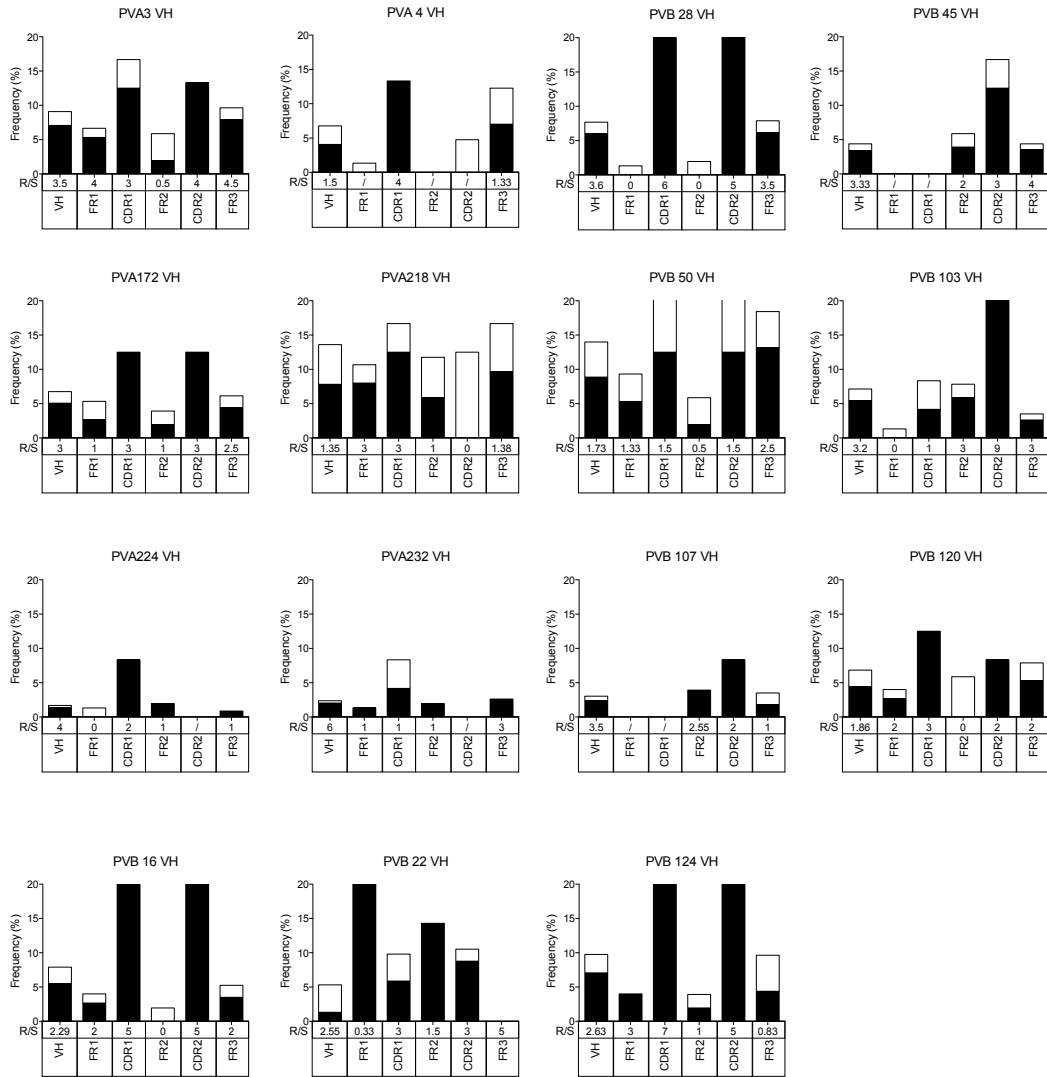
