1%	freq> 0.5%	freq> 1%	freq> 5%	all	freq> 0.1%	freq> 0.5%	freq> 1%	freq> 5%
<i>HLA-A</i>	4,946	98.72%	111	53	28	16	13	6	246	241	193	185	174
<i>HLA-B</i>	4,945	98.70%	64	110	60	33	23	5	156	153	148	145	131
<i>HLA-C</i>	4,927	98.34%	101	40	27	17	13	7	237	175	169	164	155
<i>HLA-DRB1</i>	4,905	97.90%	51	44	33	26	19	7	139	136	135	135	121
<i>HLA-DQB1</i>	4,964	99.08%	57	15	15	14	13	7	130	130	130	130	123
<i>HLA-DQA1</i>	4,938	98.56%	189	17	16	15	14	8	409	408	407	406	406
<i>HLA-DPB1</i>	4,983	99.46%	23	25	18	15	14	5	52	48	47	47	45
<i>HLA-DPA1</i>	5,008	99.96%	15	5	5	4	4	3	30	30	29	29	23
<i>HLA-DRA</i>	5,008	99.96%	1	2	2	2	2	2	2	2	2	2	2
<i>HLA-DMB</i>	4,898	97.76%	1	3	3	3	3	2	8	2	2	2	2
<i>HLA-DMA</i>	5,006	99.92%	4	2	2	2	2	2	2	8	8	8	5
<i>HLA-DOA</i>	5,003	99.86%	26	3	3	2	0	0	52	52	51	26	26
<i>HLA-DOB</i>	5,008	99.96%	4	5	5	4	4	2	8	8	7	7	5
<i>MICA</i>	4,926	98.32%	38	30	18	12	11	8	108	98	95	95	94
<i>MICB</i>	5,007	99.94%	9	17	11	7	7	6	18	15	15	15	14
<i>TAP1</i>	5,008	99.96%	7	5	4	3	3	3	14	11	9	9	9
<i>TAP2</i>	5,008	99.96%	4	5	5	5	5	3	8	8	8	8	7
<i>HLA-E</i>	5,008	99.96%	1	2	2	2	2	2	2	2	2	2	2
<i>HLA-G</i>	4,989	99.58%	49	6	6	5	4	2	98	98	97	96	50
<i>HLA-F</i>	5,008	99.96%	2	3	2	2	2	0	4	3	3	3	2
All	99,493	99.29%	757	392	265	189	158	80	1,723	1,628	1,557	1,514	1,396

<sup>a</sup> AA: amino acid.

**Supplemental Table 3. The assessment of HLA typing accuracy by capture sequencing**

HLA gene <sup>a</sup>	# of individuals typed by capture sequencing	# of individuals typed by amplicon sequencing	# of individuals typed by both	# of discordant alleles	Discordance rate (%)
<i>A</i>	192	199	192	6	1.56
<i>DRB1</i>	192	199	191	6	1.57
<i>DQB1</i>	196	199	195	0	0
<i>DQA1</i>	198	195	193	1	0.26
<i>DPB1</i>	193	193	193	4	1.04

<sup>a</sup> The HLA alleles of *HLA-A*, *-DRB1*, *-DQB1*, *-DQA1* and *-DPB1* of 200 samples from the discovery stage were re-typed using amplicon sequencing based approaches.

**Supplemental Table 4. Summary of stepwise analysis in seven groups comprised of different variants**

Group	Variant	Gene	Functional change	Condition $P^a$	Condition marker	Df	$\Delta$ deviance	AIC
SNP <sup>b</sup>	rs79372730	<i>HLA-DRB1-HLA-DQA1</i>	intergenic	$2.65 \times 10^{-2}$	DRB1:11			
	rs185663703	<i>C6orf10</i>	intron	$1.81 \times 10^{-2}$	rs114580964			
	rs9275380	<i>HLA-DQBI-HLA-DQA2</i>	intergenic	$3.95 \times 10^{-3}$	rs1130380 (DQB1:55)	4	224.64	2791.2
	rs9277398	<i>HLA-DPB1</i>	intron	$3.40 \times 10^{-1}$	DPB1:96			
Allele <sup>c</sup>	DQA1*01:02	<i>HLA-DQA1</i>	-	$1.23 \times 10^{-1}$	DRB1:11			
	DPB1*13:01	<i>HLA-DPB1</i>	-	$2.37 \times 10^{-4}$	DPB1:96	7	198.58	2823.2
	DQA1*06:01	<i>HLA-DQA1</i>	-	$1.24 \times 10^{-2}$	rs1130380 (DQB1:55)			
Amino acid <sup>d</sup>	AA_11	<i>HLA-DRB1</i>	-	1	DRB1:11			
	Pro55	<i>HLA-DQBI</i>	-	1	rs1130380 (DQB1:55)			
	AA_96	<i>HLA-DPB1</i>	-	1	DPB1:96	9	232.56	2793.2
	AA_113	<i>HLA-B</i>	-	$2.58 \times 10^{-2}$	rs114580964			
	Leu156	<i>HLA-A</i>	-	1	rs9260156 (A:156)			
SNP+Allele <sup>e</sup>	rs79372730	<i>HLA-DRB1-HLA-DQA1</i>	intergenic	$2.65 \times 10^{-2}$	DRB1:11			
	rs185663703	<i>C6orf10</i>	intron	$1.81 \times 10^{-2}$	rs114580964			
	rs9275380	<i>HLA-DQBI-HLA-DQA2</i>	intergenic	$3.95 \times 10^{-3}$	rs1130380 (DQB1:55)	4	226.41	2789.3
	DPB1*13:01	<i>HLA-DPB1</i>	-	$2.37 \times 10^{-4}$	DPB1:96			
Amino acid+Allele <sup>f</sup>	AA_11	<i>HLA-DRB1</i>	-	1	DRB1:11			
	DQA1*06:01	<i>HLA-DQA1</i>	-	$1.24 \times 10^{-2}$	rs1130380 (DQB1:55)	7	198.58	2823.2
	AA_96	<i>HLA-DPB1</i>	-	1	DPB1:96			
SNP+Amino acid <sup>g</sup>	AA_11	<i>HLA-DRB1</i>	-	1	DRB1:11			
	rs114580964	<i>BAT2, PRRC2A</i>	missense	1	rs114580964			
	AA_96	<i>HLA-DPB1</i>	-	1	DPB1:96	9	237.32	2788.4
	rs1130380-G	<i>HLA-DQBI</i>	missense	1	rs1130380 (DQB1:55)			
	rs9260156-T	<i>HLA-A</i>	nonsense, missense	1	rs9260156 (A:156)			

	AA_11	<i>HLA-DRB1</i>	-	1	DRB1:11			
	rs114580964	<i>BAT2, PRRC2A</i>	missense	1	rs114580964			
SNP+Amino acid+Allele <sup>h</sup>	AA_96	<i>HLA-DPB1</i>	-	1	DPB1:96	9	237.32	2788.4
	rs1130380-G	<i>HLA-DQB1</i>	missense	1	rs1130380 (DQB1:55)			
	rs9260156-T	<i>HLA-A</i>	nonsense, missense	1	rs9260156 (A:156)			

<sup>a</sup> We stopped analysis when the adjusted *P* value was greater than  $1.00 \times 10^{-5}$ .

<sup>b</sup> Analysis of SNPs only.

<sup>c</sup> Analysis of alleles only.

<sup>d</sup> Analysis of amino acids only.

<sup>e</sup> Analysis of SNPs and alleles.

<sup>f</sup> Analysis of amino acids and alleles.

<sup>g</sup> Analysis of SNPs and amino acids.

<sup>h</sup> Analysis of SNPs, alleles and amino acids.

