

Supplementary Material

Reclassifying Assay-Intrinsic HLA Reactivity Expands Donor Availability Without Short-Term Allograft Risk

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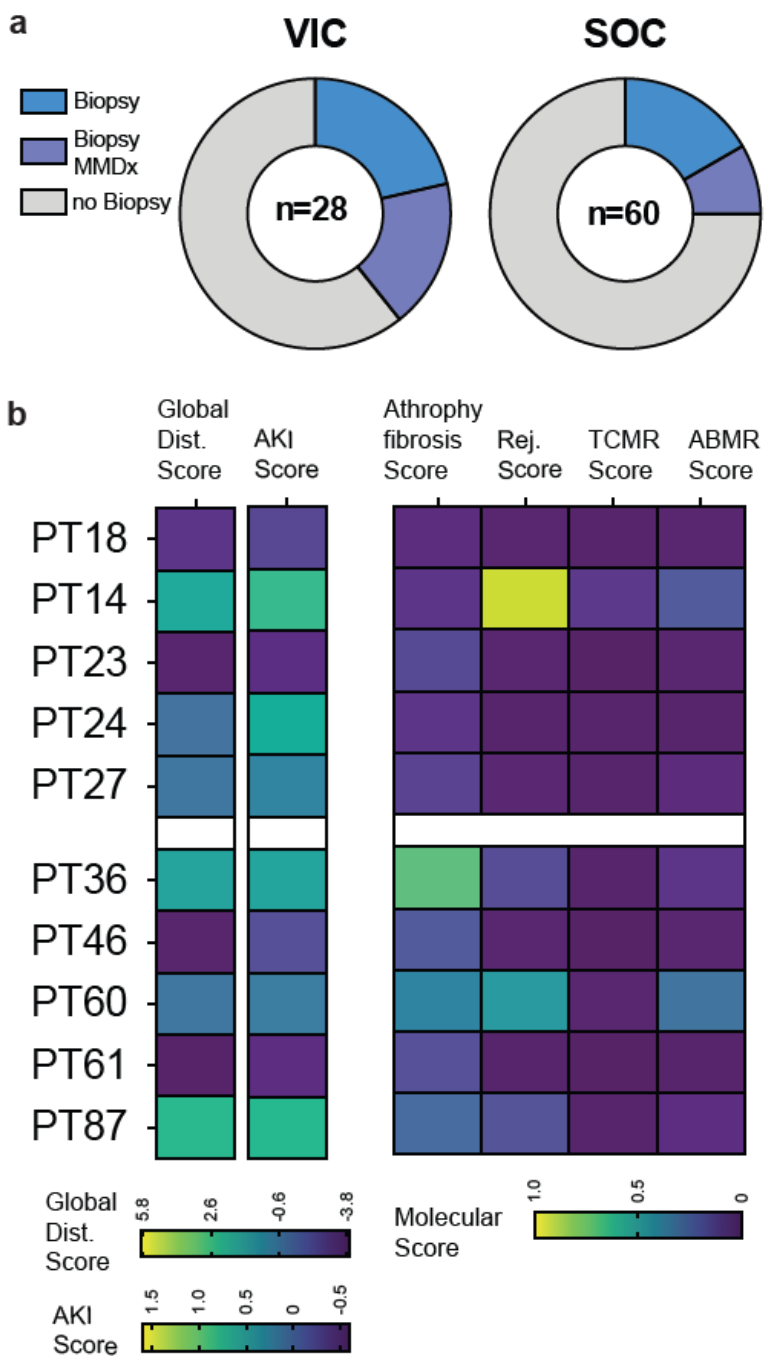
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Supplementary Figure 1. Biopsy availability and molecular injury assessment by MMDx. (a) Proportion of patients undergoing kidney allograft biopsy within the first year post-transplant in the VIC and SOC cohorts. Inner segments indicate biopsies with available Molecular Microscope Diagnostic System (MMDx) data (Biopsy MMDx). (b) Heatmap representation of MMDx-derived molecular injury and rejection scores in biopsied patients with available MMDx data. Injury-related scores include global disturbance score, acute kidney injury (AKI) score, and atrophy-fibrosis score. Rejection-related scores include composite rejection score, T cell-mediated rejection (TCMR) score, and antibody-mediated rejection (ABMR) score. Scores are shown as continuous values, with higher values indicating greater molecular injury or higher probability of rejection.

