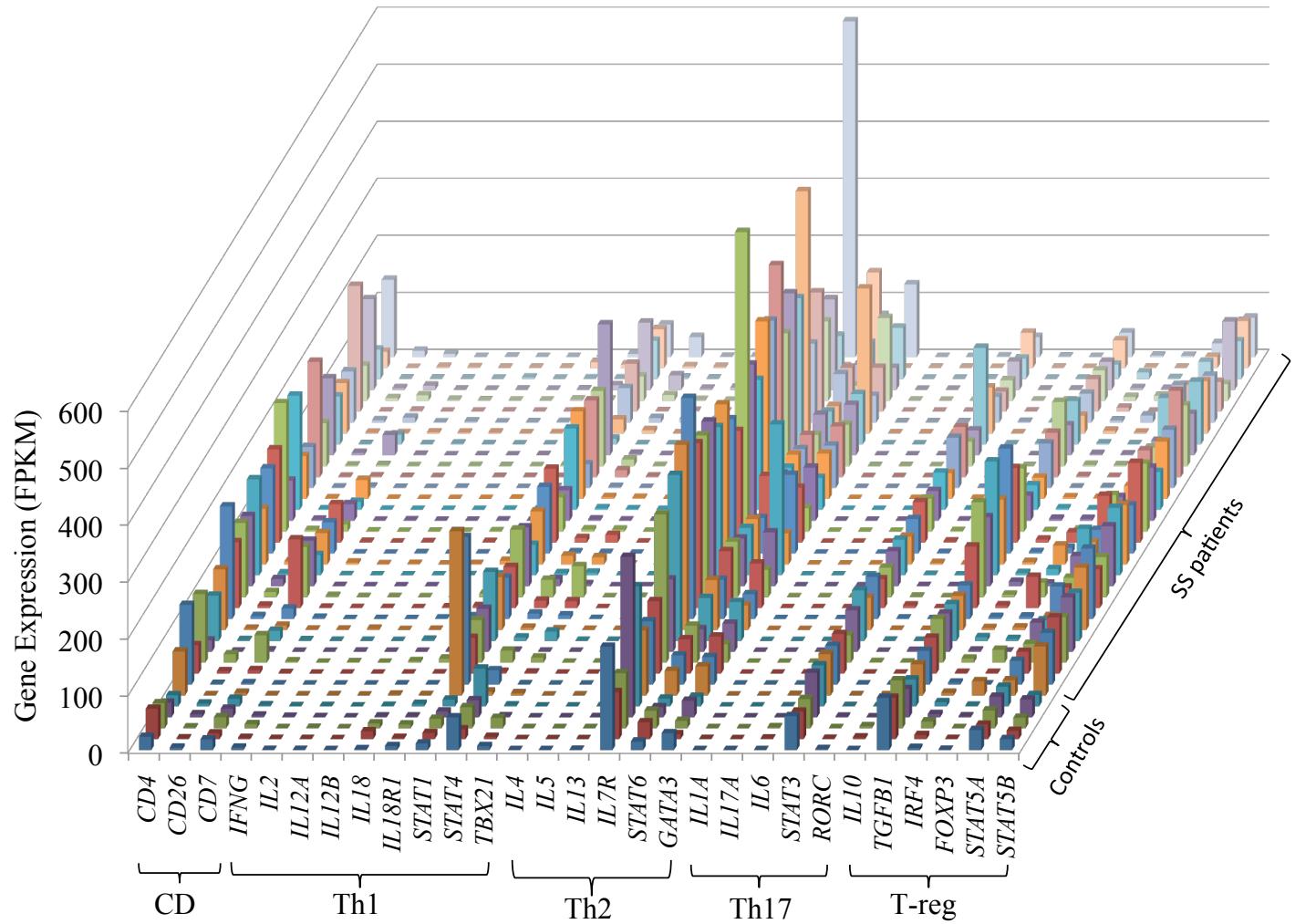
