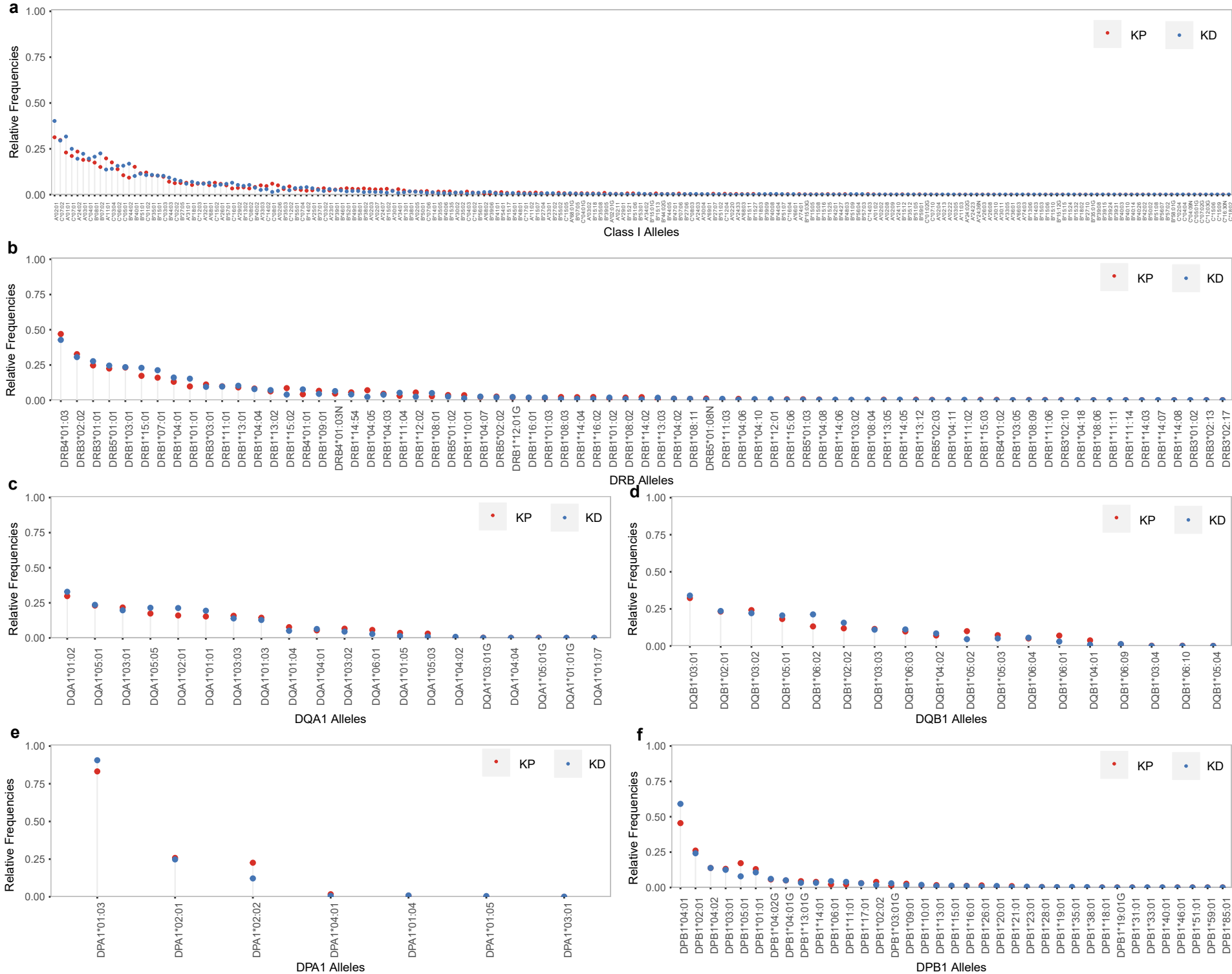