**Supplemental Table 5. Association of *HLA-DRB1*, -*DQA1*, -*DQBI*, -*DPB1* alleles in discovery, validation and combined analysis**

HLA alleles <sup>a</sup>	Cohort	Alleles	Case Freq	Control Freq	P value	OR (95% CI)	I <sup>2</sup>	Q	Alleles in high LD (D>0.8)
<i>DRB1*04:03</i>	Discovery	present/absent	0.009	0.020	9.07×10 <sup>-4</sup>	0.43 (0.26-0.71)			
	Validation	present/absent	0.007	0.014	3.90×10 <sup>-2</sup>	0.49 (0.25-0.96)			<i>DQA1*03:01</i> , <i>DQBI*03:02</i>
	Combined	present/absent	0.008	0.017	9.81×10 <sup>-5</sup>	0.45 (0.30-0.67)	0	6.50×10 <sup>-1</sup>	
<i>DRB1*11:01</i>	Discovery	present/absent	0.037	0.061	7.74×10 <sup>-5</sup>	0.59 (0.45-0.76)			
	Validation	present/absent	0.042	0.064	2.05×10 <sup>-3</sup>	0.64 (0.48-0.85)			<i>DQA1*05:05</i> , <i>DQBI*03:01</i>
	Combined	present/absent	0.039	0.063	5.85×10 <sup>-7</sup>	0.61 (0.50-0.74)	0	9.58×10 <sup>-1</sup>	
<i>DRB1*12:02</i>	Discovery	present/absent	0.051	0.094	6.63×10 <sup>-9</sup>	0.52 (0.41-0.65)			
	Validation	present/absent	0.061	0.099	1.75×10 <sup>-5</sup>	0.59 (0.46-0.75)			<i>DQA1*06:01</i> , <i>DQBI*03:01</i>
	Combined	present/absent	0.055	0.096	7.44×10 <sup>-13</sup>	0.55 (0.47-0.65)	29.35	2.36×10 <sup>-1</sup>	
<i>DRB1*15:01</i>	Discovery	present/absent	0.187	0.105	4.49×10 <sup>-16</sup>	1.98 (1.68-2.33)			
	Validation	present/absent	0.184	0.111	1.87×10 <sup>-10</sup>	1.81 (1.51-2.17)			<i>DQA1*01:02</i> , <i>DQBI*06:02</i>
	Combined	present/absent	0.186	0.108	7.07×10 <sup>-25</sup>	1.90 (1.68-2.15)	0	6.91×10 <sup>-1</sup>	
<i>DRB1*15:02</i>	Discovery	present/absent	0.055	0.028	1.90×10 <sup>-5</sup>	1.96 (1.44-2.66)			
	Validation	present/absent	0.044	0.031	4.12×10 <sup>-2</sup>	1.43 (1.01-2.01)			-
	Combined	present/absent	0.050	0.029	5.51×10 <sup>-6</sup>	1.70 (1.35-2.14)	84.97	2.00×10 <sup>-4</sup>	
<i>DRB1*16:02</i>	Discovery	present/absent	0.092	0.049	1.88×10 <sup>-8</sup>	1.95 (1.54-2.46)			
	Validation	present/absent	0.070	0.041	8.02×10 <sup>-5</sup>	1.77 (1.33-2.35)			<i>DQA1*01:02</i> , <i>DQBI*05:02</i>
	Combined	present/absent	0.083	0.045	7.45×10 <sup>-12</sup>	1.87 (1.57-2.24)	51.22	1.04×10 <sup>-1</sup>	
<i>DQA1*01:01</i>	Discovery	present/absent	0.047	0.026	4.96×10 <sup>-4</sup>	1.79 (1.29-2.49)			
	Validation	present/absent	0.051	0.032	4.79×10 <sup>-3</sup>	1.61 (1.16-2.24)			-
	Combined	present/absent	0.049	0.029	8.23×10 <sup>-6</sup>	1.70 (1.35-2.14)	85.02	2.00×10 <sup>-4</sup>	
<i>DQA1*01:02</i>	Discovery	present/absent	0.327	0.180	1.49×10 <sup>-30</sup>	2.20 (1.92-2.51)			
	Validation	present/absent	0.281	0.189	2.50×10 <sup>-11</sup>	1.67 (1.44-1.94)			<i>DRB1*15:01</i> , <i>DRB1*16:02</i> , <i>DQBI*06:02</i>
	Combined	present/absent	0.307	0.185	9.86×10 <sup>-39</sup>	1.95 (1.76-2.15)	73.28	1.06×10 <sup>-2</sup>	
<i>DQA1*03:01</i>	Discovery	present/absent	0.029	0.056	2.70×10 <sup>-6</sup>	0.50 (0.37-0.67)			<i>DRB1*04:03</i> ,

	Validation	present/absent	0.023	0.048	$3.17 \times 10^{-5}$	0.46 (0.32-0.66)			<i>DQBI*03:02</i>
<i>DQA1*05:05</i>	Combined	present/absent	0.026	0.053	$3.78 \times 10^{-10}$	0.48 (0.39-0.61)	0	$9.31 \times 10^{-1}$	
	Discovery	present/absent	0.063	0.097	$1.76 \times 10^{-5}$	0.63 (0.51-0.78)			
	Validation	present/absent	0.067	0.088	$1.96 \times 10^{-2}$	0.75 (0.59-0.96)			<i>DRB1*11:01,</i> <i>DQBI*03:01</i>
<i>DQA1*06:01</i>	Combined	present/absent	0.065	0.093	$1.96 \times 10^{-6}$	0.68 (0.58-0.80)	0	$5.09 \times 10^{-1}$	
	Discovery	present/absent	0.040	0.098	$1.50 \times 10^{-14}$	0.39 (0.31-0.49)			
	Validation	present/absent	0.058	0.096	$1.30 \times 10^{-5}$	0.58 (0.45-0.74)			<i>DRB1*12:02,</i> <i>DQBI*03:01</i>
<i>DQBI*03:01</i>	Combined	present/absent	0.048	0.097	$1.38 \times 10^{-17}$	0.47 (0.40-0.56)	76.41	$5.30 \times 10^{-3}$	
	Discovery	present/absent	0.140	0.236	$1.41 \times 10^{-17}$	0.53 (0.46-0.61)			<i>DRB1*11:01,</i> <i>DRB1*12:02,</i> <i>DQA1*06:01,</i> <i>DQA1*05:05</i>
	Validation	present/absent	0.153	0.219	$1.50 \times 10^{-7}$	0.64 (0.55-0.76)			
<i>DQBI*03:02</i>	Discovery	present/absent	0.028	0.058	$3.20 \times 10^{-7}$	0.47 (0.35-0.63)			
	Validation	present/absent	0.024	0.051	$1.78 \times 10^{-5}$	0.46 (0.32-0.65)			<i>DRB1*04:03,</i> <i>DQA1*03:01</i>
	Combined	present/absent	0.027	0.055	$2.51 \times 10^{-11}$	0.47 (0.37-0.58)	0	$9.94 \times 10^{-1}$	
<i>DQBI*05:02</i>	Discovery	present/absent	0.185	0.093	$6.97 \times 10^{-19}$	2.19 (1.84-2.60)			
	Validation	present/absent	0.146	0.100	$1.01 \times 10^{-5}$	1.55 (1.28-1.89)			<i>DRB1*16:02</i>
	Combined	present/absent	0.169	0.096	$1.03 \times 10^{-21}$	1.88 (1.65-2.14)	82.10	$8.00 \times 10^{-4}$	
<i>DQBI*06:02</i>	Discovery	present/absent	0.102	0.059	$1.21 \times 10^{-8}$	1.87 (1.51-2.32)			
	Validation	present/absent	0.108	0.054	$8.93 \times 10^{-10}$	2.15 (1.68-2.74)			<i>DRB1*15:01,</i> <i>DQA1*01:02</i>
	Combined	present/absent	0.104	0.057	$8.27 \times 10^{-17}$	1.99 (1.69-2.34)	0	$7.87 \times 10^{-1}$	
<i>DPBI*13:01</i>	Discovery	present/absent	0.070	0.029	$4.62 \times 10^{-10}$	2.47 (1.86-3.29)			
	Validation	present/absent	0.068	0.039	$5.80 \times 10^{-5}$	1.81 (1.36-2.43)			<i>DPA1*01:03</i>
	Combined	present/absent	0.069	0.033	$3.77 \times 10^{-13}$	2.12 (1.73-2.60)	28.00	$2.44 \times 10^{-1}$	

<sup>a</sup> Alleles with association  $P$ -value less than  $1.0 \times 10^{-4}$  in combined analysis were shown.

