

# SUPPLEMENTARY FIGURES

**Tandem Substitutions in Somatic Hypermutation.** *Julieta Haydeé Sepúlveda-Yáñez, Diego Alvarez-Saravia, Bas Pilzecker, Pauline A van Schouwenburg, Mirjam van der Burg, Hendrik Veelken, Marcelo A Navarrete, Heinz Jacobs and Marvyn T. Koning.*

For each allele/group, the following figures are provided:

## **Distribution of tandems by simulation**

Histogram of false tandem substitutions produced in every simulation, where each bar represents the number of simulations within a certain range. The vertical line shows the tandem substitutions found in the sequenced V(D)J rearrangements.

## **Mutation probabilities by position**

Relative frequency of mutated sequences by position (*mutated sequences / all sequences in the allele dataset*). This was used as probability distribution for the simulations. For the groups, the values represent the average of all the allele datasets of the group.

## **Distribution of mutations by sequence**

Histogram of the number of nucleotides mutated in each sequence. These values were replicated in the simulations.

## **Distribution of mutation clusters by size**

Distribution of adjacent nucleotide substitutions found in both the real and the simulated data, classified by size.

## **Tandem distribution from real data**

Heatmap of tandem substitutions found in the sequenced data.

## **Tandem distribution from simulated data**

Heatmap of false tandem substitutions produced in the simulations.

## **Tandem distribution with stop codons from simulated data**

Heatmap of false tandem substitutions in the simulations where a stop codon was introduced.

## **Distribution of mutation clusters with stop codons**

Distribution of adjacent nucleotide substitutions found in the simulated data classified by size, indicating also the ones that produced stop codons.

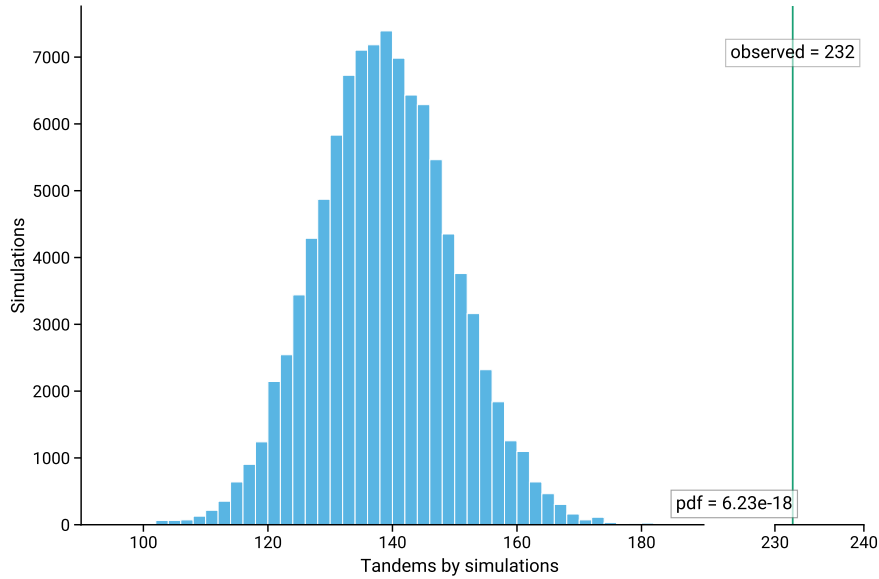
## **Percentage of false tandems**

Percentage of false tandems calculated as *simulation tandem substitutions / real tandem substitutions*. A hard cap of 100% was introduced for the cases where the simulation value was higher.

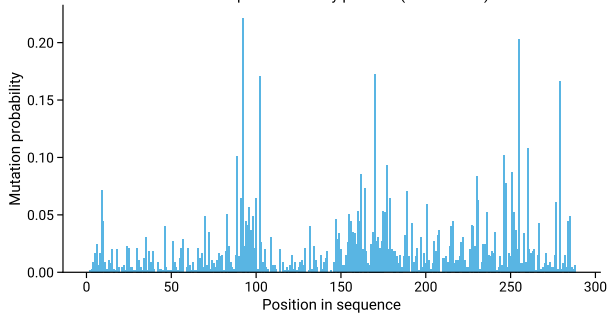
# LEIDEN HEALTHY DONOR COHORT (> 95% IGV IDENTITY)

## 1.1 IGHV1-2\*02

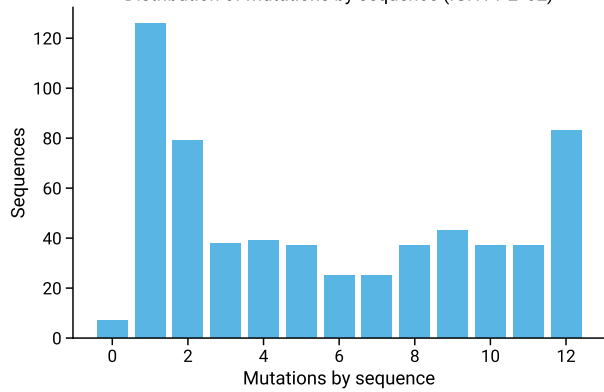
Distribution of tandems by simulation (IGHV1-2\*02)



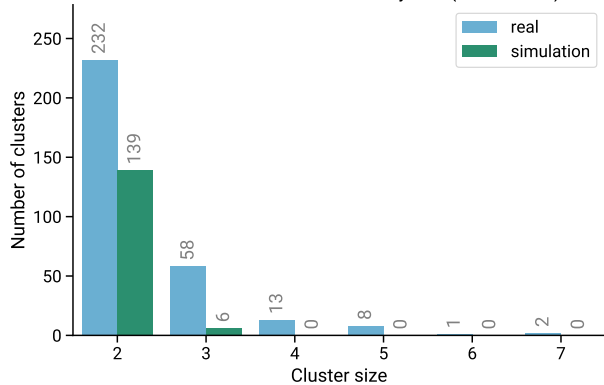
Mutation probabilities by position (IGHV1-2\*02)



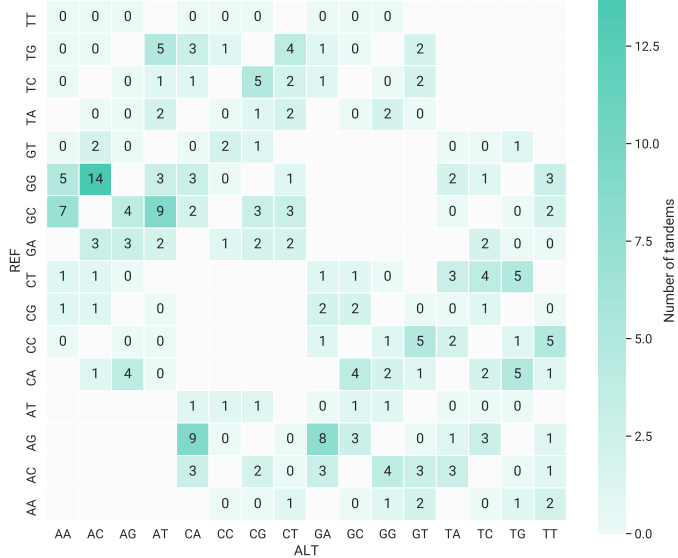
Distribution of mutations by sequence (IGHV1-2\*02)



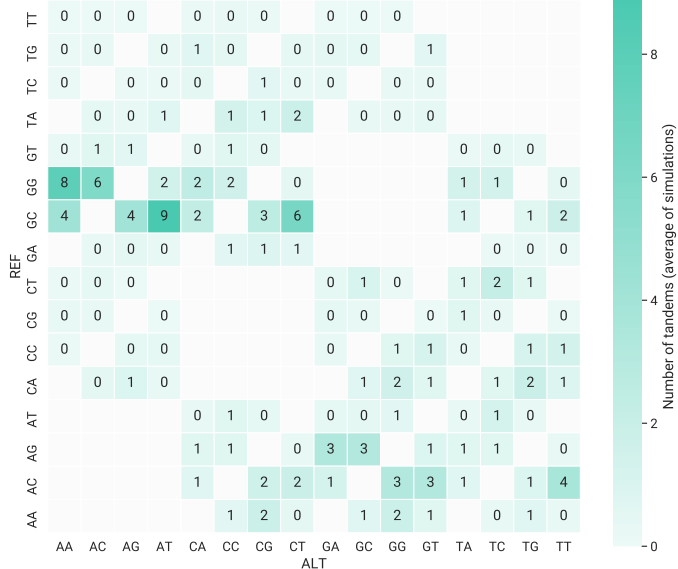
Distribution of mutation clusters by size (IGHV1-2\*02)

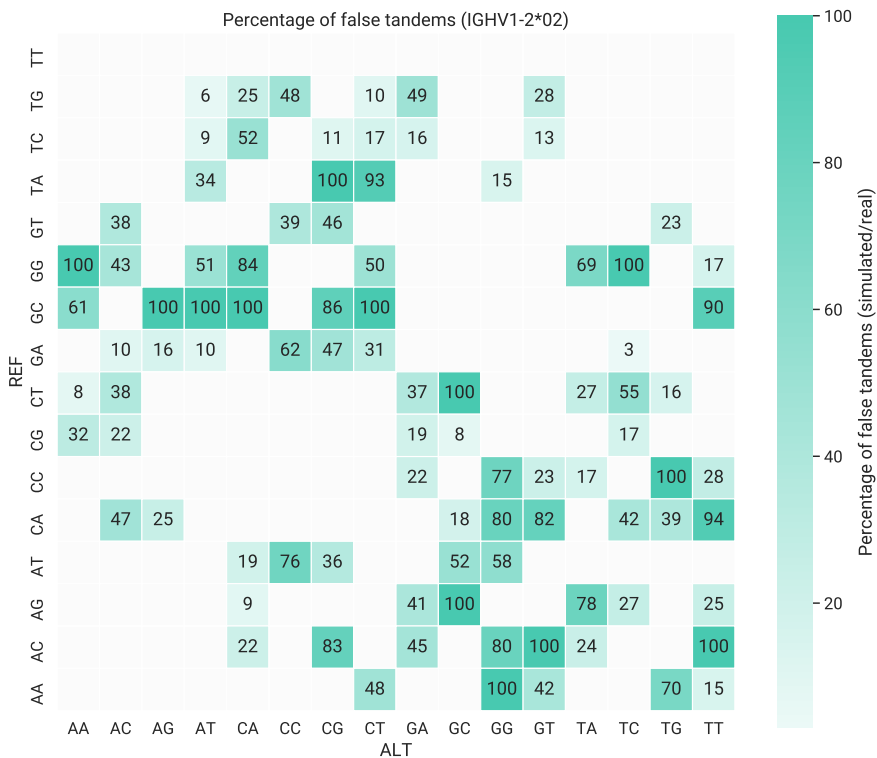
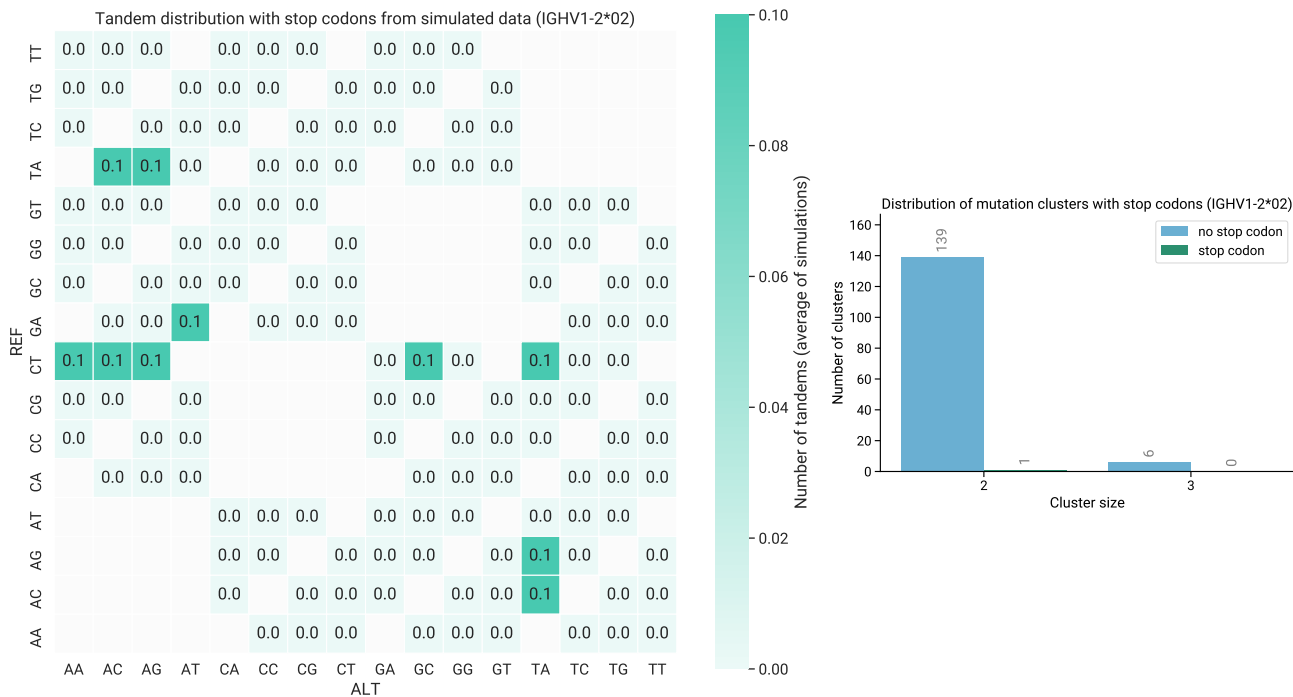


Tandem distribution from real data (IGHV1-2\*02)



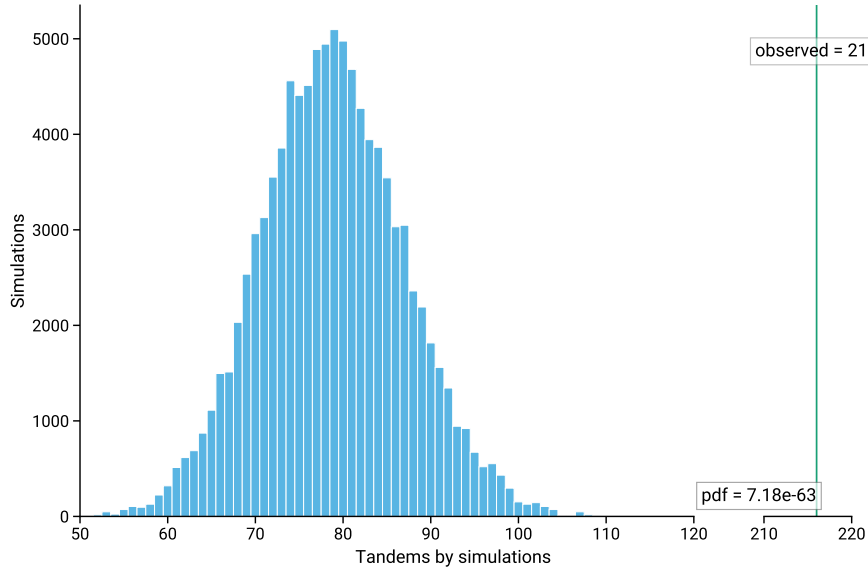
Tandem distribution from simulated data (IGHV1-2\*02)



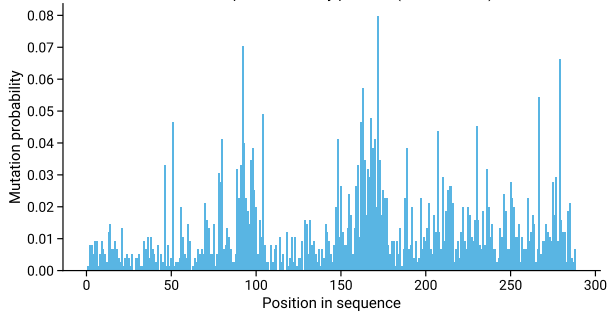


## 1.2 IGHV1-69\*01

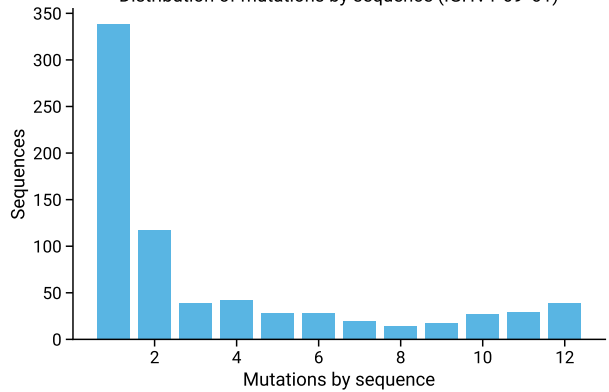
Distribution of tandems by simulation (IGHV1-69\*01)



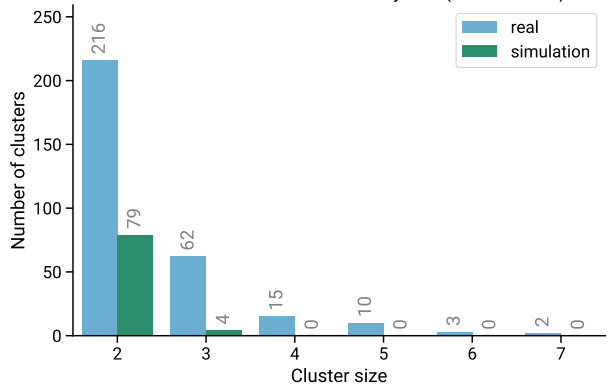
Mutation probabilities by position (IGHV1-69\*01)



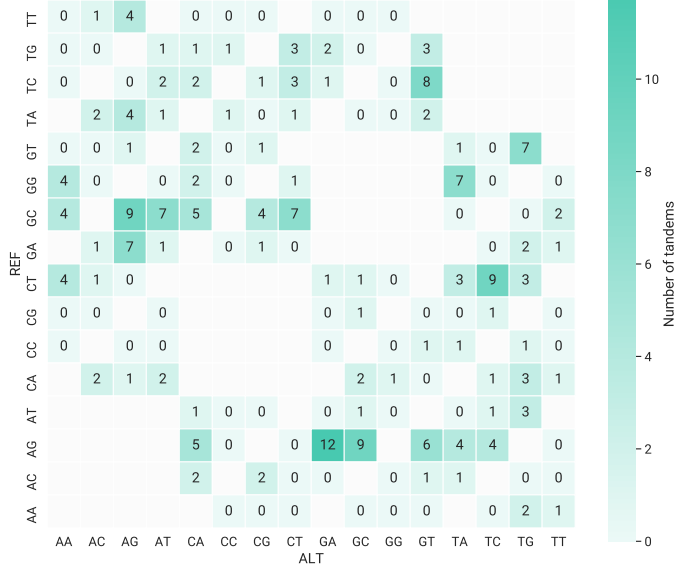
Distribution of mutations by sequence (IGHV1-69\*01)



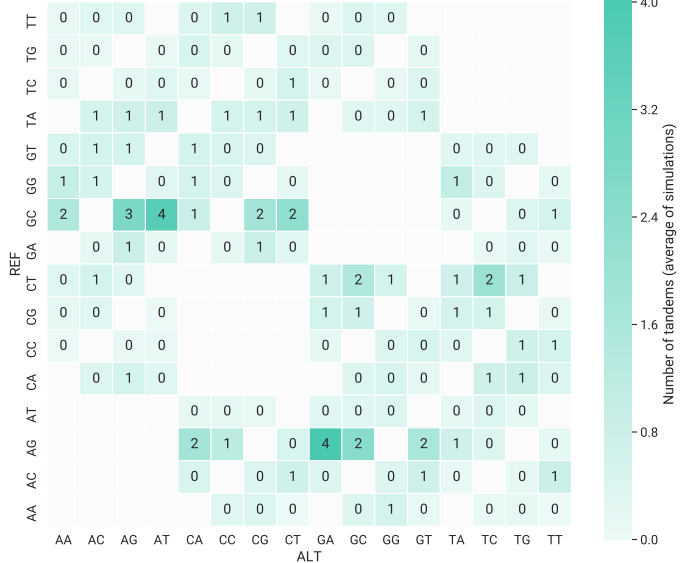
Distribution of mutation clusters by size (IGHV1-69\*01)

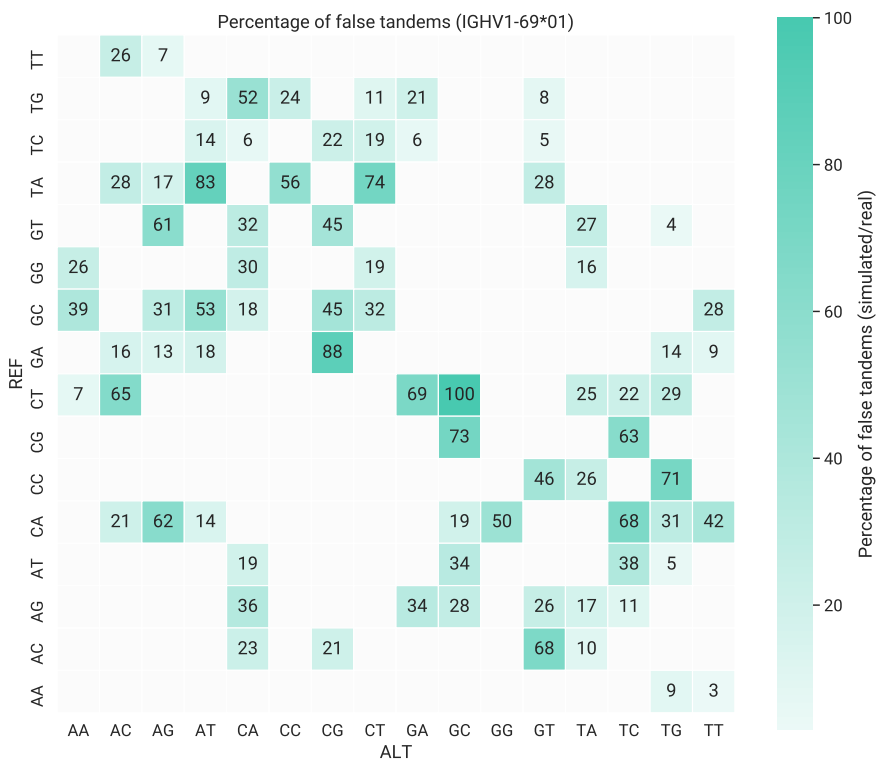
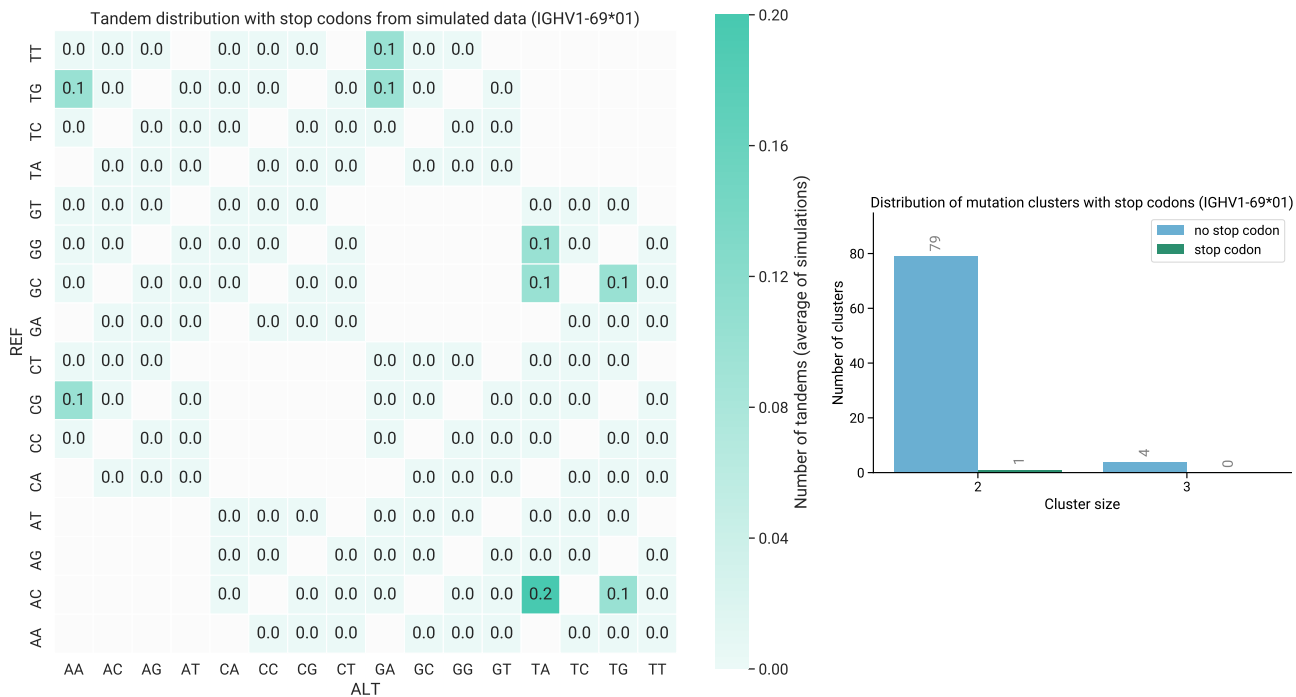


Tandem distribution from real data (IGHV1-69\*01)



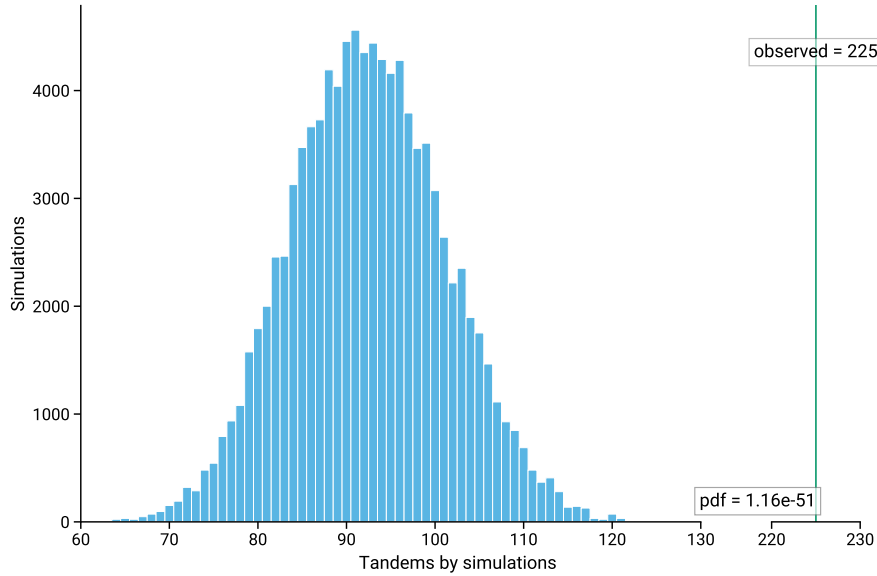
Tandem distribution from simulated data (IGHV1-69\*01)



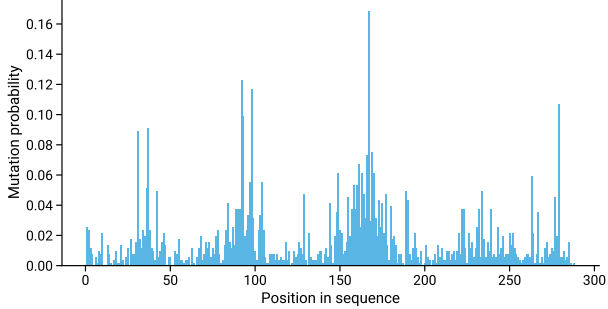


### 1.3 IGHV3-21\*01

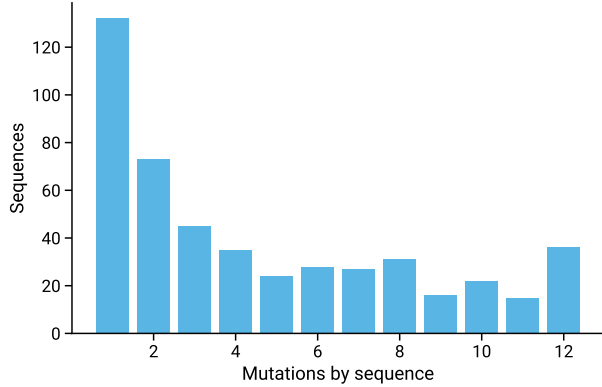
Distribution of tandems by simulation (IGHV3-21\*01)



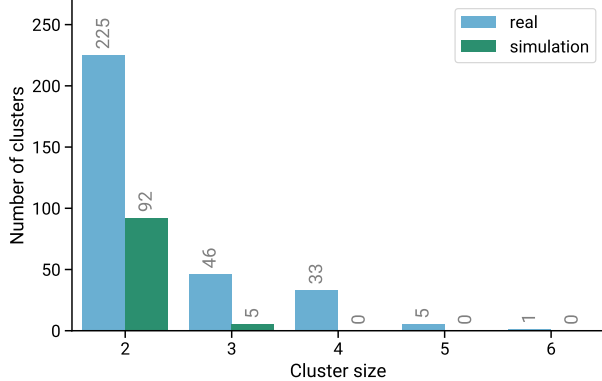
Mutation probabilities by position (IGHV3-21\*01)



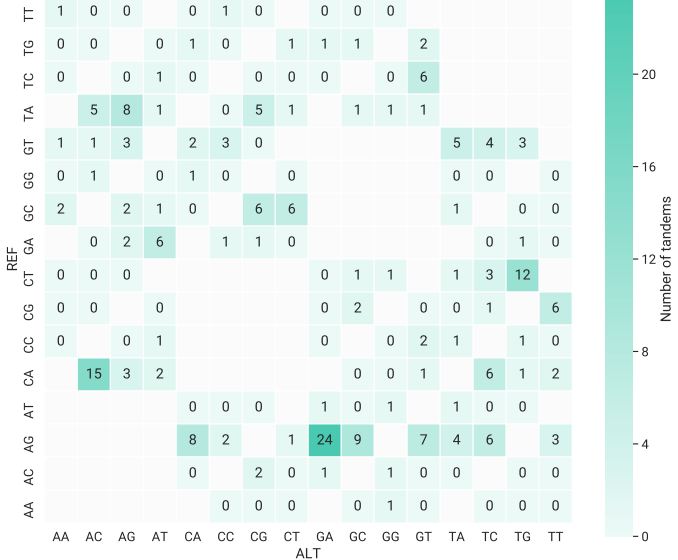
Distribution of mutations by sequence (IGHV3-21\*01)



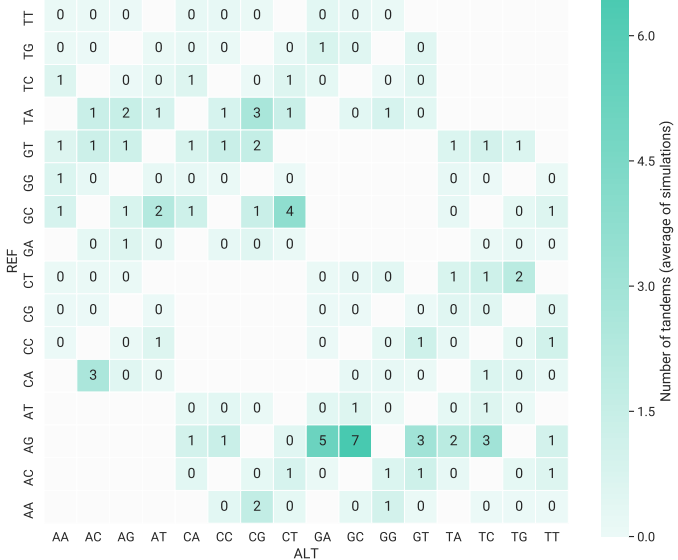
Distribution of mutation clusters by size (IGHV3-21\*01)

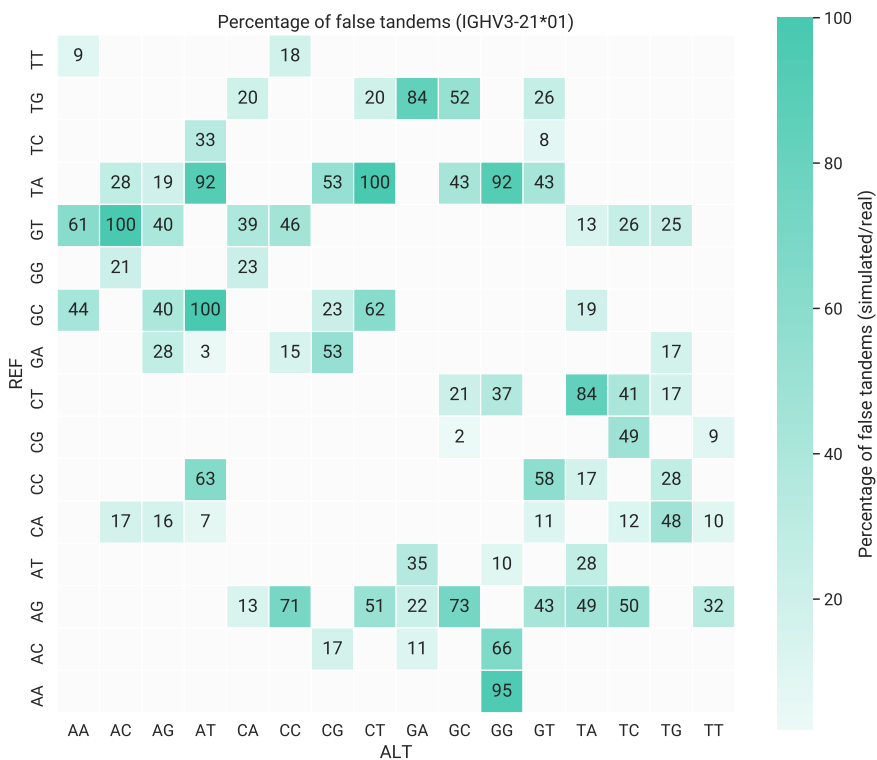
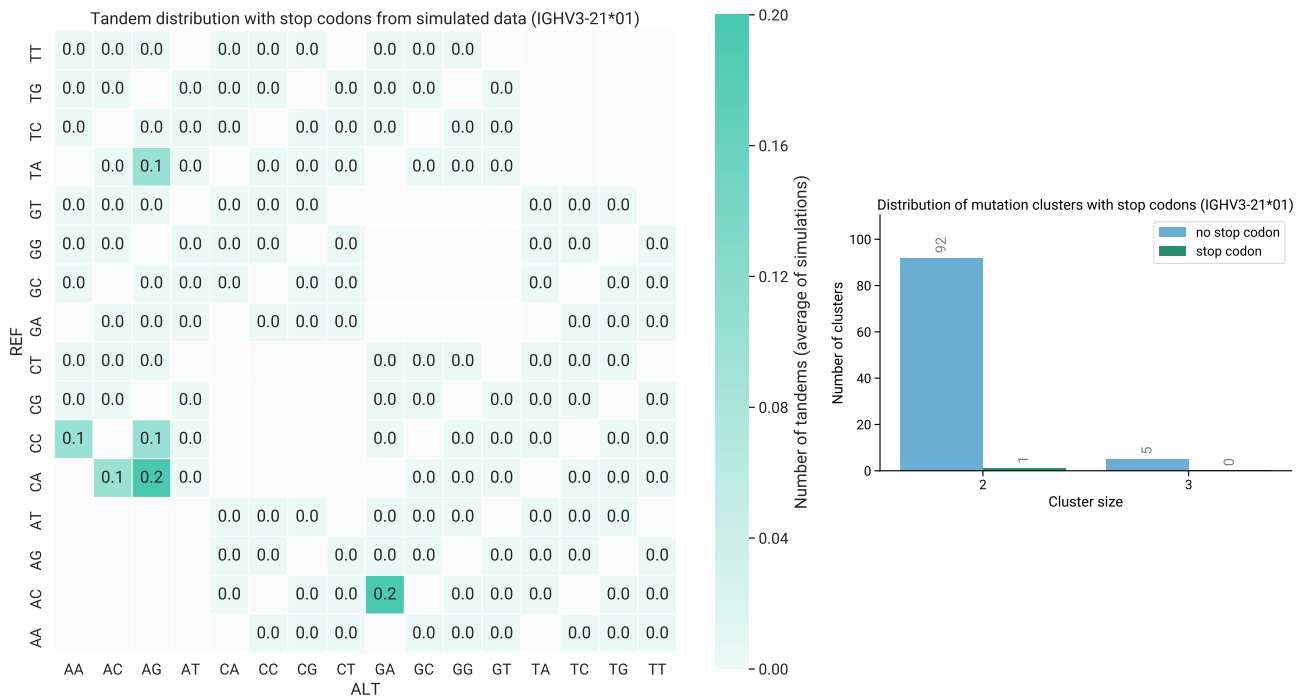


Tandem distribution from real data (IGHV3-21\*01)



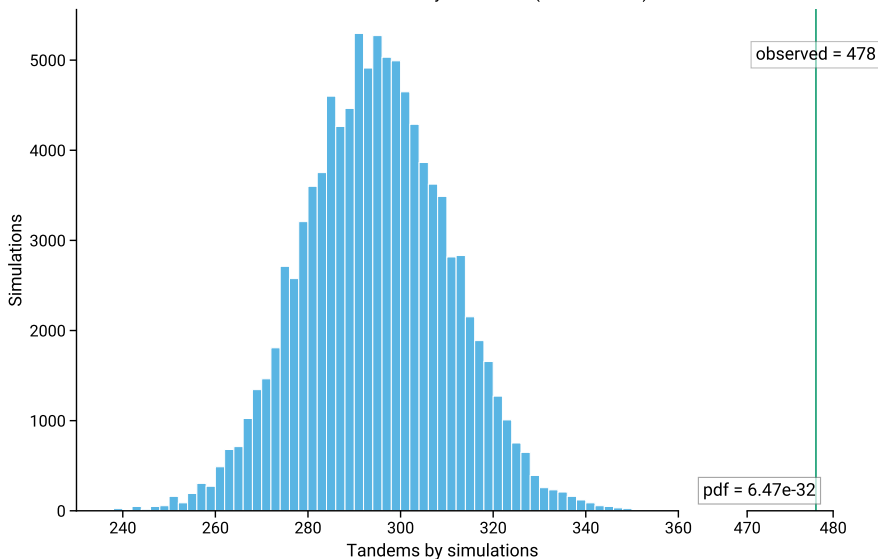
Tandem distribution from simulated data (IGHV3-21\*01)



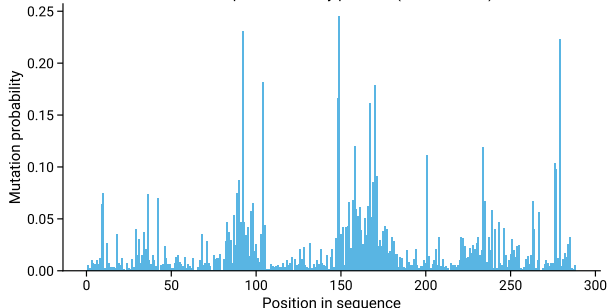


# 1.4 IGHV3-23\*01

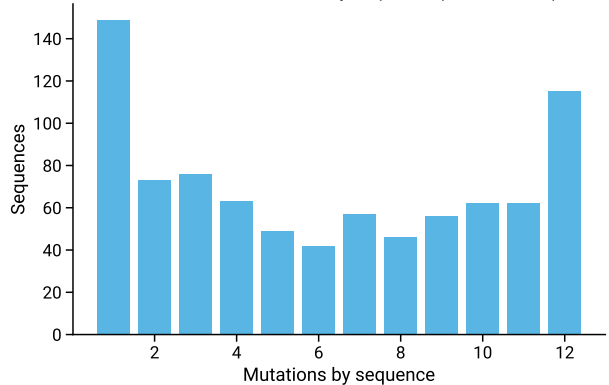
Distribution of tandems by simulation (IGHV3-23\*01)



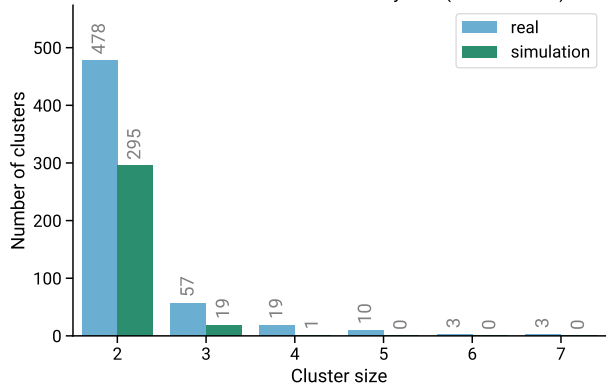
Mutation probabilities by position (IGHV3-23\*01)



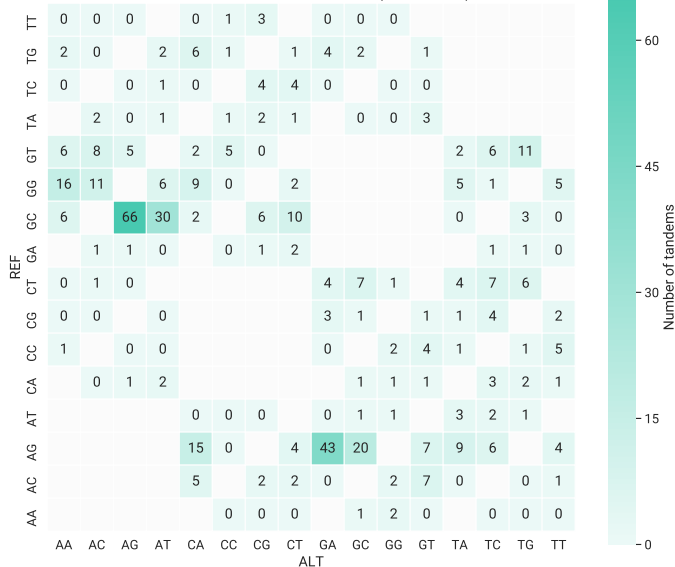
Distribution of mutations by sequence (IGHV3-23\*01)



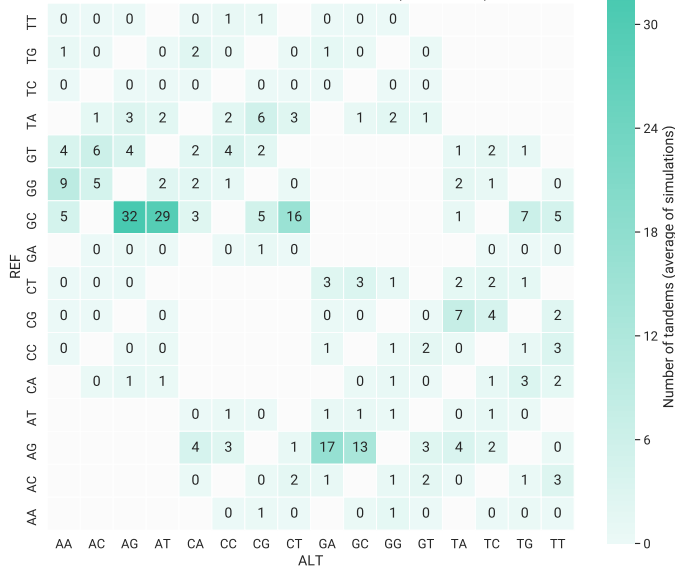
Distribution of mutation clusters by size (IGHV3-23\*01)



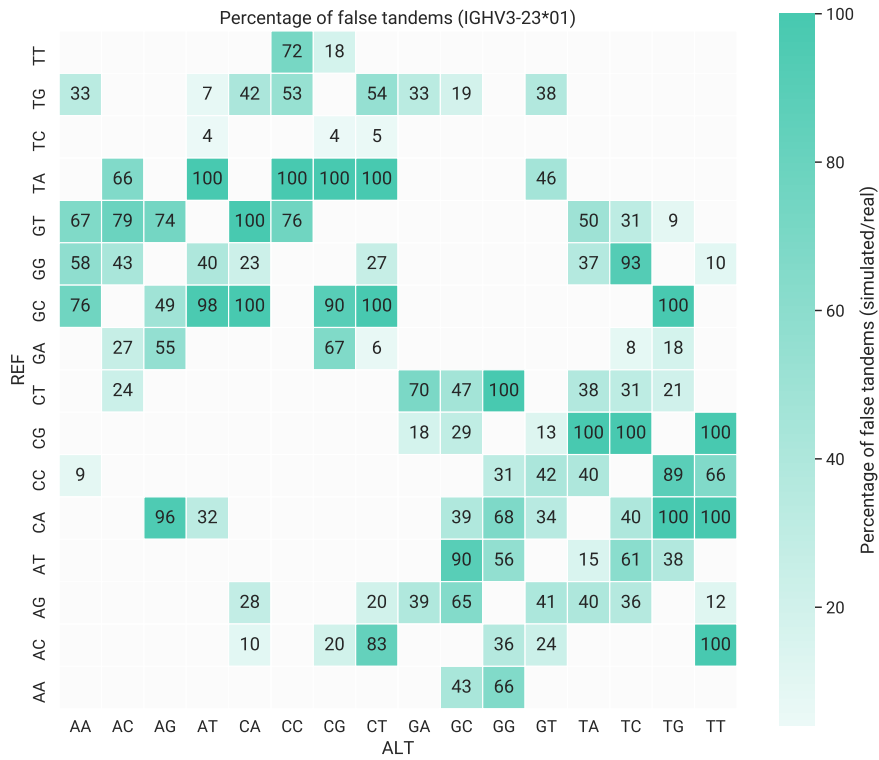
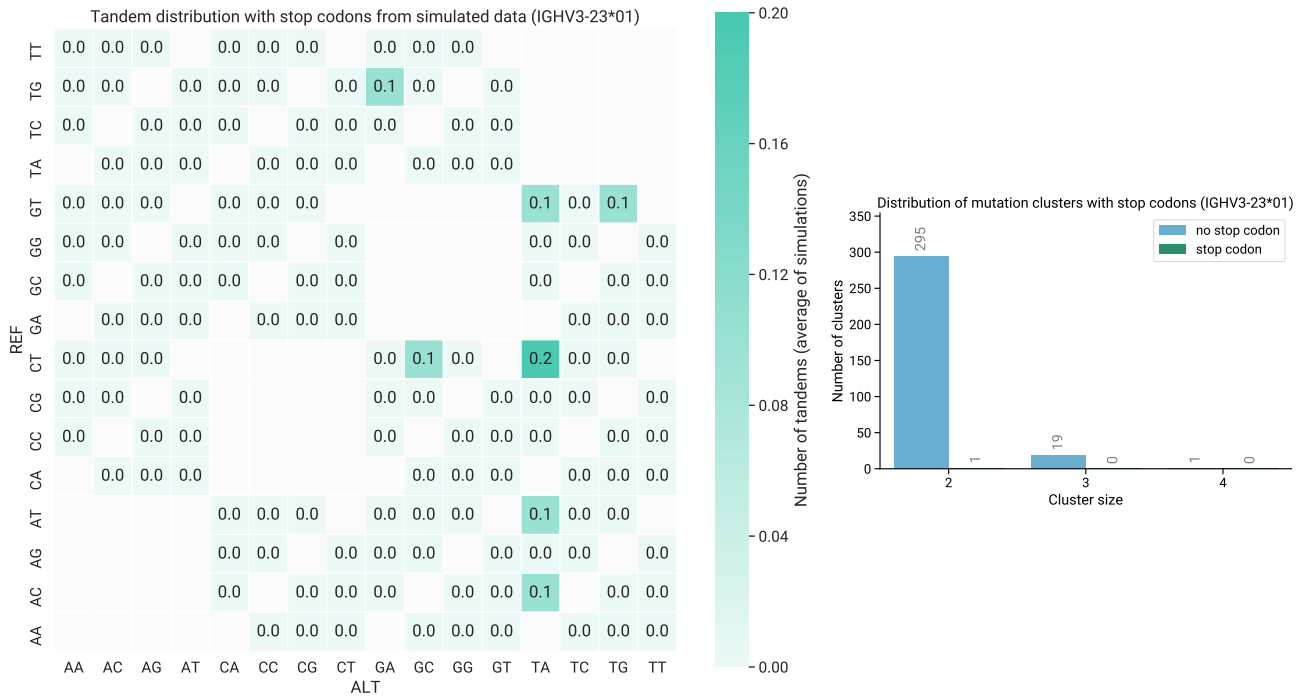
Tandem distribution from real data (IGHV3-23\*01)



Tandem distribution from simulated data (IGHV3-23\*01)

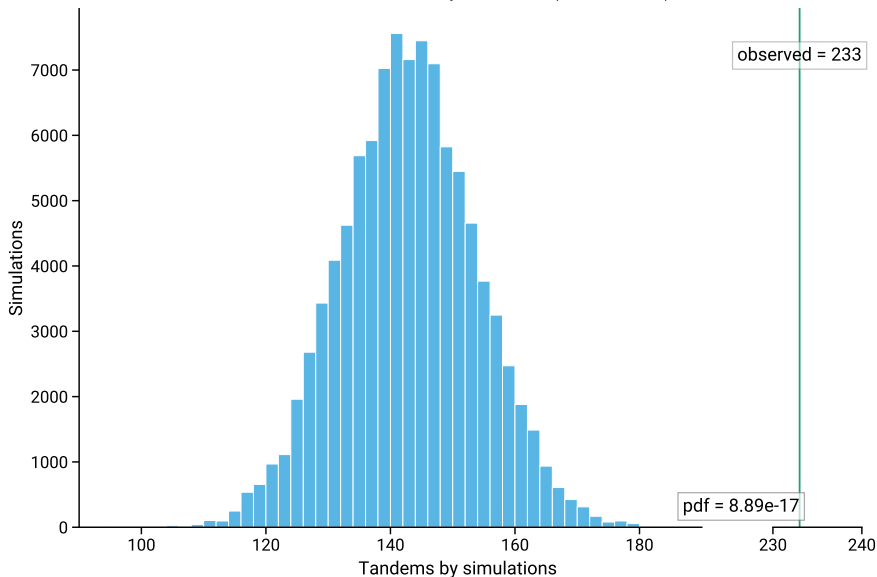




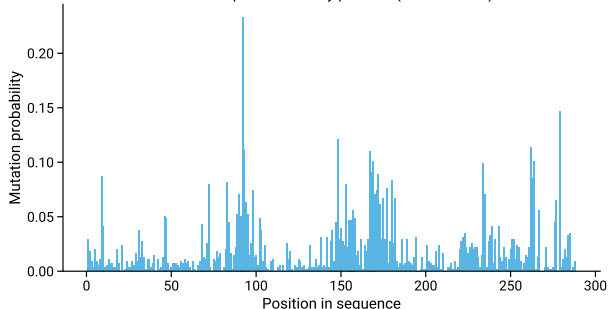


### 1.5 IGHV3-30\*03

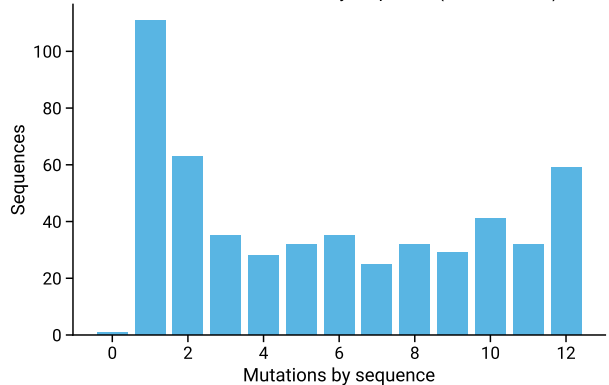
Distribution of tandems by simulation (IGHV3-30\*03)



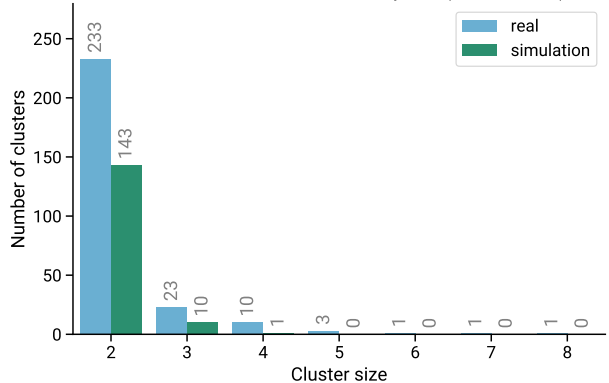
Mutation probabilities by position (IGHV3-30\*03)



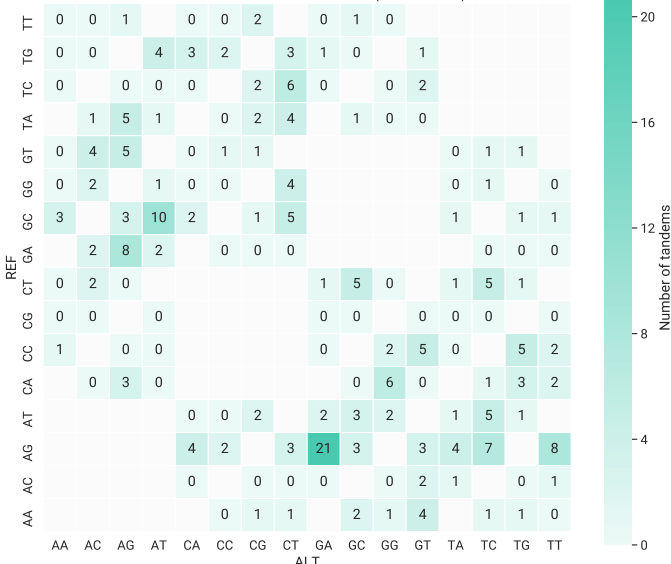
Distribution of mutations by sequence (IGHV3-30\*03)



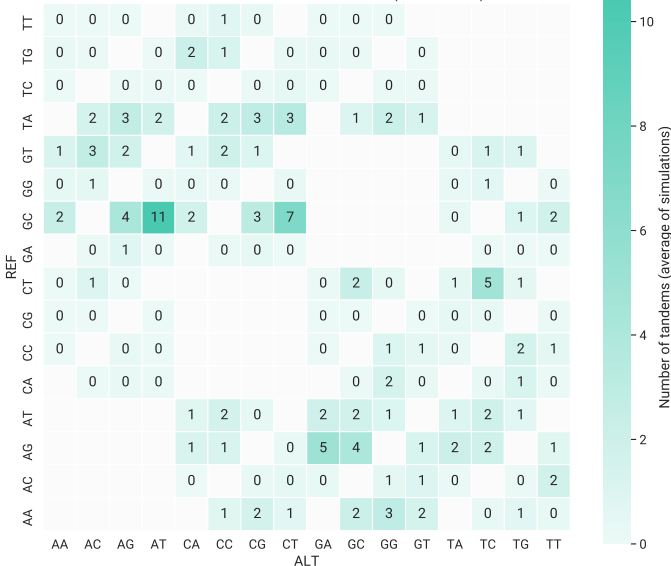
Distribution of mutation clusters by size (IGHV3-30\*03)

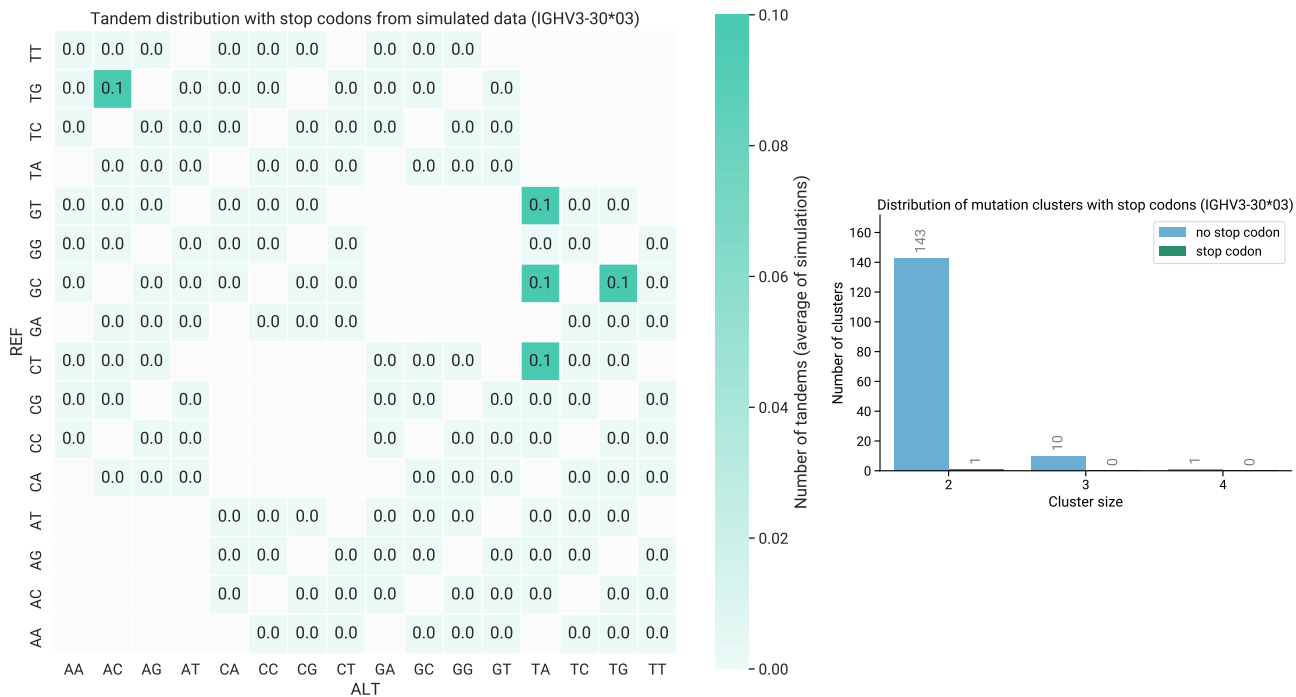


Tandem distribution from real data (IGHV3-30\*03)

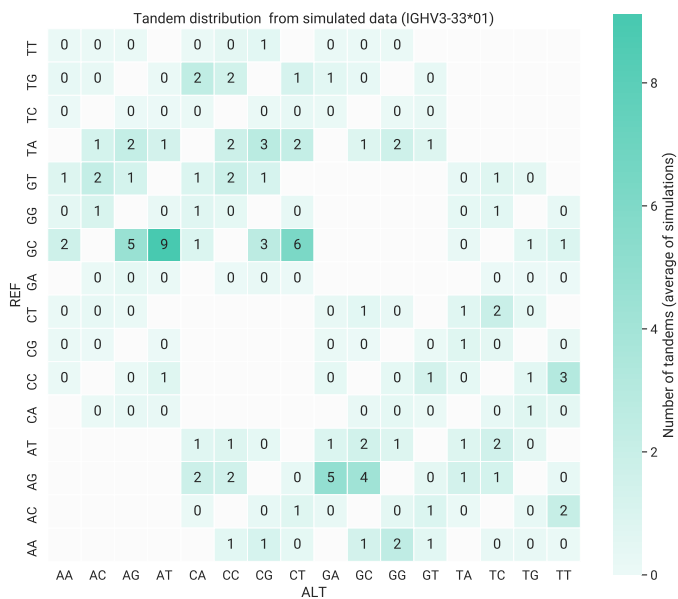
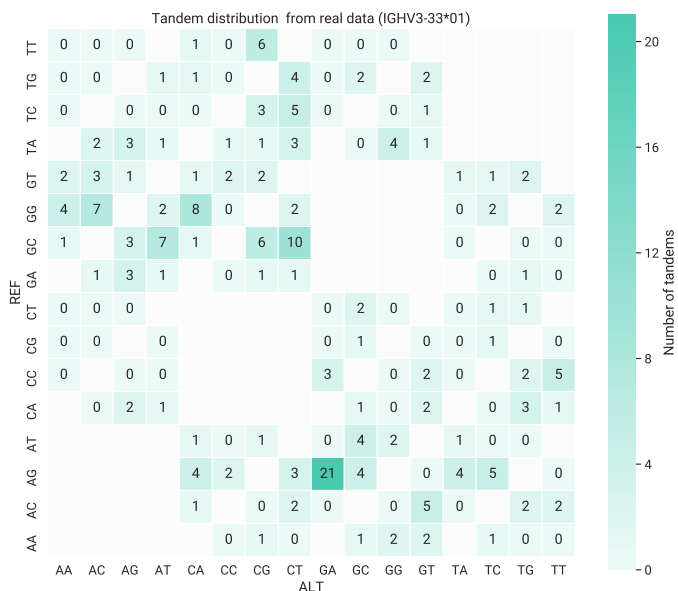
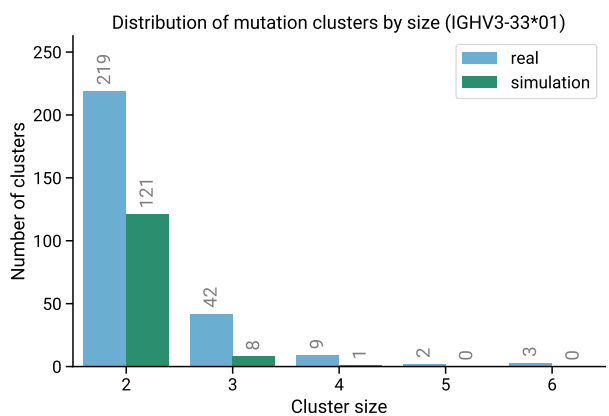
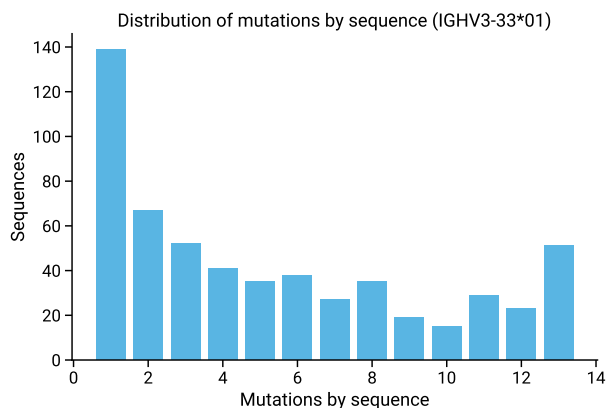
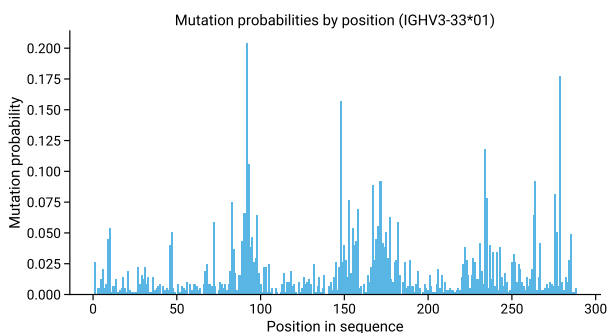
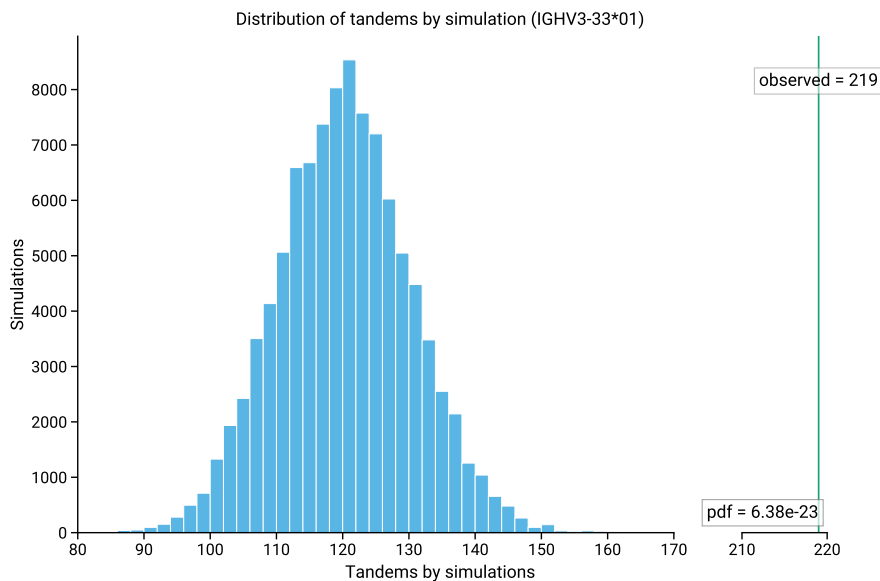


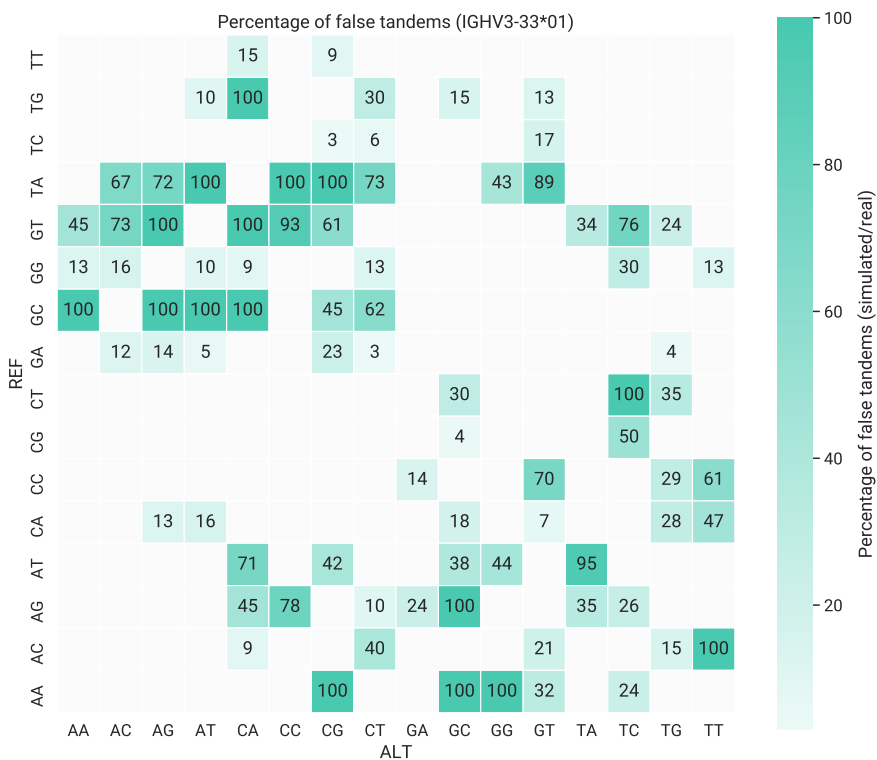
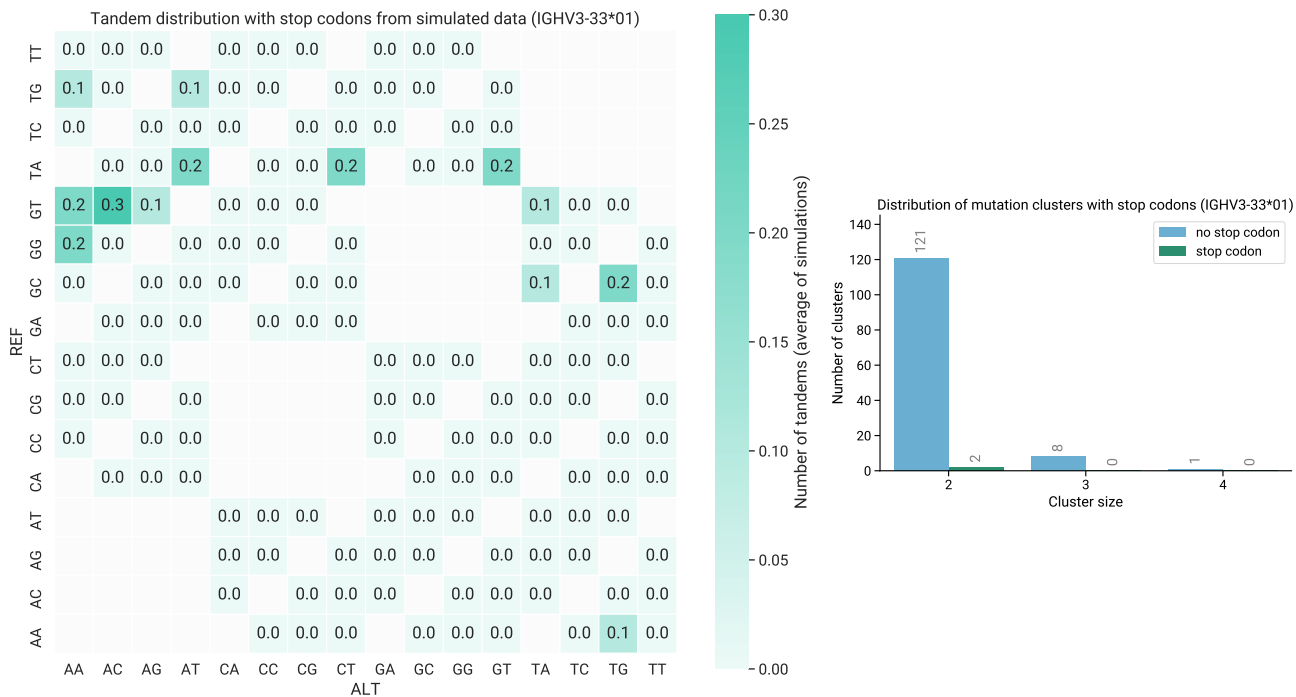
Tandem distribution from simulated data (IGHV3-30\*03)



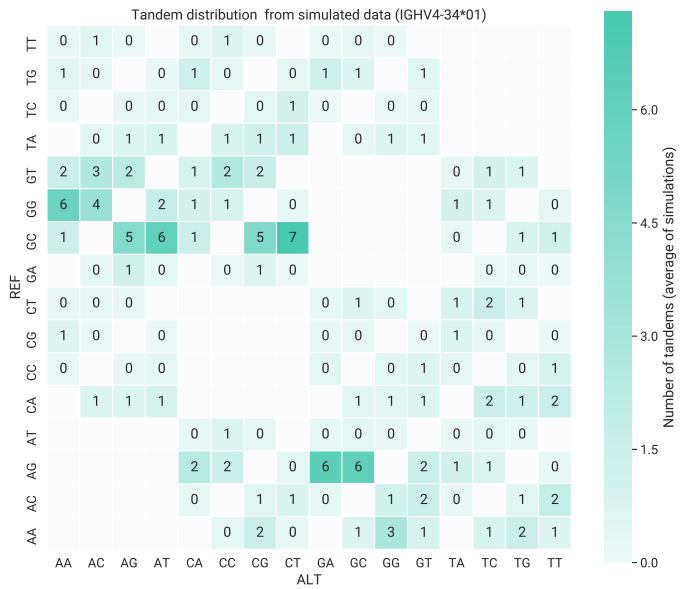
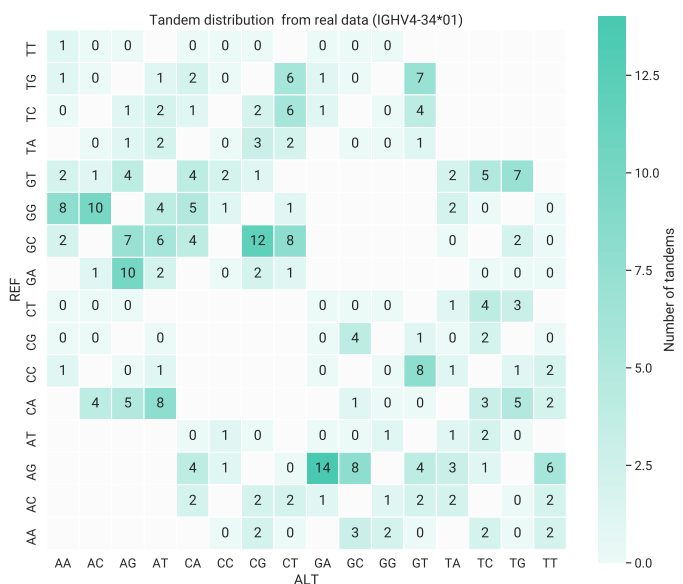
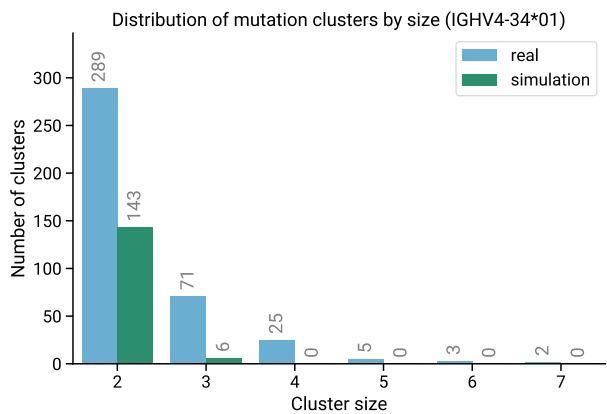
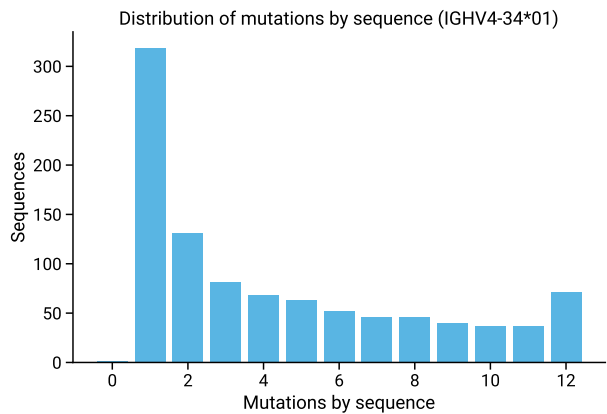
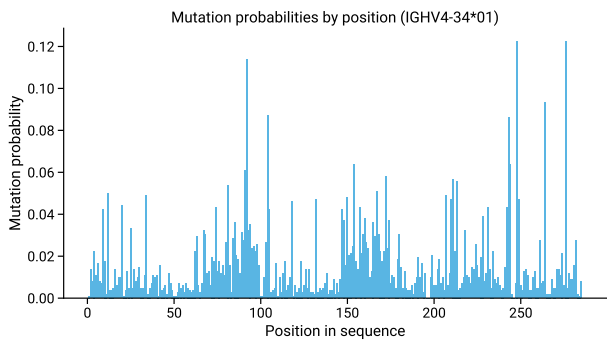
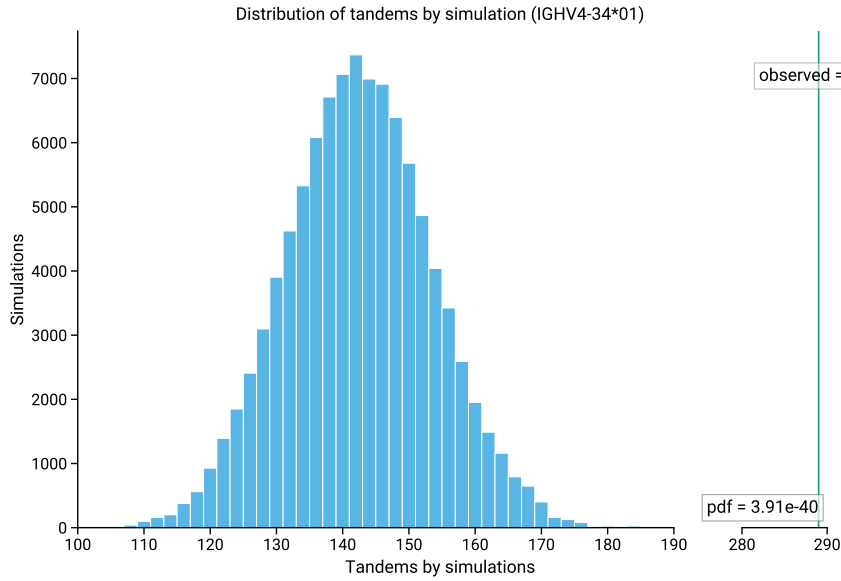


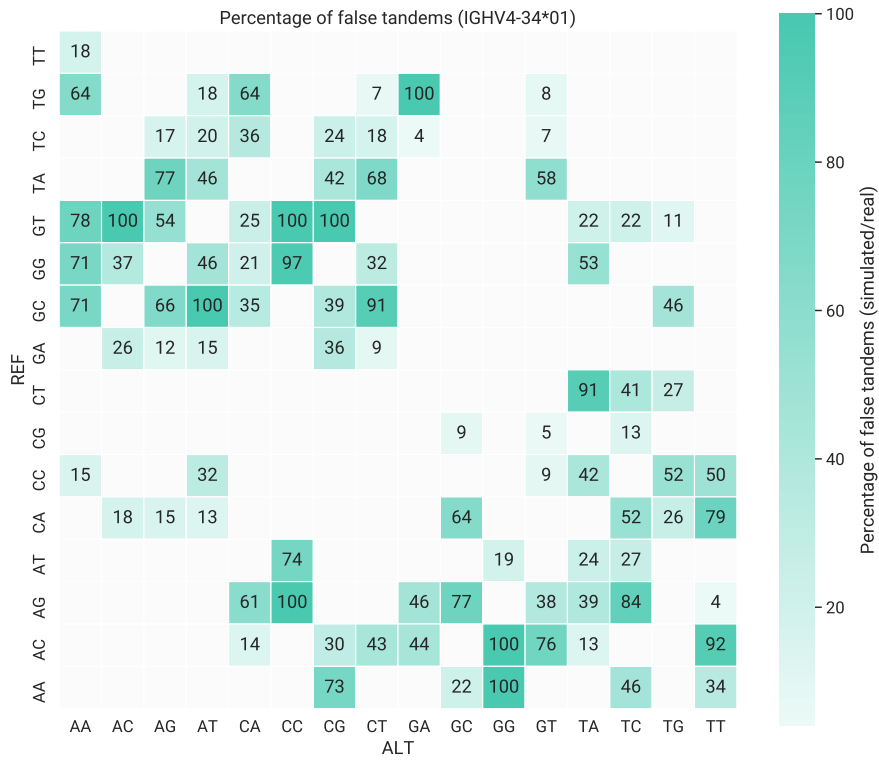
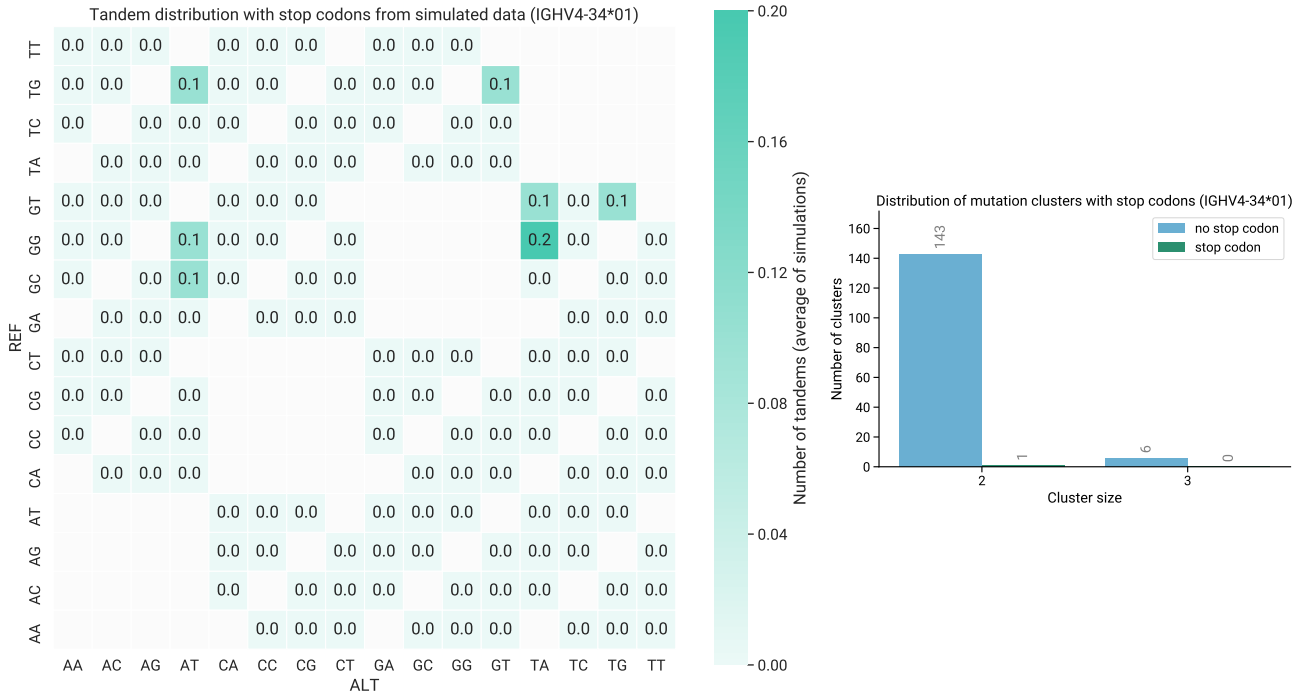
# 1.6 IGHV3-33\*01





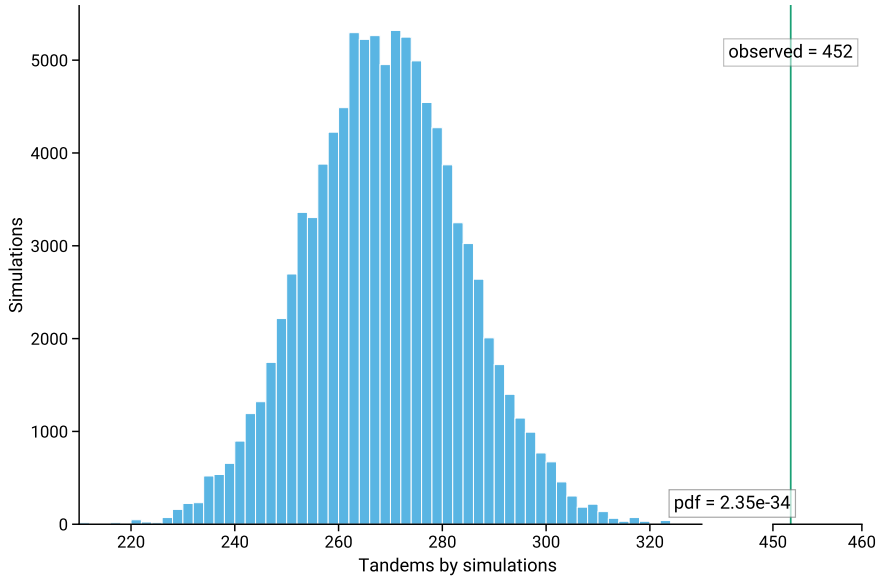
# 1.7 IGHV4-34\*01



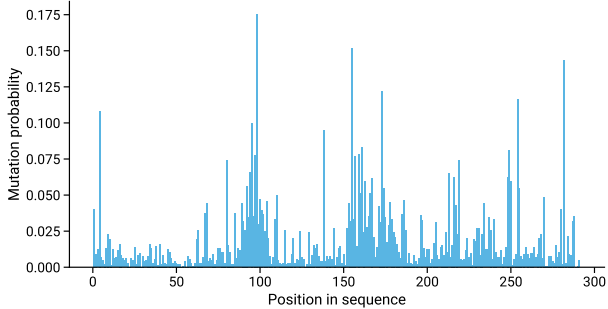


# 1.8 IGHV4-39\*01

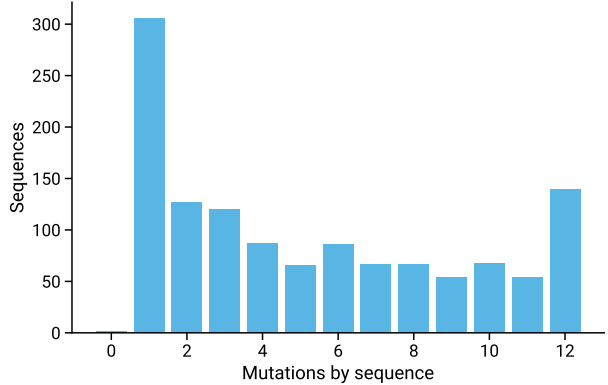
Distribution of tandems by simulation (IGHV4-39\*01)



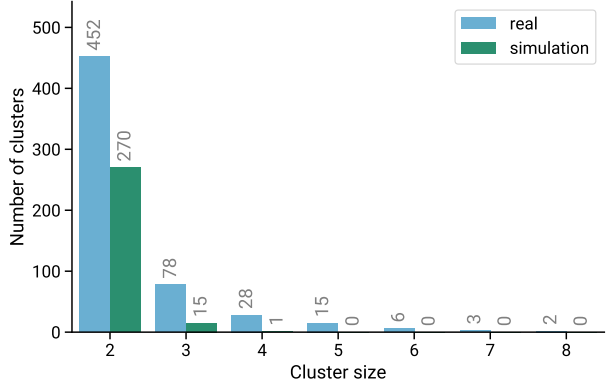
Mutation probabilities by position (IGHV4-39\*01)



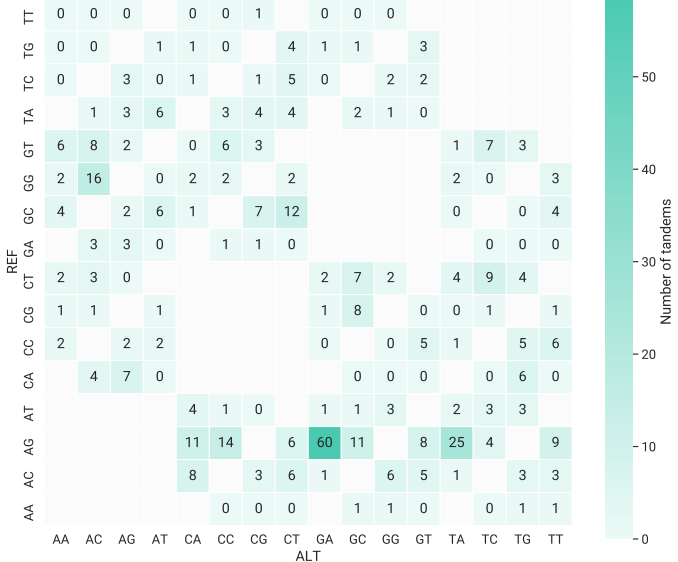
Distribution of mutations by sequence (IGHV4-39\*01)



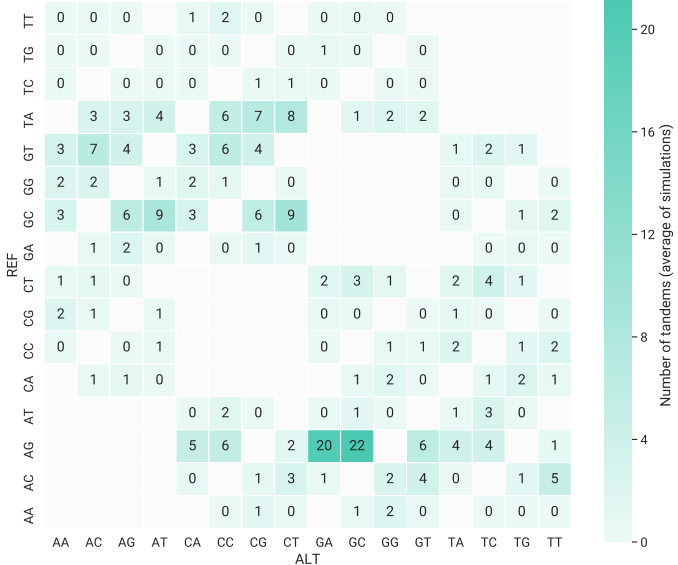
Distribution of mutation clusters by size (IGHV4-39\*01)



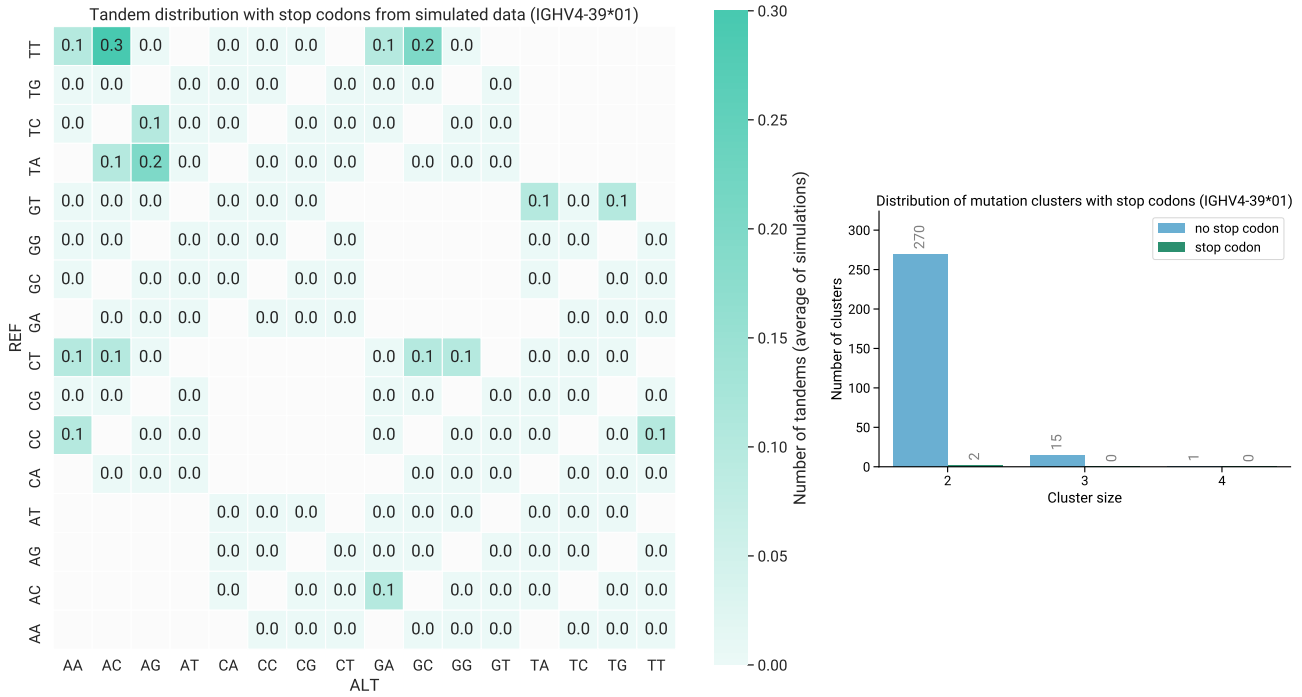
Tandem distribution from real data (IGHV4-39\*01)



Tandem distribution from simulated data (IGHV4-39\*01)

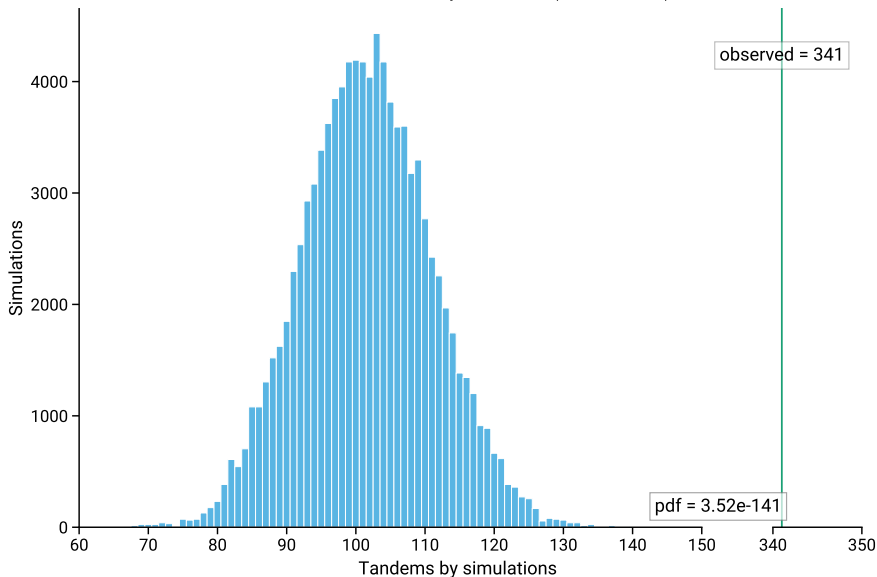




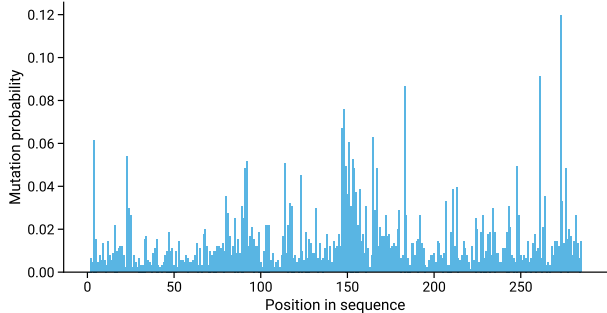


# 1.9 IGHV4-59\*01

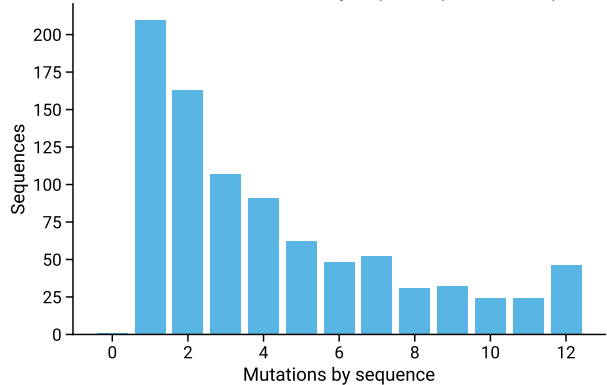
Distribution of tandems by simulation (IGHV4-59\*01)



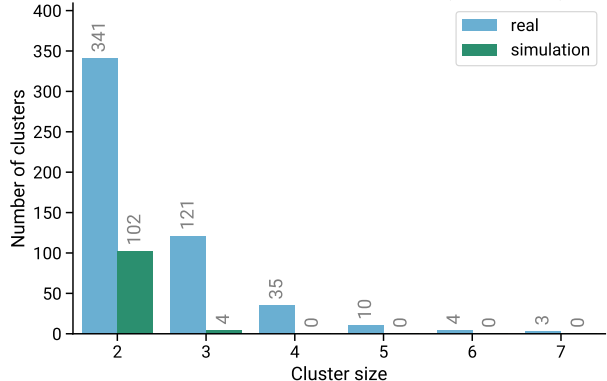
Mutation probabilities by position (IGHV4-59\*01)



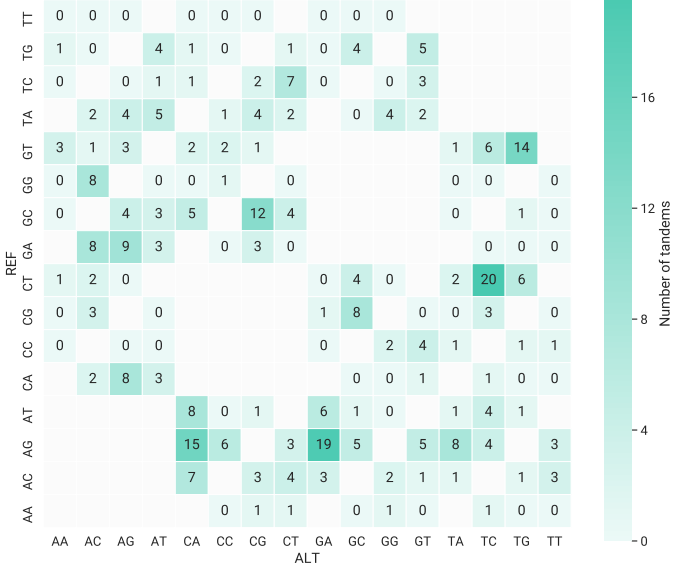
Distribution of mutations by sequence (IGHV4-59\*01)



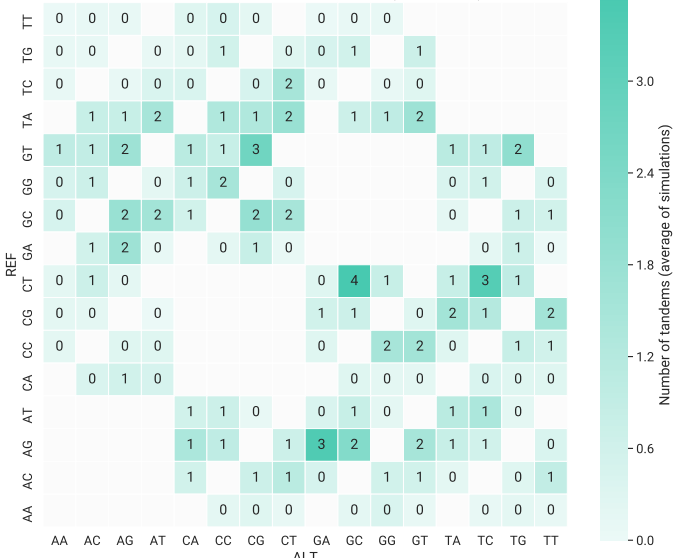
Distribution of mutation clusters by size (IGHV4-59\*01)

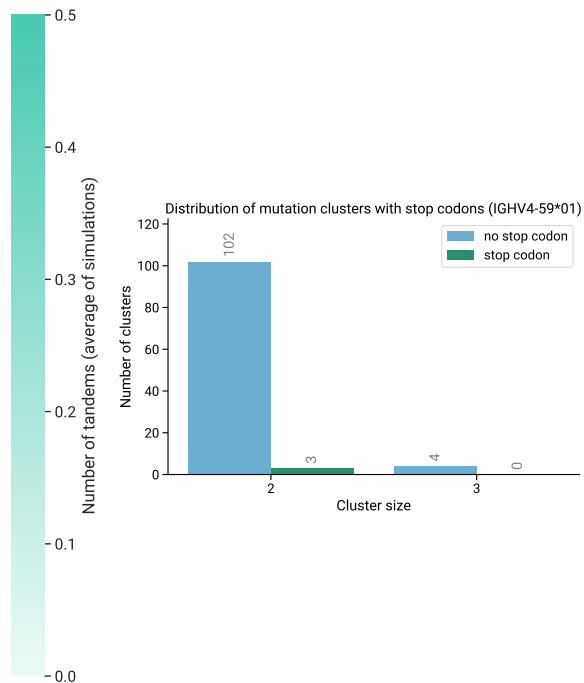
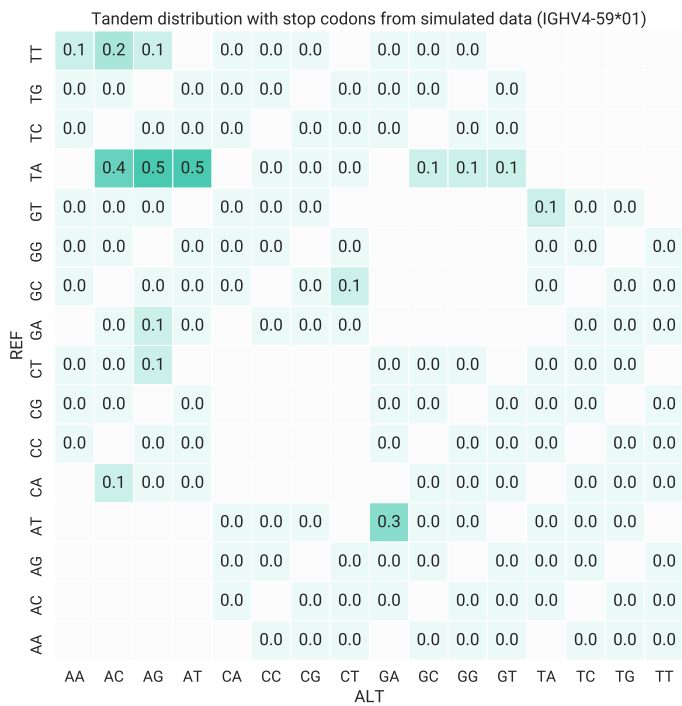


Tandem distribution from real data (IGHV4-59\*01)



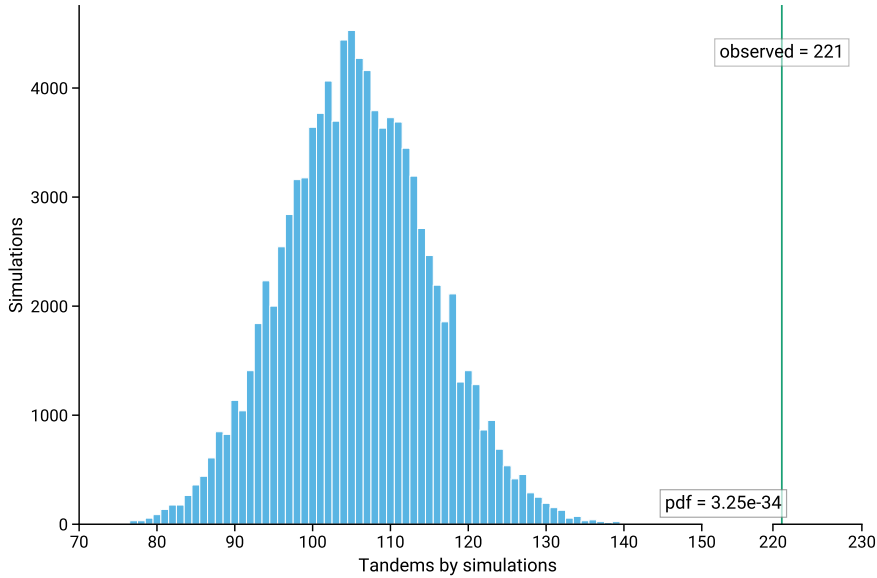
Tandem distribution from simulated data (IGHV4-59\*01)



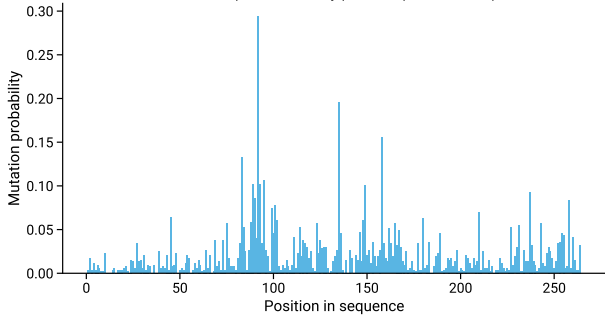


# 1.10 IGKV1-39\*01

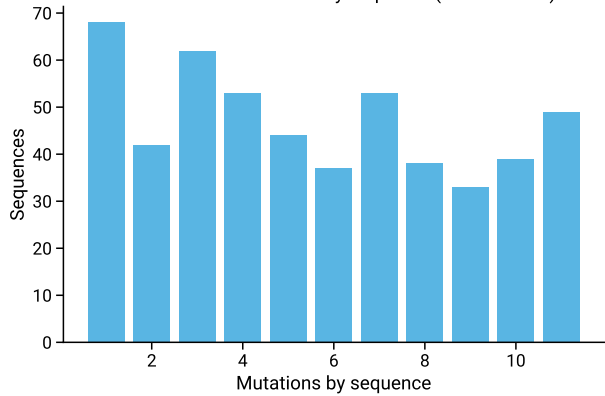
Distribution of tandems by simulation (IGKV1-39\*01)



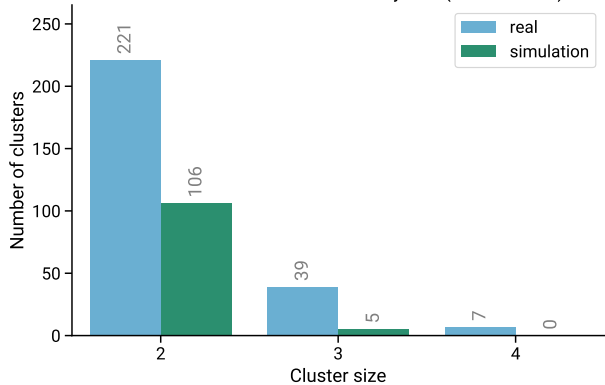
Mutation probabilities by position (IGKV1-39\*01)



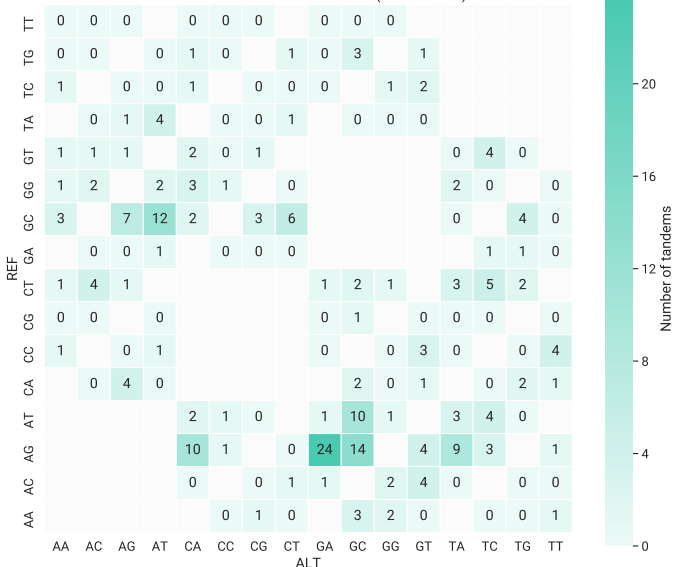
Distribution of mutations by sequence (IGKV1-39\*01)



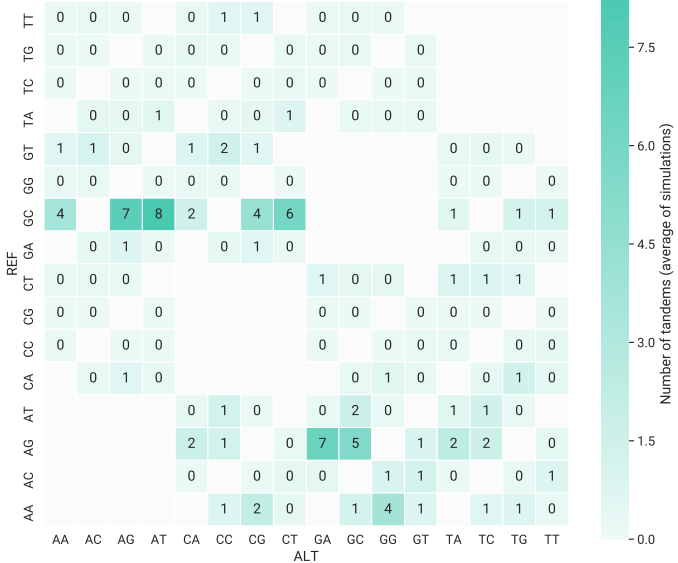
Distribution of mutation clusters by size (IGKV1-39\*01)

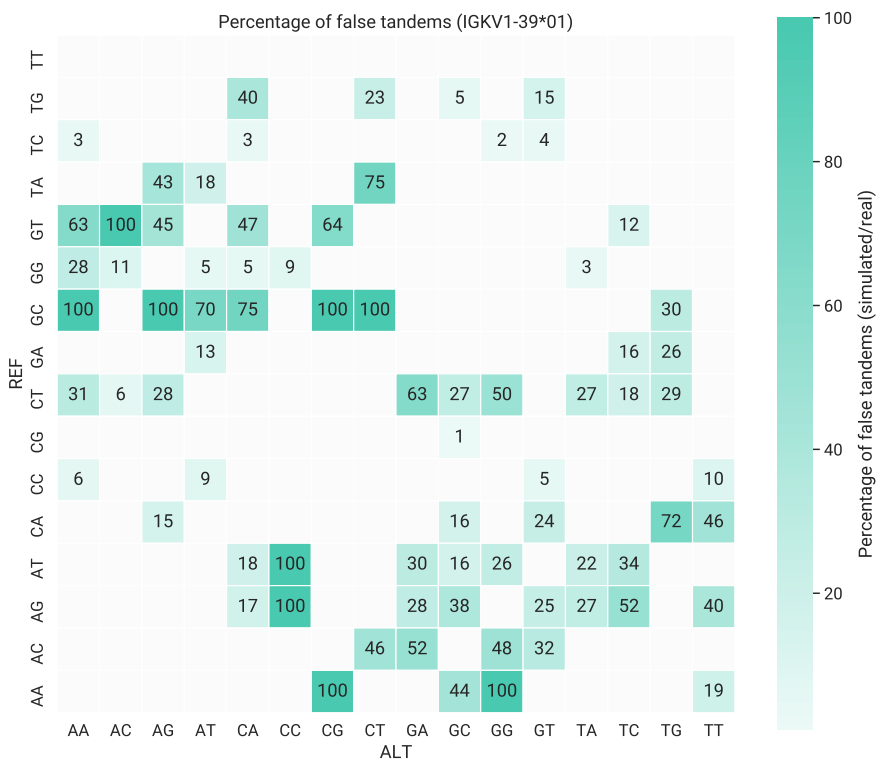
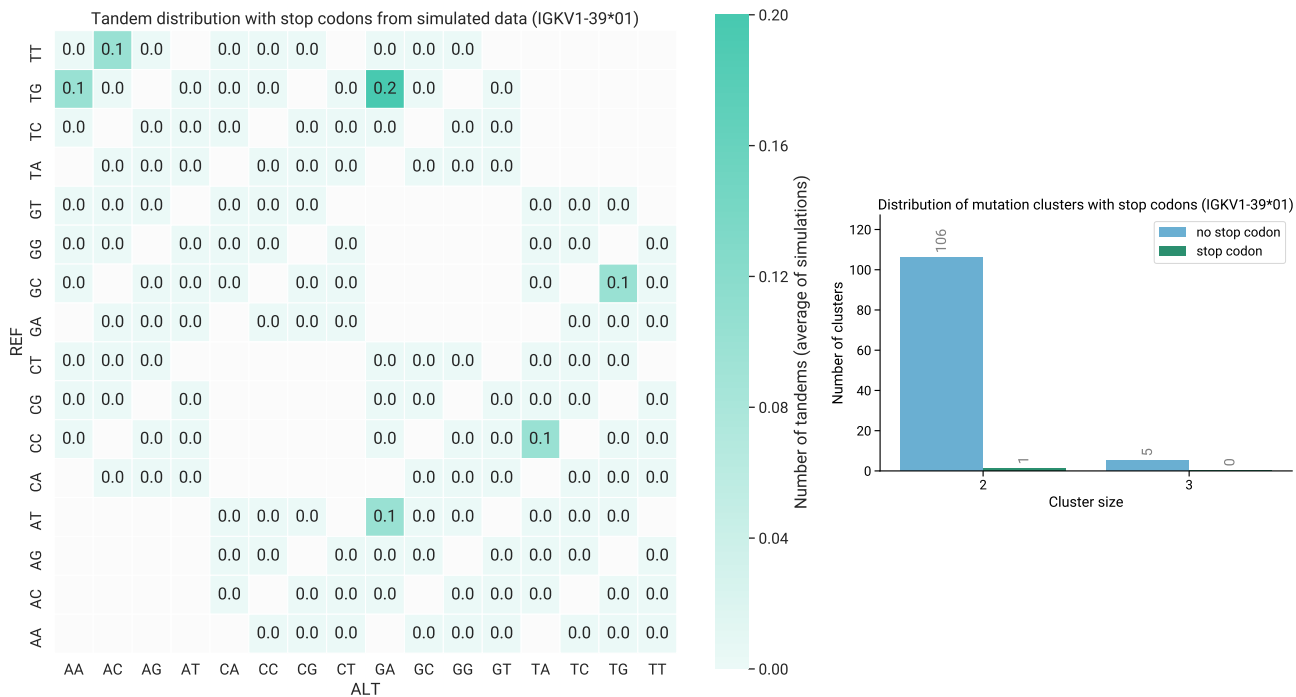


Tandem distribution from real data (IGKV1-39\*01)



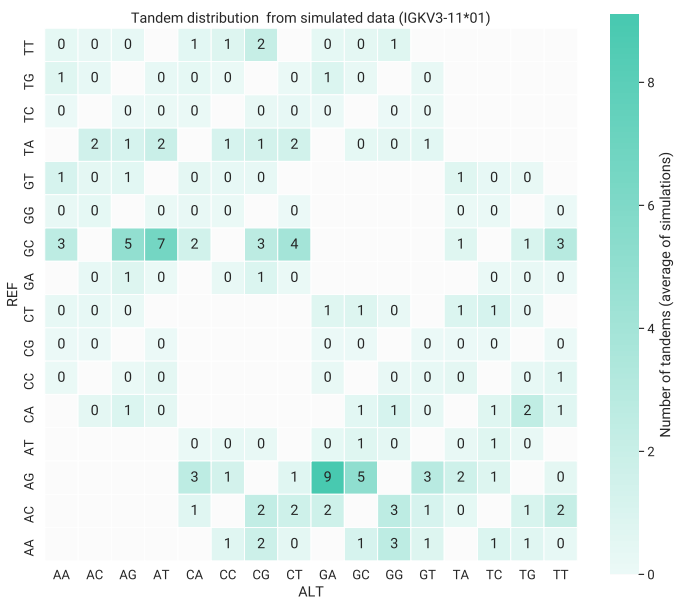
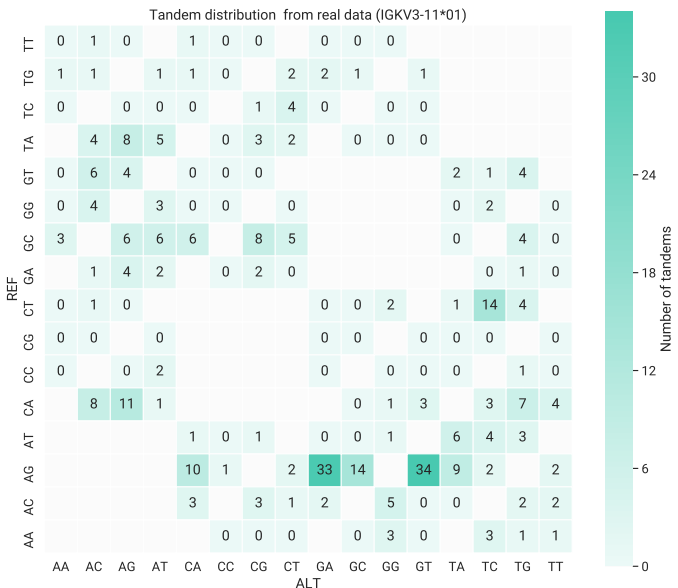
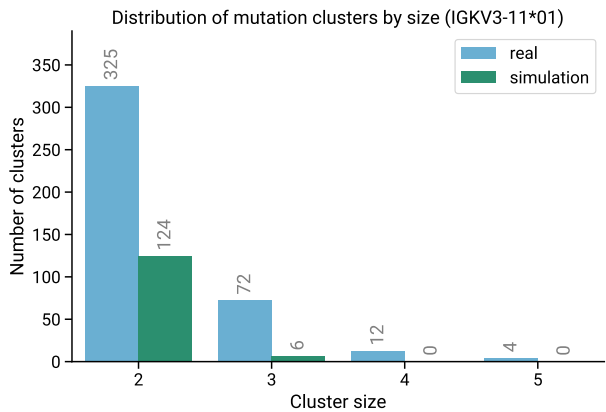
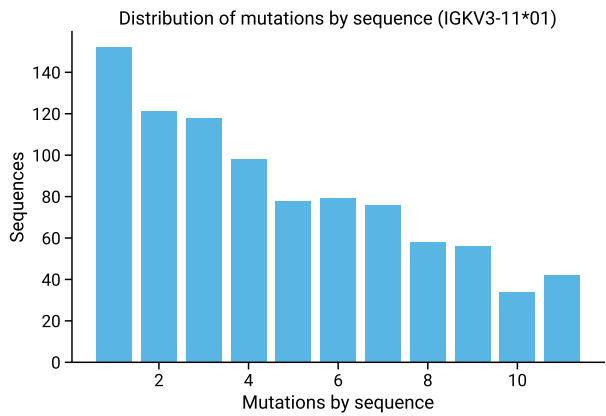
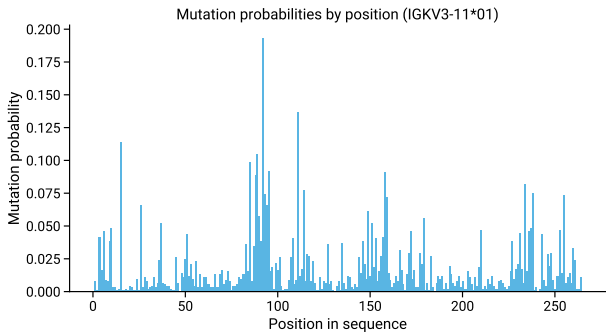
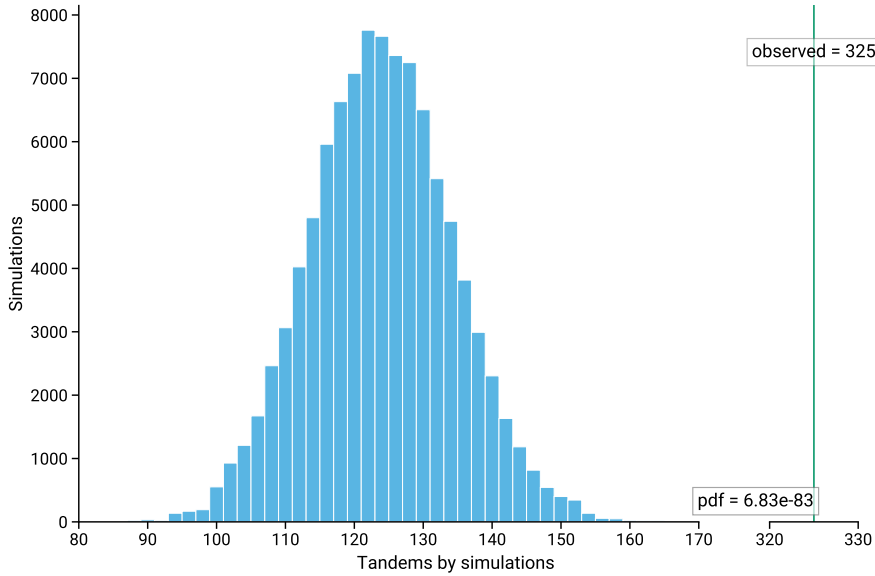
Tandem distribution from simulated data (IGKV1-39\*01)

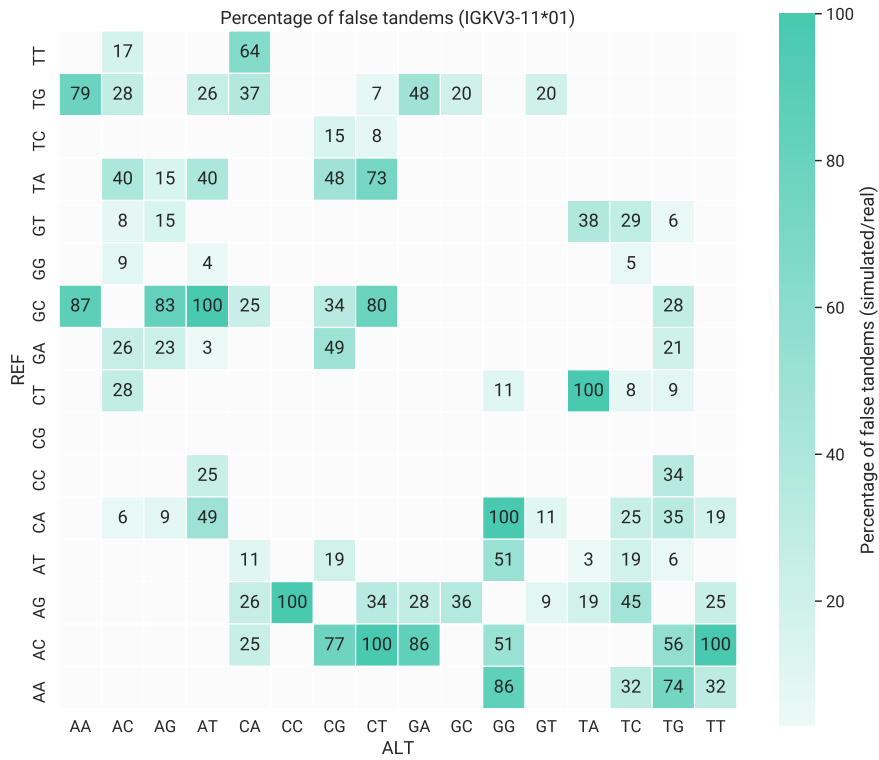
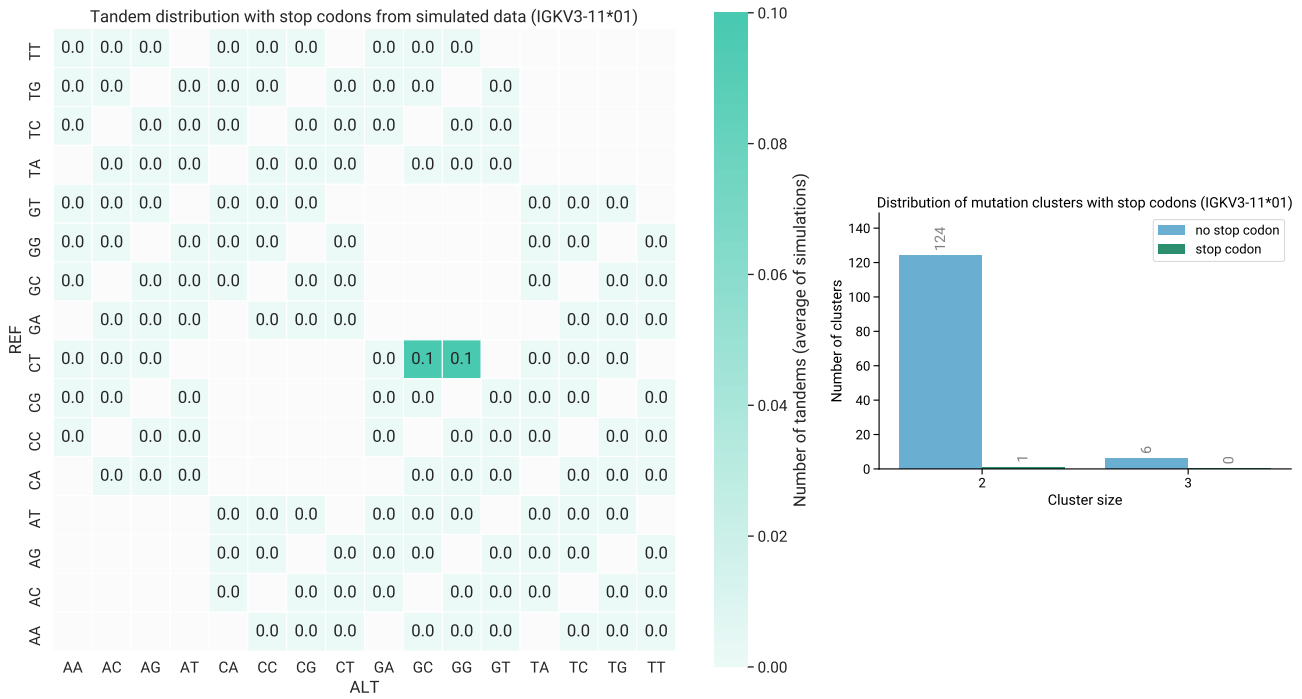




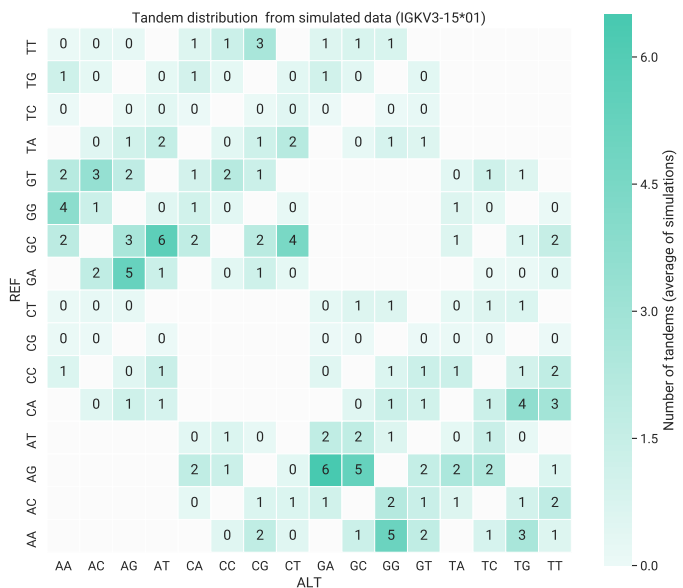
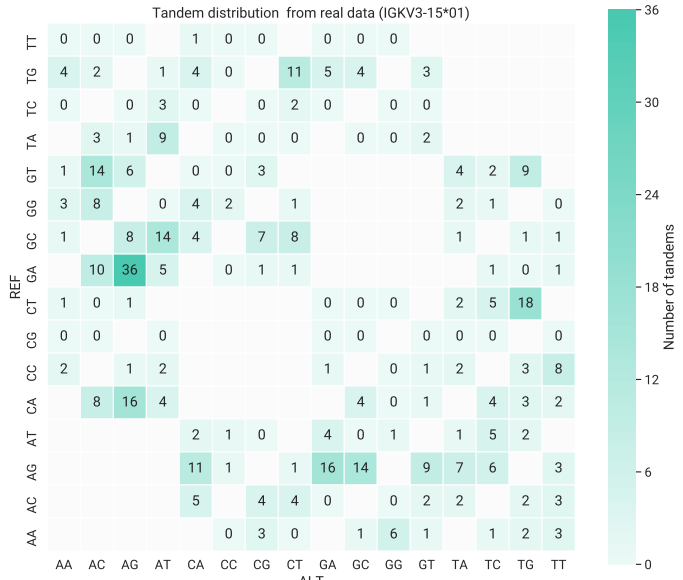
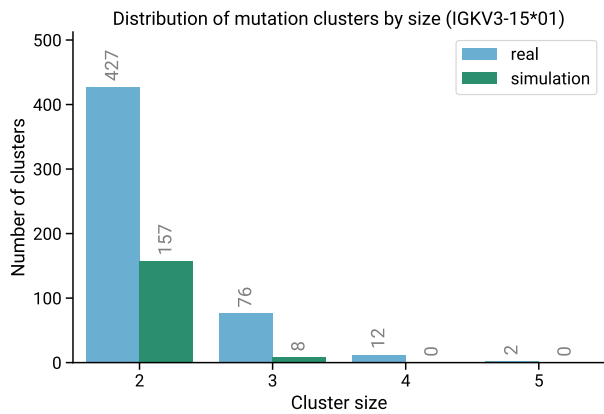
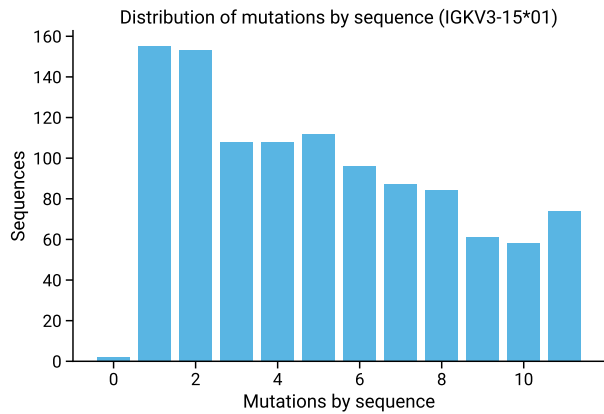
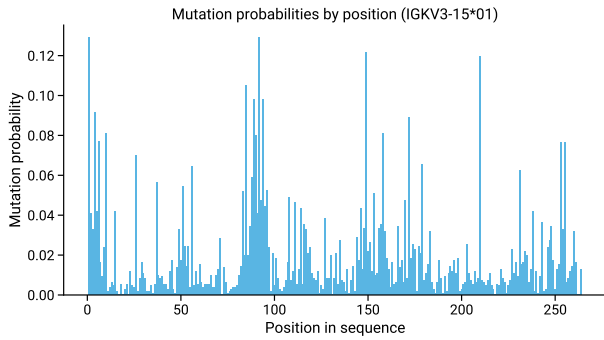
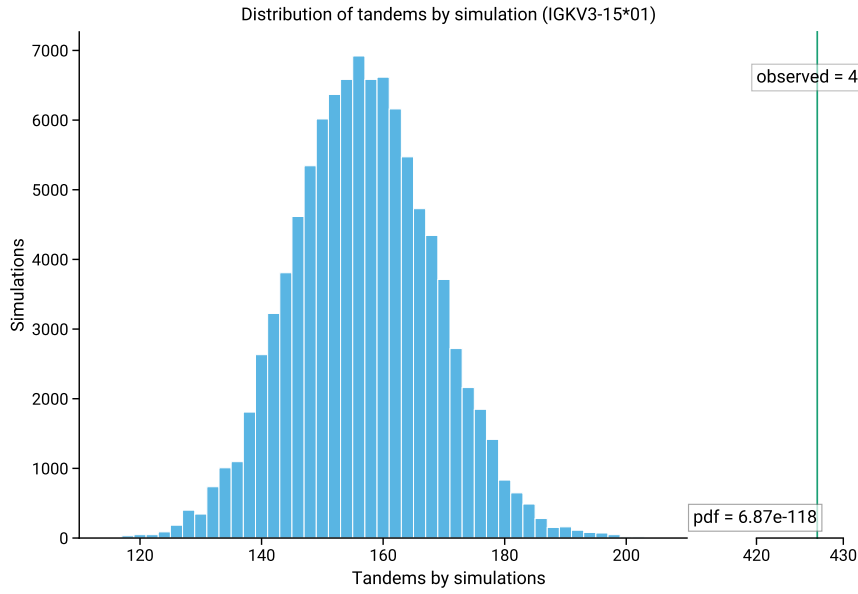
# 1.11 IGKV3-11\*01

Distribution of tandems by simulation (IGKV3-11\*01)

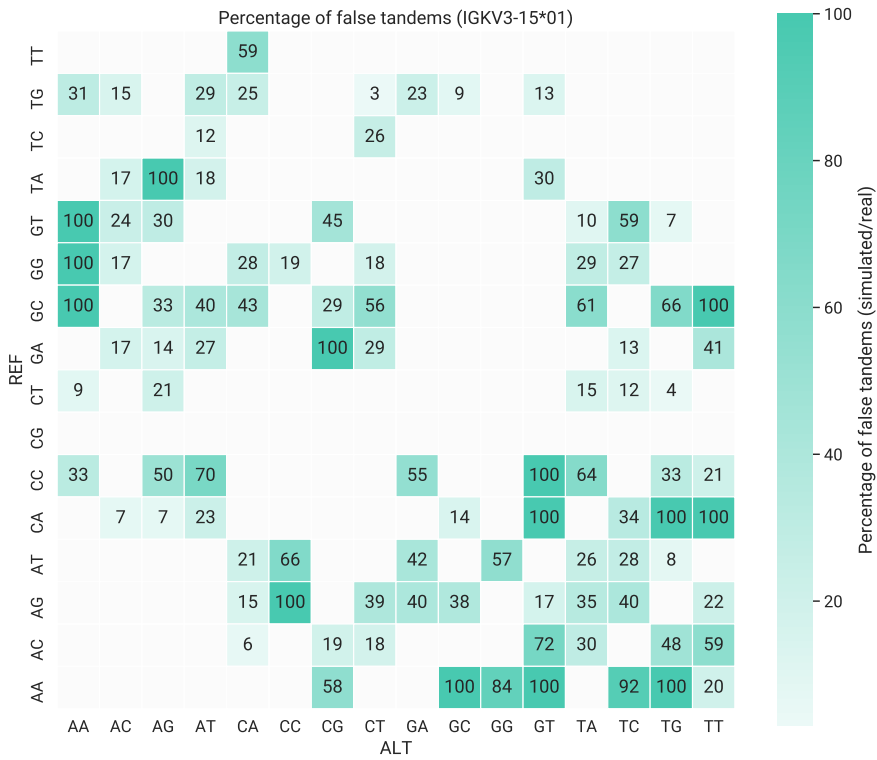
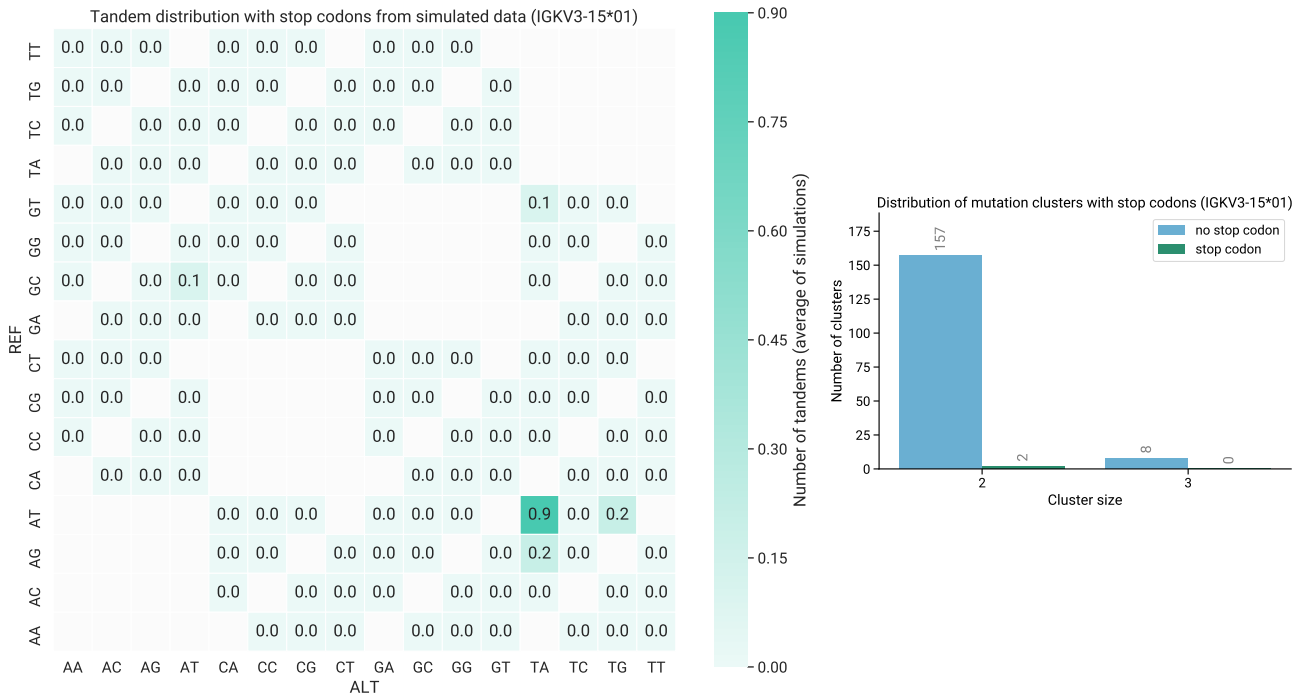




# 1.12 IGKV3-15\*01

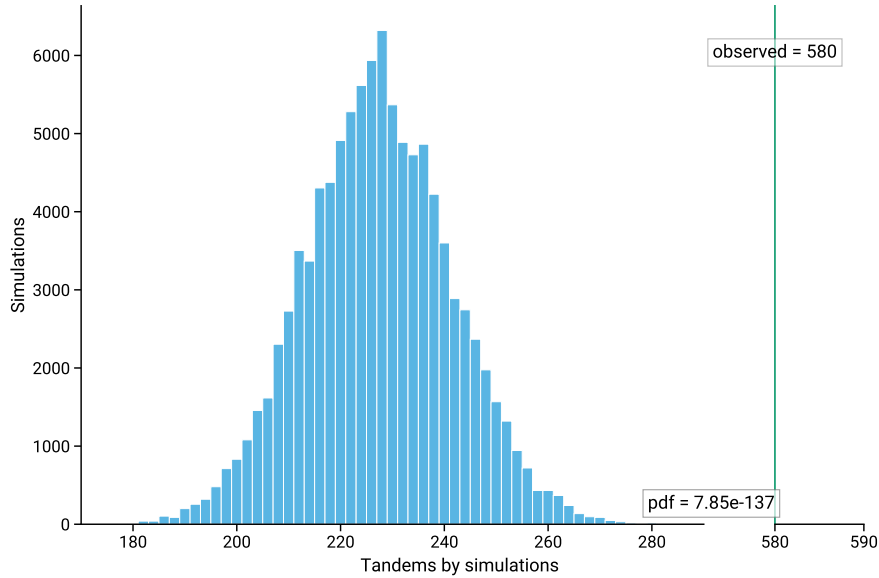




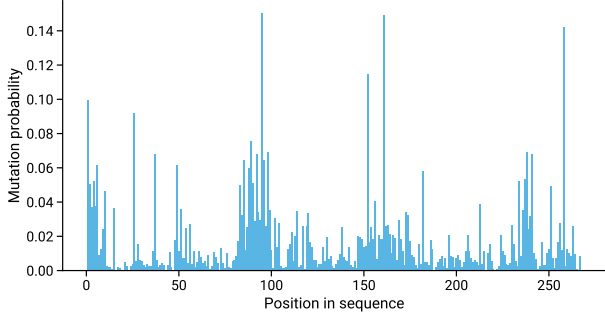


### 1.13 IGKV3-20\*01

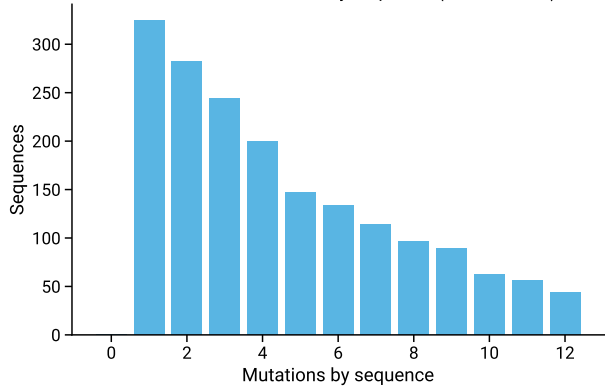
Distribution of tandems by simulation (IGKV3-20\*01)



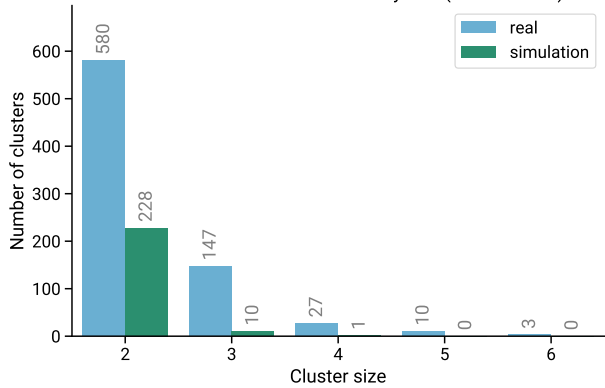
Mutation probabilities by position (IGKV3-20\*01)



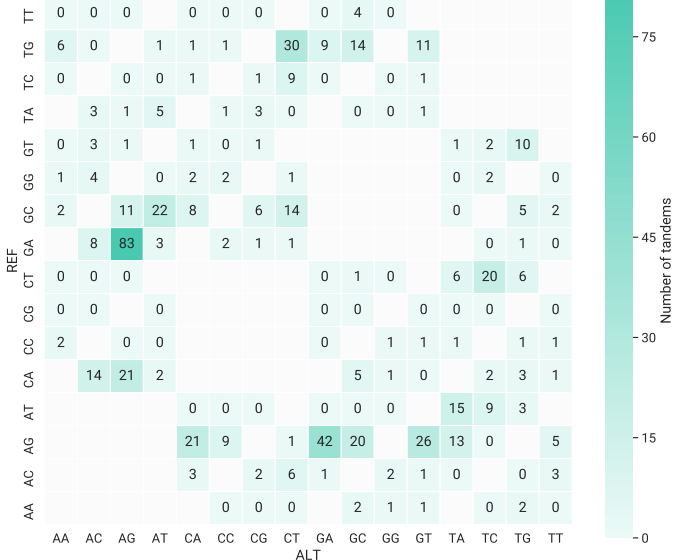
Distribution of mutations by sequence (IGKV3-20\*01)



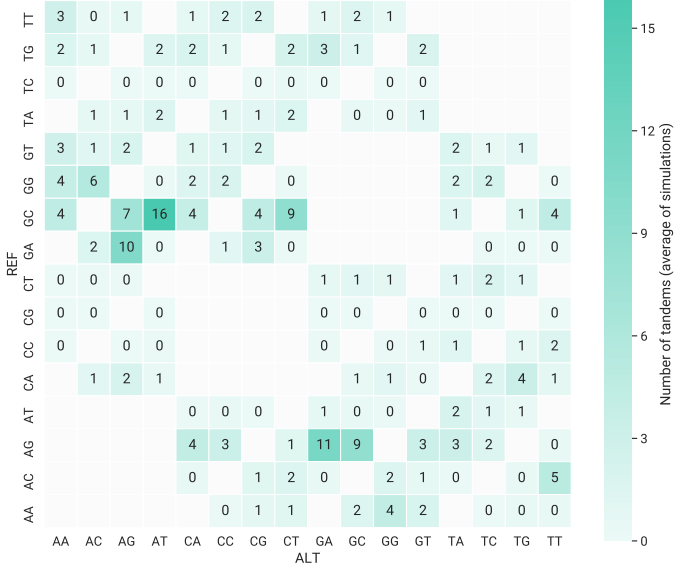
Distribution of mutation clusters by size (IGKV3-20\*01)

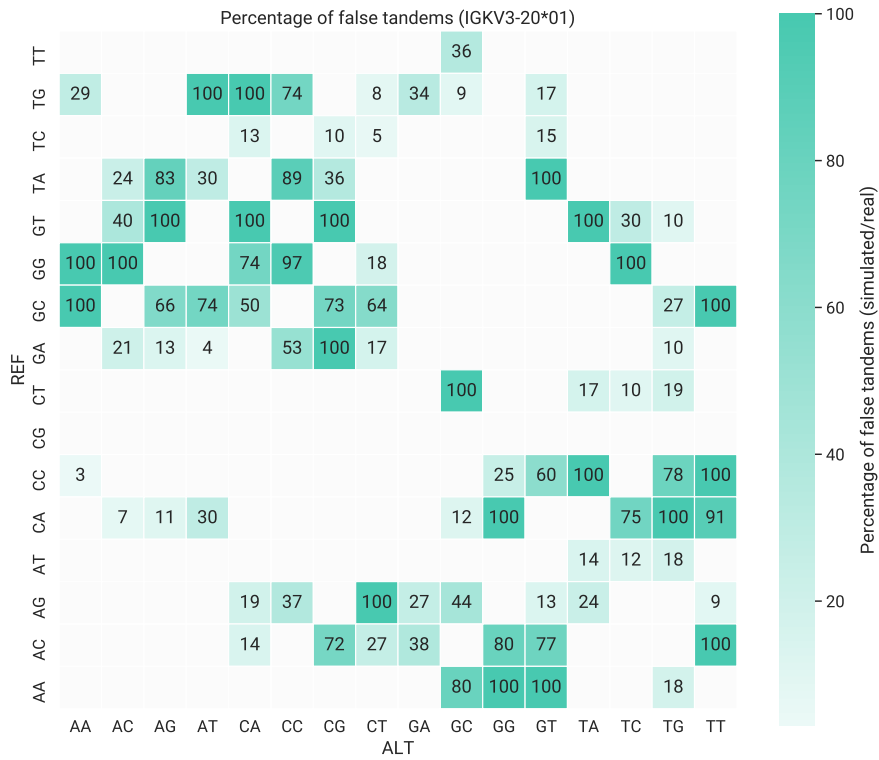
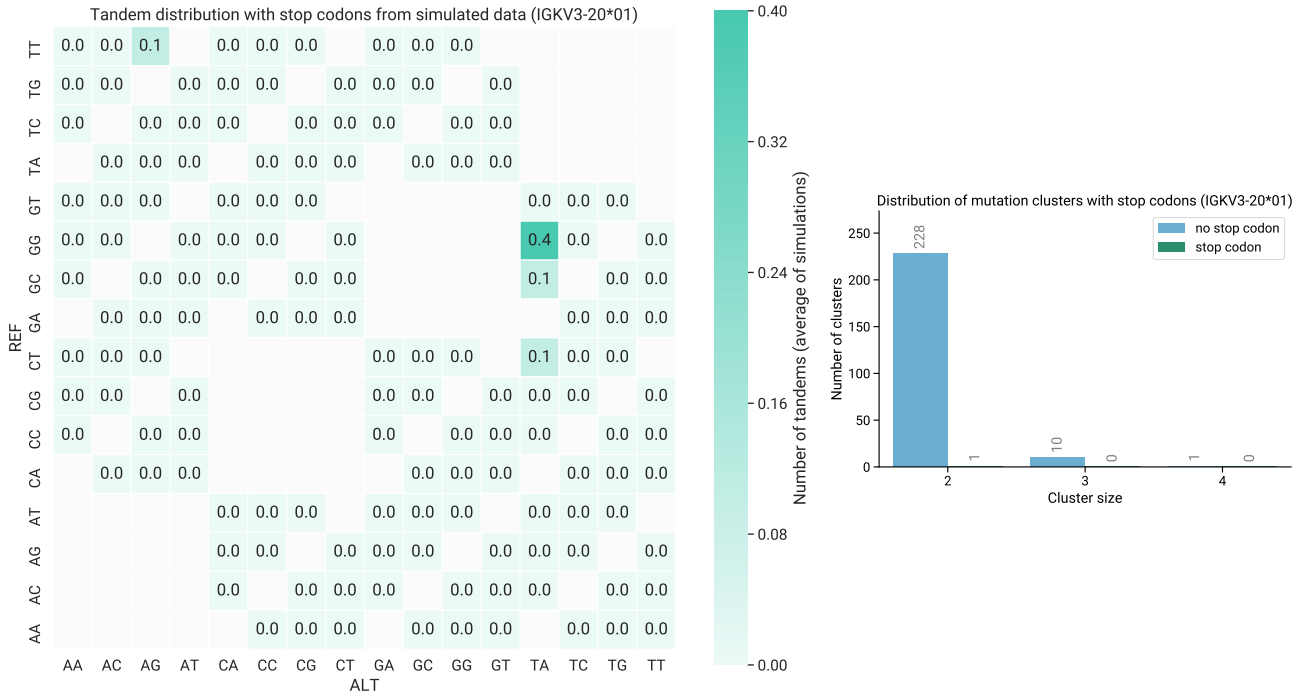


Tandem distribution from real data (IGKV3-20\*01)

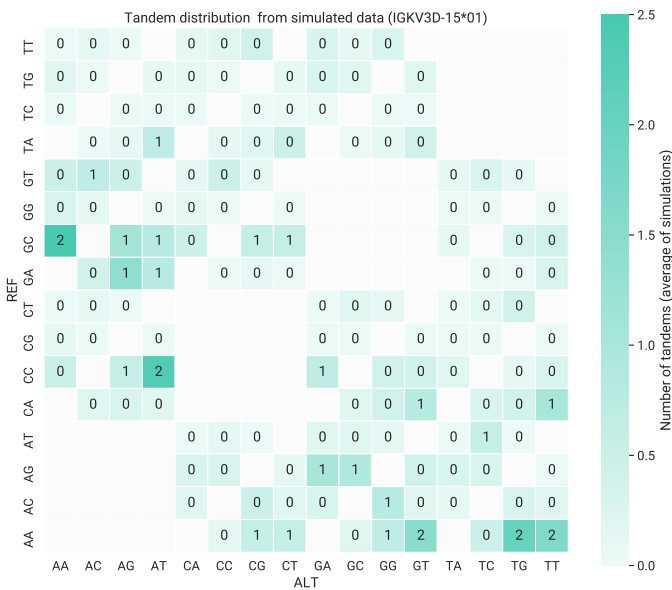
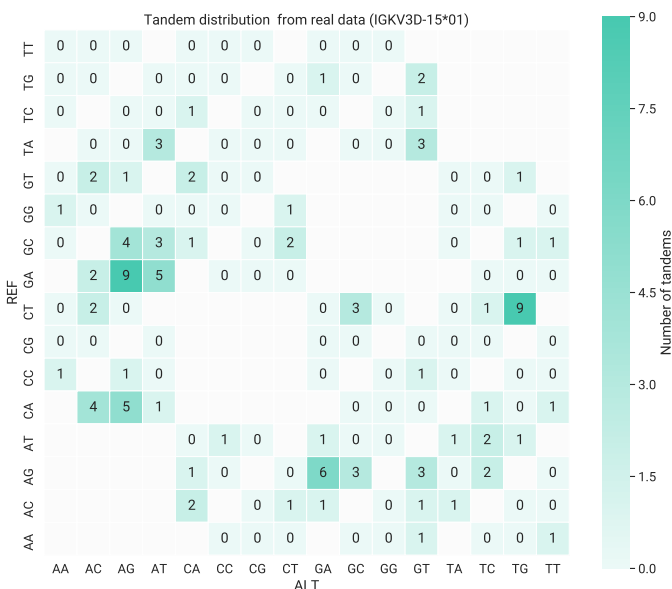
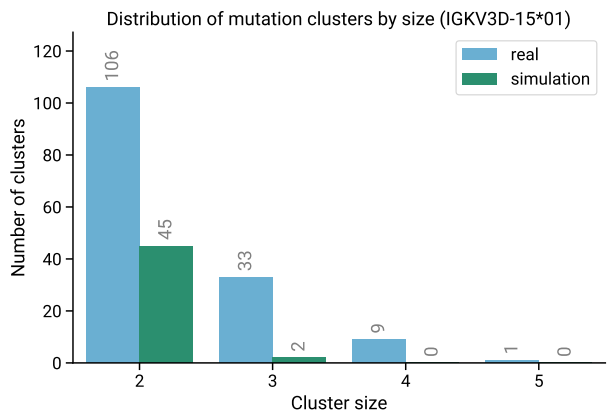
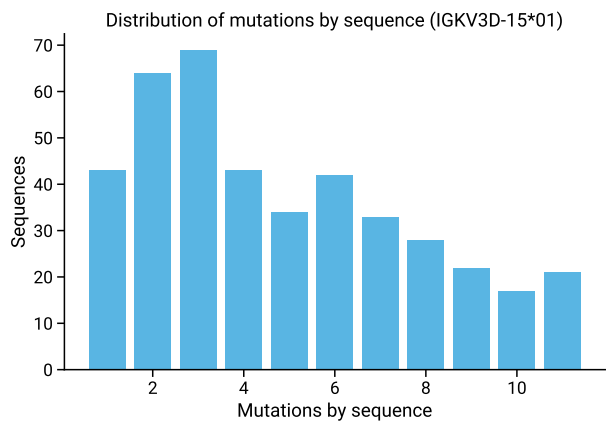
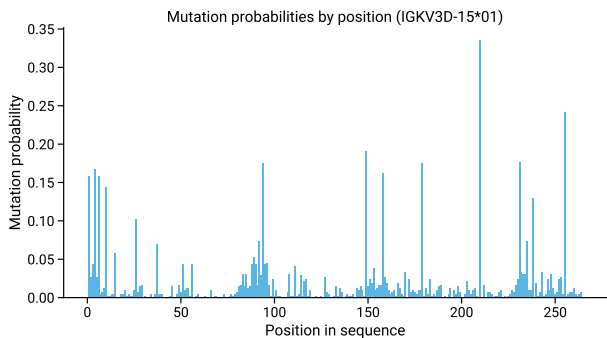
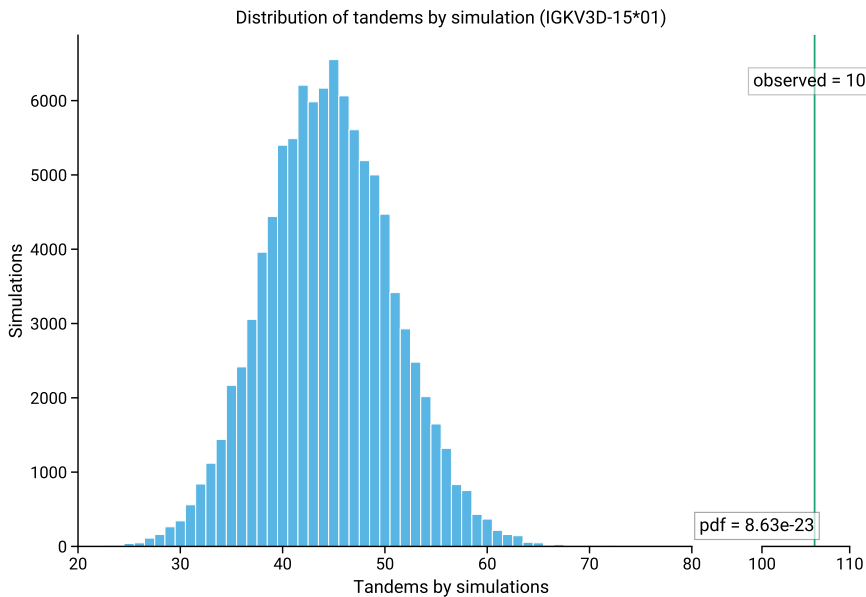


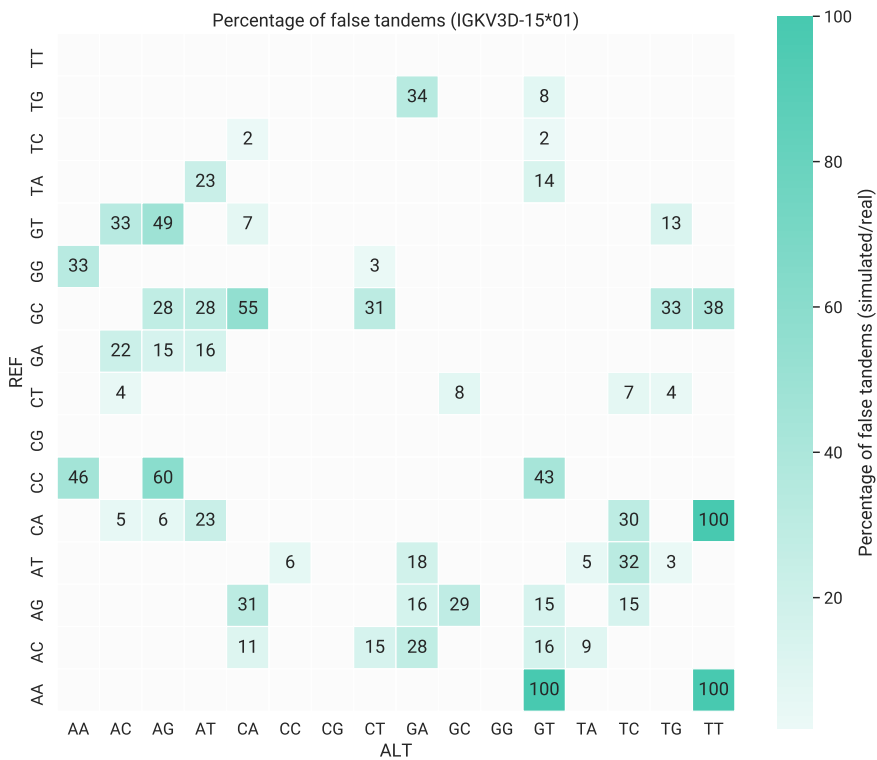
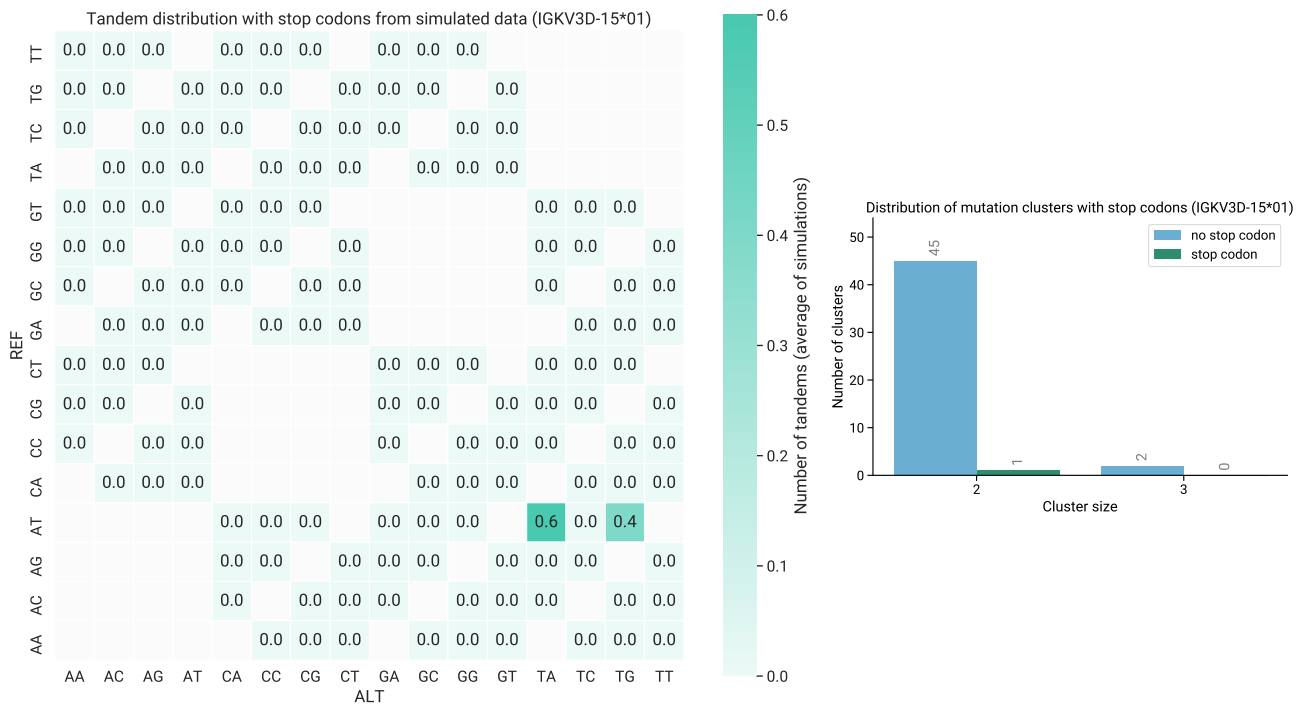
Tandem distribution from simulated data (IGKV3-20\*01)





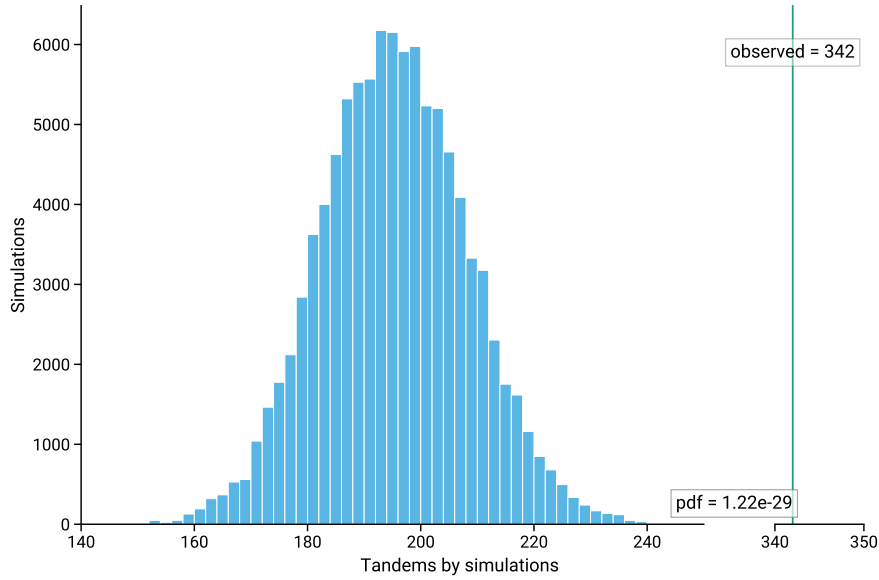
# 1.14 IGKV3D-15\*01



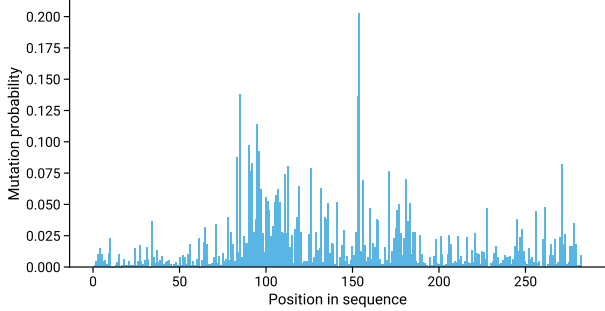


### 1.15 IGKV4-1\*01

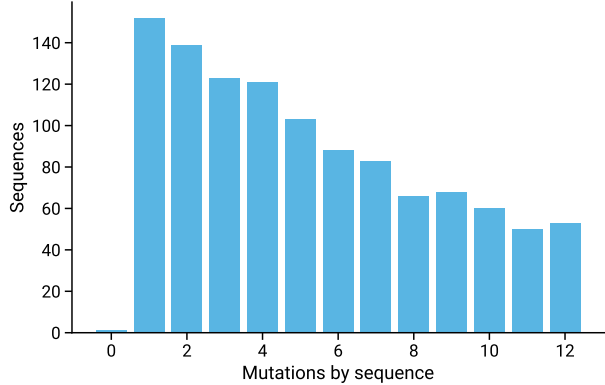
Distribution of tandems by simulation (IGKV4-1\*01)



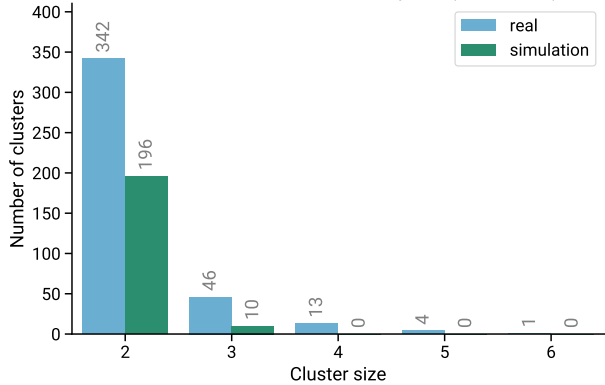
Mutation probabilities by position (IGKV4-1\*01)



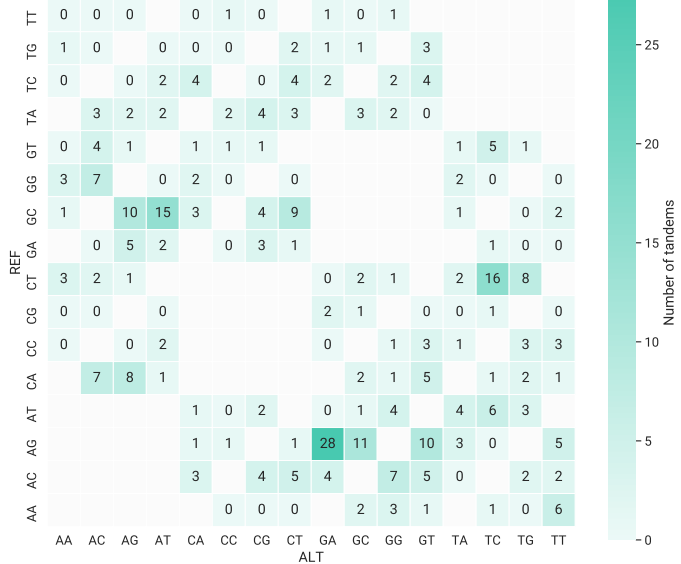
Distribution of mutations by sequence (IGKV4-1\*01)



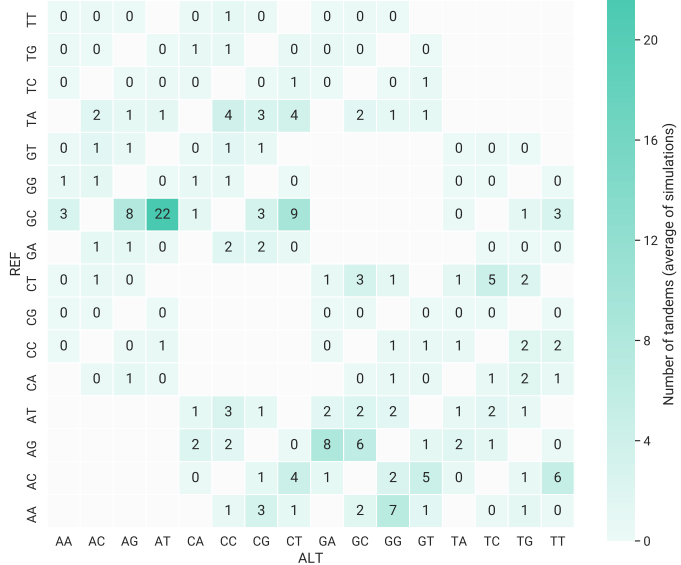
Distribution of mutation clusters by size (IGKV4-1\*01)

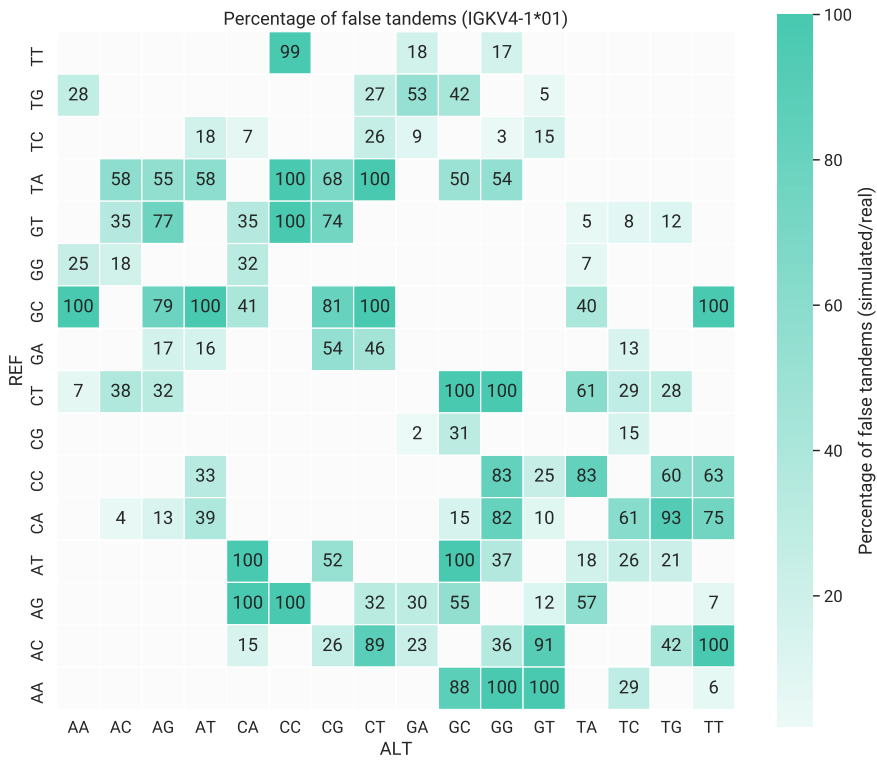
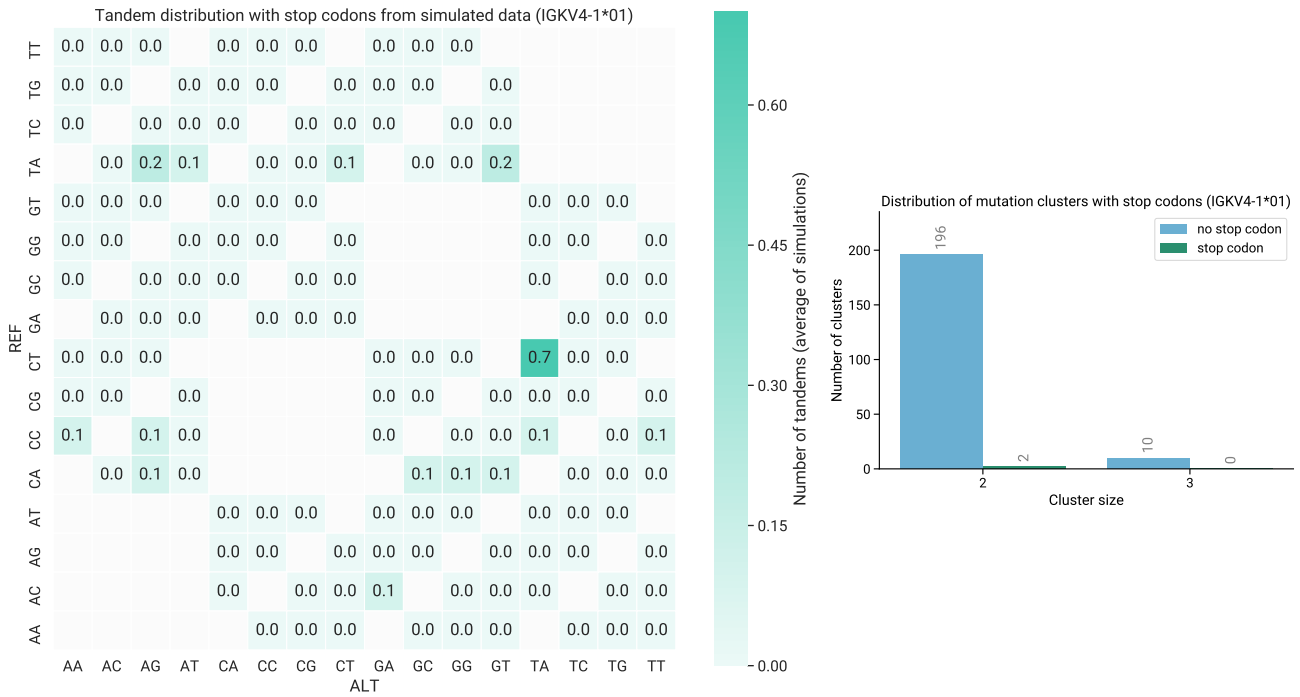


Tandem distribution from real data (IGKV4-1\*01)



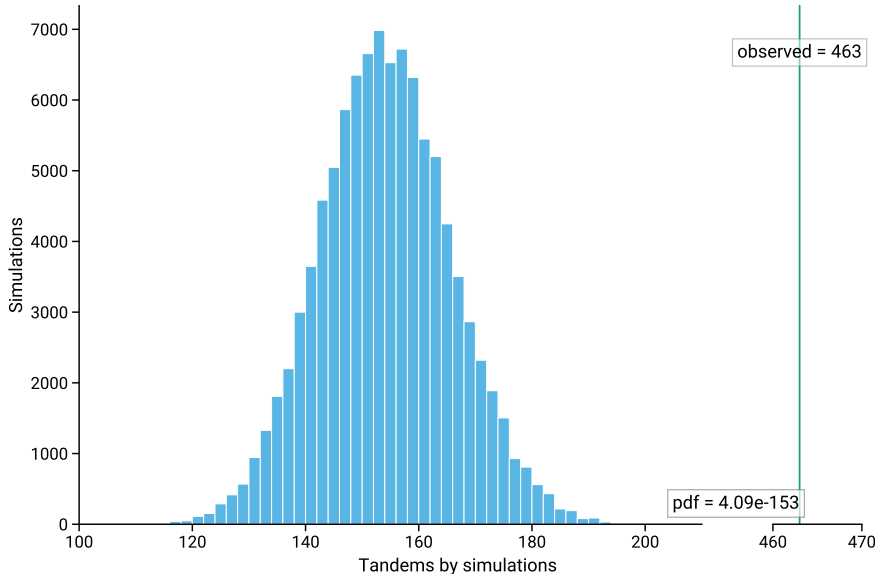
Tandem distribution from simulated data (IGKV4-1\*01)



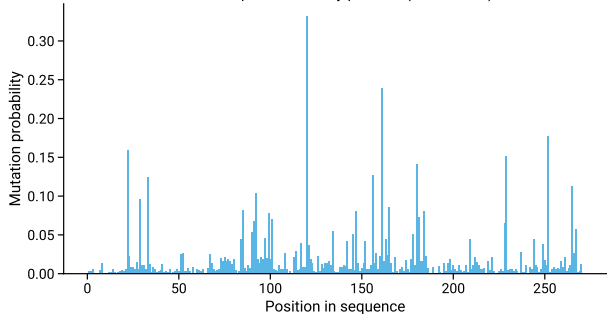


### 1.16 IGLV2-8\*01

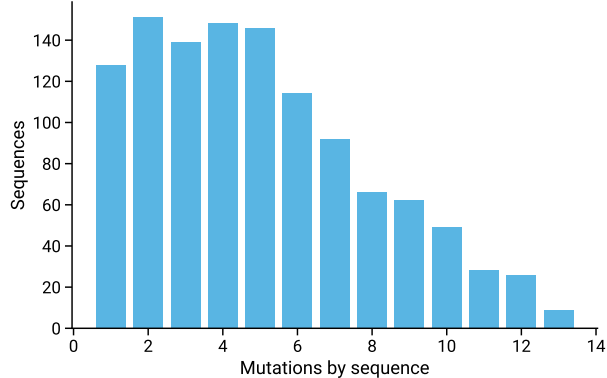
Distribution of tandems by simulation (IGLV2-8\*01)



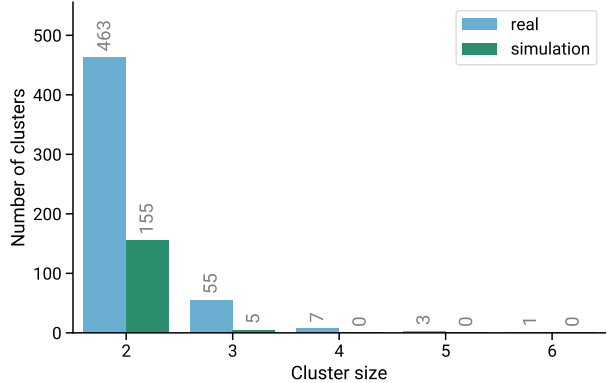
Mutation probabilities by position (IGLV2-8\*01)



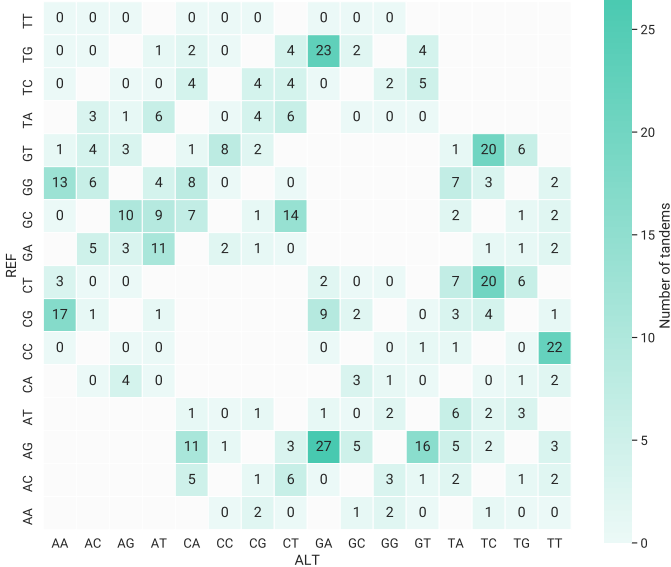
Distribution of mutations by sequence (IGLV2-8\*01)



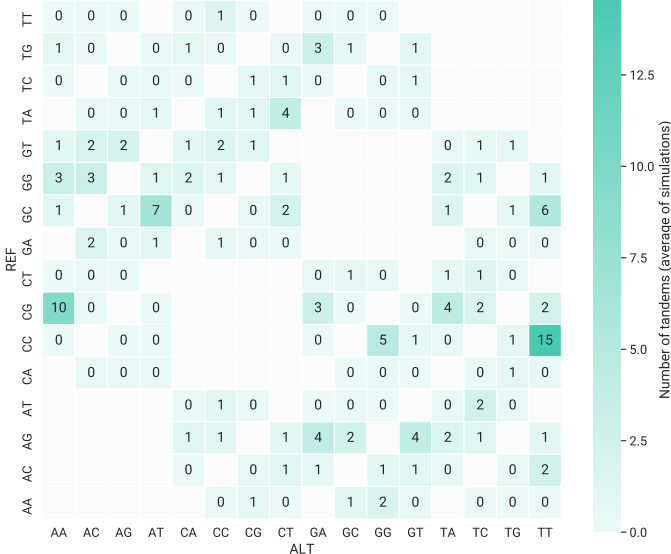
Distribution of mutation clusters by size (IGLV2-8\*01)



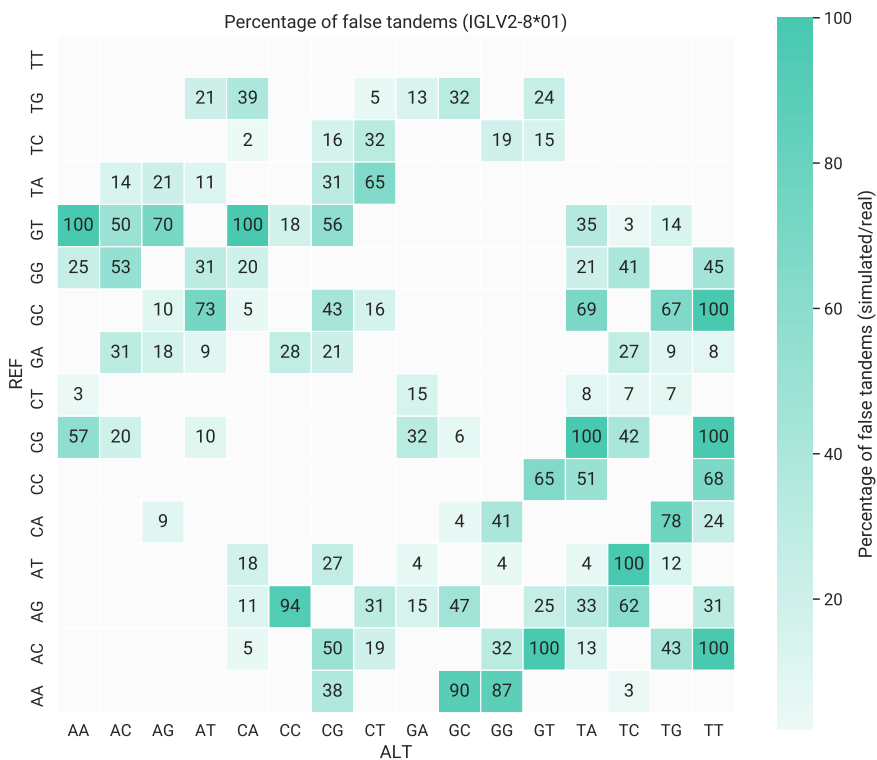
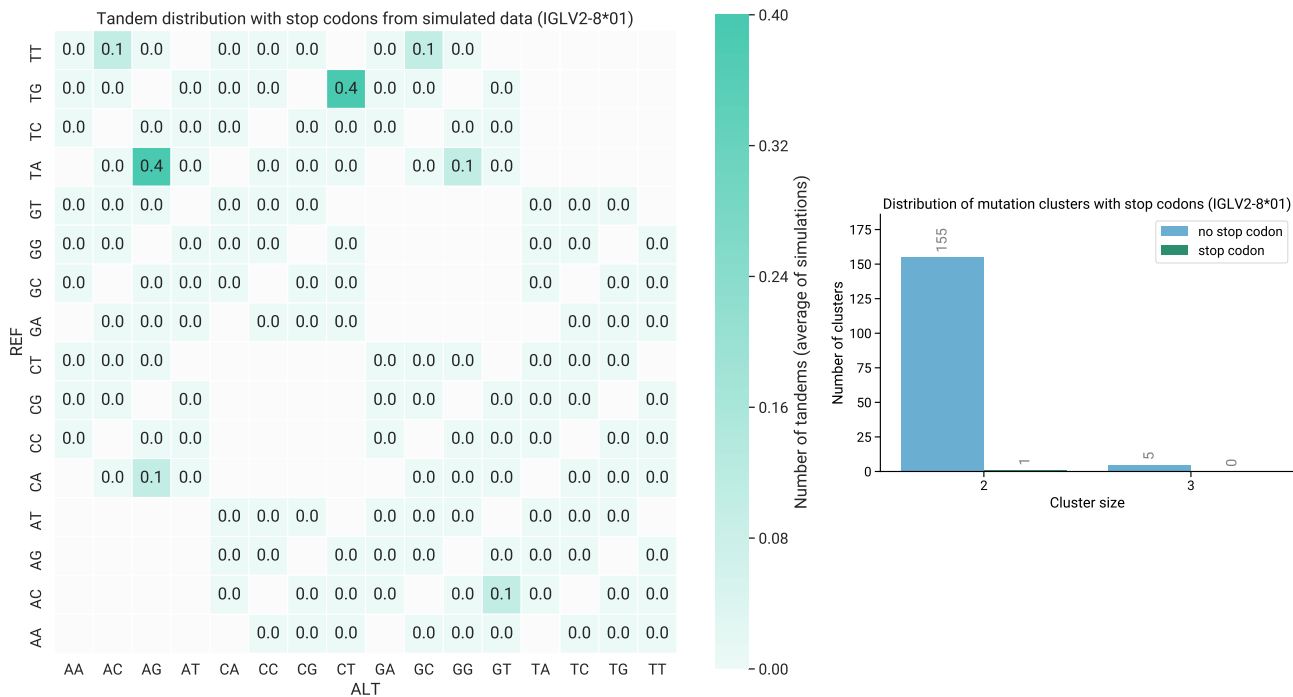
Tandem distribution from real data (IGLV2-8\*01)



Tandem distribution from simulated data (IGLV2-8\*01)

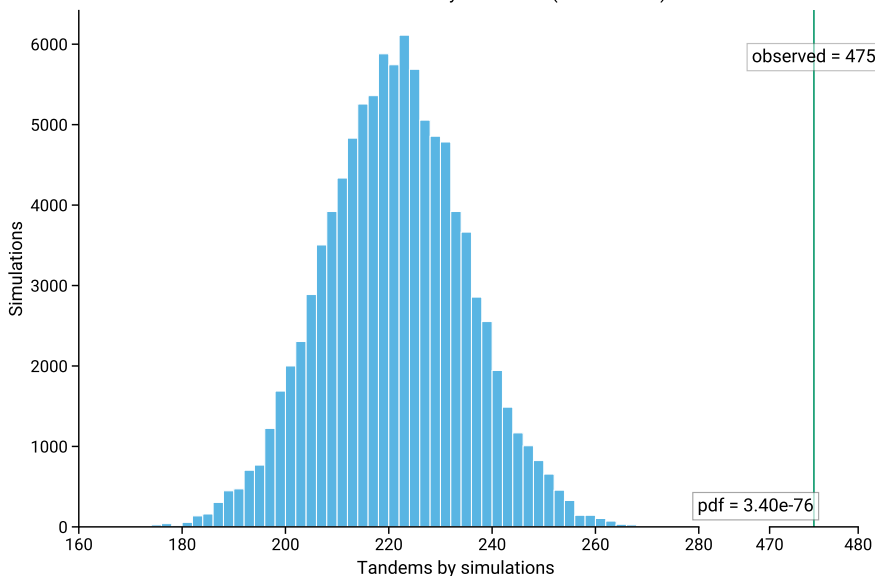




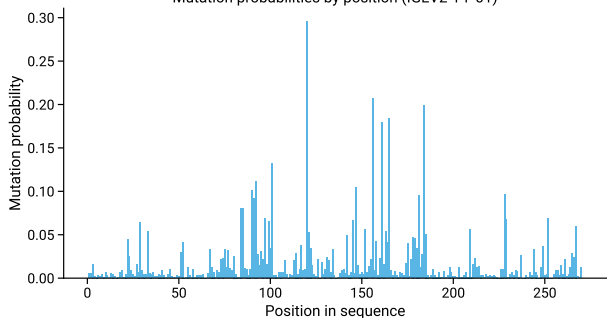


# 1.17 IGLV2-14\*01

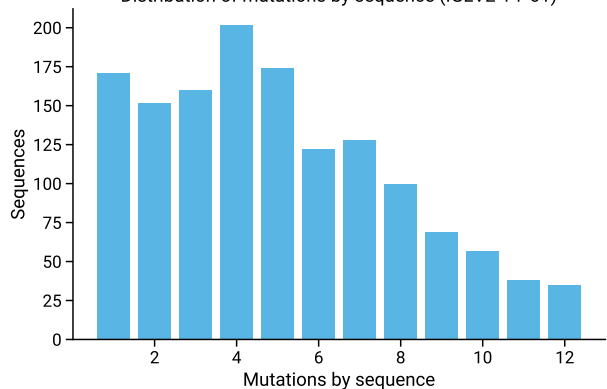
Distribution of tandems by simulation (IGLV2-14\*01)



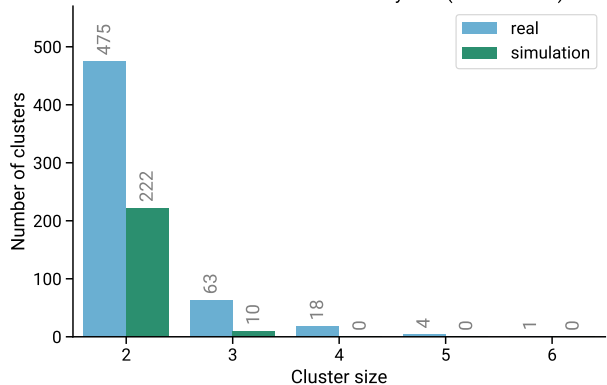
Mutation probabilities by position (IGLV2-14\*01)



Distribution of mutations by sequence (IGLV2-14\*01)



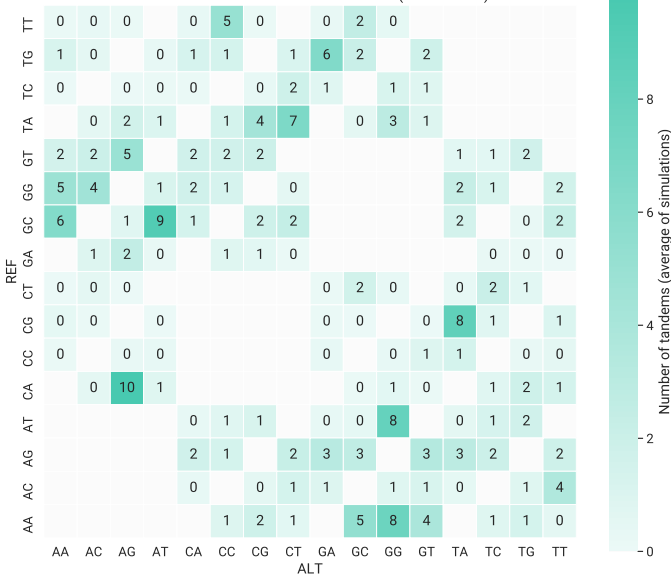
Distribution of mutation clusters by size (IGLV2-14\*01)

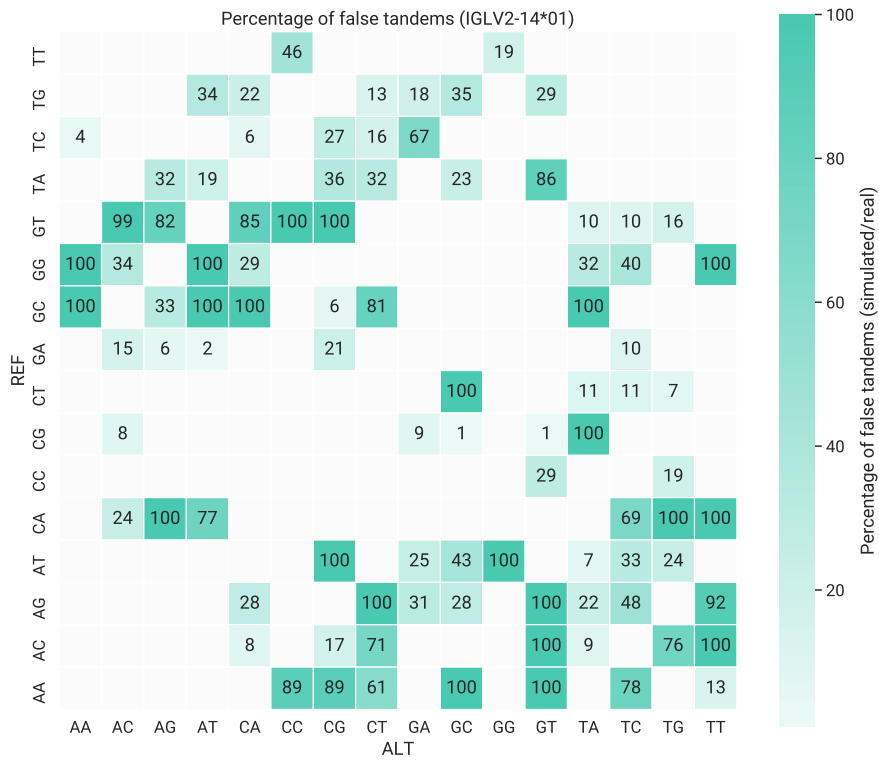
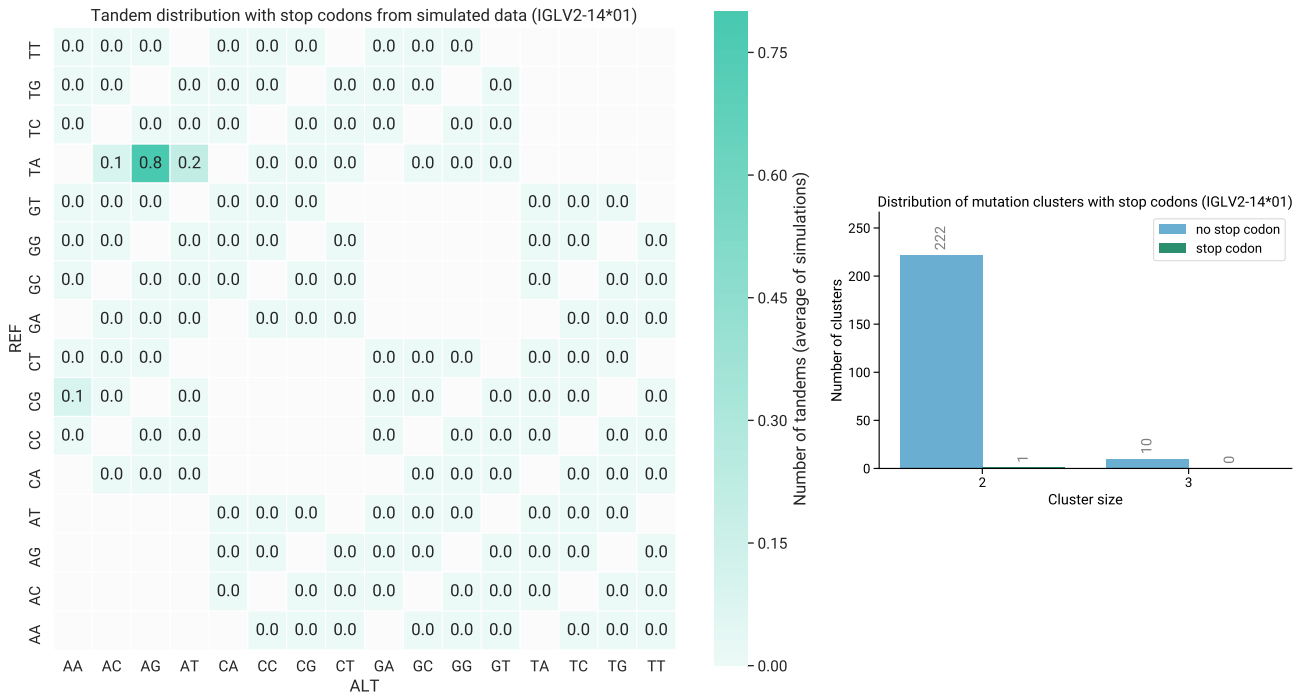


Tandem distribution from real data (IGLV2-14\*01)



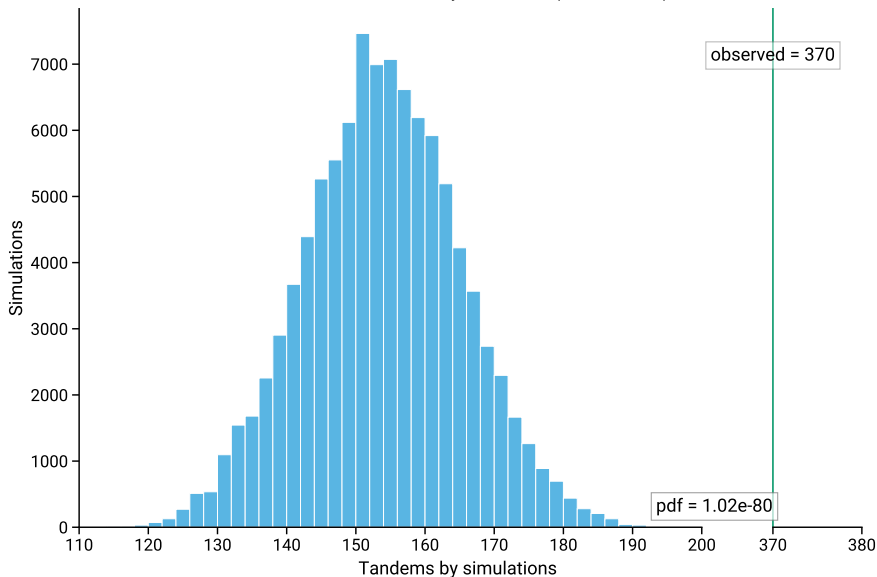
Tandem distribution from simulated data (IGLV2-14\*01)



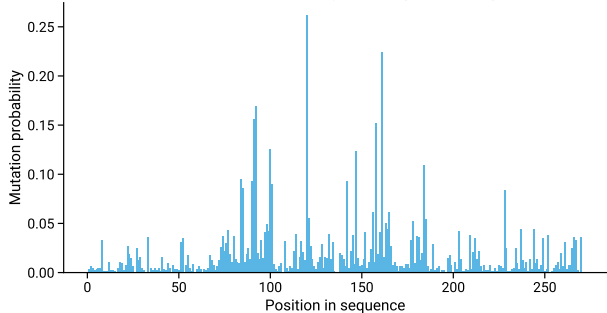


# 1.18 IGLV2-23\*01

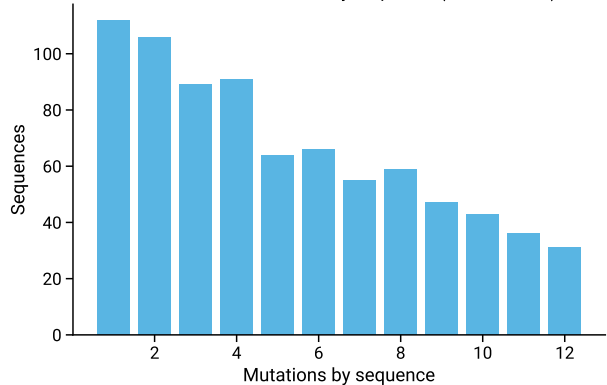
Distribution of tandems by simulation (IGLV2-23\*01)



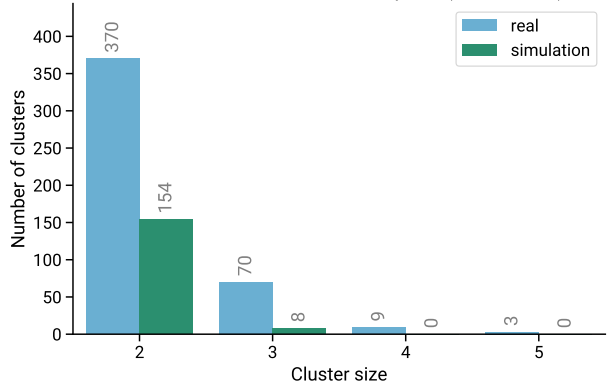
Mutation probabilities by position (IGLV2-23\*01)



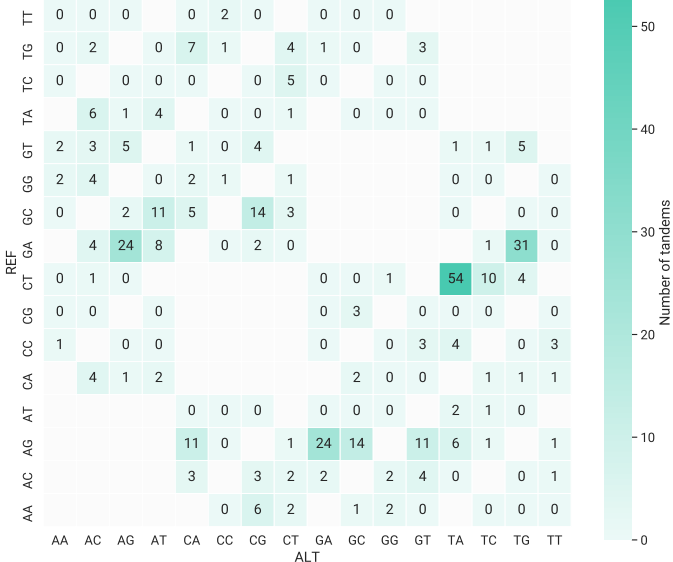
Distribution of mutations by sequence (IGLV2-23\*01)



