

Supplementary Table 1: The usage of IGKV genes in the HH and IHB library

HH-IgK	Frequency (%)	IHB-IgK	Frequency (%)
IGKV4-1	12.94	IGKV4-1	13.40
IGKV3-20	11.80	IGKV3-20	10.95
IGKV2-30	10.08	IGKV2-30	10.10
IGKV3-11	8.03	IGKV3-11	8.17
IGKV1-39	7.10	IGKV1-39	6.87
IGKV2-28	6.04	IGKV1-5	6.07
IGKV1-5	5.85	IGKV2-28	6.02
IGKV1-33	4.94	IGKV1-33	5.66
IGKV3-15	3.61	IGKV3-15	3.23
IGKV1-12	3.01	IGKV1-9	3.07
IGKV1-16	2.90	IGKV1-17	2.96
IGKV1-9	2.61	IGKV1-16	2.37
IGKV2-24	2.46	IGKV1-12	2.36
IGKV2-29	2.11	IGKV2-29	2.09
IGKV1-17	2.09	IGKV1-27	2.00
IGKV1-27	1.97	IGKV2D-29	1.76
IGKV2D-29	1.41	IGKV2-24	1.73
IGKV1D-16	1.31	IGKV1-6	1.28
IGKV1-NL1	1.26	IGKV3D-15	1.20
IGKV1-6	0.95	IGKV1-8	1.14
IGKV1-8	0.94	IGKV1D-16	1.07
IGKV1D-12	0.93	IGKV1-NL1	0.95
IGKV6-21	0.86	IGKV3D-20	0.92
IGKV3D-15	0.86	IGKV1-13	0.74
IGKV3D-20	0.74	IGKV1D-12	0.69
IGKV2D-30	0.73	IGKV6-21	0.57
IGKV3D-11	0.51	IGKV2D-30	0.55
IGKV1-13	0.44	IGKV3D-11	0.53
IGKV6D-21	0.40	IGKV1D-13	0.33
IGKV2-40	0.27	IGKV2-40	0.27
IGKV1D-8	0.25	IGKV1D-8	0.26
IGKV1D-13	0.24	IGKV6D-21	0.23
IGKV3D-7	0.14	IGKV3D-7	0.19
IGKV1D-43	0.10	IGKV1D-43	0.18
IGKV5-2	0.07	IGKV5-2	0.05
IGKV2D-26	0.03	IGKV2D-26	0.04
IGKV1D-17	0.01	IGKV1D-17	0.00

Supplementary Table 2: The usage of IGKJ genes in the HH and IHB library

HH-IgK	Frequency (%)	IHB-IgK	Frequency (%)
IGKJ4*01	26.97	IGKJ4*01	28.00
IGKJ5*01	22.45	IGKJ5*01	22.15
IGKJ1*01	21.55	IGKJ1*01	20.70
IGKJ2*01	14.89	IGKJ2*01	15.75
IGKJ3*01	9.23	IGKJ3*01	8.74
IGKJ2*02	3.07	IGKJ2*02	3.15
IGKJ4*02	1.09	IGKJ4*02	1.08
IGKJ2*03	0.57	IGKJ2*03	0.38
IGKJ2*04	0.19	IGKJ2*04	0.05