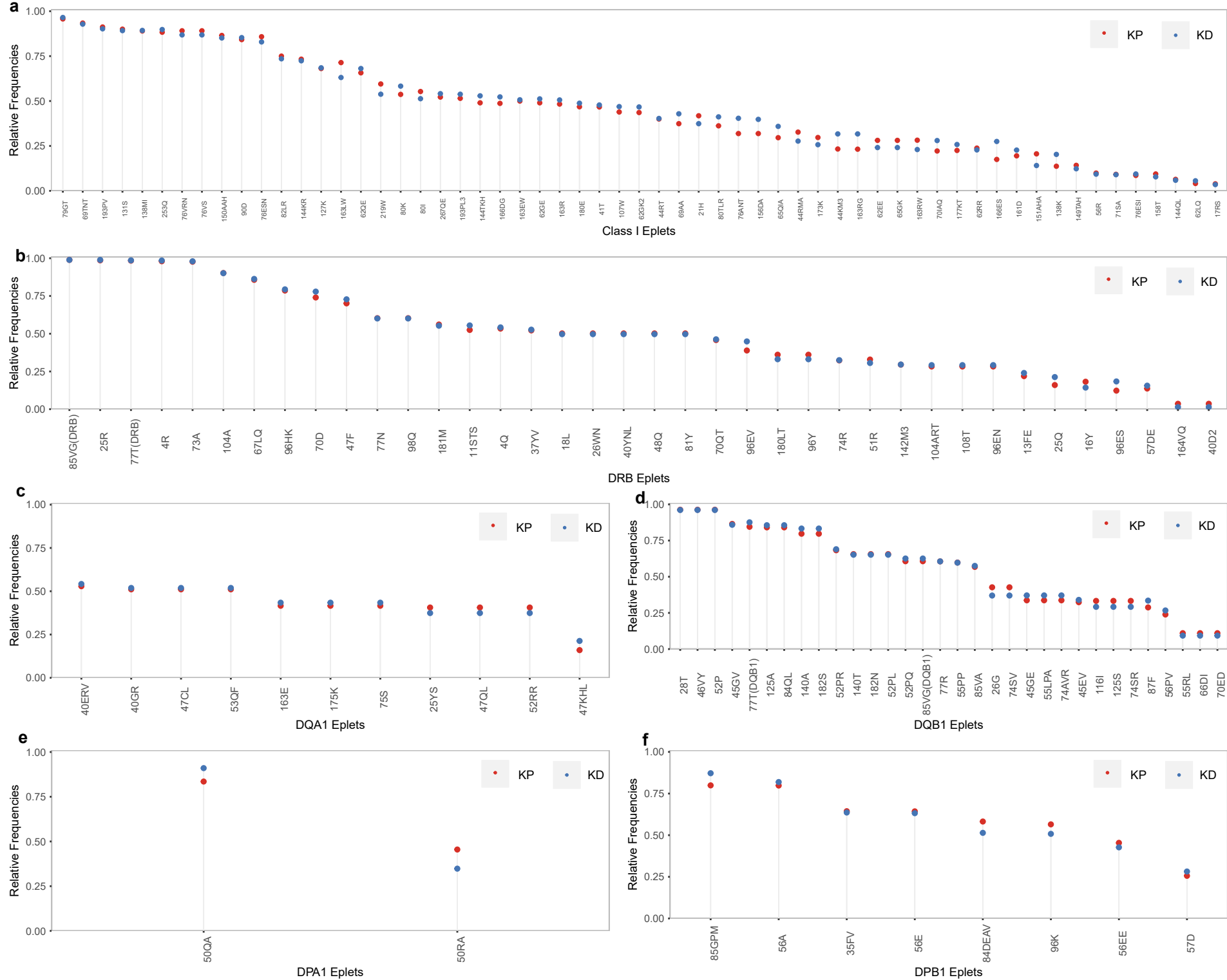