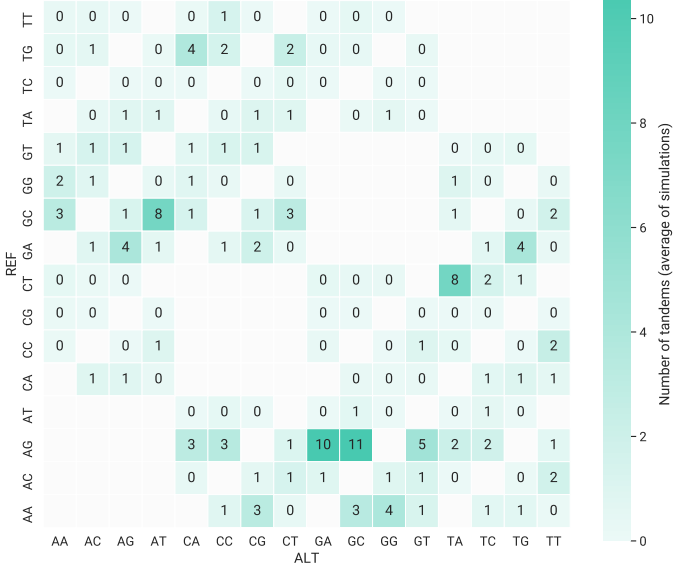
Distribution of mutation clusters by size (IGLV2-23\*01)

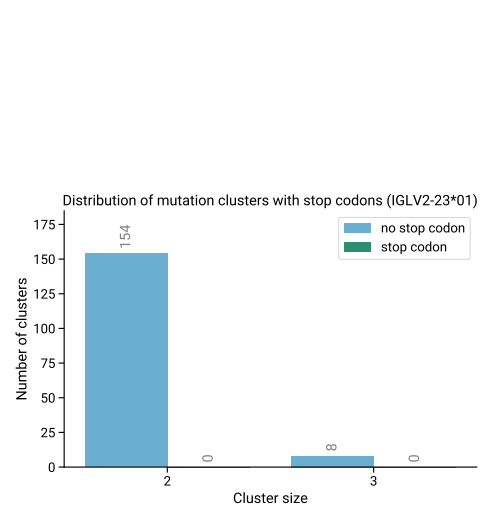
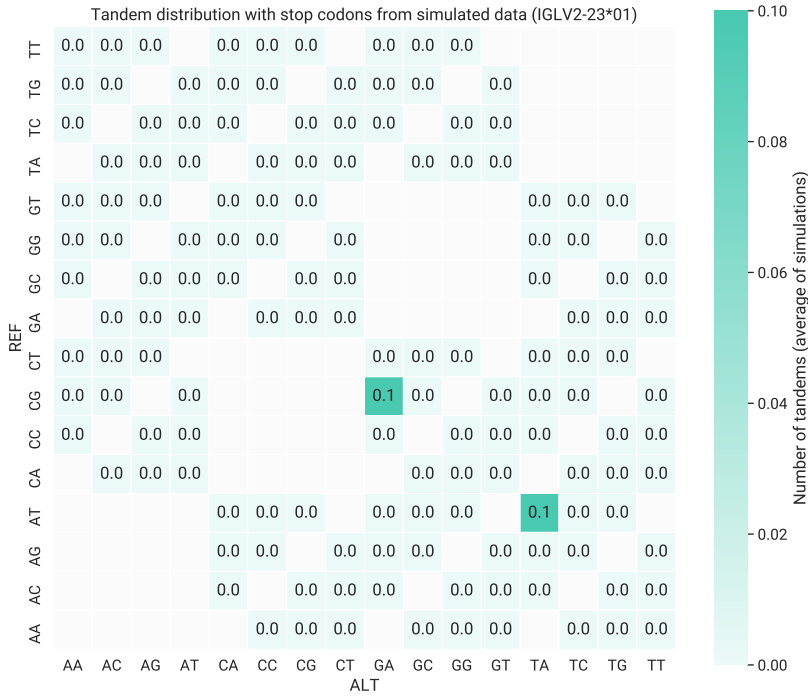


Tandem distribution from real data (IGLV2-23\*01)



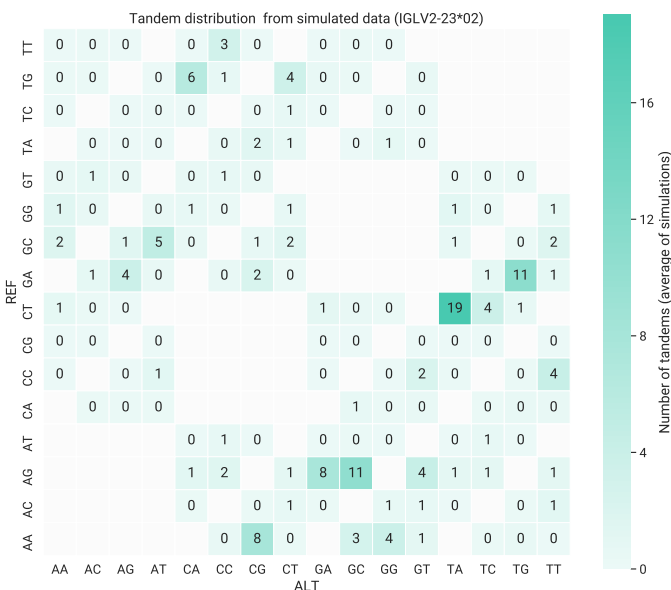
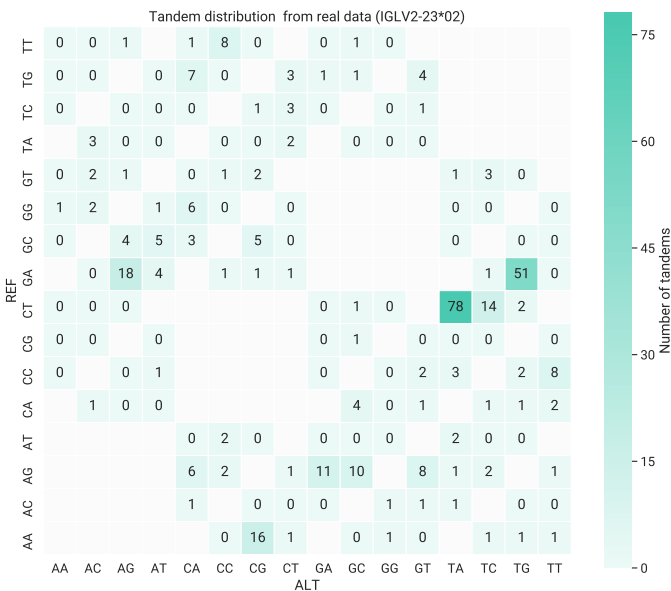
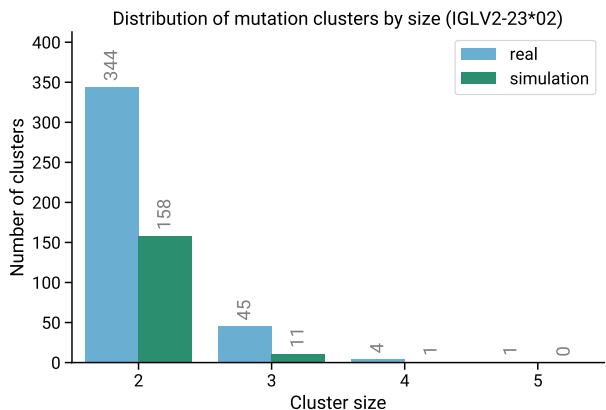
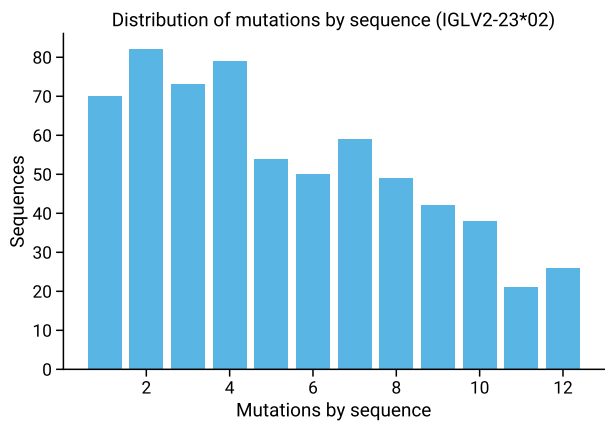
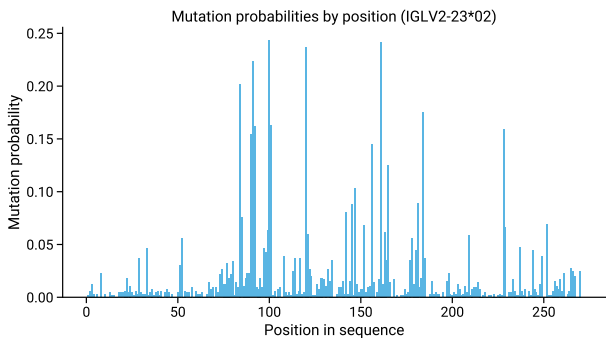
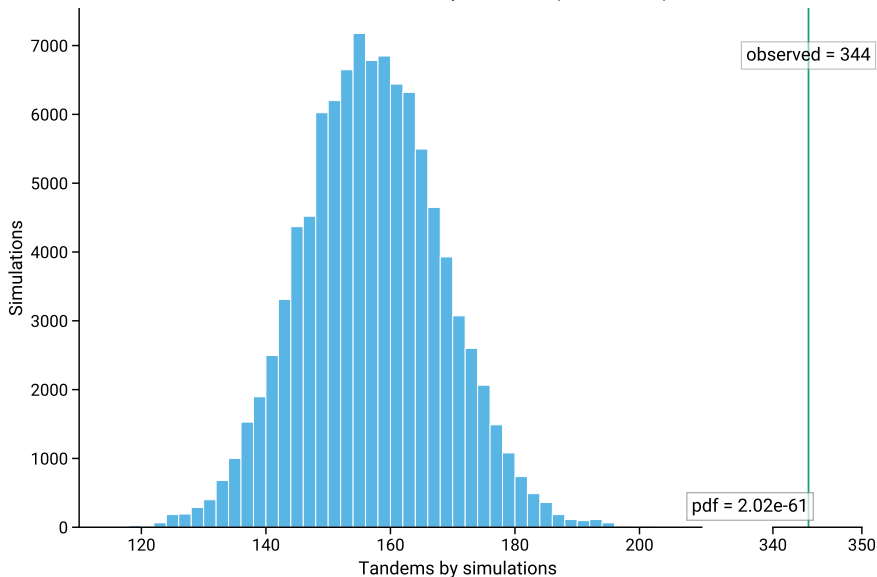
Tandem distribution from simulated data (IGLV2-23\*01)

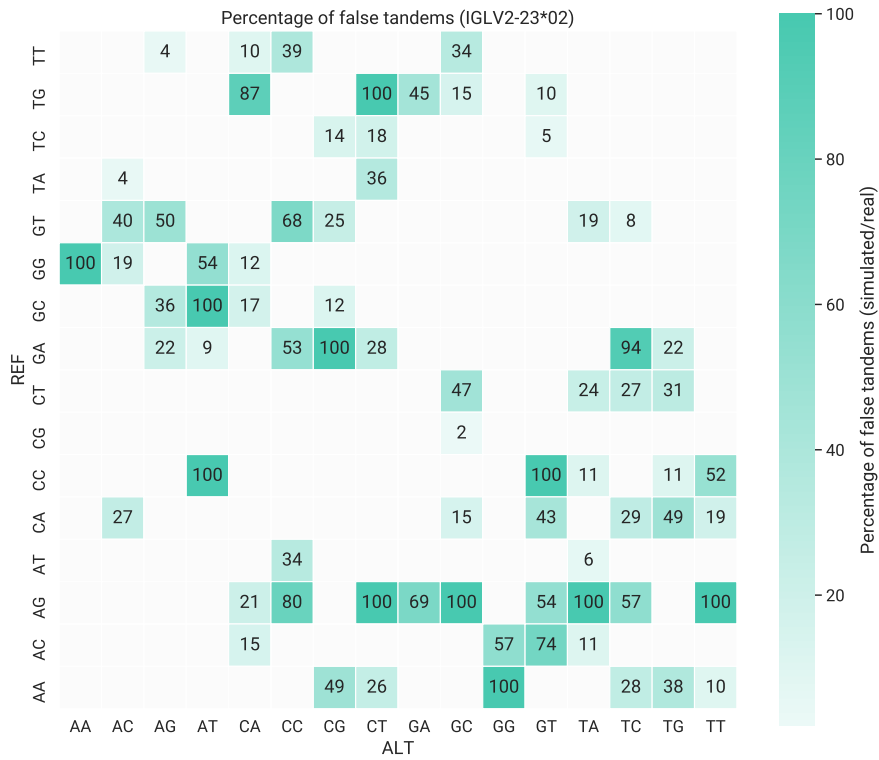
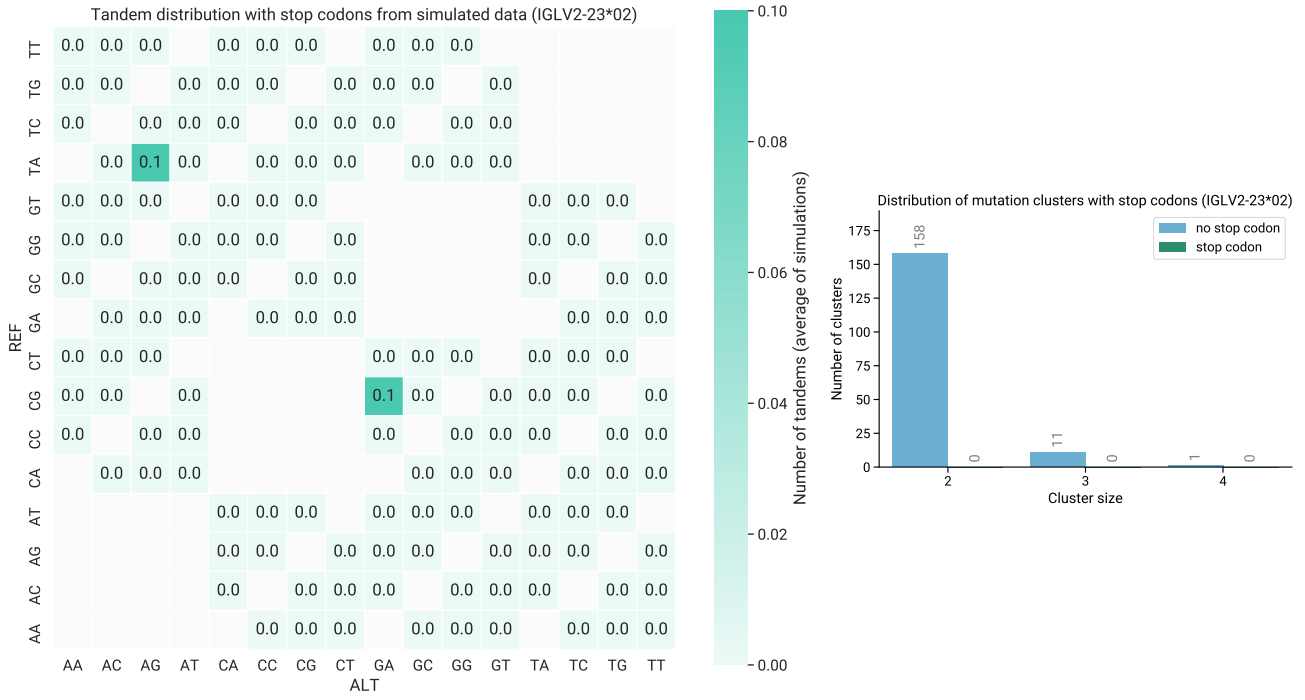




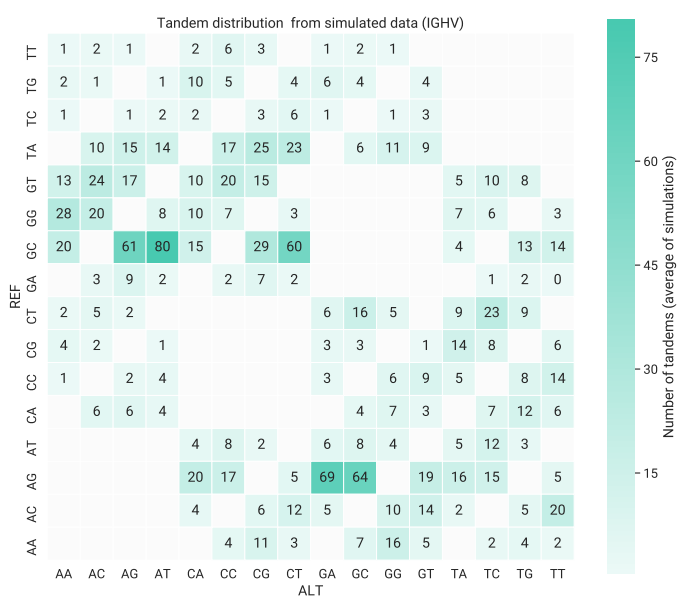
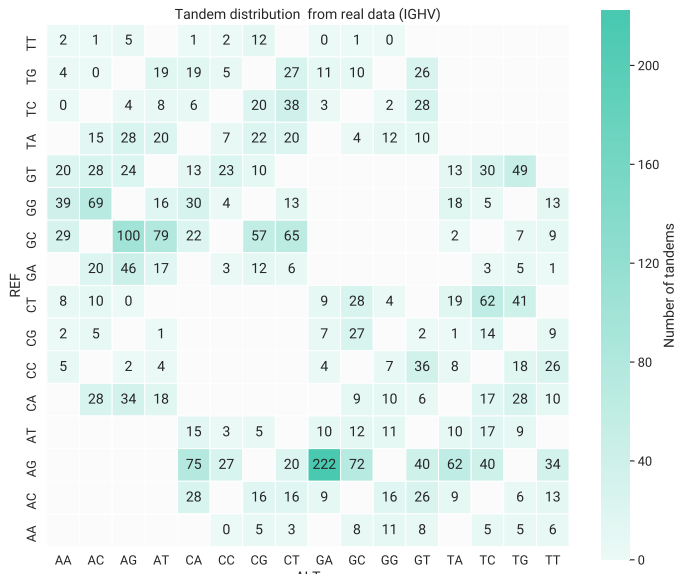
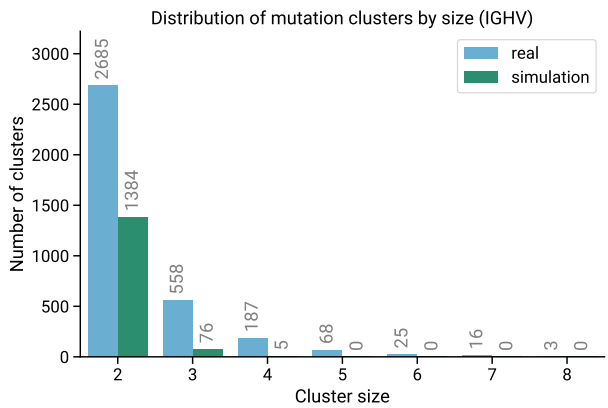
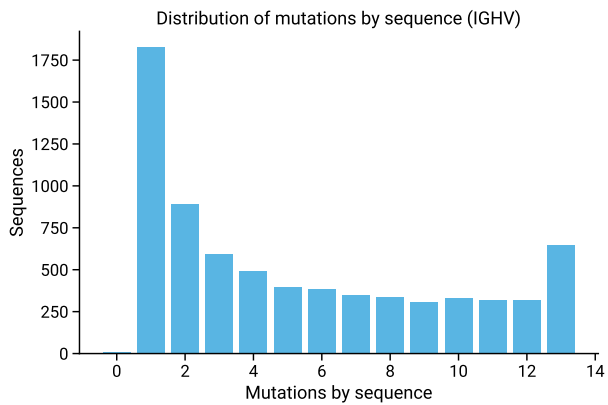
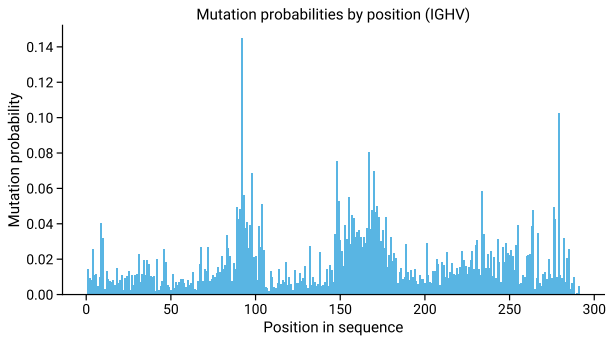
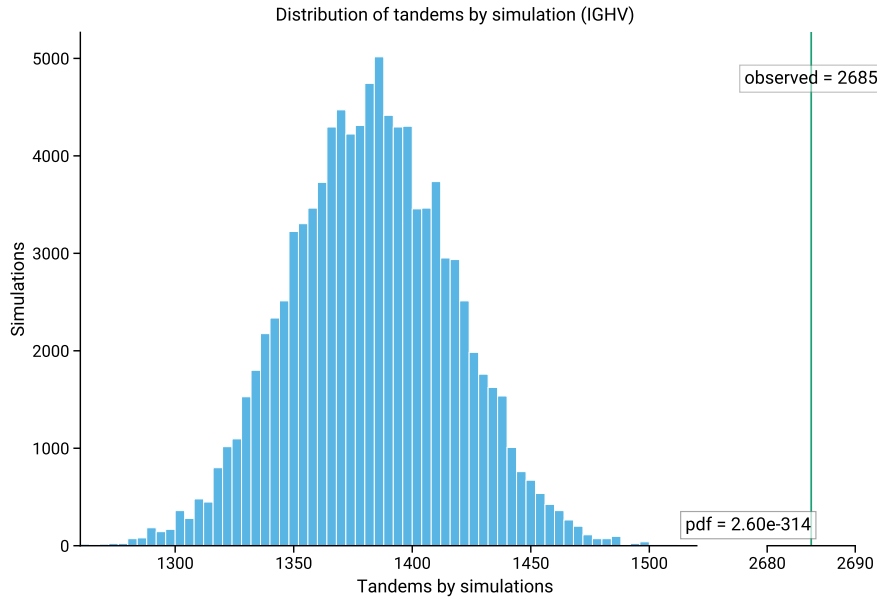
# 1.19 IGLV2-23\*02

Distribution of tandems by simulation (IGLV2-23\*02)

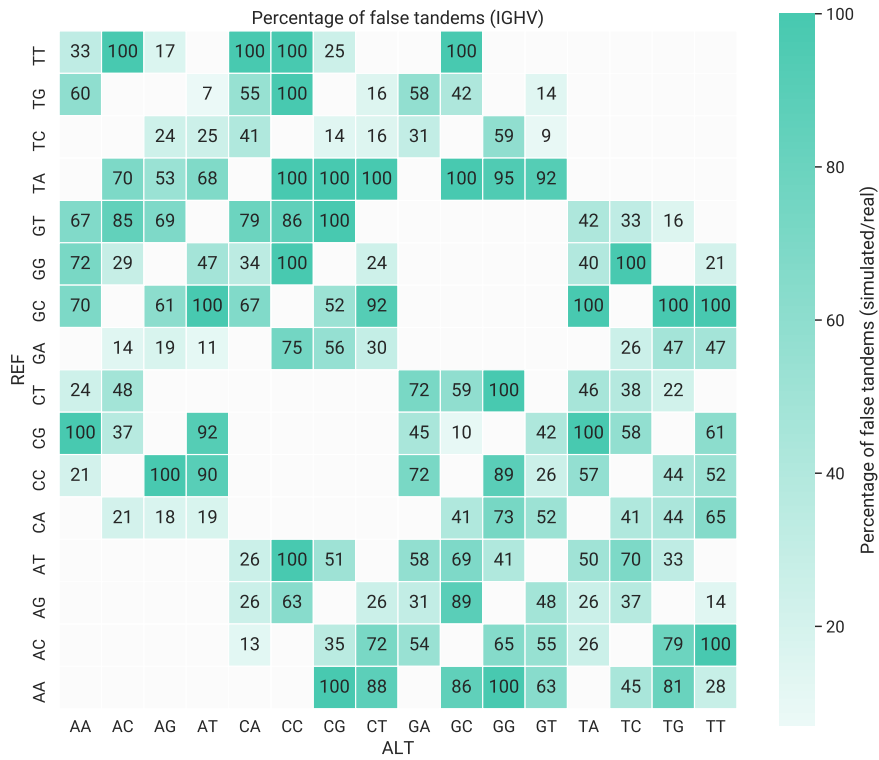
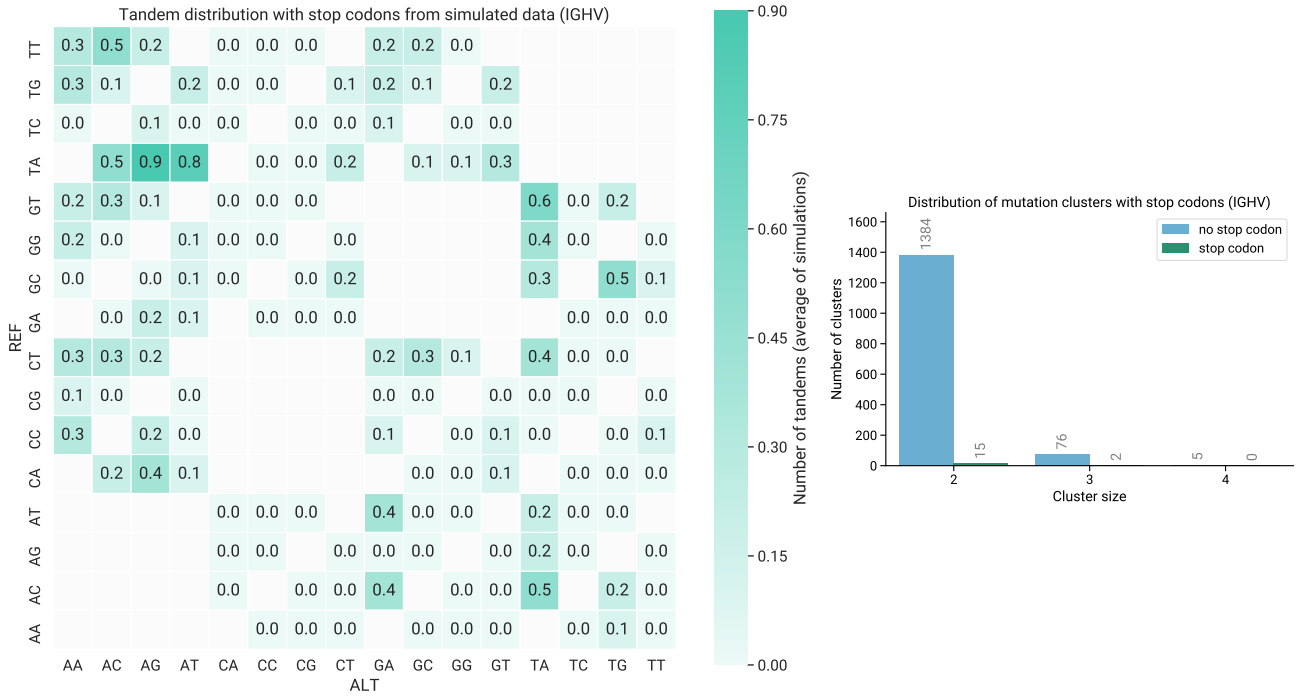




# 1.20 IGHV

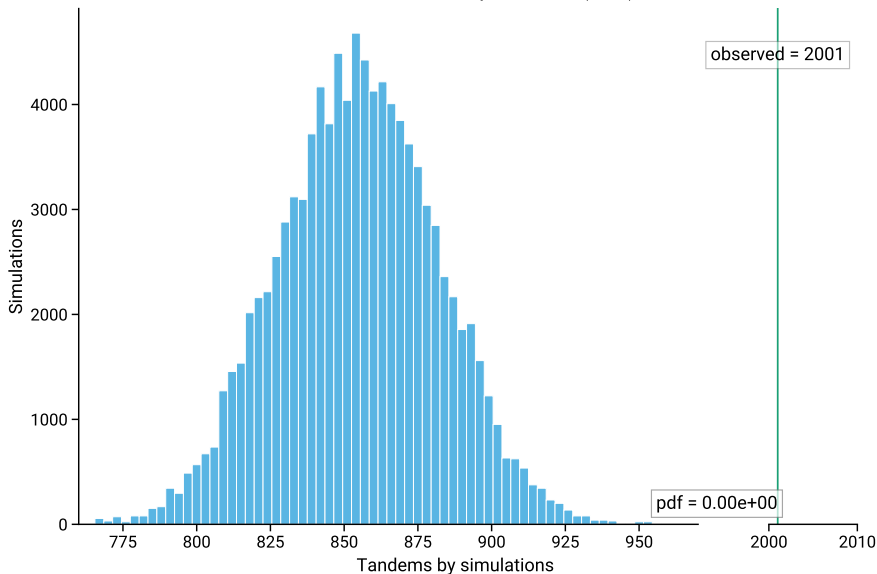




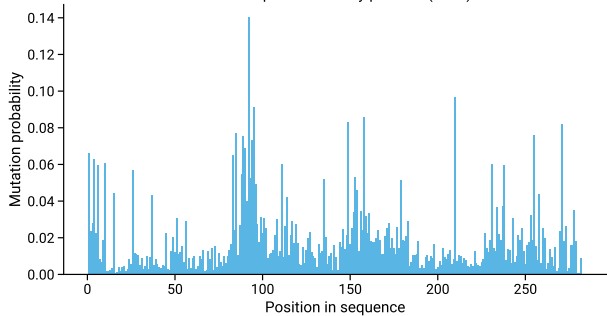


# 1.21 IGKV

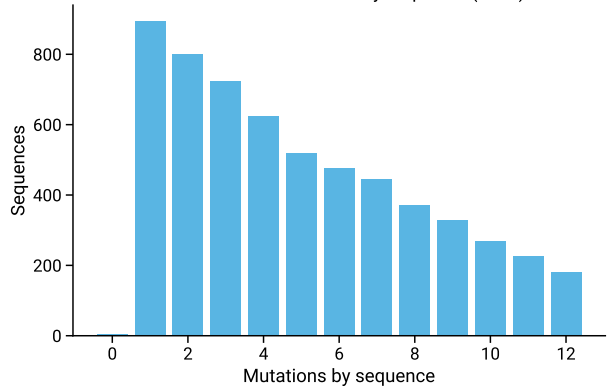
Distribution of tandems by simulation (IGKV)



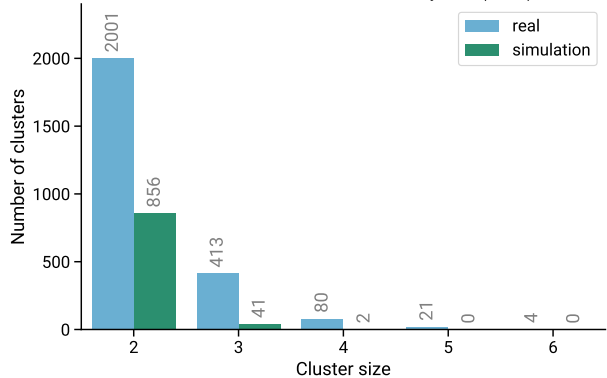
Mutation probabilities by position (IGKV)



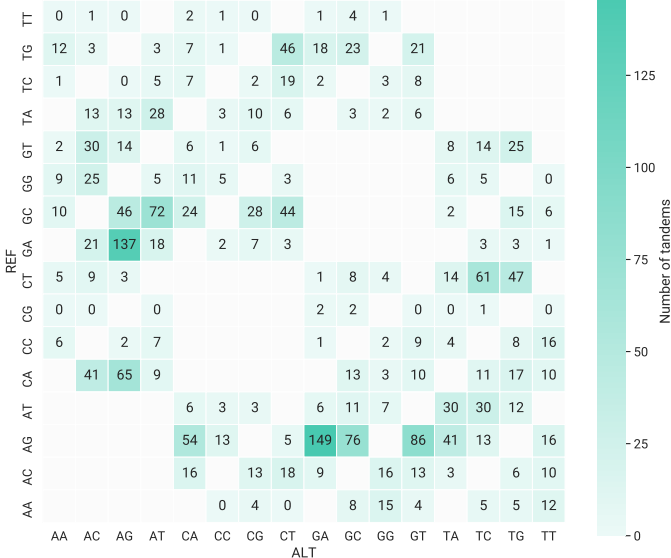
Distribution of mutations by sequence (IGKV)



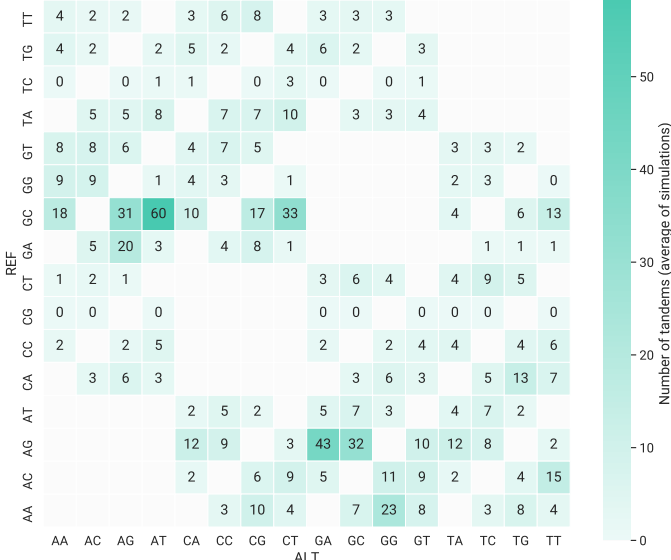
Distribution of mutation clusters by size (IGKV)

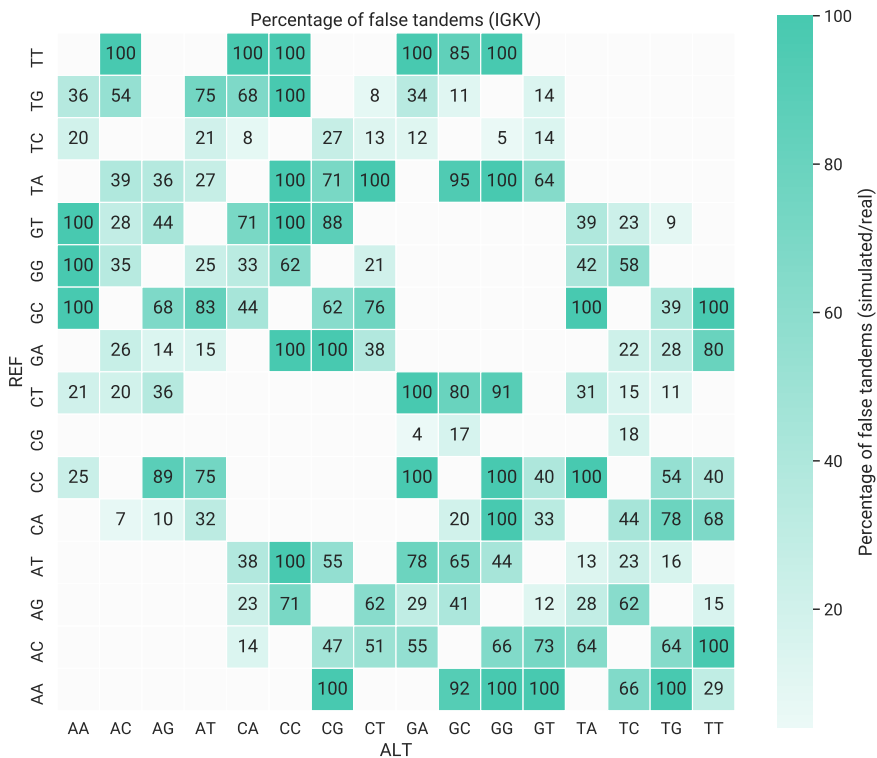
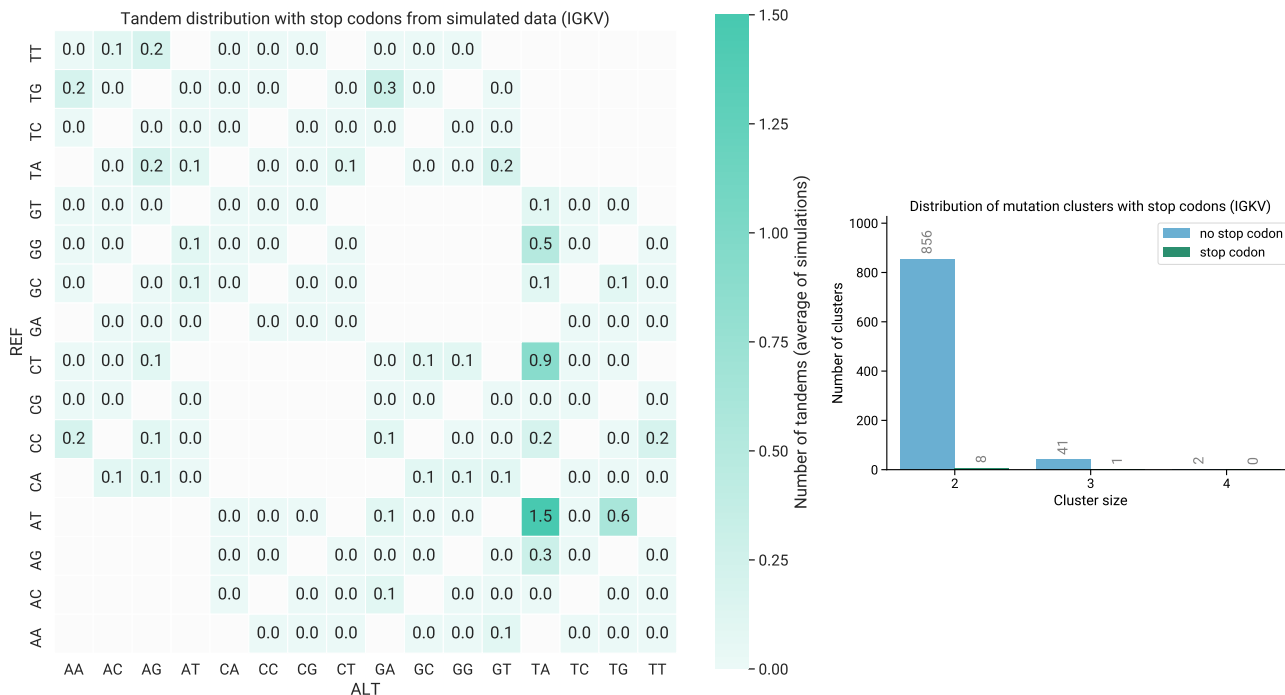


Tandem distribution from real data (IGKV)

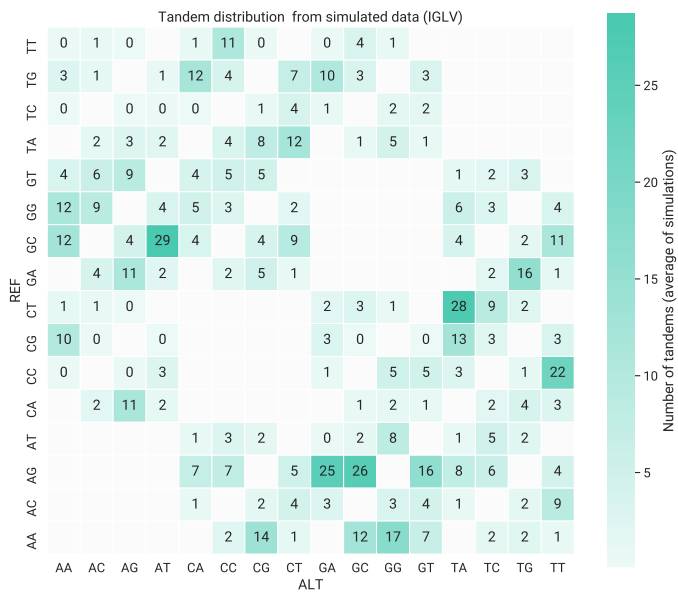
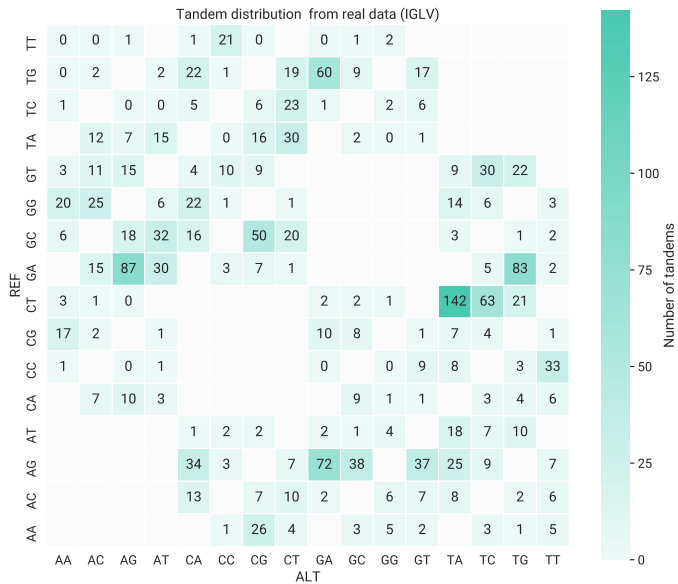
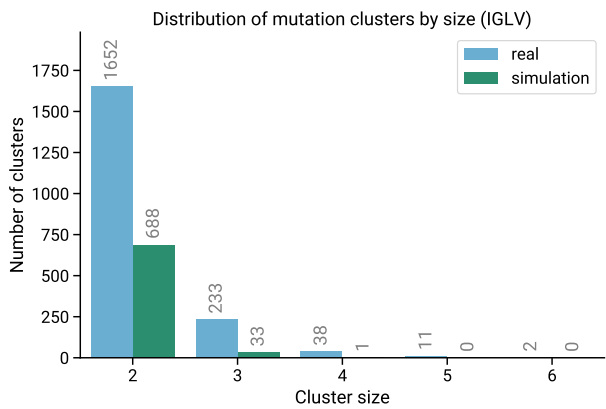
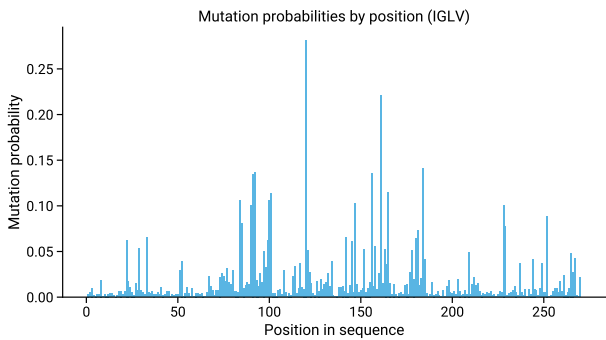
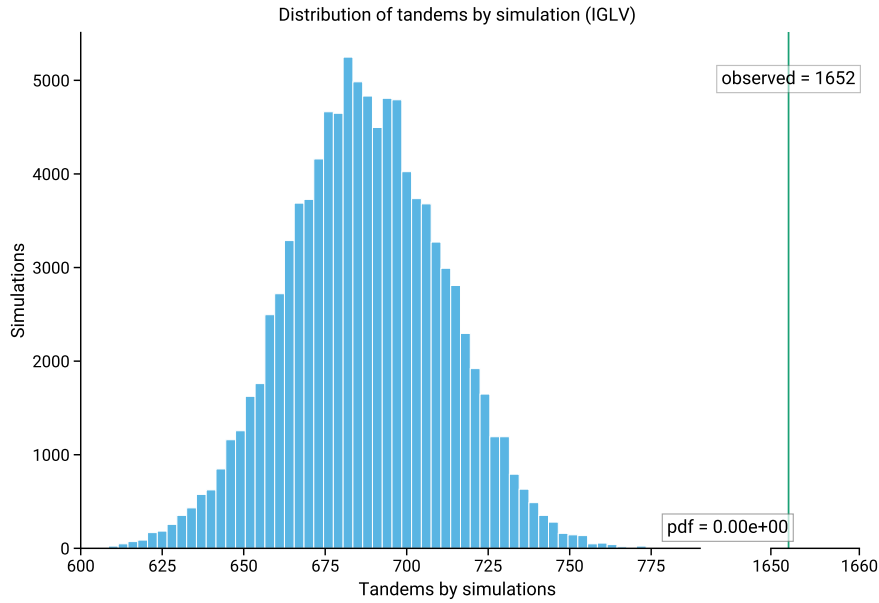


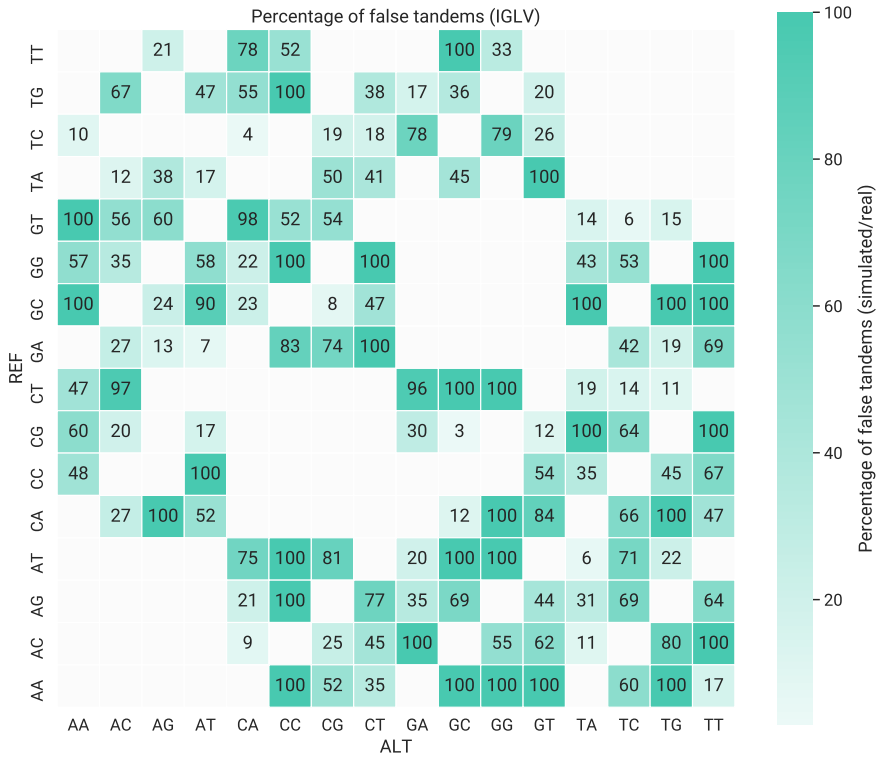
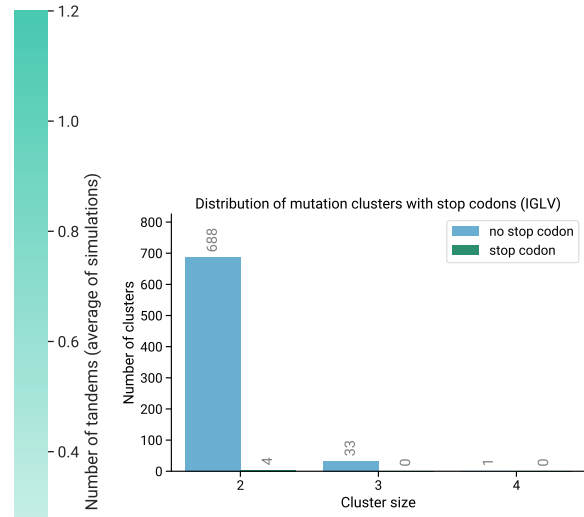
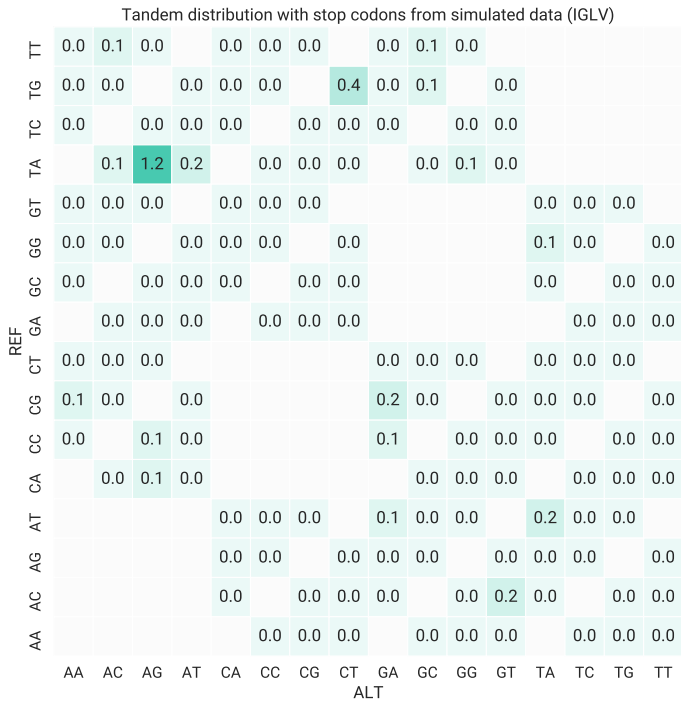
Tandem distribution from simulated data (IGKV)



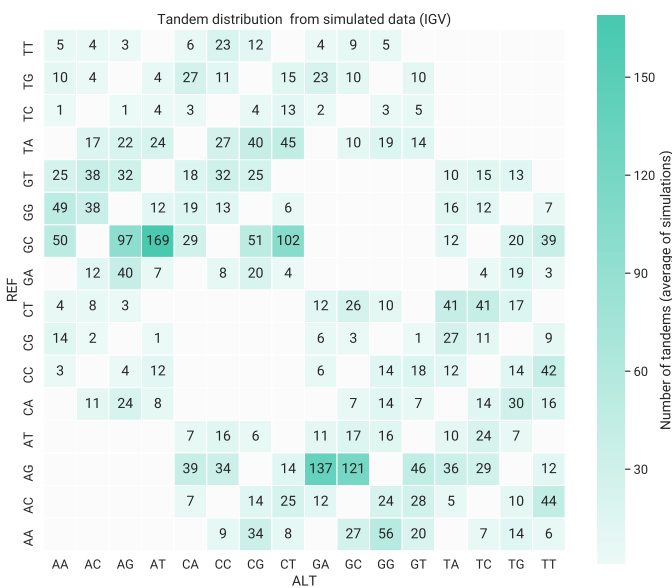
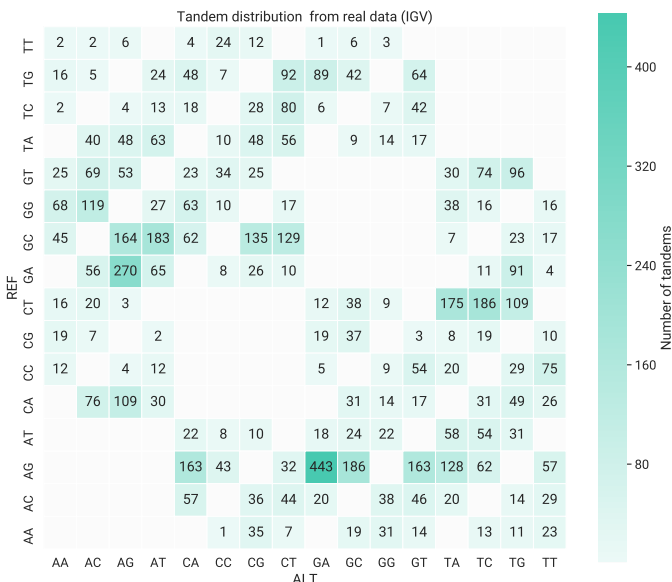
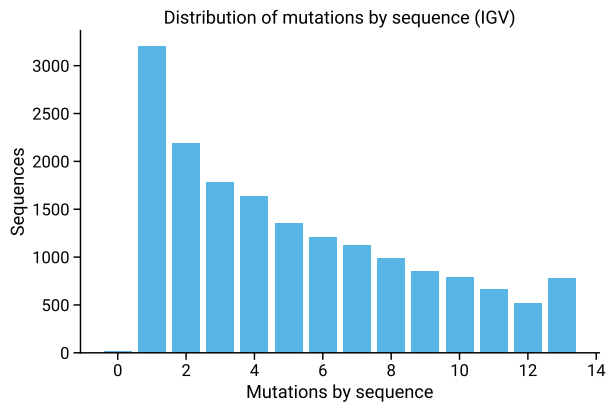
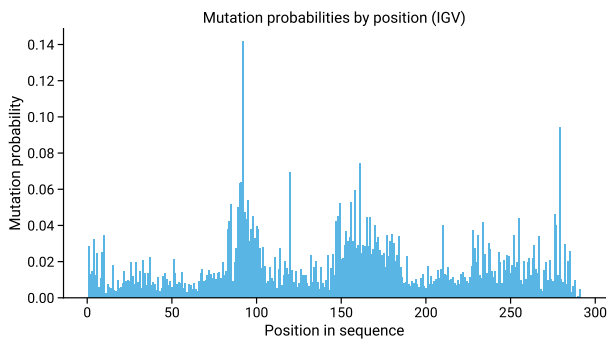
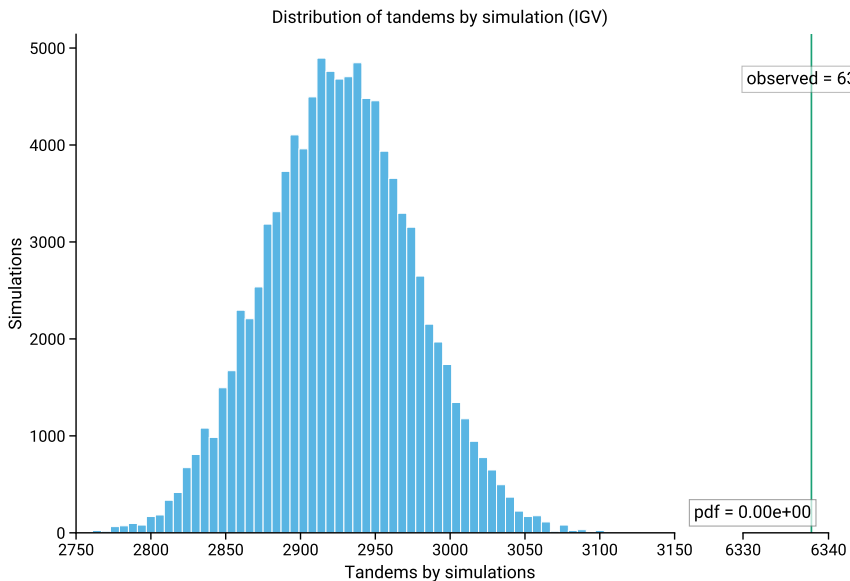


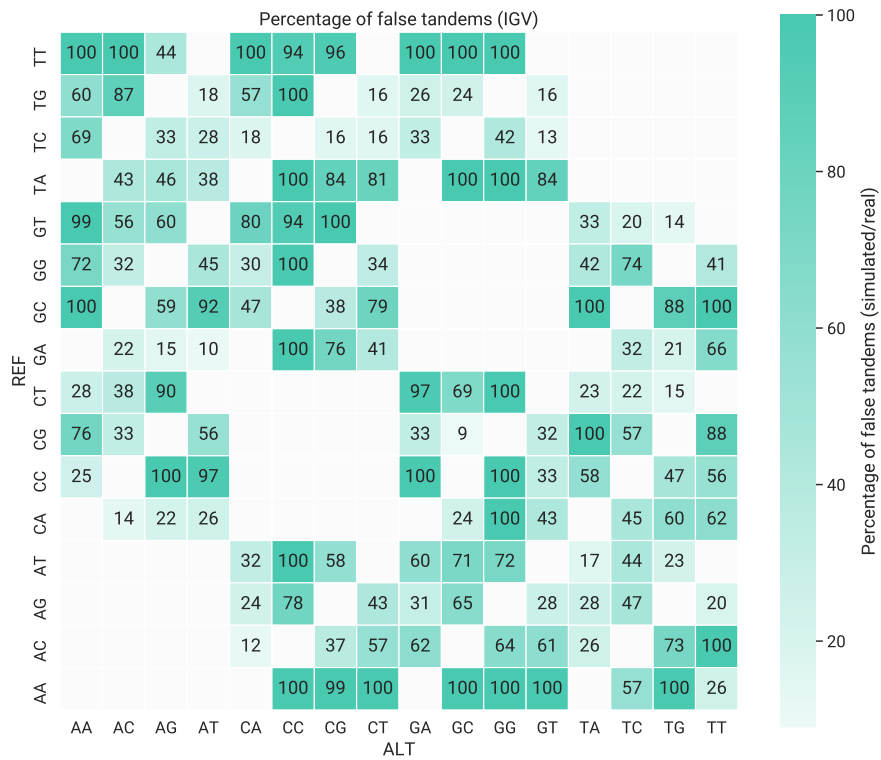
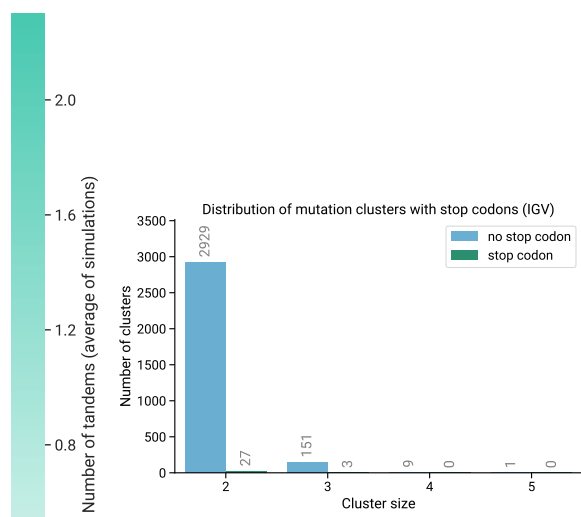
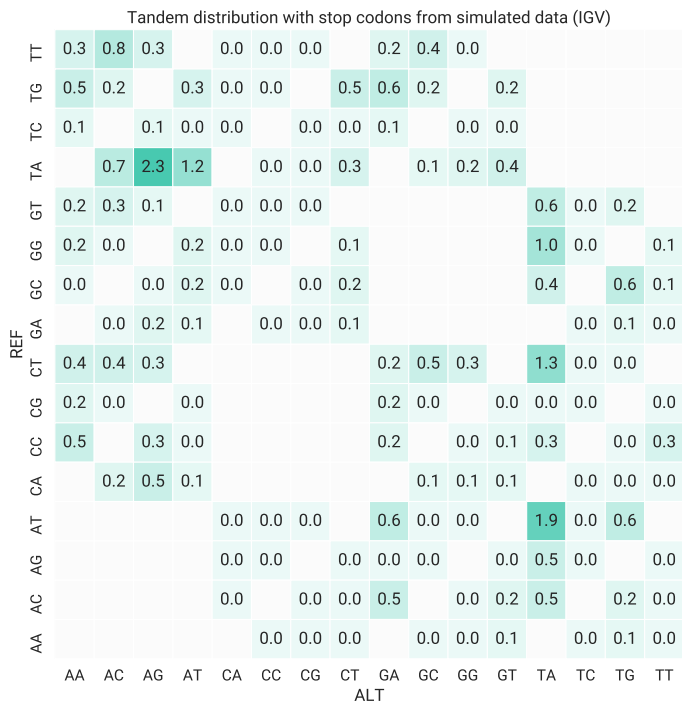
# 1.22 IGLV





# 1.23 IGV

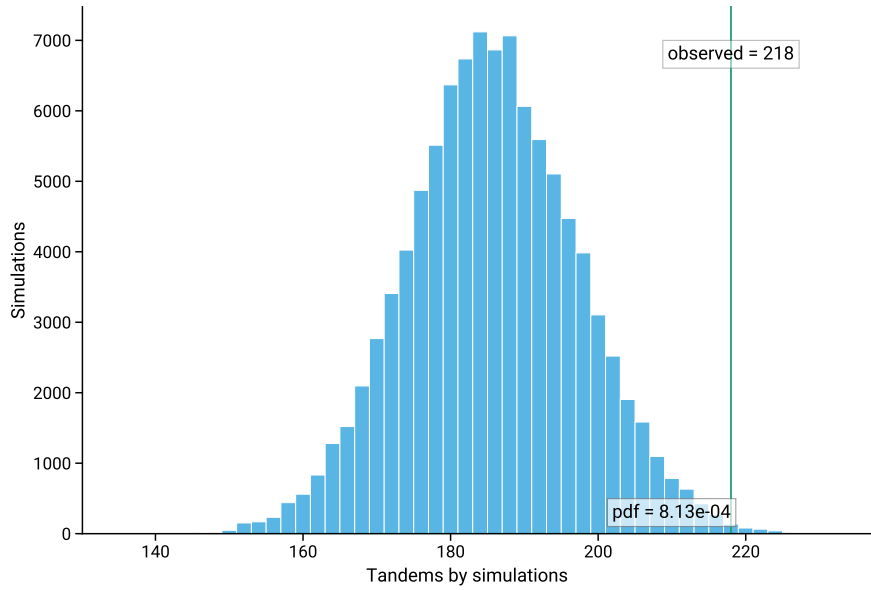




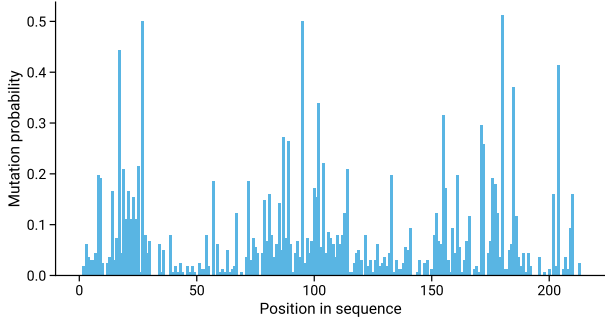
# ROTTERDAM HEALTHY DONOR COHORT

## 2.1 IGHV1-2\_02

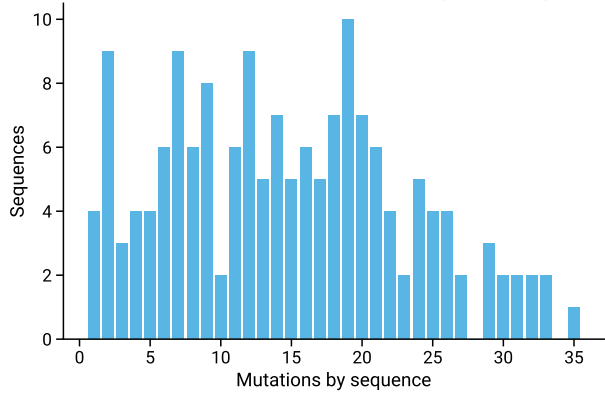
Distribution of tandems by simulation (IGHV1-2\*02)



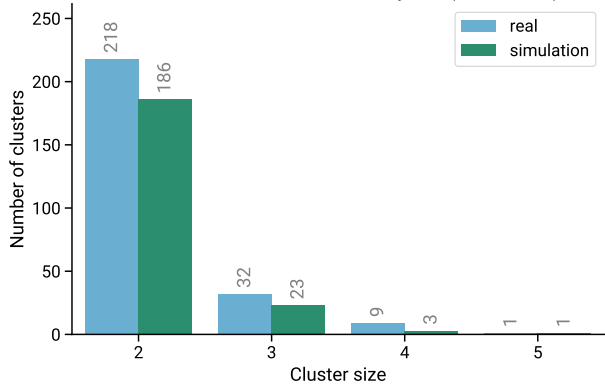
Mutation probabilities by position (IGHV1-2\*02)



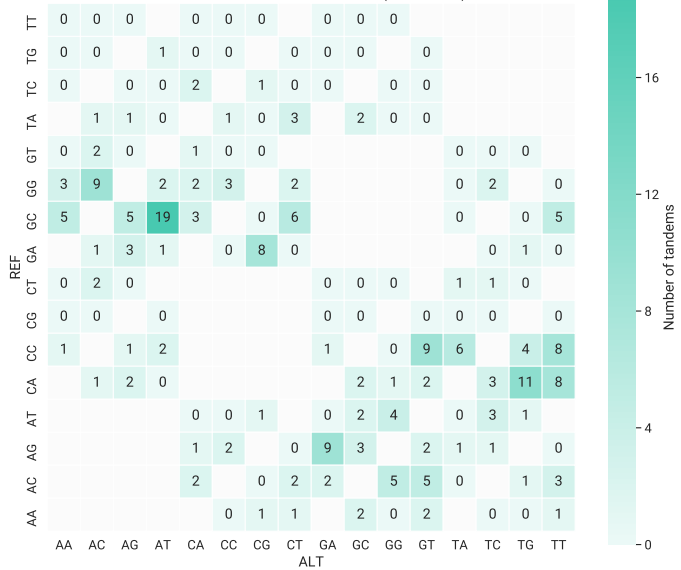
Distribution of mutations by sequence (IGHV1-2\*02)



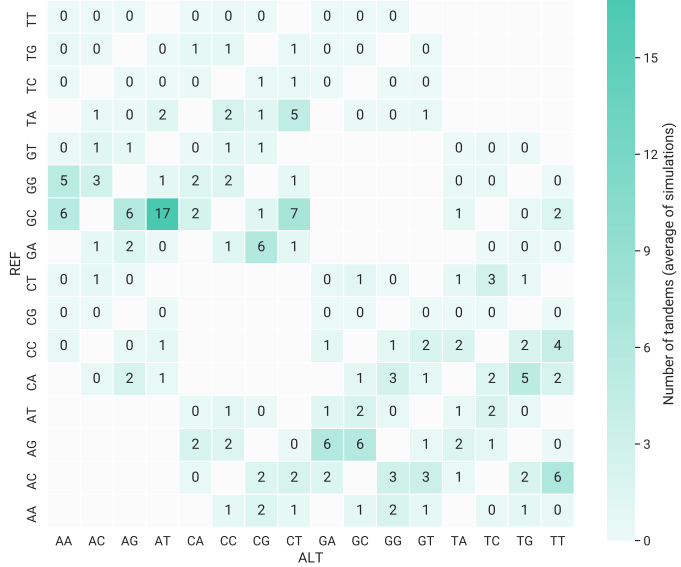
Distribution of mutation clusters by size (IGHV1-2\*02)



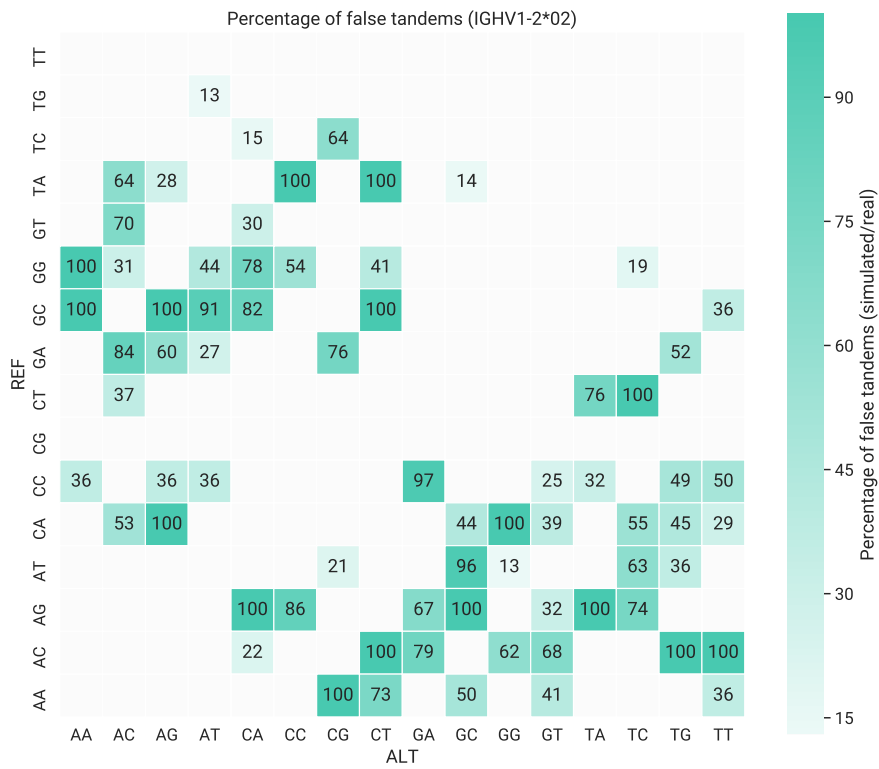
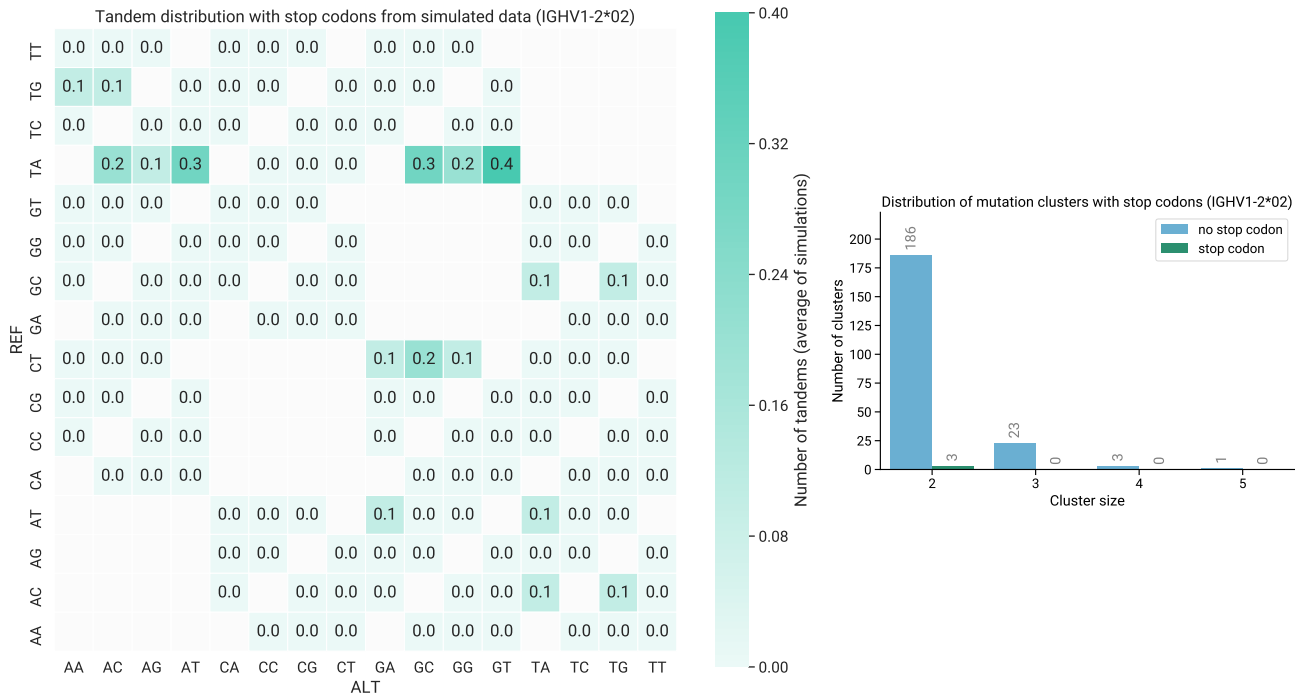
Tandem distribution from real data (IGHV1-2\*02)



Tandem distribution from simulated data (IGHV1-2\*02)

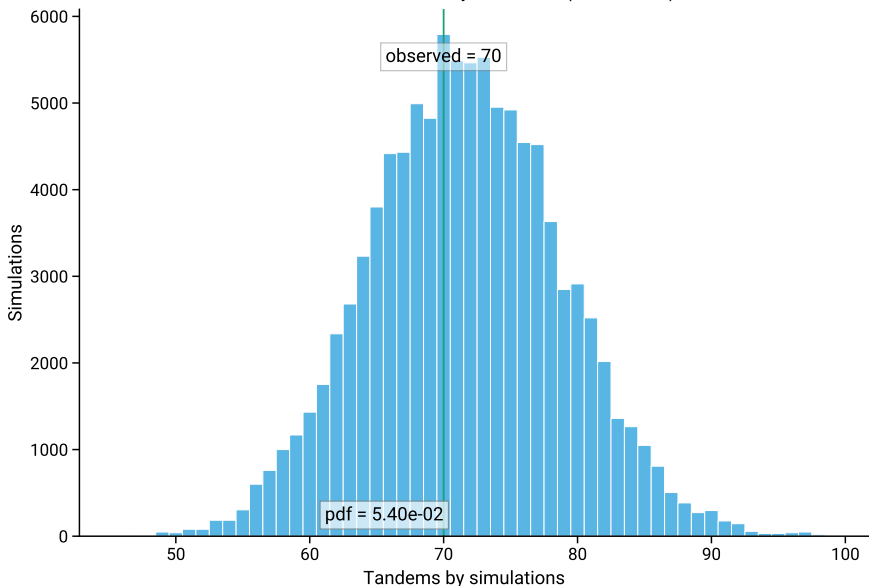




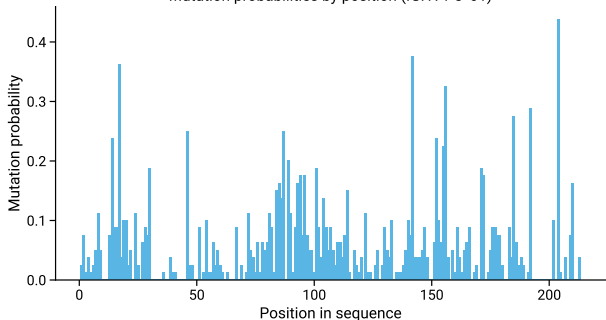


## 2.2 IGHV1-8\_01

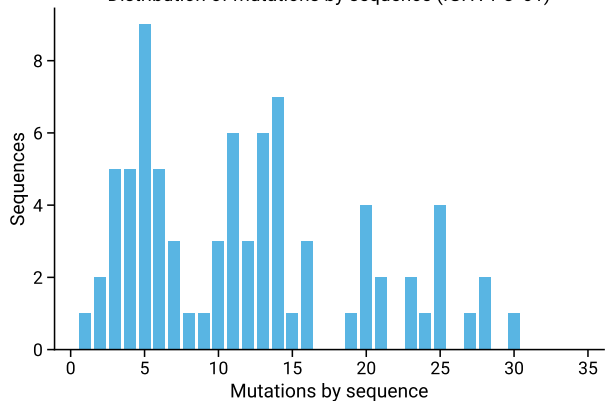
Distribution of tandems by simulation (IGHV1-8\*01)



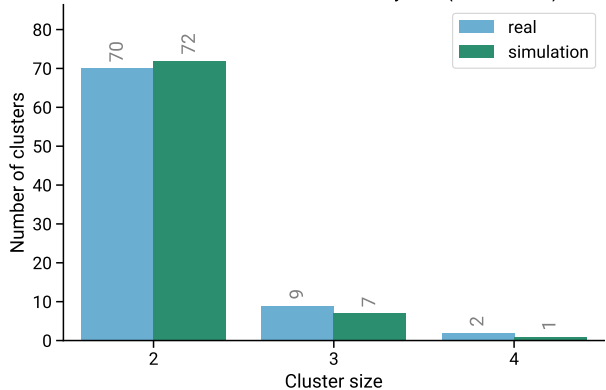
Mutation probabilities by position (IGHV1-8\*01)



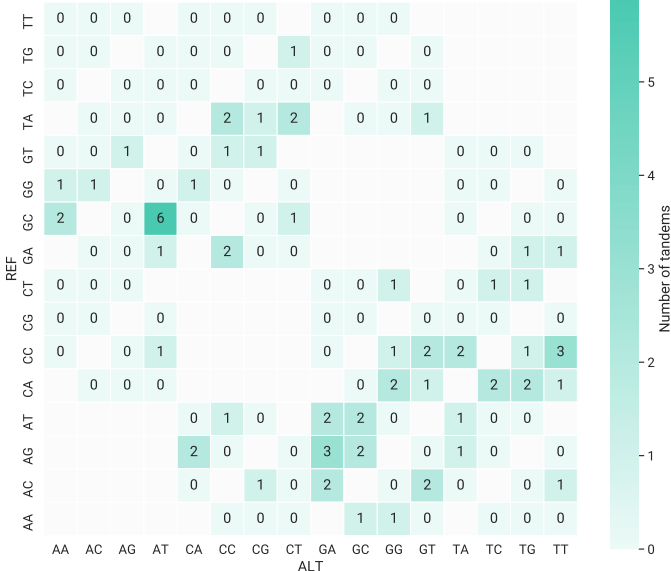
Distribution of mutations by sequence (IGHV1-8\*01)



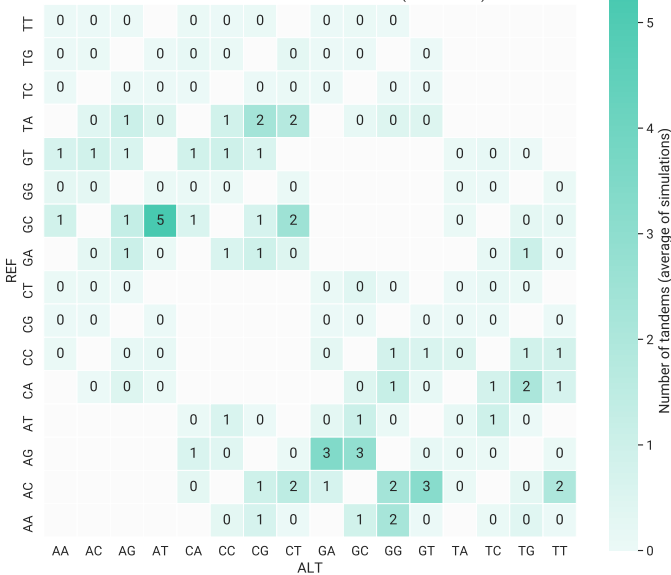
Distribution of mutation clusters by size (IGHV1-8\*01)

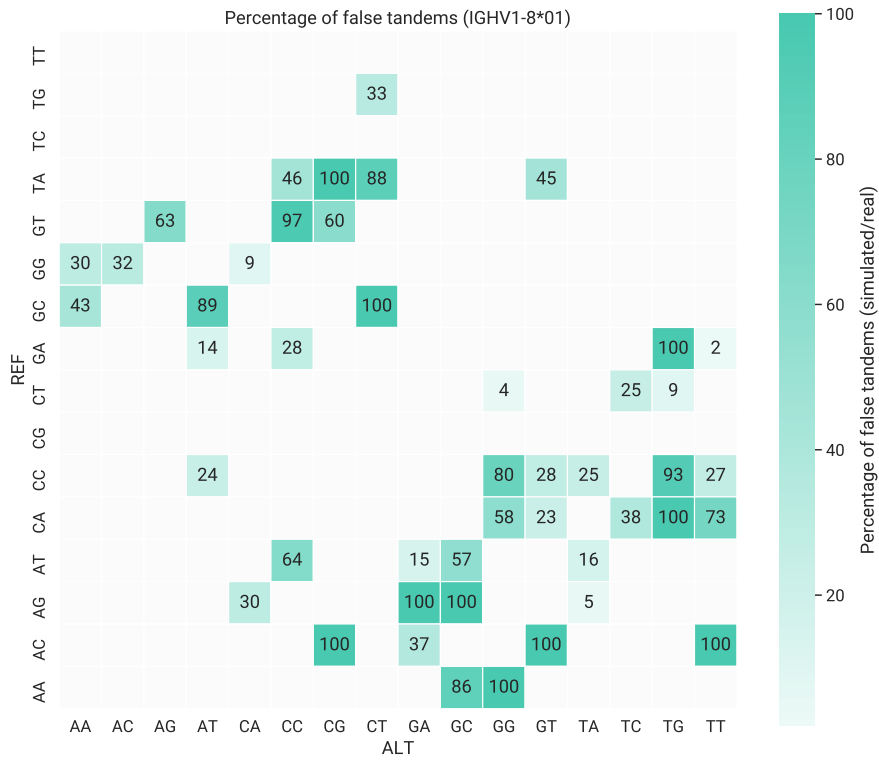
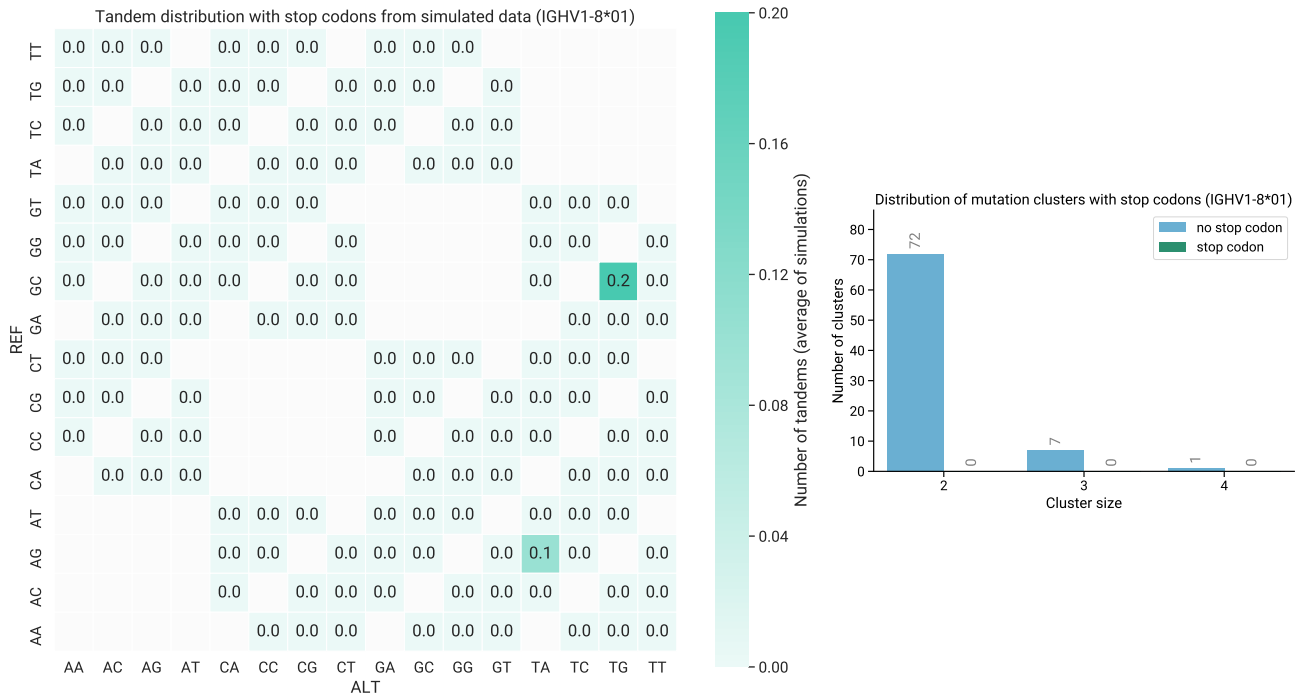


Tandem distribution from real data (IGHV1-8\*01)



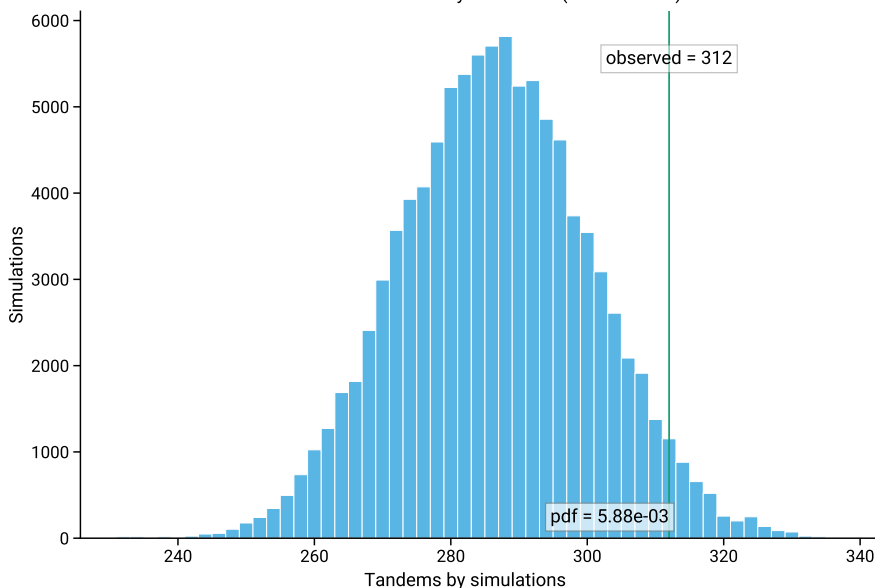
Tandem distribution from simulated data (IGHV1-8\*01)



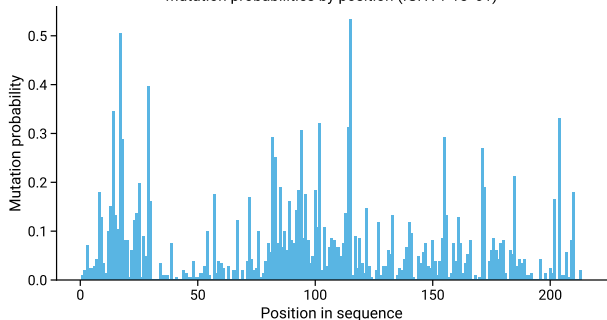


### 2.3 IGHV1-18\_01

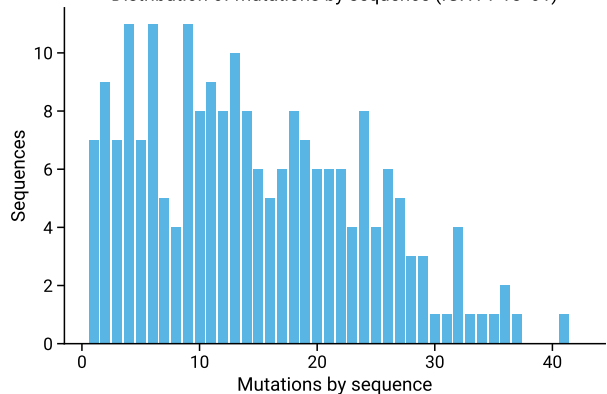
Distribution of tandems by simulation (IGHV1-18\*01)



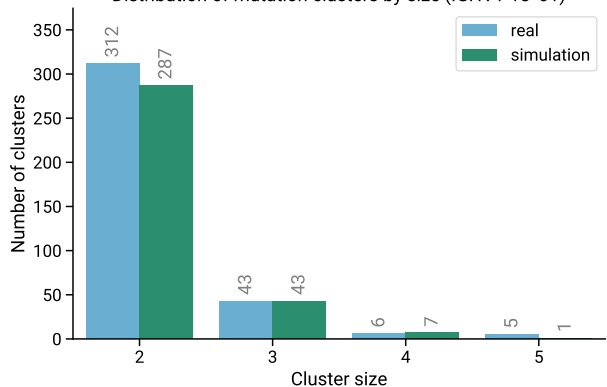
Mutation probabilities by position (IGHV1-18\*01)



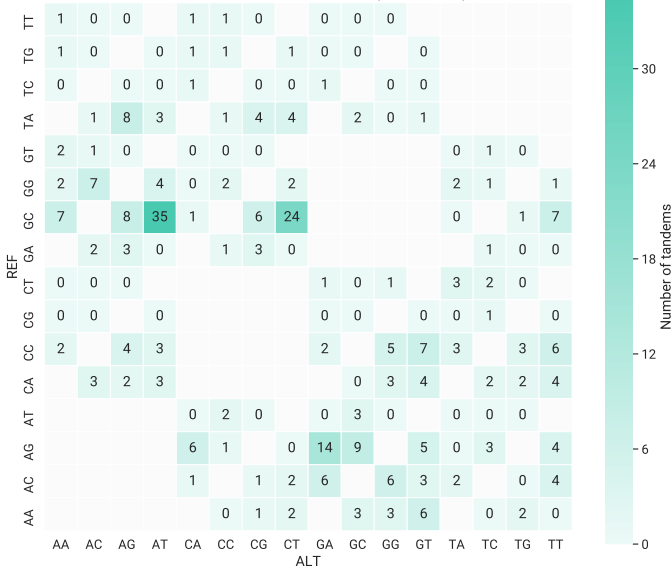
Distribution of mutations by sequence (IGHV1-18\*01)



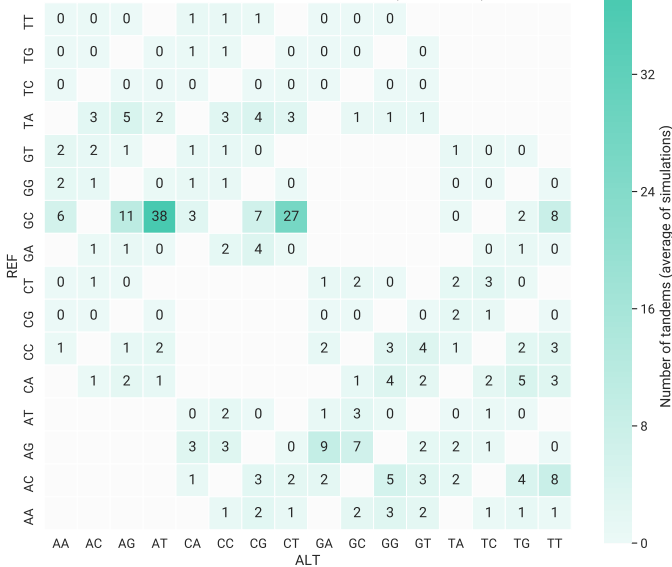
Distribution of mutation clusters by size (IGHV1-18\*01)

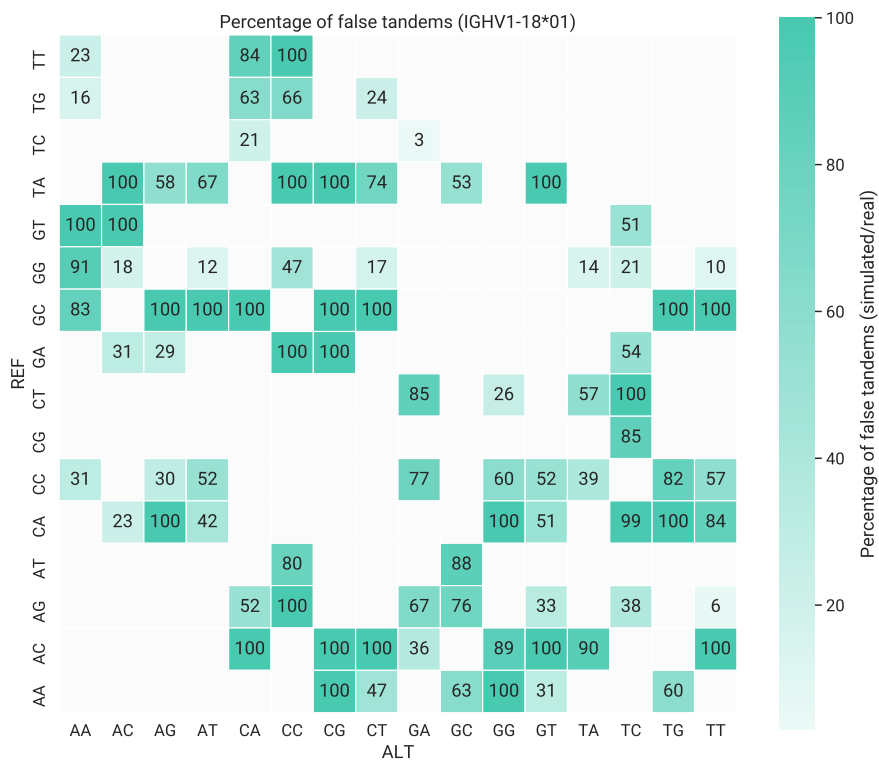
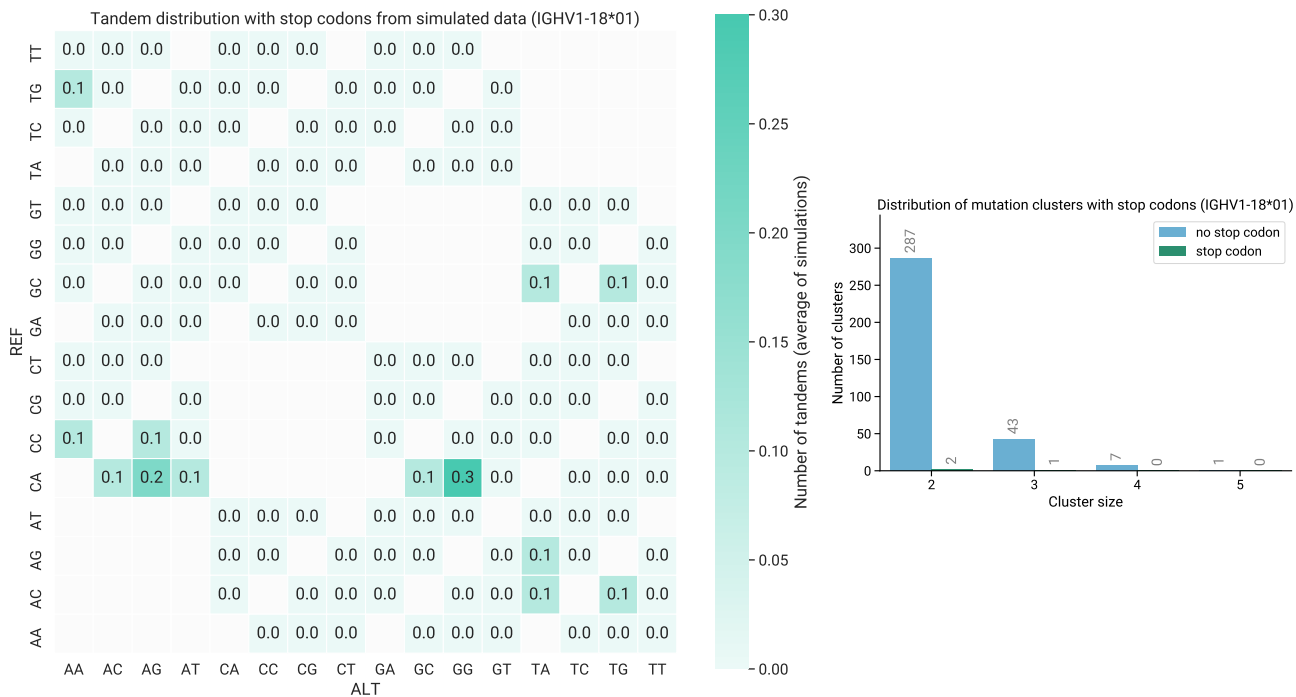


Tandem distribution from real data (IGHV1-18\*01)



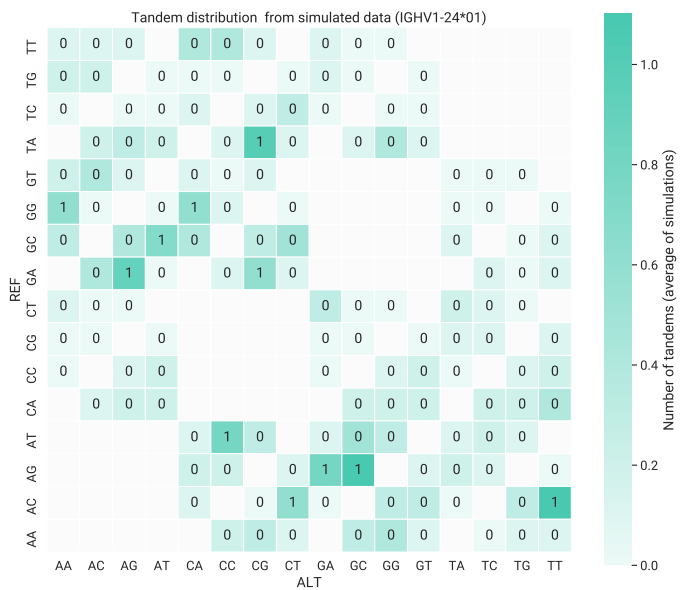
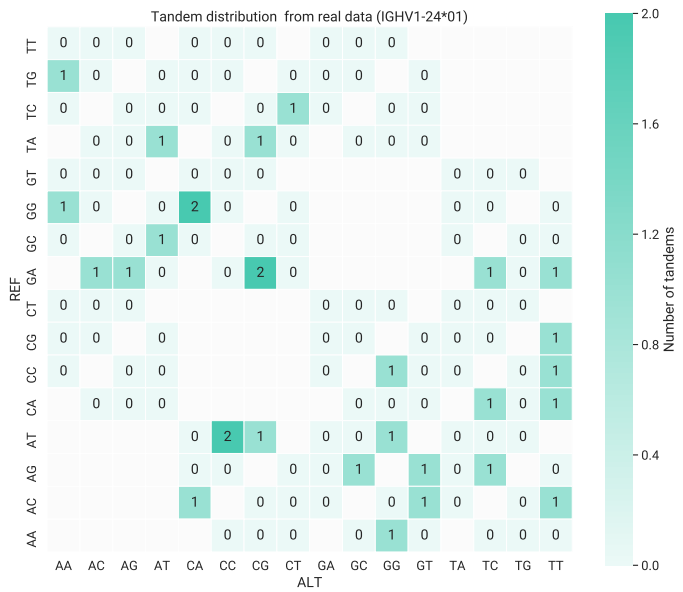
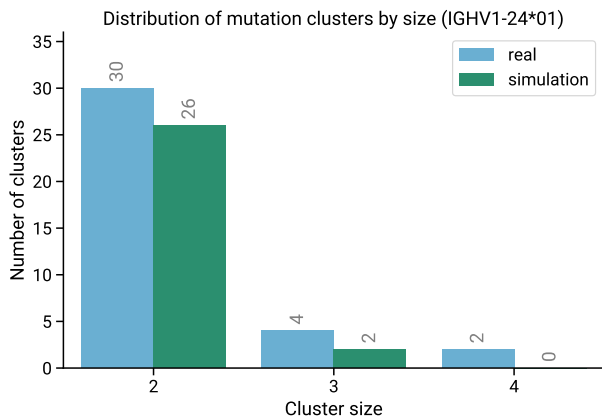
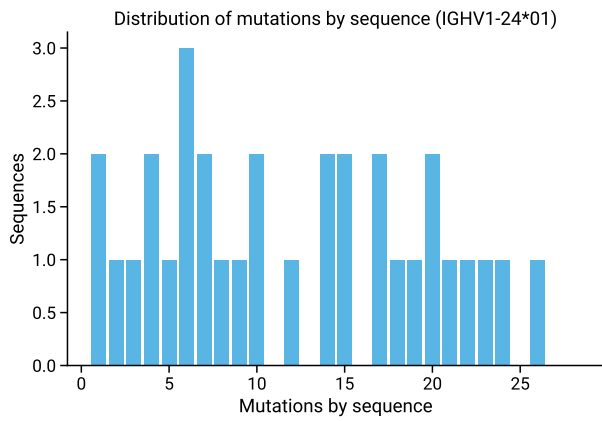
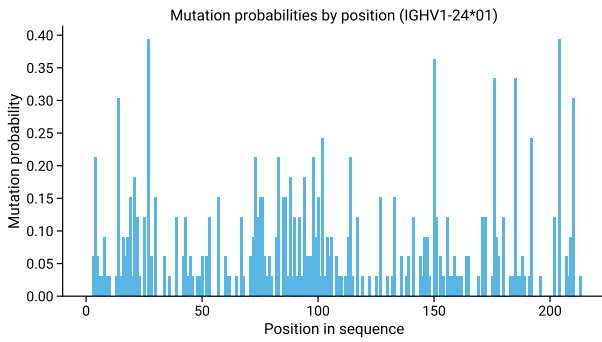
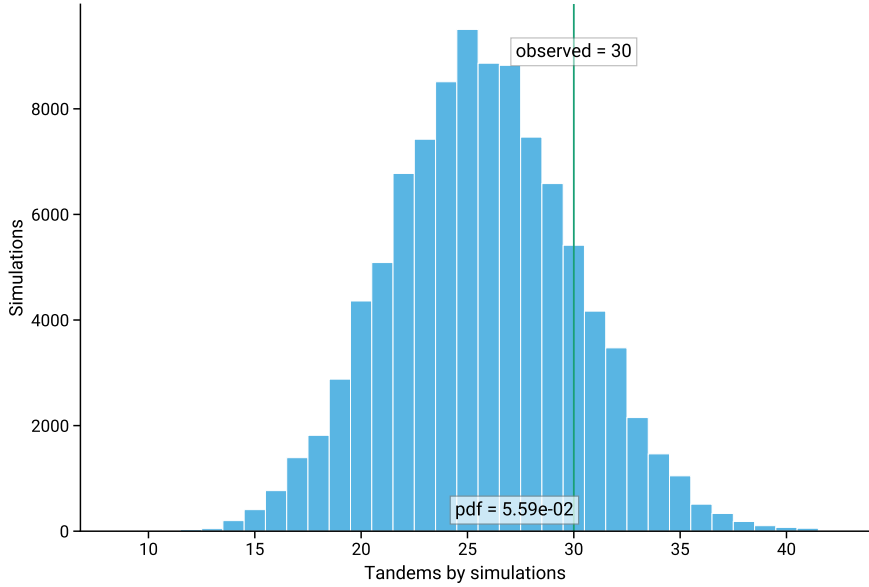
Tandem distribution from simulated data (IGHV1-18\*01)

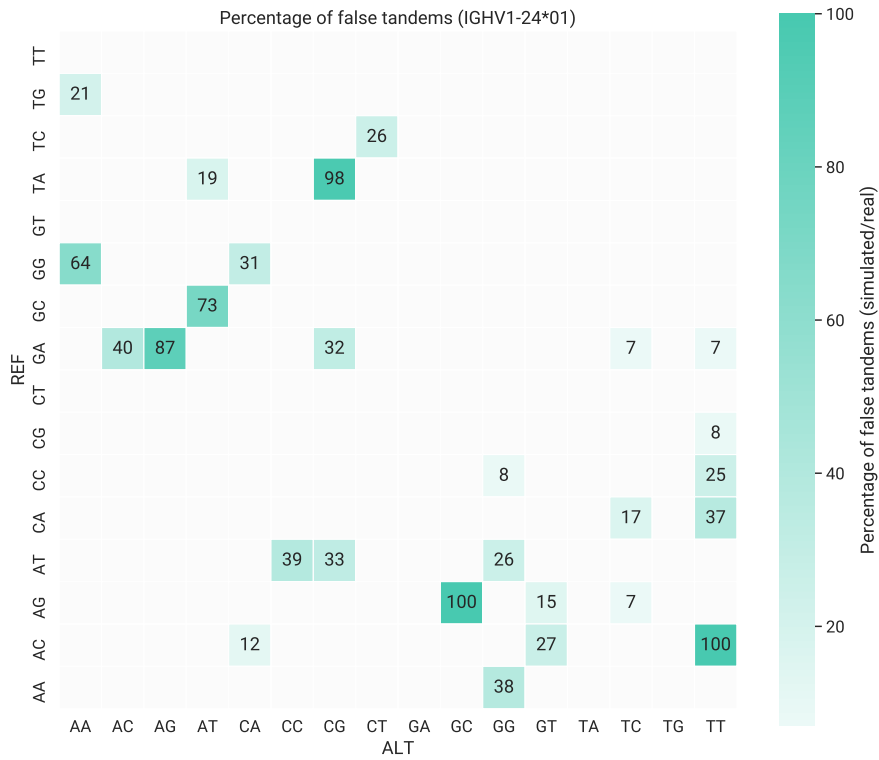
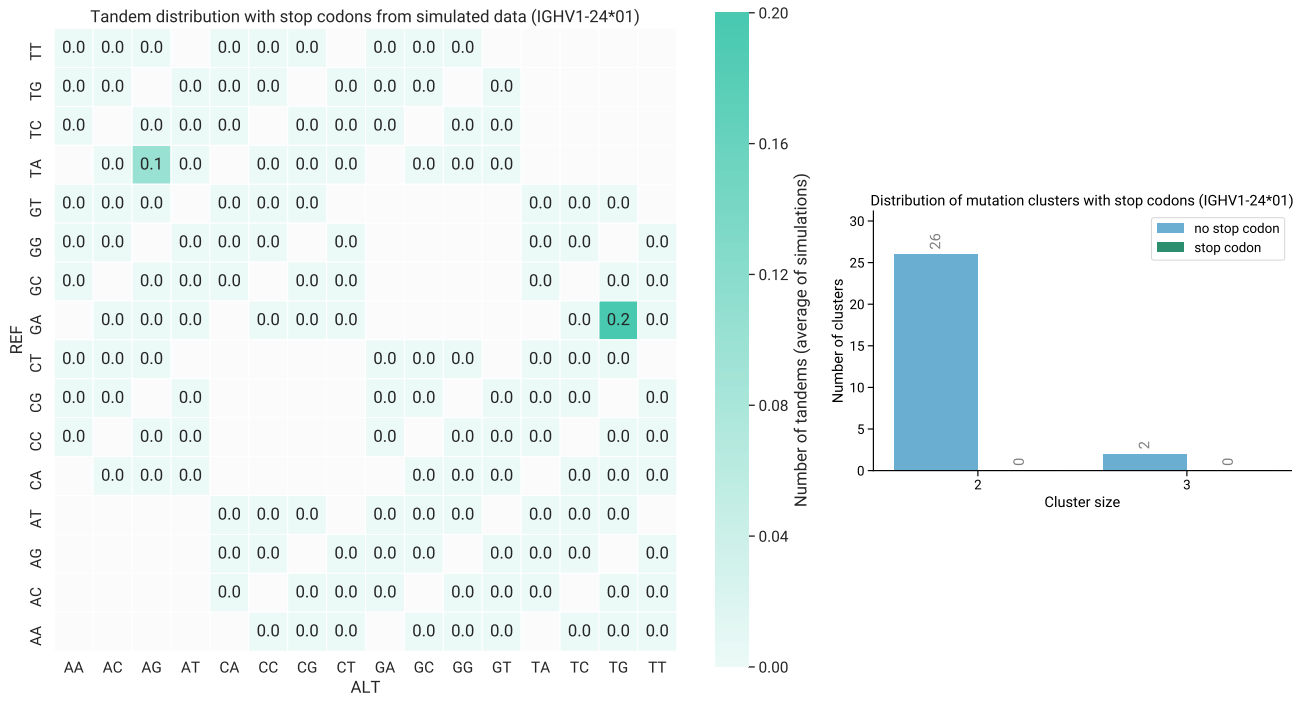




## 2.4 IGHV1-24\_01

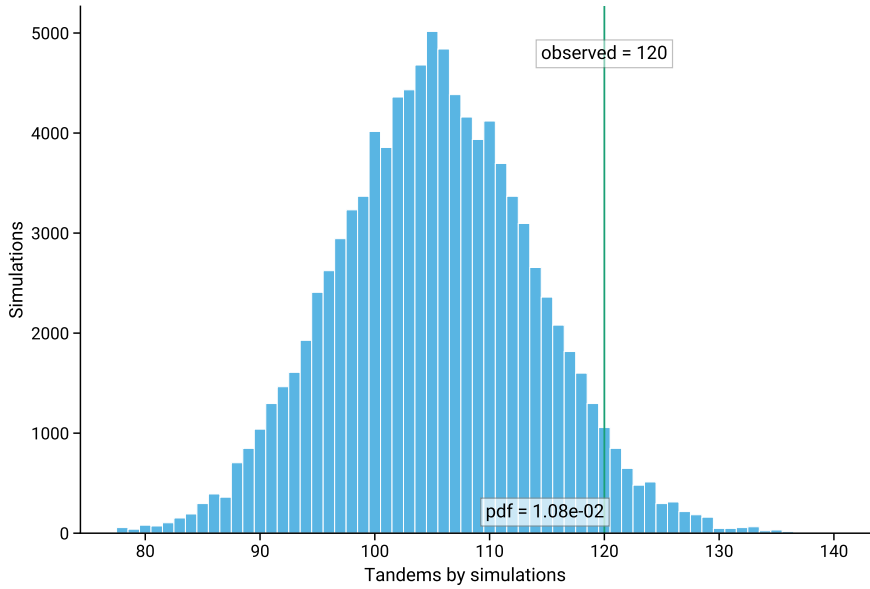
Distribution of tandems by simulation (IGHV1-24\*01)



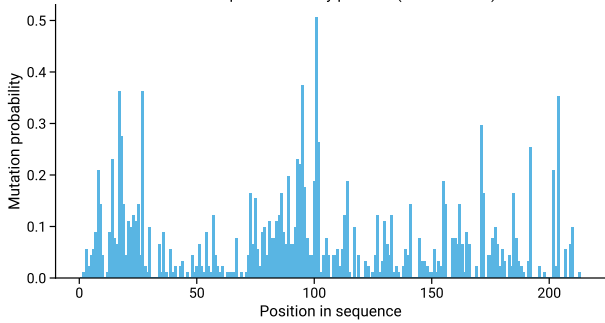


## 2.5 IGHV1-46\_01

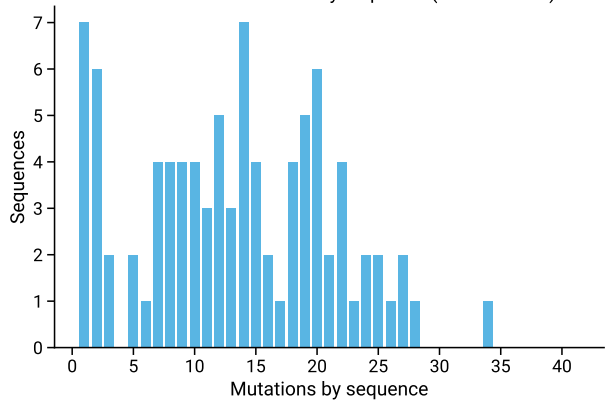
Distribution of tandems by simulation (IGHV1-46\*01)



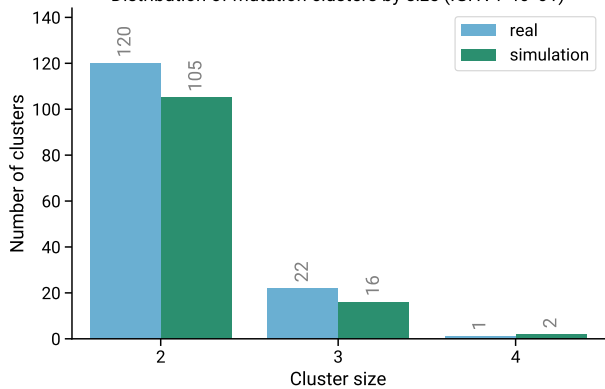
Mutation probabilities by position (IGHV1-46\*01)



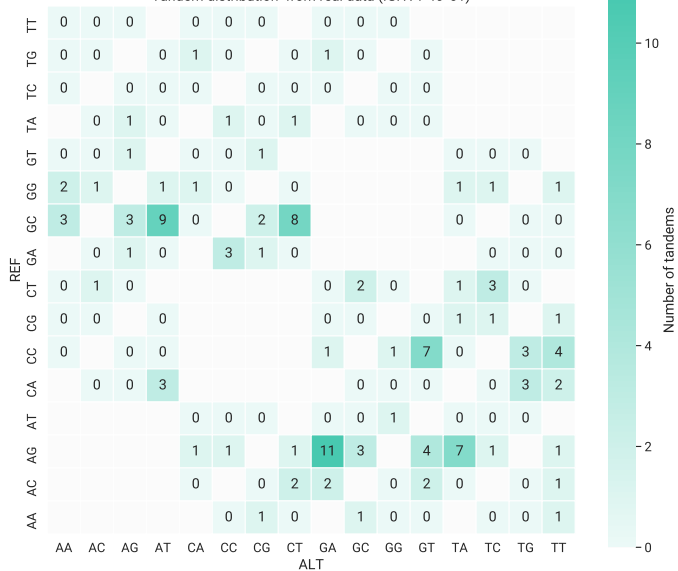
Distribution of mutations by sequence (IGHV1-46\*01)



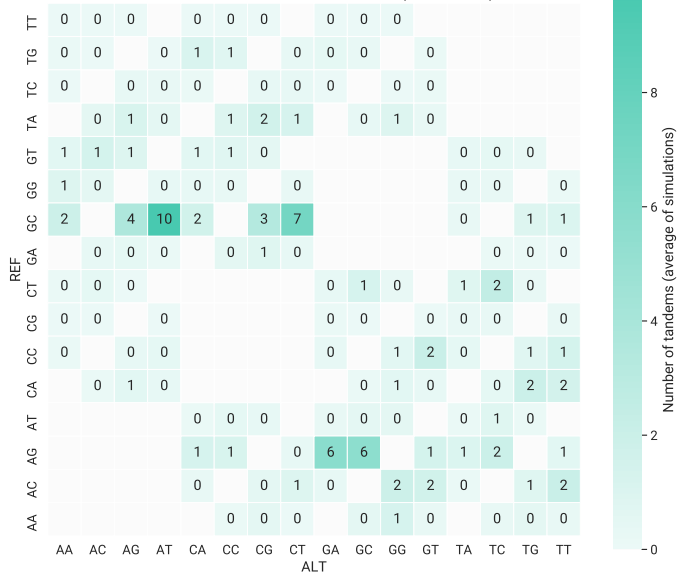
Distribution of mutation clusters by size (IGHV1-46\*01)



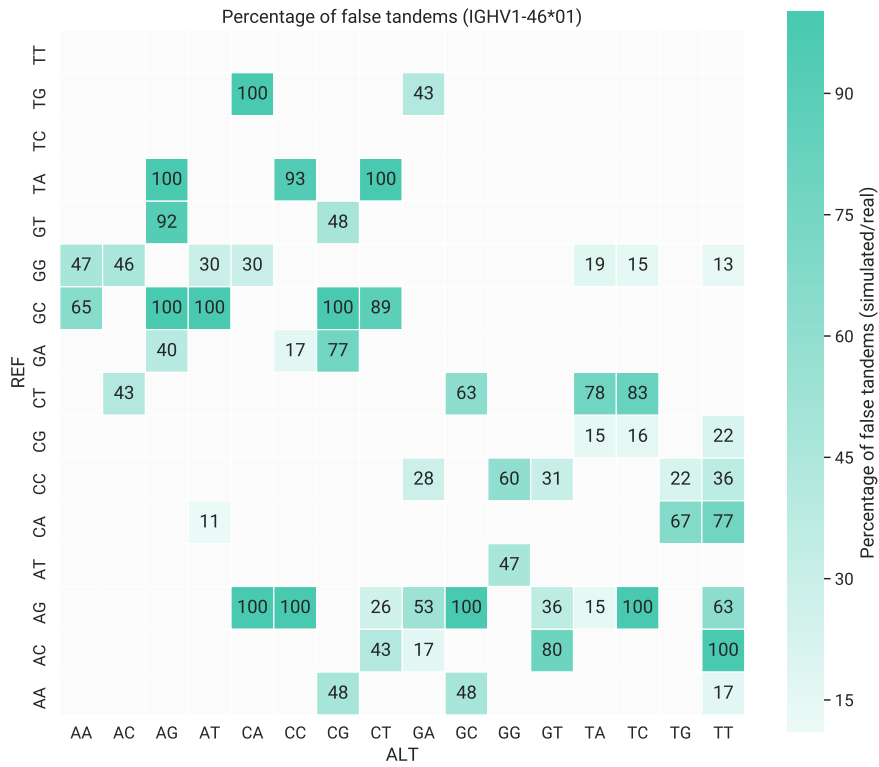
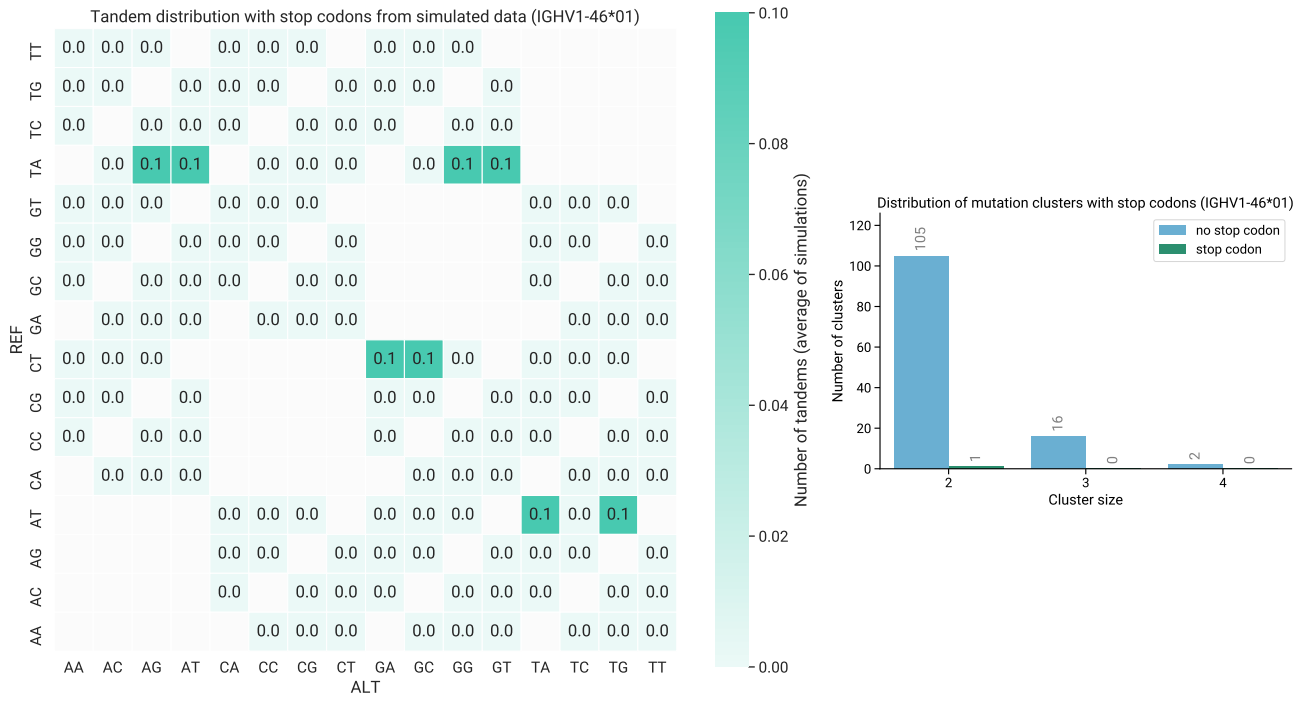
Tandem distribution from real data (IGHV1-46\*01)



Tandem distribution from simulated data (IGHV1-46\*01)

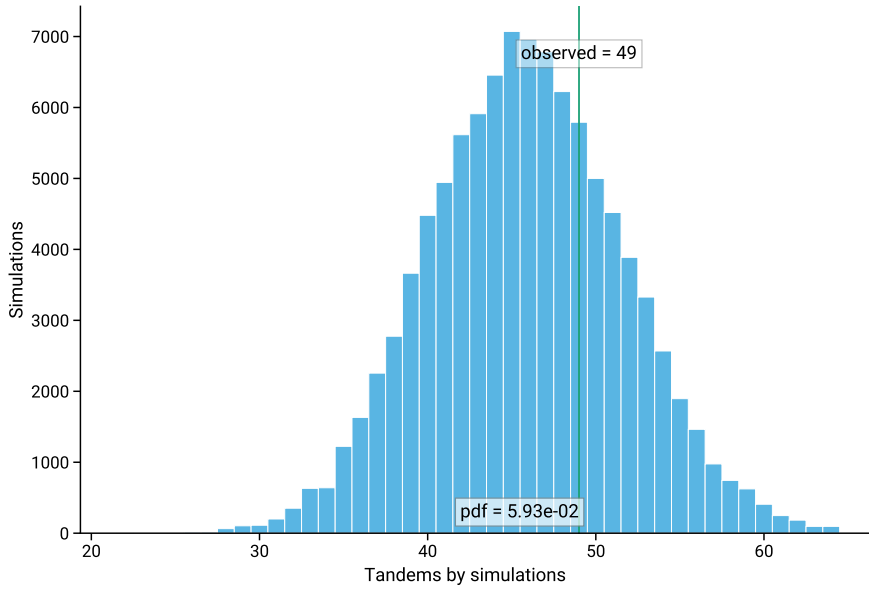




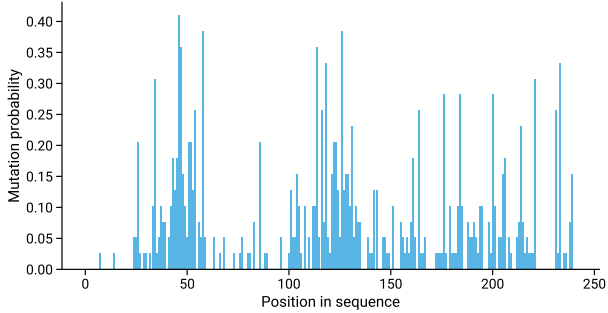


## 2.6 IGHV1-69\_13

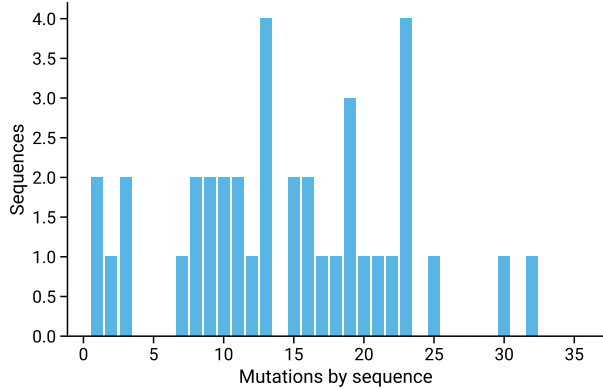
Distribution of tandems by simulation (IGHV1-69\*13)



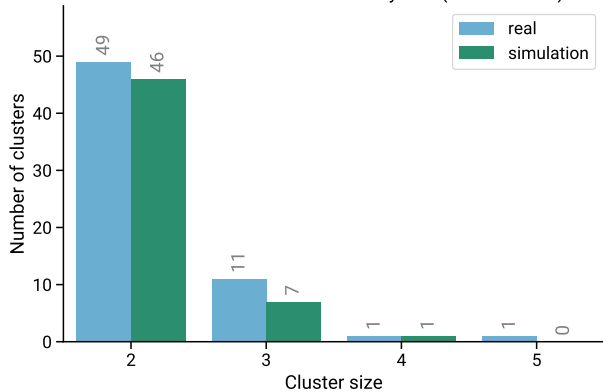
Mutation probabilities by position (IGHV1-69\*13)



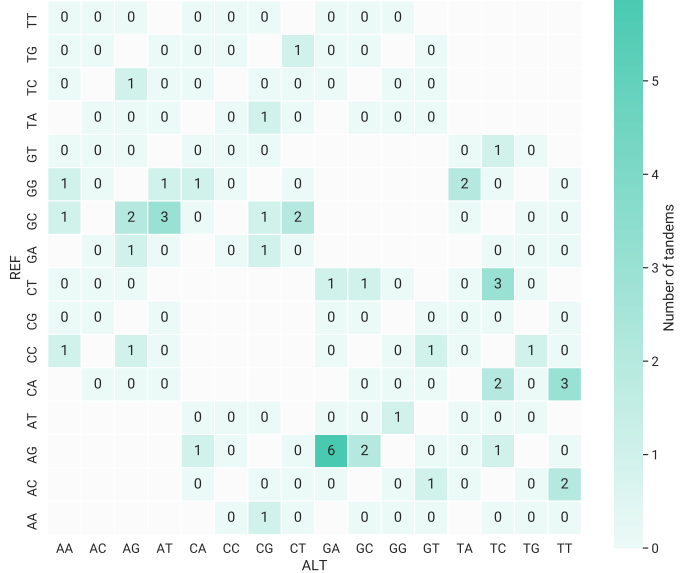
Distribution of mutations by sequence (IGHV1-69\*13)



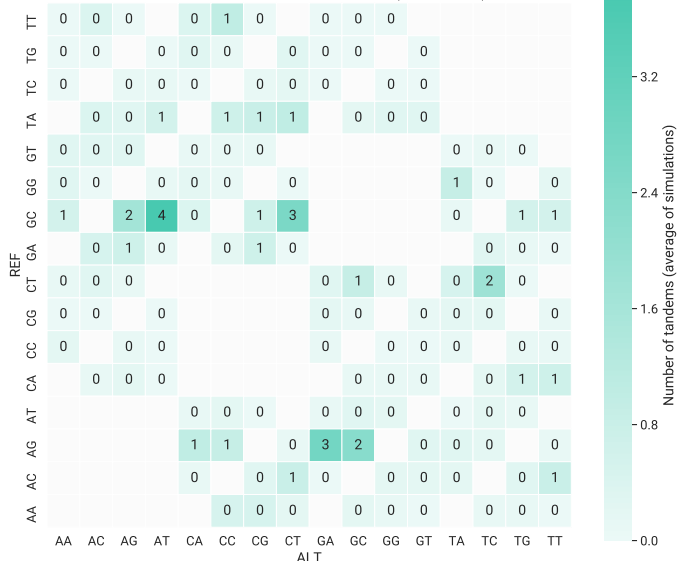
Distribution of mutation clusters by size (IGHV1-69\*13)

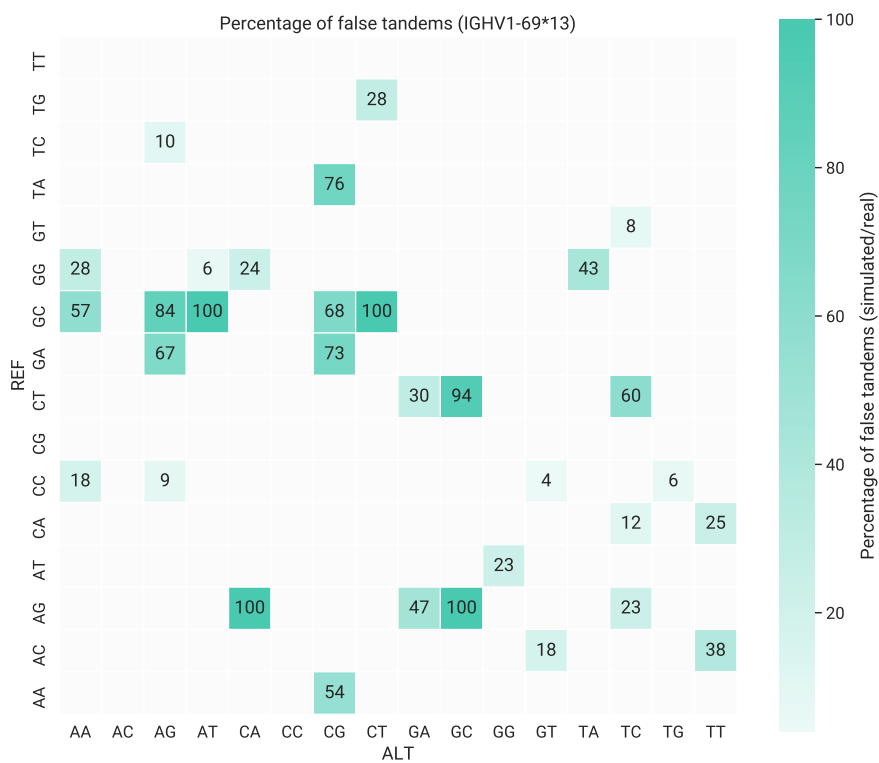
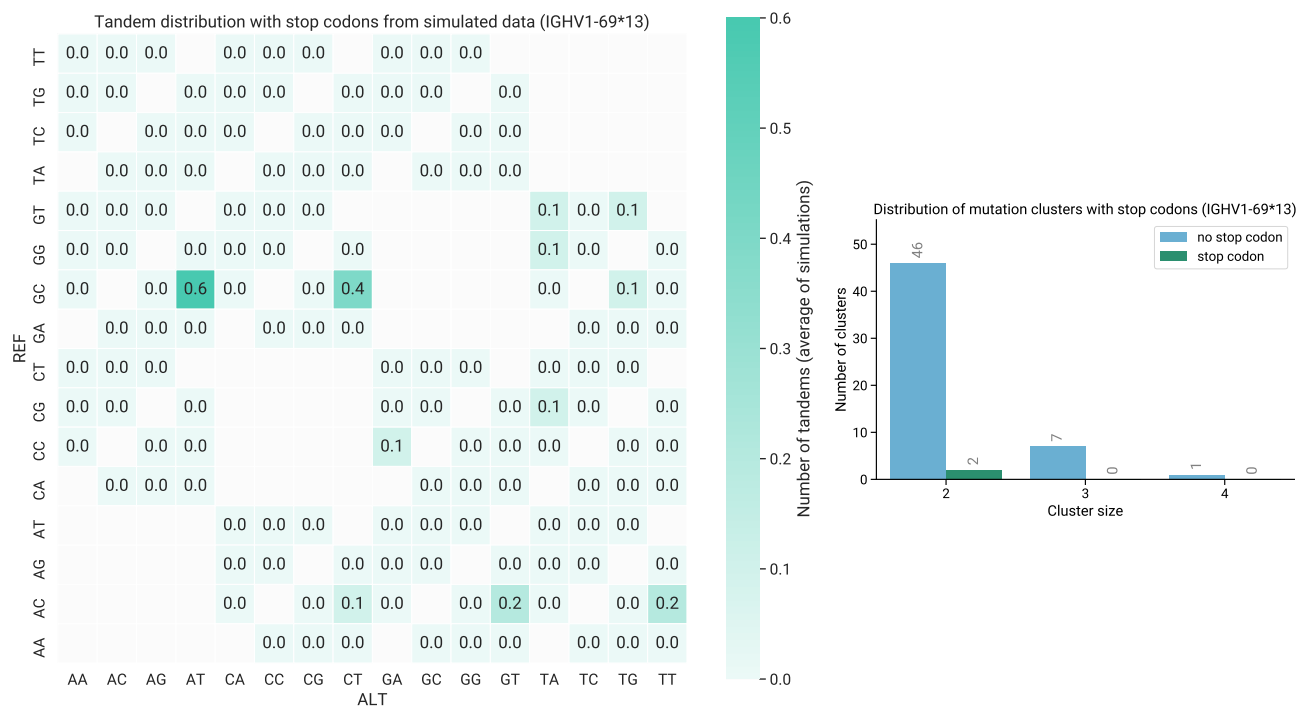


Tandem distribution from real data (IGHV1-69\*13)



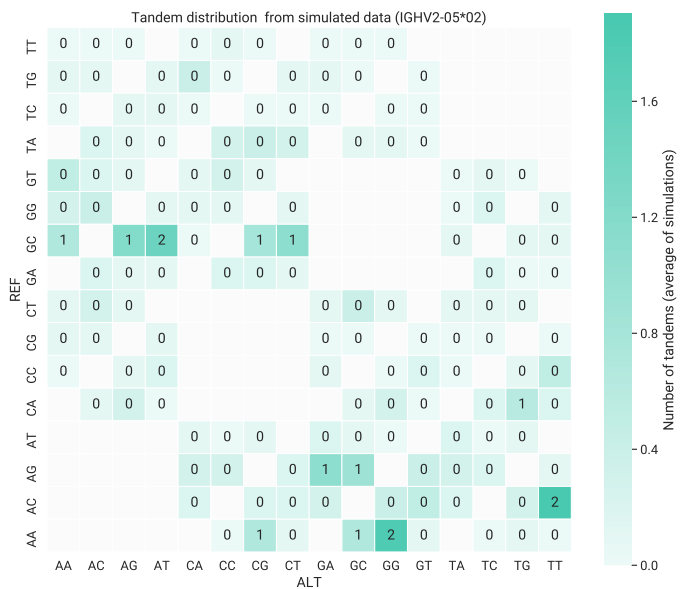
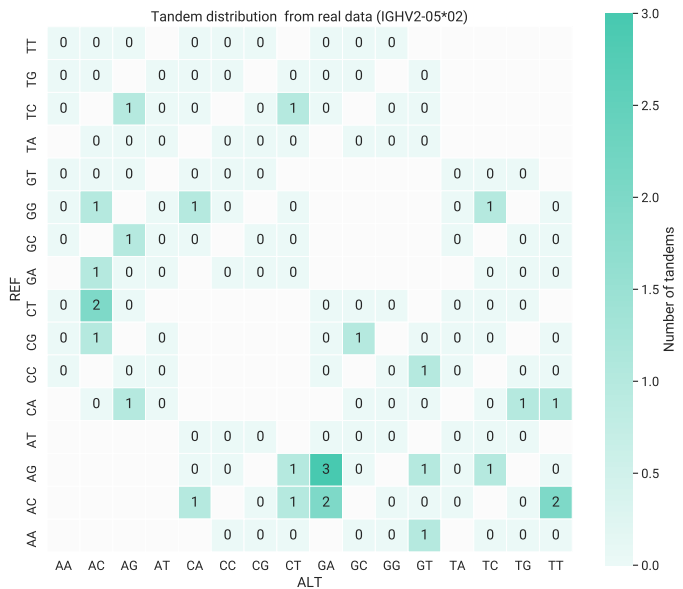
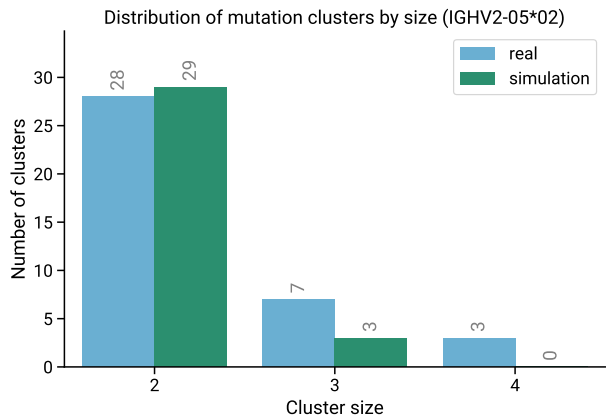
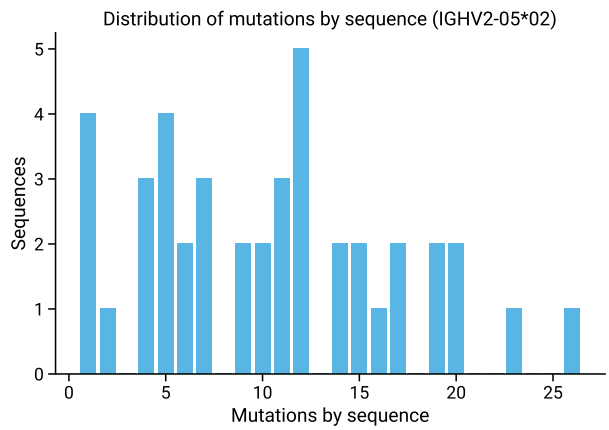
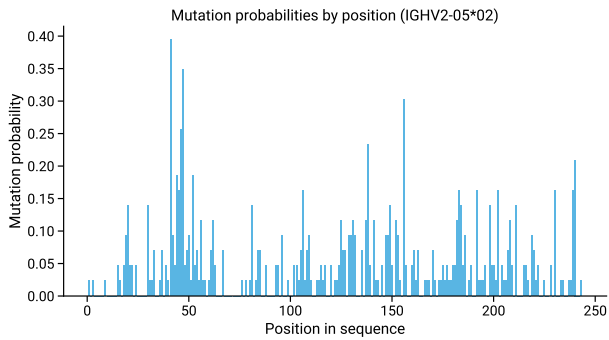
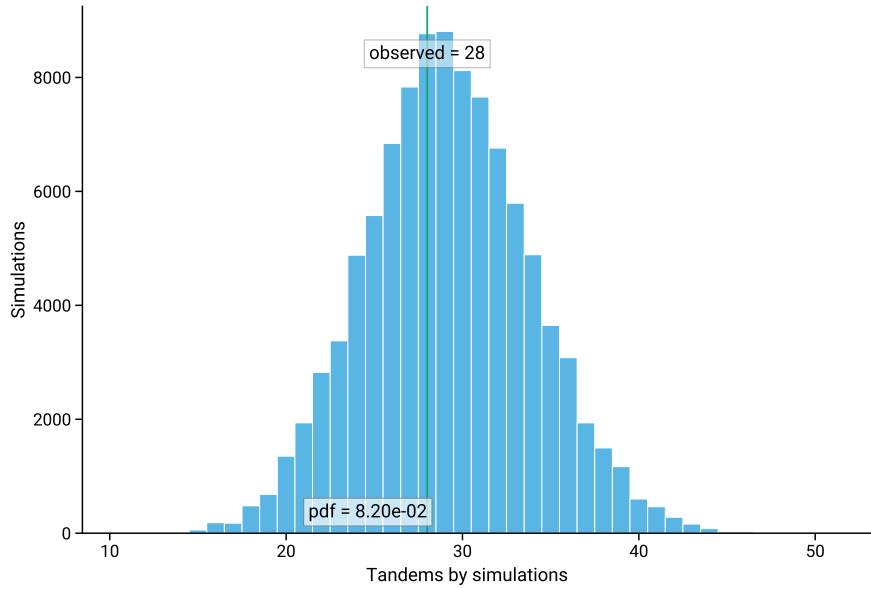
Tandem distribution from simulated data (IGHV1-69\*13)

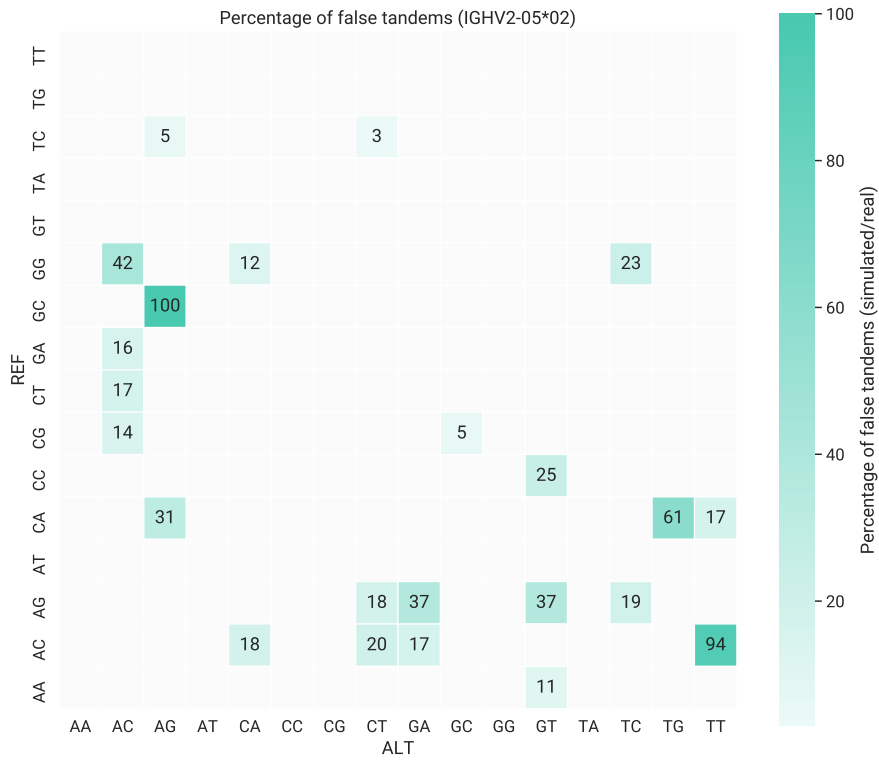
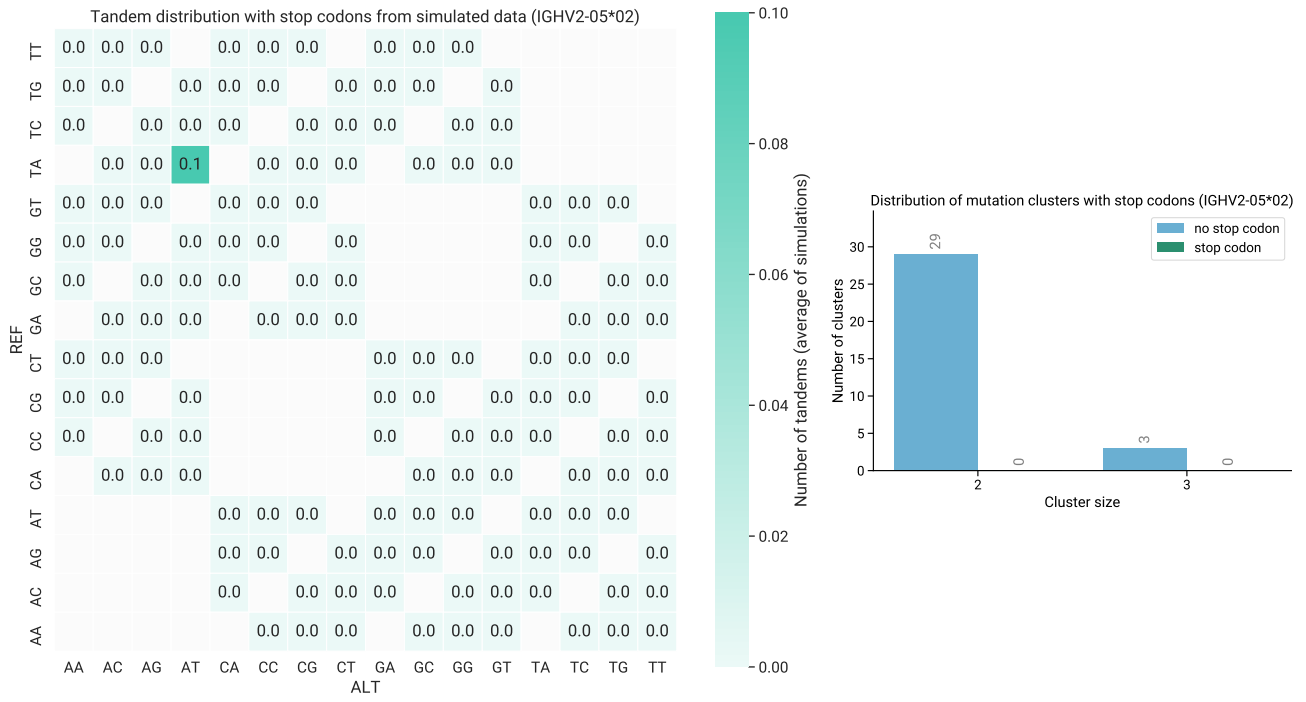




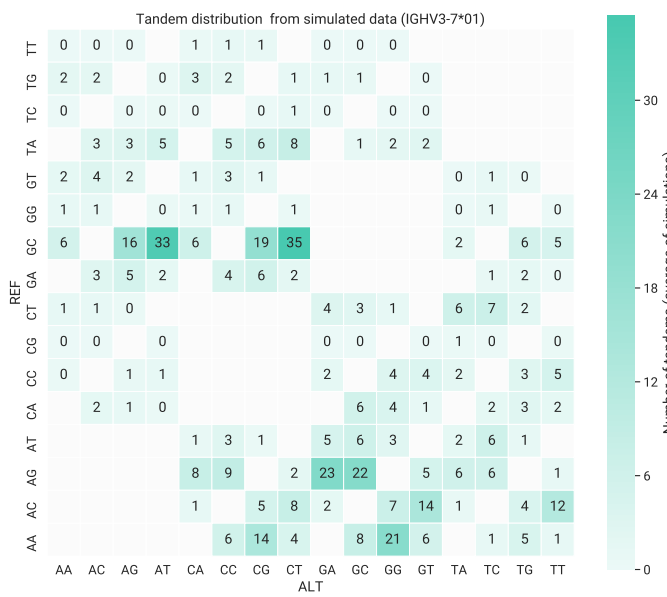
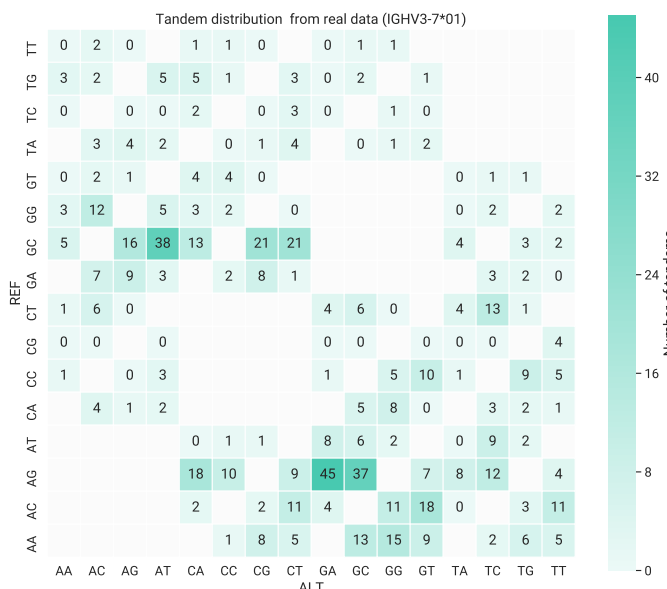
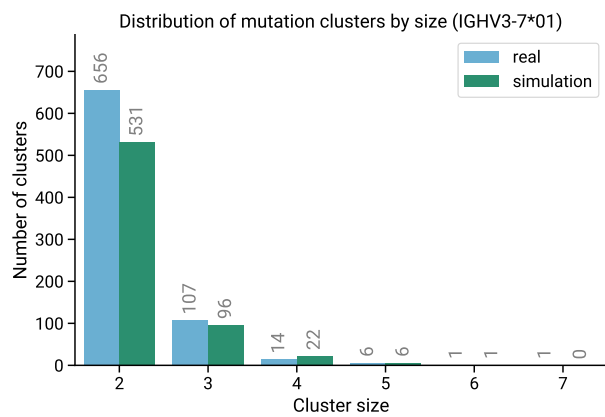
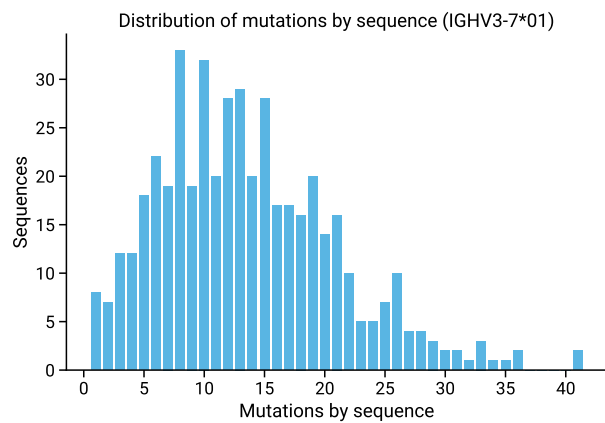
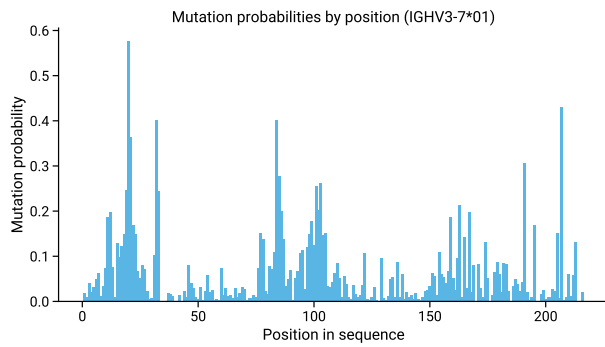
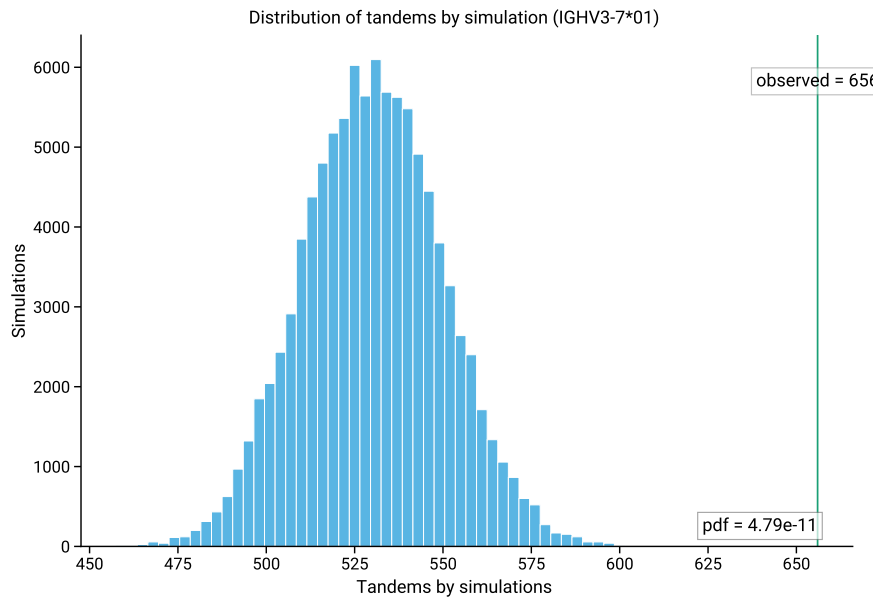
## 2.7 IGHV2-05\_02

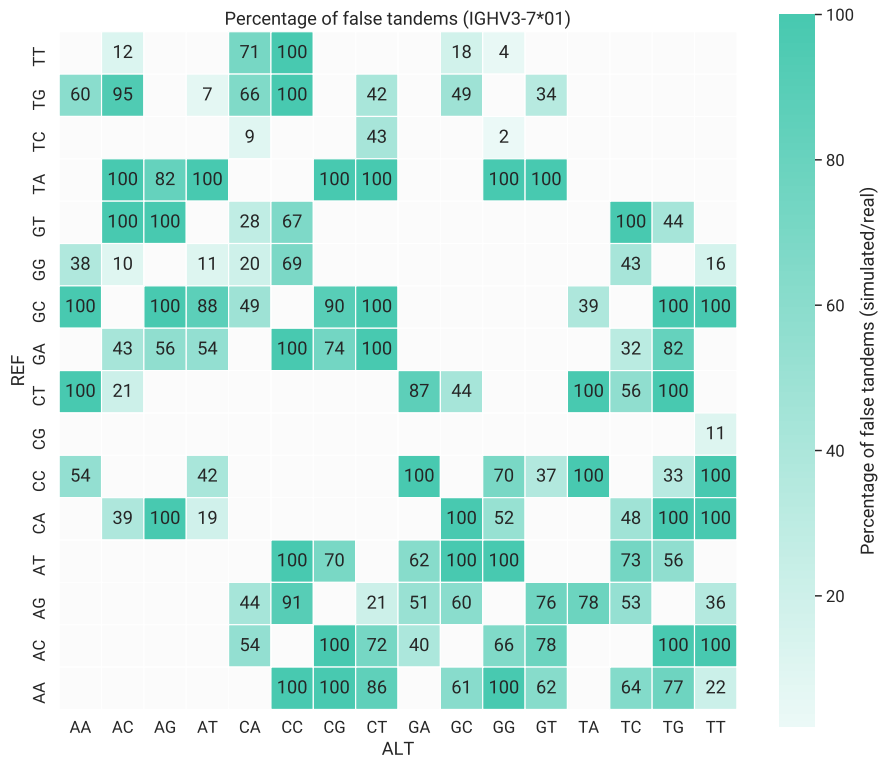
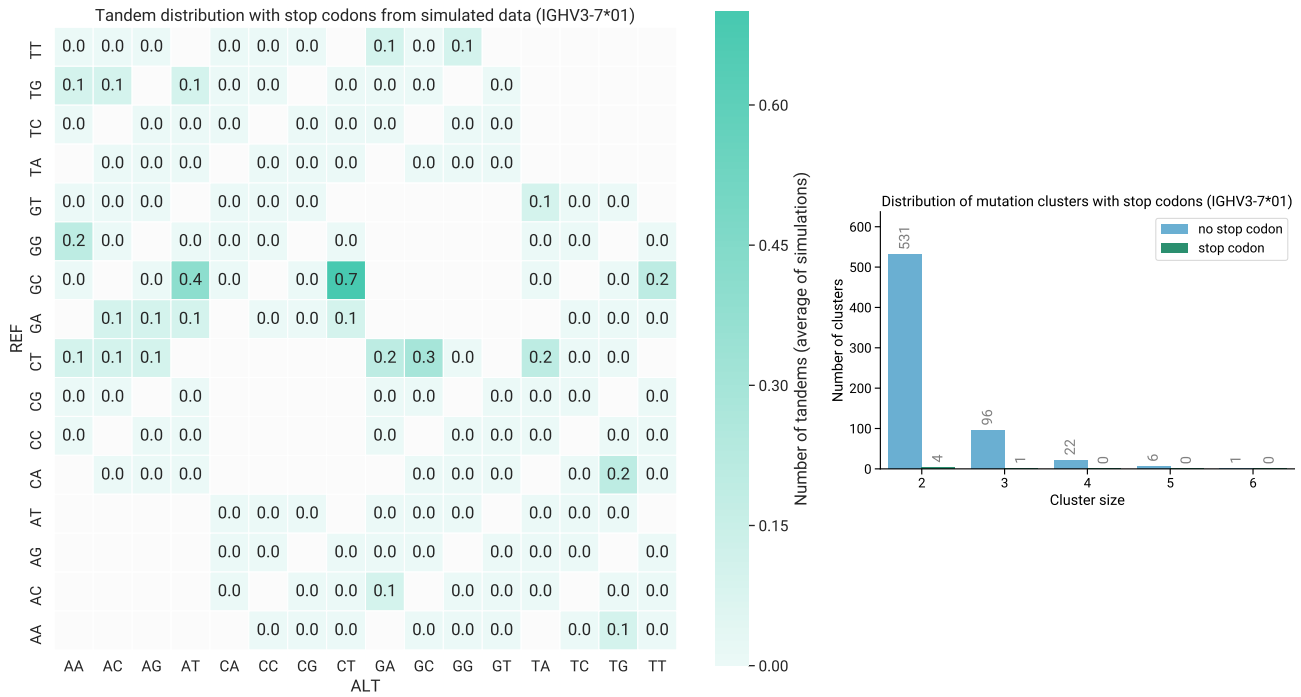
Distribution of tandems by simulation (IGHV2-05\*02)





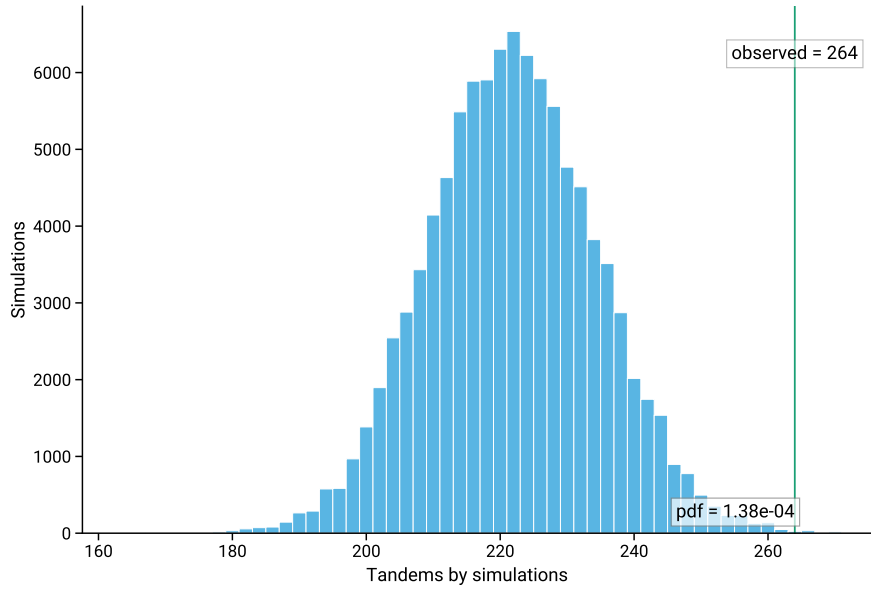
## 2.8 IGHV3-7\_01



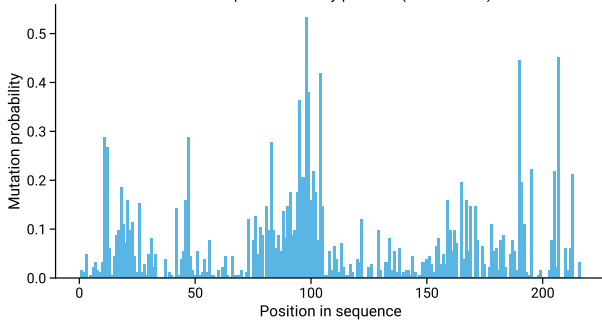


## 2.9 IGHV3-9\_01

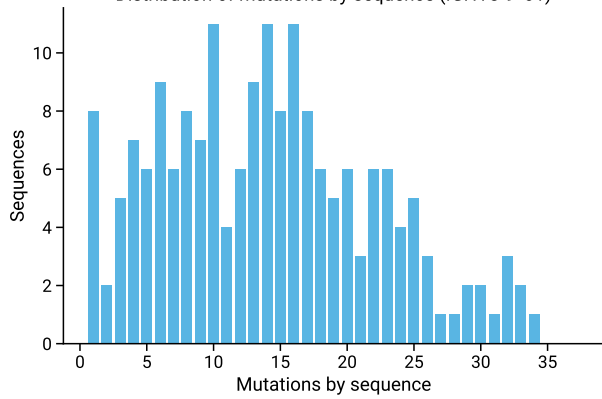
Distribution of tandems by simulation (IGHV3-9\*01)



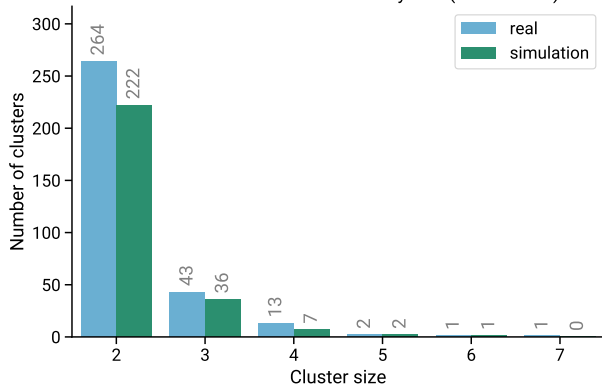
Mutation probabilities by position (IGHV3-9\*01)



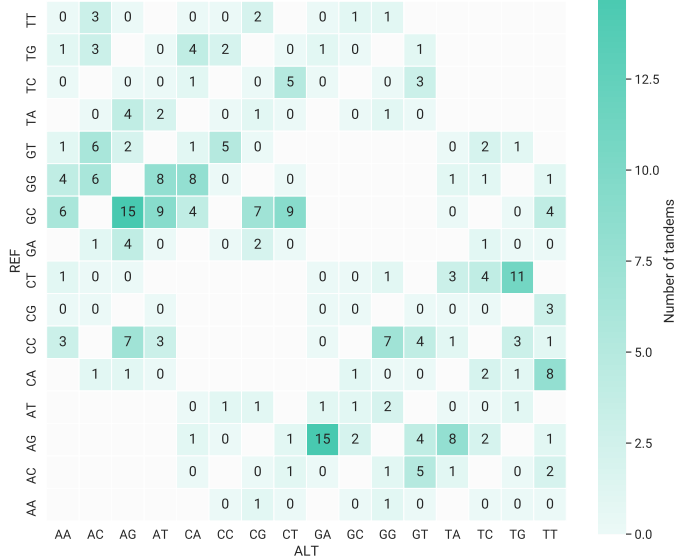
Distribution of mutations by sequence (IGHV3-9\*01)



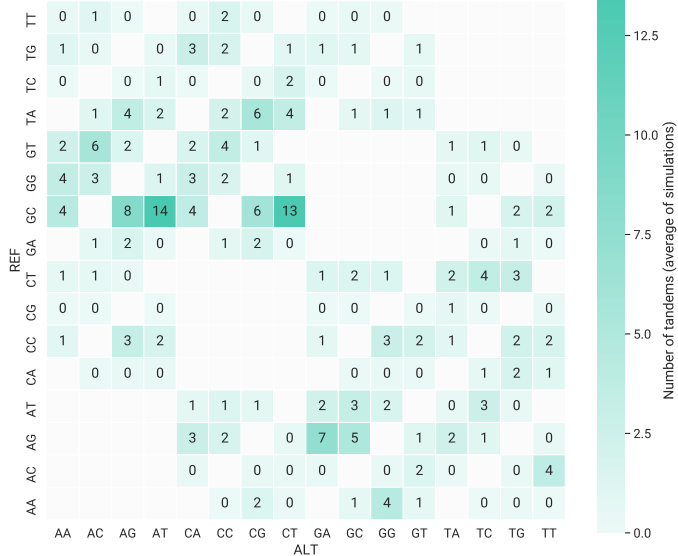
Distribution of mutation clusters by size (IGHV3-9\*01)



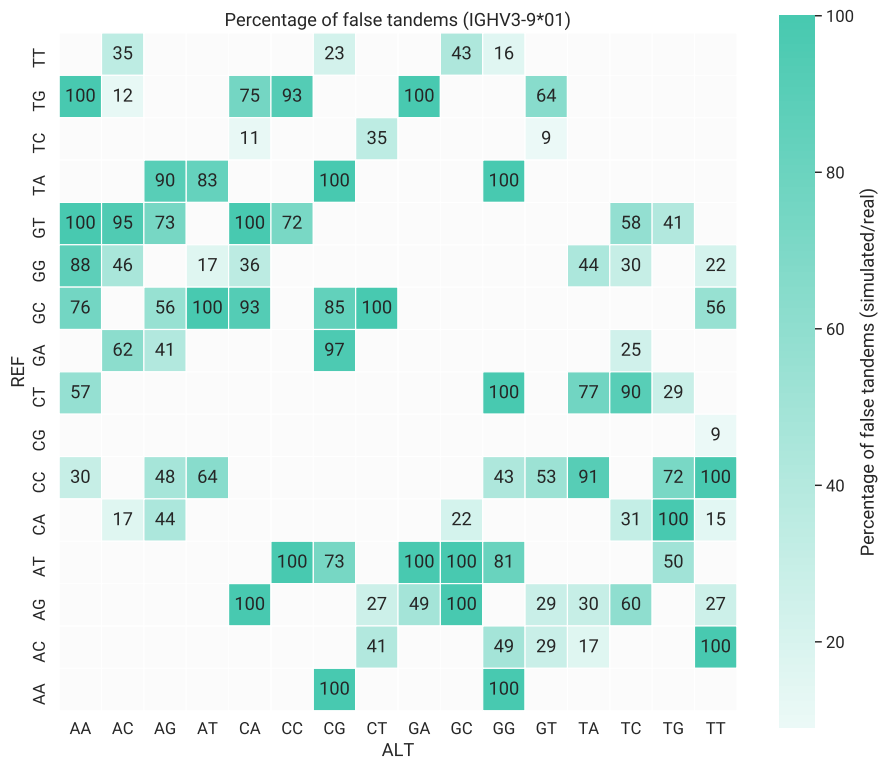
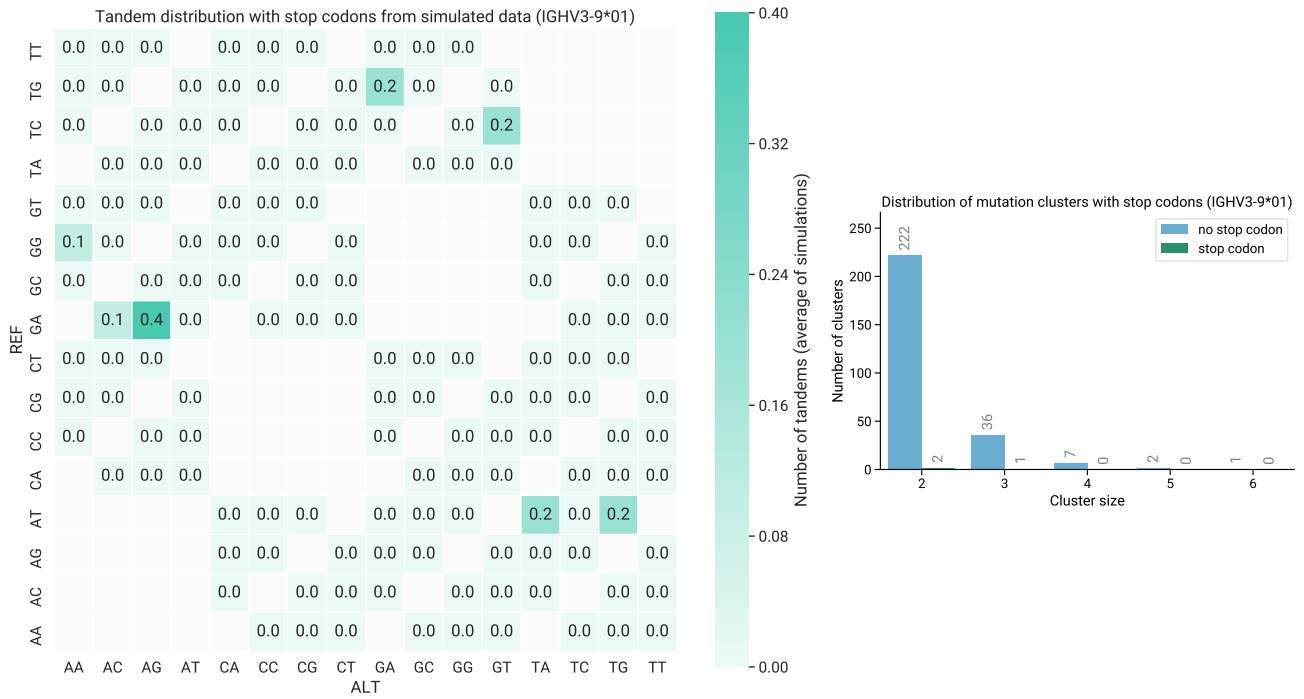
Tandem distribution from real data (IGHV3-9\*01)



Tandem distribution from simulated data (IGHV3-9\*01)

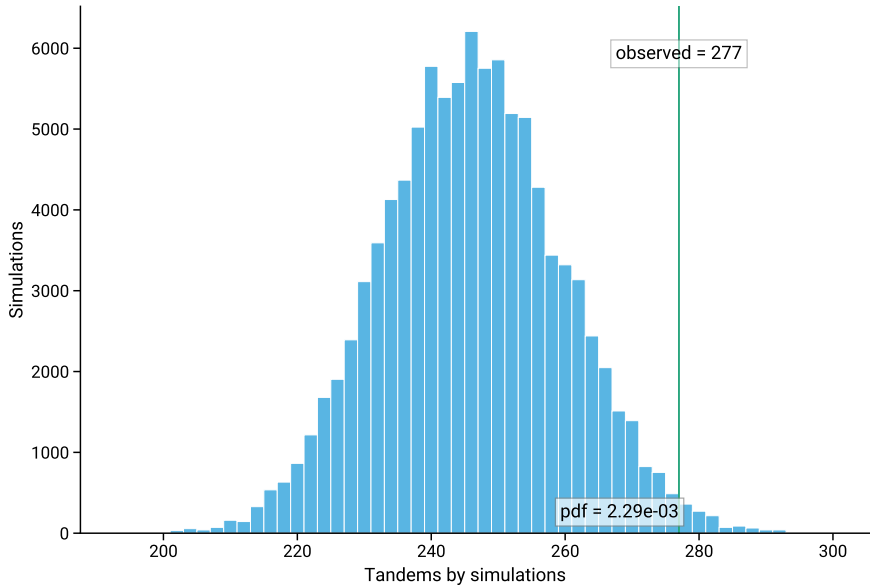




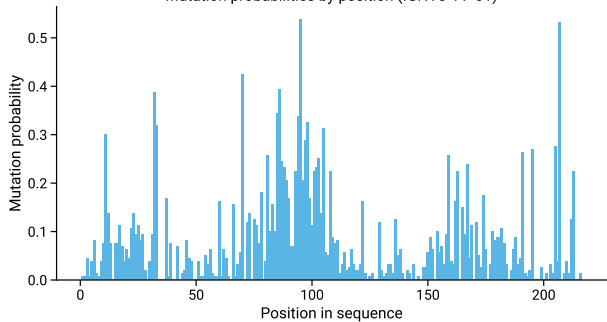


## 2.10 IGHV3-11\_01

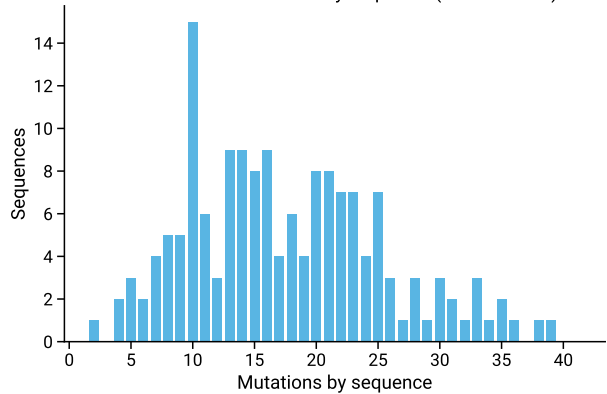
Distribution of tandems by simulation (IGHV3-11\*01)



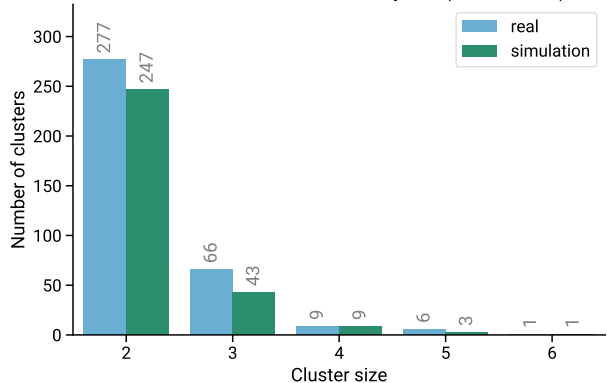
Mutation probabilities by position (IGHV3-11\*01)



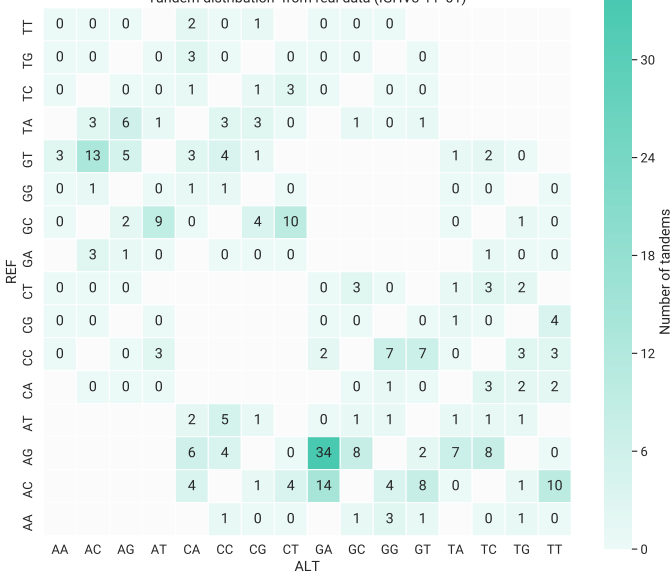
Distribution of mutations by sequence (IGHV3-11\*01)



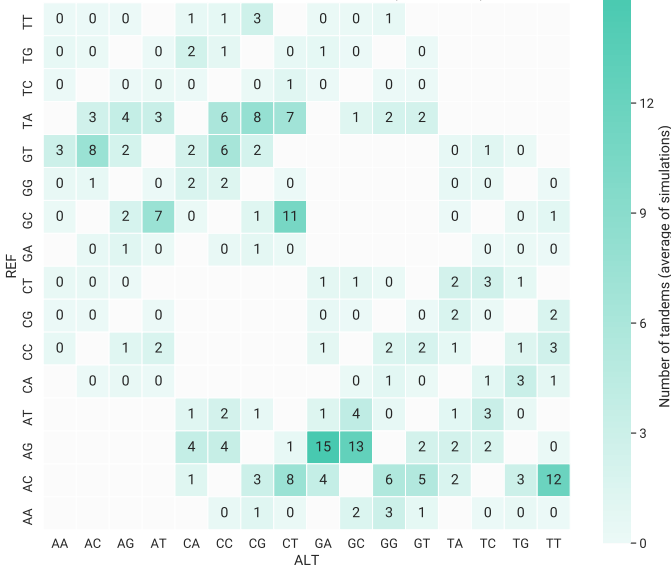
Distribution of mutation clusters by size (IGHV3-11\*01)

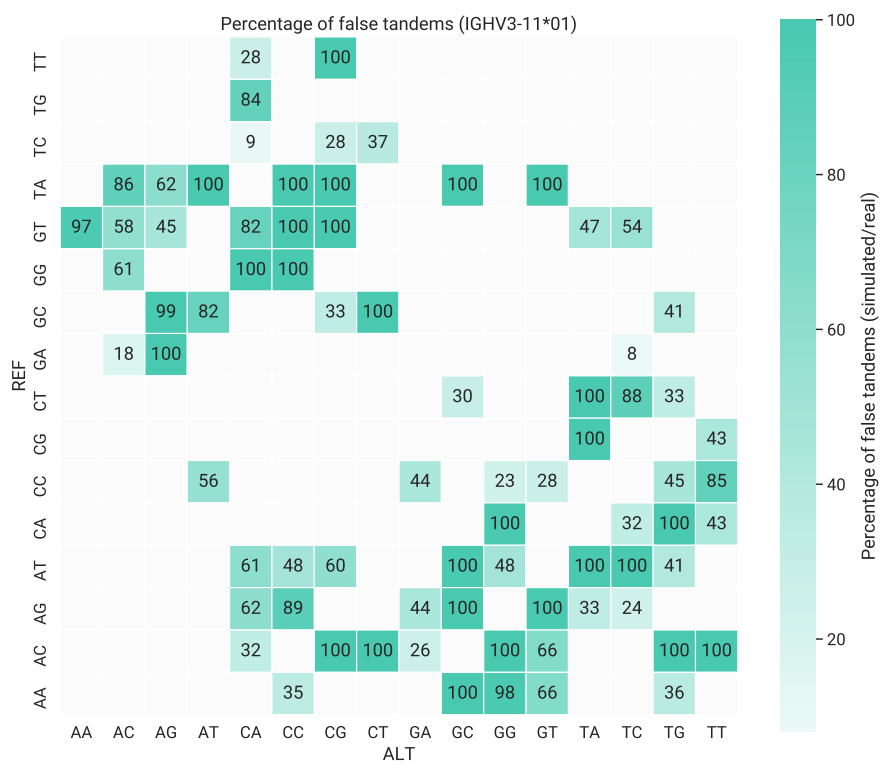
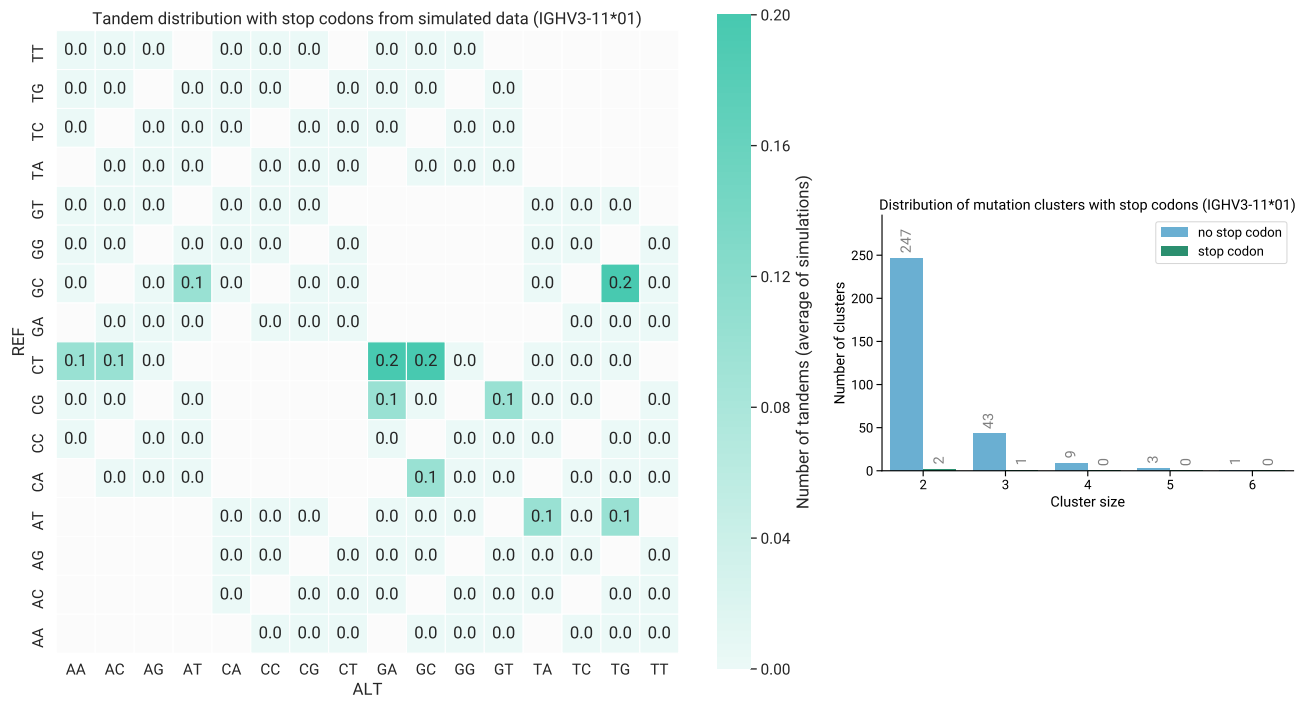


Tandem distribution from real data (IGHV3-11\*01)



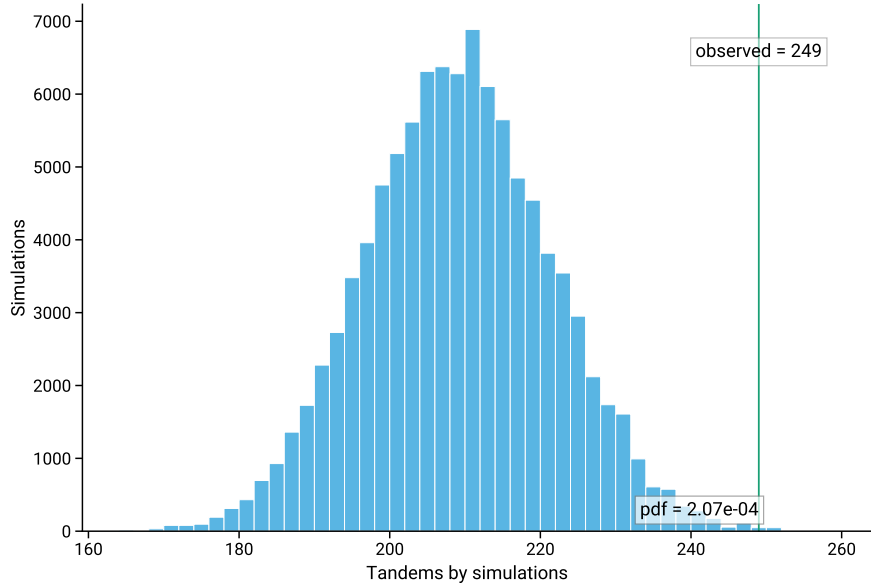
Tandem distribution from simulated data (IGHV3-11\*01)



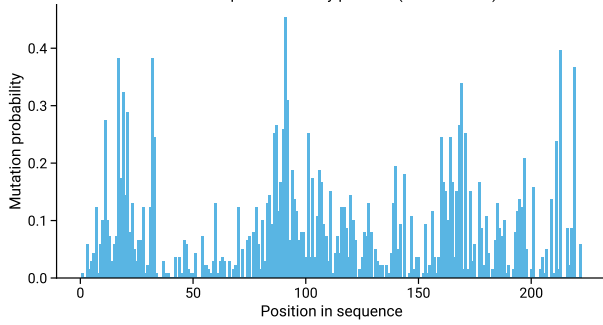


## 2.11 IGHV3-15\_01

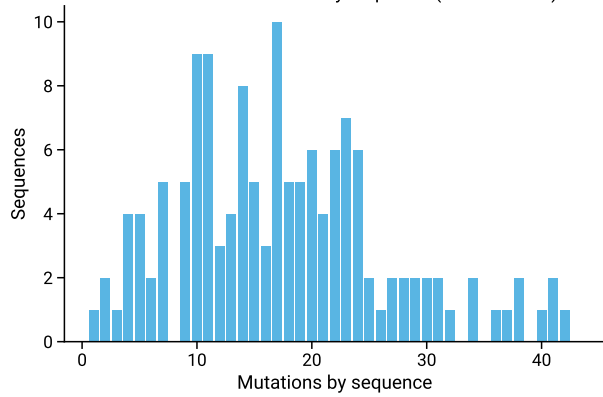
Distribution of tandems by simulation (IGHV3-15\*01)



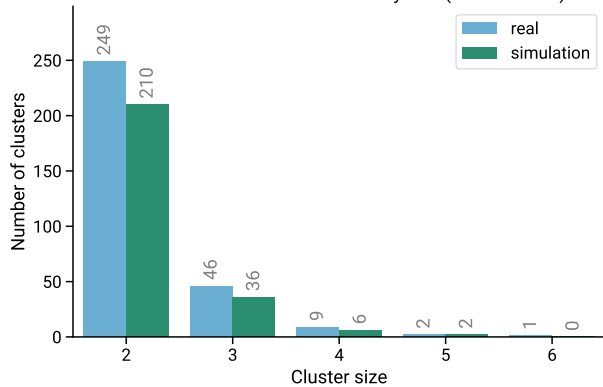
Mutation probabilities by position (IGHV3-15\*01)



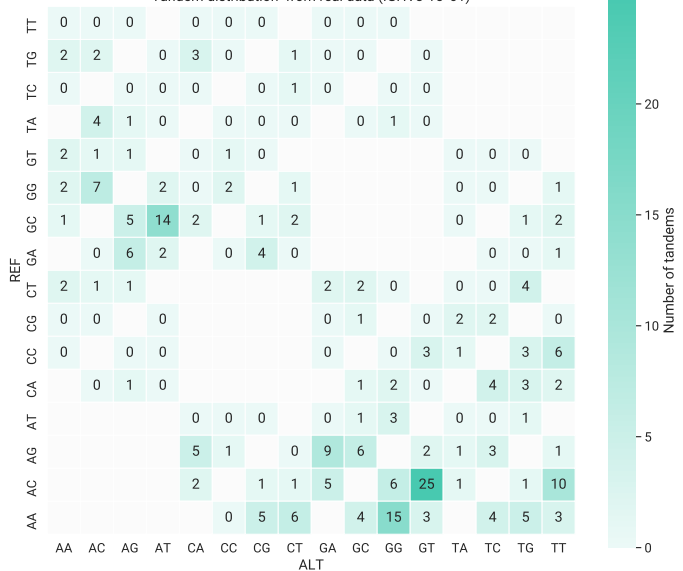
Distribution of mutations by sequence (IGHV3-15\*01)



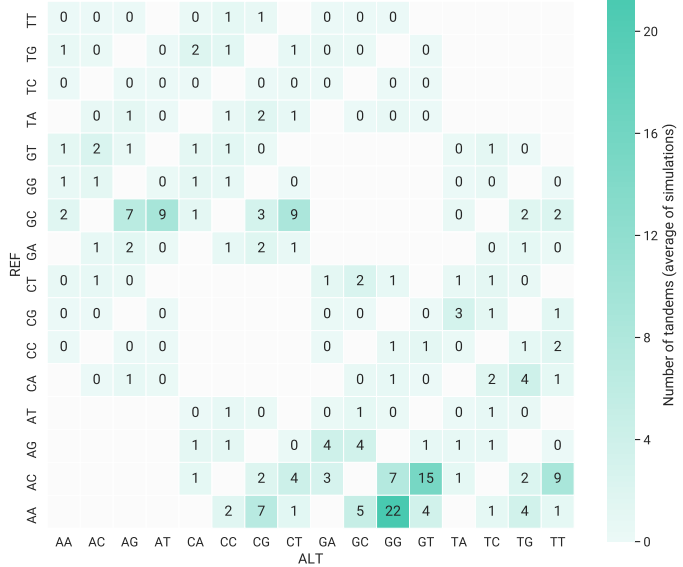
Distribution of mutation clusters by size (IGHV3-15\*01)

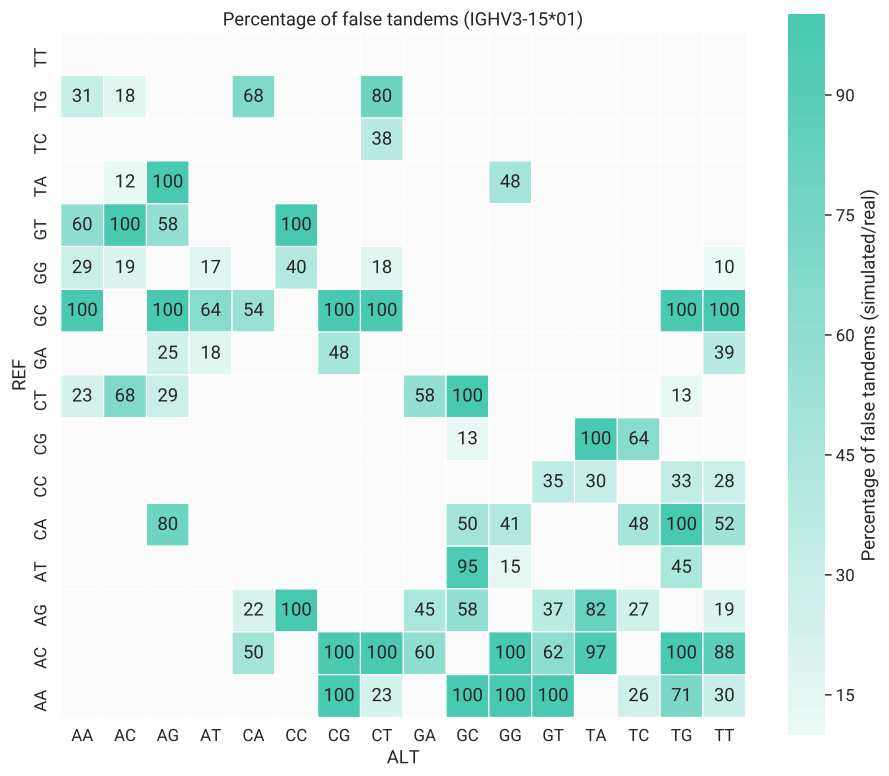
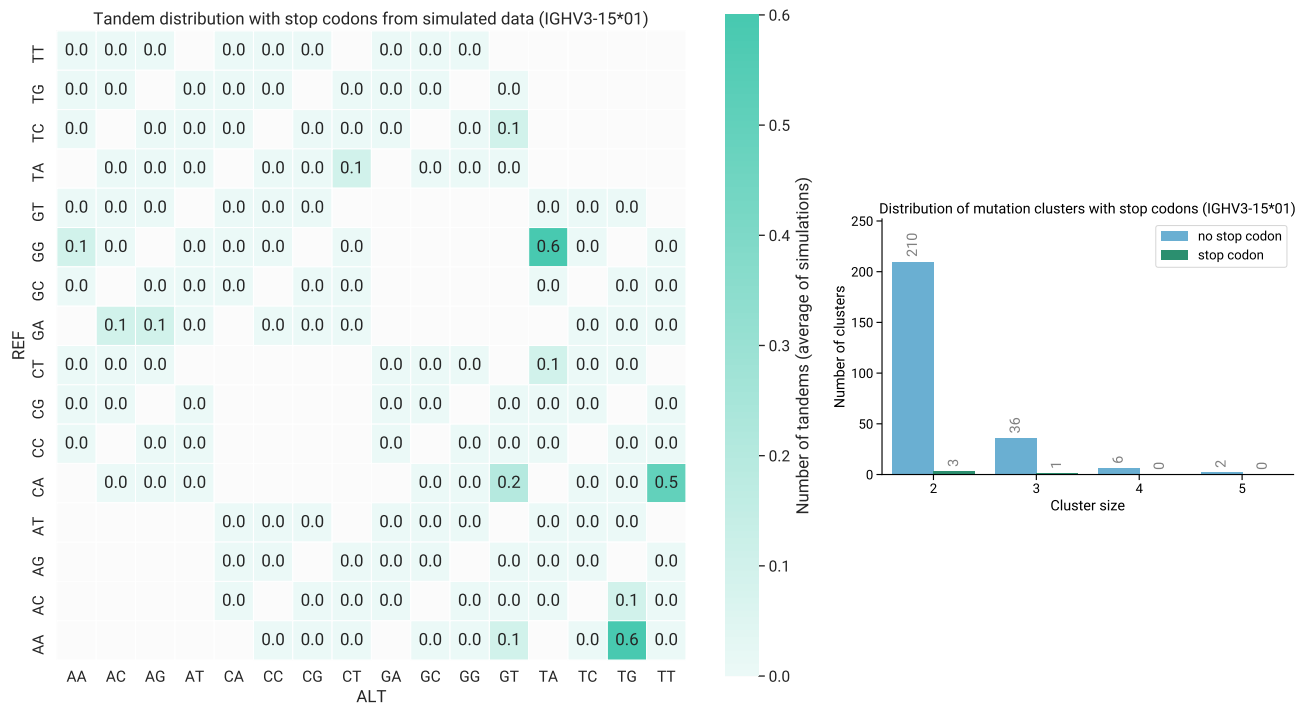


Tandem distribution from real data (IGHV3-15\*01)



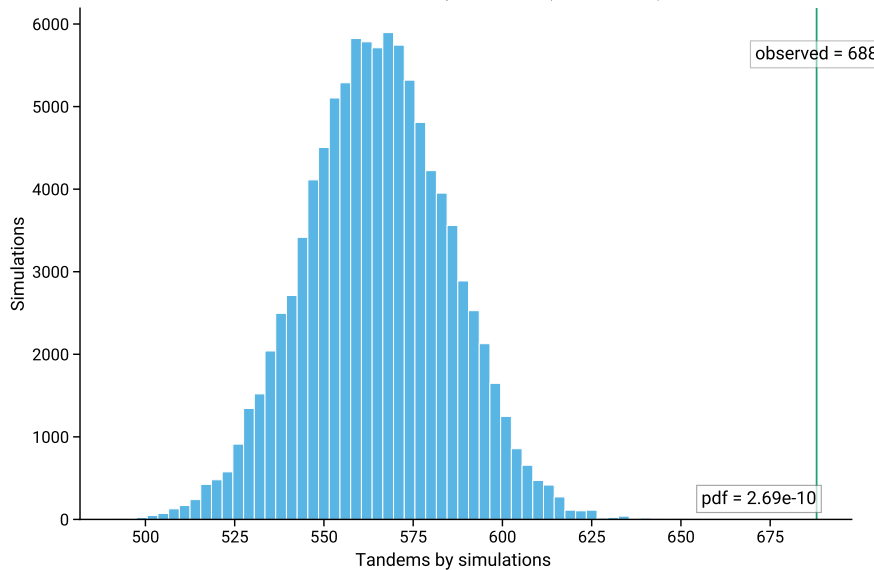
Tandem distribution from simulated data (IGHV3-15\*01)



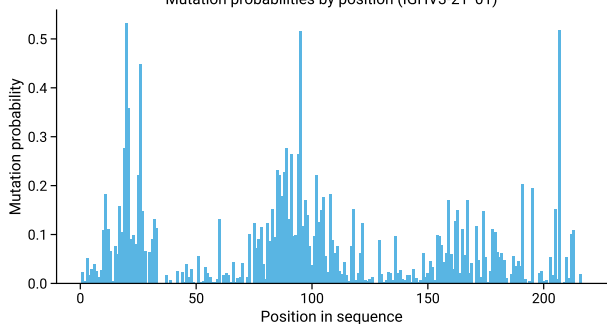


## 2.12 IGHV3-21\_01

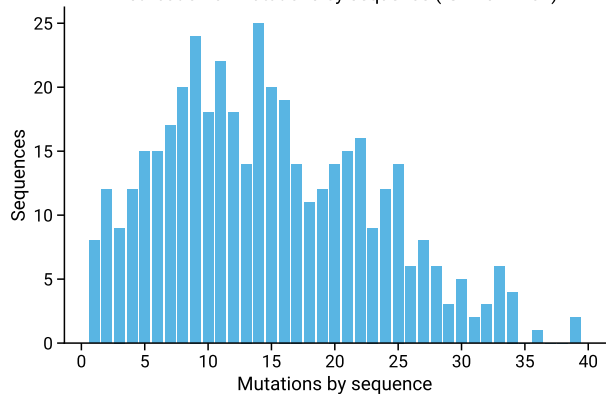
Distribution of tandems by simulation (IGHV3-21\*01)



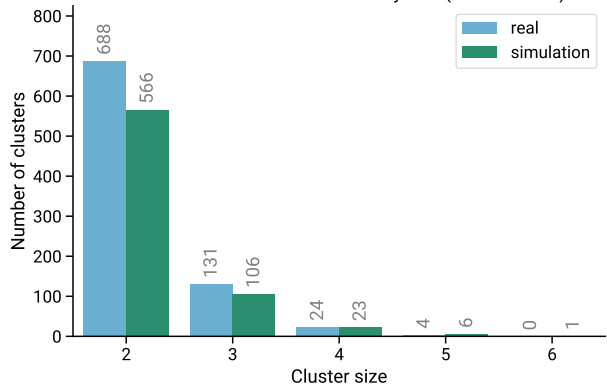
Mutation probabilities by position (IGHV3-21\*01)



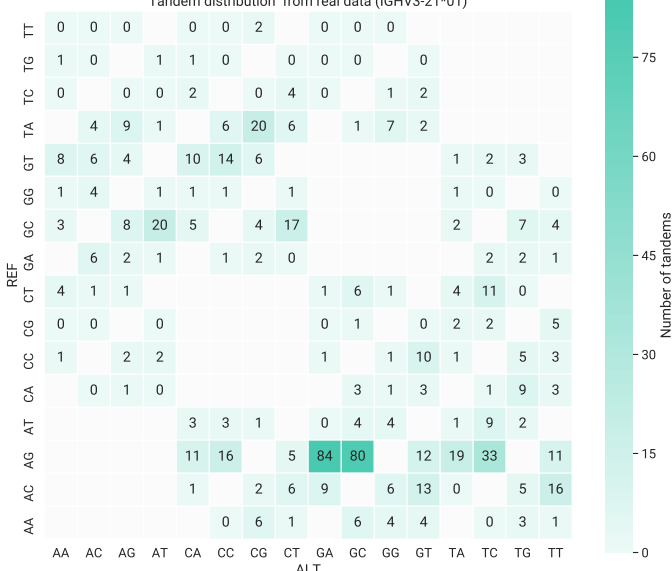
Distribution of mutations by sequence (IGHV3-21\*01)



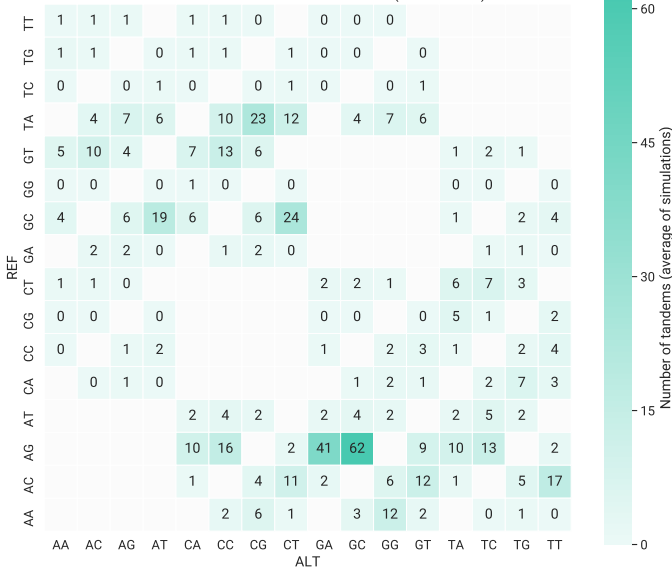
Distribution of mutation clusters by size (IGHV3-21\*01)