**Supplemental Table 6. Association of amino acids of HLA genes in discovery, validation and combined analysis**

Variant ID <sup>a</sup>	Gene	Alleles	Discovery				Validation				Combined			
			Case Freq	Control Freq	P value	OR	Case Freq	Control Freq	P value	OR	Case Freq	Control Freq	P value	OR (95% CI)
AA_149	A	T/A	0.113	0.079	4.48×10 <sup>-4</sup>	1.43	0.09	0.075	9.09×10 <sup>-2</sup>	1.22	0.103	0.077	5.79×10 <sup>-5</sup>	1.36 (1.17-1.57)
AA_152:V	A	V present/V absent	0.498	0.555	3.79×10 <sup>-4</sup>	0.81	0.509	0.548	1.28×10 <sup>-2</sup>	0.85	0.503	0.552	6.90×10 <sup>-6</sup>	0.82 (0.76-0.90)
AA_156:L	A	L present/L absent	0.377	0.452	3.17×10 <sup>-7</sup>	0.73	0.405	0.448	5.89×10 <sup>-3</sup>	0.83	0.389	0.45	1.70×10 <sup>-8</sup>	0.78 (0.72-0.85)
AA_156:W	A	W present/W absent	0.119	0.089	1.98×10 <sup>-3</sup>	1.35	0.099	0.08	3.89×10 <sup>-2</sup>	1.26	0.11	0.085	8.99×10 <sup>-5</sup>	1.33 (1.15-1.54)
AA_-24	<i>DRB1</i>	R/K	0.373	0.458	1.30×10 <sup>-9</sup>	0.68	0.401	0.464	8.96×10 <sup>-5</sup>	0.77	0.385	0.461	8.35×10 <sup>-13</sup>	0.73 (0.67-0.80)
AA_-23	<i>DRB1</i>	F/L	0.07	0.111	8.69×10 <sup>-6</sup>	0.63	0.072	0.115	7.27×10 <sup>-6</sup>	0.6	0.071	0.113	2.41×10 <sup>-11</sup>	0.60 (0.52-0.70)
AA_-16	<i>DRB1</i>	T/A	0.362	0.215	1.83×10 <sup>-25</sup>	2.09	0.327	0.205	2.70×10 <sup>-17</sup>	1.87	0.347	0.21	8.11×10 <sup>-44</sup>	1.98 (1.80-2.18)
AA_-15:V	<i>DRB1</i>	V present/V absent	0.372	0.457	1.20×10 <sup>-9</sup>	0.68	0.399	0.46	1.27×10 <sup>-4</sup>	0.78	0.383	0.459	1.02×10 <sup>-12</sup>	0.73 (0.67-0.80)
AA_-15:A	<i>DRB1</i>	A present/A absent	0.626	0.539	8.03×10 <sup>-10</sup>	1.47	0.599	0.536	9.03×10 <sup>-5</sup>	1.29	0.614	0.538	4.83×10 <sup>-13</sup>	1.37 (1.26-1.50)
AA_0	<i>DRB1</i>	S/A	0.248	0.136	5.12×10 <sup>-20</sup>	2.06	0.238	0.144	1.49×10 <sup>-13</sup>	1.86	0.244	0.14	8.33×10 <sup>-34</sup>	1.99 (1.78-2.22)
AA_9:W	<i>DRB1</i>	W present/W absent	0.425	0.262	1.52×10 <sup>-27</sup>	2.03	0.394	0.279	4.14×10 <sup>-14</sup>	1.68	0.412	0.27	8.45×10 <sup>-44</sup>	1.90 (1.73-2.08)
AA_9:E	<i>DRB1</i>	E present/E absent	0.45	0.585	9.93×10 <sup>-19</sup>	0.58	0.476	0.58	1.18×10 <sup>-10</sup>	0.66	0.461	0.583	4.73×10 <sup>-30</sup>	0.61 (0.56-0.66)
AA_10:Q	<i>DRB1</i>	Q present/Q absent	0.62	0.526	2.53×10 <sup>-10</sup>	1.47	0.596	0.535	1.28×10 <sup>-4</sup>	1.28	0.61	0.53	4.77×10 <sup>-14</sup>	1.39 (1.27-1.51)
AA_10:Y	<i>DRB1</i>	Y present/Y absent	0.363	0.456	2.54×10 <sup>-10</sup>	0.68	0.389	0.451	8.68×10 <sup>-5</sup>	0.77	0.374	0.454	3.01×10 <sup>-14</sup>	0.72 (0.66-0.78)
AA_11:P	<i>DRB1</i>	P present/P absent	0.35	0.188	1.28×10 <sup>-29</sup>	2.24	0.307	0.186	3.36×10 <sup>-18</sup>	1.94	0.332	0.187	8.17×10 <sup>-51</sup>	2.14 (1.93-2.36)
AA_11:V	<i>DRB1</i>	V present/V absent	0.086	0.129	2.01×10 <sup>-5</sup>	0.67	0.087	0.128	4.29×10 <sup>-5</sup>	0.65	0.087	0.128	3.74×10 <sup>-10</sup>	0.64 (0.56-0.74)
AA_11:S	<i>DRB1</i>	S present/S absent	0.363	0.456	2.54×10 <sup>-10</sup>	0.68	0.389	0.451	8.68×10 <sup>-5</sup>	0.77	0.374	0.454	3.01×10 <sup>-14</sup>	0.72 (0.66-0.78)
AA_12	<i>DRB1</i>	T/K	0.364	0.456	2.88×10 <sup>-10</sup>	0.68	0.389	0.451	8.68×10 <sup>-5</sup>	0.77	0.374	0.454	3.40×10 <sup>-14</sup>	0.72 (0.66-0.78)
AA_13:S	<i>DRB1</i>	S present/S absent	0.193	0.229	6.48×10 <sup>-4</sup>	0.78	0.199	0.244	8.88×10 <sup>-4</sup>	0.77	0.196	0.236	5.62×10 <sup>-6</sup>	0.79 (0.71-0.87)
AA_13:G	<i>DRB1</i>	G present/G absent	0.176	0.228	4.79×10 <sup>-4</sup>	0.74	0.19	0.208	1.67×10 <sup>-1</sup>	0.89	0.182	0.219	1.31×10 <sup>-5</sup>	0.79 (0.71-0.88)
AA_13:H	<i>DRB1</i>	H present/H absent	0.07	0.111	8.49×10 <sup>-6</sup>	0.63	0.072	0.114	6.79×10 <sup>-6</sup>	0.6	0.071	0.113	2.18×10 <sup>-11</sup>	0.60 (0.52-0.70)
AA_13:R	<i>DRB1</i>	R present/R absent	0.342	0.187	3.90×10 <sup>-28</sup>	2.21	0.307	0.186	3.36×10 <sup>-18</sup>	1.94	0.327	0.186	1.19×10 <sup>-48</sup>	2.11 (1.91-2.33)
AA_16:H	<i>DRB1</i>	H present/H absent	0.813	0.752	3.31×10 <sup>-6</sup>	1.41	0.794	0.769	6.05×10 <sup>-2</sup>	1.16	0.805	0.76	3.26×10 <sup>-7</sup>	1.31 (1.18-1.45)
AA_16:Y	<i>DRB1</i>	Y present/Y absent	0.176	0.228	4.79×10 <sup>-5</sup>	0.74	0.19	0.208	1.67×10 <sup>-1</sup>	0.89	0.182	0.219	1.31×10 <sup>-5</sup>	0.79 (0.71-0.88)