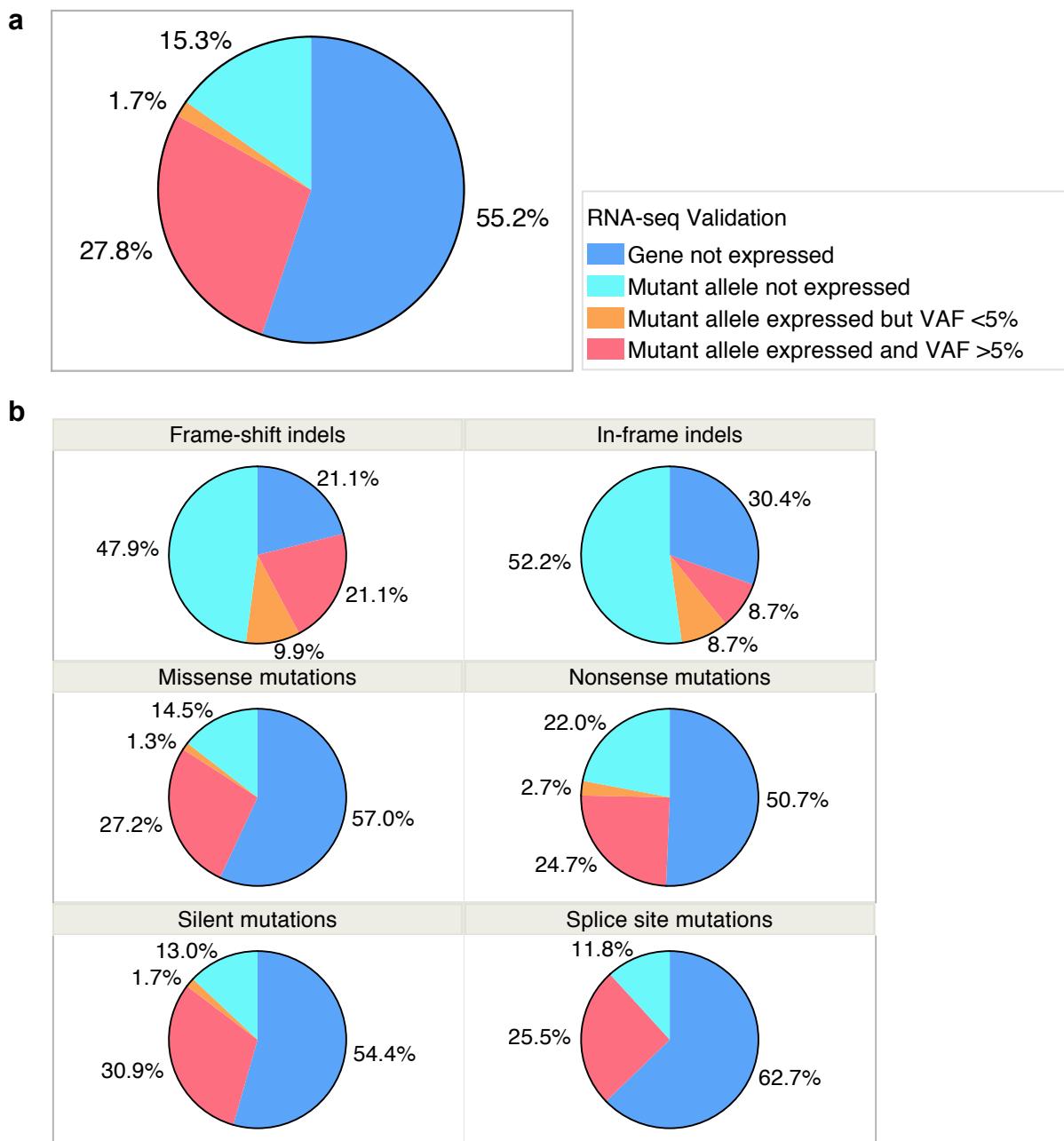