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ID	Cohort	Rec. BG	Rec. Age	Rec. Sex	Donor	PIRCHE score	PIRCHE comment	Donor BG	Donor Age	Donor sex
PT1	VIC	A pos	27	M	Living Donor	5	low risk	A pos	61	F
PT2	VIC	O pos	5	M	Living Donor	37.03	intermediate risk	O pos	41	M
PT3	VIC	A pos	20	F	Deceased Donor	129.9	high risk	O pos	55	M
PT4	VIC	O neg	5	F	Deceased Donor	76	intermediate risk	O pos	23	M
PT5	VIC	O pos	58	F	Deceased Donor	66.67	intermediate risk	O pos	68	F
PT6	VIC	B pos	51	F	Deceased Donor	43.98	intermediate risk	O pos	33	M
PT7	VIC	AB pos	48	F	Deceased Donor	92.64	high risk	AB pos	40	F
PT8	VIC	B pos	72	F	Deceased Donor	85.56	intermediate risk	B pos	57	M
PT9	VIC	O pos	57	M	Deceased Donor	54.74	intermediate risk	O neg	39	F
PT10	VIC	A pos	33	F	Deceased Donor	73.1	intermediate risk	A pos	18	M
PT11	VIC	A pos	36	M	Deceased Donor	93.33	high risk	A neg	44	F
PT12	VIC	AB pos	48	M	Deceased Donor	150.54	high risk	AB neg	55	M
PT13	VIC	B pos	20	M	Deceased Donor	106.74	high risk	B pos	43	M
PT14	VIC	O pos	71	F	Deceased Donor	55.54	intermediate risk	O pos	76	M
PT15	VIC	A pos	47	M	Deceased Donor	36.43	intermediate risk	O pos	51	M
PT16	VIC	A pos	47	M	Deceased Donor	86	intermediate risk	A pos	54	M
PT17	VIC	A neg	35	M	Deceased Donor	27.8	low risk	A pos	52	M
PT18	VIC	A pos	34	F	Deceased Donor	126.4	high risk	A pos	49	M
PT19	VIC	B pos	68	M	Deceased Donor	71.98	intermediate risk	B neg	69	F
PT20	VIC	A pos	31	F	Living Donor	90.93	high risk	A pos	57	M
PT21	VIC	A pos	35	M	Deceased Donor	68.74	intermediate risk	A pos	42	F
PT22	VIC	A pos	44	F	Deceased Donor	48.03	intermediate risk	A pos	33	M
PT23	VIC	O pos	35	F	Living Donor	119.99	high risk	O pos	32	F
PT24	VIC	O neg	61	M	Deceased Donor	70.19	intermediate risk	O pos	63	F
PT25	VIC	O pos	67	M	Deceased Donor	142.84	high risk	O pos	53	M
PT26	VIC	O pos	51	F	Deceased Donor	92	high risk	O pos	26	M
PT27	VIC	A pos	48	F	Deceased Donor	56.22	intermediate risk	A pos	13	M
PT28	VIC	A pos	68	M	Deceased Donor	148.67	high risk	A neg	49	M
PT29	SOC	B pos	19	F	Deceased Donor	35.61	intermediate risk	B pos	43	M
PT30	SOC	A pos	38	F	Deceased Donor	41.9	intermediate risk	A pos	26	F
PT31	SOC	A pos	58	F	Living Donor	0	low risk	A pos	56	F
PT32	SOC	O pos	11	F	Deceased Donor	119.25	high risk	O pos	35	M
PT33	SOC	A pos	33	F	Deceased Donor	67	intermediate risk	A pos	28	M
PT34	SOC	O pos	33	F	Deceased Donor	53.1	intermediate risk	O pos	64	F
PT35	SOC	O pos	47	F	Deceased Donor	91	high risk	O pos	49	M
PT36	SOC	A pos	49	F	Deceased Donor	112.31	high risk	A neg	56	M
PT37	SOC	AB neg	55	F	Deceased Donor	87.14	intermediate risk	AB neg	51	M
PT38	SOC	A pos	70	F	Deceased Donor	70.47	intermediate risk	A pos	72	F
PT39	SOC	O pos	48	F	Living Donor	155.62	high risk	B pos	49	M
PT40	SOC	B pos	68	F	Deceased Donor	89.12	intermediate risk	B pos	60	F
PT41	SOC	O pos	74	F	Deceased Donor	30.02	low risk	O pos	33	M
PT42	SOC	B pos	68	F	Deceased Donor	139.87	high risk	B pos	47	F
PT43	SOC	A neg	55	F	Living Donor	43.33	intermediate risk	A pos	59	M