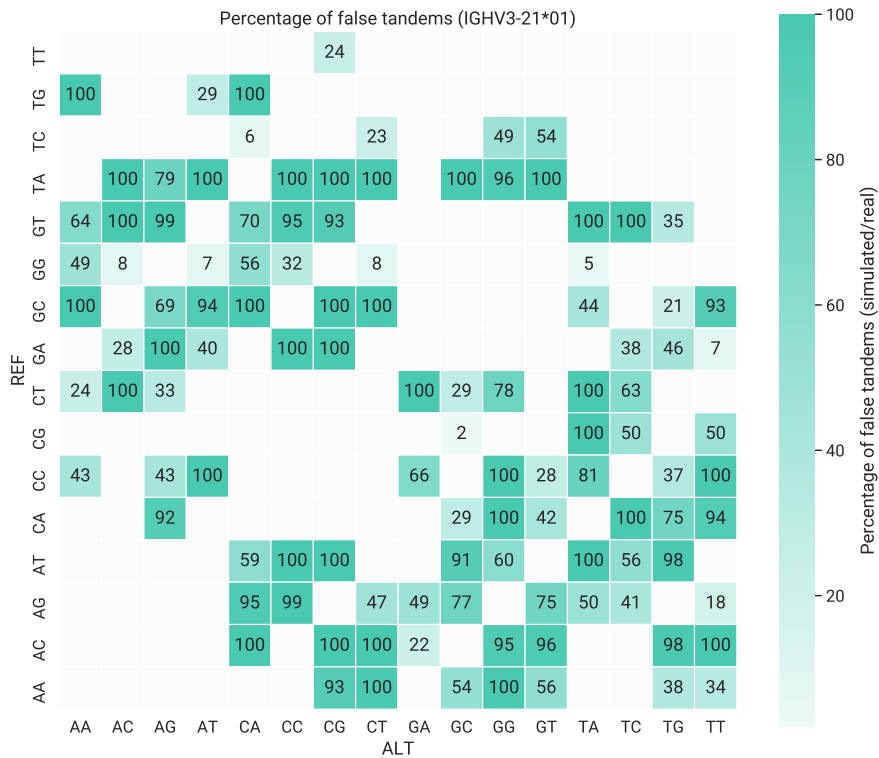
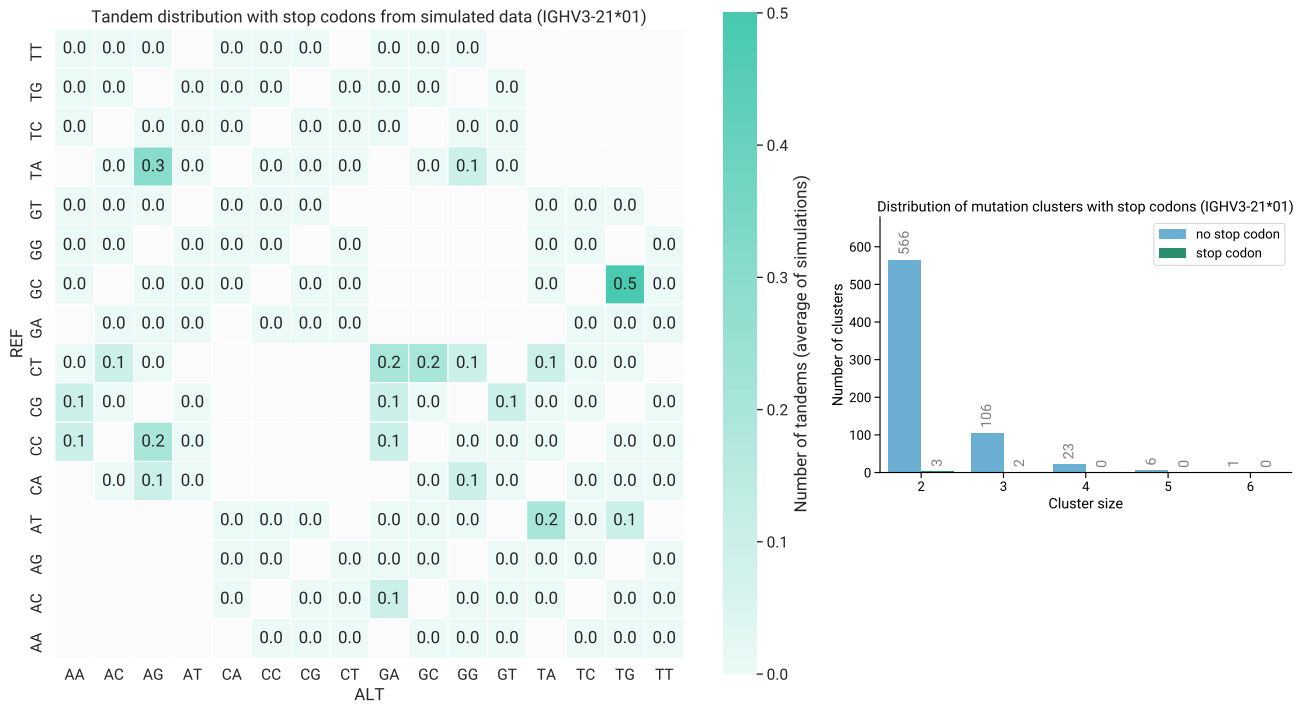


Tandem distribution from real data (IGHV3-21\*01)

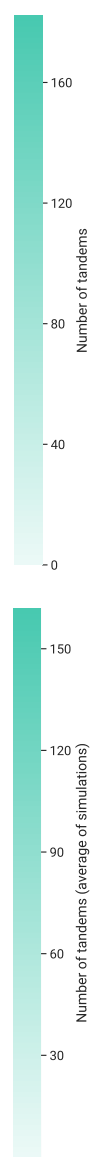
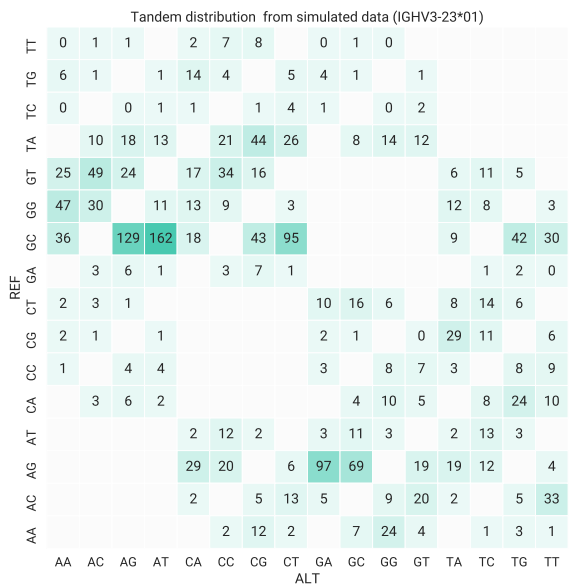
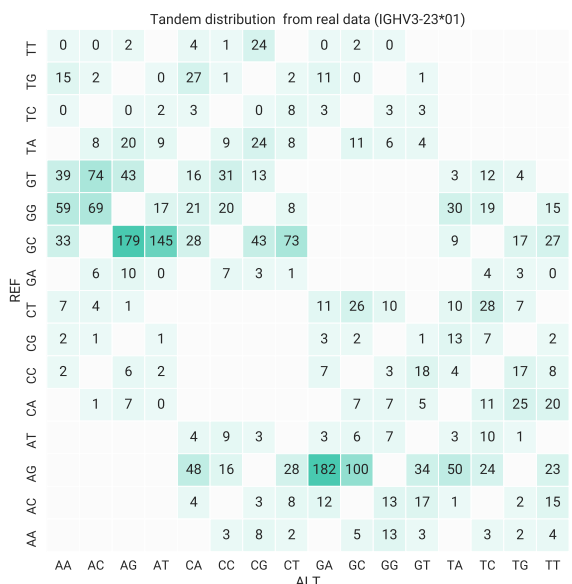
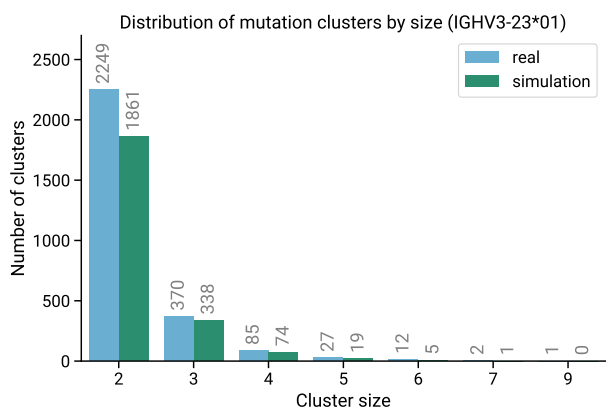
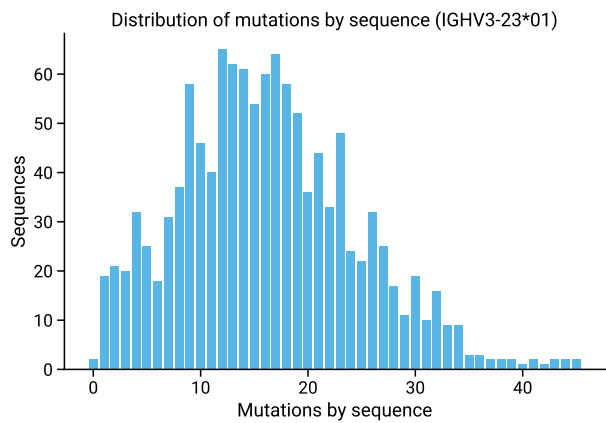
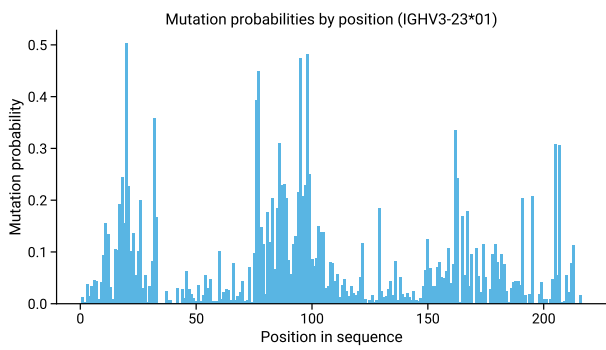
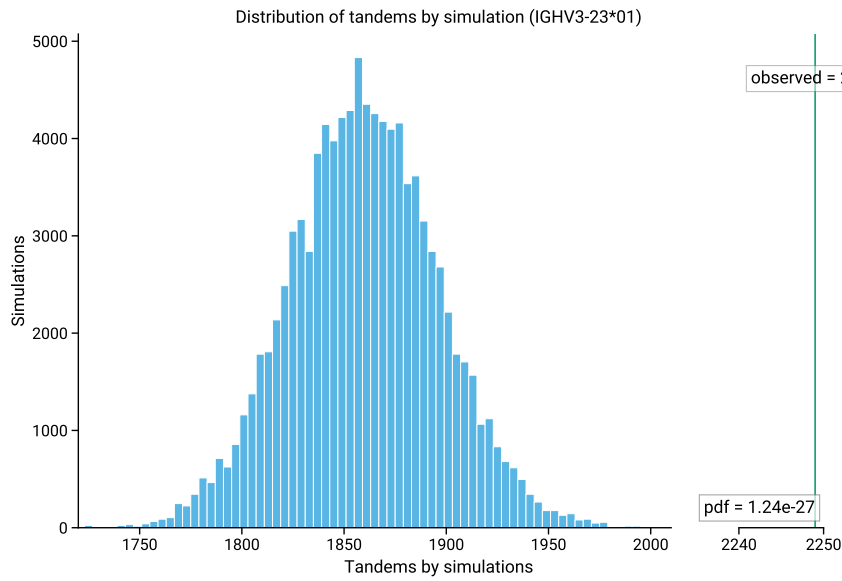


Tandem distribution from simulated data (IGHV3-21\*01)

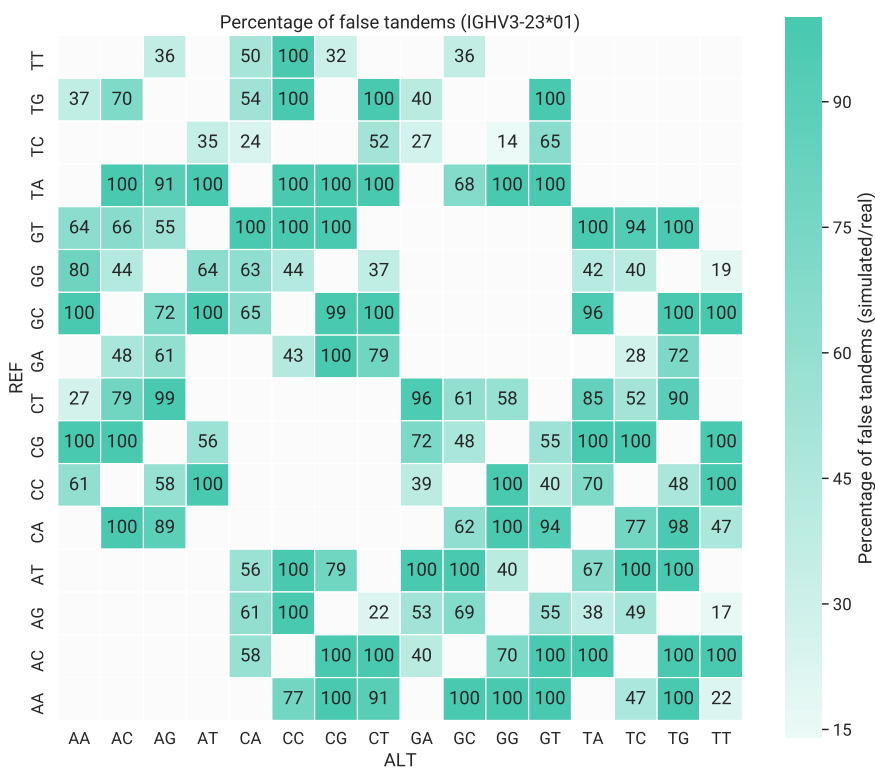
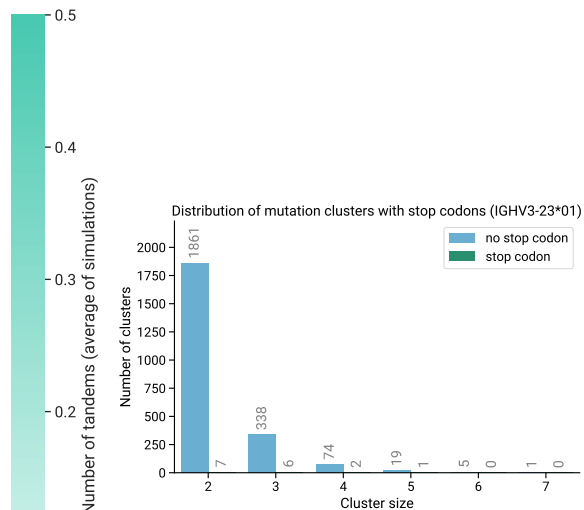
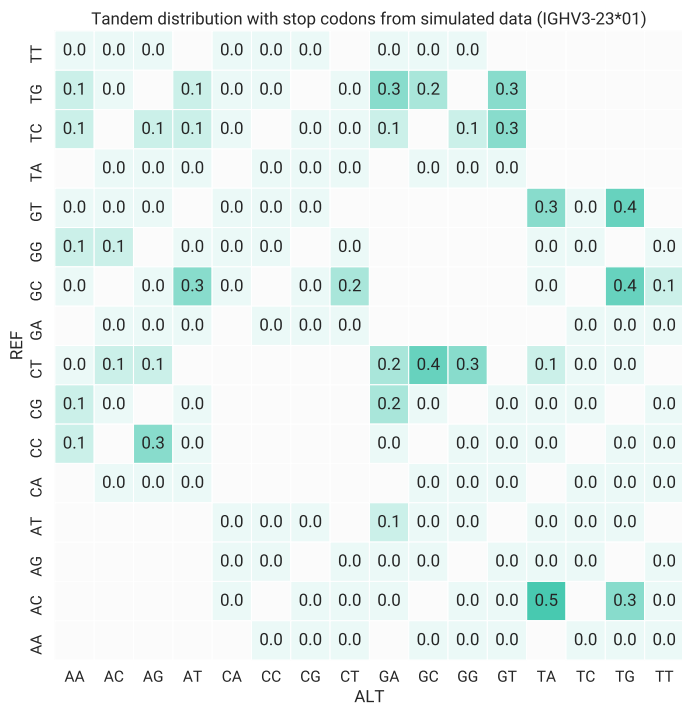




## 2.13 IGHV3-23\_01

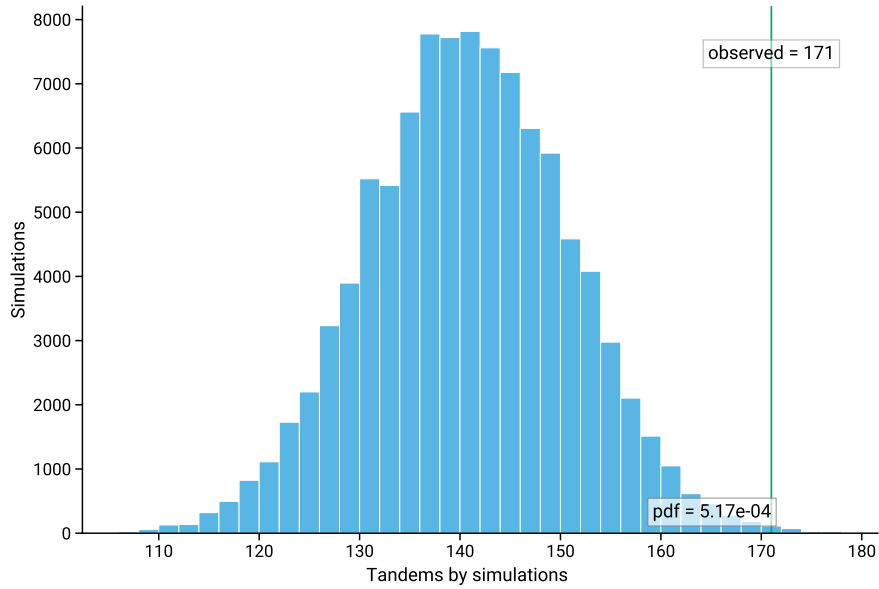




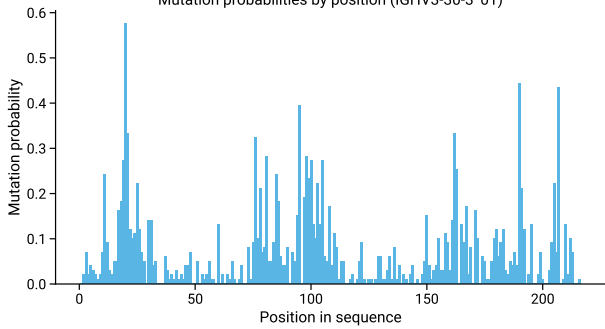


## 2.14 IGHV3-30-3\_01

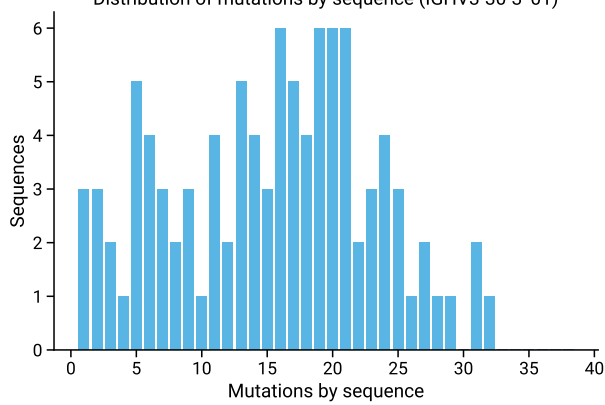
Distribution of tandems by simulation (IGHV3-30-3\*01)



Mutation probabilities by position (IGHV3-30-3\*01)



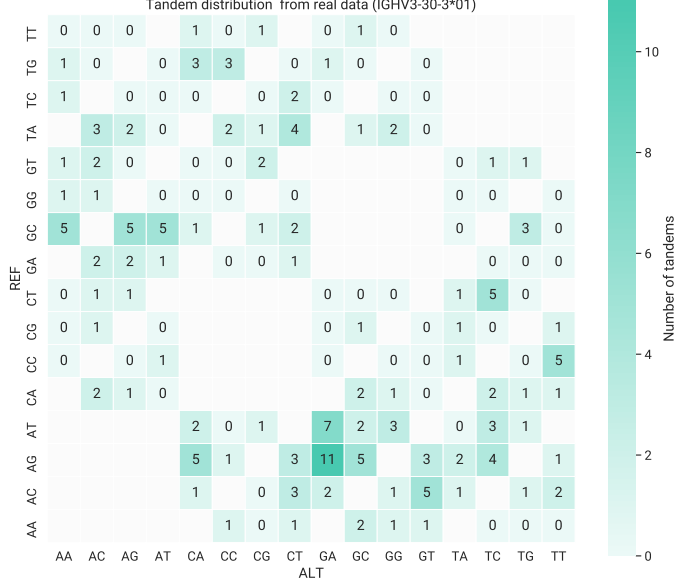
Distribution of mutations by sequence (IGHV3-30-3\*01)



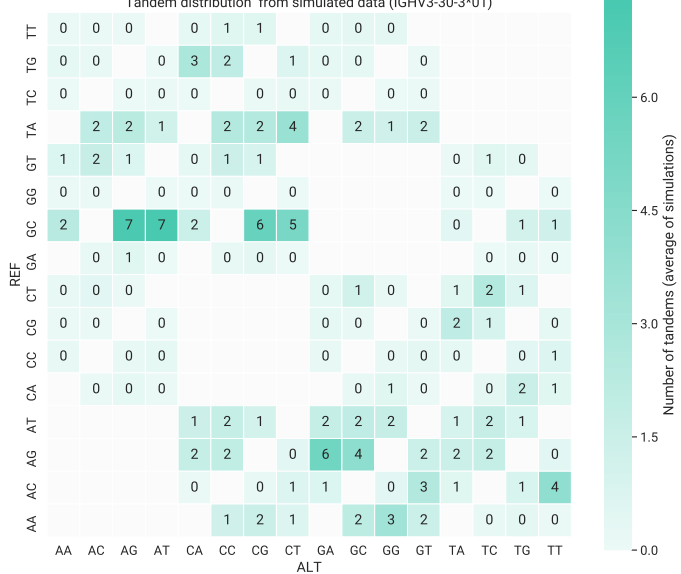
Distribution of mutation clusters by size (IGHV3-30-3\*01)

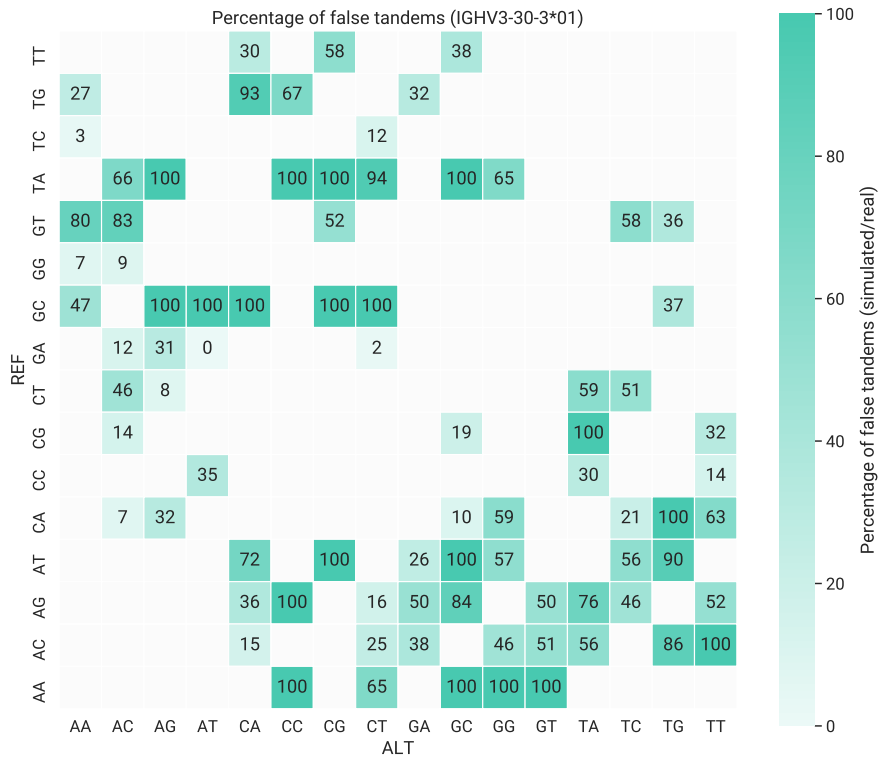
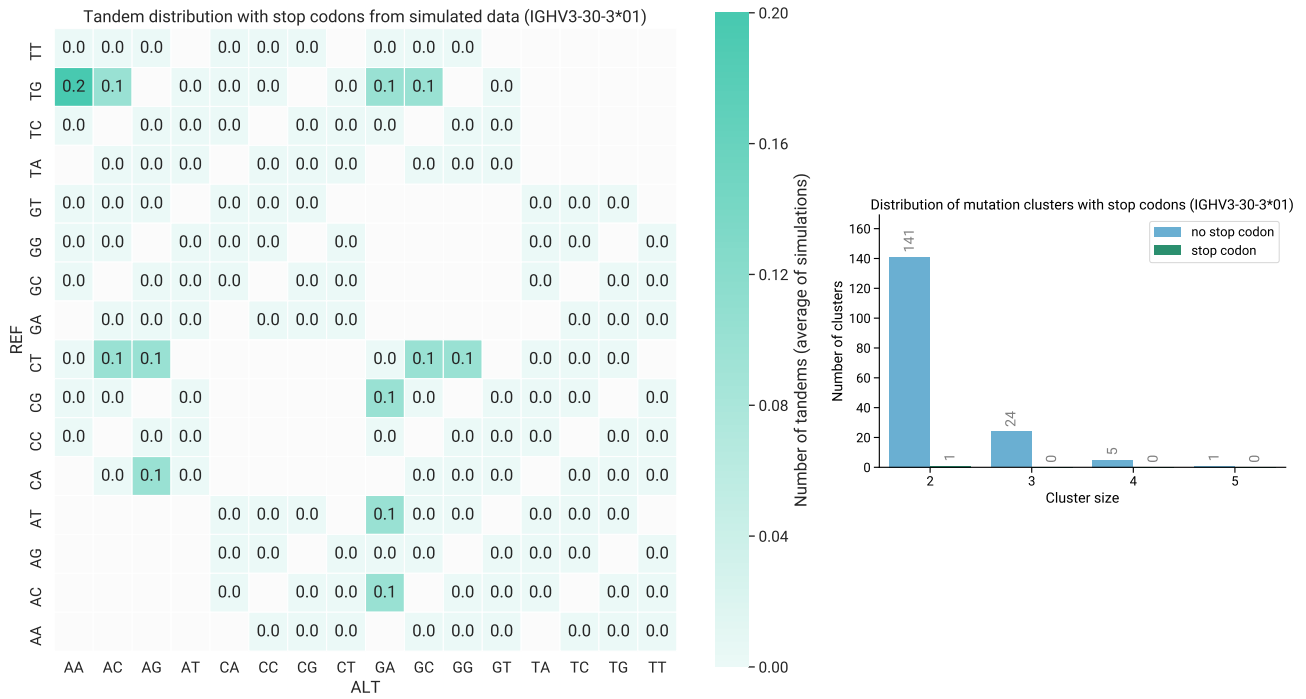


Tandem distribution from real data (IGHV3-30-3\*01)



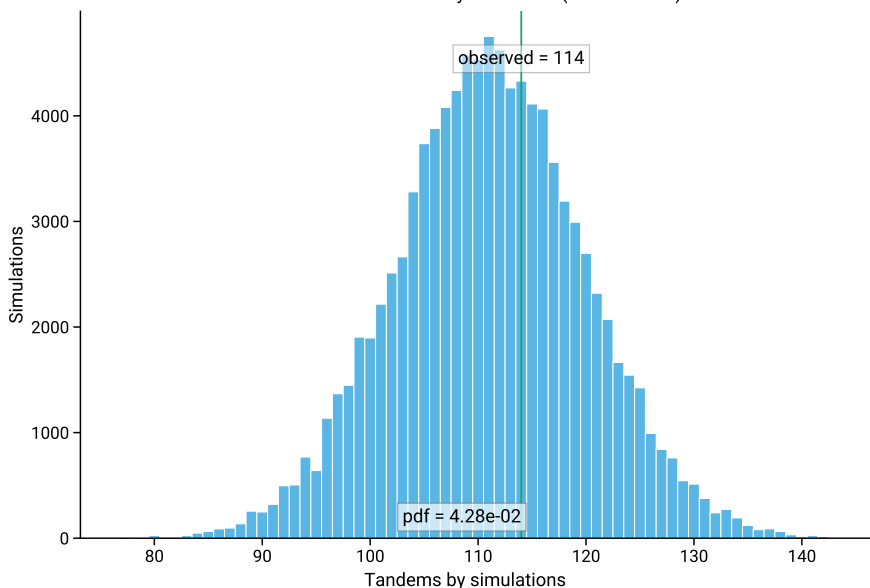
Tandem distribution from simulated data (IGHV3-30-3\*01)



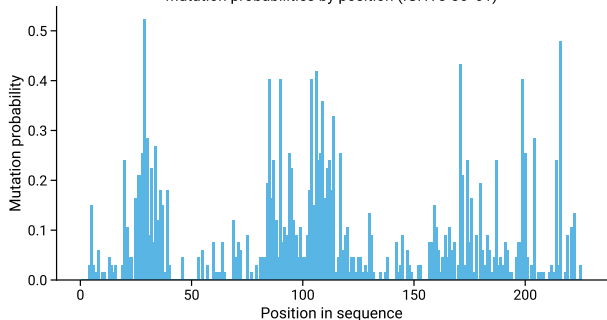


## 2.15 IGHV3-30\_01

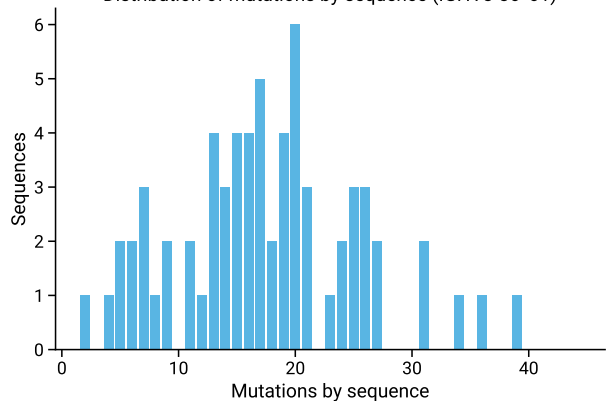
Distribution of tandems by simulation (IGHV3-30\*01)



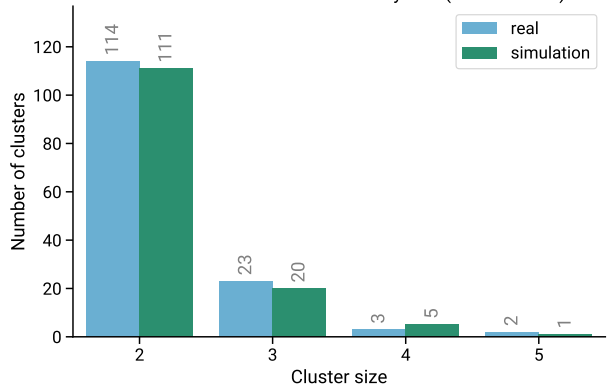
Mutation probabilities by position (IGHV3-30\*01)



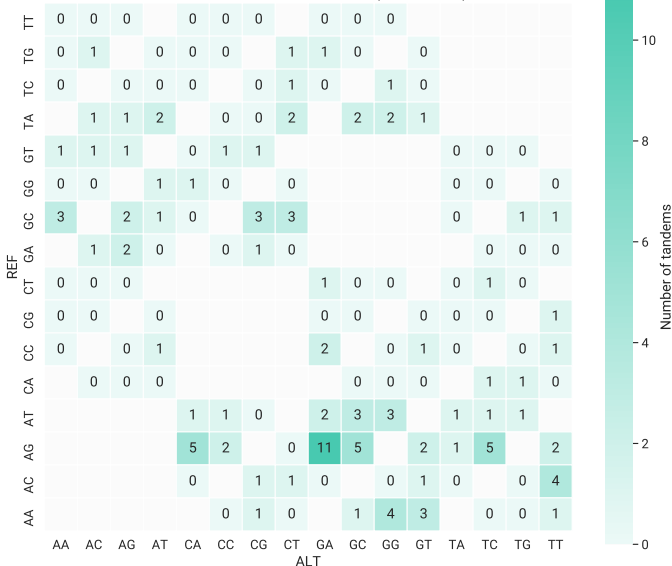
Distribution of mutations by sequence (IGHV3-30\*01)



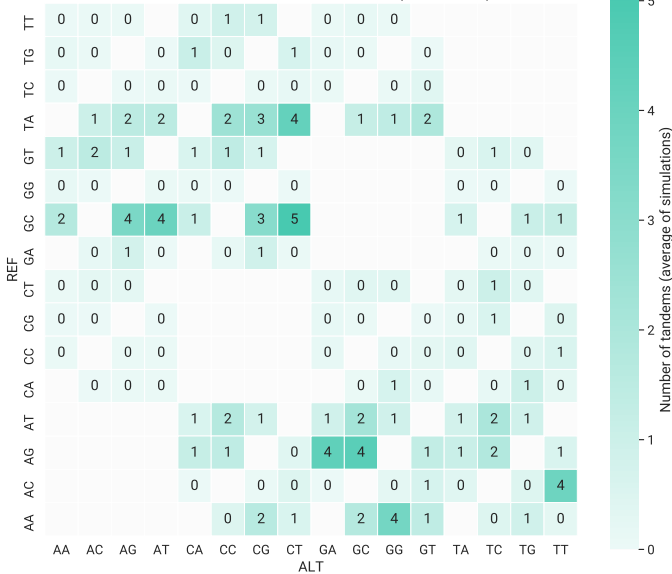
Distribution of mutation clusters by size (IGHV3-30\*01)

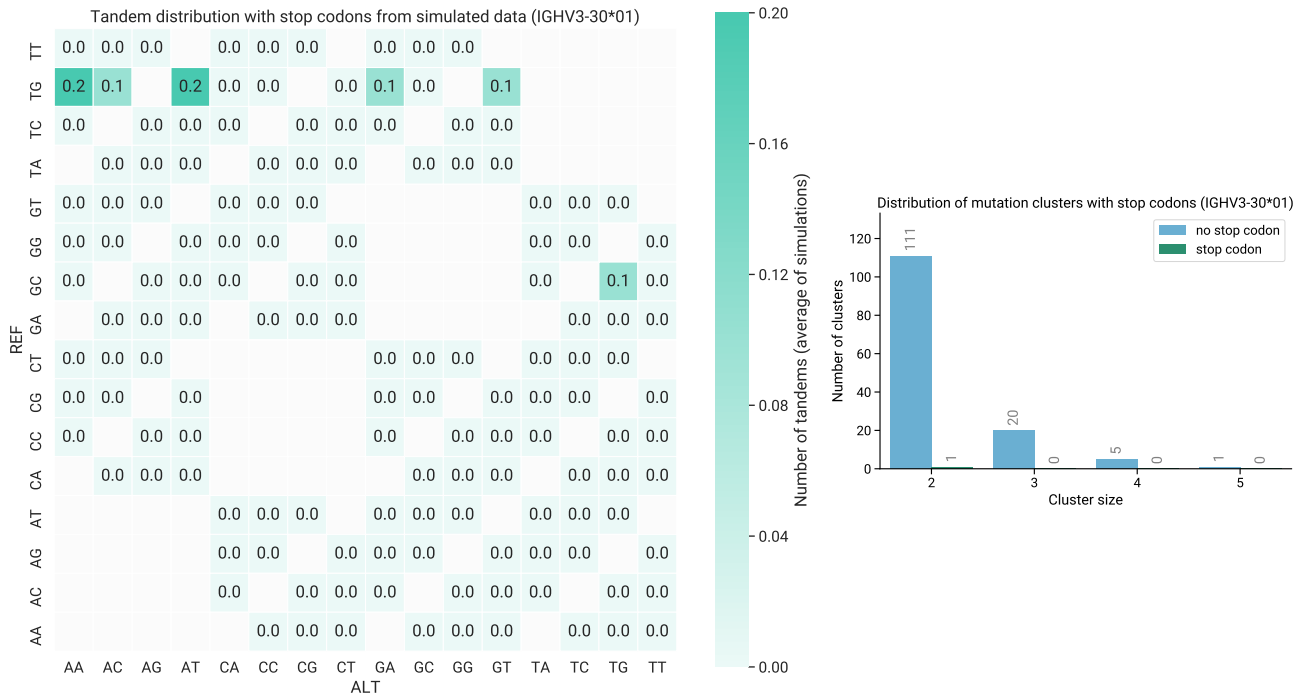


Tandem distribution from real data (IGHV3-30\*01)



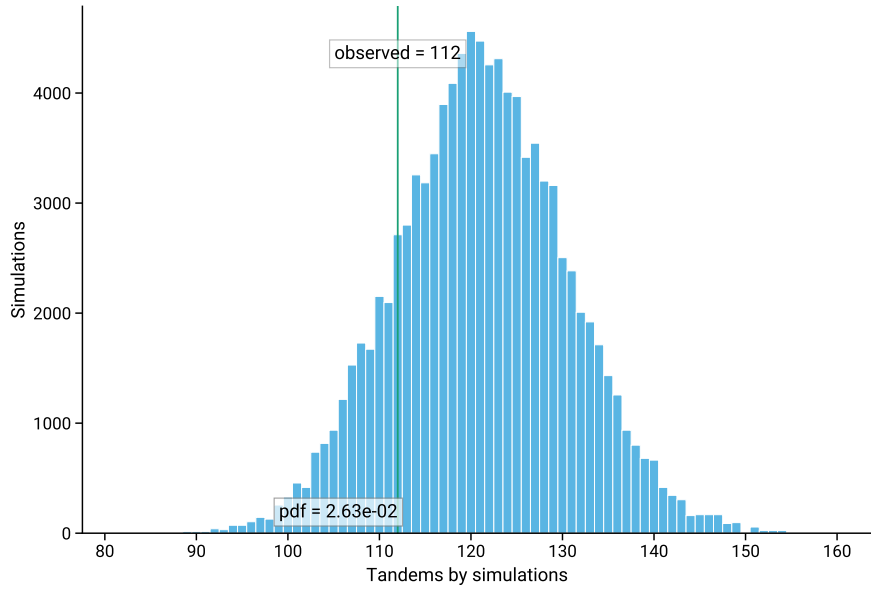
Tandem distribution from simulated data (IGHV3-30\*01)



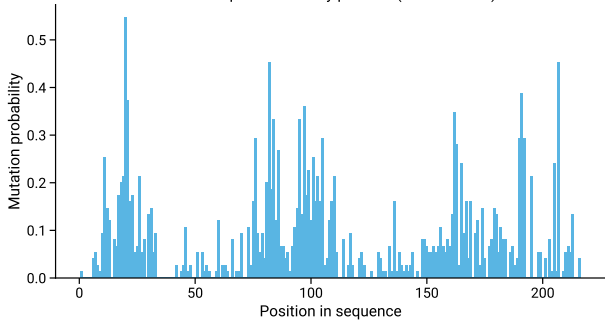


## 2.16 IGHV3-30\_02

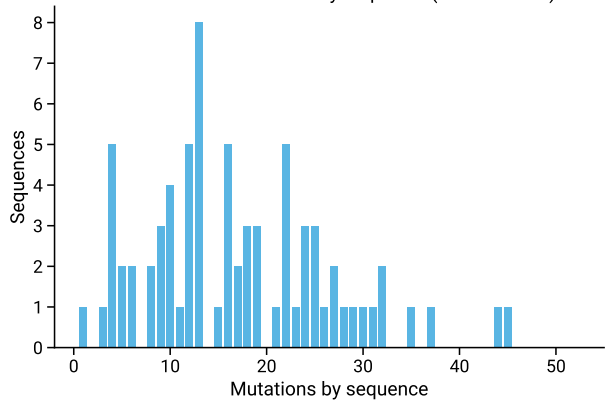
Distribution of tandems by simulation (IGHV3-30\*02)



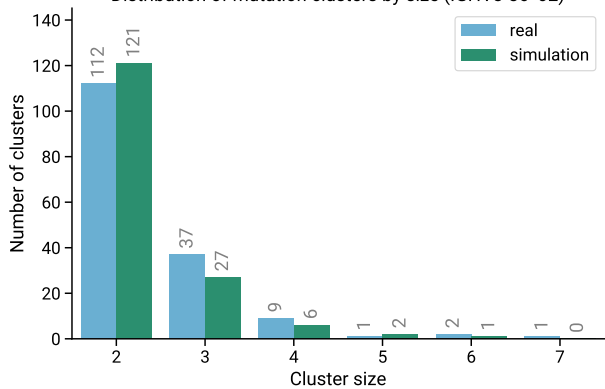
Mutation probabilities by position (IGHV3-30\*02)



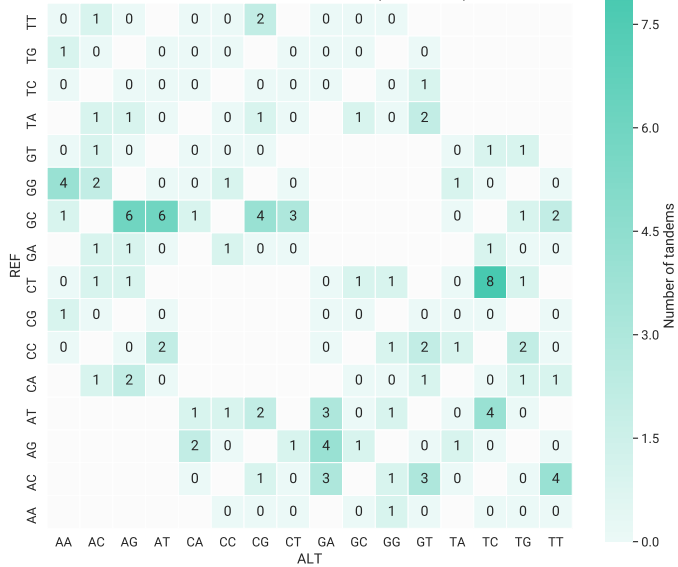
Distribution of mutations by sequence (IGHV3-30\*02)



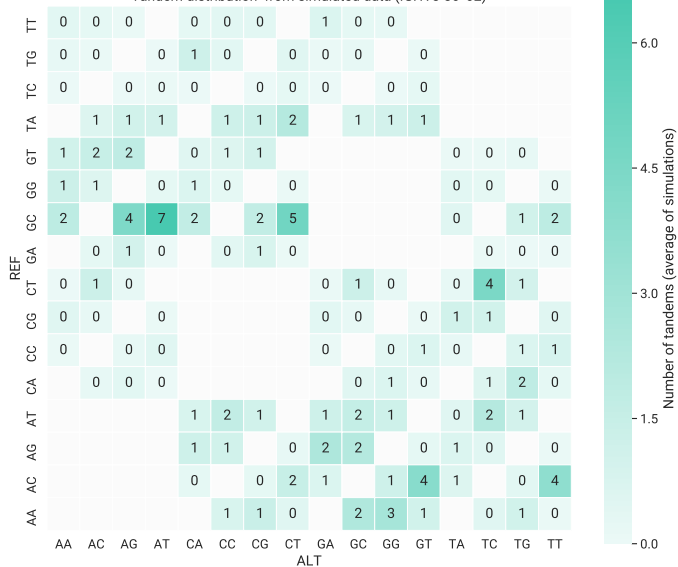
Distribution of mutation clusters by size (IGHV3-30\*02)

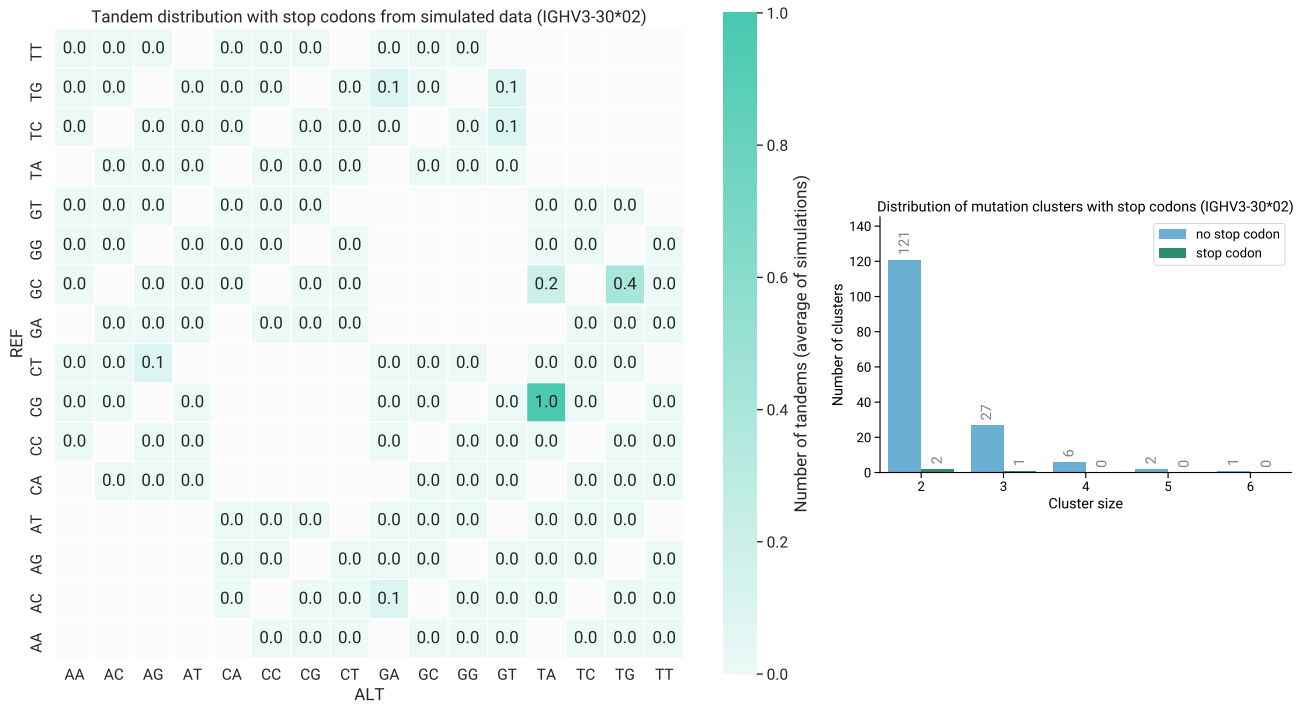


Tandem distribution from real data (IGHV3-30\*02)



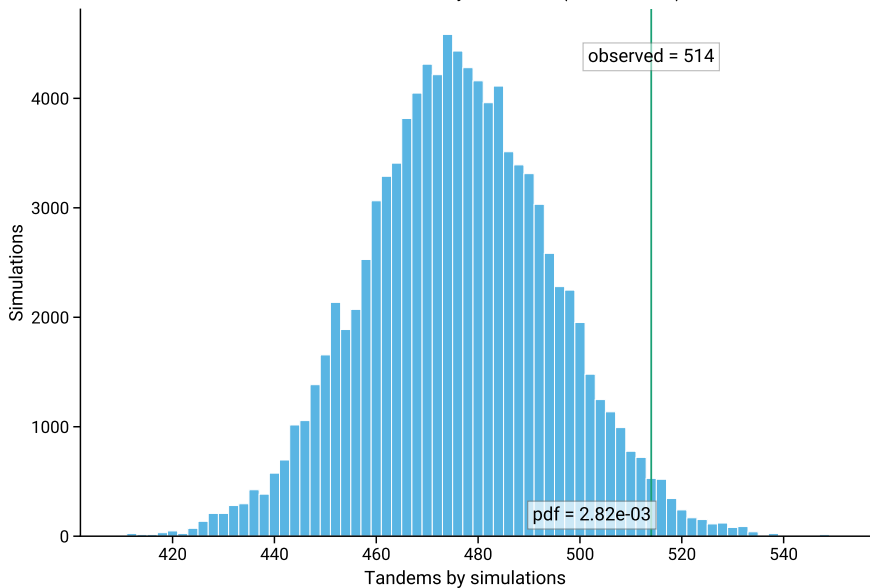
Tandem distribution from simulated data (IGHV3-30\*02)



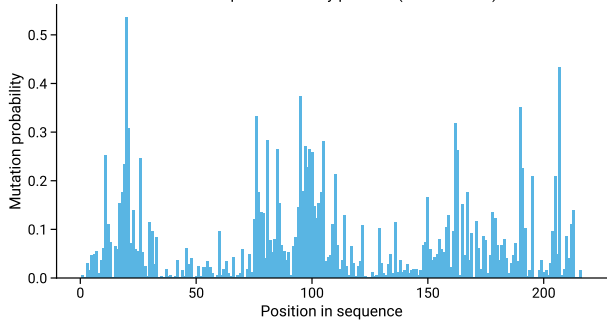


## 2.17 IGHV3-30\_03

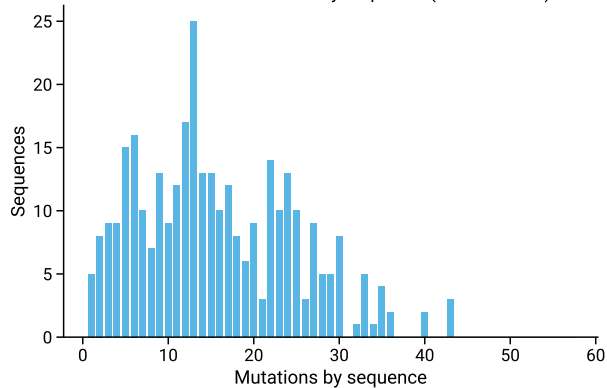
Distribution of tandems by simulation (IGHV3-30\*03)



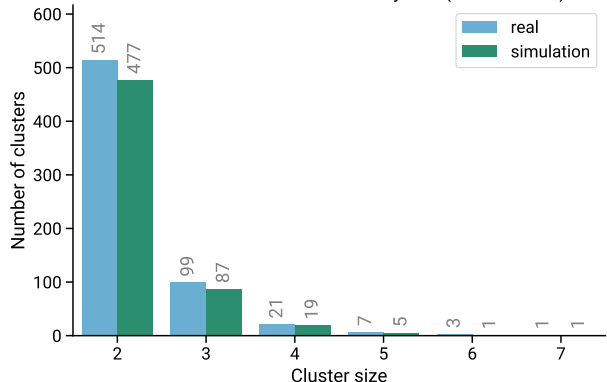
Mutation probabilities by position (IGHV3-30\*03)



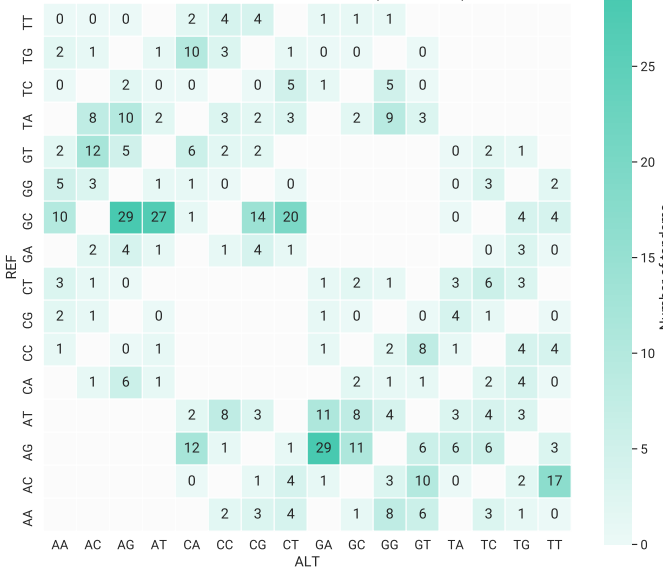
Distribution of mutations by sequence (IGHV3-30\*03)



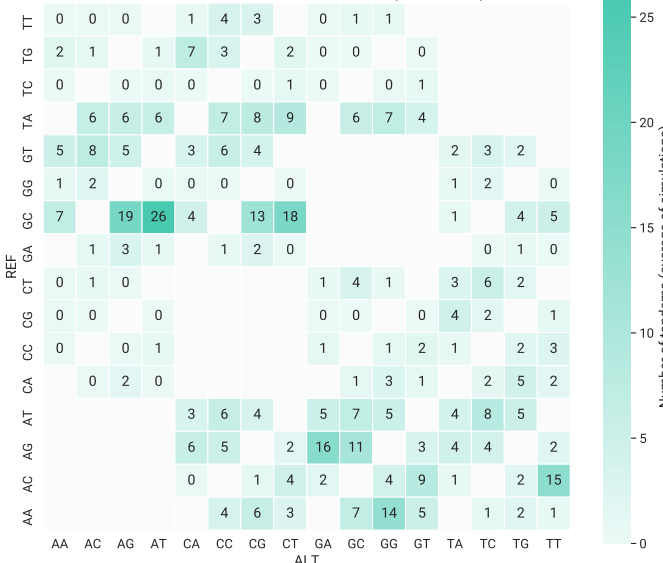
Distribution of mutation clusters by size (IGHV3-30\*03)



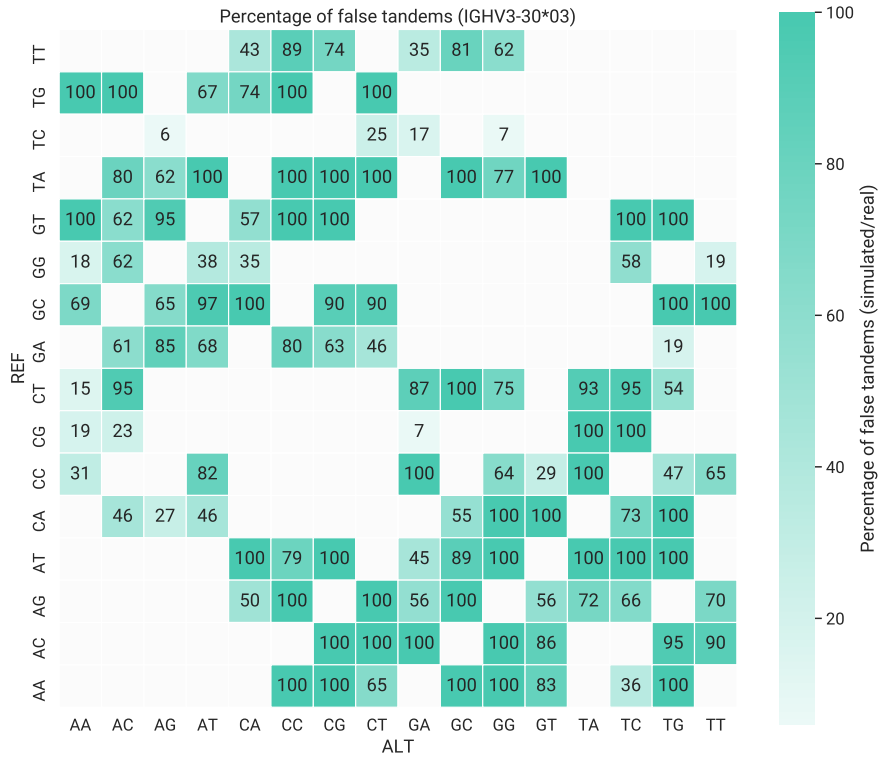
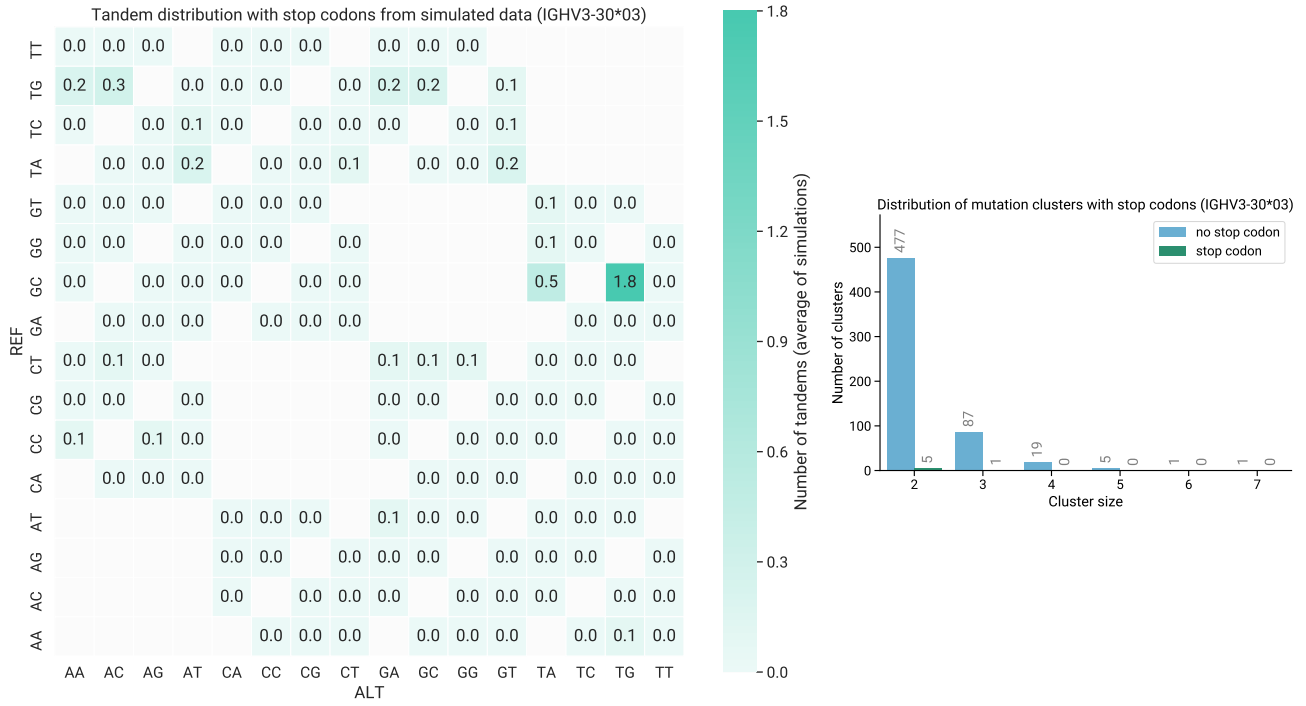
Tandem distribution from real data (IGHV3-30\*03)



Tandem distribution from simulated data (IGHV3-30\*03)

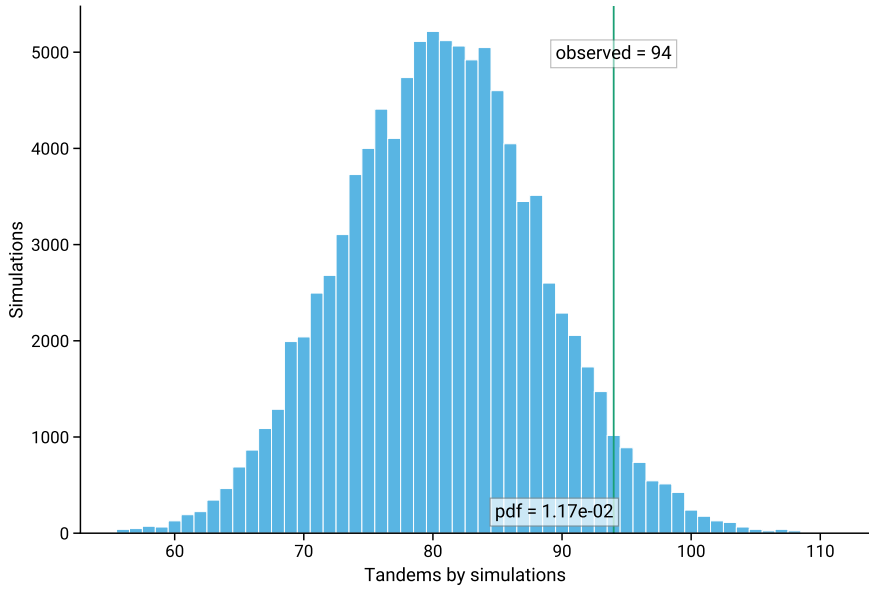




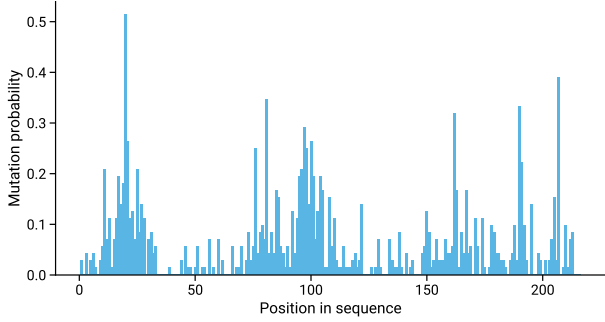


## 2.18 IGHV3-30\_04

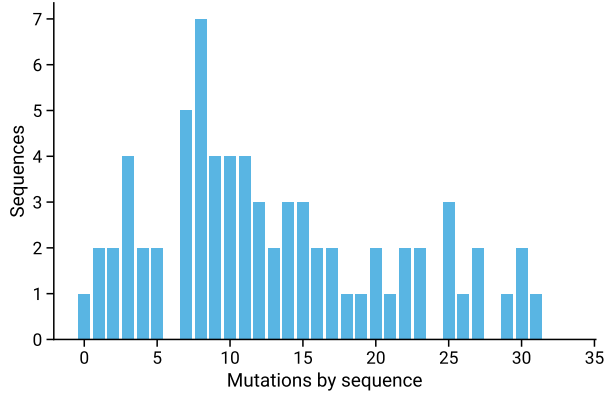
Distribution of tandems by simulation (IGHV3-30\*04)



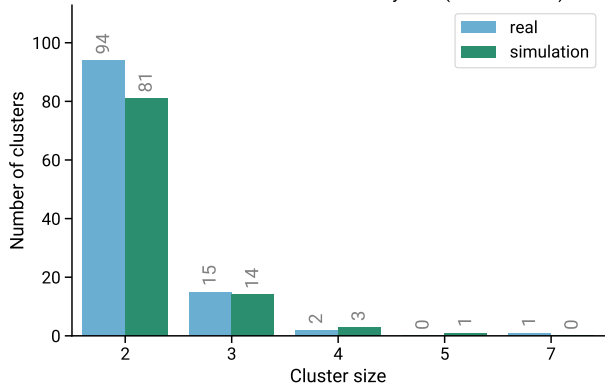
Mutation probabilities by position (IGHV3-30\*04)



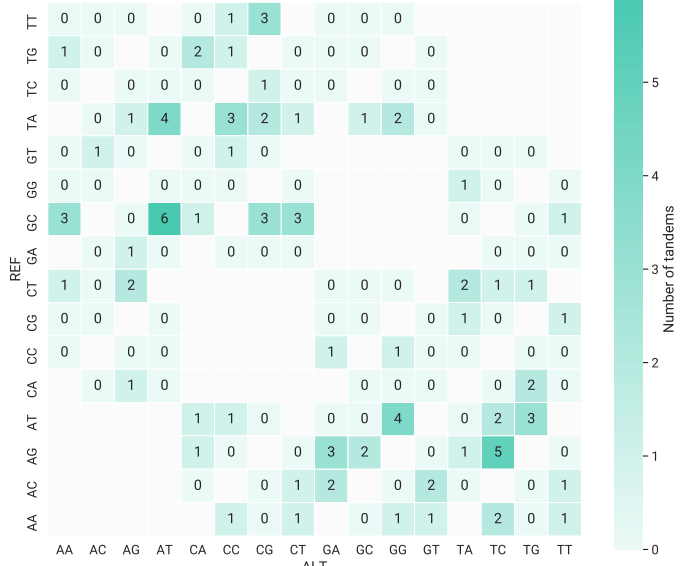
Distribution of mutations by sequence (IGHV3-30\*04)



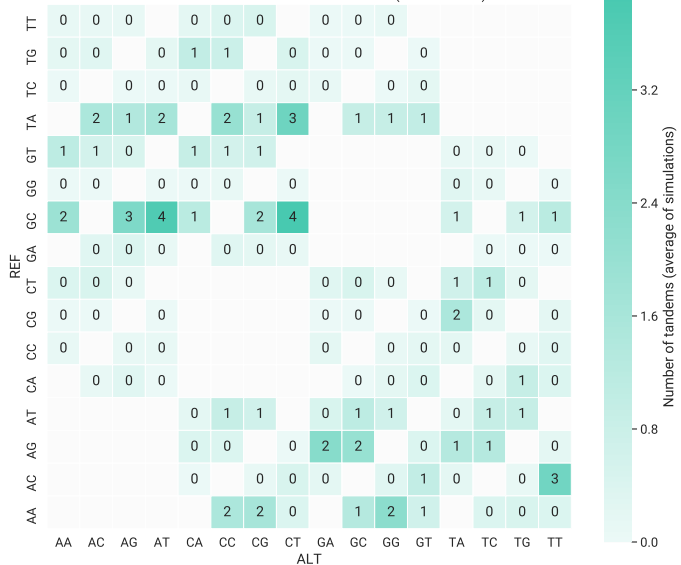
Distribution of mutation clusters by size (IGHV3-30\*04)

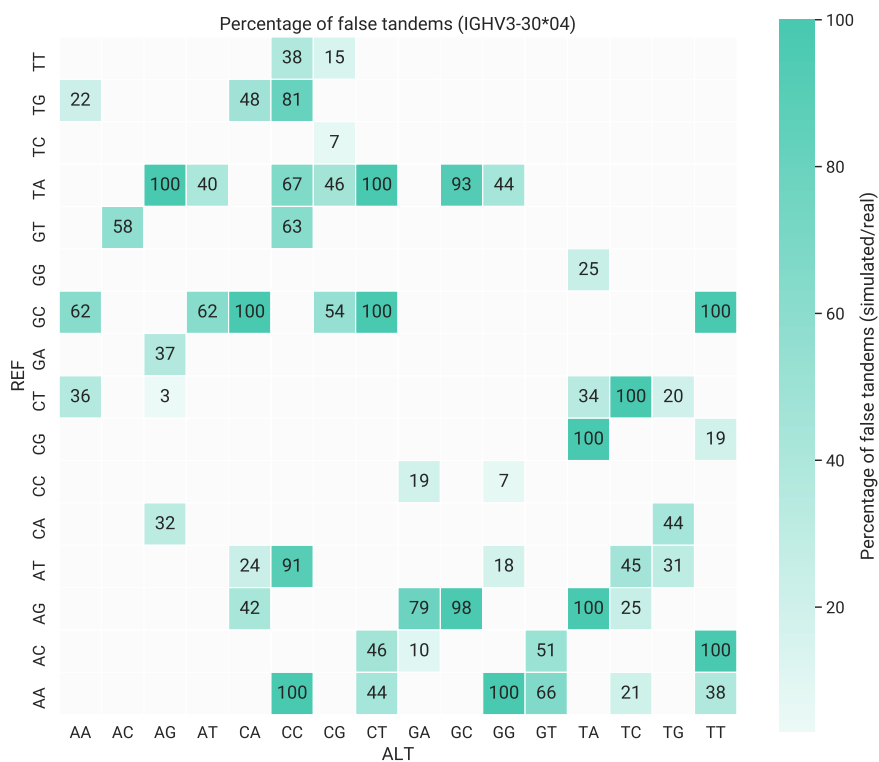
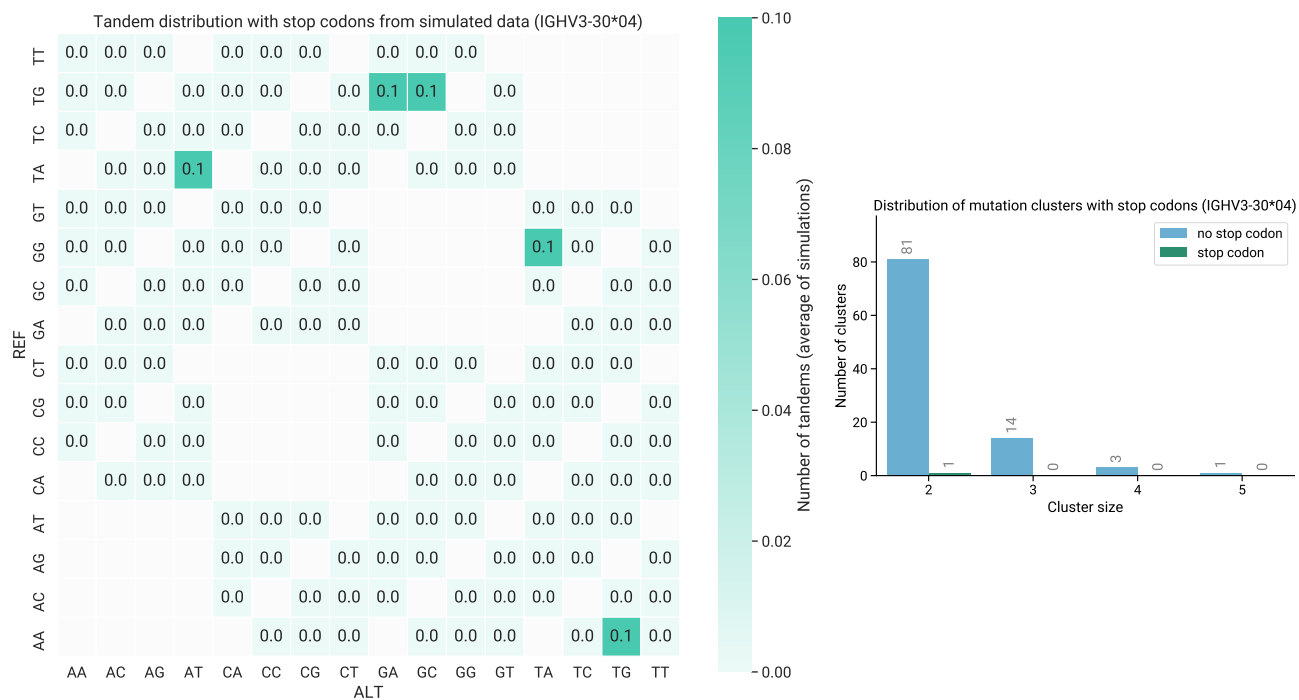


Tandem distribution from real data (IGHV3-30\*04)



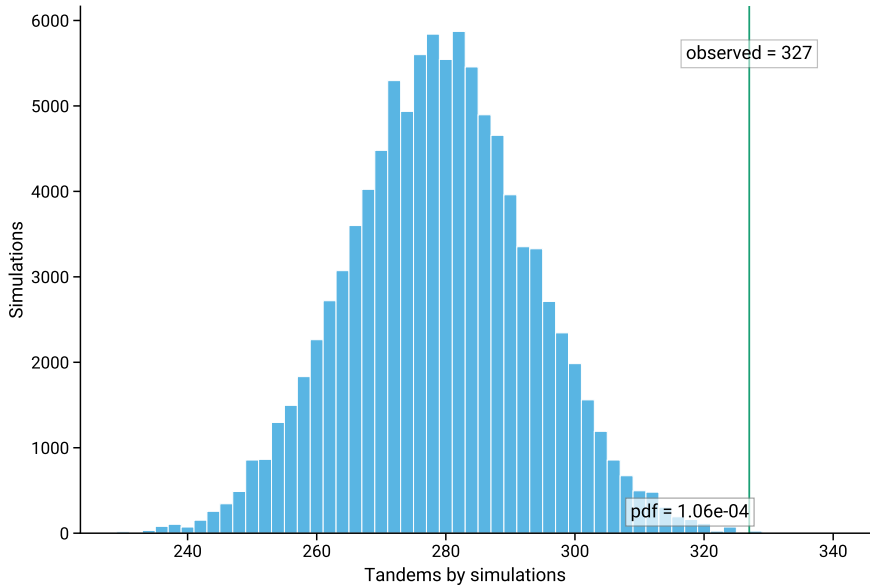
Tandem distribution from simulated data (IGHV3-30\*04)



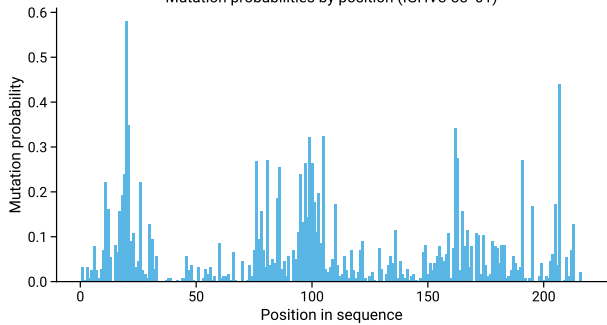


## 2.19 IGHV3-33\_01

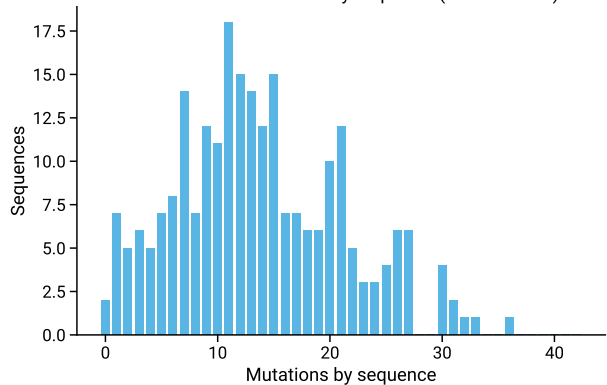
Distribution of tandems by simulation (IGHV3-33\*01)



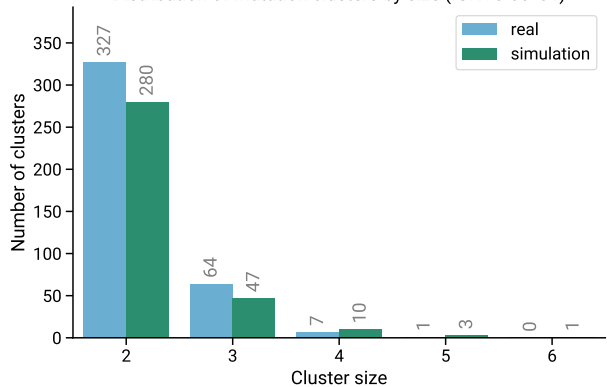
Mutation probabilities by position (IGHV3-33\*01)



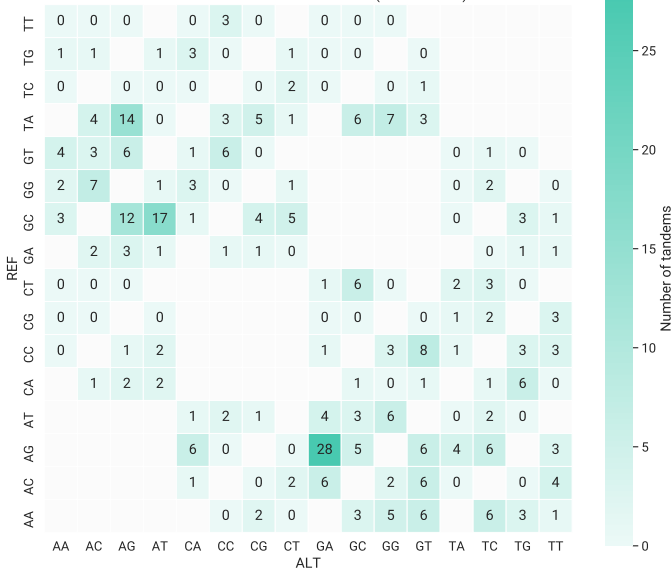
Distribution of mutations by sequence (IGHV3-33\*01)



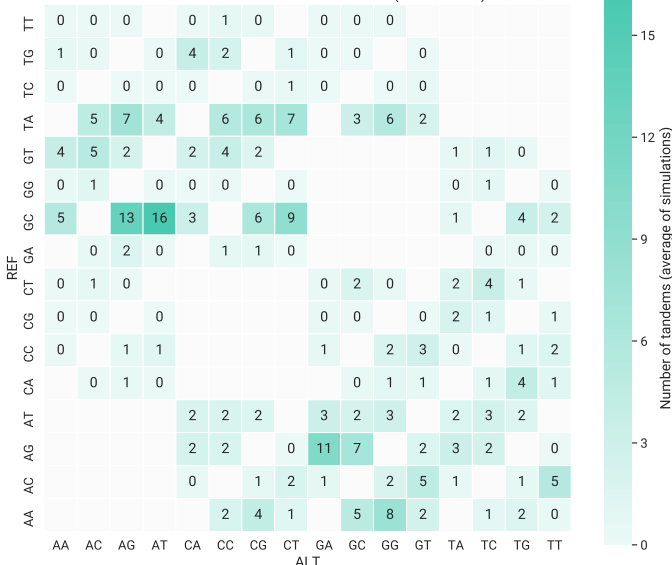
Distribution of mutation clusters by size (IGHV3-33\*01)

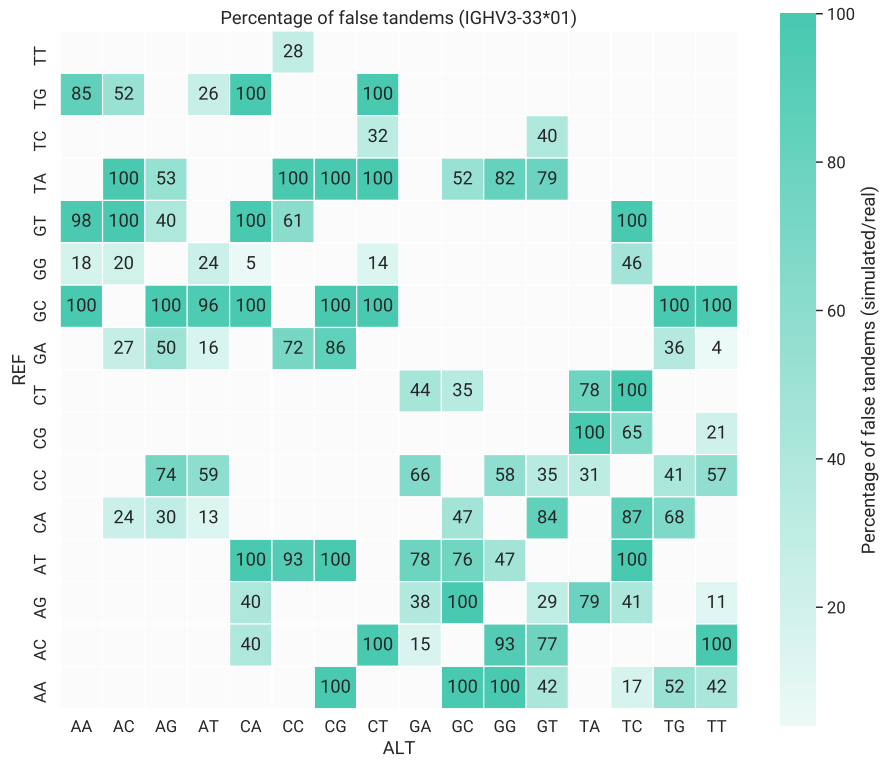
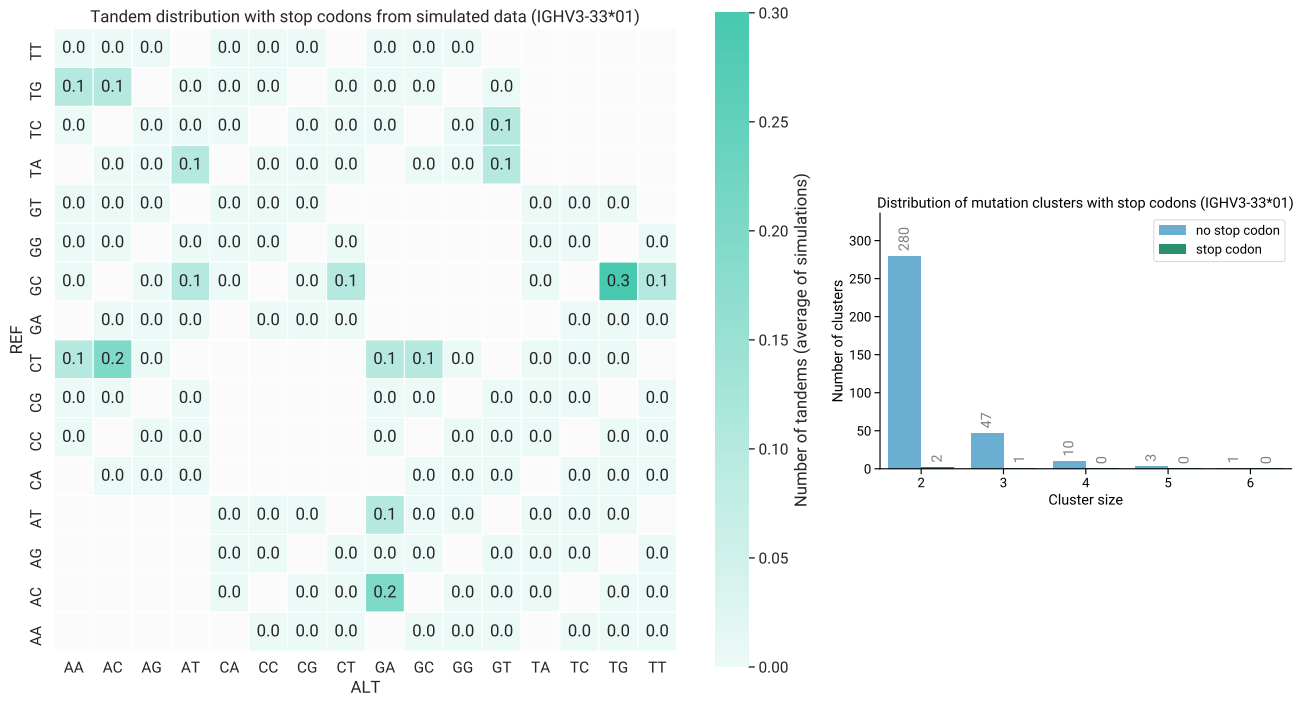


Tandem distribution from real data (IGHV3-33\*01)



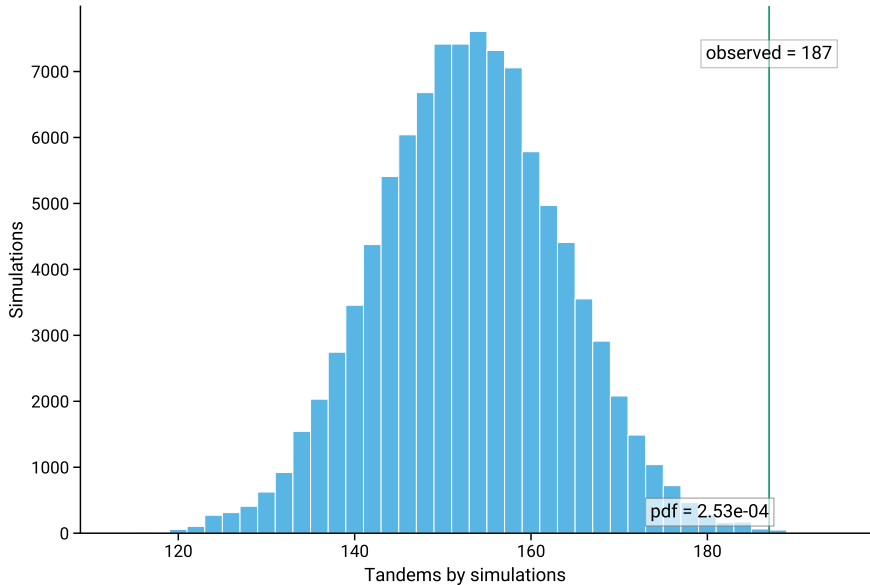
Tandem distribution from simulated data (IGHV3-33\*01)



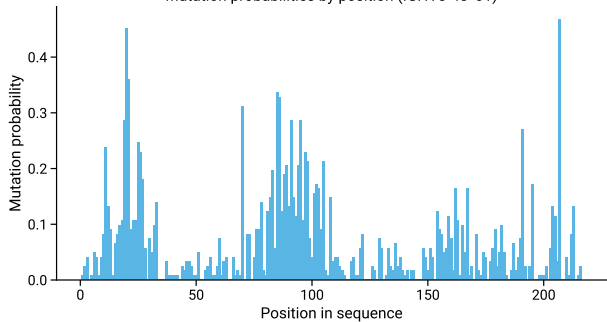


## 2.20 IGHV3-48\_01

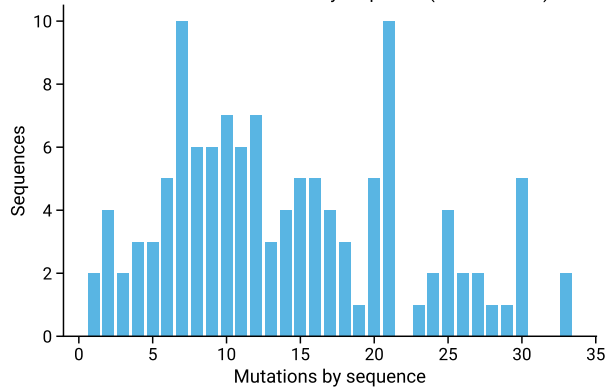
Distribution of tandems by simulation (IGHV3-48\*01)



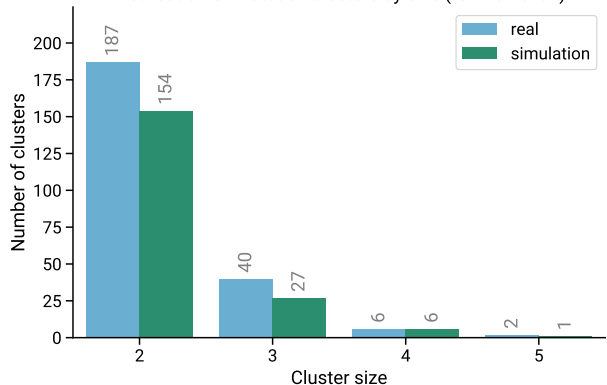
Mutation probabilities by position (IGHV3-48\*01)



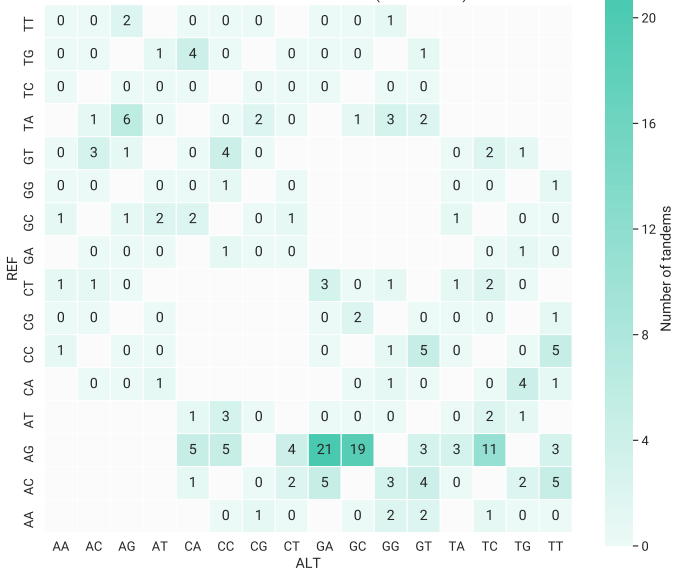
Distribution of mutations by sequence (IGHV3-48\*01)



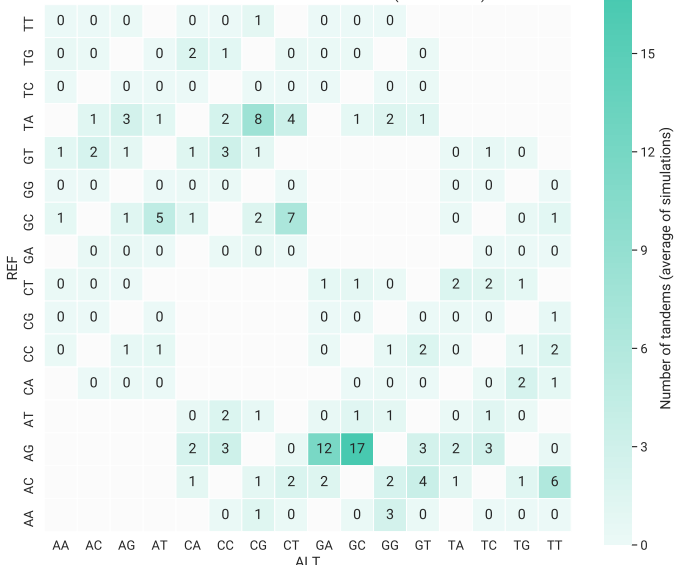
Distribution of mutation clusters by size (IGHV3-48\*01)

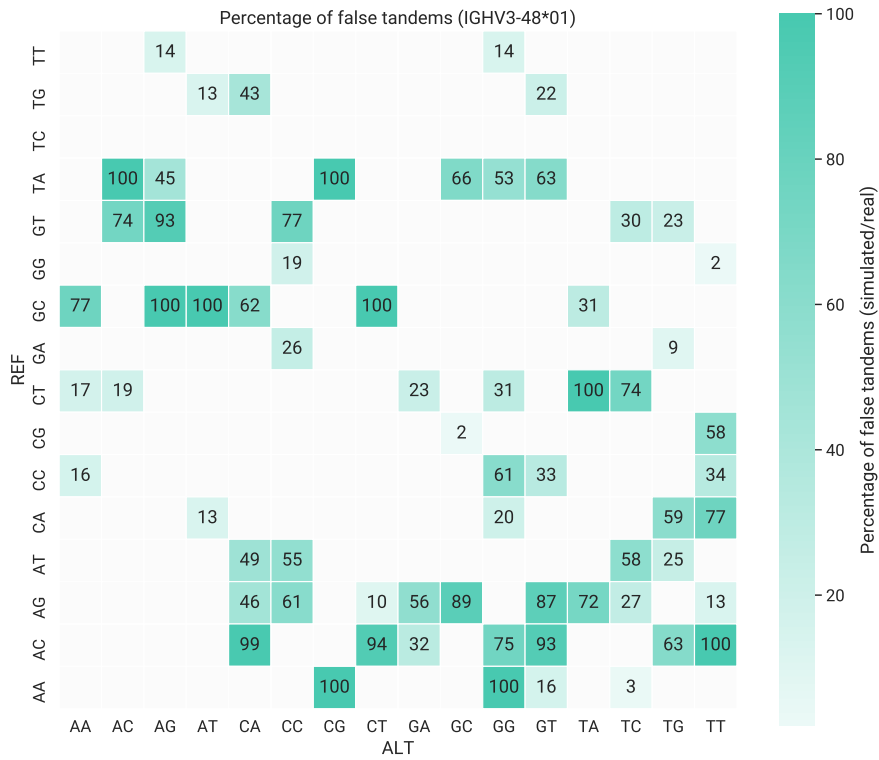
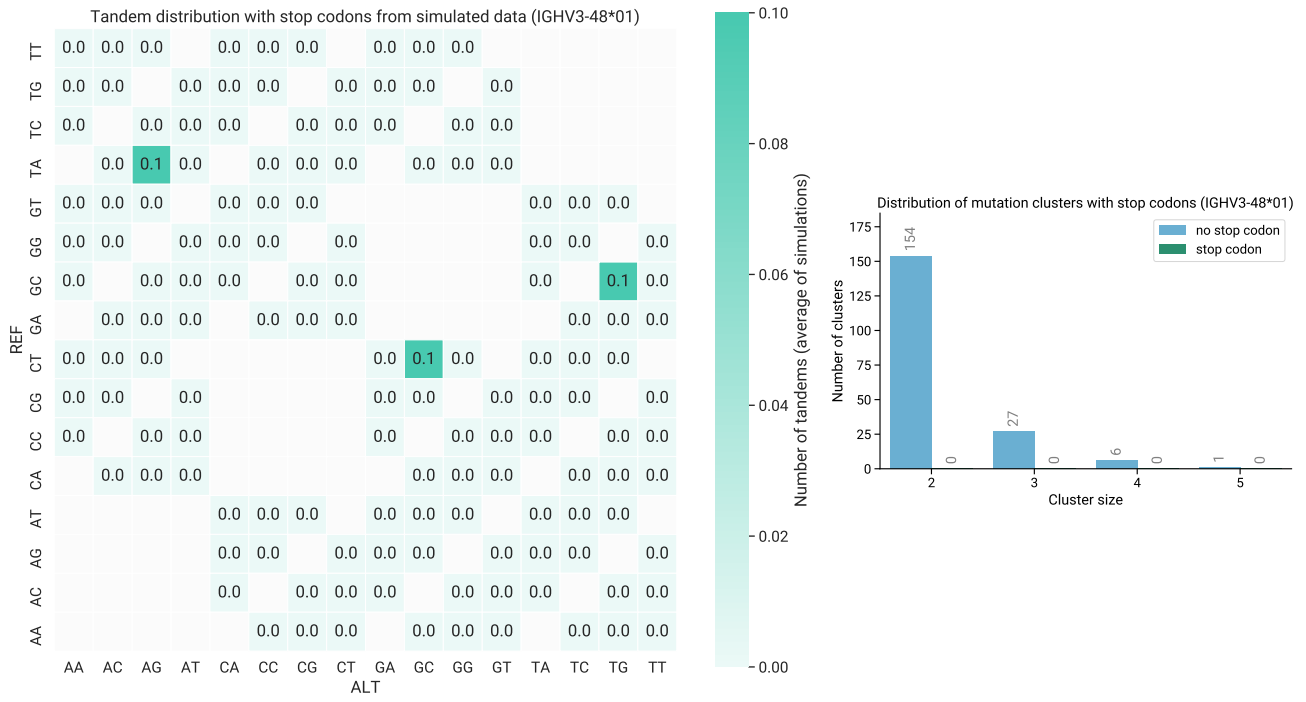


Tandem distribution from real data (IGHV3-48\*01)



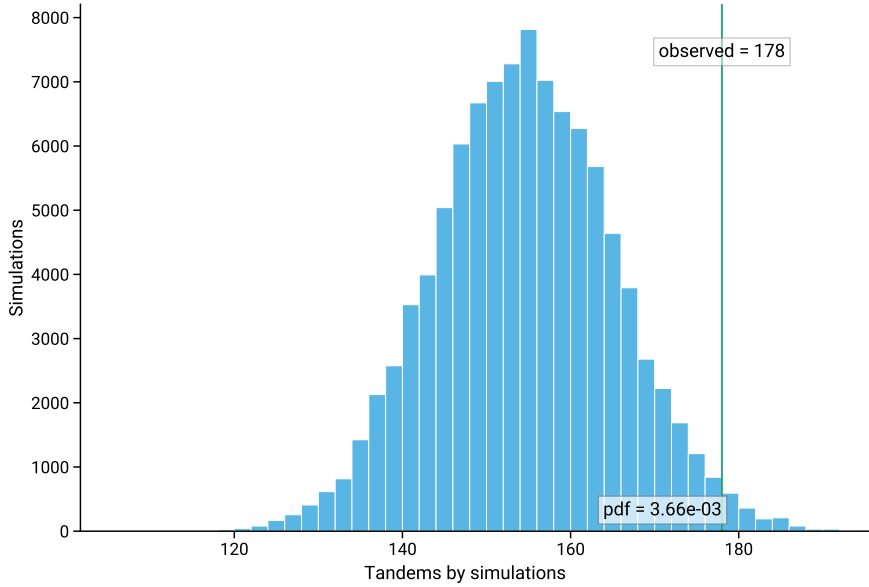
Tandem distribution from simulated data (IGHV3-48\*01)



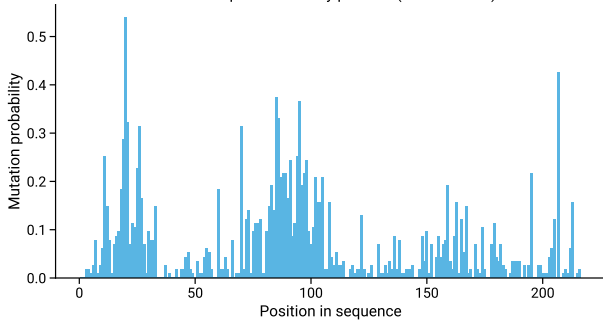


## 2.21 IGHV3-48\_02

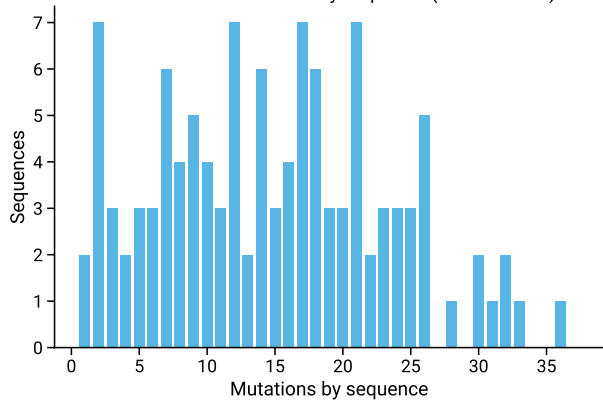
Distribution of tandems by simulation (IGHV3-48\*02)



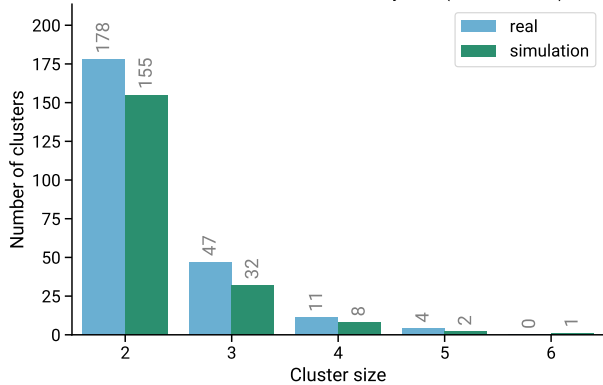
Mutation probabilities by position (IGHV3-48\*02)



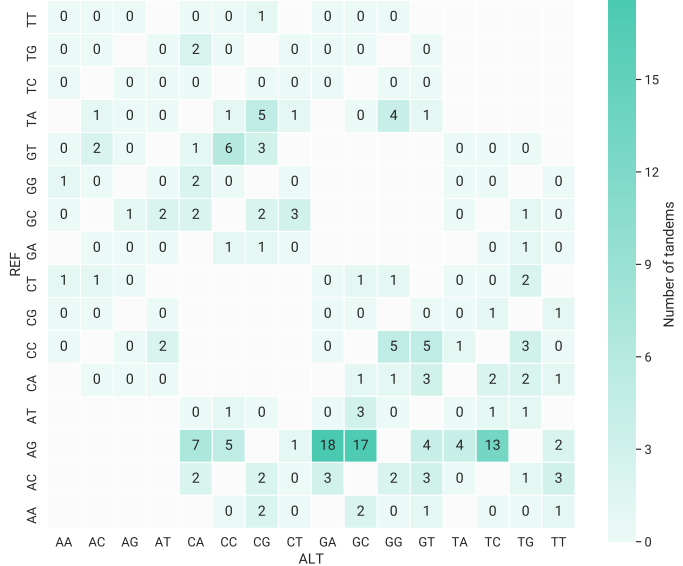
Distribution of mutations by sequence (IGHV3-48\*02)



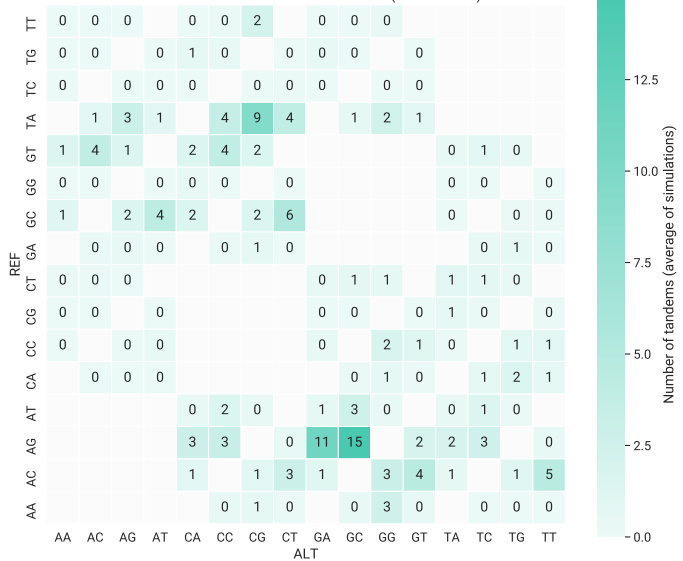
Distribution of mutation clusters by size (IGHV3-48\*02)



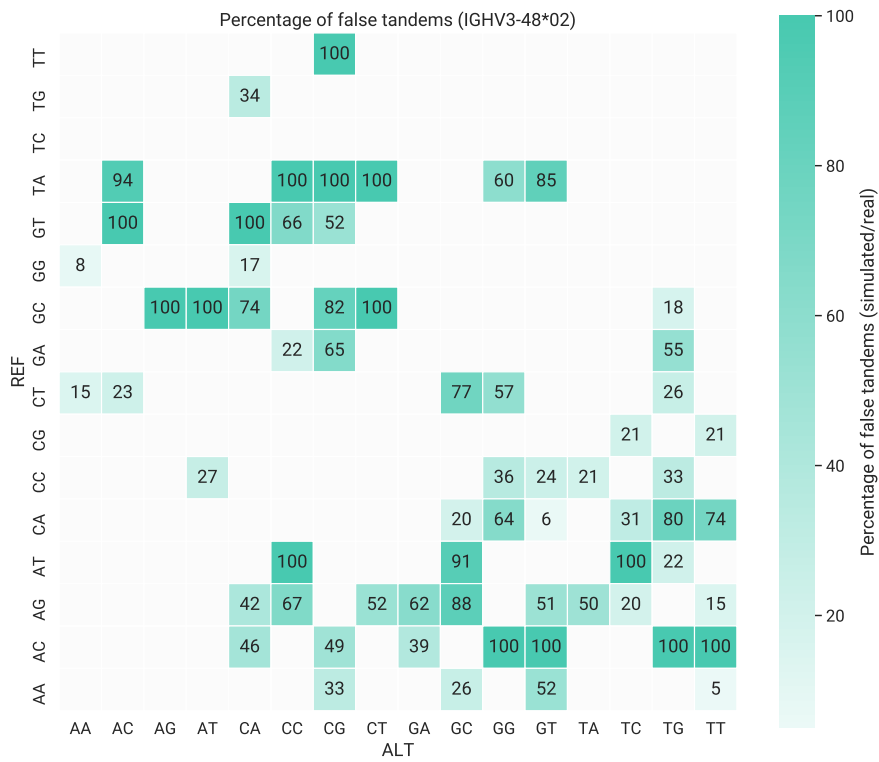
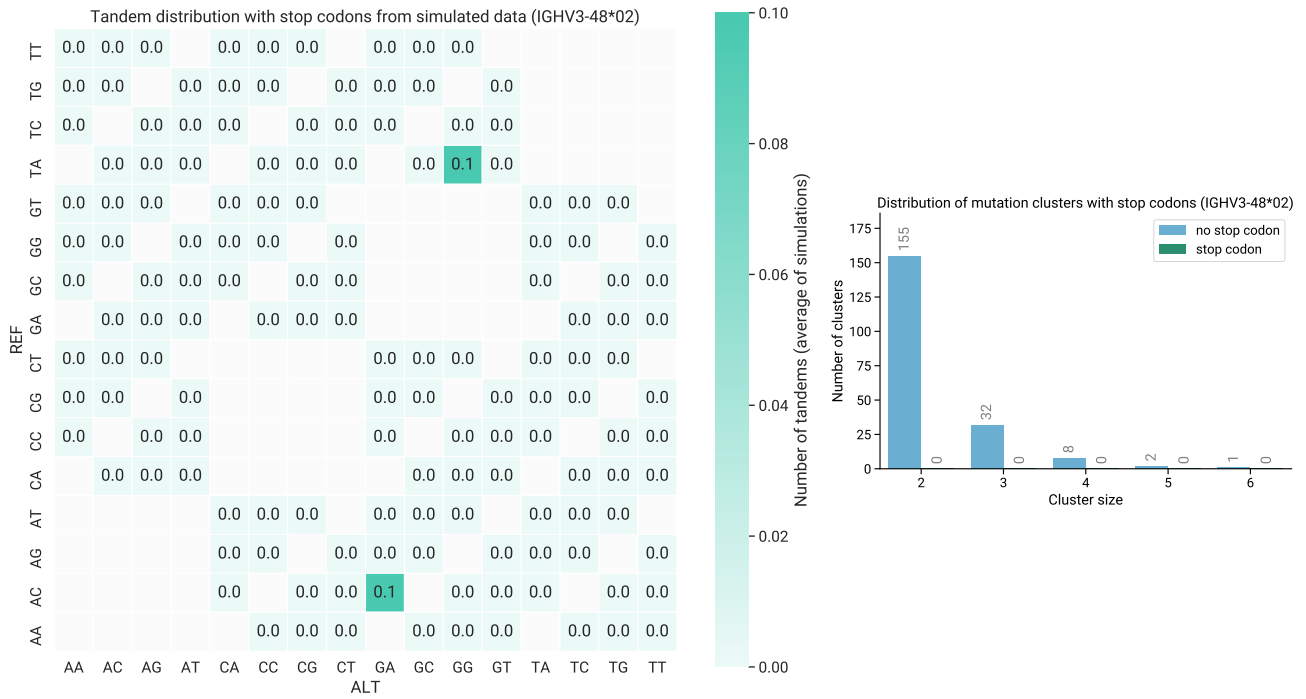
Tandem distribution from real data (IGHV3-48\*02)



Tandem distribution from simulated data (IGHV3-48\*02)

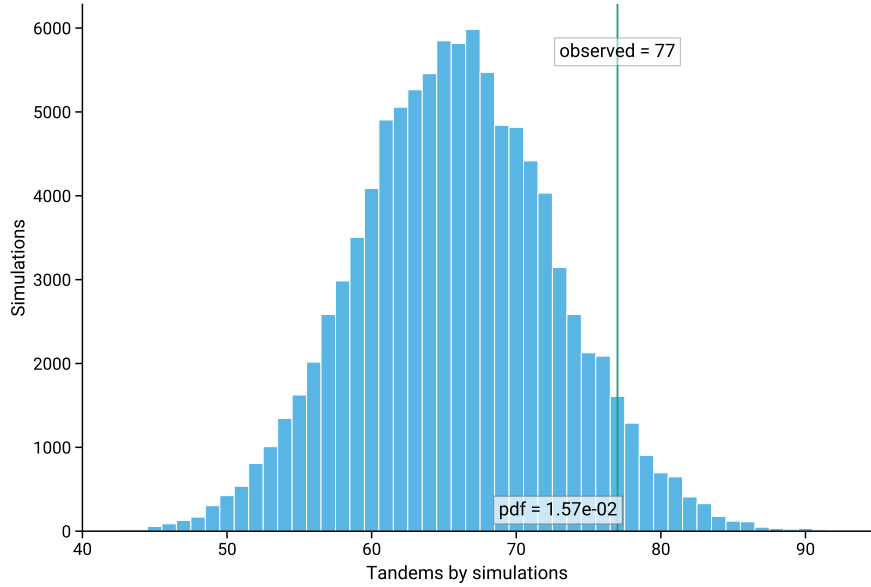




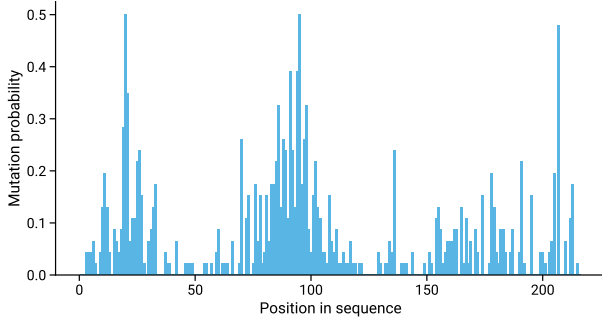


## 2.22 IGHV3-48\_04

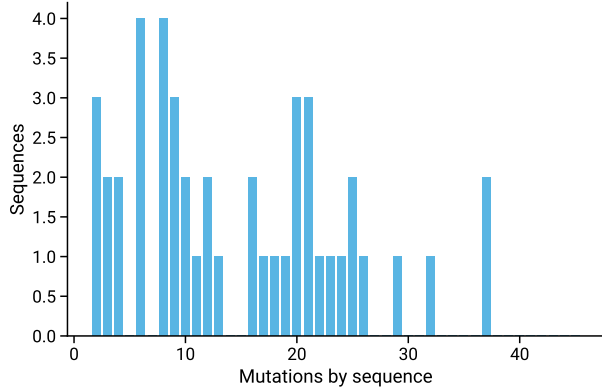
Distribution of tandems by simulation (IGHV3-48\*04)



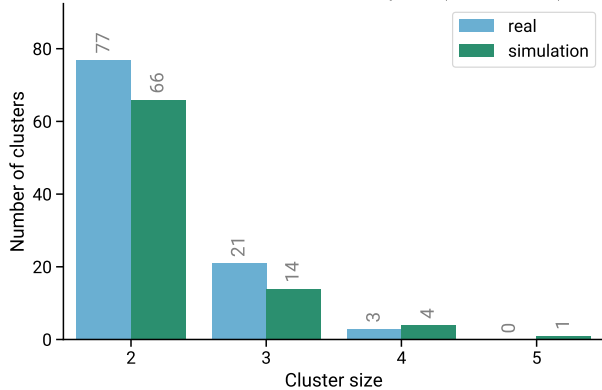
Mutation probabilities by position (IGHV3-48\*04)



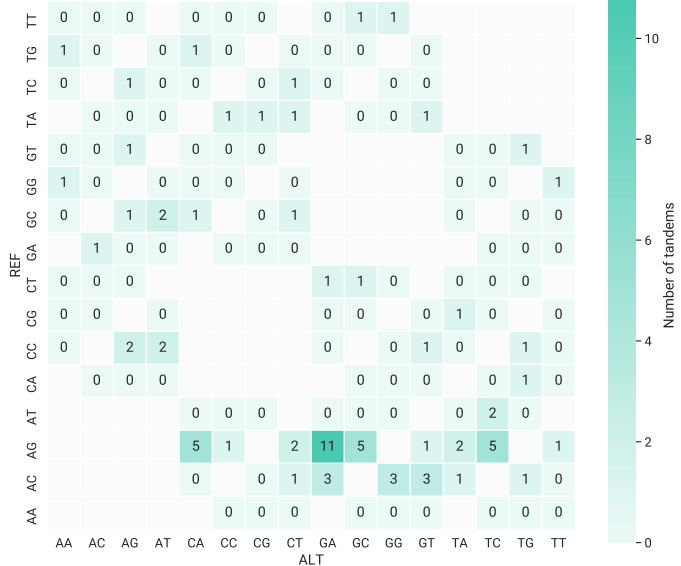
Distribution of mutations by sequence (IGHV3-48\*04)



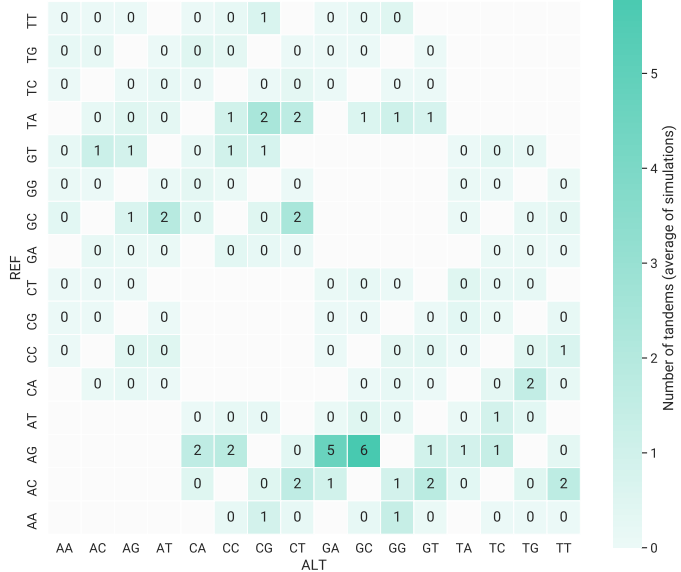
Distribution of mutation clusters by size (IGHV3-48\*04)

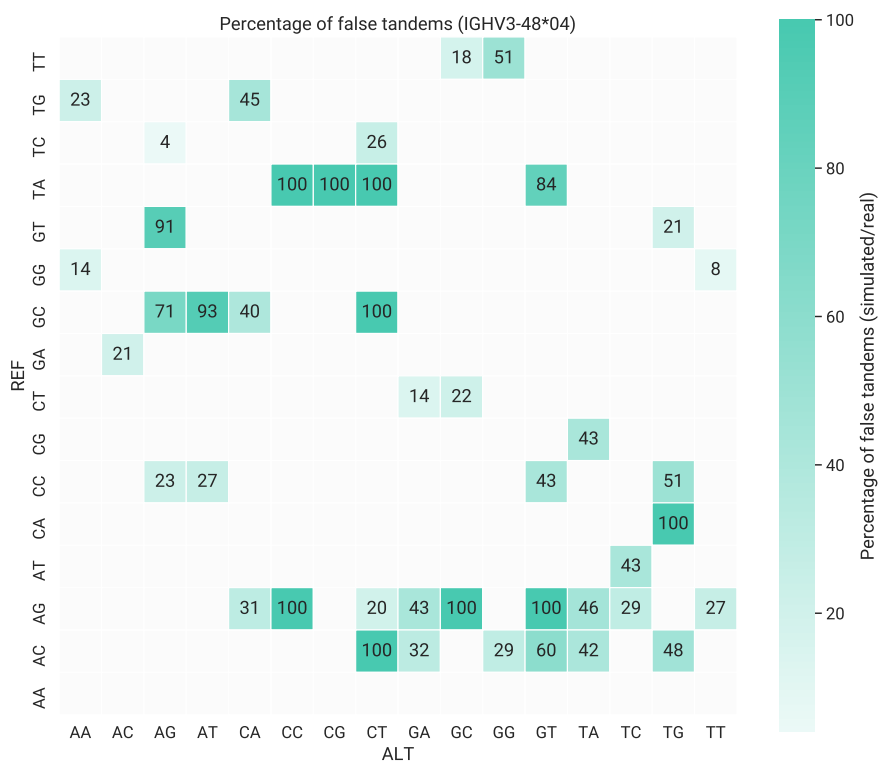
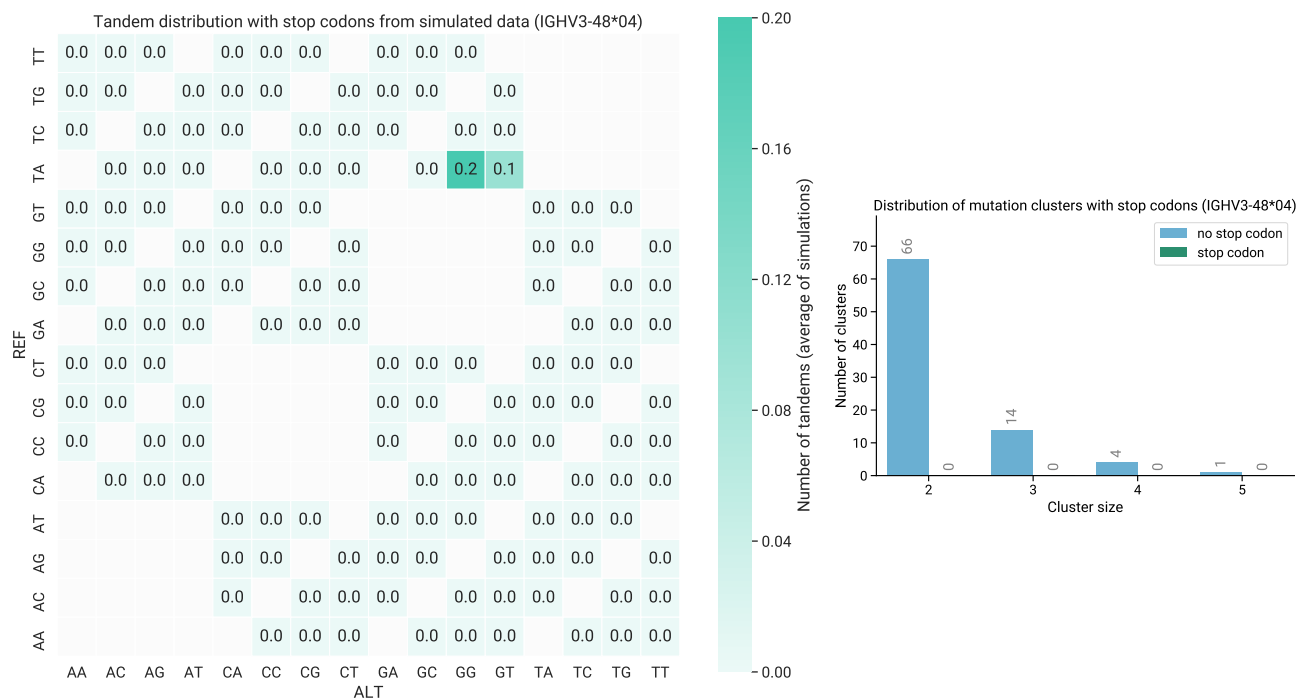


Tandem distribution from real data (IGHV3-48\*04)



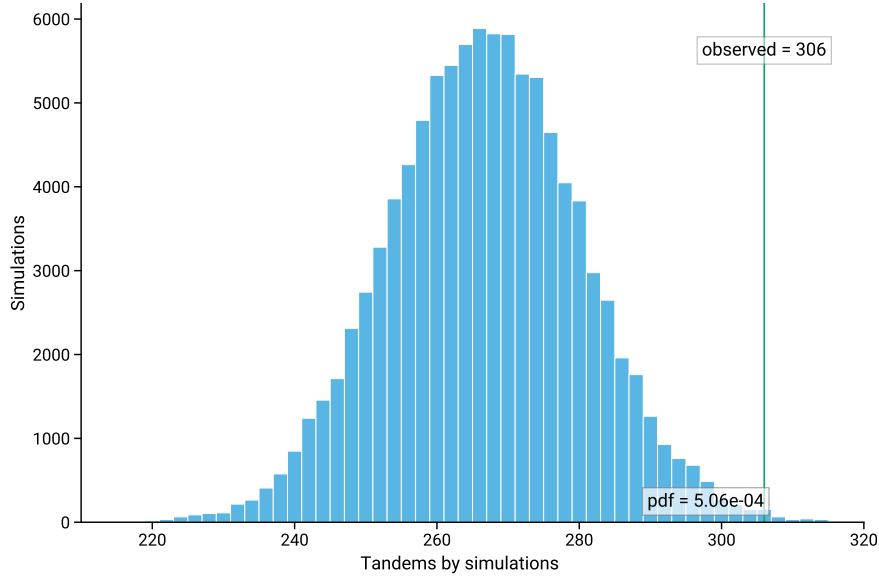
Tandem distribution from simulated data (IGHV3-48\*04)



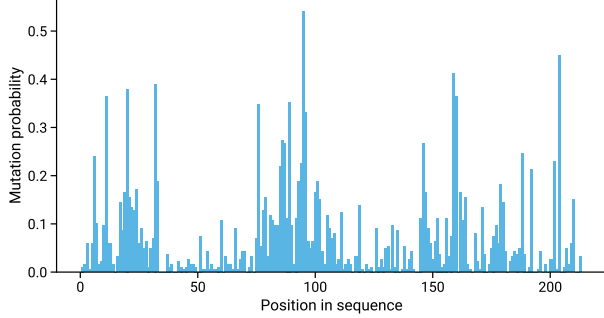


## 2.23 IGHV3-53\_01

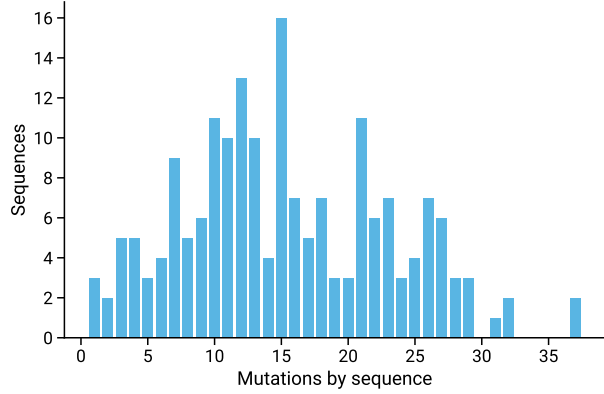
Distribution of tandems by simulation (IGHV3-53\*01)



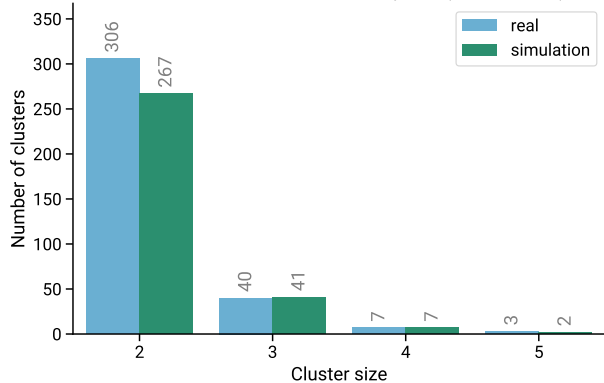
Mutation probabilities by position (IGHV3-53\*01)



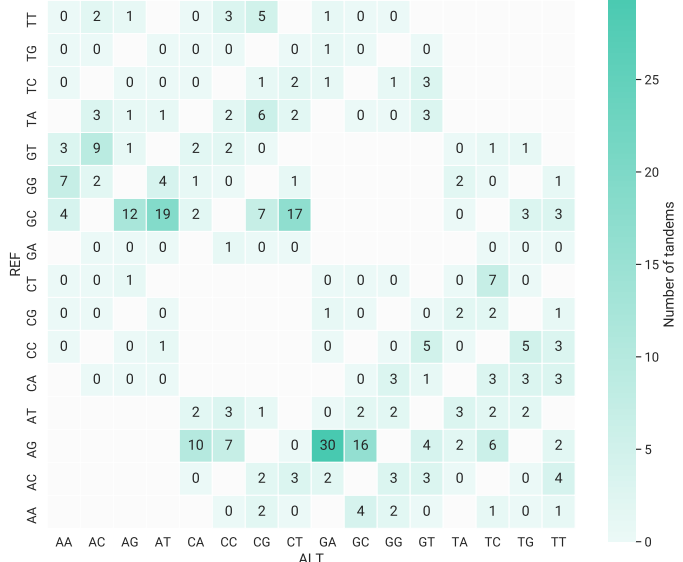
Distribution of mutations by sequence (IGHV3-53\*01)



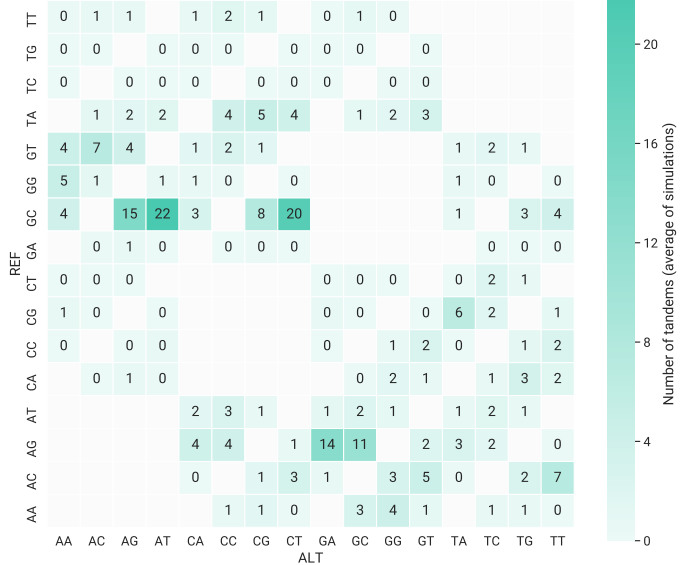
Distribution of mutation clusters by size (IGHV3-53\*01)

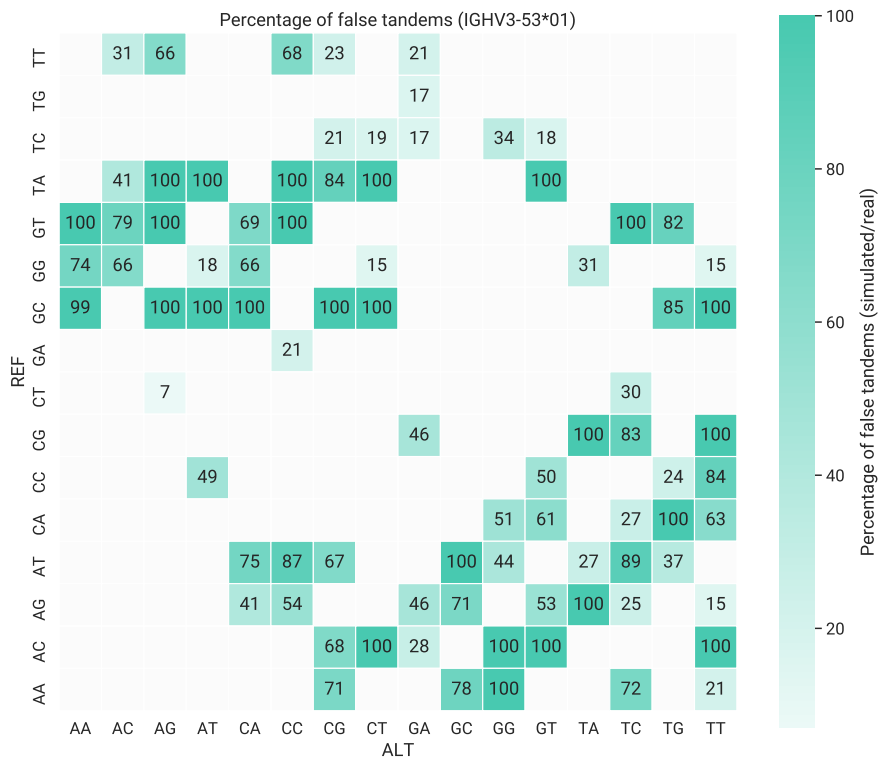
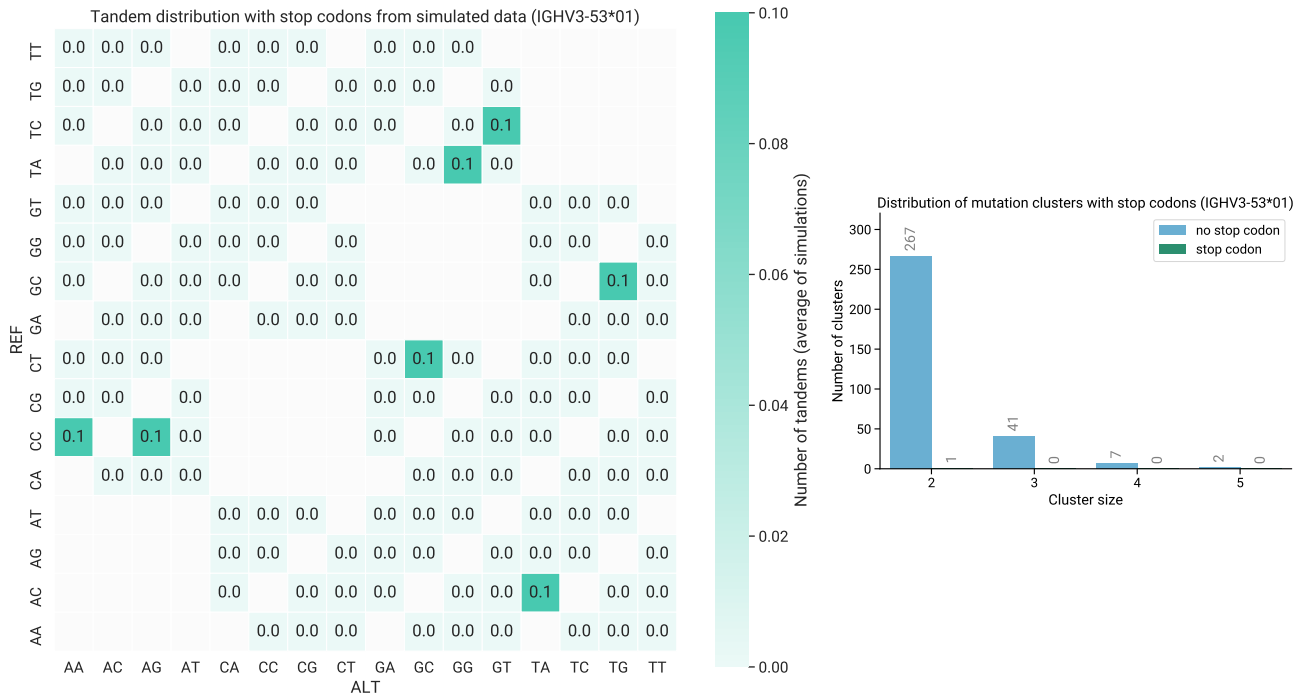


Tandem distribution from real data (IGHV3-53\*01)



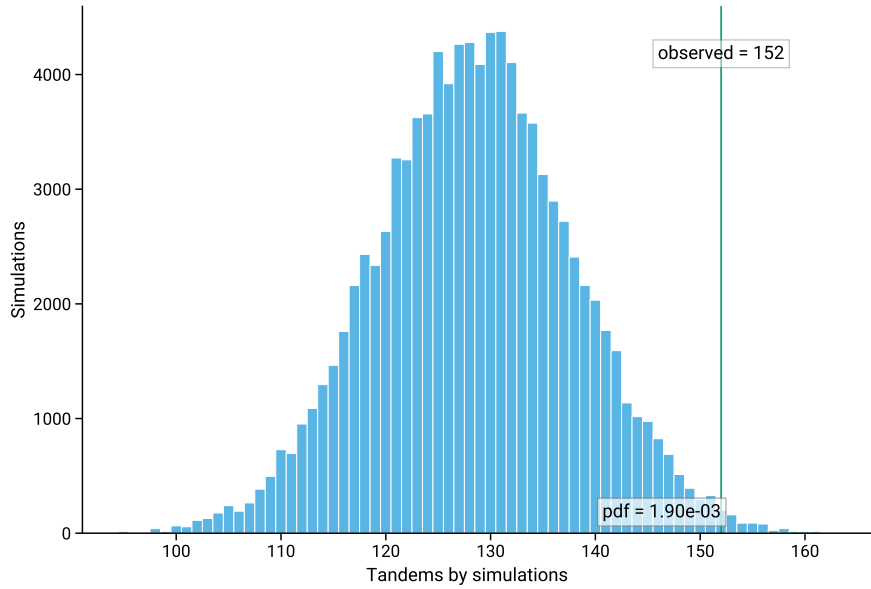
Tandem distribution from simulated data (IGHV3-53\*01)



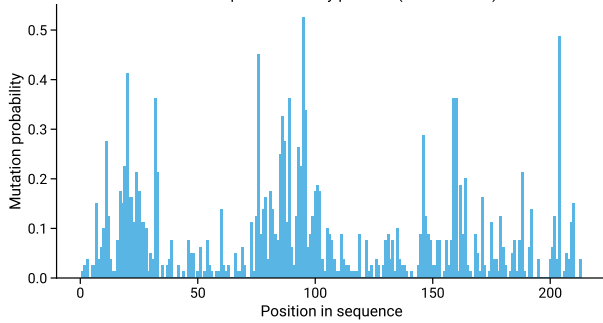


## 2.24 IGHV3-66\_01

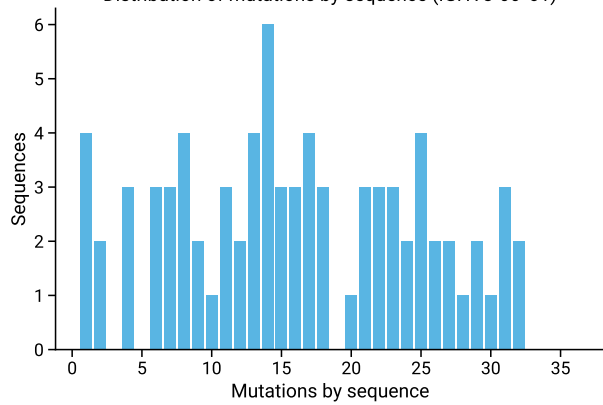
Distribution of tandems by simulation (IGHV3-66\*01)



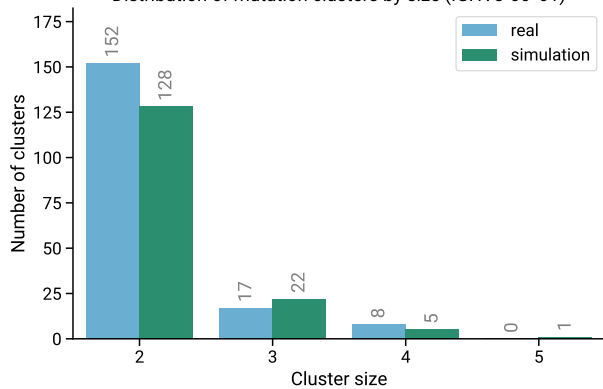
Mutation probabilities by position (IGHV3-66\*01)



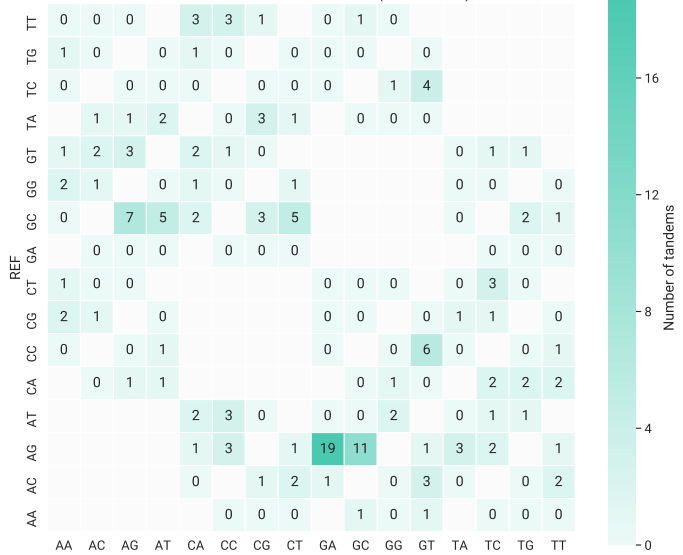
Distribution of mutations by sequence (IGHV3-66\*01)



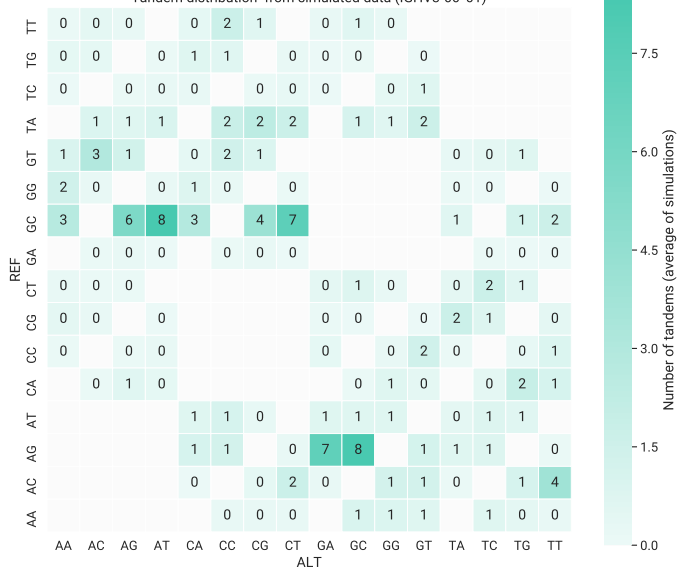
Distribution of mutation clusters by size (IGHV3-66\*01)

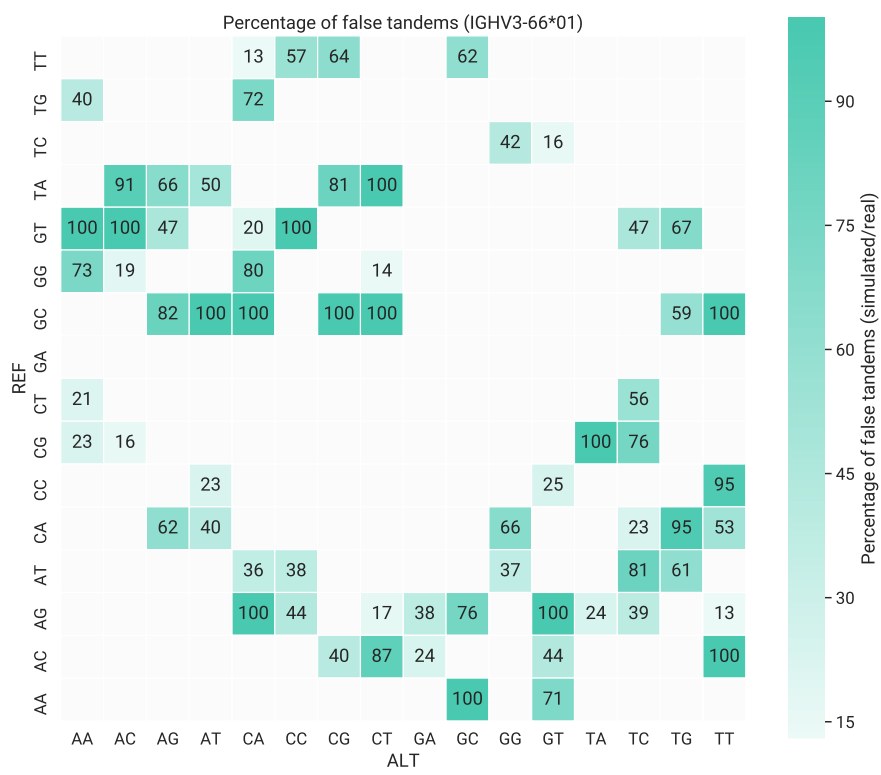
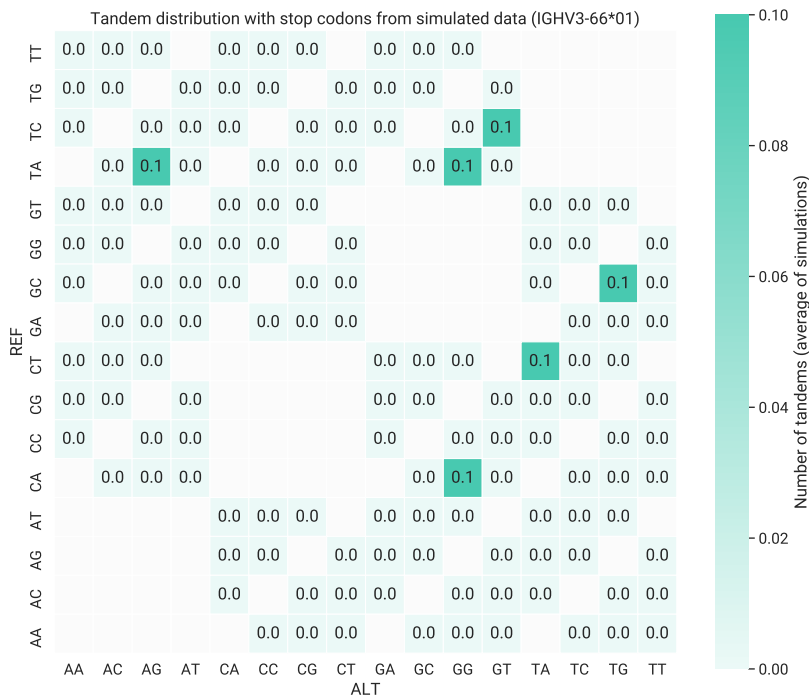


Tandem distribution from real data (IGHV3-66\*01)



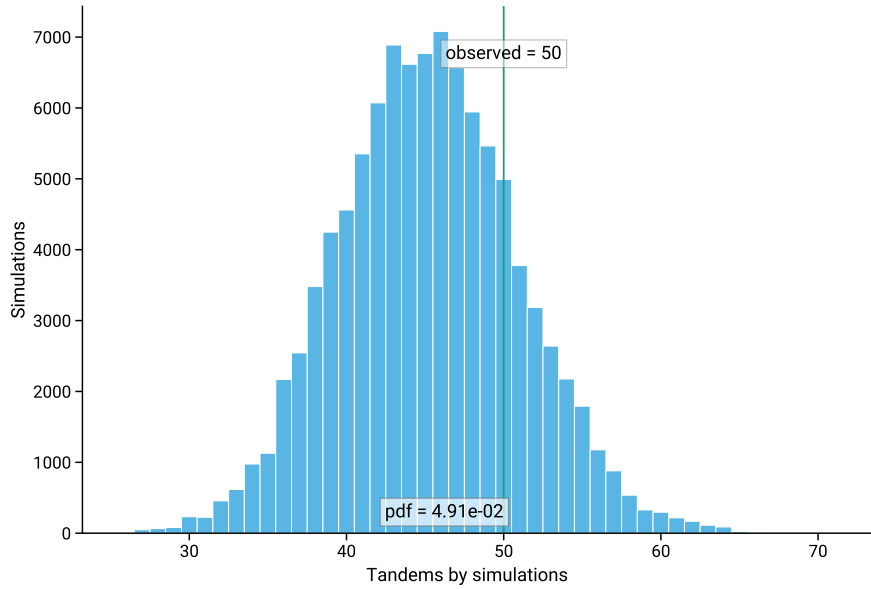
Tandem distribution from simulated data (IGHV3-66\*01)



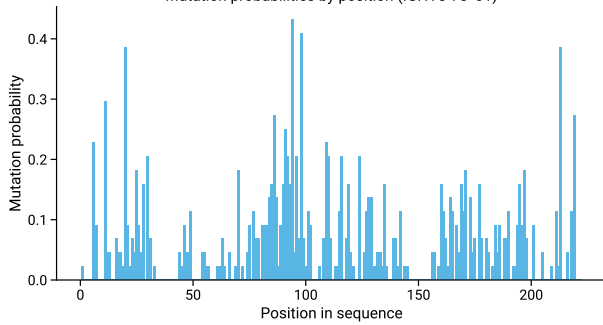


## 2.25 IGHV3-73\_01

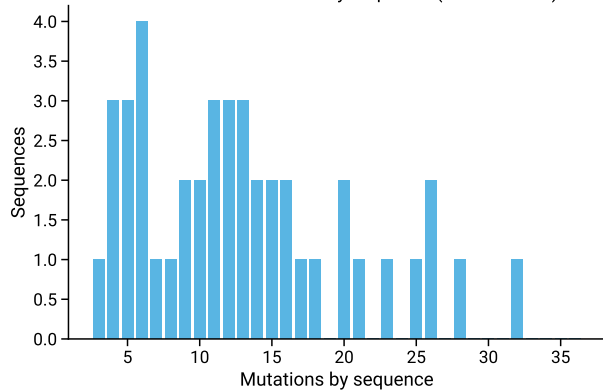
Distribution of tandems by simulation (IGHV3-73\*01)



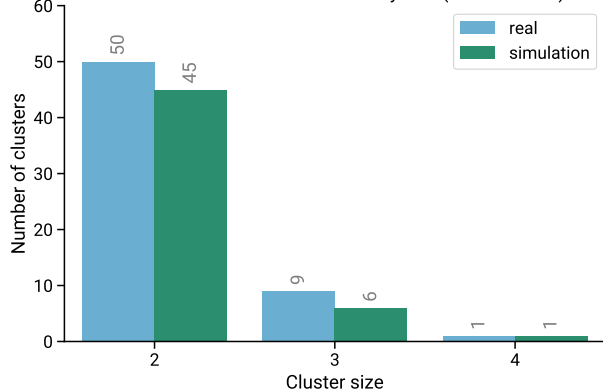
Mutation probabilities by position (IGHV3-73\*01)



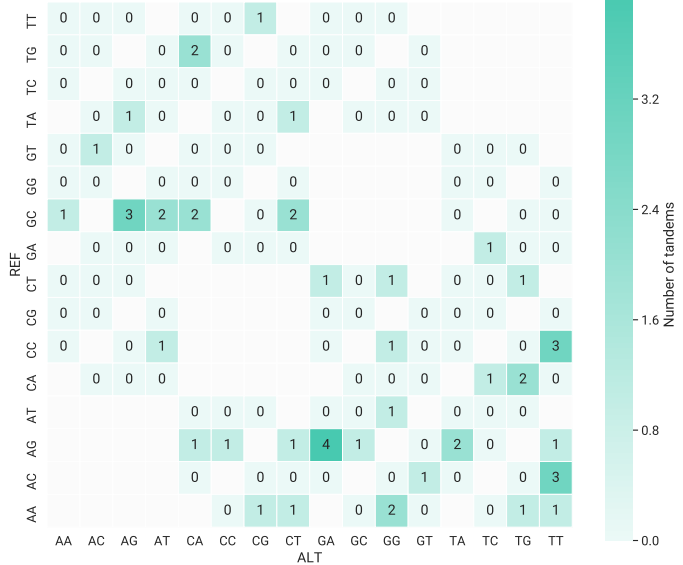
Distribution of mutations by sequence (IGHV3-73\*01)



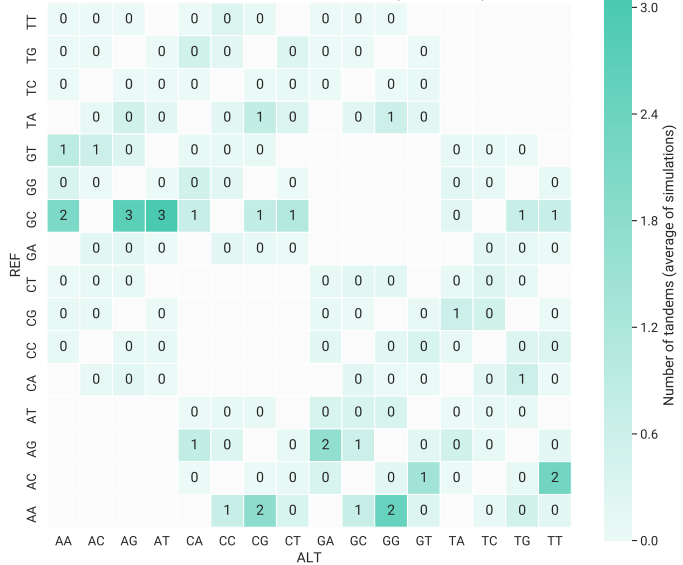
Distribution of mutation clusters by size (IGHV3-73\*01)



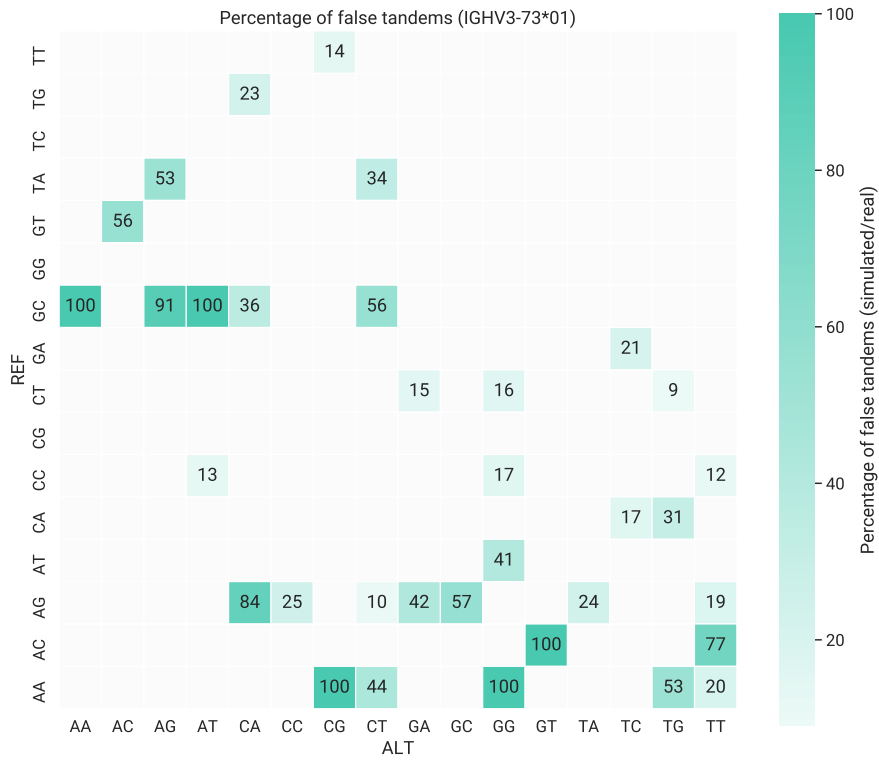
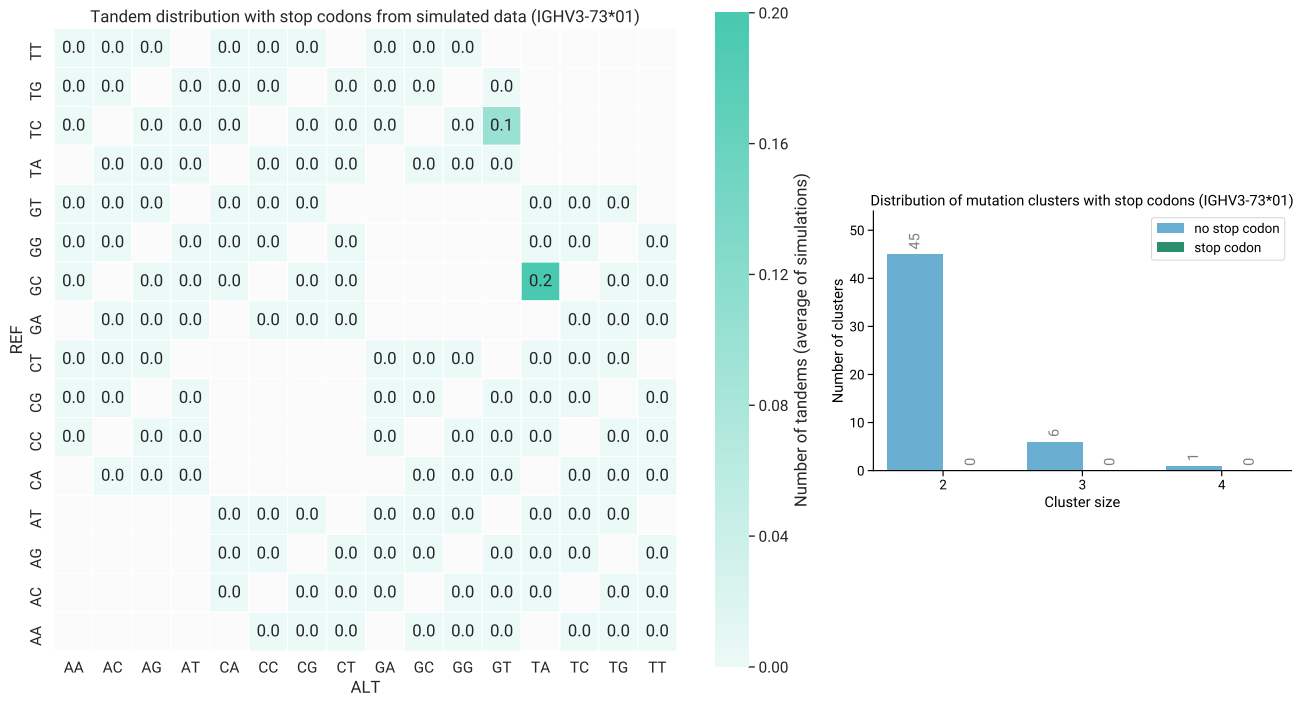
Tandem distribution from real data (IGHV3-73\*01)



Tandem distribution from simulated data (IGHV3-73\*01)

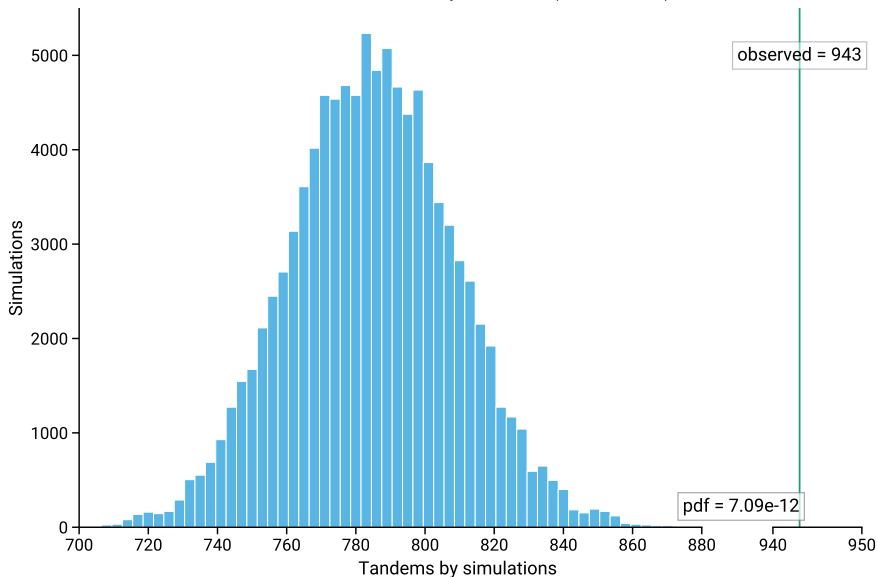




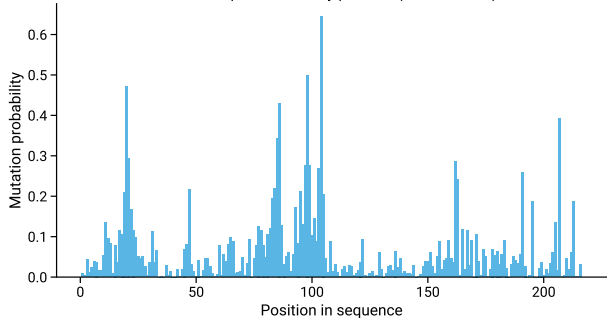


## 2.26 IGHV3-74\_01

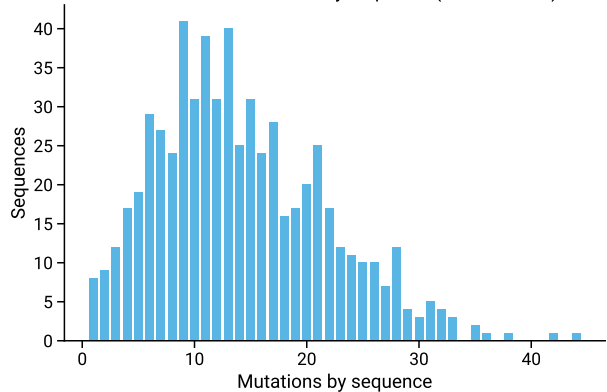
Distribution of tandems by simulation (IGHV3-74\*01)



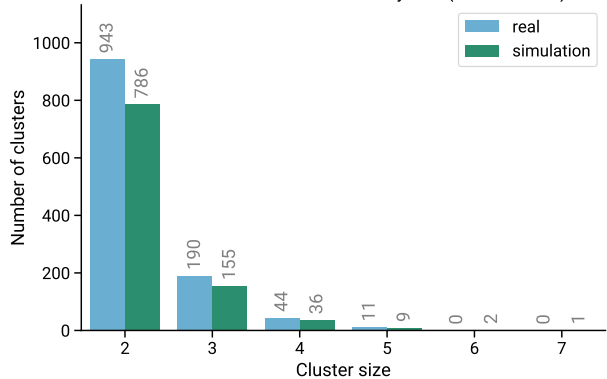
Mutation probabilities by position (IGHV3-74\*01)



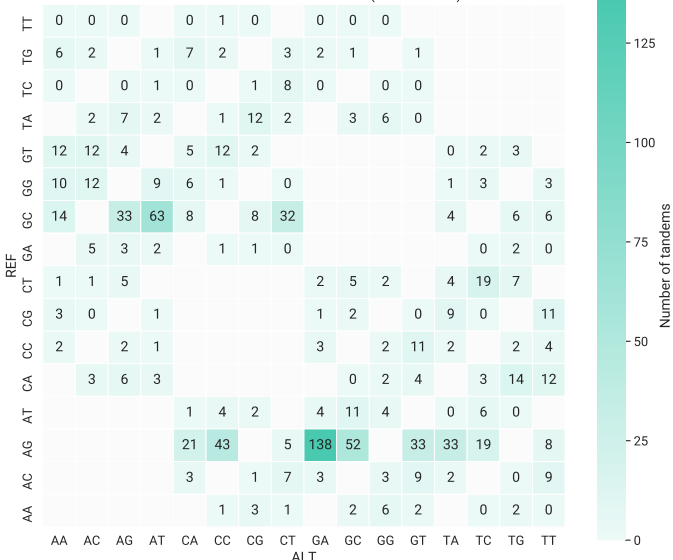
Distribution of mutations by sequence (IGHV3-74\*01)



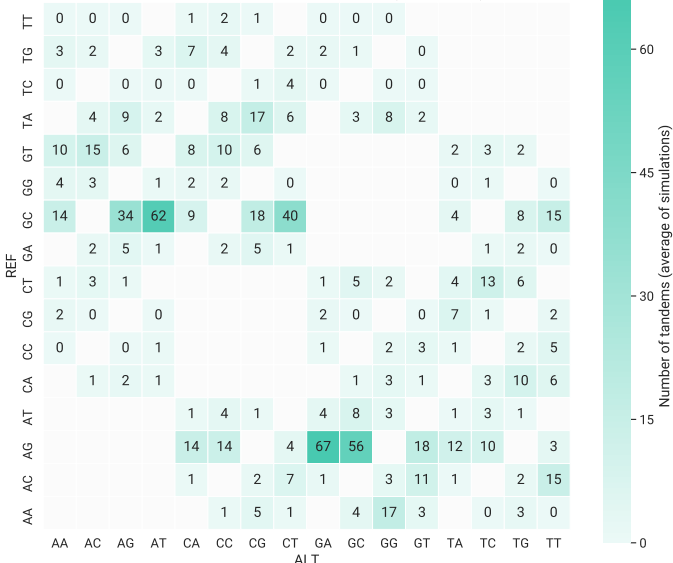
Distribution of mutation clusters by size (IGHV3-74\*01)

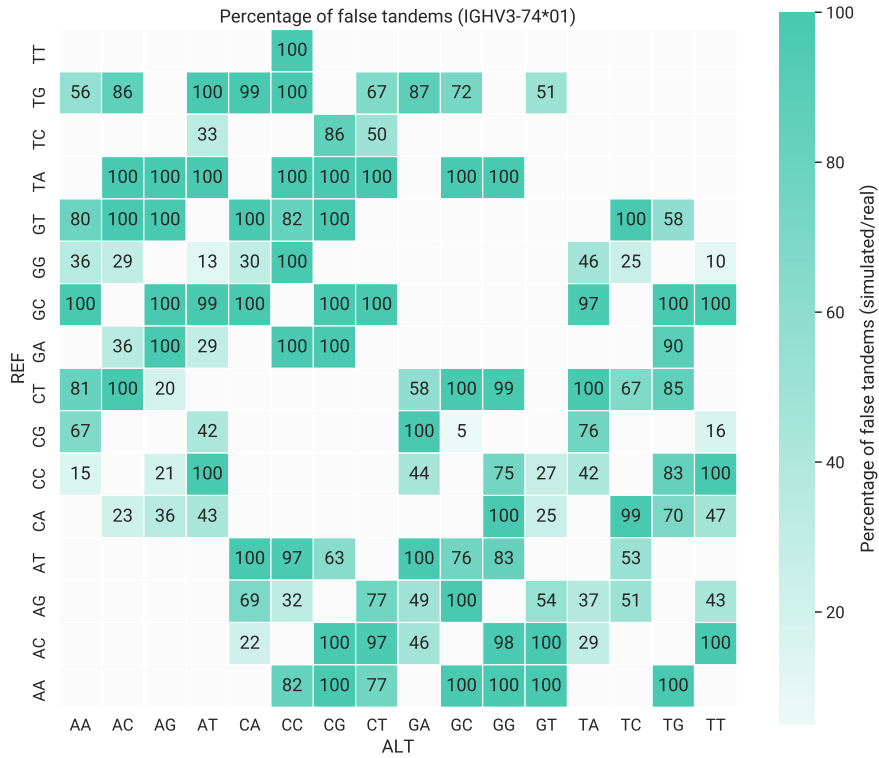
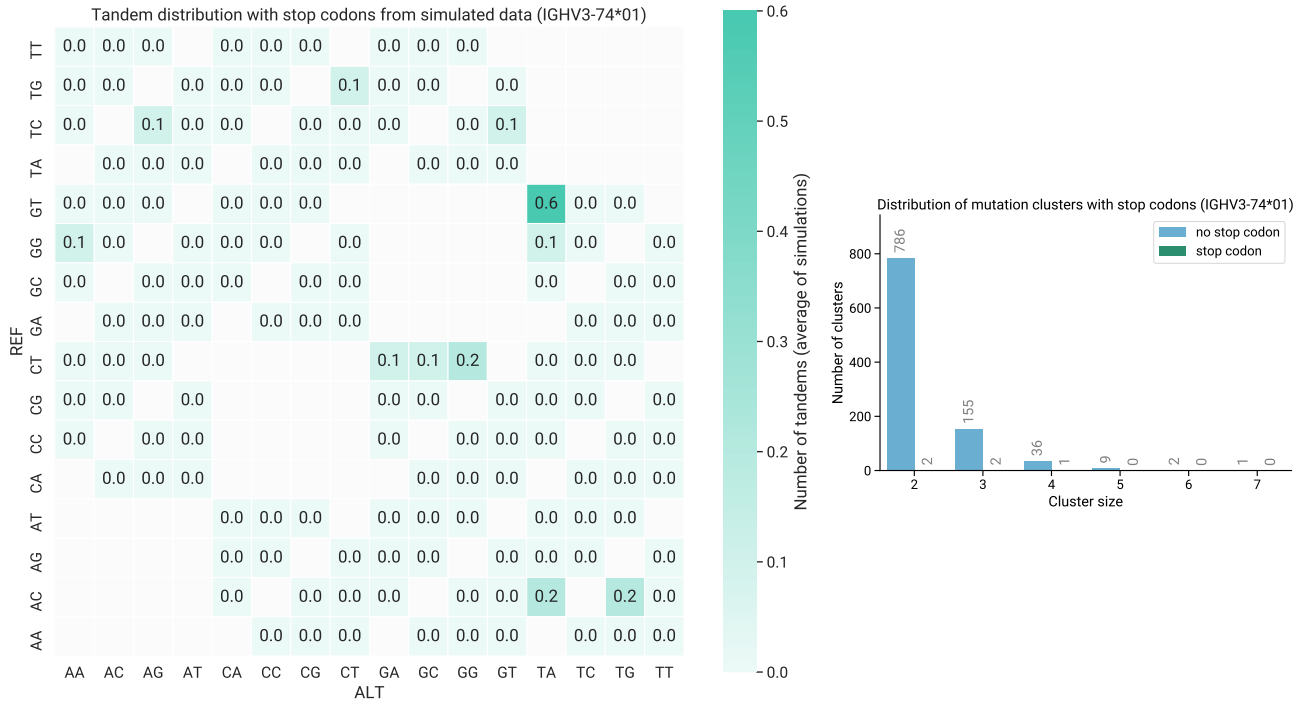


Tandem distribution from real data (IGHV3-74\*01)



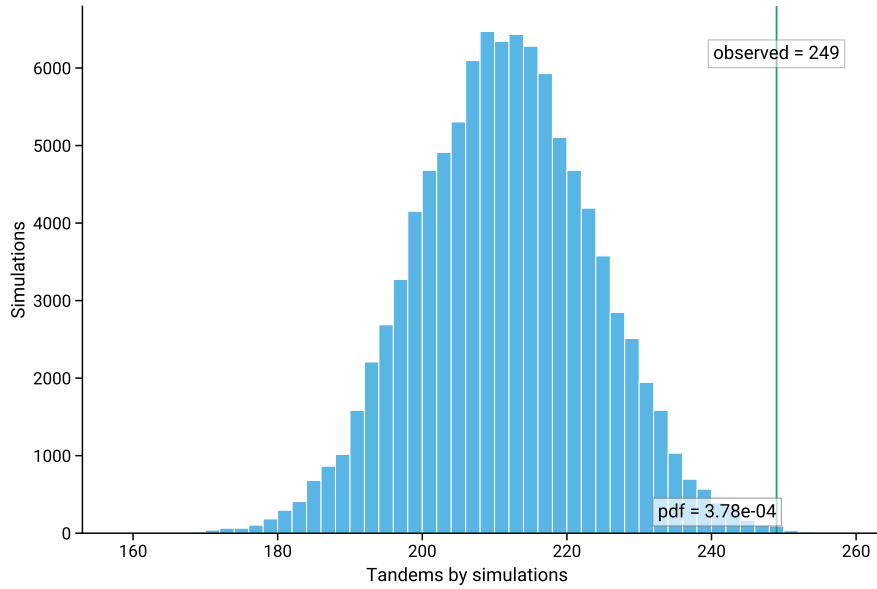
Tandem distribution from simulated data (IGHV3-74\*01)



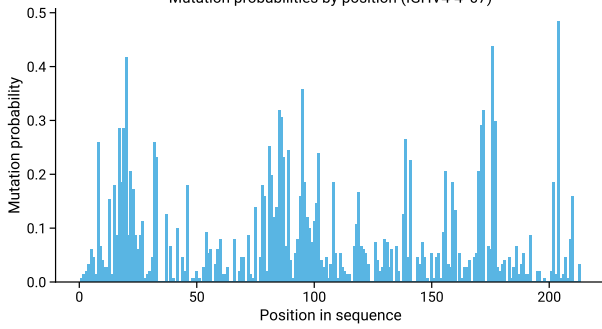


## 2.27 IGHV4-4\_07

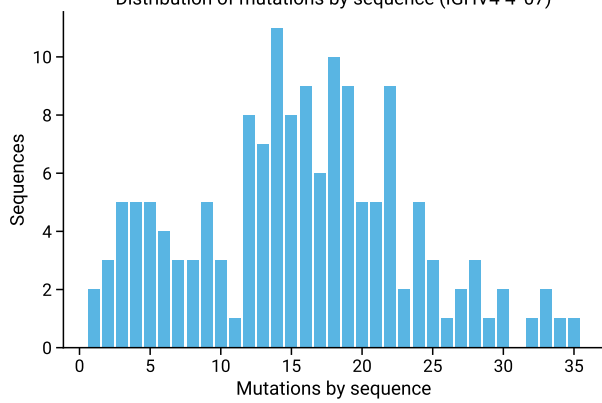
Distribution of tandems by simulation (IGHV4-4\*07)



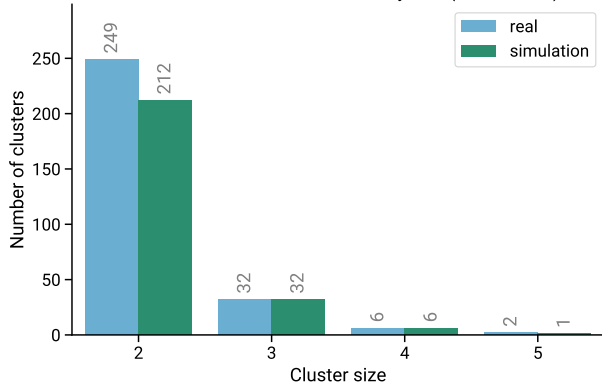
Mutation probabilities by position (IGHV4-4\*07)



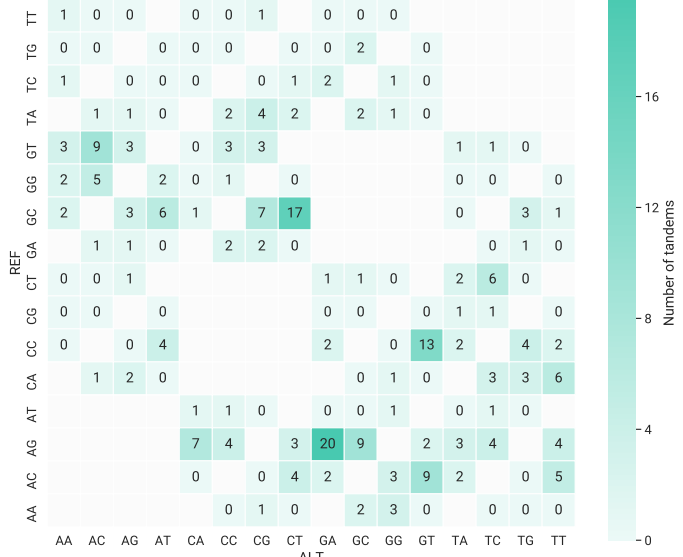
Distribution of mutations by sequence (IGHV4-4\*07)



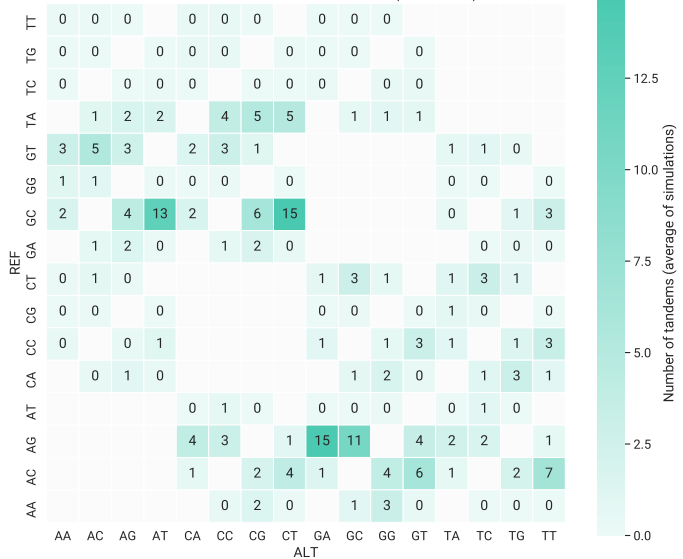
Distribution of mutation clusters by size (IGHV4-4\*07)

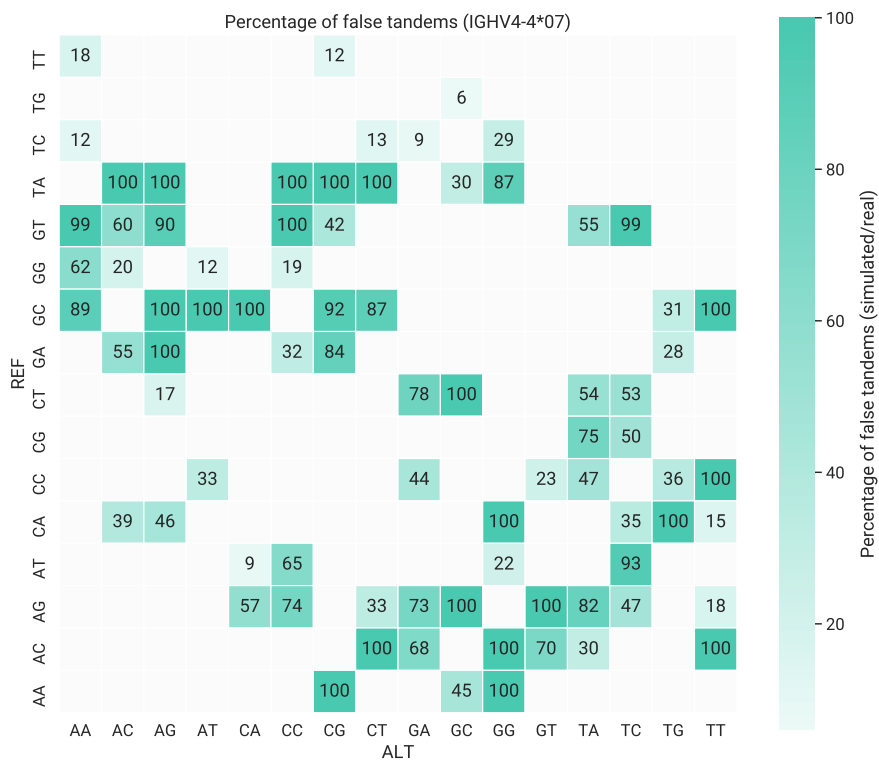
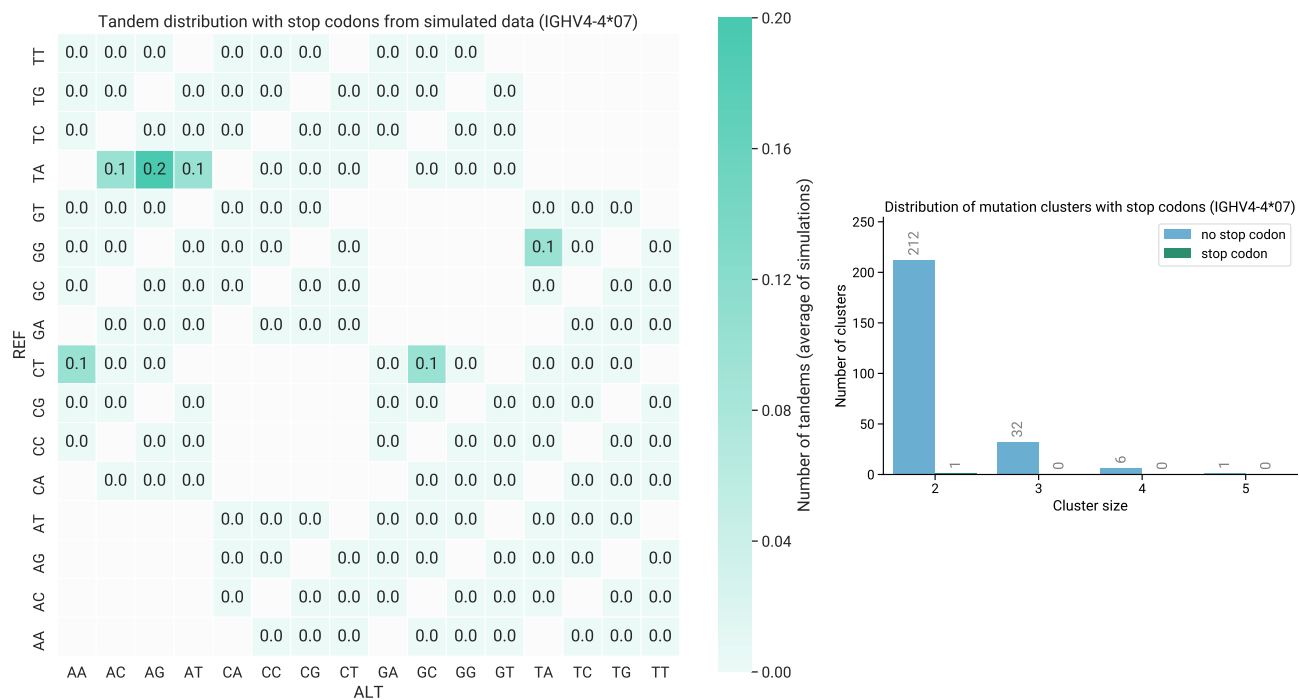


Tandem distribution from real data (IGHV4-4\*07)



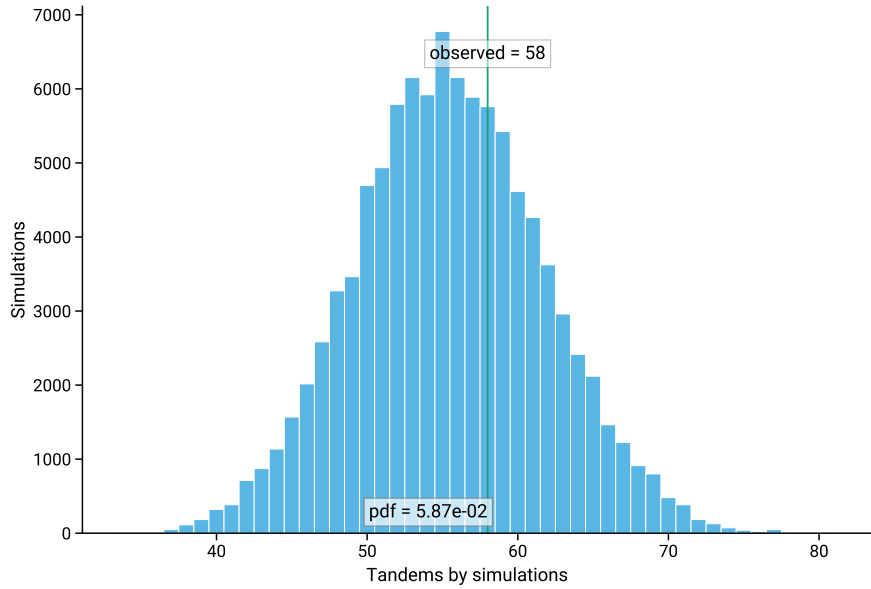
Tandem distribution from simulated data (IGHV4-4\*07)



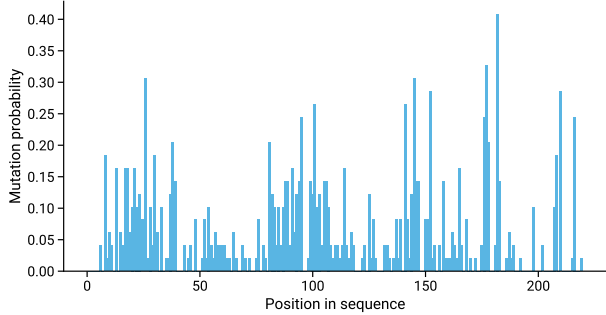


## 2.28 IGHV4-30-2\_01

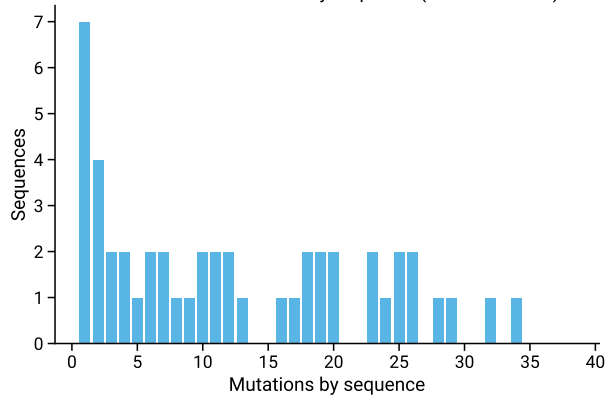
Distribution of tandems by simulation (IGHV4-30-2\*01)



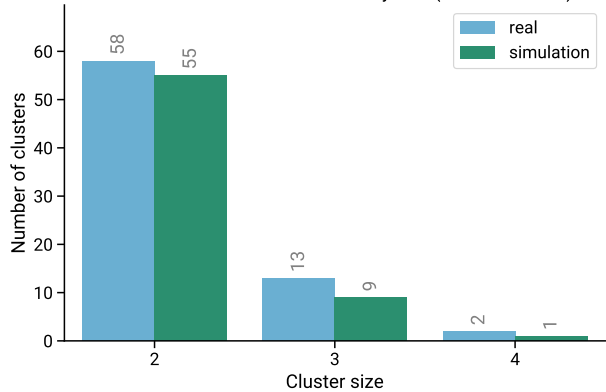
Mutation probabilities by position (IGHV4-30-2\*01)



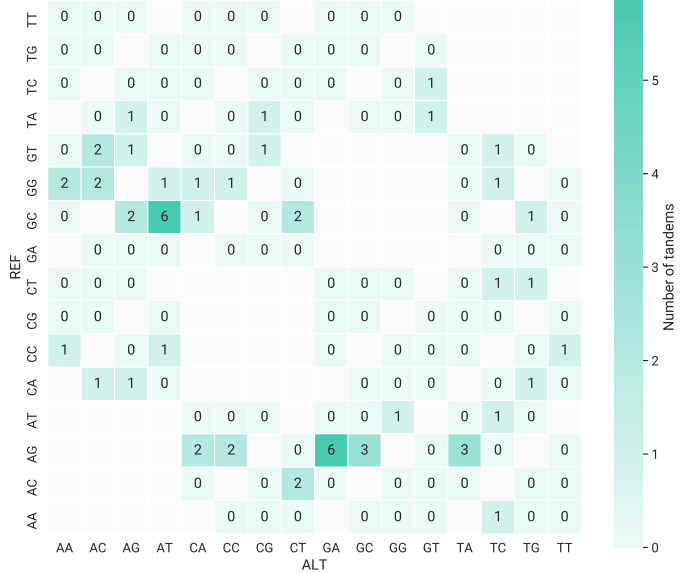
Distribution of mutations by sequence (IGHV4-30-2\*01)



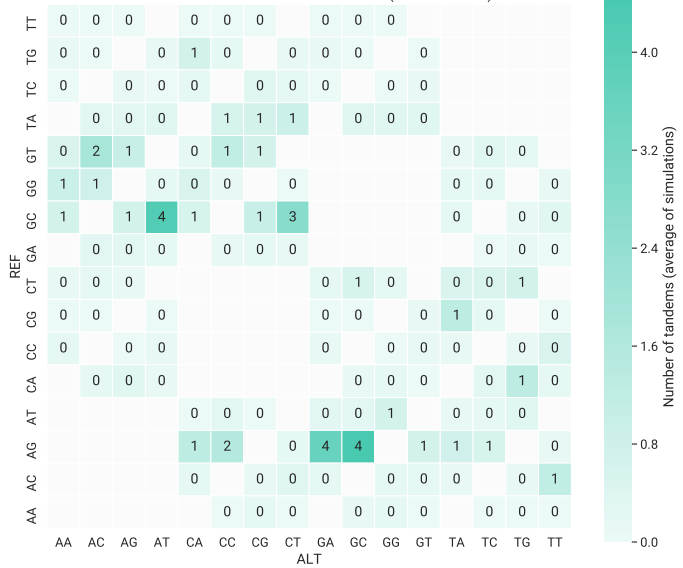
Distribution of mutation clusters by size (IGHV4-30-2\*01)

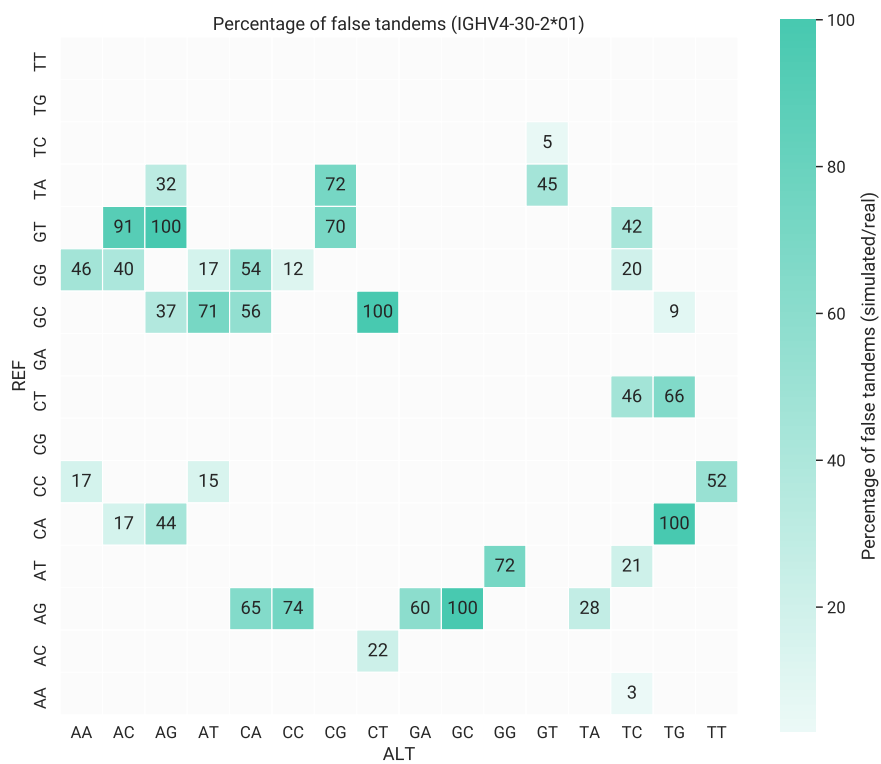
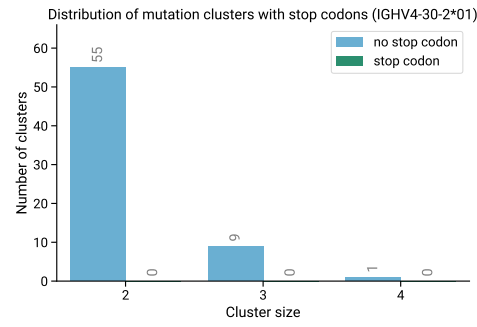


Tandem distribution from real data (IGHV4-30-2\*01)



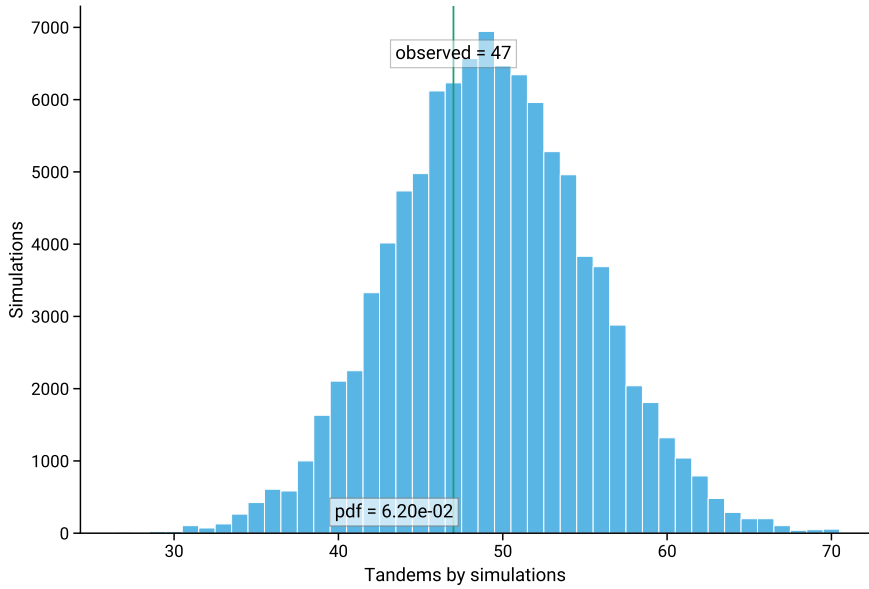
Tandem distribution from simulated data (IGHV4-30-2\*01)



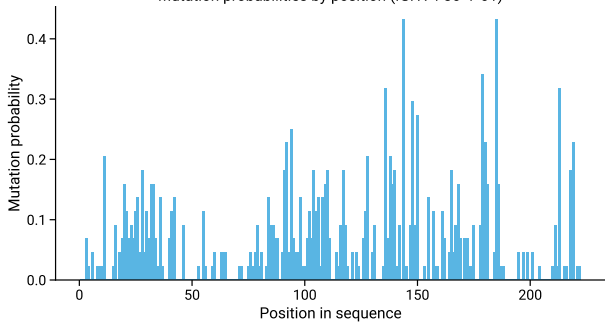


## 2.29 IGHV4-30-4\_01

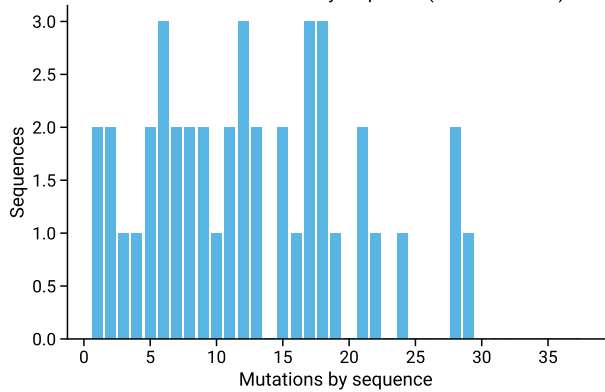
Distribution of tandems by simulation (IGHV4-30-4\*01)



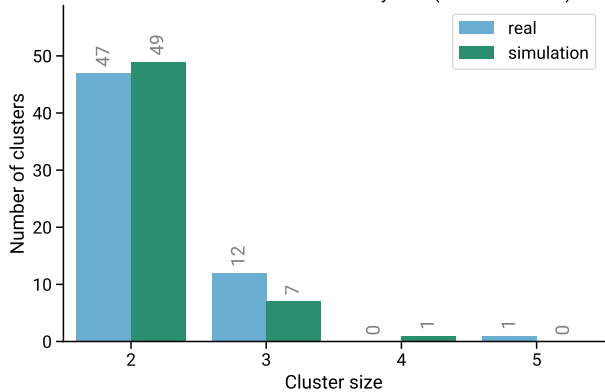
Mutation probabilities by position (IGHV4-30-4\*01)



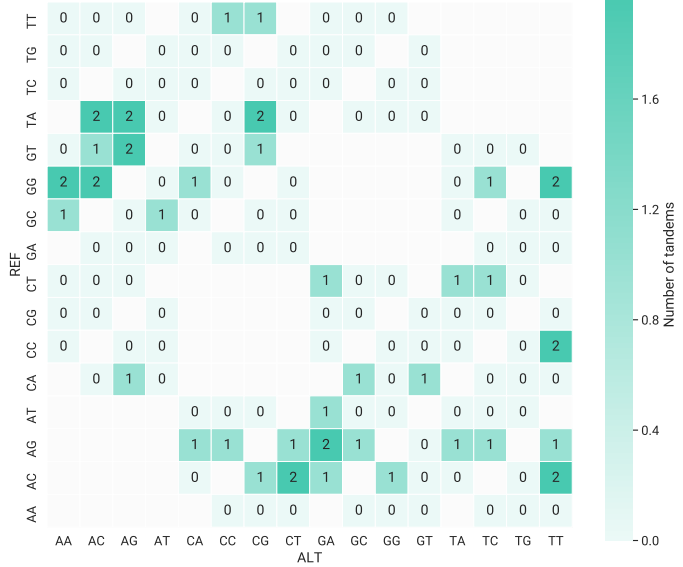
Distribution of mutations by sequence (IGHV4-30-4\*01)



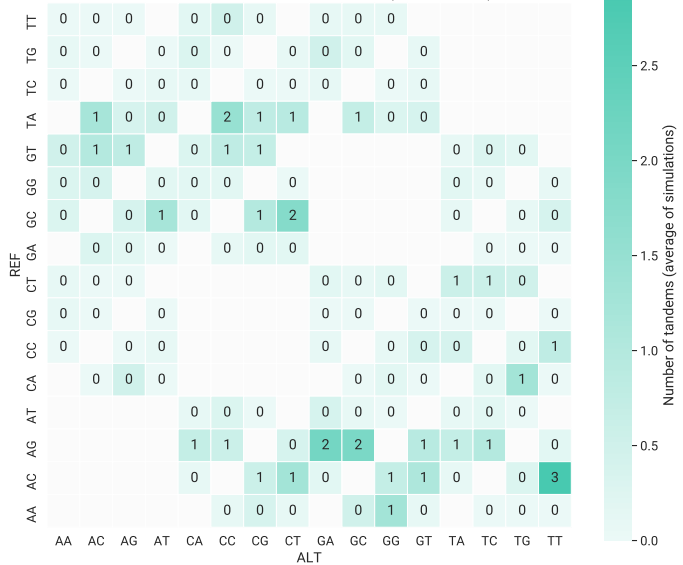
Distribution of mutation clusters by size (IGHV4-30-4\*01)



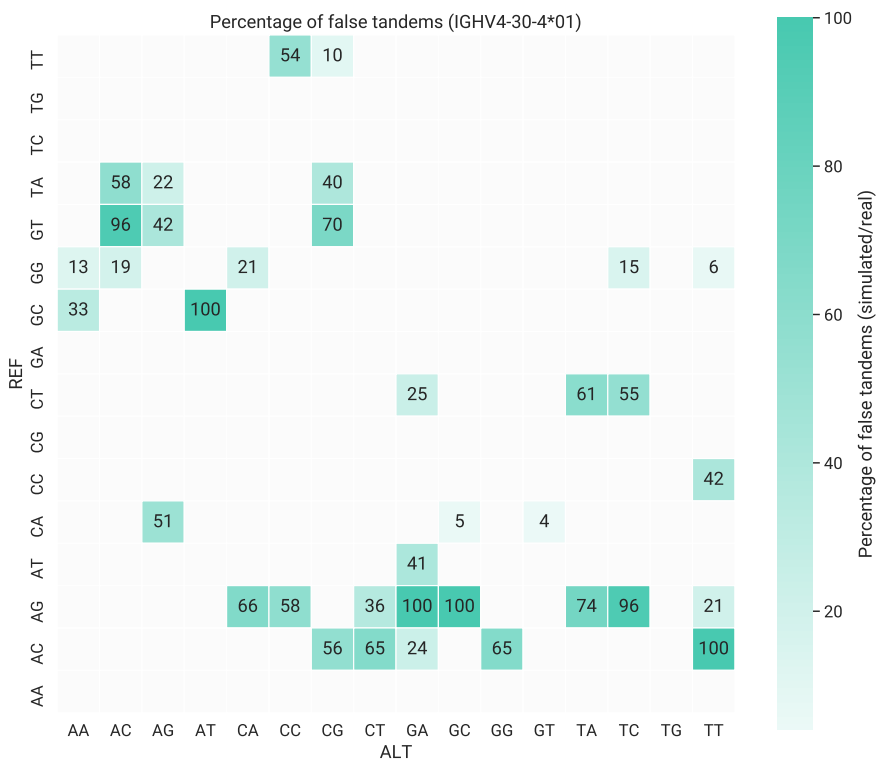
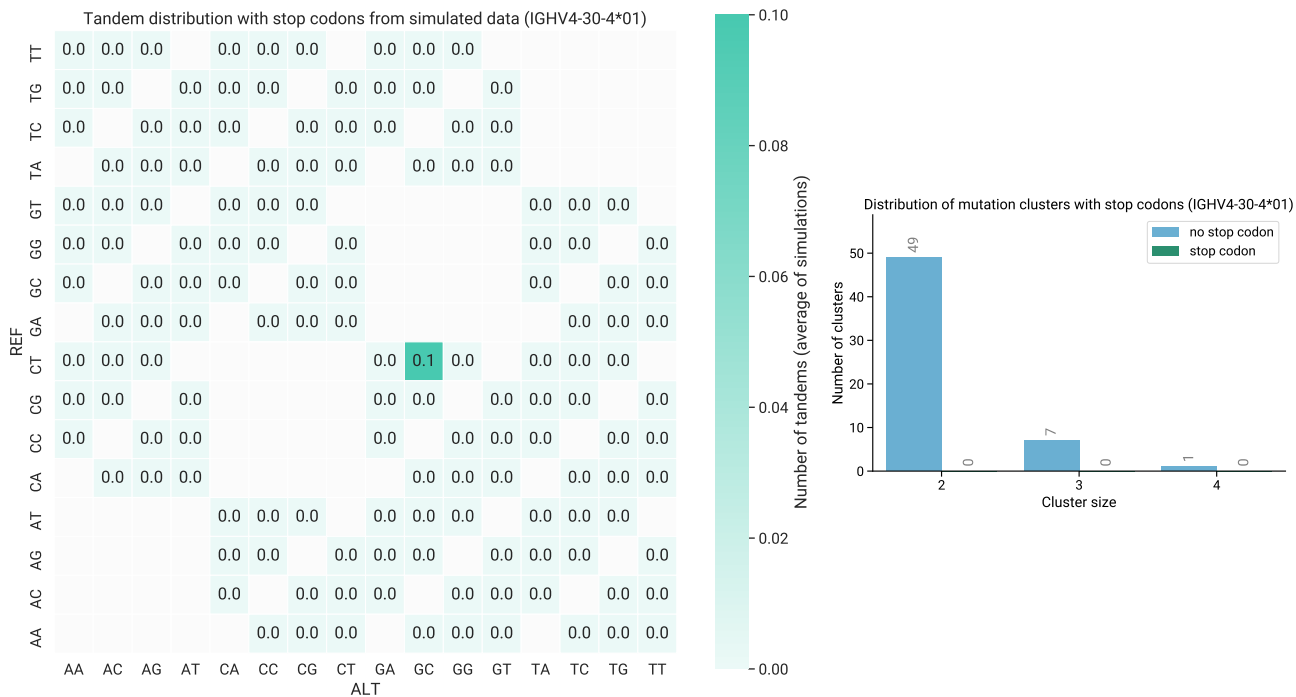
Tandem distribution from real data (IGHV4-30-4\*01)



Tandem distribution from simulated data (IGHV4-30-4\*01)

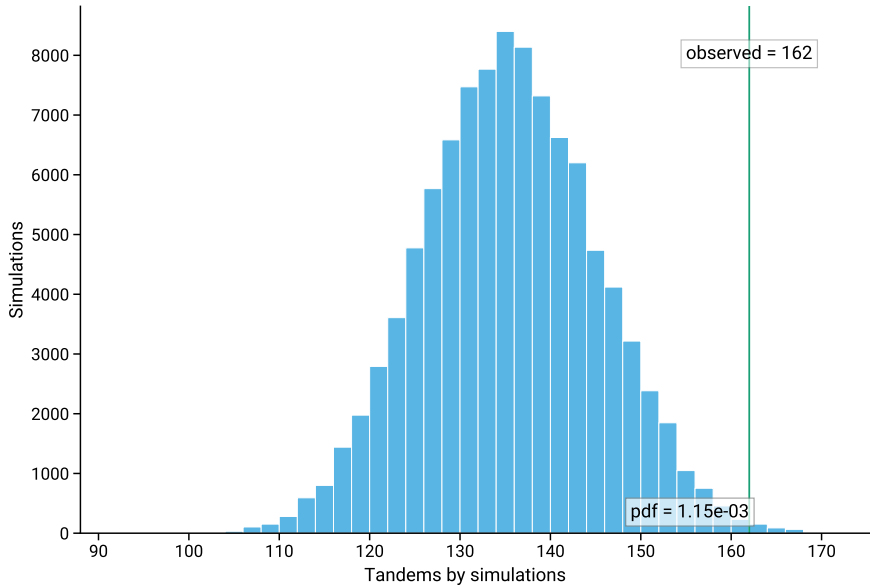




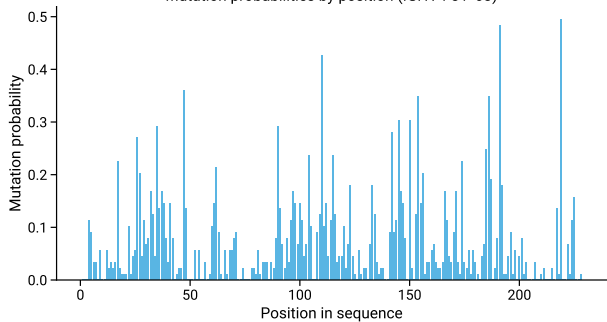


## 2.30 IGHV4-31\_03

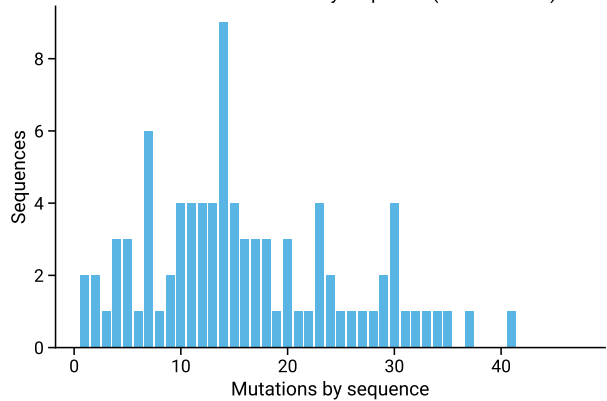
Distribution of tandems by simulation (IGHV4-31\*03)