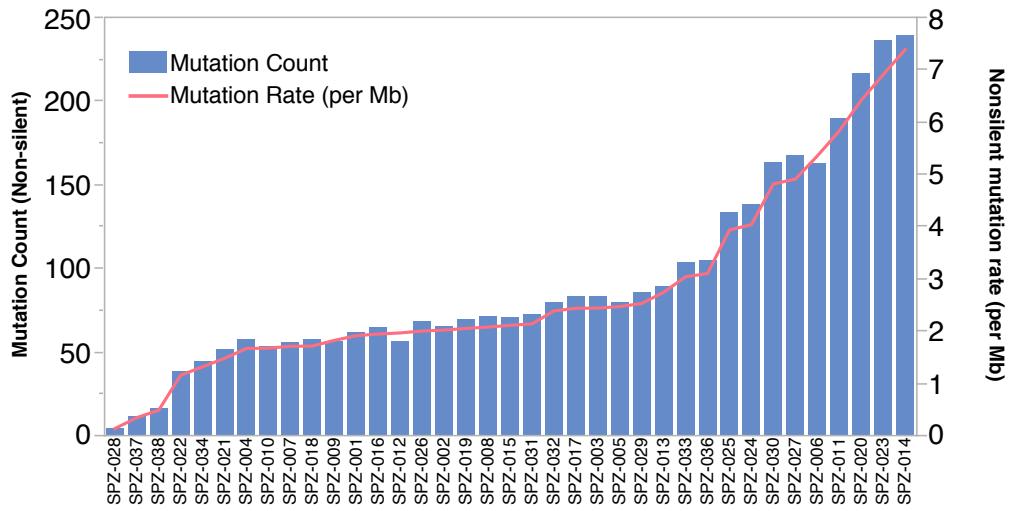
**Supplementary Figure 1**



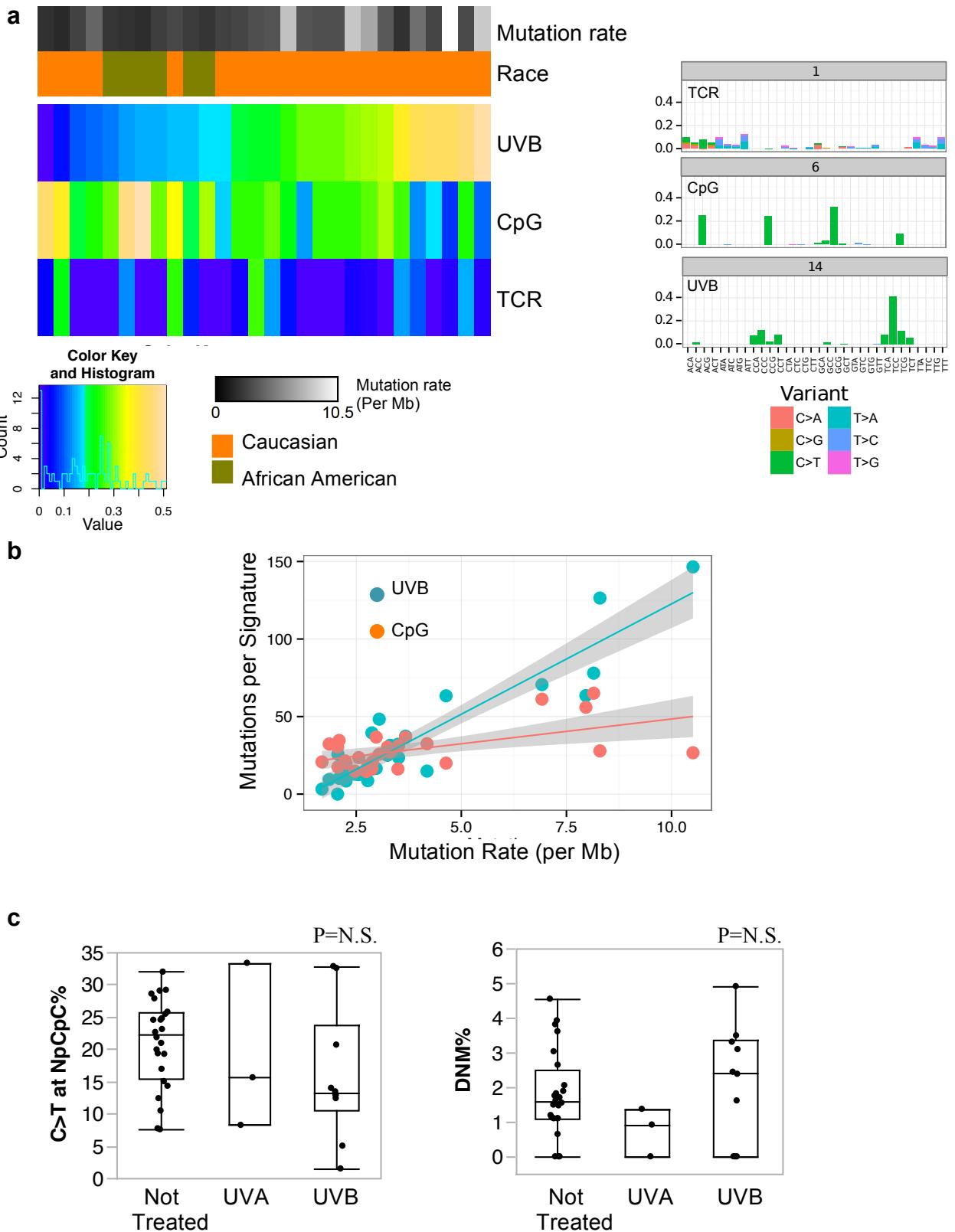