PT44	SOC	A pos	67	F	Deceased Donor	89	high risk	A pos	53	M
PT45	SOC	A pos	25	F	Living Donor	77.83	intermediate risk	A pos	57	F
PT46	SOC	A pos	53	F	Living Donor	136.66	high risk	A pos	52	M
PT47	SOC	A pos	52	F	Deceased Donor	120.53	high risk	A pos	58	M
PT48	SOC	A pos	50	F	Deceased Donor	114.96	high risk	A pos	62	M
PT49	SOC	O pos	59	F	Deceased Donor	51.87	intermediate risk	O pos	55	M
PT50	SOC	A pos	60	F	Deceased Donor	109.46	high risk	A pos	53	F
PT51	SOC	O pos	59	F	Deceased Donor	70.29	intermediate risk	O pos	69	F
PT52	SOC	AB neg	47	F	Deceased Donor	104.31	high risk	AB pos	47	M
PT53	SOC	O neg	67	F	Living Donor	106	high risk	O pos	59	M
PT54	SOC	A neg	69	F	Living Donor	68	intermediate risk	A pos	51	M
PT55	SOC	O neg	56	F	Deceased Donor	59	intermediate risk	O pos	68	F
PT56	SOC	O pos	73	F	Living Donor	86.2	intermediate risk	O pos	74	M
PT57	SOC	A pos	21	F	Deceased Donor	112.19	high risk	A pos	43	M
PT58	SOC	O pos	64	F	Deceased Donor	82.88	intermediate risk	O pos	5	F
PT59	SOC	AB pos	50	M	Deceased Donor	58	intermediate risk	AB pos	58	F
PT60	SOC	B pos	66	M	Deceased Donor	141.29	high risk	B pos	48	F
PT61	SOC	A pos	33	M	Deceased Donor	117.32	high risk	A pos	53	M
PT62	SOC	O pos	57	M	Deceased Donor	57.9	intermediate risk	O pos	50	M
PT63	SOC	O pos	69	M	Deceased Donor	92.25	high risk	O neg	77	F
PT64	SOC	O neg	29	M	Living Donor	55.92	intermediate risk	O pos	49	F
PT65	SOC	A pos	45	M	Deceased Donor	120.48	high risk	A neg	56	M
PT66	SOC	O pos	27	M	Deceased Donor	86.97	intermediate risk	O neg	48	M
PT67	SOC	O pos	73	M	Deceased Donor	41.23	intermediate risk	O pos	33	M
PT68	SOC	A pos	62	M	Deceased Donor	77.22	intermediate risk	A pos	72	M
PT69	SOC	A neg	63	M	Deceased Donor	138	high risk	A pos	51	F
PT70	SOC	AB pos	60	M	Deceased Donor	73.28	intermediate risk	AB pos	40	F
PT71	SOC	O pos	68	M	Deceased Donor	146.59	high risk	O pos	59	M
PT72	SOC	O pos	75	M	Deceased Donor	124.26	high risk	O pos	69	M
PT73	SOC	A neg	67	M	Deceased Donor	89.57	intermediate risk	A neg	32	M
PT74	SOC	A pos	32	M	Living Donor	46	intermediate risk	A pos	58	M
PT75	SOC	O pos	77	M	Deceased Donor	64.53	intermediate risk	O pos	73	M
PT76	SOC	A pos	63	M	Living Donor	135.78	high risk	O pos	61	F
PT77	SOC	A pos	69	M	Deceased Donor	95.31	high risk	A pos	48	F
PT78	SOC	AB pos	52	M	Deceased Donor	83.4	intermediate risk	AB pos	26	M
PT79	SOC	A pos	71	M	Deceased Donor	58.62	intermediate risk	A pos	72	M
PT80	SOC	A pos	66	M	Deceased Donor	36.1	intermediate risk	A pos	67	M
PT81	SOC	O neg	49	M	Living Donor	52	intermediate risk	O pos	71	F
PT82	SOC	O pos	55	M	Deceased Donor	118.38	high risk	O pos	69	F
PT83	SOC	O pos	47	M	Living Donor	57.05	intermediate risk	O pos	69	F
PT84	SOC	O pos	34	M	Living Donor	30.63	low risk	A pos	53	F
PT85	SOC	O neg	70	M	Deceased Donor	20.98	low risk	O pos	73	F
PT86	SOC	A pos	54	M	Deceased Donor	26.44	low risk	A neg	38	F
PT87	SOC	O pos	70	M	Deceased Donor	155.59	high risk	O pos	72	F
PT88	SOC	B pos	73	M	Deceased Donor	111.57	high risk	B pos	73	M

Supplementary Table 1. Detailed characteristics of donors and recipients.