AA_26:F	<i>DRB1</i>	F present/F absent	0.701	0.619	$7.87 \times 10^{-9}$	1.45	0.68	0.643	$1.59 \times 10^{-2}$	1.18	0.692	0.63	$1.61 \times 10^{-9}$	1.32 (1.20-1.44)
AA_26:L	<i>DRB1</i>	L present/L absent	0.11	0.169	$1.09 \times 10^{-8}$	0.61	0.124	0.163	$6.75 \times 10^{-4}$	0.73	0.116	0.166	$3.61 \times 10^{-11}$	0.66 (0.58-0.75)
AA_28:D	<i>DRB1</i>	D present/D absent	0.691	0.613	$2.78 \times 10^{-7}$	1.38	0.672	0.615	$2.03 \times 10^{-4}$	1.28	0.683	0.614	$4.27 \times 10^{-11}$	1.35 (1.23-1.47)
AA_28:E	<i>DRB1</i>	E present/E absent	0.182	0.234	$4.77 \times 10^{-5}$	0.74	0.198	0.244	$6.19 \times 10^{-4}$	0.76	0.189	0.239	$5.89 \times 10^{-8}$	0.75 (0.68-0.83)
AA_30:H	<i>DRB1</i>	H present/H absent	0.085	0.137	$1.79 \times 10^{-8}$	0.58	0.091	0.13	$1.79 \times 10^{-4}$	0.68	0.088	0.134	$1.78 \times 10^{-11}$	0.62 (0.54-0.72)
AA_30:Y	<i>DRB1</i>	Y present/Y absent	0.695	0.618	$4.05 \times 10^{-7}$	1.37	0.677	0.622	$3.50 \times 10^{-4}$	1.27	0.687	0.62	$1.23 \times 10^{-10}$	1.34 (1.23-1.46)
AA_32	<i>DRB1</i>	H/Y	0.26	0.319	$1.96 \times 10^{-6}$	0.72	0.266	0.313	$1.30 \times 10^{-3}$	0.8	0.263	0.316	$3.08 \times 10^{-8}$	0.77 (0.70-0.84)
AA_37:L	<i>DRB1</i>	L present/L absent	0.085	0.137	$1.79 \times 10^{-8}$	0.58	0.091	0.13	$1.79 \times 10^{-4}$	0.68	0.088	0.134	$1.78 \times 10^{-11}$	0.62 (0.54-0.72)
AA_37:S	<i>DRB1</i>	S present/S absent	0.365	0.226	$2.29 \times 10^{-21}$	1.9	0.337	0.228	$5.57 \times 10^{-14}$	1.72	0.353	0.227	$4.66 \times 10^{-37}$	1.85 (1.68-2.03)
AA_37:Y	<i>DRB1</i>	Y present/Y absent	0.198	0.26	$6.09 \times 10^{-6}$	0.72	0.213	0.257	$1.19 \times 10^{-3}$	0.78	0.205	0.259	$2.01 \times 10^{-9}$	0.74 (0.67-0.81)
AA_38:V	<i>DRB1</i>	V present/V absent	0.898	0.846	$8.98 \times 10^{-8}$	1.63	0.893	0.856	$6.10 \times 10^{-4}$	1.4	0.896	0.85	$2.38 \times 10^{-10}$	1.52 (1.33-1.72)
AA_38:L	<i>DRB1</i>	L present/L absent	0.085	0.137	$1.79 \times 10^{-8}$	0.58	0.091	0.13	$1.79 \times 10^{-4}$	0.68	0.088	0.134	$1.78 \times 10^{-11}$	0.62 (0.54-0.72)
AA_57:D	<i>DRB1</i>	D present/D absent	0.56	0.467	$2.78 \times 10^{-9}$	1.43	0.534	0.472	$1.18 \times 10^{-4}$	1.28	0.549	0.47	$3.22 \times 10^{-13}$	1.37 (1.26-1.49)
AA_57:V	<i>DRB1</i>	V present/V absent	0.278	0.349	$1.47 \times 10^{-6}$	0.73	0.291	0.346	$2.49 \times 10^{-4}$	0.78	0.284	0.348	$3.45 \times 10^{-10}$	0.75 (0.68-0.82)
AA_58	<i>DRB1</i>	E/A	0.041	0.066	$2.82 \times 10^{-4}$	0.61	0.044	0.07	$8.49 \times 10^{-4}$	0.62	0.042	0.068	$4.04 \times 10^{-7}$	0.61 (0.51-0.74)
AA_60:Y	<i>DRB1</i>	Y present/Y absent	0.674	0.607	$3.17 \times 10^{-6}$	1.34	0.665	0.607	$1.77 \times 10^{-4}$	1.29	0.67	0.607	$1.70 \times 10^{-9}$	1.31 (1.20-1.43)
AA_60:S	<i>DRB1</i>	S present/S absent	0.278	0.349	$1.47 \times 10^{-6}$	0.73	0.291	0.346	$2.49 \times 10^{-4}$	0.78	0.284	0.348	$3.45 \times 10^{-10}$	0.75 (0.68-0.82)
AA_67:I	<i>DRB1</i>	I present/I absent	0.447	0.353	$3.64 \times 10^{-12}$	1.53	0.441	0.361	$4.09 \times 10^{-7}$	1.4	0.444	0.357	$2.84 \times 10^{-17}$	1.45 (1.33-1.59)
AA_67:F	<i>DRB1</i>	F present/F absent	0.235	0.326	$2.53 \times 10^{-11}$	0.64	0.254	0.322	$3.44 \times 10^{-6}$	0.72	0.243	0.324	$8.92 \times 10^{-17}$	0.67 (0.61-0.74)
AA_70:D	<i>DRB1</i>	D present/D absent	0.41	0.45	$6.34 \times 10^{-3}$	0.85	0.402	0.447	$4.89 \times 10^{-3}$	0.83	0.407	0.449	$6.38 \times 10^{-5}$	0.84 (0.77-0.92)
AA_70:Q	<i>DRB1</i>	Q present/Q absent	0.389	0.317	$5.23 \times 10^{-7}$	1.35	0.392	0.328	$2.81 \times 10^{-5}$	1.32	0.39	0.322	$1.94 \times 10^{-11}$	1.35 (1.24-1.47)
AA_71:A	<i>DRB1</i>	A present/A absent	0.248	0.136	$5.83 \times 10^{-20}$	2.06	0.237	0.143	$1.30 \times 10^{-13}$	1.86	0.243	0.139	$7.66 \times 10^{-34}$	1.98 (1.78-2.22)
AA_71:R	<i>DRB1</i>	R present/R absent	0.653	0.766	$5.69 \times 10^{-16}$	0.58	0.668	0.76	$2.29 \times 10^{-10}$	0.63	0.66	0.763	$4.94 \times 10^{-26}$	0.60 (0.55-0.66)
AA_74:E	<i>DRB1</i>	E present/E absent	0.207	0.262	$1.33 \times 10^{-5}$	0.74	0.211	0.253	$2.09 \times 10^{-3}$	0.79	0.209	0.258	$5.81 \times 10^{-8}$	0.76 (0.69-0.84)
AA_85	<i>DRB1</i>	A/V	0.086	0.14	$7.22 \times 10^{-9}$	0.57	0.094	0.131	$2.87 \times 10^{-4}$	0.69	0.089	0.136	$1.42 \times 10^{-11}$	0.63 (0.55-0.72)
AA_96:Y	<i>DRB1</i>	Y present/Y absent	0.07	0.111	$8.49 \times 10^{-6}$	0.63	0.072	0.114	$6.36 \times 10^{-6}$	0.6	0.071	0.113	$2.05 \times 10^{-11}$	0.60 (0.52-0.70)
AA_96:Q	<i>DRB1</i>	Q present/Q absent	0.359	0.204	$1.06 \times 10^{-26}$	2.12	0.323	0.2	$3.93 \times 10^{-18}$	1.91	0.344	0.202	$2.78 \times 10^{-47}$	2.05 (1.86-2.26)
AA_96:H	<i>DRB1</i>	H present/H absent	0.551	0.657	$1.77 \times 10^{-12}$	0.64	0.588	0.667	$3.26 \times 10^{-7}$	0.71	0.567	0.662	$4.69 \times 10^{-19}$	0.67 (0.62-0.73)

AA_98	<i>DRB1</i>	E/K	0.263	0.324	$8.45 \times 10^{-5}$	0.77	0.271	0.331	$5.00 \times 10^{-5}$	0.75	0.267	0.327	$1.67 \times 10^{-9}$	0.75 (0.69-0.82)
AA_120	<i>DRB1</i>	N/S	0.087	0.129	$2.18 \times 10^{-5}$	0.67	0.087	0.128	$4.95 \times 10^{-5}$	0.65	0.087	0.128	$5.47 \times 10^{-10}$	0.65 (0.56-0.74)
AA_133	<i>DRB1</i>	L/R	0.342	0.187	$3.90 \times 10^{-28}$	2.21	0.308	0.186	$2.90 \times 10^{-18}$	1.94	0.327	0.187	$9.95 \times 10^{-49}$	2.11 (1.91-2.33)
AA_140	<i>DRB1</i>	A/T	0.556	0.427	$6.79 \times 10^{-18}$	1.72	0.525	0.422	$1.38 \times 10^{-10}$	1.52	0.543	0.425	$5.26 \times 10^{-28}$	1.61 (1.48-1.75)
AA_149	<i>DRB1</i>	H/Q	0.358	0.444	$7.69 \times 10^{-10}$	0.68	0.388	0.451	$8.46 \times 10^{-5}$	0.77	0.371	0.447	$4.46 \times 10^{-13}$	0.73 (0.67-0.79)
AA_233	<i>DRB1</i>	R/T	0.275	0.359	$1.16 \times 10^{-11}$	0.63	0.294	0.375	$1.06 \times 10^{-7}$	0.69	0.283	0.367	$1.67 \times 10^{-16}$	0.68 (0.62-0.75)
AA_-15	<i>DQA1</i>	M/L	0.42	0.511	$9.78 \times 10^{-9}$	0.71	0.432	0.504	$9.37 \times 10^{-6}$	0.74	0.425	0.508	$2.50 \times 10^{-14}$	0.72 (0.66-0.78)
AA_-12	<i>DQA1</i>	T/A	0.07	0.105	$2.30 \times 10^{-4}$	0.68	0.076	0.098	$1.63 \times 10^{-2}$	0.75	0.072	0.102	$1.47 \times 10^{-6}$	0.69 (0.59-0.80)
AA_11	<i>DQA1</i>	C/Y	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.503	0.393	$1.70 \times 10^{-11}$	1.57	0.518	0.386	$6.19 \times 10^{-34}$	1.71 (1.56-1.86)
AA_25	<i>DQA1</i>	F/Y	0.188	0.254	$1.89 \times 10^{-6}$	0.72	0.226	0.256	$3.09 \times 10^{-2}$	0.85	0.203	0.255	$4.08 \times 10^{-8}$	0.75 (0.68-0.83)
AA_26	<i>DQA1</i>	S/T	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_34	<i>DQA1</i>	E/Q	0.388	0.432	$4.96 \times 10^{-3}$	0.85	0.4	0.448	$2.58 \times 10^{-3}$	0.82	0.393	0.44	$1.97 \times 10^{-5}$	0.83 (0.76-0.90)
AA_40	<i>DQA1</i>	G/E	0.208	0.295	$4.31 \times 10^{-12}$	0.62	0.226	0.274	$8.34 \times 10^{-4}$	0.77	0.215	0.285	$7.39 \times 10^{-14}$	0.69 (0.62-0.76)
AA_47:R	<i>DQA1</i>	R present/R absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_47:C	<i>DQA1</i>	C present/C absent	0.208	0.295	$4.31 \times 10^{-12}$	0.62	0.226	0.274	$8.34 \times 10^{-4}$	0.77	0.215	0.285	$7.39 \times 10^{-14}$	0.69 (0.62-0.76)
AA_47:Q	<i>DQA1</i>	Q present/Q absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_50:L	<i>DQA1</i>	L present/L absent	0.264	0.325	$8.82 \times 10^{-5}$	0.78	0.272	0.334	$3.63 \times 10^{-5}$	0.74	0.267	0.329	$8.25 \times 10^{-10}$	0.75 (0.68-0.82)
AA_50:V	<i>DQA1</i>	V present/V absent	0.208	0.295	$4.31 \times 10^{-12}$	0.62	0.226	0.274	$8.34 \times 10^{-4}$	0.77	0.215	0.285	$7.39 \times 10^{-14}$	0.69 (0.62-0.76)
AA_50:E	<i>DQA1</i>	E present/E absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_52:S	<i>DQA1</i>	S present/S absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_52:R	<i>DQA1</i>	R present/R absent	0.402	0.556	$7.43 \times 10^{-23}$	0.56	0.428	0.534	$1.37 \times 10^{-10}$	0.65	0.412	0.546	$5.11 \times 10^{-35}$	0.58 (0.54-0.64)
AA_53:R	<i>DQA1</i>	R present/R absent	0.264	0.325	$8.82 \times 10^{-5}$	0.78	0.272	0.334	$3.63 \times 10^{-5}$	0.74	0.267	0.329	$8.25 \times 10^{-10}$	0.75 (0.68-0.82)
AA_53:K	<i>DQA1</i>	K present/K absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_53:Q	<i>DQA1</i>	Q present/Q absent	0.208	0.295	$4.31 \times 10^{-12}$	0.62	0.226	0.274	$8.34 \times 10^{-4}$	0.77	0.215	0.285	$7.39 \times 10^{-14}$	0.69 (0.62-0.76)
AA_56:G	<i>DQA1</i>	G present/G absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_56:R	<i>DQA1</i>	R present/R absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_56:F	<i>DQA1</i>	F present/F absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_57	<i>DQA1</i>	D/F	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)