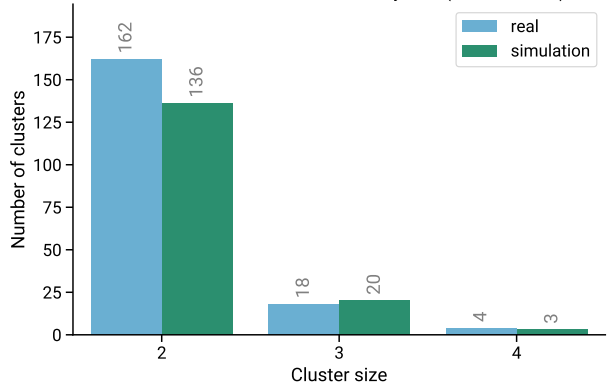
Mutation probabilities by position (IGHV4-31\*03)



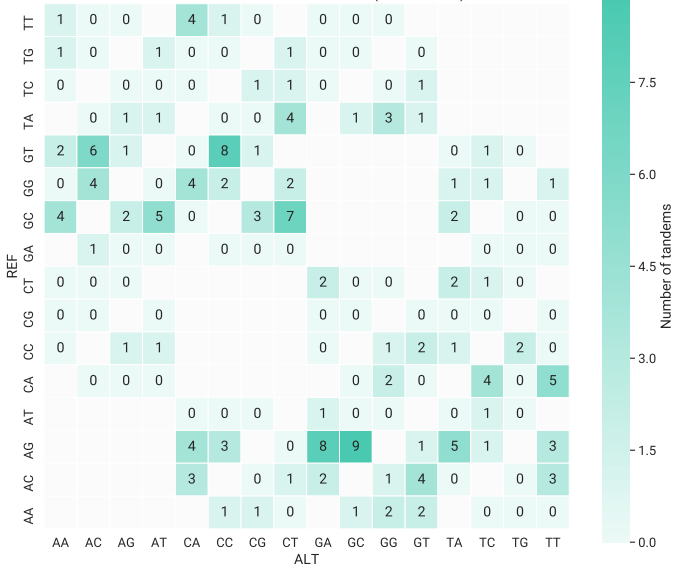
Distribution of mutations by sequence (IGHV4-31\*03)



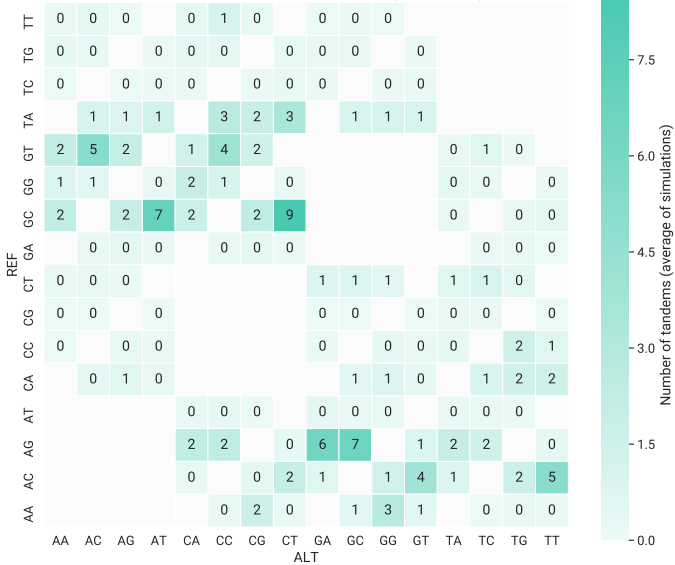
Distribution of mutation clusters by size (IGHV4-31\*03)

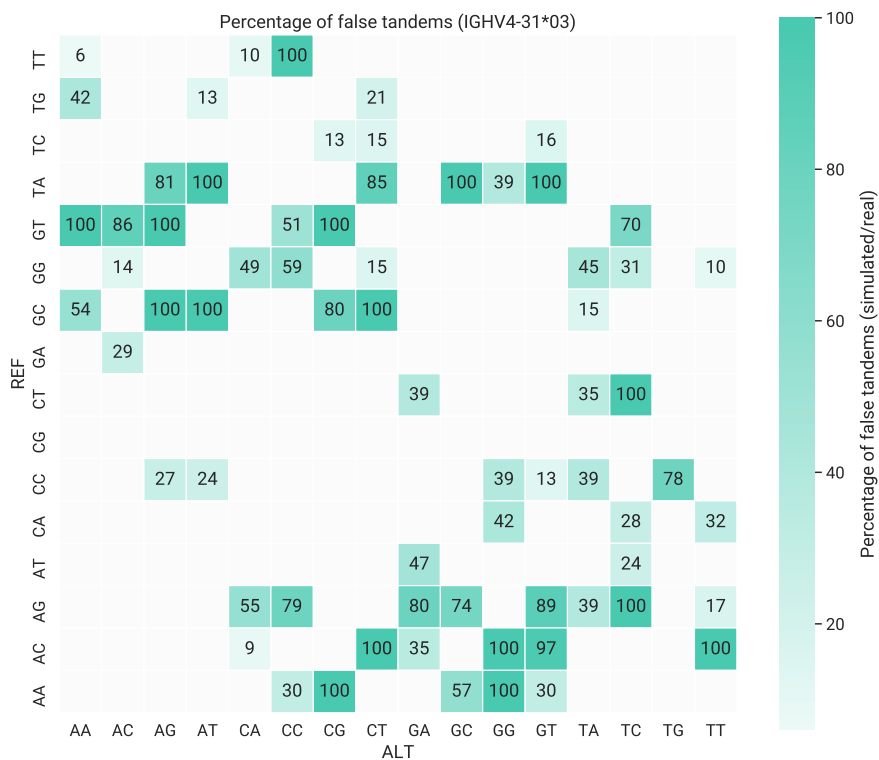
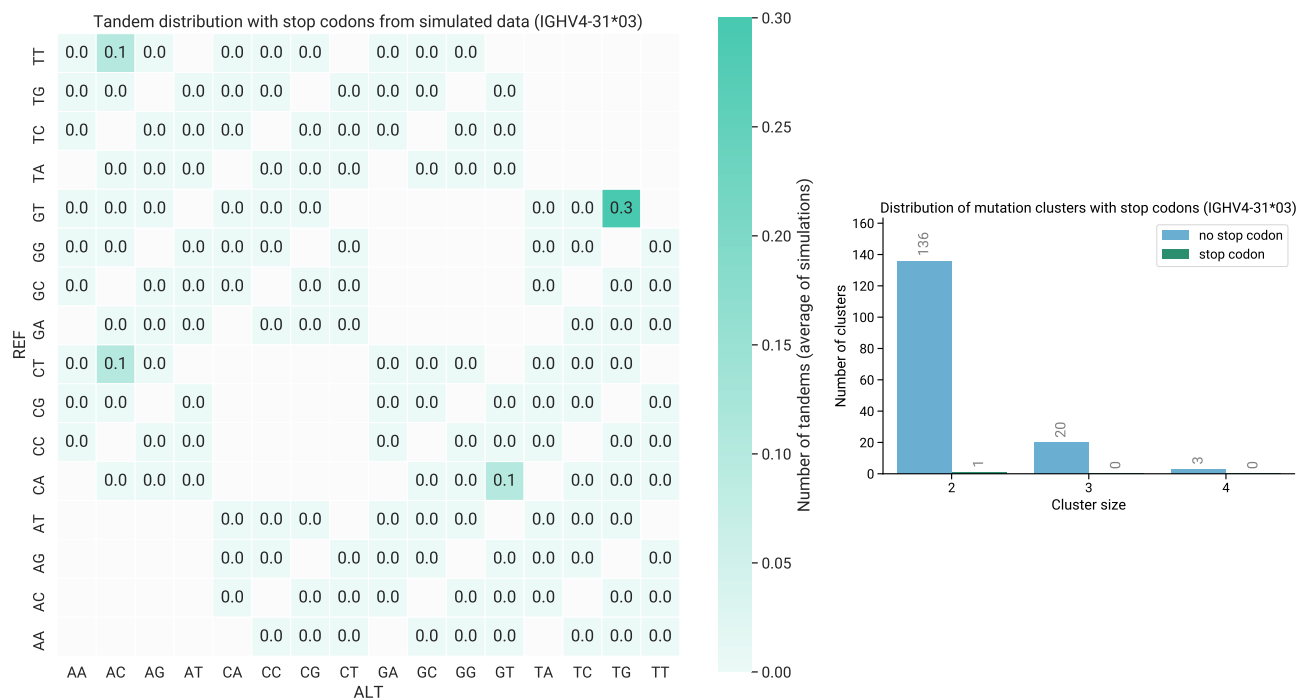


Tandem distribution from real data (IGHV4-31\*03)



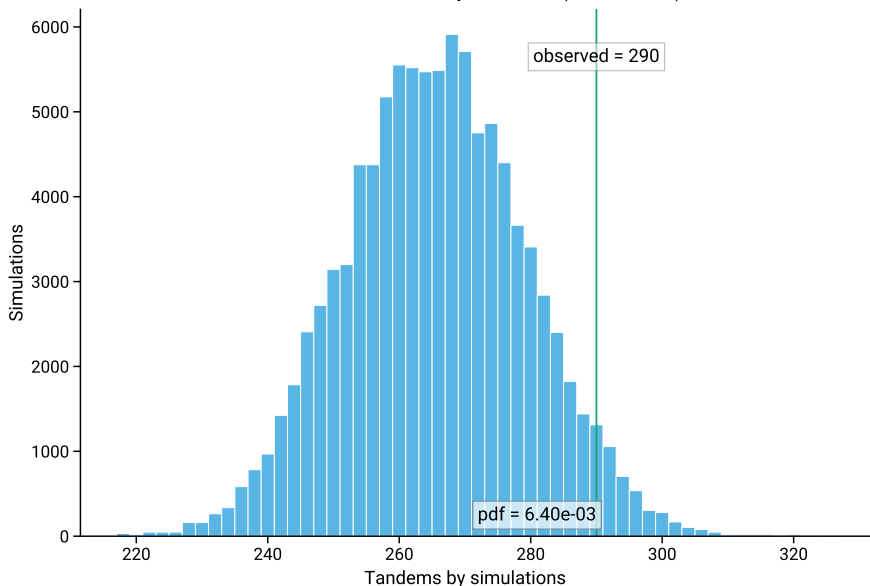
Tandem distribution from simulated data (IGHV4-31\*03)



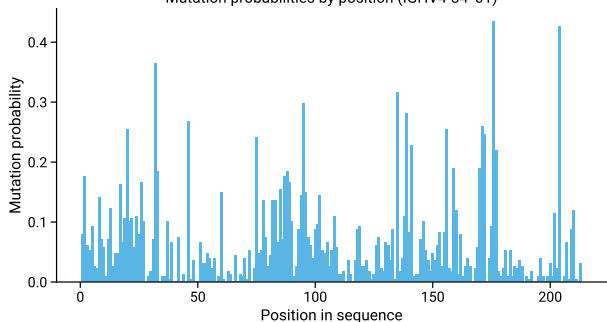


## 2.31 IGHV4-34\_01

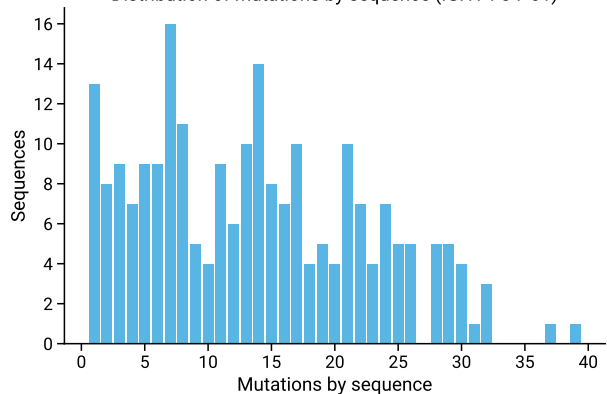
Distribution of tandems by simulation (IGHV4-34\*01)



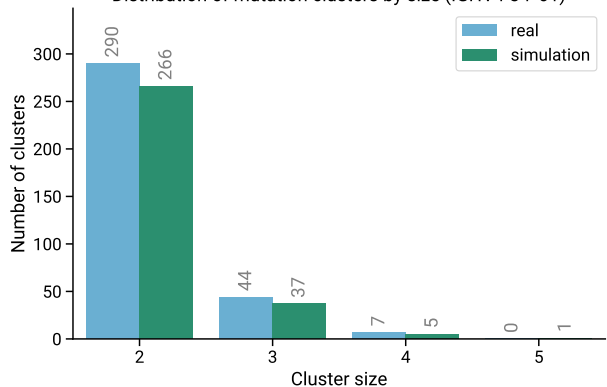
Mutation probabilities by position (IGHV4-34\*01)



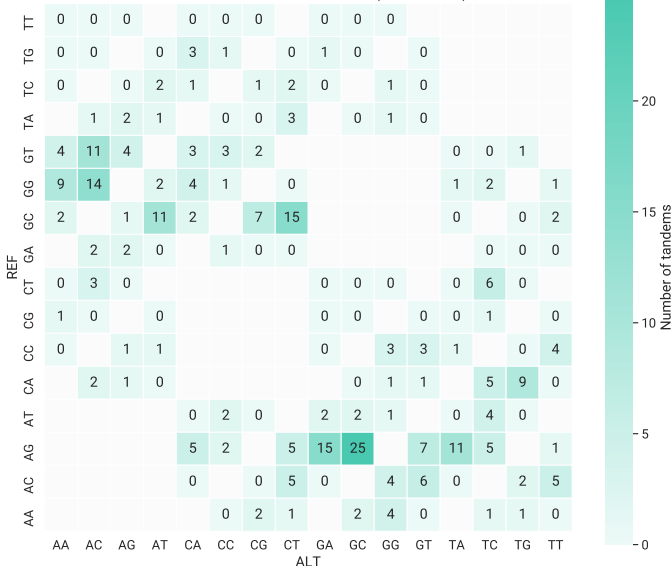
Distribution of mutations by sequence (IGHV4-34\*01)



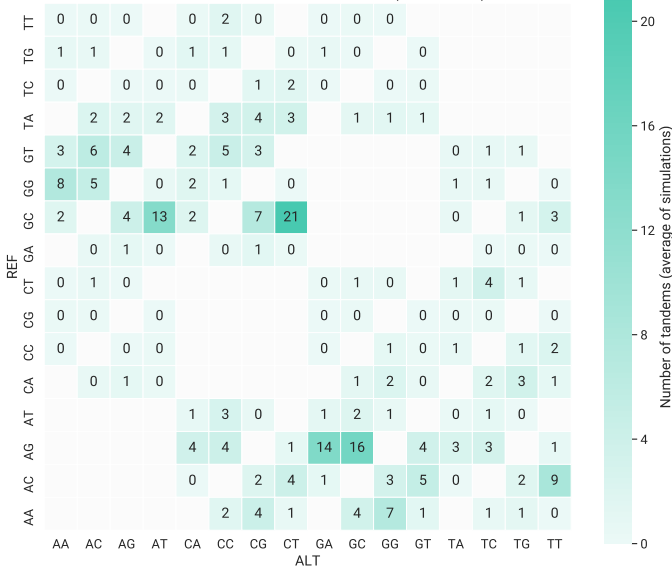
Distribution of mutation clusters by size (IGHV4-34\*01)

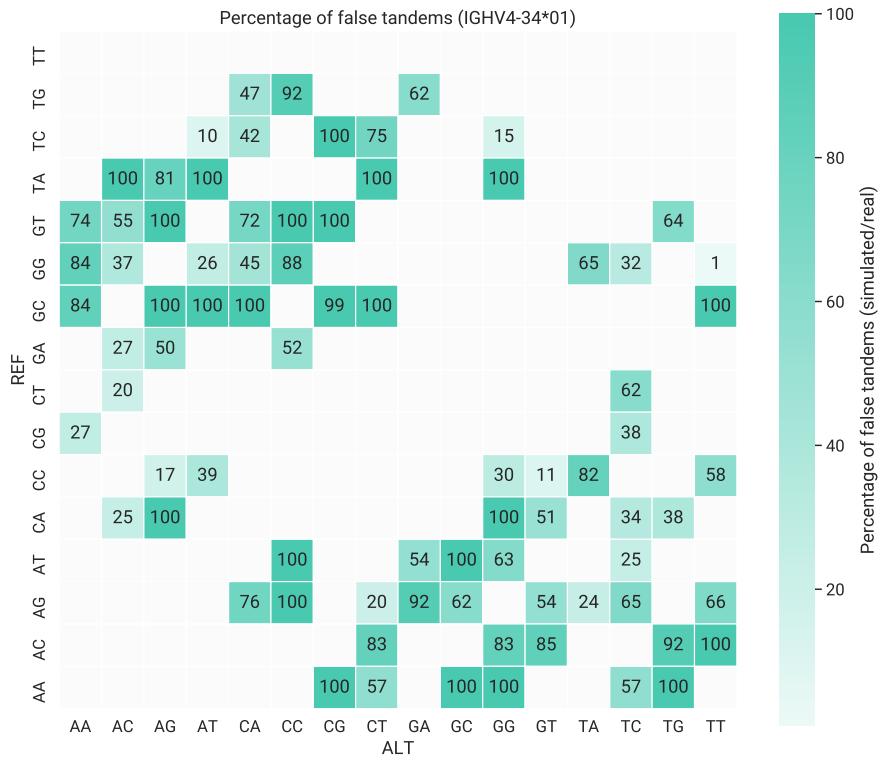
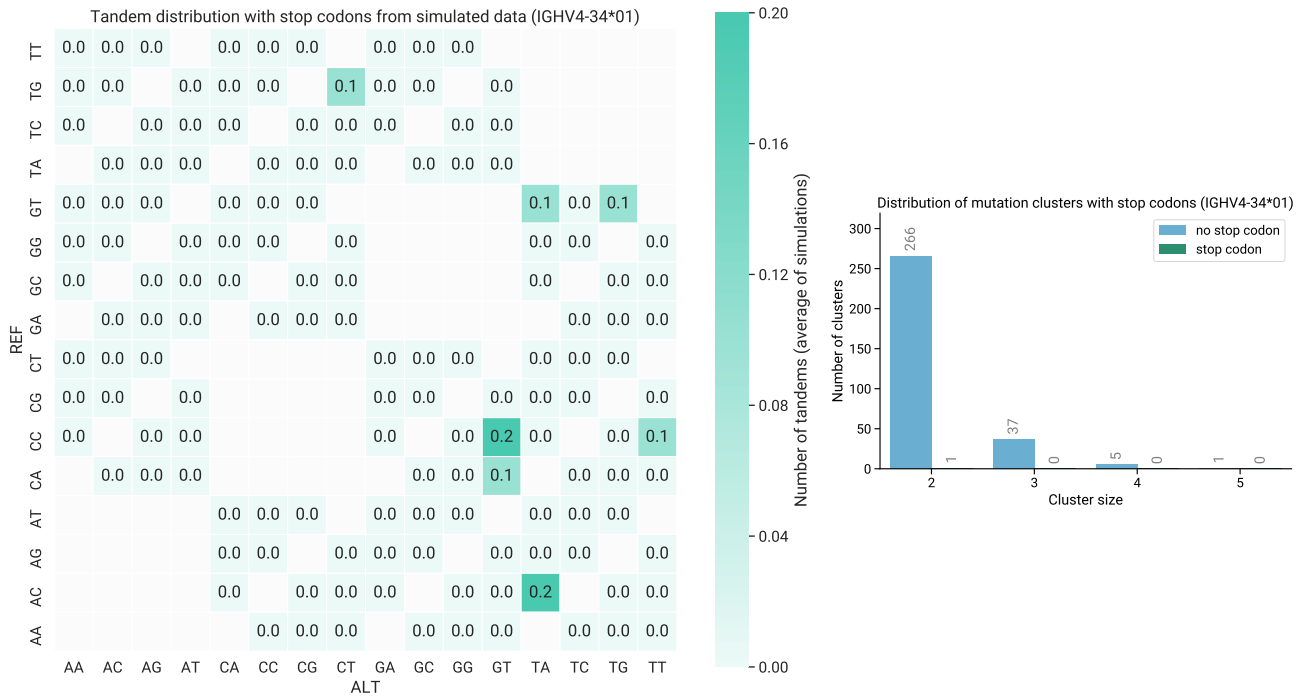


Tandem distribution from real data (IGHV4-34\*01)



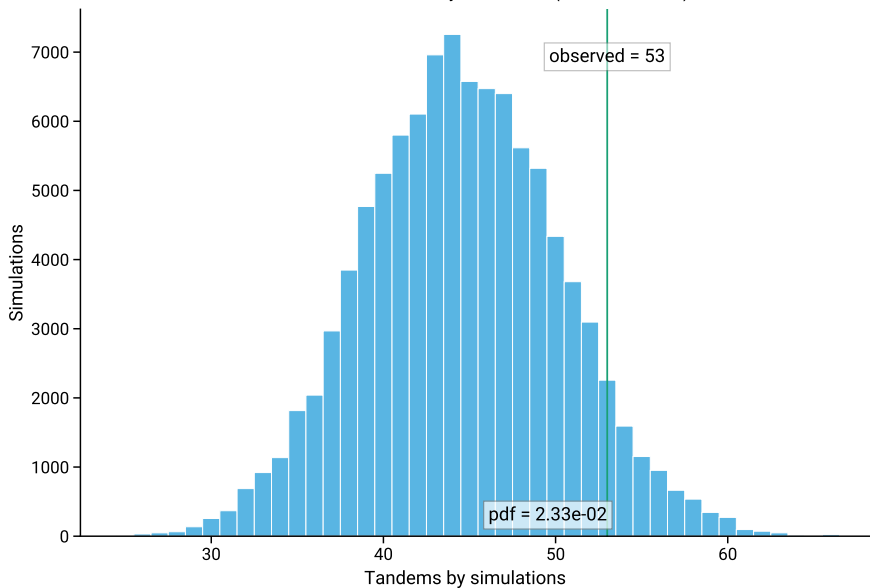
Tandem distribution from simulated data (IGHV4-34\*01)



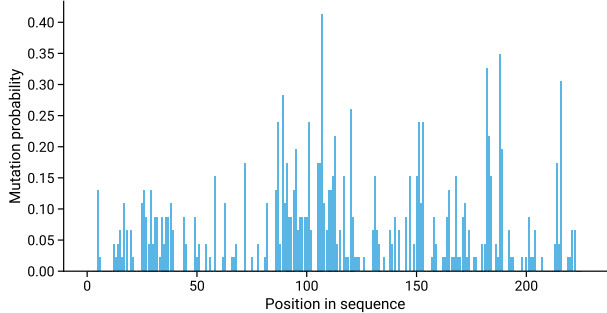


### 2.32 IGHV4-38-2\_02

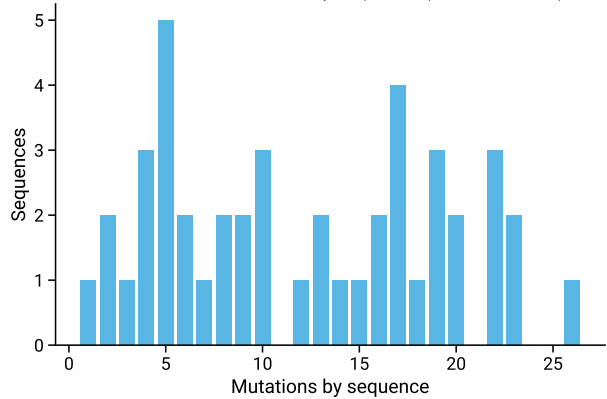
Distribution of tandems by simulation (IGHV4-38-2\*02)



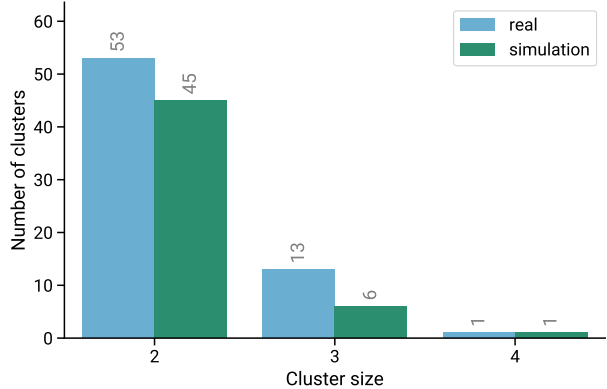
Mutation probabilities by position (IGHV4-38-2\*02)



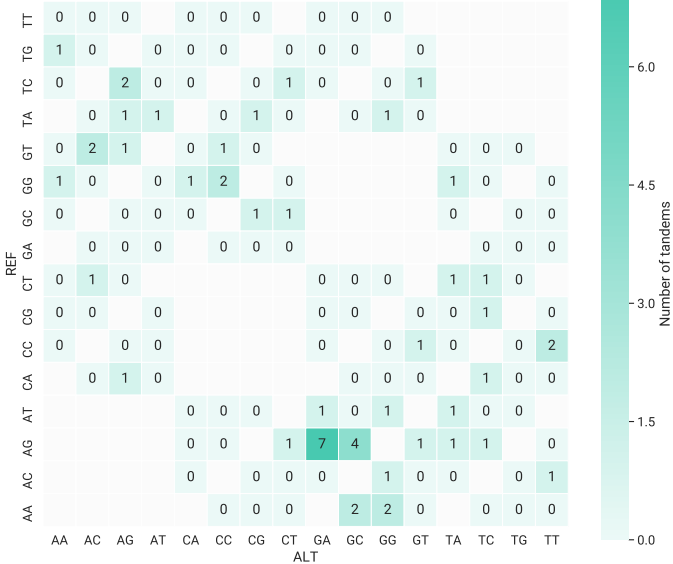
Distribution of mutations by sequence (IGHV4-38-2\*02)



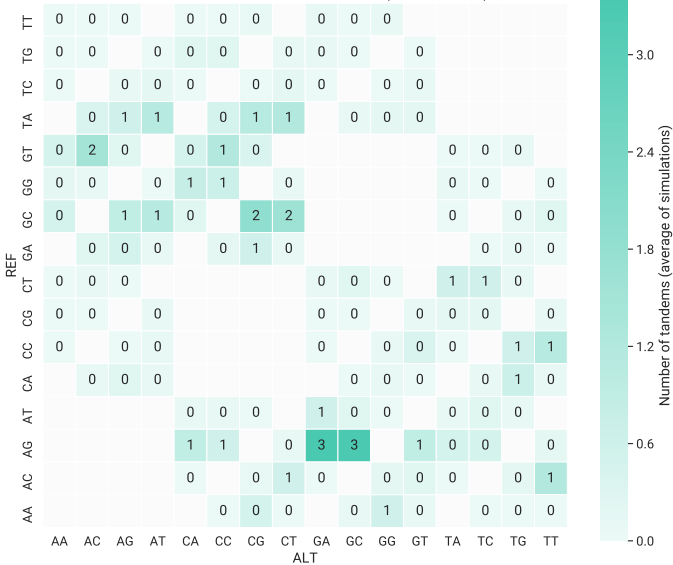
Distribution of mutation clusters by size (IGHV4-38-2\*02)

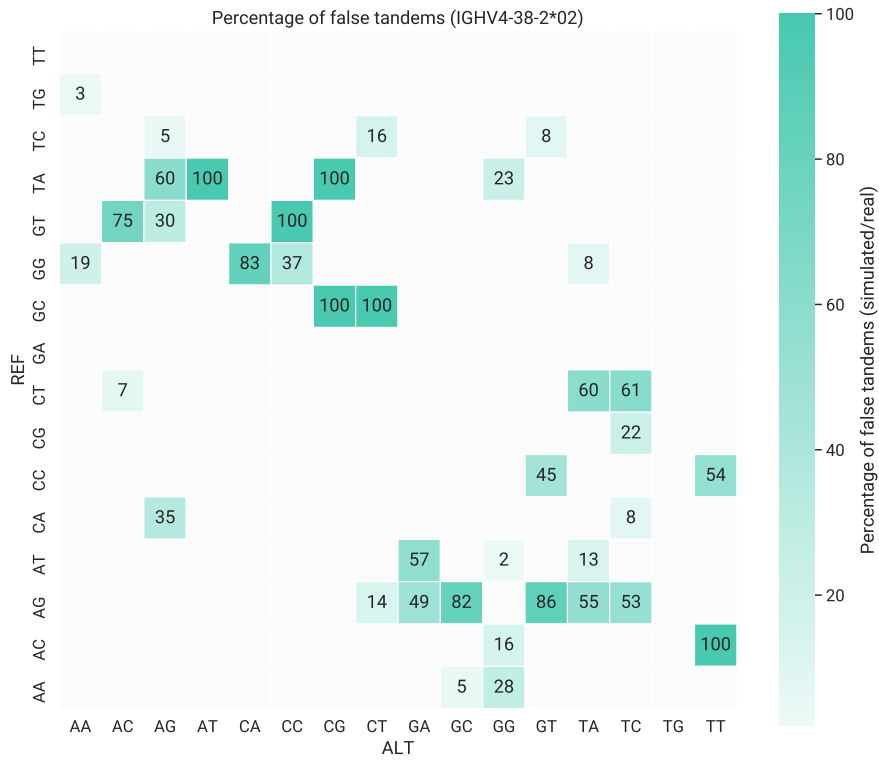
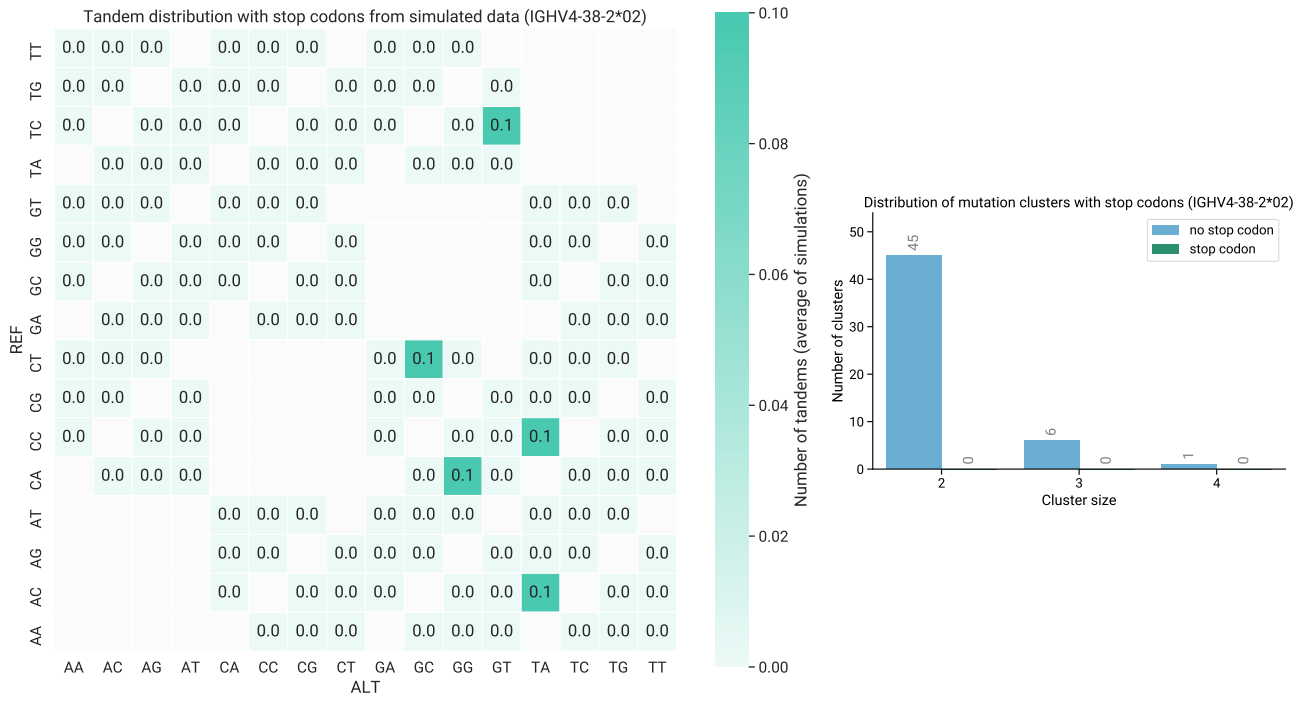


Tandem distribution from real data (IGHV4-38-2\*02)



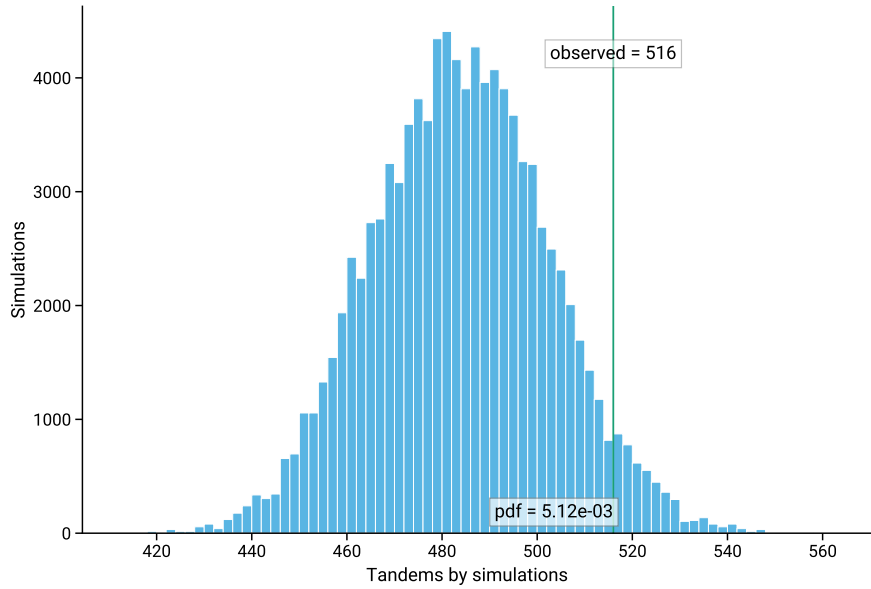
Tandem distribution from simulated data (IGHV4-38-2\*02)



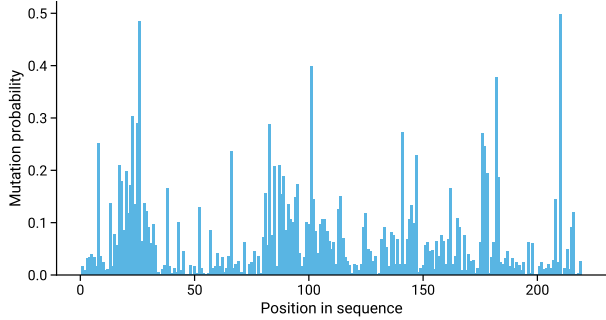


## 2.33 IGHV4-39\_01

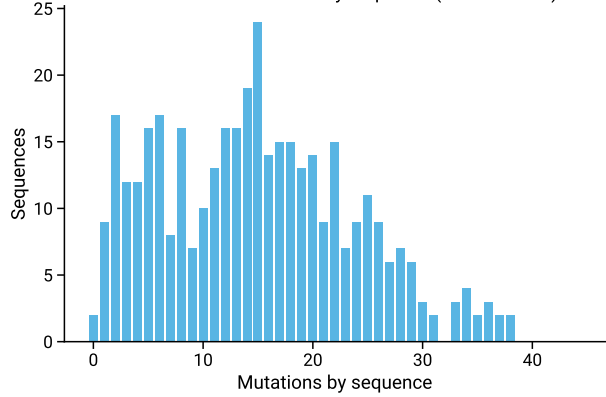
Distribution of tandems by simulation (IGHV4-39\*01)



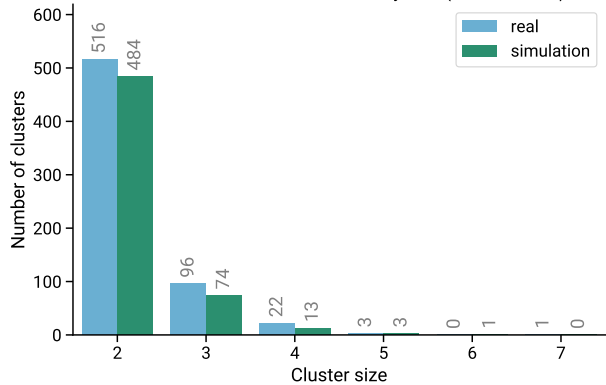
Mutation probabilities by position (IGHV4-39\*01)



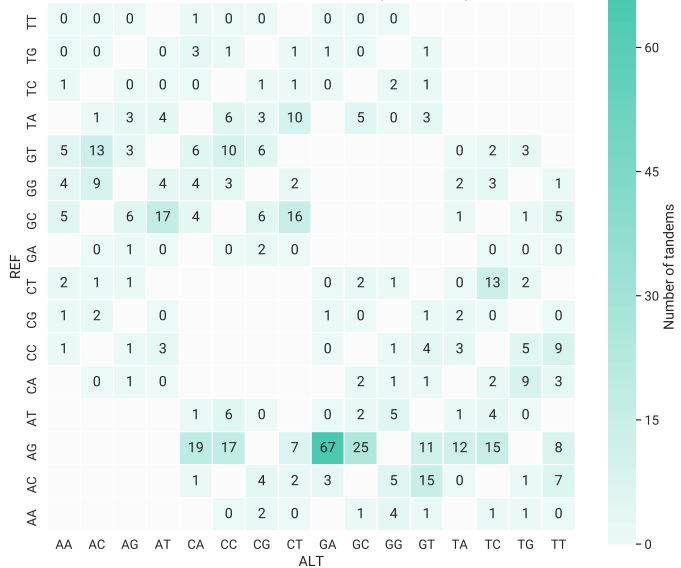
Distribution of mutations by sequence (IGHV4-39\*01)



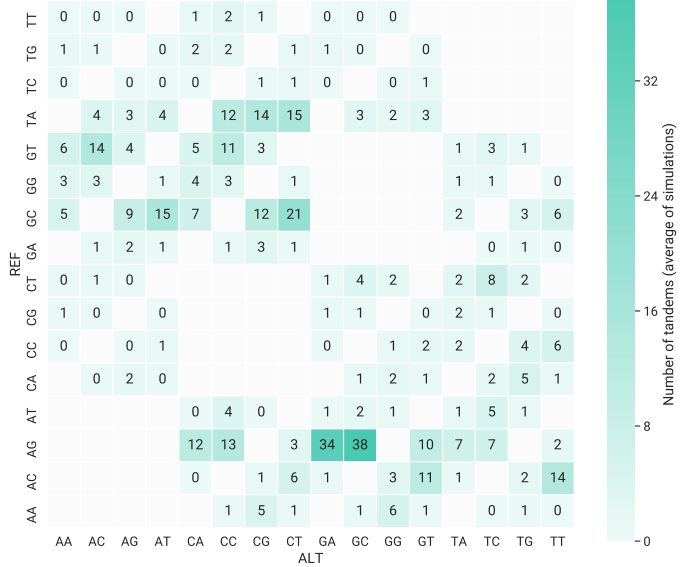
Distribution of mutation clusters by size (IGHV4-39\*01)



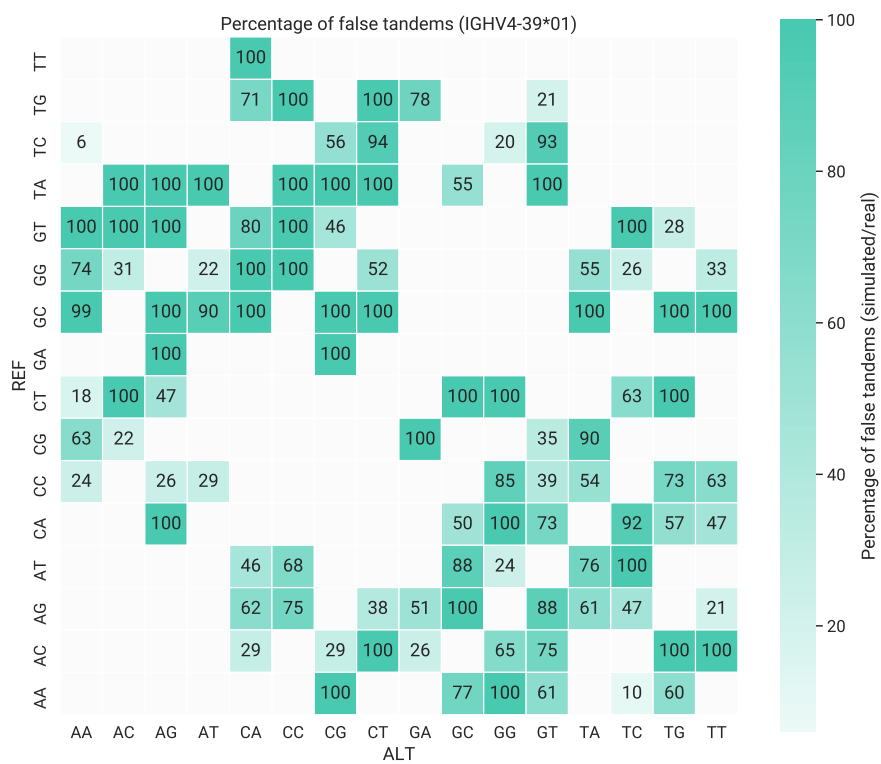
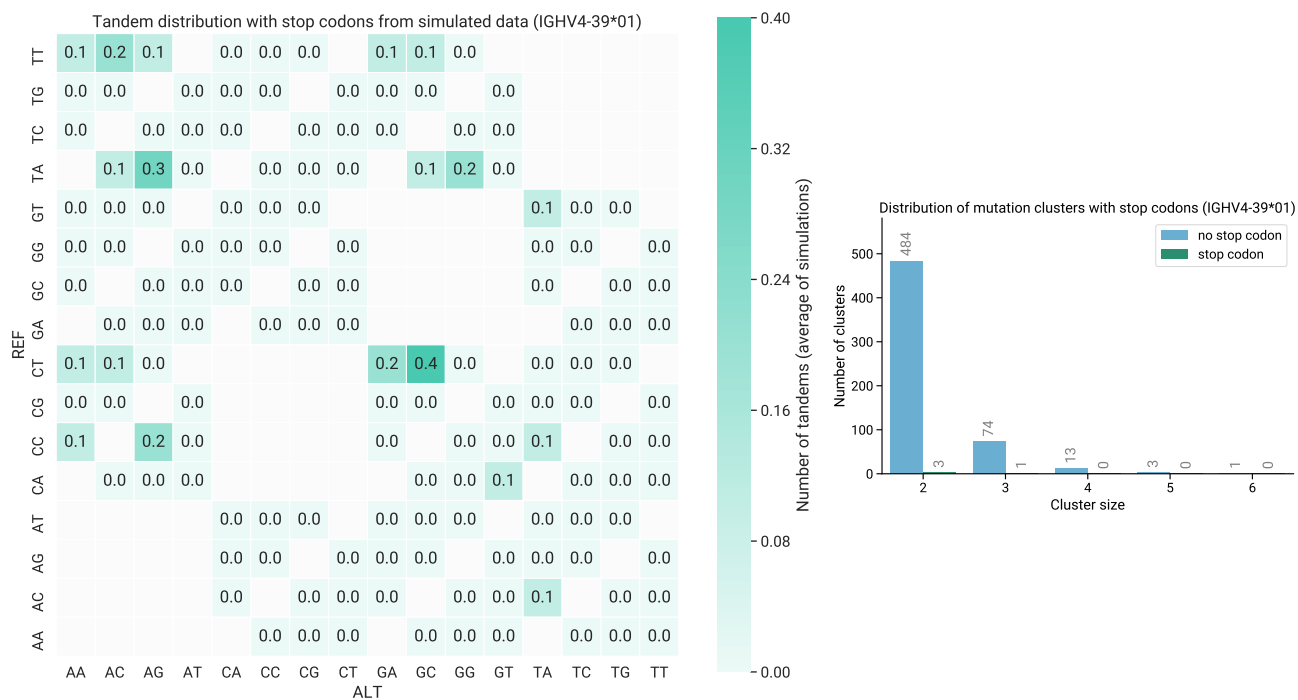
Tandem distribution from real data (IGHV4-39\*01)



Tandem distribution from simulated data (IGHV4-39\*01)

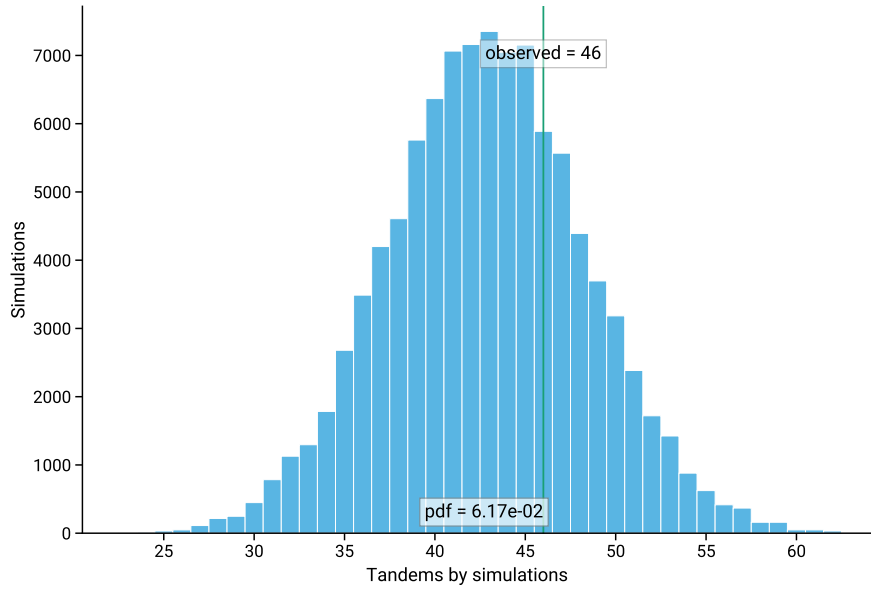




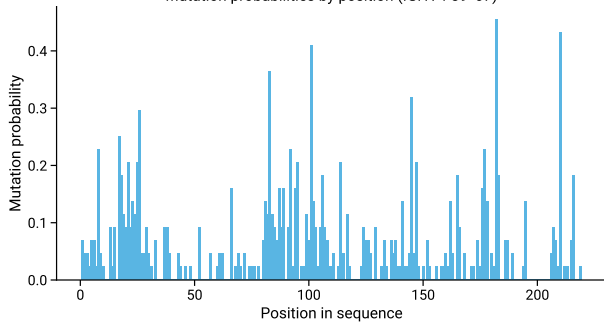


## 2.34 IGHV4-39\_07

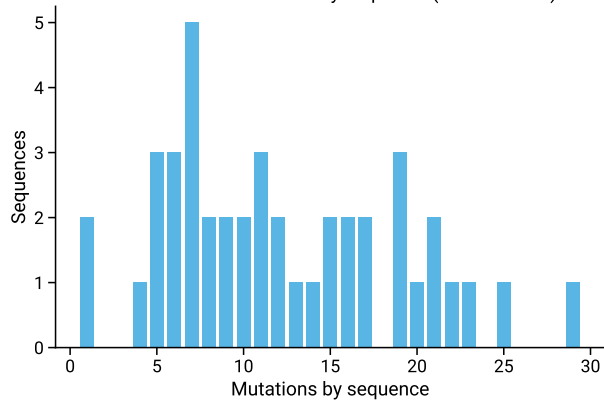
Distribution of tandems by simulation (IGHV4-39\*07)



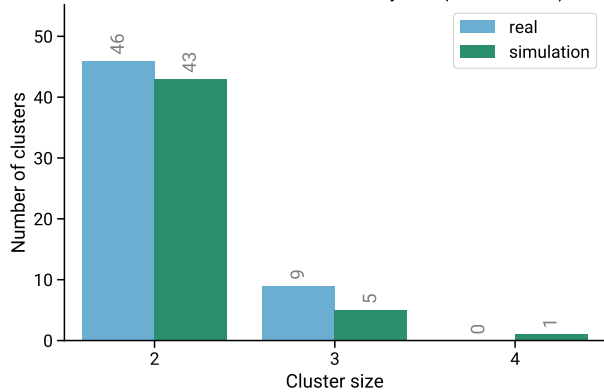
Mutation probabilities by position (IGHV4-39\*07)



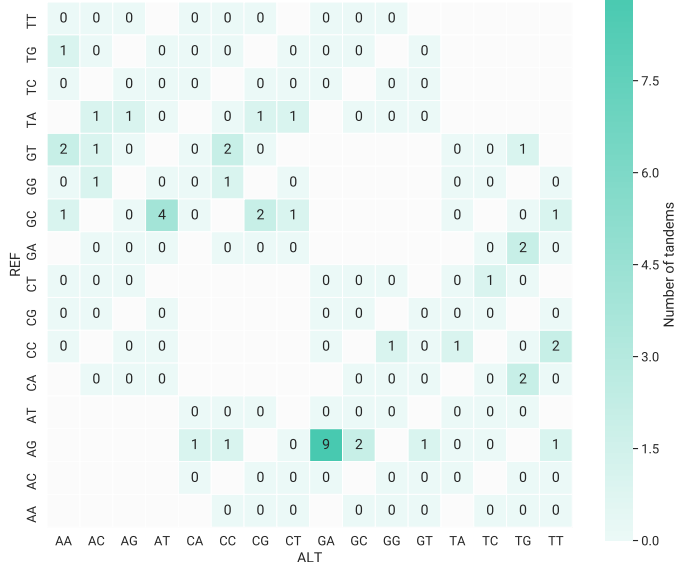
Distribution of mutations by sequence (IGHV4-39\*07)



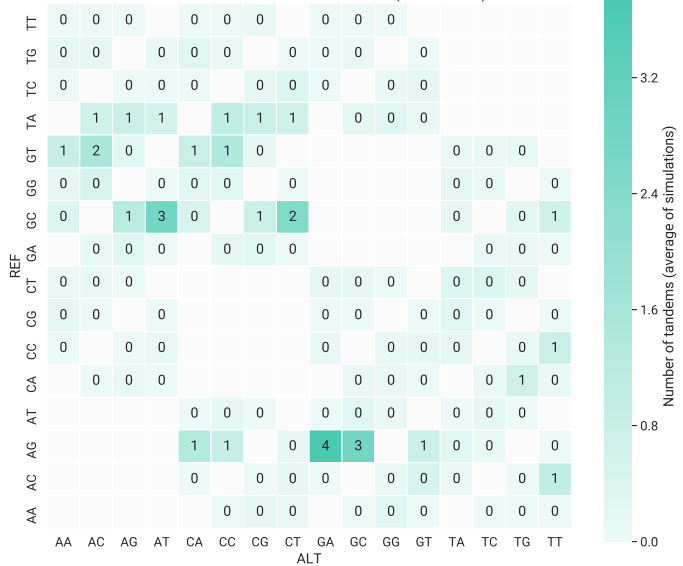
Distribution of mutation clusters by size (IGHV4-39\*07)

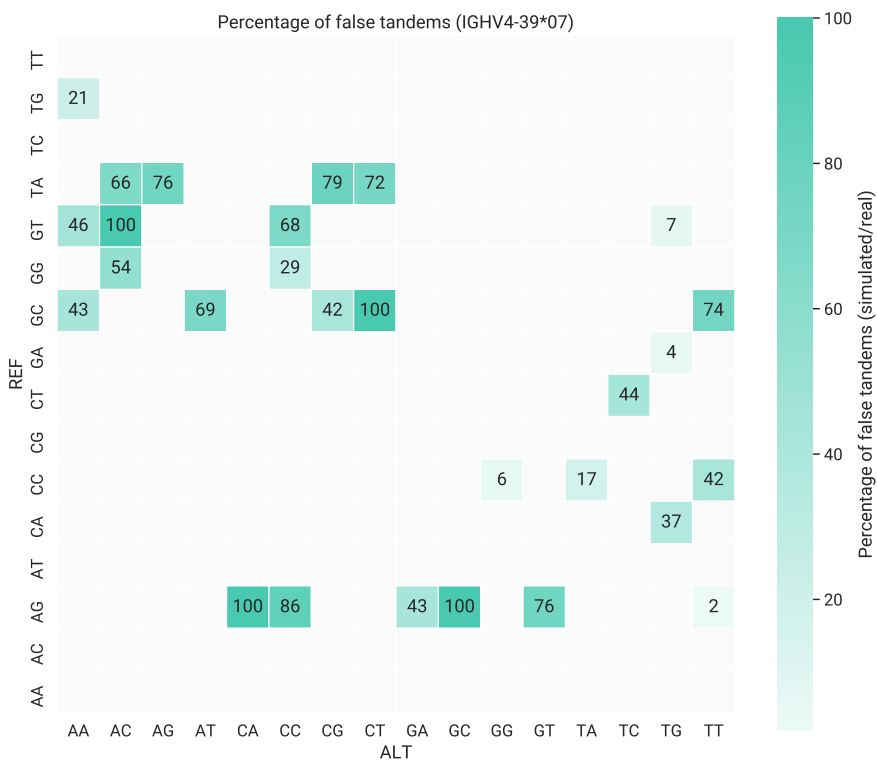
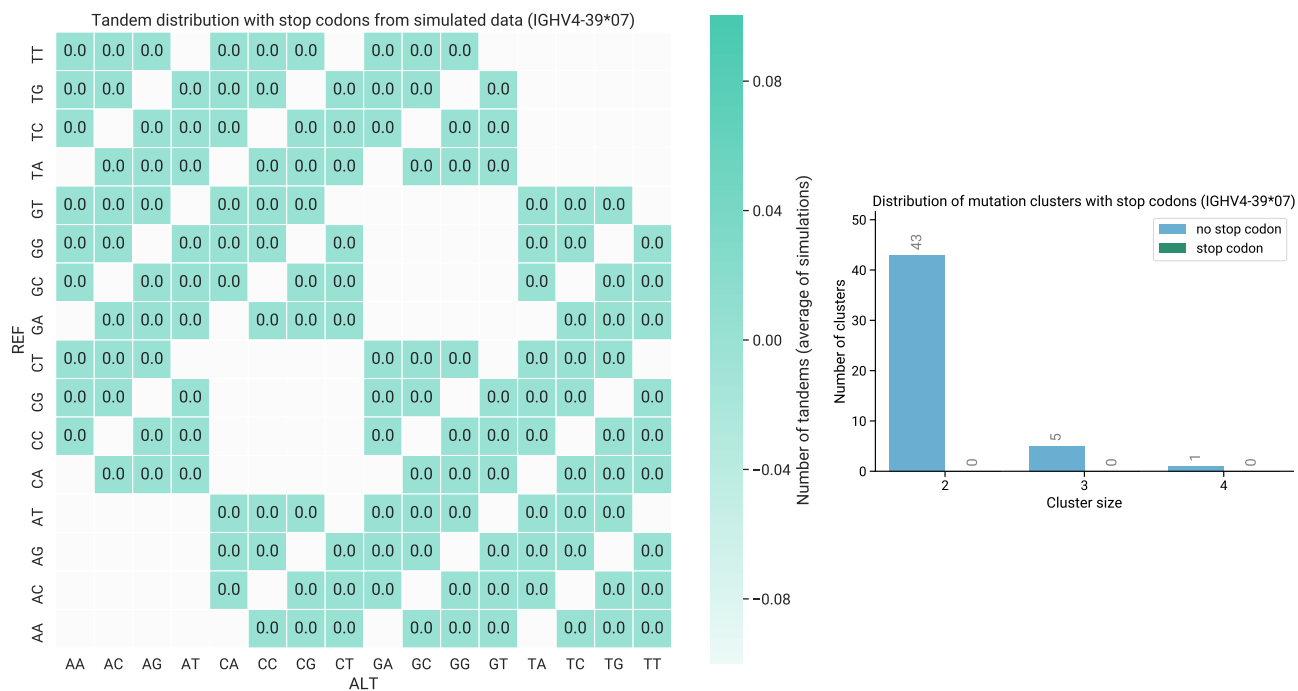


Tandem distribution from real data (IGHV4-39\*07)



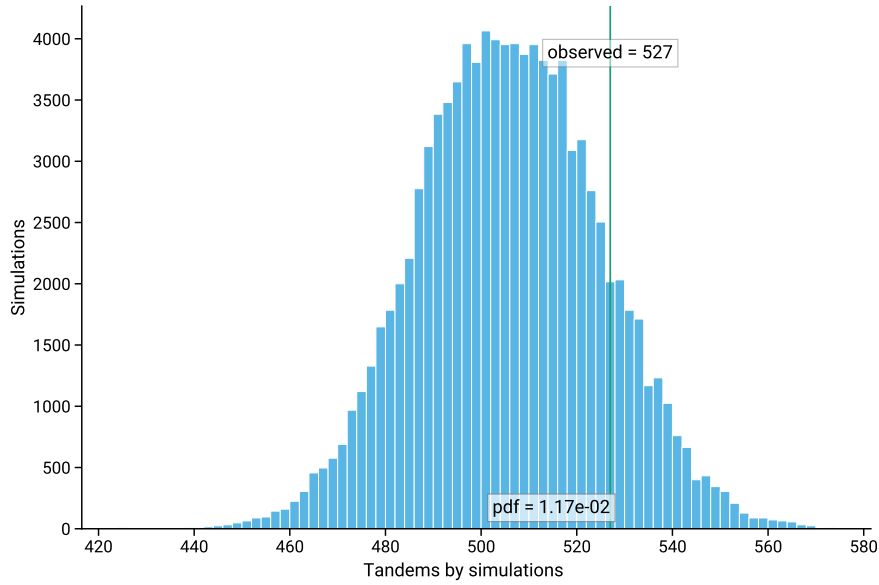
Tandem distribution from simulated data (IGHV4-39\*07)



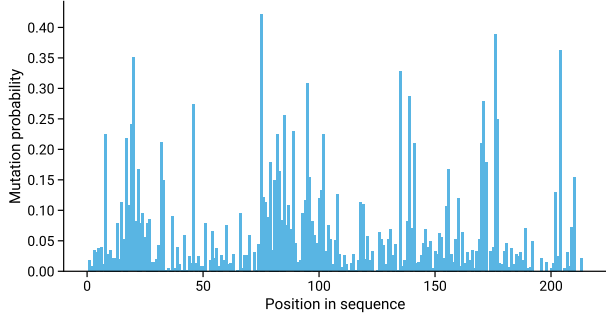


## 2.35 IGHV4-59\_01

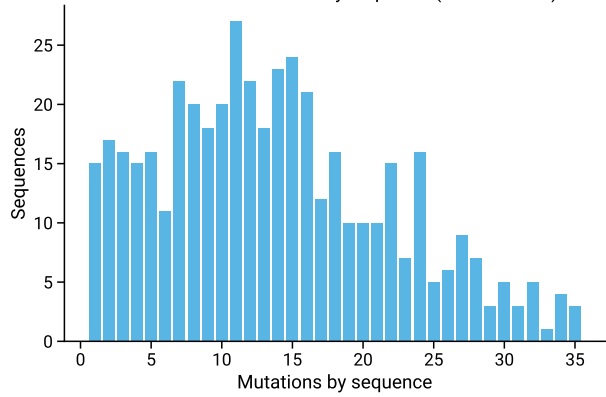
Distribution of tandems by simulation (IGHV4-59\*01)



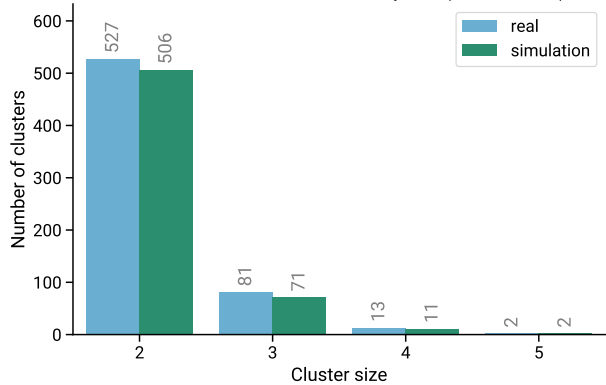
Mutation probabilities by position (IGHV4-59\*01)



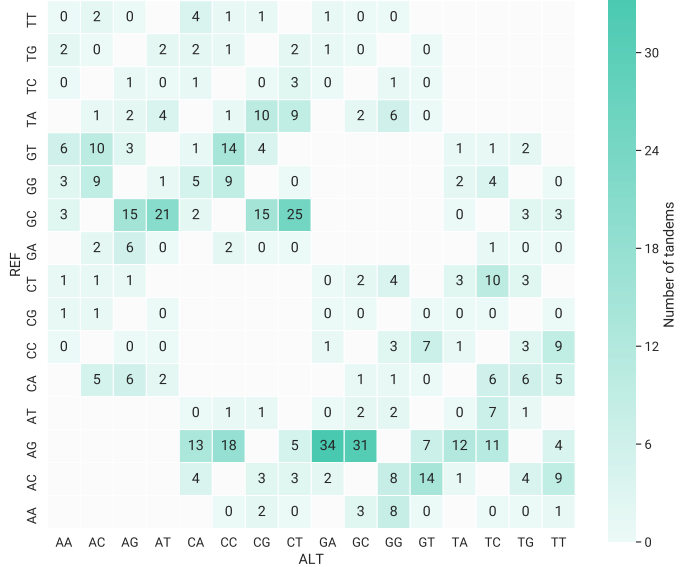
Distribution of mutations by sequence (IGHV4-59\*01)



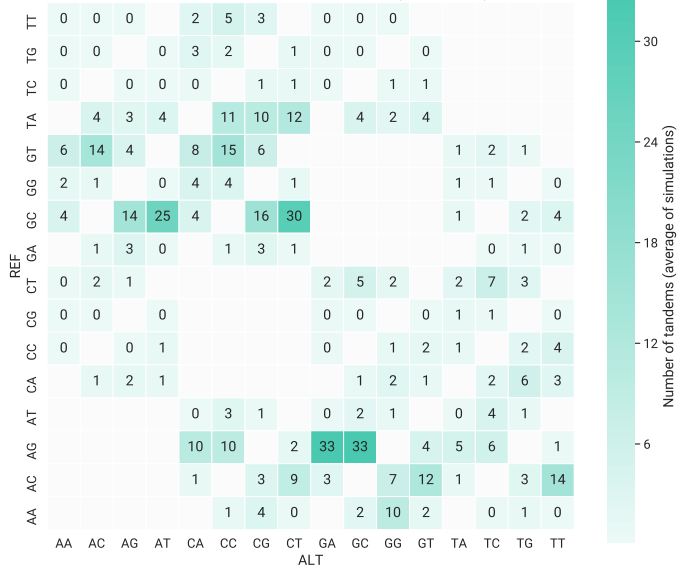
Distribution of mutation clusters by size (IGHV4-59\*01)

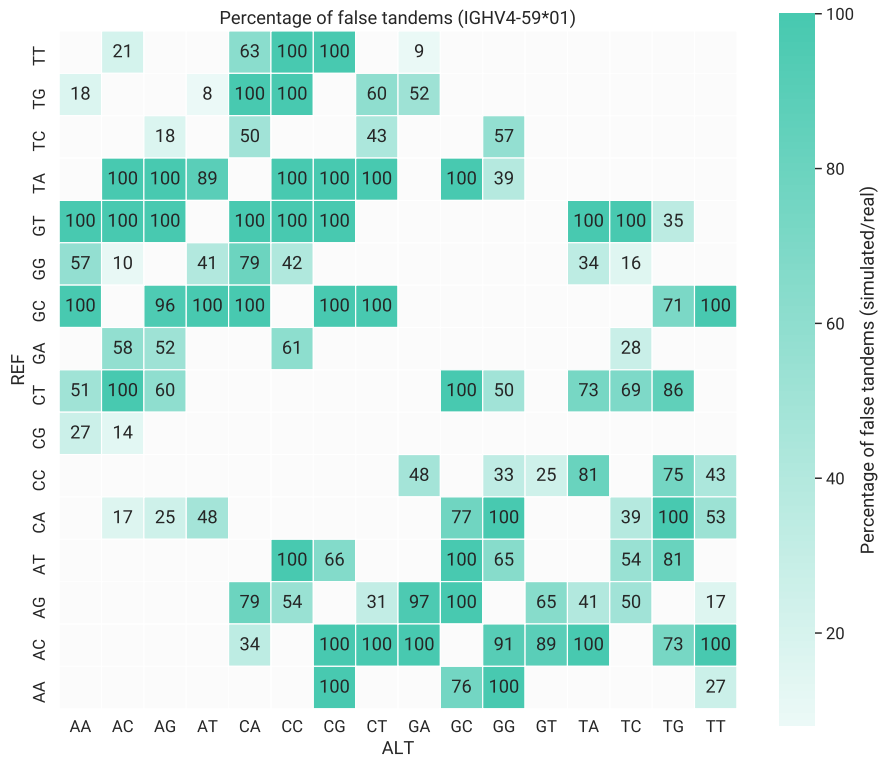
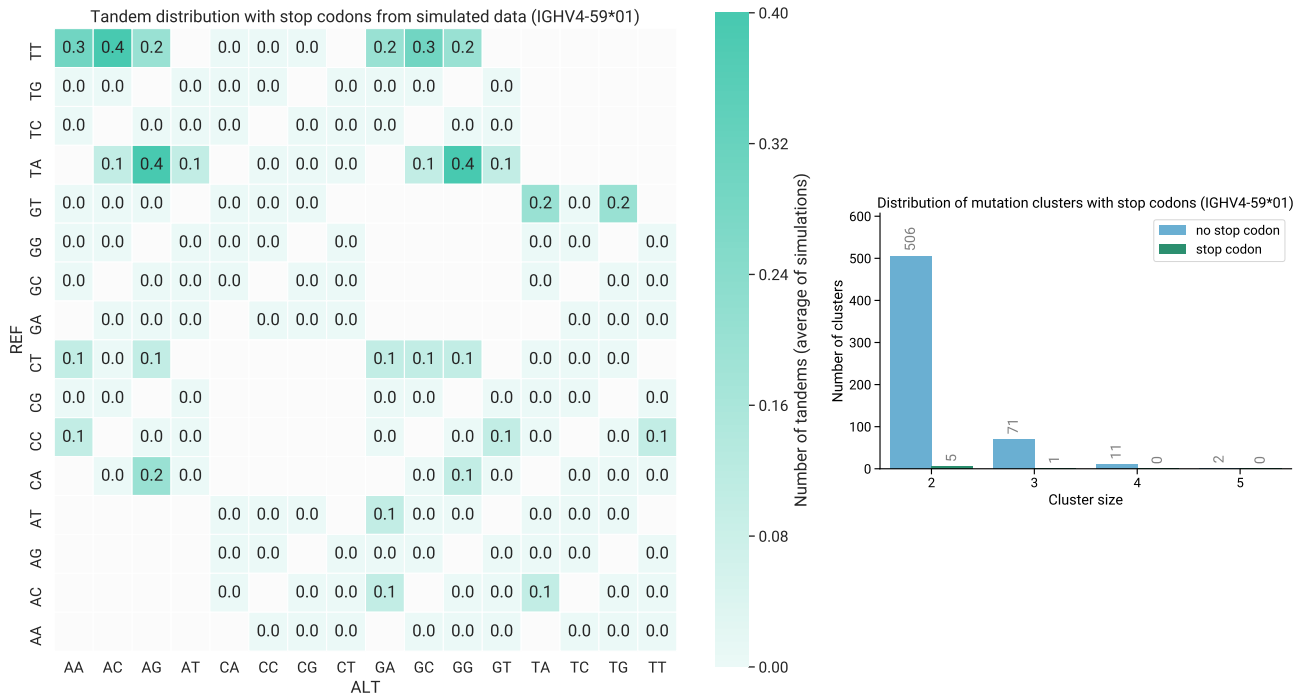


Tandem distribution from real data (IGHV4-59\*01)



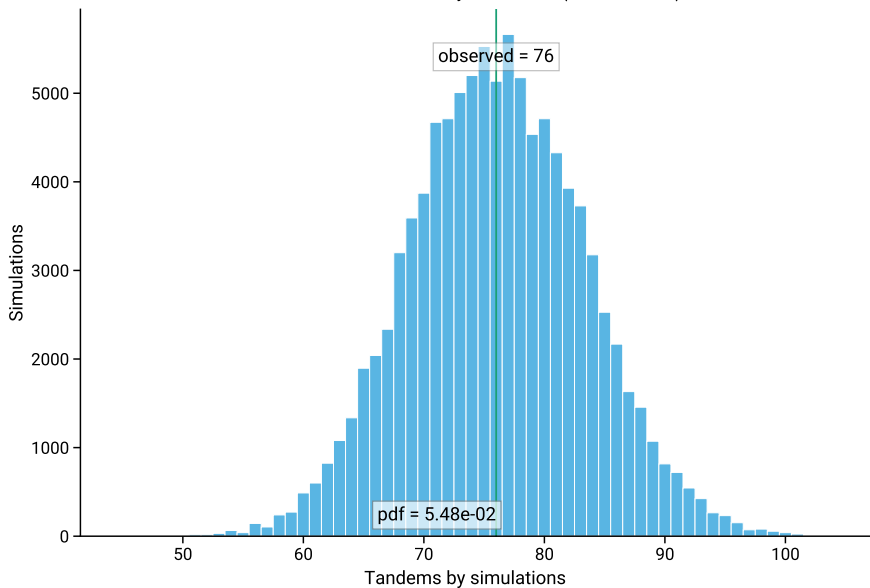
Tandem distribution from simulated data (IGHV4-59\*01)



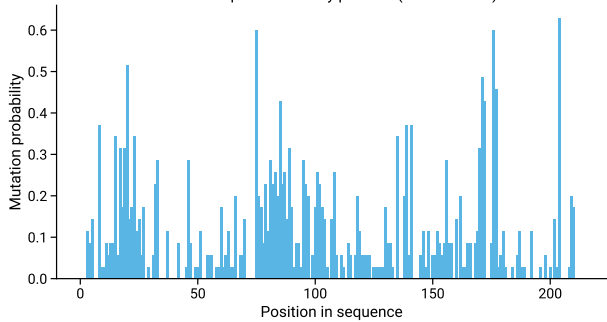


## 2.36 IGHV4-59\_03

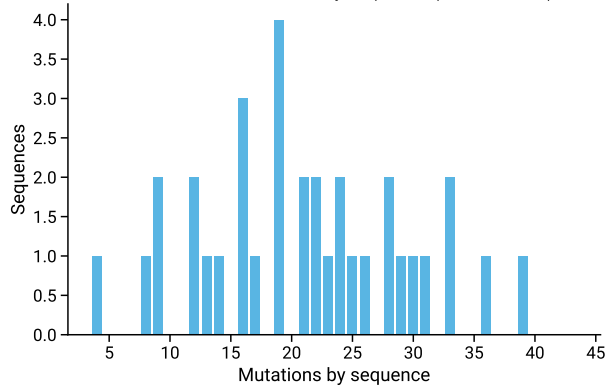
Distribution of tandems by simulation (IGHV4-59\*03)



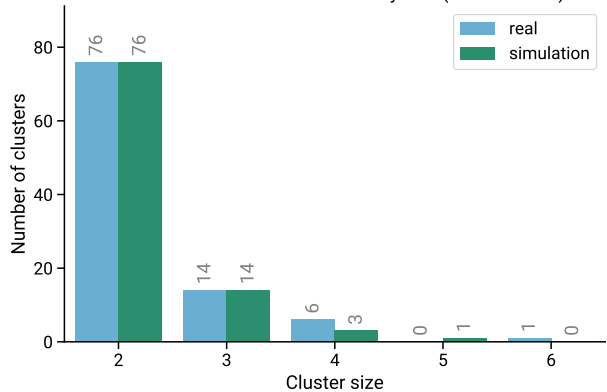
Mutation probabilities by position (IGHV4-59\*03)



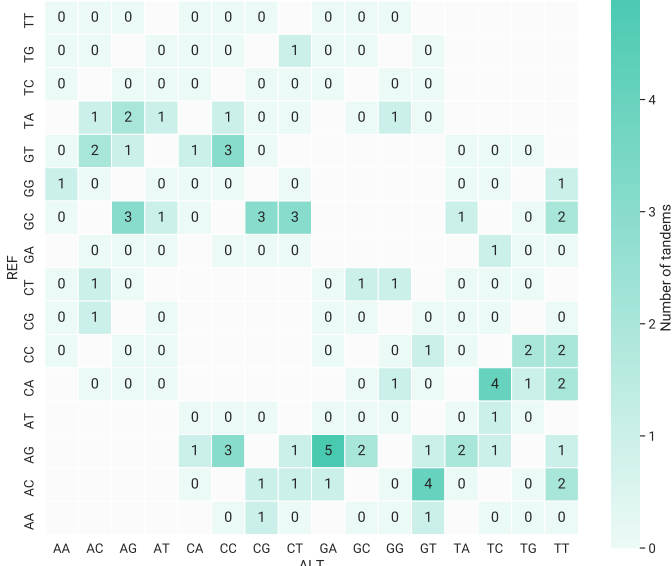
Distribution of mutations by sequence (IGHV4-59\*03)



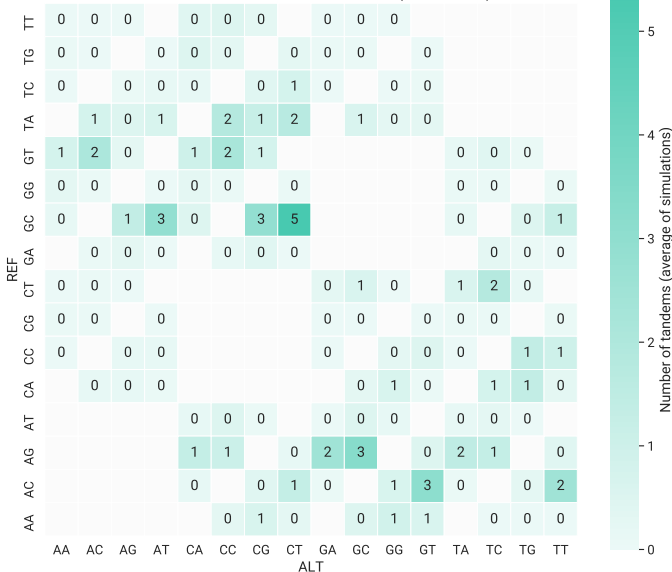
Distribution of mutation clusters by size (IGHV4-59\*03)

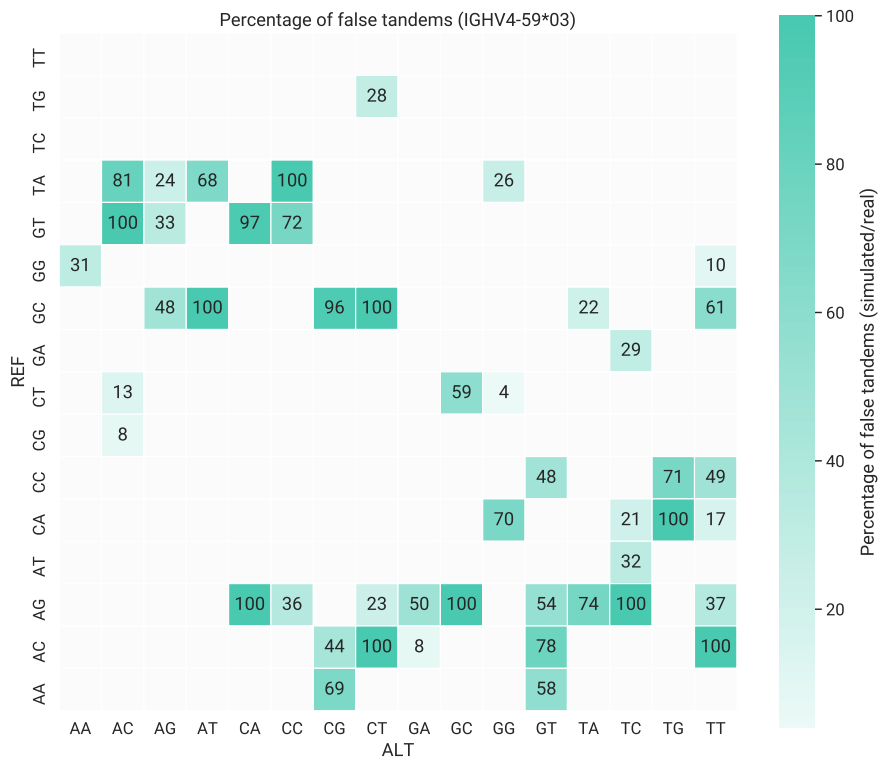
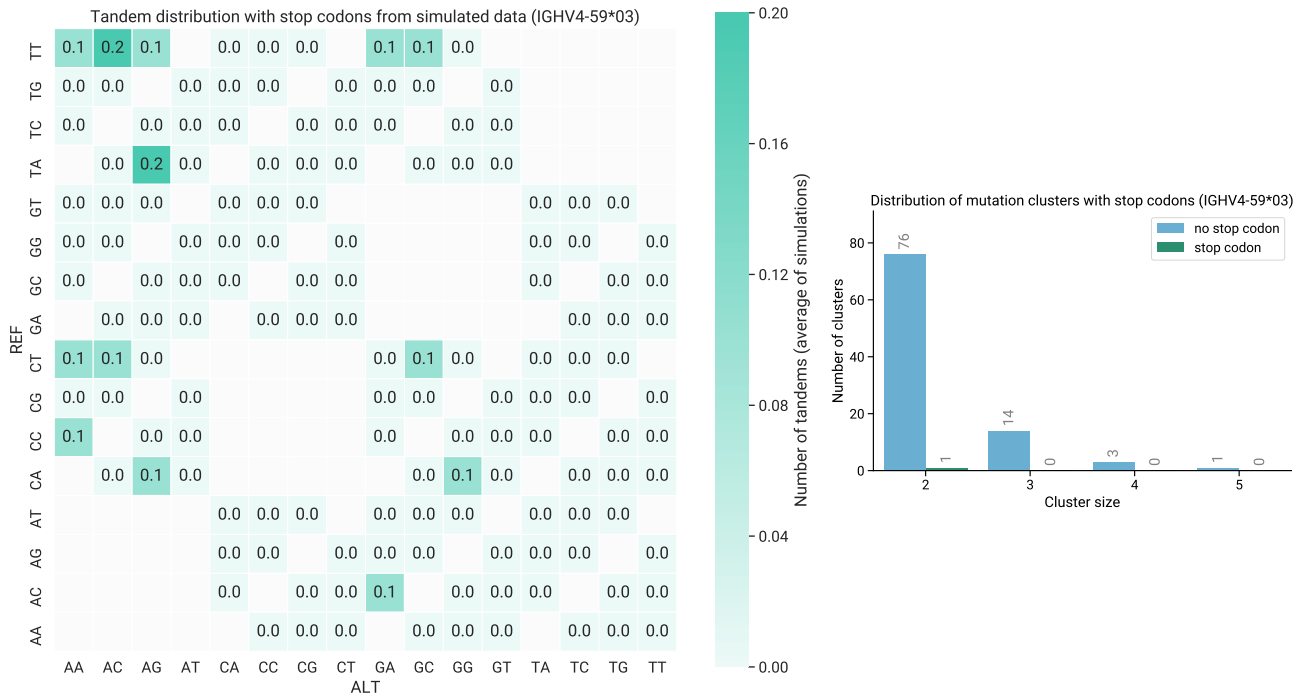


Tandem distribution from real data (IGHV4-59\*03)



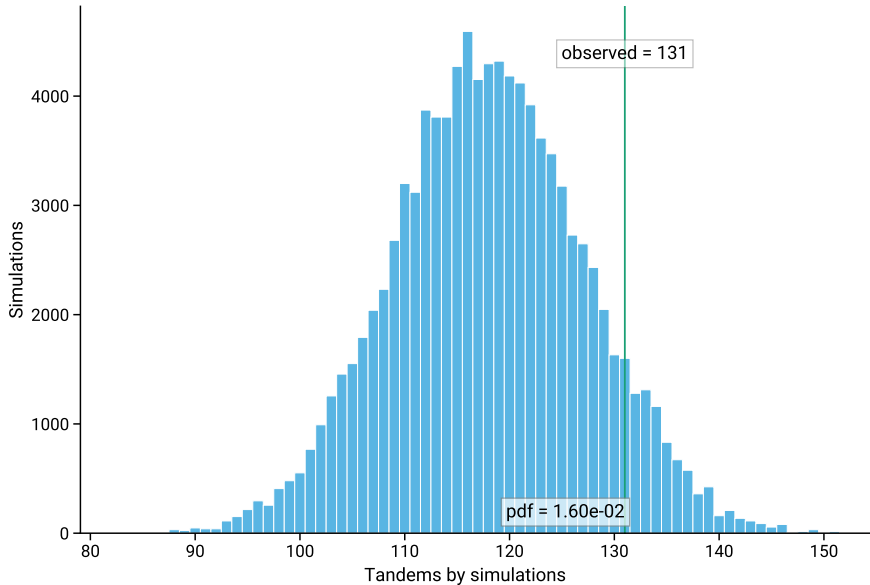
Tandem distribution from simulated data (IGHV4-59\*03)



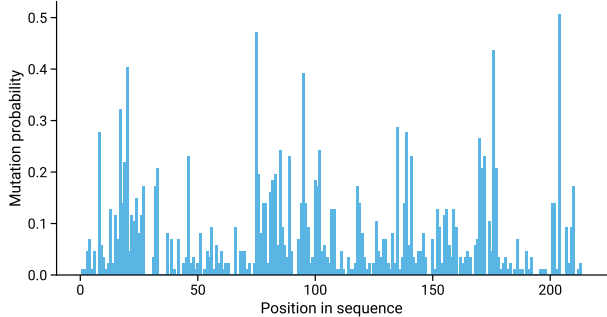


## 2.37 IGHV4-59\_08

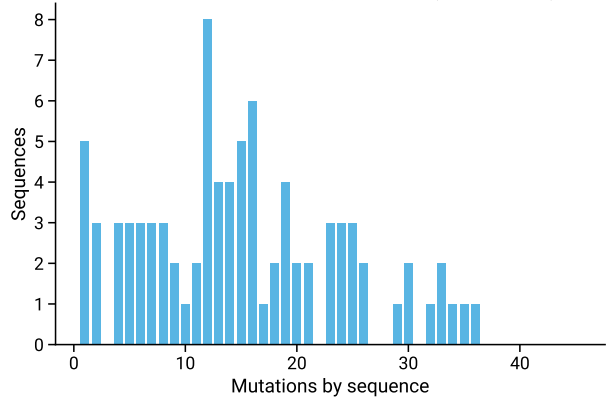
Distribution of tandems by simulation (IGHV4-59\*08)



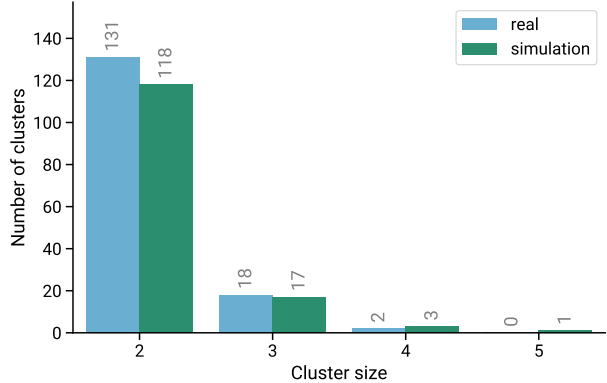
Mutation probabilities by position (IGHV4-59\*08)



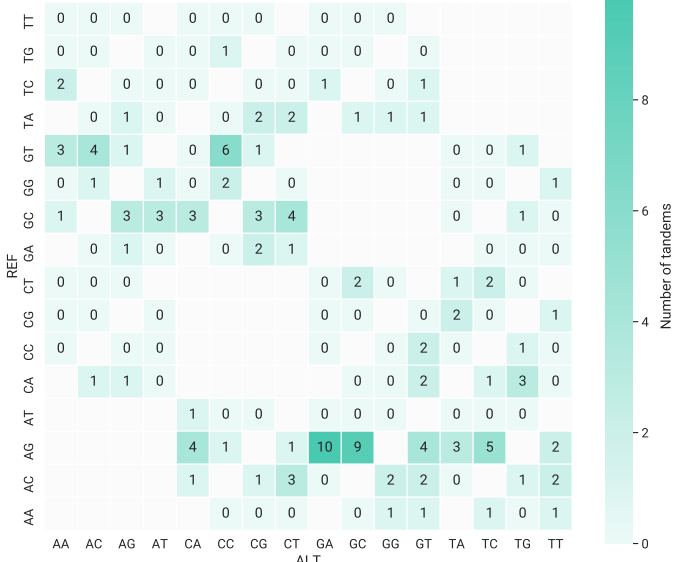
Distribution of mutations by sequence (IGHV4-59\*08)



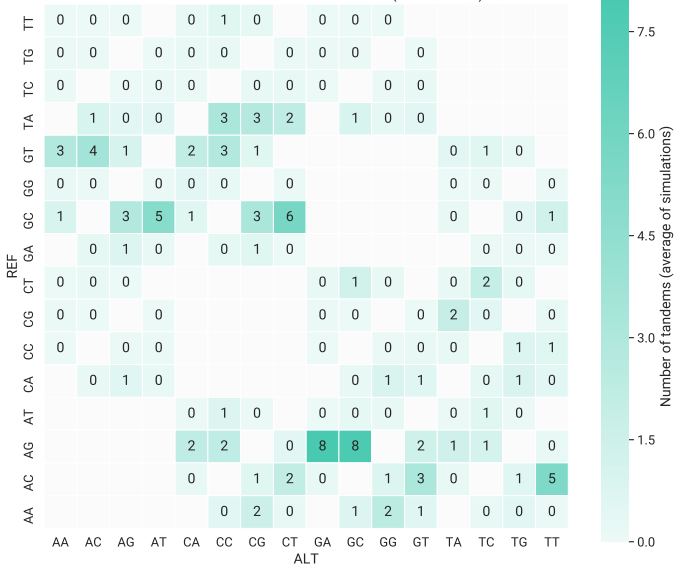
Distribution of mutation clusters by size (IGHV4-59\*08)



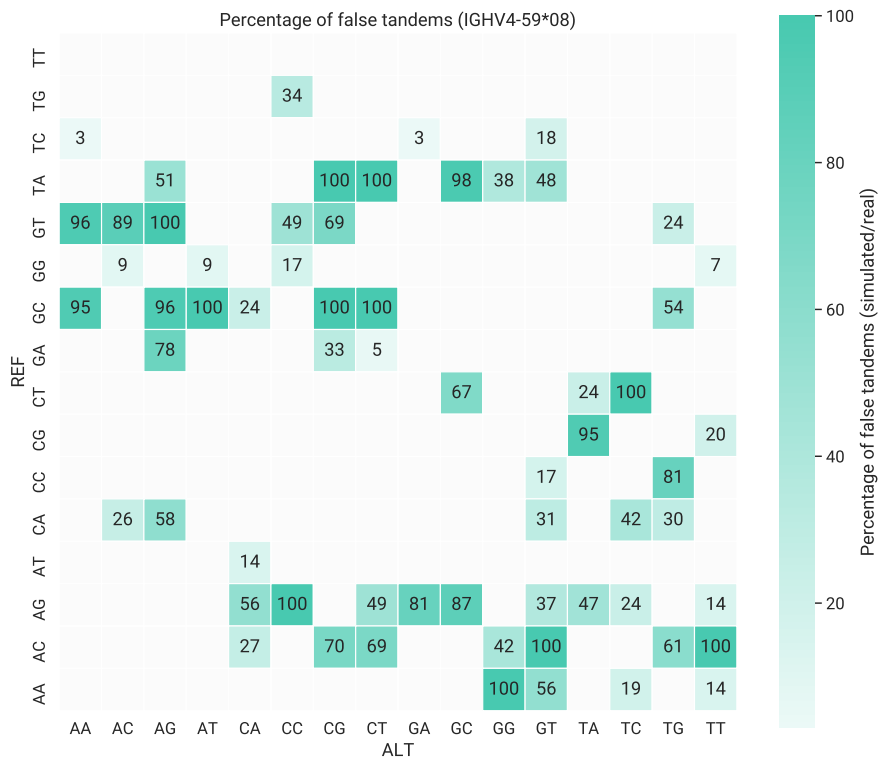
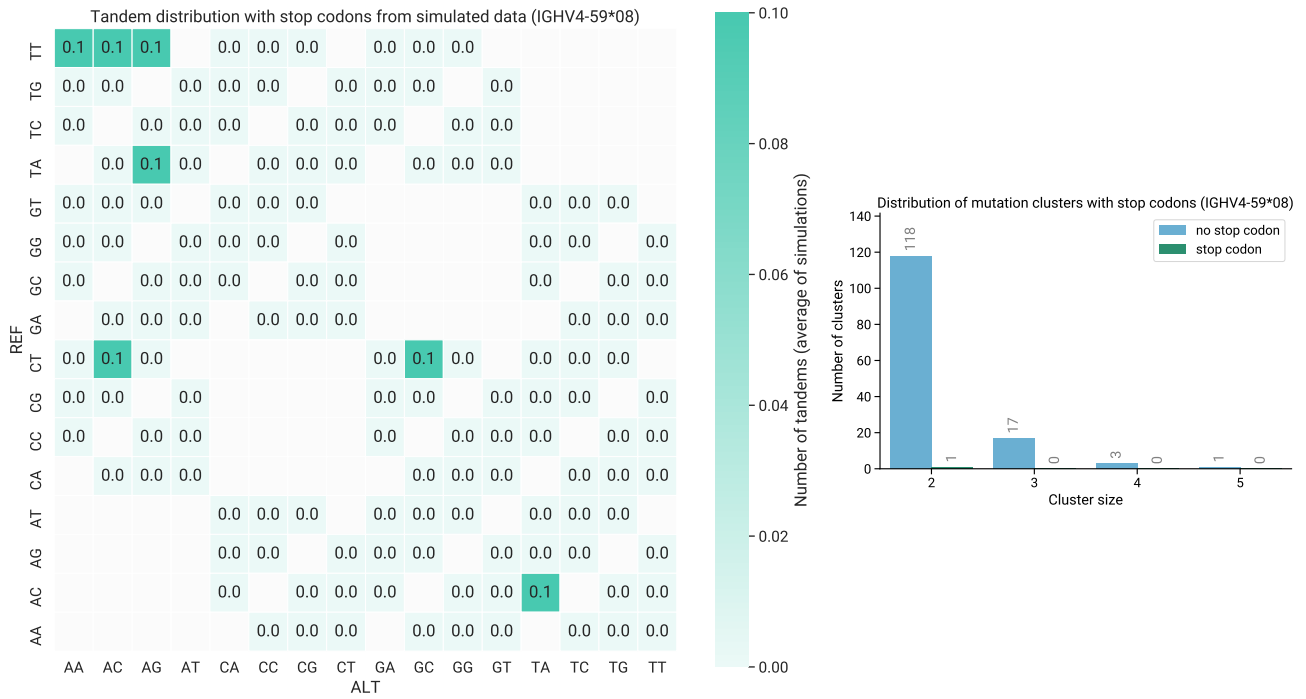
Tandem distribution from real data (IGHV4-59\*08)



Tandem distribution from simulated data (IGHV4-59\*08)

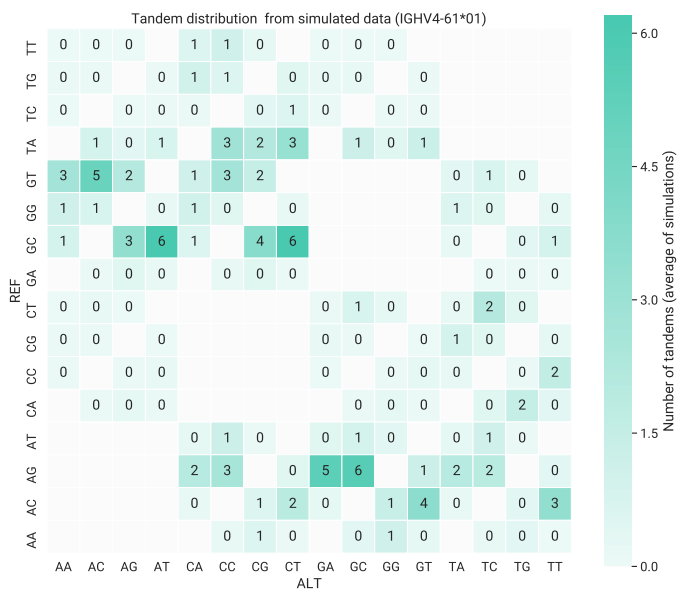
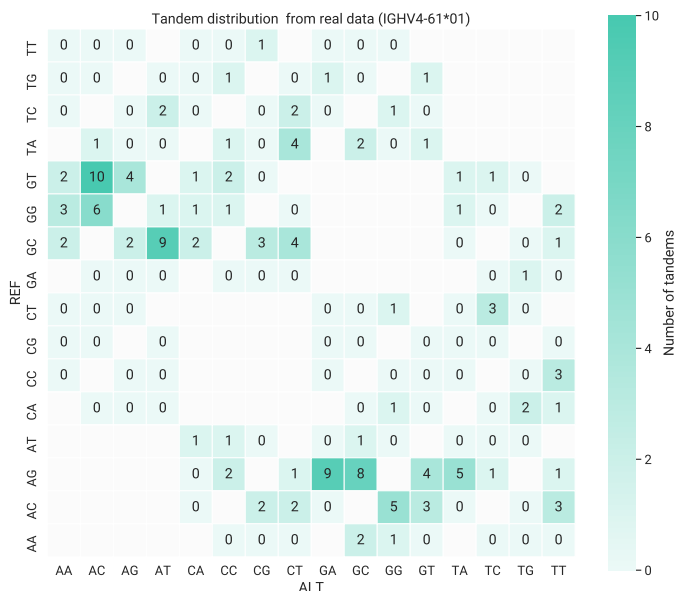
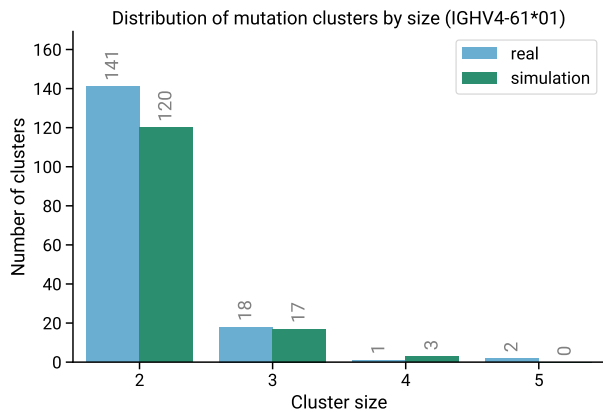
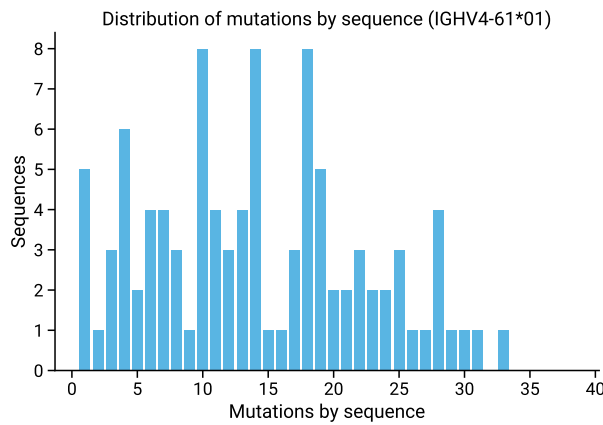
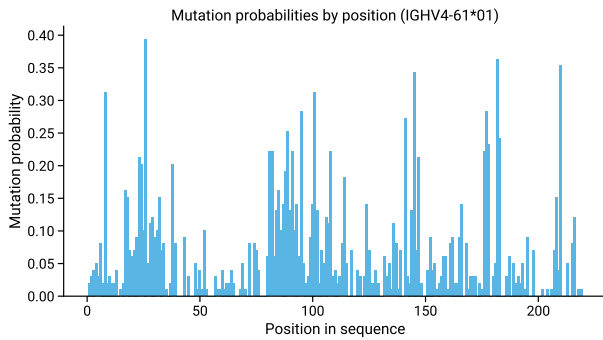
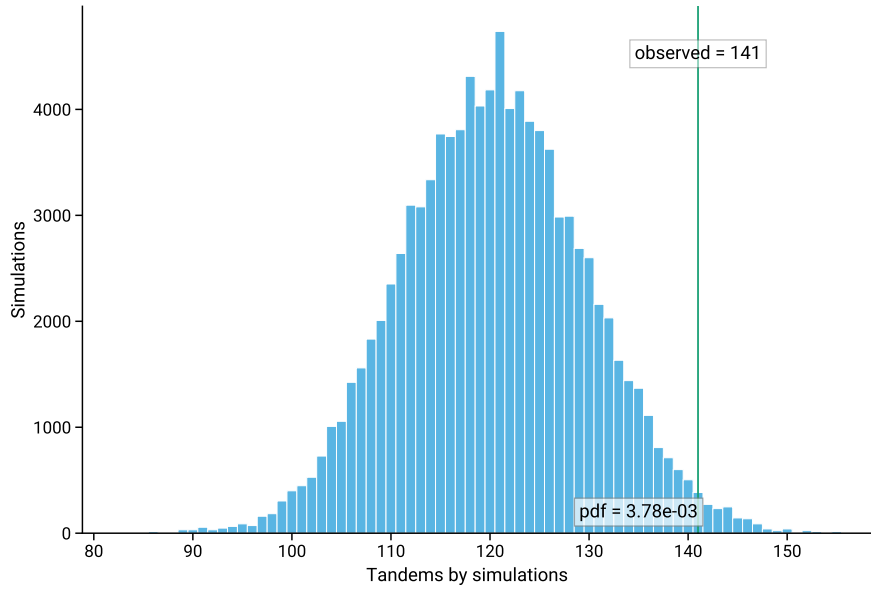


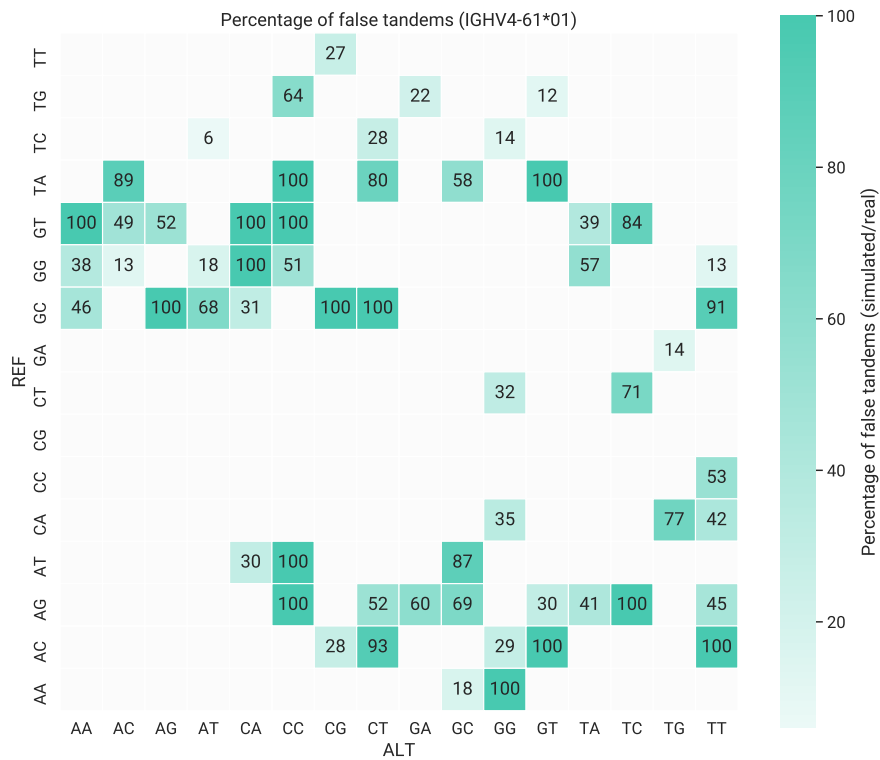
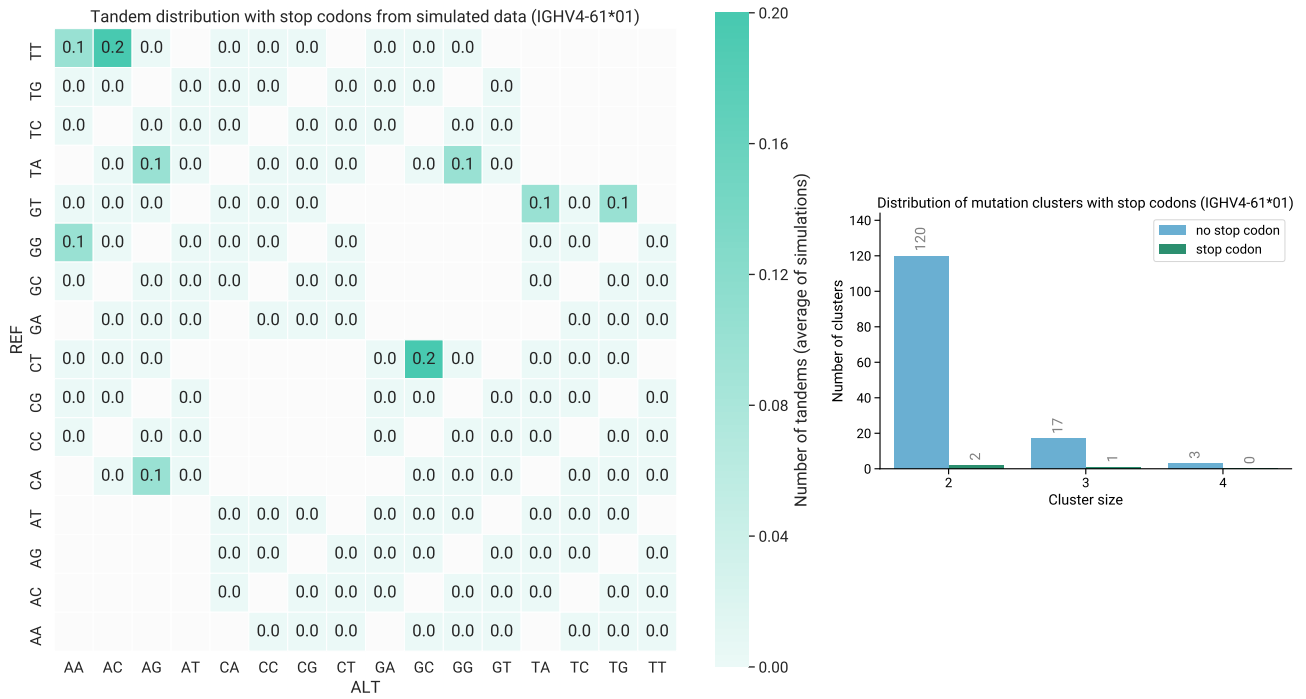




## 2.38 IGHV4-61\_01

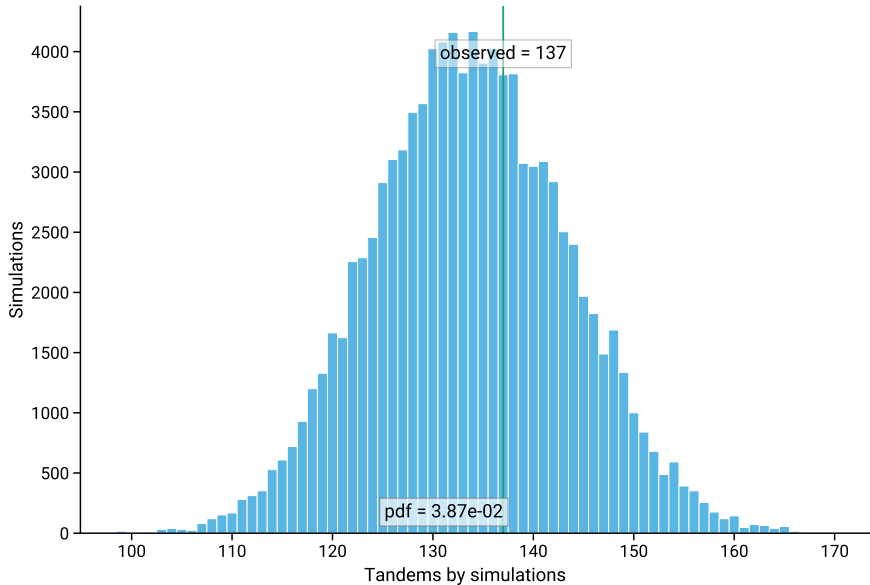
Distribution of tandems by simulation (IGHV4-61\*01)



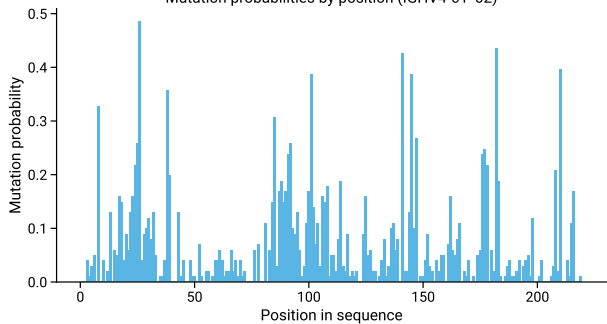


## 2.39 IGHV4-61\_02

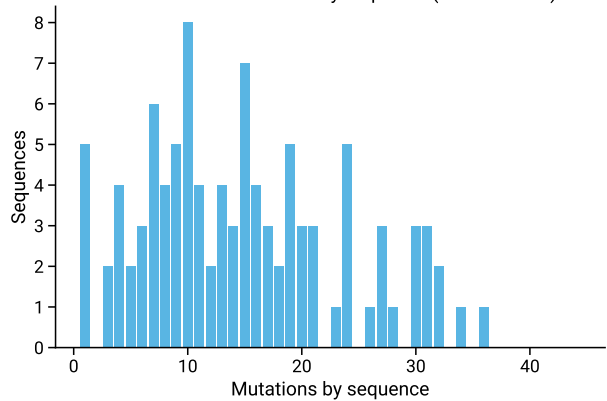
Distribution of tandems by simulation (IGHV4-61\*02)



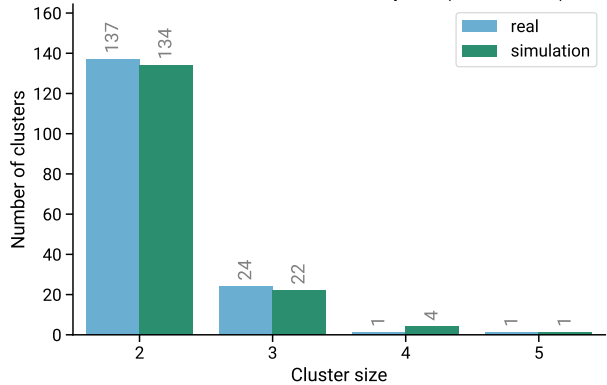
Mutation probabilities by position (IGHV4-61\*02)



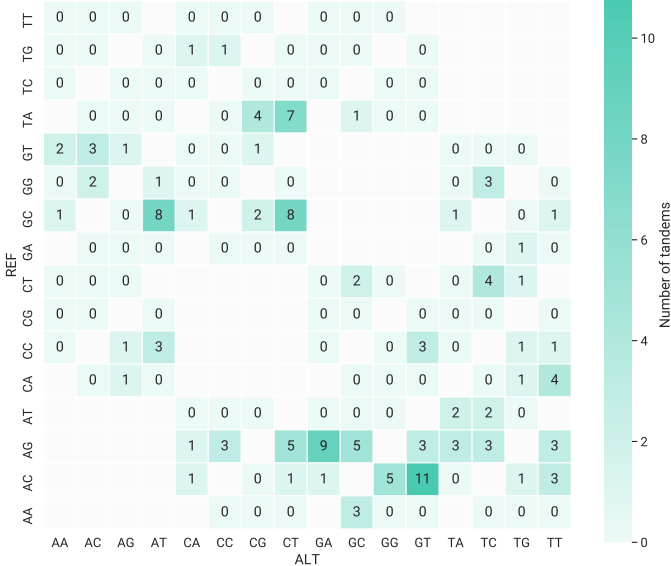
Distribution of mutations by sequence (IGHV4-61\*02)



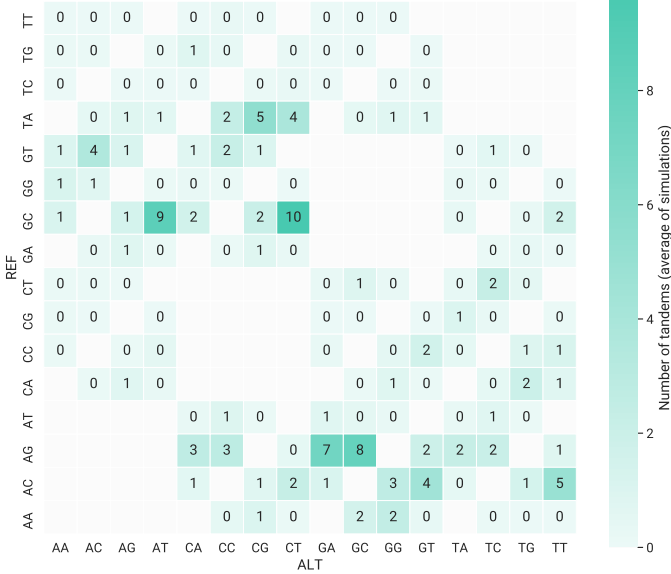
Distribution of mutation clusters by size (IGHV4-61\*02)

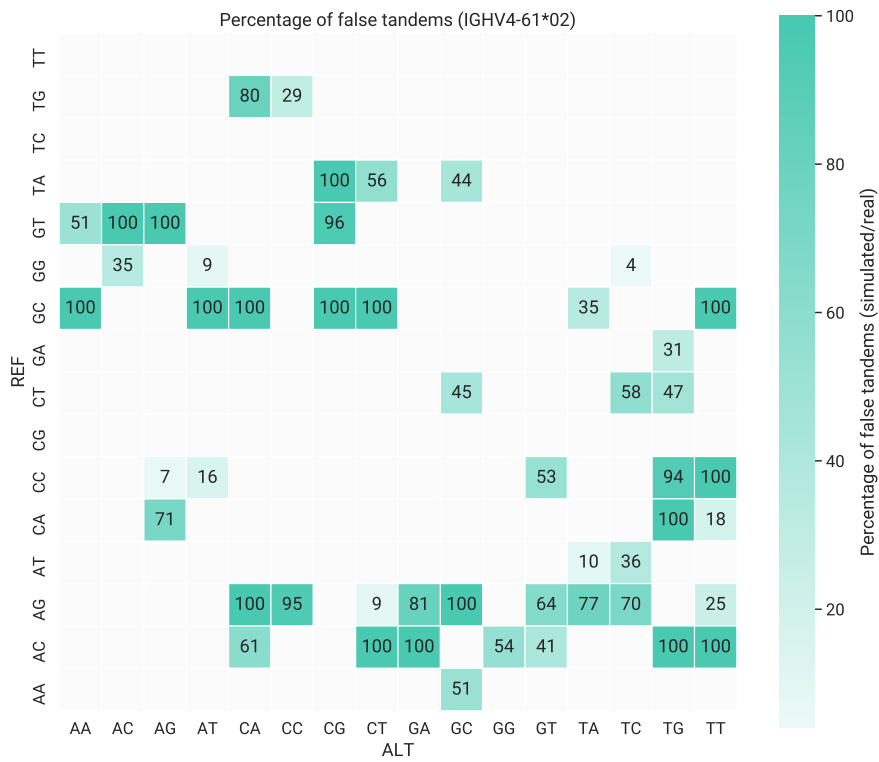
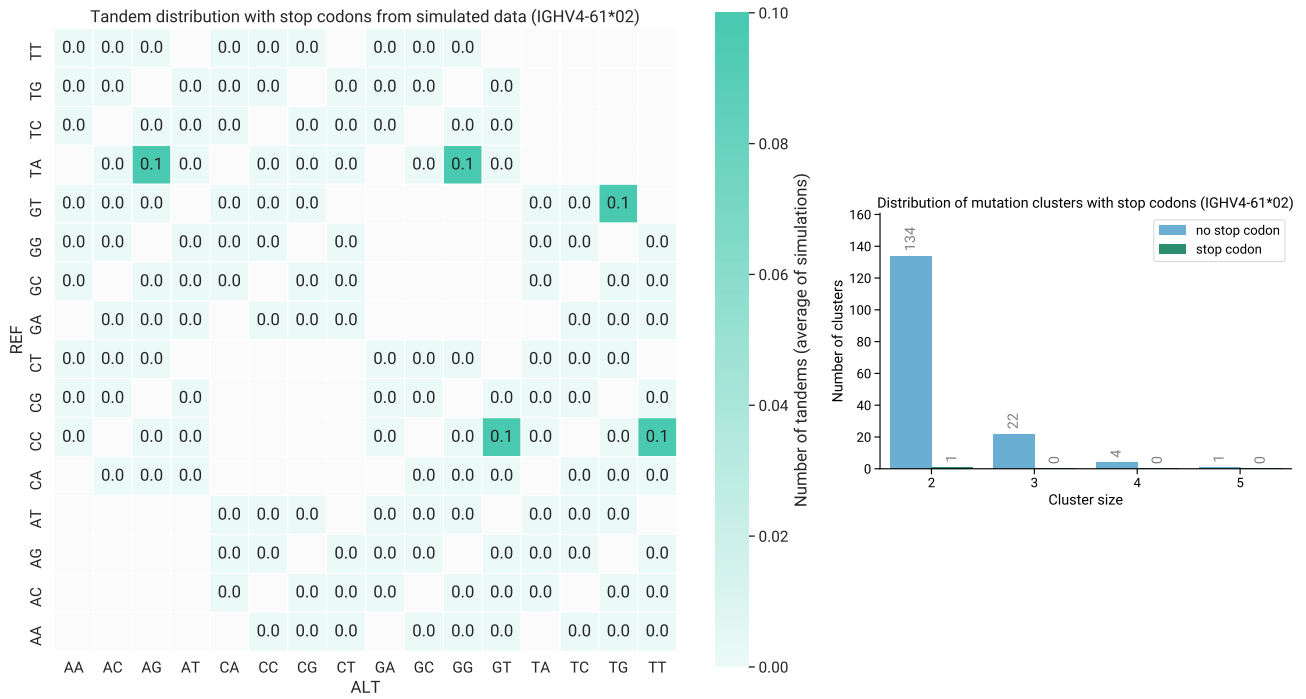


Tandem distribution from real data (IGHV4-61\*02)



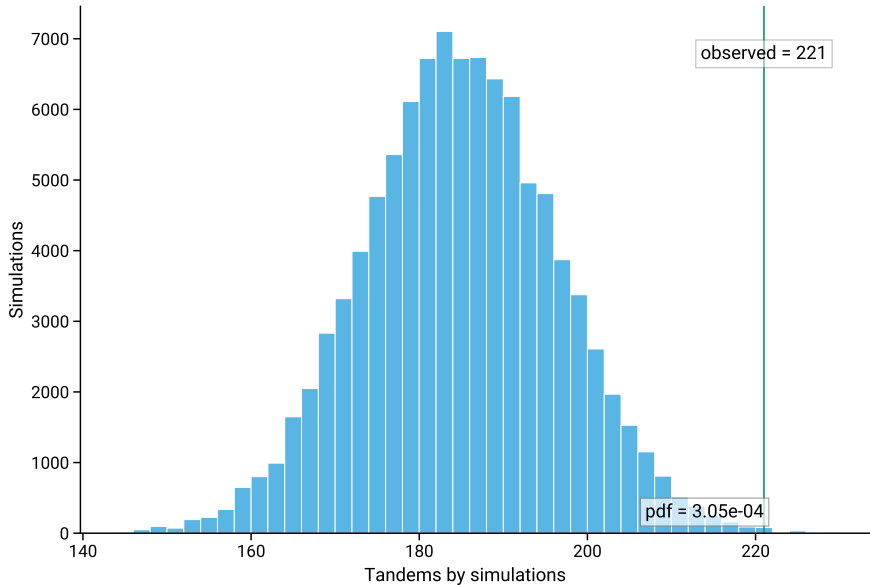
Tandem distribution from simulated data (IGHV4-61\*02)



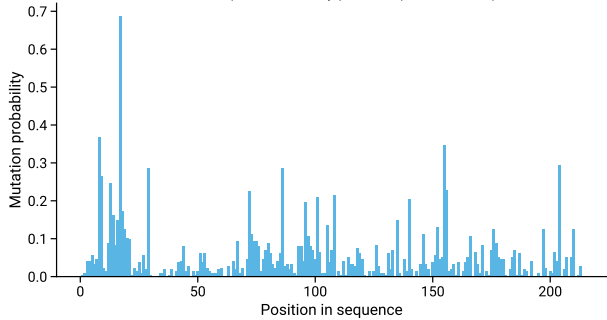


## 2.40 IGHV5-51\_01

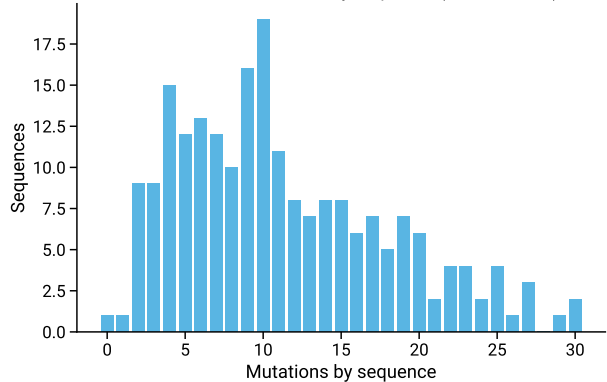
Distribution of tandems by simulation (IGHV5-51\*01)



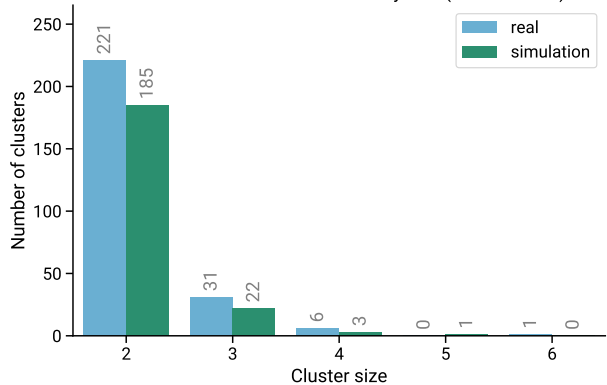
Mutation probabilities by position (IGHV5-51\*01)



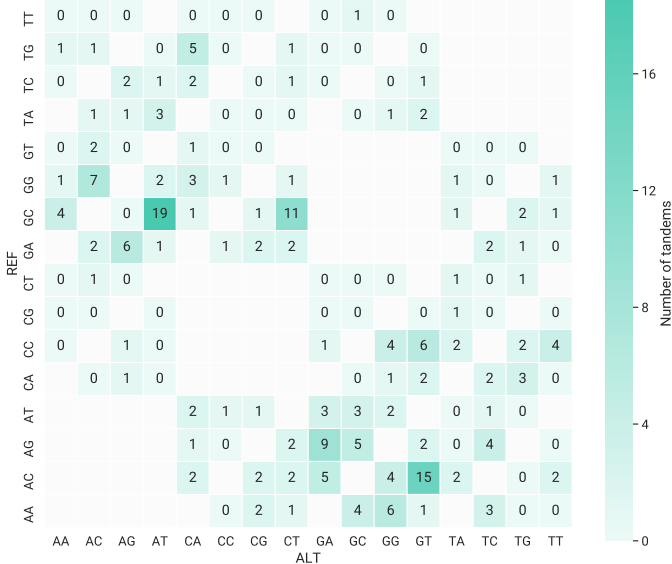
Distribution of mutations by sequence (IGHV5-51\*01)



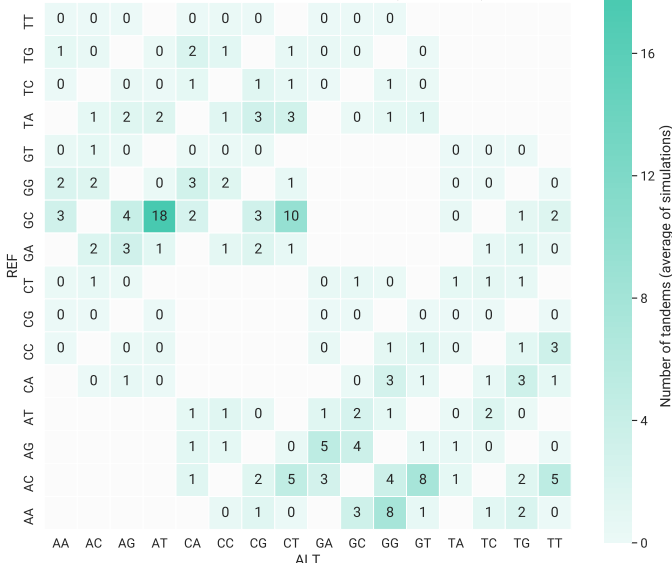
Distribution of mutation clusters by size (IGHV5-51\*01)

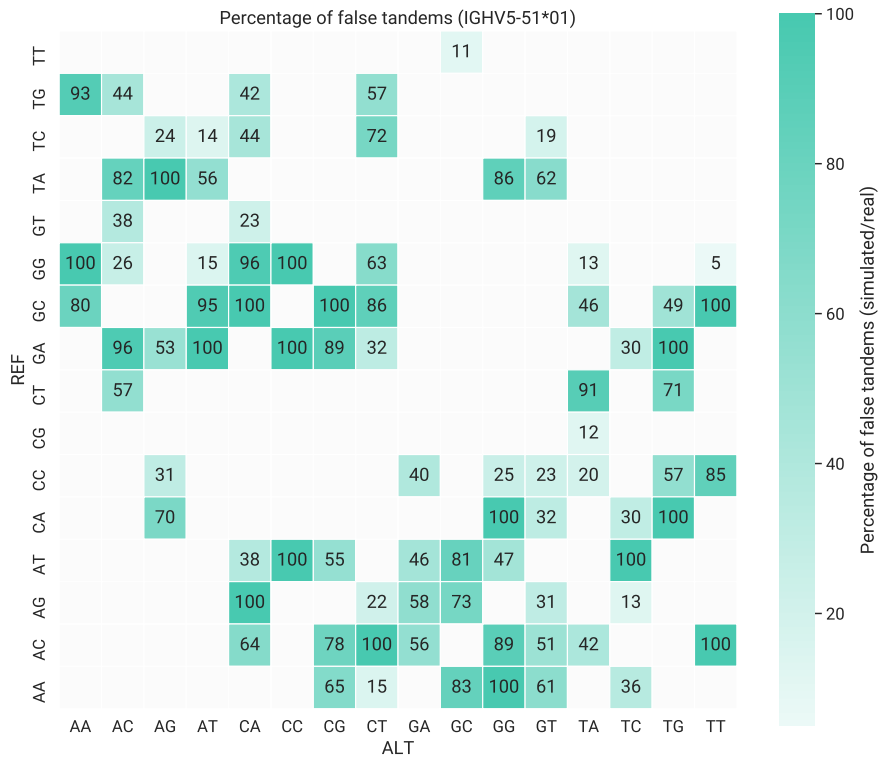
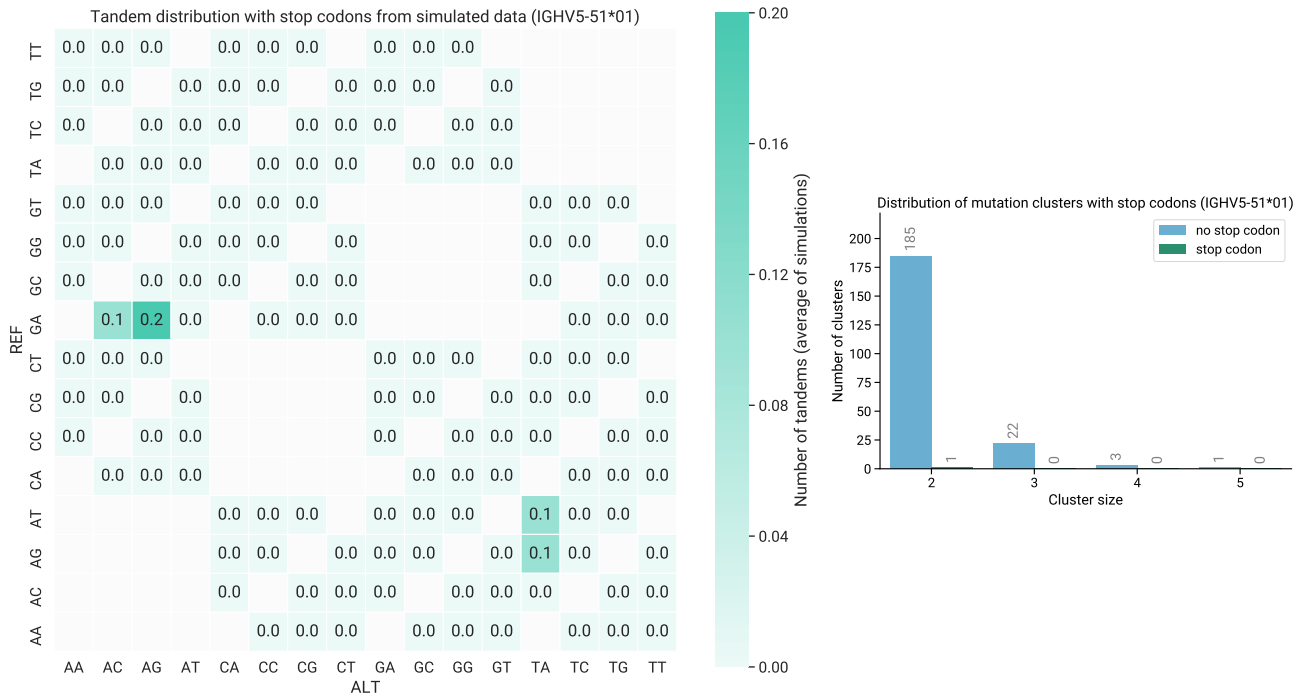


Tandem distribution from real data (IGHV5-51\*01)



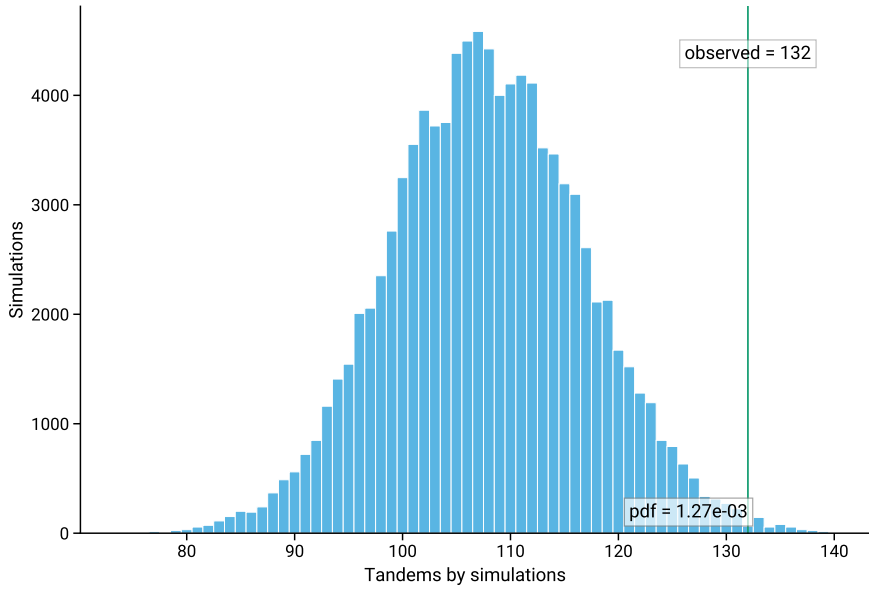
Tandem distribution from simulated data (IGHV5-51\*01)



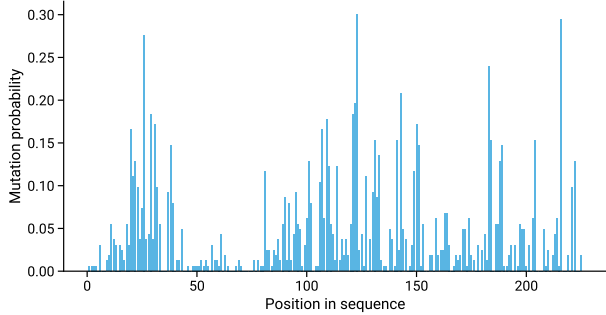


## 2.41 IGHV6-1\_01

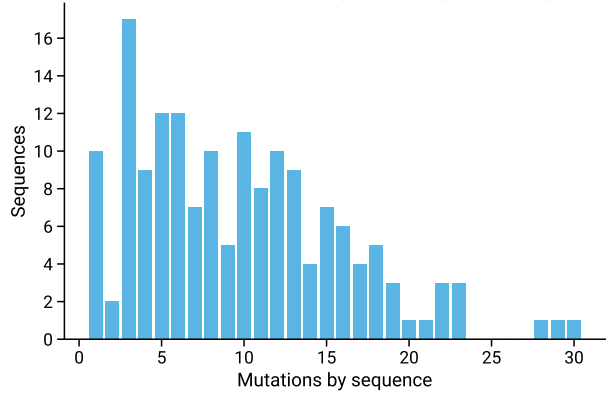
Distribution of tandems by simulation (IGHV6-1\*01)



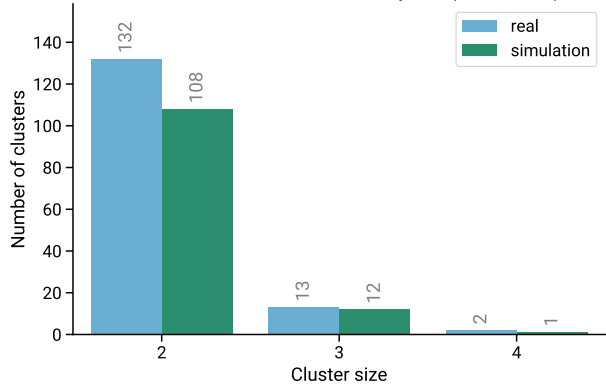
Mutation probabilities by position (IGHV6-1\*01)



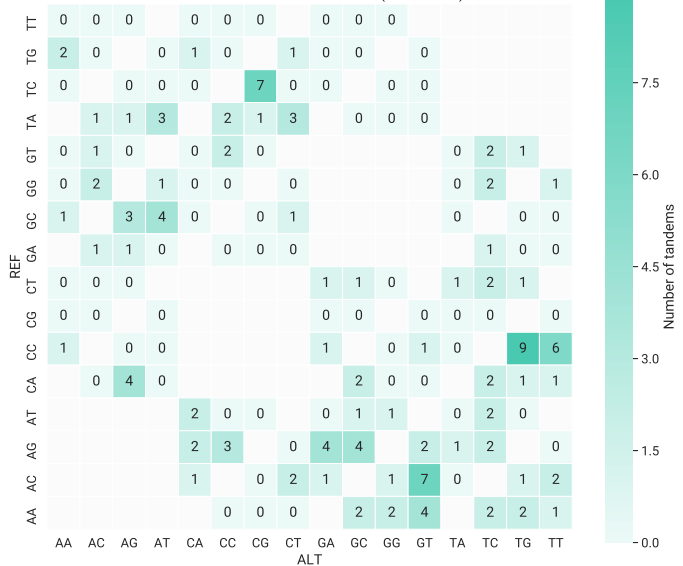
Distribution of mutations by sequence (IGHV6-1\*01)



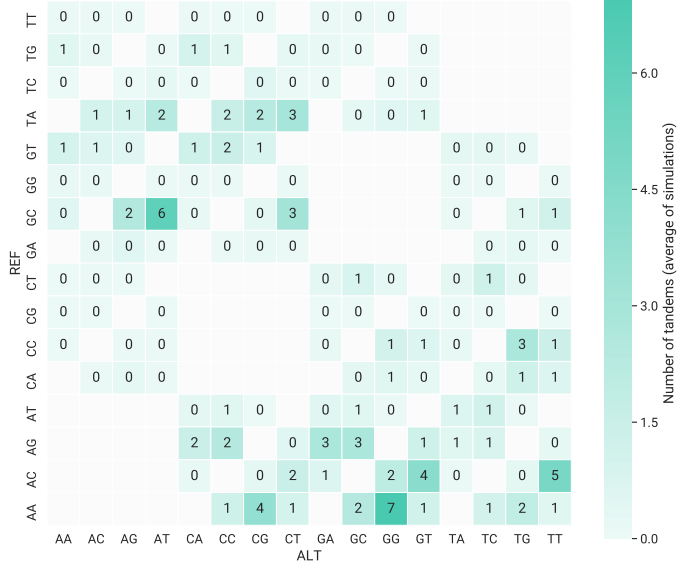
Distribution of mutation clusters by size (IGHV6-1\*01)



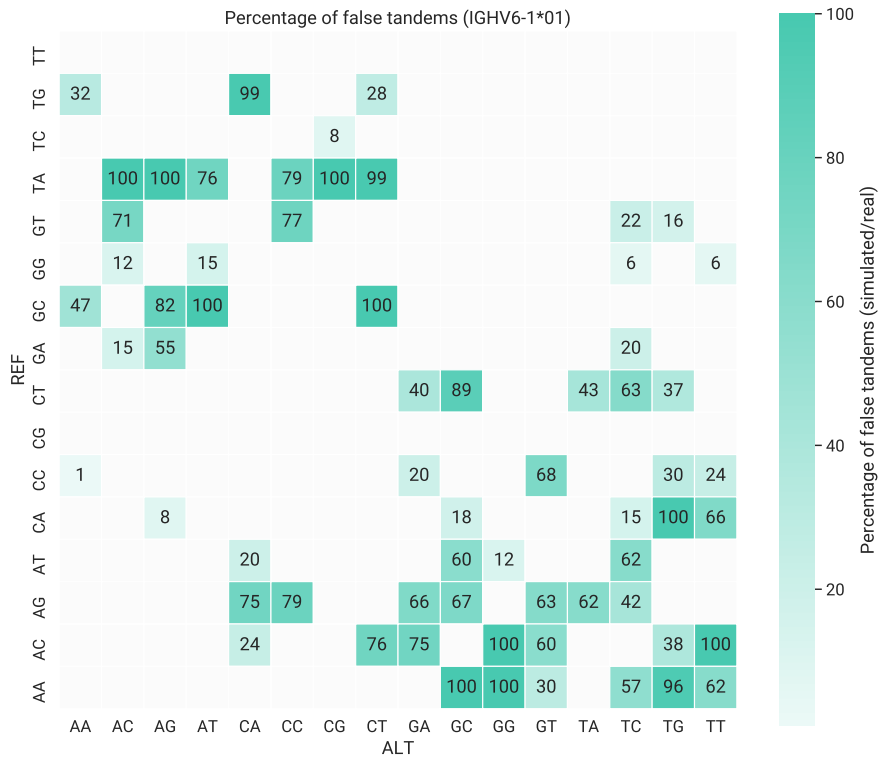
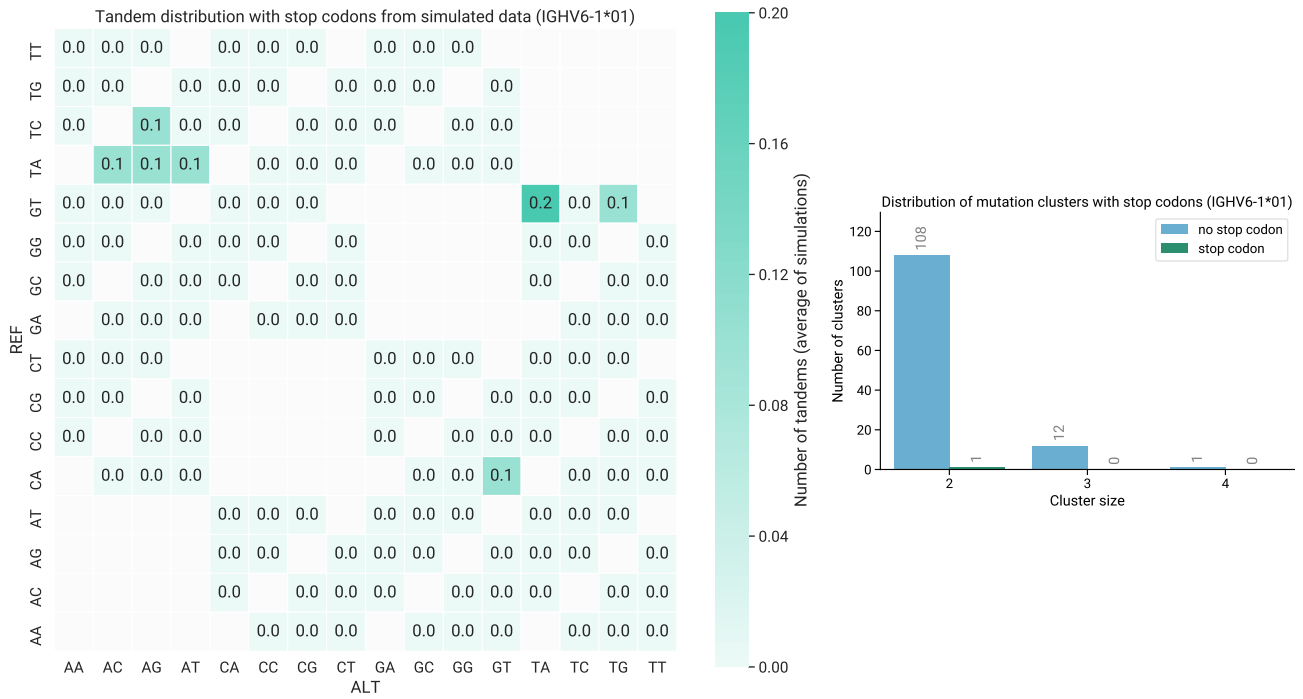
Tandem distribution from real data (IGHV6-1\*01)



Tandem distribution from simulated data (IGHV6-1\*01)

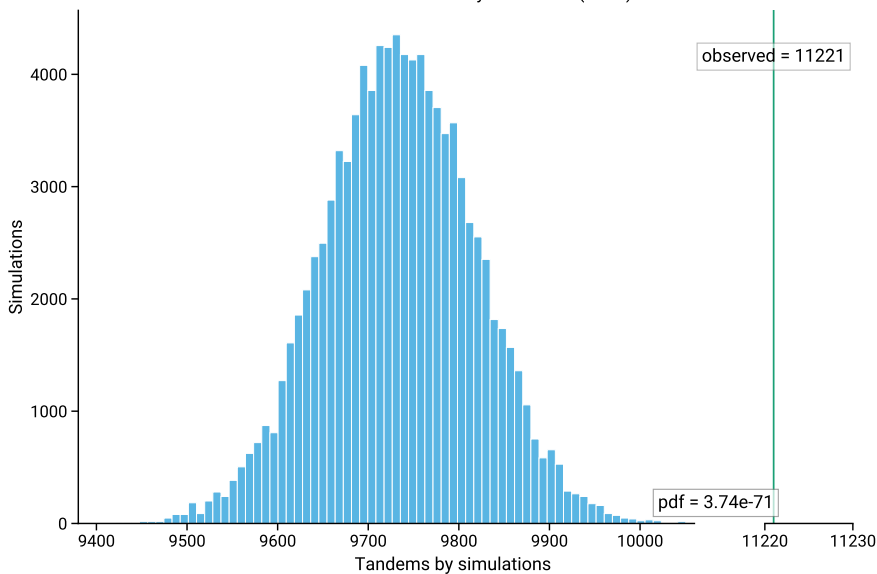




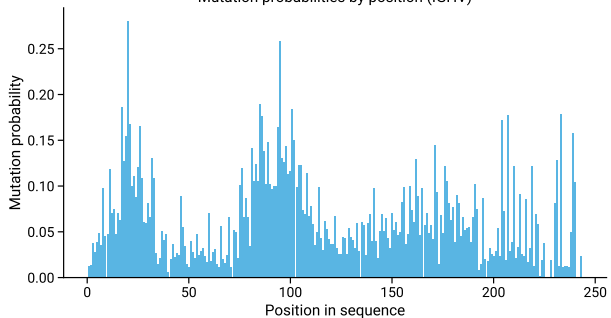


## 2.42 IGHV

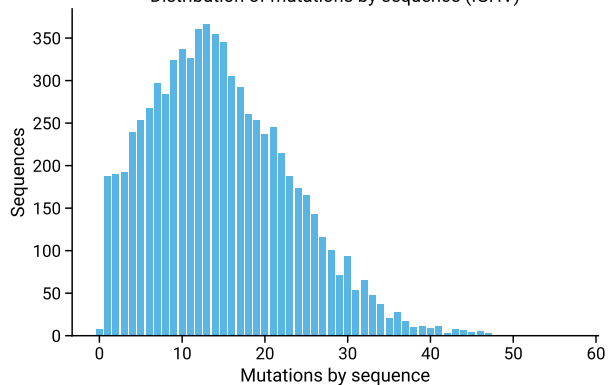
Distribution of tandems by simulation (IGHV)



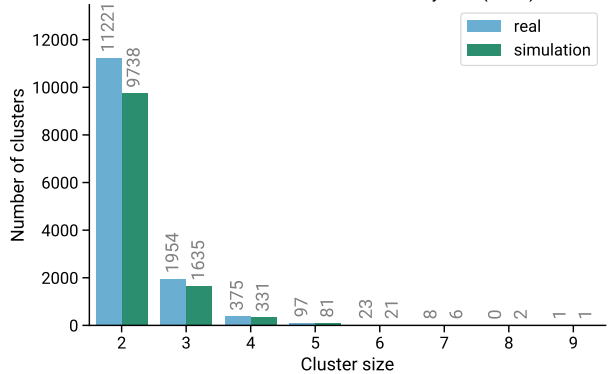
Mutation probabilities by position (IGHV)



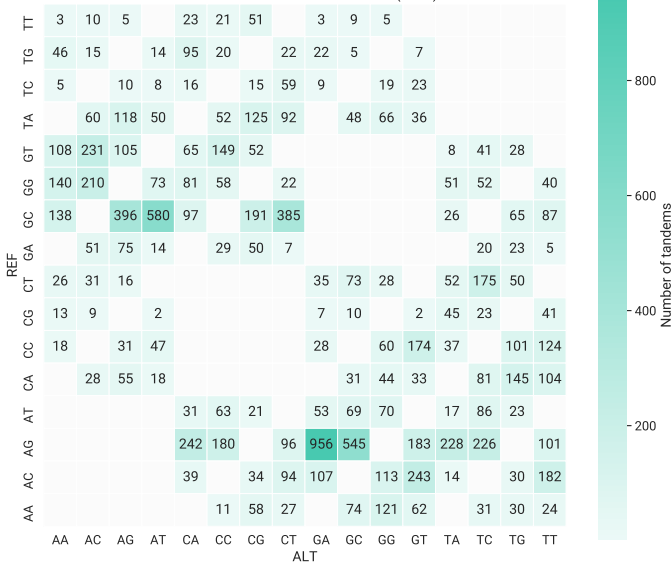
Distribution of mutations by sequence (IGHV)



Distribution of mutation clusters by size (IGHV)

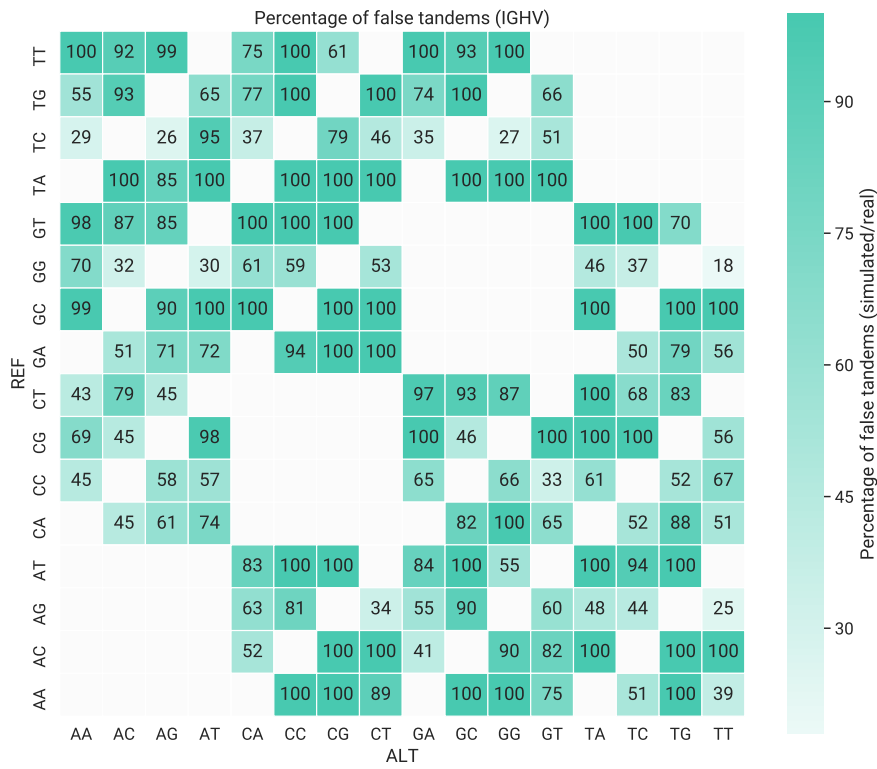
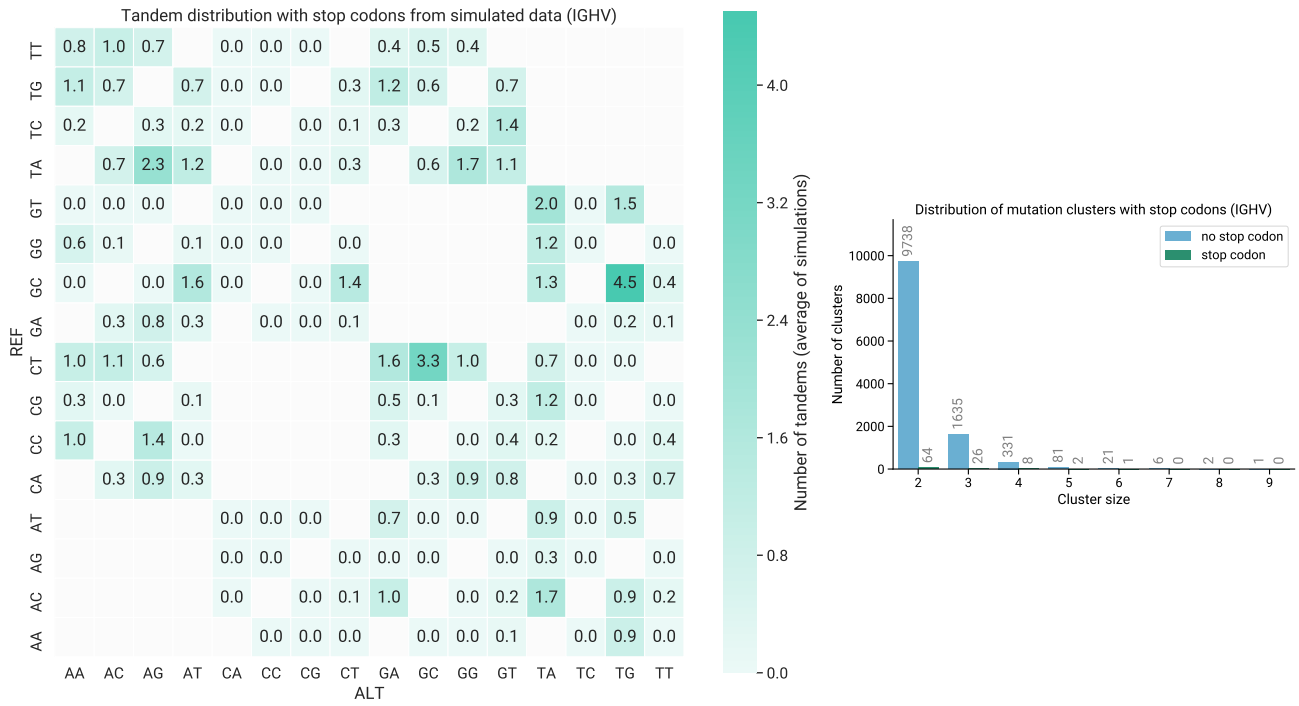


Tandem distribution from real data (IGHV)



Tandem distribution from simulated data (IGHV)

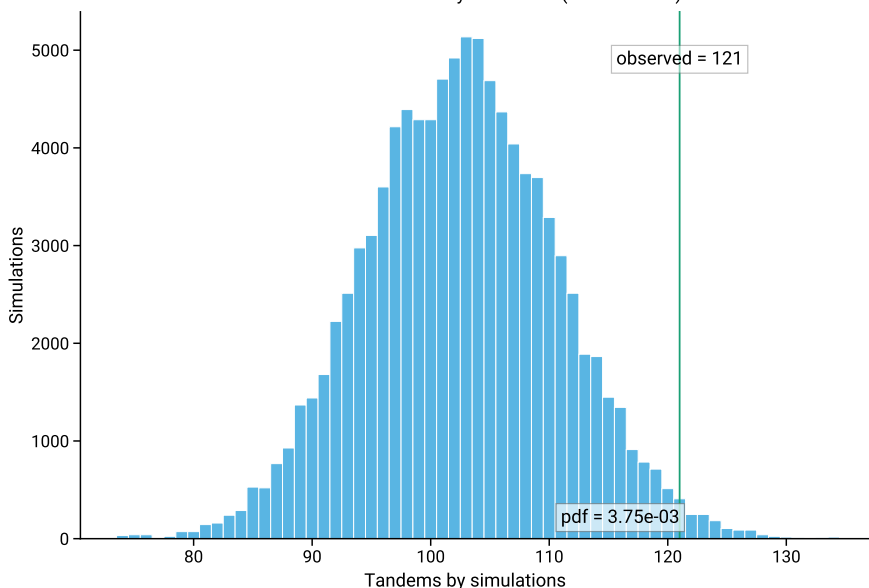




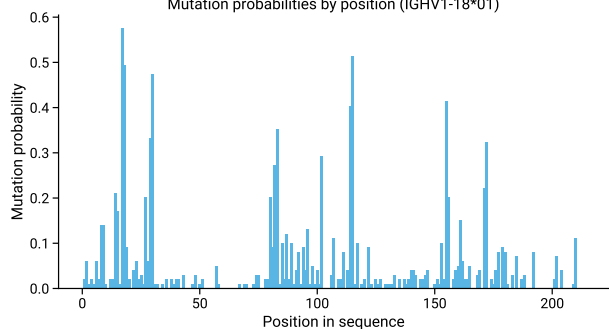
# MSH2/6 DEFICIENT

## 3.1 IGHV1-18\*01

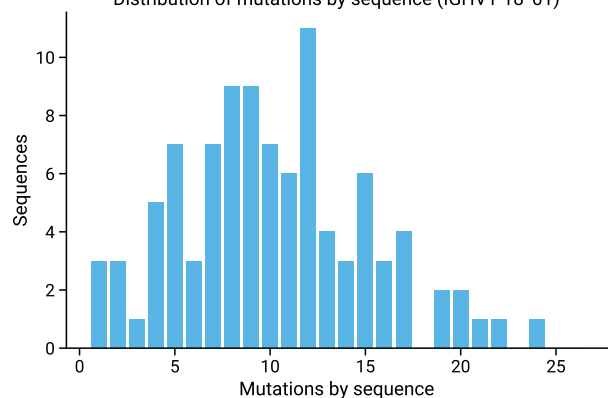
Distribution of tandems by simulation (IGHV1-18\*01)



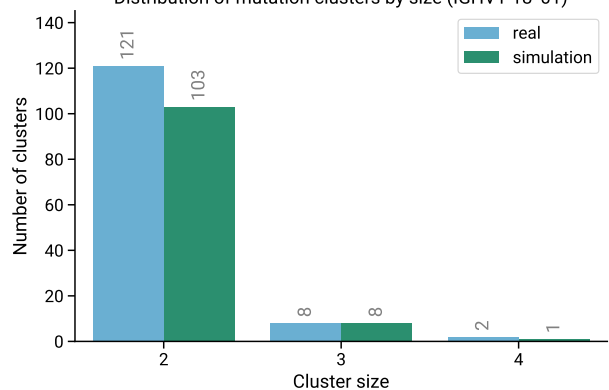
Mutation probabilities by position (IGHV1-18\*01)



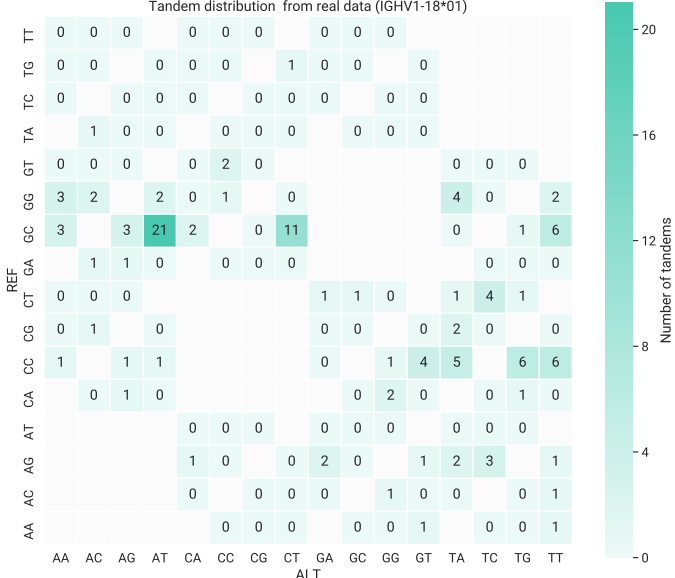
Distribution of mutations by sequence (IGHV1-18\*01)



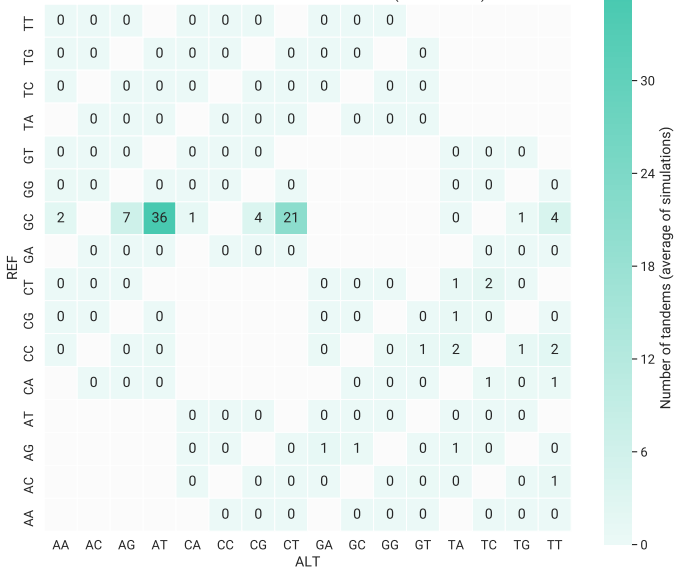
Distribution of mutation clusters by size (IGHV1-18\*01)

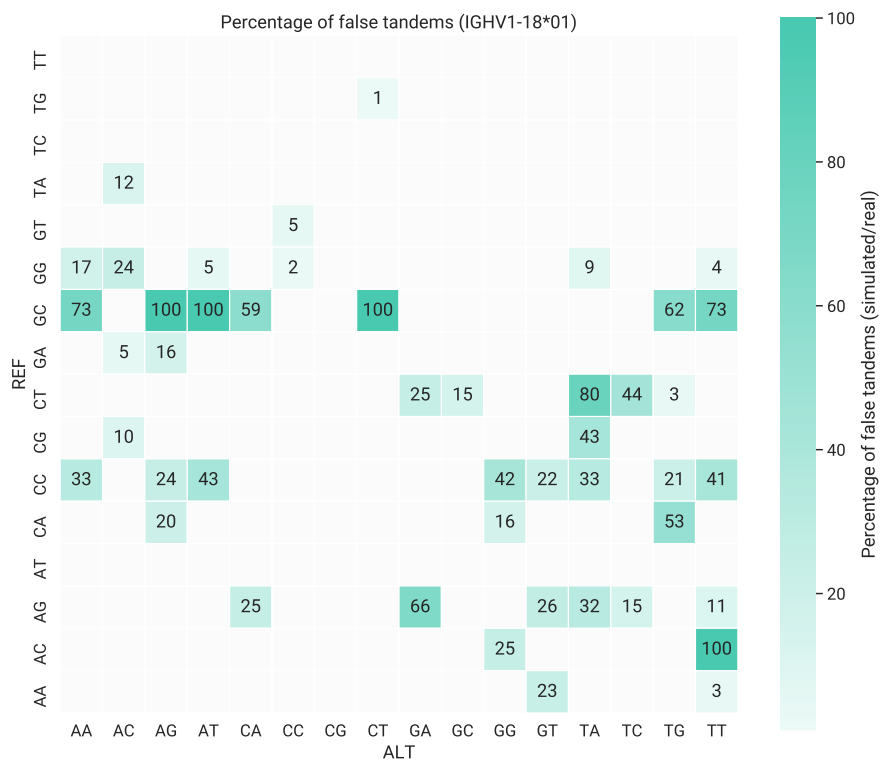
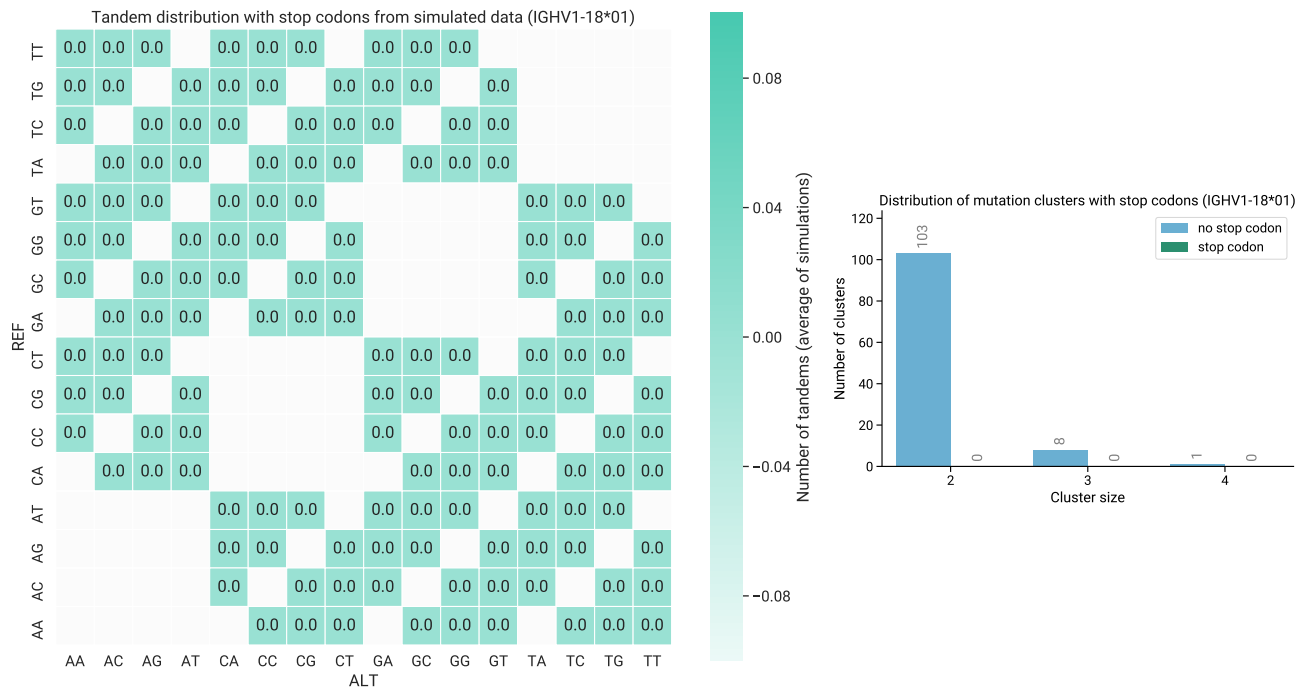


Tandem distribution from real data (IGHV1-18\*01)



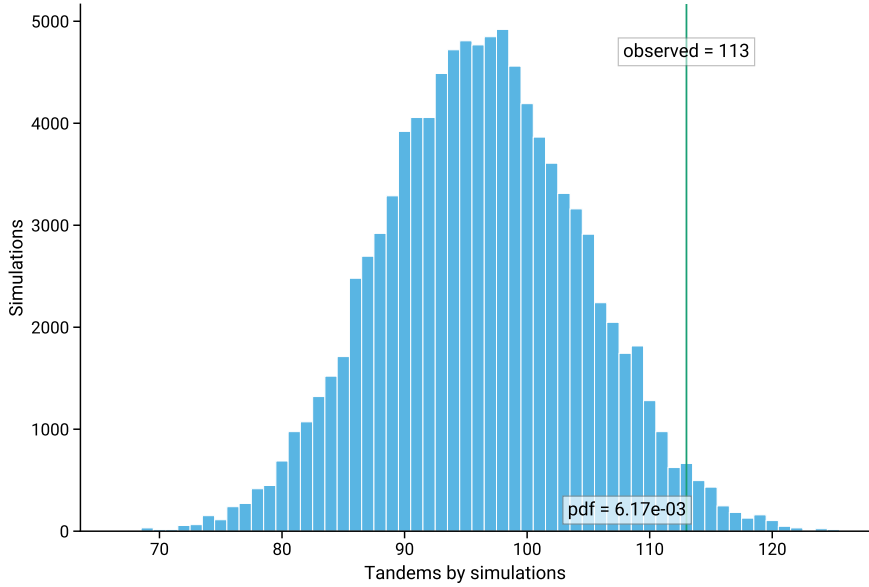
Tandem distribution from simulated data (IGHV1-18\*01)



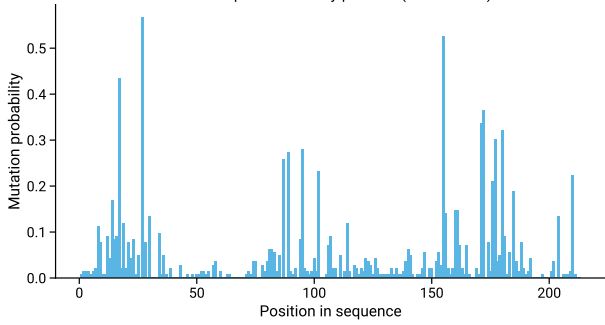


### 3.2 IGHV1-2\*02

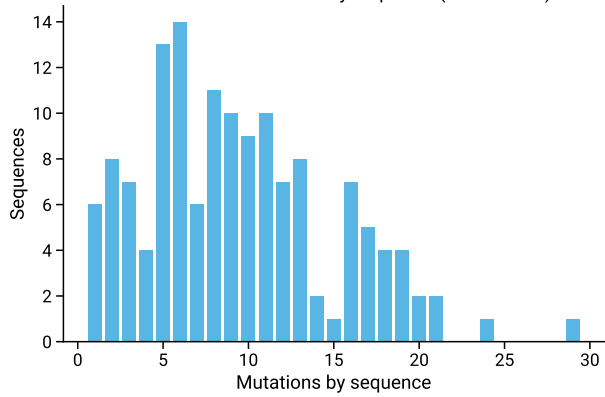
Distribution of tandems by simulation (IGHV1-2\*02)



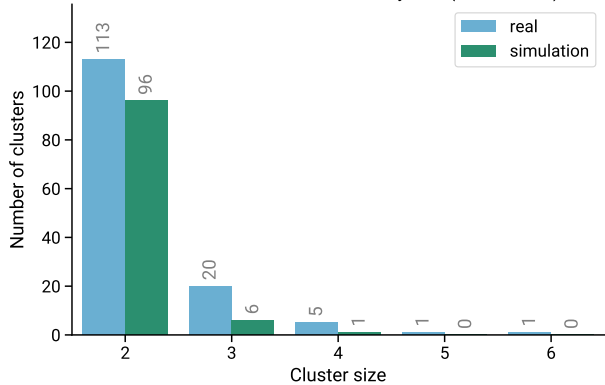
Mutation probabilities by position (IGHV1-2\*02)



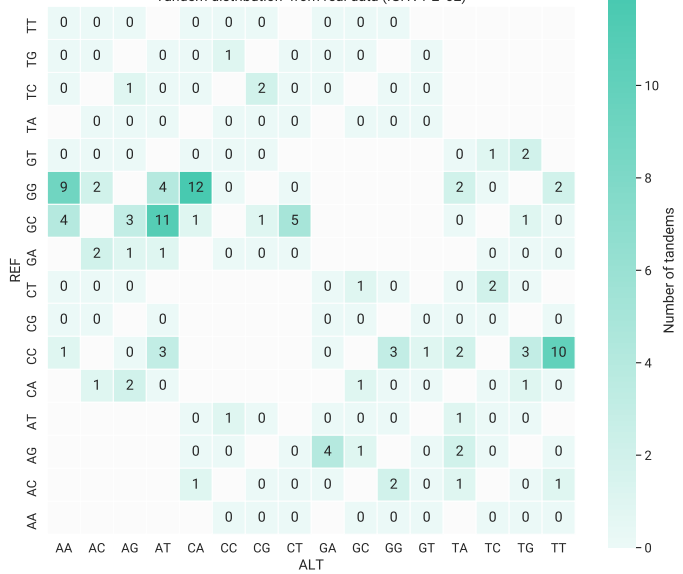
Distribution of mutations by sequence (IGHV1-2\*02)



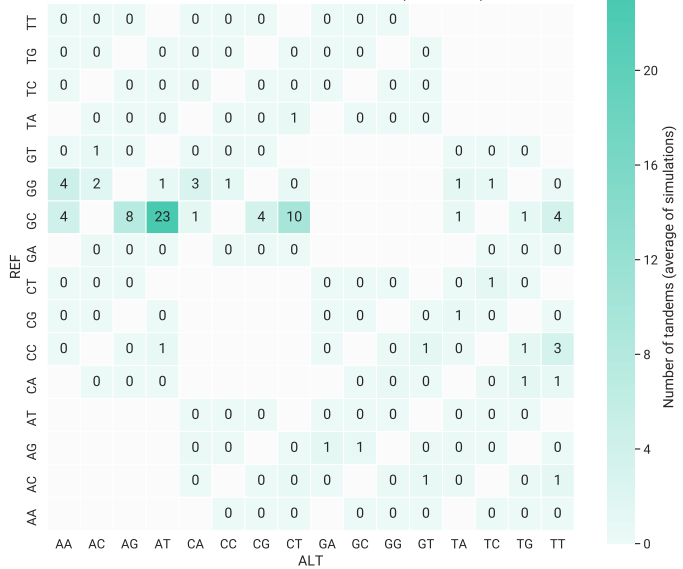
Distribution of mutation clusters by size (IGHV1-2\*02)

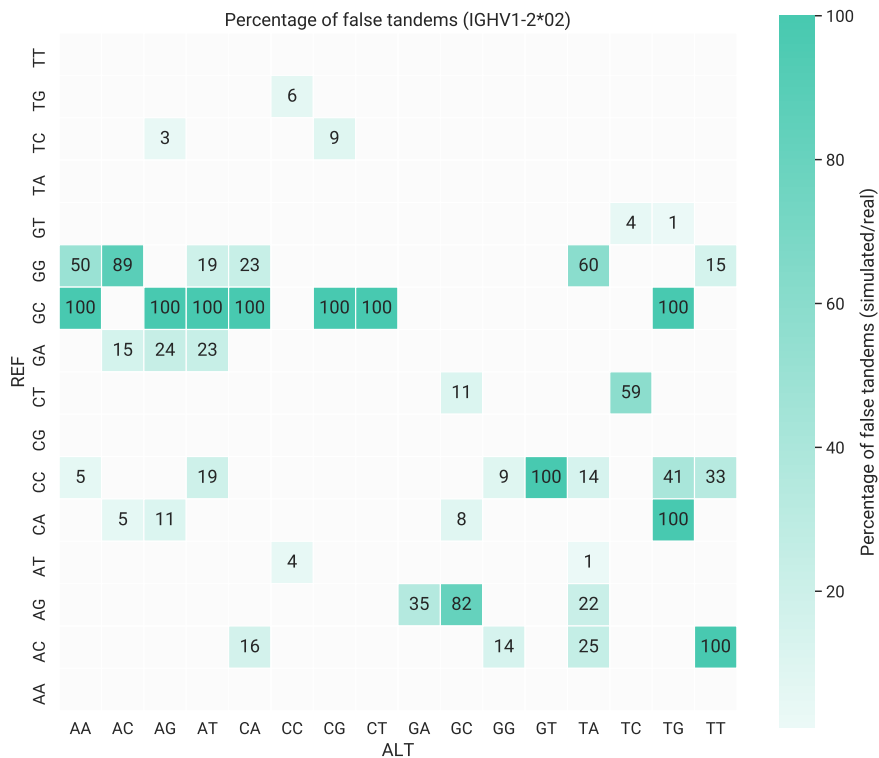
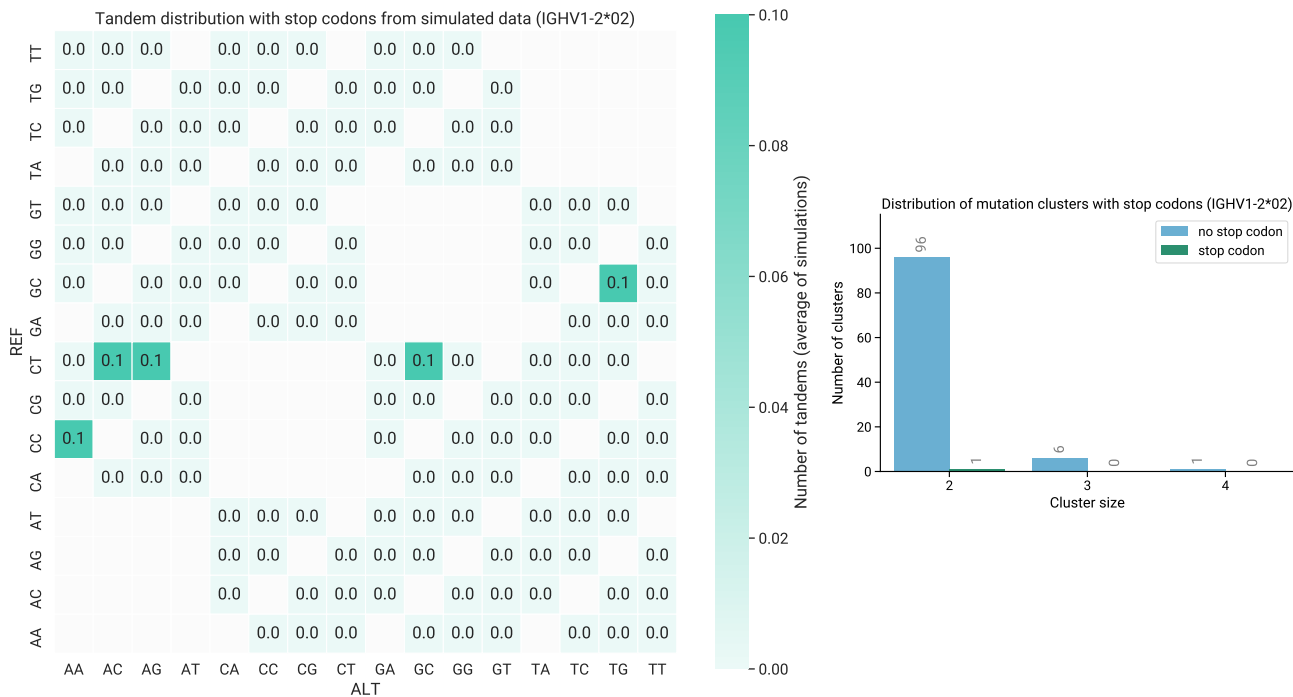


Tandem distribution from real data (IGHV1-2\*02)

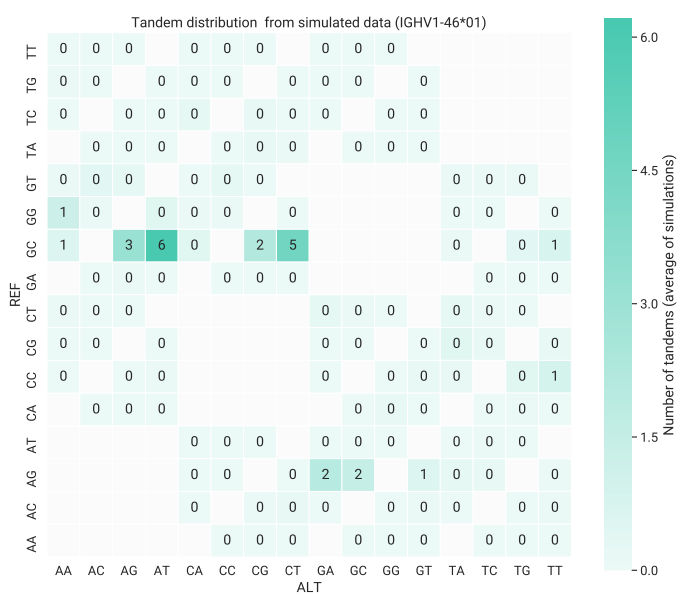
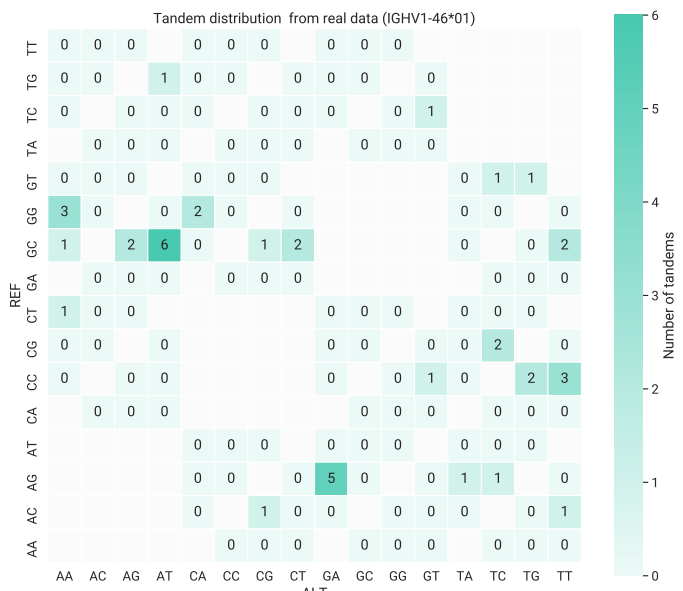
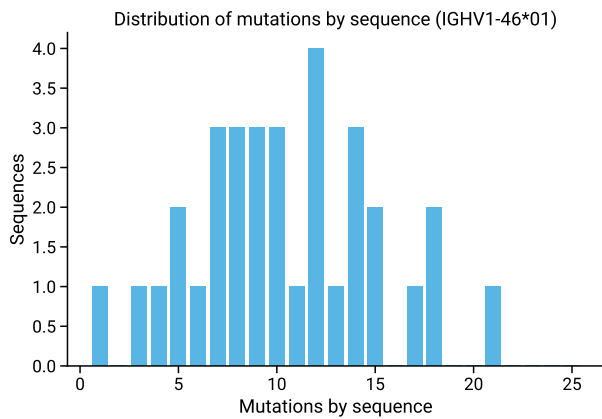
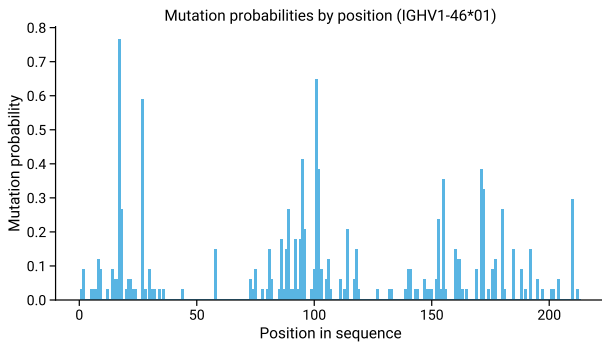
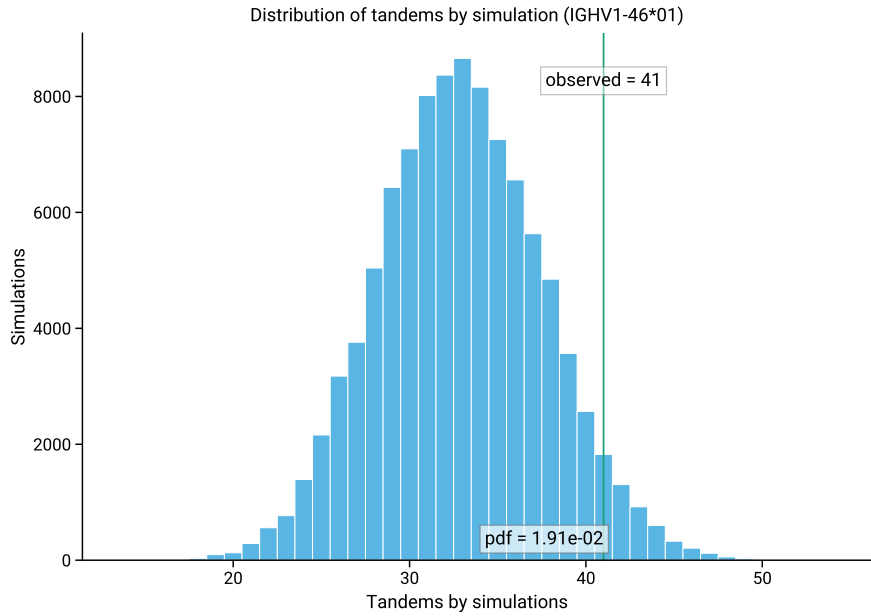


Tandem distribution from simulated data (IGHV1-2\*02)

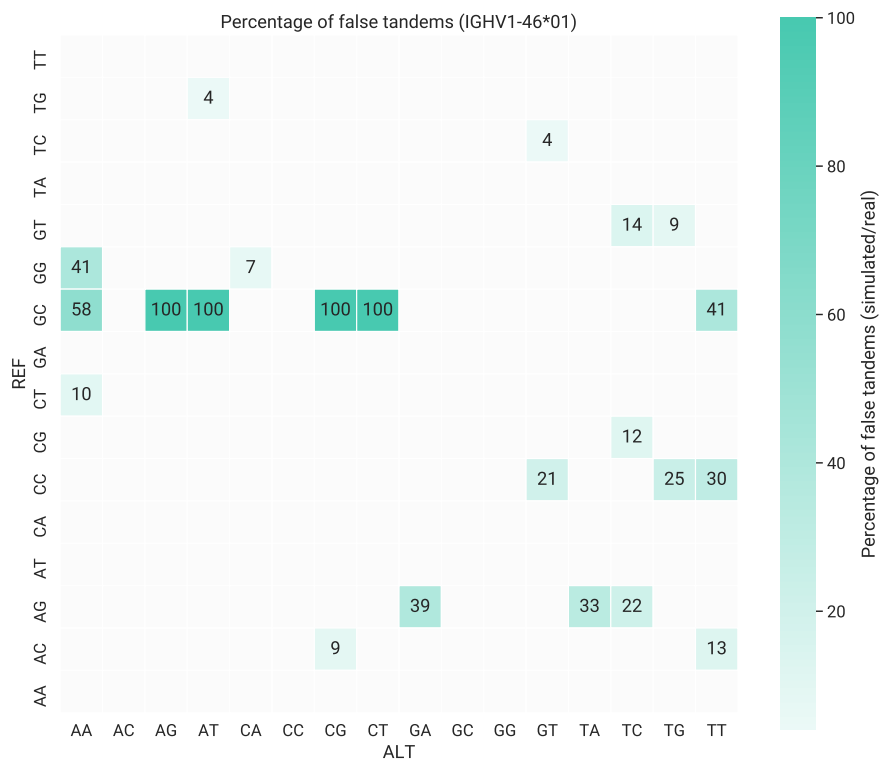
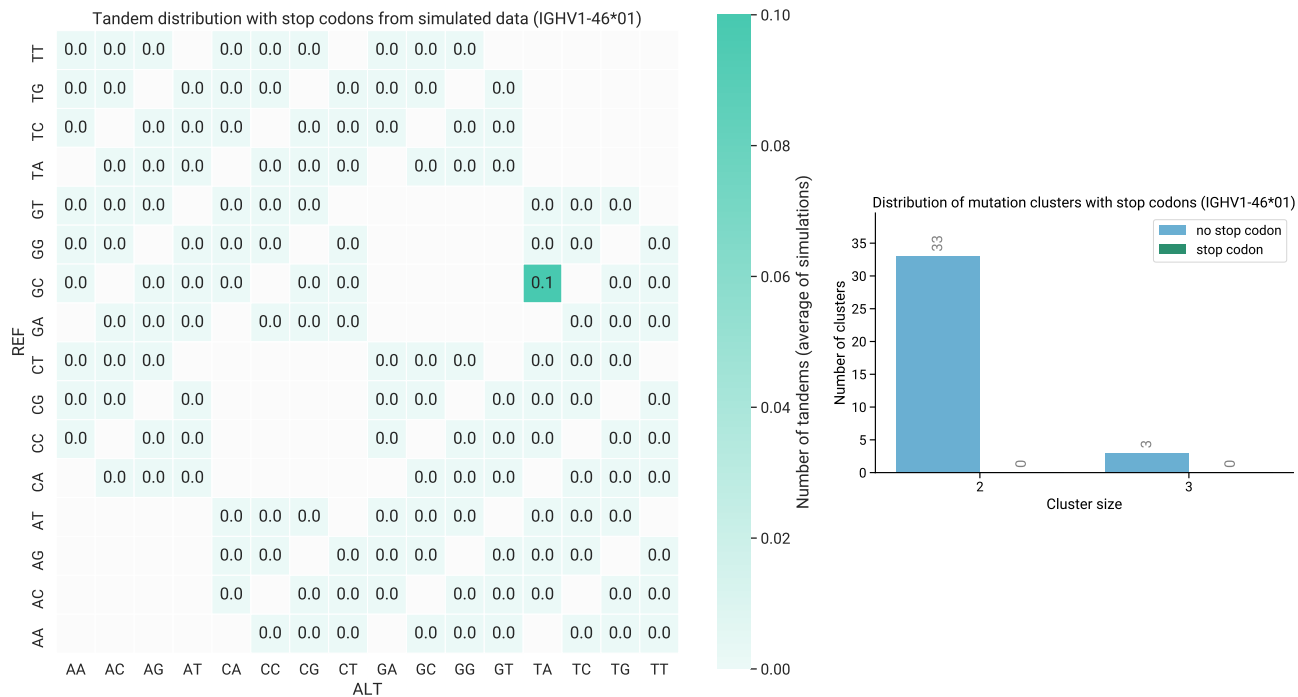




### 3.3 IGHV1-46\*01

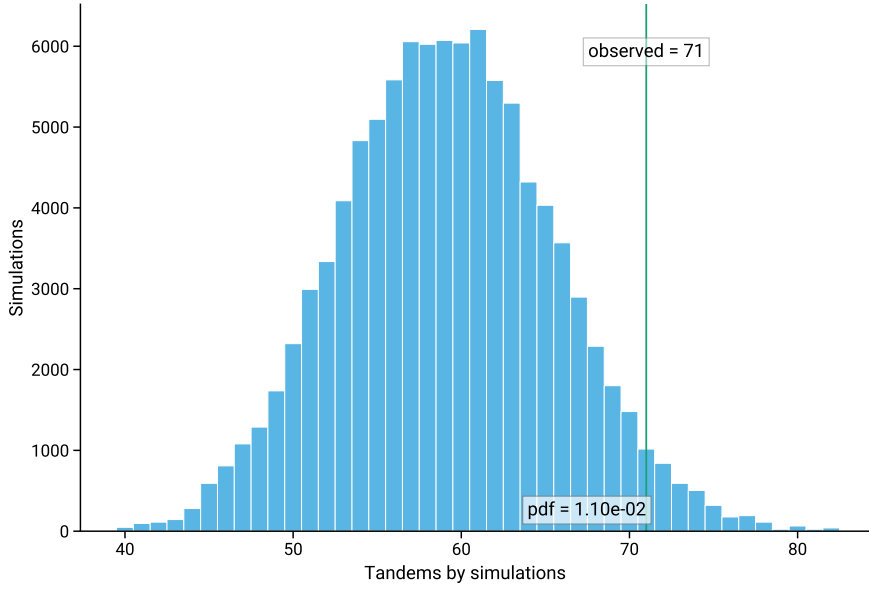




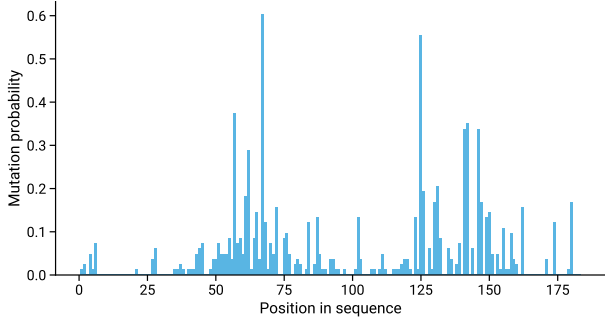


### 3.4 IGHV1-69\*01

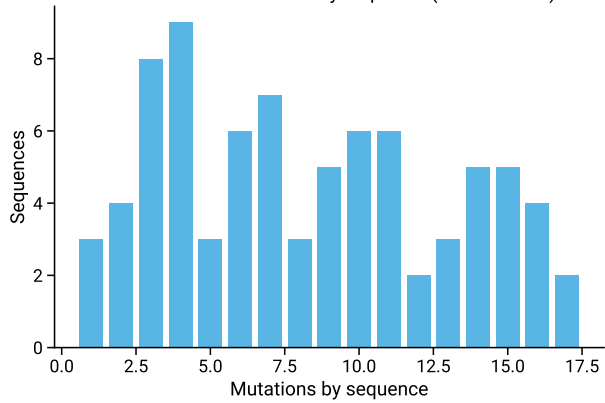
Distribution of tandems by simulation (IGHV1-69\*01)



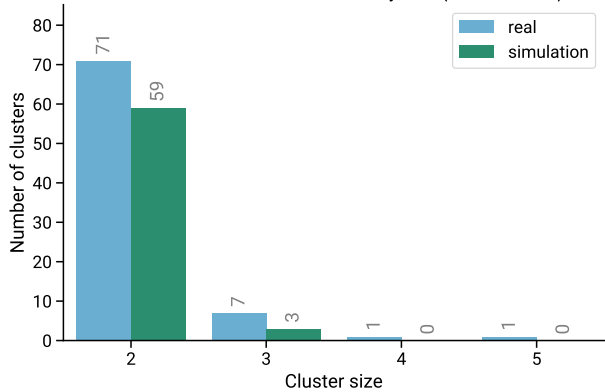
Mutation probabilities by position (IGHV1-69\*01)



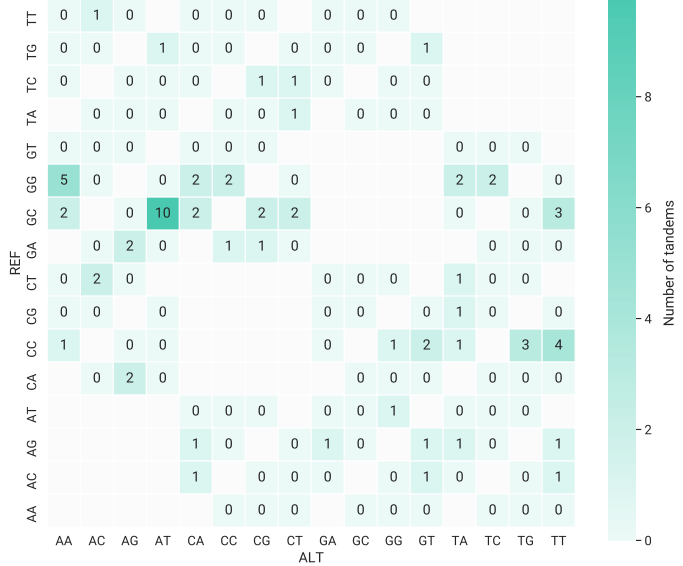
Distribution of mutations by sequence (IGHV1-69\*01)



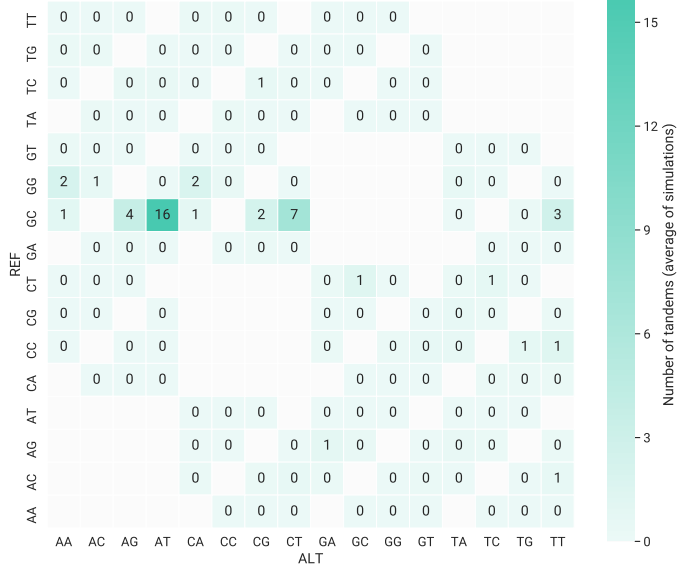
Distribution of mutation clusters by size (IGHV1-69\*01)

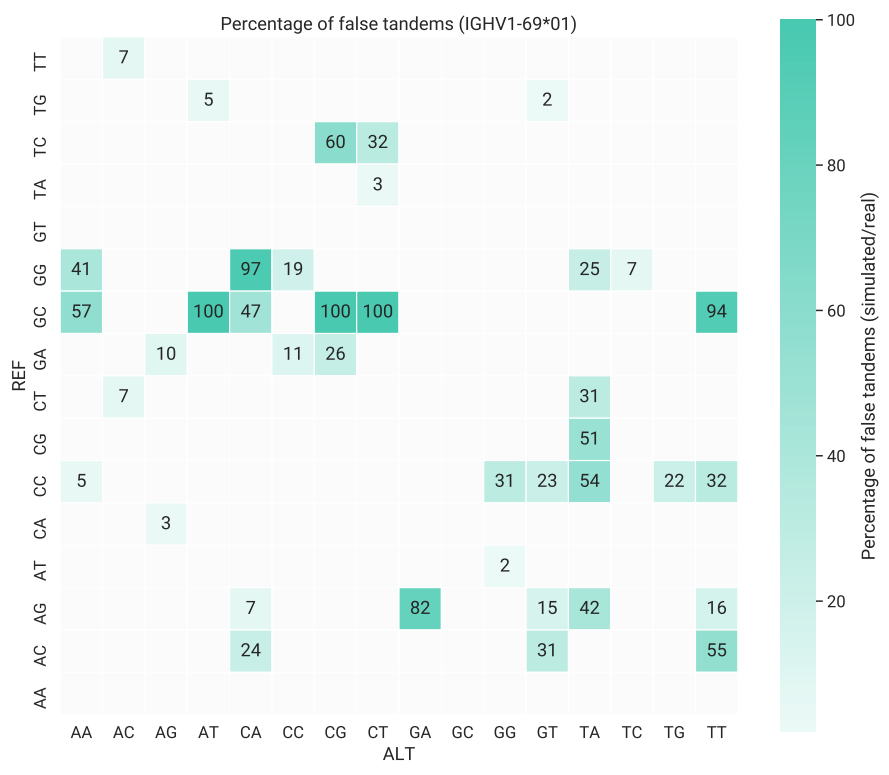
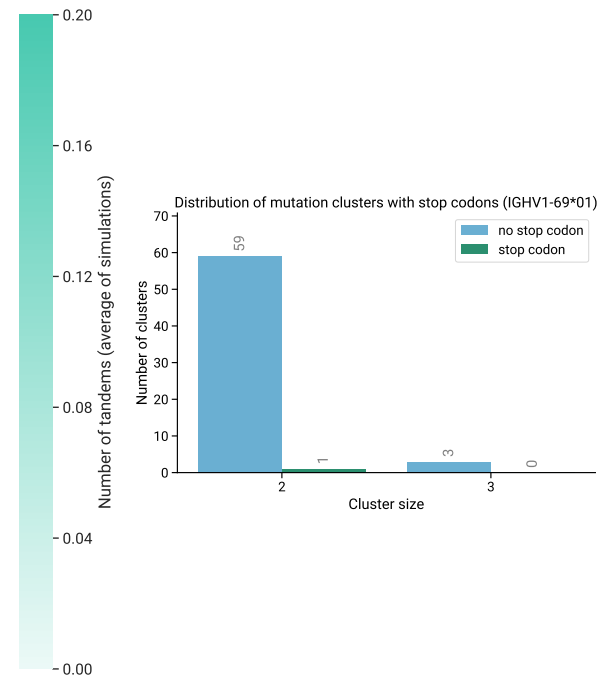
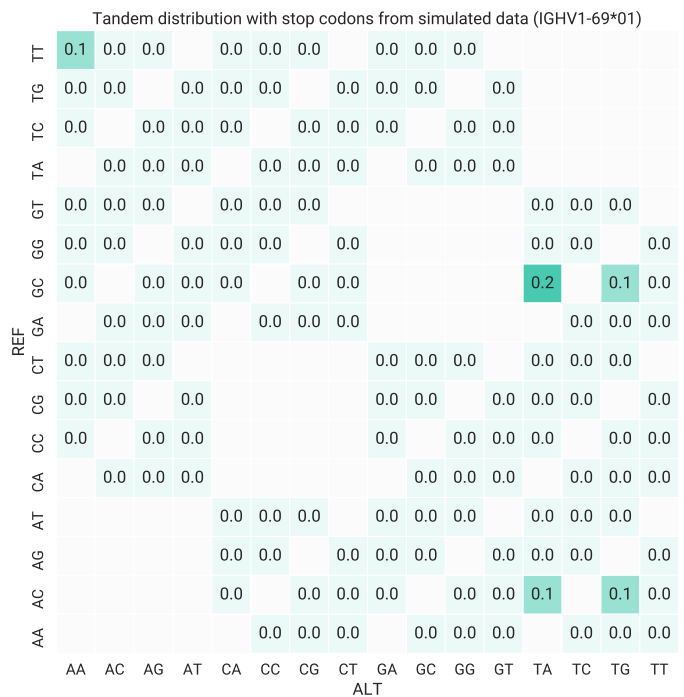


Tandem distribution from real data (IGHV1-69\*01)