Supplemental Figure 1. A comparison of the relative frequencies in observed alleles present in the omitted and included subjects in the study population.

Relative frequencies were calculated as the proportion of subjects expressing a particular alleles within the study cohort (*include*, n = 1846) and omitted subjects (*omit*, n = 154). (a) and (b) depict the allele frequencies by class I and class II, respectively.

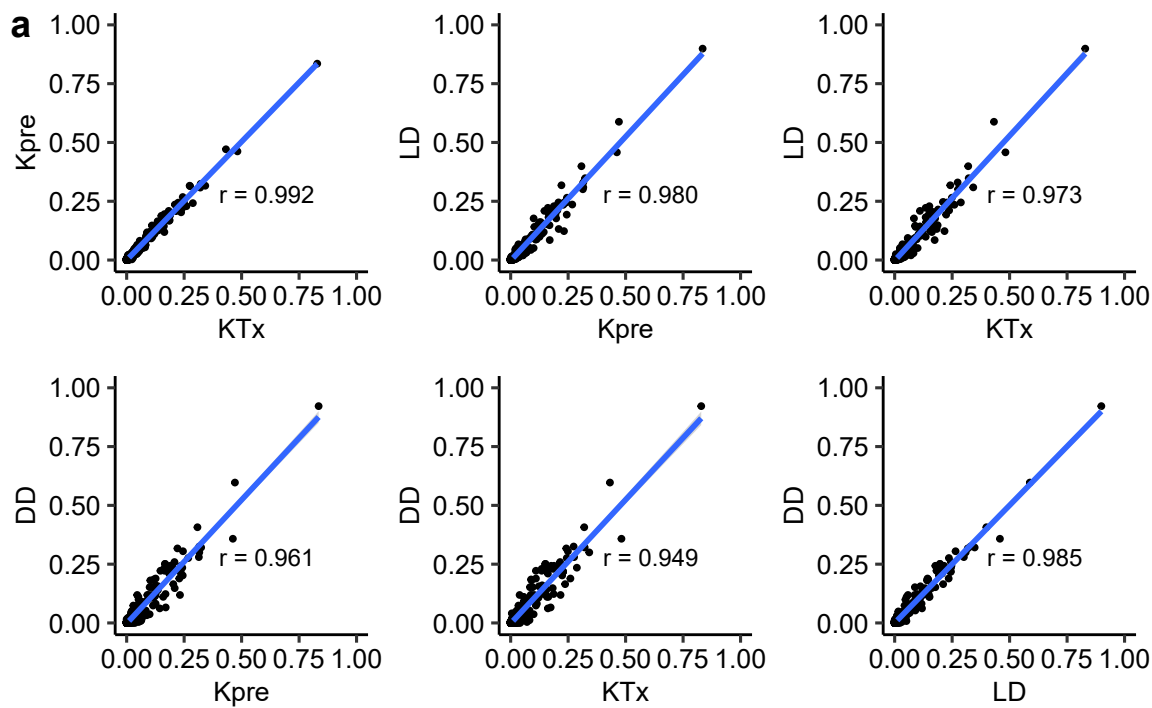


Supplemental Figure 2. The relative frequencies of the HLA alleles in the study population categorized by class I genes and individual class II genes. Relative frequencies were calculated as the proportion of subjects of subjects expressing a particular allele within kidney patients (n=1049) or donors (n=797). (a) class I, (b) DRB1/3/4/5, (c) DQA1, (d) DQB1, (e) DPA1, and (f) DPB1 observed alleles. *KP* = *Kidney patients*, *KD* = *kidney donors*.