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Bead nr.	Abbreviated Specificity	LS1A04_011	LS1A04_012	LS1A04_013	LS1A04_14	LS1A04_15	LS1A04_16
	patients tested (total n = 741)	37	66	127	290	182	39
3	A1	0%	0%	2%	2%	9%	5%
4	A2	3%	0%	0%	4%	3%	5%
5	A2	0%	0%	1%	3%	4%	5%
6	A2	0%	2%	1%	3%	4%	3%
7	A3	0%	2%	0%	2%	2%	5%
8	A11	5%	0%	0%	0%	0%	5%
9	A11	3%	0%	4%	4%	13%	21%
10	A23	0%	0%	3%	3%	5%	15%
11	A24	0%	0%	2%	7%	14%	26%
12	A24	5%	0%	6%	8%	8%	15%
13	A25	11%	0%	3%	4%	4%	13%
14	A26	0%	0%	1%	5%	7%	5%
15	A29	8%	12%	5%	8%	10%	15%
16	--B27--Bw4	0%	0%	0%	4%	3%	5%
17	A29	3%	5%	3%	6%	16%	21%
18	A30	5%	2%	0%	5%	9%	3%
19	A30	5%	2%	0%	4%	5%	3%
20	A31	5%	3%	2%	7%	5%	5%
21	A32	0%	3%	2%	4%	4%	3%
22	A33	0%	0%	2%	3%	3%	5%
23	A34	14%	5%	8%	10%	16%	23%
24	A34	5%	0%	0%	0%	2%	5%
25	A36	0%	0%	2%	3%	5%	8%
26	A43	8%	2%	2%	11%	14%	15%
27	A66	8%	2%	2%	10%	19%	15%
28	A66	14%	0%	3%	6%	15%	13%
29	A68	0%	0%	2%	3%	2%	0%
30	A68	0%	0%	0%	1%	2%	8%
31	A69	0%	0%	1%	1%	2%	5%
32	A74	0%	0%	0%	0%	1%	3%
33	A80	3%	5%	4%	12%	18%	21%
34	--B7--Bw6	0%	0%	0%	0%	1%	15%
35	--B8--Bw6	0%	5%	9%	8%	9%	13%
36	--B13--Bw4	0%	3%	0%	4%	9%	5%
37	--B64--Bw6	0%	0%	0%	0%	1%	0%
38	--B65--Bw6	0%	0%	0%	0%	0%	0%
40	--B62--Bw6	0%	5%	4%	2%	1%	0%
41	--B75--Bw6	3%	0%	3%	7%	8%	8%
42	--B72--Bw6	0%	2%	4%	1%	1%	0%
43	--B71--Bw6	0%	5%	6%	1%	1%	3%
44	--B76--Bw6	19%	6%	18%	10%	19%	36%
45	--B77--Bw4	0%	0%	2%	2%	1%	3%
46	--B63--Bw4	11%	12%	11%	4%	3%	10%
47	--B18--Bw6	0%	0%	0%	1%	1%	3%
48	--B27--Bw6	0%	0%	2%	6%	5%	5%
49	--B35--Bw6	0%	0%	1%	0%	2%	5%
50	--B37--Bw4	0%	11%	12%	8%	19%	18%
51	--B38--Bw4	0%	0%	0%	0%	0%	0%
52	--B39--Bw6	0%	0%	0%	0%	0%	0%
53	--B60--Bw6	0%	0%	0%	5%	4%	5%