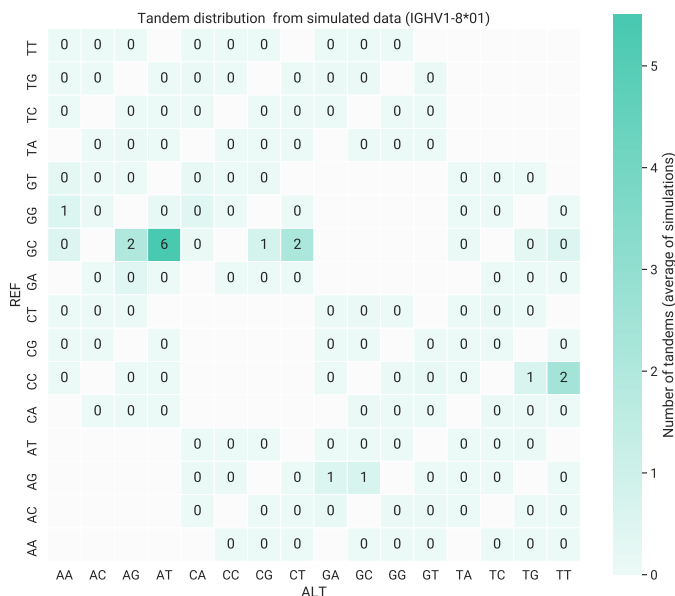
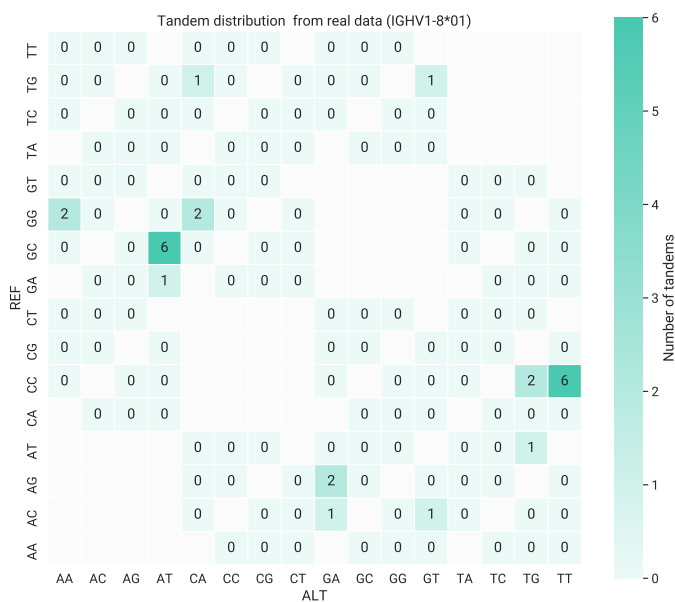
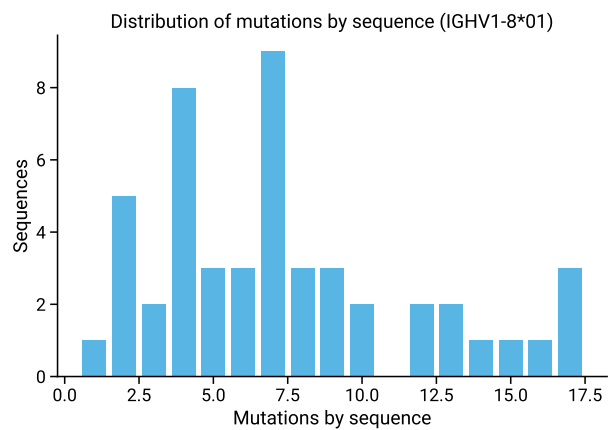
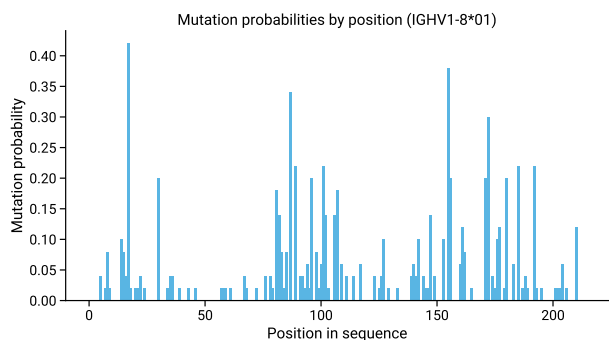
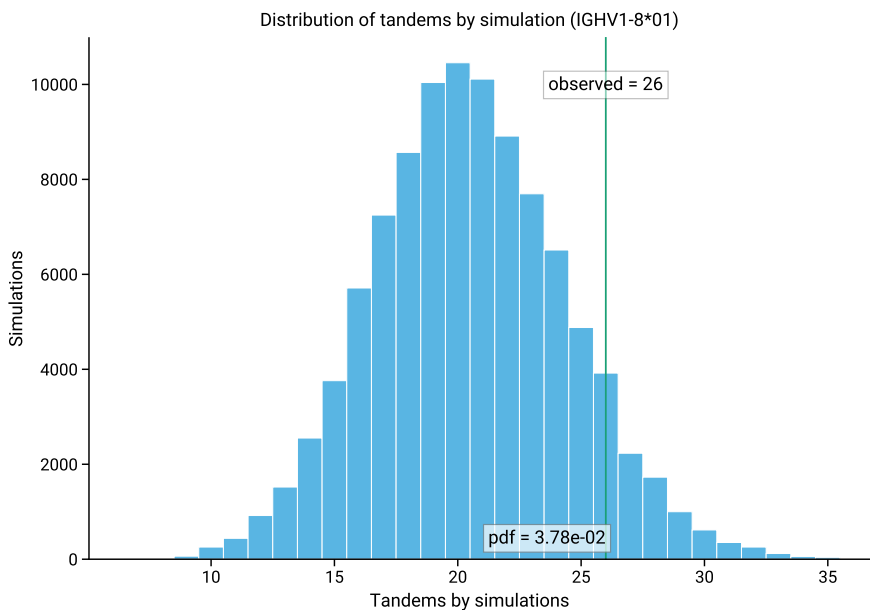


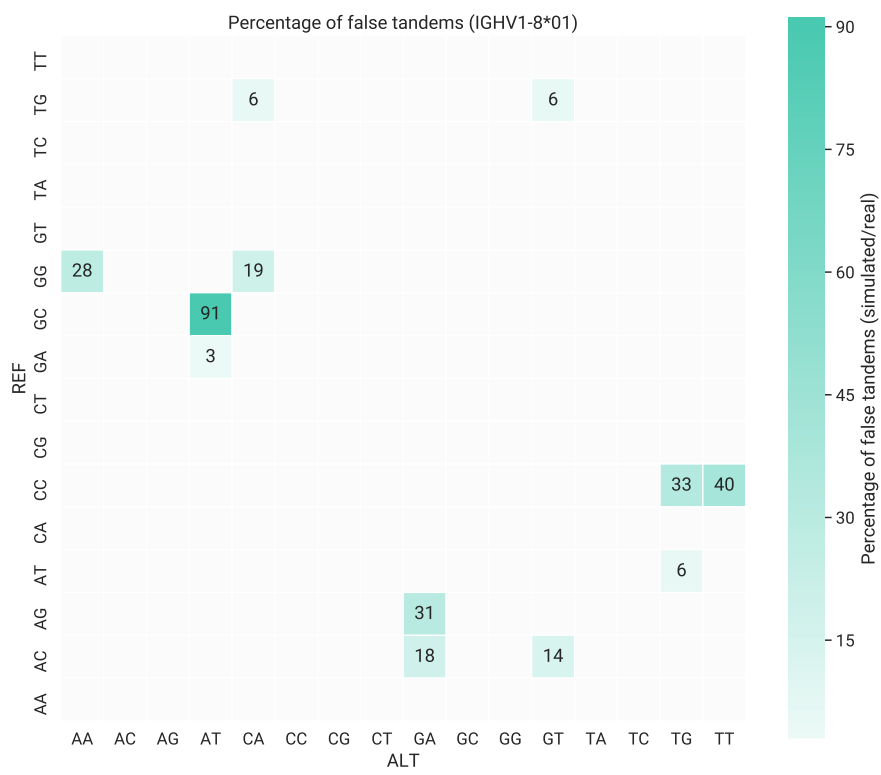
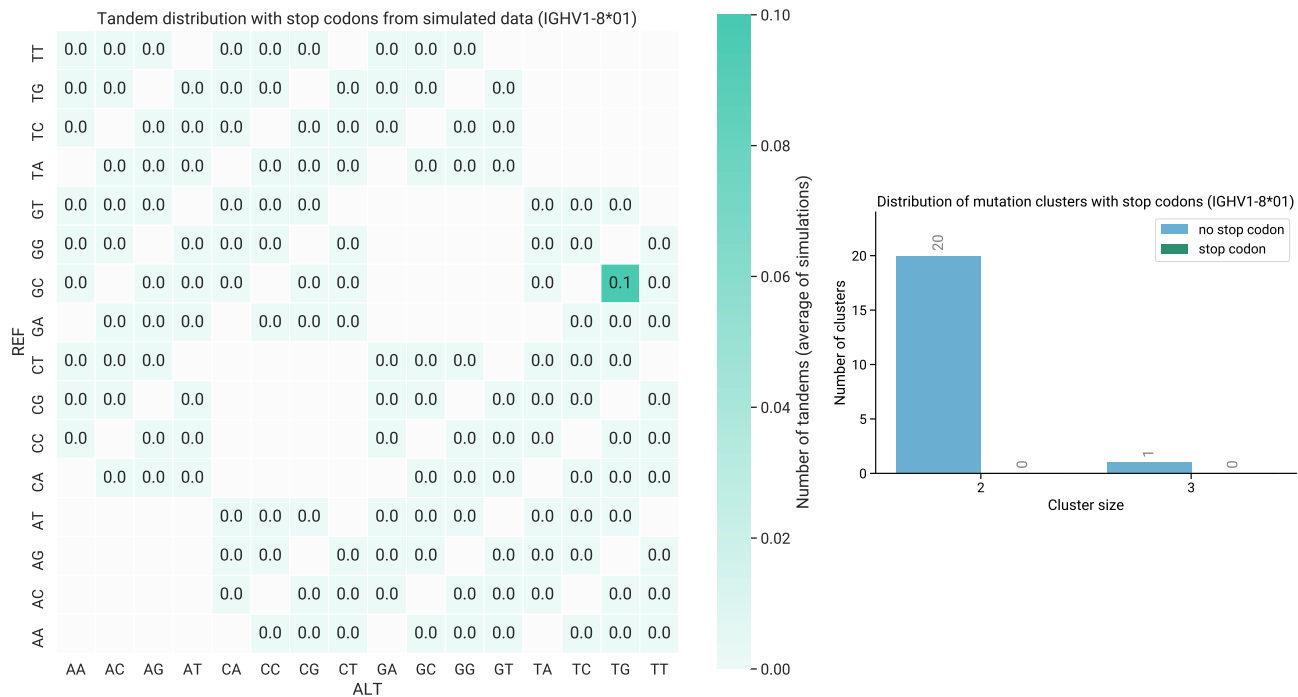
Tandem distribution from simulated data (IGHV1-69\*01)





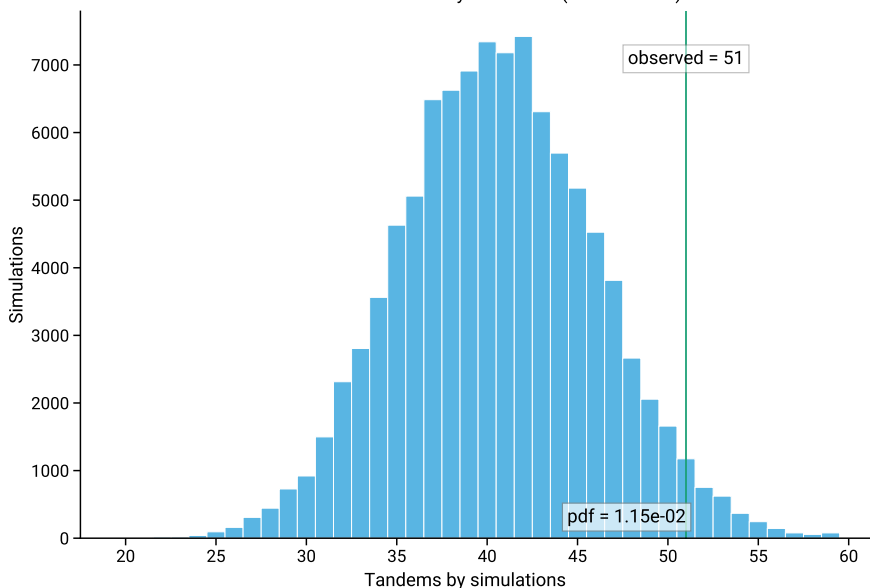
### 3.5 IGHV1-8\*01



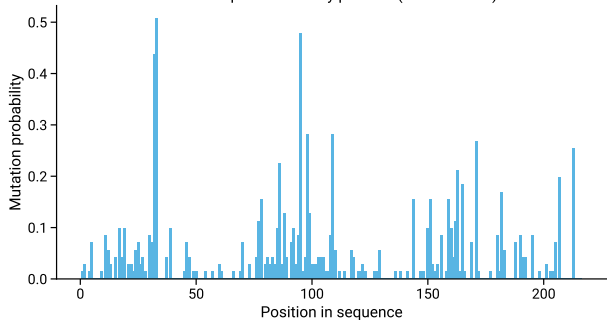


### 3.6 IGHV3-11\*01

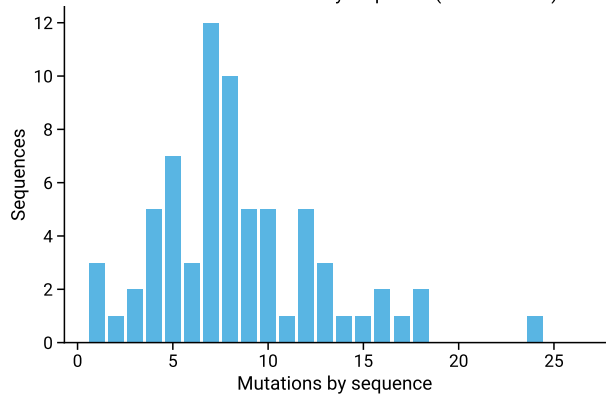
Distribution of tandems by simulation (IGHV3-11\*01)



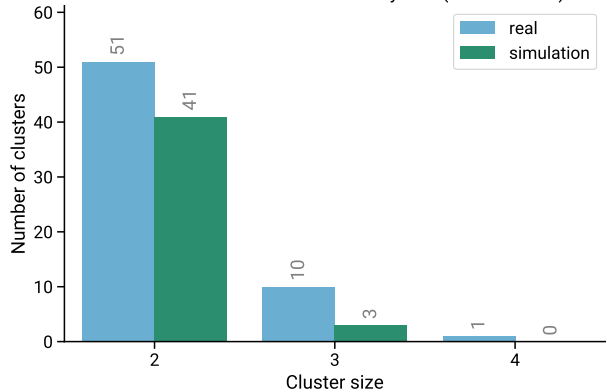
Mutation probabilities by position (IGHV3-11\*01)



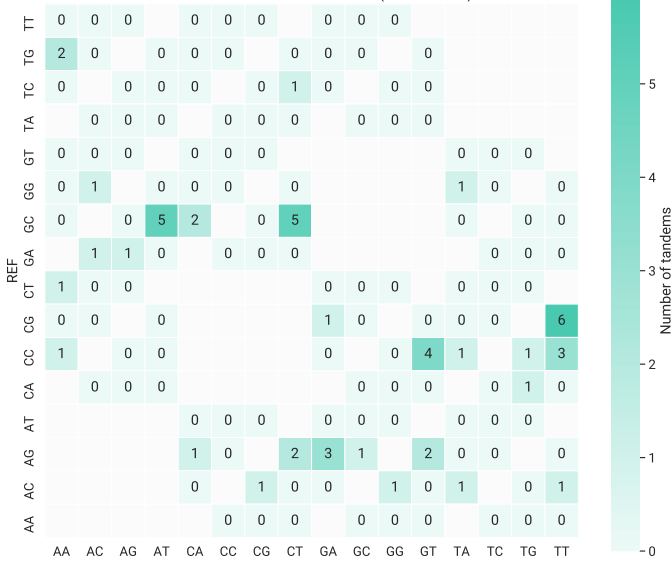
Distribution of mutations by sequence (IGHV3-11\*01)



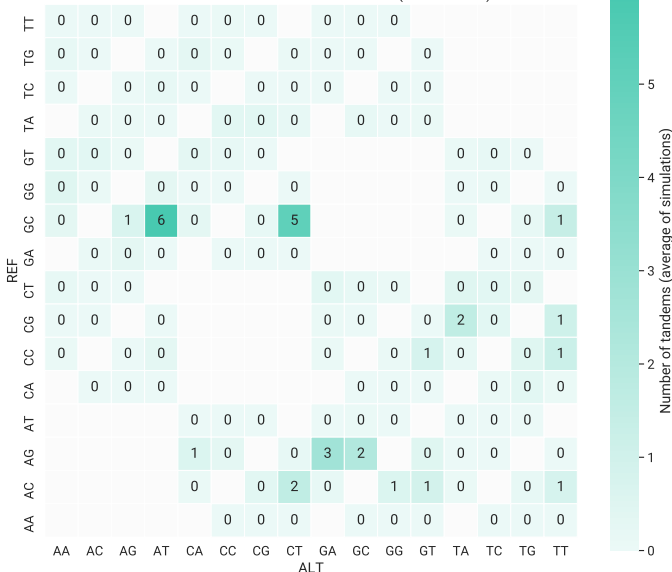
Distribution of mutation clusters by size (IGHV3-11\*01)

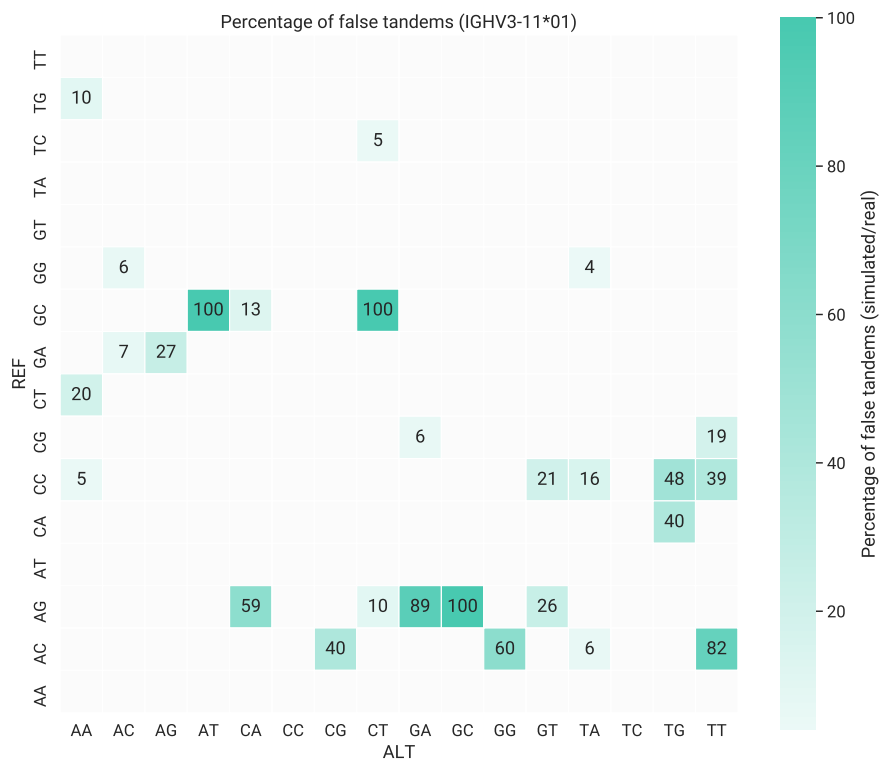
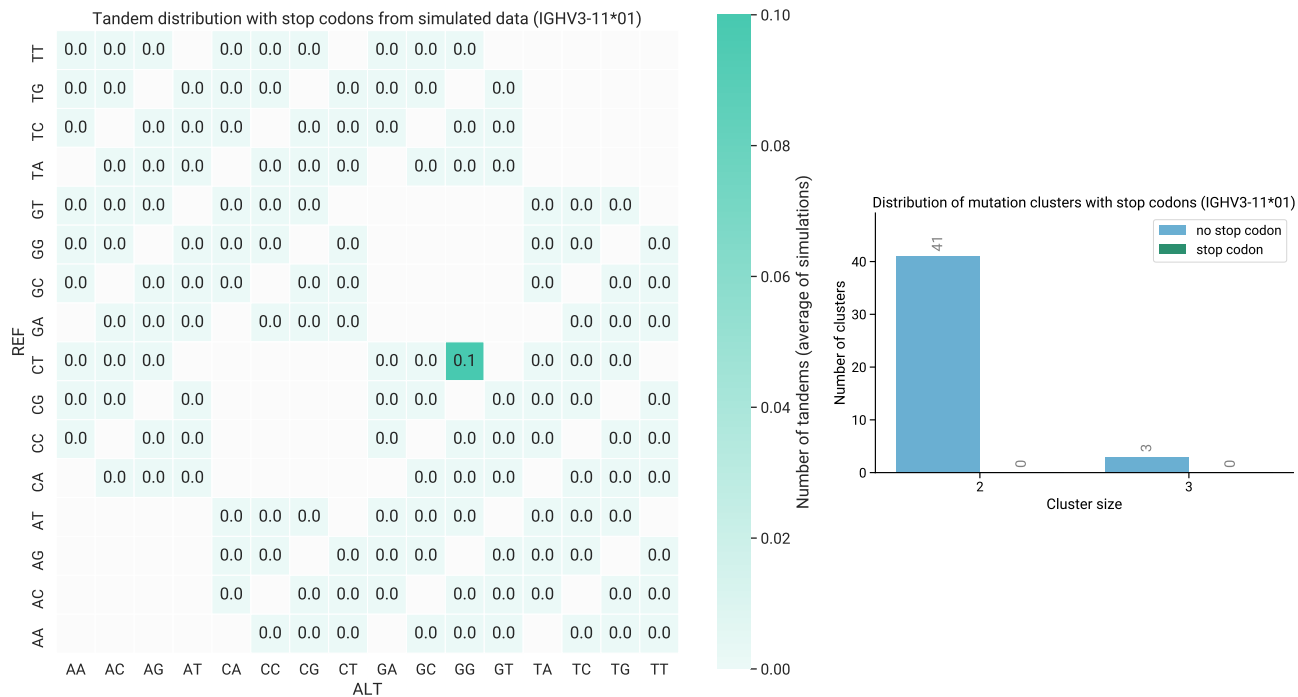


Tandem distribution from real data (IGHV3-11\*01)



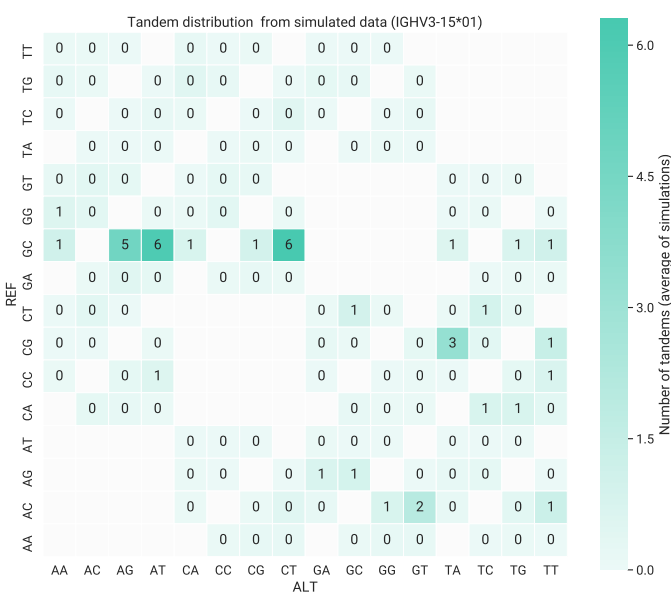
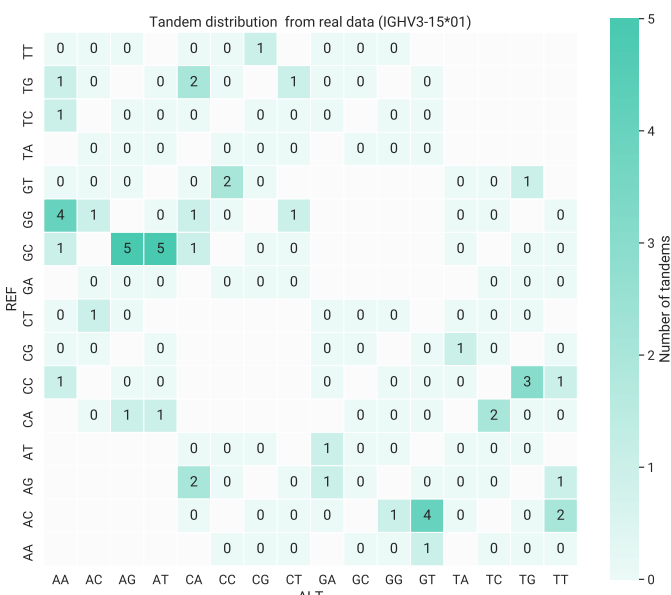
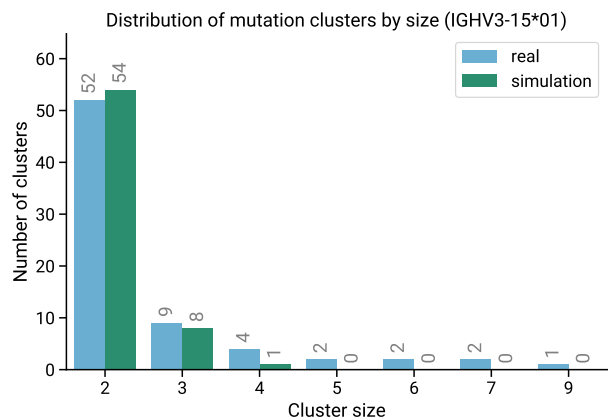
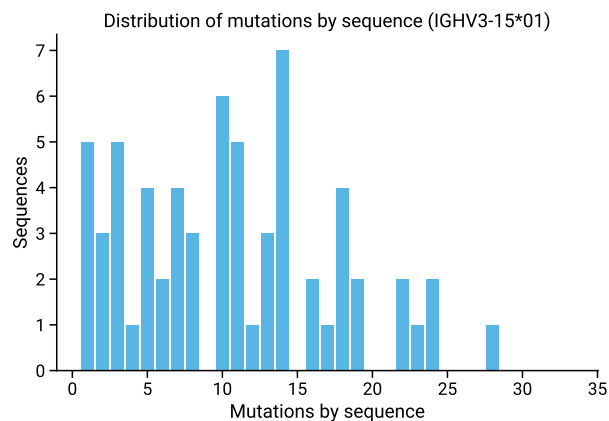
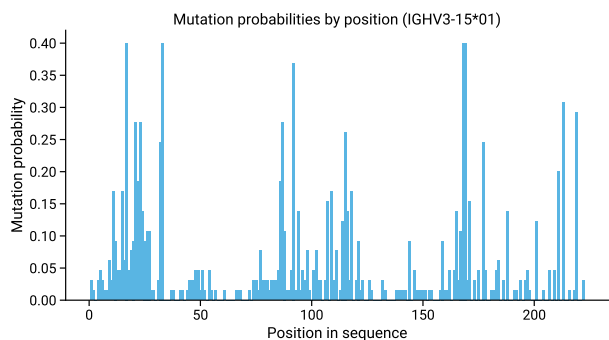
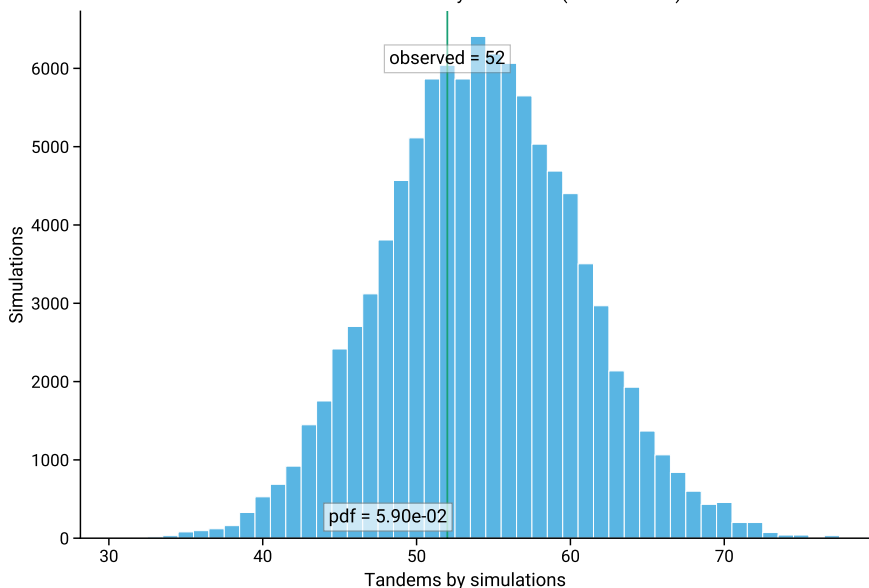
Tandem distribution from simulated data (IGHV3-11\*01)



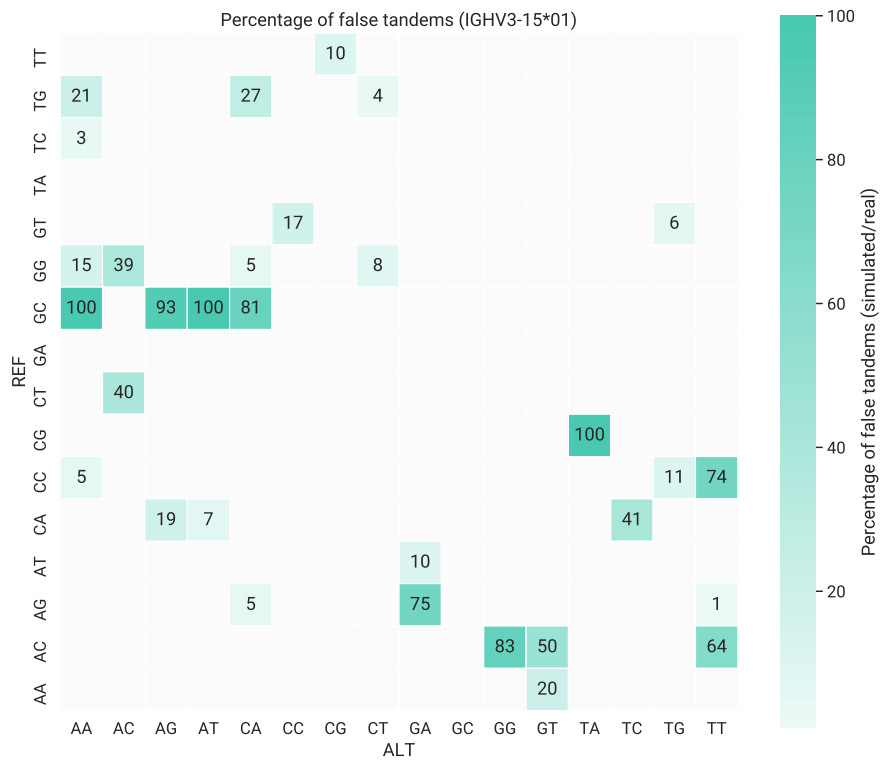
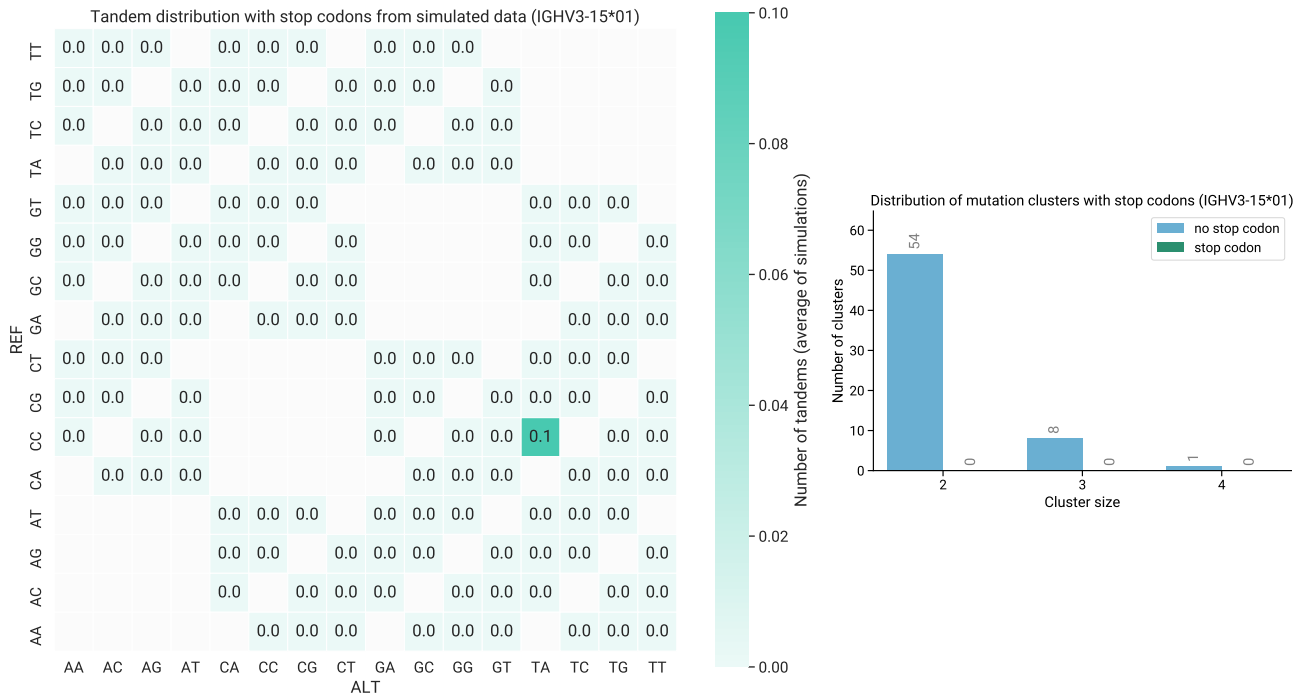


### 3.7 IGHV3-15\*01

Distribution of tandems by simulation (IGHV3-15\*01)

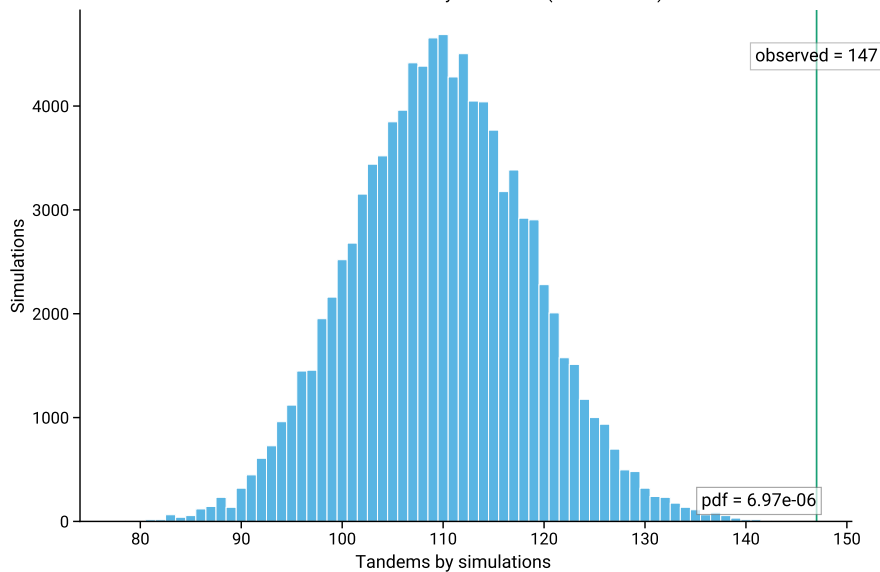




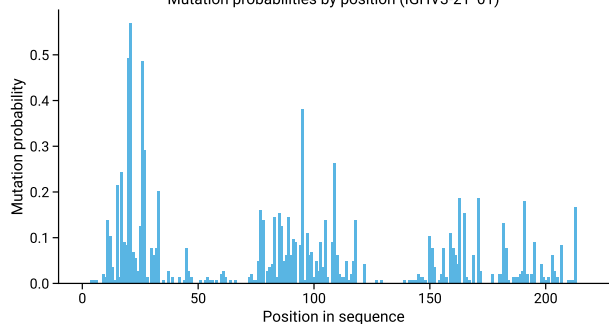


### 3.8 IGHV3-21\*01

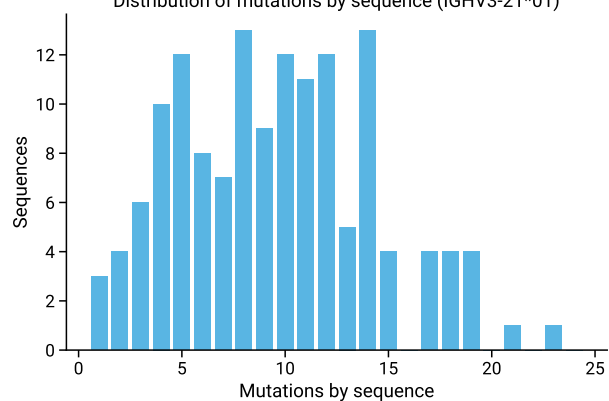
Distribution of tandems by simulation (IGHV3-21\*01)



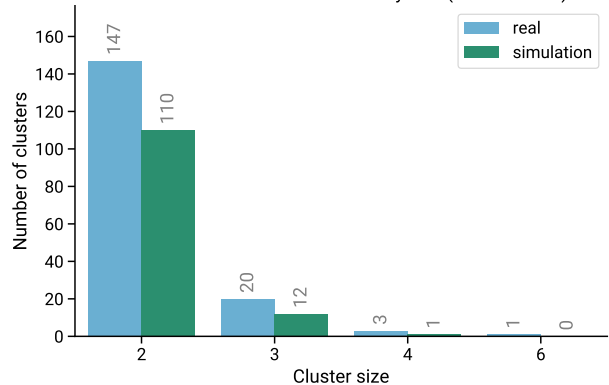
Mutation probabilities by position (IGHV3-21\*01)



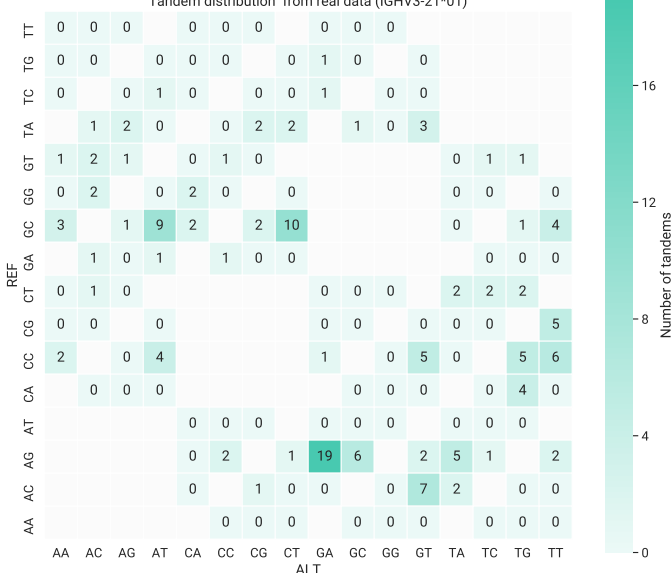
Distribution of mutations by sequence (IGHV3-21\*01)



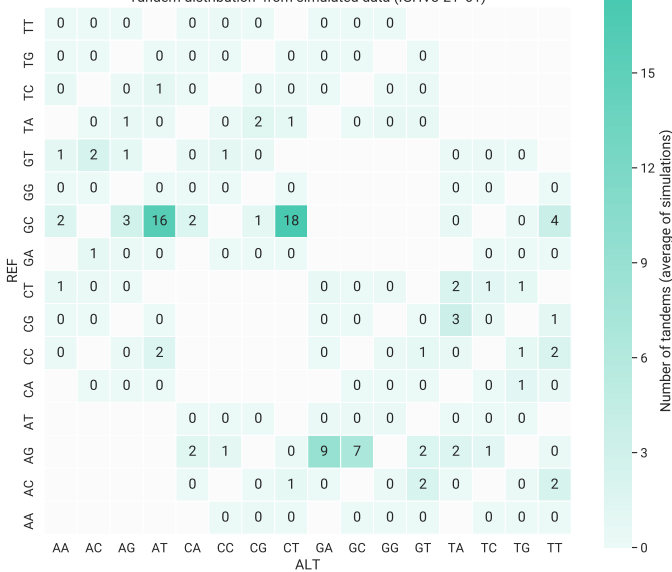
Distribution of mutation clusters by size (IGHV3-21\*01)

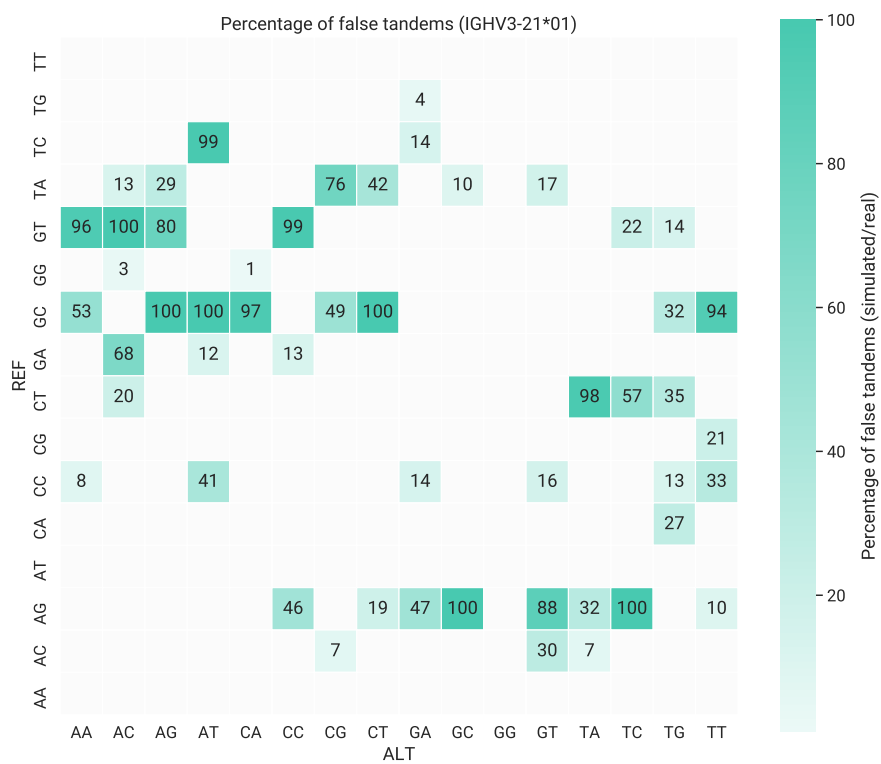
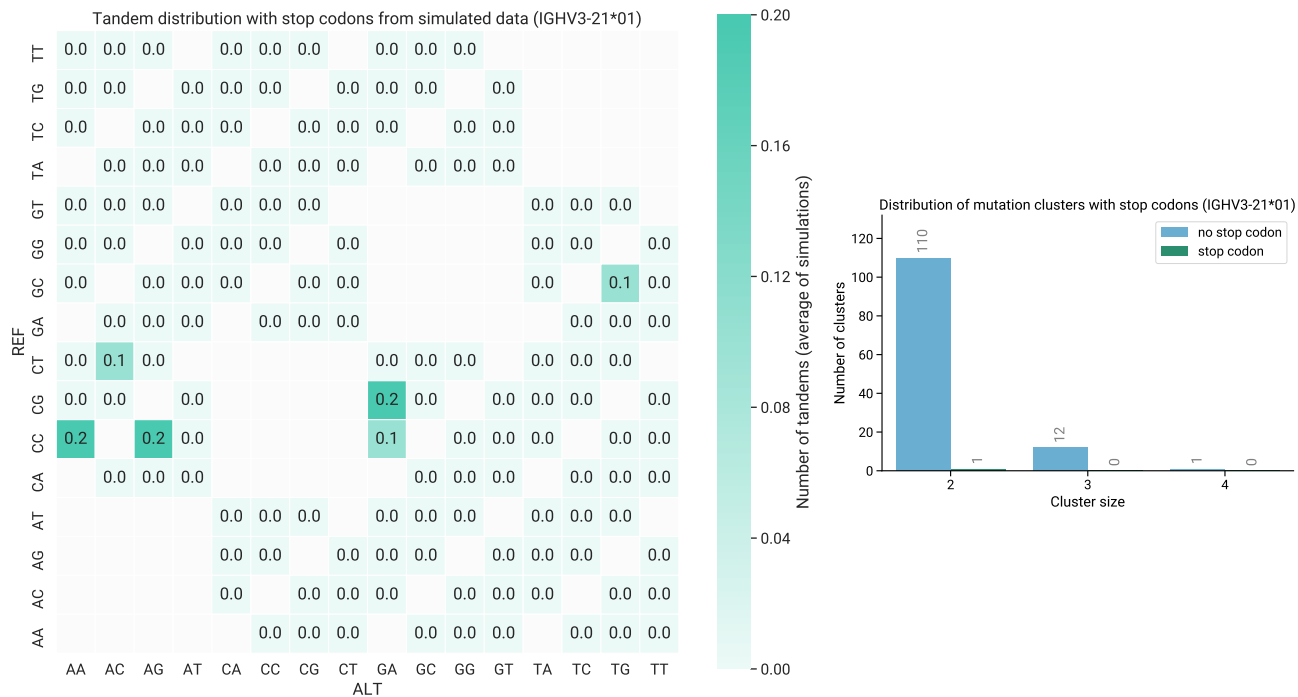


Tandem distribution from real data (IGHV3-21\*01)



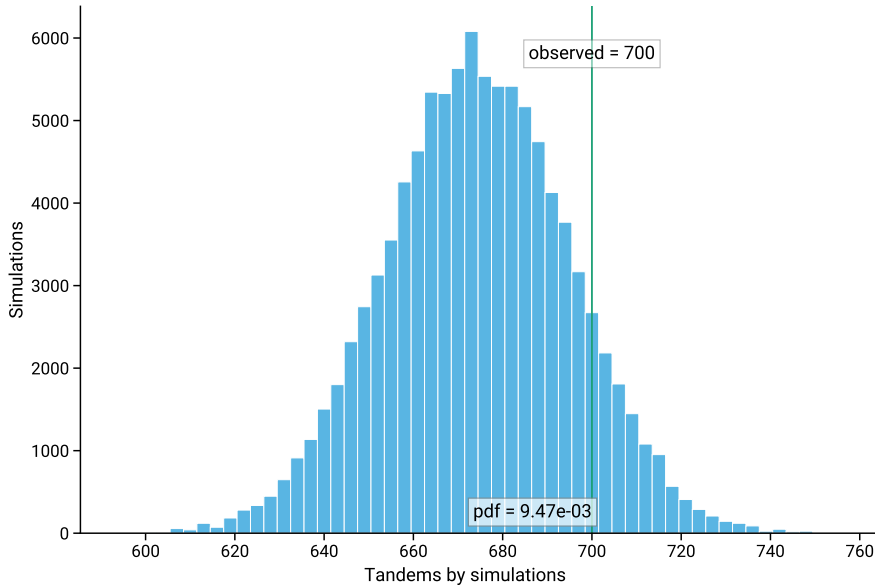
Tandem distribution from simulated data (IGHV3-21\*01)



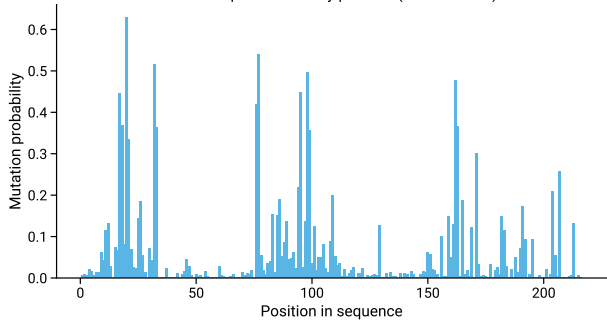


### 3.9 IGHV3-23\*01

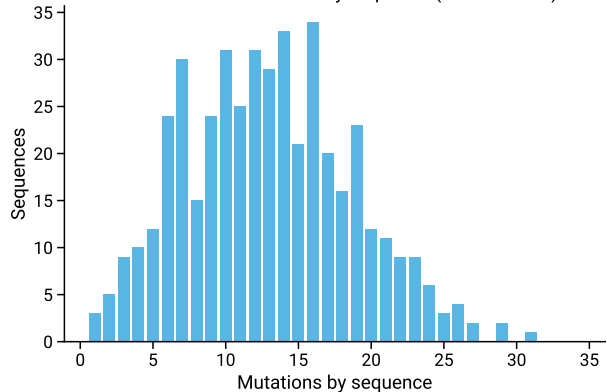
Distribution of tandems by simulation (IGHV3-23\*01)



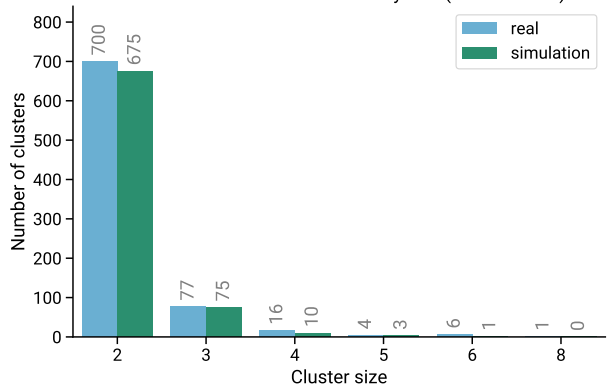
Mutation probabilities by position (IGHV3-23\*01)



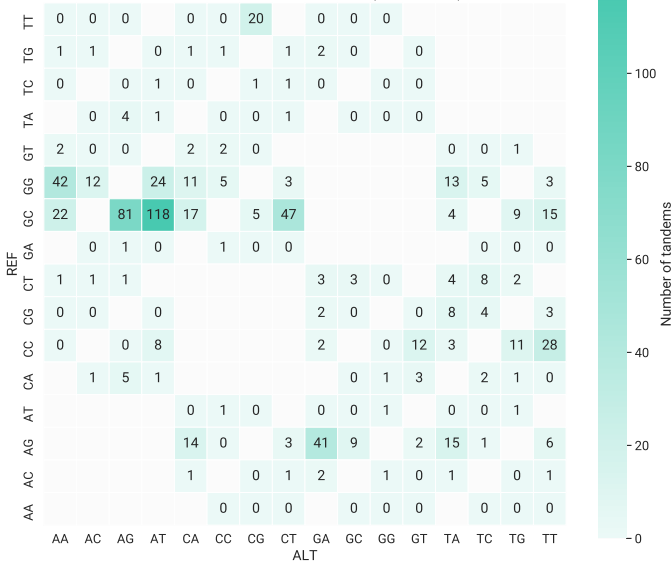
Distribution of mutations by sequence (IGHV3-23\*01)



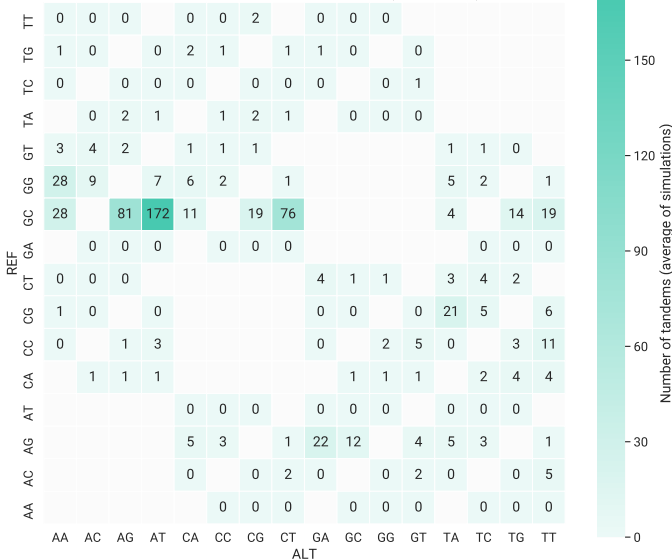
Distribution of mutation clusters by size (IGHV3-23\*01)

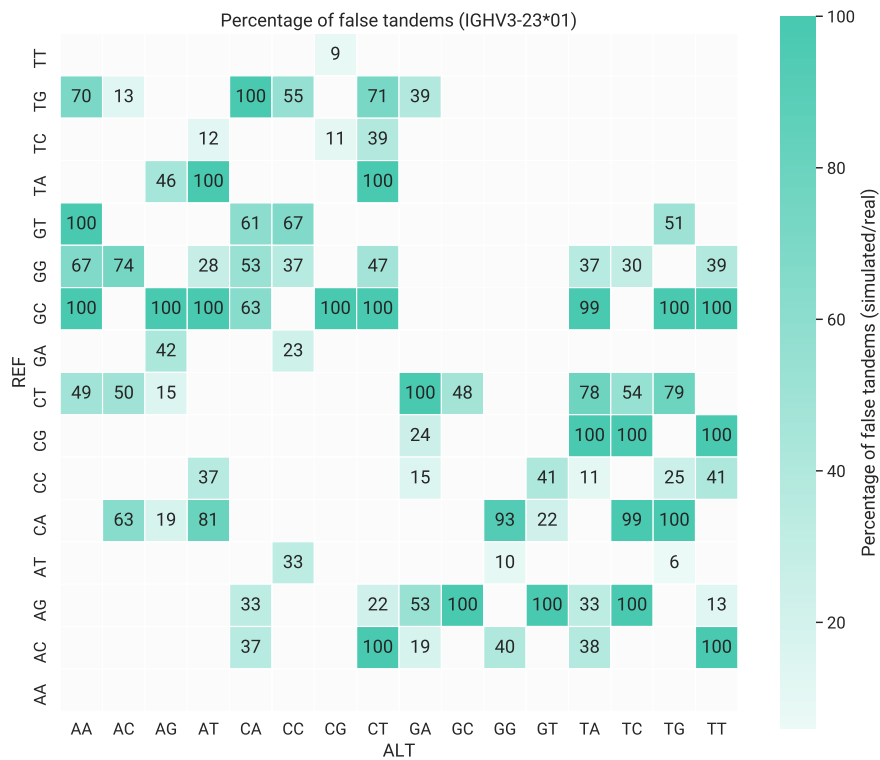
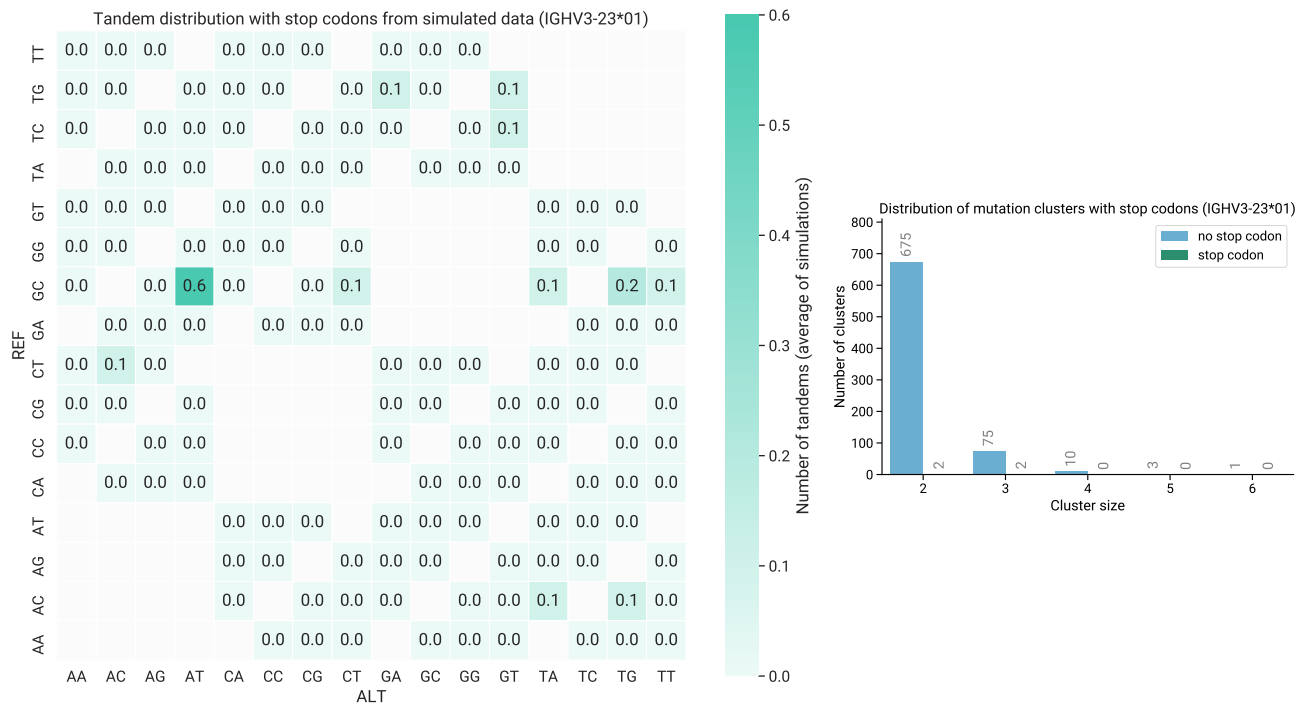


Tandem distribution from real data (IGHV3-23\*01)



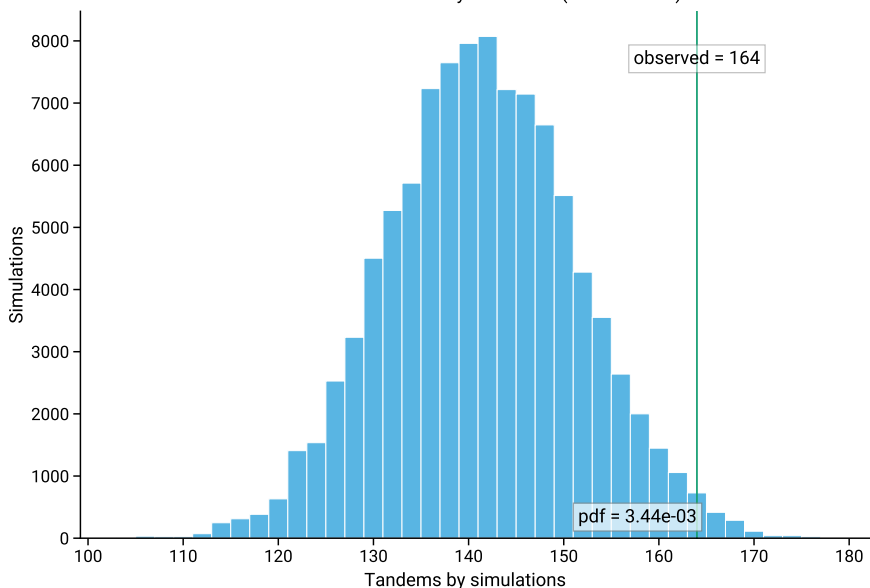
Tandem distribution from simulated data (IGHV3-23\*01)



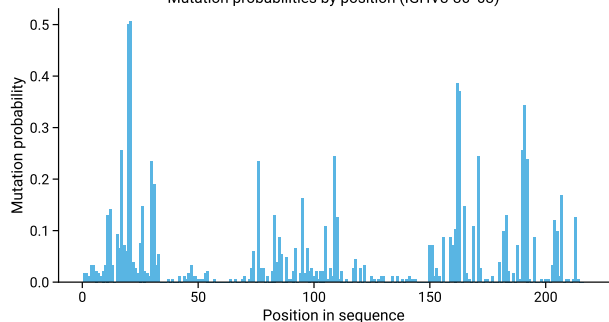


### 3.10 IGHV3-30\*03

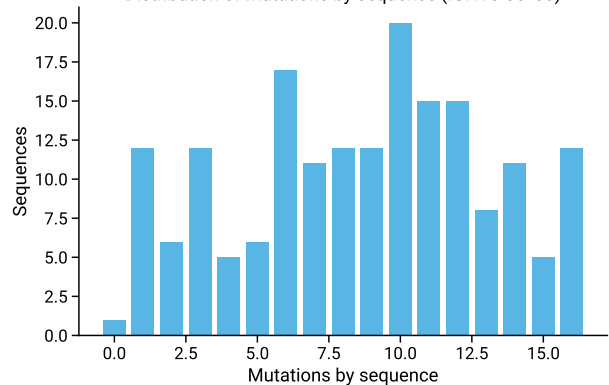
Distribution of tandems by simulation (IGHV3-30\*03)



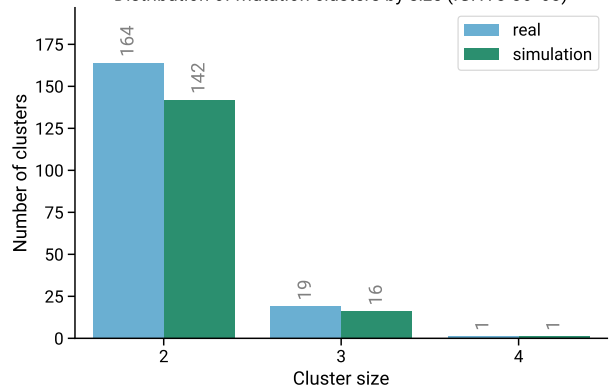
Mutation probabilities by position (IGHV3-30\*03)



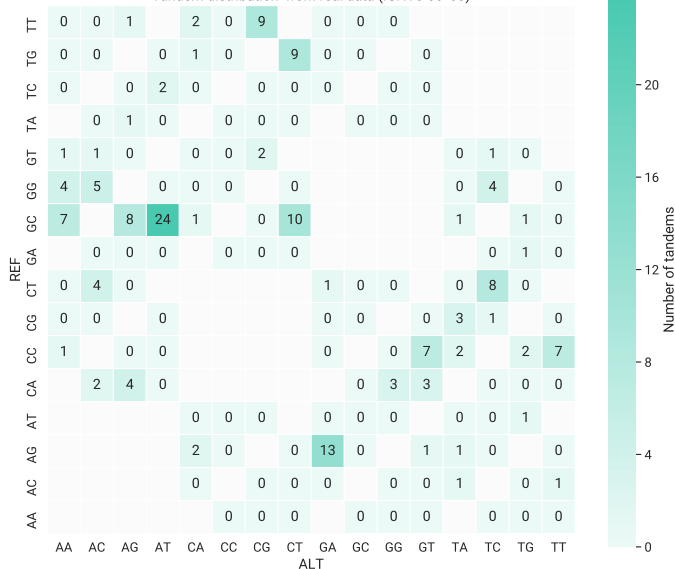
Distribution of mutations by sequence (IGHV3-30\*03)



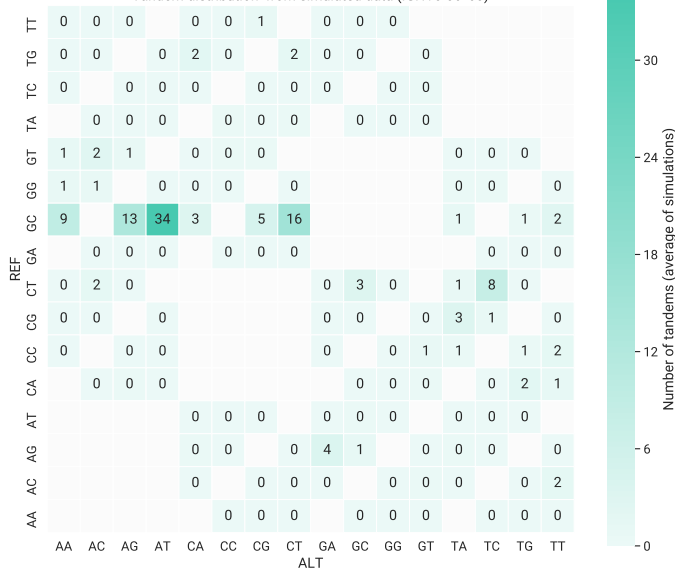
Distribution of mutation clusters by size (IGHV3-30\*03)

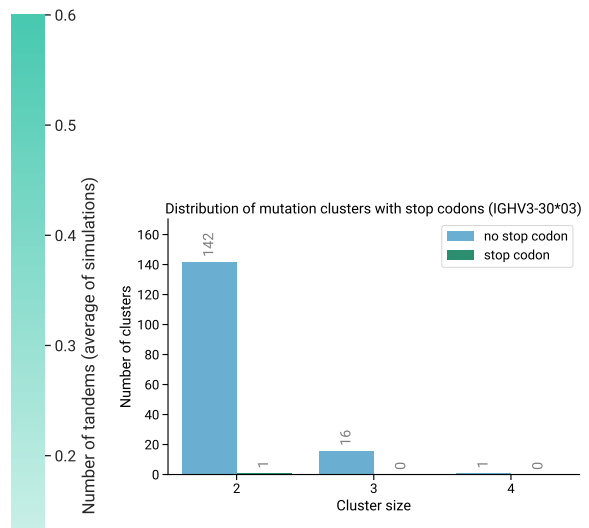
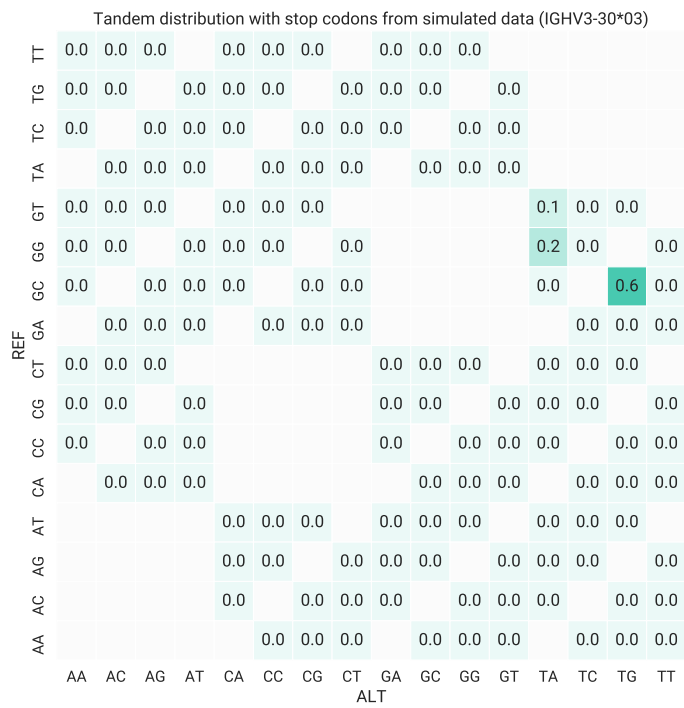


Tandem distribution from real data (IGHV3-30\*03)



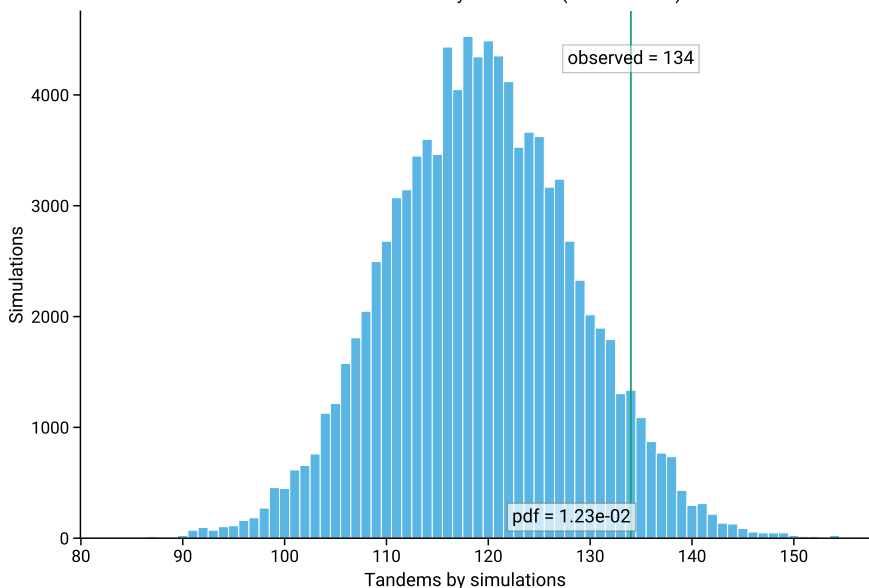
Tandem distribution from simulated data (IGHV3-30\*03)



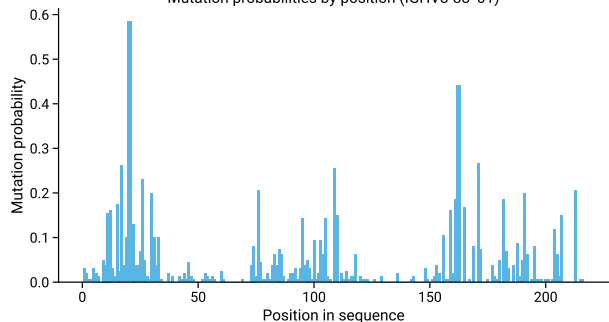


### 3.11 IGHV3-33\*01

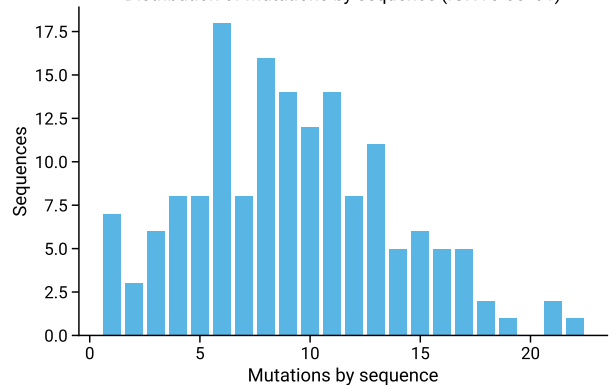
Distribution of tandems by simulation (IGHV3-33\*01)



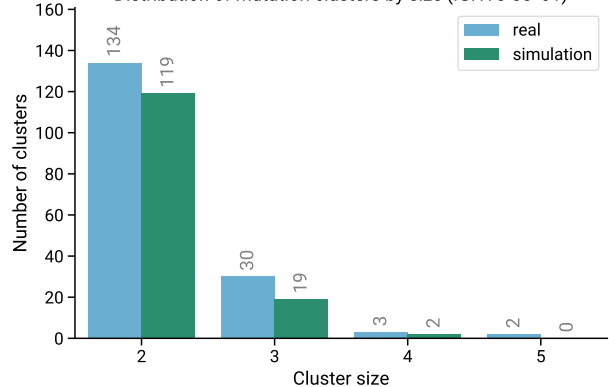
Mutation probabilities by position (IGHV3-33\*01)



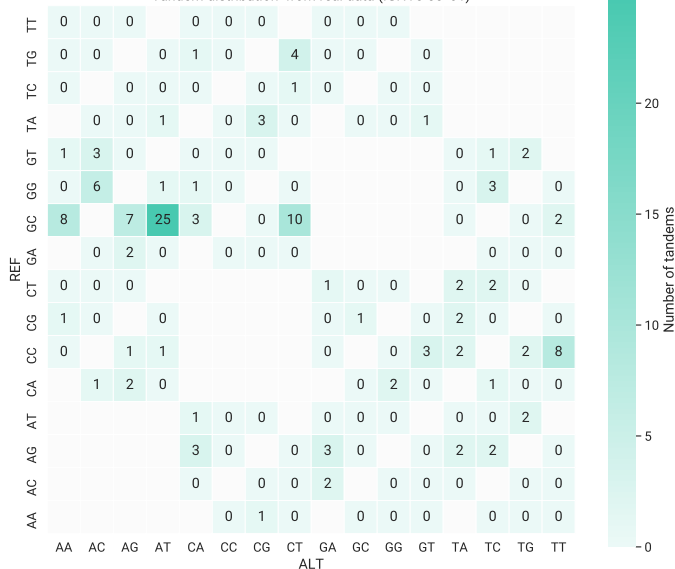
Distribution of mutations by sequence (IGHV3-33\*01)



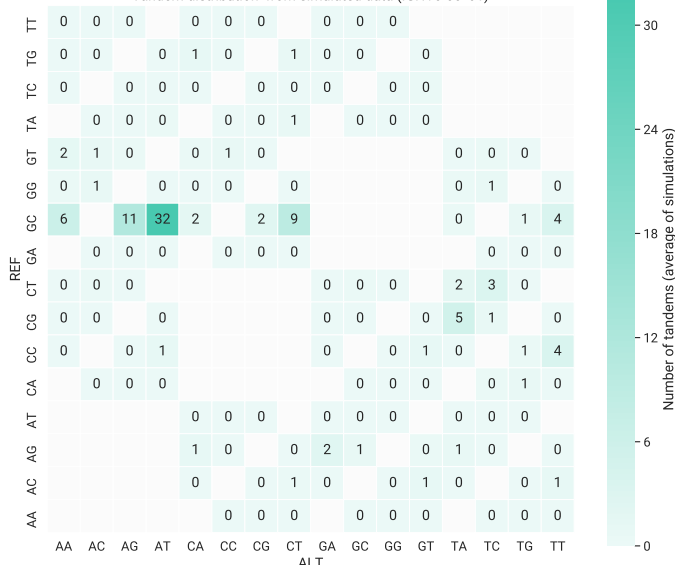
Distribution of mutation clusters by size (IGHV3-33\*01)



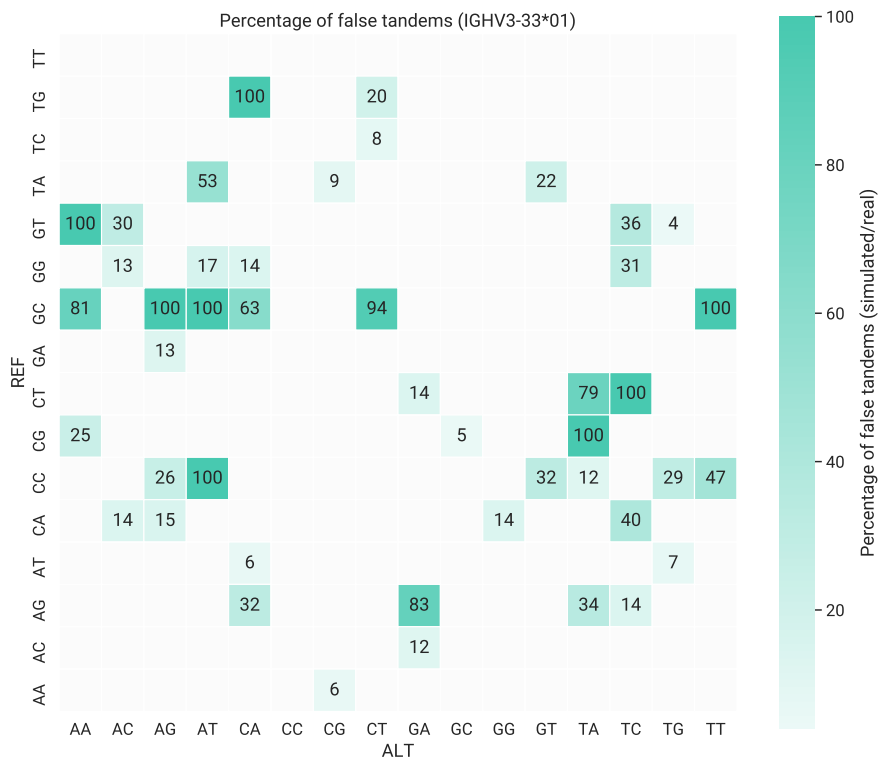
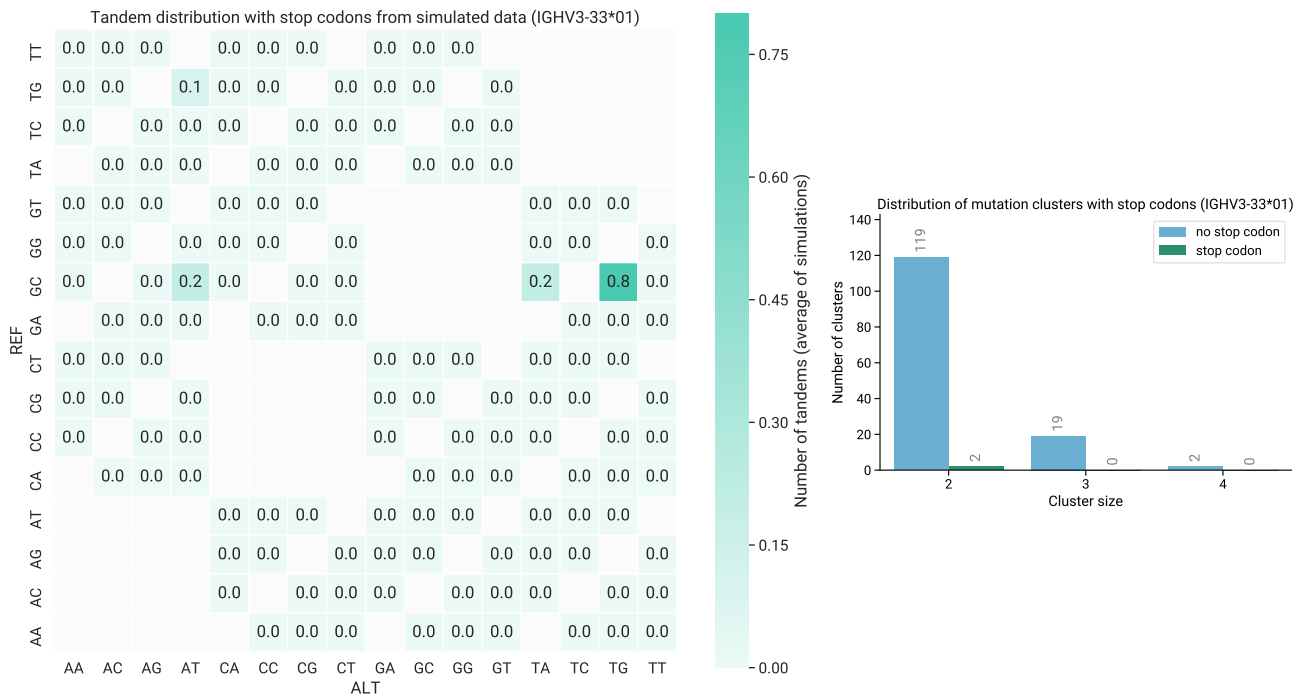
Tandem distribution from real data (IGHV3-33\*01)



Tandem distribution from simulated data (IGHV3-33\*01)

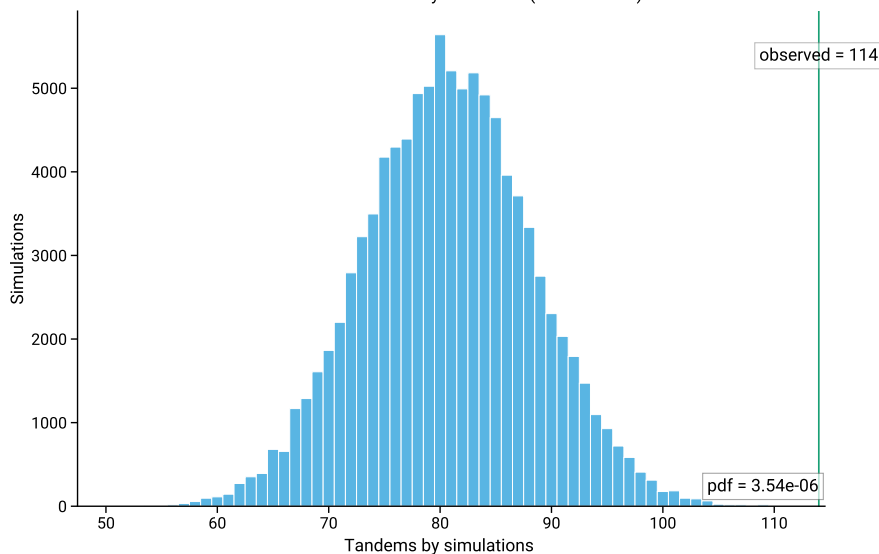




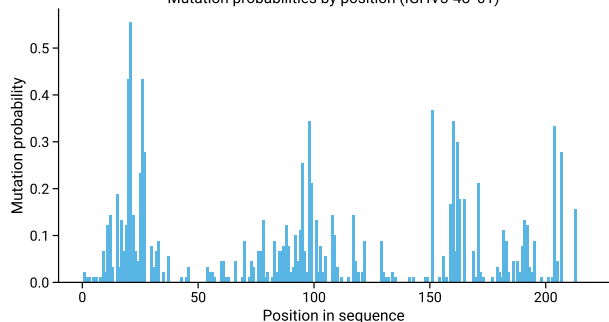


### 3.12 IGHV3-48\*01

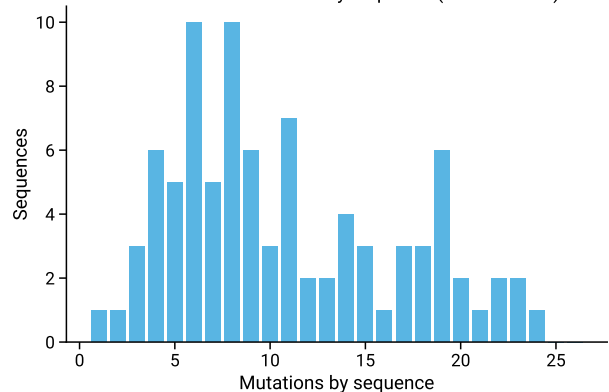
Distribution of tandems by simulation (IGHV3-48\*01)



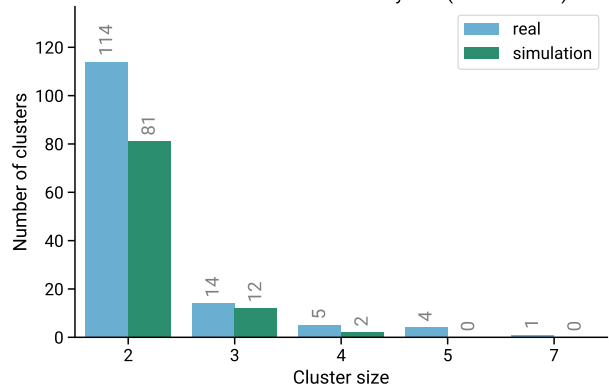
Mutation probabilities by position (IGHV3-48\*01)



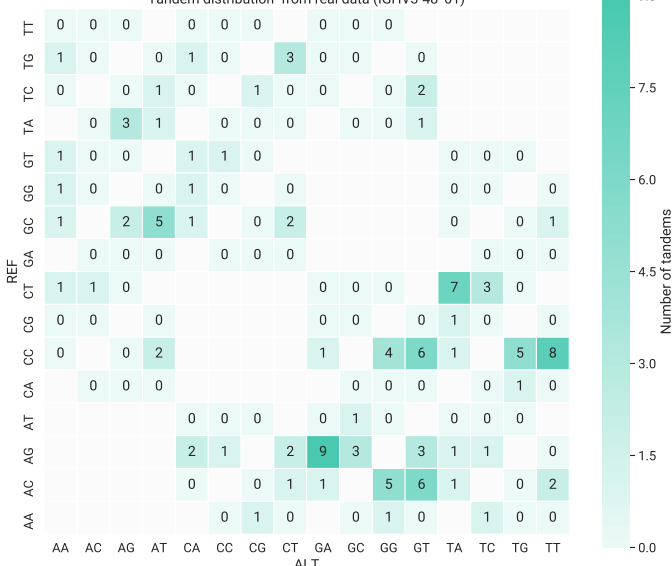
Distribution of mutations by sequence (IGHV3-48\*01)



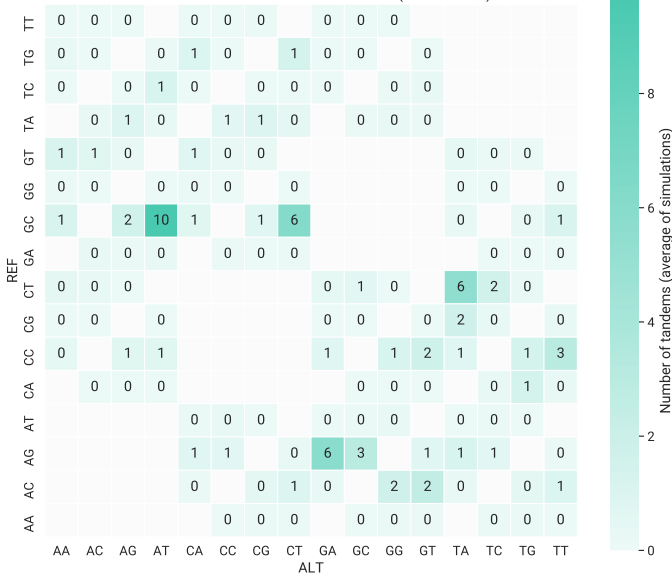
Distribution of mutation clusters by size (IGHV3-48\*01)

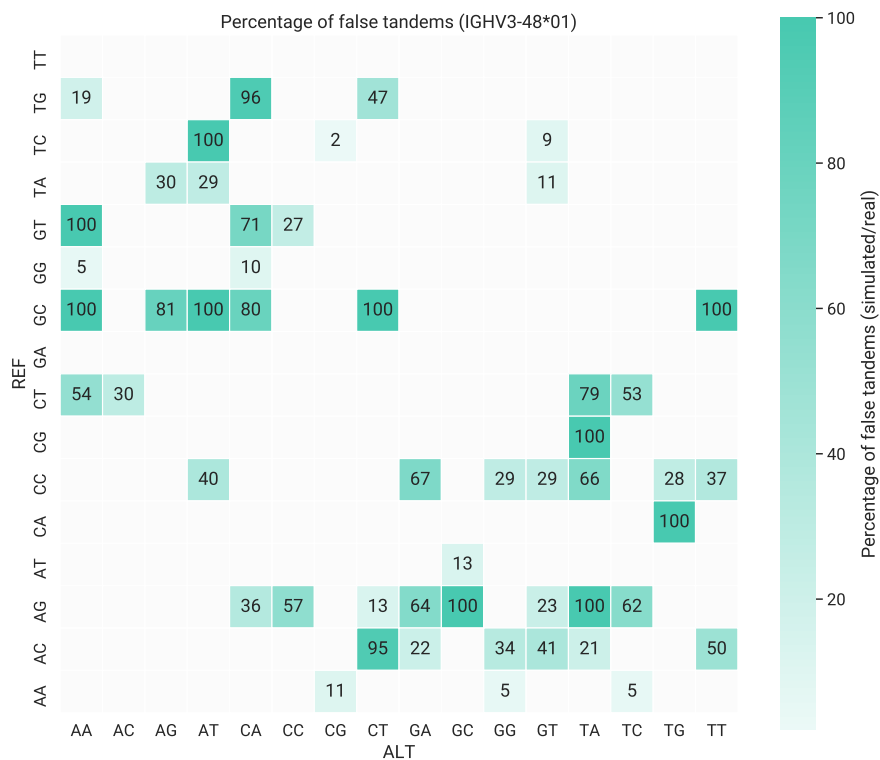
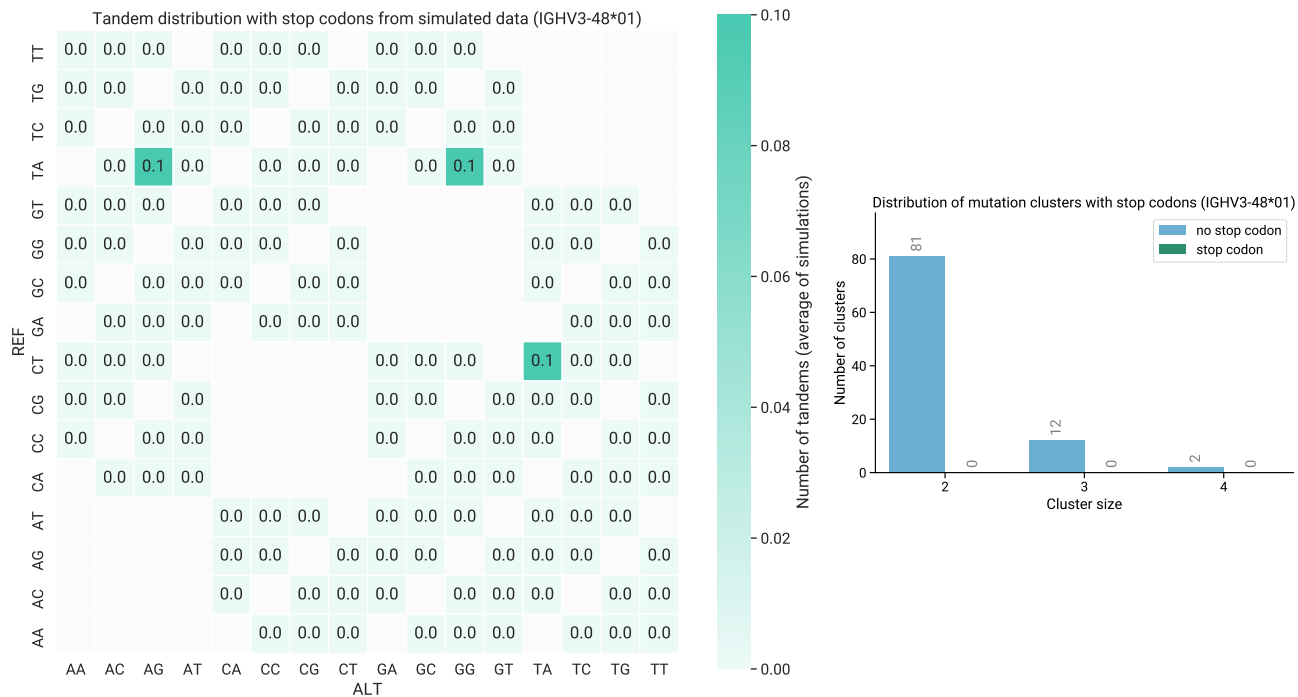


Tandem distribution from real data (IGHV3-48\*01)



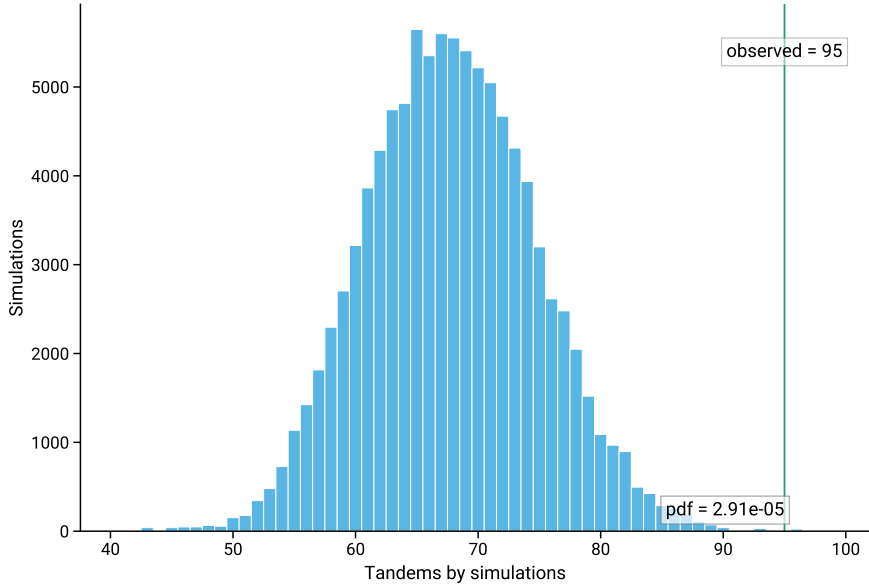
Tandem distribution from simulated data (IGHV3-48\*01)



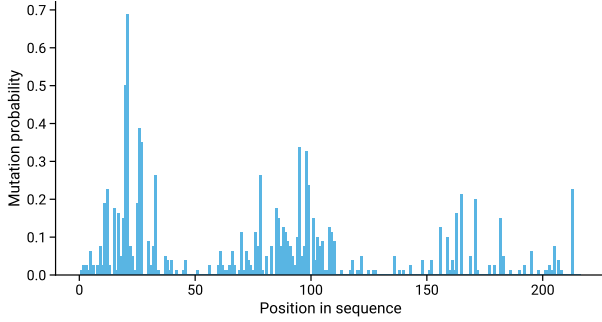


### 3.13 IGHV3-48\*02

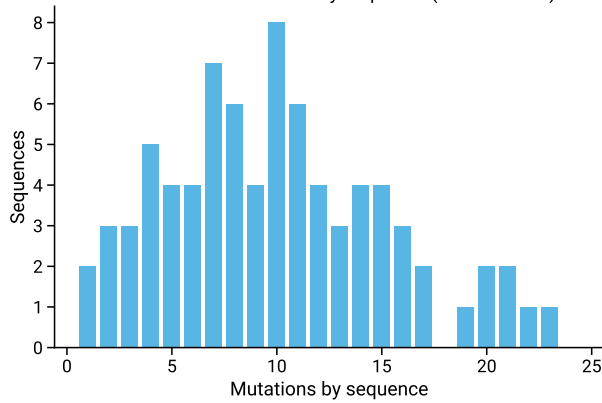
Distribution of tandems by simulation (IGHV3-48\*02)



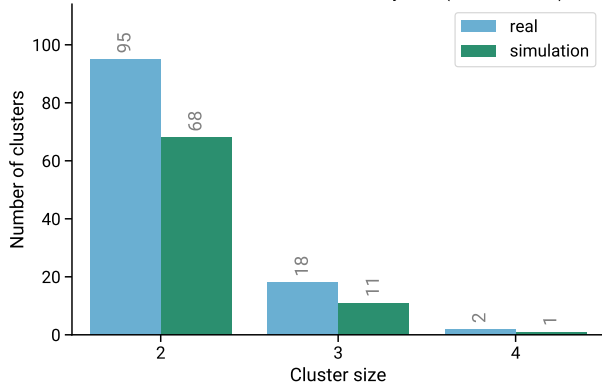
Mutation probabilities by position (IGHV3-48\*02)



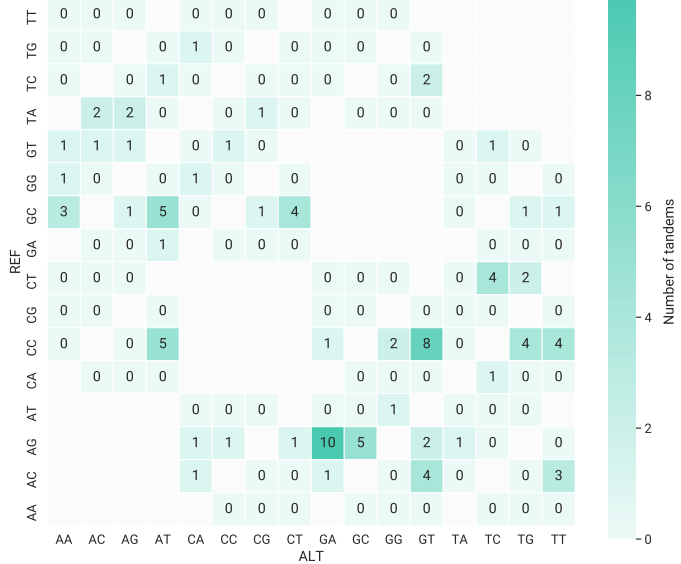
Distribution of mutations by sequence (IGHV3-48\*02)



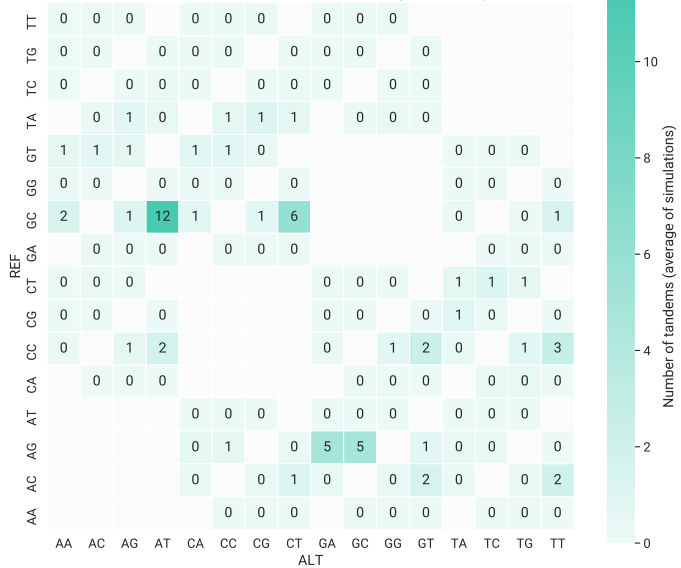
Distribution of mutation clusters by size (IGHV3-48\*02)

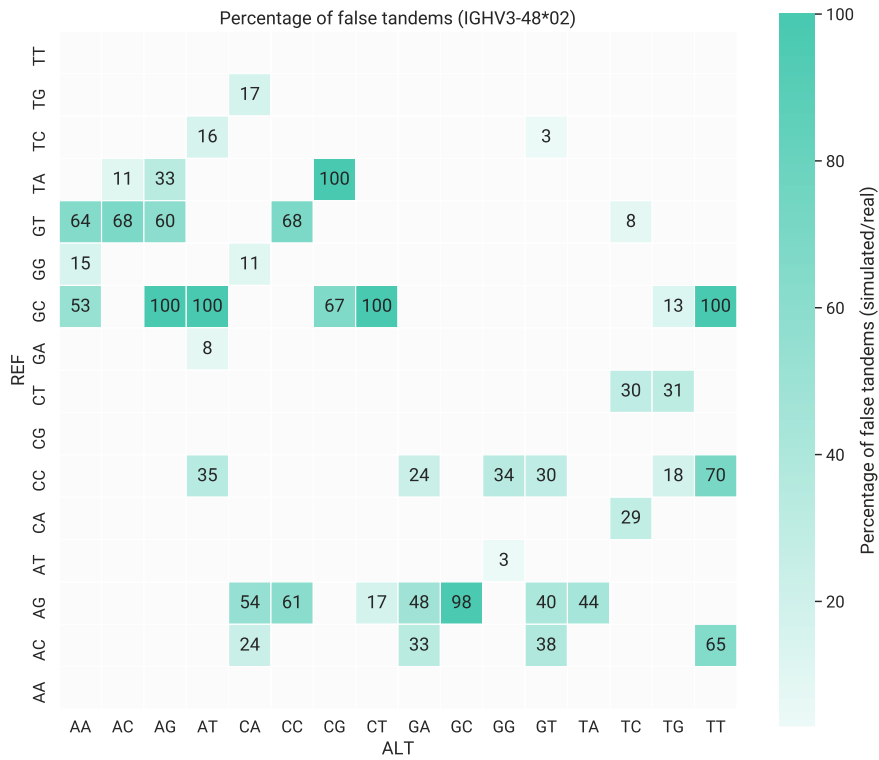
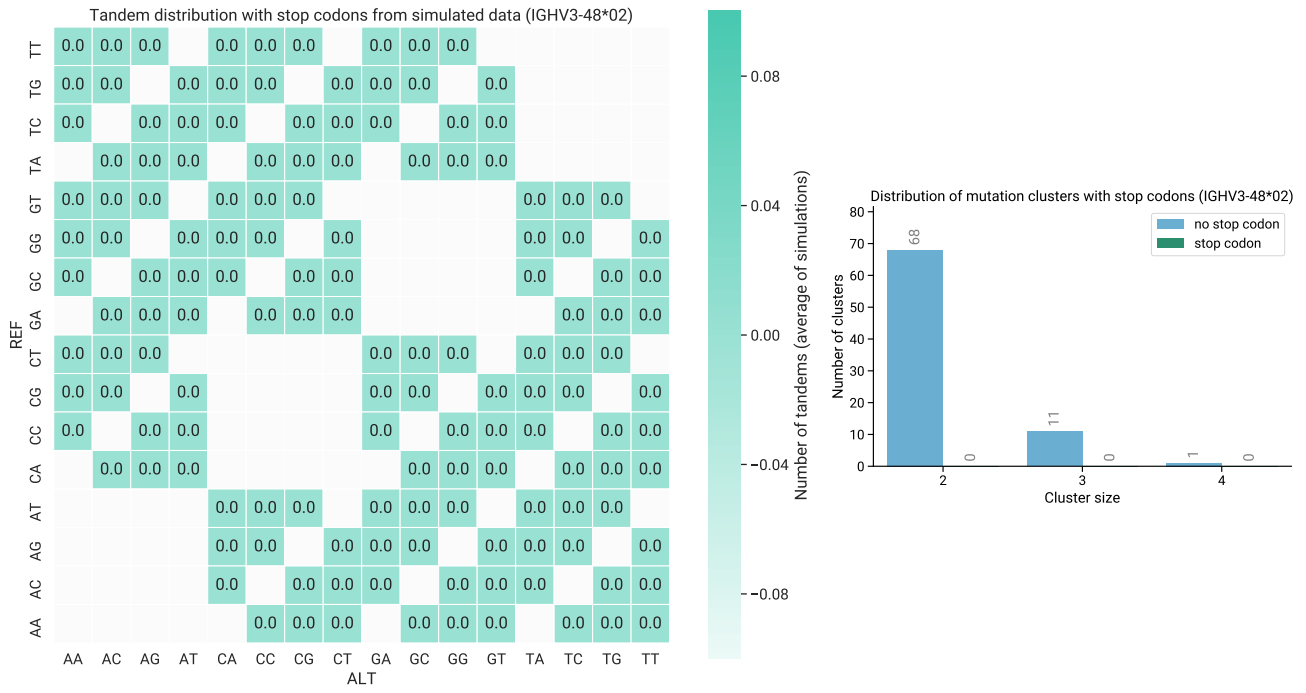


Tandem distribution from real data (IGHV3-48\*02)



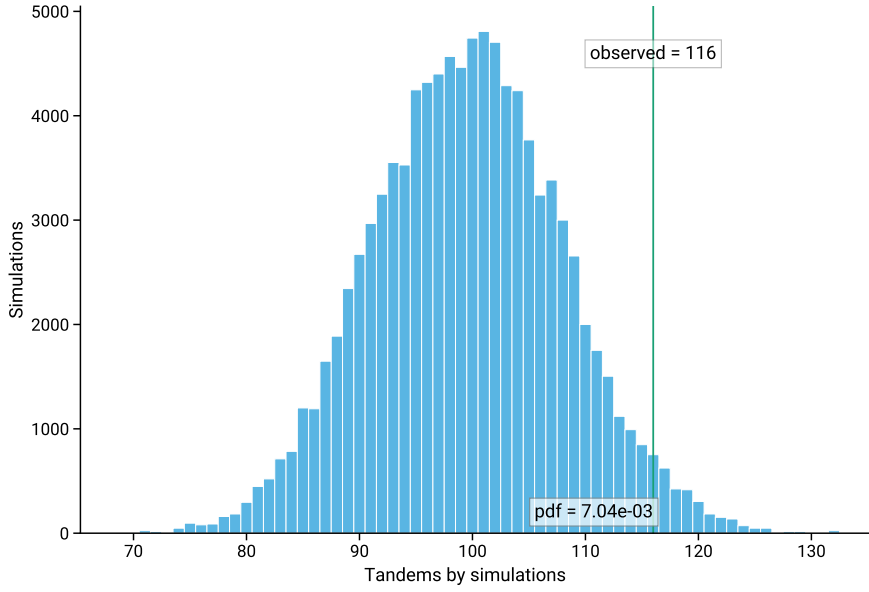
Tandem distribution from simulated data (IGHV3-48\*02)



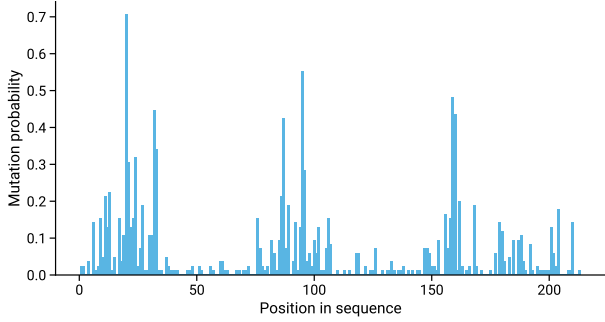


### 3.14 IGHV3-53\*01

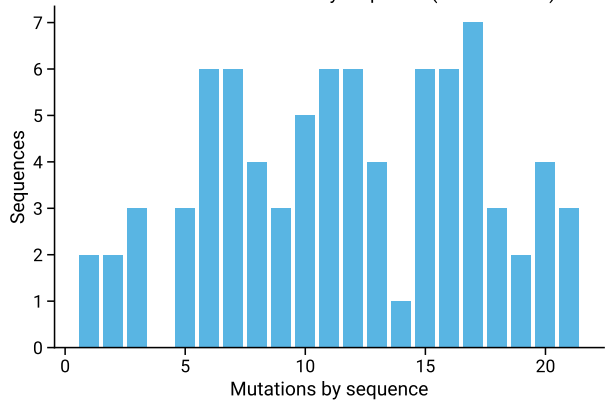
Distribution of tandems by simulation (IGHV3-53\*01)



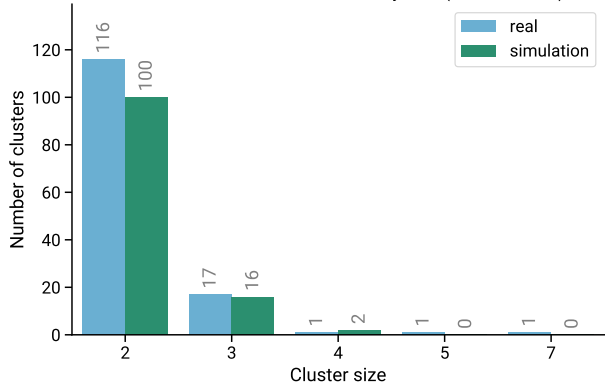
Mutation probabilities by position (IGHV3-53\*01)



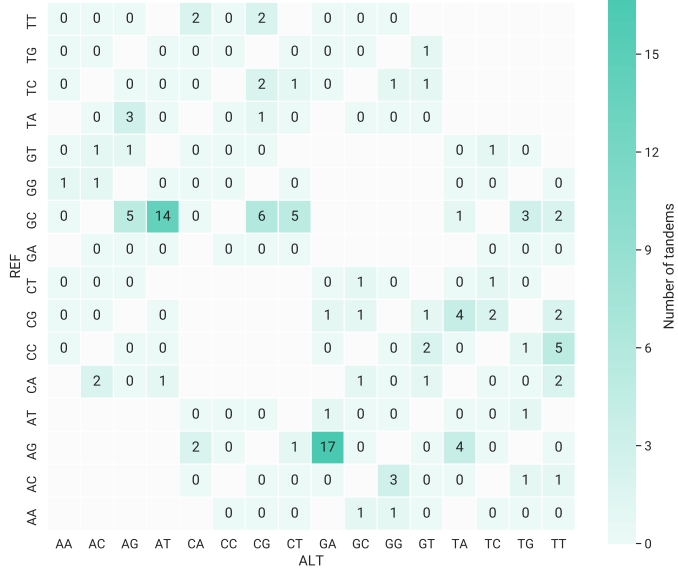
Distribution of mutations by sequence (IGHV3-53\*01)



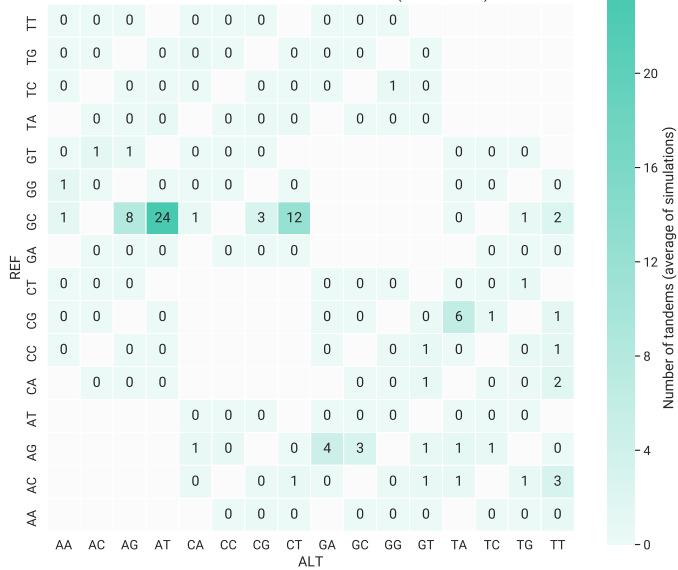
Distribution of mutation clusters by size (IGHV3-53\*01)

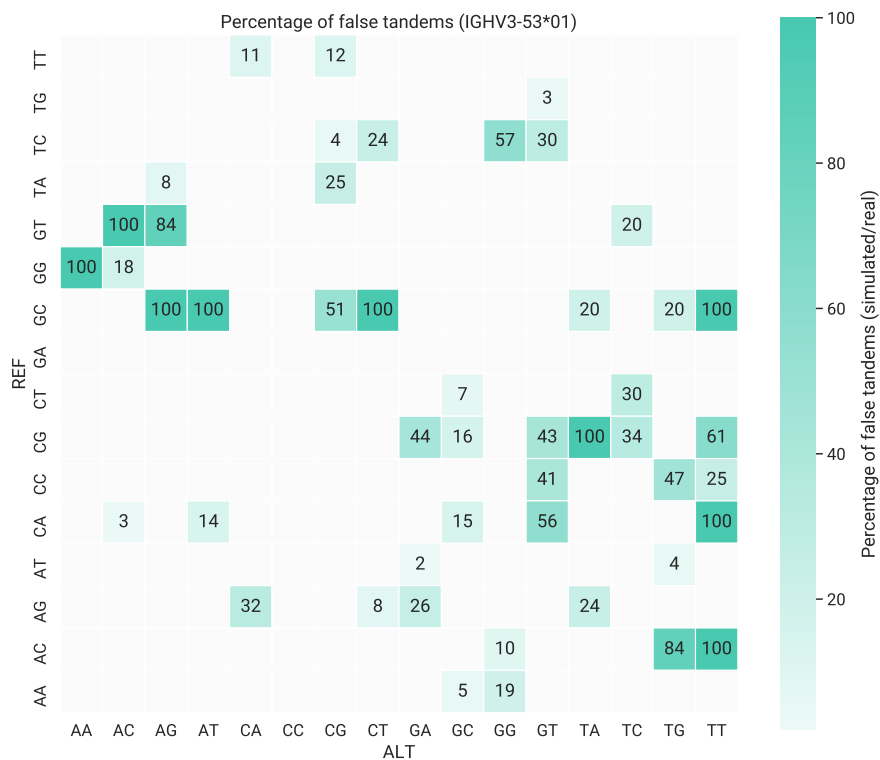
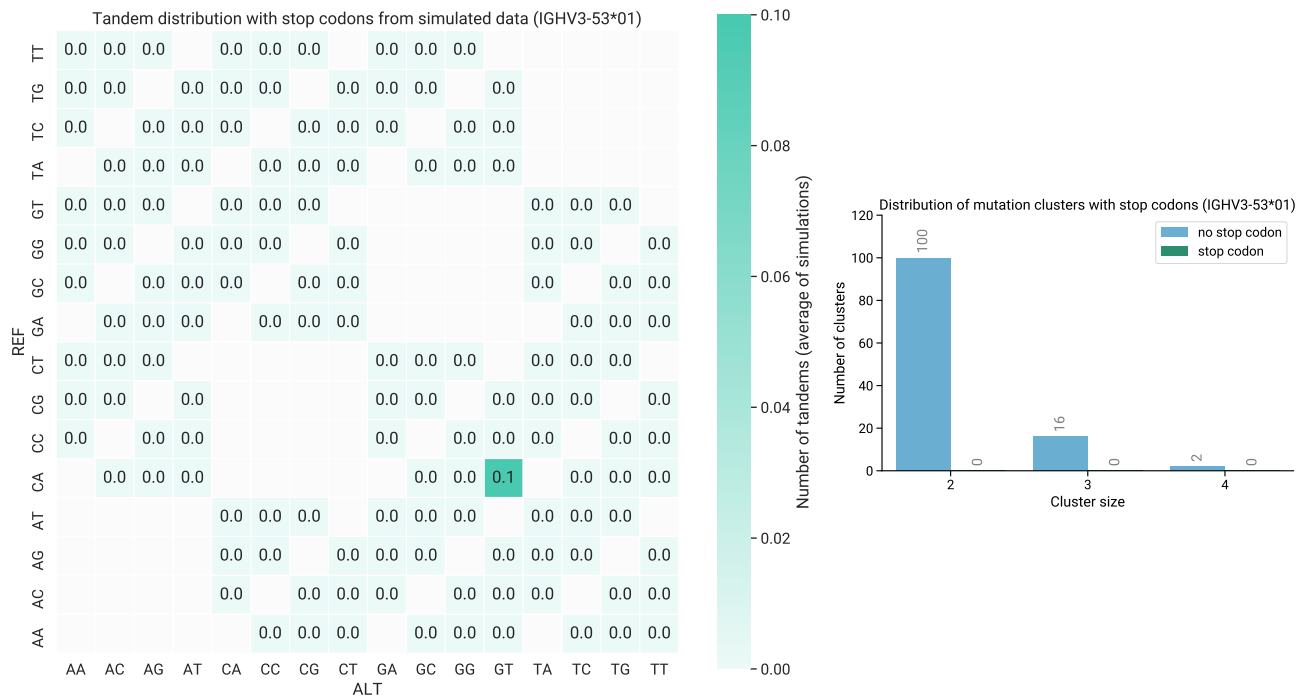


Tandem distribution from real data (IGHV3-53\*01)

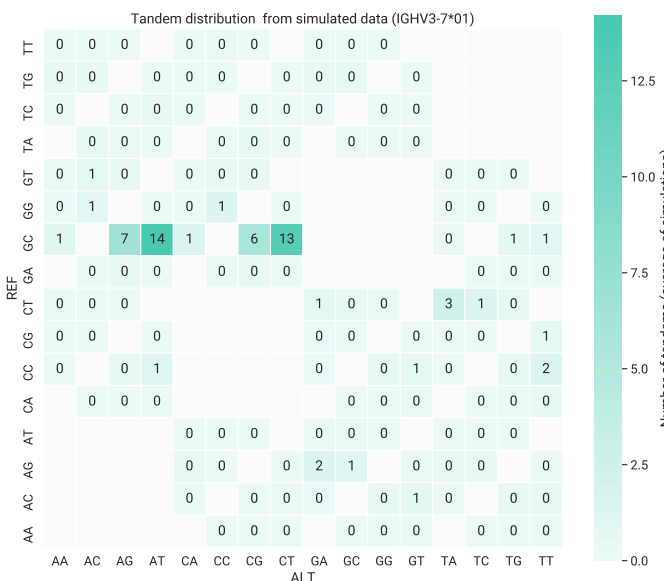
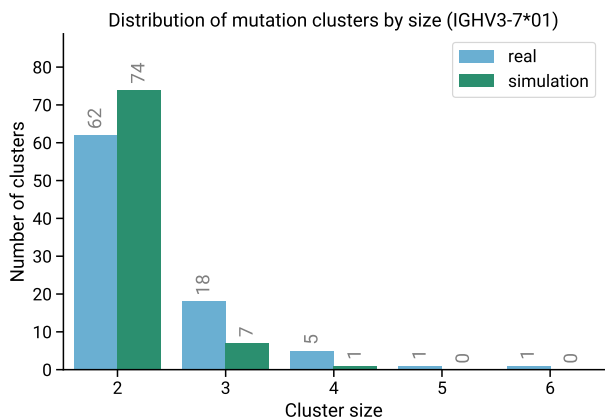
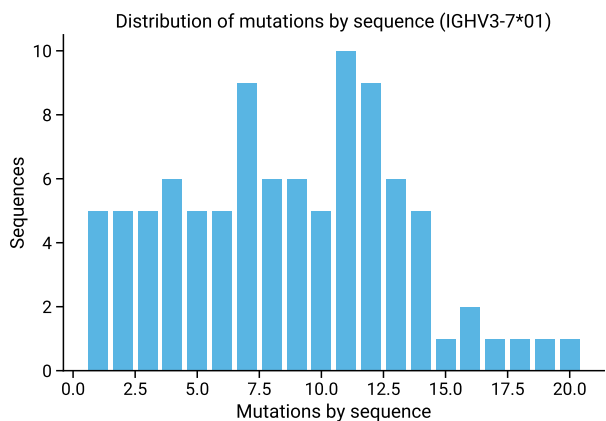
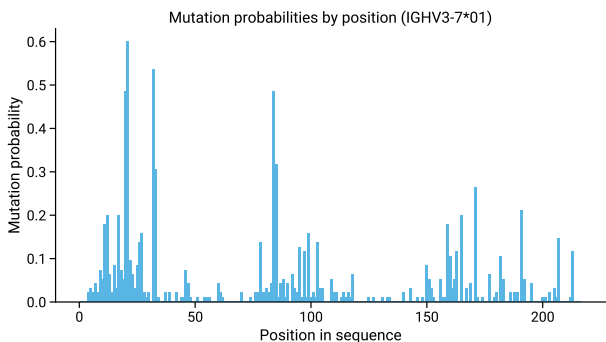
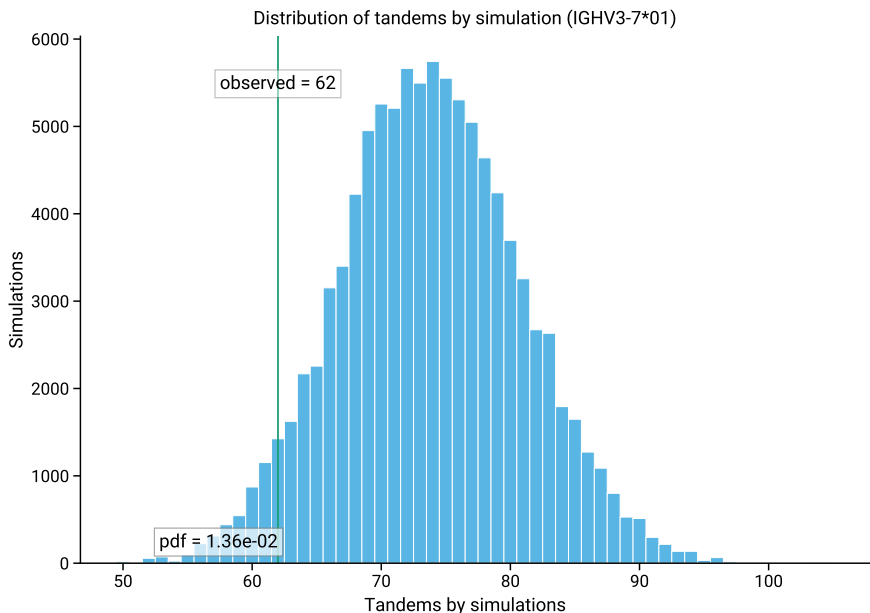


Tandem distribution from simulated data (IGHV3-53\*01)

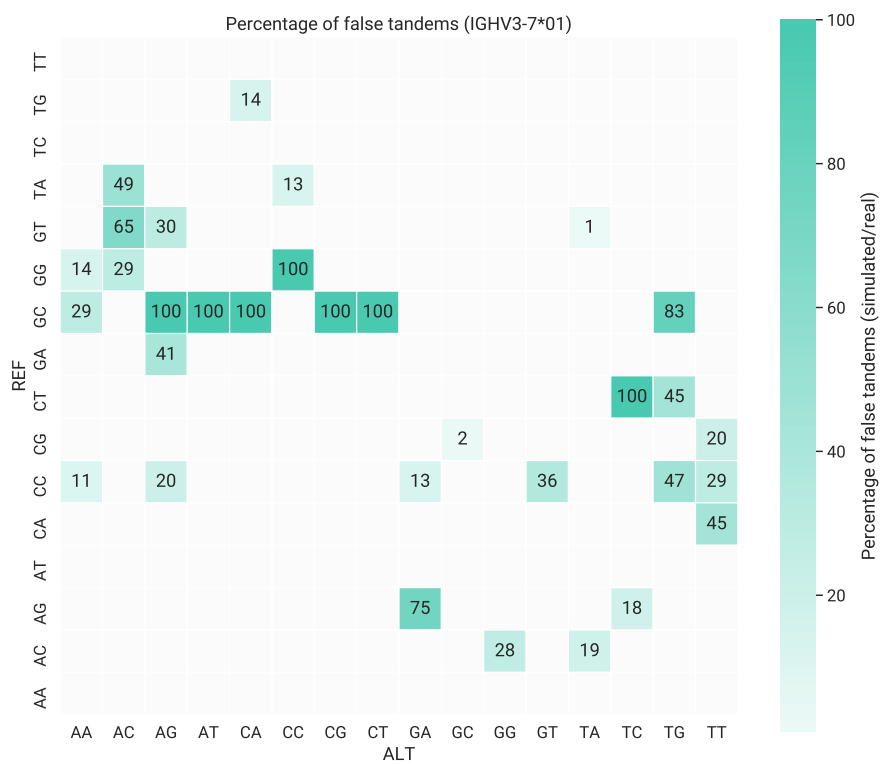
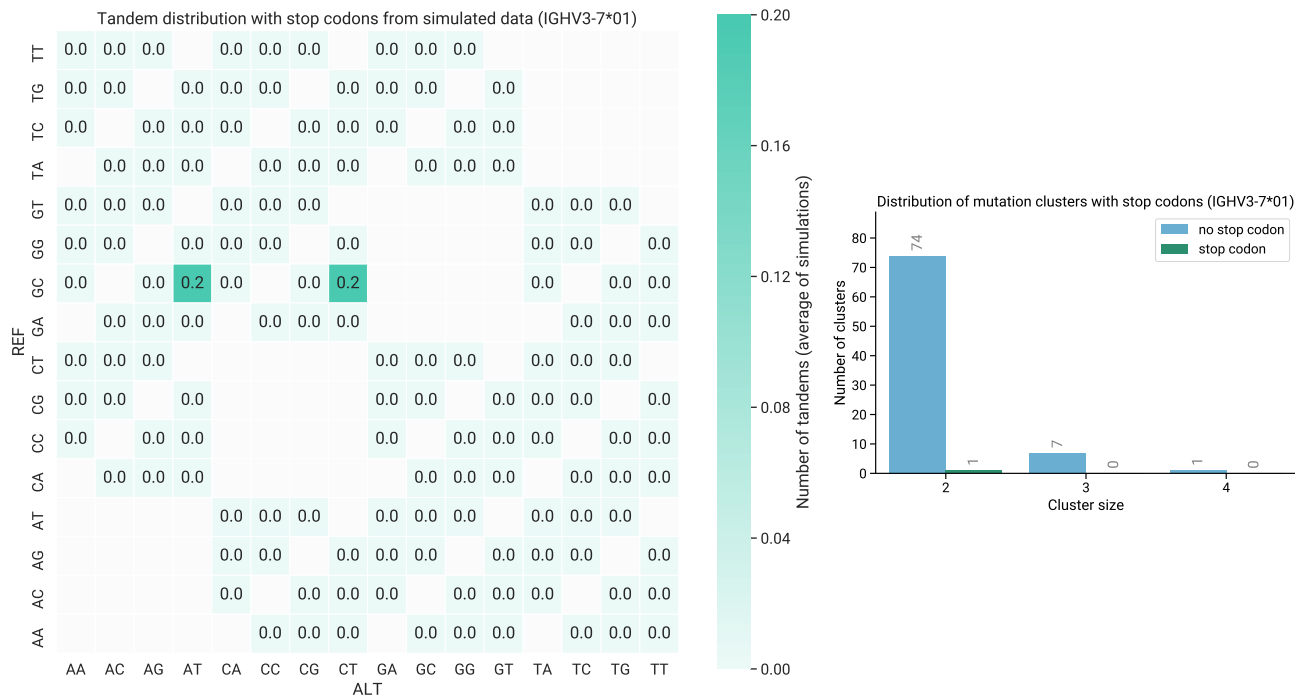




### 3.15 IGHV3-7\*01

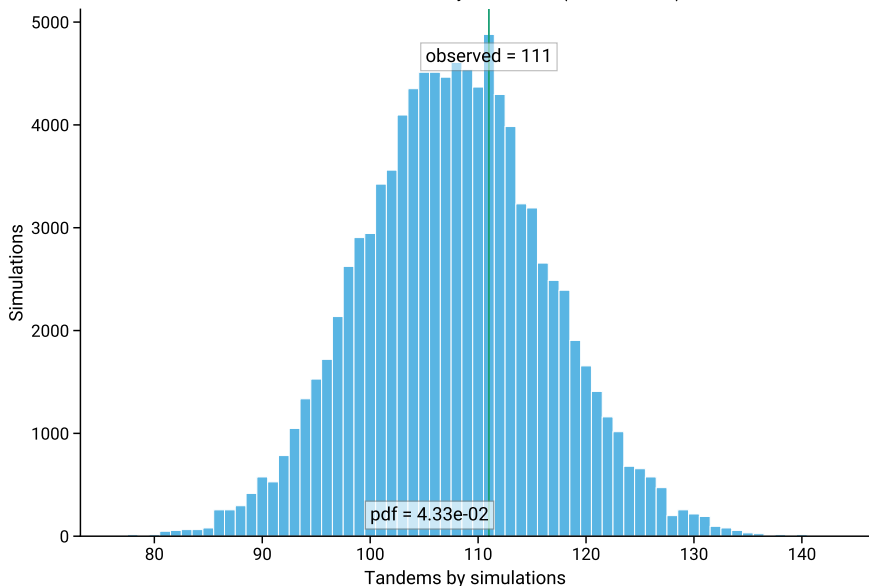




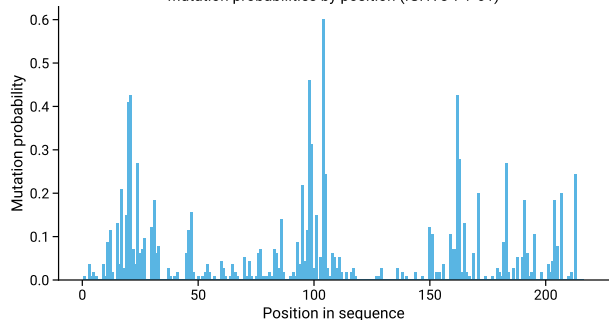


### 3.16 IGHV3-74\*01

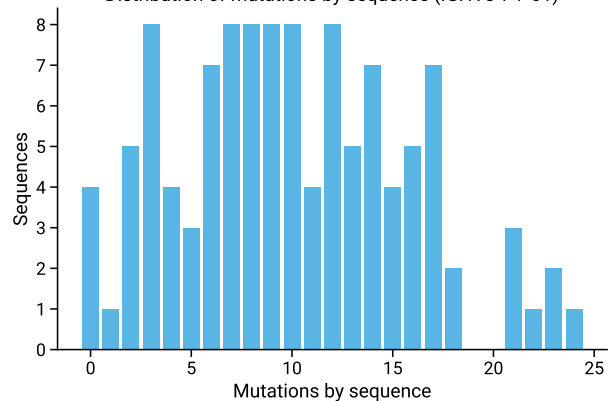
Distribution of tandems by simulation (IGHV3-74\*01)



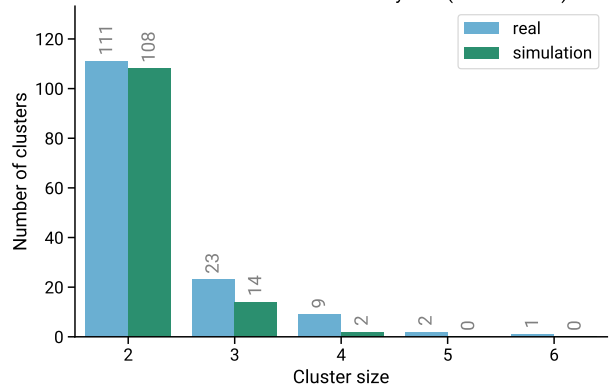
Mutation probabilities by position (IGHV3-74\*01)



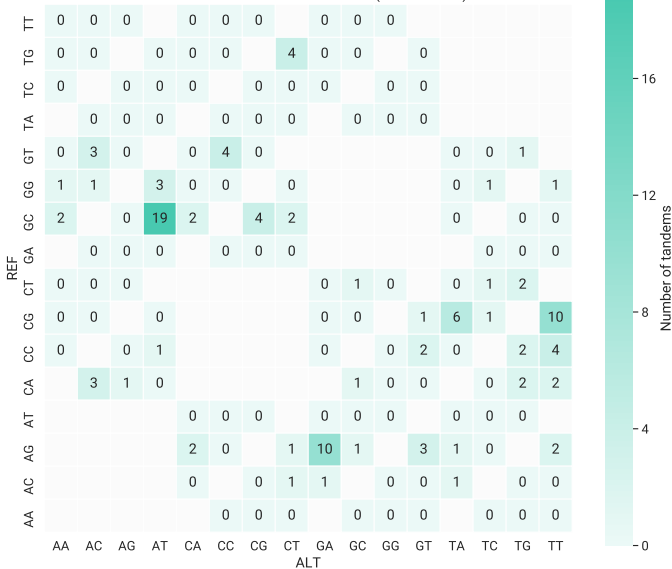
Distribution of mutations by sequence (IGHV3-74\*01)



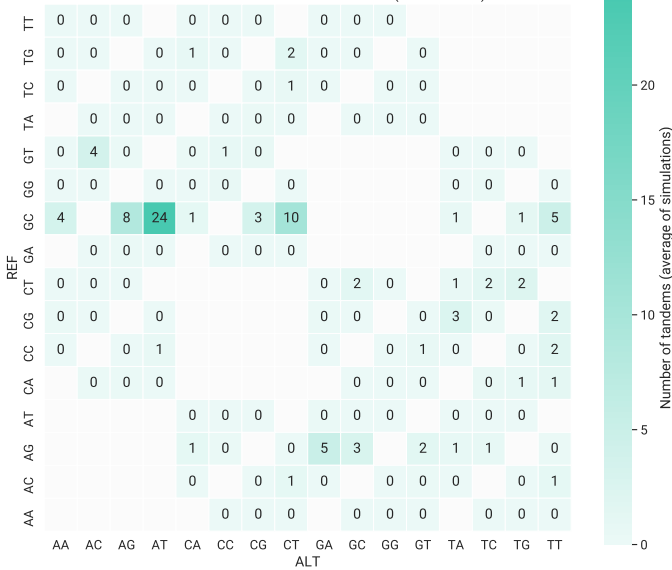
Distribution of mutation clusters by size (IGHV3-74\*01)

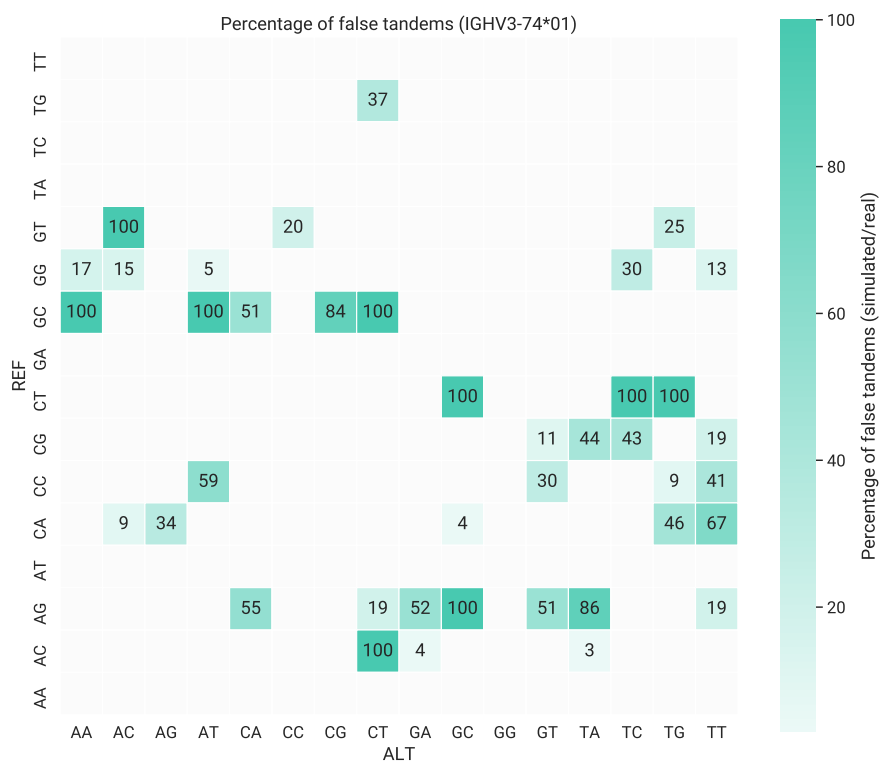
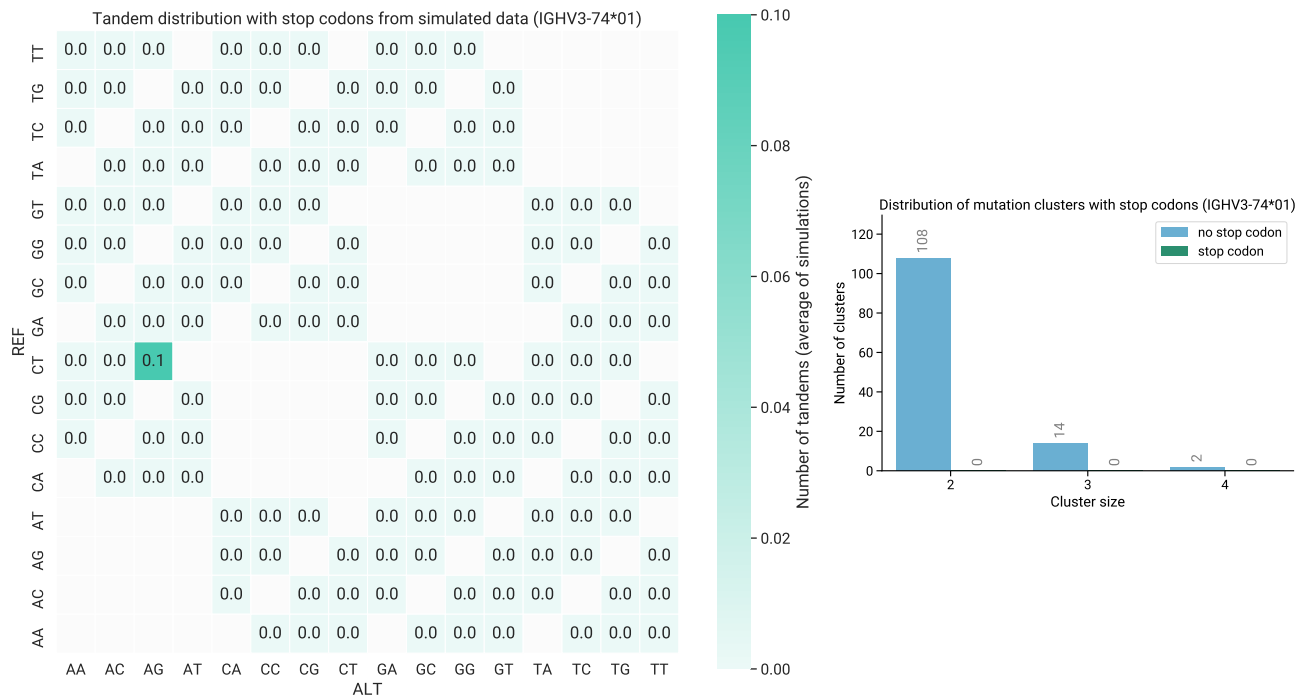


Tandem distribution from real data (IGHV3-74\*01)



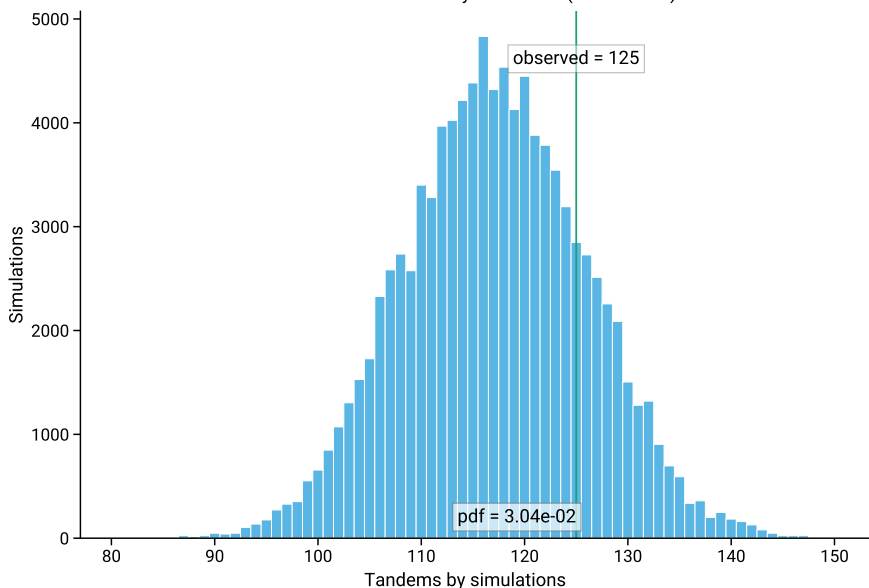
Tandem distribution from simulated data (IGHV3-74\*01)



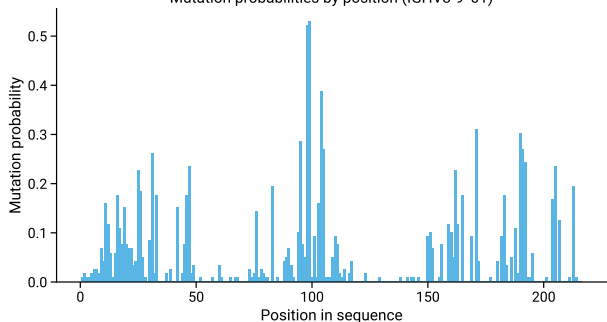


### 3.17 IGHV3-9\*01

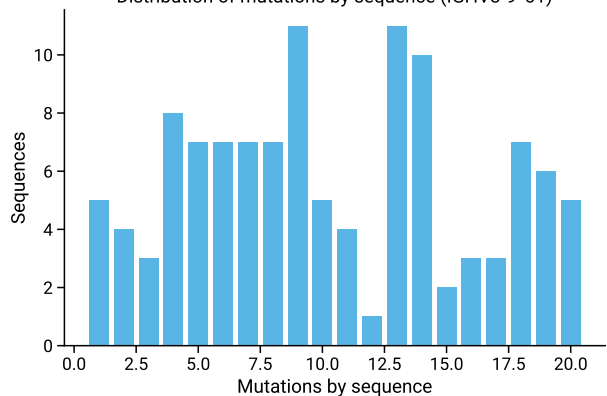
Distribution of tandems by simulation (IGHV3-9\*01)



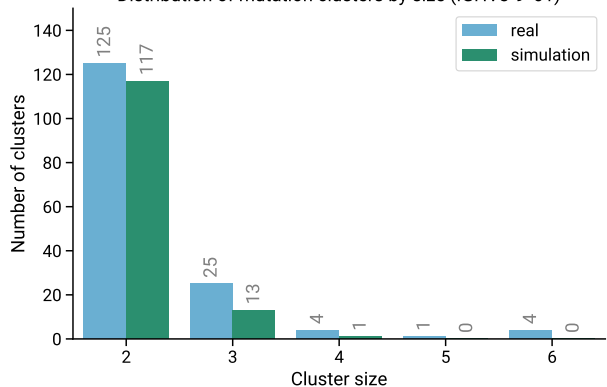
Mutation probabilities by position (IGHV3-9\*01)



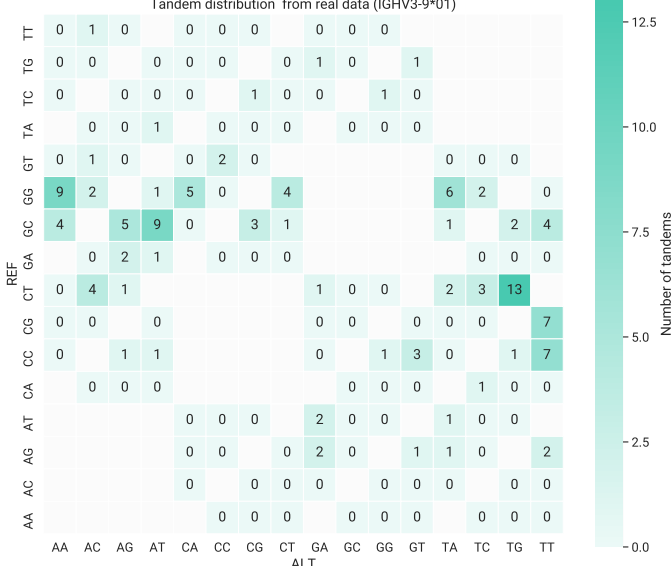
Distribution of mutations by sequence (IGHV3-9\*01)



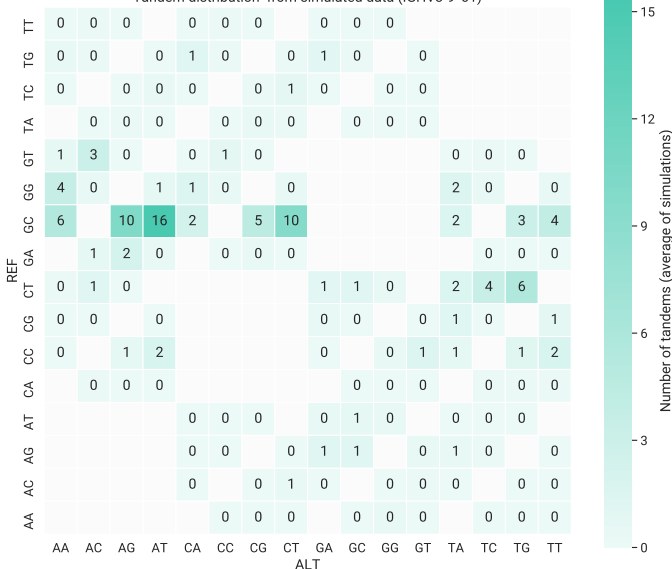
Distribution of mutation clusters by size (IGHV3-9\*01)

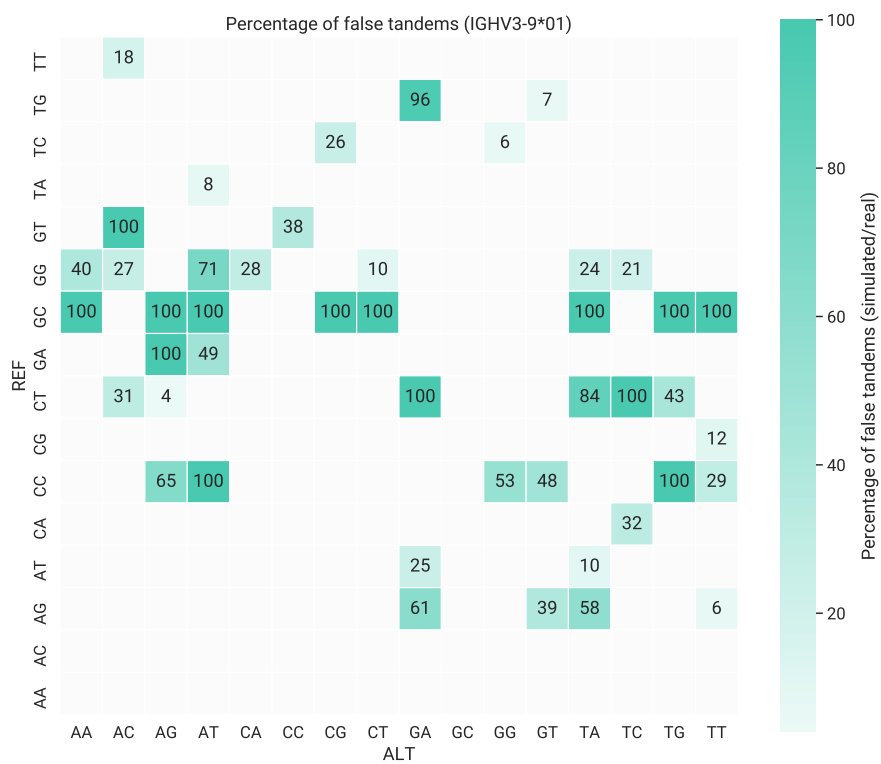
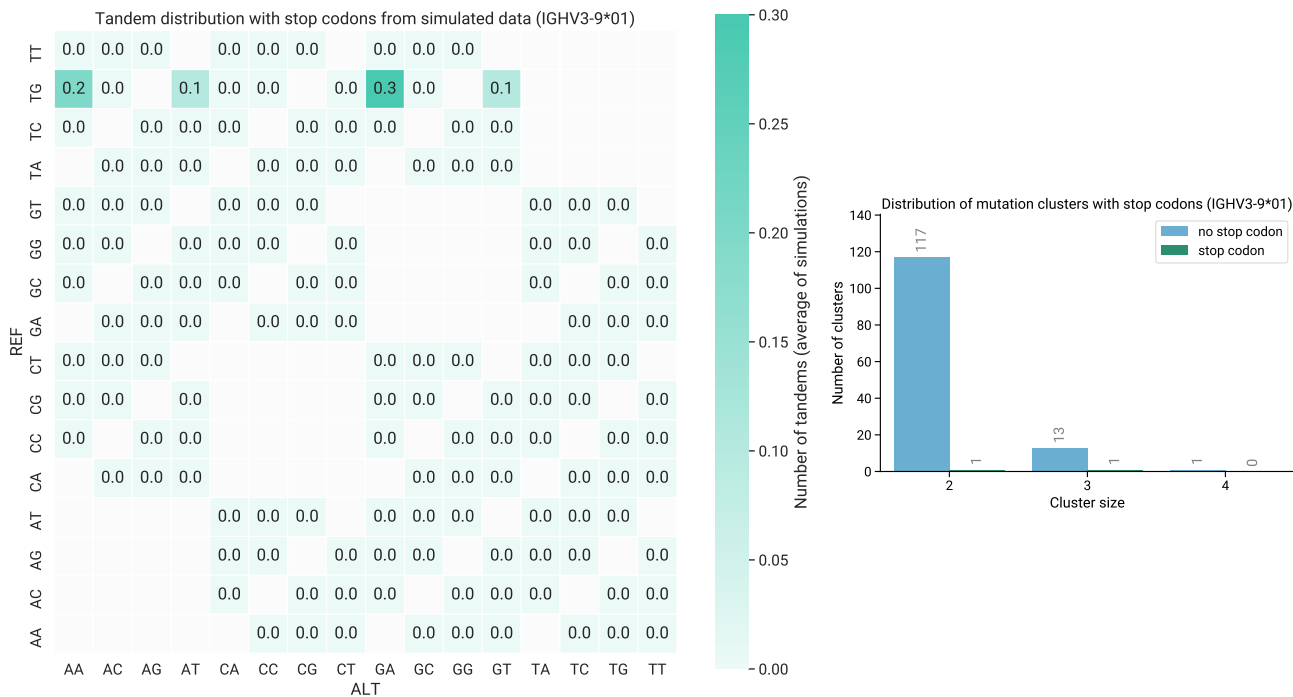


Tandem distribution from real data (IGHV3-9\*01)



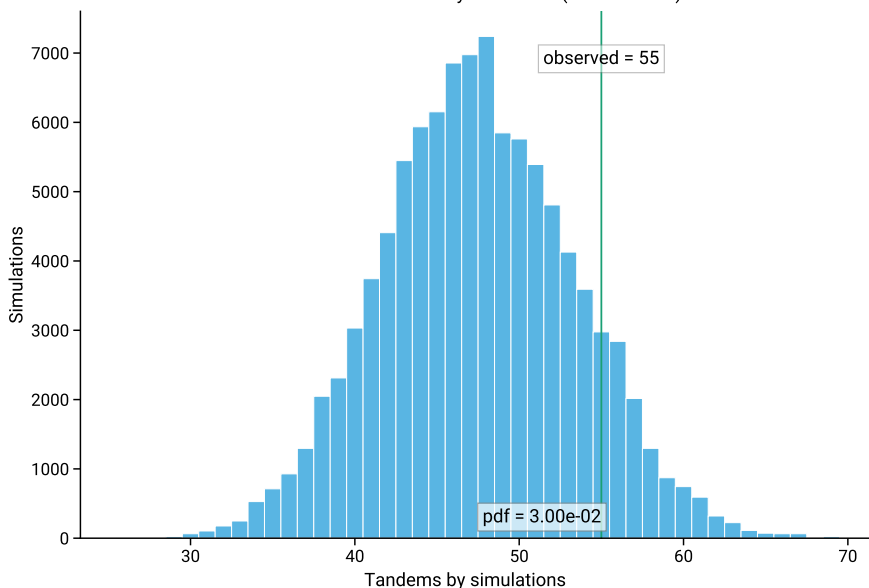
Tandem distribution from simulated data (IGHV3-9\*01)



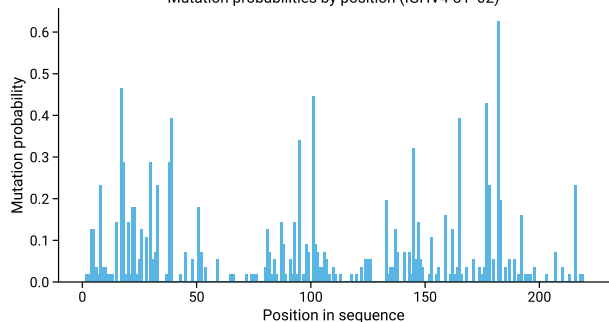


### 3.18 IGHV4-31\*02

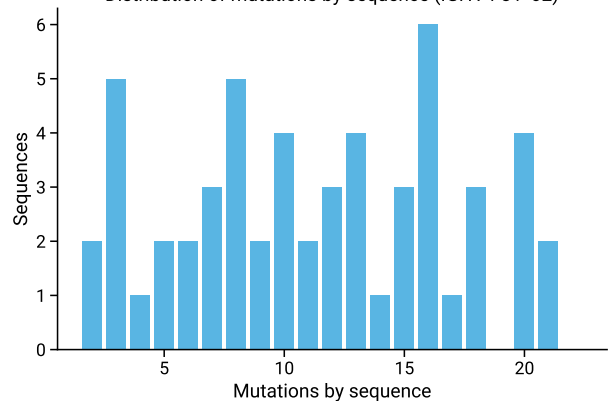
Distribution of tandems by simulation (IGHV4-31\*02)



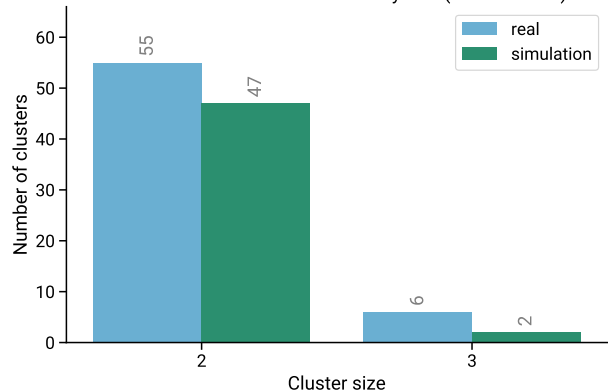
Mutation probabilities by position (IGHV4-31\*02)



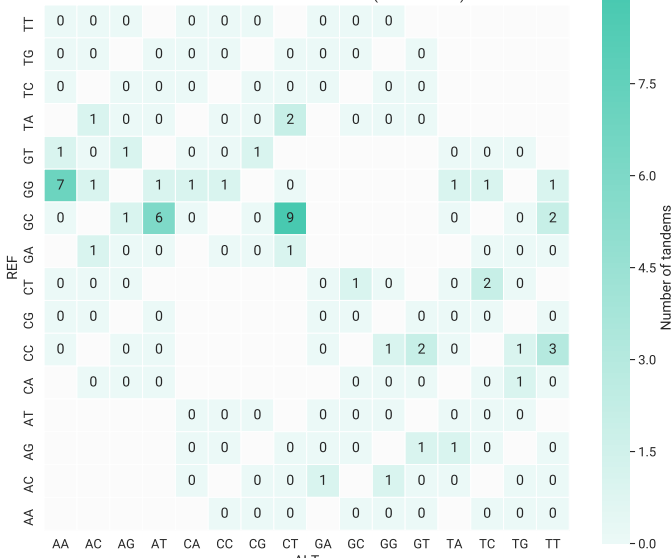
Distribution of mutations by sequence (IGHV4-31\*02)



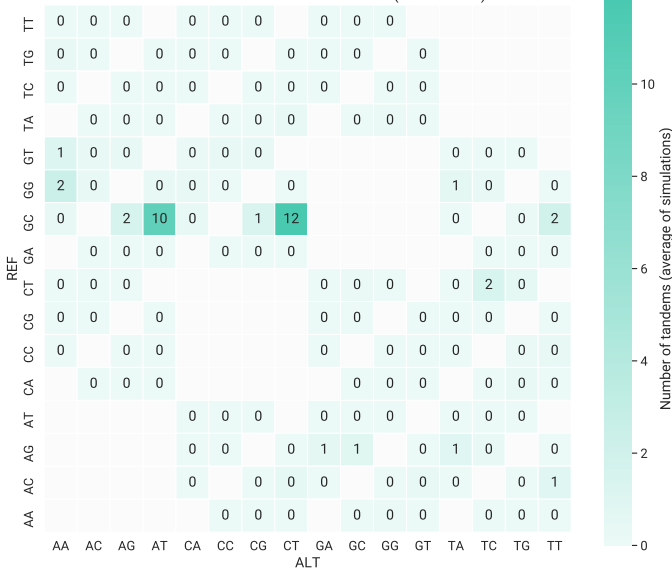
Distribution of mutation clusters by size (IGHV4-31\*02)

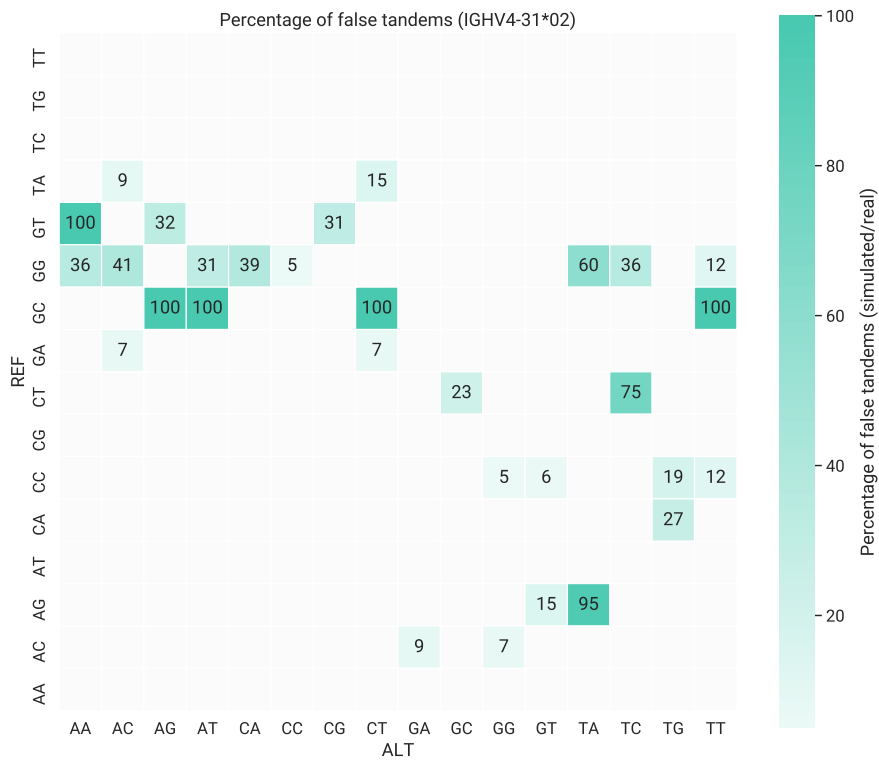
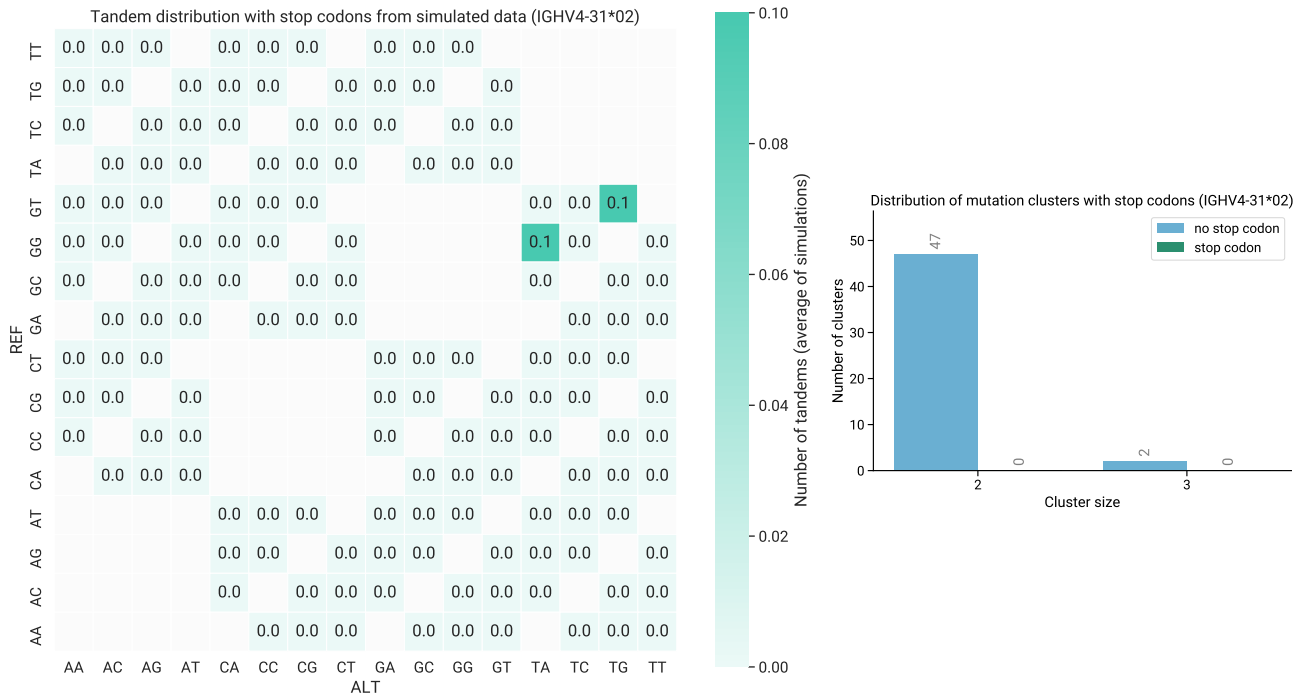


Tandem distribution from real data (IGHV4-31\*02)



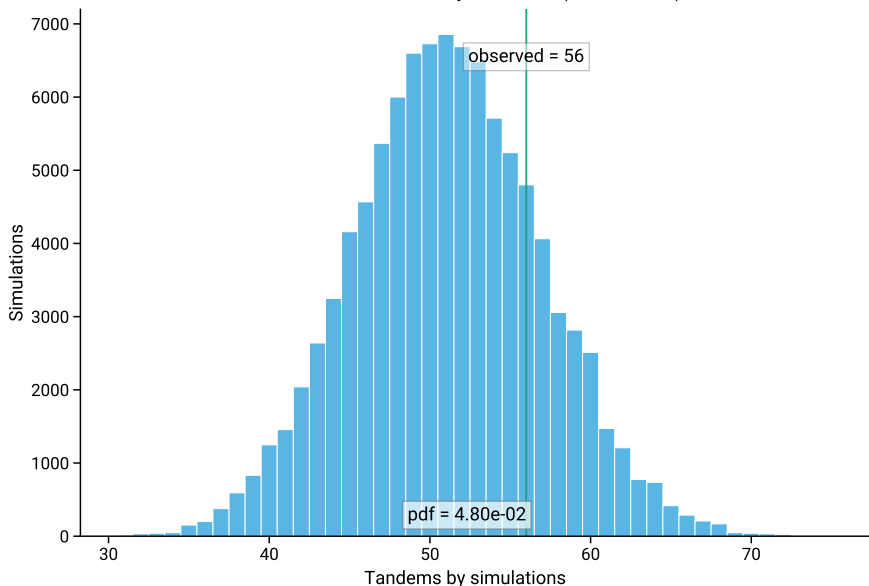
Tandem distribution from simulated data (IGHV4-31\*02)



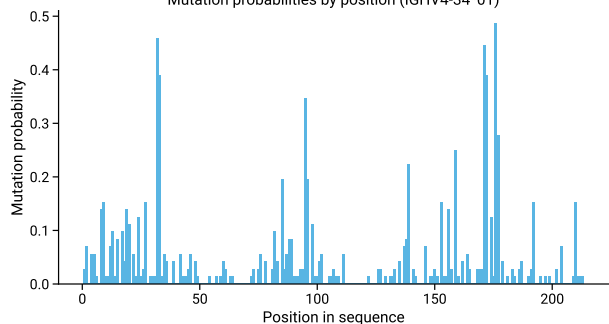


### 3.19 IGHV4-34\*01

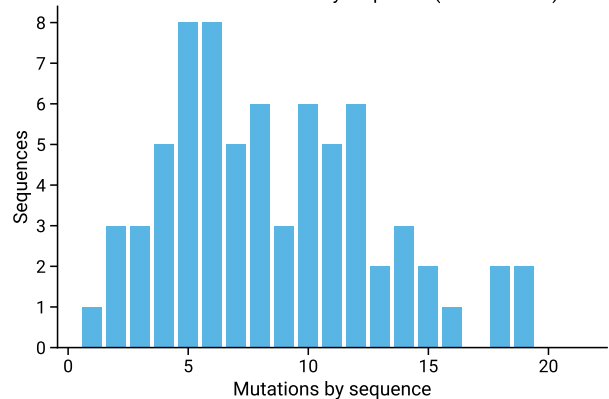
Distribution of tandems by simulation (IGHV4-34\*01)



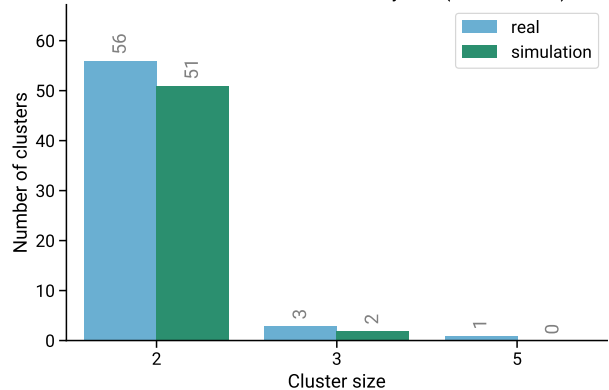
Mutation probabilities by position (IGHV4-34\*01)



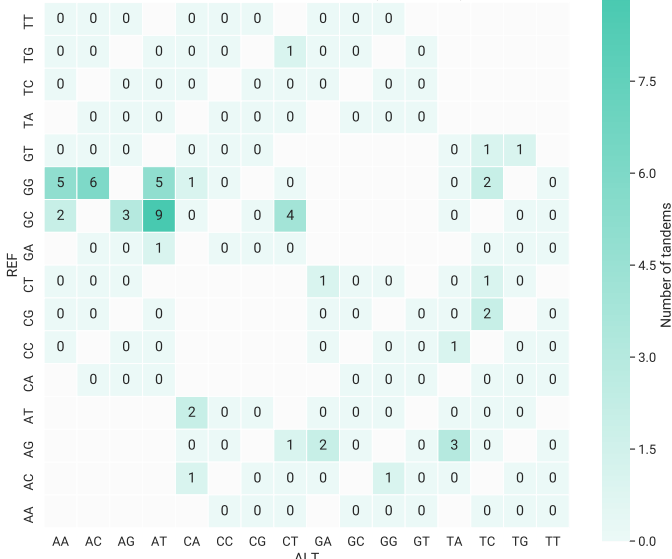
Distribution of mutations by sequence (IGHV4-34\*01)



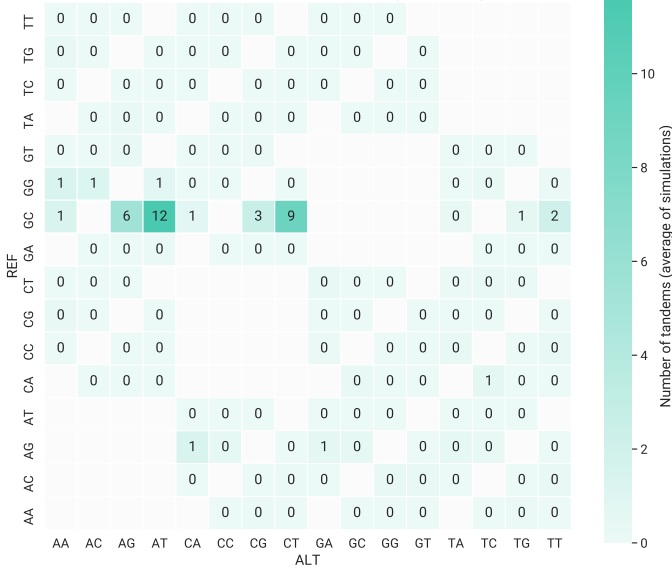
Distribution of mutation clusters by size (IGHV4-34\*01)



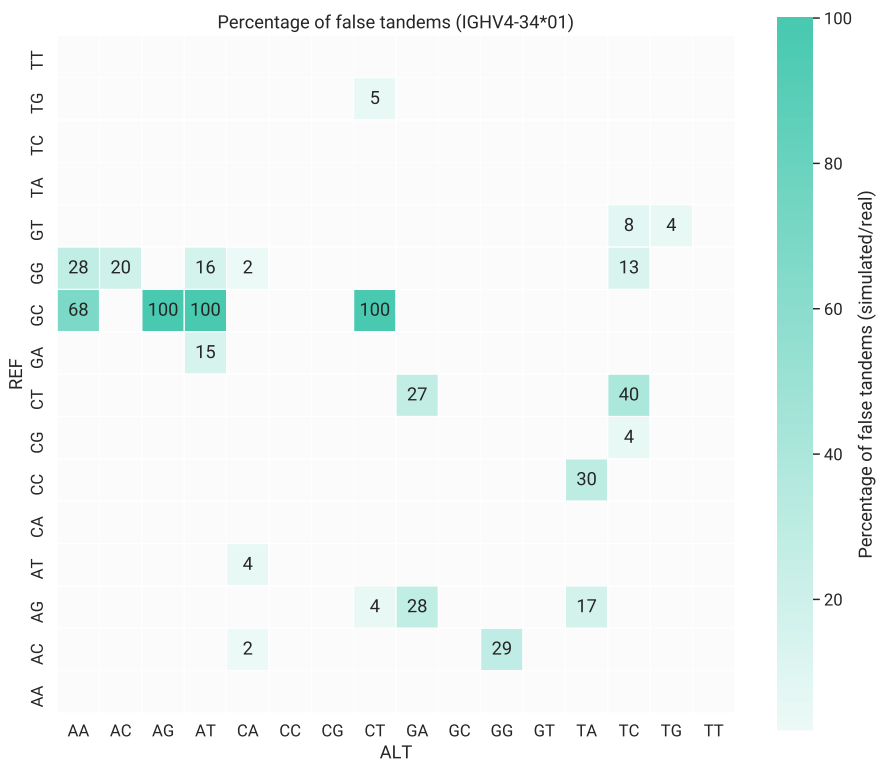
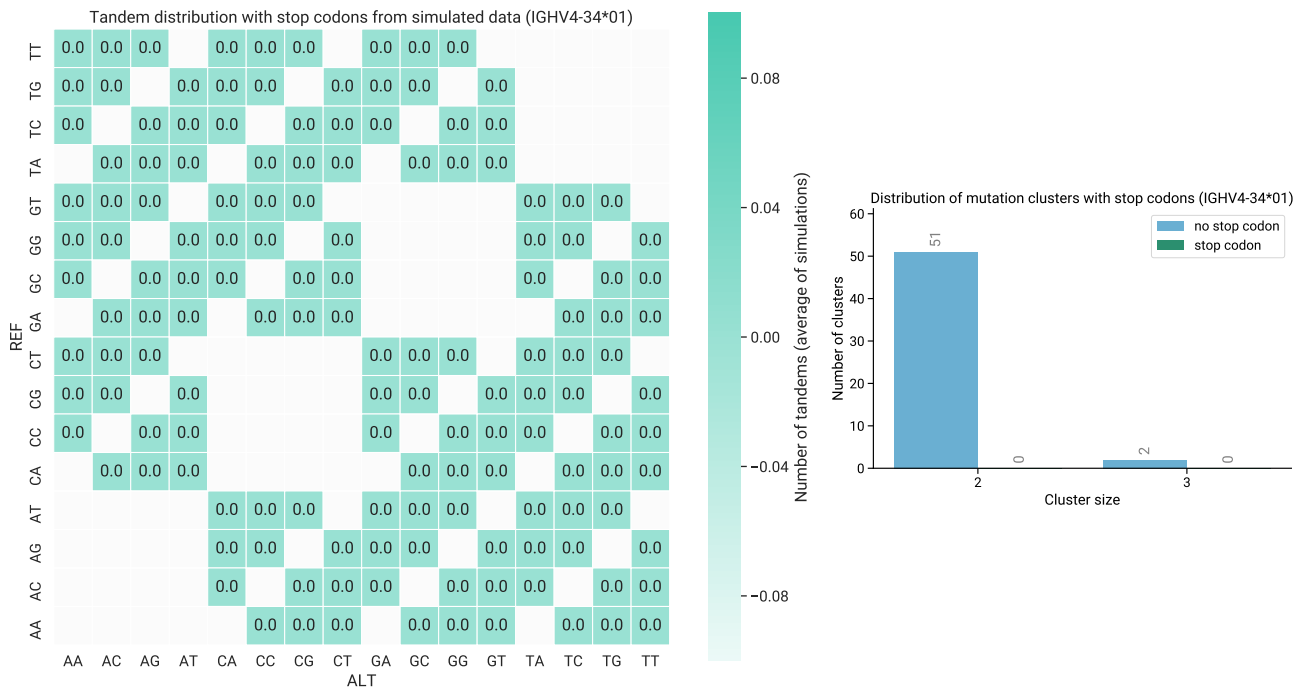
Tandem distribution from real data (IGHV4-34\*01)



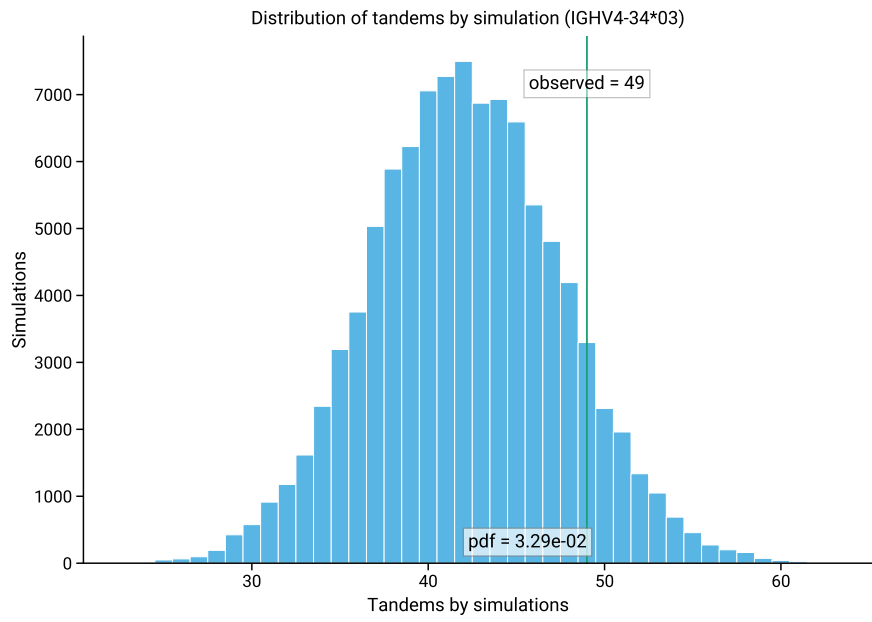
Tandem distribution from simulated data (IGHV4-34\*01)

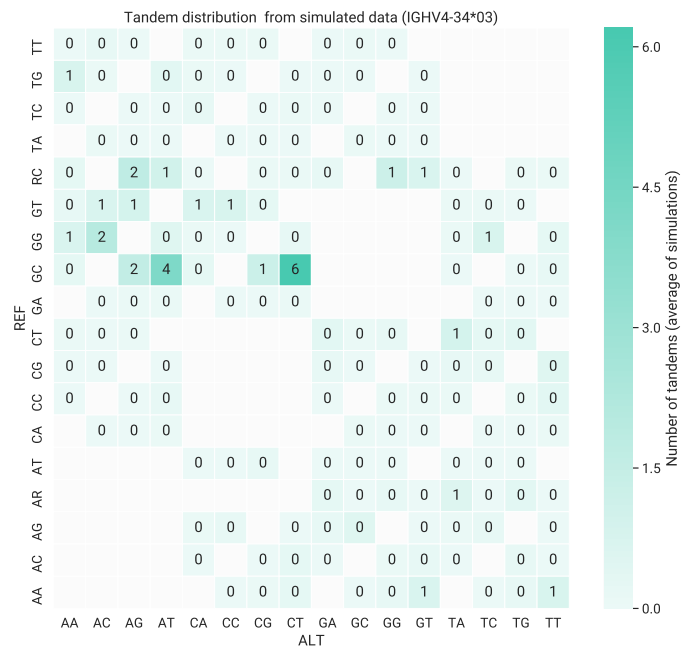
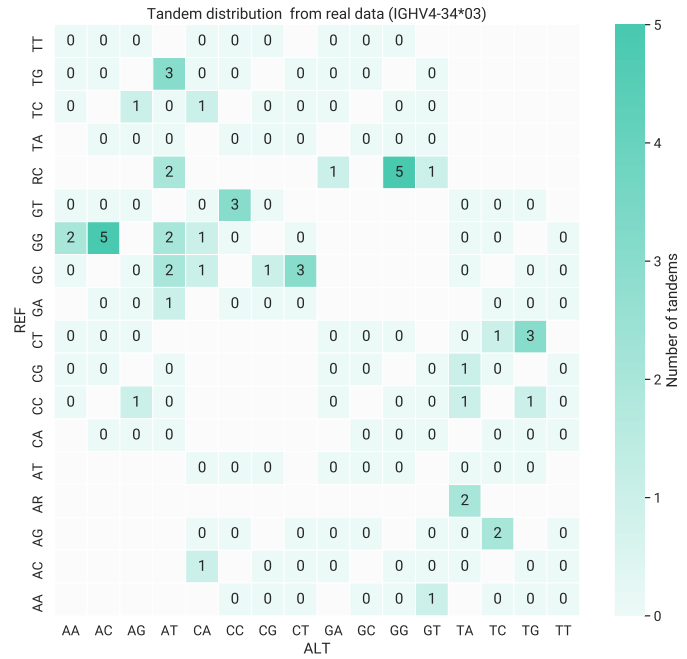
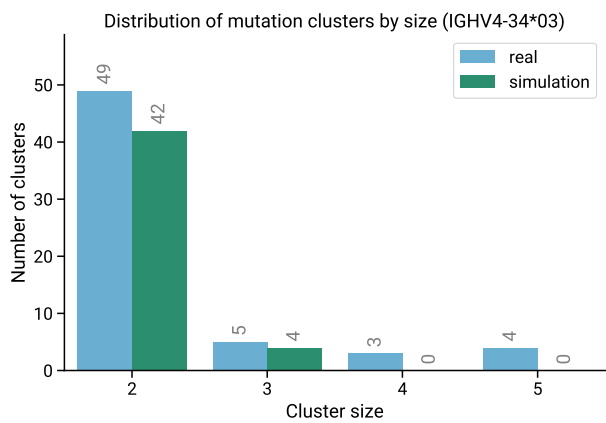
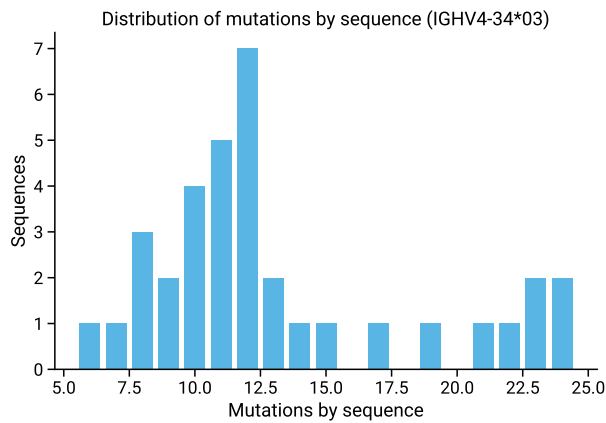
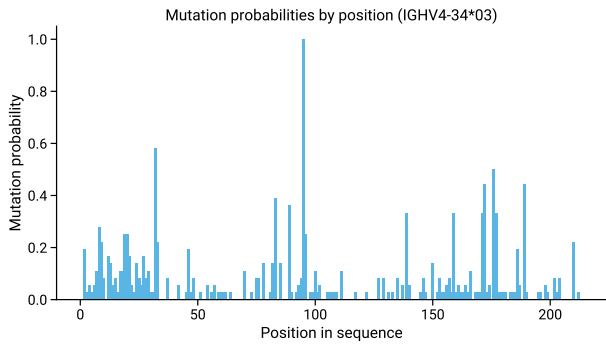


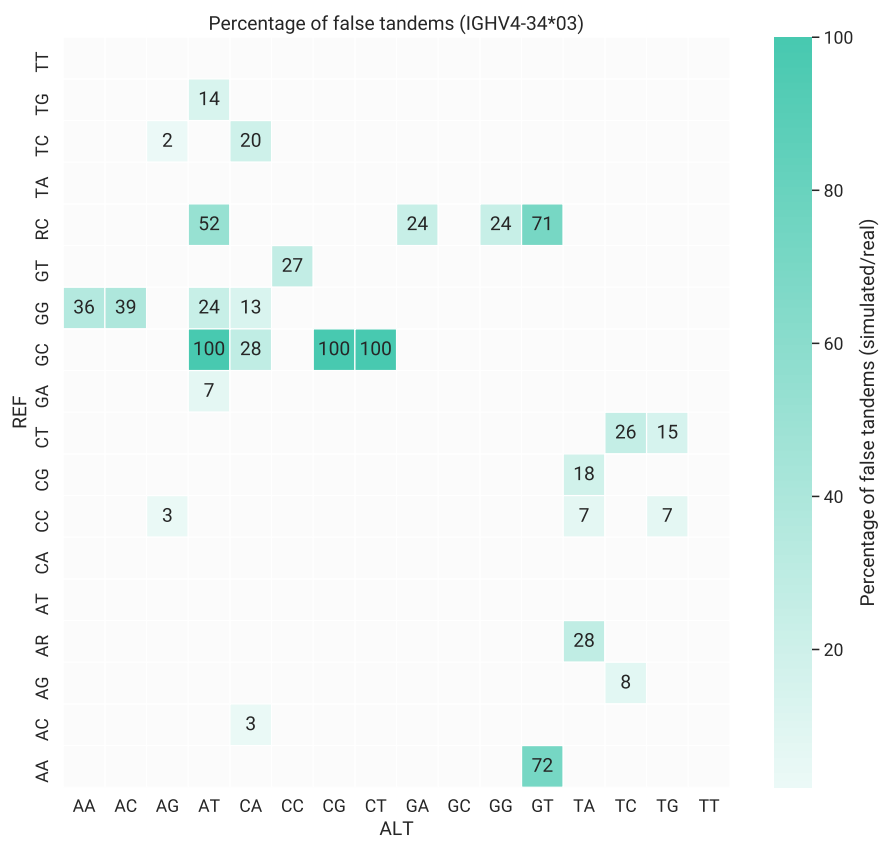
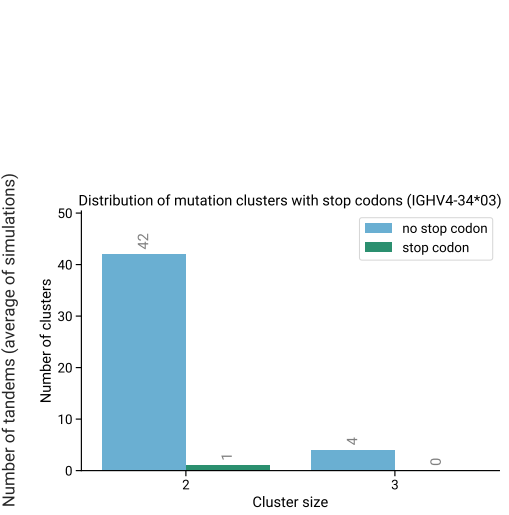
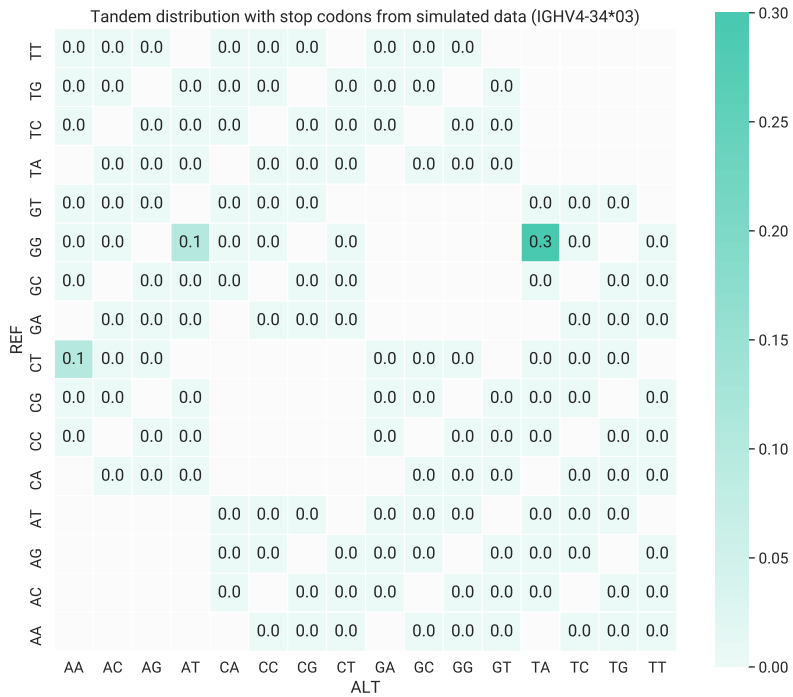




## 3.20 IGHV4-34\*03

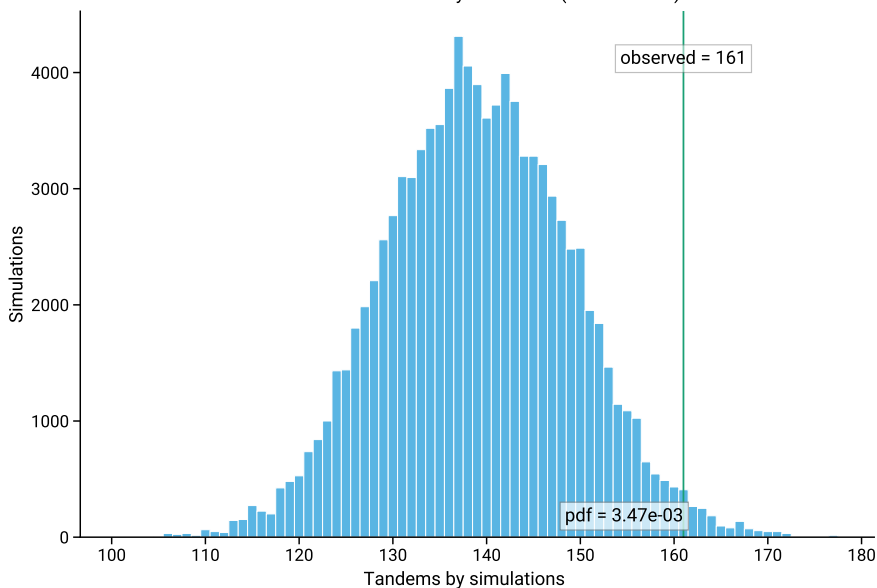




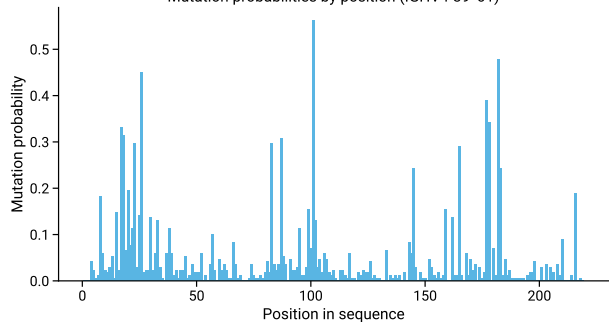


### 3.21 IGHV4-39\*01

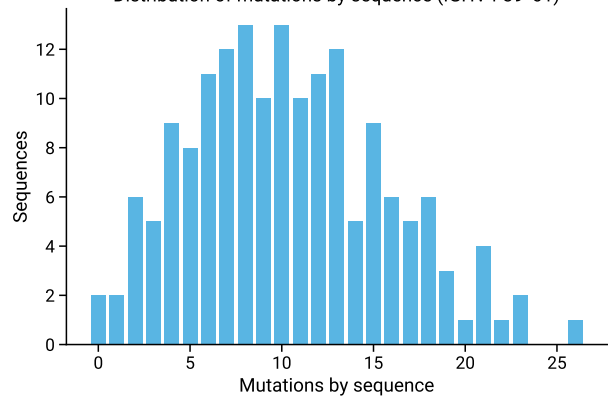
Distribution of tandems by simulation (IGHV4-39\*01)



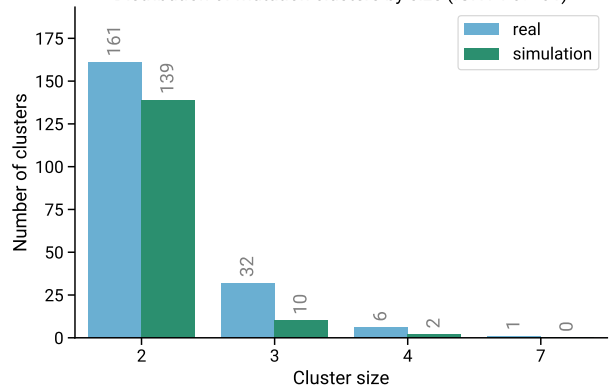
Mutation probabilities by position (IGHV4-39\*01)



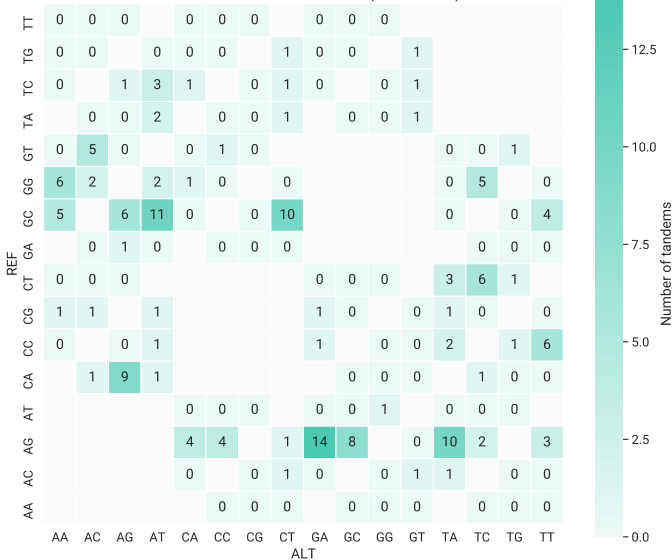
Distribution of mutations by sequence (IGHV4-39\*01)



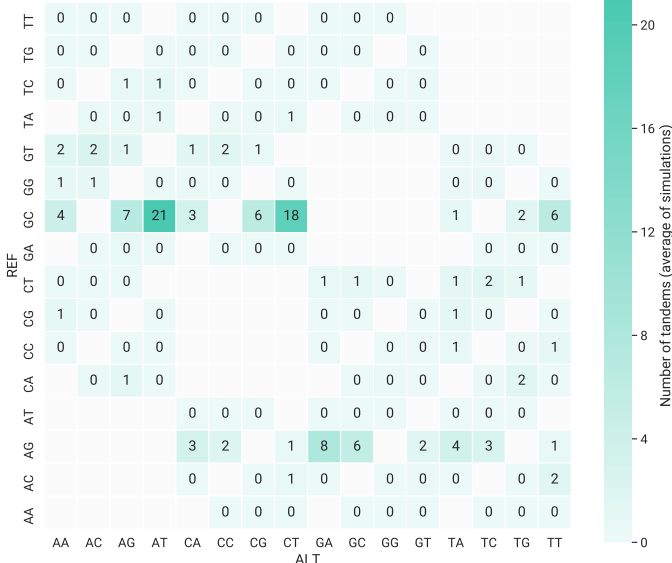
Distribution of mutation clusters by size (IGHV4-39\*01)

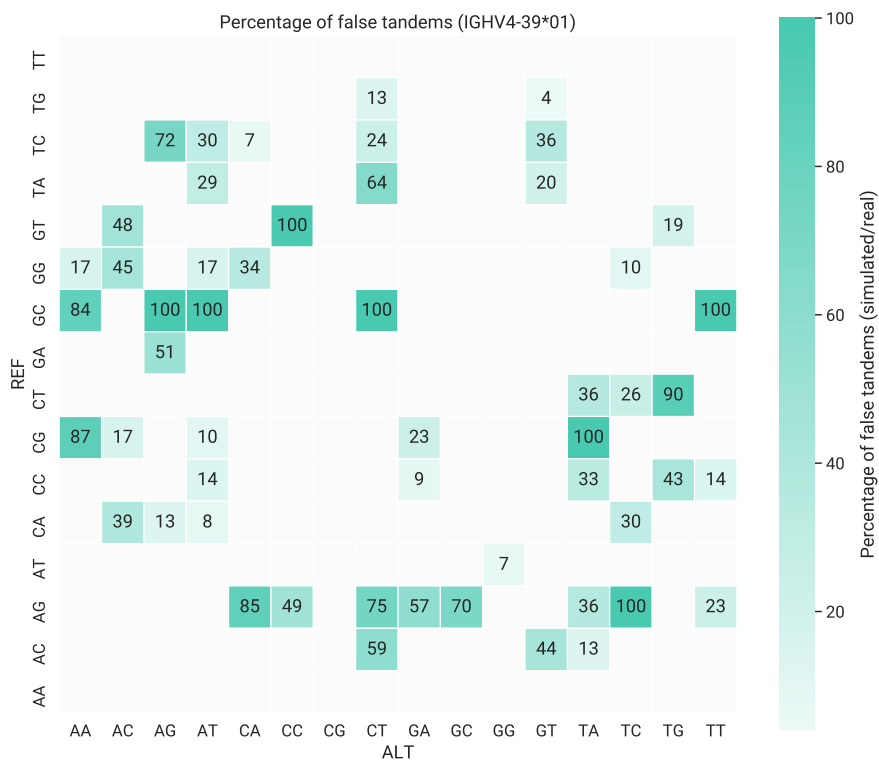
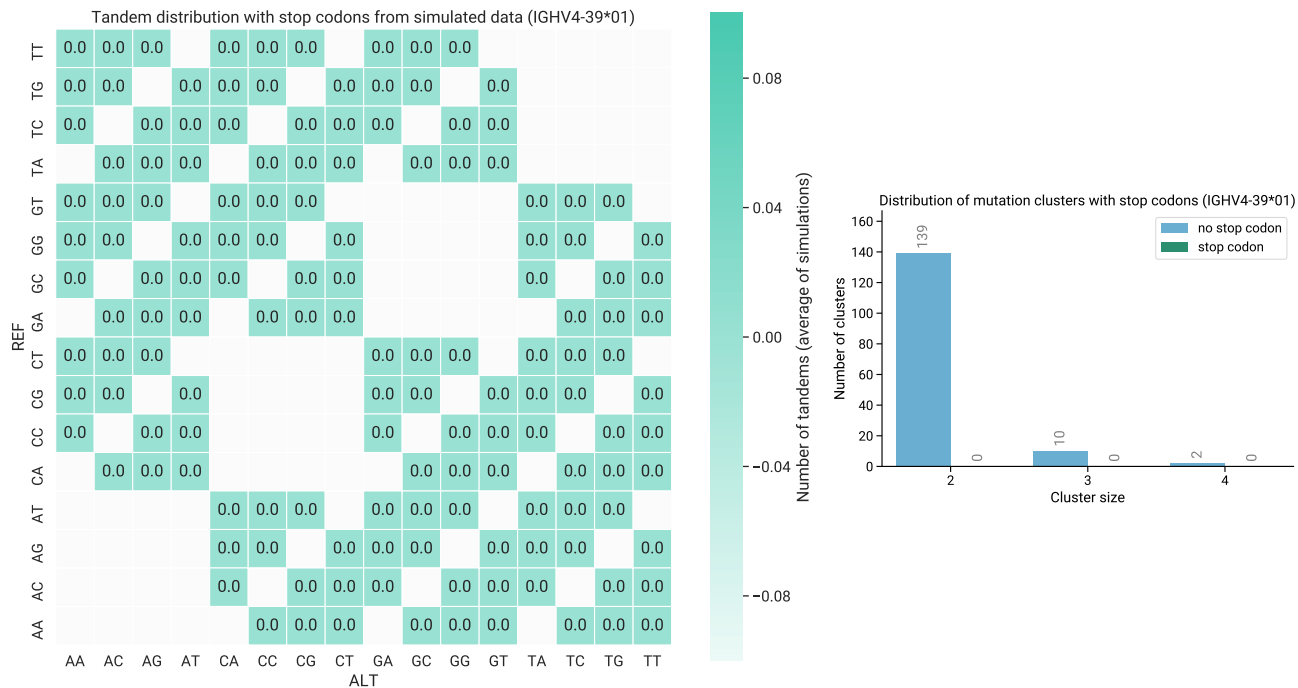


Tandem distribution from real data (IGHV4-39\*01)



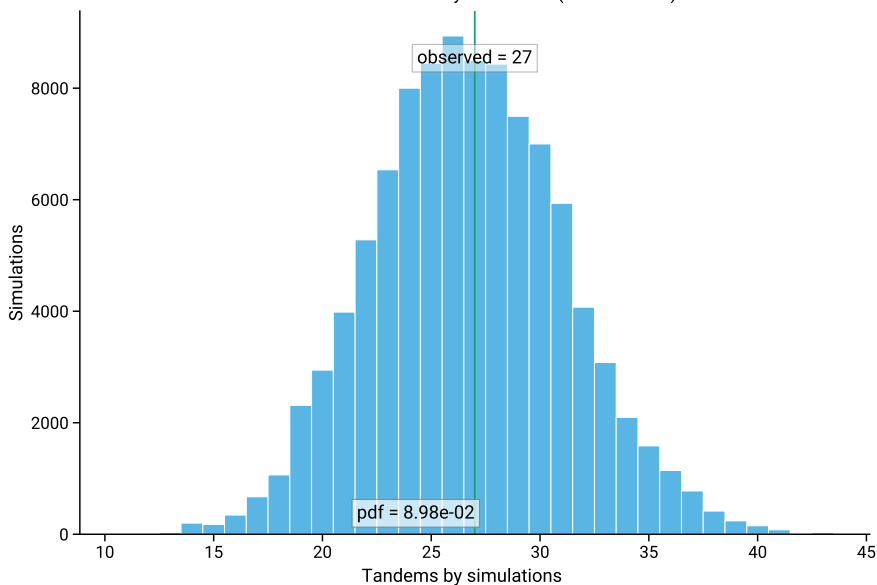
Tandem distribution from simulated data (IGHV4-39\*01)



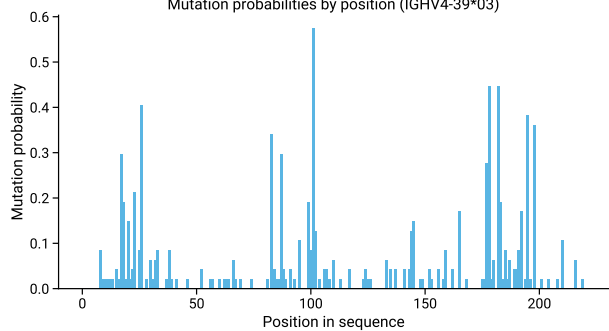


### 3.22 IGHV4-39\*03

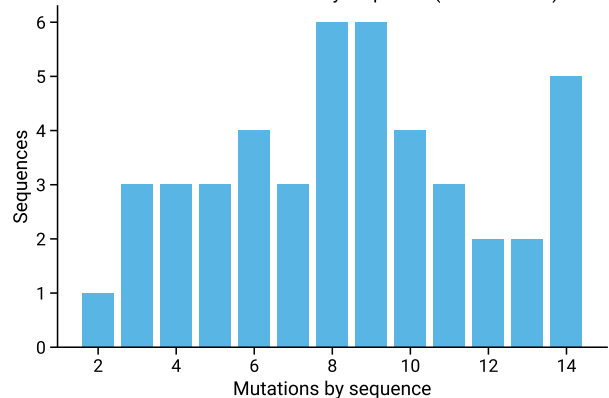
Distribution of tandems by simulation (IGHV4-39\*03)



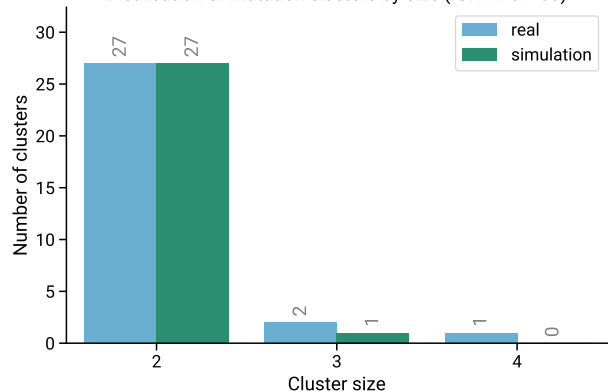
Mutation probabilities by position (IGHV4-39\*03)



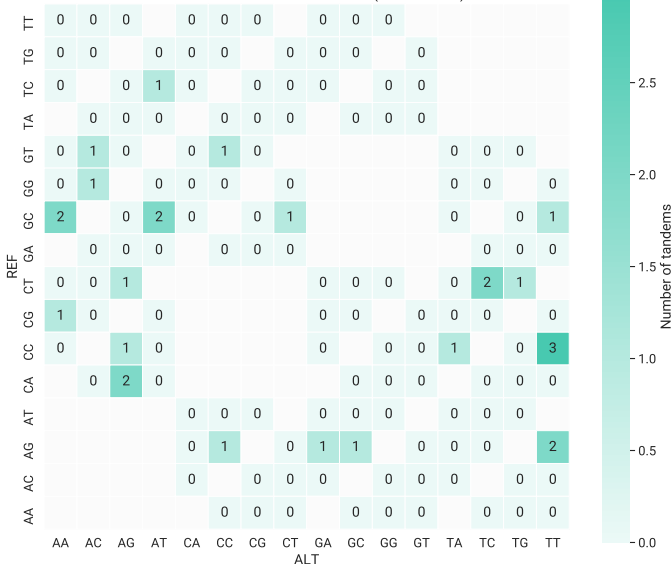
Distribution of mutations by sequence (IGHV4-39\*03)