Supplementary Table 3: The usage of IGLV genes in the HH and IHB library

HH-IgL	Frequency (%)	IHB-IgL	Frequency (%)
IGLV3-1	17.66	IGLV3-1	22.66
IGLV3-21	15.01	IGLV9-49	15.70
IGLV10-54	11.02	IGLV3-21	14.91
IGLV9-49	9.54	IGLV3-27	8.08
IGLV3-27	6.46	IGLV3-19	5.95
IGLV6-57	5.05	IGLV10-54	5.18
IGLV3-19	4.57	IGLV6-57	4.57
IGLV2-8	4.08	IGLV2-8	2.99
IGLV5-52	3.60	IGLV5-37	2.60
IGLV1-44	2.82	IGLV5-52	2.39
IGLV1-40	2.72	IGLV1-40	2.12
IGLV5-37	2.46	IGLV2-14	1.97
IGLV2-14	2.28	IGLV1-51	1.52
IGLV1-51	2.00	IGLV3-9	1.36
IGLV2-11	1.73	IGLV1-44	1.20
IGLV3-9	1.57	IGLV3-25	1.15
IGLV1-47	1.51	IGLV1-47	1.13
IGLV3-25	1.41	IGLV4-3	0.86
IGLV2-23	0.75	IGLV2-11	0.79
IGLV5-45	0.66	IGLV5-45	0.64
IGLV3-10	0.66	IGLV2-18	0.57
IGLV2-18	0.65	IGLV2-23	0.52
IGLV4-3	0.57	IGLV3-10	0.38
IGLV5-39	0.49	IGLV8-61	0.31
IGLV8-61	0.24	IGLV4-60	0.15
IGLV4-69	0.22	IGLV4-69	0.05
IGLV1-36	0.11	IGLV1-36	0.05
IGLV3-16	0.07	IGLV3-12	0.05
IGLV7-46	0.03	IGLV3-16	0.05
IGLV7-43	0.03	IGLV5-39	0.05
IGLV3-12	0.02	IGLV7-43	0.02
IGLV4-60	0.00	IGLV7-46	0.02
IGLV3-22	0.00	IGLV3-22	0.00

Supplementary Table 4: The usage of IGLJ genes in the HH and IHB library

HH-IgL	Frequency (%)	IHB-IgL	Frequency (%)
IGLJ2*01	41.24	IGLJ3*02	37.38
IGLJ3*02	33.74	IGLJ2*01	37.33
IGLJ1*01	19.33	IGLJ1*01	18.97
IGLJ7*01	5.24	IGLJ7*01	5.43
IGLJ6*01	0.18	IGLJ6*01	0.35
IGLJ5*01	0.15	IGLJ5*01	0.32
IGLJ4*01	0.06	IGLJ4*01	0.20
IGLJ5*02	0.04	IGLJ5*02	0.03
IGLJ7*02	0.02	IGLJ7*02	0.01

Supplementary Table 5: The comparisons of the somatic hypermutation levels between the HH and IHB library

	Library		<i>p</i> , <i>OR(95%CI)</i> ^a
	HH (%)	IHB (%)	IHB vs. HH
IgK repertoire			
P (V_{Identity}≥90%)^b	87.59	86.92	<2.2E-16, 1.062(1.047,1.077)
P(mut in CDR1)^c	65.47	64.01	<2.2E-16, 1.066(1.056,1.076)
P(mut in CDR2)^d	29.77	29.32	<2.2E-16, 1.021(1.011,1.032)
IgL repertoire			
P (V_{Identity}≥90%)	69.15	74.62	<2.2E-16, 0.762(0.750,0.775)
P(mut in CDR1)	65.52	56.00	<2.2E-16, 1.493(1.472,1.515)
P(mut in CDR2)	56.79	52.63	<2.2E-16, 1.183(1.166,1.20)

a: Calculated by the logistic regression.

b: Frequency of the sequences with ≥90% V gene identity as the germline genes.

c: Frequency of the sequences with amino acid mutations in CDR1 regions.

d: Frequency of the sequences with amino acid mutations in CDR2 regions.

Supplementary Table 6: The comparisons of the occurrence of junctional modifications in IgK and IgL repertoires

Junctional modifications	Occurrence (%)				
	3VP	3VT	5JP	5JT	N
IgK repertoire					
HH	4.50	85.02	9.39	72.83	68.11
IHB	4.51	86.65	9.54	73.08	69.21
<i>p</i> ,	0.776,	<2.2E-16,	0.033,	0.017,	<2.2E-16,
OR(95%CI)^a	1.003	1.143	1.017	1.013	1.053
(HH vs. IHB)	(0.981,1.026)	(1.128,1.159)	(1.001,1.033)	(1.002,1.023)	(1.042,1.063)
IgL repertoire					
HH	2.53	89.40	10.41	67.90	71.07
IHB	3.04	88.36	10.37	69.03	70.73
<i>p</i> ,	<2.2E-16,	<2.2E-16,	0.719,	2.3E-11,	0.034,
OR(95%CI)^a	1.208	0.900	0.996	1.054	0.983
(HH vs. IHB)	(1.157,1.261)	(0.880,0.920)	(0.973,1.019)	(1.038,1.070)	(0.968,0.999)

a: Calculated by the logistic regression.