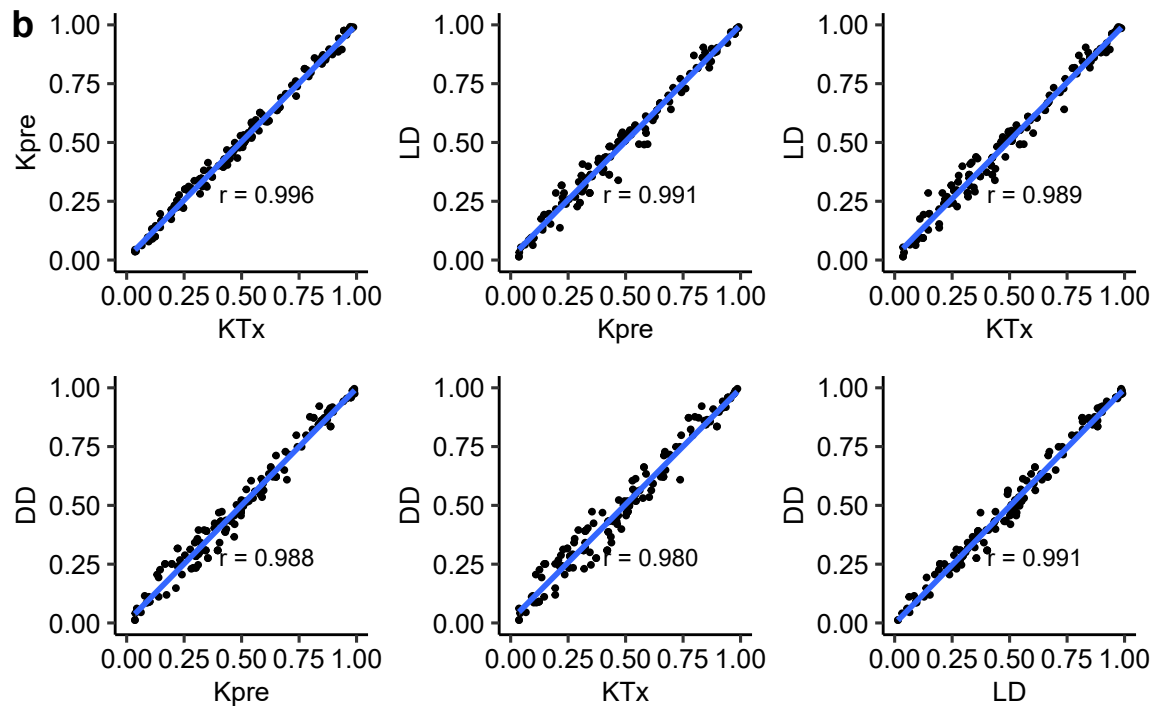


Supplemental Figure 3. The relative frequencies of the HLA eplets in the study population categorized by class I genes and individual class II genes. Relative frequencies were calculated as the proportion of subjects of subjects expressing a particular eplet within kidney patients (n=1049) or donors (n=797). (a) class I, (b) DRB1/3/4/5, (c) DQA1, (d) DQB1, (e) DPA1, and (f) DPB1 observed alleles. *KP* = *Kidney patients*, *KD* = *kidney donors*.