## Supplementary Figure 2



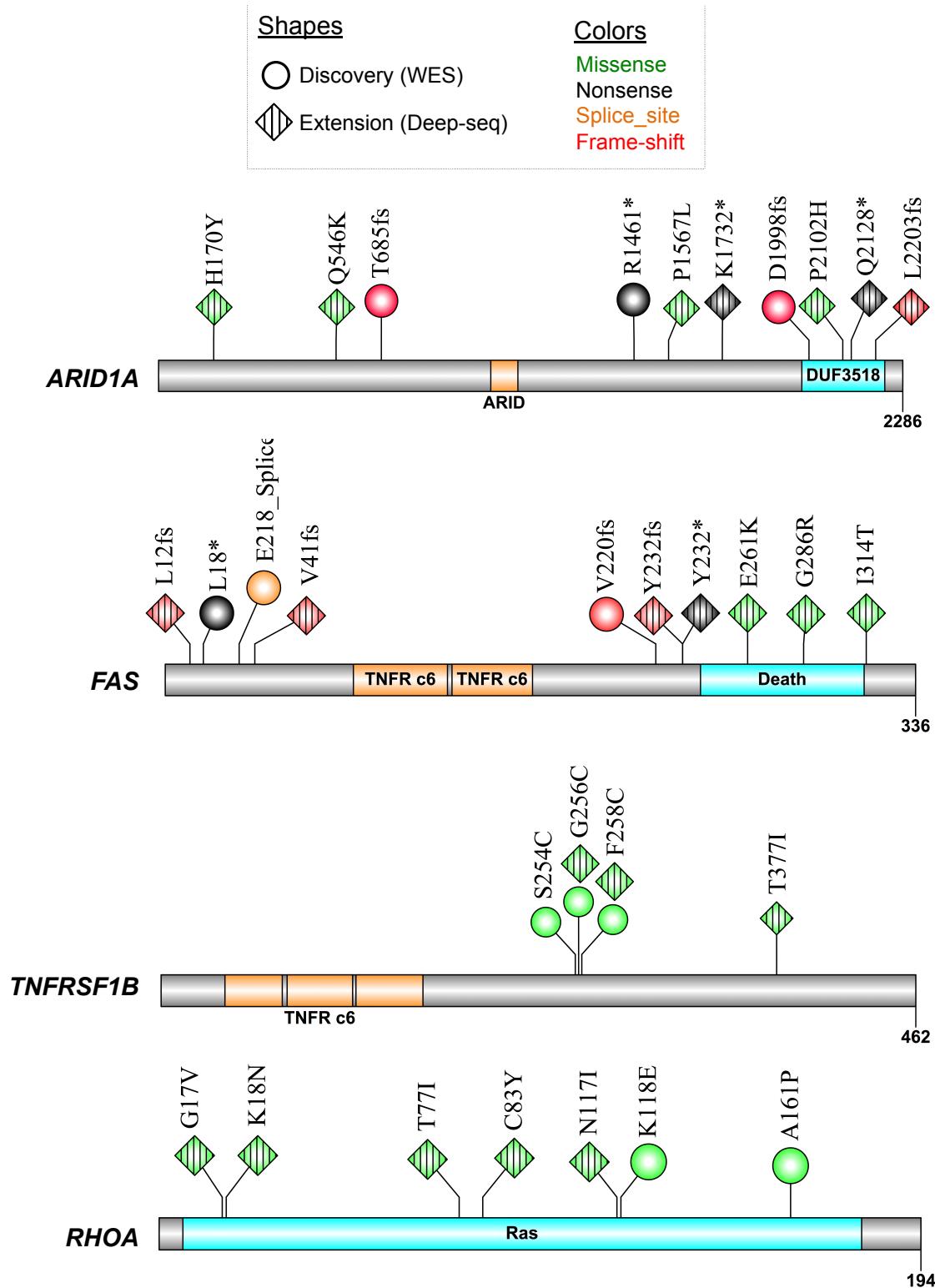
**Supplementary Figure 3**