AA_61:G	<i>DQAI</i>	G present/G absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_61:F	<i>DQAI</i>	F present/F absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_61:A	<i>DQAI</i>	A present/A absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_64:R	<i>DQAI</i>	R present/R absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_64:T	<i>DQAI</i>	T present/T absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_64:N	<i>DQAI</i>	N present/N absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_66:A	<i>DQAI</i>	A present/A absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_66:M	<i>DQAI</i>	M present/M absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_66:I	<i>DQAI</i>	I present/I absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_68:T	<i>DQAI</i>	T present/T absent	0.051	0.109	$3.69 \times 10^{-12}$	0.46	0.069	0.104	$3.11 \times 10^{-4}$	0.65	0.059	0.107	$5.35 \times 10^{-15}$	0.53 (0.45-0.62)
AA_68:V	<i>DQAI</i>	V present/V absent	0.721	0.642	$5.98 \times 10^{-9}$	1.45	0.705	0.653	$6.97 \times 10^{-4}$	1.27	0.715	0.647	$2.69 \times 10^{-11}$	1.36 (1.25-1.49)
AA_69:L	<i>DQAI</i>	L present/L absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_69:A	<i>DQAI</i>	A present/A absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_69:K	<i>DQAI</i>	K present/K absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_74:N	<i>DQAI</i>	N present/N absent	0.721	0.642	$5.98 \times 10^{-9}$	1.45	0.705	0.653	$6.97 \times 10^{-4}$	1.27	0.715	0.647	$2.69 \times 10^{-11}$	1.36 (1.25-1.49)
AA_74:I	<i>DQAI</i>	I present/I absent	0.122	0.173	$8.01 \times 10^{-6}$	0.7	0.139	0.177	$1.50 \times 10^{-3}$	0.75	0.129	0.175	$1.30 \times 10^{-8}$	0.71 (0.63-0.80)
AA_76:V	<i>DQAI</i>	V present/V absent	0.195	0.262	$1.33 \times 10^{-6}$	0.72	0.202	0.261	$2.96 \times 10^{-5}$	0.72	0.198	0.261	$4.27 \times 10^{-12}$	0.70 (0.63-0.77)
AA_76:I	<i>DQAI</i>	I present/I absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.295	0.347	$7.22 \times 10^{-4}$	0.79	0.284	0.353	$1.50 \times 10^{-11}$	0.73 (0.67-0.80)
AA_76:M	<i>DQAI</i>	M present/M absent	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.503	0.393	$1.70 \times 10^{-11}$	1.57	0.518	0.386	$6.19 \times 10^{-34}$	1.71 (1.56-1.86)
AA_80:S	<i>DQAI</i>	S present/S absent	0.193	0.261	$8.67 \times 10^{-7}$	0.71	0.202	0.26	$3.20 \times 10^{-5}$	0.72	0.197	0.261	$2.75 \times 10^{-12}$	0.70 (0.63-0.77)
AA_80:N	<i>DQAI</i>	N present/N absent	0.279	0.359	$5.95 \times 10^{-9}$	0.69	0.295	0.347	$6.91 \times 10^{-4}$	0.79	0.285	0.353	$2.64 \times 10^{-11}$	0.73 (0.67-0.80)
AA_80:Y	<i>DQAI</i>	Y present/Y absent	0.528	0.38	$4.25 \times 10^{-21}$	1.76	0.503	0.393	$1.76 \times 10^{-11}$	1.57	0.518	0.386	$8.55 \times 10^{-34}$	1.70 (1.56-1.85)
AA_101:T	<i>DQAI</i>	T present/T absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_101:L	<i>DQAI</i>	L present/L absent	0.275	0.356	$2.54 \times 10^{-9}$	0.68	0.294	0.344	$1.00 \times 10^{-3}$	0.79	0.282	0.351	$1.88 \times 10^{-11}$	0.73 (0.67-0.80)
AA_106:N	<i>DQAI</i>	N present/N absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_106:T	<i>DQAI</i>	T present/T absent	0.123	0.173	$1.07 \times 10^{-5}$	0.7	0.14	0.177	$2.00 \times 10^{-3}$	0.75	0.13	0.175	$2.43 \times 10^{-8}$	0.71 (0.63-0.80)
AA_129:H	<i>DQAI</i>	H present/H absent	0.272	0.355	$1.60 \times 10^{-7}$	0.72	0.299	0.348	$1.60 \times 10^{-3}$	0.8	0.283	0.352	$1.70 \times 10^{-11}$	0.73 (0.67-0.80)
AA_129:S	<i>DQAI</i>	S present/S absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)