54	--B61--Bw6	0%	2%	1%	3%	1%	3%
55	--B41--Bw6	0%	0%	2%	3%	1%	3%
56	--B42--Bw6	8%	0%	0%	1%	2%	0%
57	--B44--Bw4	0%	0%	2%	6%	8%	5%
58	--B44--Bw4	0%	0%	0%	3%	6%	3%
59	--B45--Bw6	3%	2%	4%	5%	9%	5%
60	--B49--Bw4	3%	6%	9%	3%	1%	5%
61	--B47--Bw4	0%	0%	2%	2%	6%	8%
62	--B48--Bw6	0%	0%	0%	1%	1%	0%
63	--B46--Bw6	3%	3%	4%	7%	12%	26%
64	--B50--Bw6	0%	3%	6%	1%	1%	5%
65	--B51--Bw4	0%	0%	3%	1%	2%	5%
66	--B51--Bw4	0%	0%	2%	0%	1%	3%
67	--B52--Bw4	0%	0%	3%	2%	2%	8%
68	--B53--Bw4	0%	2%	2%	1%	1%	3%
69	--B54--Bw6	3%	2%	2%	2%	3%	5%
70	--B55--Bw6	0%	0%	0%	0%	1%	3%
71	--B56--Bw6	3%	8%	7%	0%	2%	0%
72	--B57--Bw4	3%	2%	3%	9%	9%	26%
73	--B57--Bw4	0%	2%	3%	9%	11%	28%
74	--B58--Bw4	0%	2%	2%	4%	7%	15%
75	--B59--Bw4	0%	2%	2%	2%	2%	13%
76	--B67--Bw6	5%	2%	11%	3%	14%	10%
77	--B73--Bw6	0%	0%	2%	4%	9%	10%
78	--B78--Bw6	0%	0%	0%	0%	3%	5%
79	--B81--Bw6	3%	3%	1%	2%	4%	3%
80	--B82--Bw6	5%	2%	2%	6%	13%	21%
81	-----Cw1-	3%	11%	8%	2%	10%	10%
82	-----Cw2-	5%	5%	5%	6%	13%	13%
83	-----Cw10-	0%	0%	6%	6%	12%	10%
84	-----Cw9-	0%	3%	8%	8%	17%	10%
85	-----Cw10-	0%	3%	6%	4%	12%	10%
86	-----Cw4-	0%	3%	7%	4%	16%	23%
87	-----Cw5-	3%	3%	10%	10%	8%	3%
88	-----Cw6-	0%	2%	4%	7%	10%	21%
89	-----Cw7-	0%	3%	2%	2%	6%	13%
90	-----Cw8-	0%	0%	2%	2%	4%	0%
91	-----Cw12-	5%	8%	10%	2%	4%	5%
92	-----Cw17-	0%	0%	2%	2%	7%	23%
93	-----Cw15-	5%	8%	8%	5%	5%	3%
94	-----Cw16-	0%	0%	2%	3%	3%	13%
95	-----Cw14-	3%	14%	10%	22%	42%	18%
96	-----Cw18-	0%	2%	6%	14%	15%	13%
97	--B13--Bw4	0%	2%	2%	4%	4%	3%
98	--B75--Bw6	0%	0%	0%	1%	2%	13%
99	--B61--Bw6	0%	0%	0%	4%	2%	3%
100	A33	0%	0%	0%	1%	3%	3%

Supplementary Table 2. Mean Class I bead reactivity (%) in non-immunized males in different One Lambda SAB assay lots.