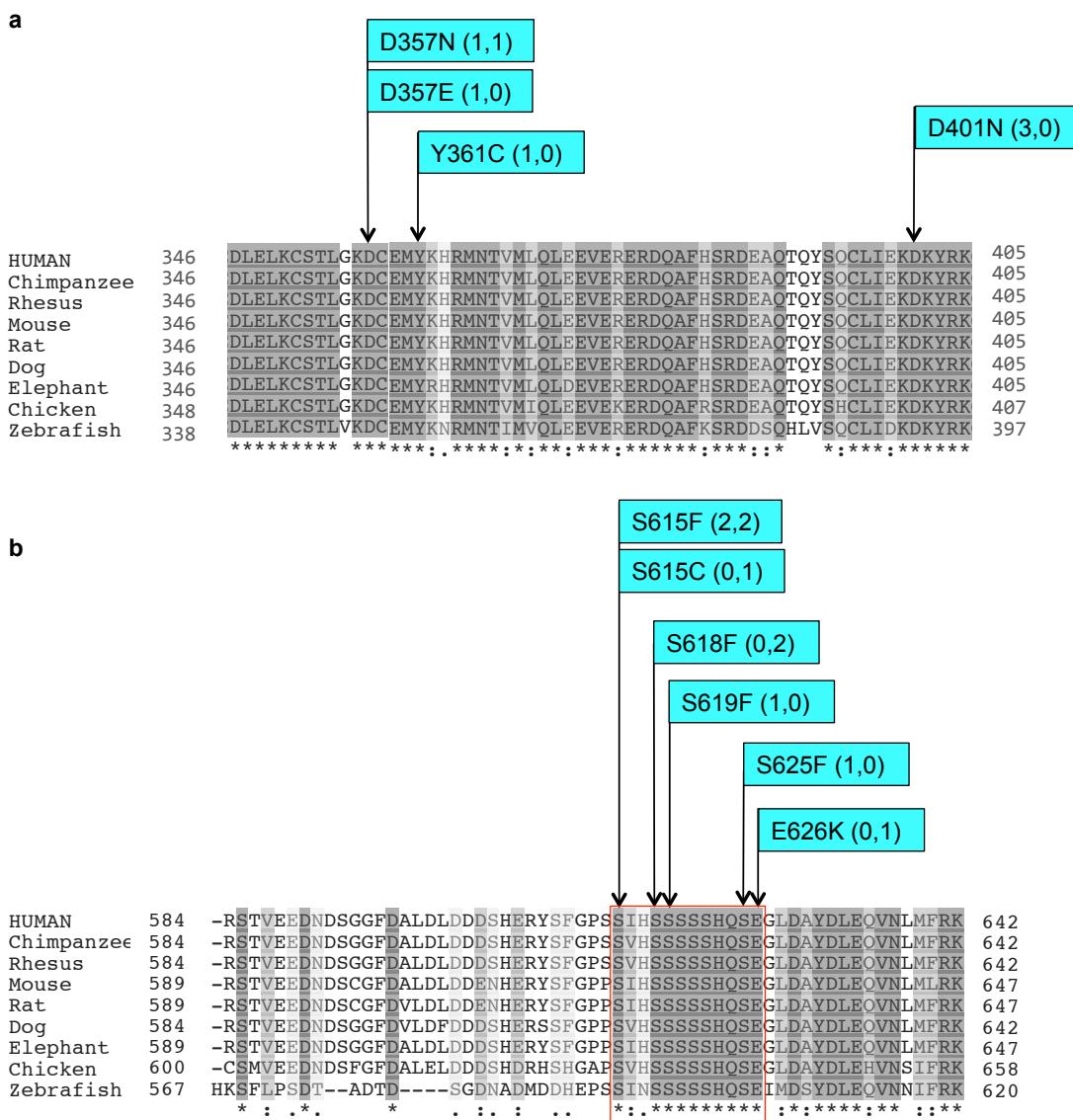
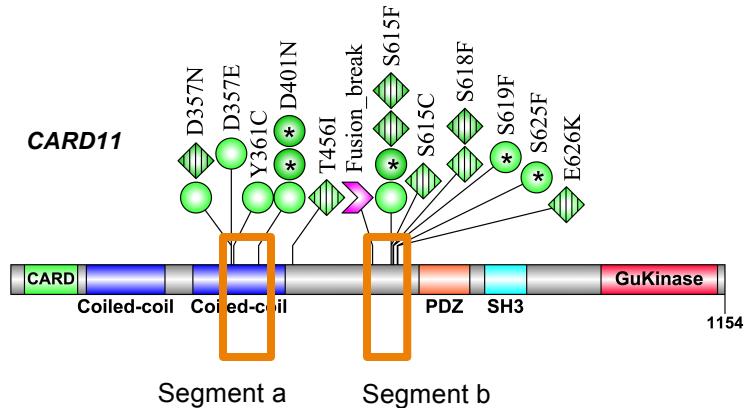
## Supplementary Figure 4