AA_129:Q	<i>DQA1</i>	Q present/Q absent	0.451	0.287	$2.91 \times 10^{-25}$	1.91	0.403	0.305	$4.22 \times 10^{-10}$	1.54	0.432	0.295	$6.96 \times 10^{-38}$	1.80 (1.65-1.97)
AA_130:S	<i>DQA1</i>	S present/S absent	0.646	0.549	$4.14 \times 10^{-10}$	1.45	0.607	0.566	$9.86 \times 10^{-3}$	1.19	0.63	0.556	$9.44 \times 10^{-12}$	1.35 (1.24-1.48)
AA_130:V	<i>DQA1</i>	V present/V absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_138:S	<i>DQA1</i>	S present/S absent	0.27	0.35	$3.41 \times 10^{-9}$	0.69	0.29	0.338	$1.56 \times 10^{-3}$	0.8	0.278	0.345	$5.52 \times 10^{-11}$	0.73 (0.67-0.81)
AA_138:T	<i>DQA1</i>	T present/T absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_155:F	<i>DQA1</i>	F present/F absent	0.123	0.173	$1.07 \times 10^{-5}$	0.7	0.14	0.177	$2.00 \times 10^{-3}$	0.75	0.13	0.175	$2.43 \times 10^{-8}$	0.71 (0.63-0.80)
AA_155:T	<i>DQA1</i>	T present/T absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_159	<i>DQA1</i>	A/S	0.262	0.34	$1.77 \times 10^{-8}$	0.7	0.283	0.326	$3.84 \times 10^{-3}$	0.81	0.271	0.334	$3.03 \times 10^{-10}$	0.74 (0.68-0.81)
AA_160:A	<i>DQA1</i>	A present/A absent	0.558	0.437	$6.67 \times 10^{-15}$	1.59	0.52	0.441	$1.60 \times 10^{-6}$	1.37	0.542	0.438	$4.07 \times 10^{-21}$	1.51 (1.39-1.64)
AA_160:D	<i>DQA1</i>	D present/D absent	0.288	0.378	$3.74 \times 10^{-9}$	0.7	0.323	0.39	$2.36 \times 10^{-5}$	0.75	0.302	0.383	$1.57 \times 10^{-14}$	0.70 (0.64-0.77)
AA_162:I	<i>DQA1</i>	I present/I absent	0.123	0.173	$1.07 \times 10^{-5}$	0.7	0.14	0.177	$2.00 \times 10^{-3}$	0.75	0.13	0.175	$2.43 \times 10^{-8}$	0.71 (0.63-0.80)
AA_162:E	<i>DQA1</i>	E present/E absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_174:E	<i>DQA1</i>	E present/E absent	0.123	0.173	$1.07 \times 10^{-5}$	0.7	0.14	0.177	$2.00 \times 10^{-3}$	0.75	0.13	0.175	$2.43 \times 10^{-8}$	0.71 (0.63-0.80)
AA_174:D	<i>DQA1</i>	D present/D absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_175:Q	<i>DQA1</i>	Q present/Q absent	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.498	0.392	$9.47 \times 10^{-11}$	1.54	0.516	0.386	$4.59 \times 10^{-33}$	1.69 (1.55-1.85)
AA_175:E	<i>DQA1</i>	E present/E absent	0.195	0.262	$1.33 \times 10^{-6}$	0.72	0.204	0.261	$5.30 \times 10^{-5}$	0.73	0.199	0.261	$7.93 \times 10^{-12}$	0.70 (0.63-0.78)
AA_175:P	<i>DQA1</i>	P present/P absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_187:A	<i>DQA1</i>	A present/A absent	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.498	0.392	$9.47 \times 10^{-11}$	1.54	0.516	0.386	$4.59 \times 10^{-33}$	1.69 (1.55-1.85)
AA_187:P	<i>DQA1</i>	P present/P absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_187:T	<i>DQA1</i>	T present/T absent	0.195	0.262	$1.33 \times 10^{-6}$	0.72	0.204	0.261	$5.30 \times 10^{-5}$	0.73	0.199	0.261	$7.93 \times 10^{-12}$	0.70 (0.63-0.78)
AA_199:A	<i>DQA1</i>	A present/A absent	0.662	0.578	$8.00 \times 10^{-10}$	1.46	0.644	0.585	$2.72 \times 10^{-4}$	1.28	0.654	0.581	$5.45 \times 10^{-12}$	1.36 (1.25-1.49)
AA_199:L	<i>DQA1</i>	L present/L absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_207:G	<i>DQA1</i>	G present/G absent	0.277	0.358	$2.63 \times 10^{-9}$	0.68	0.297	0.347	$1.26 \times 10^{-3}$	0.8	0.285	0.353	$2.57 \times 10^{-11}$	0.73 (0.67-0.80)
AA_207:M	<i>DQA1</i>	M present/M absent	0.327	0.18	$8.93 \times 10^{-27}$	2.14	0.278	0.19	$4.05 \times 10^{-10}$	1.64	0.307	0.185	$1.53 \times 10^{-37}$	1.94 (1.75-2.15)
AA_207:V	<i>DQA1</i>	V present/V absent	0.396	0.462	$3.94 \times 10^{-5}$	0.78	0.425	0.463	$2.18 \times 10^{-2}$	0.86	0.408	0.462	$4.96 \times 10^{-7}$	0.80 (0.74-0.87)
AA_214:V	<i>DQA1</i>	V present/V absent	0.723	0.642	$3.15 \times 10^{-9}$	1.46	0.702	0.653	$1.29 \times 10^{-3}$	1.26	0.715	0.647	$3.17 \times 10^{-11}$	1.36 (1.24-1.49)
AA_214:F	<i>DQA1</i>	F present/F absent	0.206	0.295	$1.54 \times 10^{-12}$	0.61	0.228	0.274	$1.47 \times 10^{-3}$	0.78	0.215	0.285	$6.58 \times 10^{-14}$	0.69 (0.62-0.76)
AA_215:L	<i>DQA1</i>	L present/L absent	0.195	0.262	$1.33 \times 10^{-6}$	0.72	0.204	0.261	$5.30 \times 10^{-5}$	0.73	0.199	0.261	$7.93 \times 10^{-12}$	0.70 (0.63-0.78)

AA_215:F	<i>DQAI</i>	F present/F absent	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.498	0.392	$9.47 \times 10^{-11}$	1.54	0.516	0.386	$4.59 \times 10^{-33}$	1.69 (1.55-1.85)
AA_215:I	<i>DQAI</i>	I present/I absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_218:Q	<i>DQAI</i>	Q present/Q absent	0.528	0.38	$3.49 \times 10^{-21}$	1.77	0.498	0.392	$9.47 \times 10^{-11}$	1.54	0.516	0.386	$4.59 \times 10^{-33}$	1.69 (1.55-1.85)
AA_218:G	<i>DQAI</i>	G present/G absent	0.277	0.358	$3.17 \times 10^{-9}$	0.69	0.298	0.347	$1.28 \times 10^{-3}$	0.8	0.285	0.353	$3.07 \times 10^{-11}$	0.73 (0.67-0.80)
AA_218:R	<i>DQAI</i>	R present/R absent	0.195	0.262	$1.33 \times 10^{-6}$	0.72	0.204	0.261	$5.30 \times 10^{-5}$	0.73	0.199	0.261	$7.93 \times 10^{-12}$	0.70 (0.63-0.78)
AA_-26	<i>DQBI</i>	S/A	0.273	0.177	$4.64 \times 10^{-11}$	1.61	0.237	0.184	$4.74 \times 10^{-5}$	1.39	0.258	0.18	$1.46 \times 10^{-17}$	1.57 (1.42-1.75)
AA_-20	<i>DQBI</i>	D/G	0.397	0.26	$6.88 \times 10^{-20}$	1.79	0.367	0.262	$3.25 \times 10^{-12}$	1.64	0.385	0.261	$6.28 \times 10^{-34}$	1.76 (1.61-1.93)
AA_-17	<i>DQBI</i>	A/V	0.398	0.473	$4.64 \times 10^{-7}$	0.75	0.415	0.464	$2.53 \times 10^{-3}$	0.82	0.405	0.469	$3.53 \times 10^{-9}$	0.77 (0.71-0.84)
AA_-5:S	<i>DQBI</i>	S present/S absent	0.397	0.26	$6.88 \times 10^{-20}$	1.79	0.367	0.262	$3.25 \times 10^{-12}$	1.64	0.385	0.261	$6.28 \times 10^{-34}$	1.76 (1.61-1.93)
AA_-5:T	<i>DQBI</i>	T present/T absent	0.573	0.7	$1.37 \times 10^{-16}$	0.6	0.593	0.681	$1.64 \times 10^{-8}$	0.68	0.582	0.691	$7.03 \times 10^{-26}$	0.62 (0.57-0.68)
AA_-4:S	<i>DQBI</i>	S present/S absent	0.273	0.177	$4.64 \times 10^{-11}$	1.61	0.237	0.184	$4.74 \times 10^{-5}$	1.39	0.258	0.18	$1.46 \times 10^{-17}$	1.57 (1.42-1.75)
AA_-4:L	<i>DQBI</i>	L present/L absent	0.125	0.084	$9.50 \times 10^{-8}$	1.69	0.131	0.078	$2.07 \times 10^{-7}$	1.77	0.127	0.081	$1.15 \times 10^{-12}$	1.68 (1.46-1.94)
AA_-4:P	<i>DQBI</i>	P present/P absent	0.603	0.74	$6.78 \times 10^{-20}$	0.56	0.633	0.738	$3.27 \times 10^{-12}$	0.61	0.615	0.739	$6.14 \times 10^{-34}$	0.57 (0.52-0.62)
AA_9:F	<i>DQBI</i>	F present/F absent	0.146	0.114	$4.72 \times 10^{-5}$	1.43	0.159	0.123	$1.36 \times 10^{-3}$	1.35	0.151	0.118	$2.09 \times 10^{-6}$	1.35 (1.19-1.53)
AA_9:Y	<i>DQBI</i>	Y present/Y absent	0.728	0.77	$4.59 \times 10^{-5}$	0.76	0.705	0.757	$3.03 \times 10^{-4}$	0.77	0.718	0.764	$5.73 \times 10^{-7}$	0.78 (0.71-0.86)
AA_13	<i>DQBI</i>	A/G	0.268	0.353	$2.04 \times 10^{-9}$	0.69	0.29	0.34	$8.15 \times 10^{-4}$	0.79	0.277	0.347	$1.40 \times 10^{-12}$	0.72 (0.66-0.79)
AA_26:G	<i>DQBI</i>	G present/G absent	0.316	0.229	$1.07 \times 10^{-8}$	1.47	0.288	0.251	$7.77 \times 10^{-3}$	1.21	0.304	0.239	$1.71 \times 10^{-11}$	1.39 (1.26-1.53)
AA_26:Y	<i>DQBI</i>	Y present/Y absent	0.268	0.353	$2.05 \times 10^{-9}$	0.69	0.29	0.34	$8.15 \times 10^{-4}$	0.79	0.277	0.347	$1.39 \times 10^{-12}$	0.72 (0.66-0.79)
AA_30:Y	<i>DQBI</i>	Y present/Y absent	0.591	0.689	$1.14 \times 10^{-8}$	0.7	0.629	0.679	$1.21 \times 10^{-3}$	0.8	0.607	0.684	$1.79 \times 10^{-13}$	0.72 (0.66-0.78)
AA_30:H	<i>DQBI</i>	H present/H absent	0.279	0.195	$5.78 \times 10^{-8}$	1.46	0.248	0.205	$1.31 \times 10^{-3}$	1.28	0.266	0.2	$1.25 \times 10^{-12}$	1.44 (1.30-1.59)
AA_38	<i>DQBI</i>	V/A	0.529	0.406	$8.90 \times 10^{-13}$	1.52	0.495	0.418	$1.38 \times 10^{-6}$	1.37	0.514	0.412	$2.53 \times 10^{-21}$	1.51 (1.38-1.64)
AA_45	<i>DQBI</i>	E/G	0.141	0.237	$1.33 \times 10^{-15}$	0.55	0.154	0.22	$2.00 \times 10^{-7}$	0.65	0.147	0.229	$1.31 \times 10^{-22}$	0.58 (0.52-0.65)
AA_55:R	<i>DQBI</i>	R present/R absent	0.57	0.437	$3.55 \times 10^{-18}$	1.69	0.556	0.461	$4.61 \times 10^{-9}$	1.46	0.564	0.448	$6.01 \times 10^{-27}$	1.59 (1.46-1.73)
AA_55:P	<i>DQBI</i>	P present/P absent	0.301	0.447	$7.78 \times 10^{-22}$	0.55	0.322	0.422	$1.04 \times 10^{-10}$	0.65	0.31	0.436	$5.99 \times 10^{-34}$	0.58 (0.53-0.63)
AA_57:D	<i>DQBI</i>	D present/D absent	0.583	0.675	$3.78 \times 10^{-8}$	0.71	0.632	0.662	$5.70 \times 10^{-2}$	0.88	0.604	0.669	$1.16 \times 10^{-9}$	0.76 (0.70-0.83)
AA_57:S	<i>DQBI</i>	S present/S absent	0.186	0.094	$1.12 \times 10^{-14}$	2.03	0.146	0.102	$3.19 \times 10^{-5}$	1.51	0.169	0.098	$5.74 \times 10^{-21}$	1.86 (1.63-2.11)
AA_70:R	<i>DQBI</i>	R present/R absent	0.577	0.699	$1.09 \times 10^{-15}$	0.61	0.597	0.686	$7.06 \times 10^{-9}$	0.68	0.586	0.693	$3.19 \times 10^{-25}$	0.63 (0.57-0.69)
AA_70:G	<i>DQBI</i>	G present/G absent	0.379	0.247	$7.58 \times 10^{-19}$	1.77	0.353	0.247	$7.50 \times 10^{-13}$	1.66	0.368	0.247	$1.08 \times 10^{-33}$	1.77 (1.61-1.94)