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Bead nr.	Abbreviated Specificity	LS2A01NC 013	LS2A01 014	LS2A01 015	LS2A01 016	LS2A01 017
	patients tested (total n = 1004)	48	121	297	381	157
4	DR1.....	13%	10%	7%	2%	20%
5	DR103.....	10%	5%	2%	2%	5%
6	DR17.....	4%	2%	2%	1%	1%
7	DR18.....	8%	7%	3%	2%	0%
8	DR4.....	17%	11%	2%	1%	4%
9	DR4.....	15%	11%	4%	2%	1%
10	DR4.....	4%	10%	4%	2%	10%
11	DR4.....	4%	6%	3%	1%	2%
12	DR4.....	23%	13%	2%	1%	4%
13	DR7.....	21%	9%	2%	2%	10%
14	DR8.....	0%	3%	2%	2%	0%
15	DR9.....	2%	6%	4%	4%	1%
16	DR9.....	2%	5%	4%	3%	7%
17	DR10.....	6%	10%	2%	1%	8%
18	DR11.....	6%	7%	3%	1%	0%
19	DR11.....	0%	3%	1%	1%	4%
20	DR12.....	4%	8%	1%	2%	10%
21	DR12.....	4%	8%	3%	2%	9%
22	DR13.....	0%	5%	6%	1%	0%
23	DR13.....	0%	5%	3%	1%	1%
24	DR14.....	4%	6%	3%	0%	1%
25	DR14.....	0%	5%	3%	1%	0%
26	DR14.....	0%	3%	2%	0%	1%
27	DR15.....	2%	5%	1%	0%	3%
28	DR15.....	2%	4%	3%	1%	4%
29	DR15.....	0%	2%	2%	0%	2%
30	DR16.....	0%	4%	2%	0%	2%
31	DR16.....	0%	5%	2%	1%	2%
32	--DR52.....	2%	4%	3%	3%	1%
33	--DR52.....	15%	11%	7%	2%	8%
34	--DR52.....	0%	3%	2%	3%	1%
35	--DR53.....	19%	20%	8%	8%	21%
36	--DR53.....	17%	12%	8%	7%	17%
37	--DR51.....	19%	8%	7%	6%	3%
38	--DR51.....	2%	9%	3%	1%	1%
39	....DQ2.....	6%	8%	3%	2%	0%
40	....DQ2.....	6%	10%	3%	2%	6%
41	....DQ2.....	8%	4%	0%	2%	1%
42	....DQ2.....	13%	12%	4%	7%	8%
43	....DQ2.....	6%	7%	3%	1%	1%
44	....DQ4.....	2%	8%	2%	2%	6%
45	....DQ4.....	0%	5%	1%	2%	10%
46	....DQ4.....	0%	7%	2%	2%	8%
47	....DQ4.....	0%	7%	2%	1%	8%
48	....DQ5.....	2%	7%	2%	2%	8%
49	....DQ5.....	0%	9%	3%	2%	6%
50	....DQ6.....	0%	6%	1%	2%	6%
51	....DQ6.....	2%	3%	3%	2%	5%
52	....DQ6.....	4%	1%	2%	3%	4%
53	....DQ6.....	15%	3%	3%	3%	6%
54	....DQ6.....	0%	9%	3%	3%	4%
55	....DQ6.....	0%	6%	1%	1%	4%
56	....DQ7.....	8%	12%	2%	5%	10%
57	....DQ7.....	15%	10%	2%	3%	6%
58	....DQ7.....	21%	12%	4%	4%	12%
59	....DQ7.....	19%	12%	4%	4%	8%
60	....DQ7.....	10%	10%	3%	3%	5%
61	....DQ8.....	2%	3%	2%	3%	5%
62	....DQ8.....	4%	6%	4%	5%	8%
63	....DQ8.....	2%	2%	3%	6%	5%
64	....DQ9.....	2%	3%	1%	7%	3%
65	....DQ9.....	0%	3%	3%	8%	11%
66	....DQ9.....	2%	2%	3%	5%	6%
67	....DP1.....	8%	0%	1%	6%	13%
68	....DP1.....	21%	24%	15%	17%	41%
69	....DP2.....	0%	1%	0%	1%	3%
70	....DP5.....	15%	25%	6%	10%	17%
71	....DP3.....	17%	12%	4%	3%	21%
72	....DP3.....	0%	1%	2%	1%	3%
73	....DP3.....	0%	2%	1%	1%	1%