**Supplementary Figure 5**



## Supplementary Figure 6



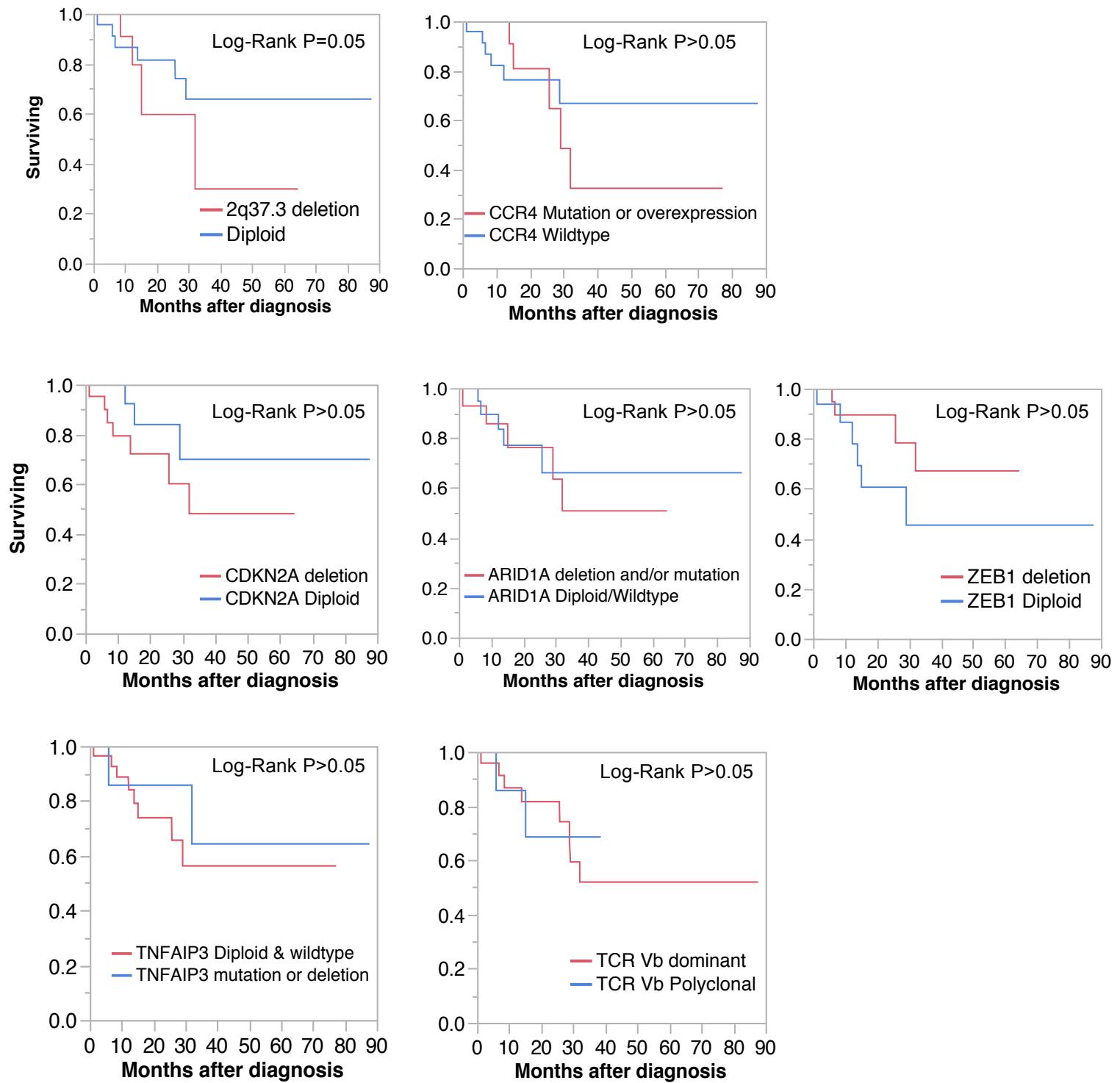
## Supplementary Figure 7

### SS origin

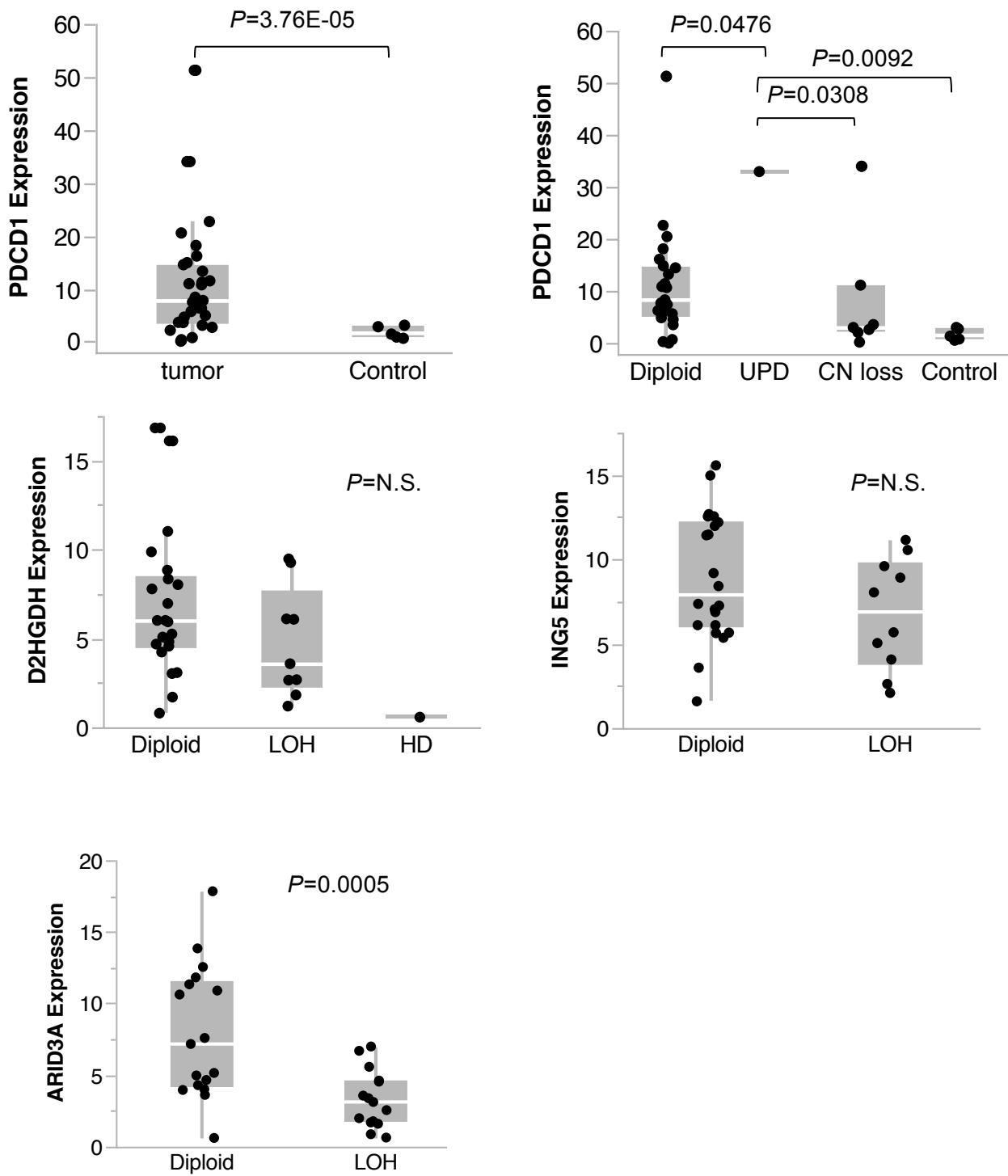
 Evolved from MF  
 De novo

	SPZ-022	SPZ-024	2007-046	2015-044	2006-049	2006-018	2004-127	2006-166	2009-136	2009-068	2006-063	2006-187	2006-193	2006-150	2005-158	SPZ-009	SPZ-018	SPZ-029	2006-054
SS origin	Evolved from MF	De novo	De novo	De novo	Evolved from MF	De novo	De novo	Evolved from MF	Evolved from MF	De novo	De novo	De novo	De novo	De novo	Evolved from MF				
R48W	0.33	0.16	0.15	0.14	0.11	0.10	0.02	0.03											
S345F									0.01	0.15	0.10	0.12	0.04						
S520F												0.18							
P319L												0.47							
472-483del												0.12							
G869R												0.03							
R873W												0.05							
E989K												0.45							
Q1016L										0.02									
L1035V																0.47			
E1163K						0.04													
D1165H																	0.02		