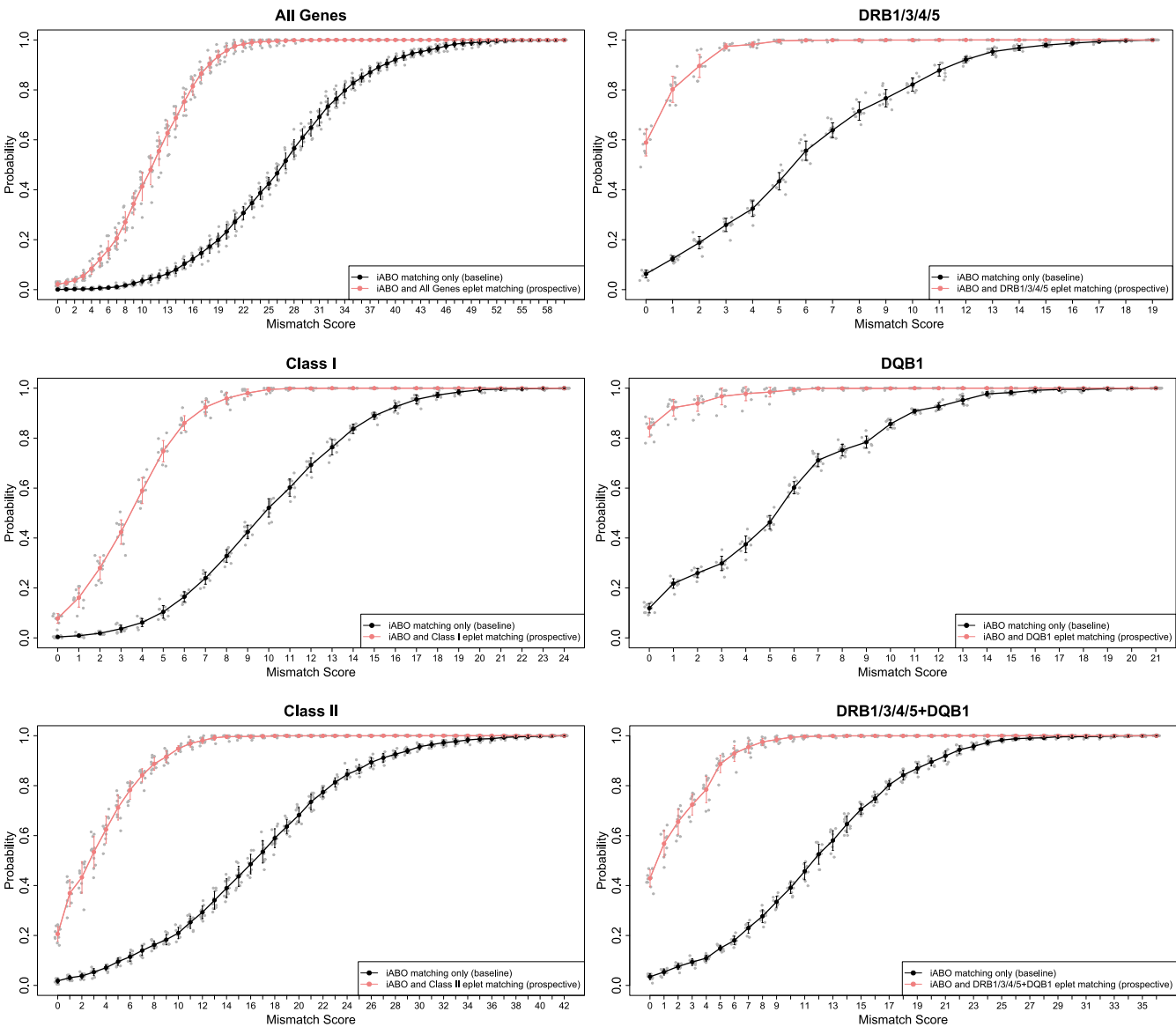
Alleles



Eplets



Supplemental Figure 4. Pairwise analysis between patient and donor subgroups of allele and eplet frequencies. Frequencies were calculated as the patients and donors expressing a particular allele or eplet. The line and correlation coefficient were calculated using Pearson Correlation. (a) Each dot represents an allele and its frequency for patients ($n=1049$) is plotted on the x axis and its frequency for donors ($n=797$) on the y axis. (b) As above but for eplets. Kpre = pre-transplant recipients, Ktx = post-transplant recipients, LD = potential living donors, and DD = deceased donors.