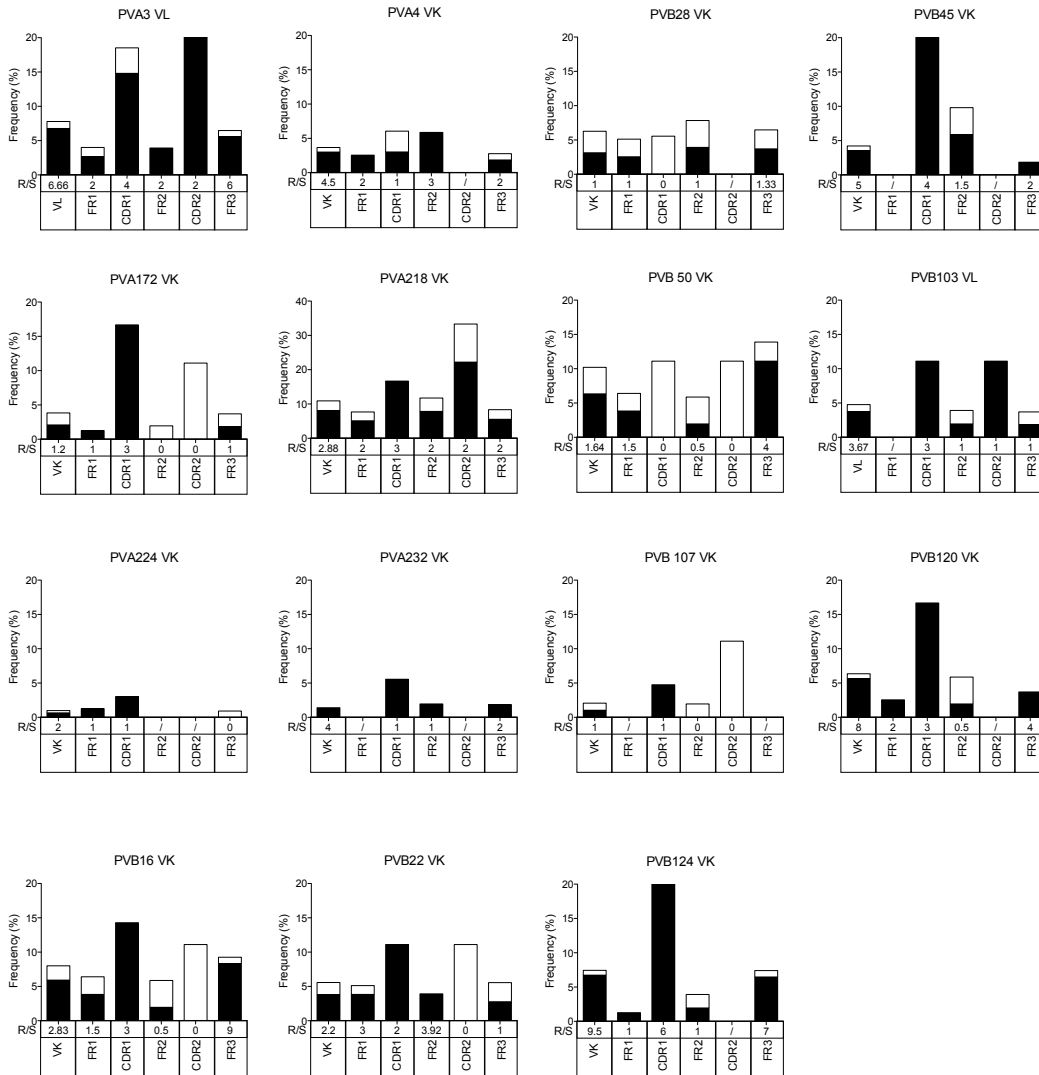