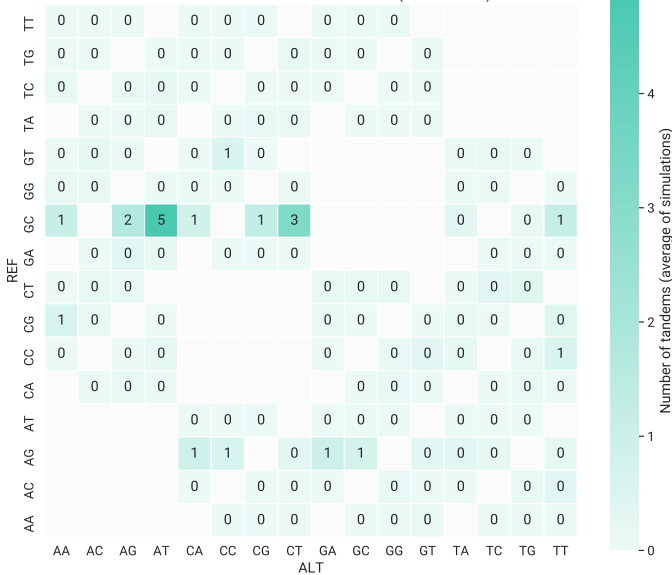
Distribution of mutation clusters by size (IGHV4-39\*03)

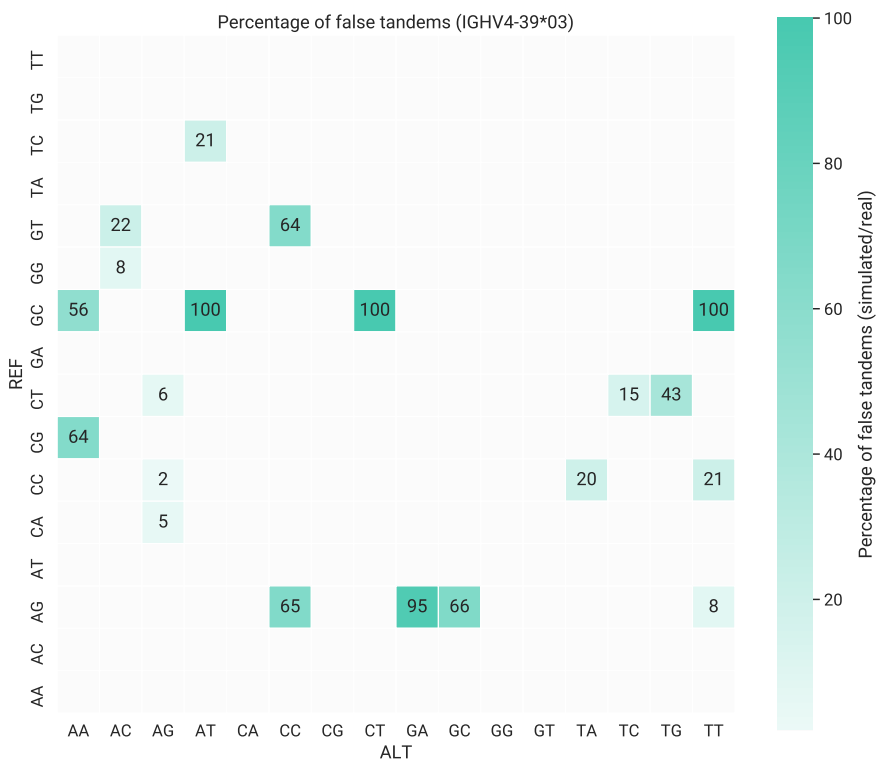
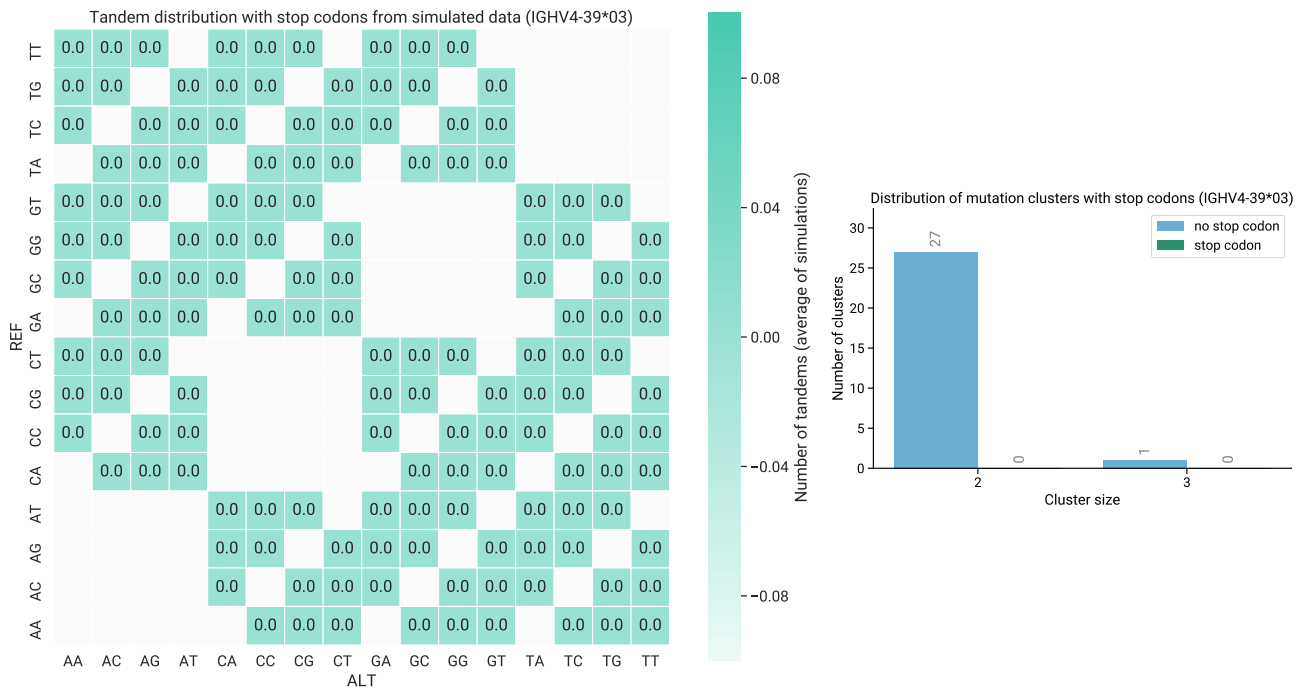


Tandem distribution from real data (IGHV4-39\*03)



Tandem distribution from simulated data (IGHV4-39\*03)

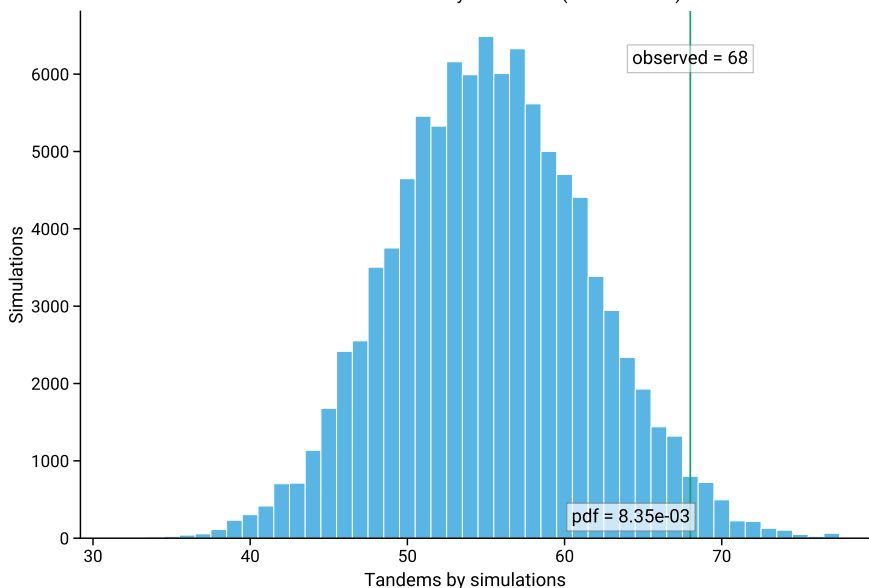




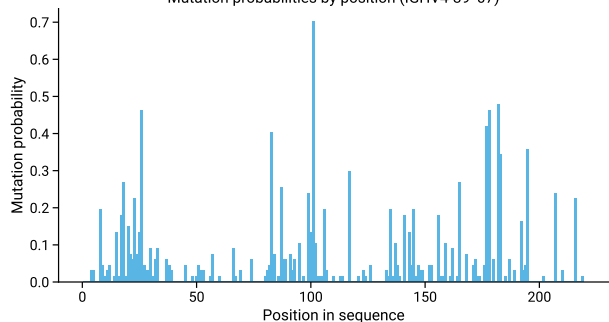


### 3.23 IGHV4-39\*07

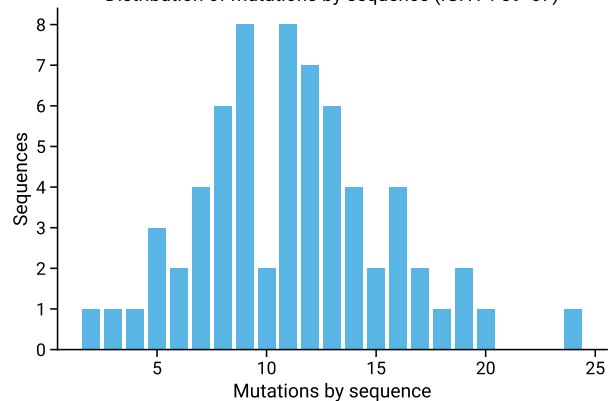
Distribution of tandems by simulation (IGHV4-39\*07)



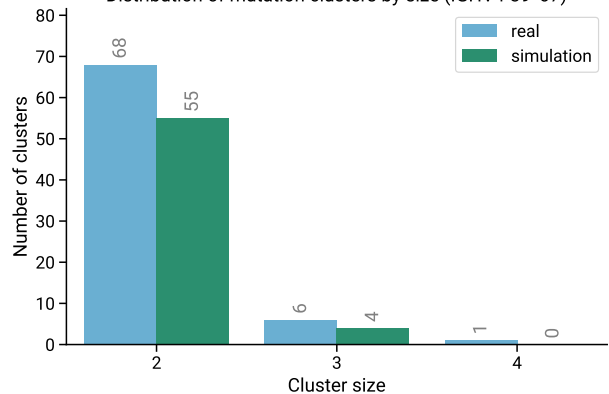
Mutation probabilities by position (IGHV4-39\*07)



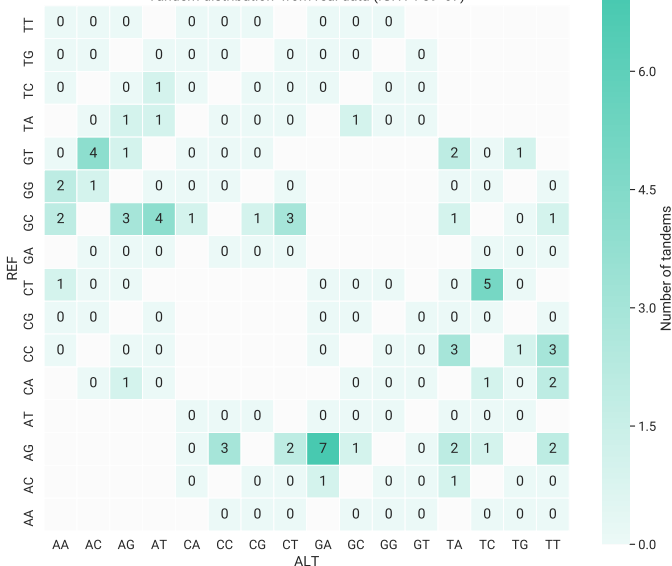
Distribution of mutations by sequence (IGHV4-39\*07)



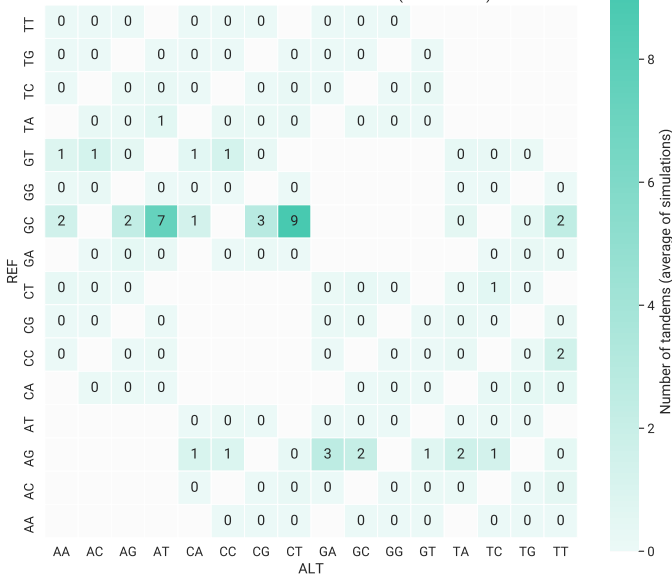
Distribution of mutation clusters by size (IGHV4-39\*07)

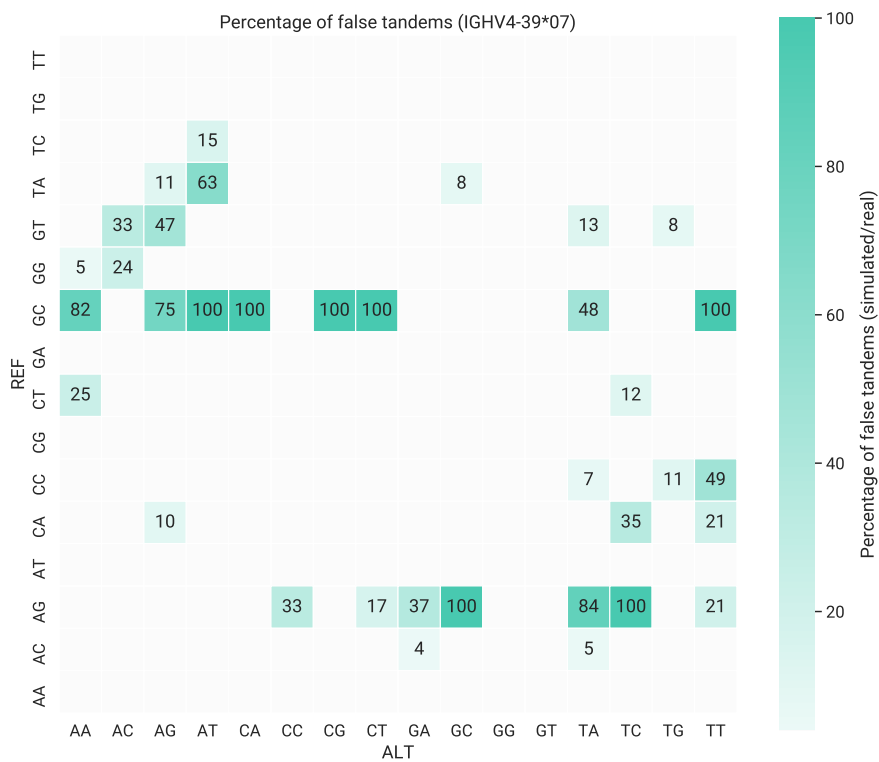
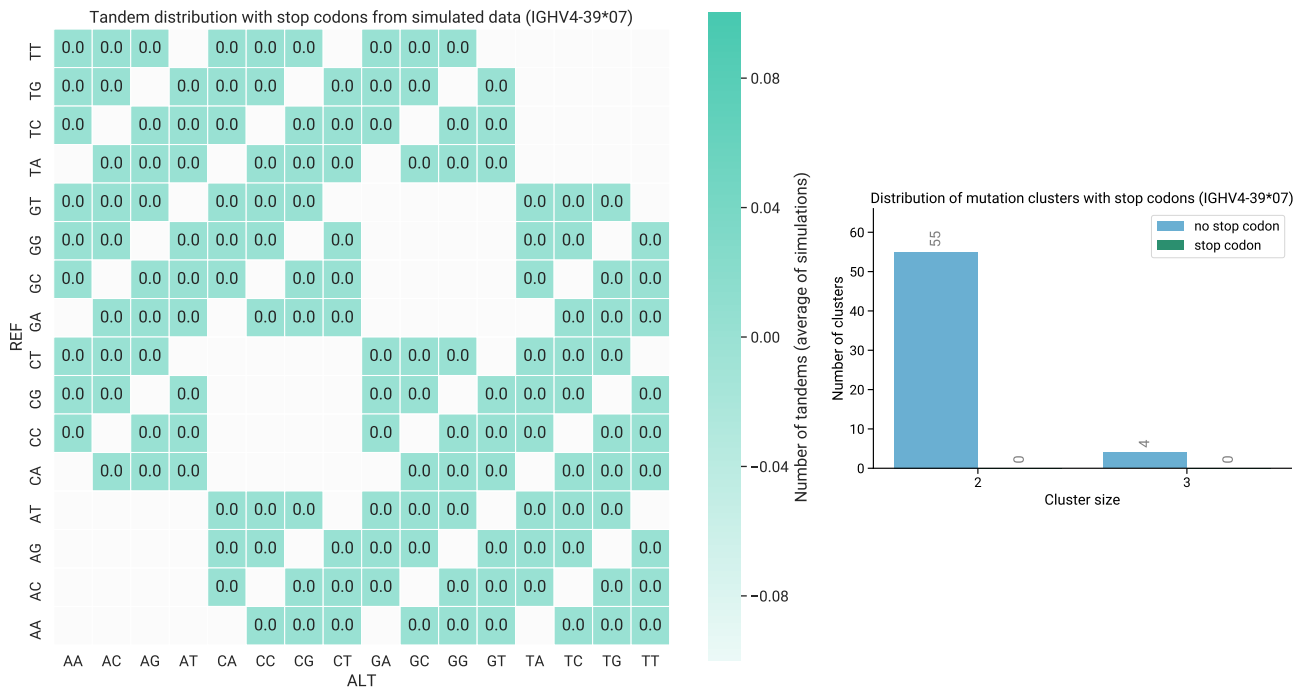


Tandem distribution from real data (IGHV4-39\*07)



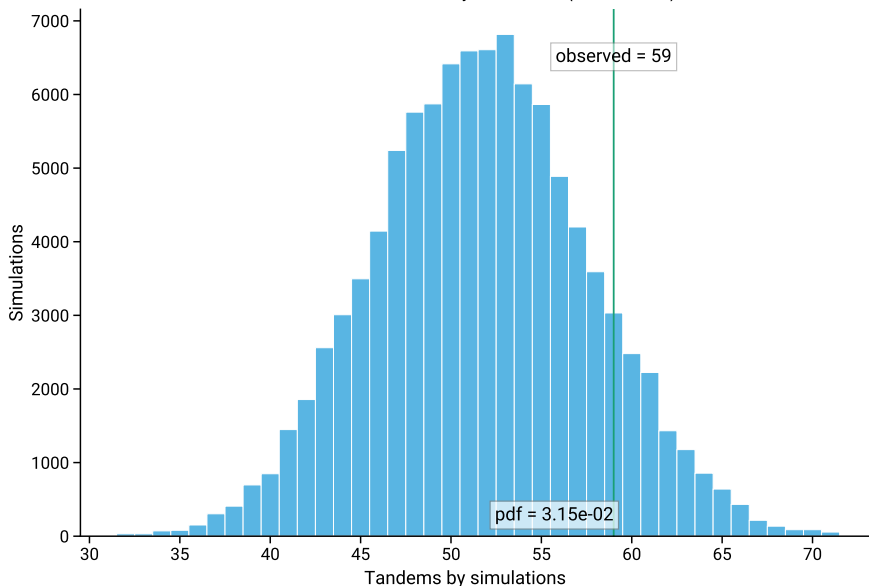
Tandem distribution from simulated data (IGHV4-39\*07)



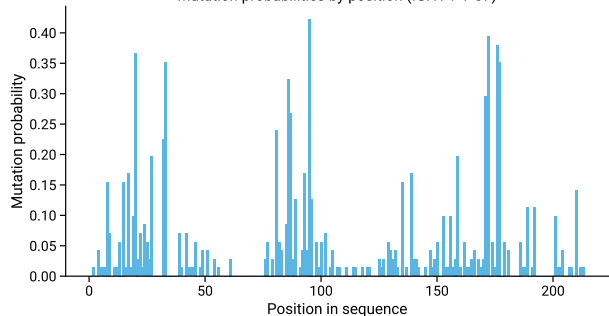


### 3.24 IGHV4-4\*07

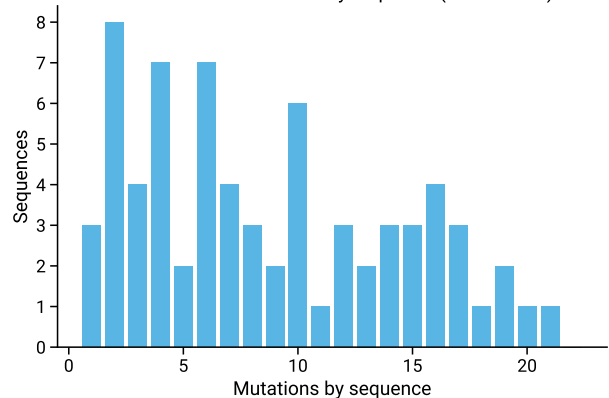
Distribution of tandems by simulation (IGHV4-4\*07)



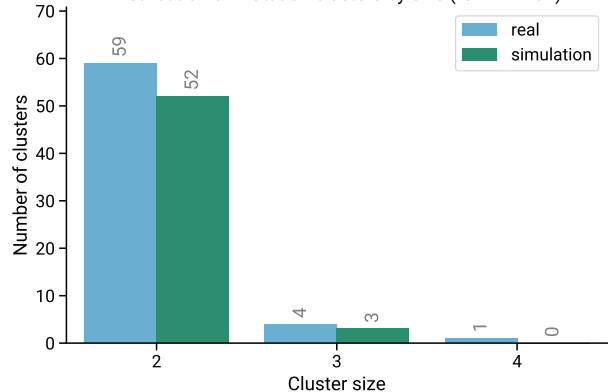
Mutation probabilities by position (IGHV4-4\*07)



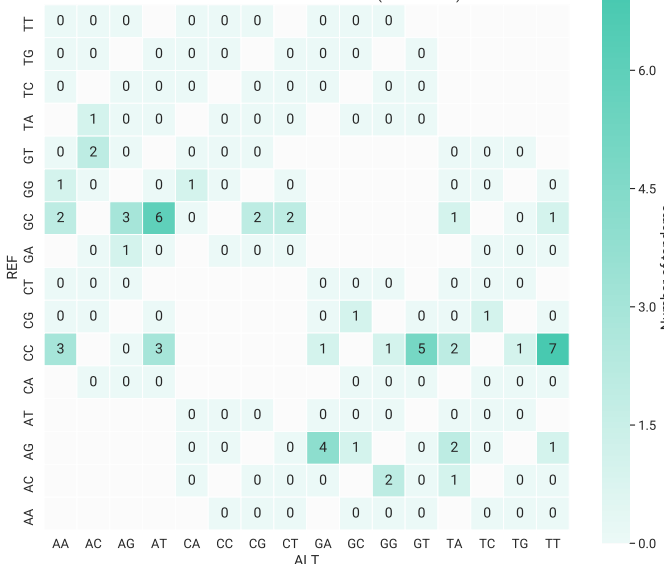
Distribution of mutations by sequence (IGHV4-4\*07)



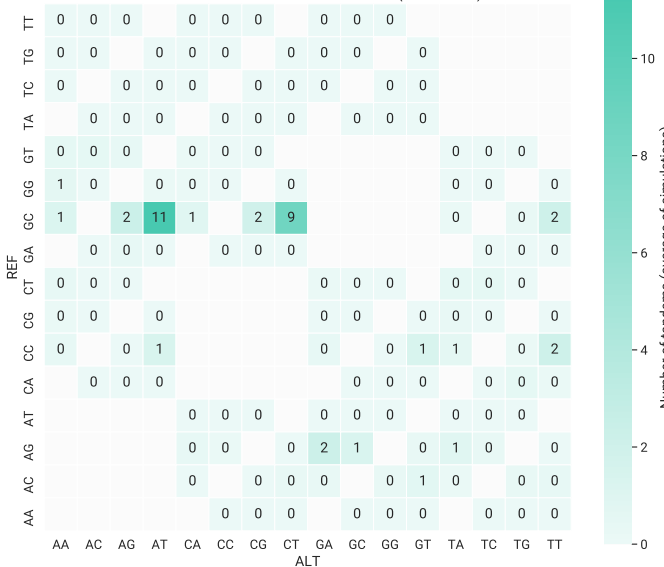
Distribution of mutation clusters by size (IGHV4-4\*07)

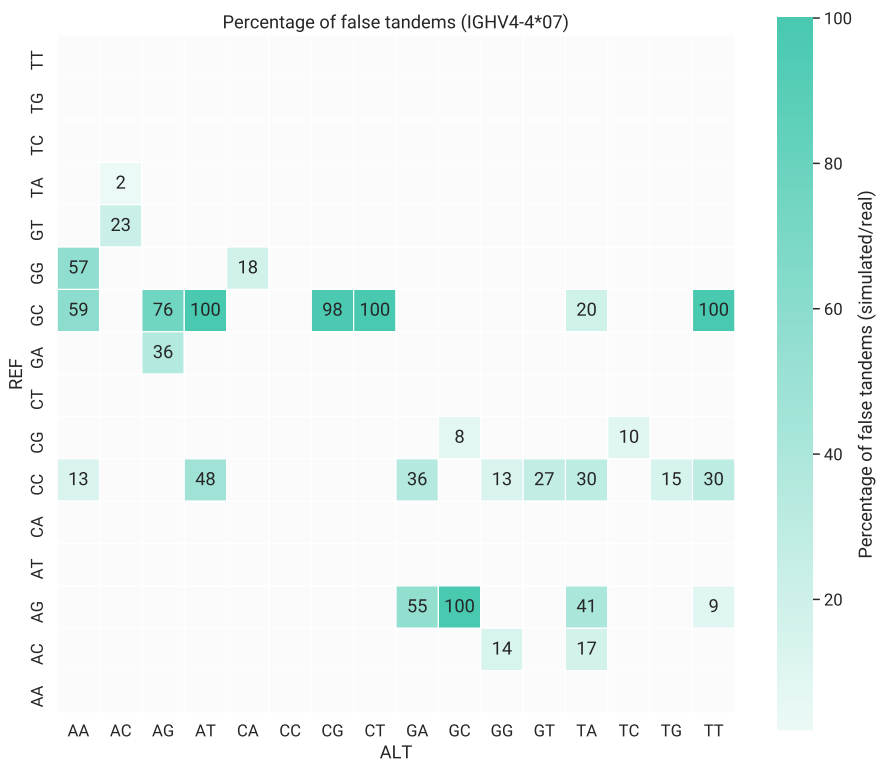
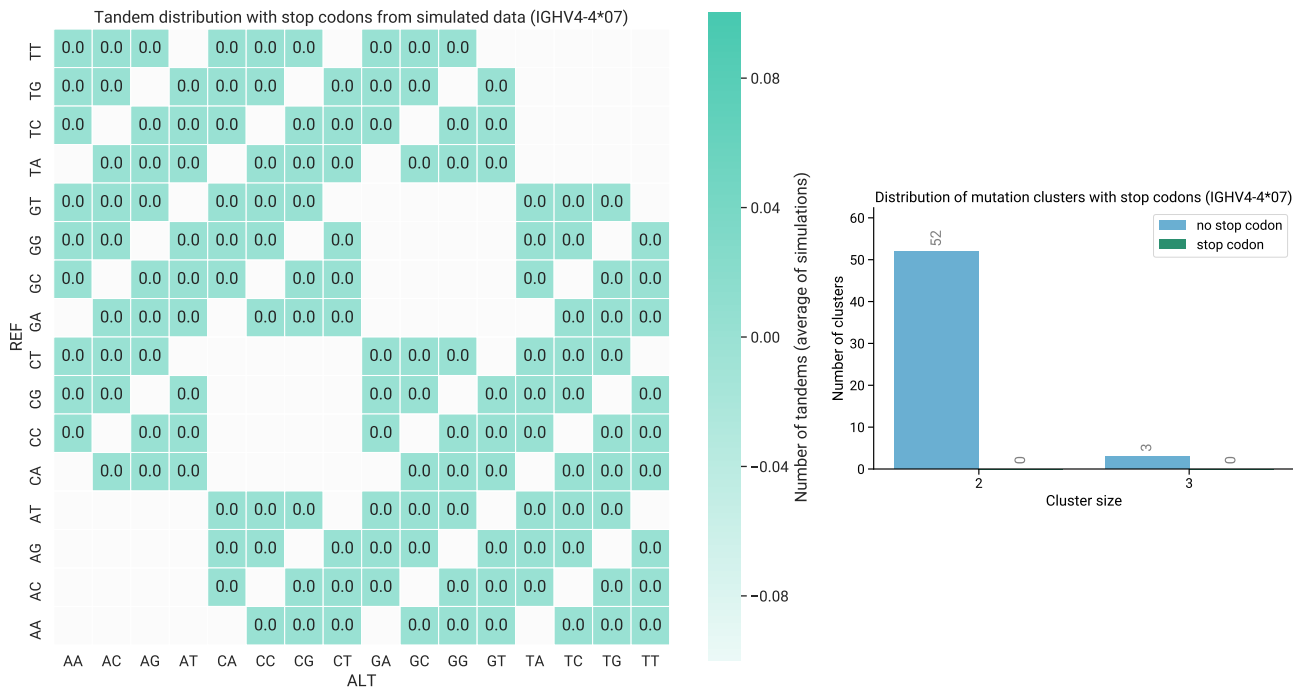


Tandem distribution from real data (IGHV4-4\*07)



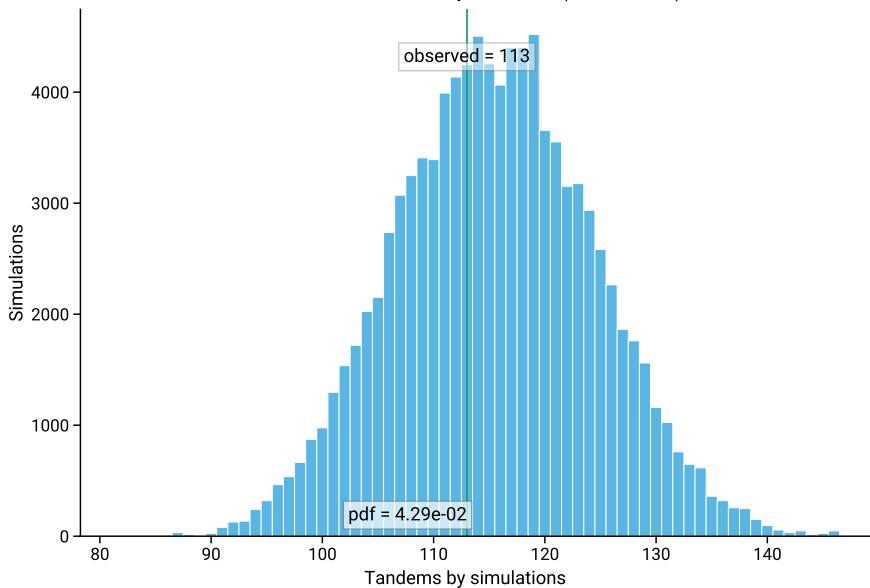
Tandem distribution from simulated data (IGHV4-4\*07)



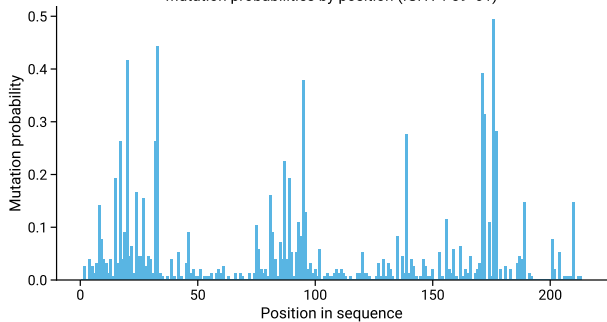


### 3.25 IGHV4-59\*01

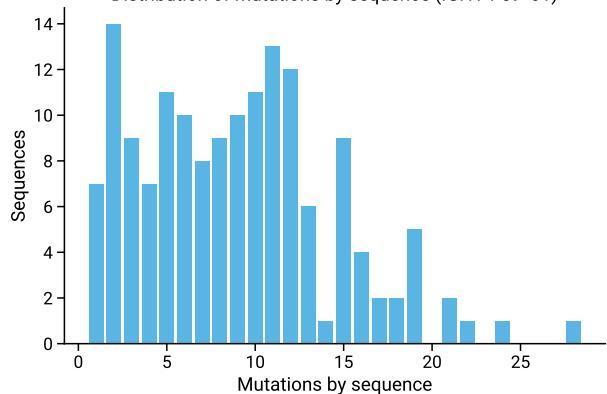
Distribution of tandems by simulation (IGHV4-59\*01)



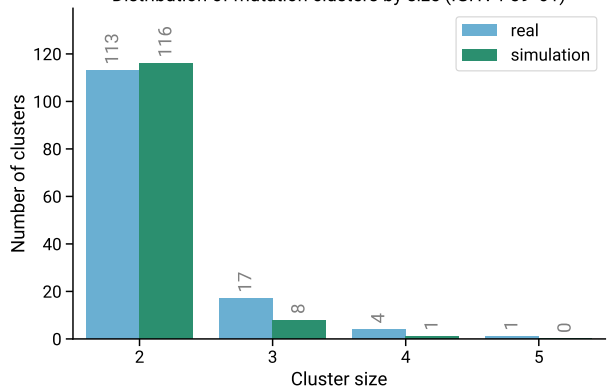
Mutation probabilities by position (IGHV4-59\*01)



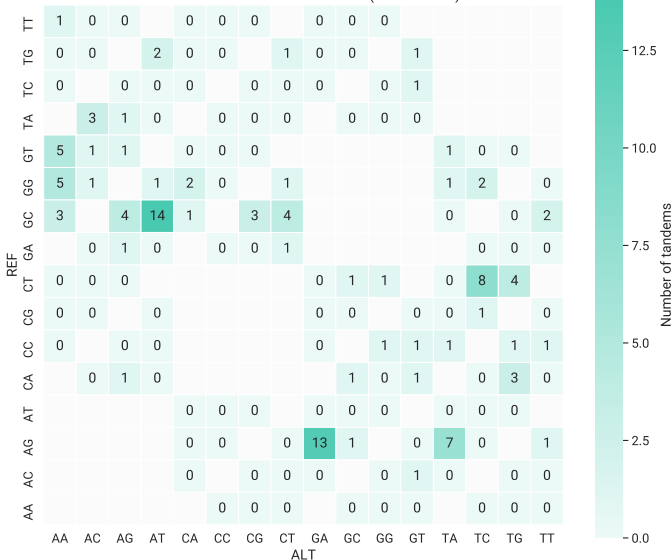
Distribution of mutations by sequence (IGHV4-59\*01)



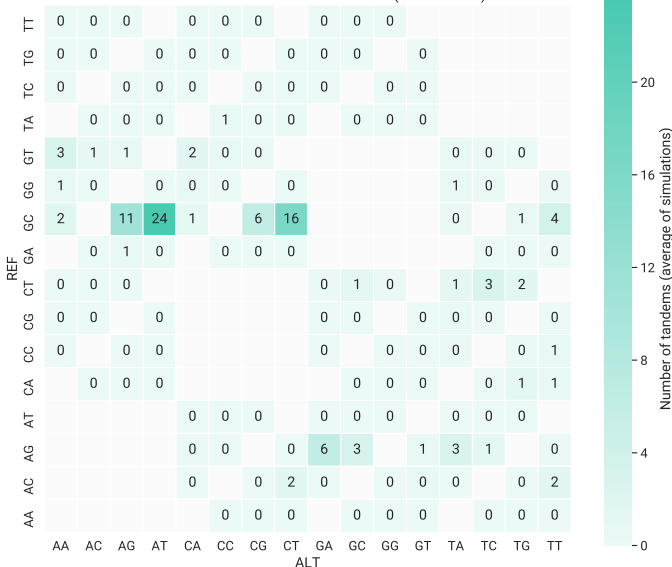
Distribution of mutation clusters by size (IGHV4-59\*01)

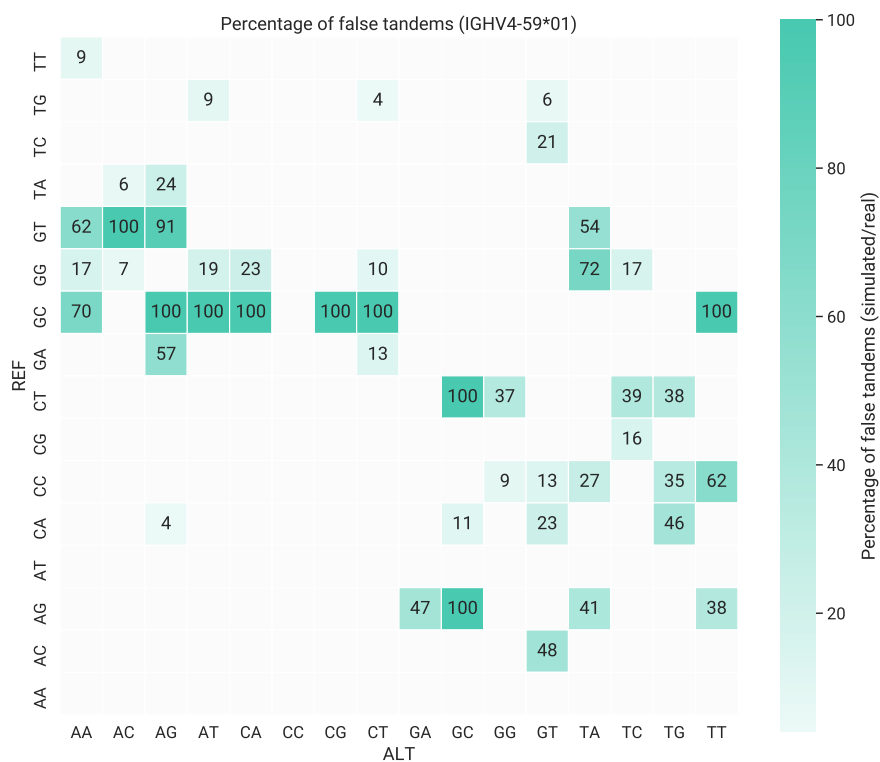
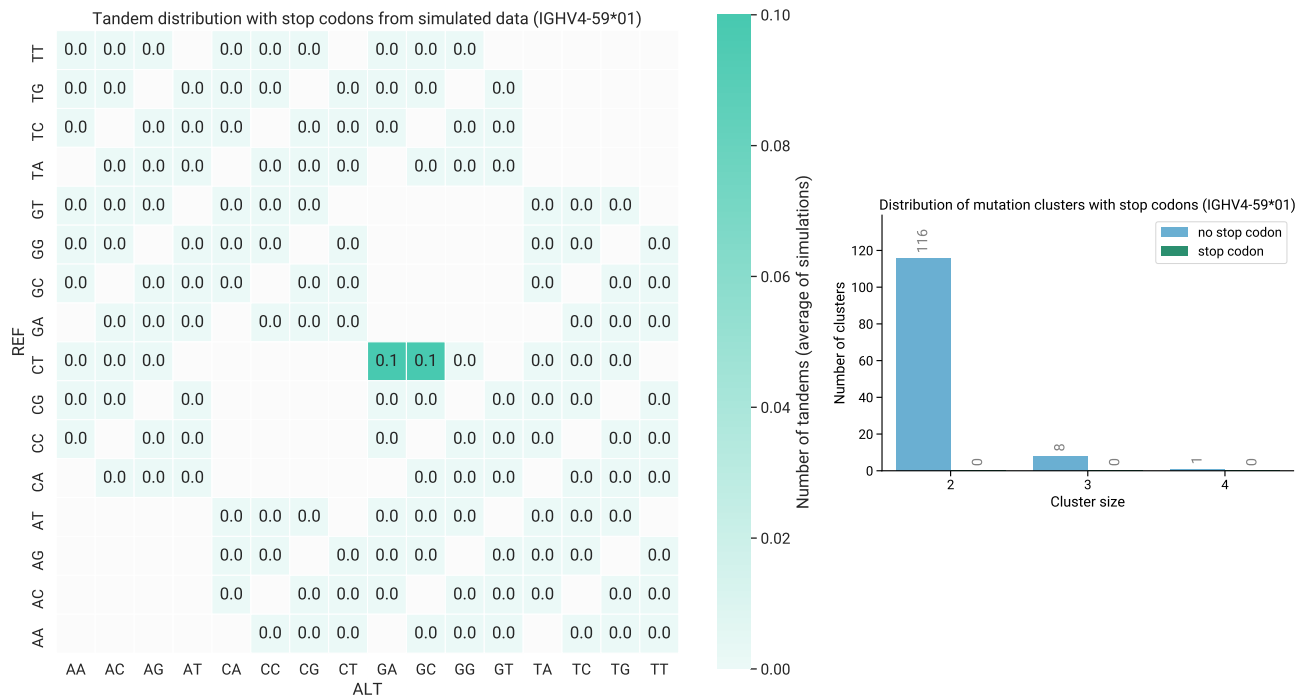


Tandem distribution from real data (IGHV4-59\*01)



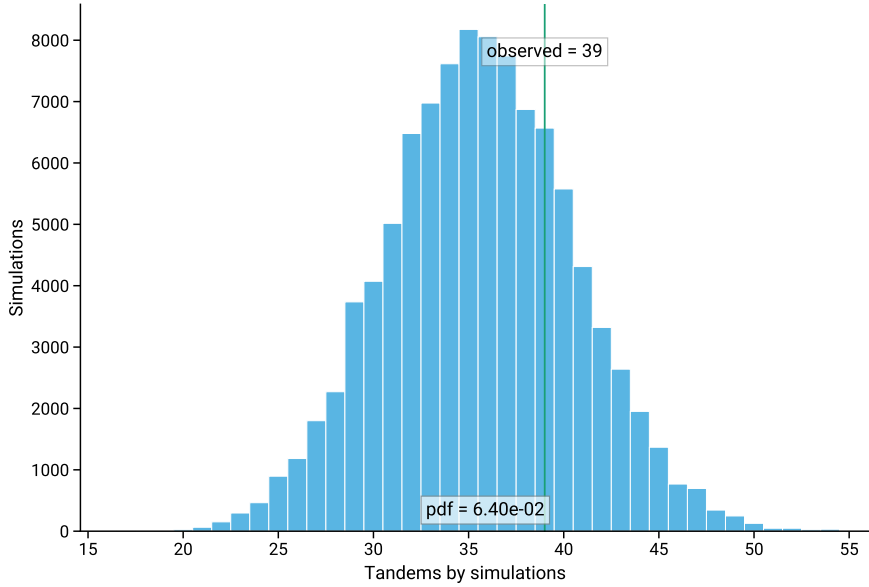
Tandem distribution from simulated data (IGHV4-59\*01)



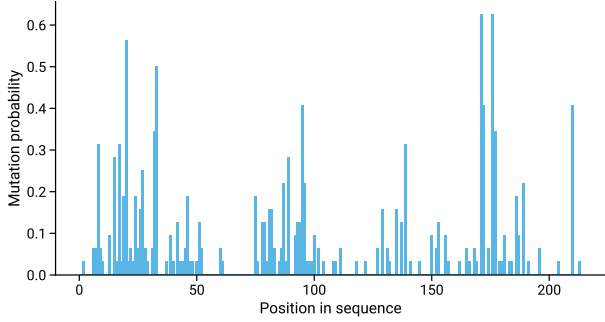


### 3.26 IGHV4-59\*03

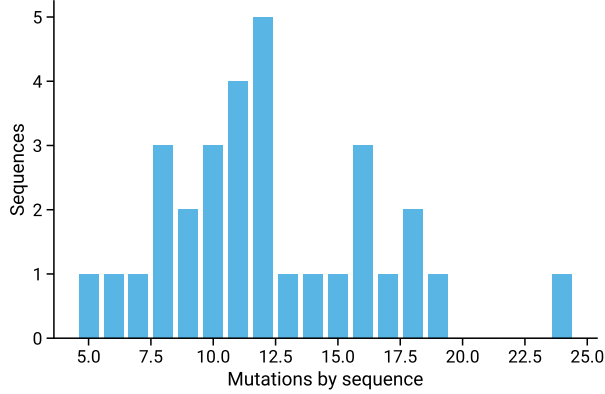
Distribution of tandems by simulation (IGHV4-59\*03)



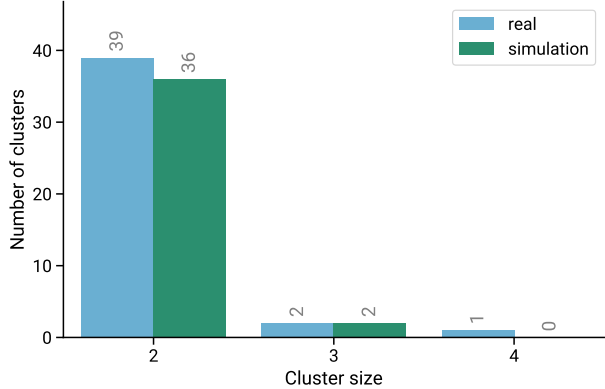
Mutation probabilities by position (IGHV4-59\*03)



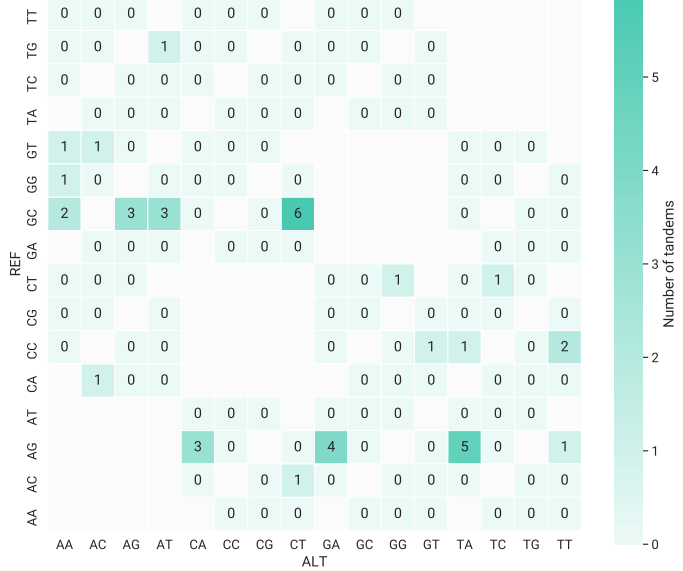
Distribution of mutations by sequence (IGHV4-59\*03)



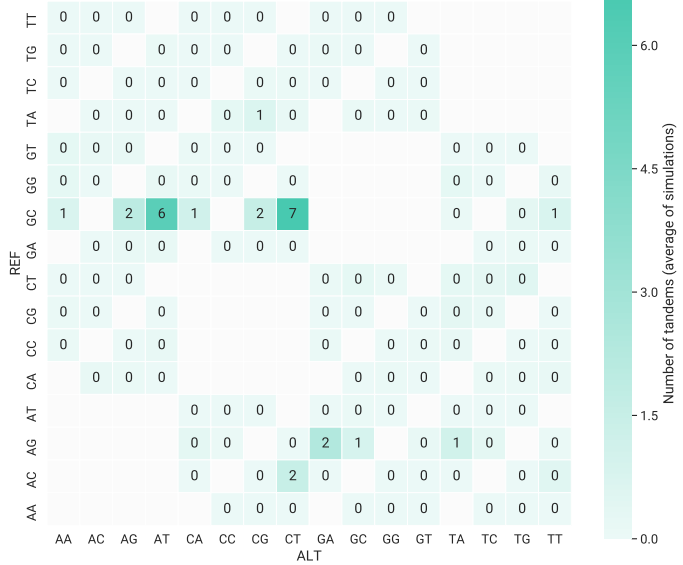
Distribution of mutation clusters by size (IGHV4-59\*03)

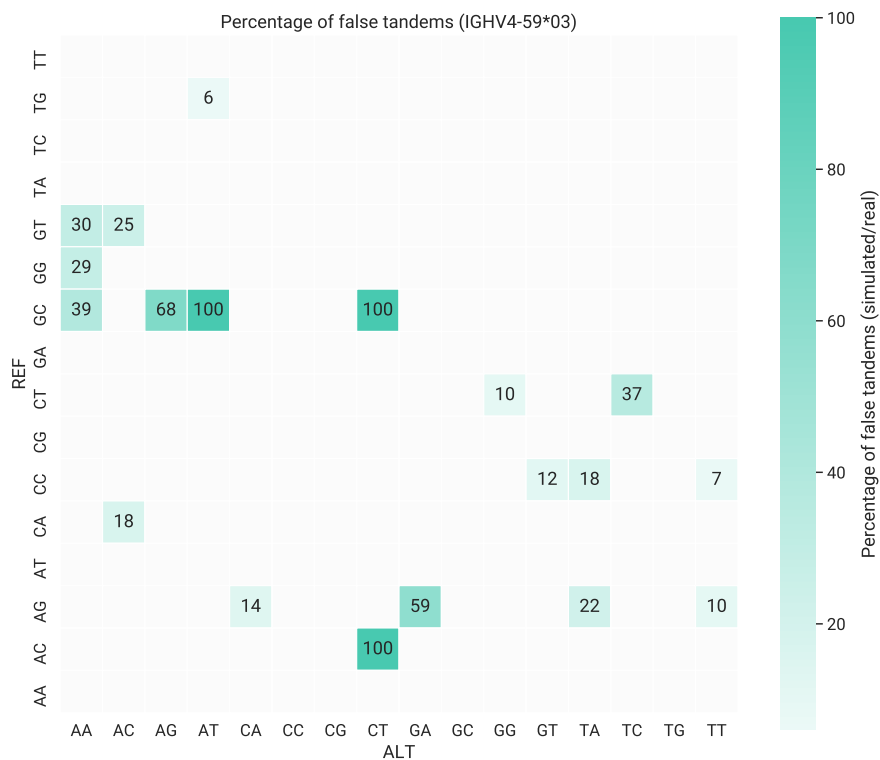
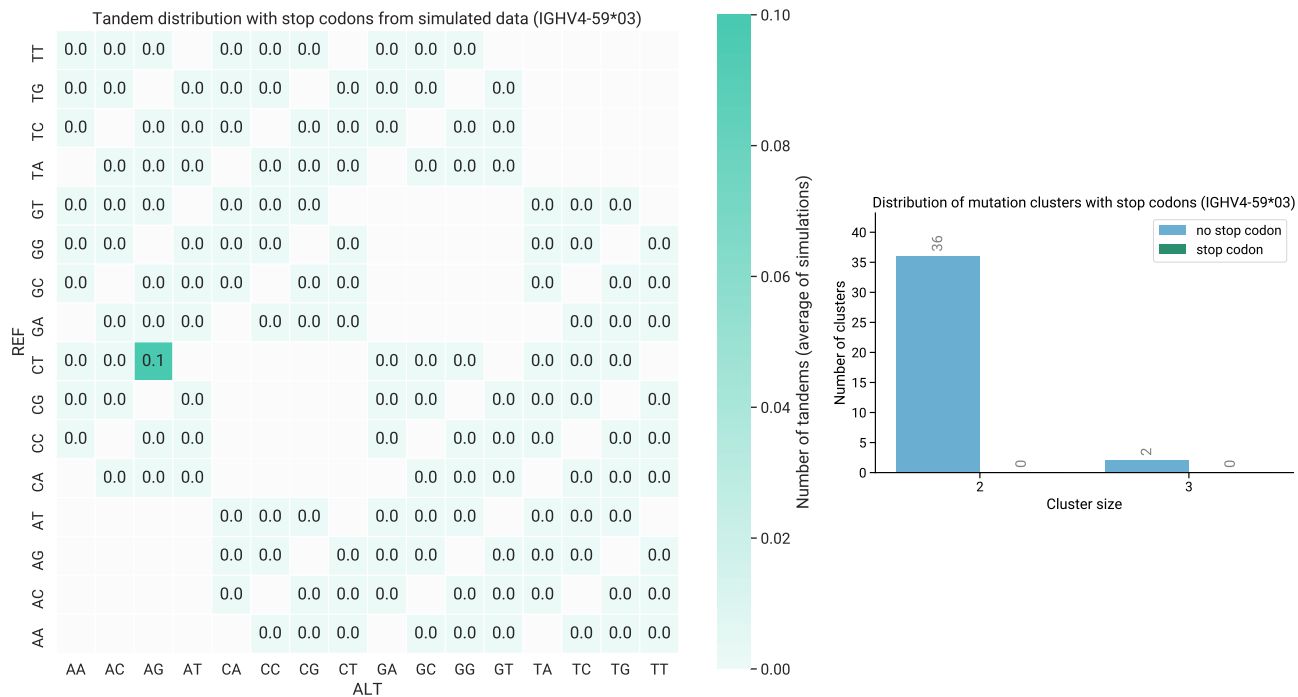


Tandem distribution from real data (IGHV4-59\*03)



Tandem distribution from simulated data (IGHV4-59\*03)

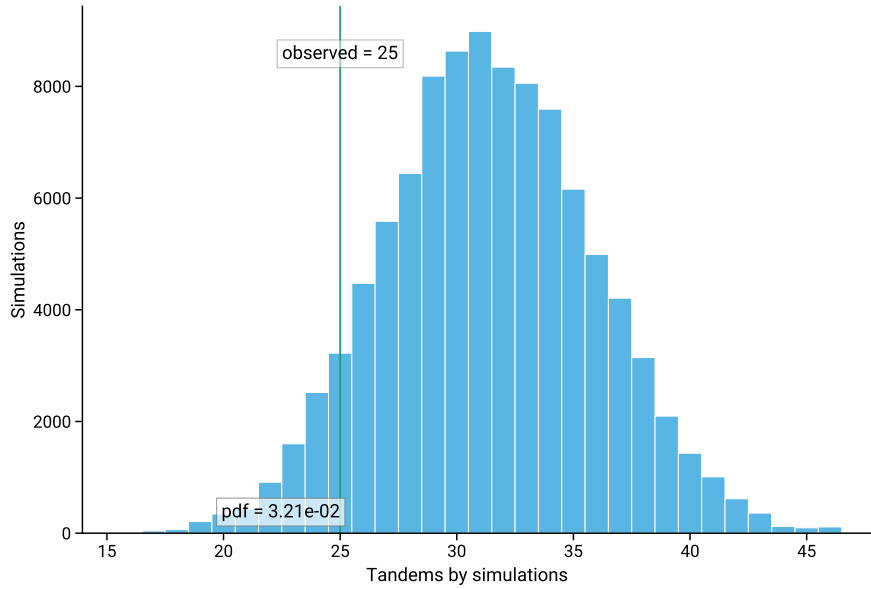




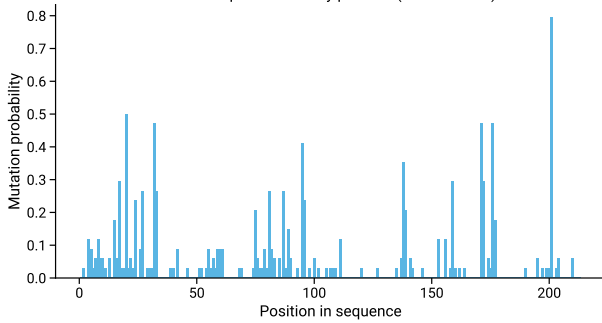


### 3.27 IGHV4-59\*08

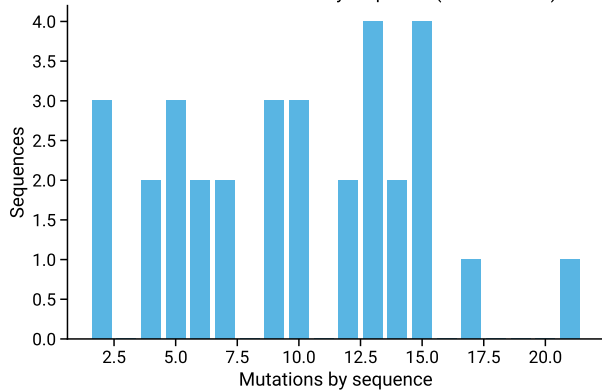
Distribution of tandems by simulation (IGHV4-59\*08)



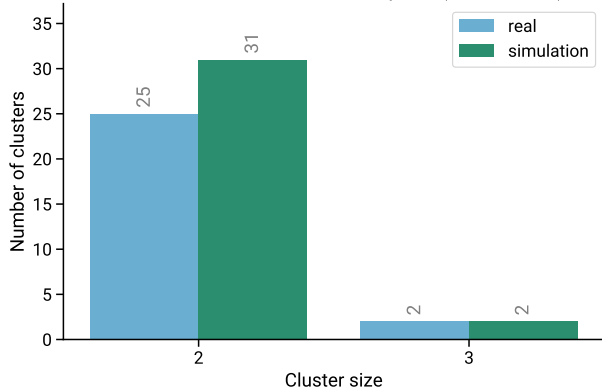
Mutation probabilities by position (IGHV4-59\*08)



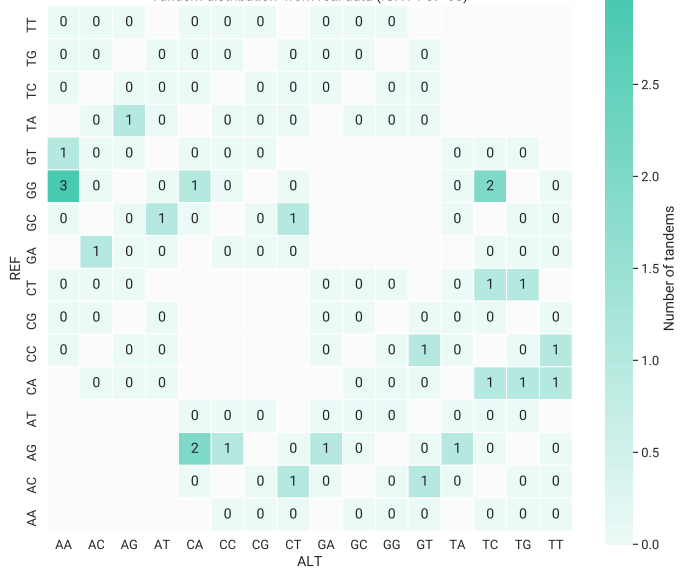
Distribution of mutations by sequence (IGHV4-59\*08)



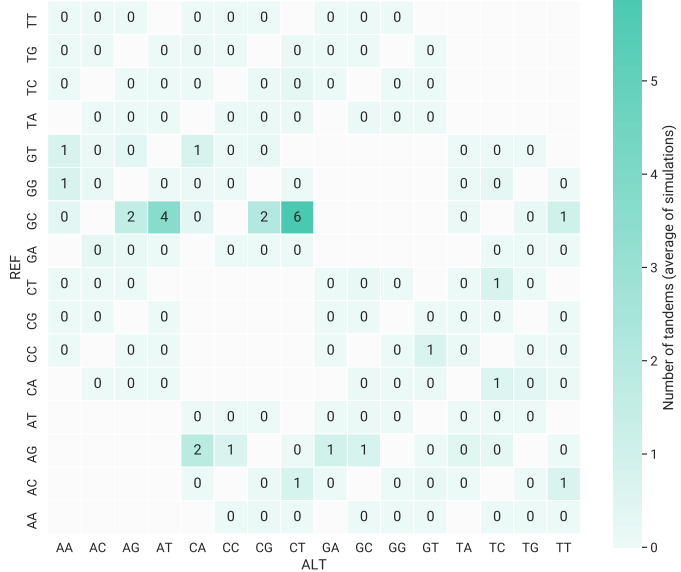
Distribution of mutation clusters by size (IGHV4-59\*08)

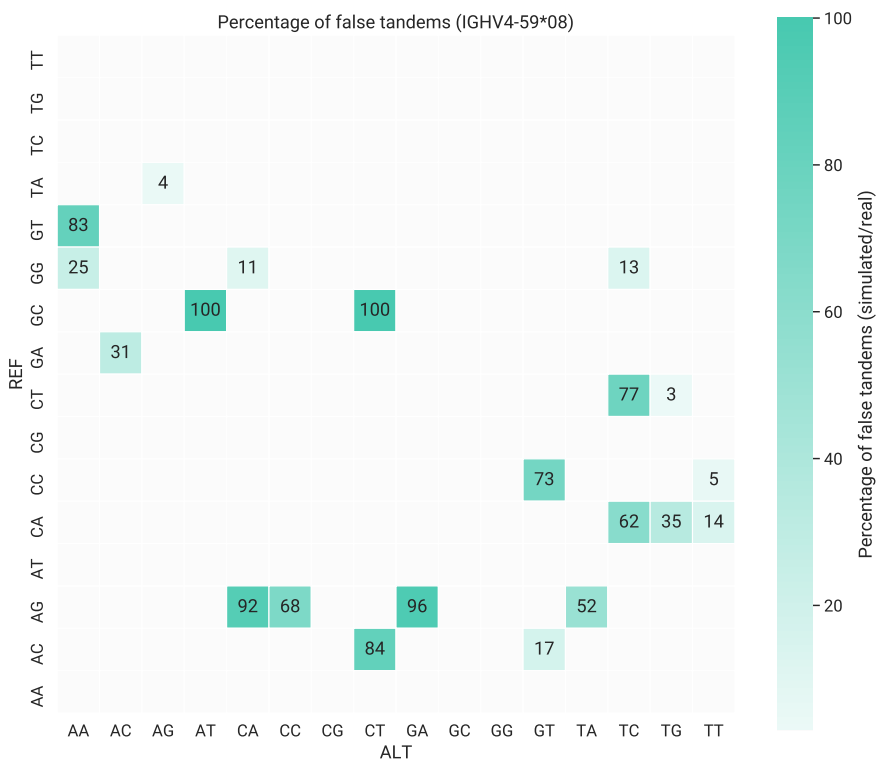
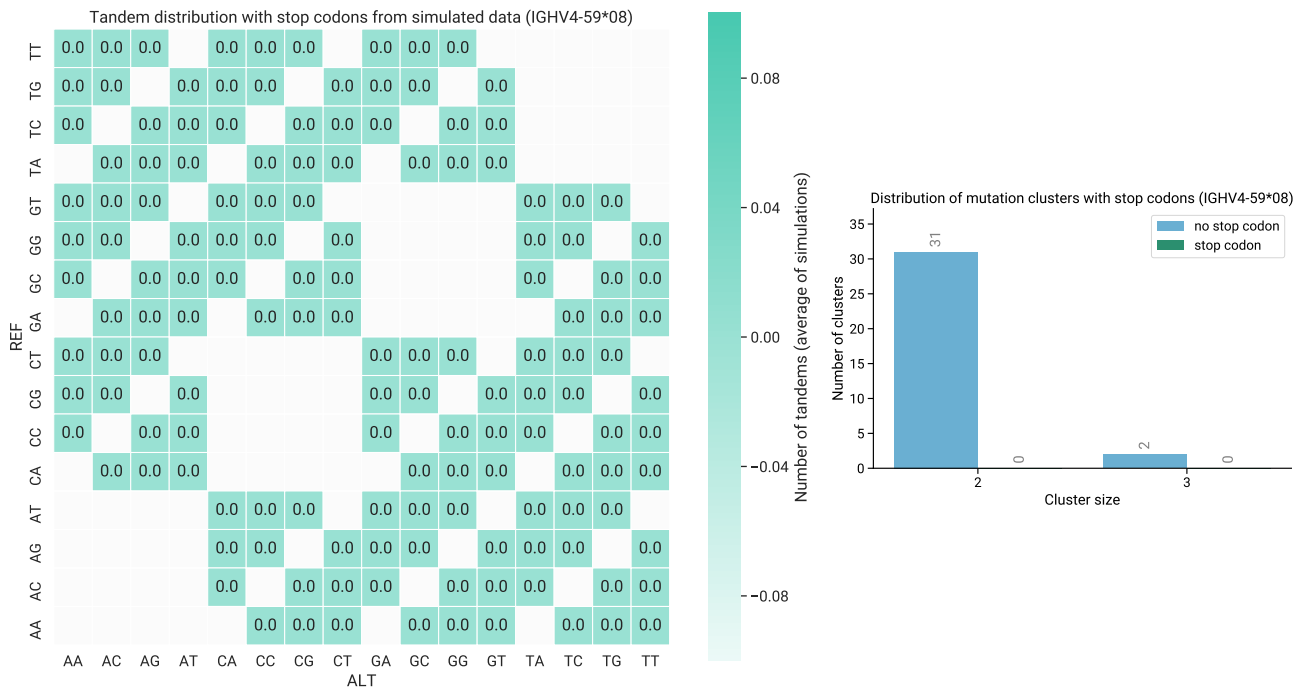


Tandem distribution from real data (IGHV4-59\*08)



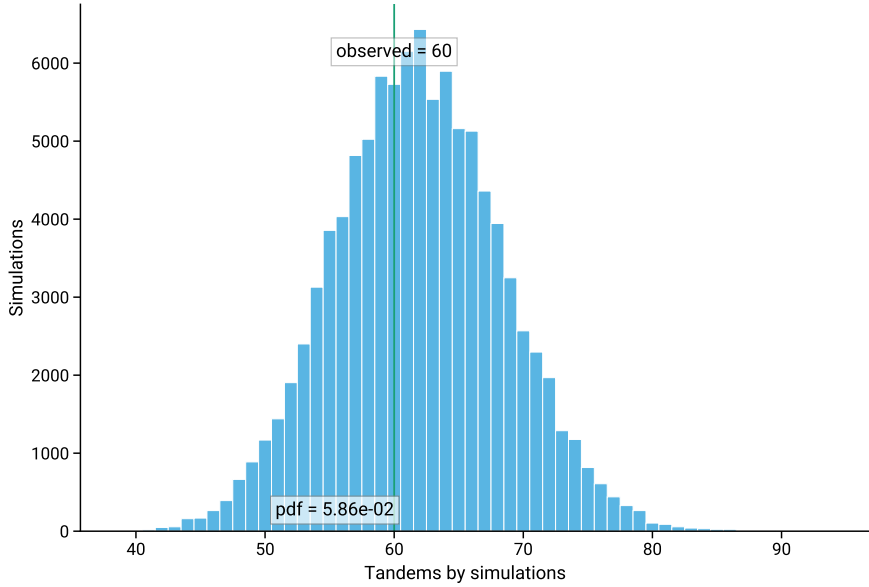
Tandem distribution from simulated data (IGHV4-59\*08)



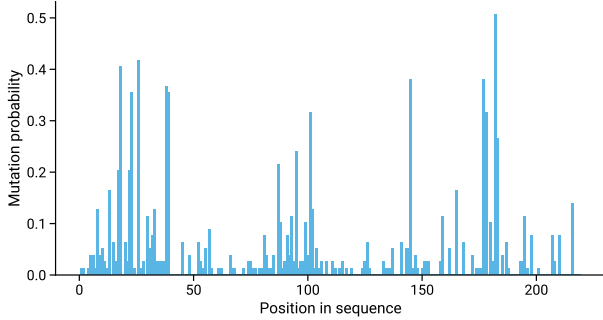


### 3.28 IGHV4-61\*01

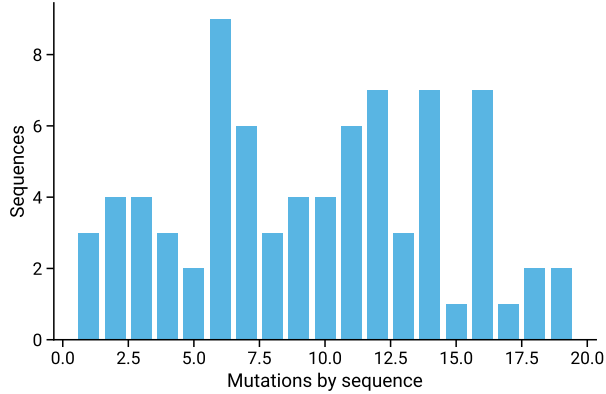
Distribution of tandems by simulation (IGHV4-61\*01)



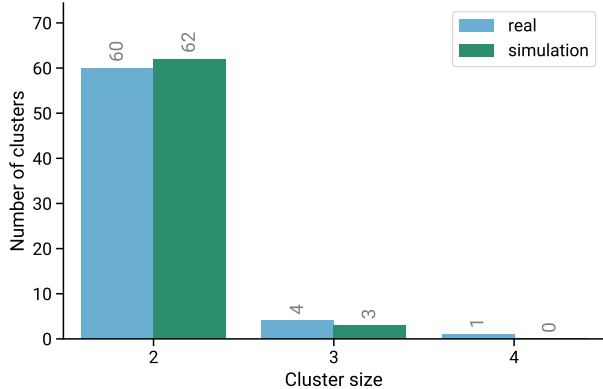
Mutation probabilities by position (IGHV4-61\*01)



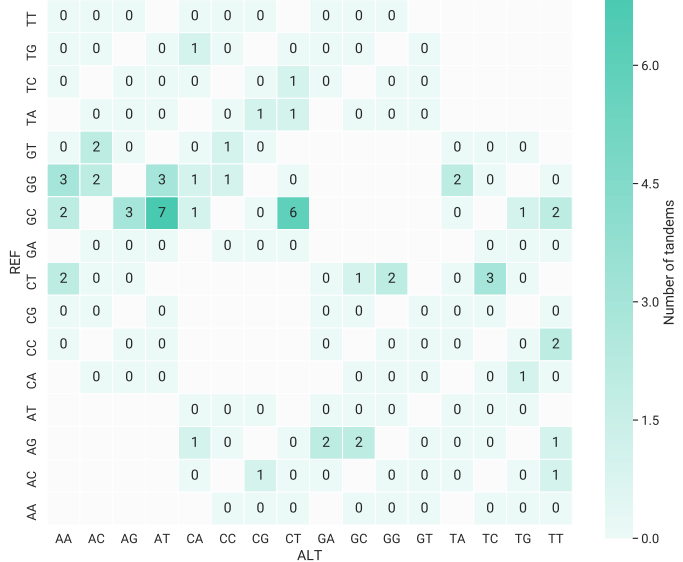
Distribution of mutations by sequence (IGHV4-61\*01)



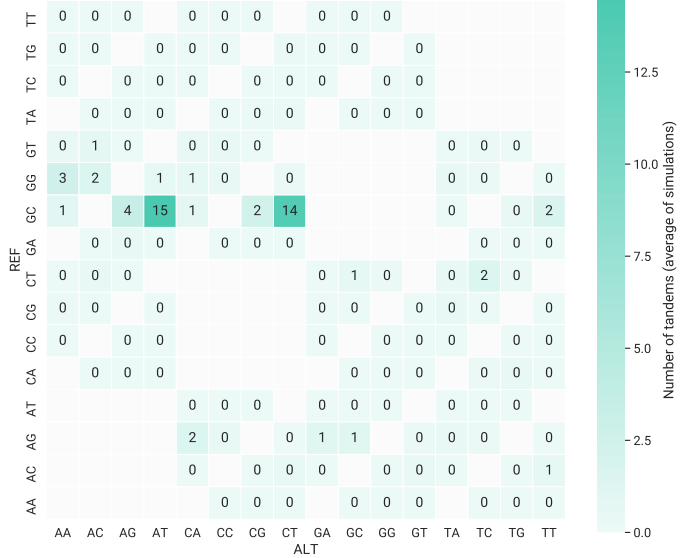
Distribution of mutation clusters by size (IGHV4-61\*01)

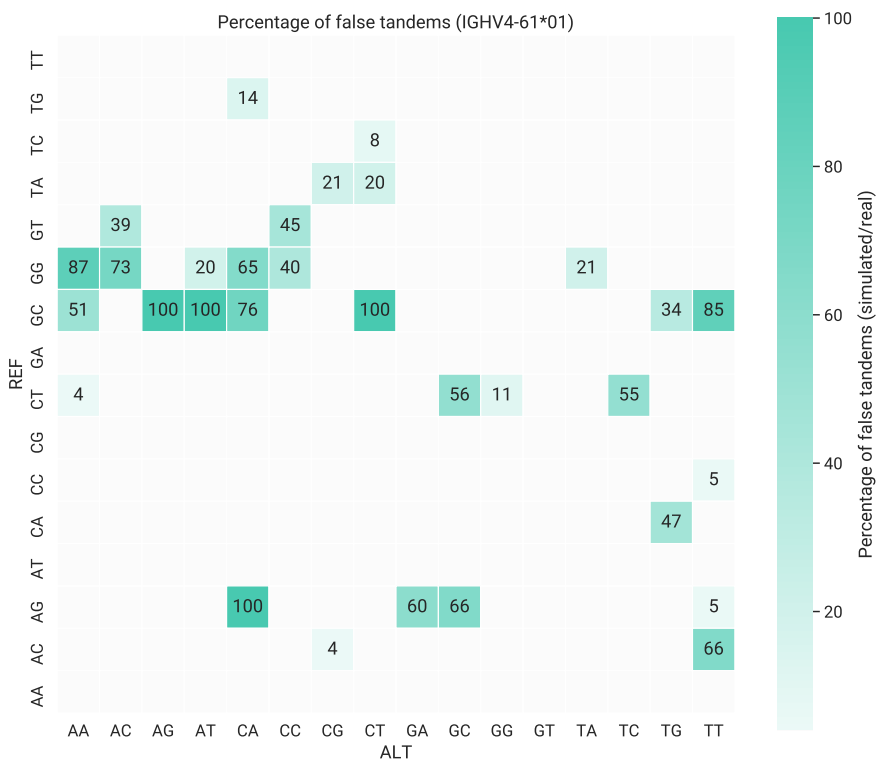
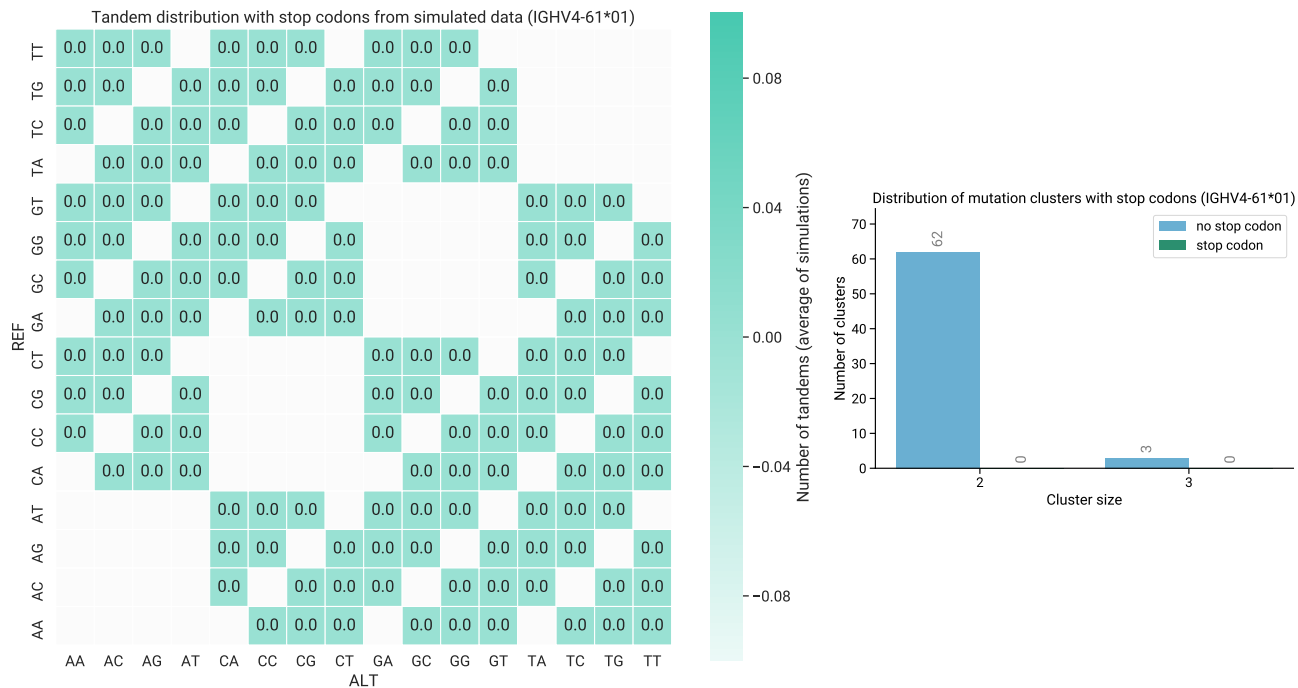


Tandem distribution from real data (IGHV4-61\*01)



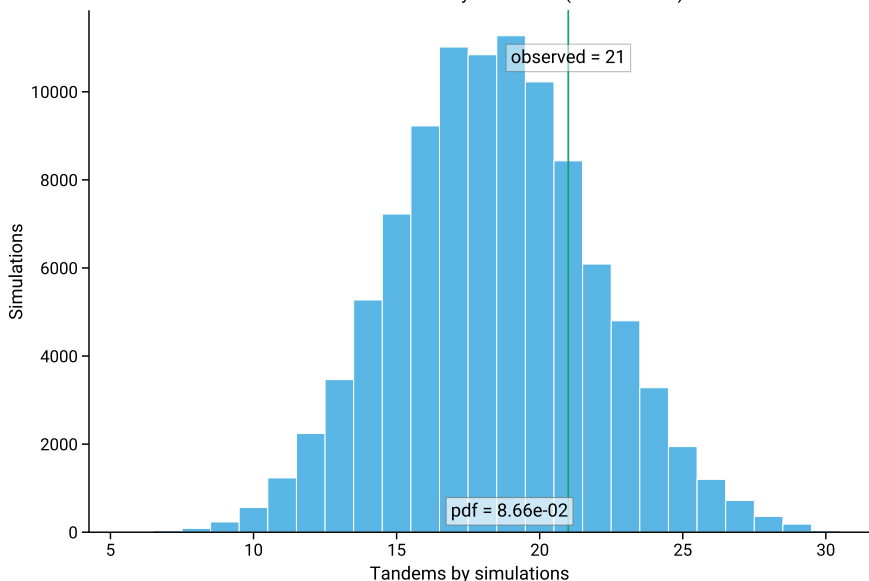
Tandem distribution from simulated data (IGHV4-61\*01)



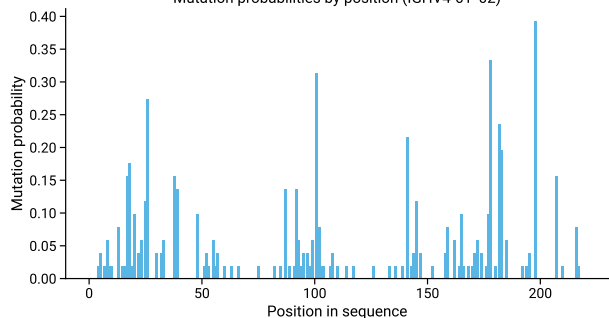


### 3.29 IGHV4-61\*02

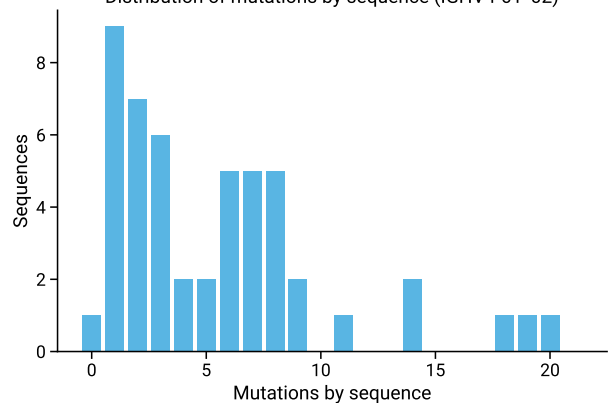
Distribution of tandems by simulation (IGHV4-61\*02)



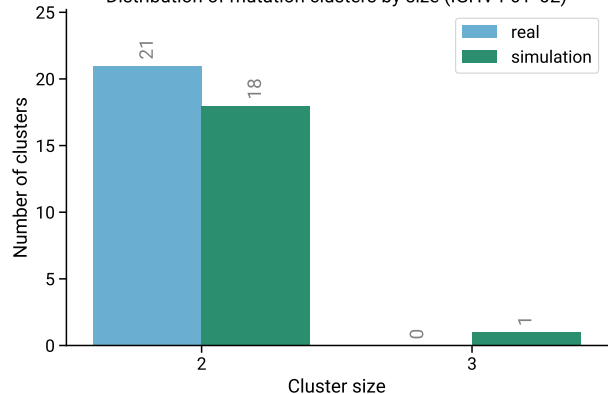
Mutation probabilities by position (IGHV4-61\*02)



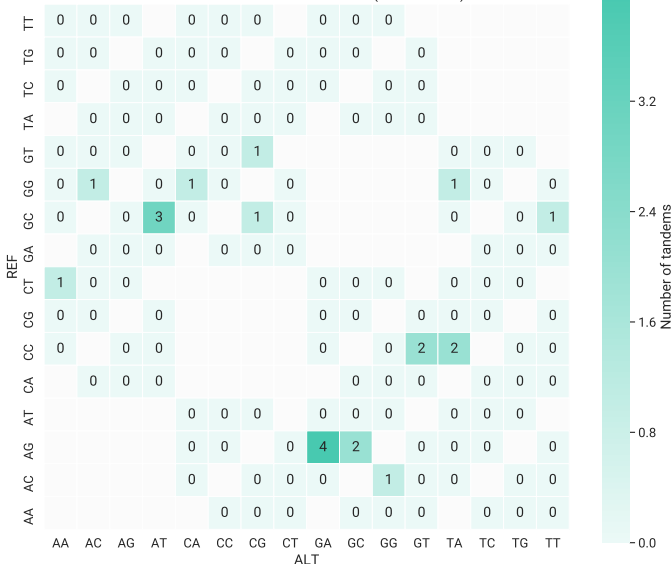
Distribution of mutations by sequence (IGHV4-61\*02)



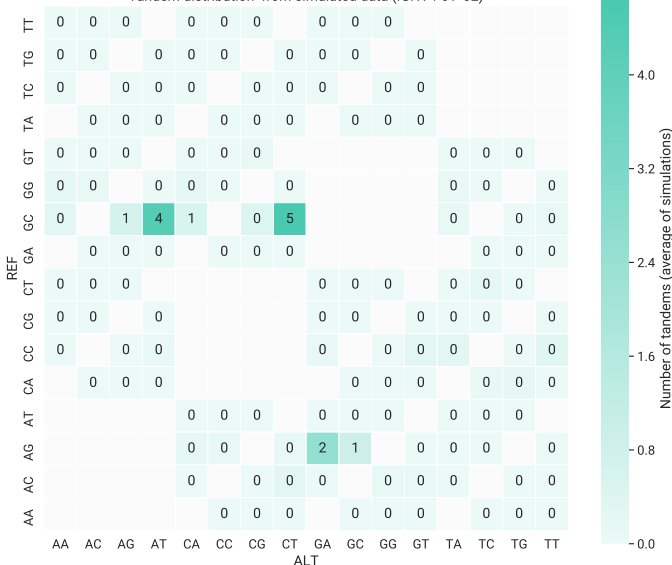
Distribution of mutation clusters by size (IGHV4-61\*02)

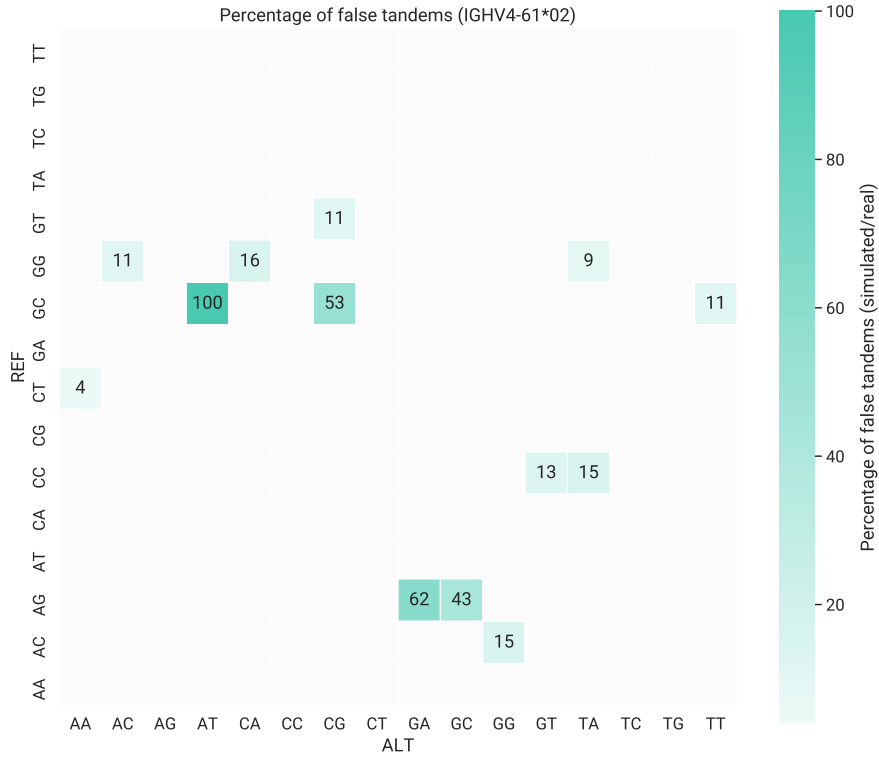
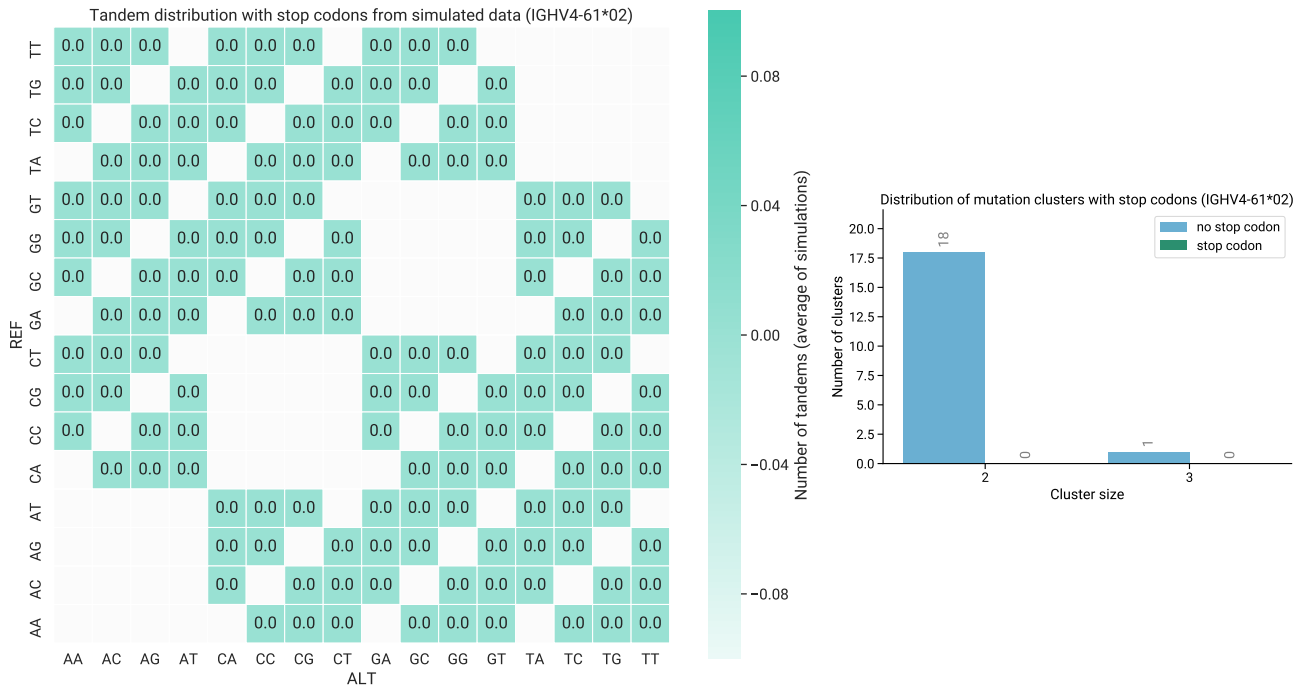


Tandem distribution from real data (IGHV4-61\*02)



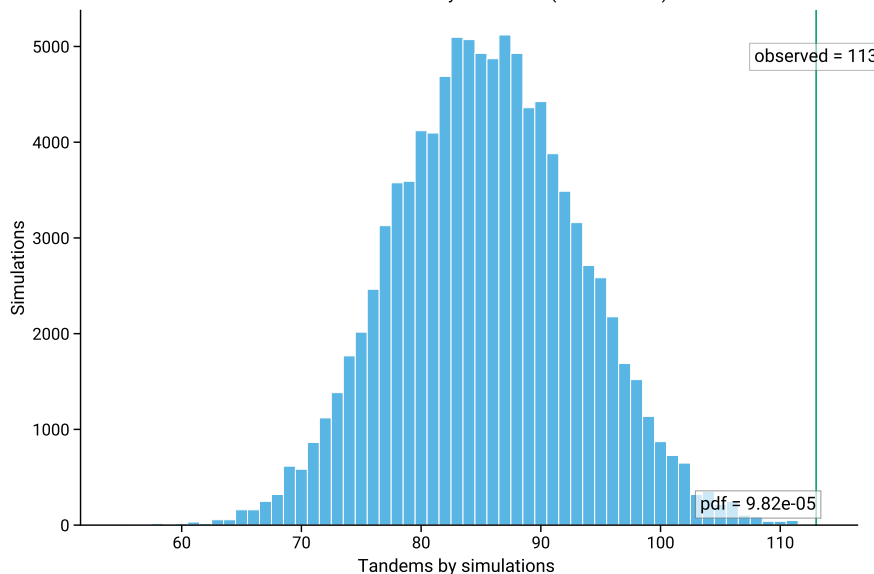
Tandem distribution from simulated data (IGHV4-61\*02)



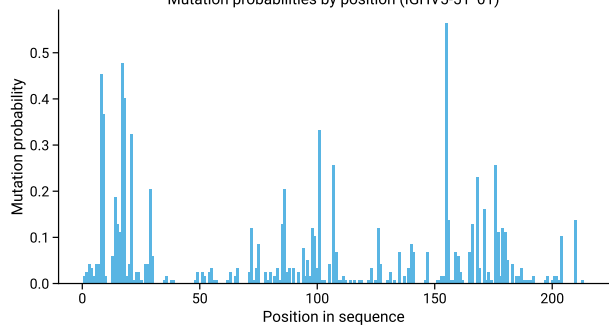


### 3.30 IGHV5-51\*01

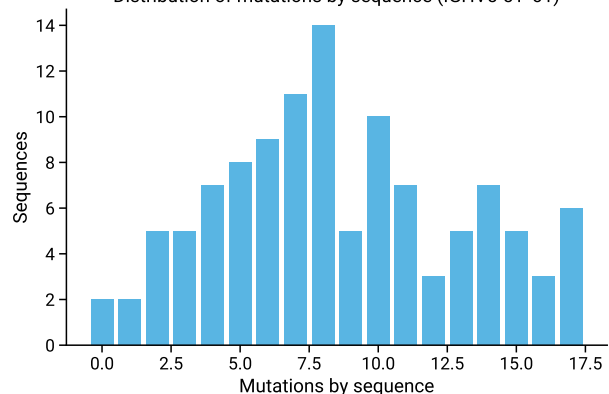
Distribution of tandems by simulation (IGHV5-51\*01)



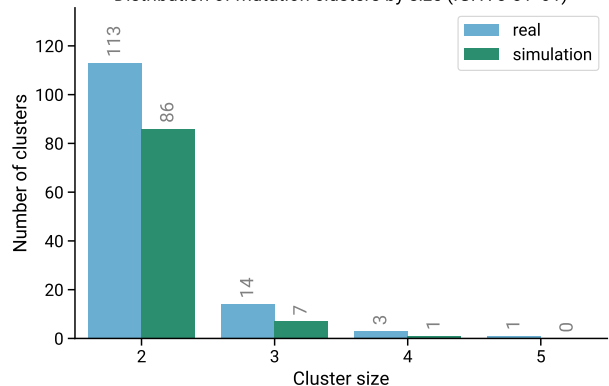
Mutation probabilities by position (IGHV5-51\*01)



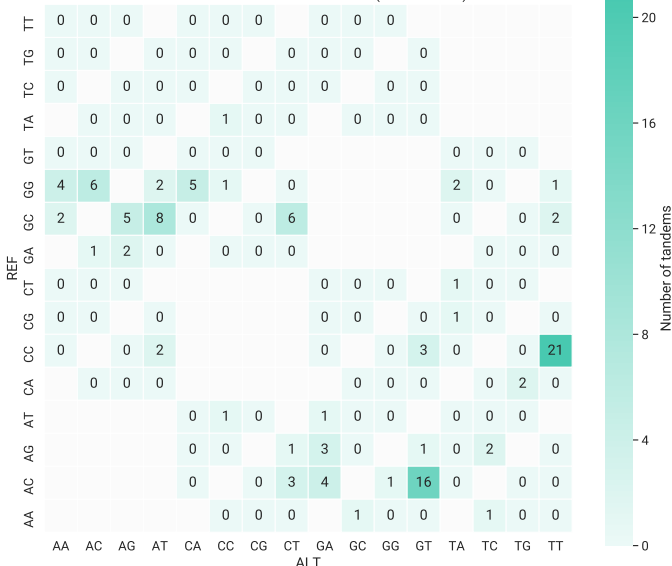
Distribution of mutations by sequence (IGHV5-51\*01)



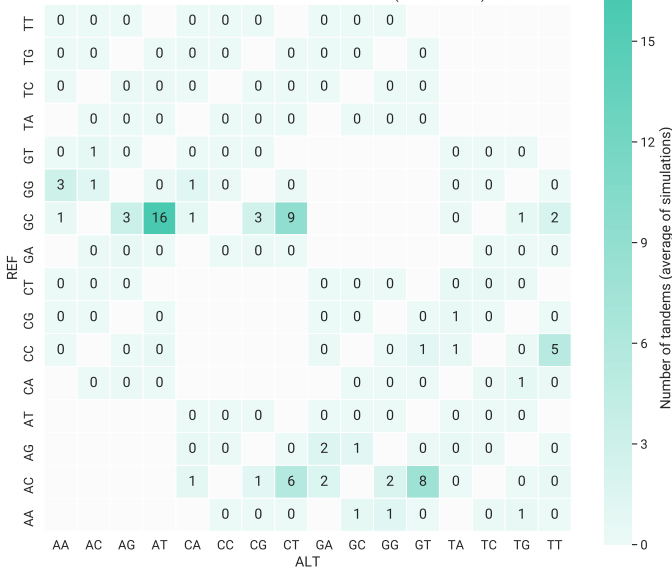
Distribution of mutation clusters by size (IGHV5-51\*01)

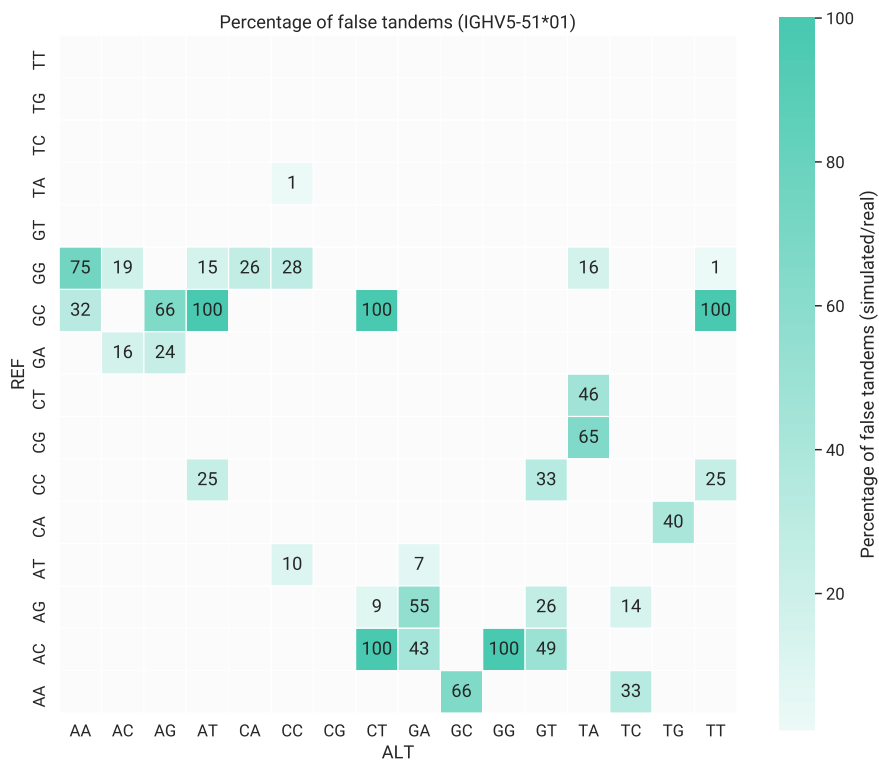
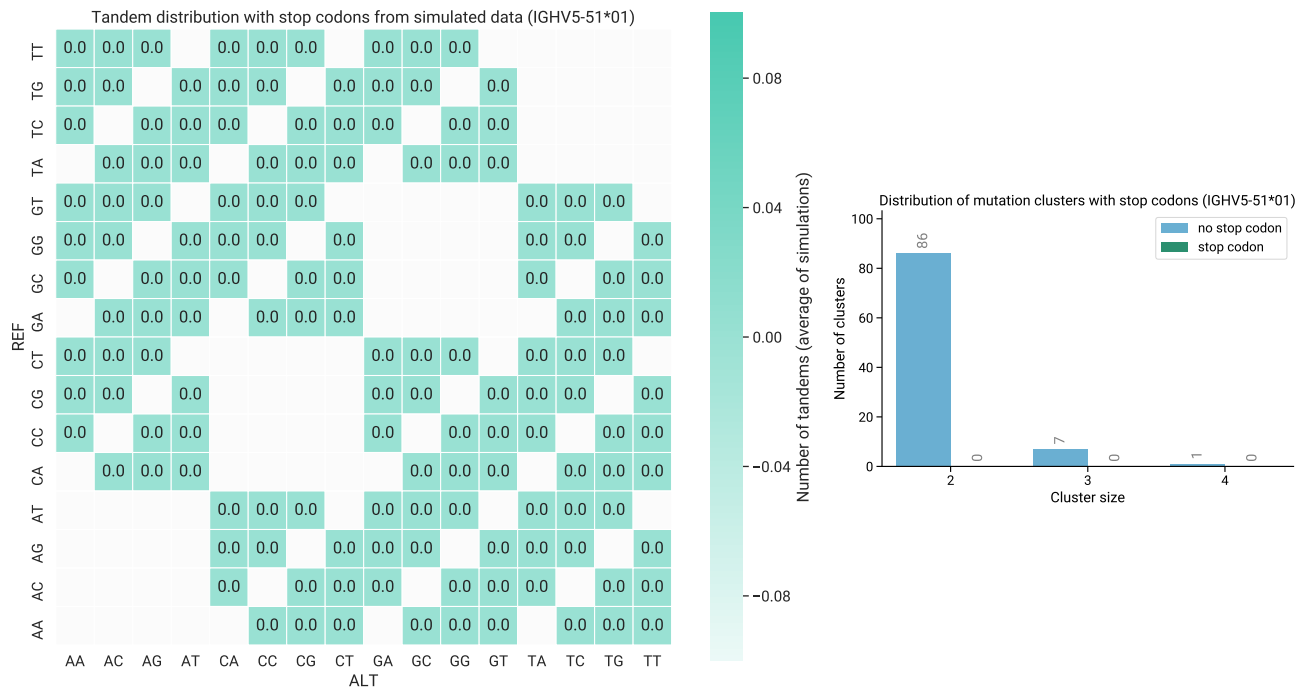


Tandem distribution from real data (IGHV5-51\*01)



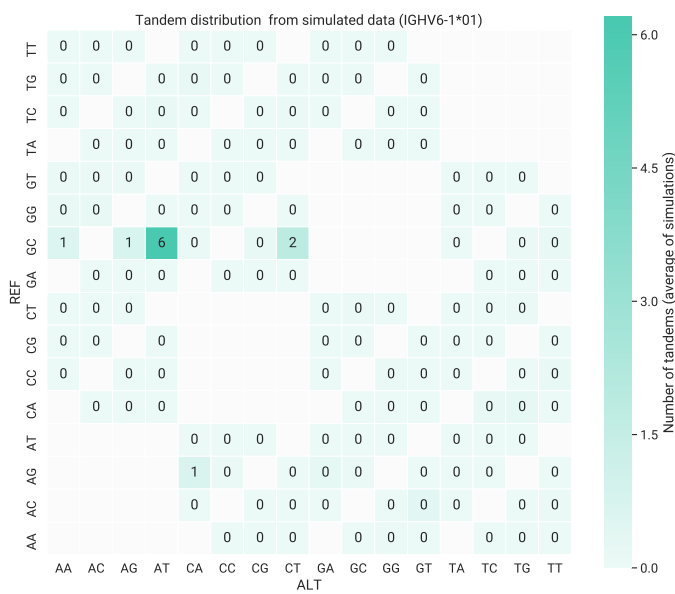
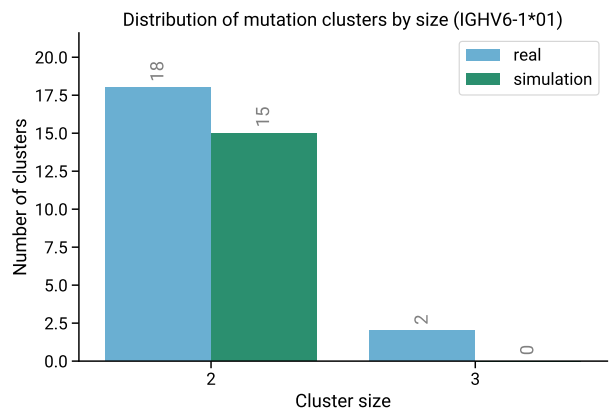
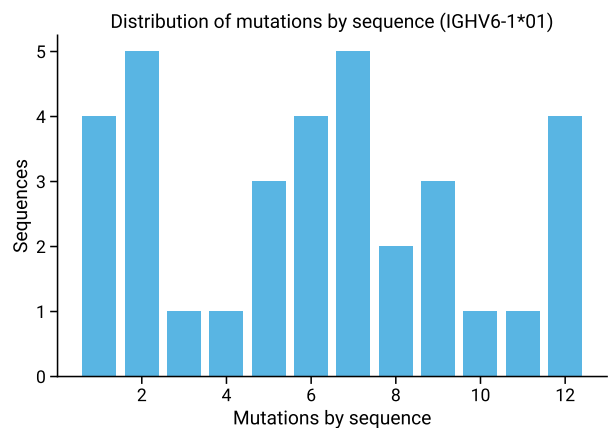
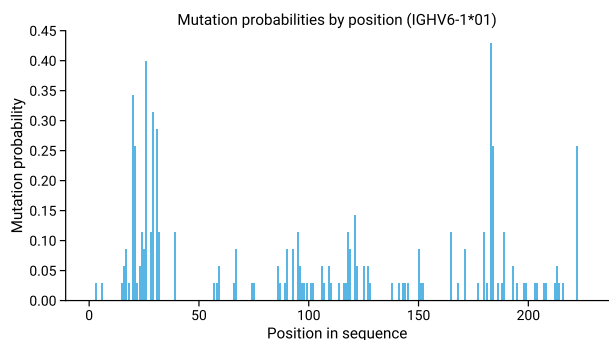
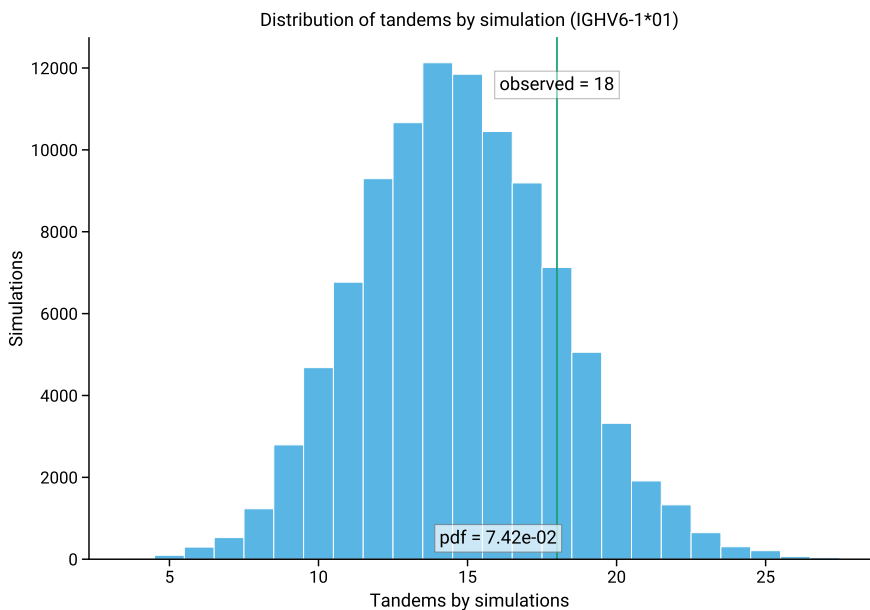
Tandem distribution from simulated data (IGHV5-51\*01)

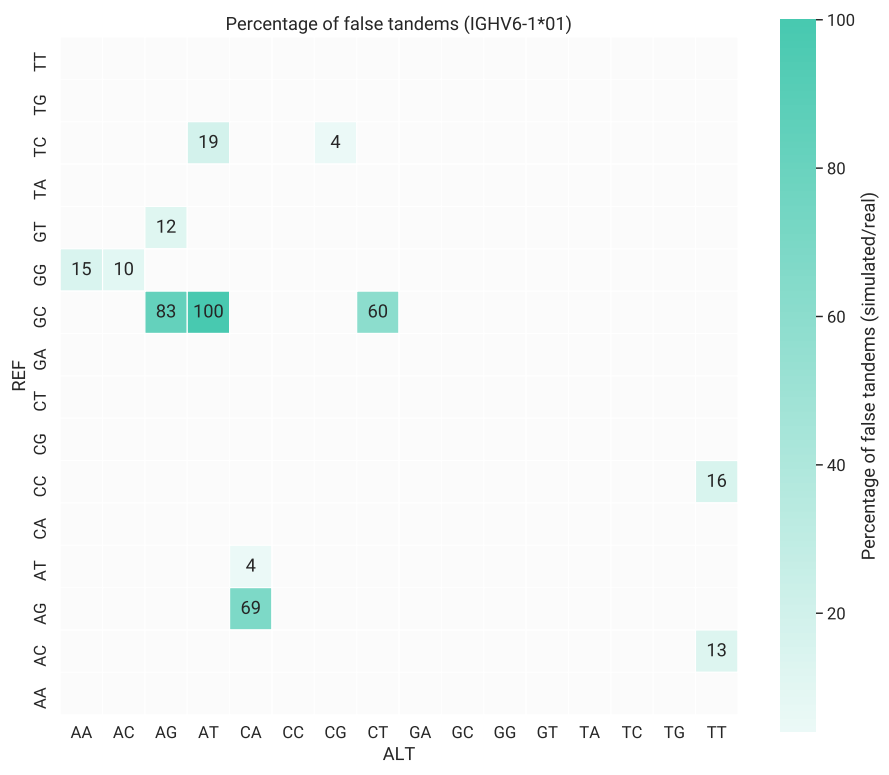
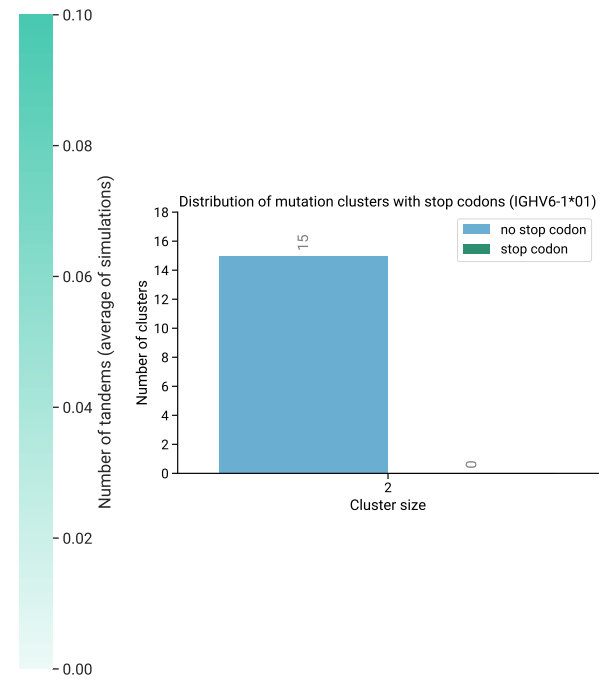
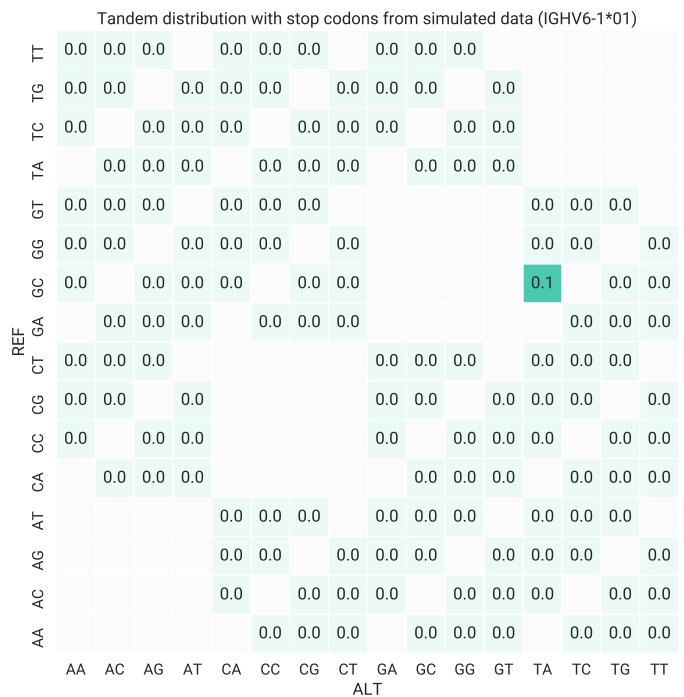




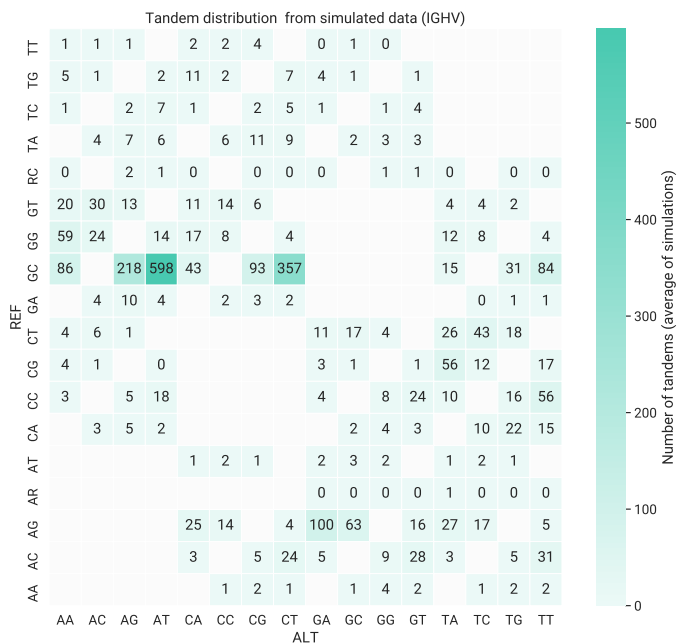
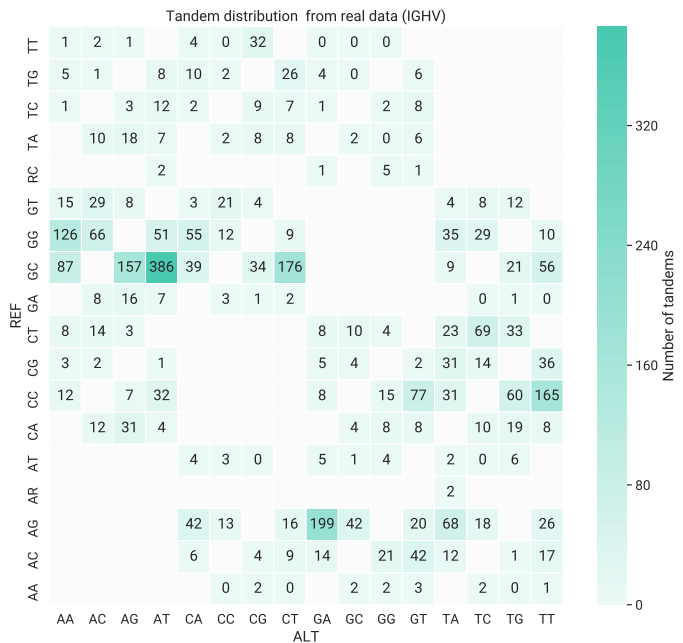
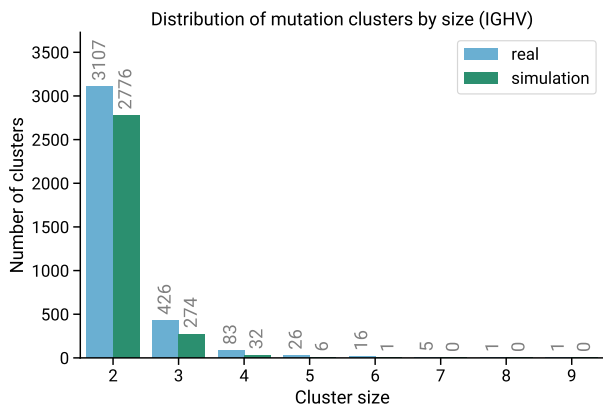
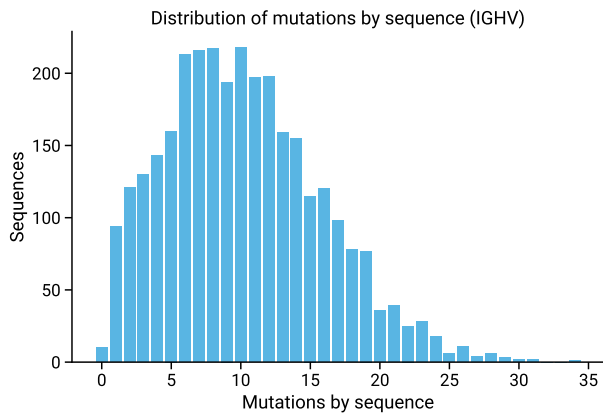
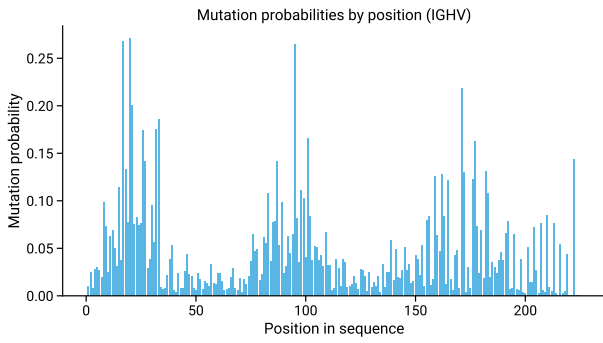
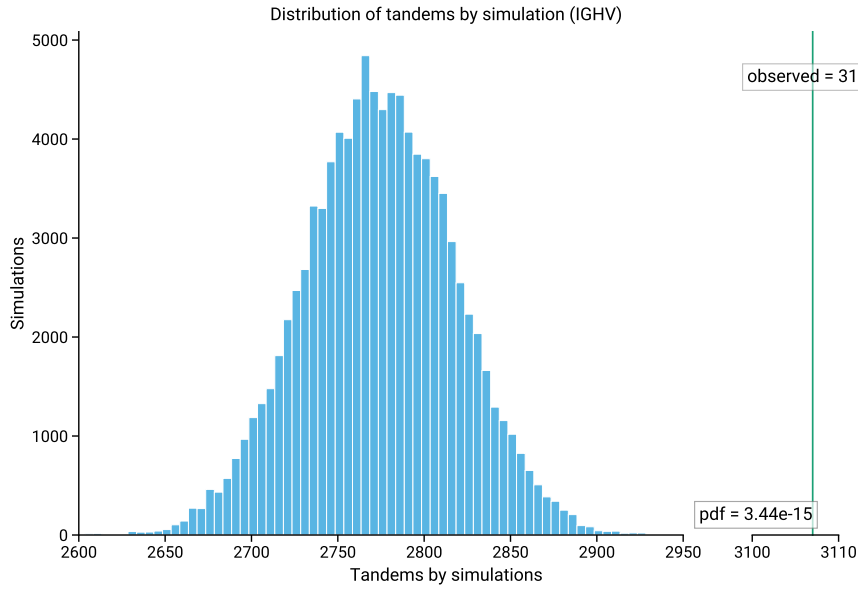


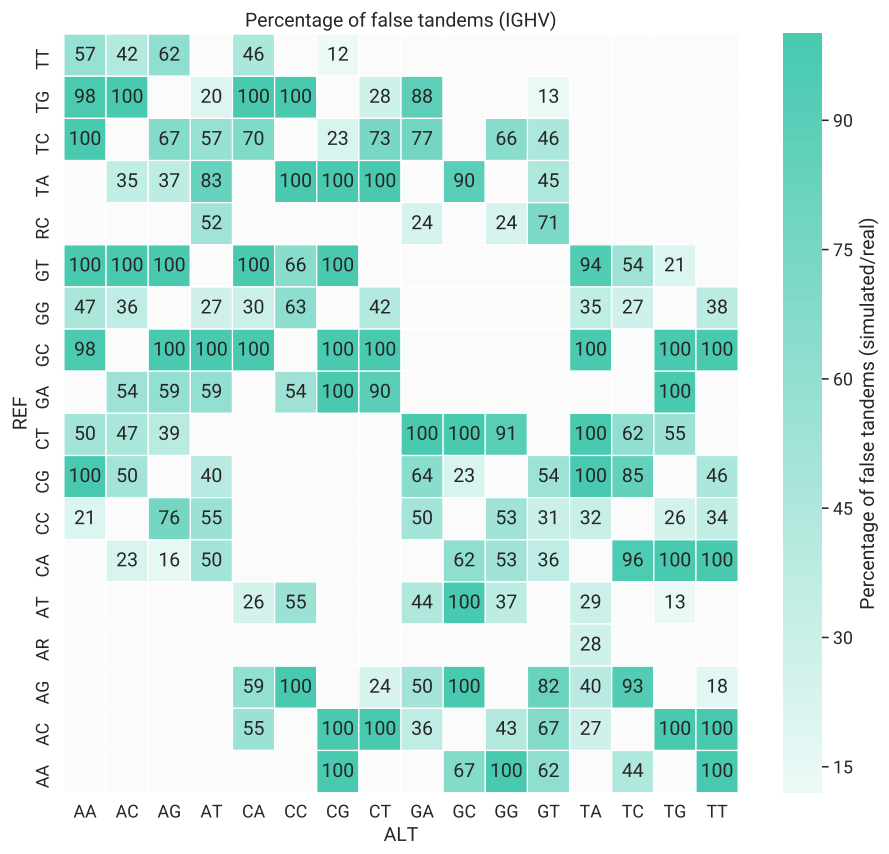
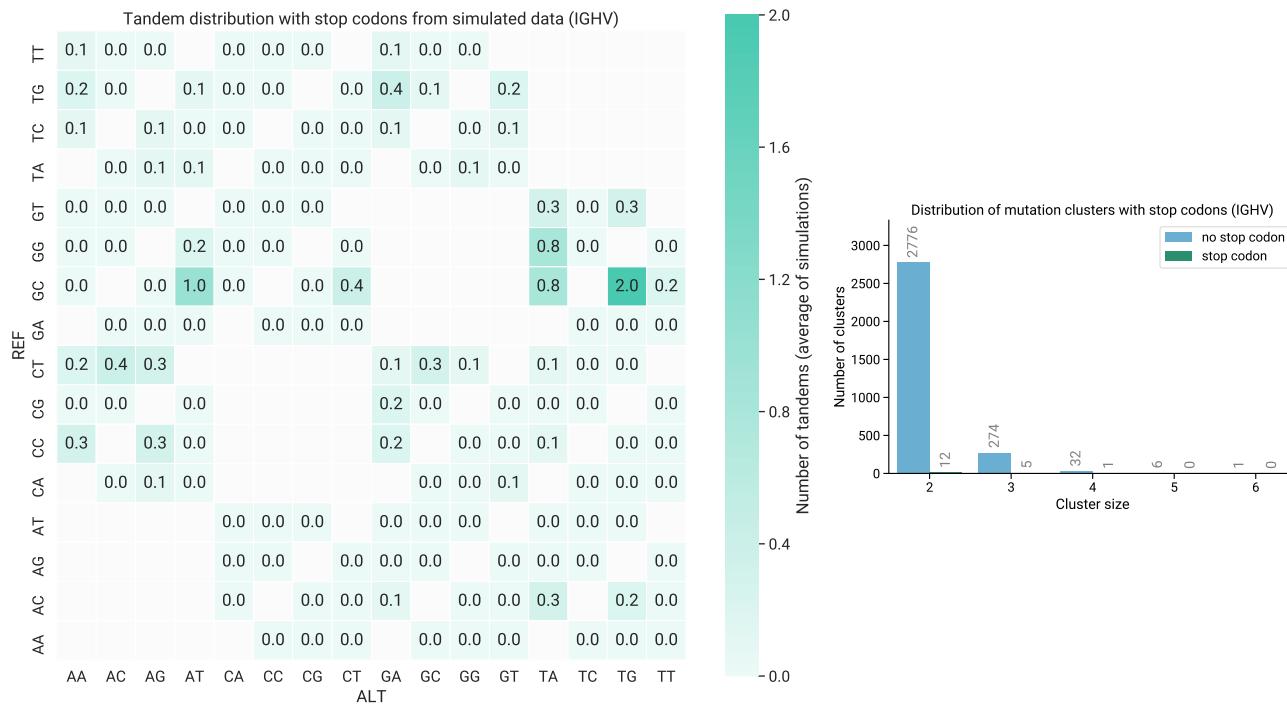
### 3.31 IGHV6-1\*01





### 3.32 IGHV

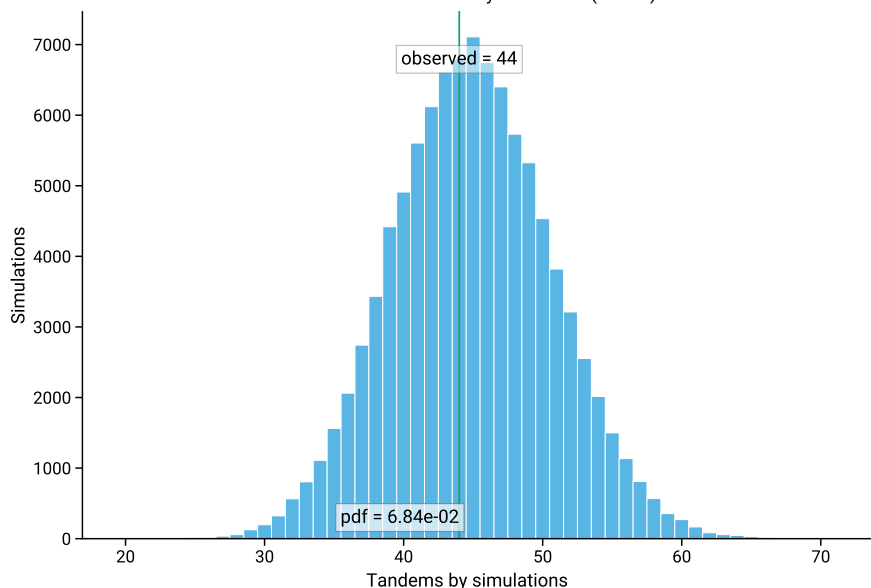




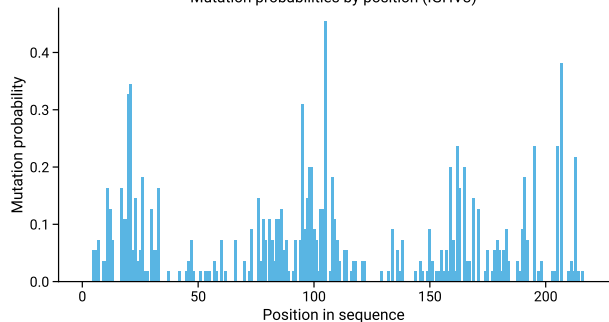
# UNG DEFICIENT

## 4.1 IGHV3

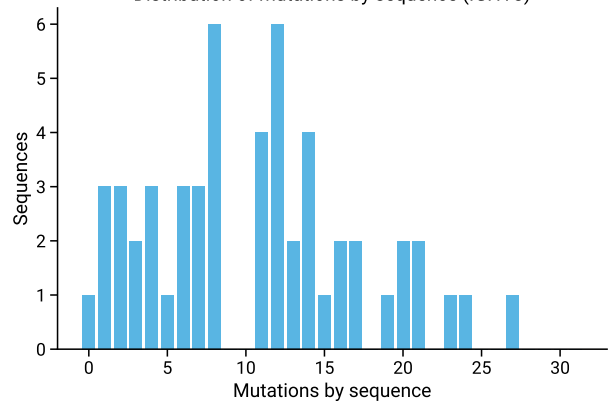
Distribution of tandems by simulation (IGHV3)



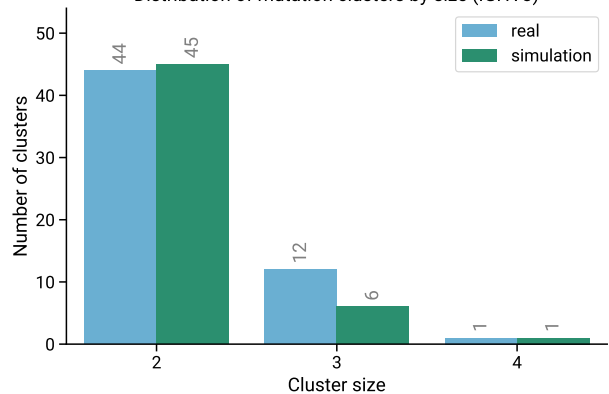
Mutation probabilities by position (IGHV3)



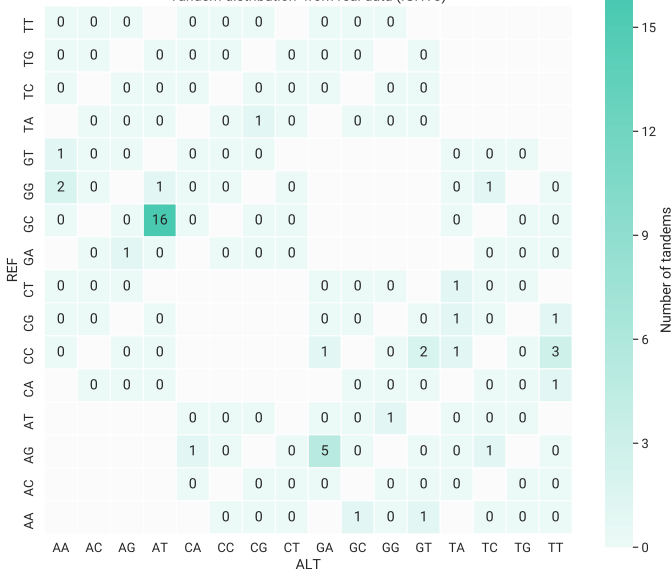
Distribution of mutations by sequence (IGHV3)



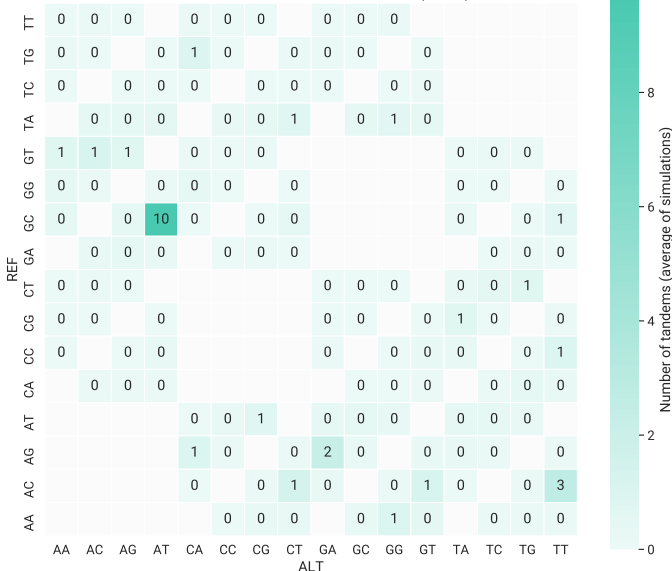
Distribution of mutation clusters by size (IGHV3)

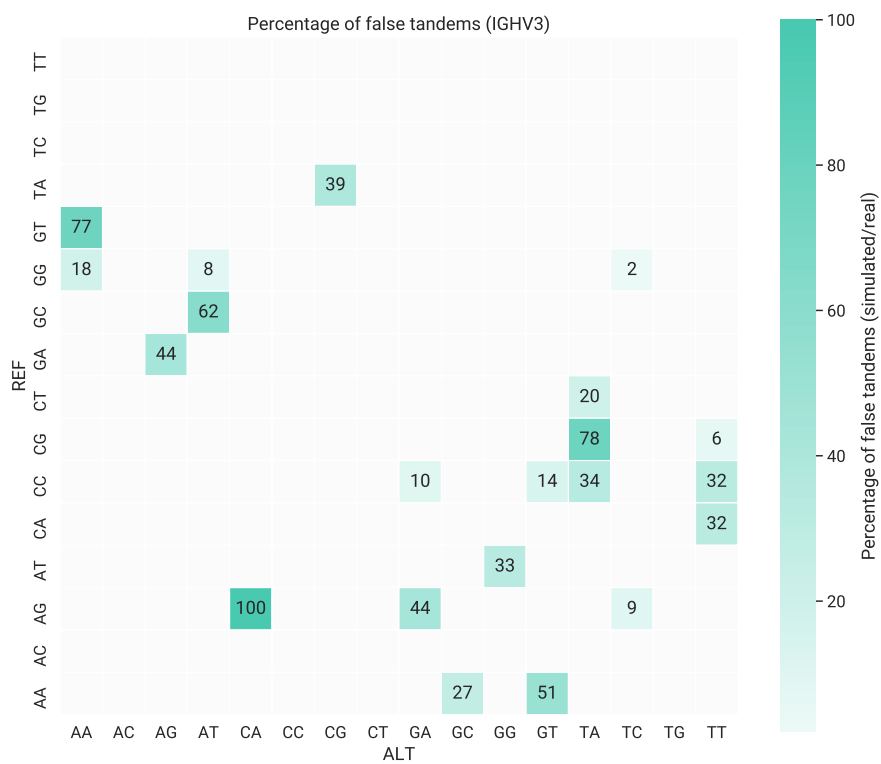
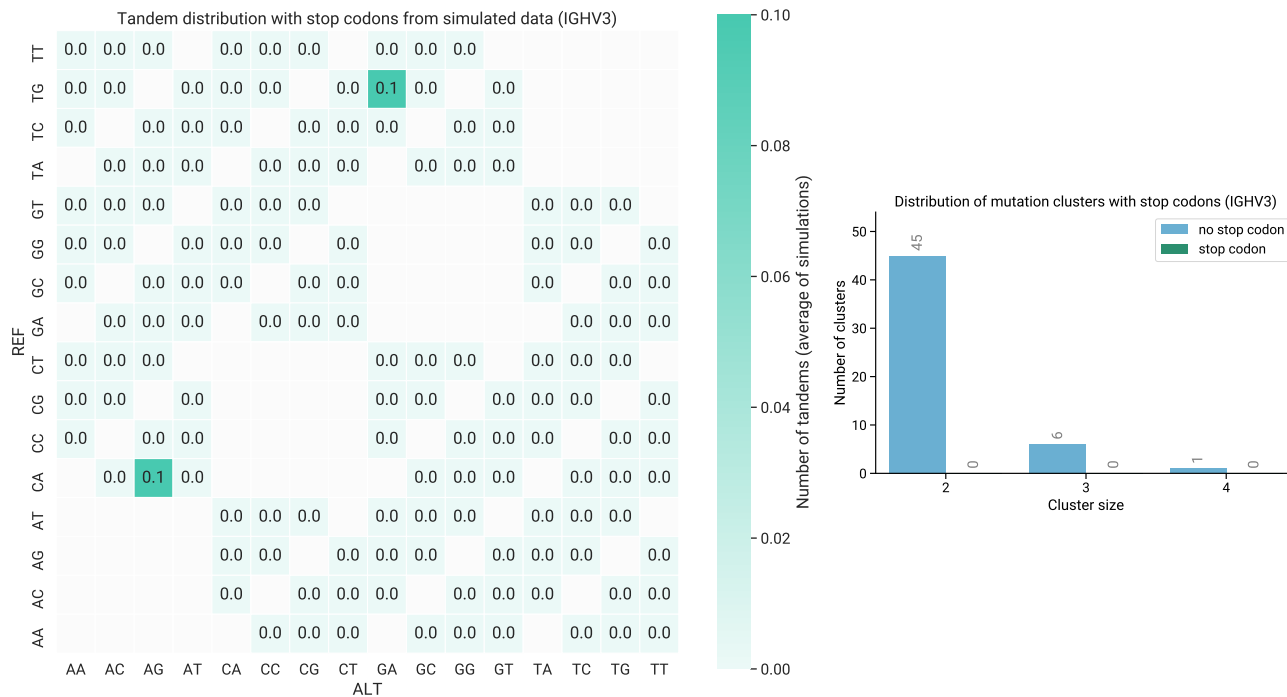


Tandem distribution from real data (IGHV3)

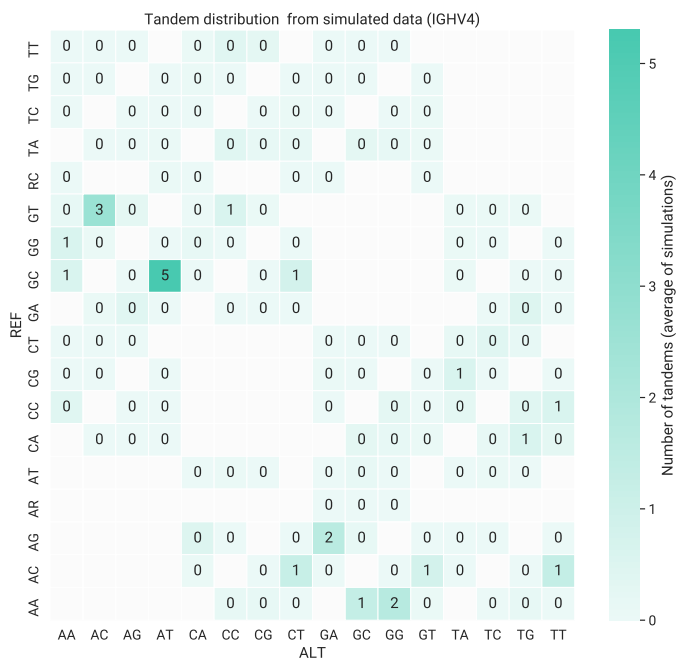
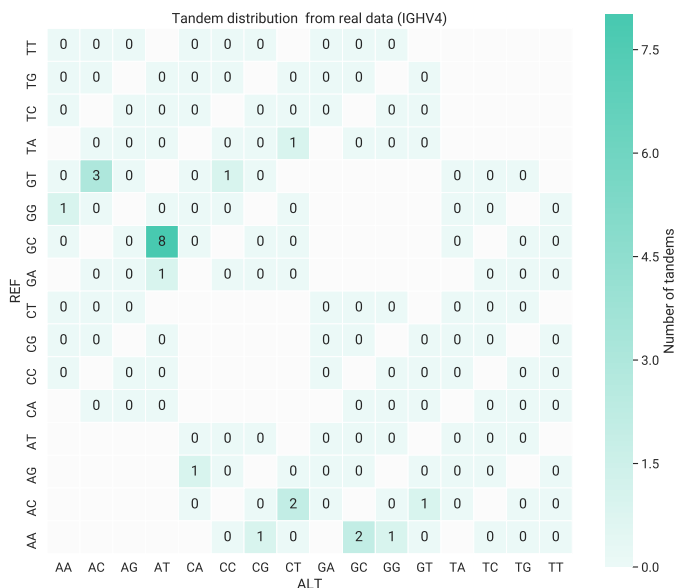
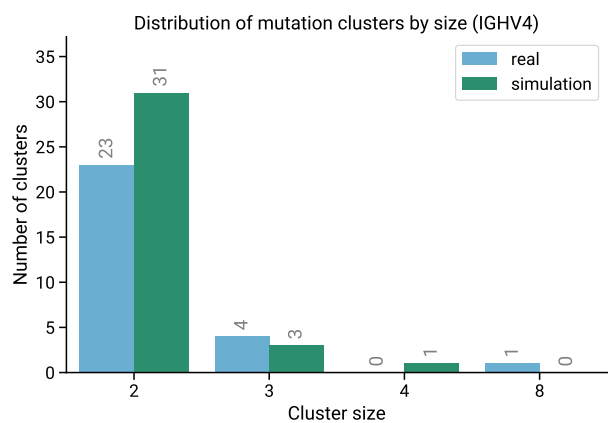
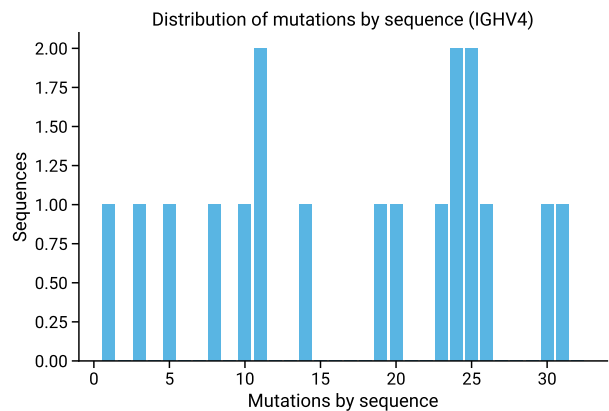
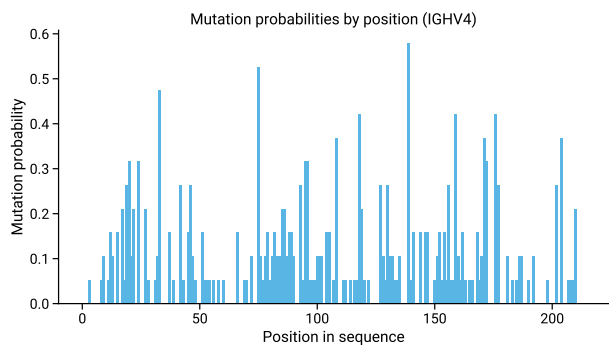
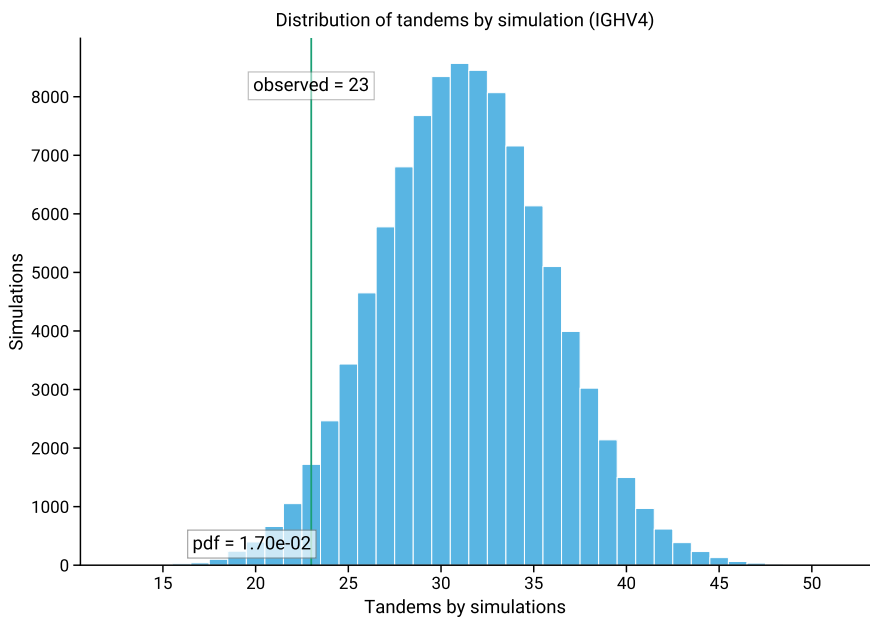


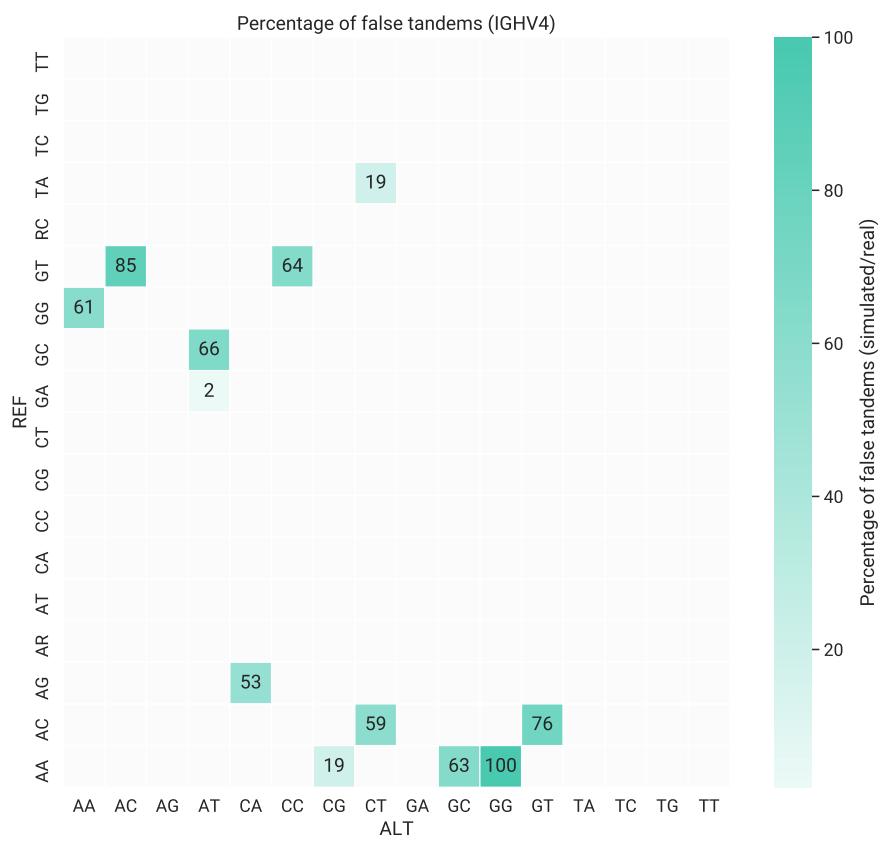
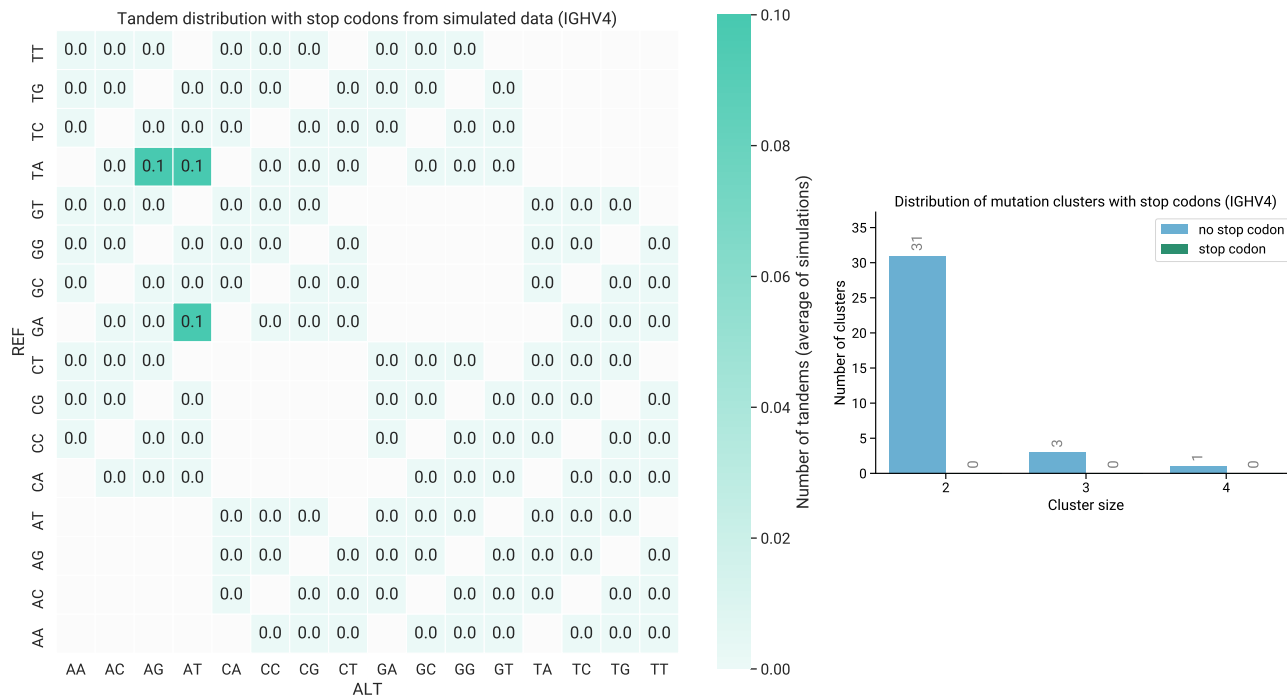
Tandem distribution from simulated data (IGHV3)





## 4.2 IGHV4

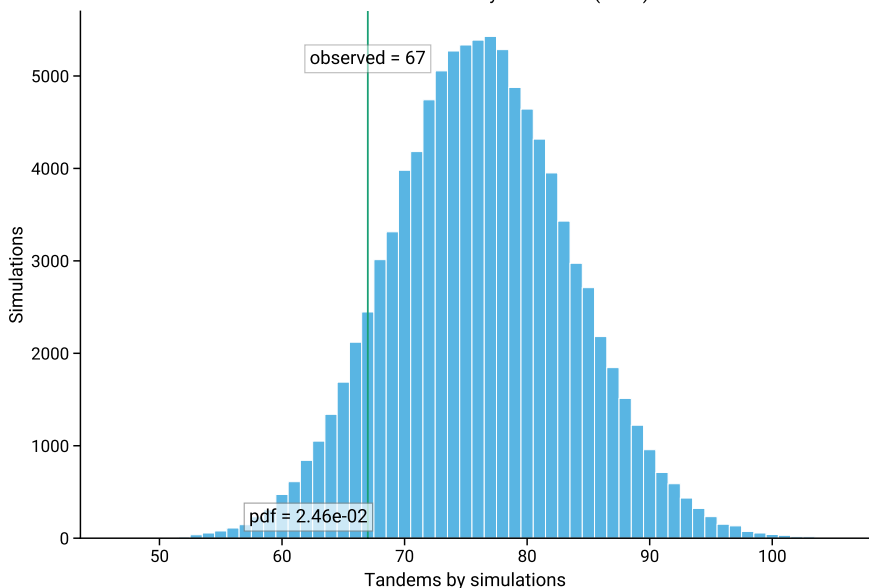




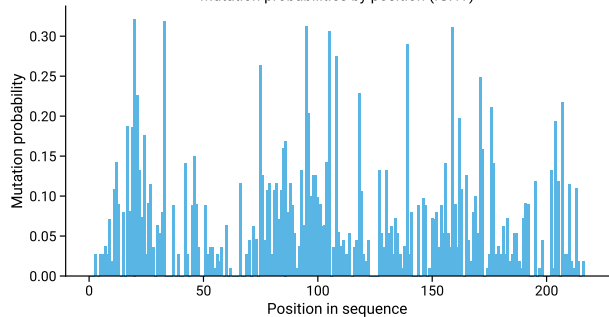


### 4.3 IGHV

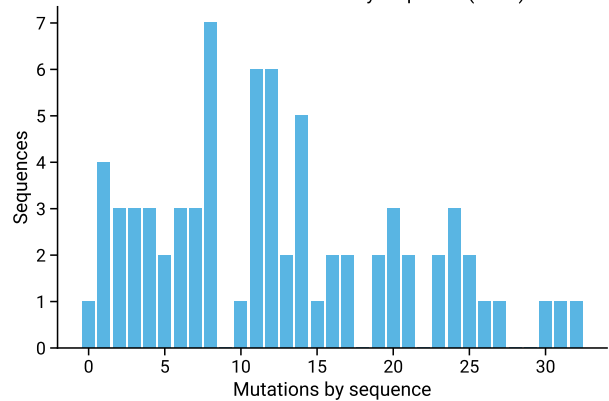
Distribution of tandems by simulation (IGHV)



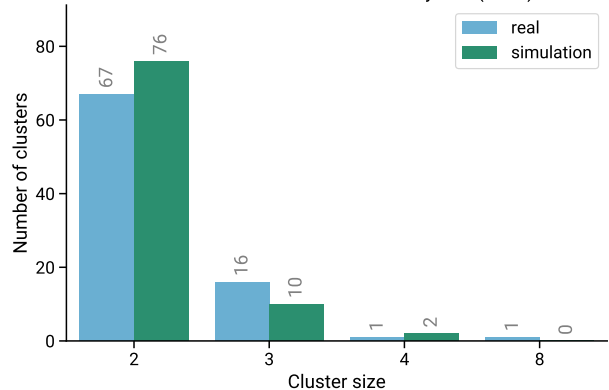
Mutation probabilities by position (IGHV)



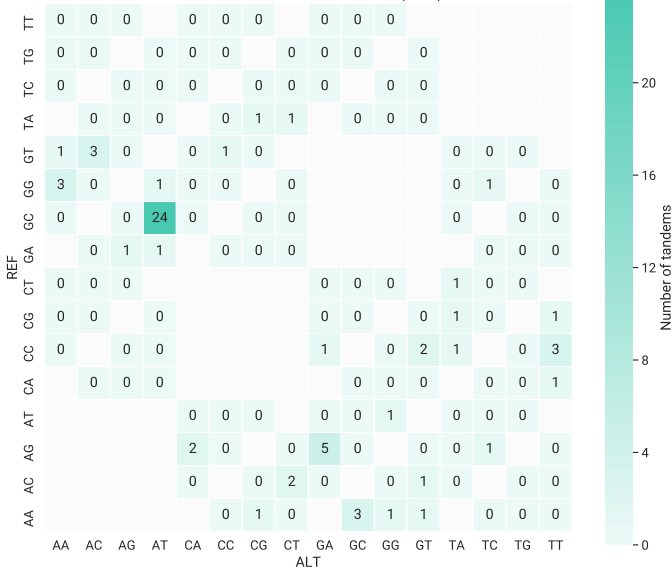
Distribution of mutations by sequence (IGHV)



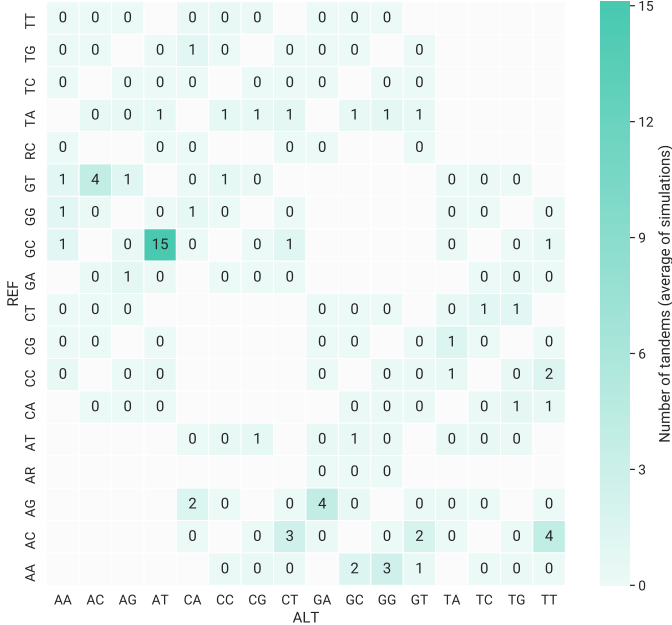
Distribution of mutation clusters by size (IGHV)

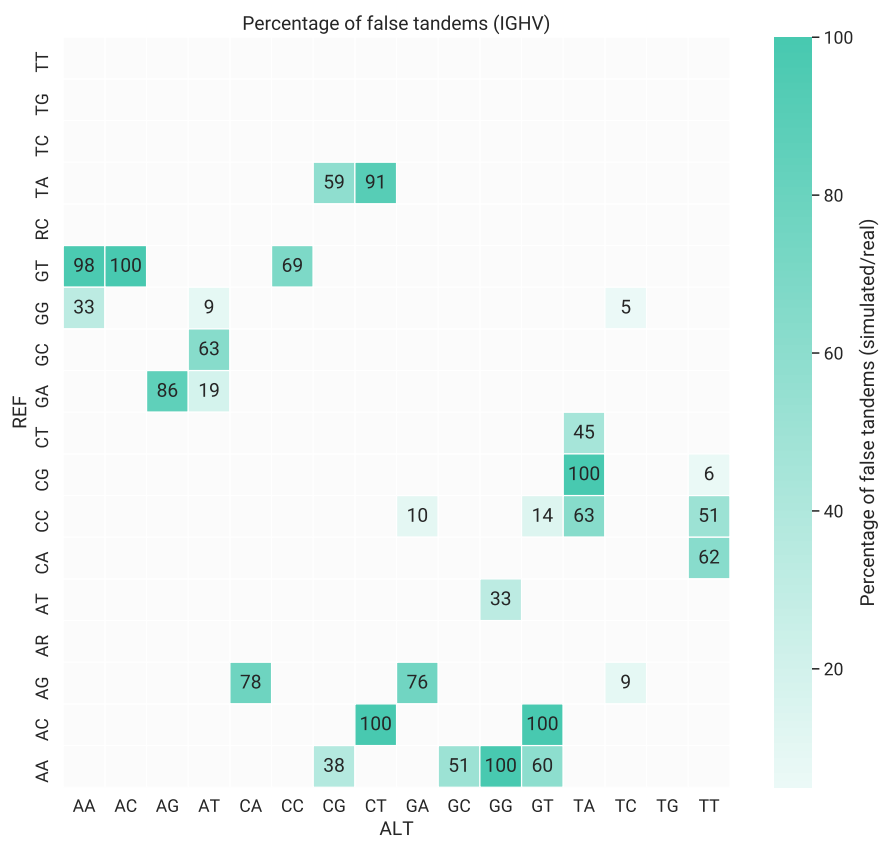
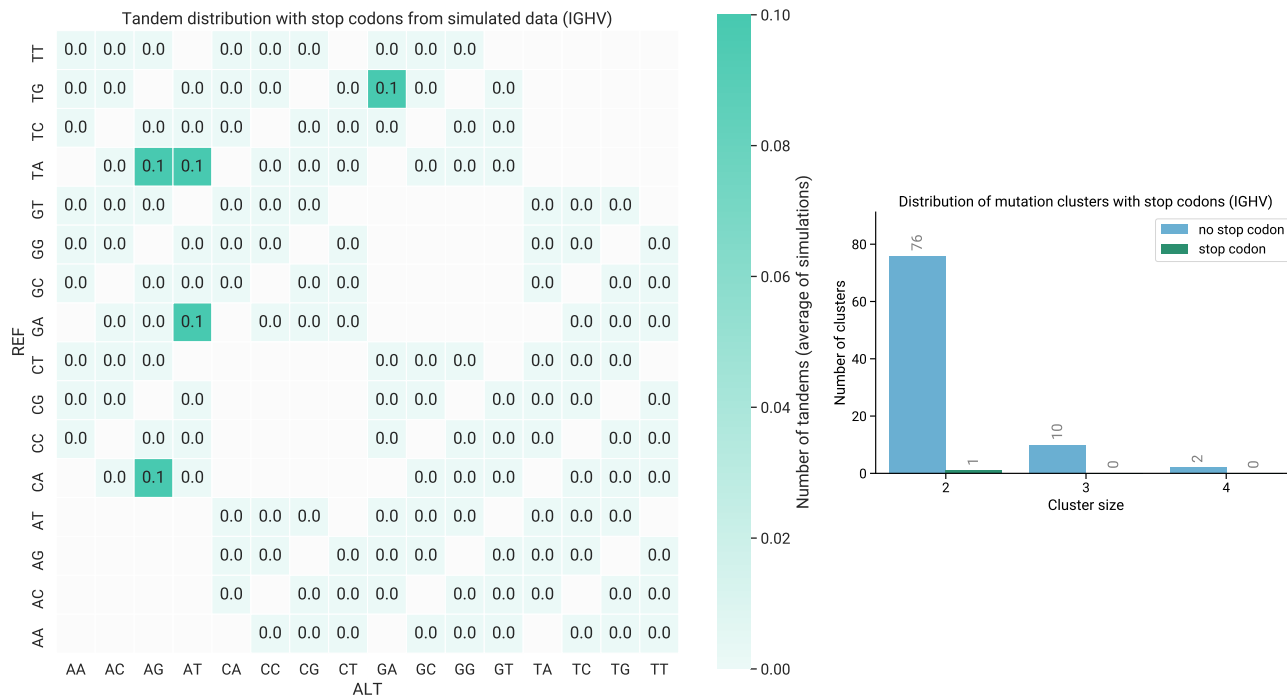


Tandem distribution from real data (IGHV)



Tandem distribution from simulated data (IGHV)

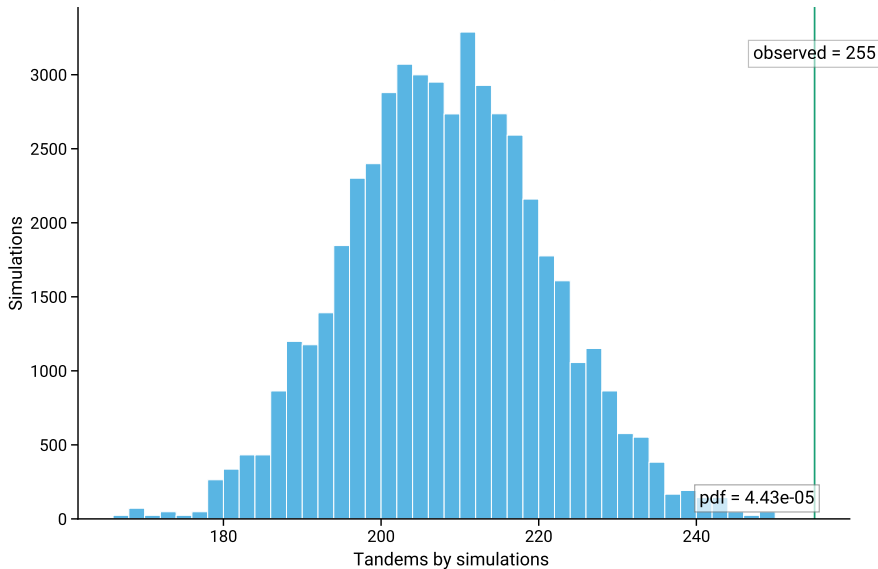




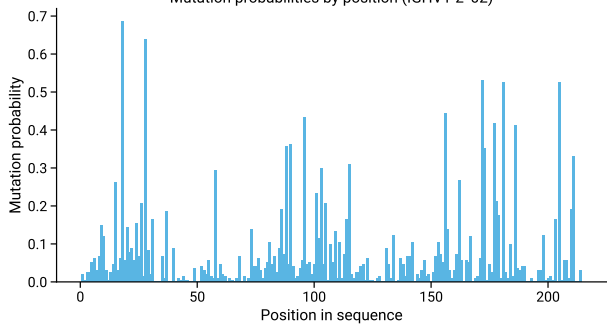
# LEIDEN HEALTHY DONOR COHORT (90 – 95% IGV IDENTITY)

## 5.1 IGHV1-2\*02

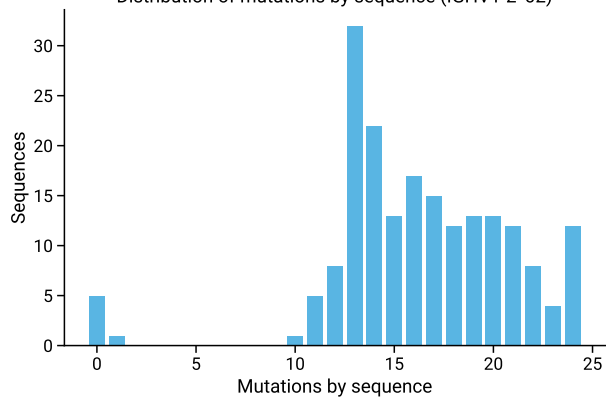
Distribution of tandems by simulation (IGHV1-2\*02)



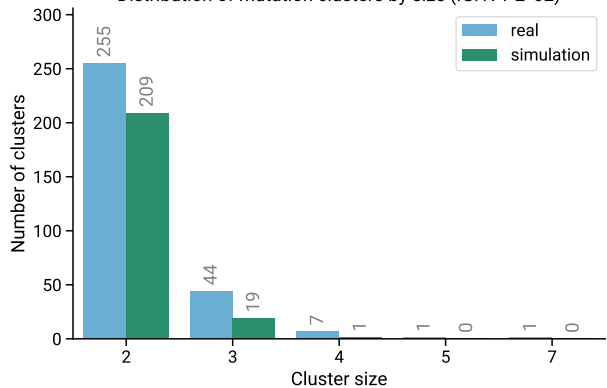
Mutation probabilities by position (IGHV1-2\*02)



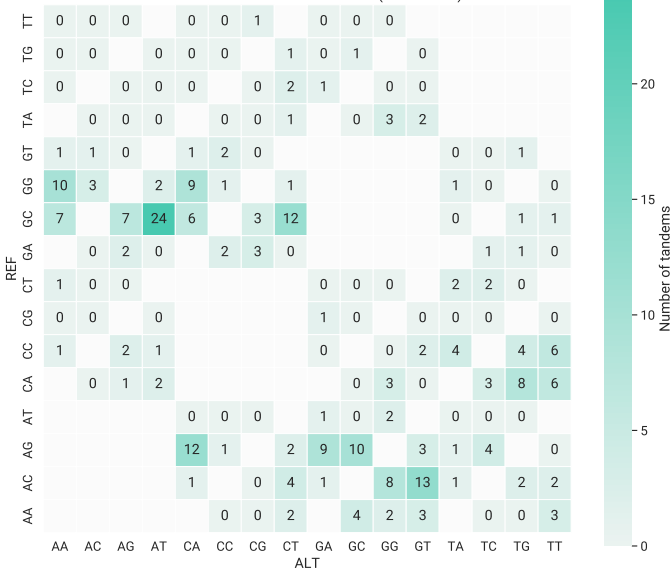
Distribution of mutations by sequence (IGHV1-2\*02)



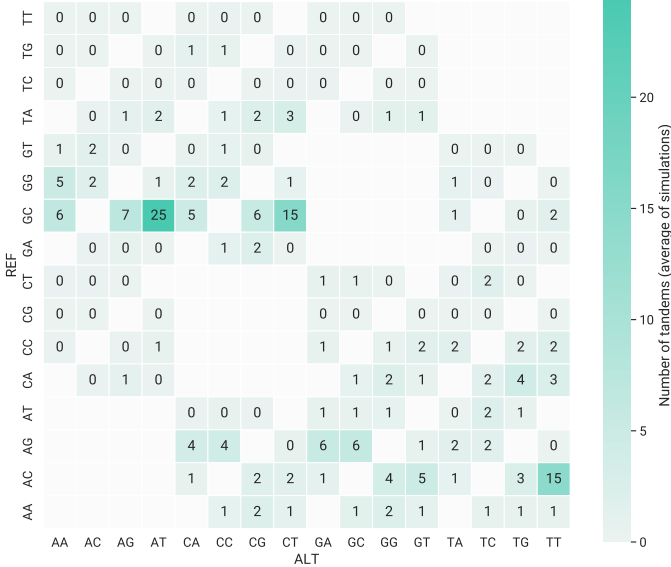
Distribution of mutation clusters by size (IGHV1-2\*02)

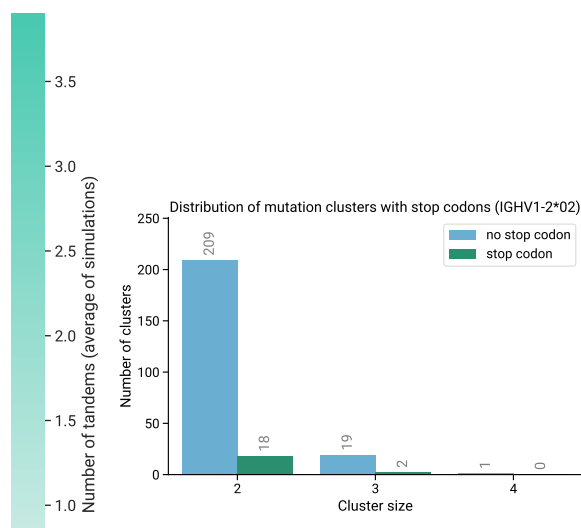
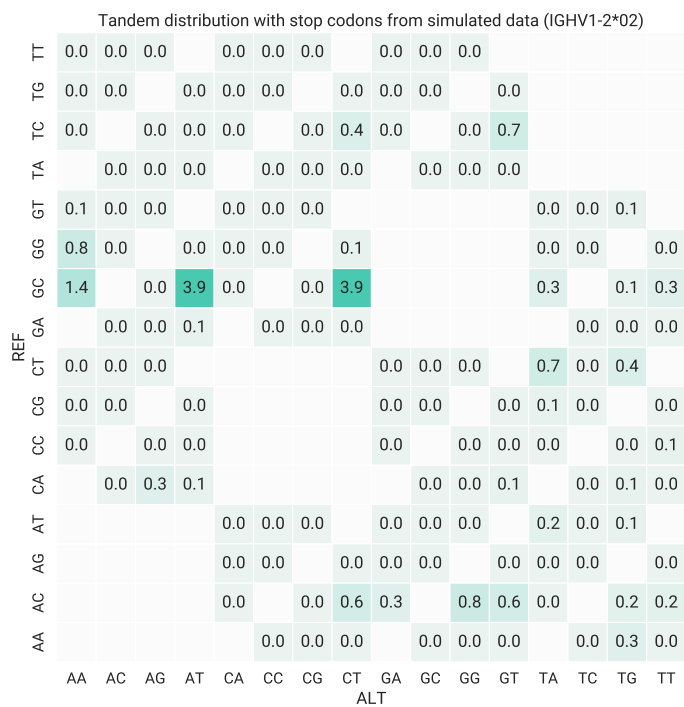


Tandem distribution from real data (IGHV1-2\*02)



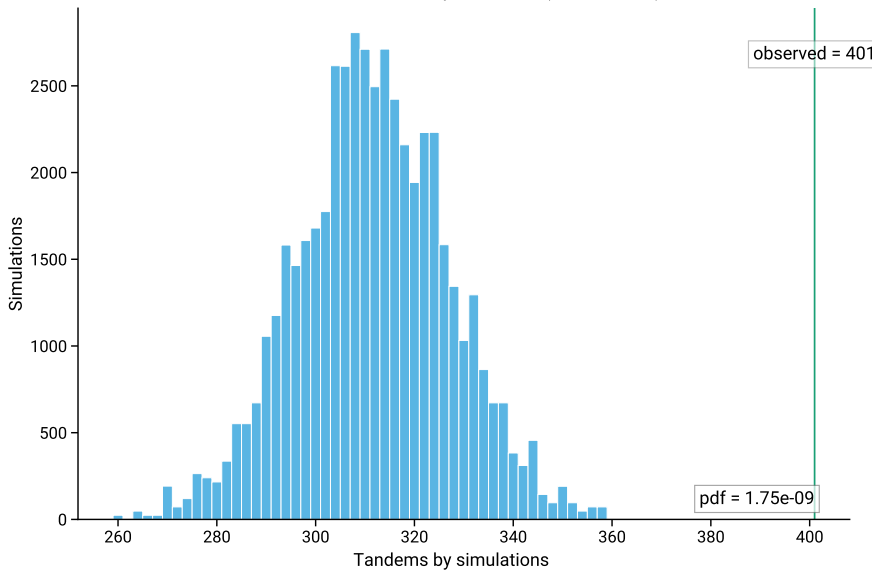
Tandem distribution from simulated data (IGHV1-2\*02)



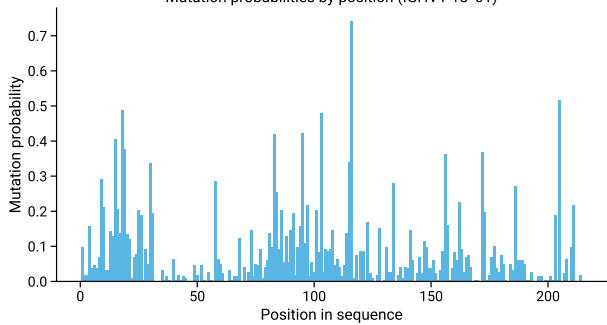


### 5.2 IGHV1-18\*01

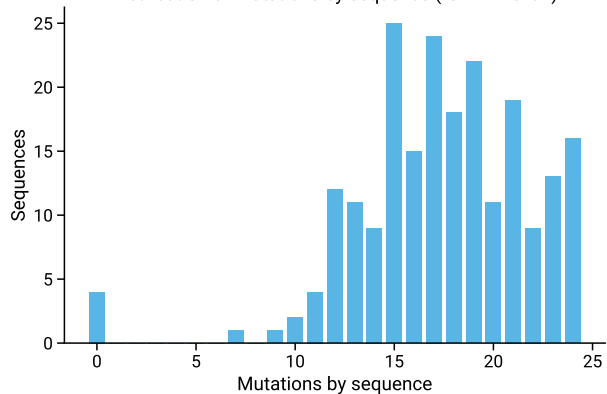
Distribution of tandems by simulation (IGHV1-18\*01)



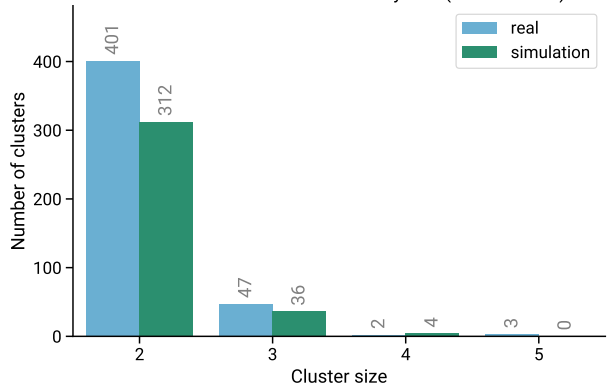
Mutation probabilities by position (IGHV1-18\*01)



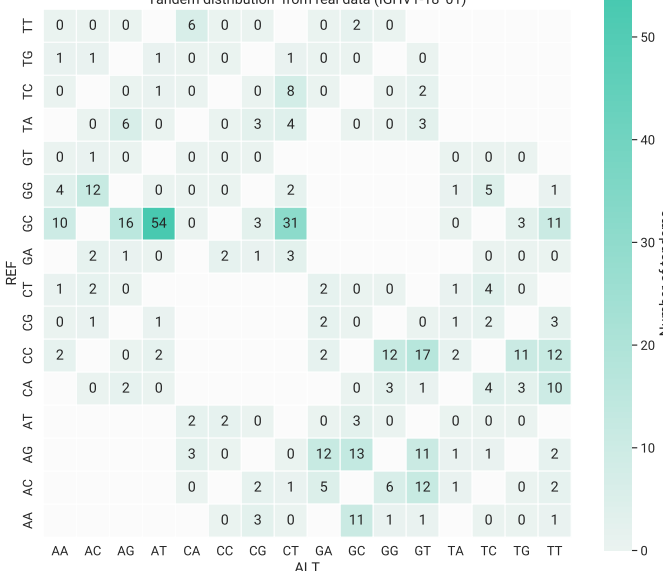
Distribution of mutations by sequence (IGHV1-18\*01)



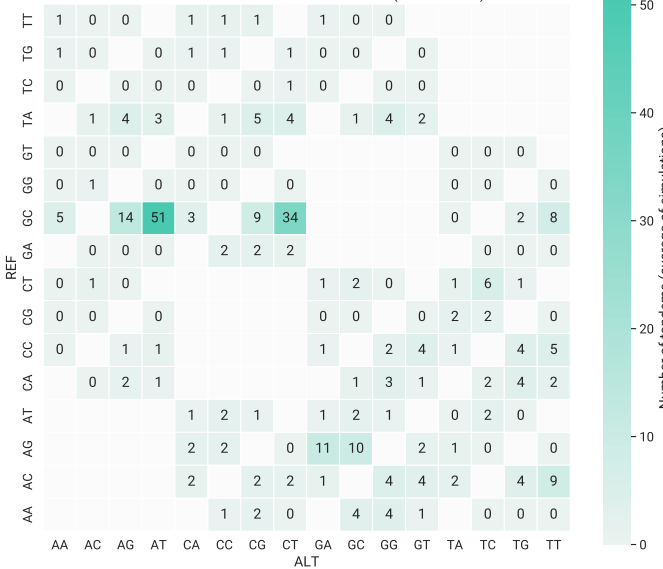
Distribution of mutation clusters by size (IGHV1-18\*01)

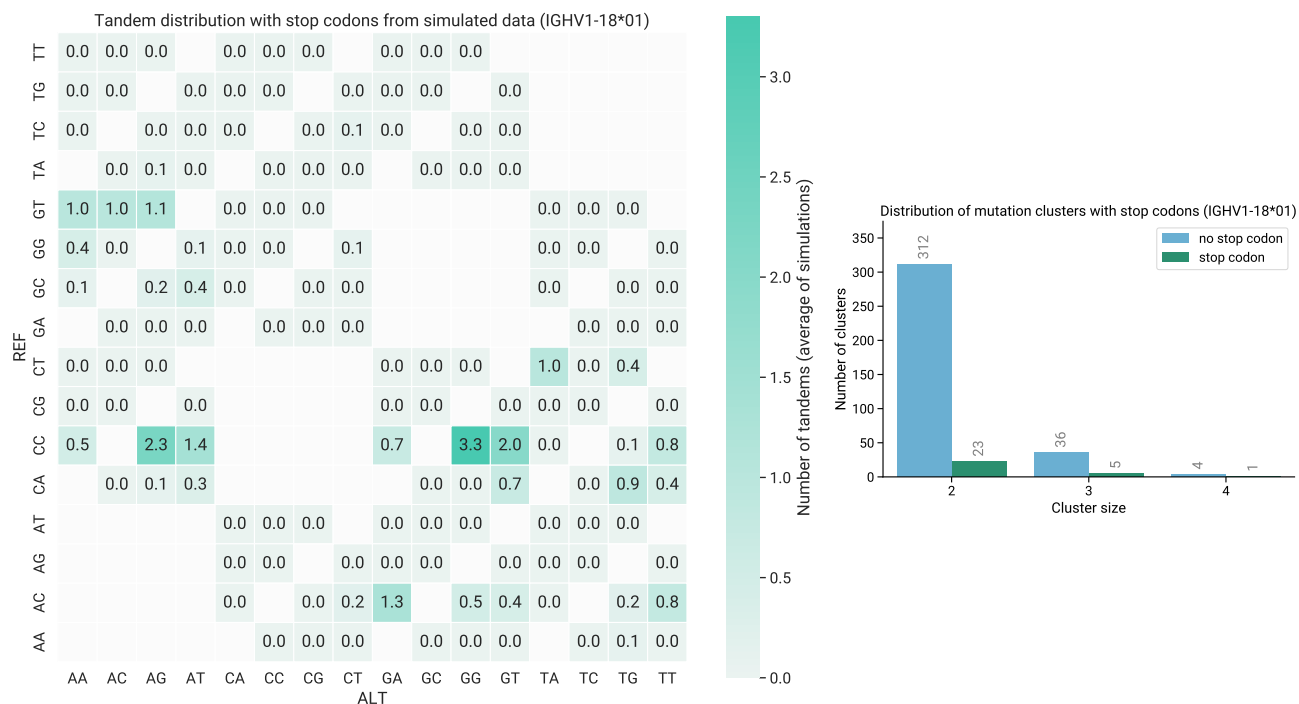


Tandem distribution from real data (IGHV1-18\*01)



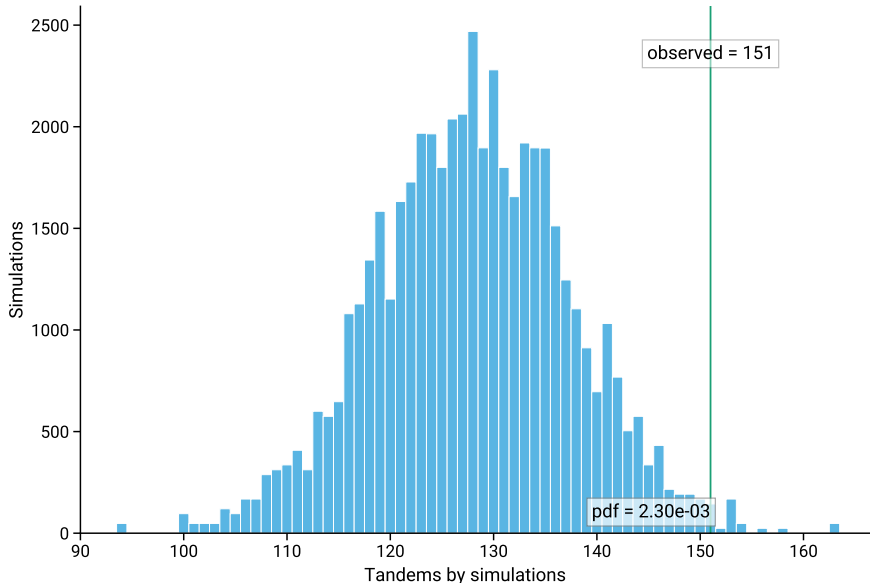
Tandem distribution from simulated data (IGHV1-18\*01)



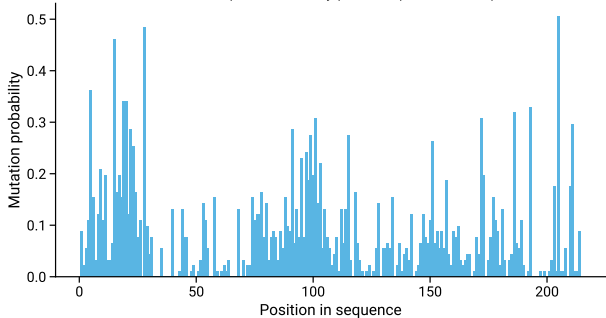


### 5.3 IGHV1-24\*01

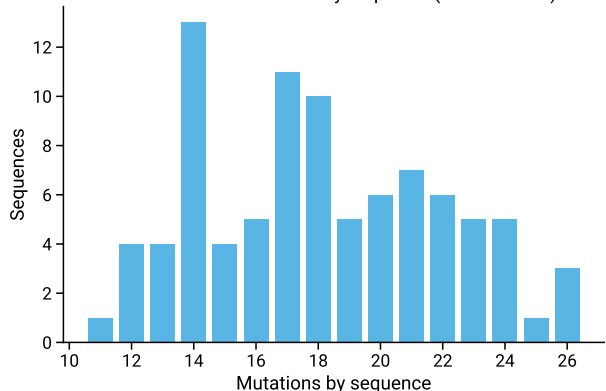
Distribution of tandems by simulation (IGHV1-24\*01)



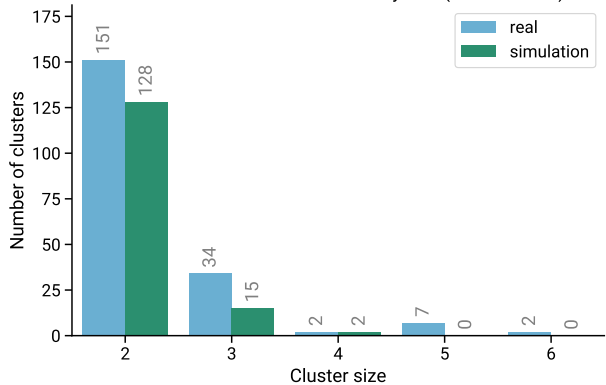
Mutation probabilities by position (IGHV1-24\*01)



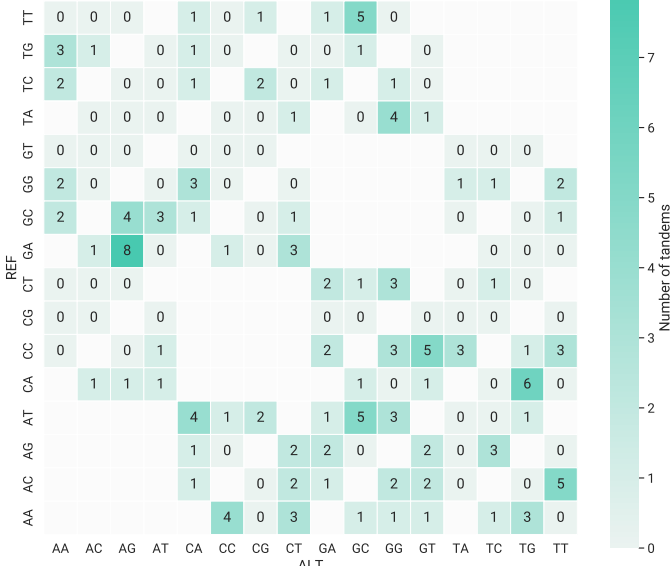
Distribution of mutations by sequence (IGHV1-24\*01)



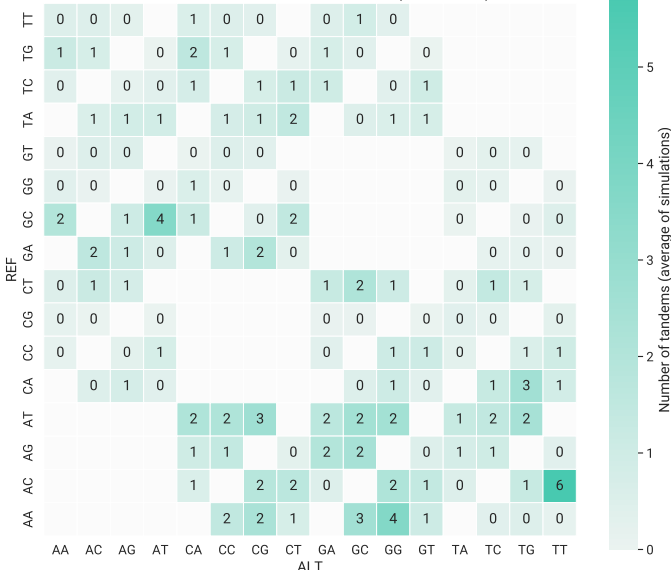
Distribution of mutation clusters by size (IGHV1-24\*01)

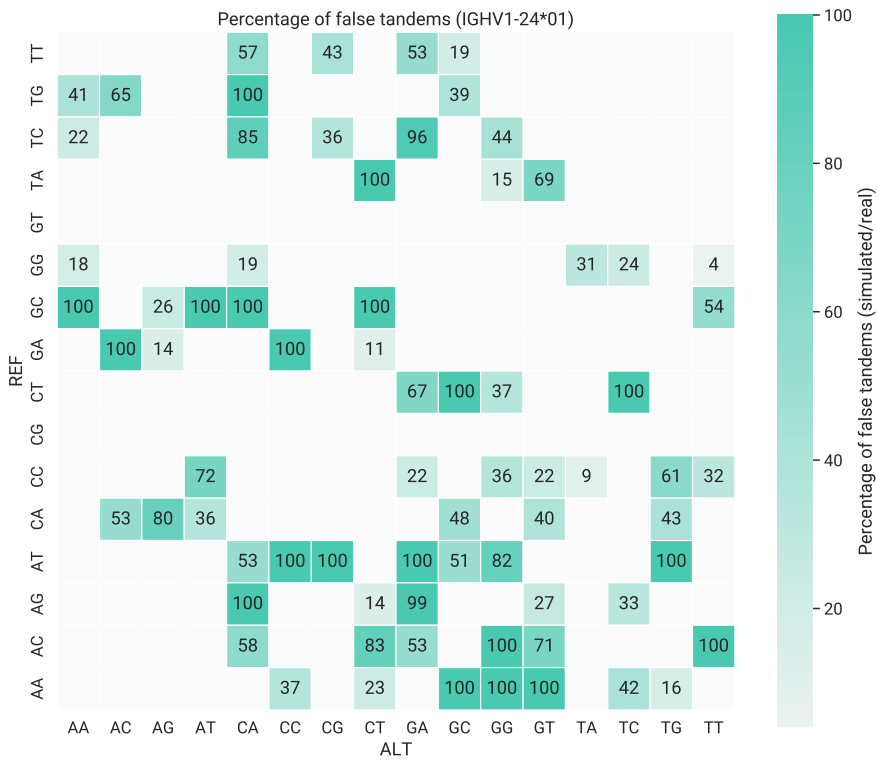
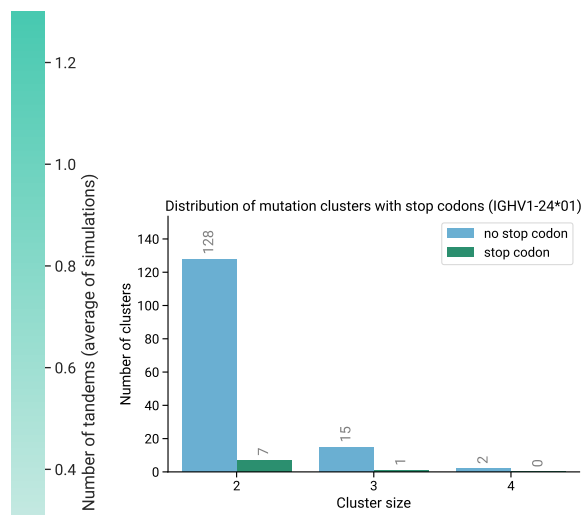
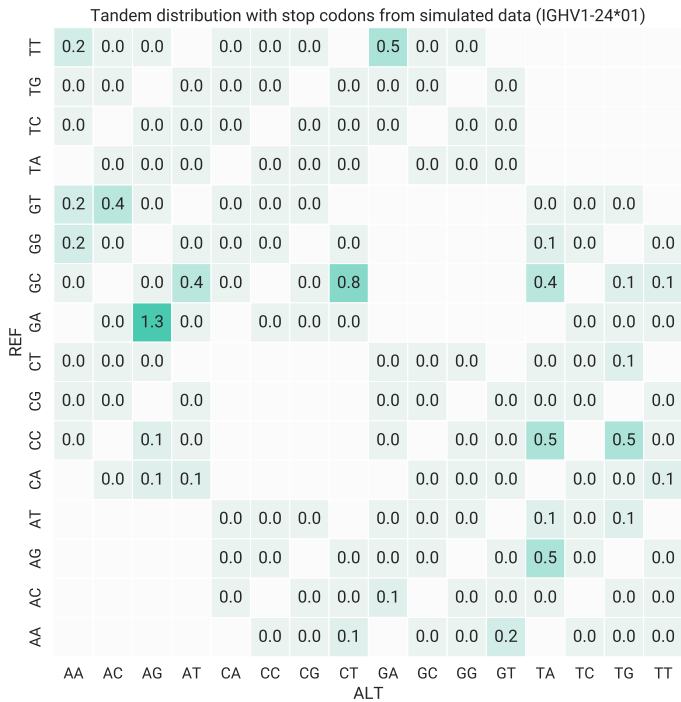


Tandem distribution from real data (IGHV1-24\*01)



Tandem distribution from simulated data (IGHV1-24\*01)

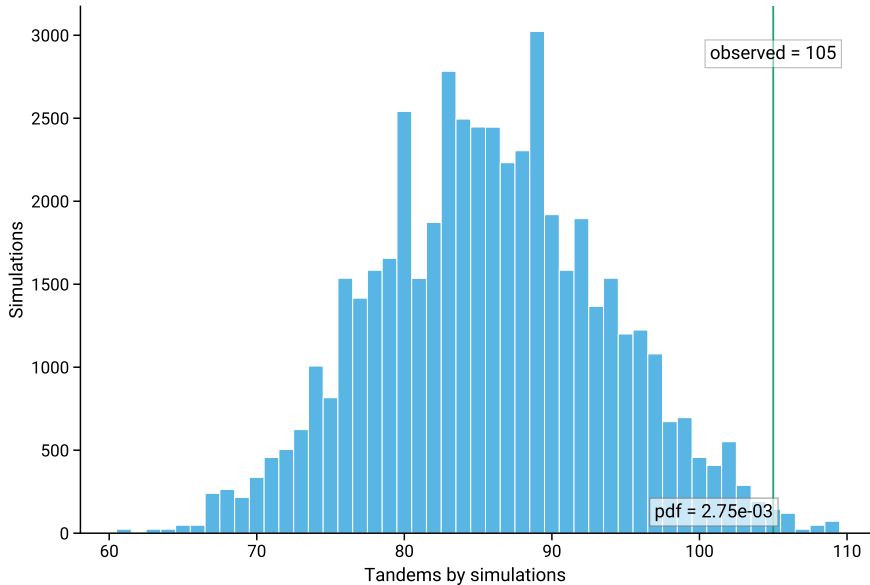




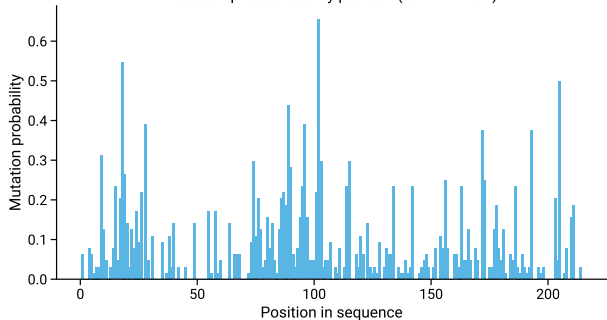


### 5.4 IGHV1-46\*01

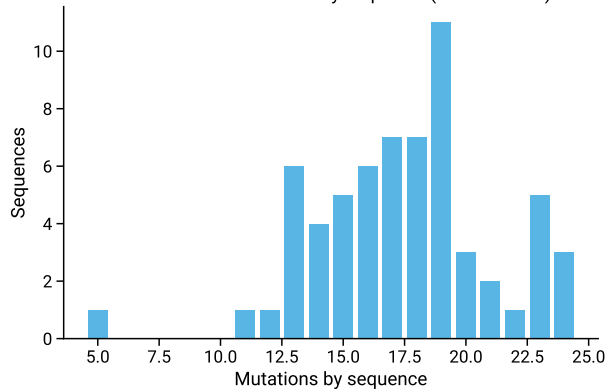
Distribution of tandems by simulation (IGHV1-46\*01)



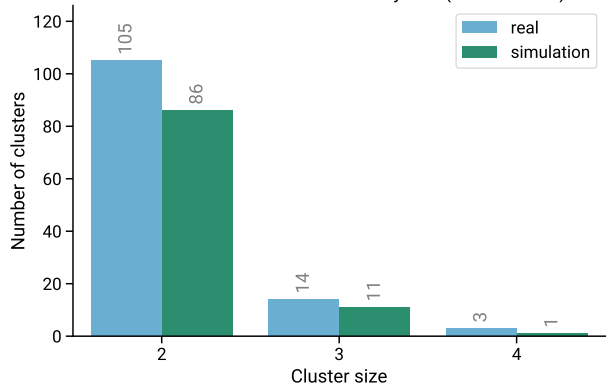
Mutation probabilities by position (IGHV1-46\*01)



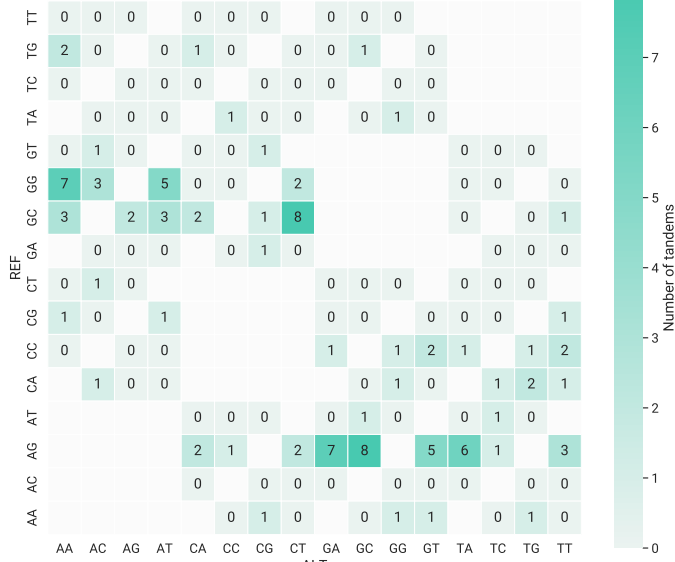
Distribution of mutations by sequence (IGHV1-46\*01)



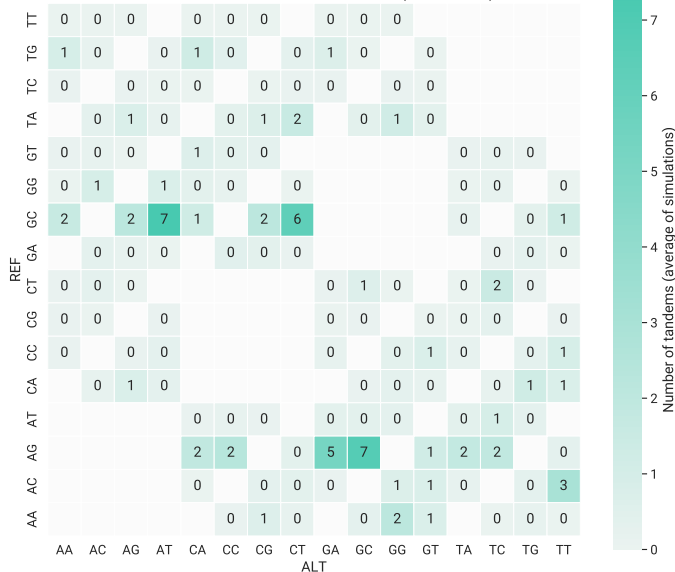
Distribution of mutation clusters by size (IGHV1-46\*01)

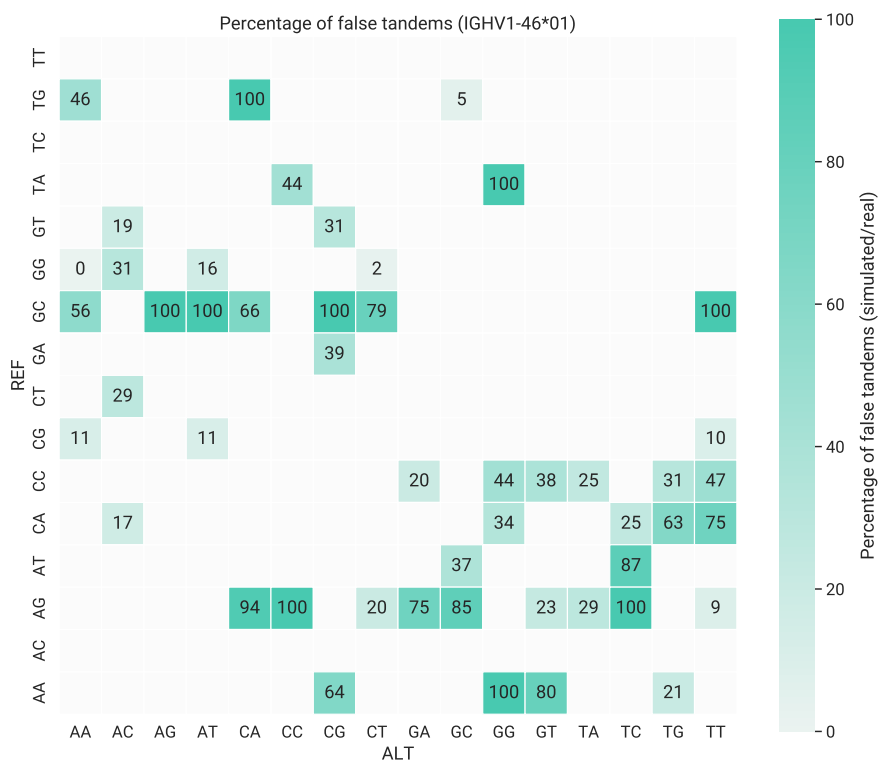
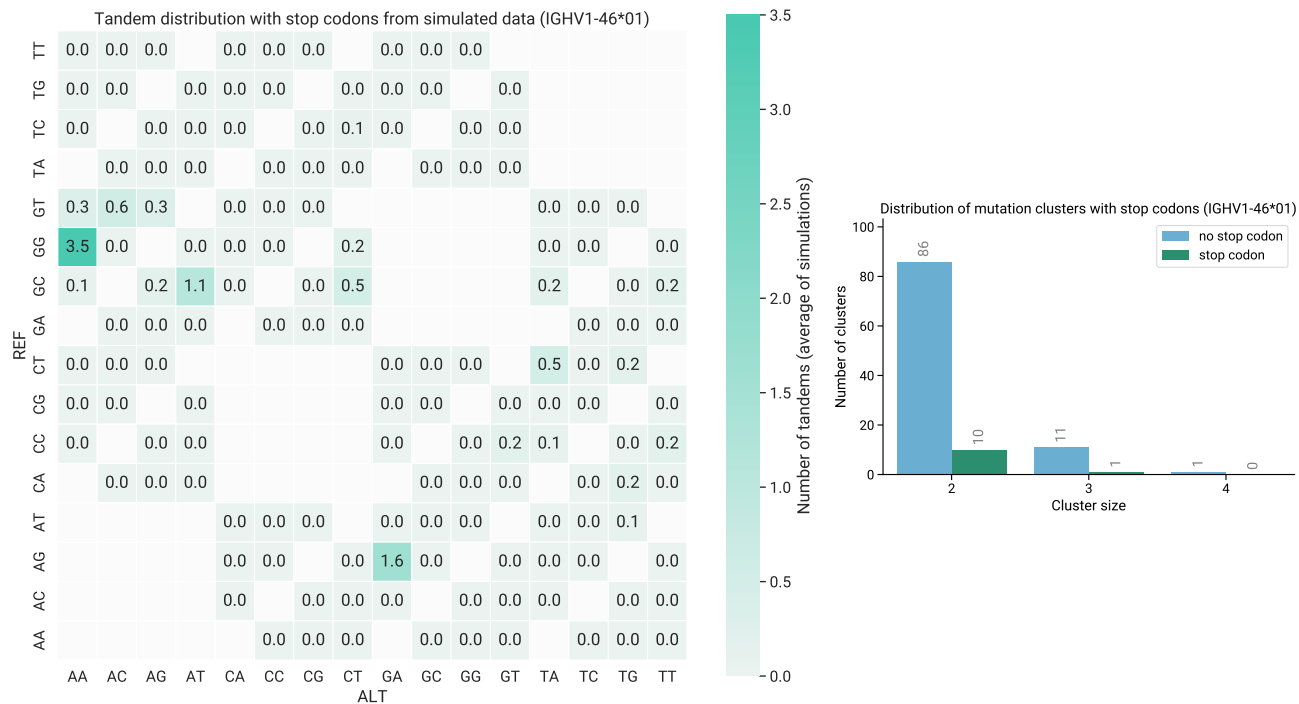