Supplemental Figure 5. Cumulative probabilities of eplet mismatches in the average province matching simulations with and without prospective eplet matching. Matching simulations incorporated prospective eplet and blood group matching (red curve) and baseline blood group matching only (black curve) in kidney patients and deceased donors. Plots represent simulations using an averaged province Canadian waitlist ($n=290$) and an annual deceased donor rate ($n=109$) according to the Canadian Organ Replacement Register. Simulations were performed across all HLA genes, class I genes, class II genes, DRB1/3/4/5, DQB1, and DRB1/3/4/5+DQB1 combined. Eplet mismatch scores for the respective genes on the x axis are plotted against the averaged cumulative probability of these scores in the matched population. Jittered grey dots represent the cumulative probabilities at each individual simulation. Error bars are calculated as the standard deviation ten repeated independent simulation runs.

Supplemental Table 1. List of observed alleles and their relative frequencies in the total population that are absent from HLAMatchmaker class I v02 and class II v2.2.

HLA-A		HLA-C		HLA-DPB1		HLA-DQA1	
A*01:25	0.0005	C*01:06	0.0005	DPB1*104:01	0.0205	DQA1*05:06	0.001
A*11:19	0.0005	C*04:06	0.001	DPB1*105:01	0.0075	DQA1*05:07	0.0005
A*23:17	0.0005	C*04:10	0.0005	DPB1*124:01	0.001	DQA1*05:08	0.0015
A*31:12	0.0005	C*05:14	0.0005	DPB1*126:01	0.001	DQA1*05:09	0.0085
A*31:16	0.001	C*07:18	0.0055	DPB1*131:01	0.0005	HLA-DQB1	
A*34:05	0.0015	C*07:19	0.0005	DPB1*215:01	0.0005	DQB1*03:19	0.0015
HLA-B		C*07:26	0.001	DPB1*24:01	0.001	HLA-DRB1	
B*15:19	0.001	C*07:27	0.0005	DPB1*296:01	0.0005	DRB1*04:40	0.0005
B*35:30	0.0005	C*07:66	0.0005	DPB1*350:01	0.0005	DRB1*07:03	0.001
B*35:41	0.0005	C*08:22	0.001	DPB1*41:01	0.0005	DRB1*12:10	0.001
B*39:01L	0.0005	C*12:09	0.0005	DPB1*48:01	0.001	DRB1*14:28	0.0005
		C*15:04	0.001	DPB1*70:01	0.0005	DRB1*15:40	0.0005
		C*15:13	0.0025			HLA-DRB3	
		C*17:03	0.007			DRB3*02:24	0.0015

Supplemental Table 2. List of interlocus eplets and their relative frequencies.

Eplet	Gene	Relative Frequency		
		Kidney Patients (KP)	Kidney Donors (KD)	Total Population
156DA	B,C	0.319	0.398	0.353
163EW	A,B,C	0.500	0.507	0.503
163LW	B,C	0.714	0.631	0.678
166DG	A,B	0.487	0.523	0.503
193PV	B,C	0.912	0.902	0.908
253Q	A,C	0.883	0.898	0.889
62GE	A,B	0.490	0.512	0.499
62RR	A,B	0.238	0.228	0.234
76VRN	B,C	0.891	0.868	0.881
76VS	B,C	0.891	0.868	0.881
80I	A,B	0.553	0.513	0.536
82LR	A,B	0.750	0.735	0.744
90D	A,C	0.842	0.853	0.847
104A	DRB1,3,5	0.902	0.901	0.901
181M	DRB1,4	0.561	0.553	0.557
25R	DRB1,3,5	0.986	0.989	0.987
4Q	DRB1,4	0.534	0.542	0.537
4R	DRB1,3,5	0.980	0.985	0.982
67LQ	DRB1,3	0.857	0.863	0.860
70D	DRB1,5	0.740	0.779	0.757
73A	DRB1,4,5	0.977	0.980	0.978
74R	DRB1,3	0.323	0.325	0.324
77N	DRB1,3	0.603	0.601	0.602
77T(DRB)	DRB1,4,5	0.845	0.876	0.985
85VG(DRB)	DRB1,3,5	0.607	0.626	0.989
96EV	DRB1,5	0.389	0.449	0.415
96HK	DRB1,3	0.786	0.794	0.789