# Supplementary Figure 1A



# Supplementary Figure 1B

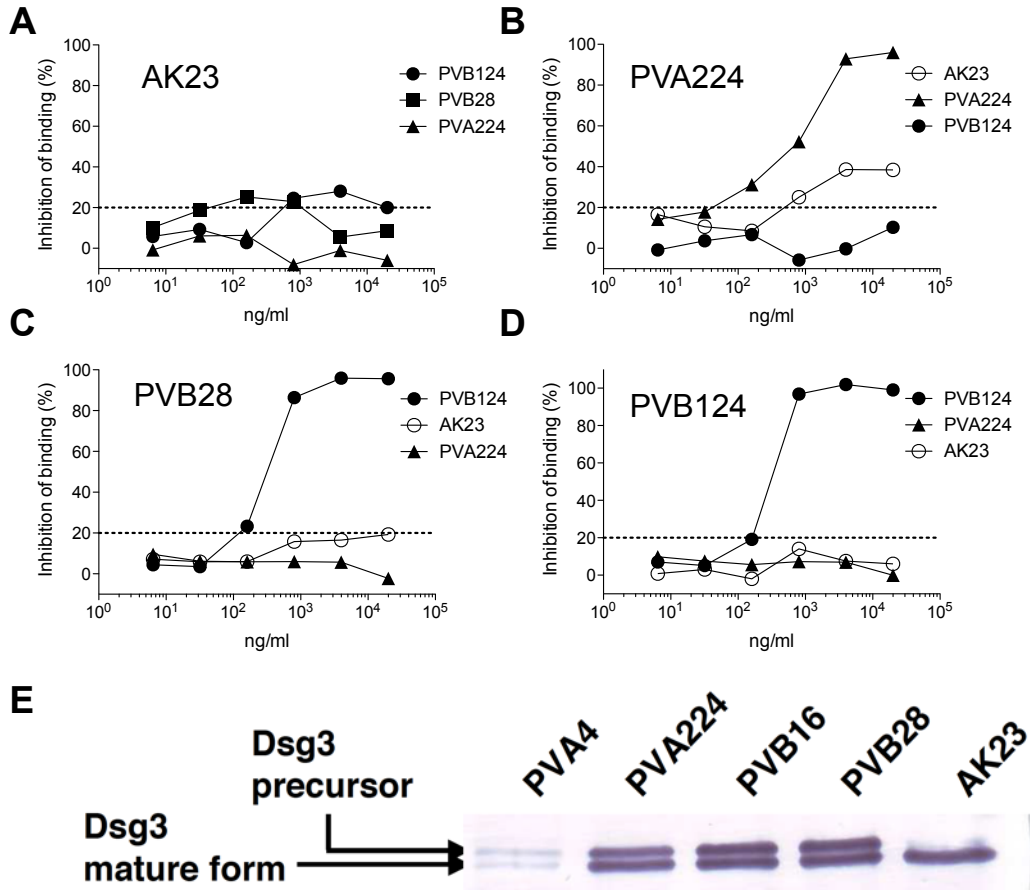


## Supplementary Figure 2

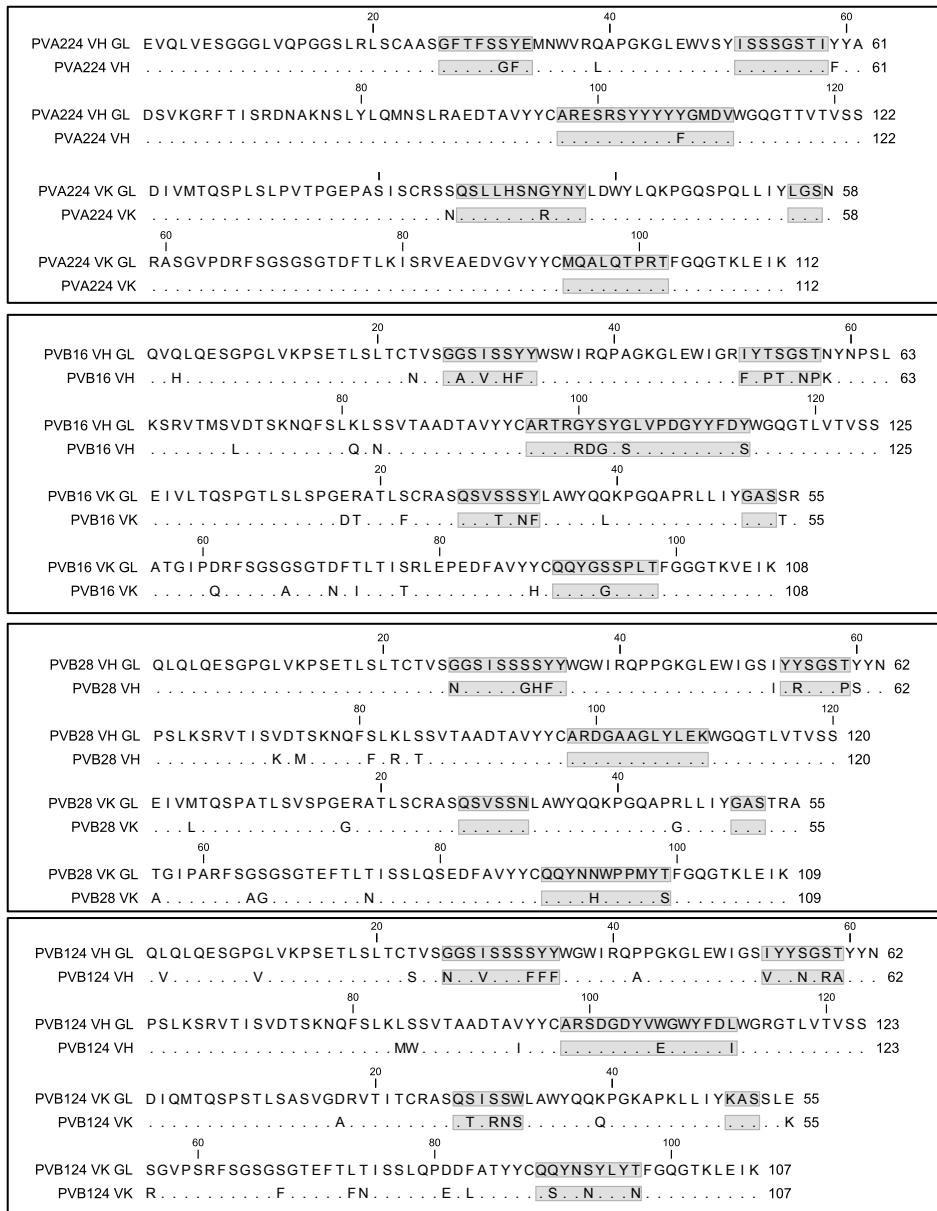
20  
!