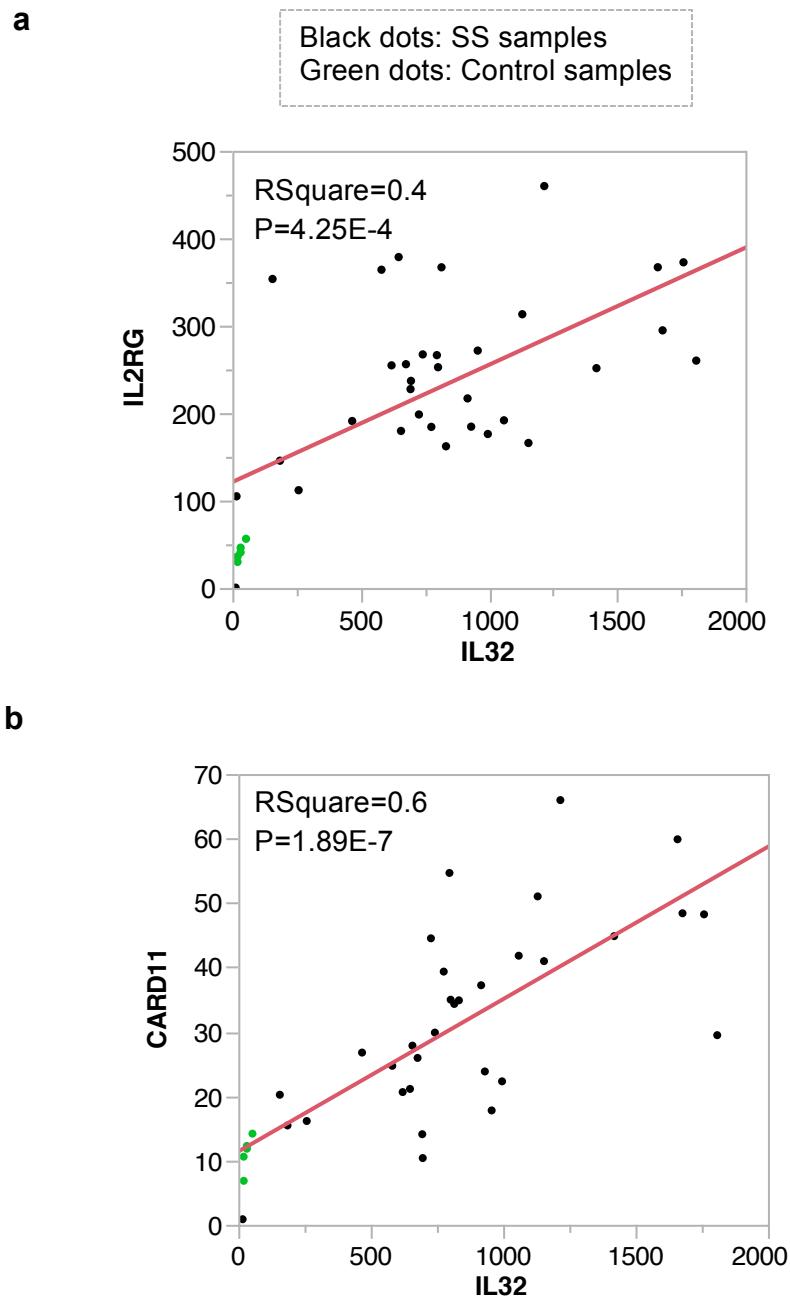
**Supplementary Figure 8**



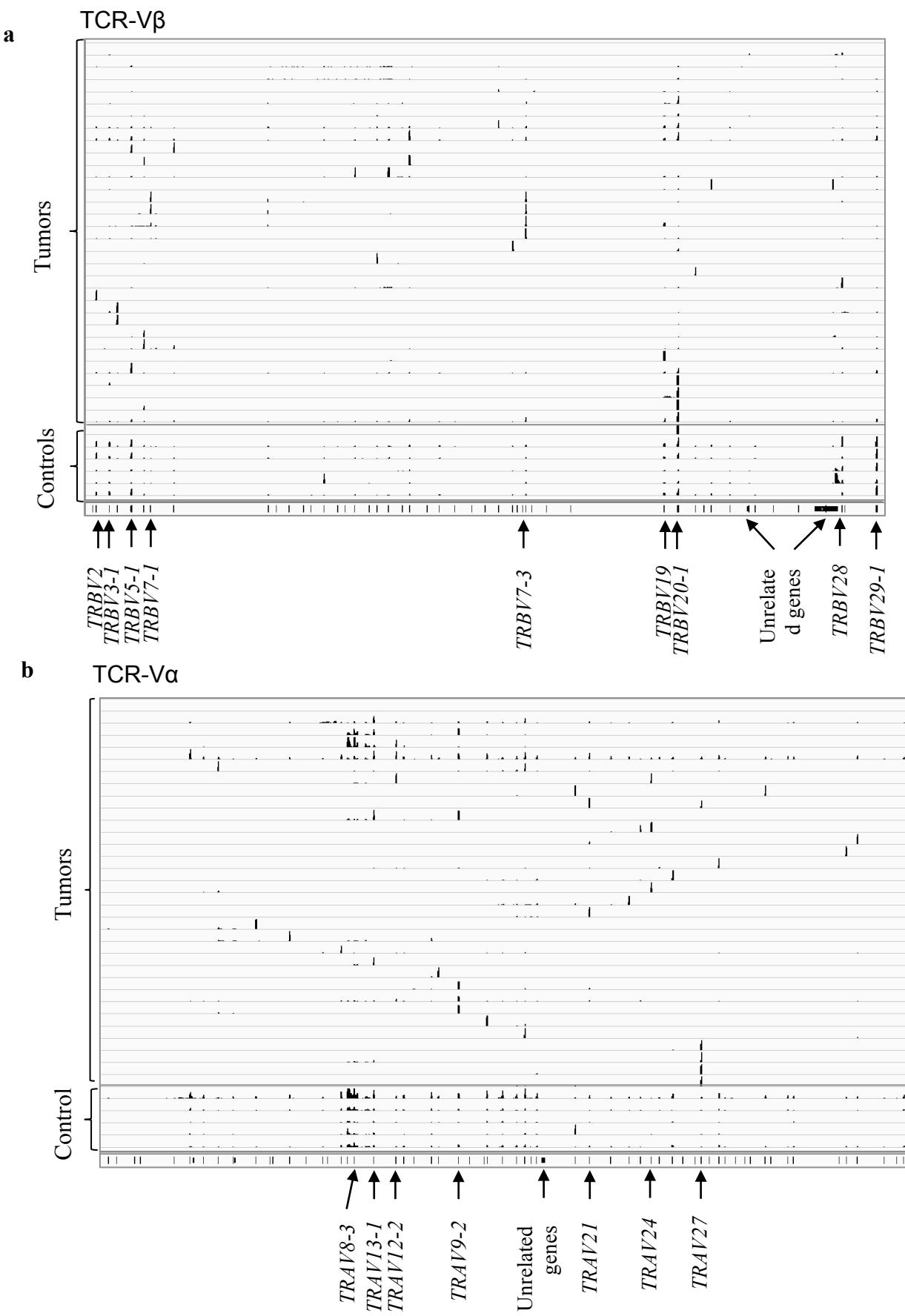
**Supplementary Figure 9**



## Supplementary Figure 10



**Supplementary Figure 11**



**Supplementary Figure 12**