74	....DP4.....	2%	0%	1%	1%	4%
75	....DP4.....	0%	0%	2%	2%	1%
76	....DP5.....	2%	3%	1%	3%	1%
77	....DP6.....	0%	2%	2%	0%	2%
78	....DP6.....	2%	16%	16%	8%	12%
79	....DP9.....	0%	0%	1%	1%	1%
80	....DP10.....	4%	2%	2%	2%	3%
81	....DP11.....	8%	2%	3%	1%	1%
82	....DP28.....	2%	1%	0%	1%	1%
83	....DP13.....	0%	4%	1%	1%	9%
84	....DP13.....	0%	2%	1%	1%	4%
85	....DP13.....	2%	5%	2%	2%	8%
86	....DP14.....	4%	3%	2%	1%	20%
87	....DP15.....	2%	2%	2%	1%	8%
88	....DP17.....	0%	2%	2%	2%	2%
89	....DP18.....	0%	0%	0%	1%	1%
90	....DP18.....	0%	2%	1%	0%	0%
91	....DP18.....	0%	2%	1%	1%	0%
92DP19.....	15%	2%	0%	0%	3%
93DP20.....	2%	1%	2%	3%	1%
94DP23.....	2%	1%	2%	2%	10%
95DP28.....	2%	5%	0%	1%	1%
96DP28.....	2%	2%	0%	1%	1%
97DP11.....	2%	10%	2%	3%	3%

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Supplementary Table 3. Mean Class II bead reactivity (%) in non-immunized males in different One Lambda SAB assay lots.

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VIC				SOC			
	3m	6m	1y		3m	6m	1y
PT1	0	0	0	PT29	0	0	0
PT2	0	0	0	PT30	0	0	0
PT3	0	0	0	PT31	0	0	0
PT4	0	0	0	PT32	0	1	0
PT5	0	0	0	PT33	0	0	0
PT6	0	0	0	PT34	0	0	0
PT7	0	0	0	PT35	0	0	0
PT8	0	0	0	PT36	0	1	1
PT9	0	0	1	PT37	0	1	0
PT10	0	0	0	PT38	0	0	0
PT11	0	0	1	PT39	0	0	0
PT12	0	0	0	PT40	0	0	0
PT13	0	0	0	PT41	0	0	0
PT14	1	1	1	PT42	0	0	0
PT15	0	0	0	PT43	0	0	0
PT16	0	0	1	PT44	0	0	1
PT17	0	0	0	PT45	0	0	1
PT18	0	1	1	PT46	0	1	1
PT19	0	0	0	PT47	0	0	0
PT20	0	0	0	PT48	0	0	0
PT21	0	0	0	PT49	1	1	1
PT22	1	1	1	PT50	0	0	0
PT23	0	0	0	PT51	0	0	0
PT24	0	0	0	PT52	0	0	0
PT25	0	0	0	PT53	0	0	0
PT26	0	0	0	PT54	0	0	0
PT27	0	0	0	PT55	0	0	0
PT28	0	0	0	PT56	0	0	0
sum	2	3	6	PT57	0	0	0
%	7.14285714	10.7142857	21.4285714	PT58	0	0	0
				PT59	1	1	1
				PT60	0	0	1
				PT61	0	1	1
				PT62	0	0	0
				PT63	0	0	0
				PT64	0	0	0
				PT65	0	0	0
				PT66	0	0	1
				PT67	0	0	0
				PT68	0	0	0
				PT69	0	0	0
				PT70	0	0	0
				PT71	0	0	0
				PT72	0	0	0
				PT73	0	0	0
				PT74	1	1	1
				PT75	0	0	0
				PT76	0	0	0
				PT77	1	1	1
				PT78	1	1	1
				PT79	0	0	0
				PT80	0	0	0
				PT81	0	0	0
				PT82	0	0	0
				PT83	0	0	0
				PT84	0	0	0
				PT85	0	0	0
				PT86	1	1	1
				PT87	0	0	1
				PT88	0	0	0
				sum	6	11	14
				%	10	18.3333333	23.3333333

Supplementary Table 4. *De novo* donor specific antibody development in transplanted patients at 3, 6, and 12 months post-transplant.