AK23 - MOUSE - a r g - - - - - g y **d** g y - p - - - **W**GQ  
PV1 - VH3-7 - a - - s g - g - - - v v **d** f - - - - d h **W**GQ  
PV1 - VH1-46 - a r d - - - - - r q g f **d** l d - v - - - **W**GQ  
PF2 (F24-9) - VH3-53 - a r d - - - - - l g g f **d** f d - y - - - **W**GQ  
PV1 (Px4-3) - VH1-69 - a r g - - - - - g **d** y s g **w** y - n f d y **W**GQ  
PF1 (PF1-8-15) - VH3-30 - a r d - - - - r v **e** g y v **w** g g - t f d h **W**GQ  
PVA3 - VH3-15 - t - - - - - l p a g t y l m - s - - - **W**GQ  
PVA4 - VH2-5 - a h r g g r - - - - - q l v g a - w f d p **W**GQ  
PVA172 - VH3-7 - v r d y r - h i e g v p a a g t - f e - y **W**GQ  
PVA218 - VH5a - a r h g g - s a y s s s d a f - d - - f **W**GQ  
PVA224 - VH3-48 - a r e s r - s - - - - y y y y f - g m d v **W**GQ  
PVA232 - VH3-23 - a k t i f - g - - - - v v n s c - - m d v **W**GQ  
PVB16 - VH4-4 - a r t r r - d g y s l v p d g y - y f d s **W**GQ  
PVB22 - VH4-39 - a r - - - - a a y s s g w - s f - d - - f **W**GQ  
PVB28 - VH4-39 - a r d - - - - - g a a g l y l e - k - - - **W**GQ  
PVB45 - VH3-11 - t r d y t v e m a s s g v e a t - p q n y **W**GQ  
PVB50 - VH1-18 - a r g g - - - - r g g y d y p d - a f d l **W**GQ  
PVB103 - VH3-23 - a k w - - - - - - - v v i p y - y f d s **W**GR  
PVB107 - VH3-23 - a r g r k v l m l r g v s g l w v p m d v **W**GK  
PVB120 - VH1-2 - a t s - - - - - - - r d s g g - y y n y **W**GQ  
PVB124 - VH4-39 - a r s d g - d - - - - y v e g w - y f d i **W**GR

## Supplementary Figure 3



# Supplementary Figure 4

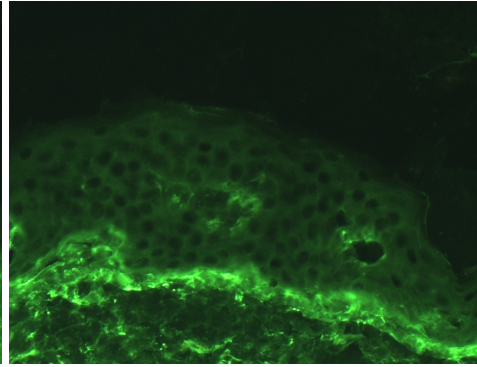
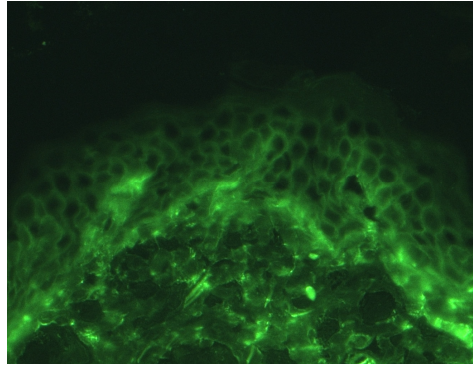