Tandem distribution from real data (IGHV1-46\*01)

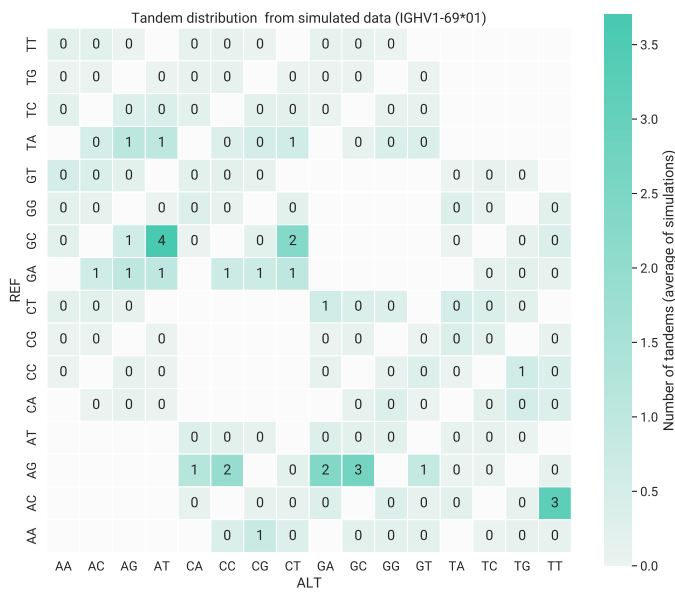
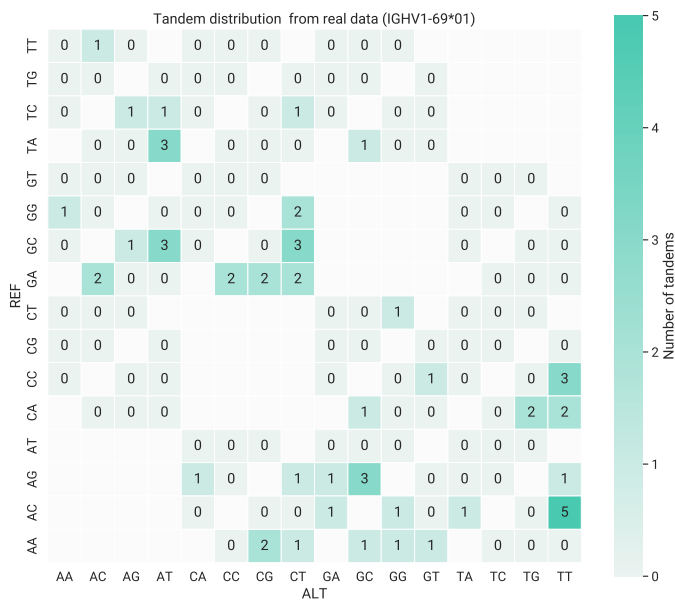
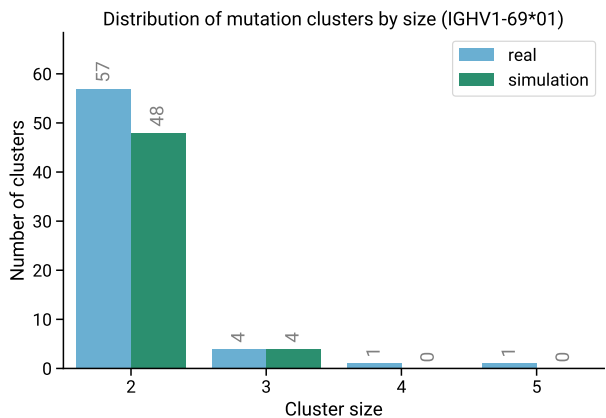
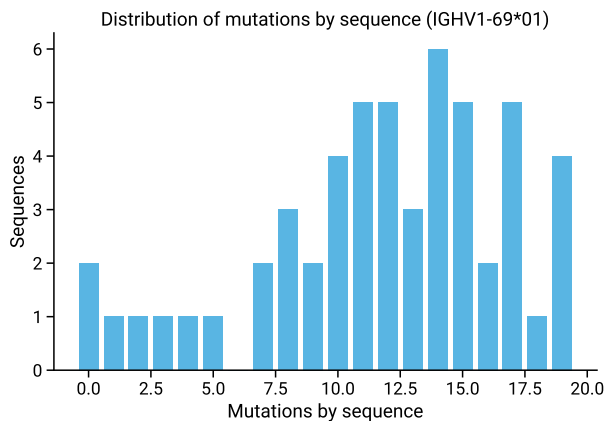
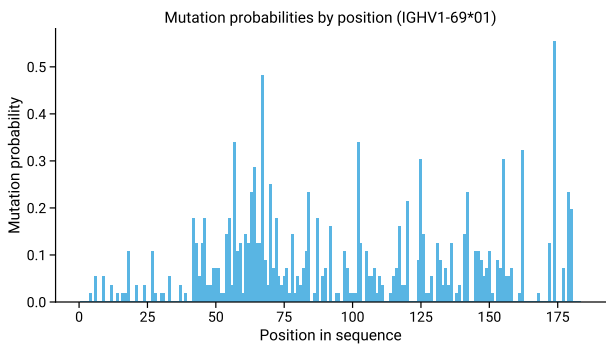
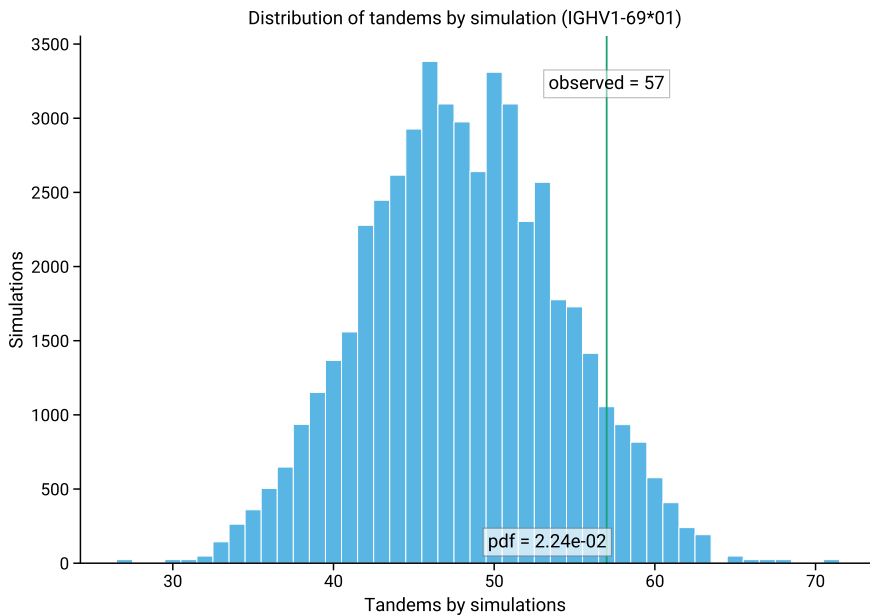


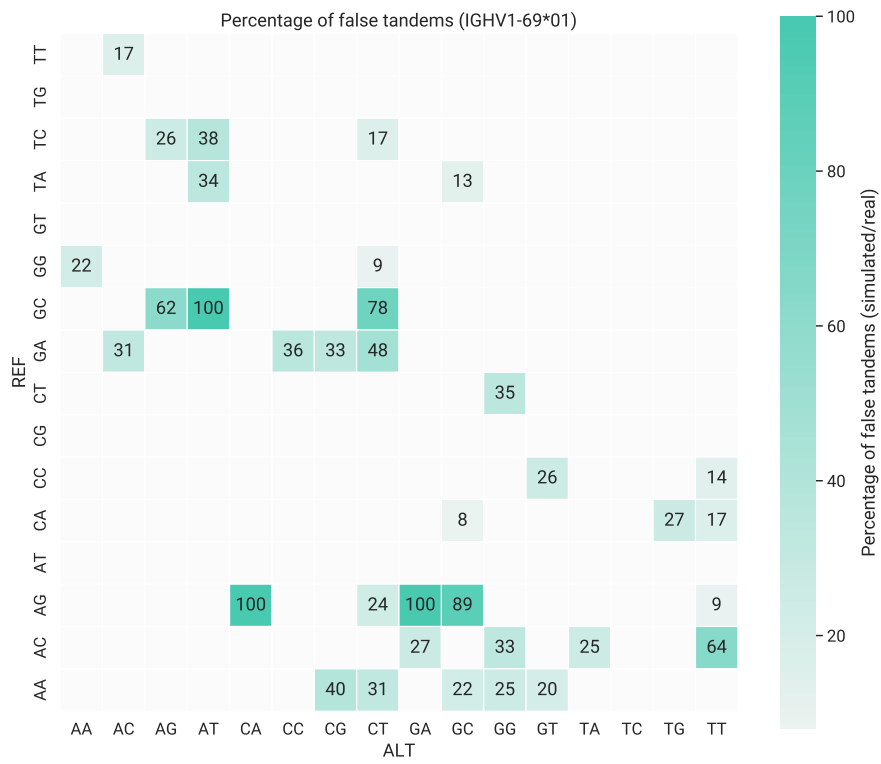
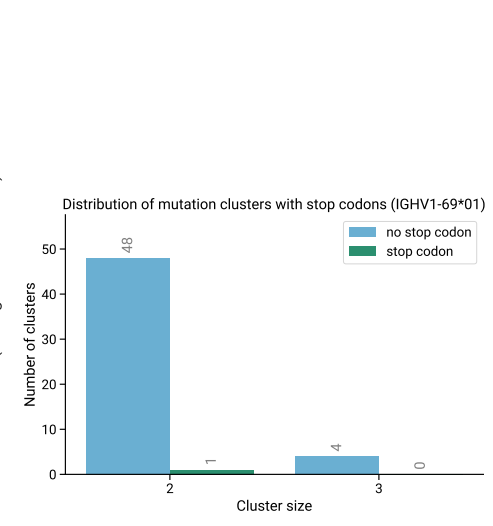
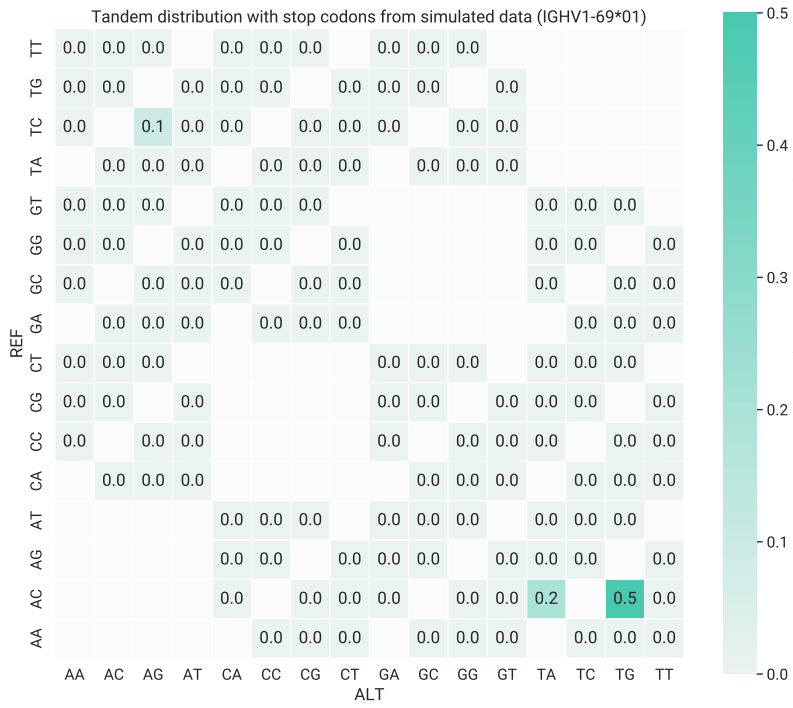
Tandem distribution from simulated data (IGHV1-46\*01)



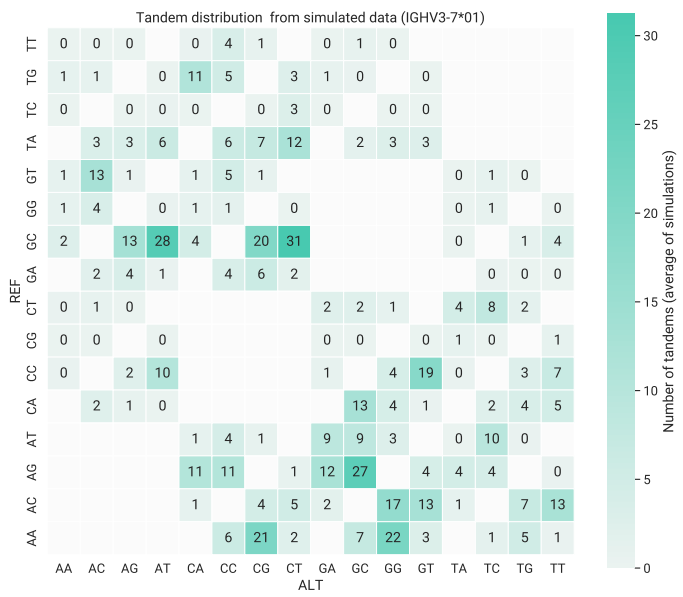
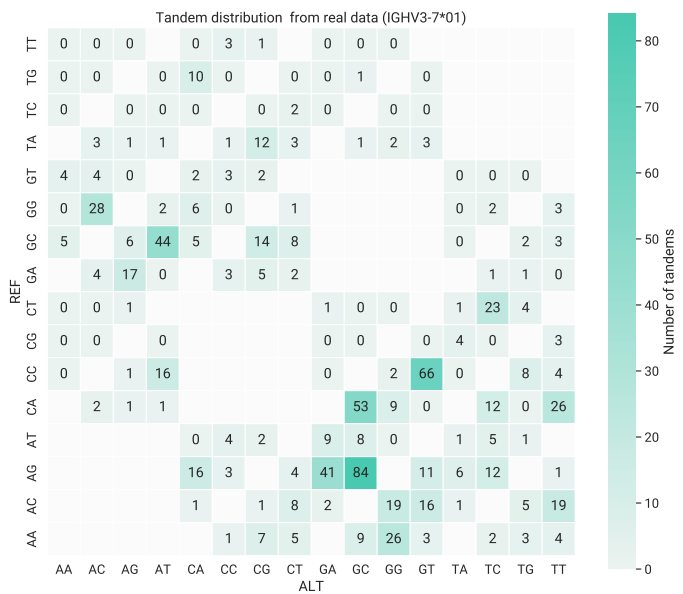
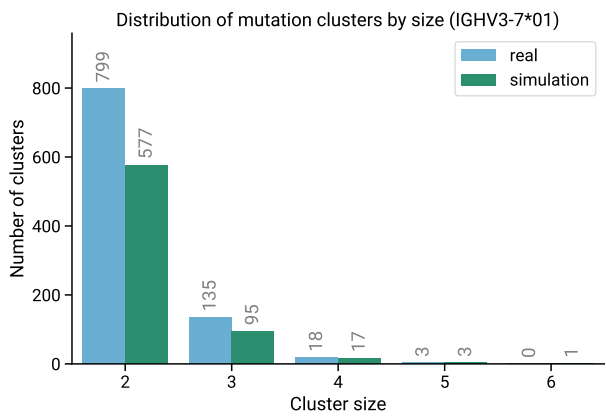
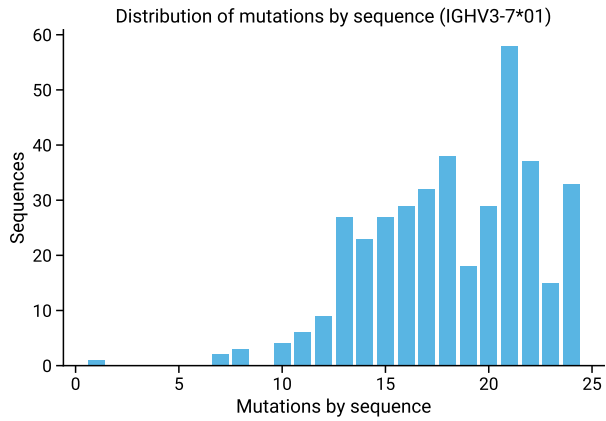
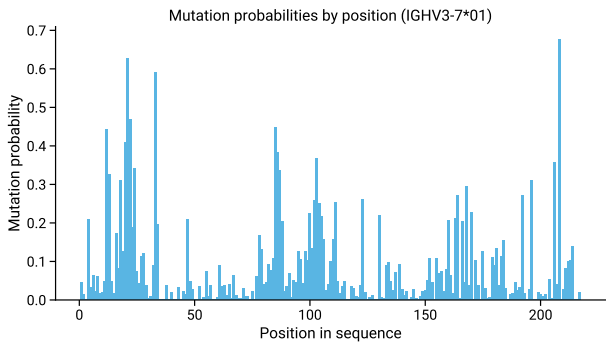
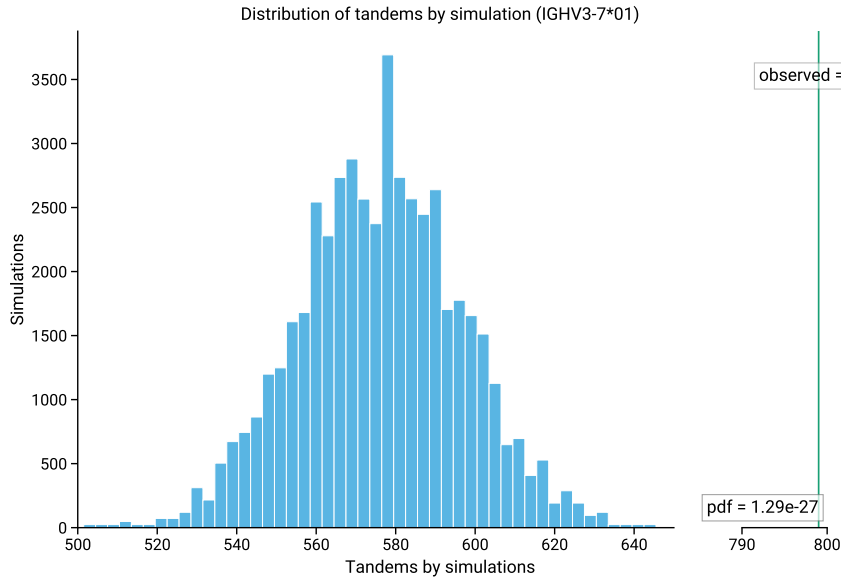


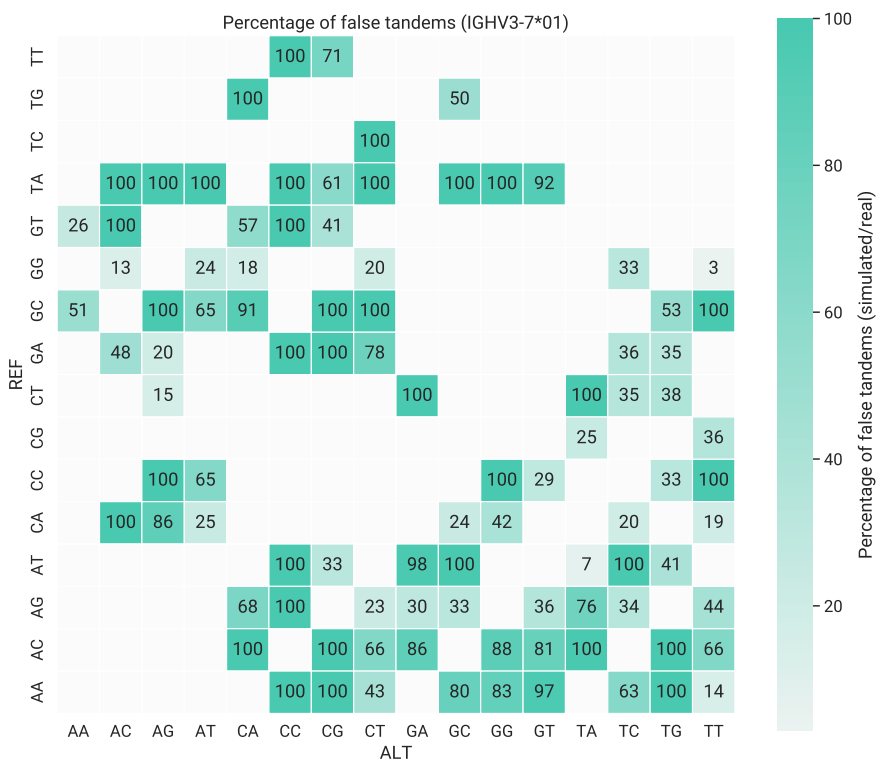
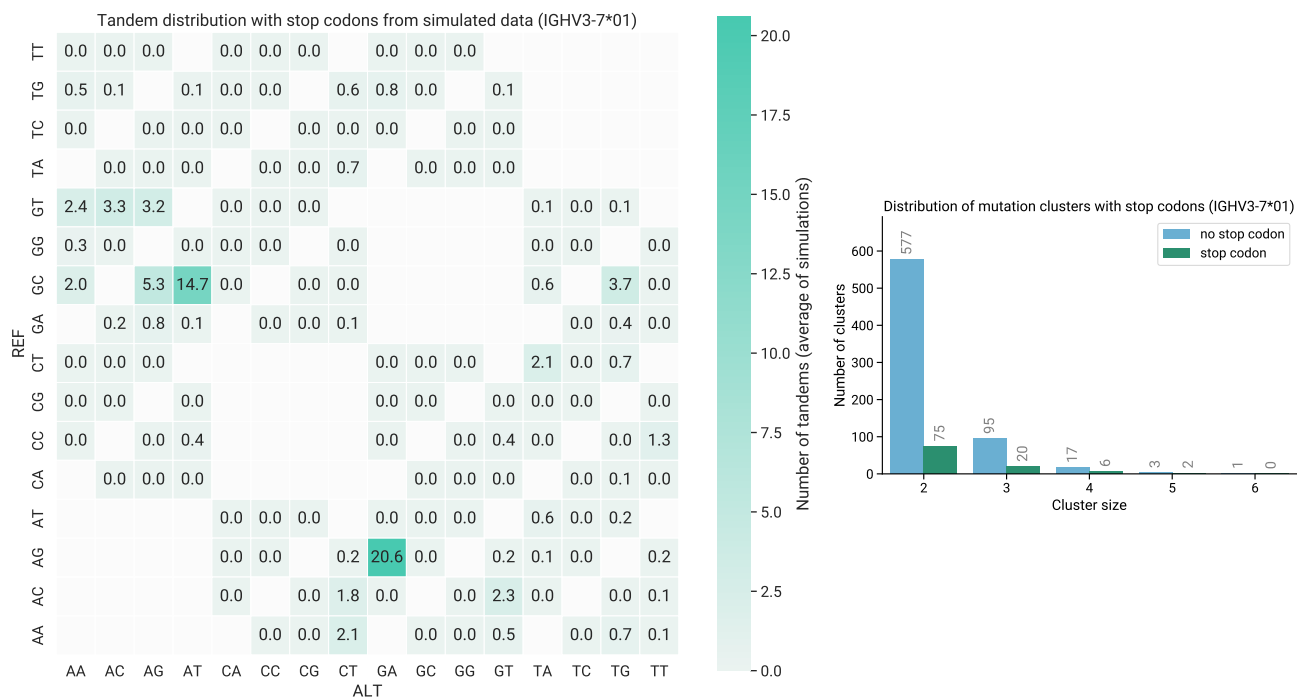
### 5.5 IGHV1-69\*01





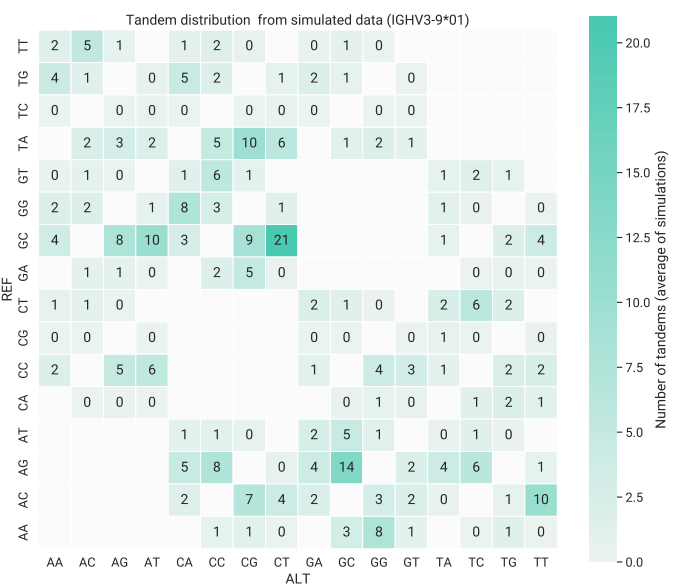
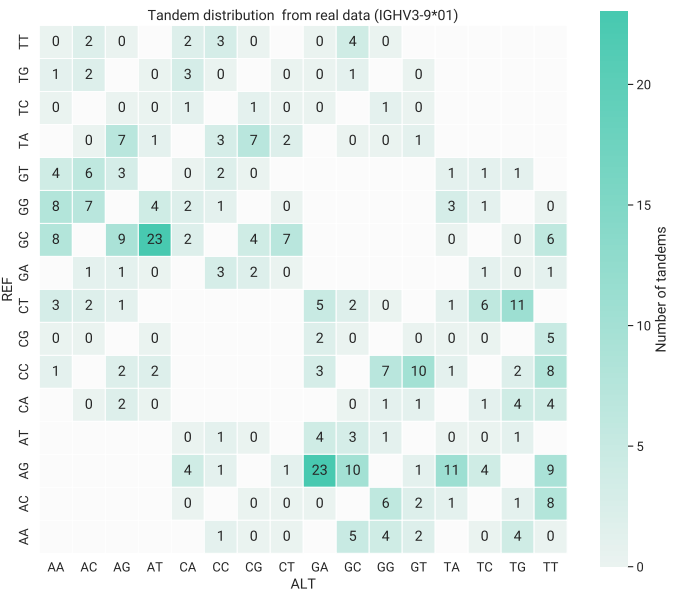
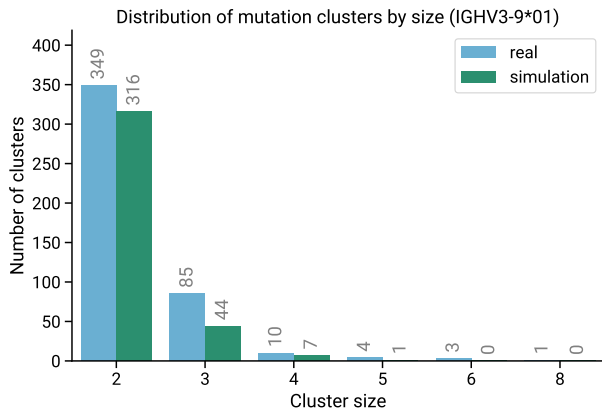
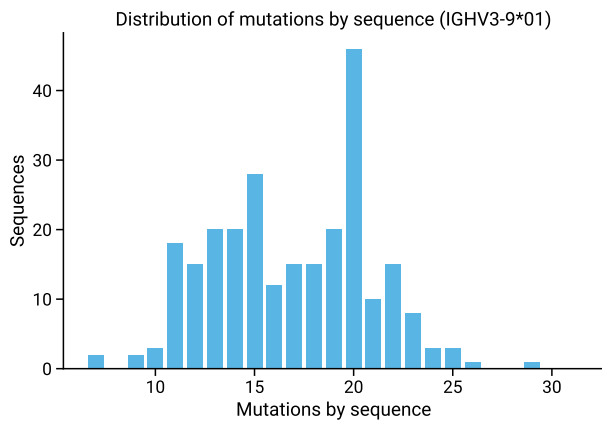
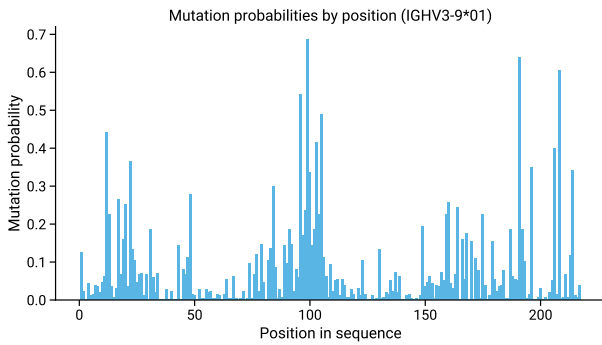
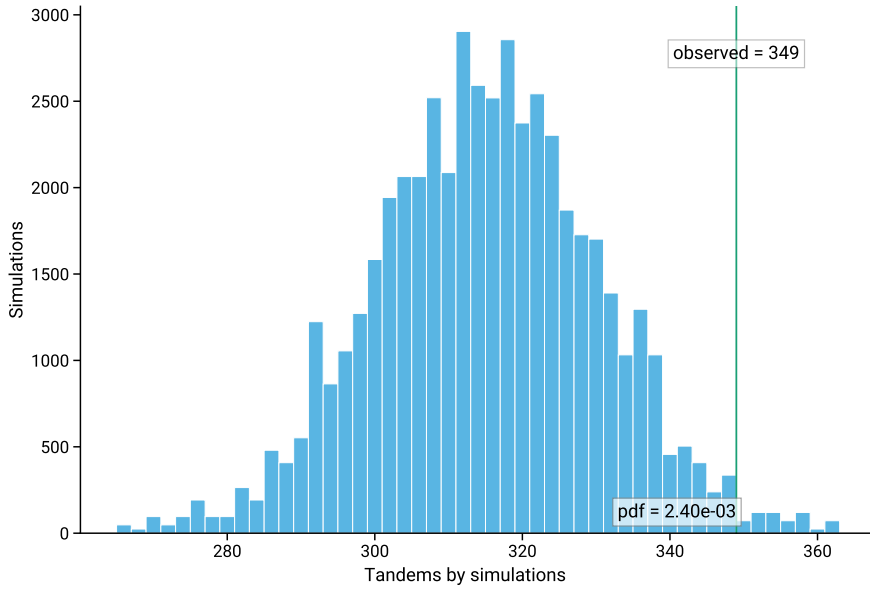
### 5.6 IGHV3-7\*01

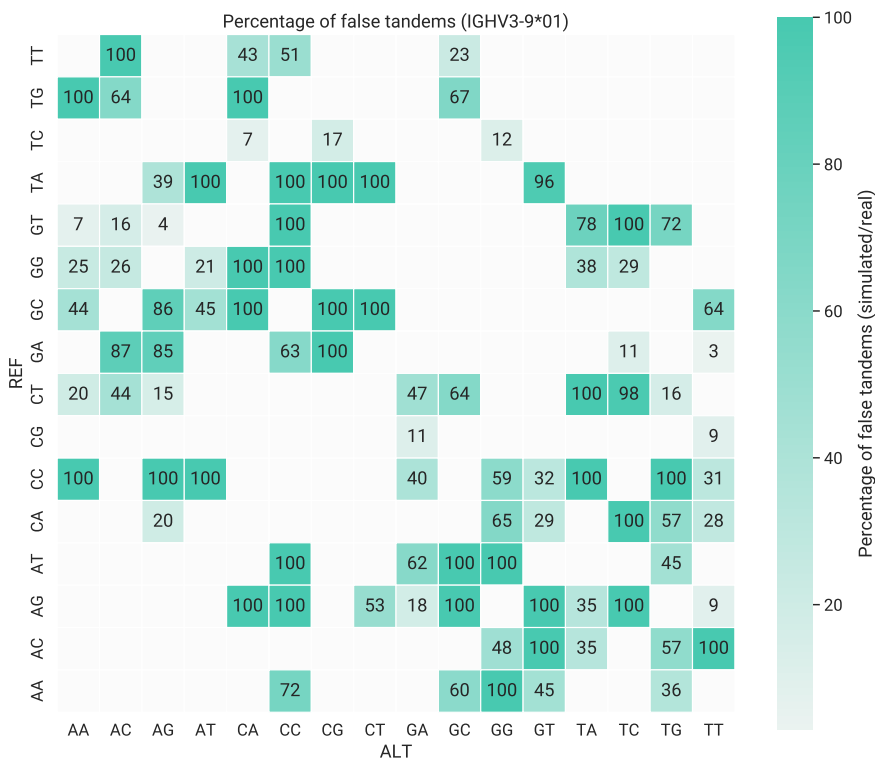
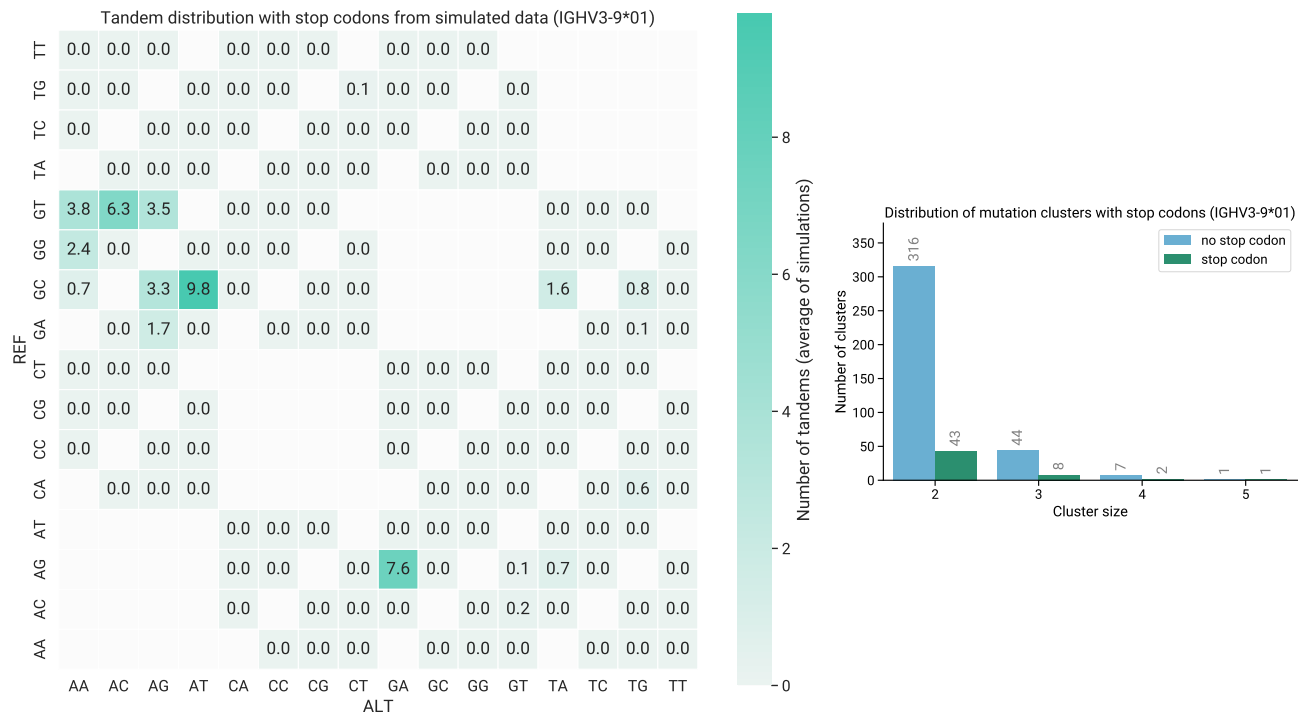




# 5.7 IGHV3-9\*01

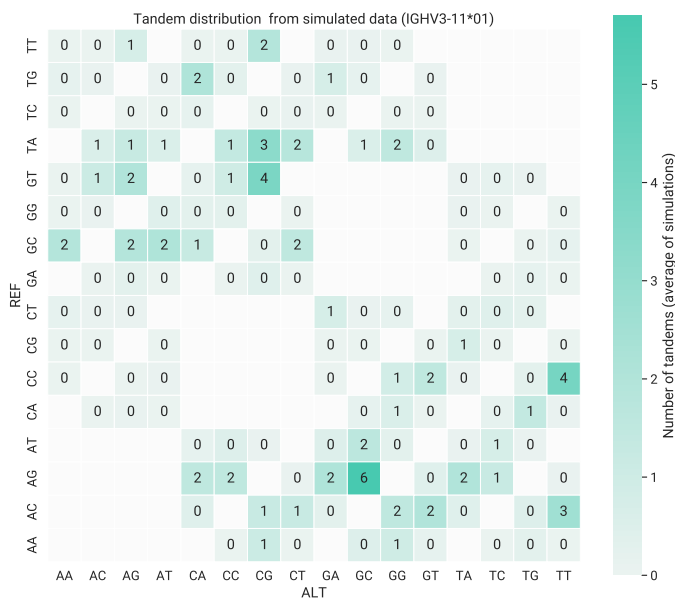
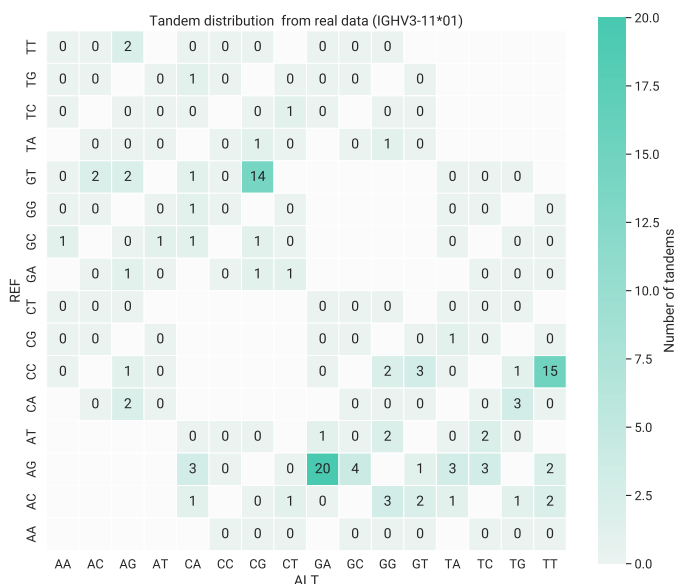
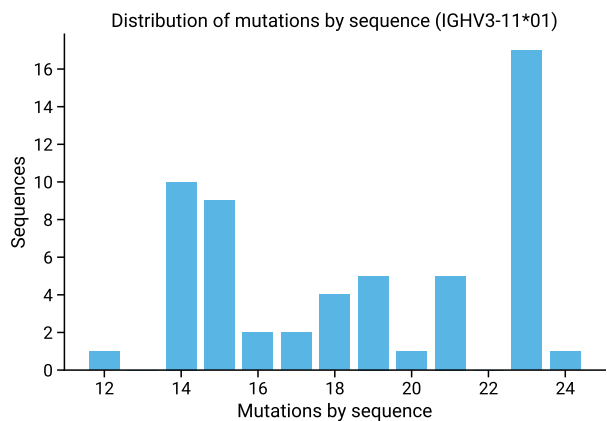
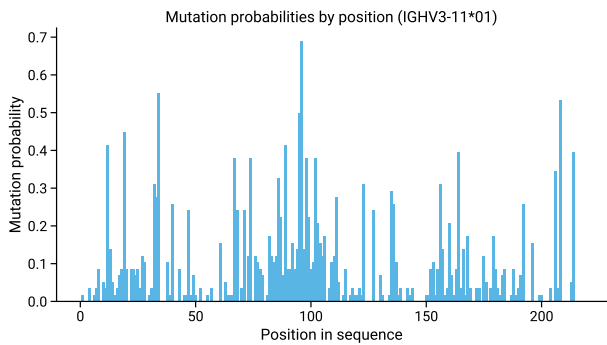
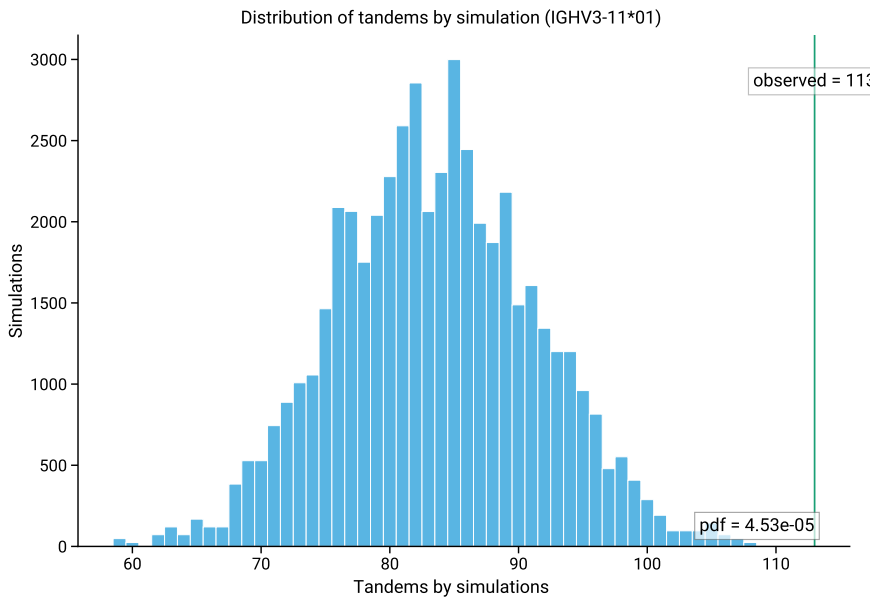
Distribution of tandems by simulation (IGHV3-9\*01)

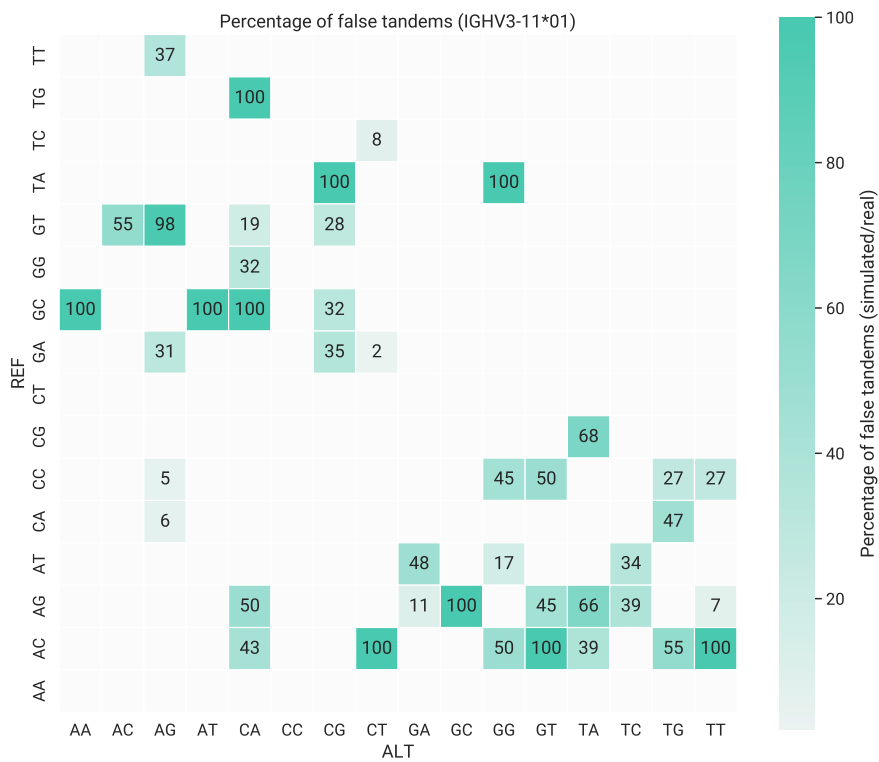
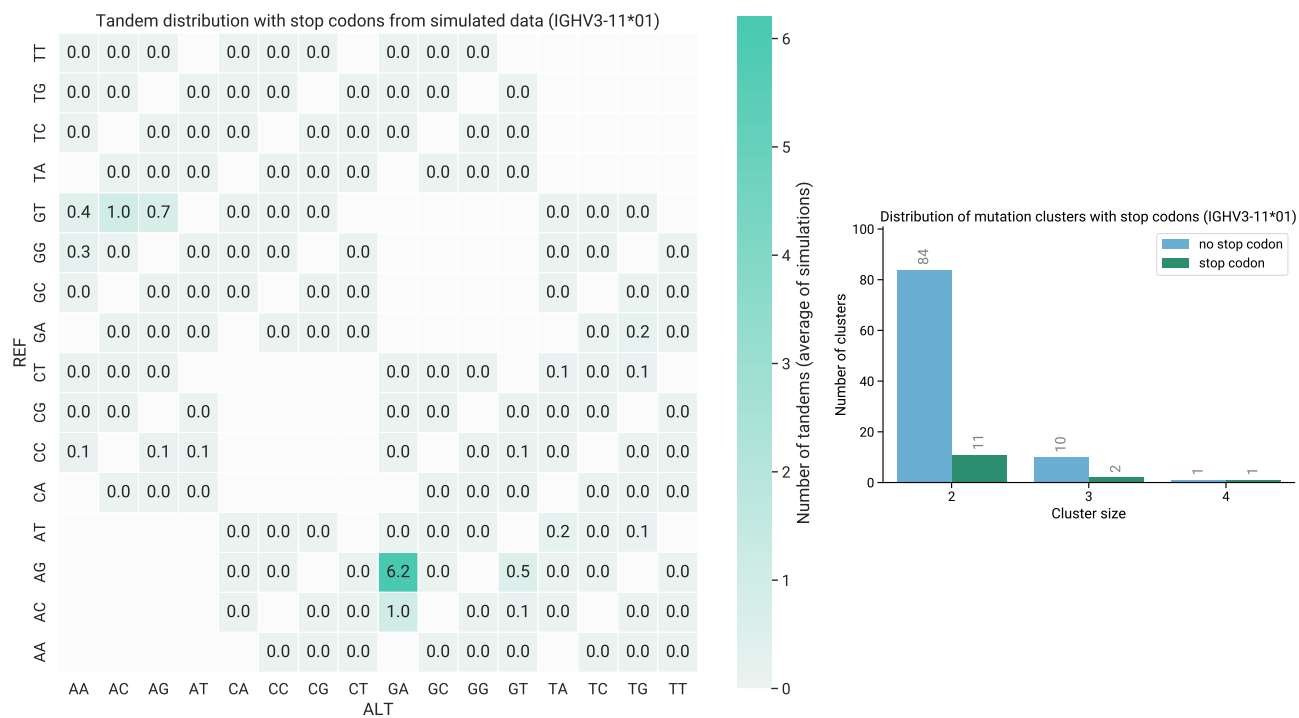






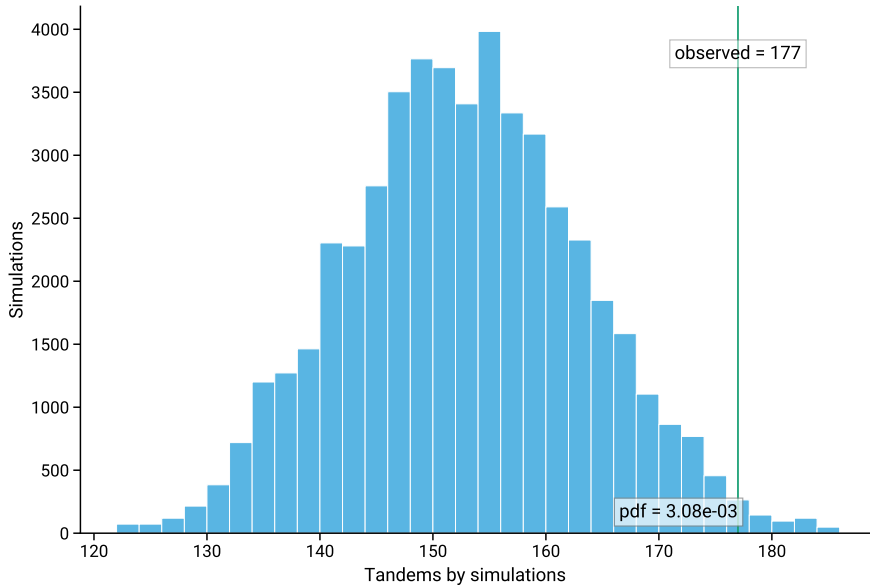
### 5.8 IGHV3-11\*01



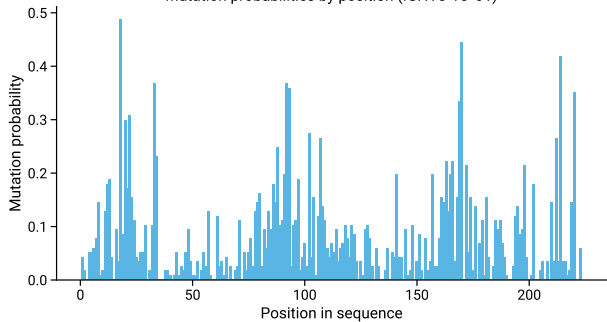


### 5.9 IGHV3-15\*01

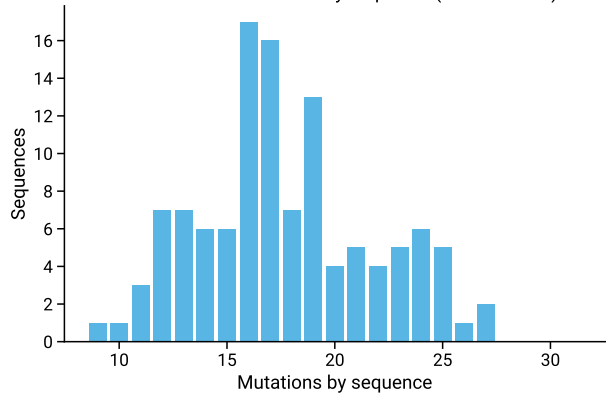
Distribution of tandems by simulation (IGHV3-15\*01)



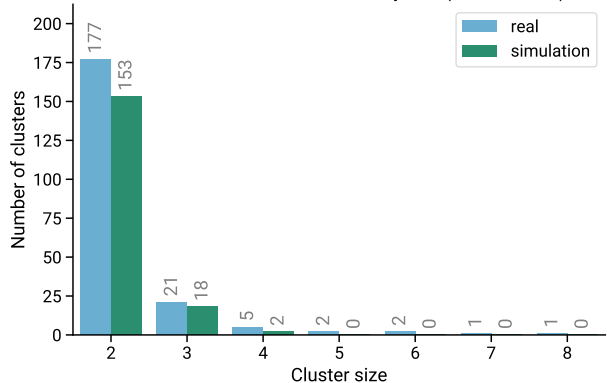
Mutation probabilities by position (IGHV3-15\*01)



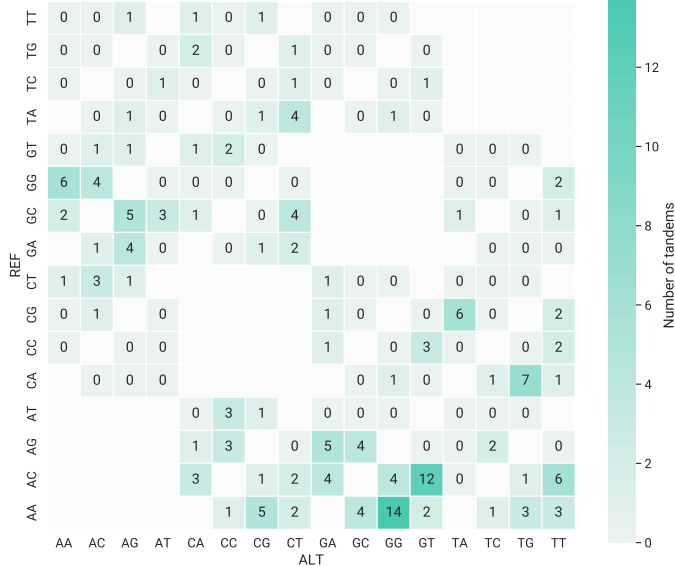
Distribution of mutations by sequence (IGHV3-15\*01)



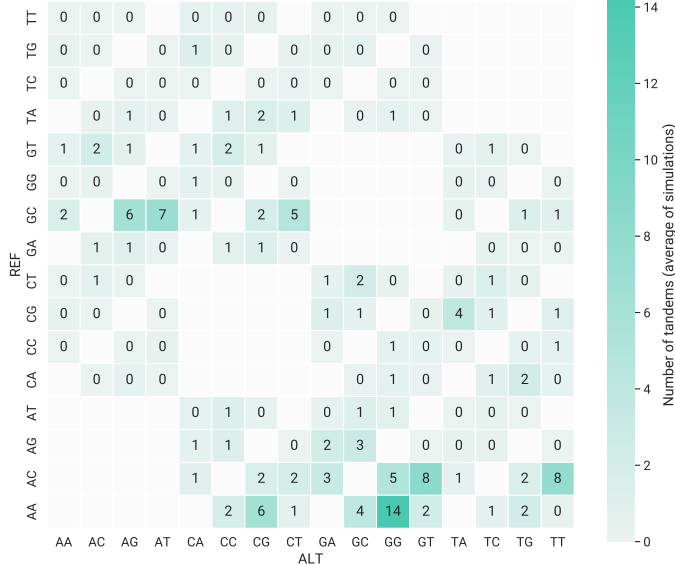
Distribution of mutation clusters by size (IGHV3-15\*01)

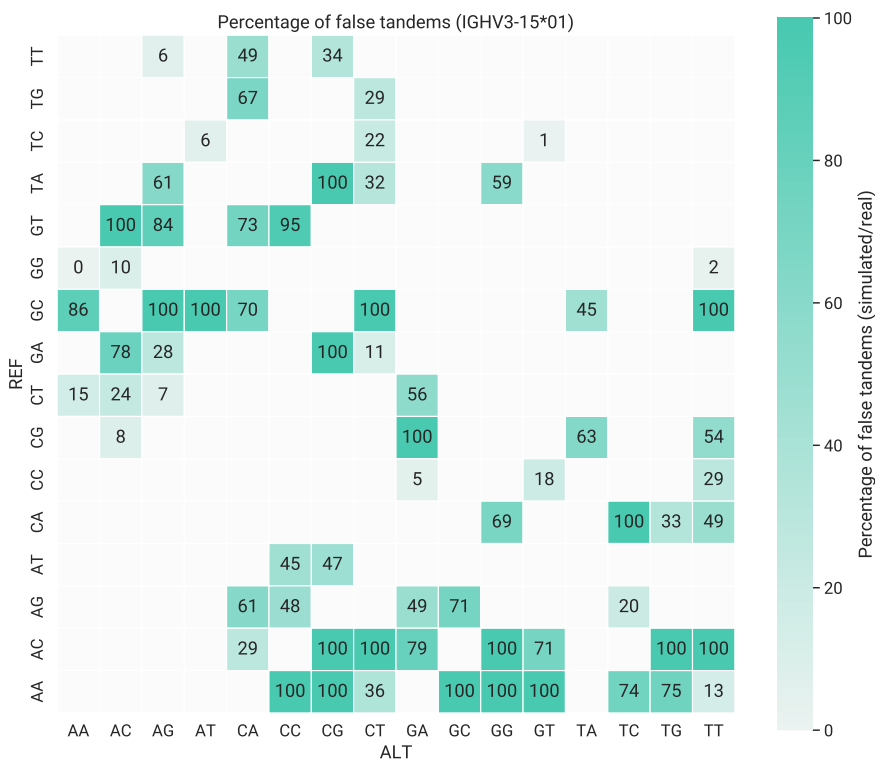
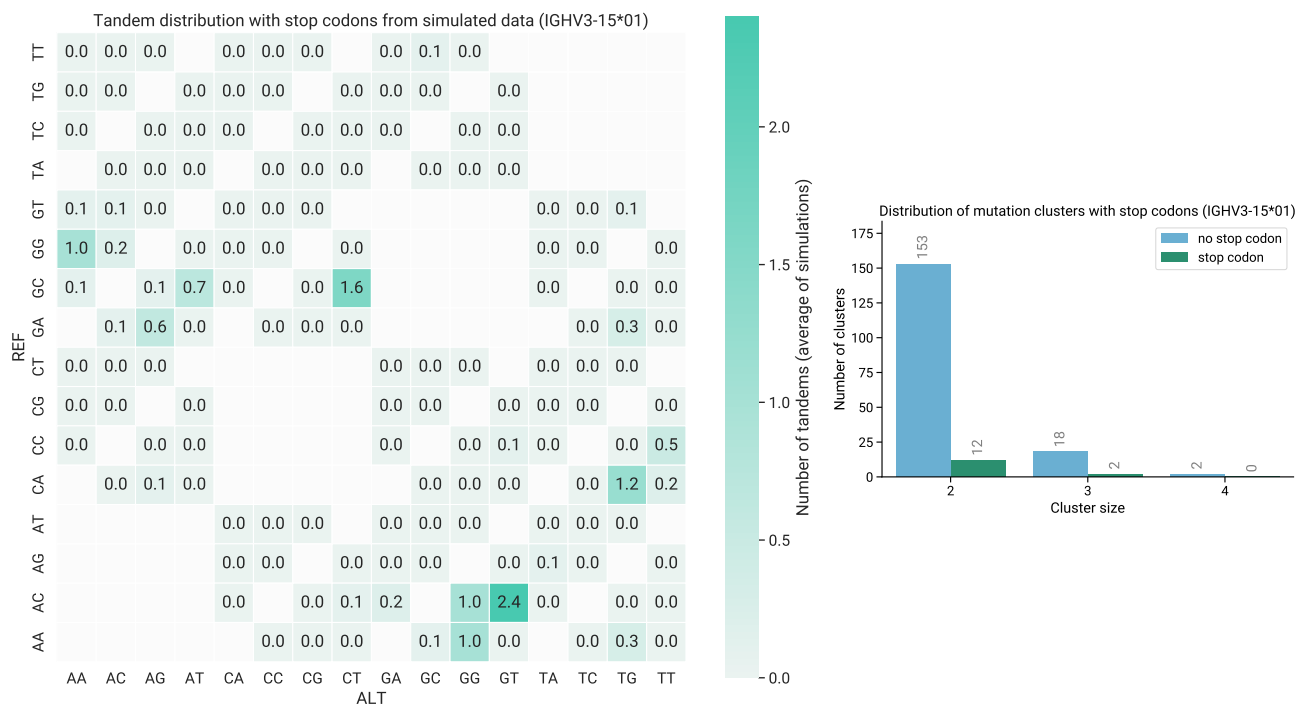


Tandem distribution from real data (IGHV3-15\*01)

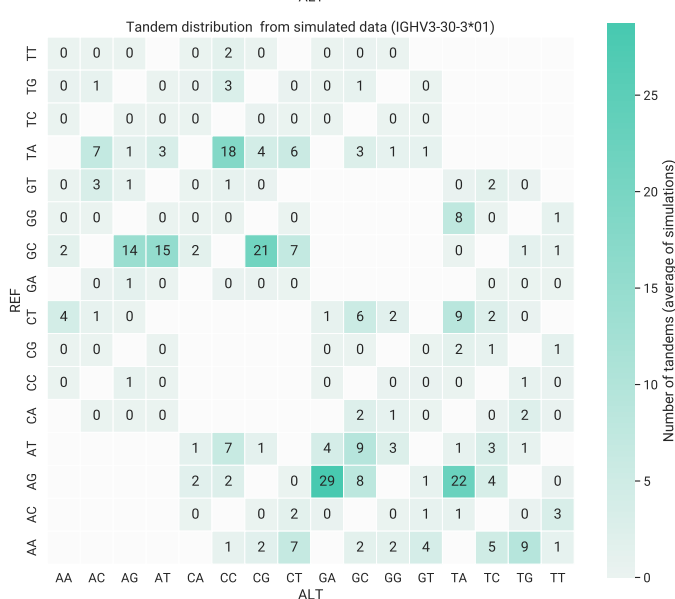
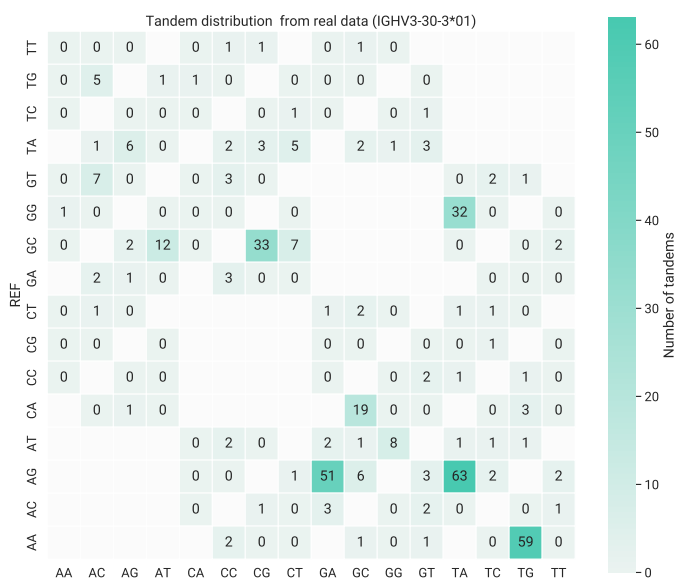
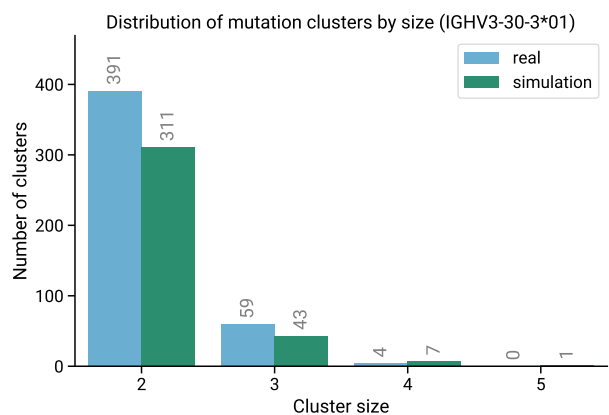
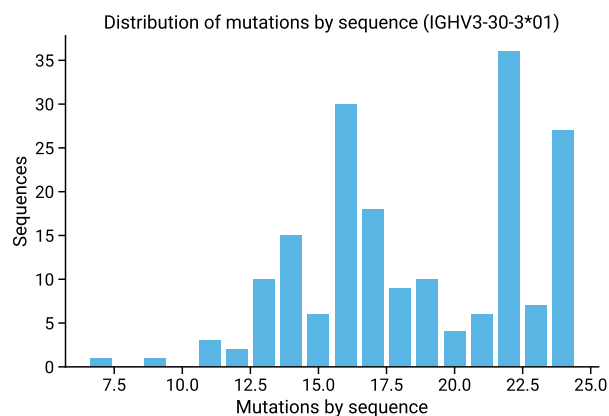
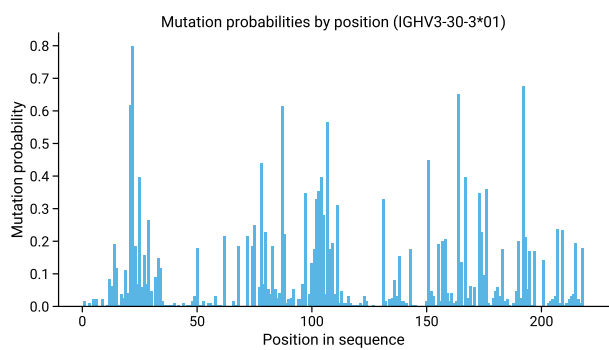
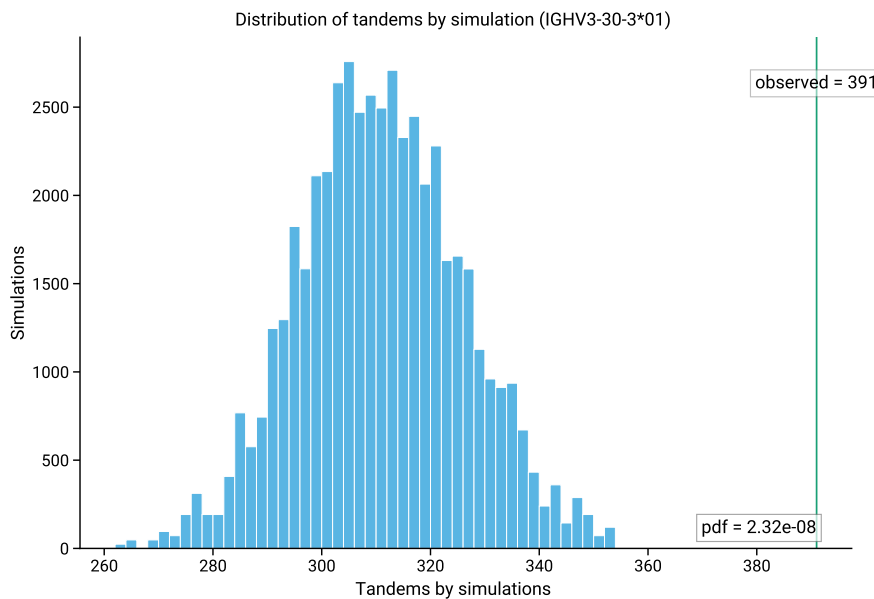


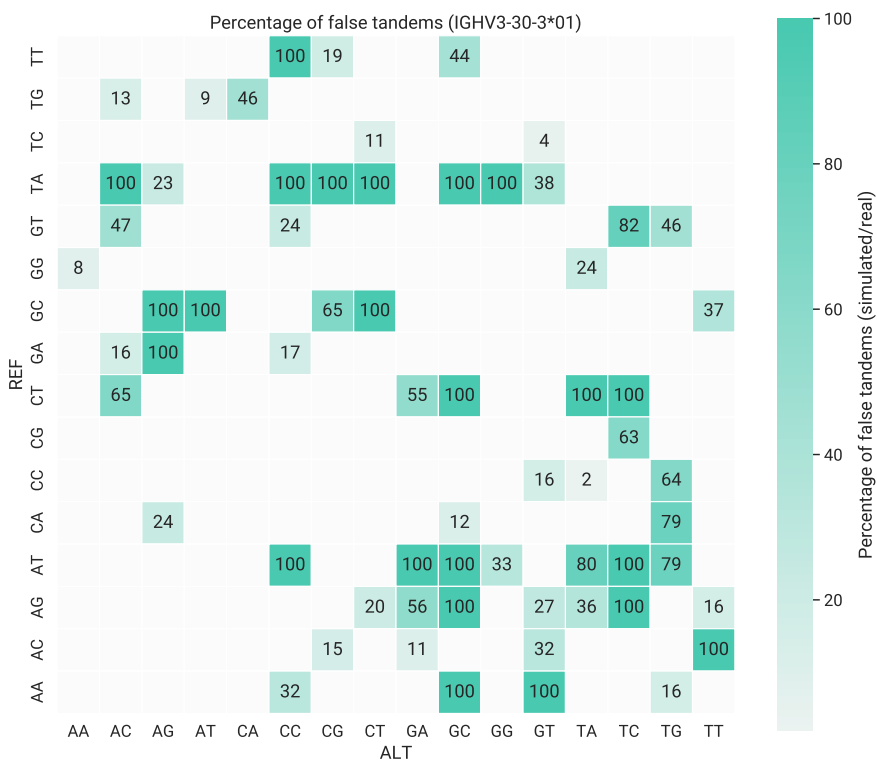
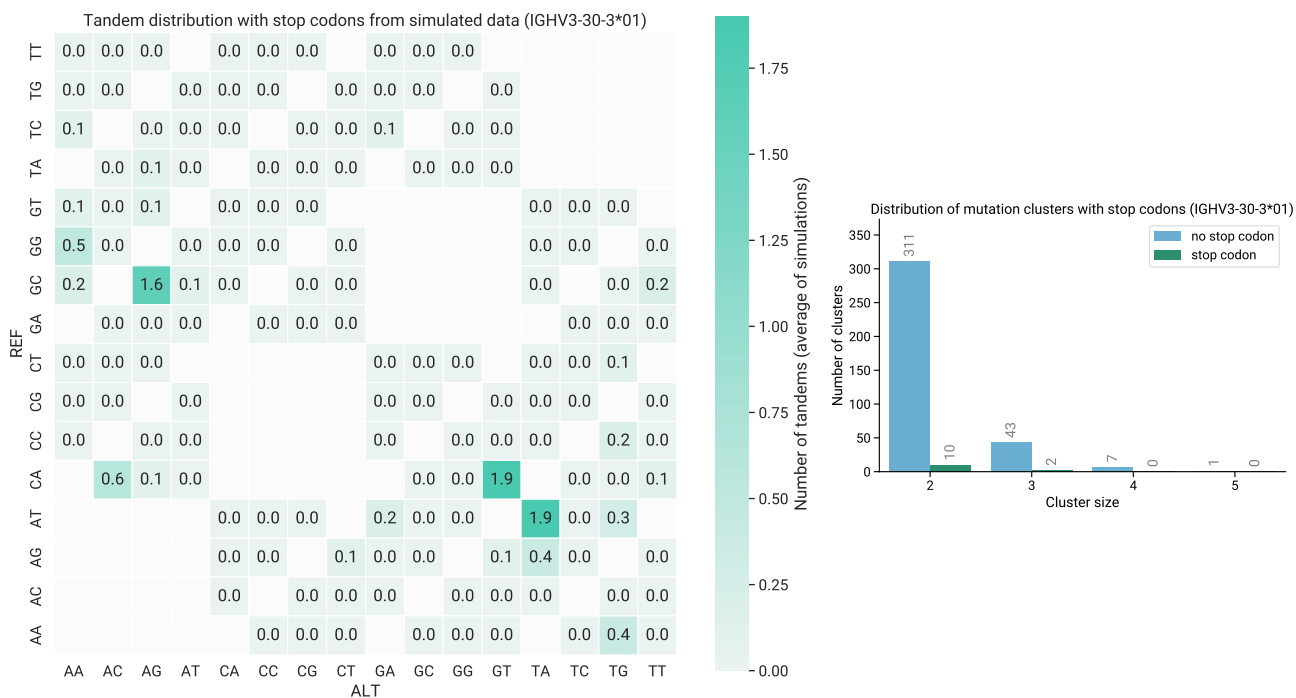
Tandem distribution from simulated data (IGHV3-15\*01)





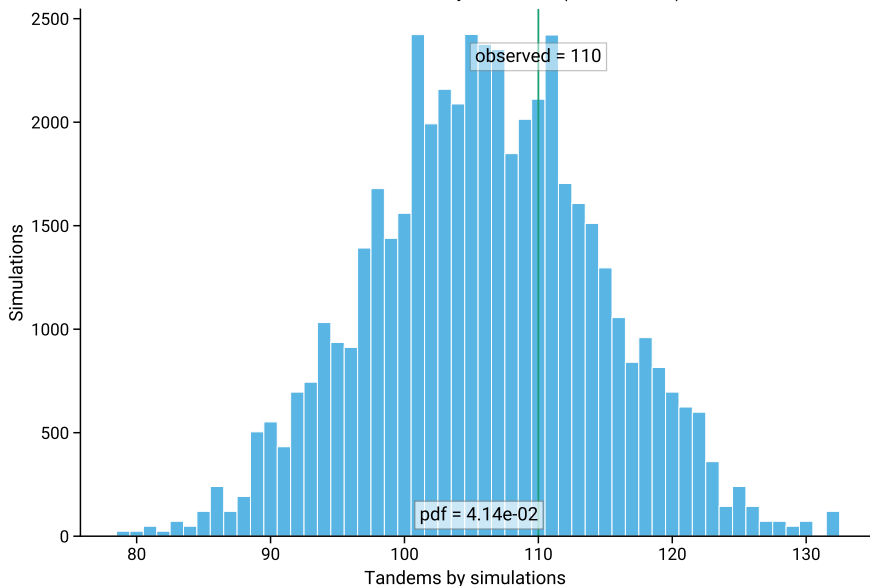
### 5.10 IGHV3-30-3\*01



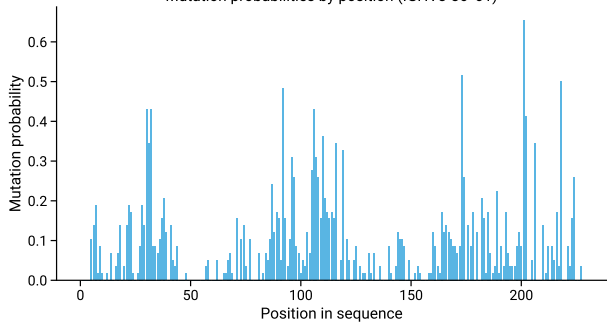


### 5.11 IGHV3-30\*01

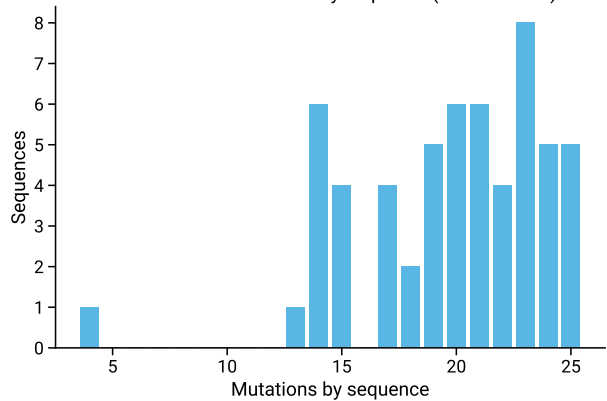
Distribution of tandems by simulation (IGHV3-30\*01)



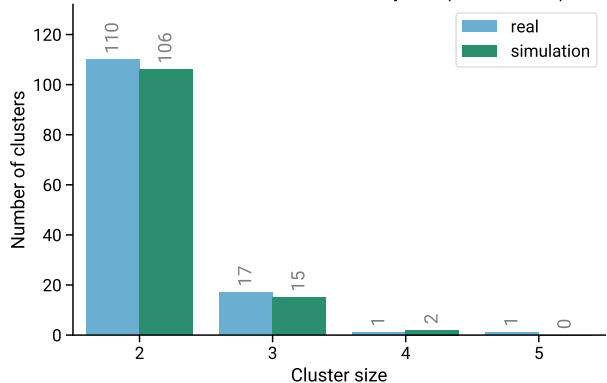
Mutation probabilities by position (IGHV3-30\*01)



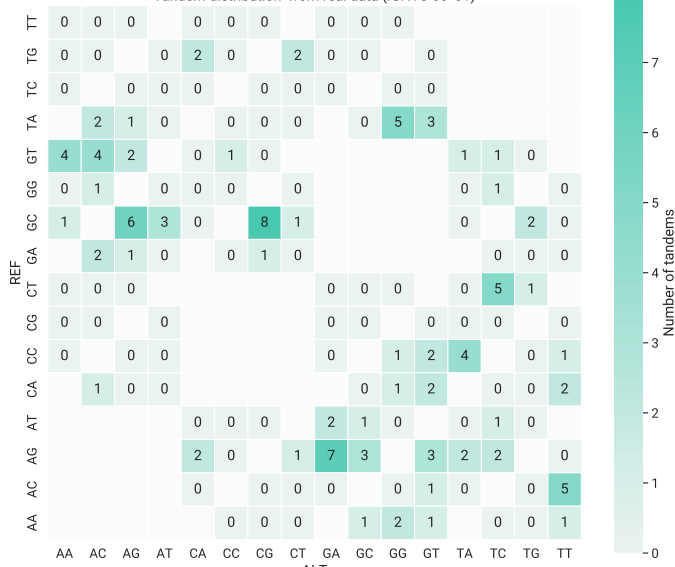
Distribution of mutations by sequence (IGHV3-30\*01)



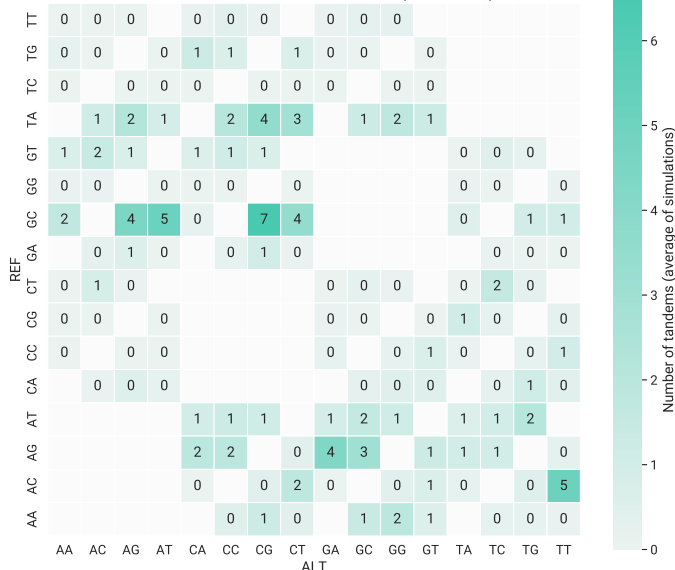
Distribution of mutation clusters by size (IGHV3-30\*01)

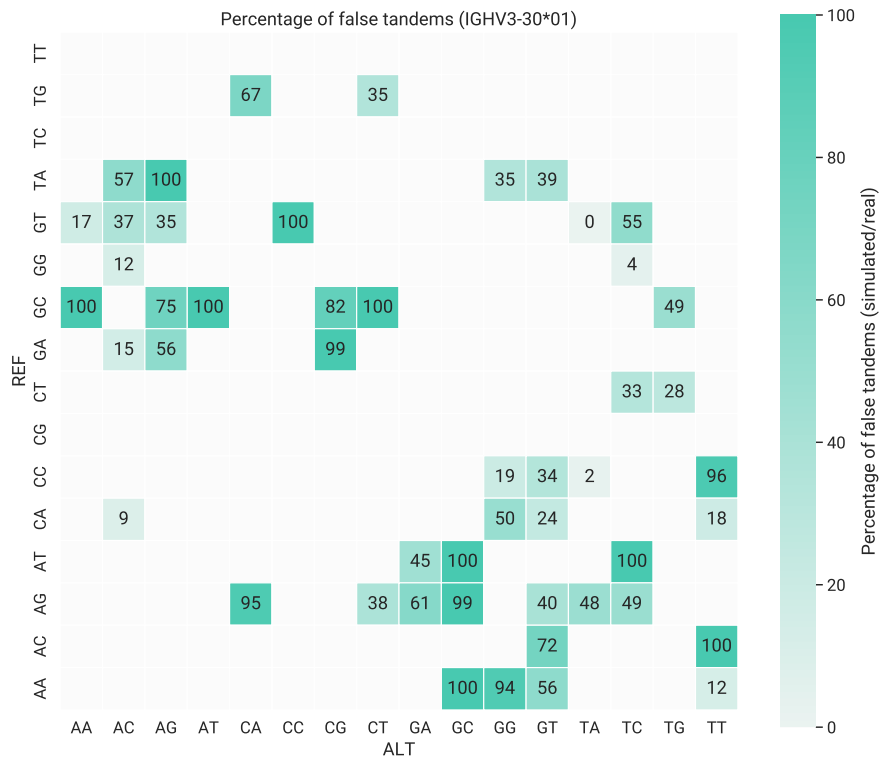
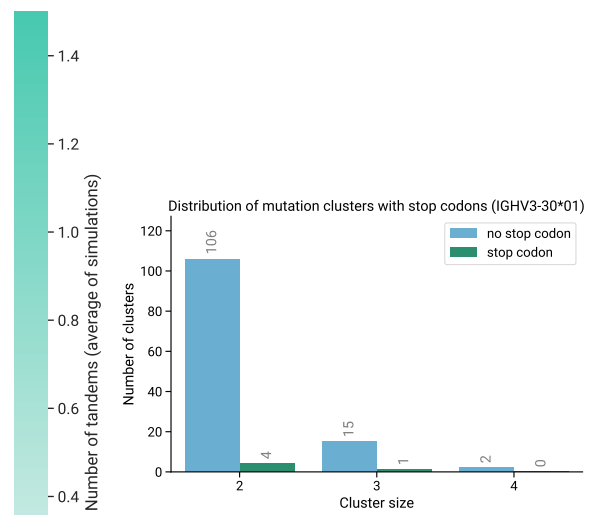
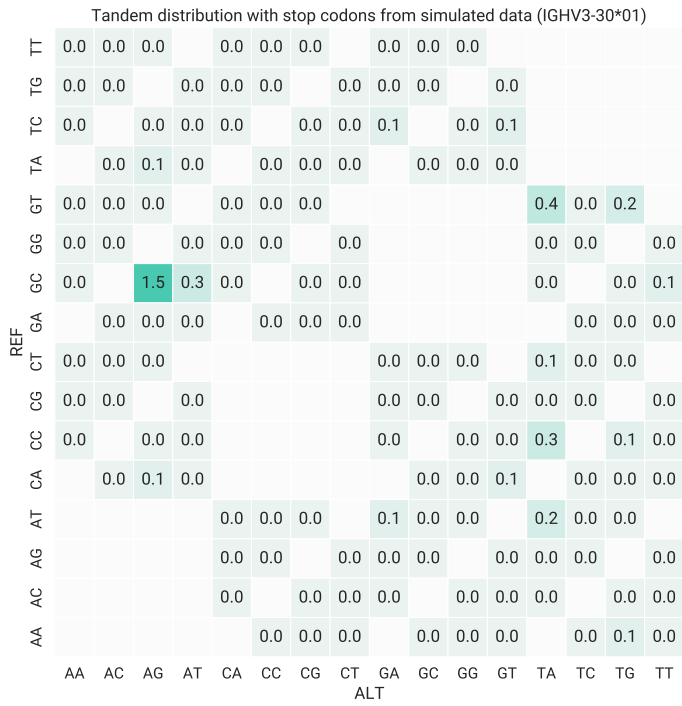


Tandem distribution from real data (IGHV3-30\*01)



Tandem distribution from simulated data (IGHV3-30\*01)

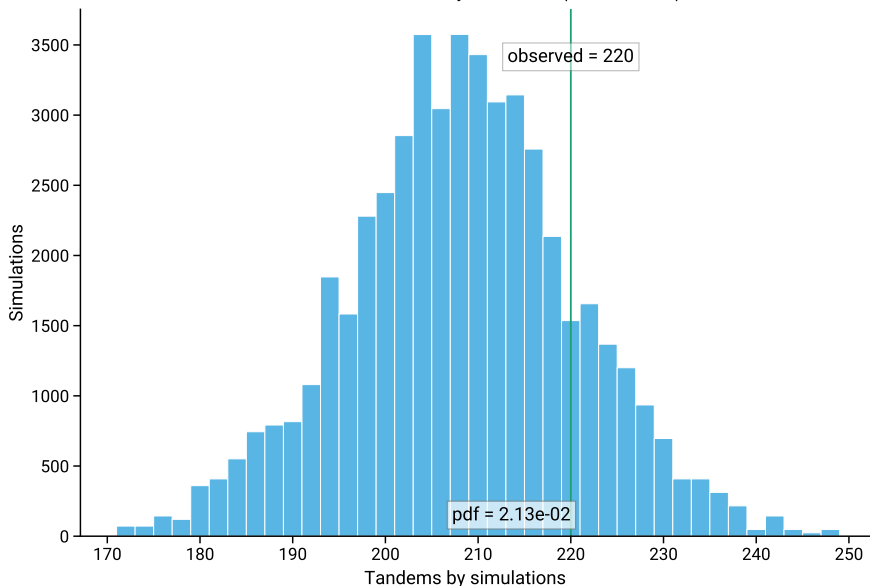




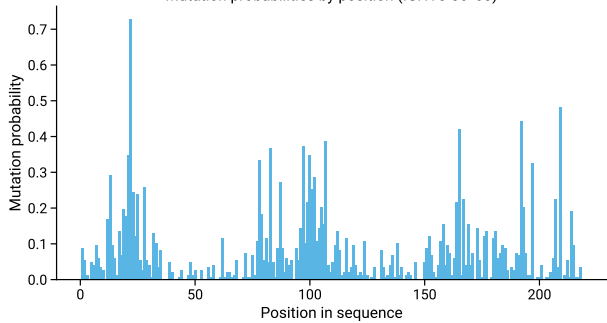


### 5.12 IGHV3-30\*03

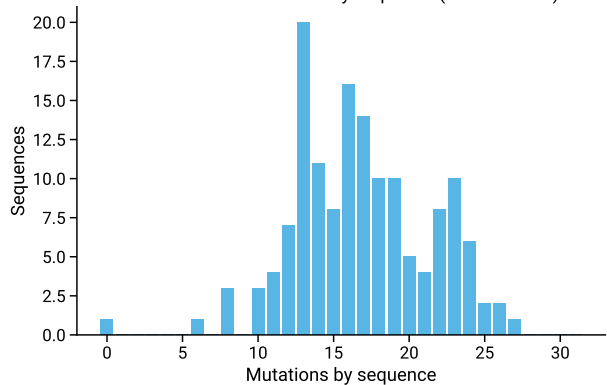
Distribution of tandems by simulation (IGHV3-30\*03)



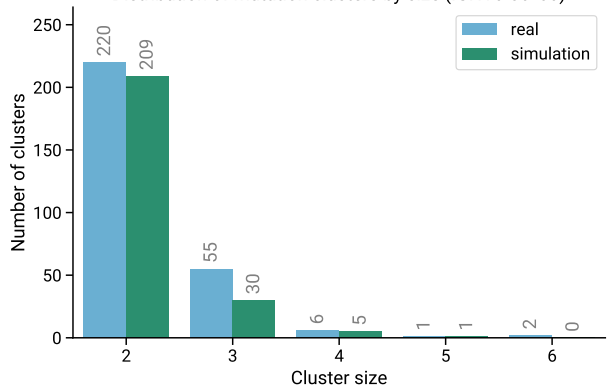
Mutation probabilities by position (IGHV3-30\*03)



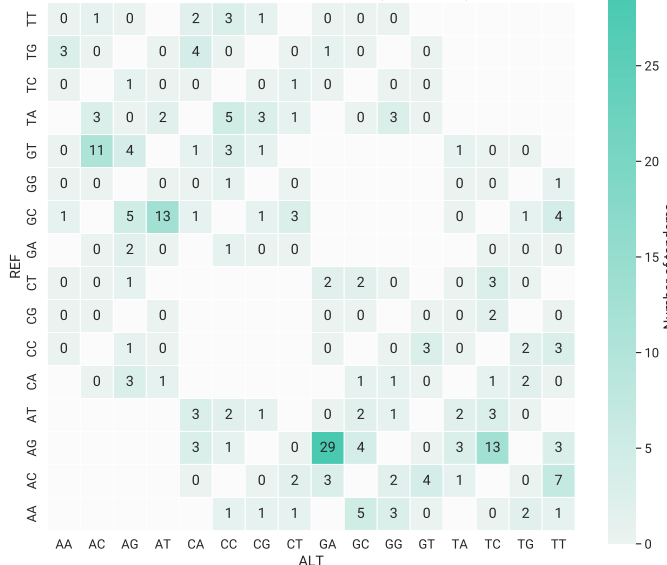
Distribution of mutations by sequence (IGHV3-30\*03)



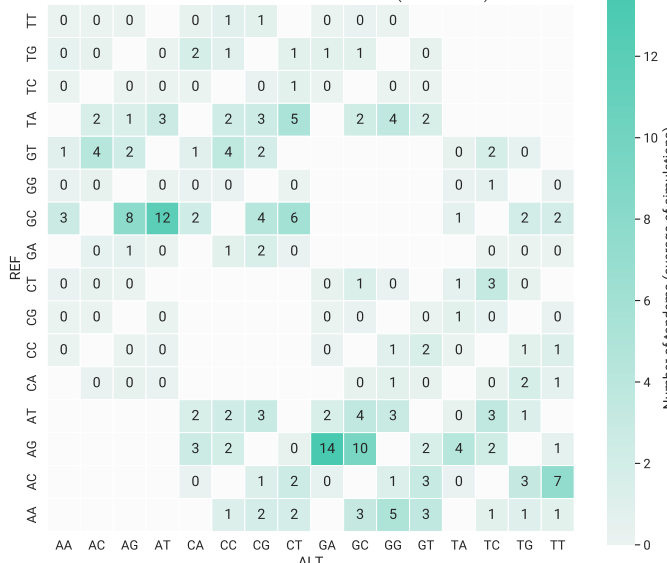
Distribution of mutation clusters by size (IGHV3-30\*03)

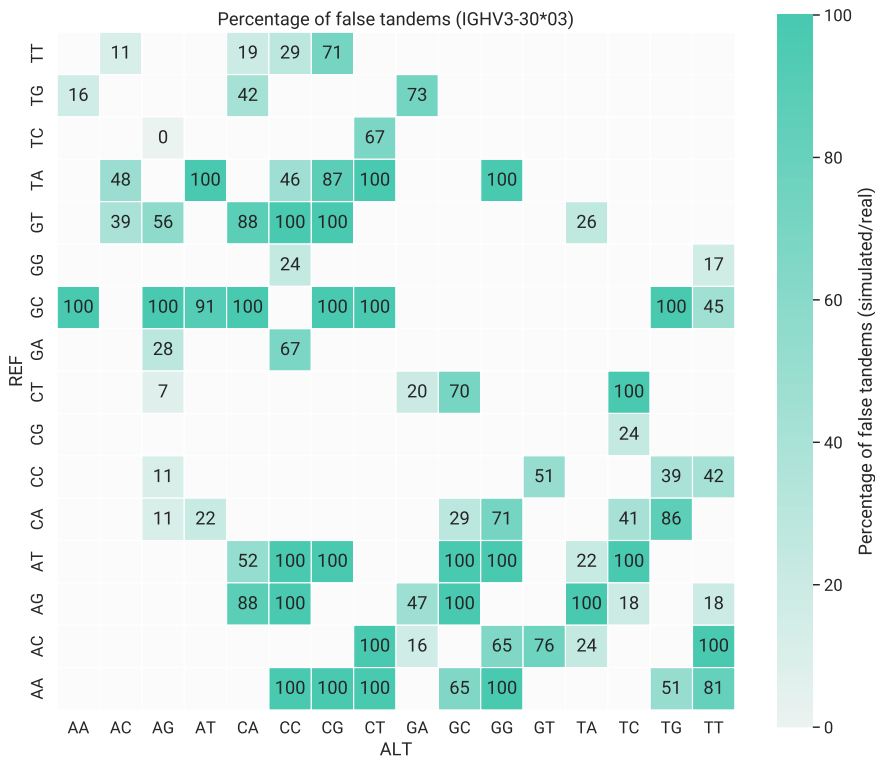
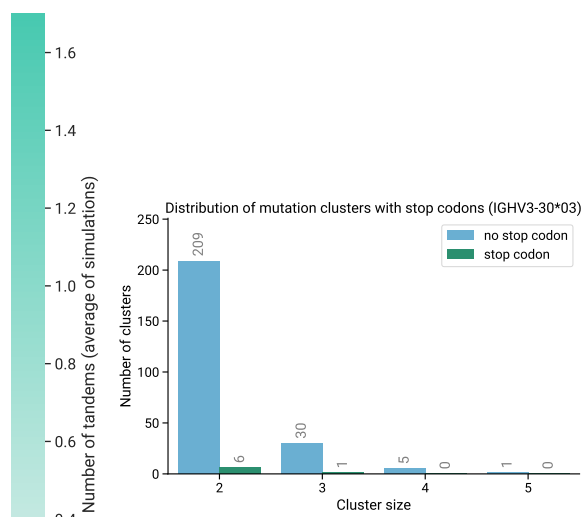
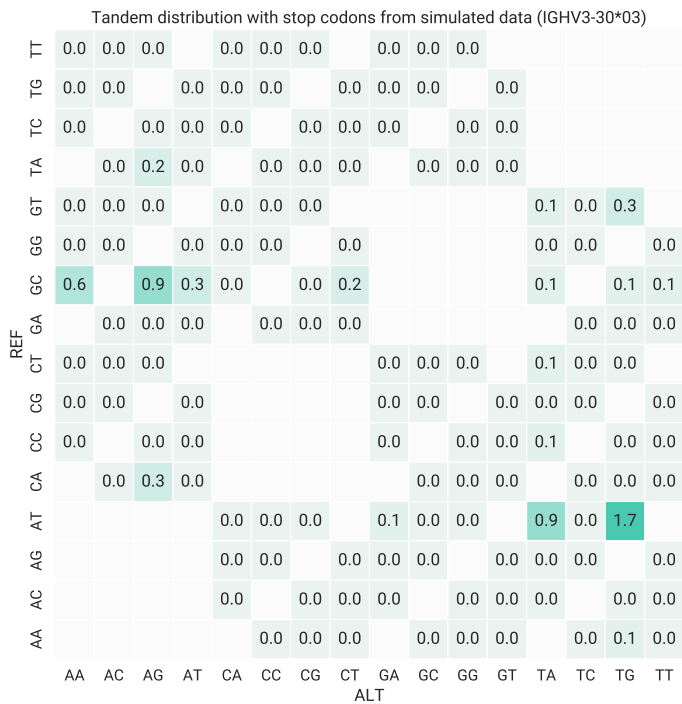


Tandem distribution from real data (IGHV3-30\*03)



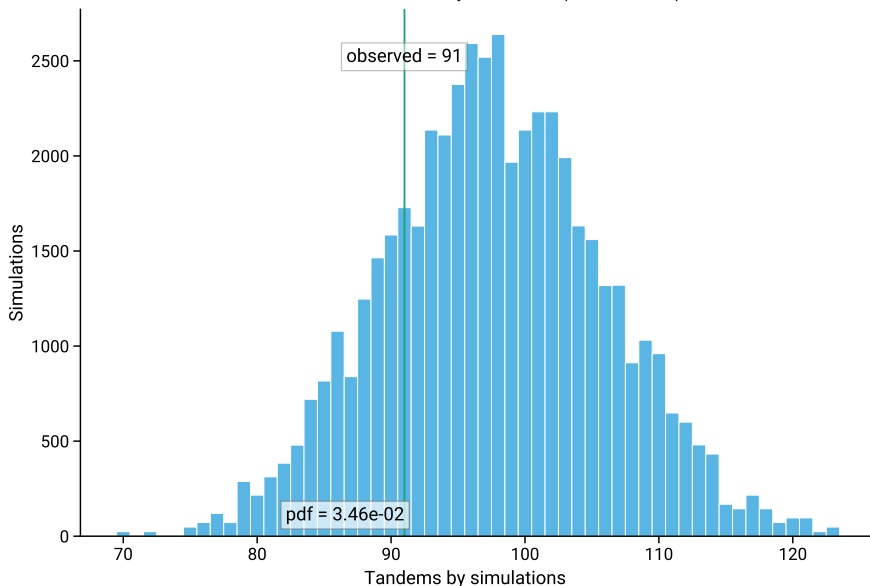
Tandem distribution from simulated data (IGHV3-30\*03)



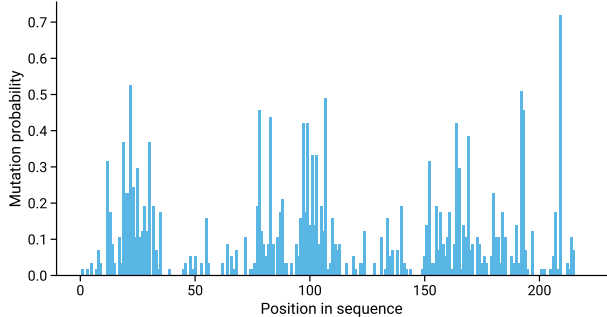


### 5.13 IGHV3-30\*04

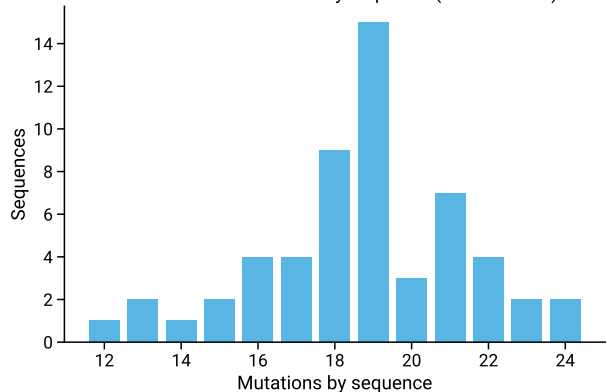
Distribution of tandems by simulation (IGHV3-30\*04)



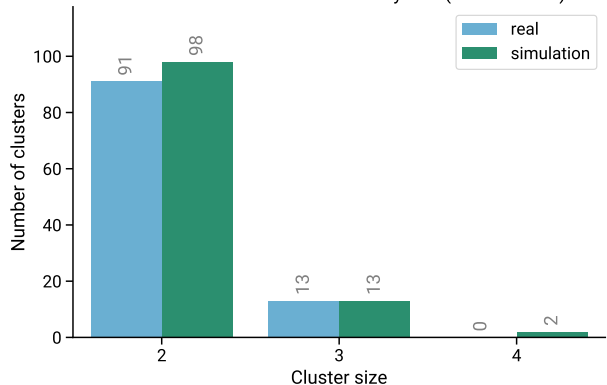
Mutation probabilities by position (IGHV3-30\*04)



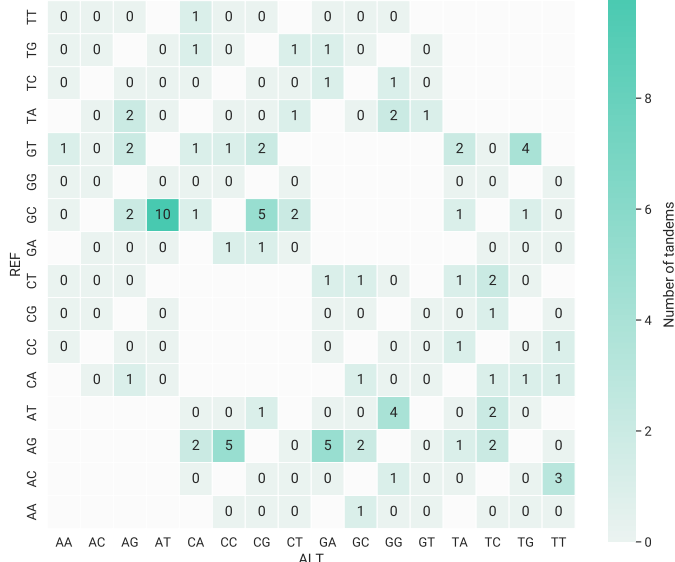
Distribution of mutations by sequence (IGHV3-30\*04)



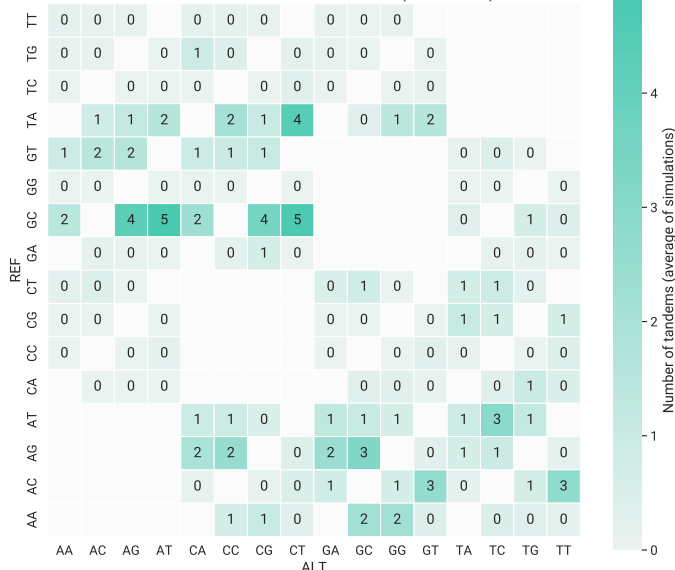
Distribution of mutation clusters by size (IGHV3-30\*04)

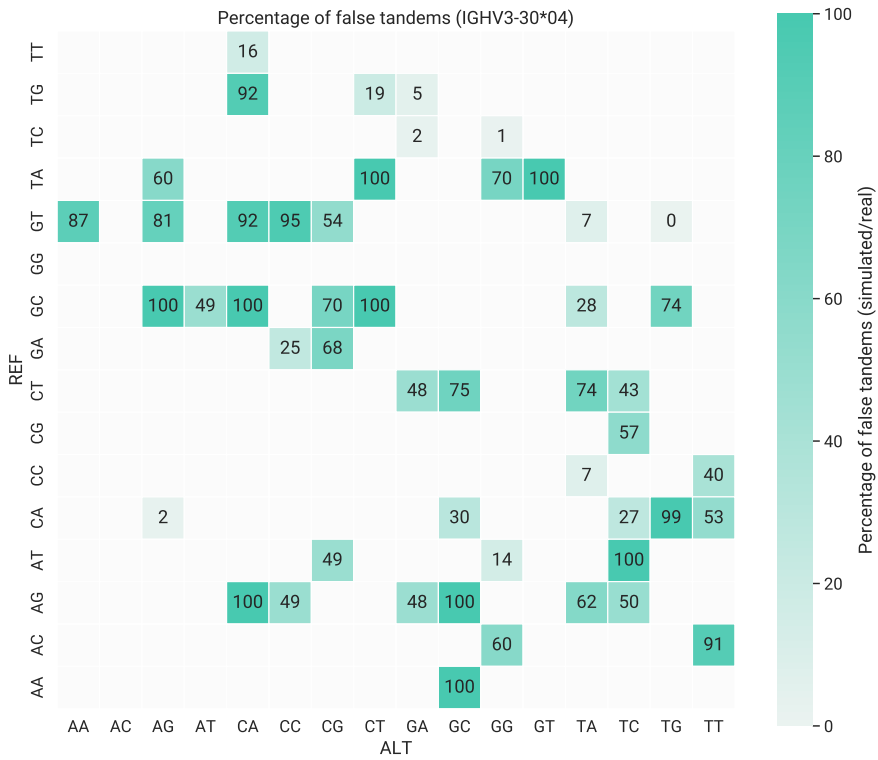


Tandem distribution from real data (IGHV3-30\*04)



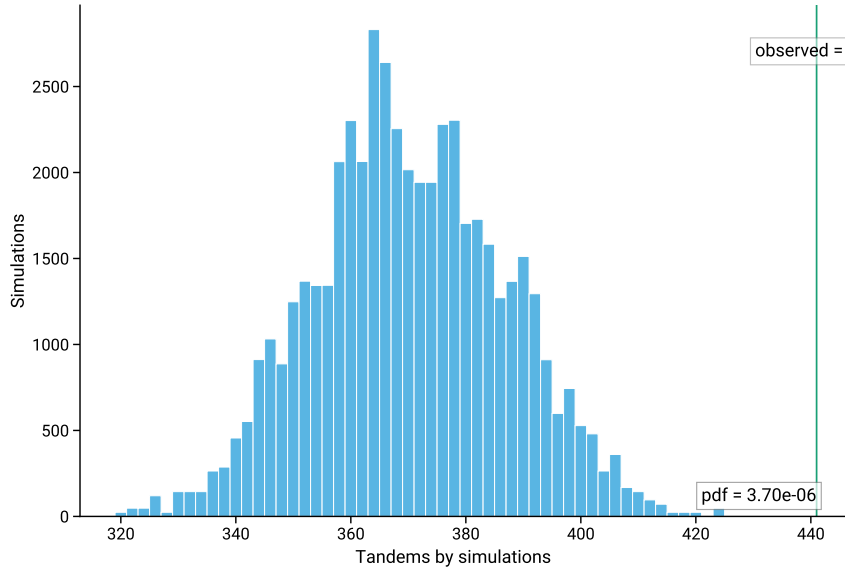
Tandem distribution from simulated data (IGHV3-30\*04)



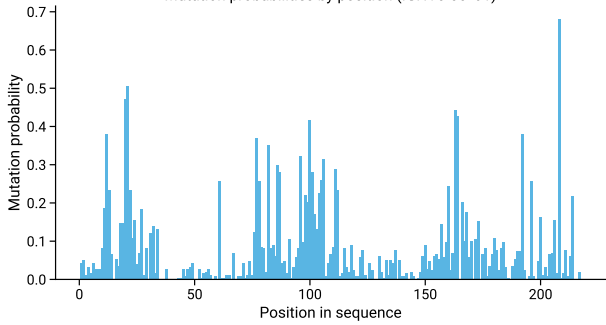


### 5.14 IGHV3-33\*01

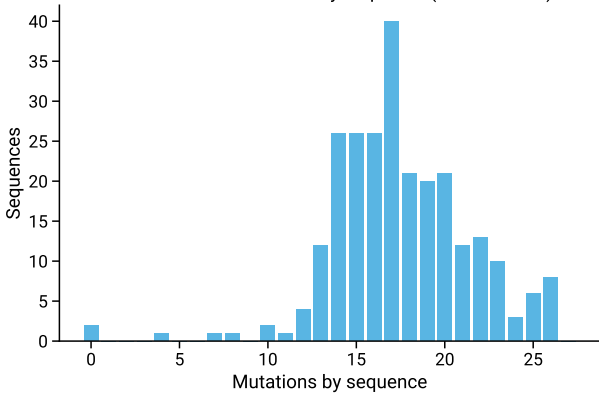
Distribution of tandems by simulation (IGHV3-33\*01)



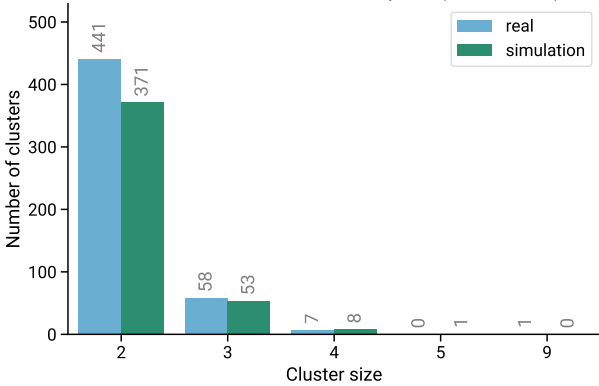
Mutation probabilities by position (IGHV3-33\*01)



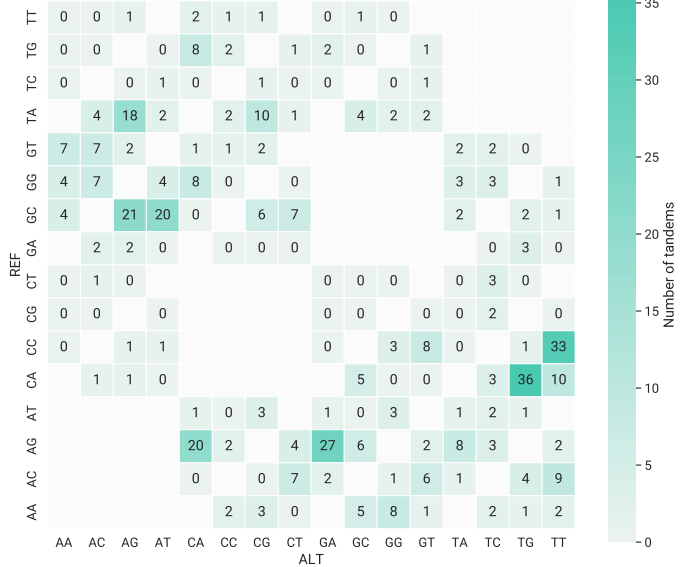
Distribution of mutations by sequence (IGHV3-33\*01)



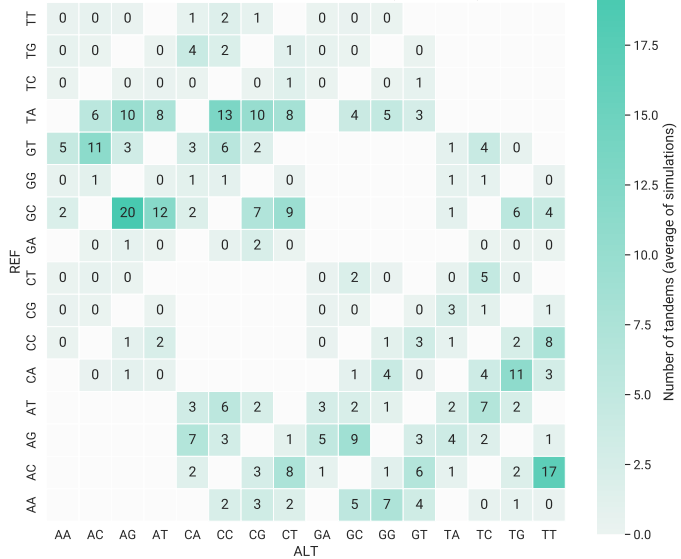
Distribution of mutation clusters by size (IGHV3-33\*01)

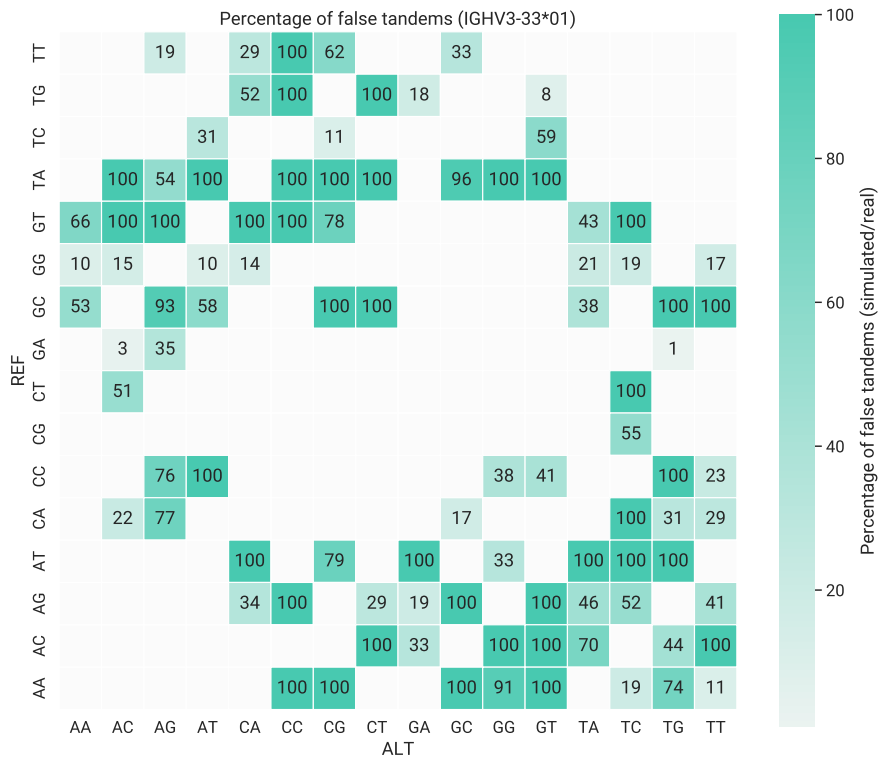
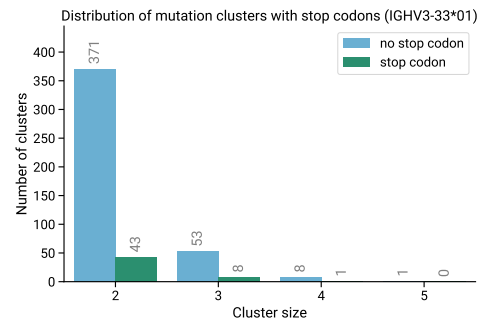
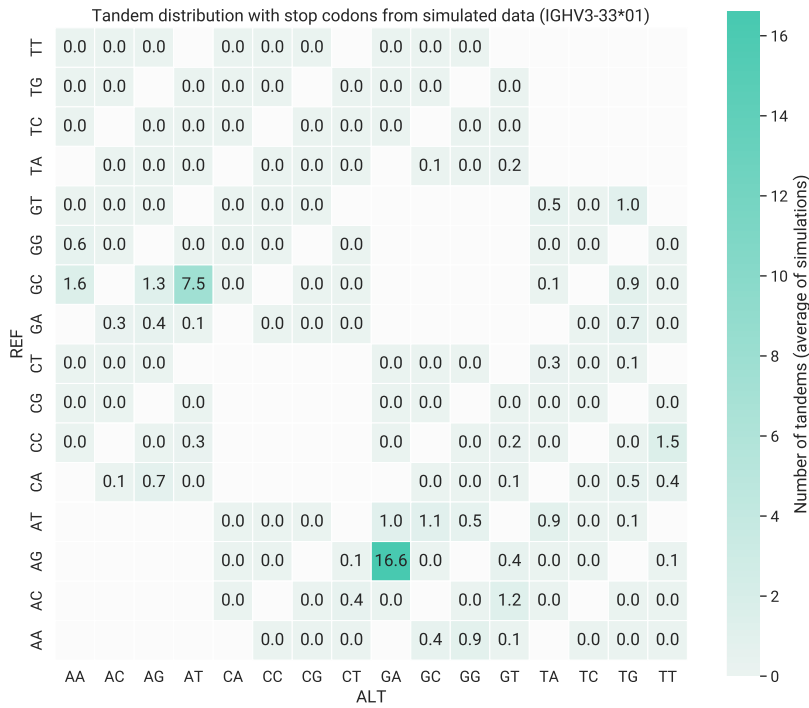


Tandem distribution from real data (IGHV3-33\*01)

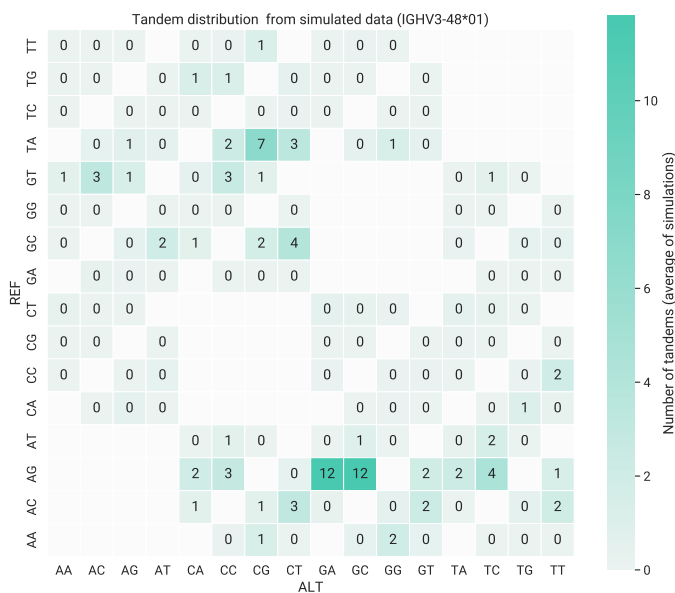
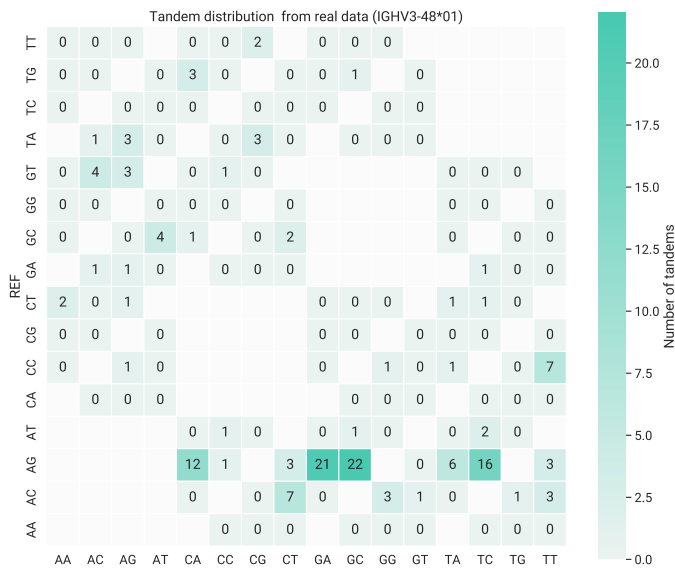
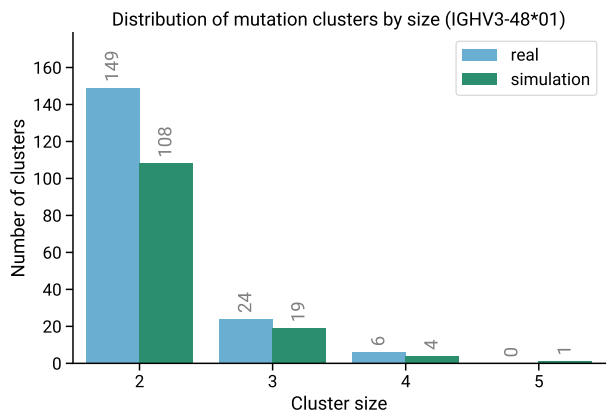
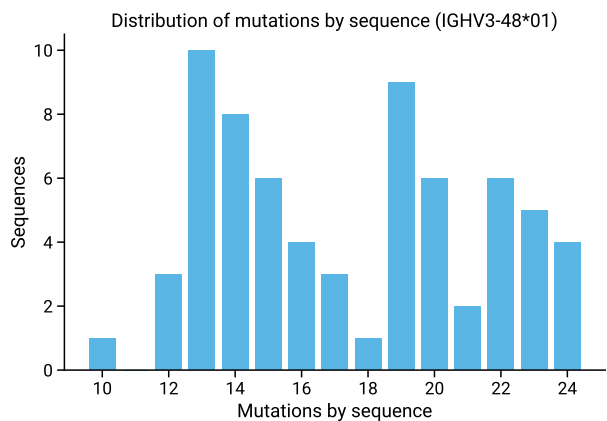
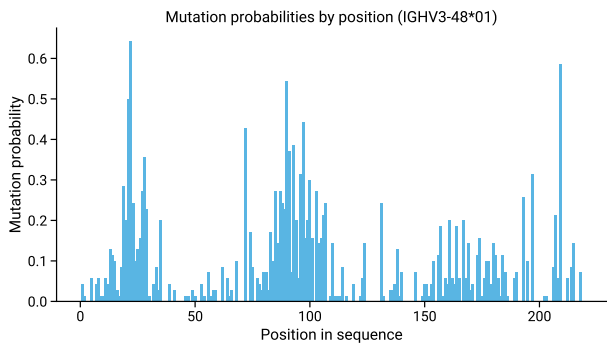
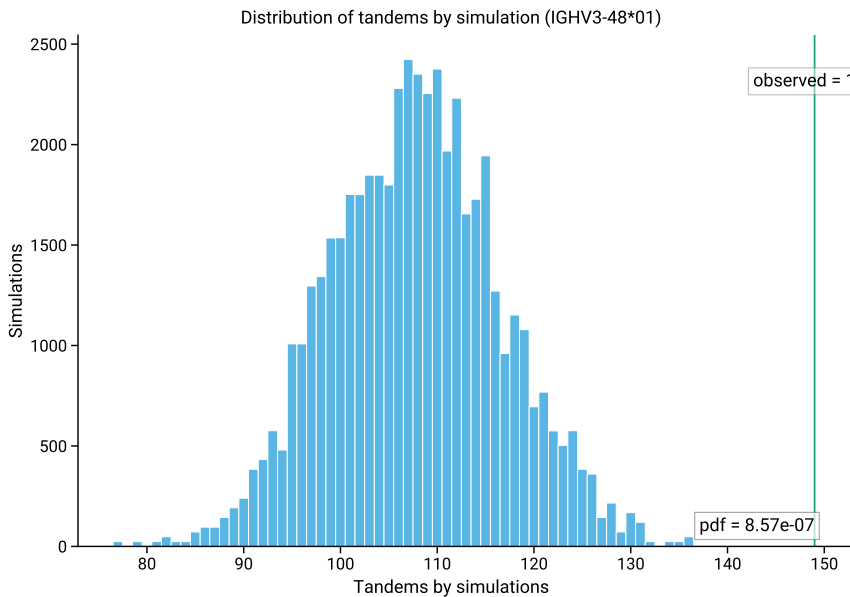


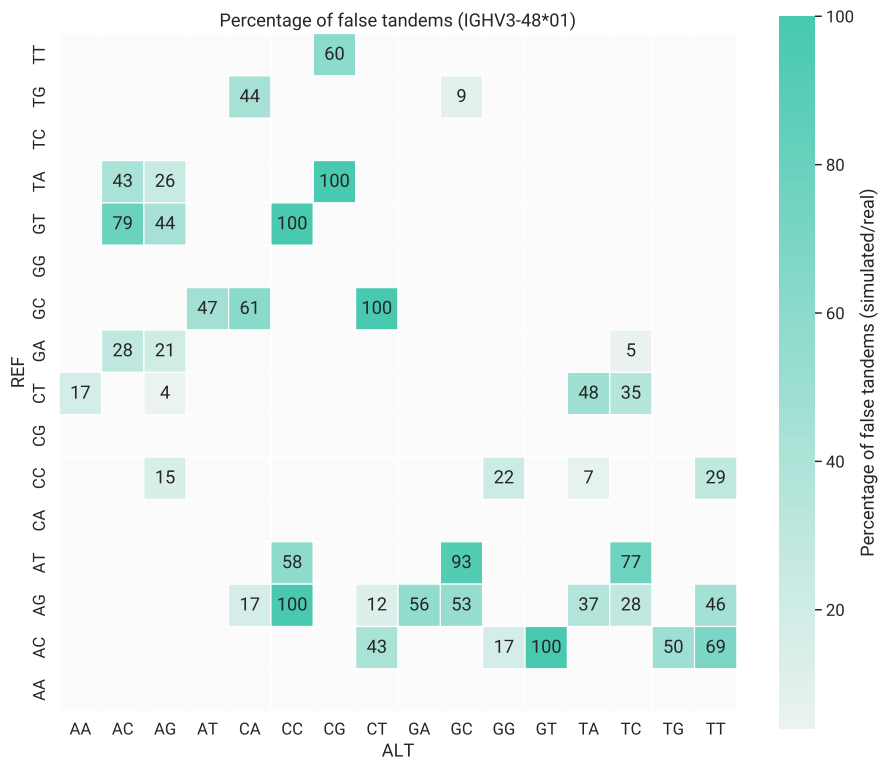
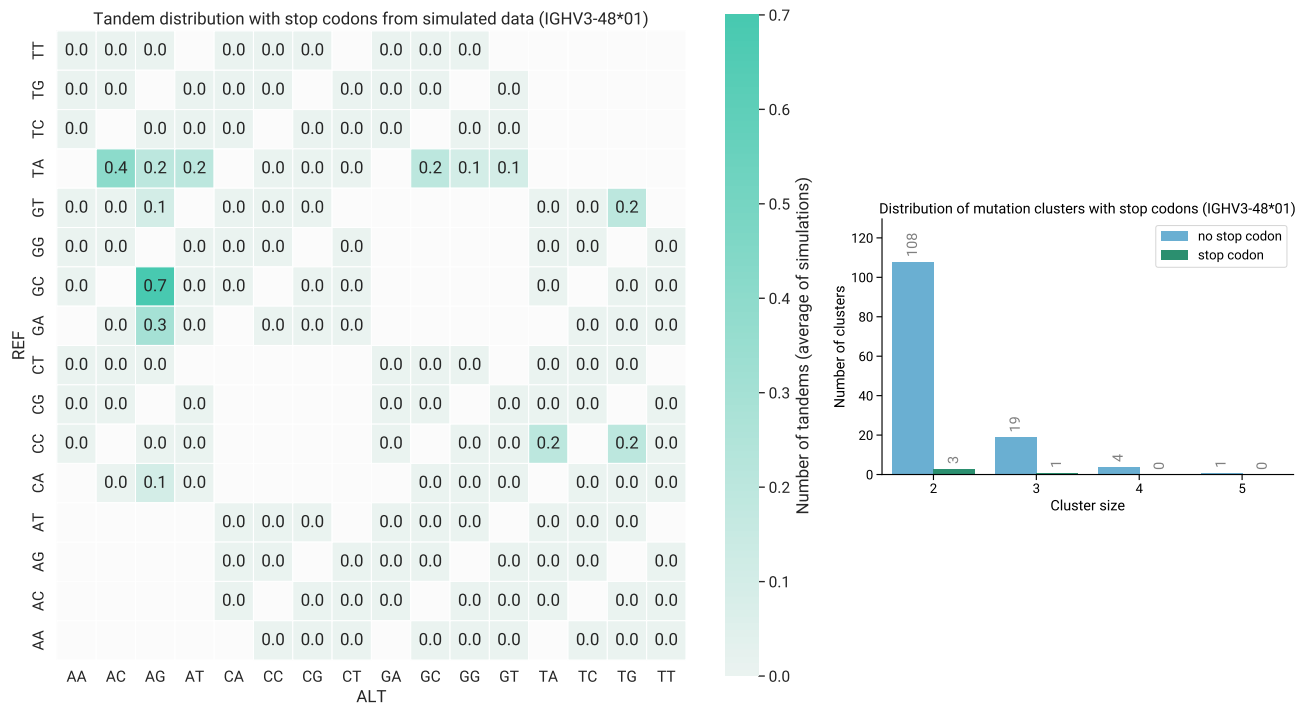
Tandem distribution from simulated data (IGHV3-33\*01)





### 5.15 IGHV3-48\*01

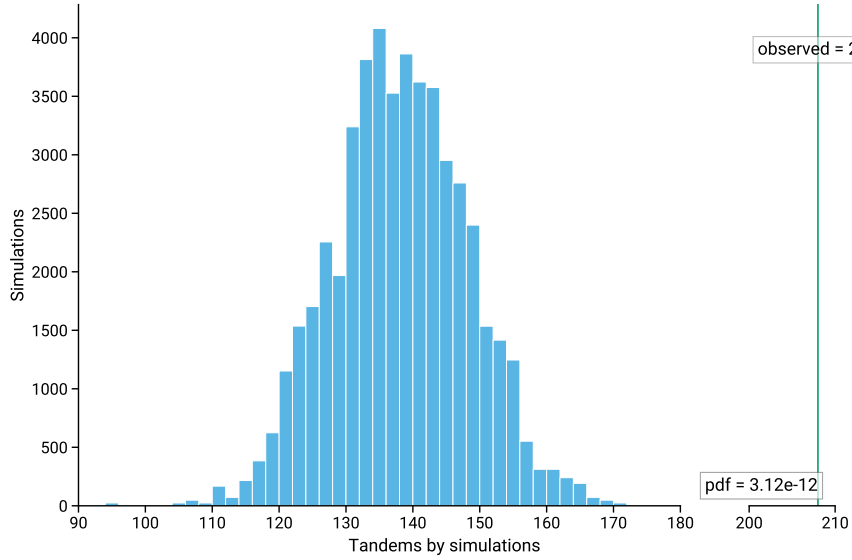




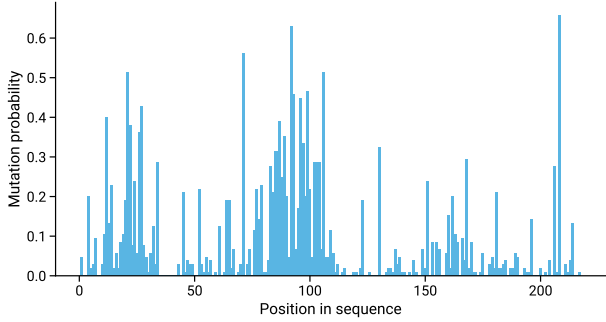


### 5.16 IGHV3-48\*02

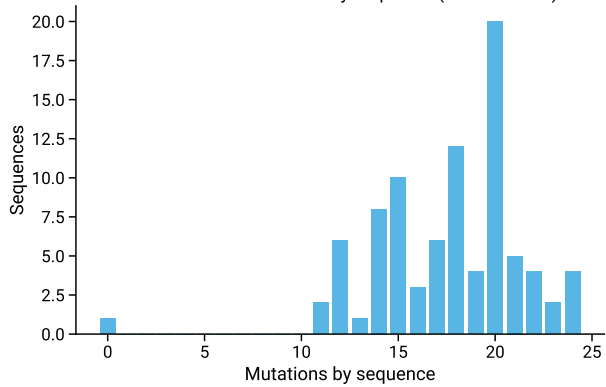
Distribution of tandems by simulation (IGHV3-48\*02)



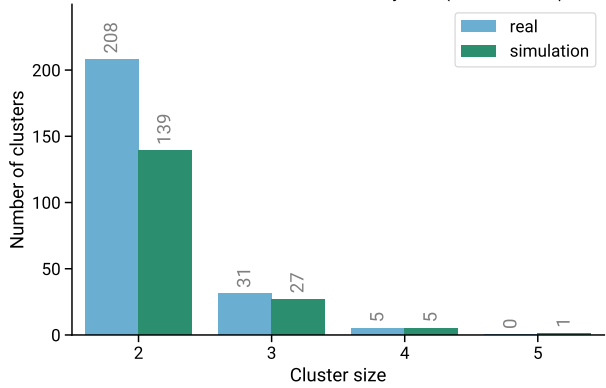
Mutation probabilities by position (IGHV3-48\*02)



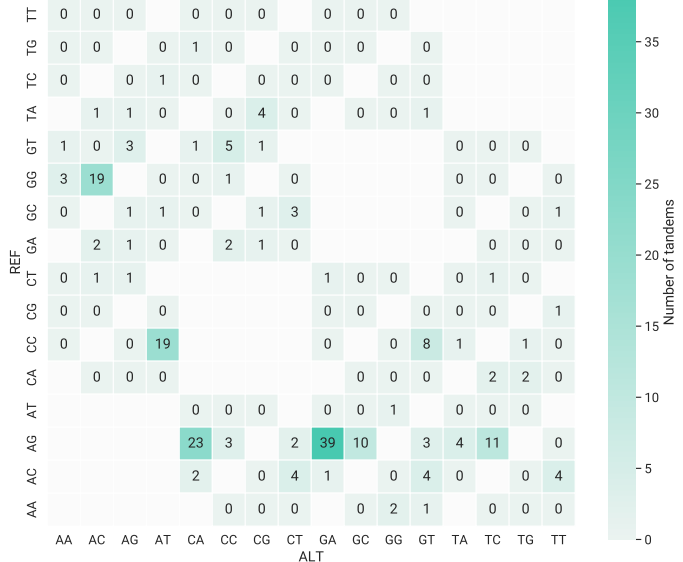
Distribution of mutations by sequence (IGHV3-48\*02)



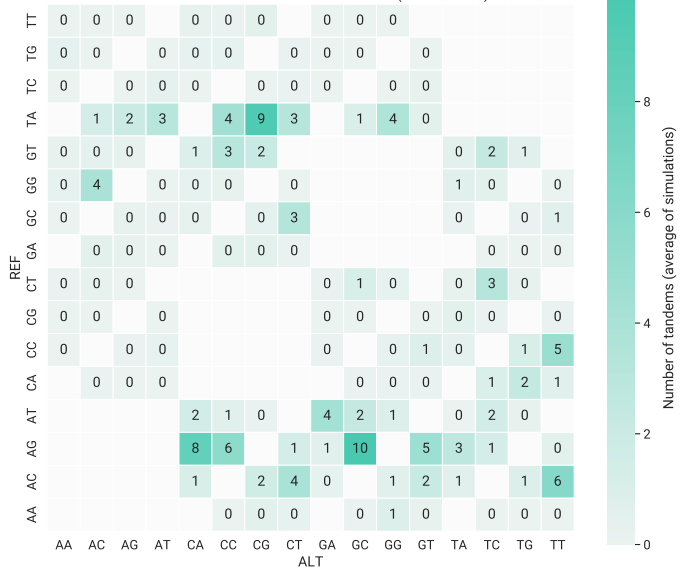
Distribution of mutation clusters by size (IGHV3-48\*02)

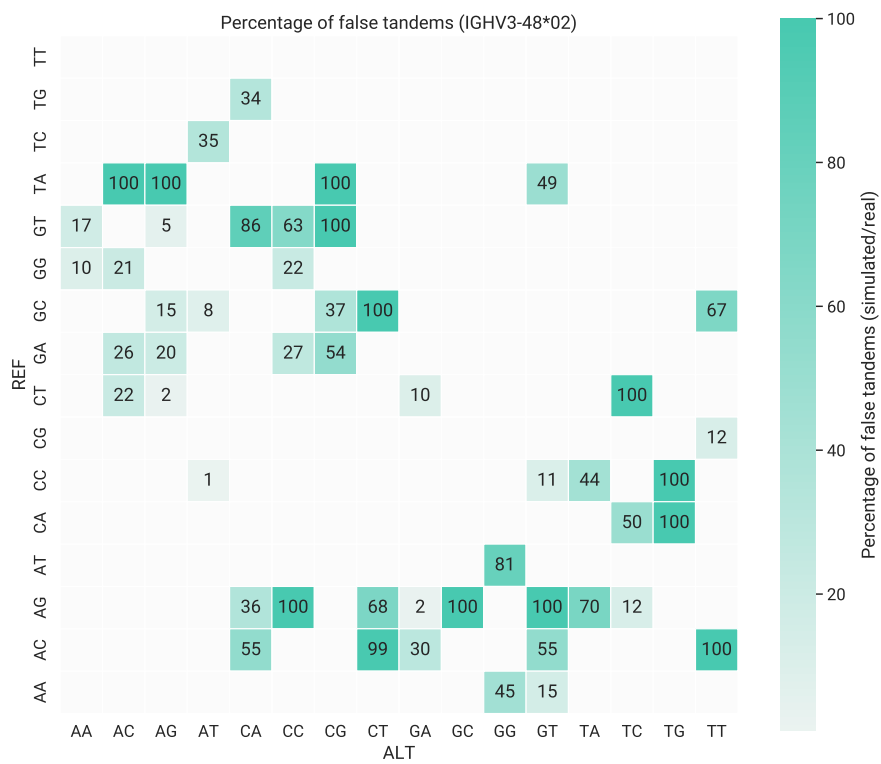
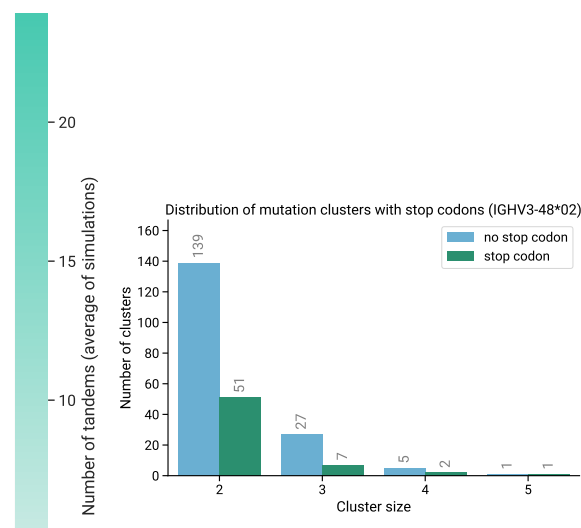
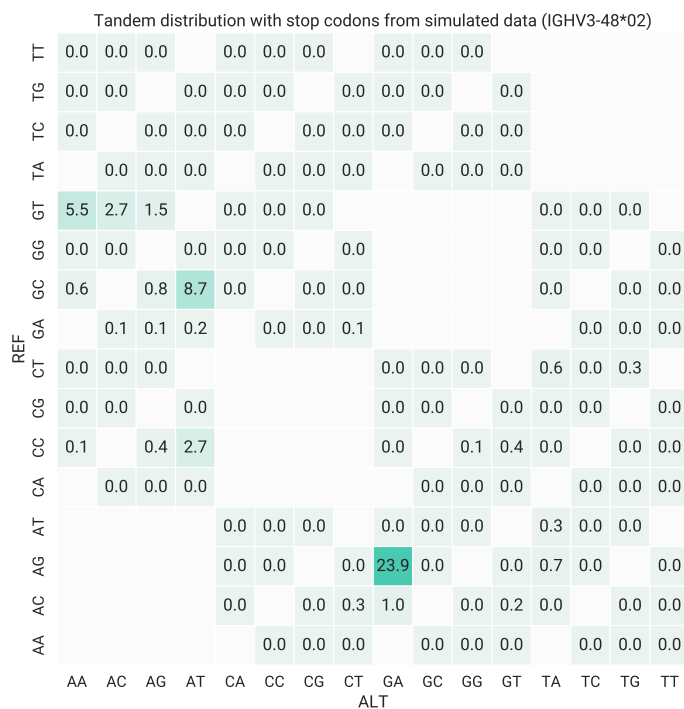


Tandem distribution from real data (IGHV3-48\*02)



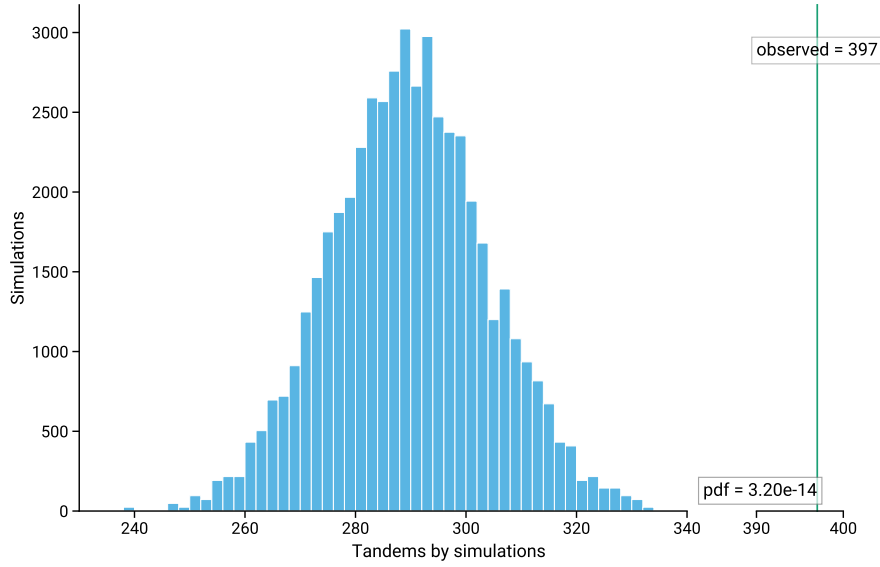
Tandem distribution from simulated data (IGHV3-48\*02)



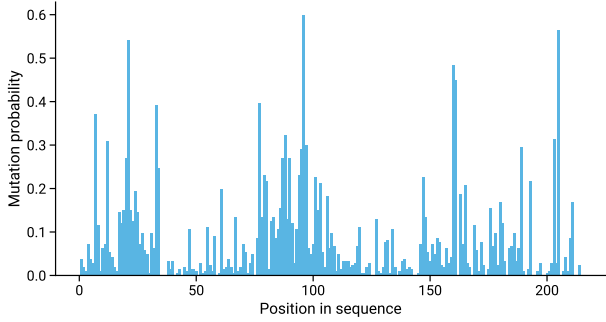


### 5.17 IGHV3-53\*01

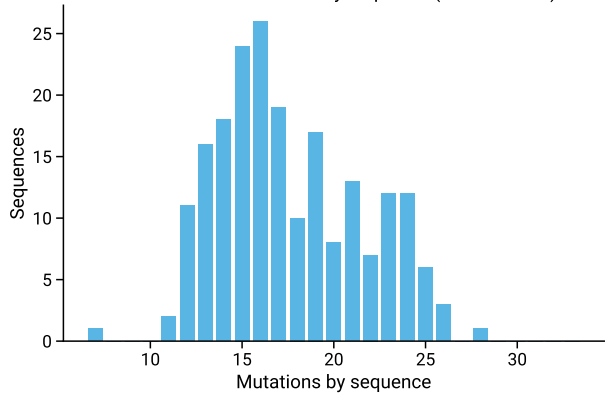
Distribution of tandems by simulation (IGHV3-53\*01)



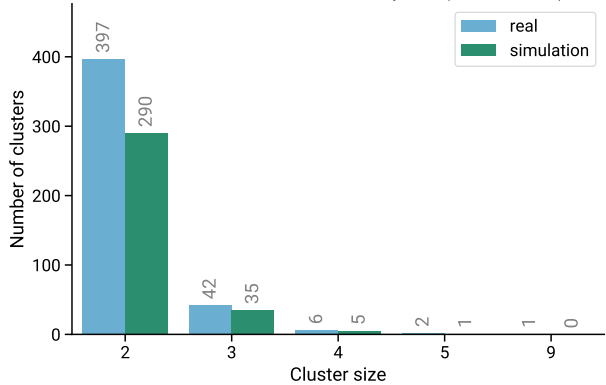
Mutation probabilities by position (IGHV3-53\*01)



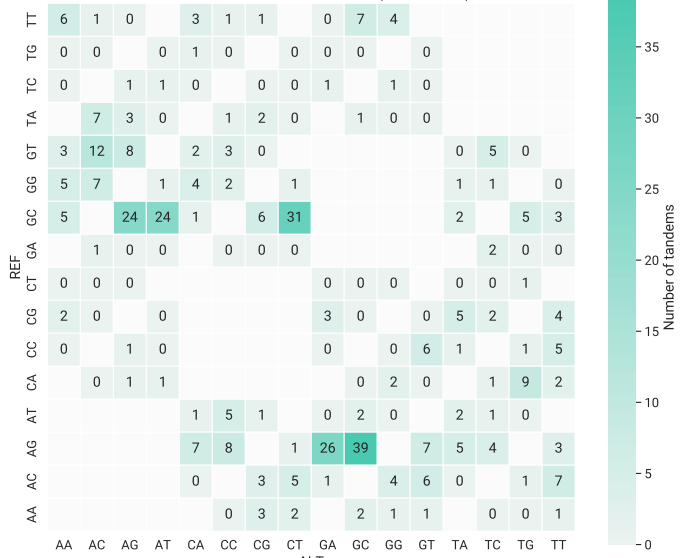
Distribution of mutations by sequence (IGHV3-53\*01)



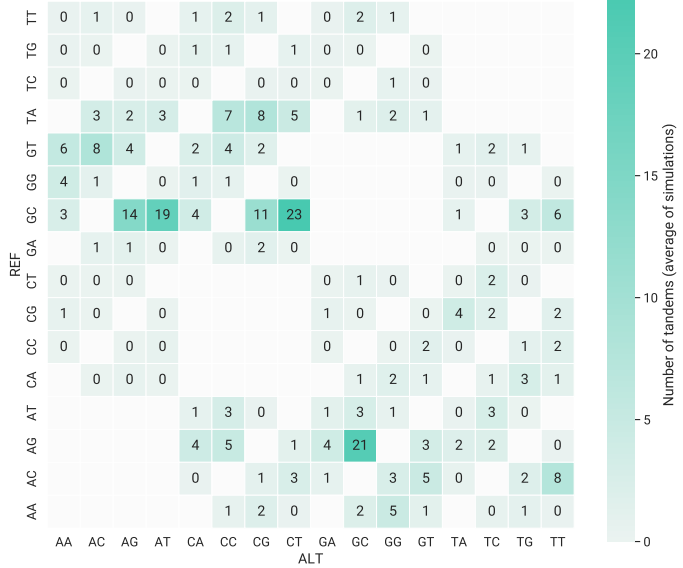
Distribution of mutation clusters by size (IGHV3-53\*01)

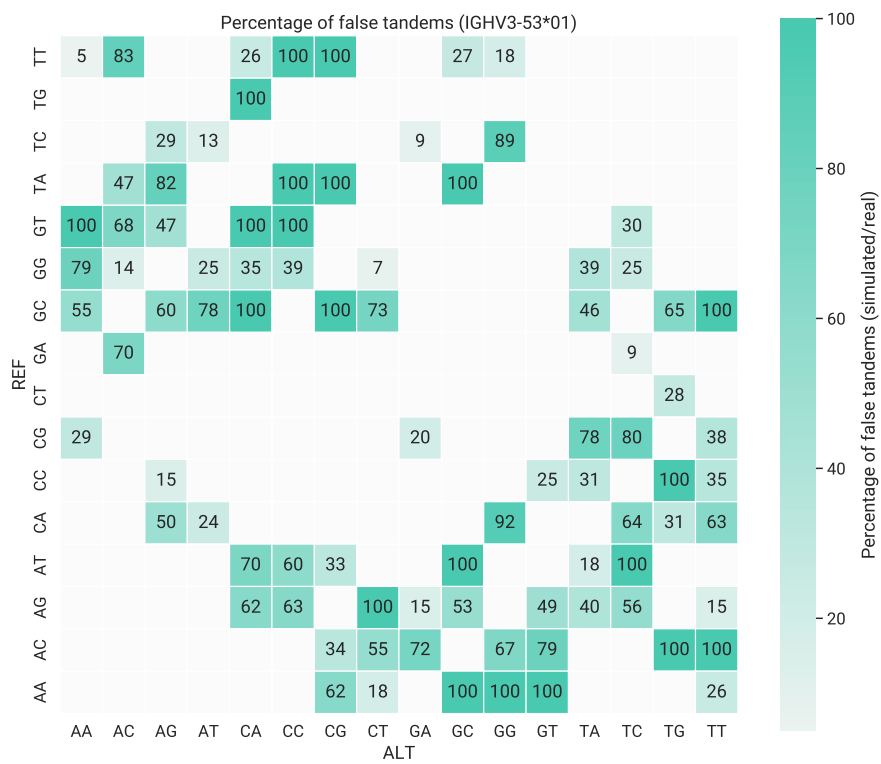
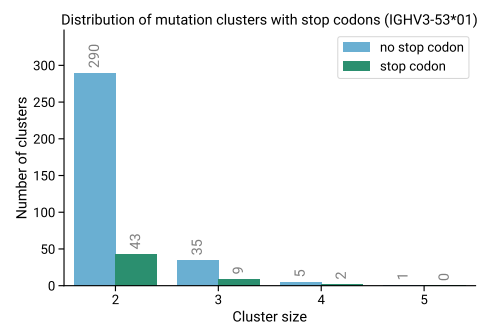
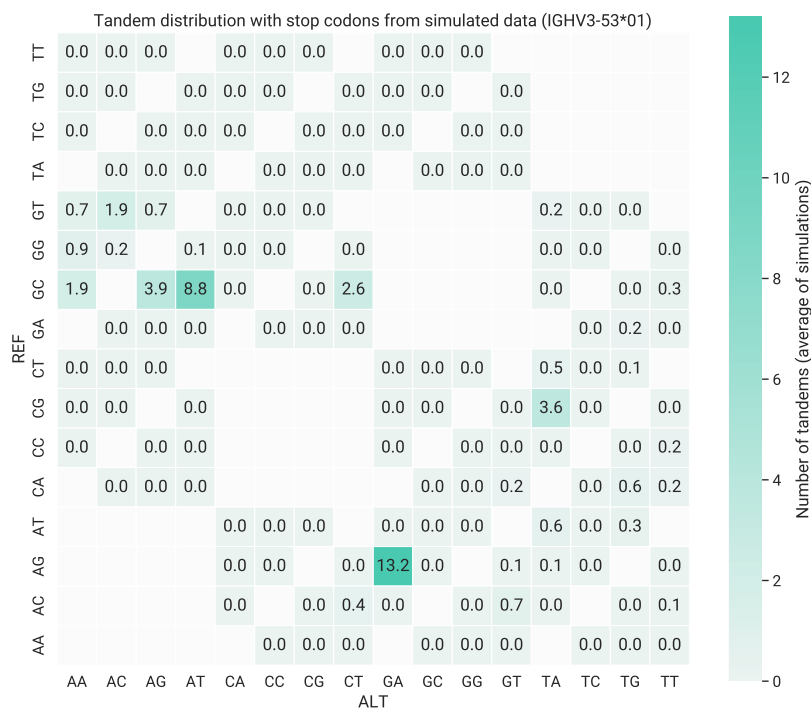


Tandem distribution from real data (IGHV3-53\*01)



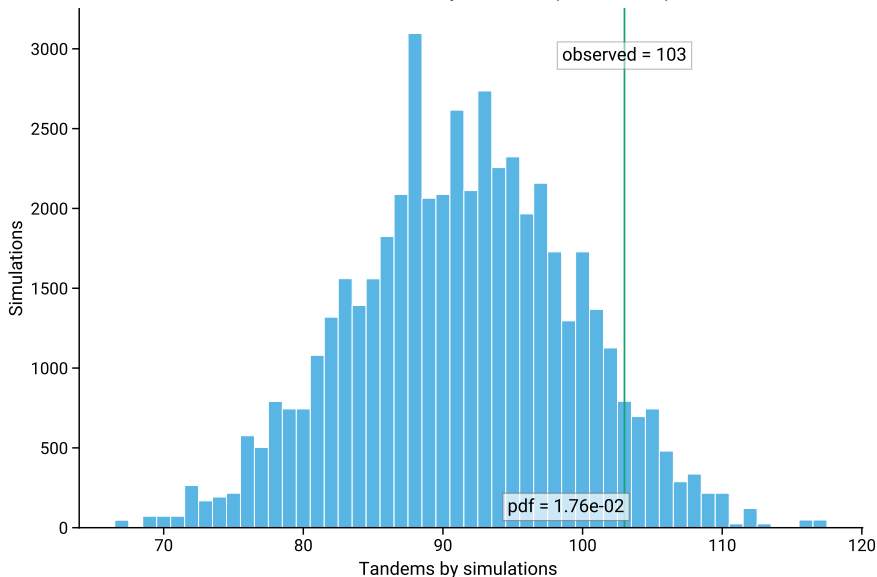
Tandem distribution from simulated data (IGHV3-53\*01)



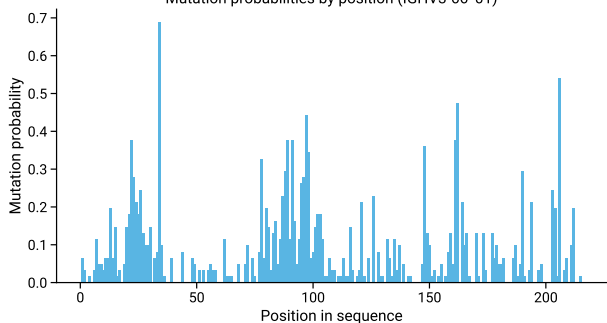


### 5.18 IGHV3-66\*01

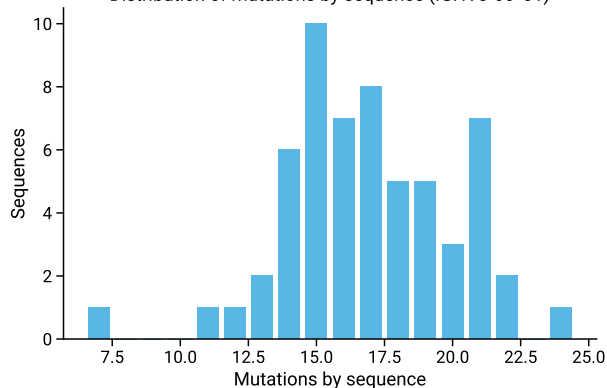
Distribution of tandems by simulation (IGHV3-66\*01)



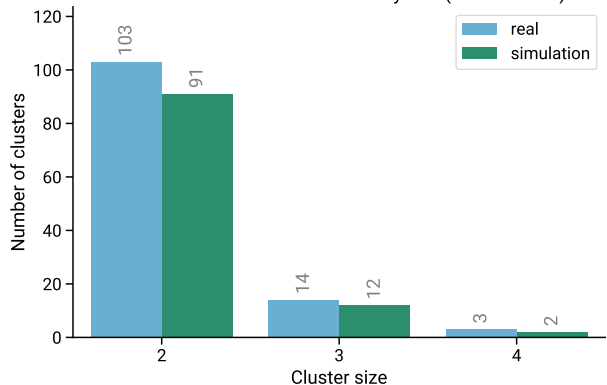
Mutation probabilities by position (IGHV3-66\*01)



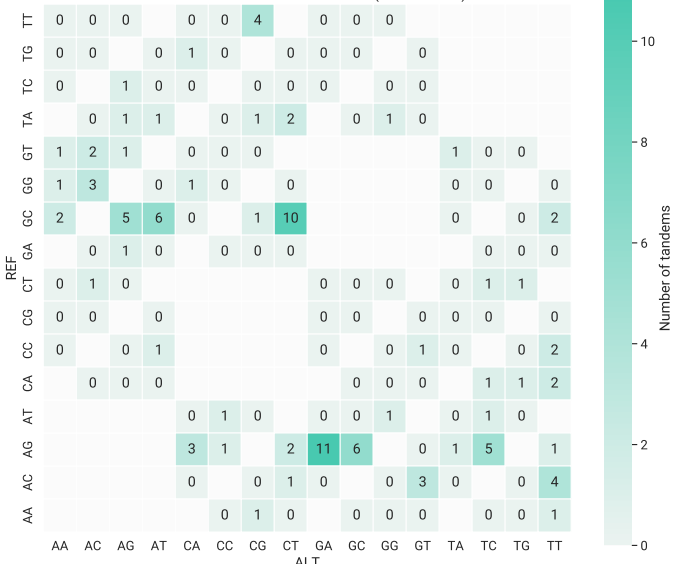
Distribution of mutations by sequence (IGHV3-66\*01)



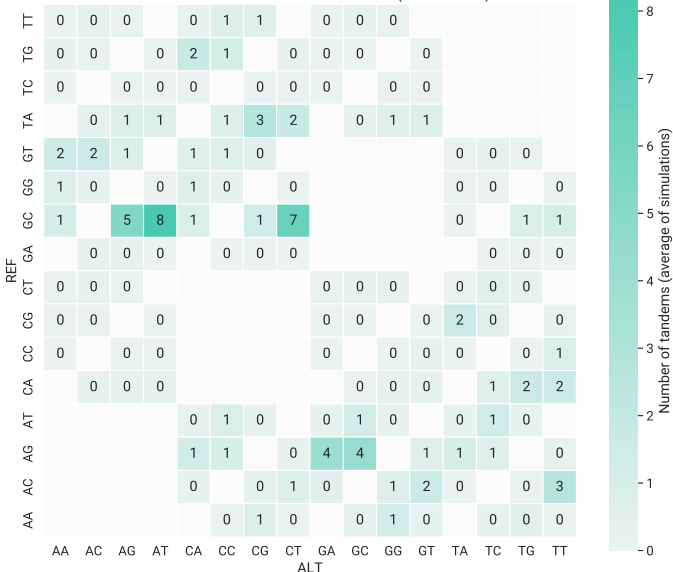
Distribution of mutation clusters by size (IGHV3-66\*01)

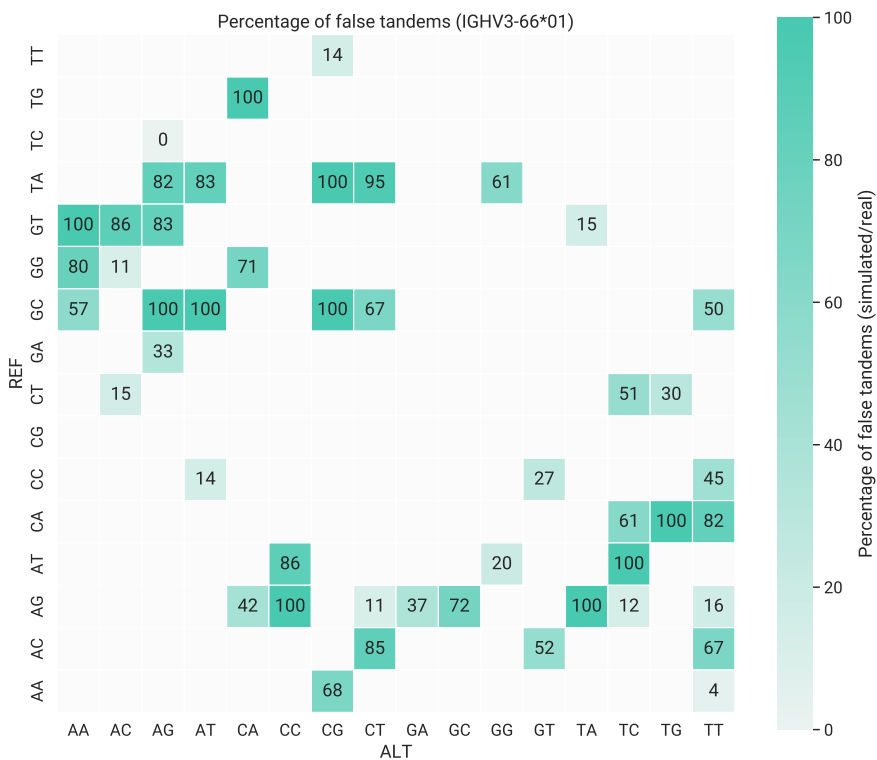
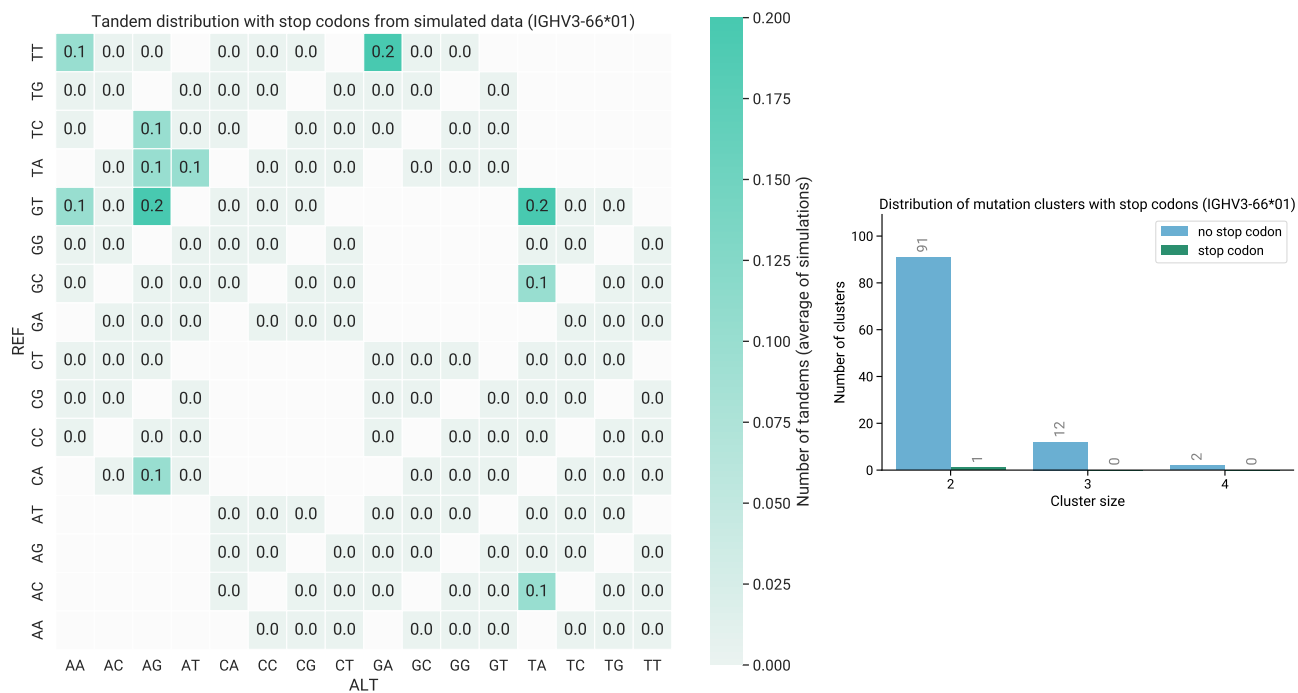


Tandem distribution from real data (IGHV3-66\*01)



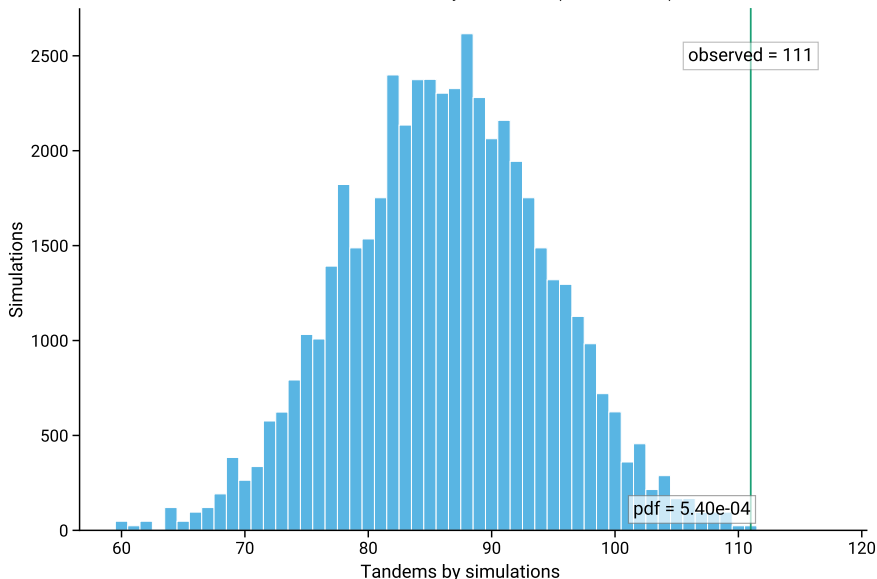
Tandem distribution from simulated data (IGHV3-66\*01)



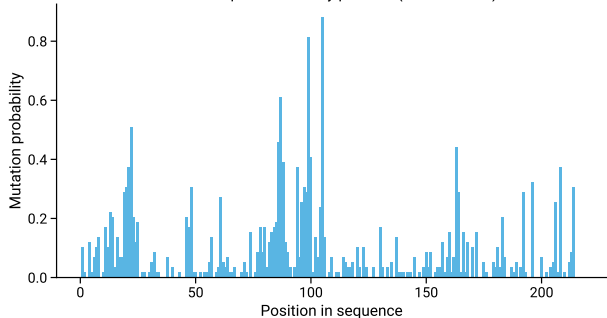


### 5.19 IGHV3-74\*01

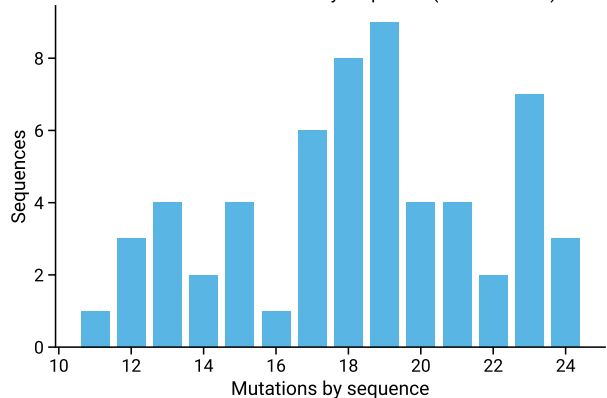
Distribution of tandems by simulation (IGHV3-74\*01)



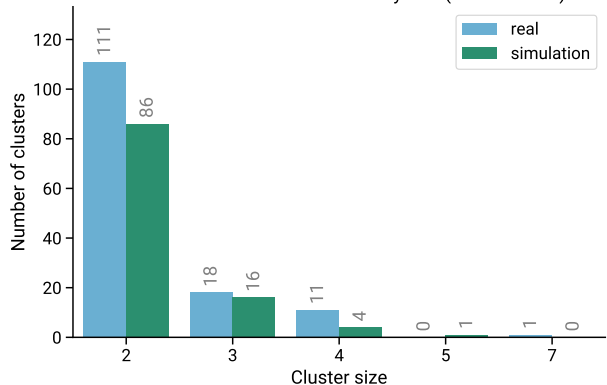
Mutation probabilities by position (IGHV3-74\*01)



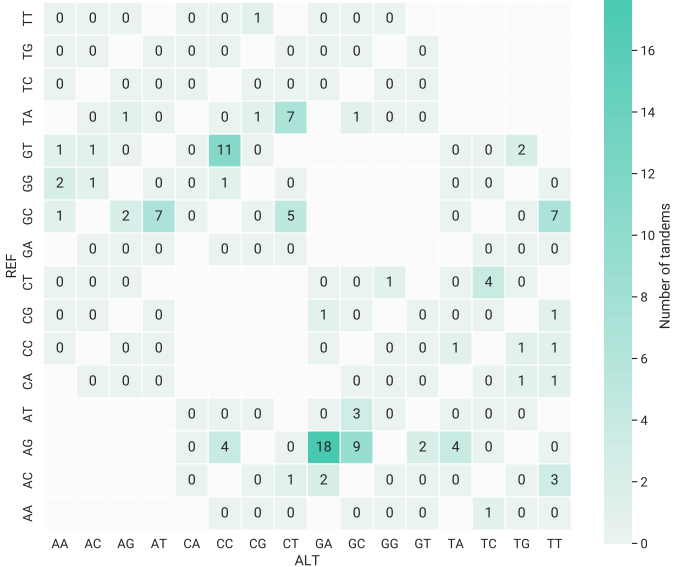
Distribution of mutations by sequence (IGHV3-74\*01)



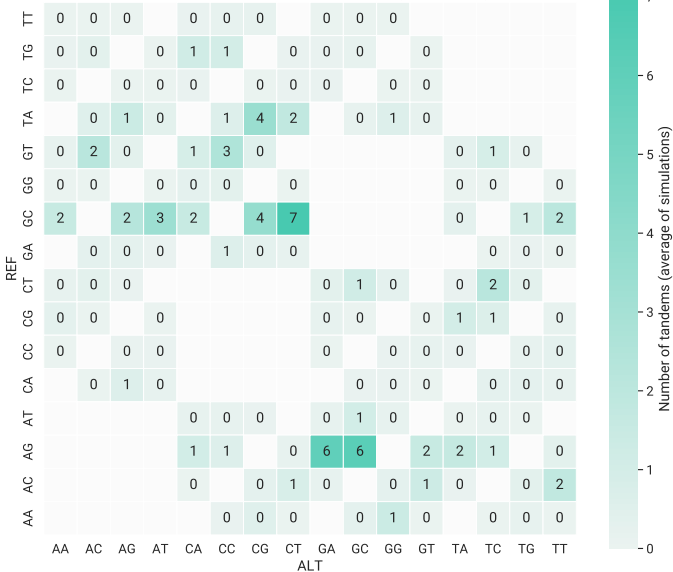
Distribution of mutation clusters by size (IGHV3-74\*01)

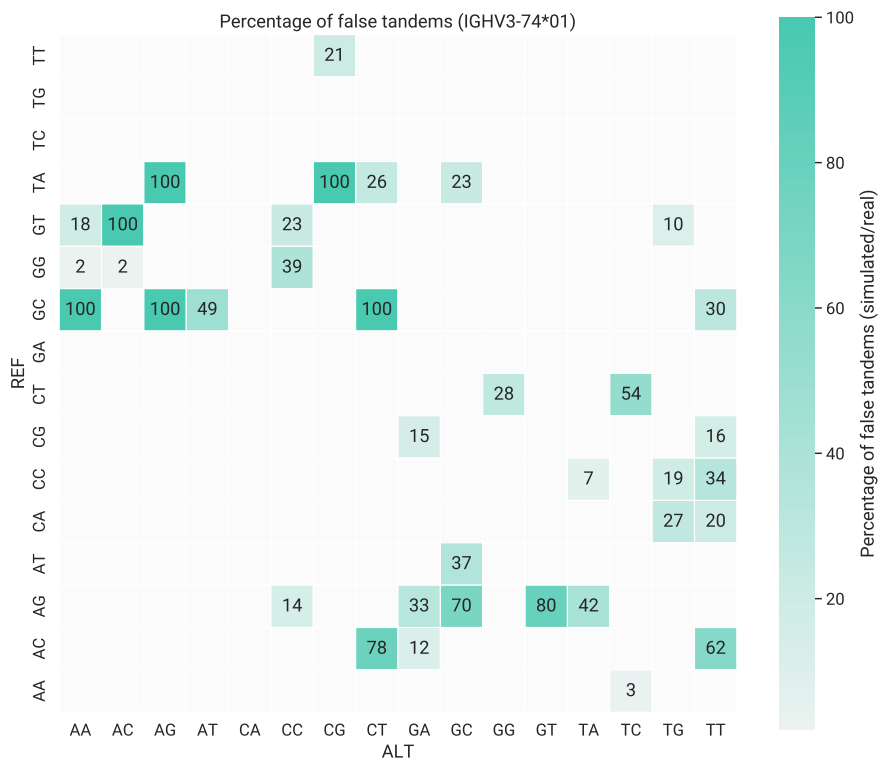
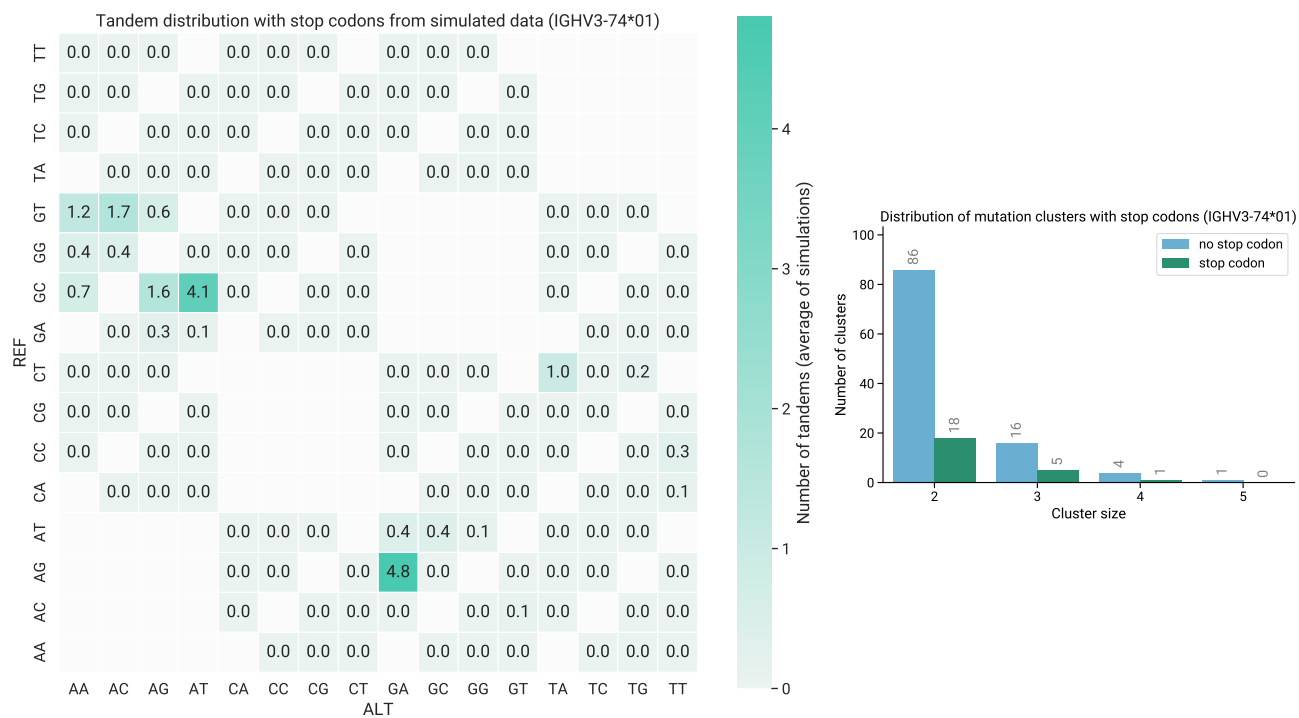


Tandem distribution from real data (IGHV3-74\*01)



Tandem distribution from simulated data (IGHV3-74\*01)

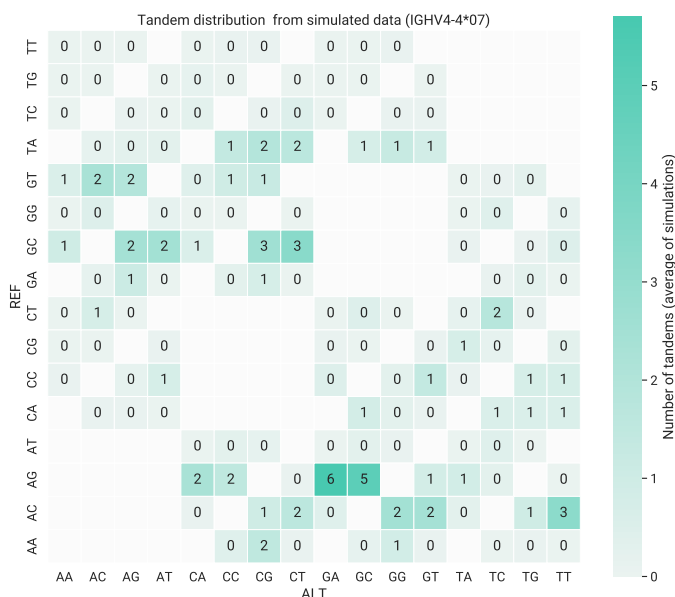
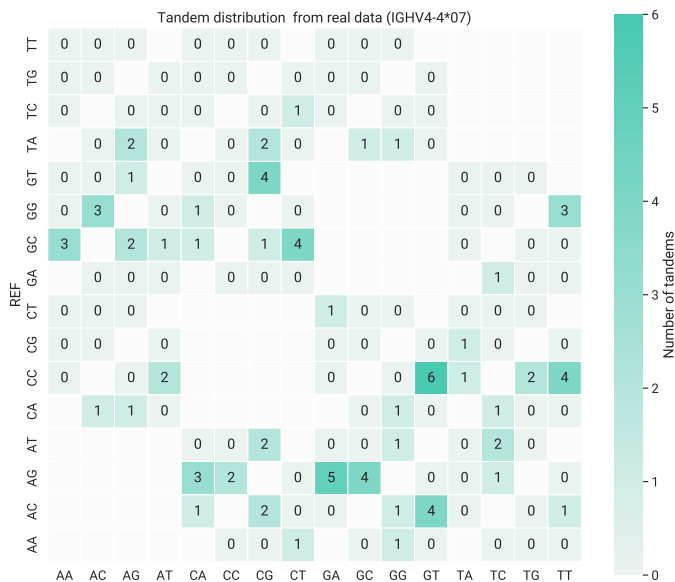
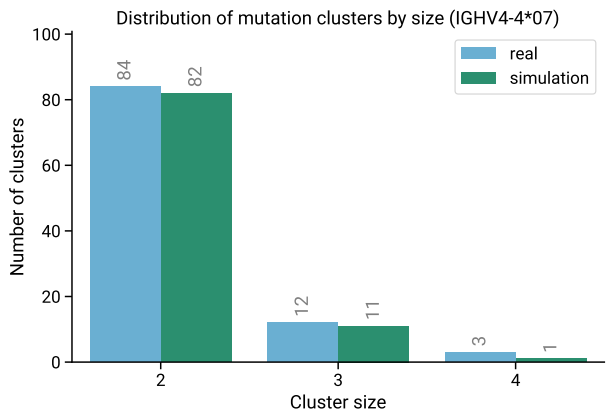
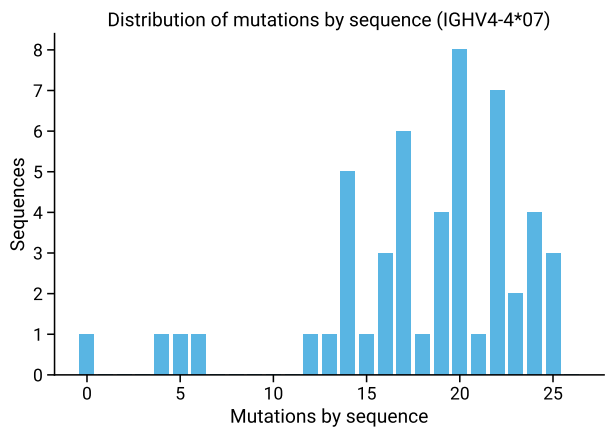
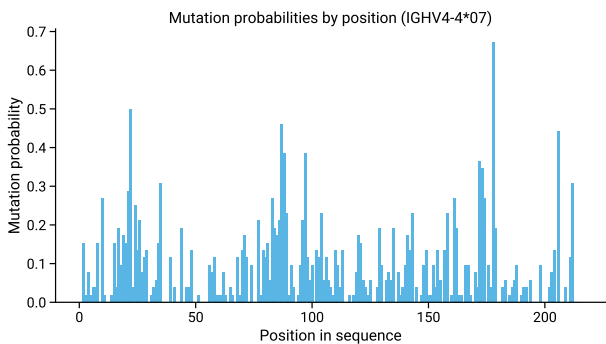
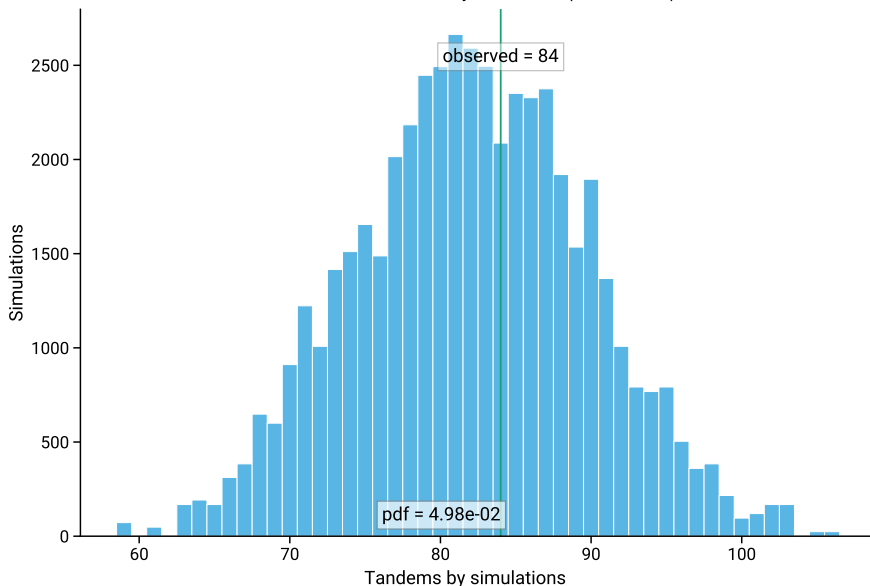


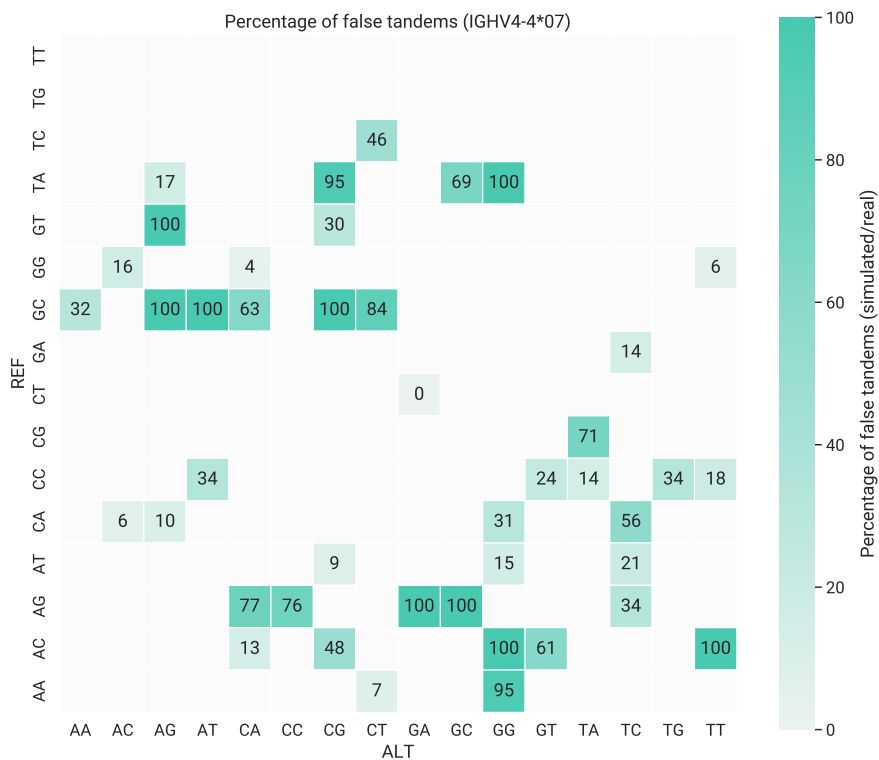
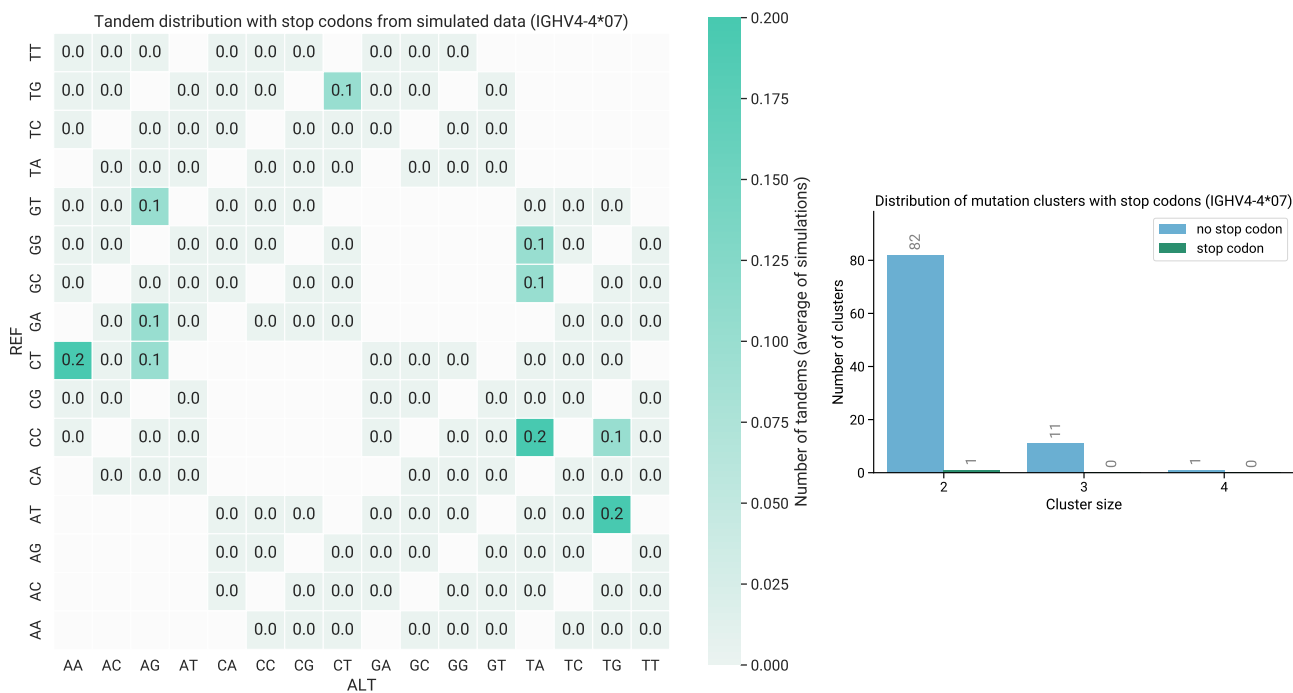




### 5.20 IGHV4-4\*07

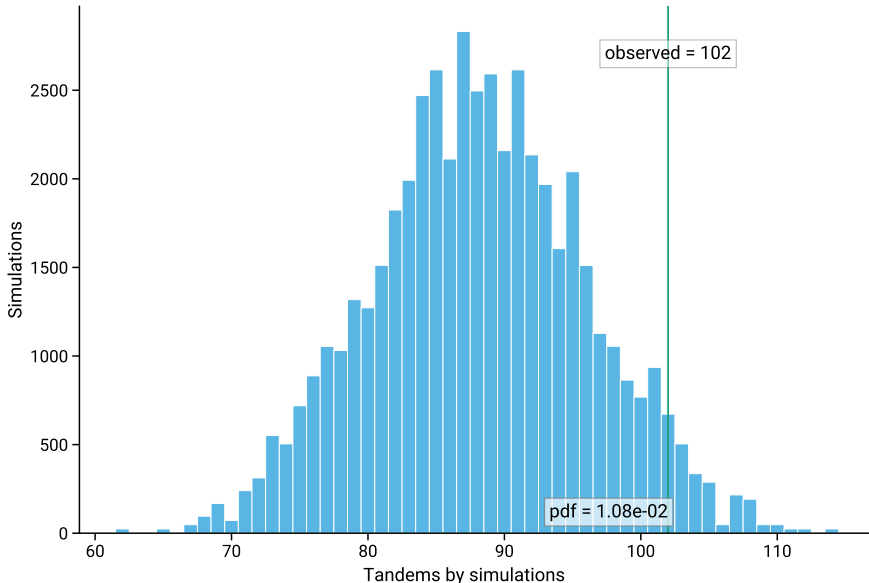
Distribution of tandems by simulation (IGHV4-4\*07)



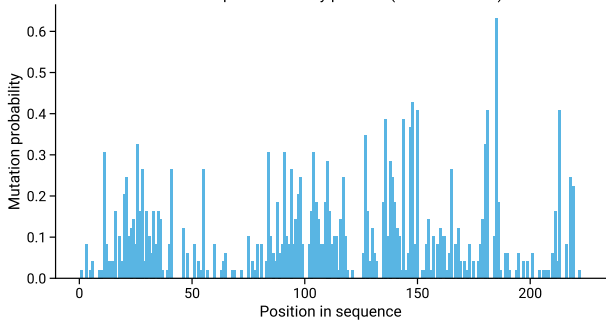


### 5.21 IGHV4-30-4\*01

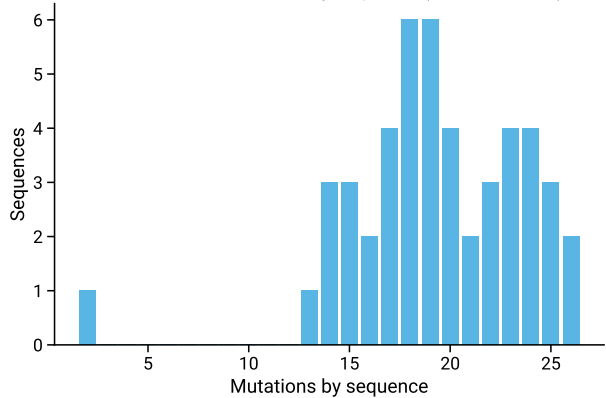
Distribution of tandems by simulation (IGHV4-30-4\*01)



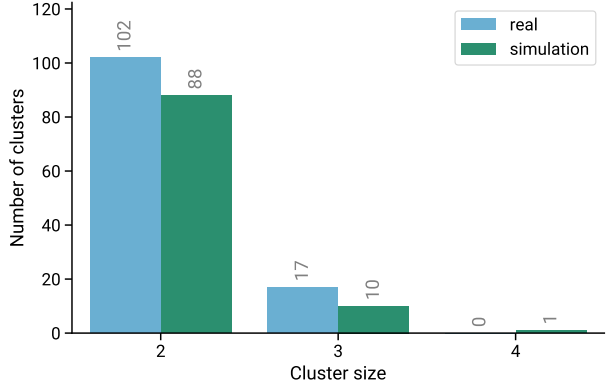
Mutation probabilities by position (IGHV4-30-4\*01)



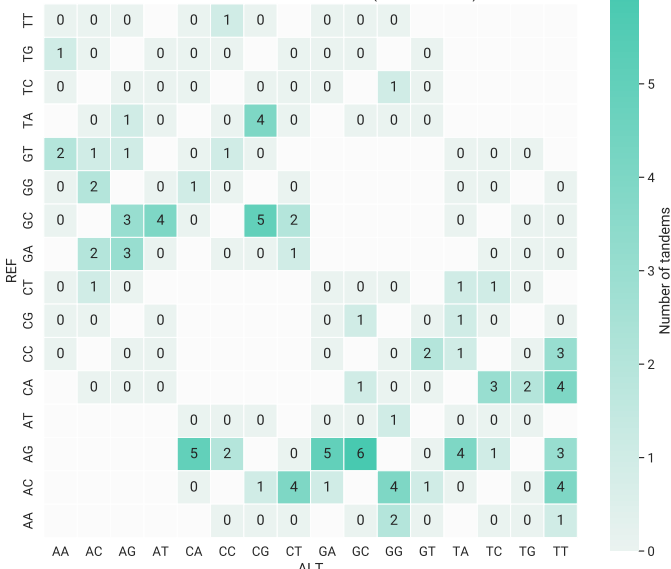
Distribution of mutations by sequence (IGHV4-30-4\*01)



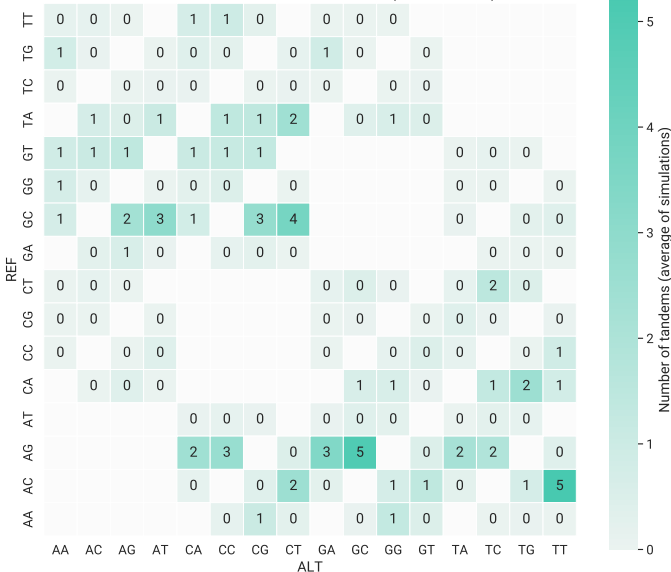
Distribution of mutation clusters by size (IGHV4-30-4\*01)

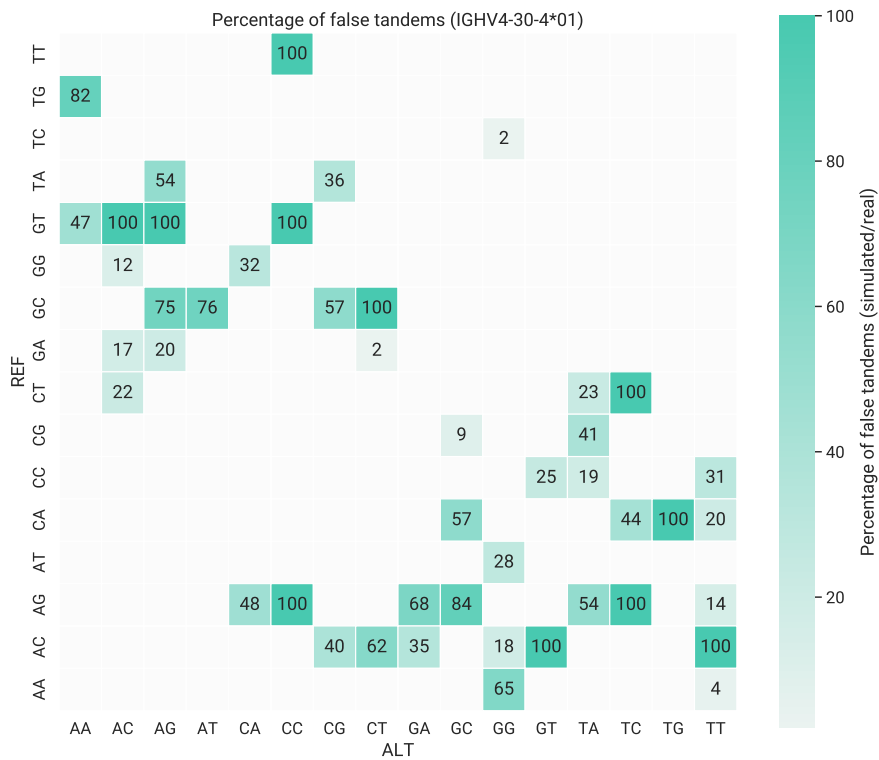
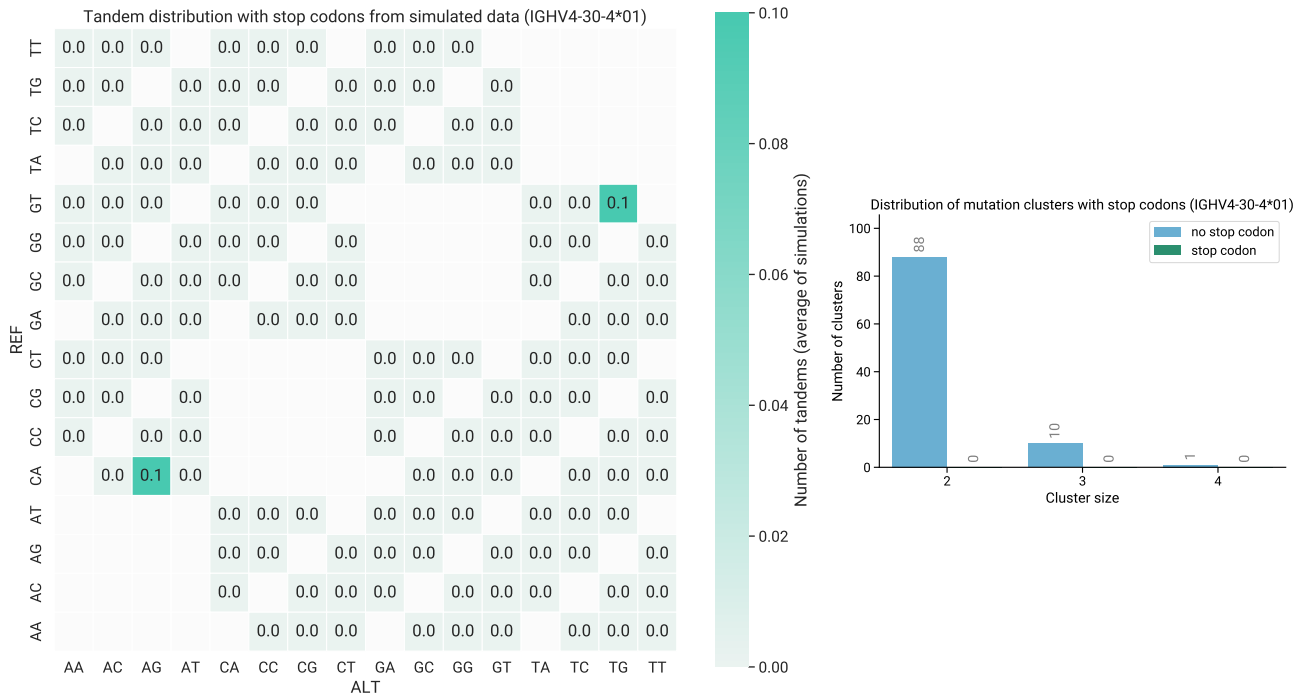


Tandem distribution from real data (IGHV4-30-4\*01)