AA_71:A	<i>DQBI</i>	A present/A absent	0.273	0.175	$1.47 \times 10^{-11}$	1.63	0.236	0.181	$1.87 \times 10^{-5}$	1.41	0.257	0.177	$1.45 \times 10^{-18}$	1.59 (1.44-1.77)
AA_71:T	<i>DQBI</i>	T present/T absent	0.554	0.655	$1.63 \times 10^{-9}$	0.69	0.591	0.636	$3.59 \times 10^{-3}$	0.82	0.57	0.646	$4.55 \times 10^{-13}$	0.73 (0.67-0.79)
AA_74:S	<i>DQBI</i>	S present/S absent	0.317	0.229	$1.03 \times 10^{-8}$	1.47	0.286	0.248	$6.36 \times 10^{-3}$	1.22	0.304	0.237	$1.17 \times 10^{-11}$	1.39 (1.27-1.53)
AA_74:E	<i>DQBI</i>	E present/E absent	0.554	0.655	$1.63 \times 10^{-9}$	0.69	0.591	0.636	$4.00 \times 10^{-3}$	0.83	0.57	0.646	$5.36 \times 10^{-13}$	0.73 (0.67-0.79)
AA_75	<i>DQBI</i>	V/L	0.446	0.345	$1.63 \times 10^{-9}$	1.44	0.409	0.364	$4.03 \times 10^{-3}$	1.21	0.43	0.354	$5.39 \times 10^{-13}$	1.37 (1.26-1.50)
AA_77	<i>DQBI</i>	R/T	0.402	0.291	$1.12 \times 10^{-11}$	1.53	0.359	0.297	$4.59 \times 10^{-5}$	1.32	0.384	0.294	$2.67 \times 10^{-18}$	1.49 (1.36-1.63)
AA_86:A	<i>DQBI</i>	A present/A absent	0.505	0.363	$4.32 \times 10^{-20}$	1.74	0.489	0.368	$2.27 \times 10^{-14}$	1.65	0.498	0.365	$9.22 \times 10^{-36}$	1.72 (1.58-1.88)
AA_86:E	<i>DQBI</i>	E present/E absent	0.475	0.618	$2.51 \times 10^{-20}$	0.57	0.495	0.605	$4.55 \times 10^{-12}$	0.64	0.483	0.612	$2.58 \times 10^{-33}$	0.59 (0.55-0.65)
AA_87:Y	<i>DQBI</i>	Y present/Y absent	0.293	0.194	$3.33 \times 10^{-11}$	1.59	0.252	0.208	$1.01 \times 10^{-3}$	1.29	0.276	0.2	$1.21 \times 10^{-15}$	1.51 (1.36-1.66)
AA_87:F	<i>DQBI</i>	F present/F absent	0.233	0.188	$1.39 \times 10^{-5}$	1.37	0.253	0.187	$6.29 \times 10^{-7}$	1.48	0.241	0.188	$5.01 \times 10^{-10}$	1.39 (1.25-1.54)
AA_87:L	<i>DQBI</i>	L present/L absent	0.475	0.618	$2.51 \times 10^{-20}$	0.57	0.495	0.605	$4.55 \times 10^{-12}$	0.64	0.483	0.612	$2.58 \times 10^{-33}$	0.59 (0.55-0.65)
AA_125:G	<i>DQBI</i>	G present/G absent	0.253	0.208	$1.11 \times 10^{-5}$	1.36	0.27	0.212	$2.96 \times 10^{-5}$	1.37	0.26	0.21	$1.41 \times 10^{-8}$	1.33 (1.21-1.47)
AA_125:S	<i>DQBI</i>	S present/S absent	0.273	0.175	$1.47 \times 10^{-11}$	1.63	0.236	0.18	$2.01 \times 10^{-5}$	1.41	0.257	0.177	$1.52 \times 10^{-18}$	1.59 (1.44-1.77)
AA_125:A	<i>DQBI</i>	A present/A absent	0.475	0.618	$2.51 \times 10^{-20}$	0.57	0.495	0.608	$1.84 \times 10^{-12}$	0.63	0.483	0.613	$8.92 \times 10^{-34}$	0.59 (0.54-0.64)
AA_126	<i>DQBI</i>	H/Q	0.186	0.094	$1.12 \times 10^{-14}$	2.03	0.147	0.1	$7.67 \times 10^{-6}$	1.56	0.169	0.096	$6.85 \times 10^{-22}$	1.89 (1.66-2.15)
AA_140	<i>DQBI</i>	T/A	0.345	0.502	$2.18 \times 10^{-23}$	0.55	0.371	0.491	$8.08 \times 10^{-14}$	0.61	0.356	0.497	$7.38 \times 10^{-40}$	0.56 (0.52-0.61)
AA_185	<i>DQBI</i>	I/T	0.204	0.265	$2.09 \times 10^{-5}$	0.75	0.217	0.269	$1.65 \times 10^{-4}$	0.75	0.209	0.267	$3.65 \times 10^{-10}$	0.73 (0.66-0.80)
AA_35:Y	<i>DPBI</i>	Y present/Y absent	0.098	0.061	$1.22 \times 10^{-5}$	1.62	0.103	0.078	$6.51 \times 10^{-3}$	1.37	0.1	0.069	$2.06 \times 10^{-7}$	1.51 (1.29-1.76)
AA_76:I	<i>DPBI</i>	I present/I absent	0.106	0.068	$7.22 \times 10^{-6}$	1.6	0.107	0.08	$4.11 \times 10^{-3}$	1.39	0.106	0.073	$8.66 \times 10^{-8}$	1.51 (1.30-1.76)
AA_76:M	<i>DPBI</i>	M present/M absent	0.785	0.834	$2.58 \times 10^{-5}$	0.73	0.794	0.827	$1.14 \times 10^{-2}$	0.81	0.789	0.831	$8.05 \times 10^{-7}$	0.76 (0.68-0.85)
AA_96	<i>DPBI</i>	R/K	0.348	0.414	$2.35 \times 10^{-5}$	0.75	0.37	0.392	$1.50 \times 10^{-1}$	0.91	0.357	0.404	$7.74 \times 10^{-6}$	0.82 (0.75-0.89)

<sup>a</sup> We only report one variant if the LD of  $R^2$  was equal to 1. For example, we found significant linkage from position AA 57 to 231 in DQA1 and only showed AA 57 in the table due to limited space. Here variants with combined *P*-value less than  $1.0 \times 10^{-4}$  were shown.