# Supplementary Figure 5

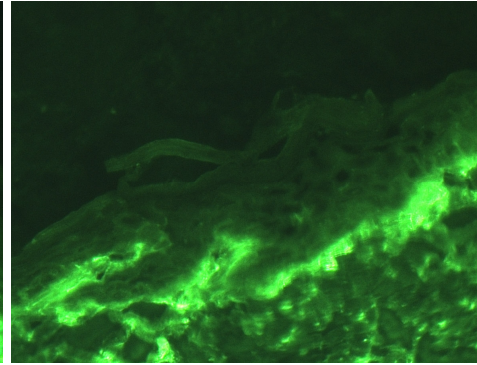
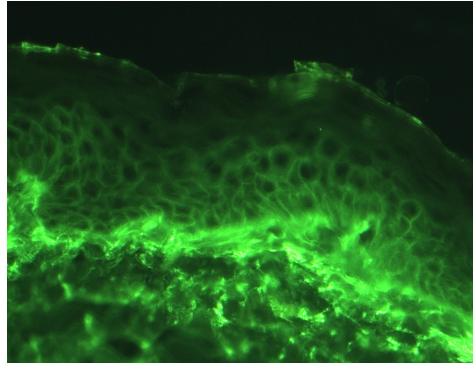
VH<sub>SM</sub>-VL<sub>SM</sub>

VH<sub>GL</sub>-VL<sub>GL</sub>

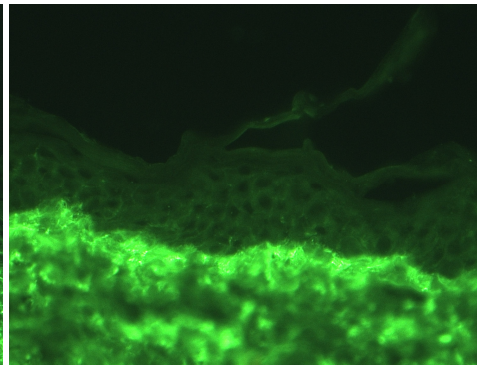
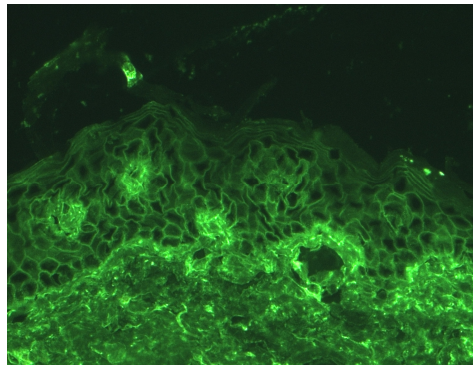
PVB28



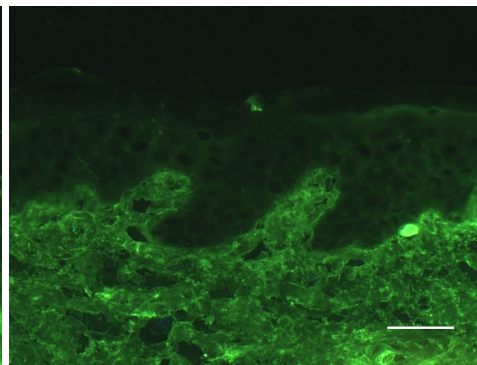
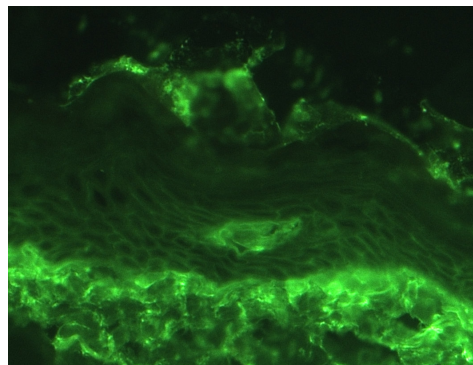
PVB16



PVB124



PVA224



**Supplementary Table 1.** Analysis of VH and VK/VL gene segments using Focused binomial and Global binomial tests for determining antigenic selection using the tool available at <http://clip.med.yale.edu/selection> and described in reference 18 (Uduman et al Nuclein. Acid. Res. 2011)

	Observed Mutations						Expected				Focused test		Global test	
	CDR			FWR			CDR		FWR		P value		P value	
	R	S	R/S	R	S	R/S	R	S	R	S	CDR	FWR	CDR	FWR
PVA3 VH	6	2	3	13	6	2.17	4.25	1.08	15.3	6.34	0.308	-0.297	0.177	-0.183
PVA4 VH*	4	1	4	8	7	1.14	2.99	0.86	11.8	4.34	-0.409	-0.0461	0.264	-0.0419
PVA172 VH	6	0	6	7	6	1.17	3.09	0.84	10.8	4.24	0.193	-0.136	0.0355	-0.0383
PVA218 VH*	3	4	0.75	16	17	0.94	6.57	1.74	23.7	8.02	-0.00279	-0.000113	-0.0638	-0.0068
PVA224 VH	2	0	2	2	1	2	0.96	0.2	2.77	1.07	0.202	-0.473	0.117	-0.244
PVA232 VH	1	1	1	5	0	5	1.19	0.33	3.87	1.61	0.365	0.193	-0.423	0.195
PVB16 VH	10	2	5	6	4	1.5	3.67	0.97	12.2	5.16	0.0194	-0.112	0.000149	-0.0039
PVB22 VH	9	2	4.5	14	7	2	6.27	1.49	16.8	7.46	0.224	-0.331	0.112	-0.162
PVB28 VH	10	2	5	7	4	1.75	4.51	1.07	12.1	5.36	0.0417	-0.195	0.00195	-0.0173
PVB45 VH	3	1	3	6	2	3	2.18	0.52	6.71	2.59	0.33	-0.457	0.269	-0.34
PVB50 VH*	5	5	1	18	13	1.38	7.13	1.72	23.7	8.49	-0.0294	-0.00475	-0.19	-0.037
PVB103 VH	9	3	3	5	4	1.25	3.58	0.98	11.6	4.83	0.068	-0.0331	0.000831	-0.00185
PVB107 VH	2	0	2	4	2	2	1.36	0.37	4.42	1.84	0.313	-0.5	0.275	-0.382
PVB120 VH	5	0	5	6	9	0.67	2.87	0.92	11.9	4.28	0.495	-0.00632	0.0873	-0.00347
PVB124 VH	12	1	12	8	8	1	5.68	1.35	15.2	6.76	0.0688	-0.0579	0.00156	-0.00367
PVA3 VL	6	1	6	9	3	3	2.54	0.52	11.9	4.06	0.054	-0.407	0.00984	-0.0863
PVA4 VL*	1	1	1	7	1	7	1.39	0.39	6.08	2.14	-0.47	0.318	-0.361	0.275
PVA172 VK	3	1	3	3	3	1	1.04	0.3	6.4	2.25	0.21	-0.0468	0.0215	-0.0125
PVA218 VK	5	1	5	12	9	1.33	2.51	0.69	17.6	6.24	0.277	-0.0369	0.0494	-0.0124
PVA224 VK	1	0	1	1	1	1	0.42	0.12	1.82	0.64	0.333	-0.261	0.165	-0.165
PVA232 VK	1	0	1	3	0	3	0.4	0.12	2.6	0.88	0.0562	0.141	0.157	0.338
PVB16 VK*	3	1	3	12	6	2	2.63	0.76	13.6	5.01	-0.465	-0.249	0.403	-0.24
PVB22 VK	2	1	2	8	4	2	1.49	0.44	9.76	3.32	0.496	-0.195	0.329	-0.17
PVB28 VK*	0	1	0	7	8	0.88	1.59	0.47	10.4	3.54	-0.0294	-0.00549	-0.0921	-0.0369
PVB45 VK	4	0	4	5	2	2.5	1.2	0.3	7.01	2.5	0.0248	-0.499	0.00331	-0.104
PVB50 VK*	0	3	0	13	10	1.3	2.42	0.66	16.9	6.01	-0.015	-0.00698	-0.0513	-0.0538
PVB103 VL	4	0	4	3	3	1	1.34	0.27	6.25	2.14	0.118	-0.113	0.00667	-0.0168
PVB107 VK§	1	1	1	0	1	0	0.36	0.1	1.86	0.68	0.47	-0.0149	0.126	-0.0137
PVB120 VK	3	0	3	7	2	3.5	1.25	0.36	7.68	2.71	0.0633	0.338	0.0495	-0.341
PVB124 VK	5	1	5	9	2	4.5	1.92	0.43	10.8	3.88	0.0259	0.392	0.009	-0.186

The colors indicate the direction of selection:

Red indicates positive and green indicates negative selection

Dark colors indicate statistical significance (based on alpha cut-off value of 0.05), lighter colors indicate a trend of selection.

\*, negative selection in CDR according to the Focused test; §, 6 nucleotides insertion in LCDR1