**Supplemental Table 7. Clinical characteristics of LN patients in capture sequencing and validation cohorts**

	Discovery stage	Validation stage	Total
Female/Male	1,127/204	831/119	1,958/323
Age, year (no.)	31.56 (1,331)	32.79 (950)	32.07 (2,281)
ISN/RPS classification of LN (no.)	1,323	921	2,244
I	1.51% (20)	1.74% (16)	1.60% (36)
II	6.42% (85)	5.86% (54)	6.19% (139)
III	10.81% (143)	8.90% (82)	9.94% (223)
IV	51.85% (686)	41.26% (380)	47.86% (1,074)
V	14.36% (190)	17.16% (158)	15.06% (338)
VI	1.06% (14)	0.43% (4)	0.80% (18)
V+III	5.59% (74)	8.79% (81)	7.09% (159)
V+IV	8.39% (111)	15.85% (146)	11.45% (257)
GFR, ml/min/1.73m <sup>2</sup> (no.)	85.81 (942)	80.23 (573)	83.70 (1,515)
CKD stage of LN (no.)	942	573	1,515
CKD stage 1	44.69% (421)	39.97% (229)	42.90% (650)
CKD stage 2	21.87% (206)	25.48% (146)	23.23% (352)
CKD stage 3	18.68% (176)	18.67% (107)	18.68% (283)
CKD stage 4	7.54% (71)	9.77% (56)	8.38% (127)
CKD stage 5	7.22% (68)	6.11% (35)	6.80% (103)
Proteinuria, g/24h (no.)	2.71 (861)	3.57 (546)	3.04 (1,407)
Rash (no.)	44.56% (373)	30.31% (164)	40.21% (537)
Oral ulcers (no.)	7.85% (66)	5.08% (26)	7.07% (92)
Arthritis (no.)	44.07% (420)	36.48% (201)	41.61% (621)
Serositis (no.)	19.08% (162)	19.49% (92)	19.23% (254)
Neurologic disorder (no.)	3.06% (26)	6.45% (34)	4.98% (60)
Hematologic disorder (no.)	64.43% (596)	71.48% (411)	67.31% (1,007)
ANA (no.)	92.51% (803)	91.41% (447)	92.12% (1,250)
Anti-dsDNA antibody (no.)	77.38% (674)	67.68% (312)	74.31% (986)
Anti-smith antibody (no.)	30.56% (253)	28.76% (149)	29.89% (402)
SLEDAI score (no.)	14.44 (853)	15.42 (531)	14.82 (1,384)
IgA, g/L (no.)	2.29 (823)	2.46 (515)	2.36 (1,338)
IgM, g/L (no.)	1.11 (790)	1.10 (513)	1.11 (1,303)
IgG, g/L (no.)	12.23 (825)	12.53 (518)	12.35 (1,343)
Anticardiolipin antibody IgG (no.)	30.27% (148)	27.15% (82)	29.16% (230)
Anticardiolipin antibody IgM (no.)	24.64% (121)	19.26% (57)	22.92% (178)
Low C3 <sup>a</sup> (no.)	79.30% (724)	81.58% (443)	80.17% (1,167)
Low C4 <sup>b</sup> (no.)	73.30% (656)	73.64% (394)	73.43% (1,050)

Values expressed as mean (number) or percentage (number).

<sup>a</sup> Low C3 was defined as C3 < 0.79 g/L.<sup>b</sup> Low C4 was defined as C4 < 0.17 g/L.

**Supplemental Table 8. The association of LN predisposing genes with clinical phenotypes in LN patients**

Variant	Clinical phenotype	OR (95% CI)	P <sup>a</sup>
HLA-DQ $\beta$ 1 Arg55	Positivity of anticardiolipin antibody IgM	0.53 (0.41-0.68)	$8.64 \times 10^{-7}$
HLA-DR $\beta$ 1 Pro11	Positivity of anticardiolipin antibody IgM	0.54 (0.41-0.71)	$1.46 \times 10^{-5}$
HLA-DR $\beta$ 1 Pro11	Positivity of anticardiolipin antibody IgG	0.60 (0.47-0.77)	$5.72 \times 10^{-5}$
HLA-DQ $\beta$ 1 Leu55	Low C4 <sup>b</sup>	1.90 (1.41-2.56)	$2.59 \times 10^{-5}$

<sup>a</sup> The Bonferroni threshold for significance is  $1.04 \times 10^{-4}$ ,  $0.05/(23*21)$ .

<sup>b</sup> Low C4 was defined as C4 < 0.17 g/L.

**Supplemental Table 9. Association analysis of independent loci in marginal and multivariate models**

Variant	Gene	Case freq	Control freq	Marginal model		Multivariate model		Variance explained <sup>a</sup>
				P	OR (95% CI)	P	OR (95% CI)	
Pro11	<i>HLA-DRB1</i>	0.332	0.187	$8.17 \times 10^{-51}$	2.14 (1.93-2.36)	$7.07 \times 10^{-31}$	1.97 (1.75-2.21)	1.50%
Glu45	<i>HLA-DQB1</i>	0.146	0.229	$1.31 \times 10^{-22}$	0.58 (0.52-0.65)	$4.40 \times 10^{-6}$	0.74 (0.65-0.84)	0.91%
Leu156	<i>HLA-A</i>	0.389	0.450	$1.70 \times 10^{-8}$	0.78 (0.72-0.85)	$4.23 \times 10^{-4}$	0.84 (0.77-0.93)	0.23%
Ile76	<i>HLA-DPB1</i>	0.106	0.073	$8.66 \times 10^{-8}$	1.51 (1.30-1.70)	$4.42 \times 10^{-4}$	1.34 (1.14-1.58)	0.17%
rs114580964-A	<i>PRRC2A</i>	0.023	0.056	$1.47 \times 10^{-14}$	0.38 (0.30-0.49)	$2.34 \times 10^{-10}$	0.43 (0.33-0.56)	0.25%
Total								3.06%

<sup>a</sup> Explained variance was calculated using the method proposed by So *et al.*<sup>7</sup>

The overall prevalence of LN in the population was set to 0.00028.<sup>8</sup>

**Supplemental Table 10. Sample-level quality control at the discovery stage**

Filters	Criteria	Removed
Mean sequencing depth	Fold coverage < 30X	1
Coverage	1X coverage < 95%	0
GC content	Outliers	0
Mapping rate	Mapping rate < 95%	39
IBD	Remove contaminated samples, duplicates and closely related samples (1 <sup>st</sup> -degree or 2 <sup>nd</sup> -degree)	79
Inbreeding coefficient	> 0.1 or < -0.1	30
PCA <sup>a</sup>	>6 $\sigma$ from the mean of any first 10 PCs	0
All above filters	Any one	122

<sup>a</sup> PCA analysis was conducted after the applying of the previous filters.

**Supplemental Table 11.** SNP-level quality control at the discovery stage

	Criteria	Removed	In dbSNP135
Base quality	Quality difference <sup>a</sup> > 6	3,781	1,332
Strand bias	Fisher exact test <i>P</i> -value < $1.0 \times 10^{-7}$ & log2 odds ratio > 4 or < -4	9,546	2,880
Depth	Average depth < 8 or > 200	15,852	7,936
Mappability	Mappability score <sup>b</sup> < 0.5	1,296	596
Homopolymer	Homopolymer run <sup>c</sup> > 6	2,891	481
Allelic balance	Binomial test <i>P</i> -value < $1.0 \times 10^{-7}$ and bias <sup>d</sup> > 0.5	11,151	3,962
HWE	Exact HW test <i>P</i> -value < $1 \times 10^{-4}$	22,018	16,474
All above filters	Any one	46,303	25,433

<sup>a</sup> The absolute difference of base quality scores between major allele and minor allele,  $Q_{diff} = |m_1 - m_2|$ , where  $m_1$  and  $m_2$  are the median base quality scores for major allele and minor allele, respectively.

<sup>b</sup> Mappability score measures the accessibility of a genomic locus by short read sequencing.

<sup>c</sup> Homopolymer run is the length of the homopolymer of a SNP site.

<sup>d</sup> The absolute difference of reads number between major allele and minor allele,  $B_{diff} = (r_2 - r_1) / (r_2 + r_1)$  where  $r_1$  is the number of reads supporting major allele and  $r_2$  is the number of reads supporting minor allele.

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