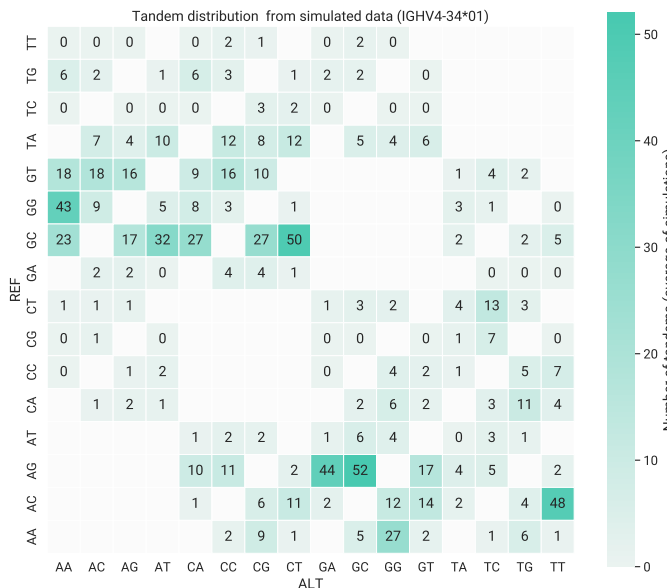
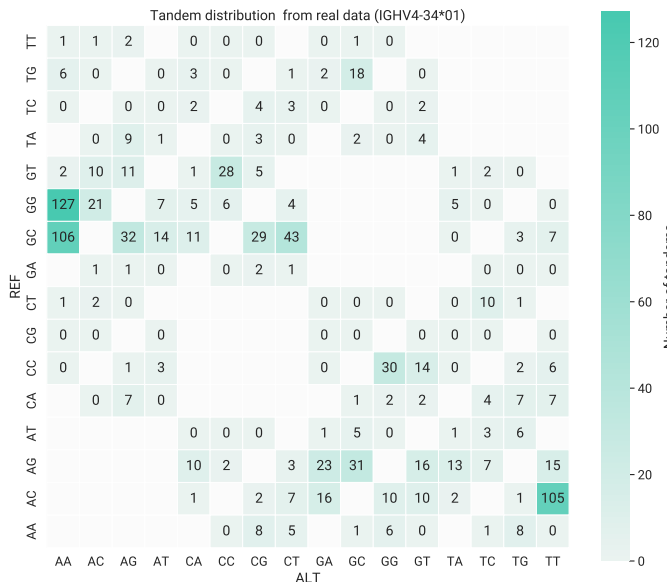
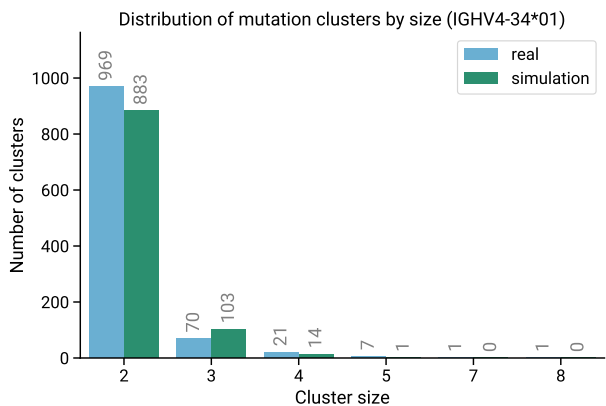
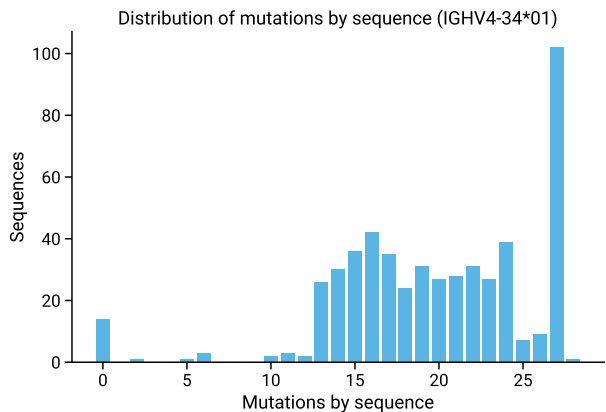
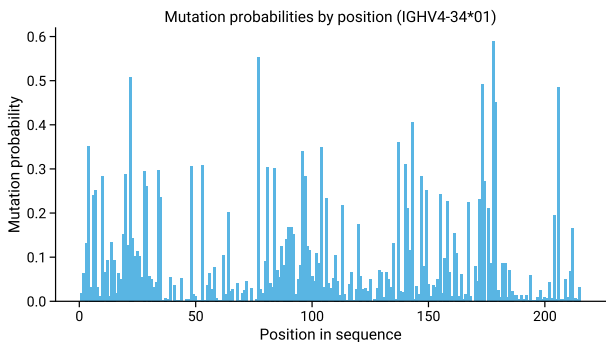
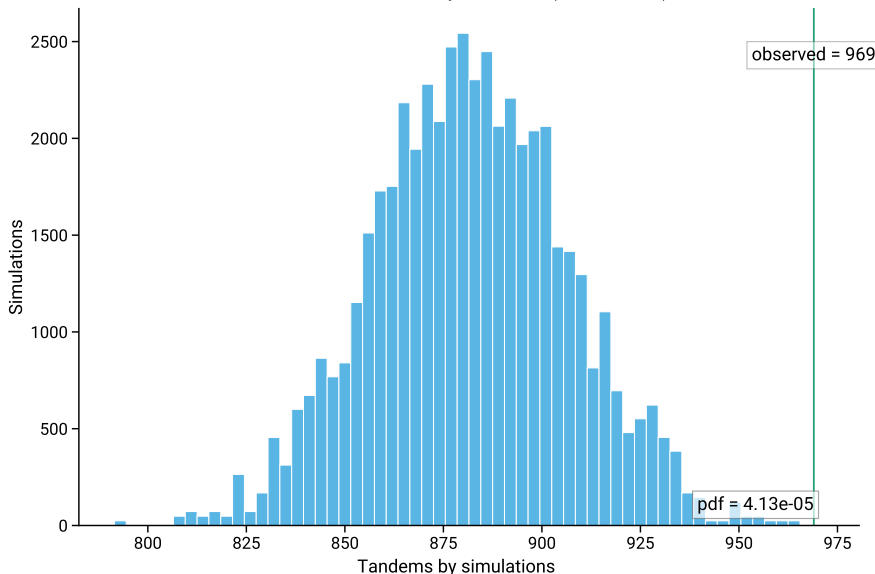
Tandem distribution from simulated data (IGHV4-30-4\*01)

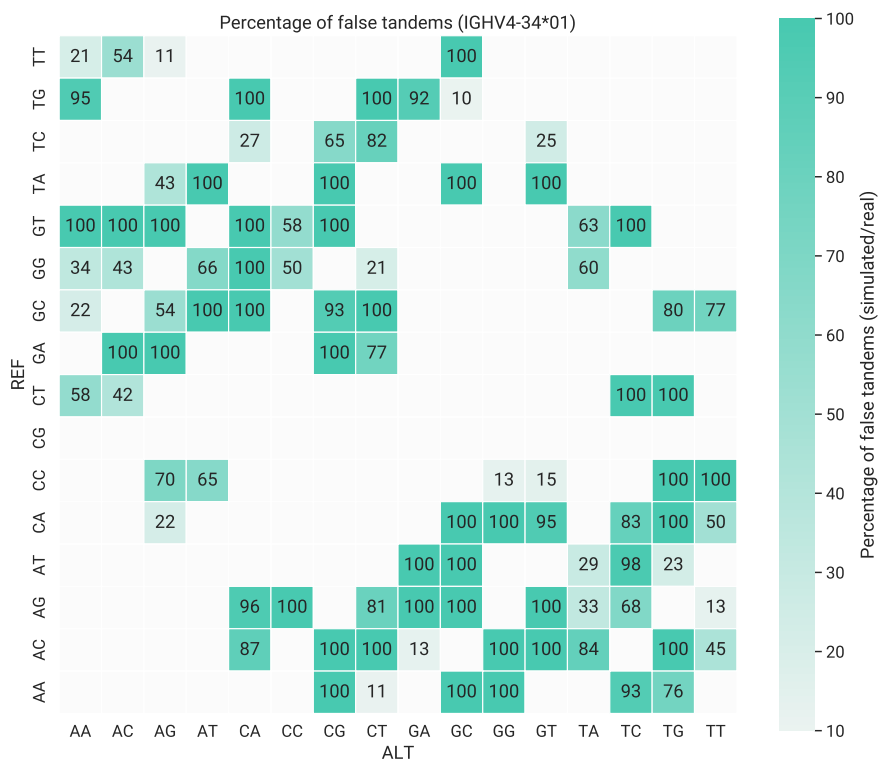
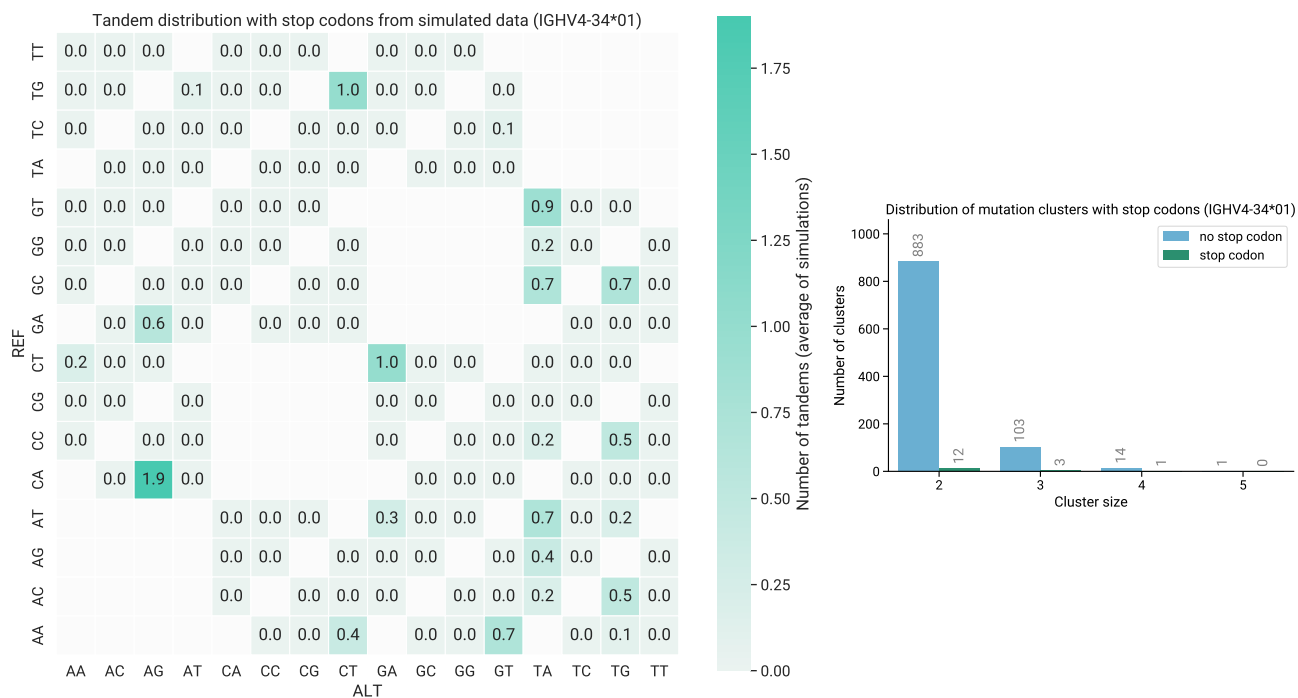




### 5.22 IGHV4-34\*01

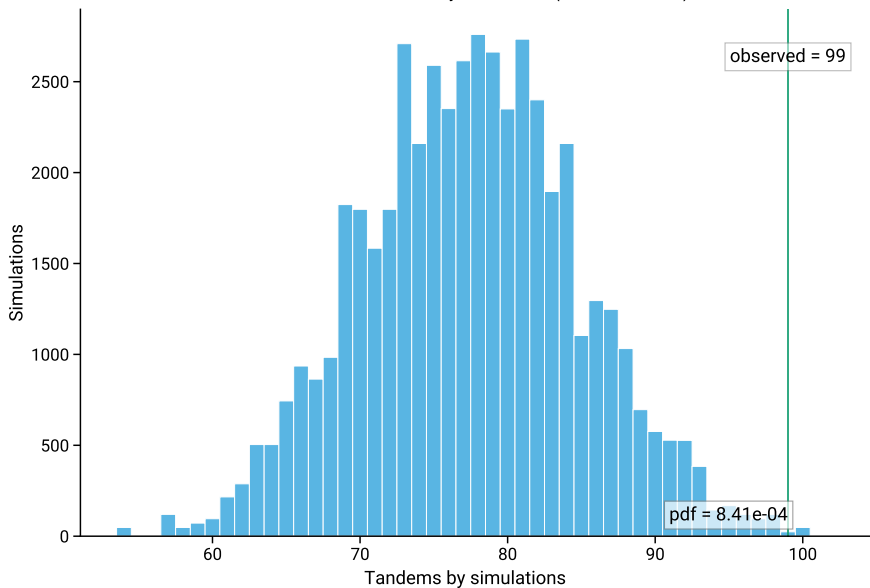
Distribution of tandems by simulation (IGHV4-34\*01)



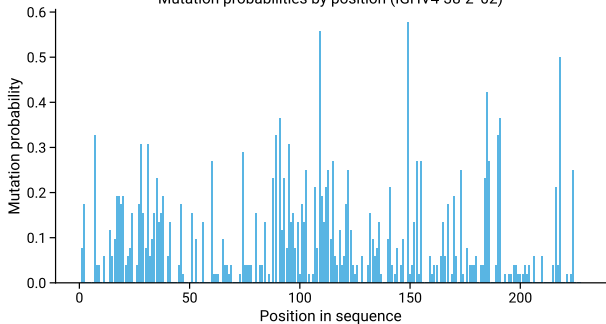


### 5.23 IGHV4-38-2\*02

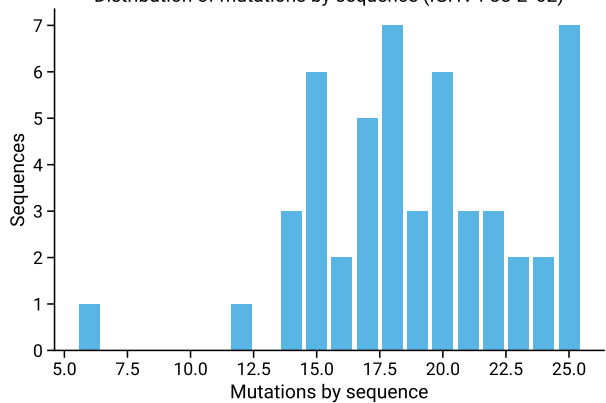
Distribution of tandems by simulation (IGHV4-38-2\*02)



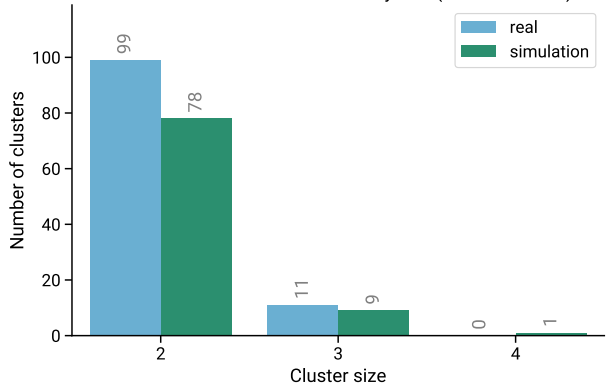
Mutation probabilities by position (IGHV4-38-2\*02)



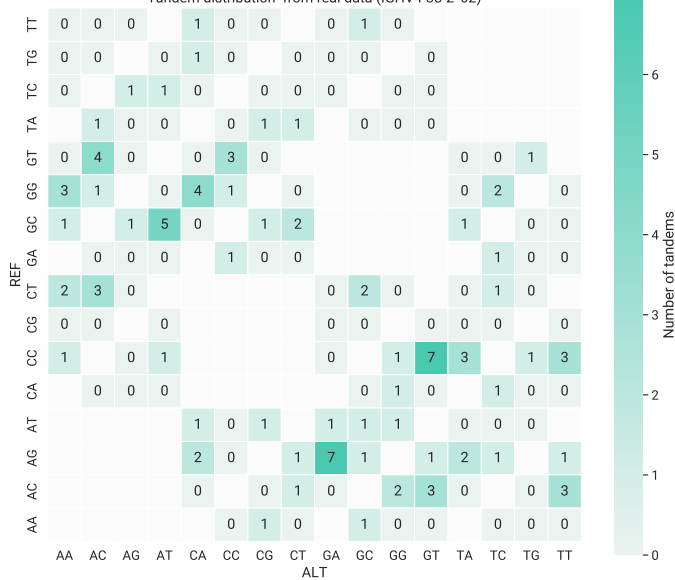
Distribution of mutations by sequence (IGHV4-38-2\*02)



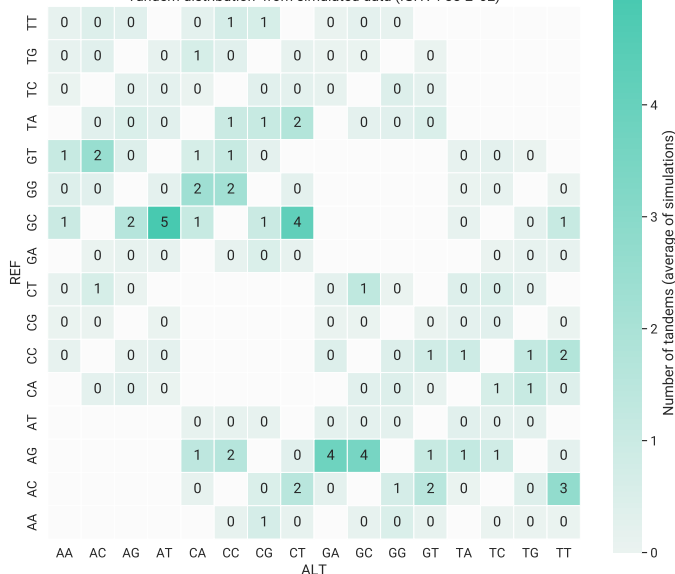
Distribution of mutation clusters by size (IGHV4-38-2\*02)

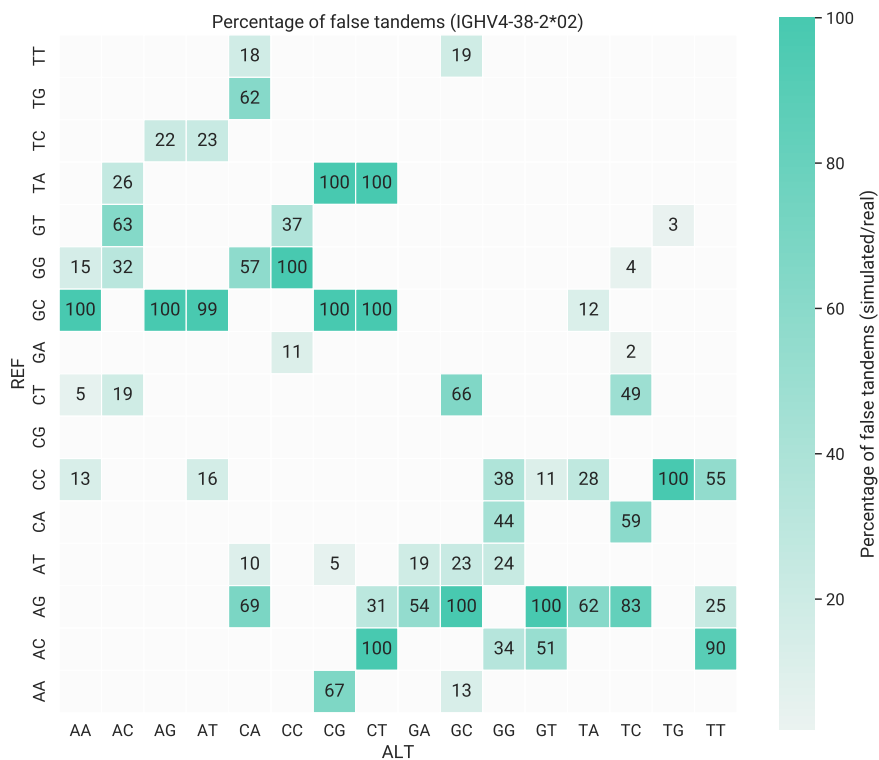
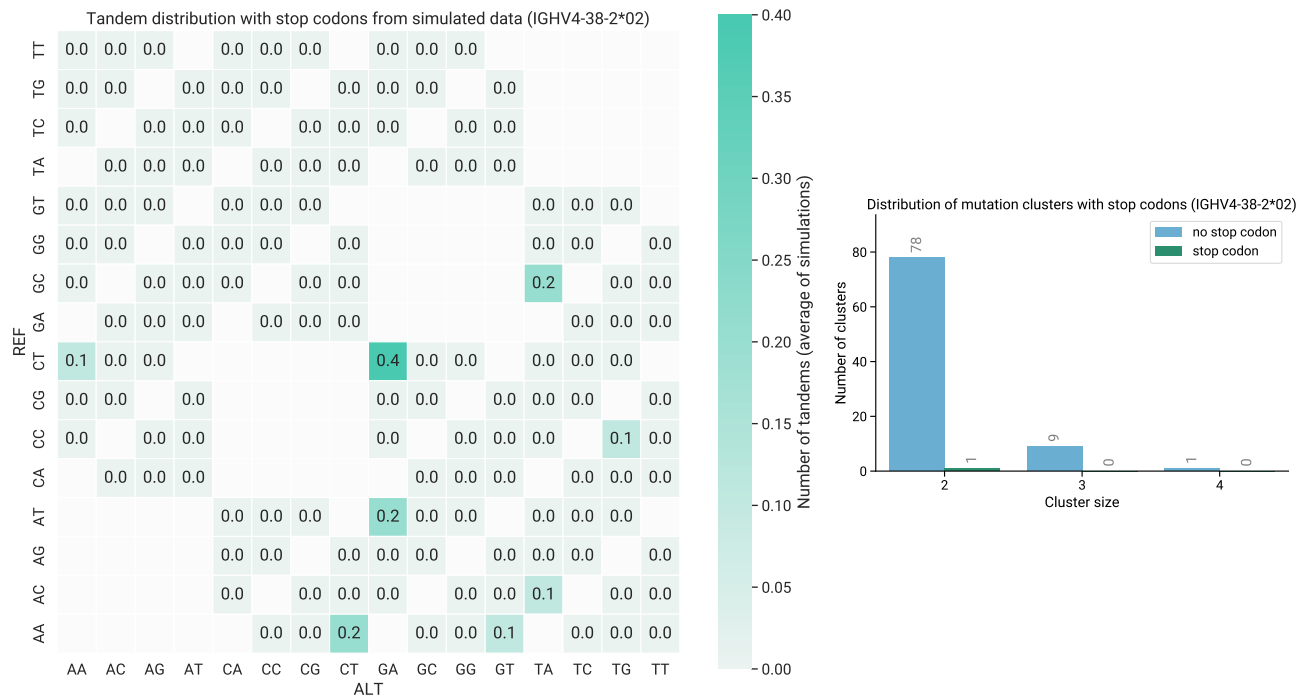


Tandem distribution from real data (IGHV4-38-2\*02)



Tandem distribution from simulated data (IGHV4-38-2\*02)

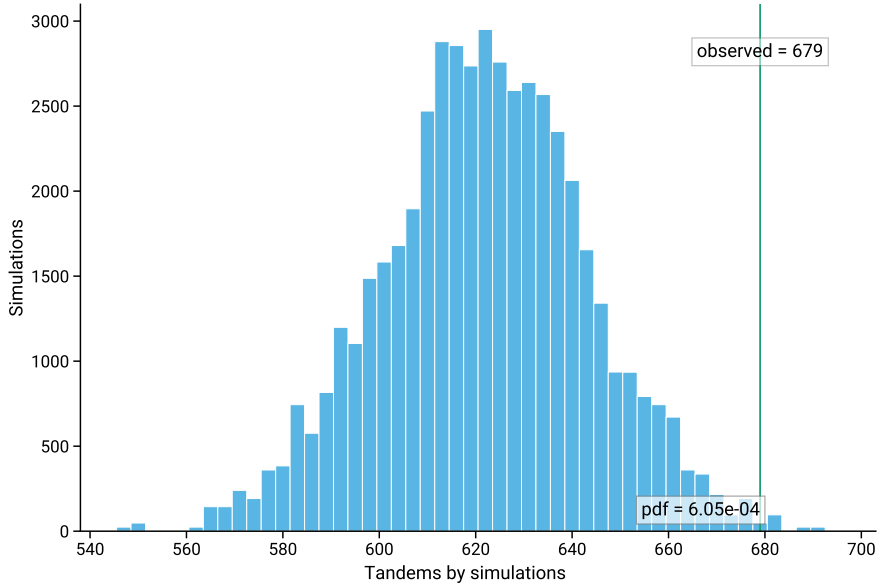




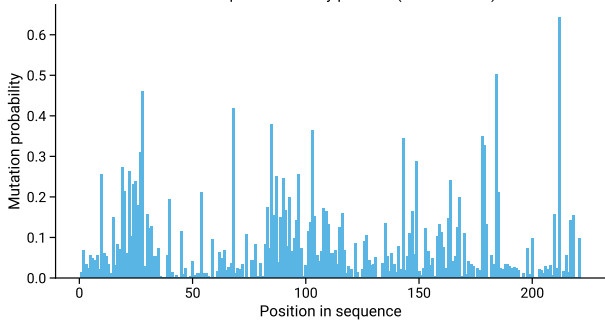


### 5.24 IGHV4-39\*01

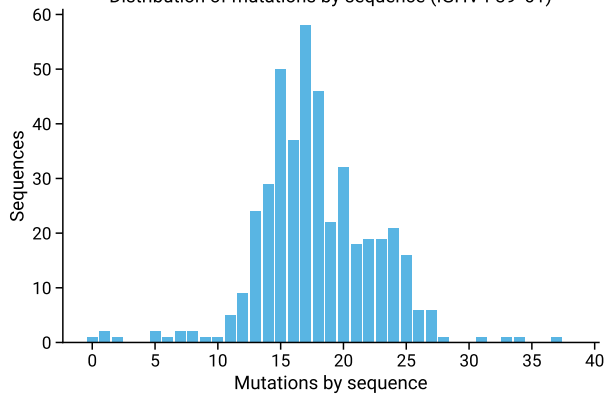
Distribution of tandems by simulation (IGHV4-39\*01)



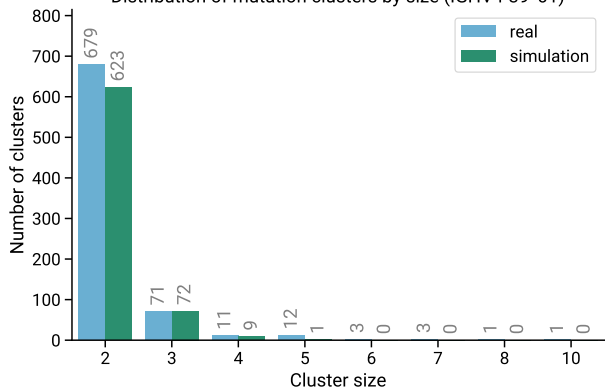
Mutation probabilities by position (IGHV4-39\*01)



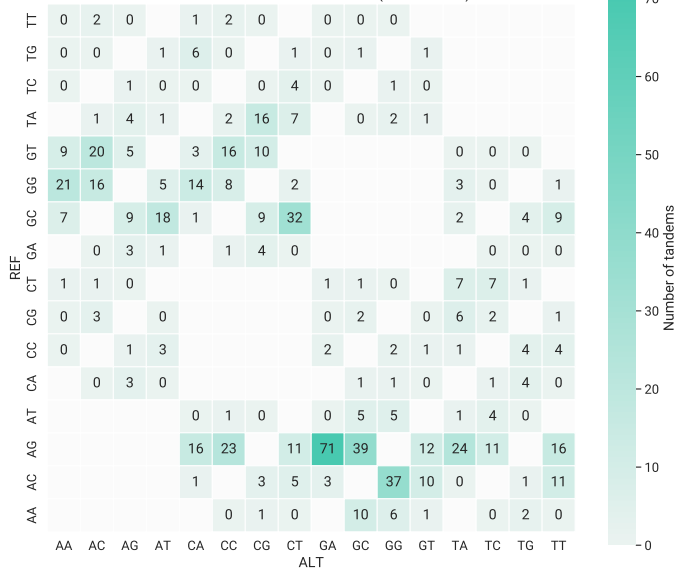
Distribution of mutations by sequence (IGHV4-39\*01)



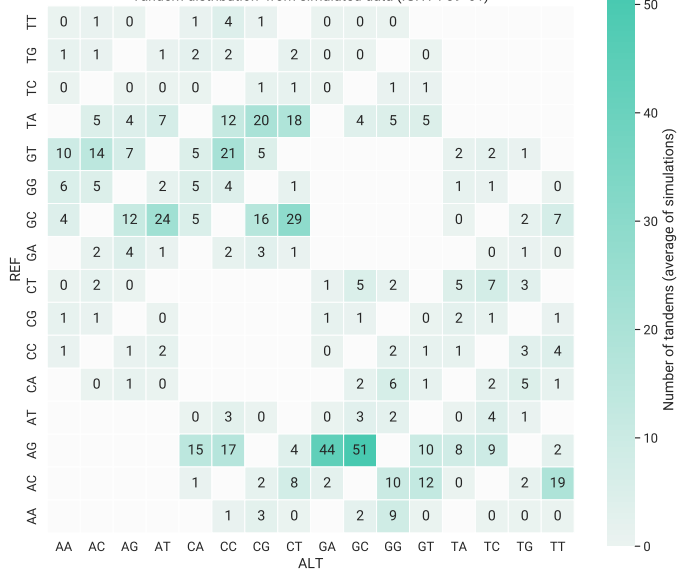
Distribution of mutation clusters by size (IGHV4-39\*01)

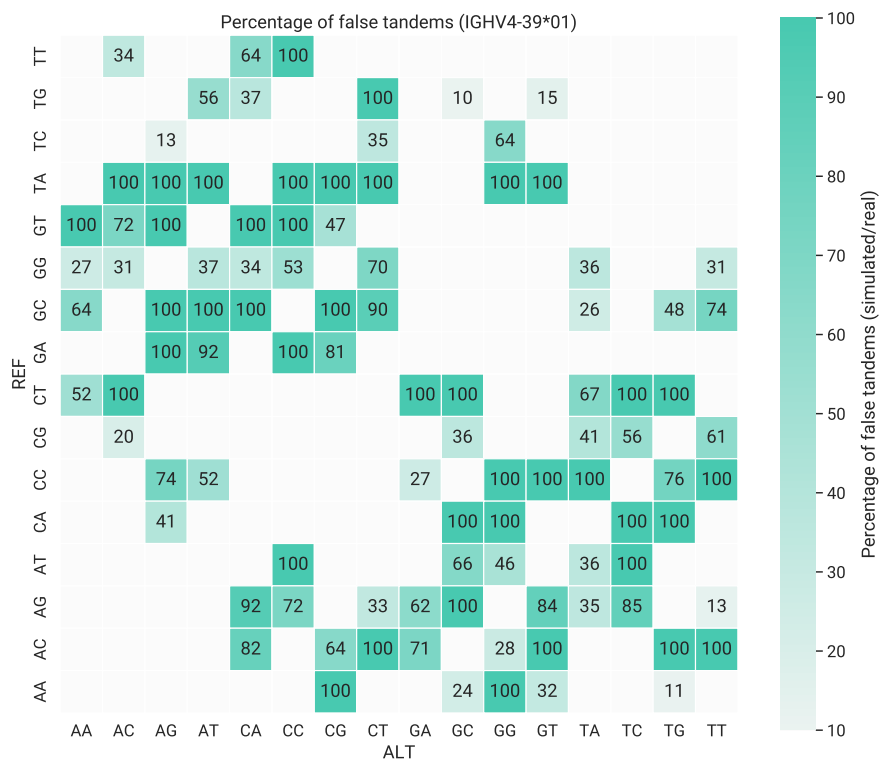
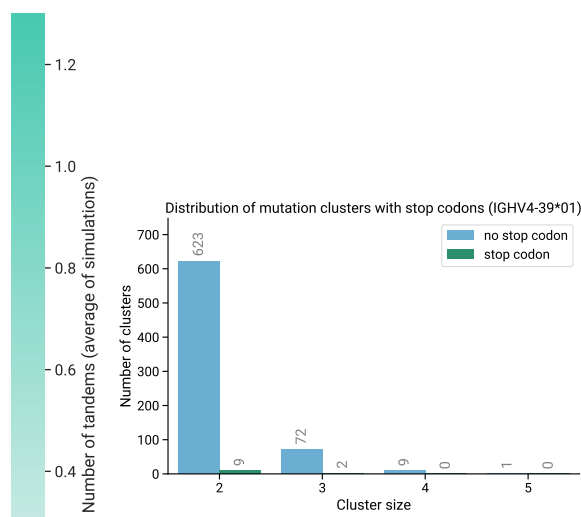
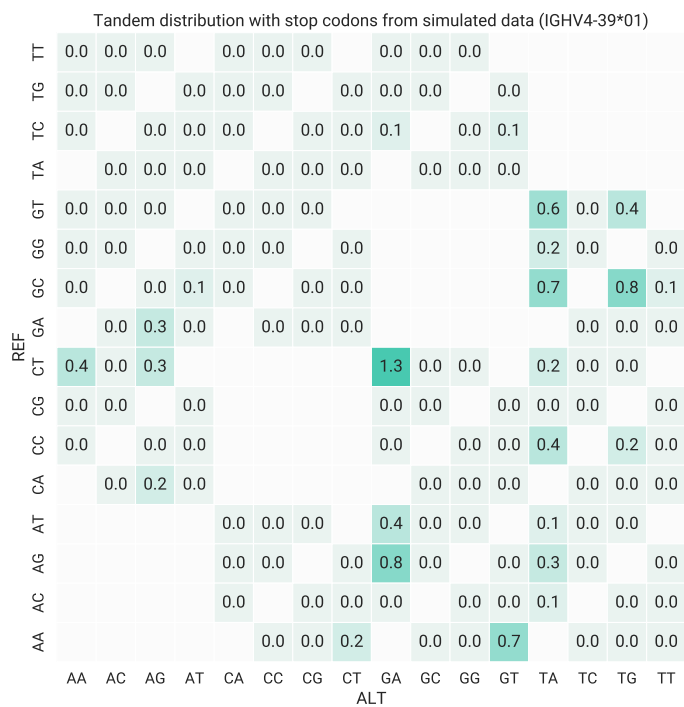


Tandem distribution from real data (IGHV4-39\*01)



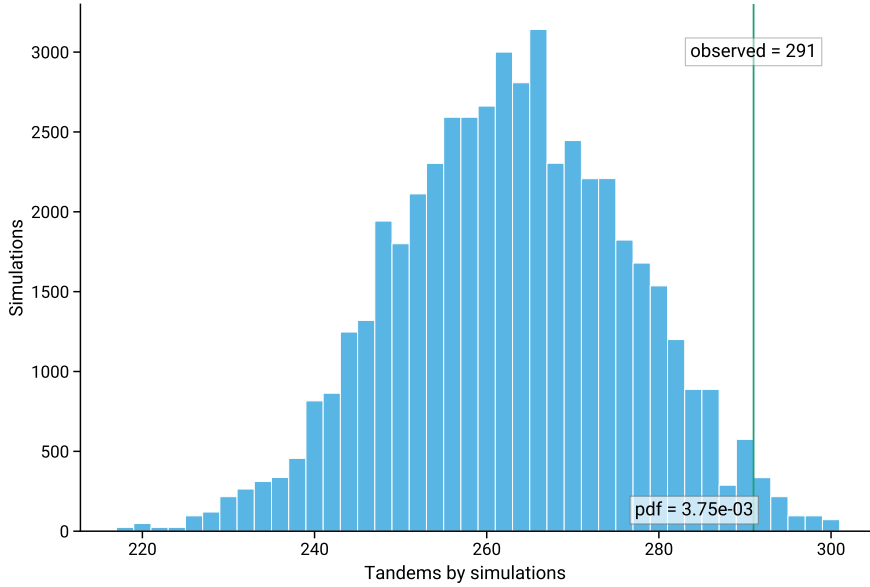
Tandem distribution from simulated data (IGHV4-39\*01)



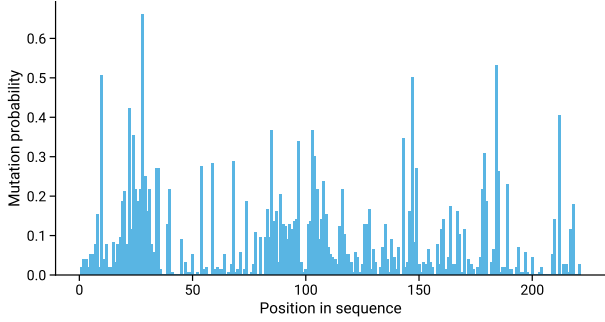


### 5.25 IGHV4-39\*07

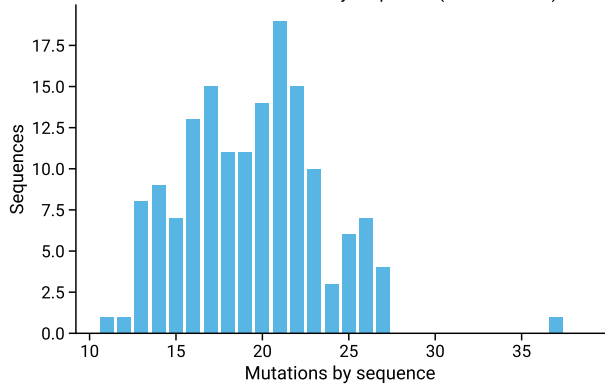
Distribution of tandems by simulation (IGHV4-39\*07)



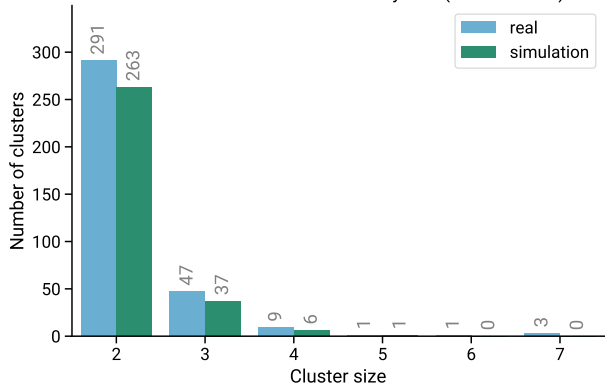
Mutation probabilities by position (IGHV4-39\*07)



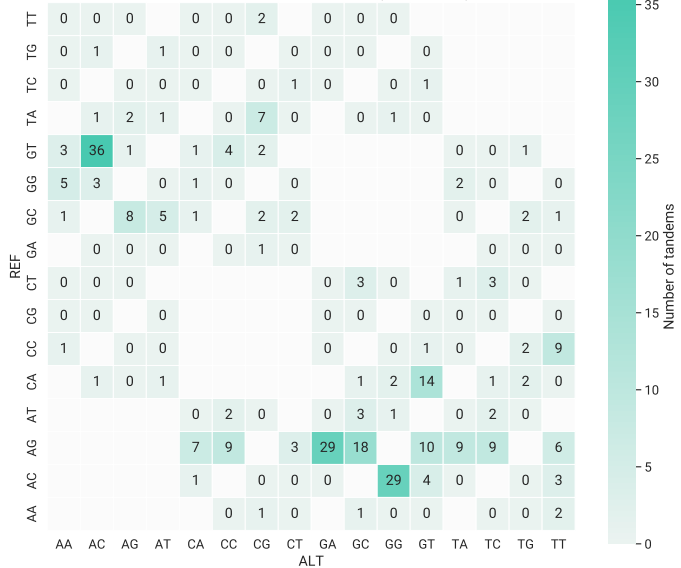
Distribution of mutations by sequence (IGHV4-39\*07)



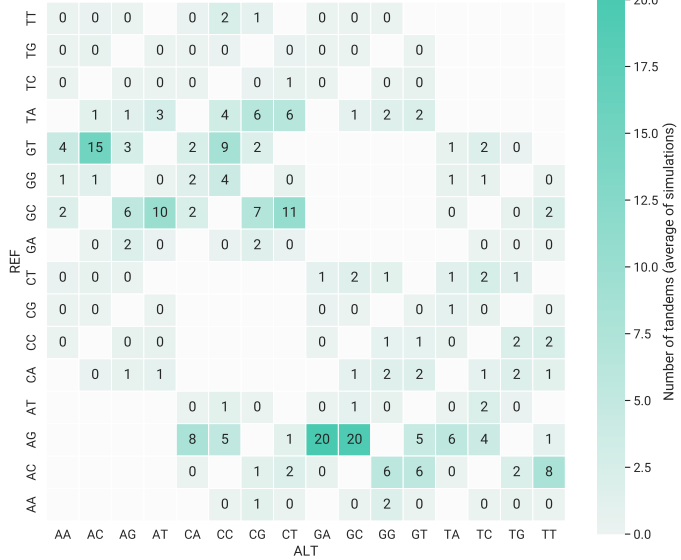
Distribution of mutation clusters by size (IGHV4-39\*07)

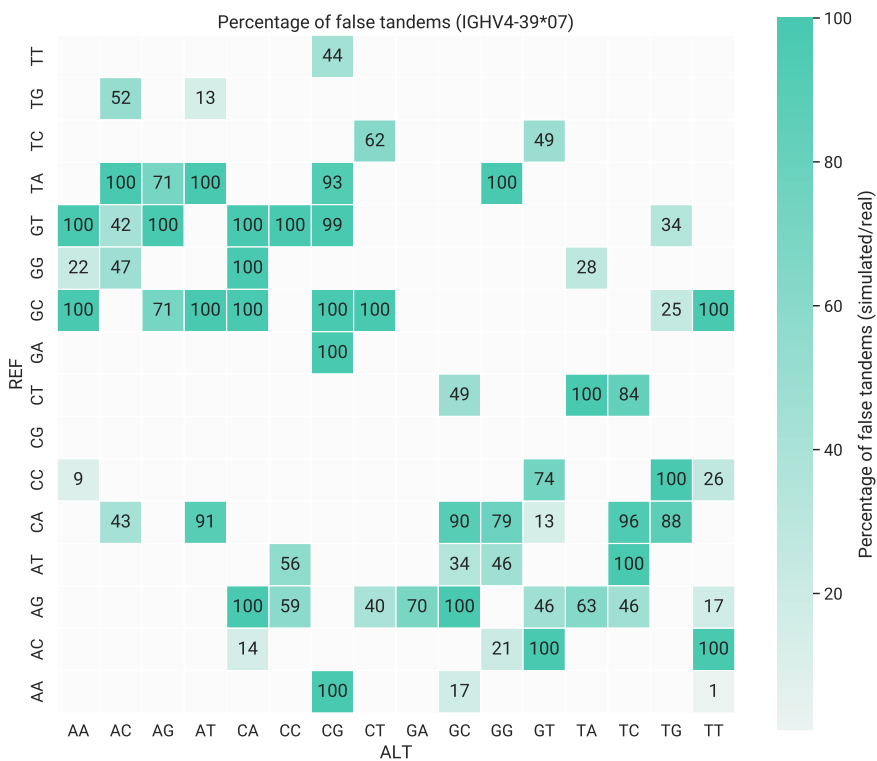
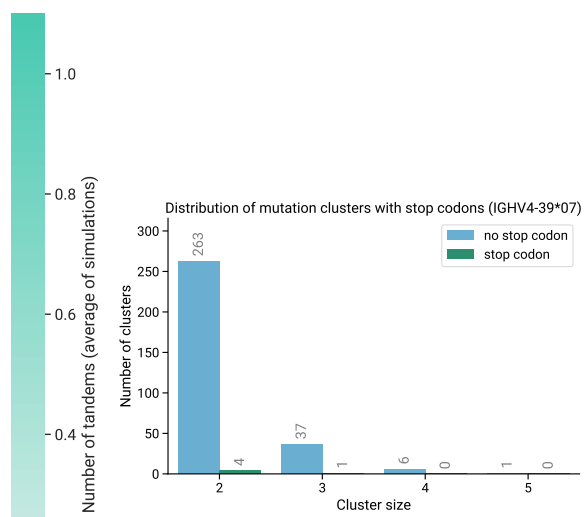
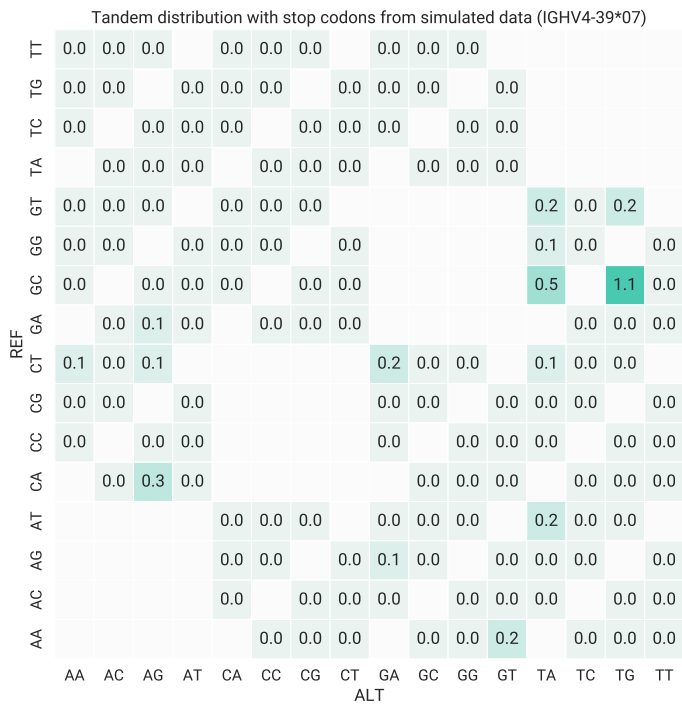


Tandem distribution from real data (IGHV4-39\*07)



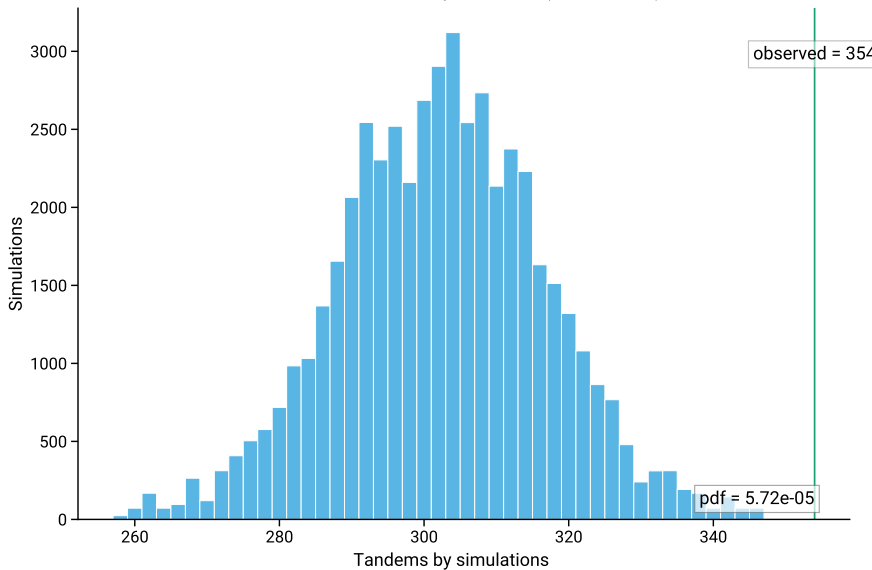
Tandem distribution from simulated data (IGHV4-39\*07)



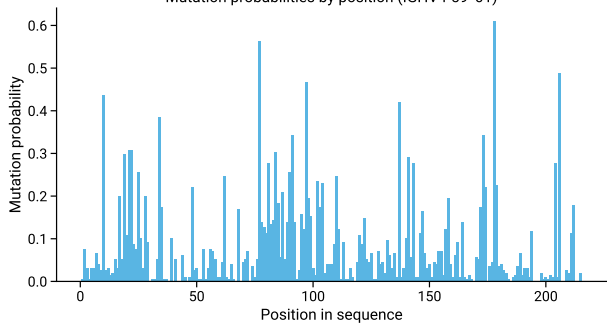


### 5.26 IGHV4-59\*01

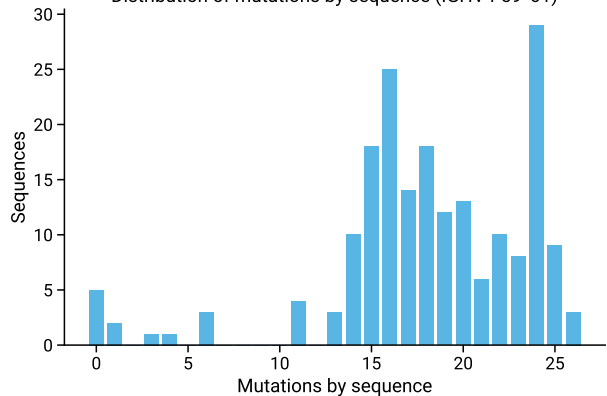
Distribution of tandems by simulation (IGHV4-59\*01)



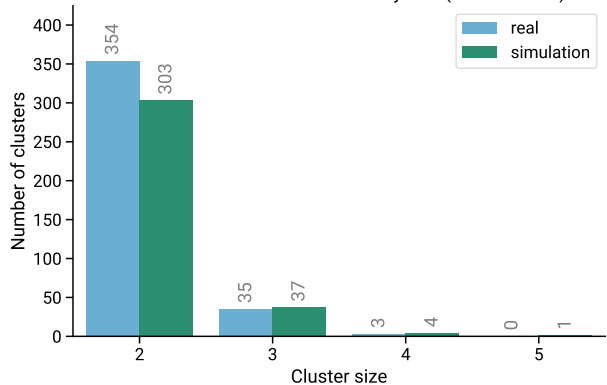
Mutation probabilities by position (IGHV4-59\*01)



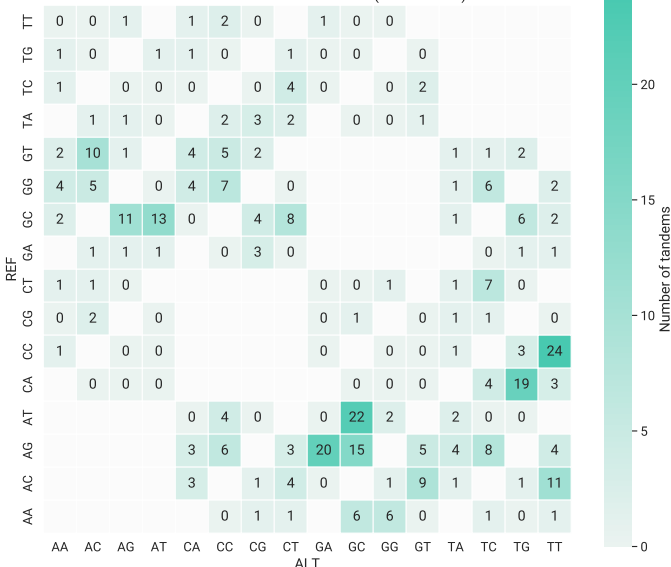
Distribution of mutations by sequence (IGHV4-59\*01)



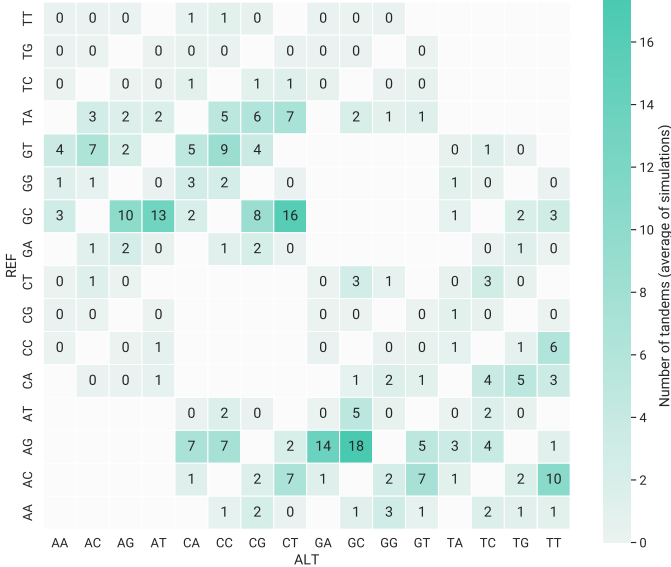
Distribution of mutation clusters by size (IGHV4-59\*01)

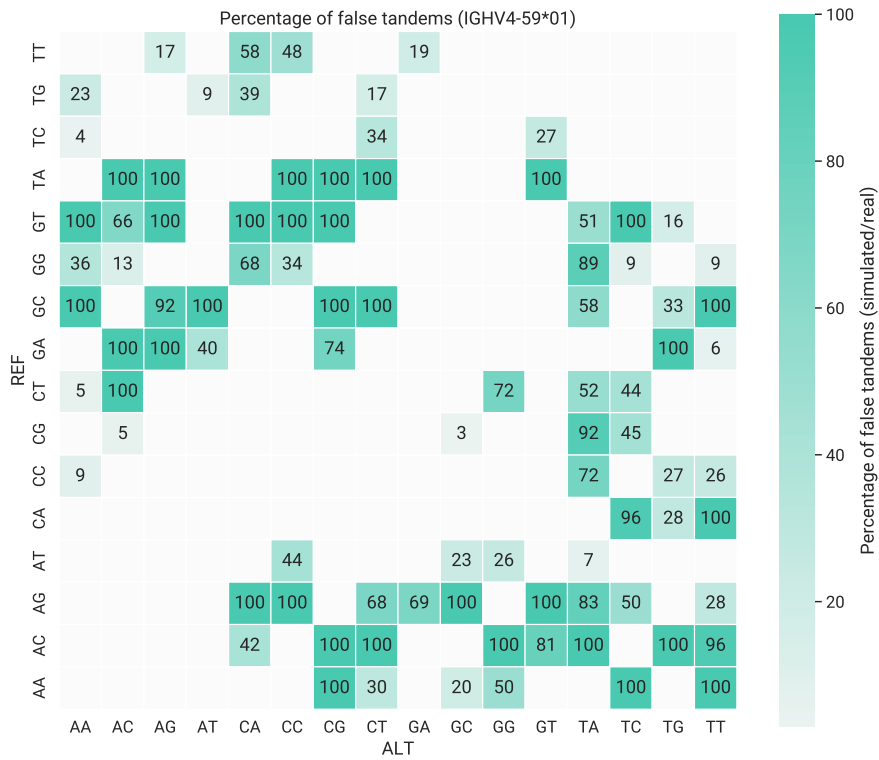
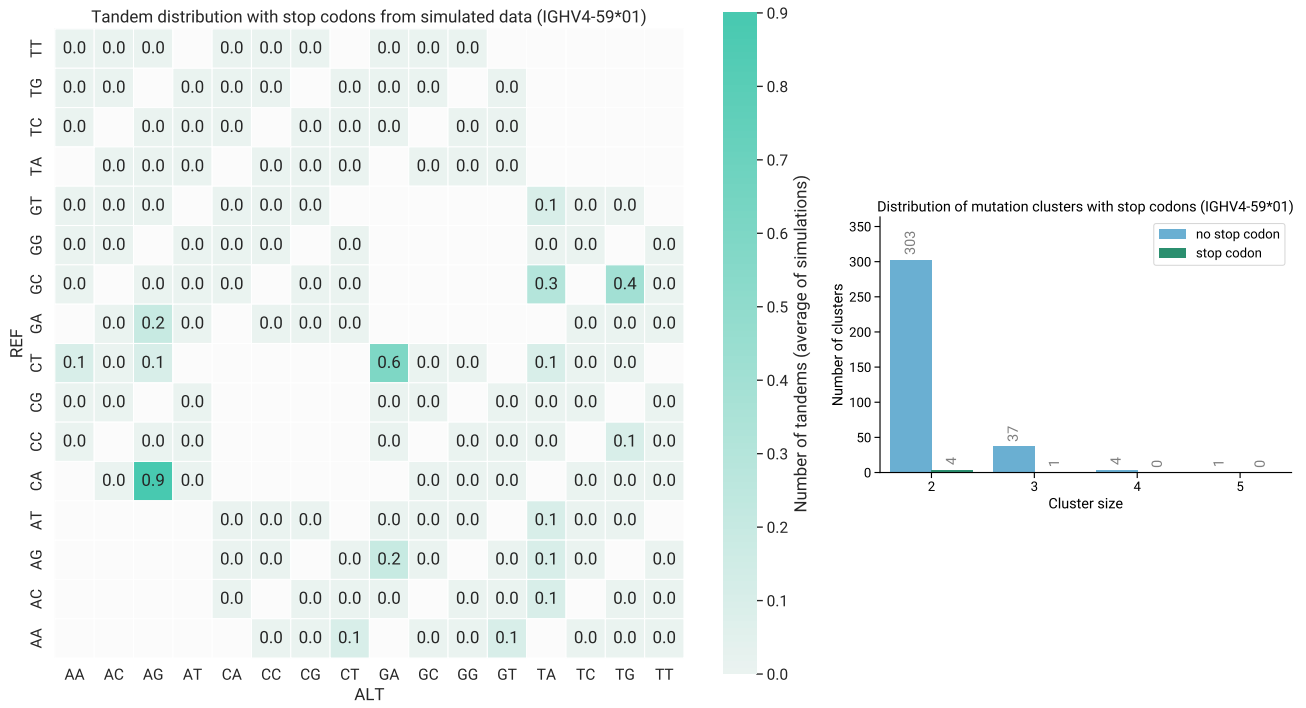


Tandem distribution from real data (IGHV4-59\*01)



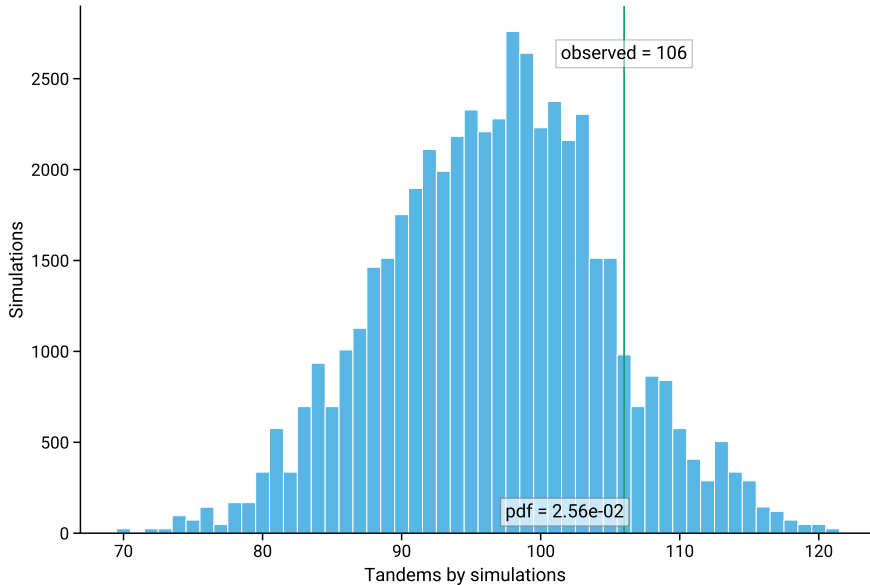
Tandem distribution from simulated data (IGHV4-59\*01)



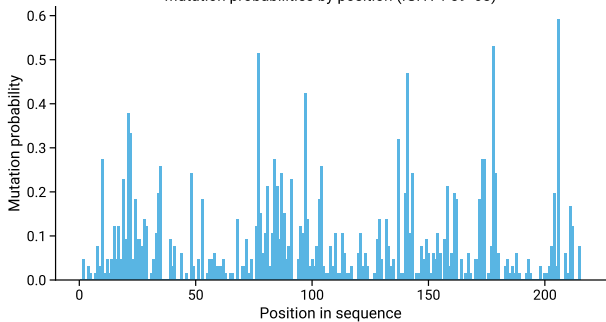


### 5.27 IGHV4-59\*08

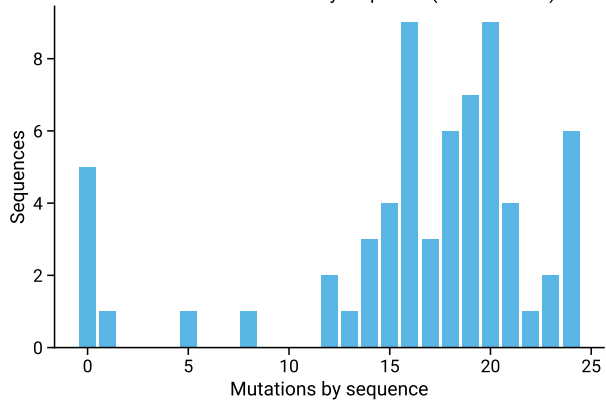
Distribution of tandems by simulation (IGHV4-59\*08)



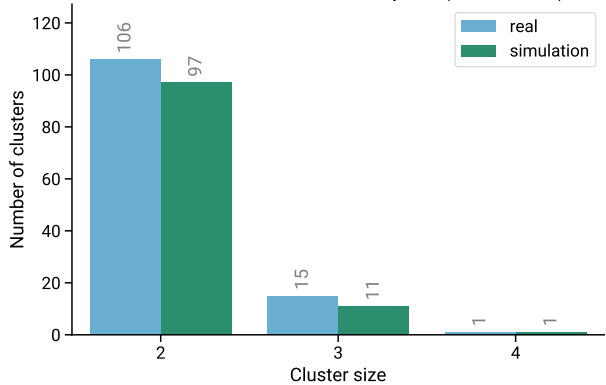
Mutation probabilities by position (IGHV4-59\*08)



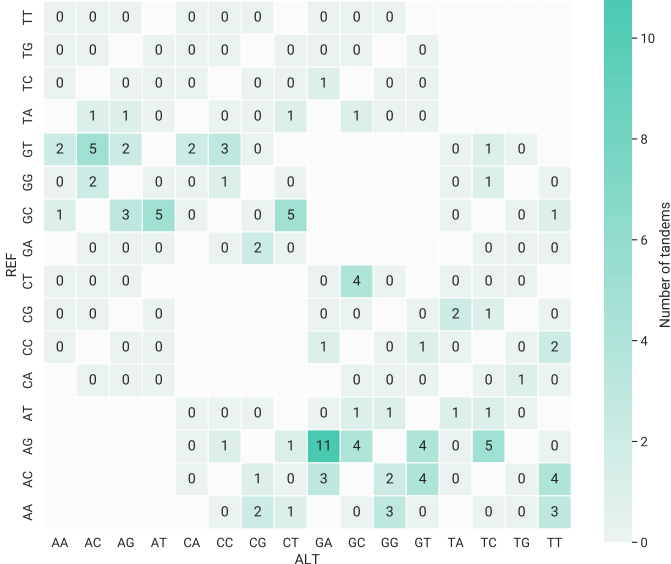
Distribution of mutations by sequence (IGHV4-59\*08)



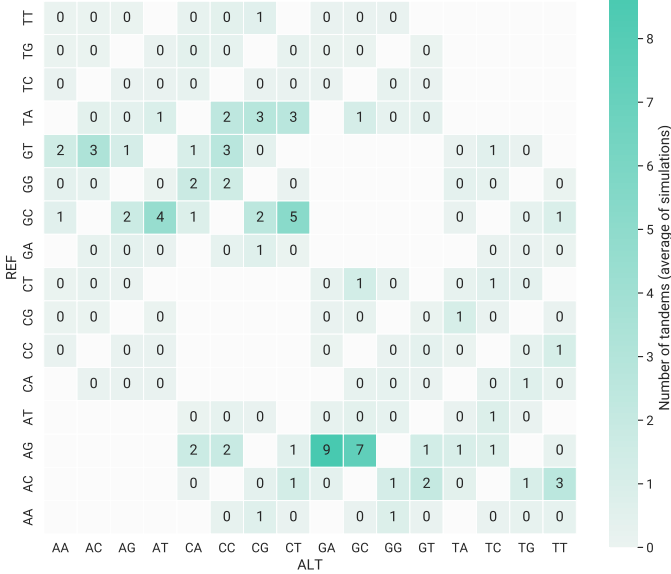
Distribution of mutation clusters by size (IGHV4-59\*08)

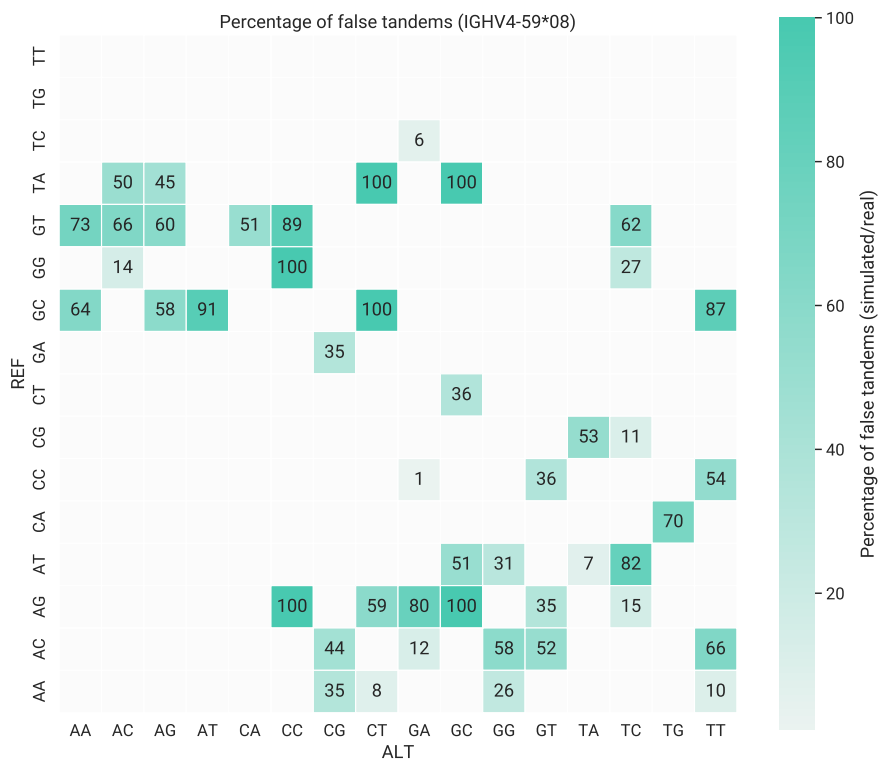
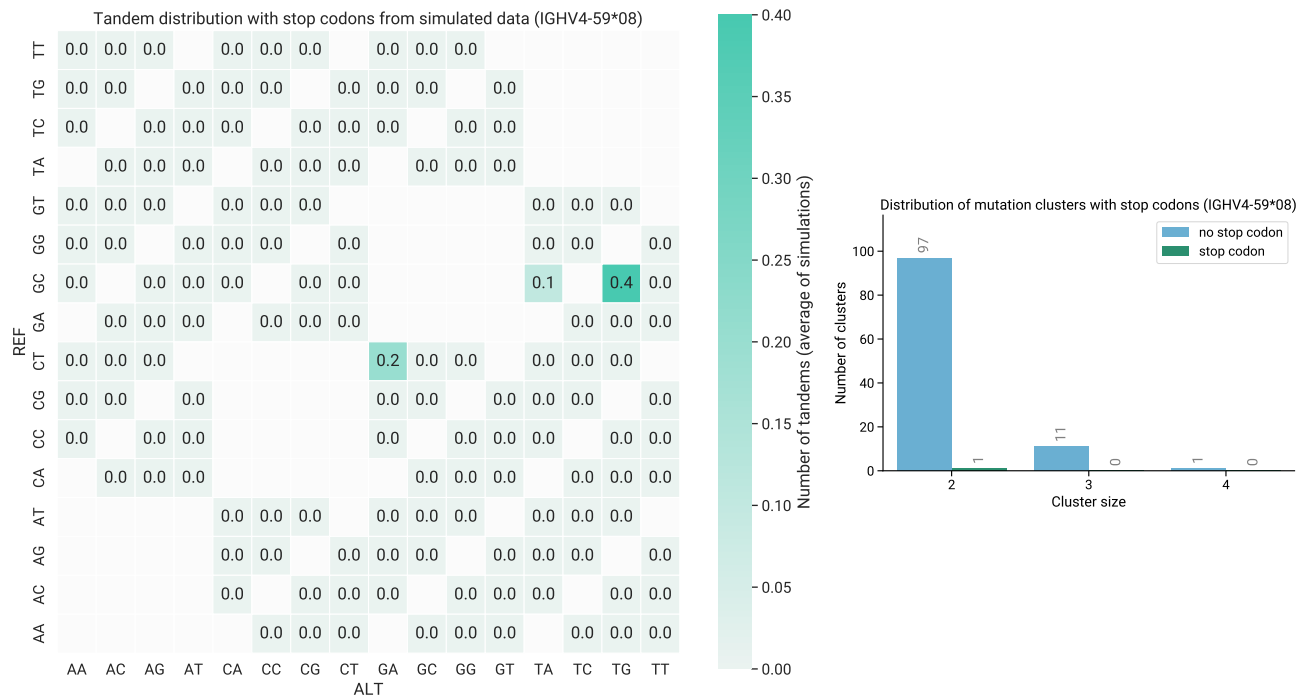


Tandem distribution from real data (IGHV4-59\*08)



Tandem distribution from simulated data (IGHV4-59\*08)

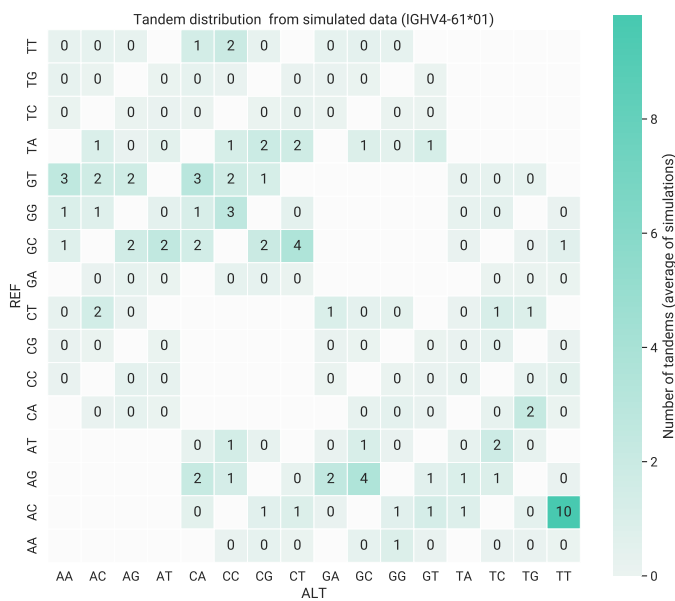
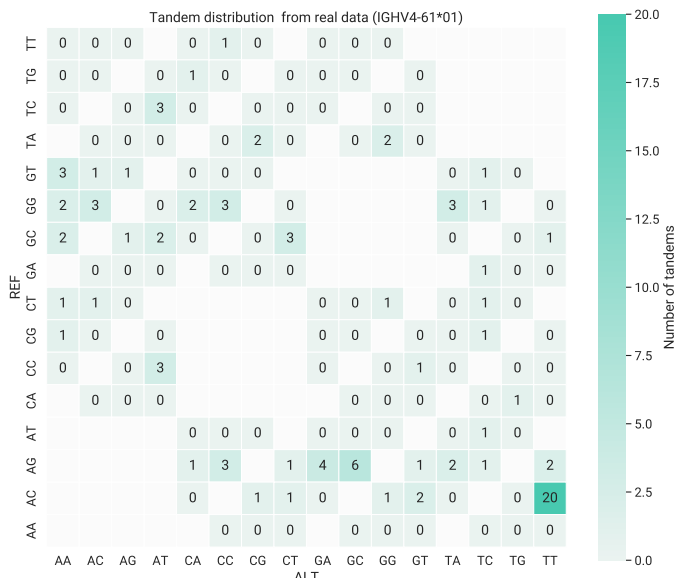
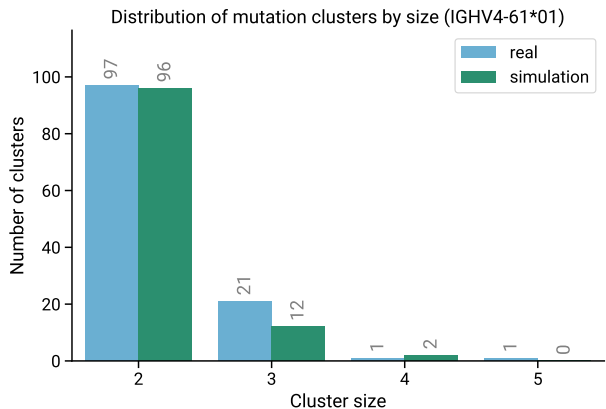
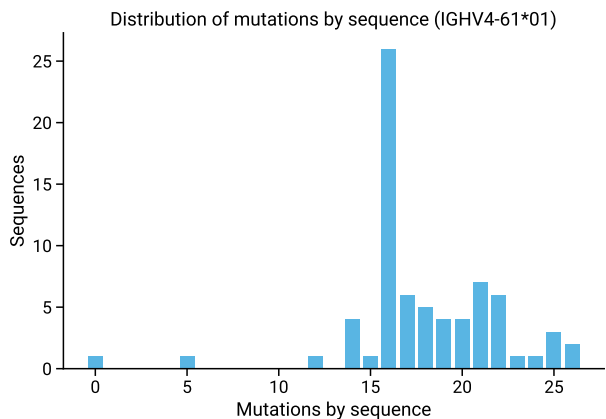
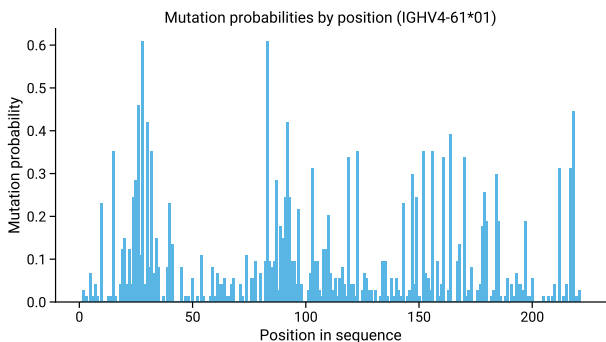
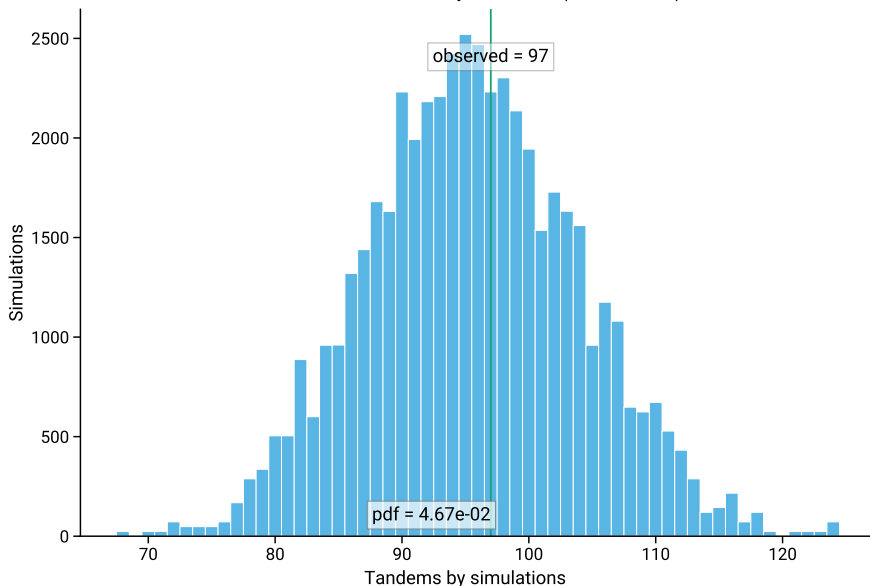


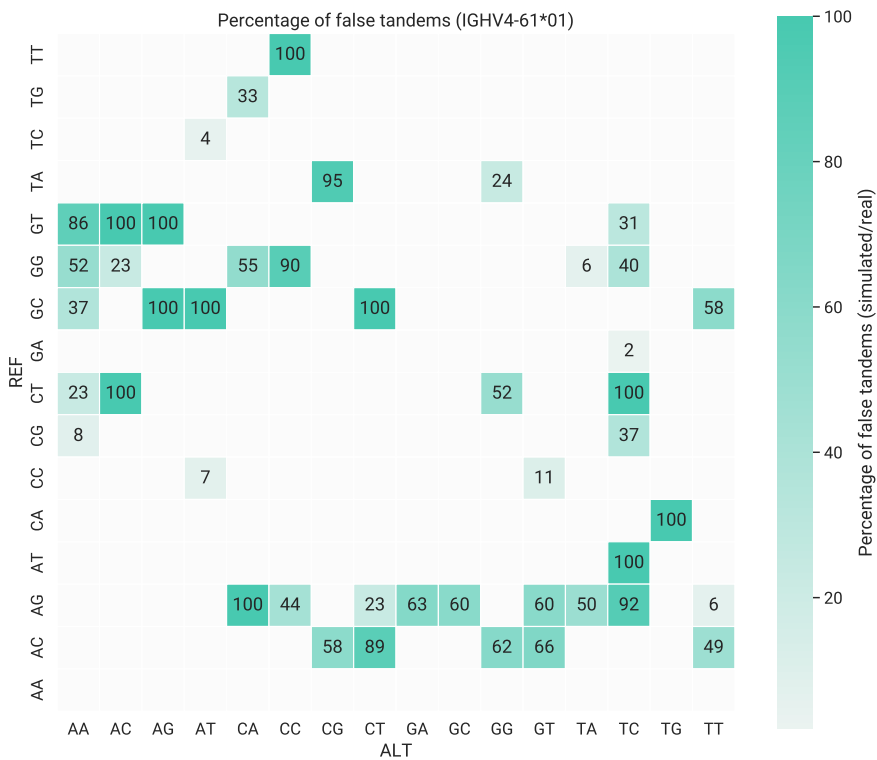
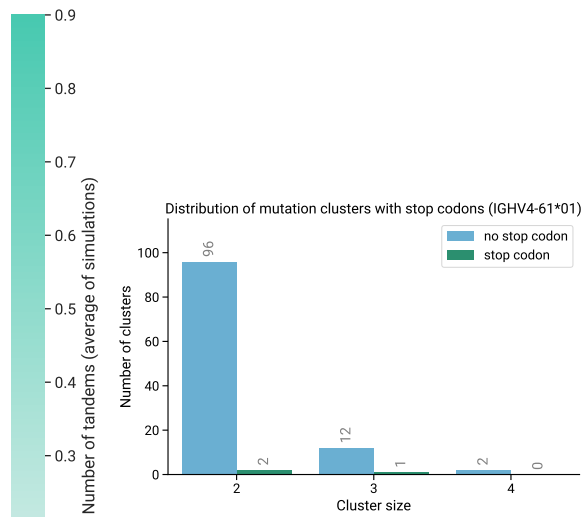
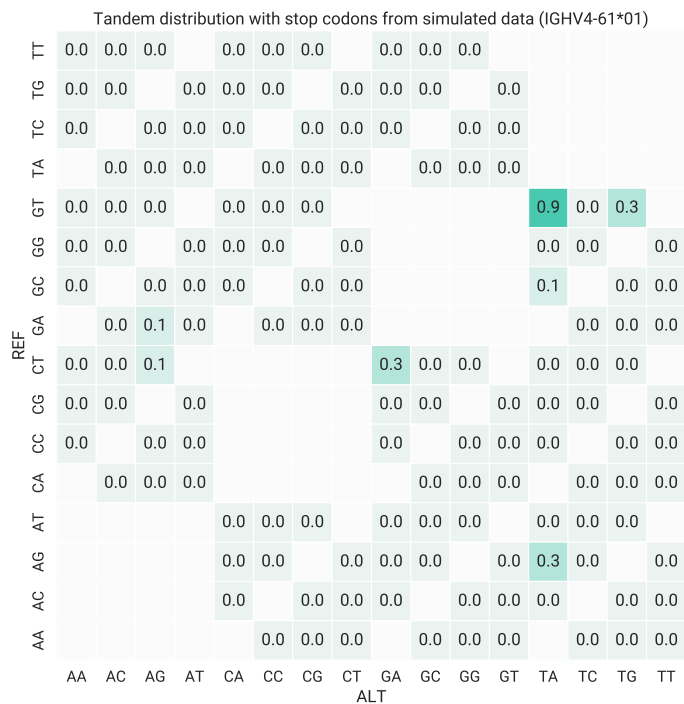




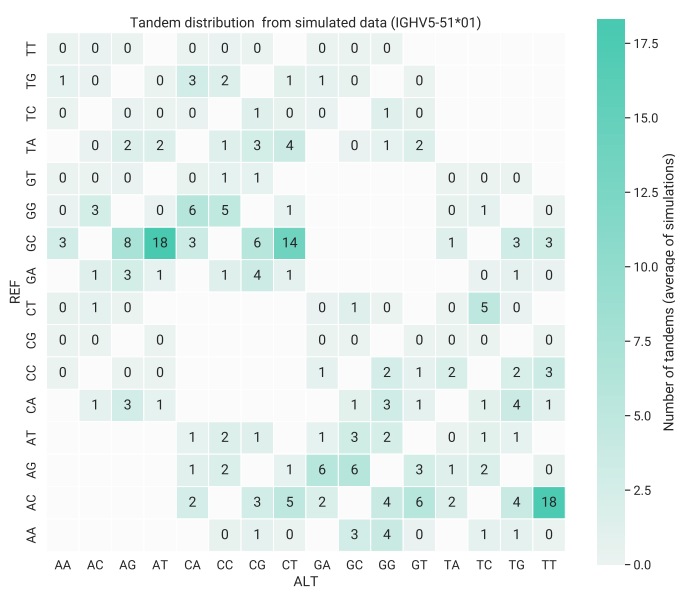
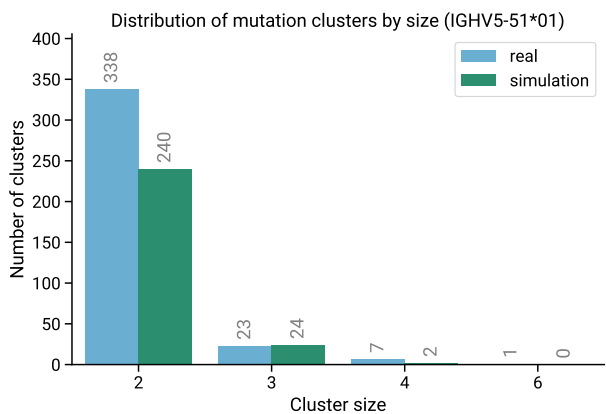
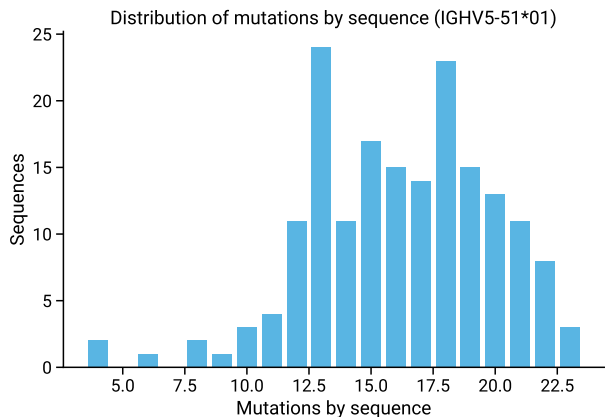
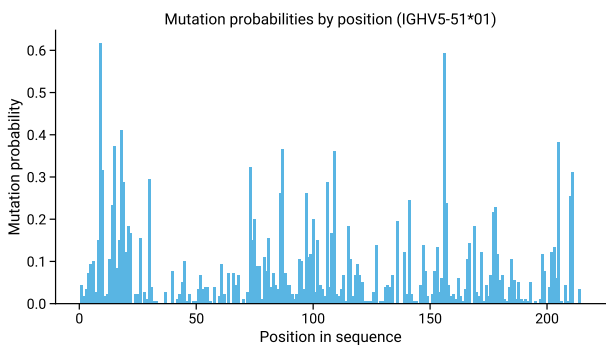
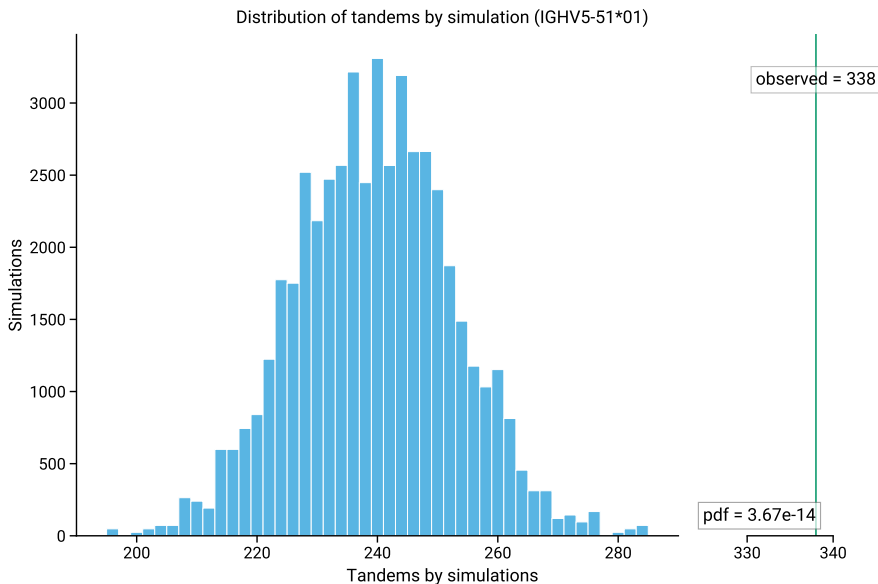
### 5.28 IGHV4-61\*01

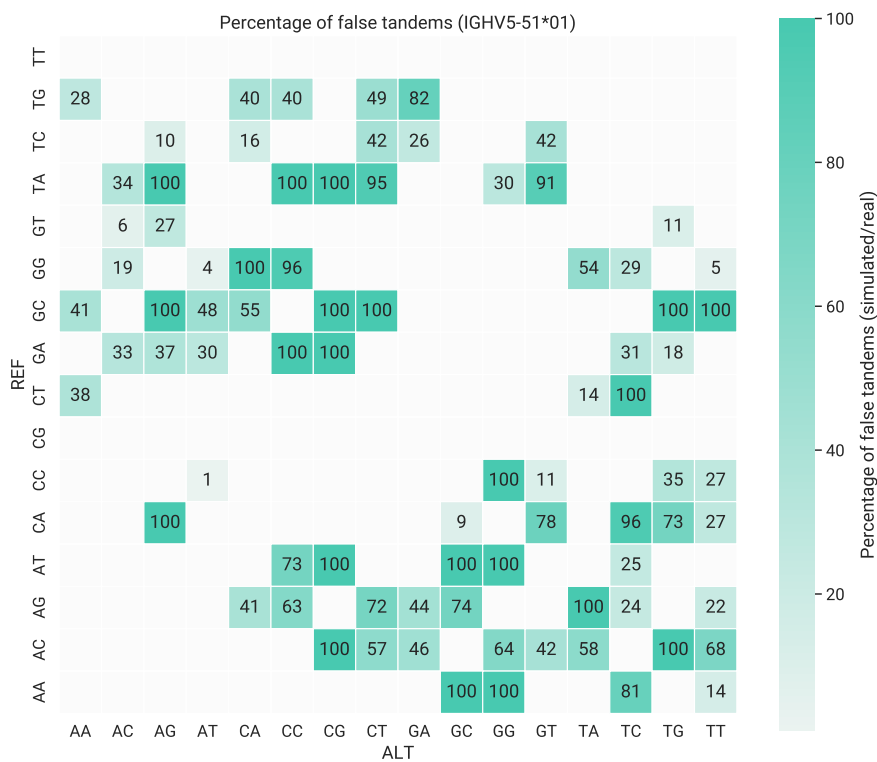
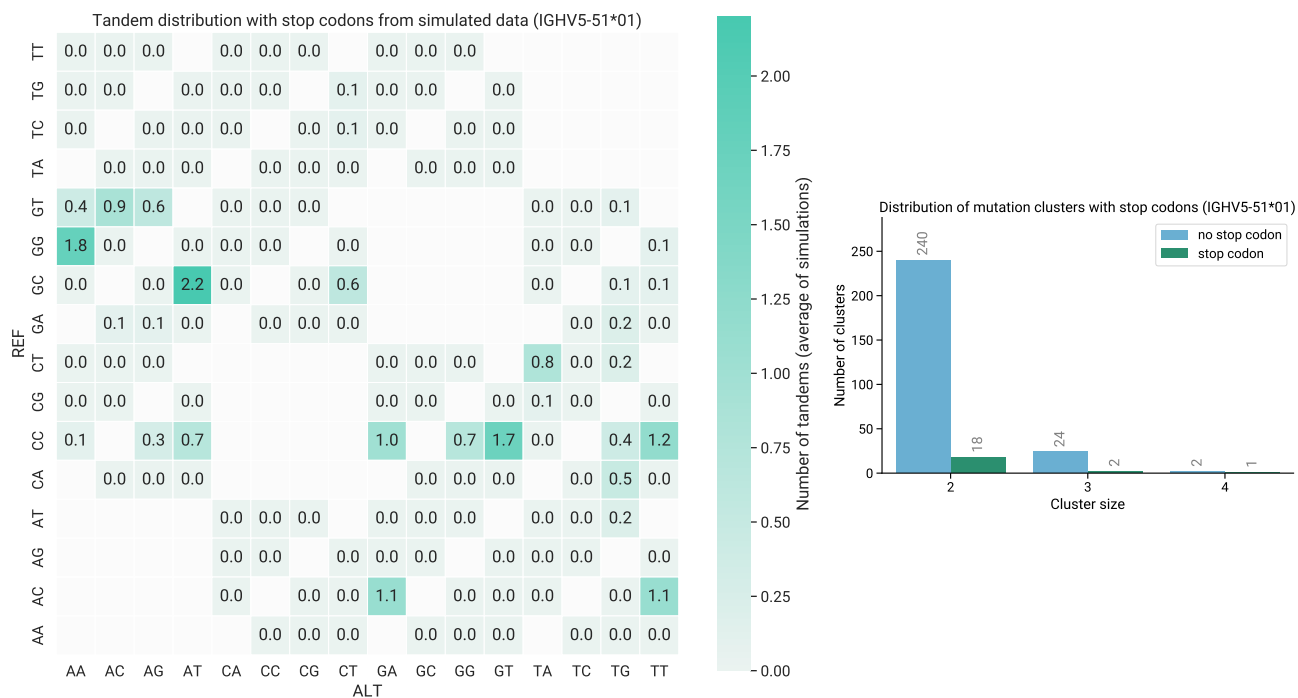
Distribution of tandems by simulation (IGHV4-61\*01)





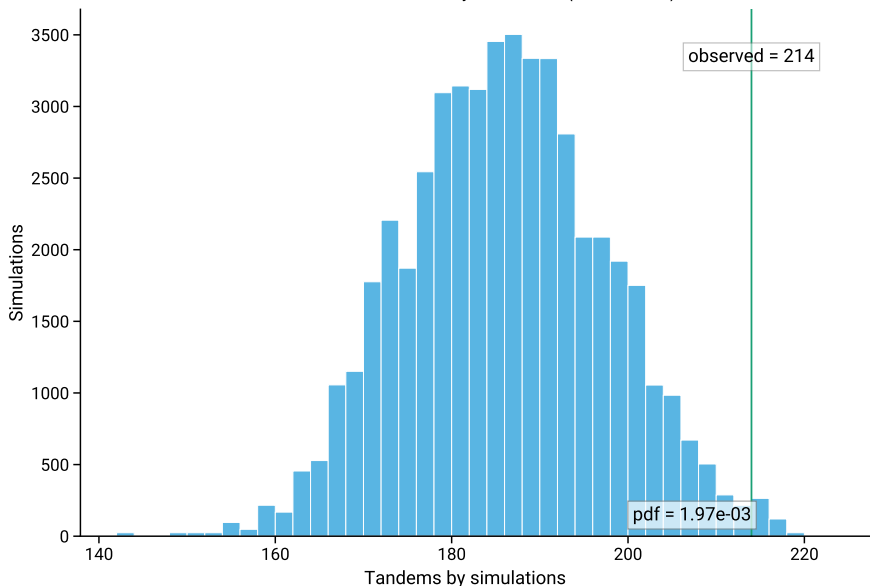
### 5.29 IGHV5-51\*01



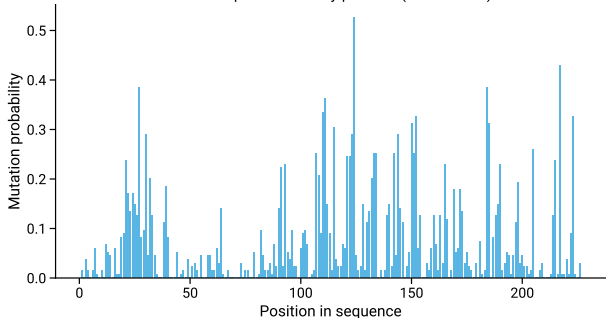


### 5.30 IGHV6-1\*01

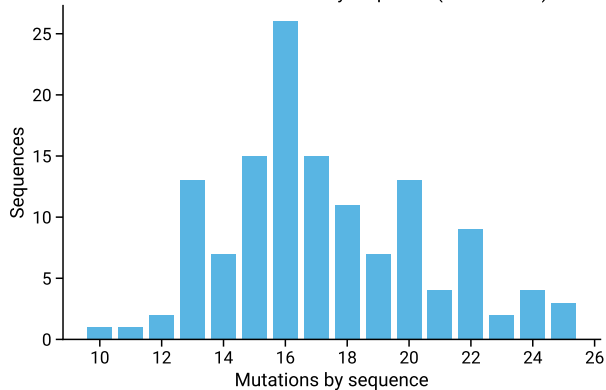
Distribution of tandems by simulation (IGHV6-1\*01)



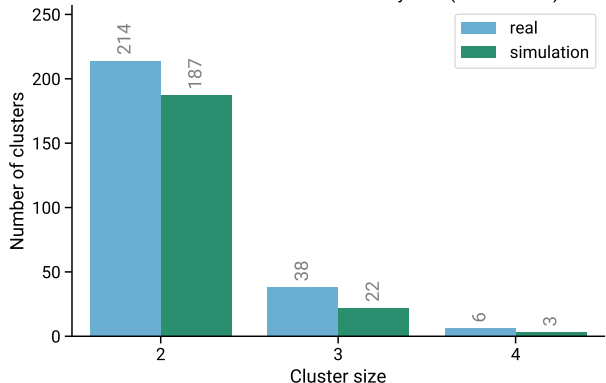
Mutation probabilities by position (IGHV6-1\*01)



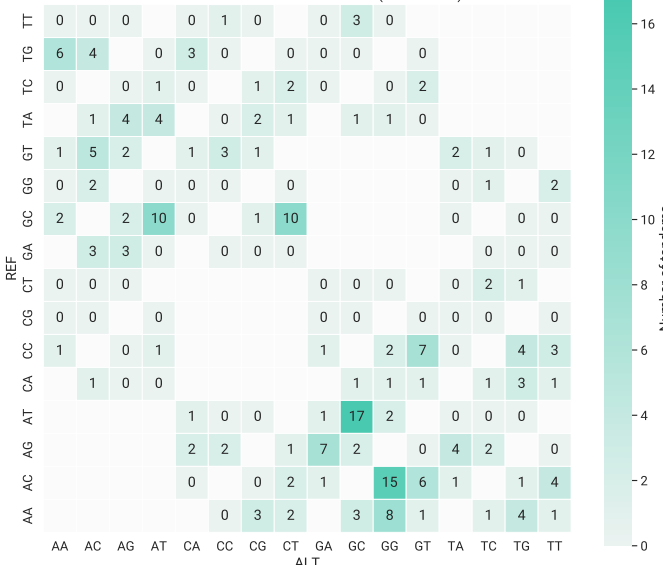
Distribution of mutations by sequence (IGHV6-1\*01)



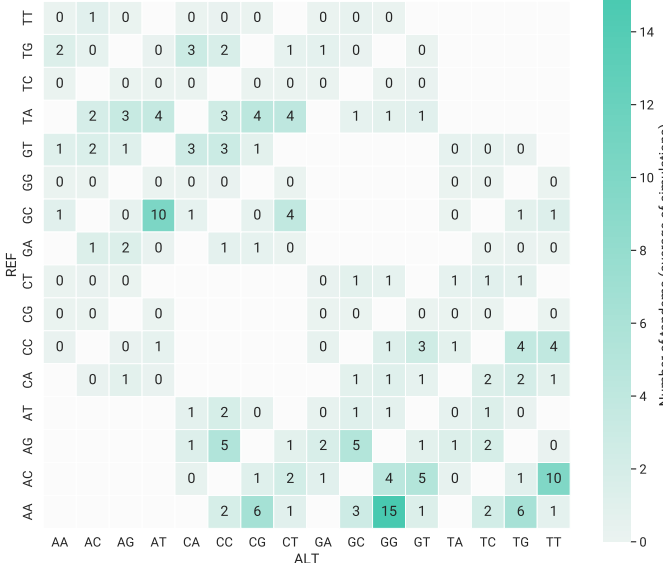
Distribution of mutation clusters by size (IGHV6-1\*01)

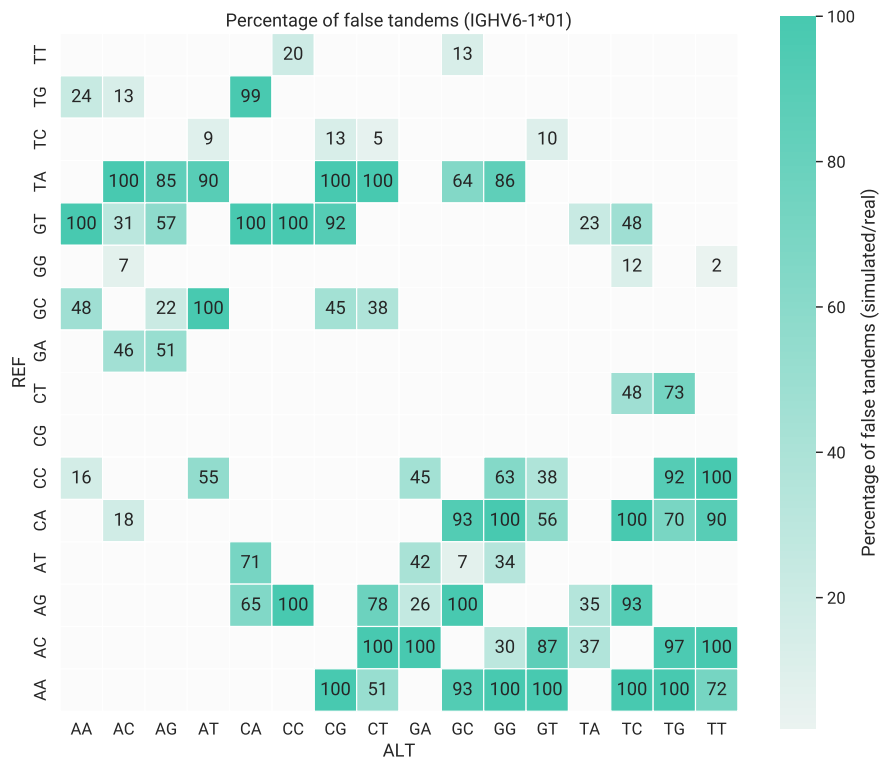
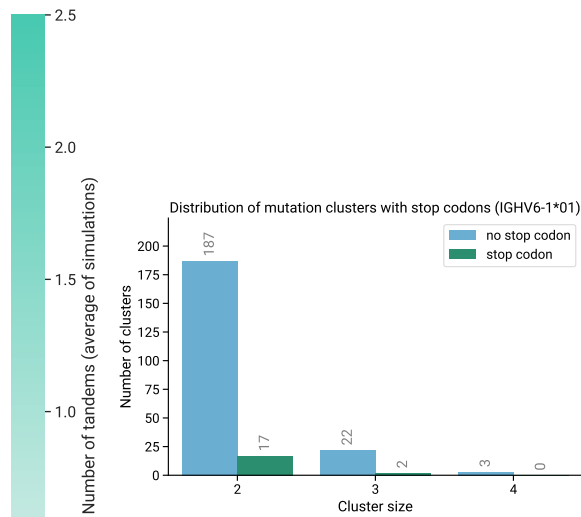
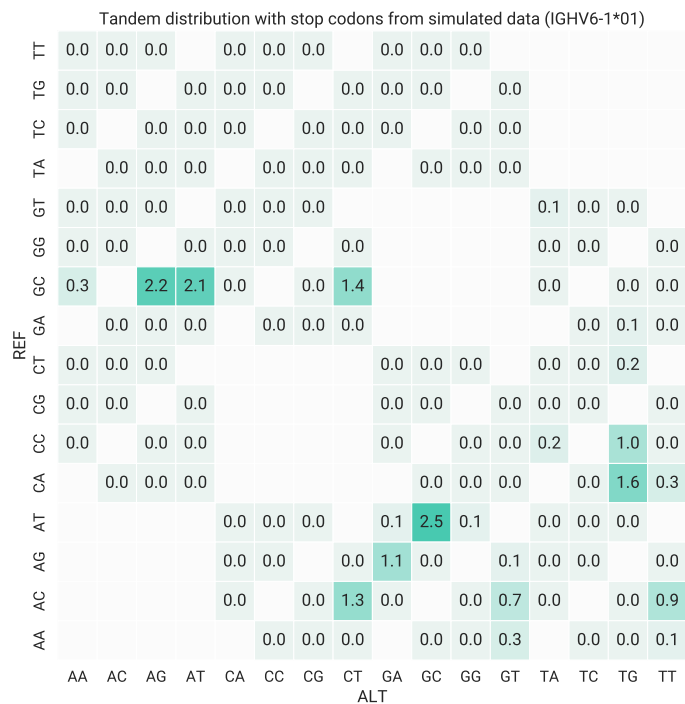


Tandem distribution from real data (IGHV6-1\*01)



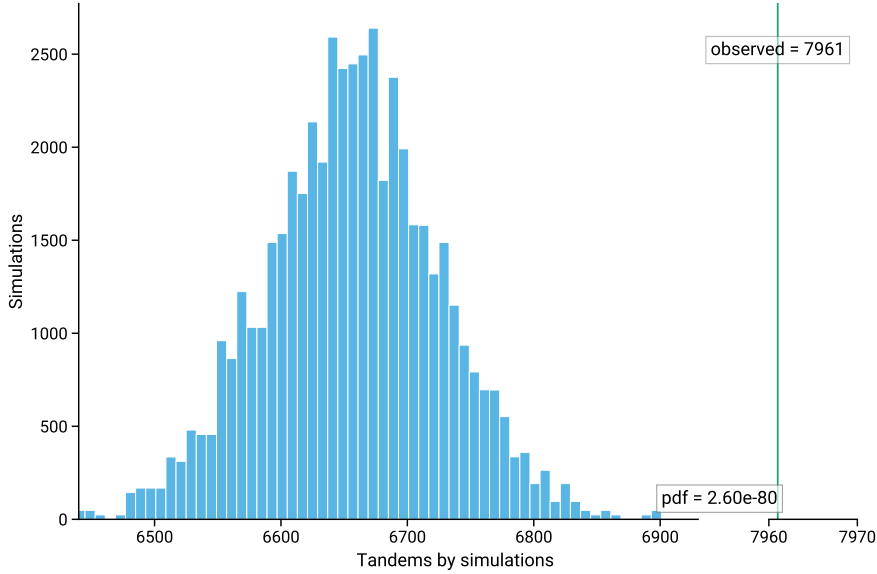
Tandem distribution from simulated data (IGHV6-1\*01)



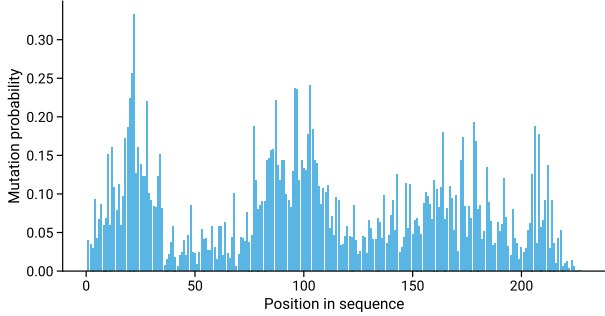


### 5.31 IGHV

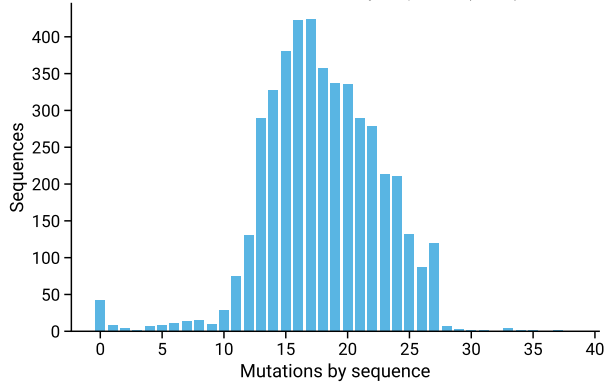
Distribution of tandems by simulation (IGHV)



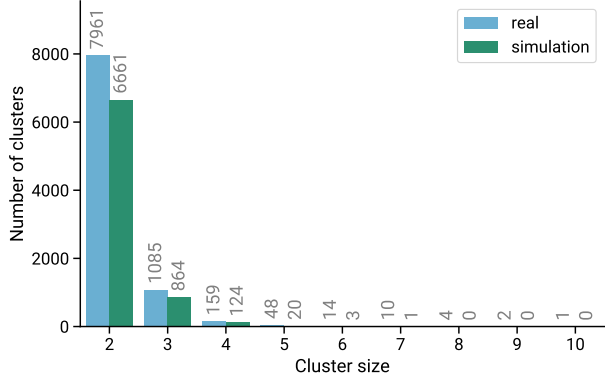
Mutation probabilities by position (IGHV)



Distribution of mutations by sequence (IGHV)



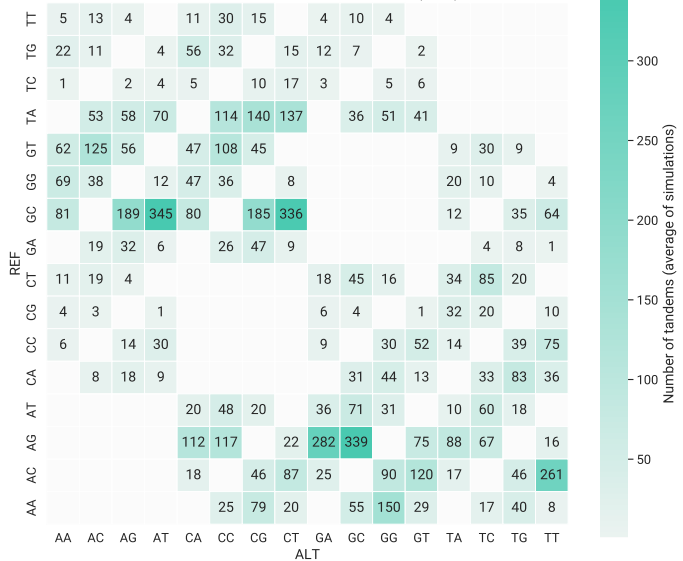
Distribution of mutation clusters by size (IGHV)

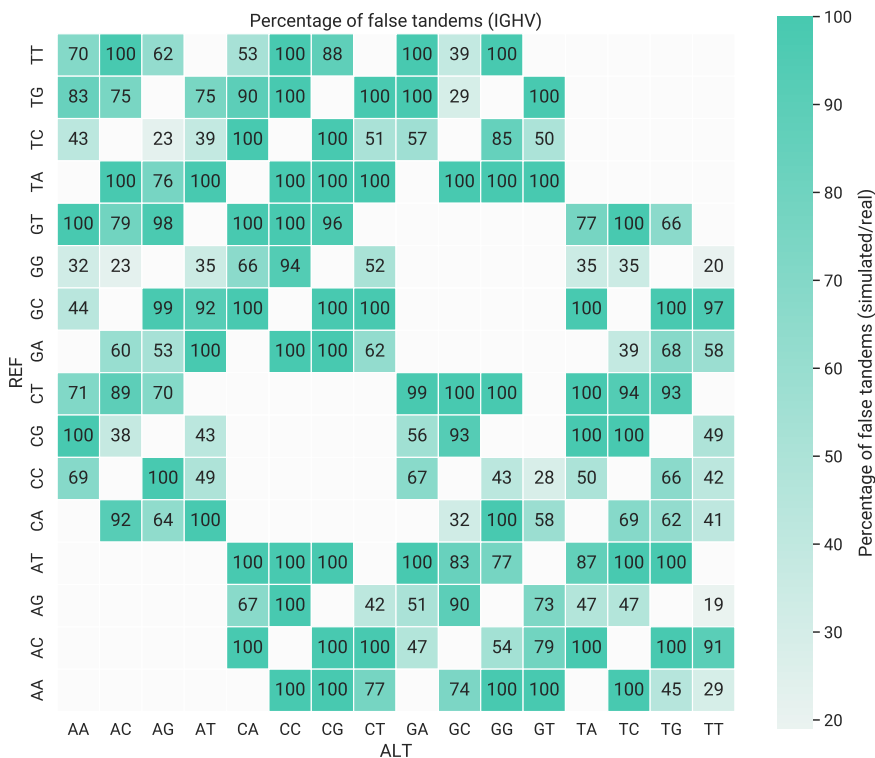
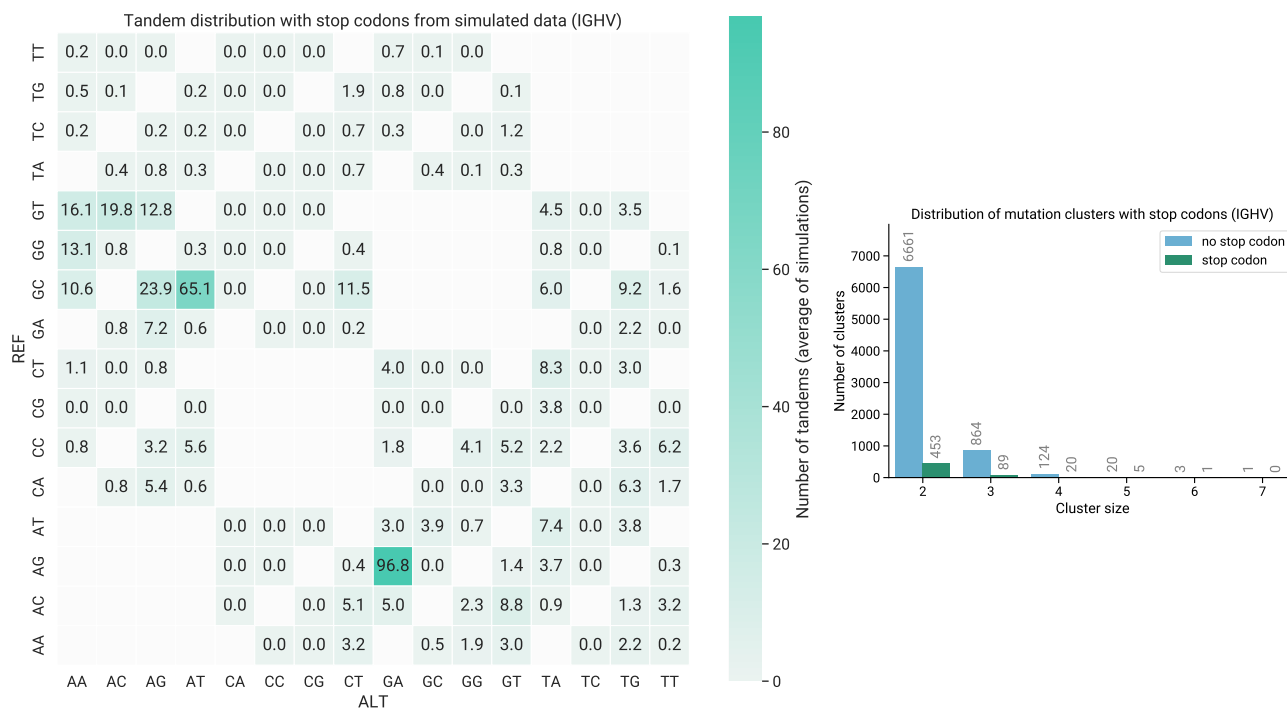


Tandem distribution from real data (IGHV)



Tandem distribution from simulated data (IGHV)



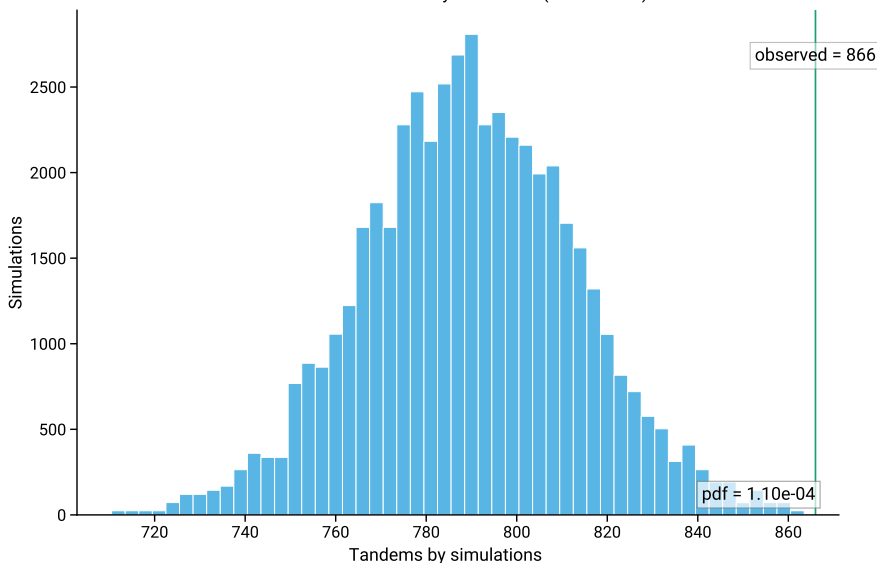




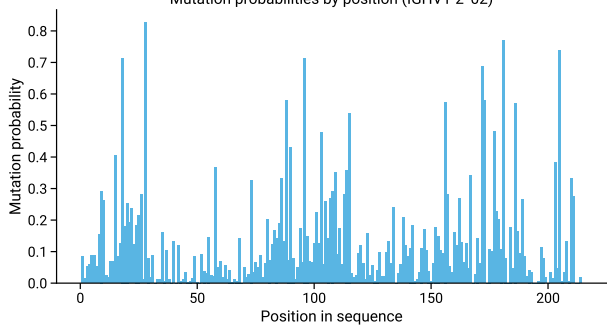
# LEIDEN HEALTHY DONOR COHORT (80 – 90% IGV IDENTITY)

## 6.1 IGHV1-2\*02

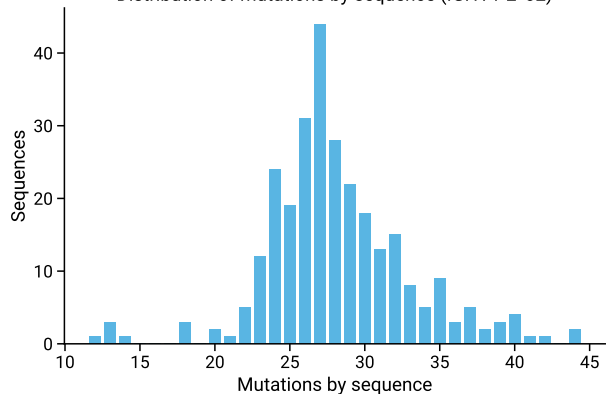
Distribution of tandems by simulation (IGHV1-2\*02)



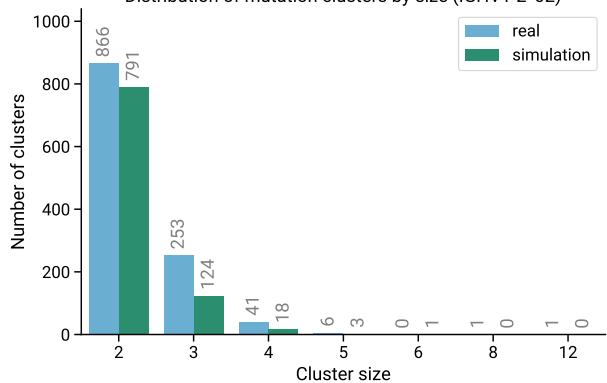
Mutation probabilities by position (IGHV1-2\*02)



Distribution of mutations by sequence (IGHV1-2\*02)



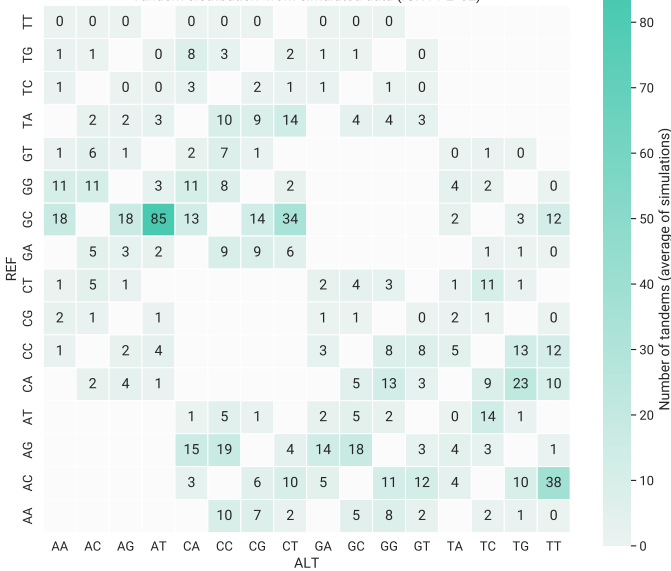
Distribution of mutation clusters by size (IGHV1-2\*02)

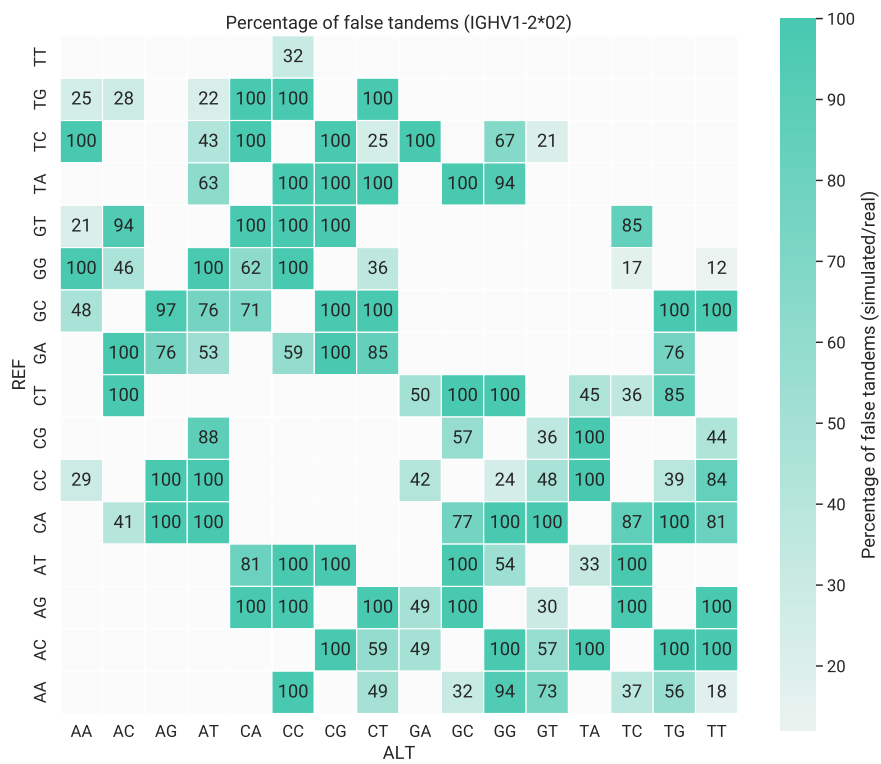
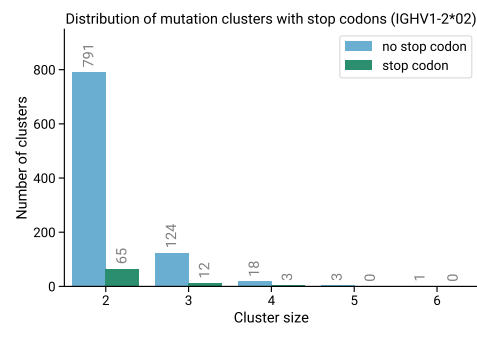
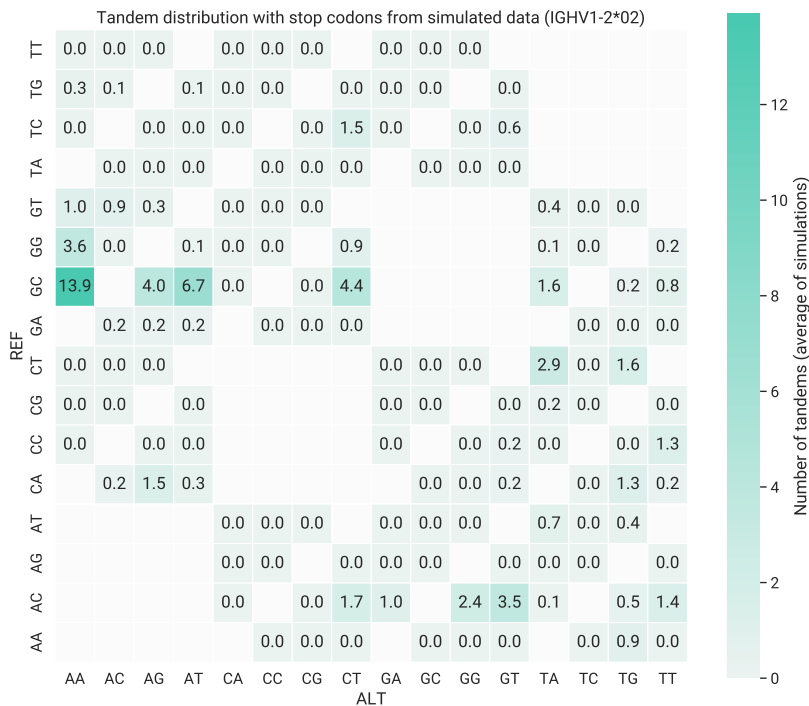


Tandem distribution from real data (IGHV1-2\*02)



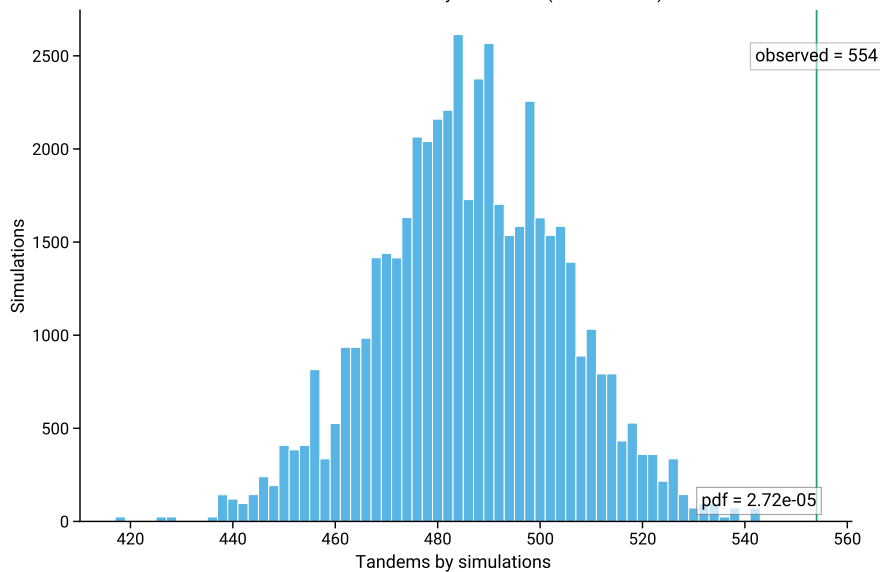
Tandem distribution from simulated data (IGHV1-2\*02)



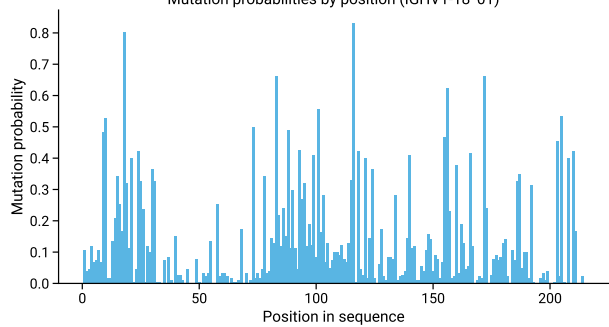


### 6.2 IGHV1-18\*01

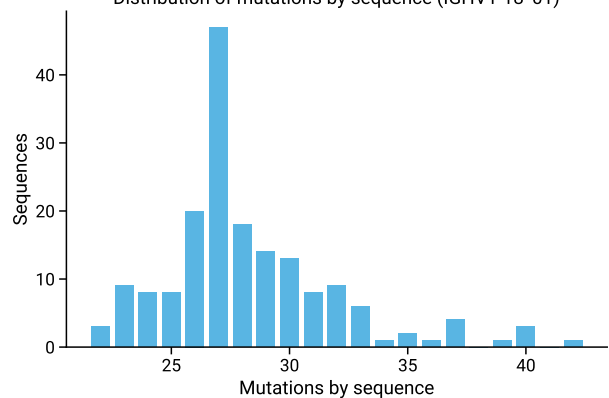
Distribution of tandems by simulation (IGHV1-18\*01)



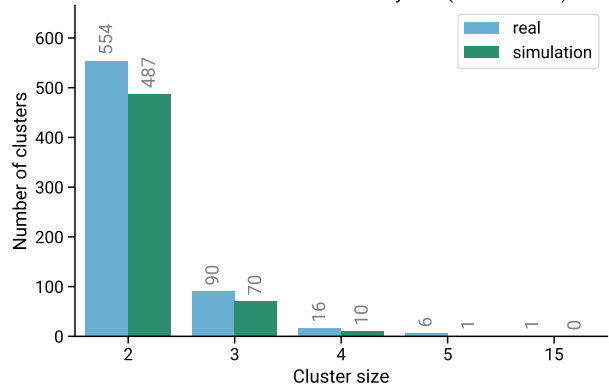
Mutation probabilities by position (IGHV1-18\*01)



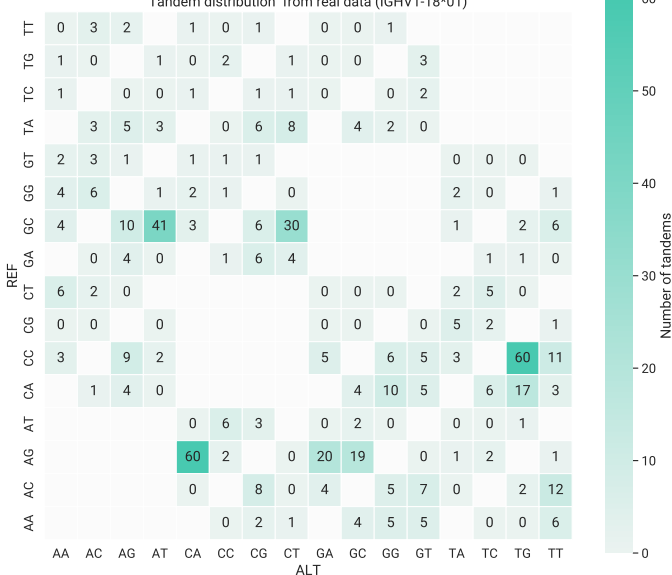
Distribution of mutations by sequence (IGHV1-18\*01)



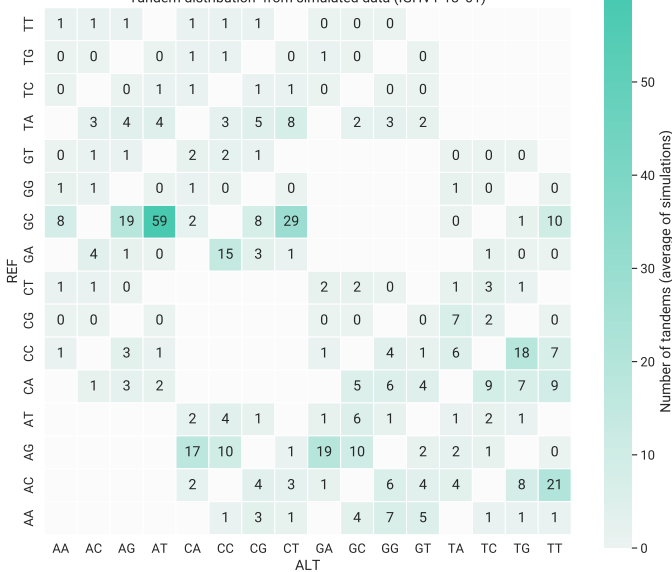
Distribution of mutation clusters by size (IGHV1-18\*01)

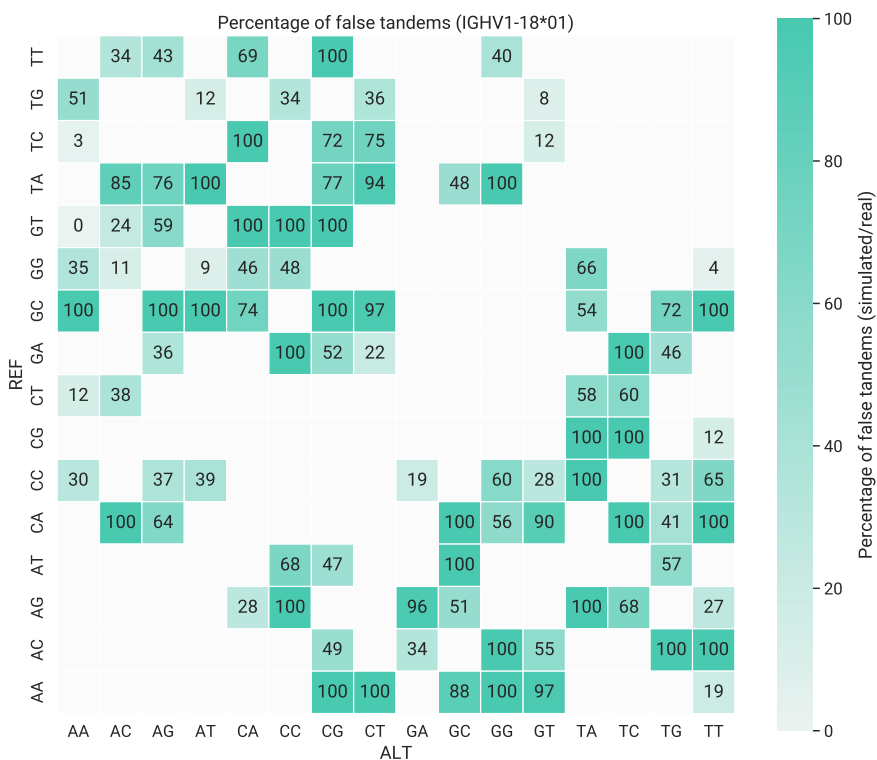
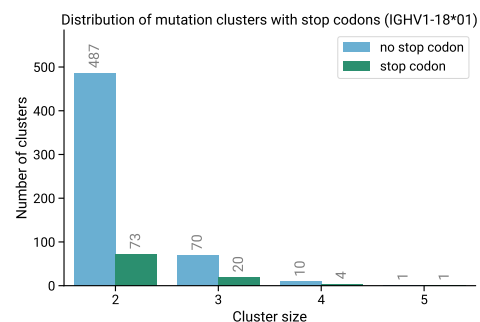
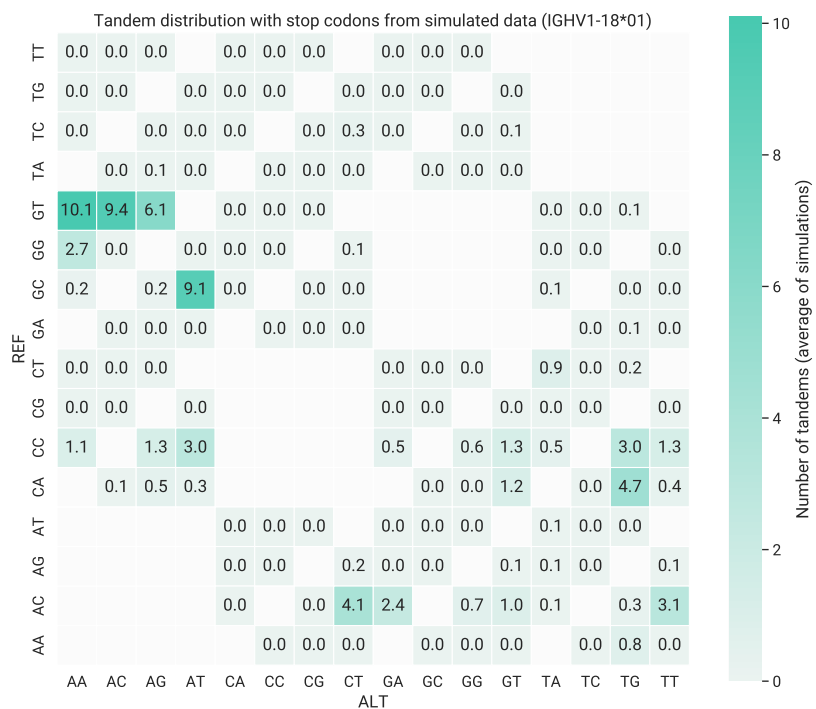


Tandem distribution from real data (IGHV1-18\*01)

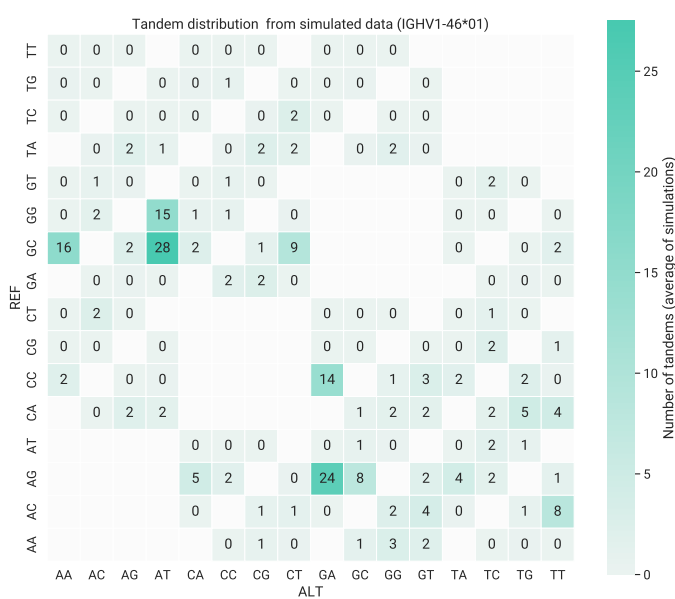
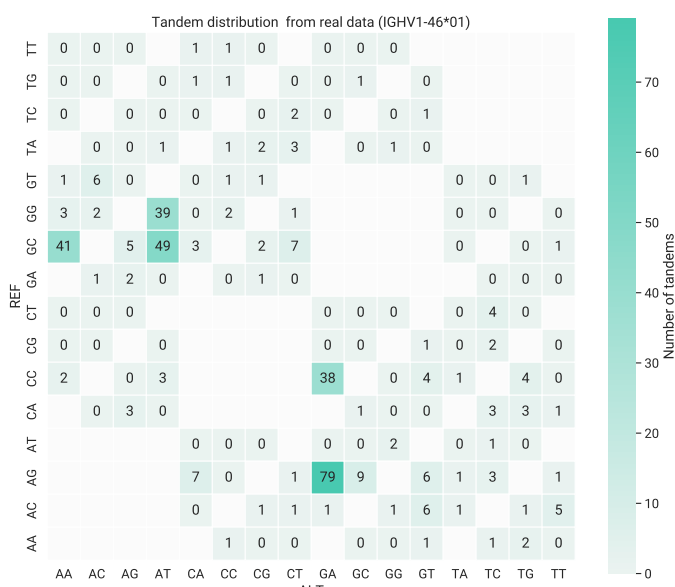
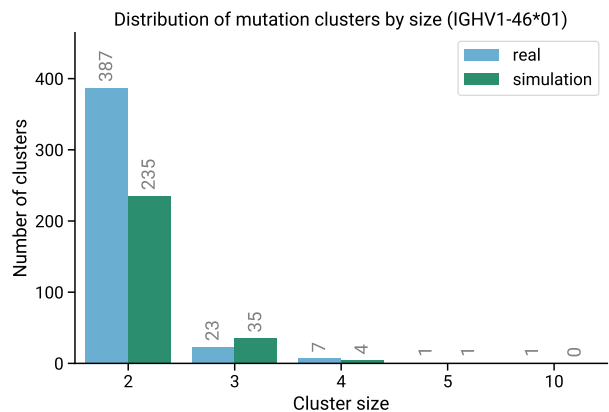
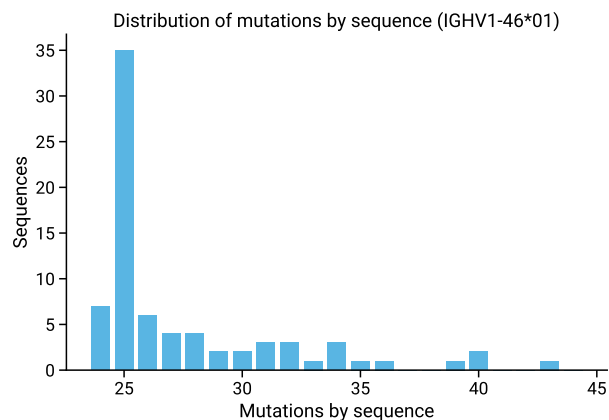
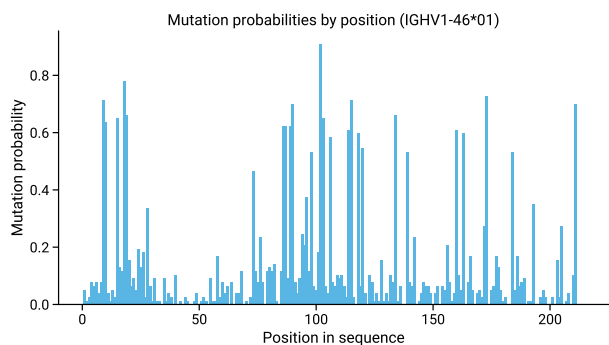
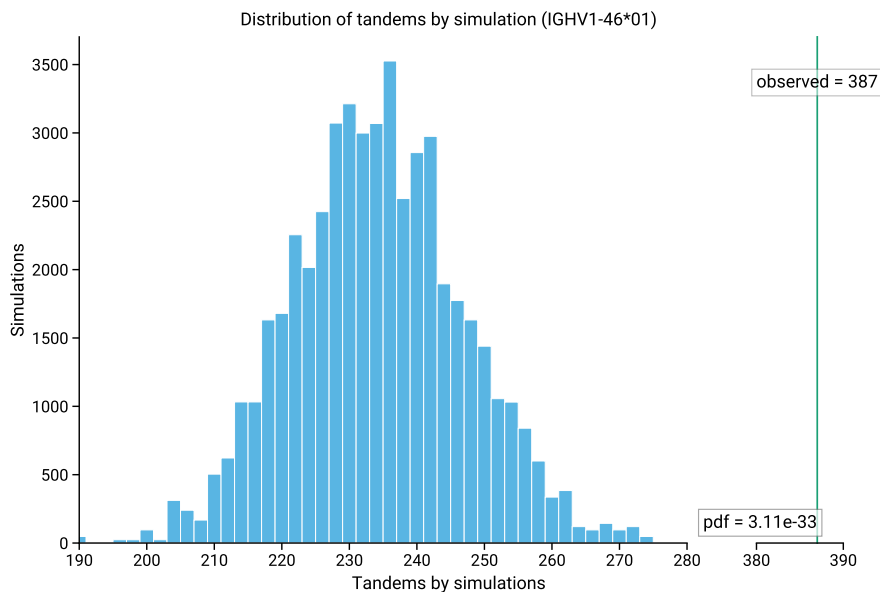


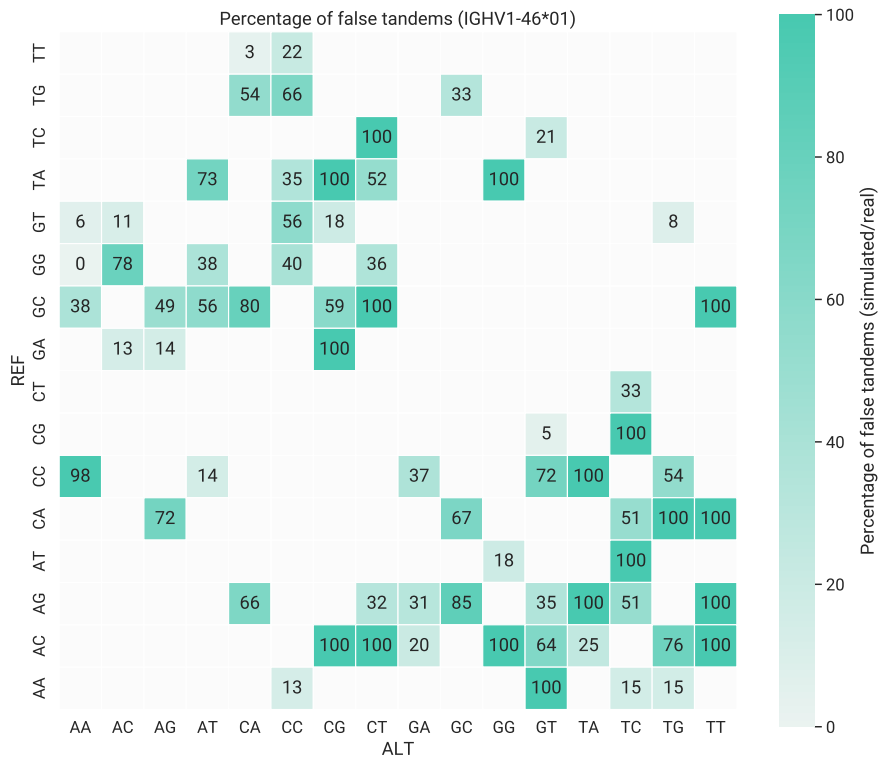
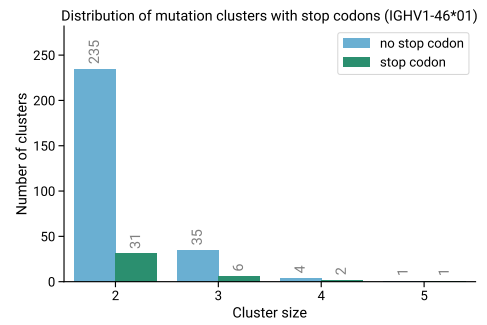
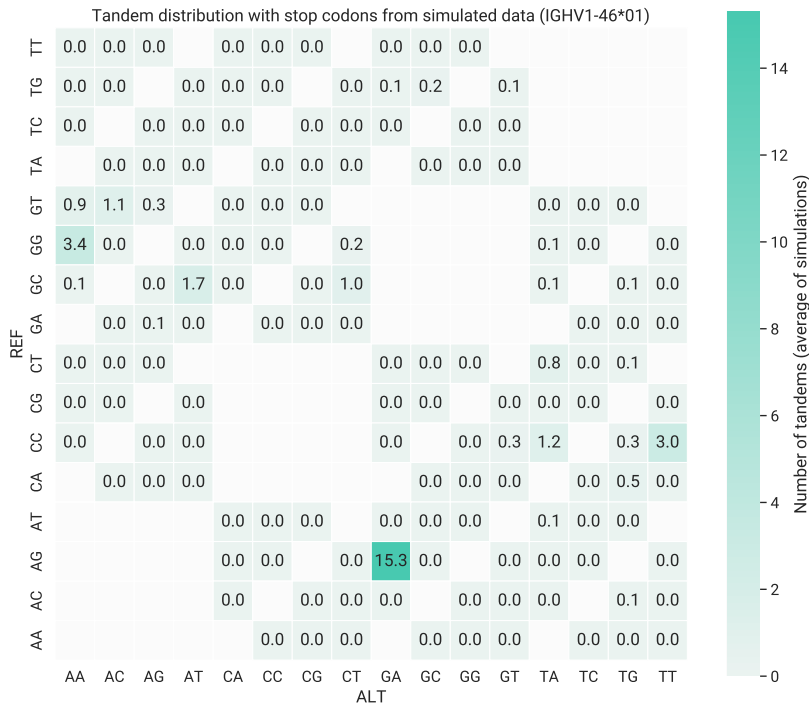
Tandem distribution from simulated data (IGHV1-18\*01)





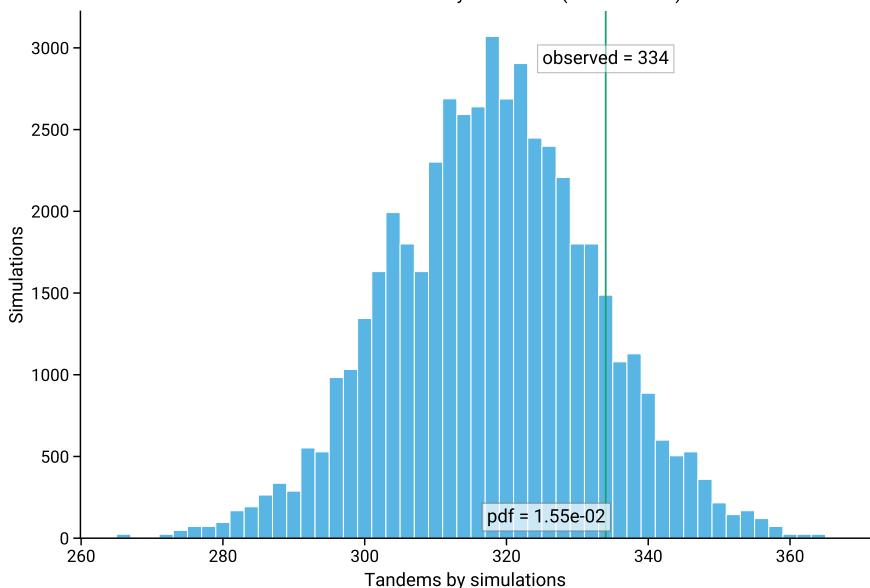
### 6.3 IGHV1-46\*01



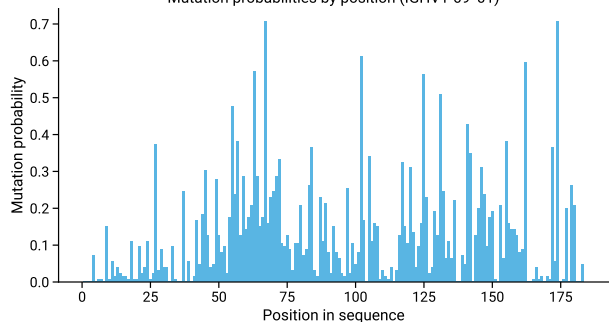


### 6.4 IGHV1-69\*01

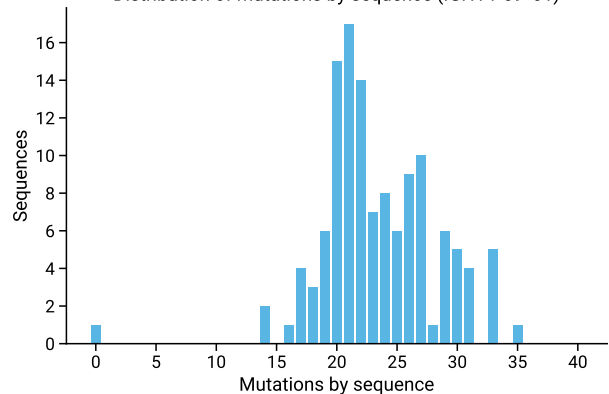
Distribution of tandems by simulation (IGHV1-69\*01)



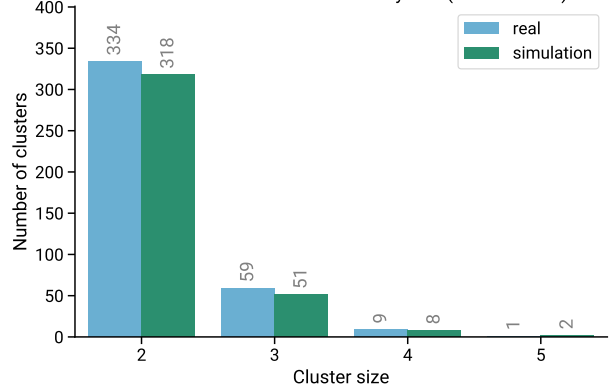
Mutation probabilities by position (IGHV1-69\*01)



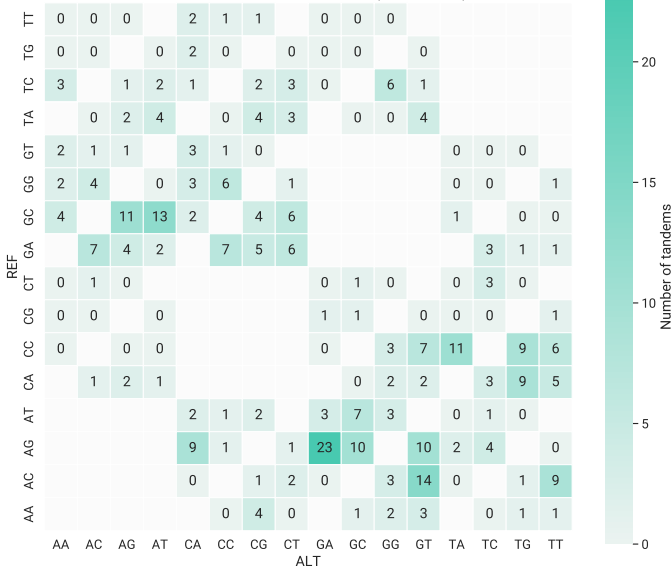
Distribution of mutations by sequence (IGHV1-69\*01)



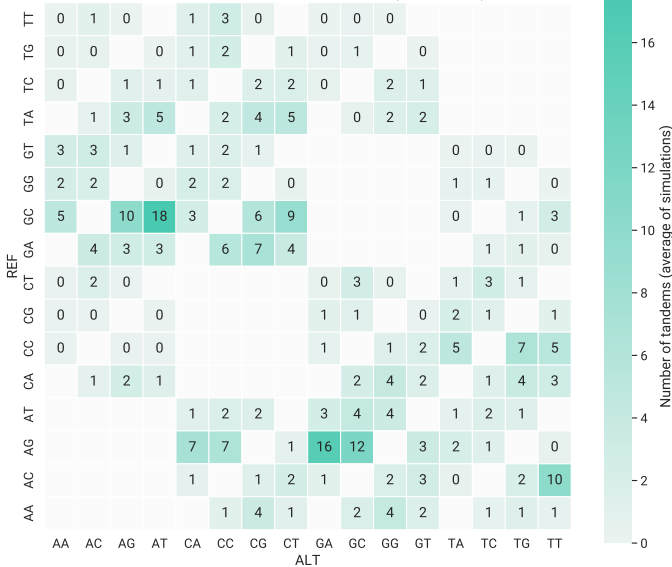
Distribution of mutation clusters by size (IGHV1-69\*01)

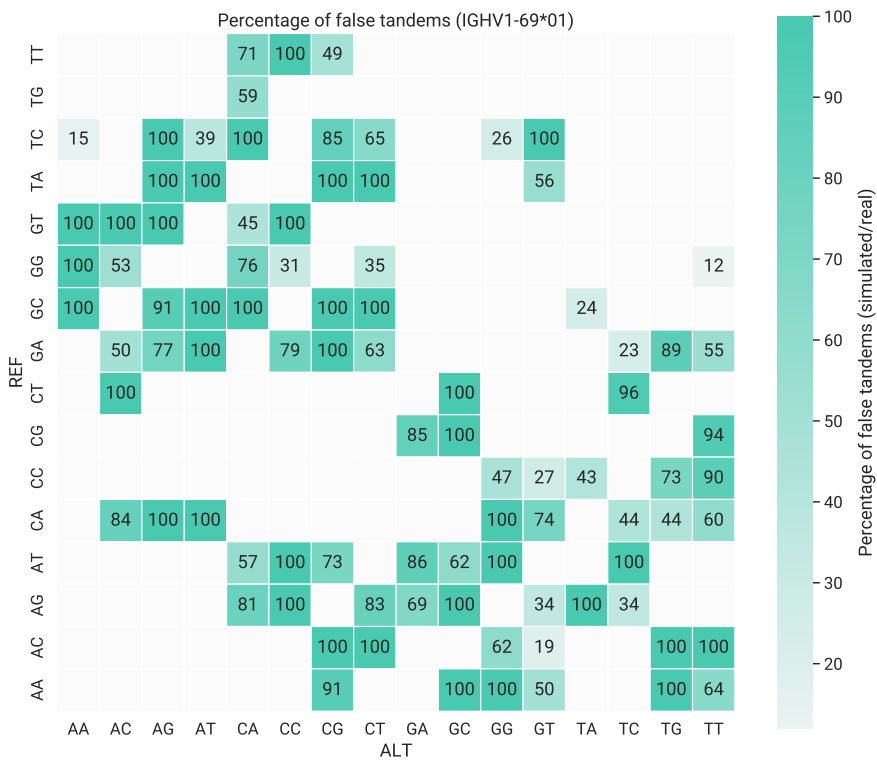
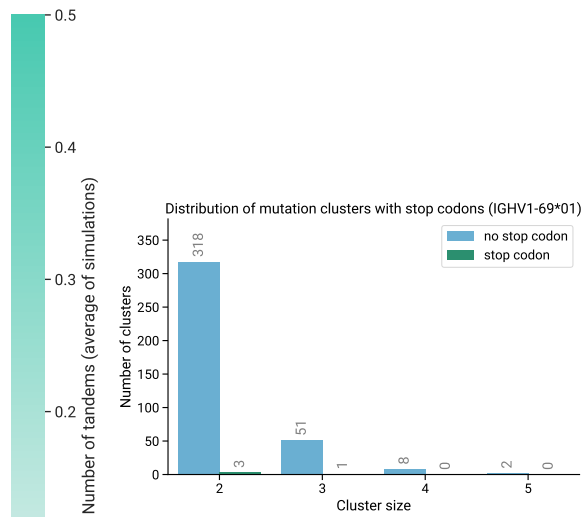
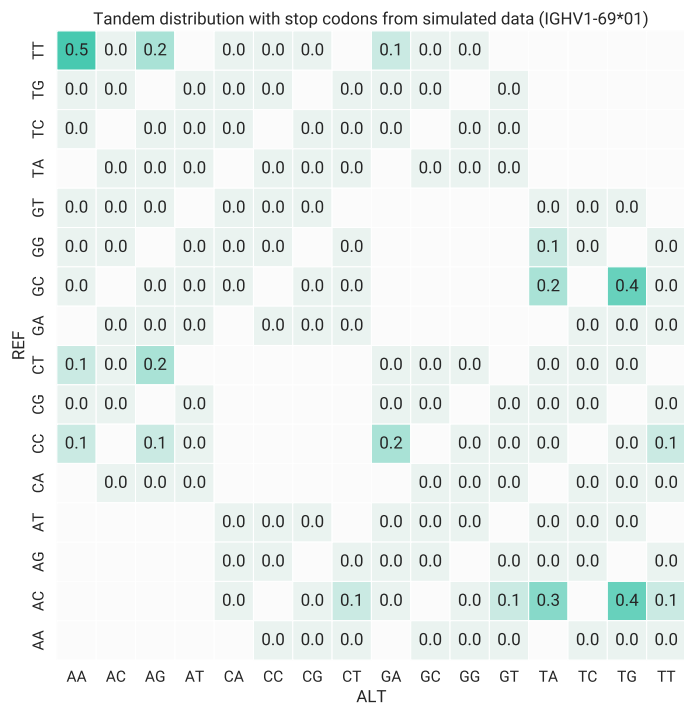


Tandem distribution from real data (IGHV1-69\*01)



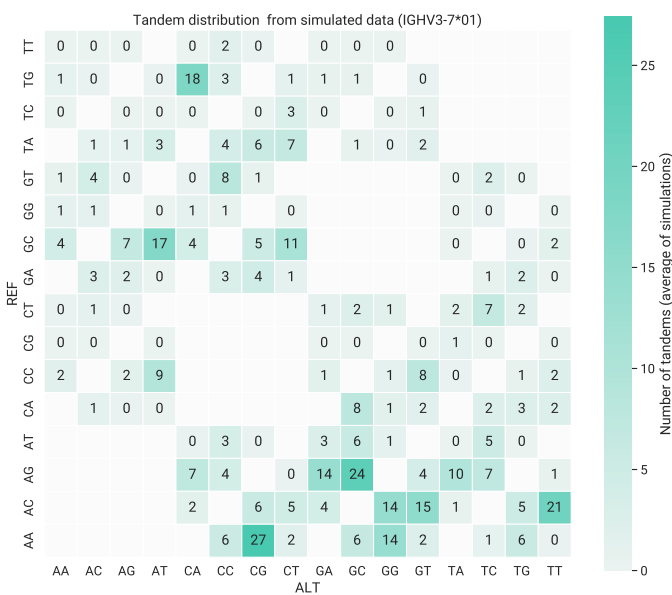
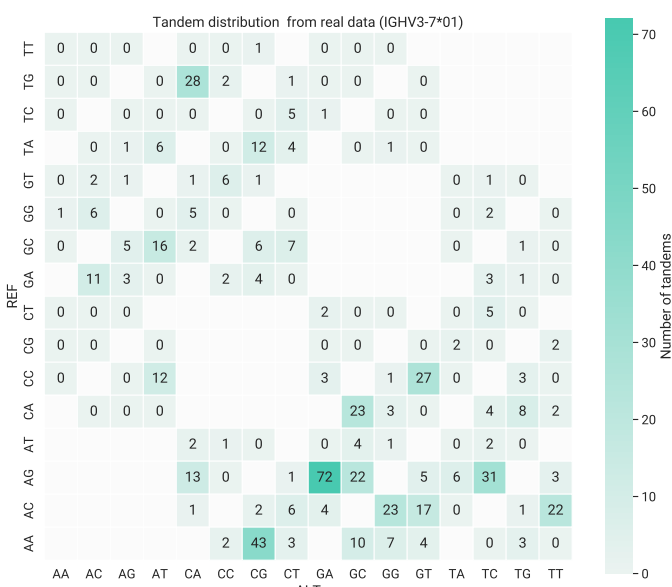
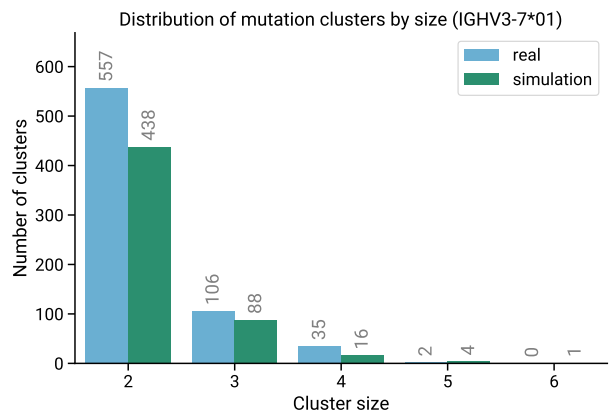
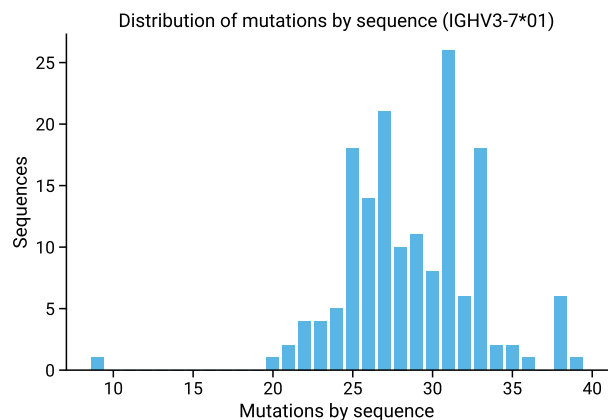
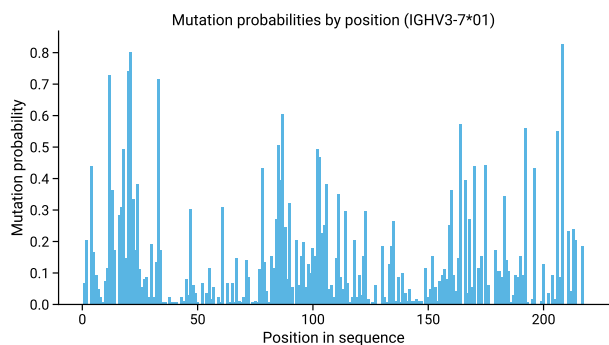
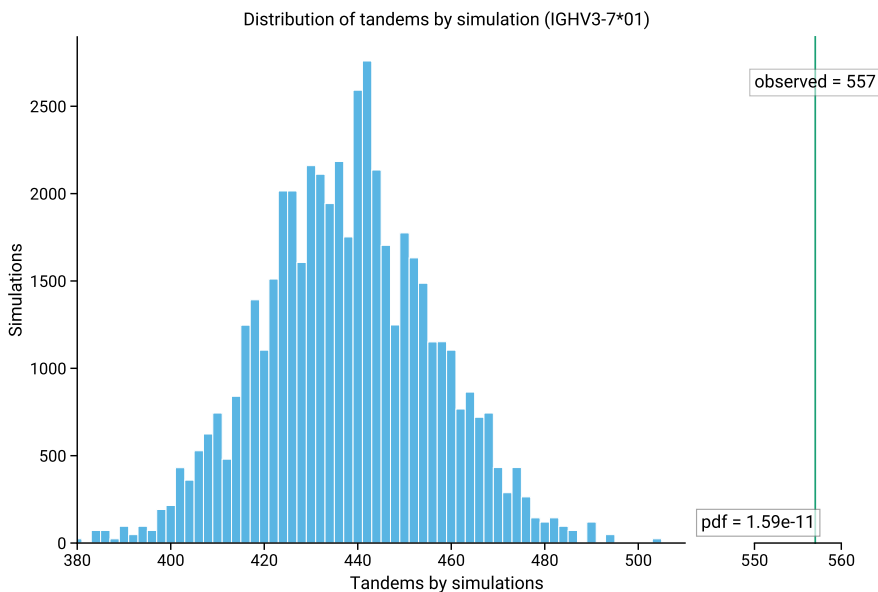
Tandem distribution from simulated data (IGHV1-69\*01)

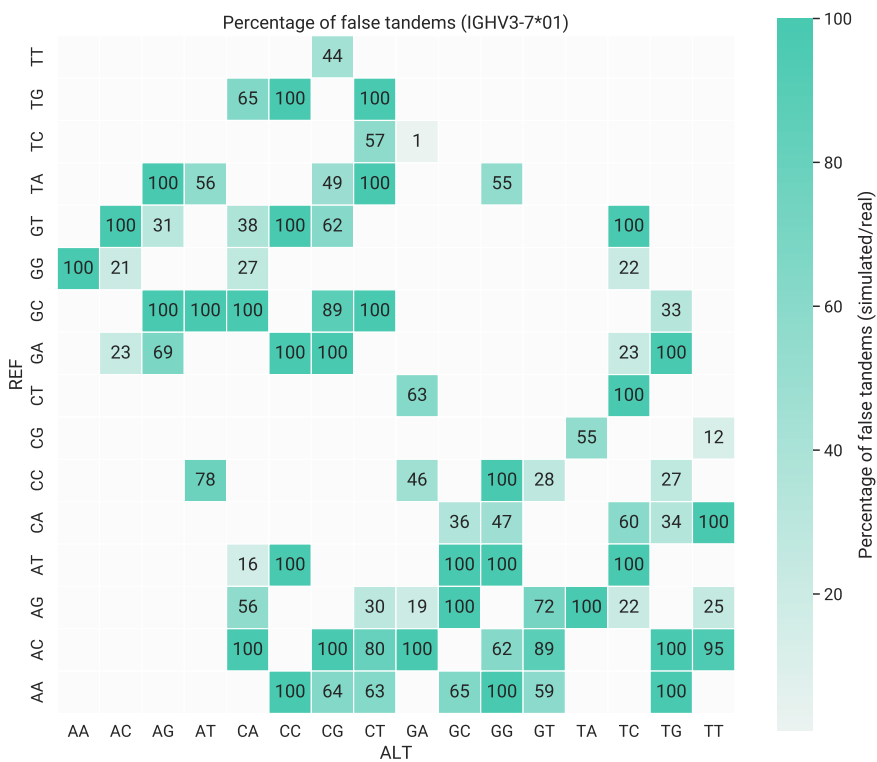
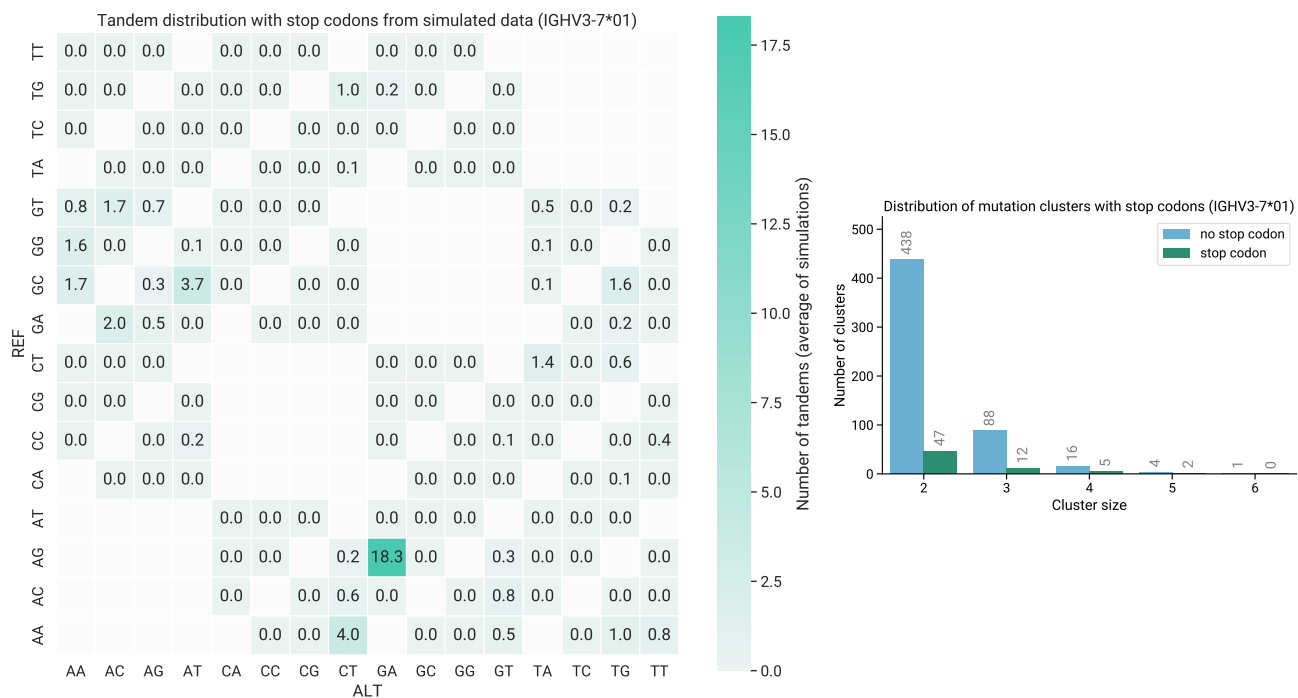






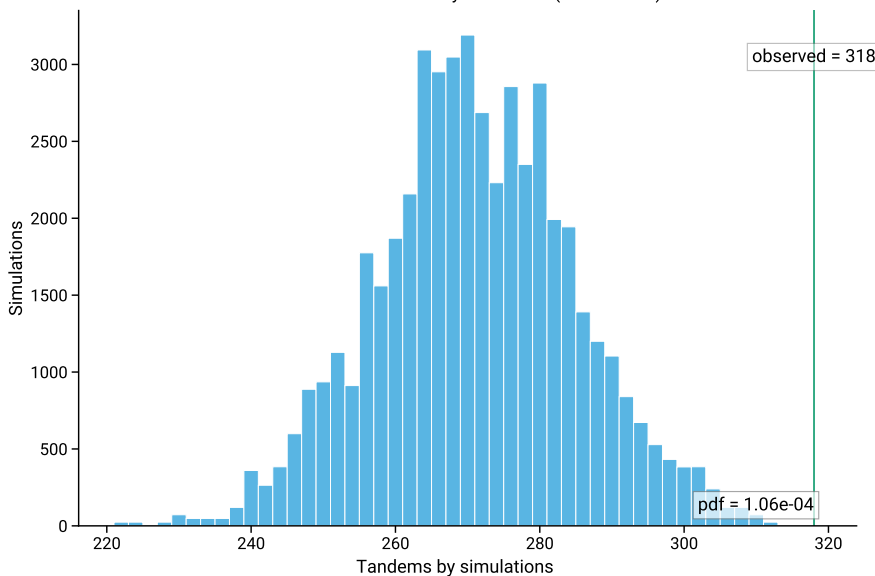
### 6.5 IGHV3-7\*01



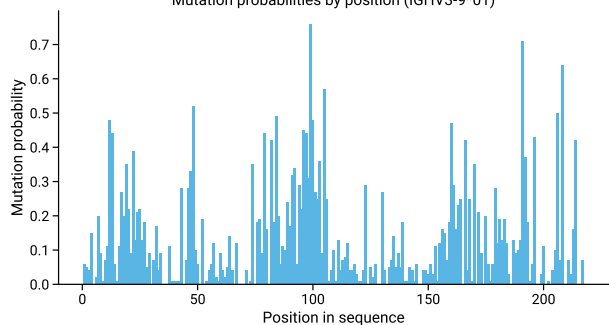


### 6.6 IGHV3-9\*01

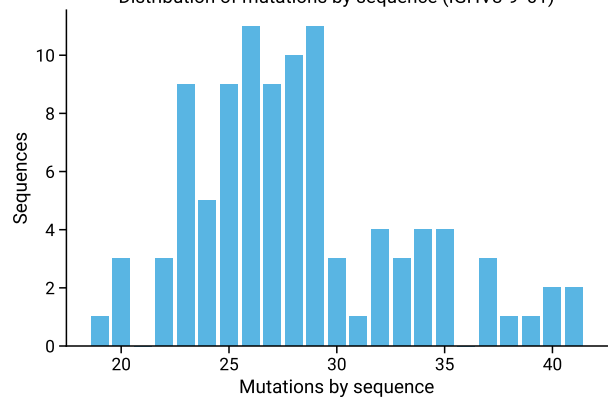
Distribution of tandems by simulation (IGHV3-9\*01)



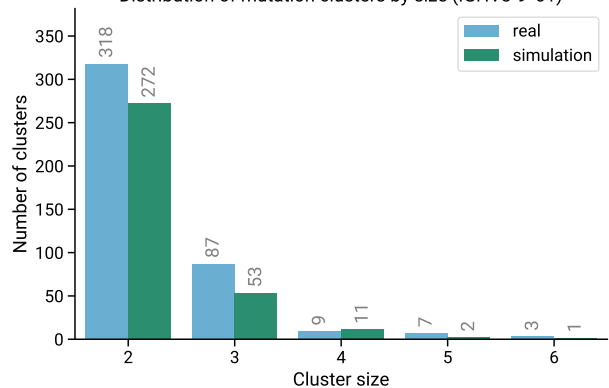
Mutation probabilities by position (IGHV3-9\*01)



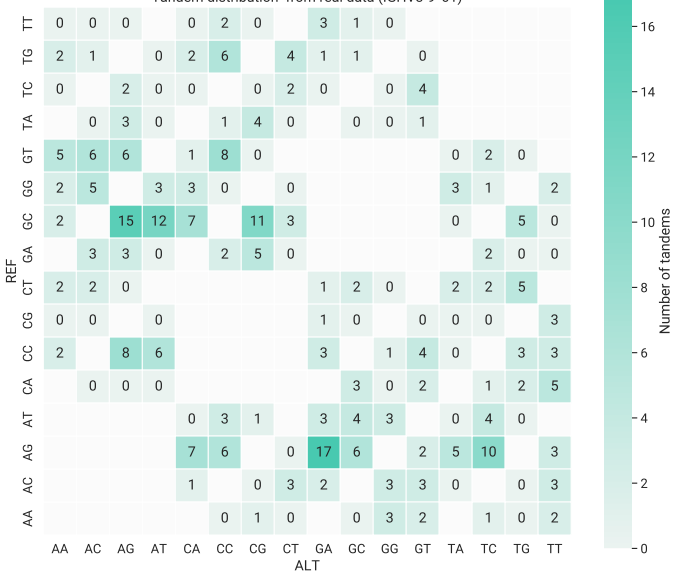
Distribution of mutations by sequence (IGHV3-9\*01)



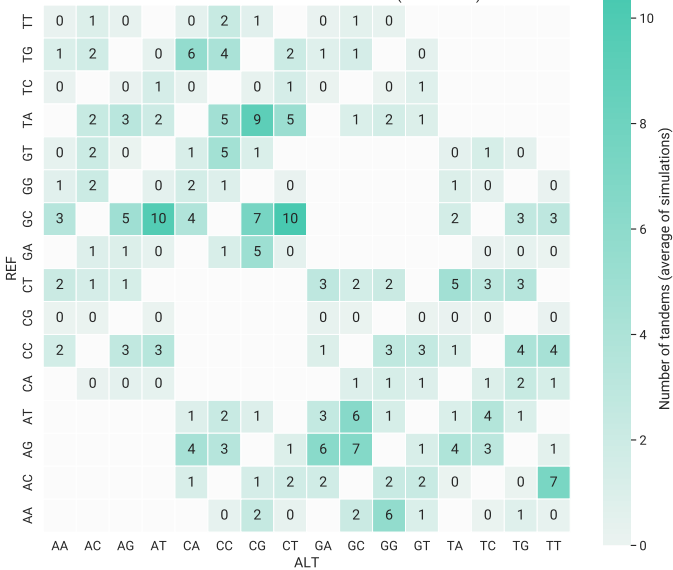
Distribution of mutation clusters by size (IGHV3-9\*01)

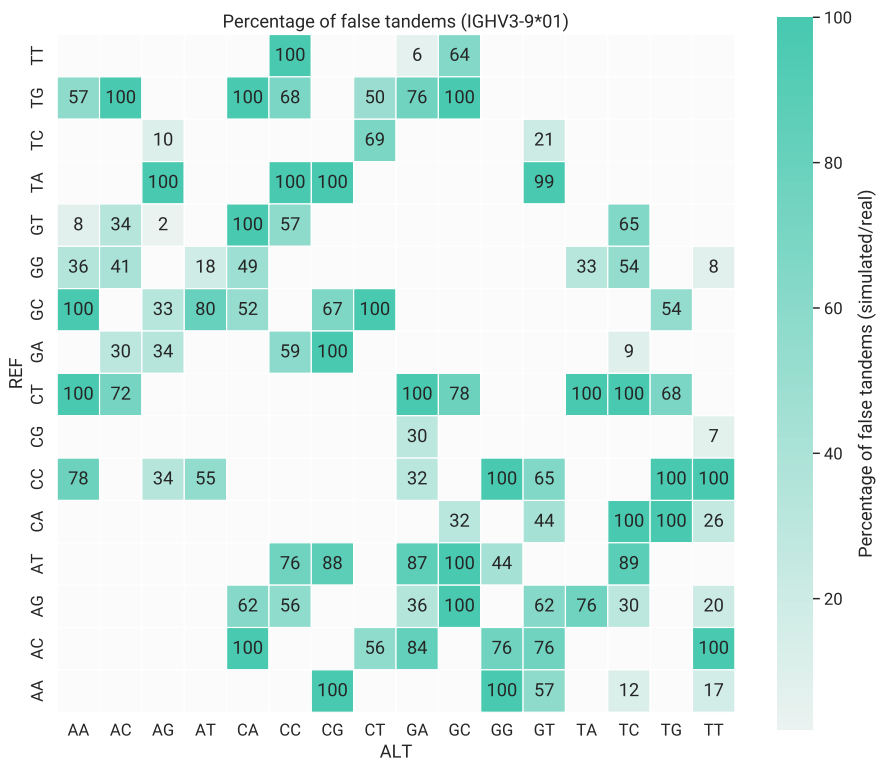
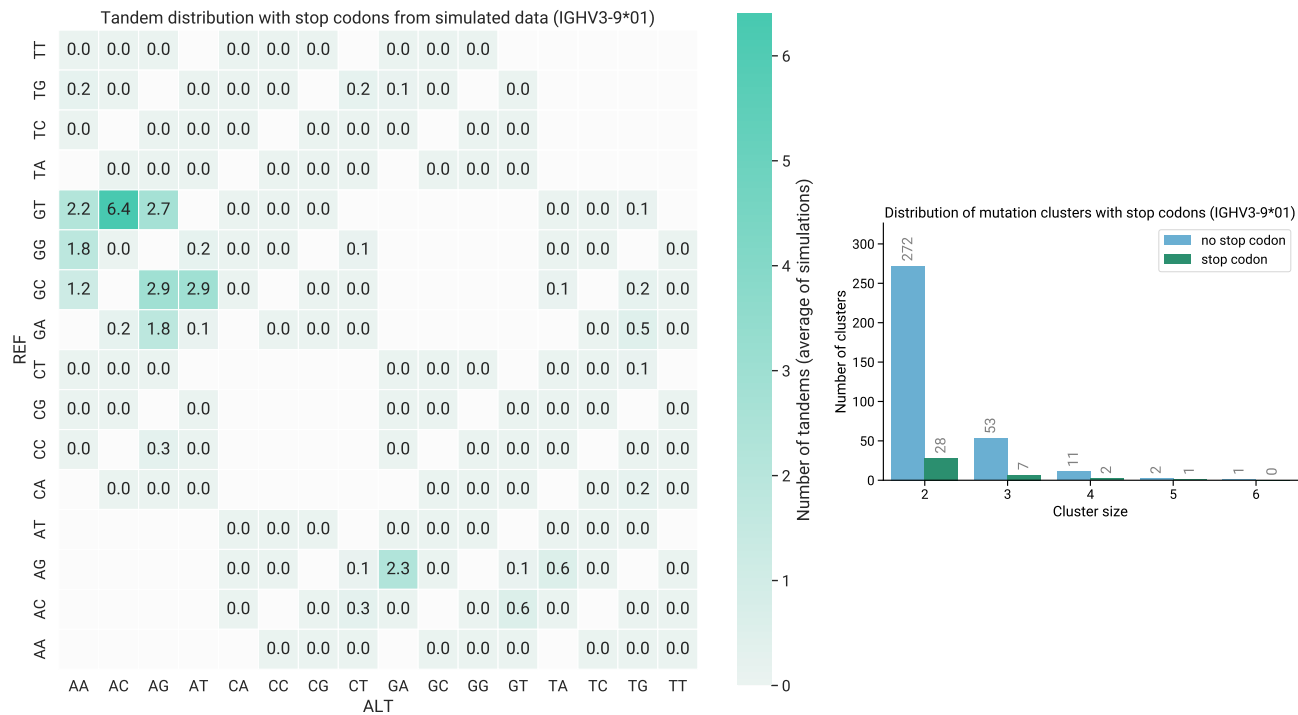


Tandem distribution from real data (IGHV3-9\*01)



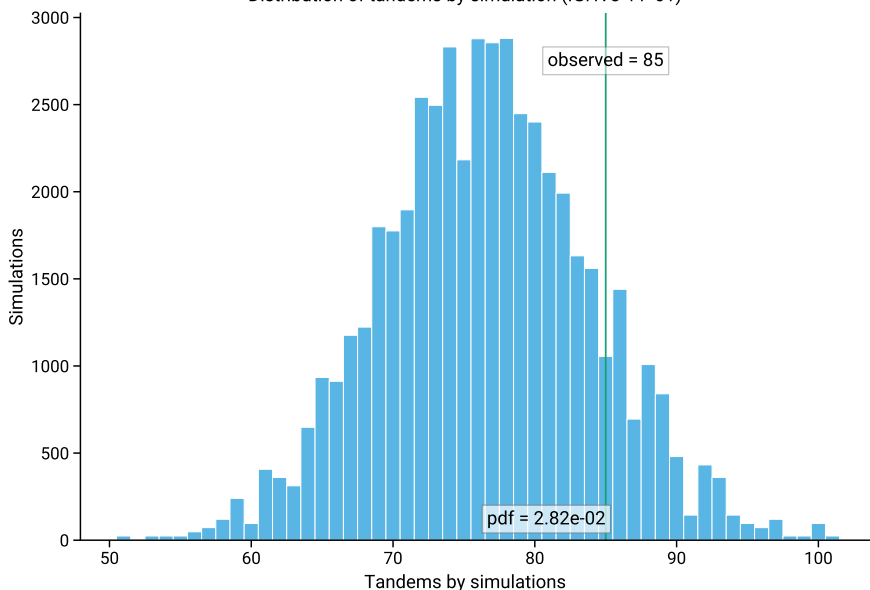
Tandem distribution from simulated data (IGHV3-9\*01)



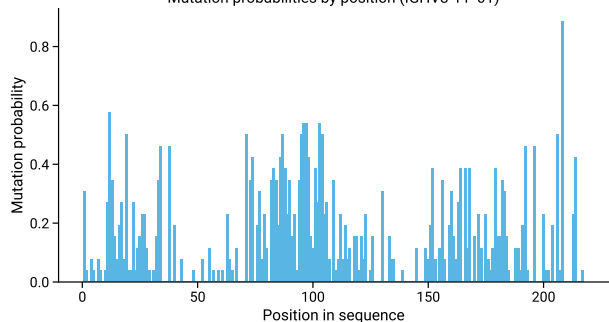


### 6.7 IGHV3-11\*01

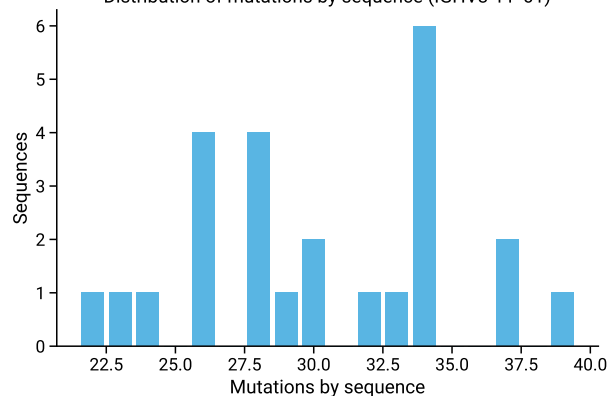
Distribution of tandems by simulation (IGHV3-11\*01)



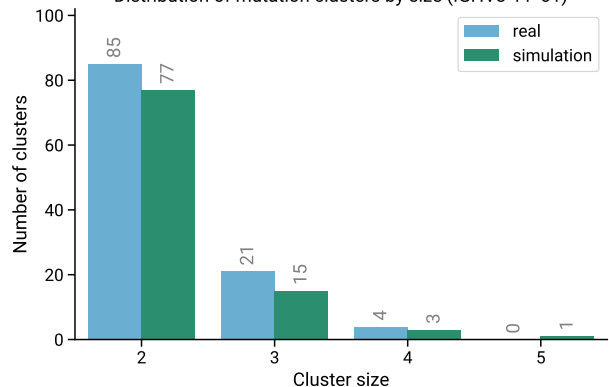
Mutation probabilities by position (IGHV3-11\*01)



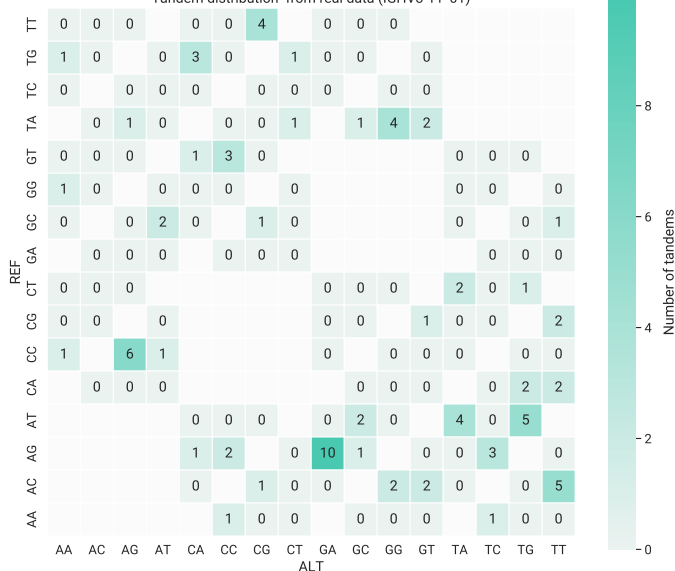
Distribution of mutations by sequence (IGHV3-11\*01)



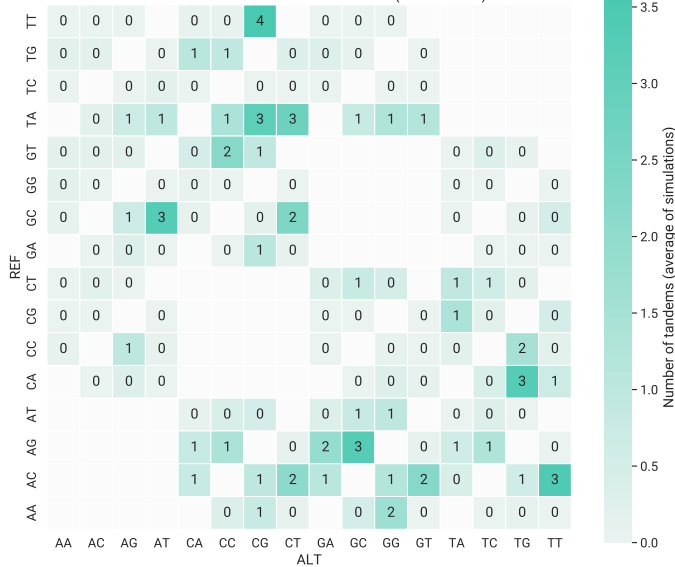
Distribution of mutation clusters by size (IGHV3-11\*01)

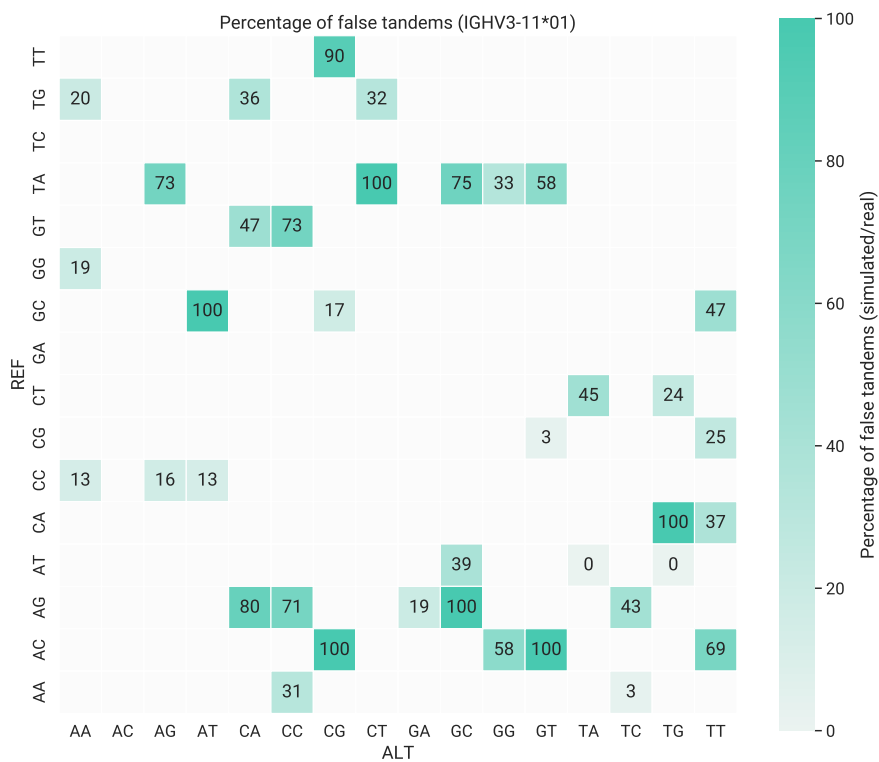
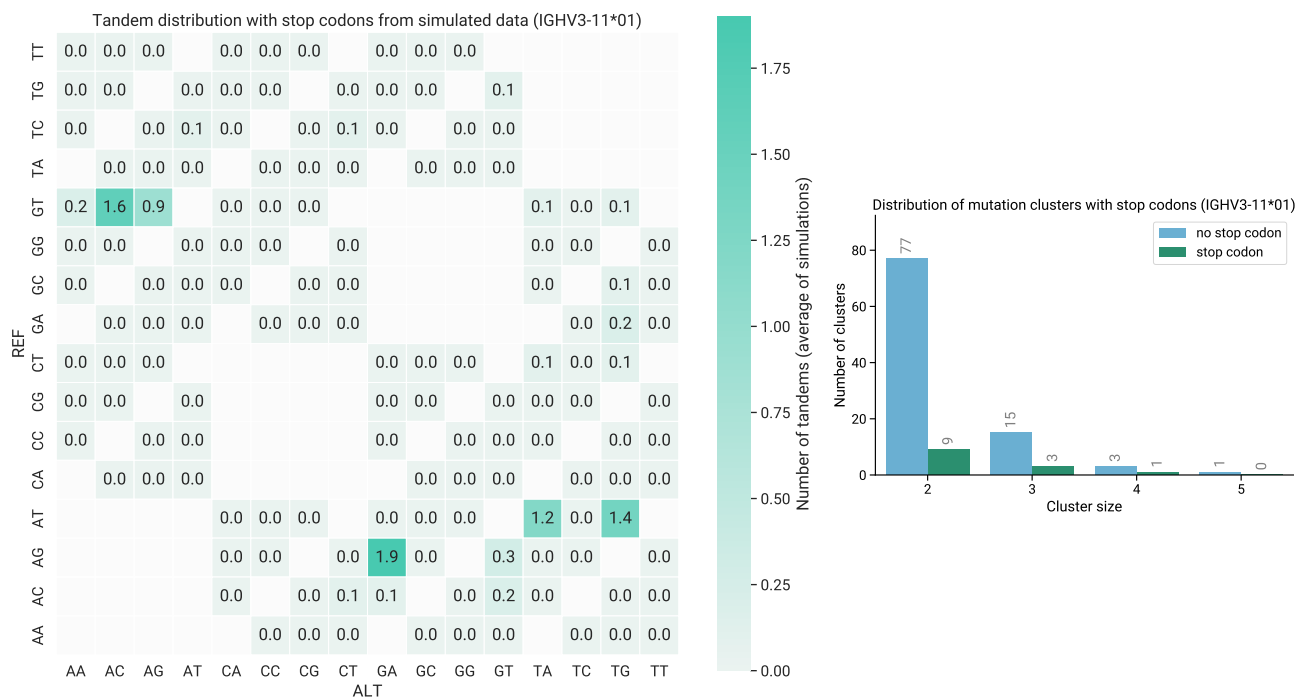


Tandem distribution from real data (IGHV3-11\*01)



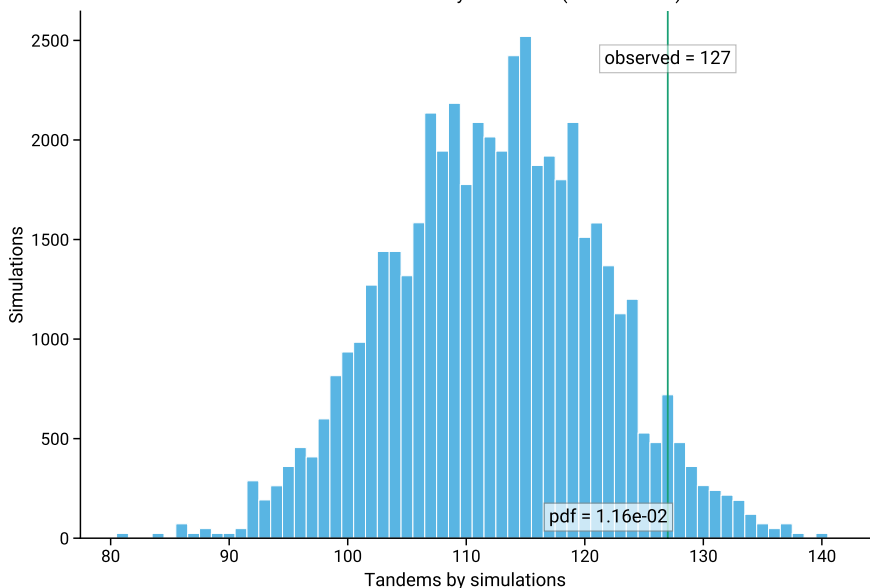
Tandem distribution from simulated data (IGHV3-11\*01)



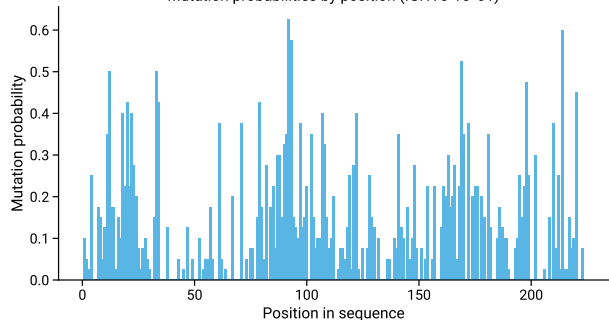


### 6.8 IGHV3-15\*01

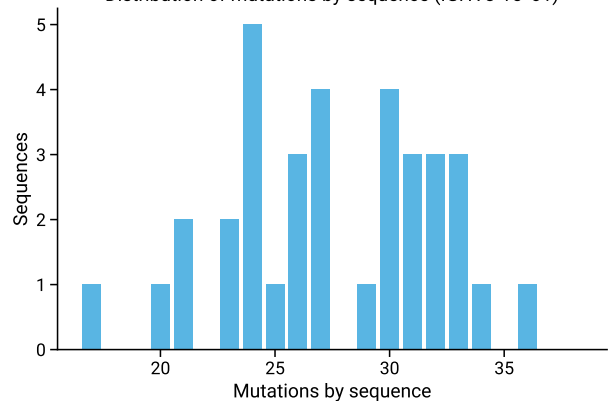
Distribution of tandems by simulation (IGHV3-15\*01)



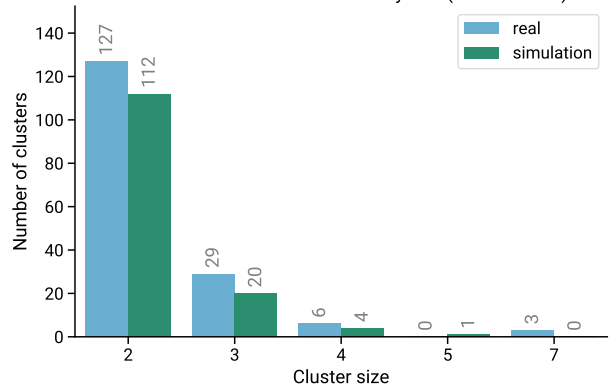
Mutation probabilities by position (IGHV3-15\*01)



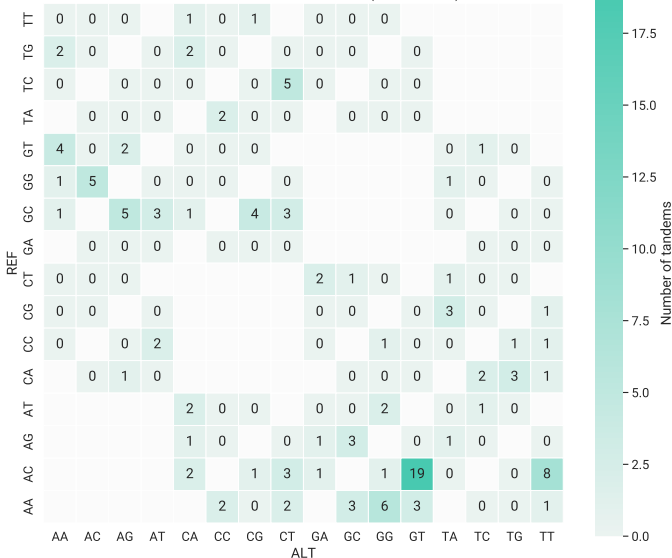
Distribution of mutations by sequence (IGHV3-15\*01)



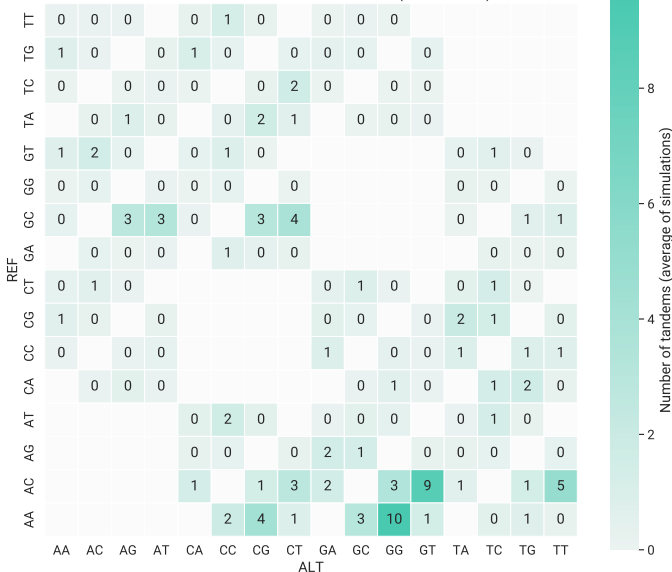
Distribution of mutation clusters by size (IGHV3-15\*01)

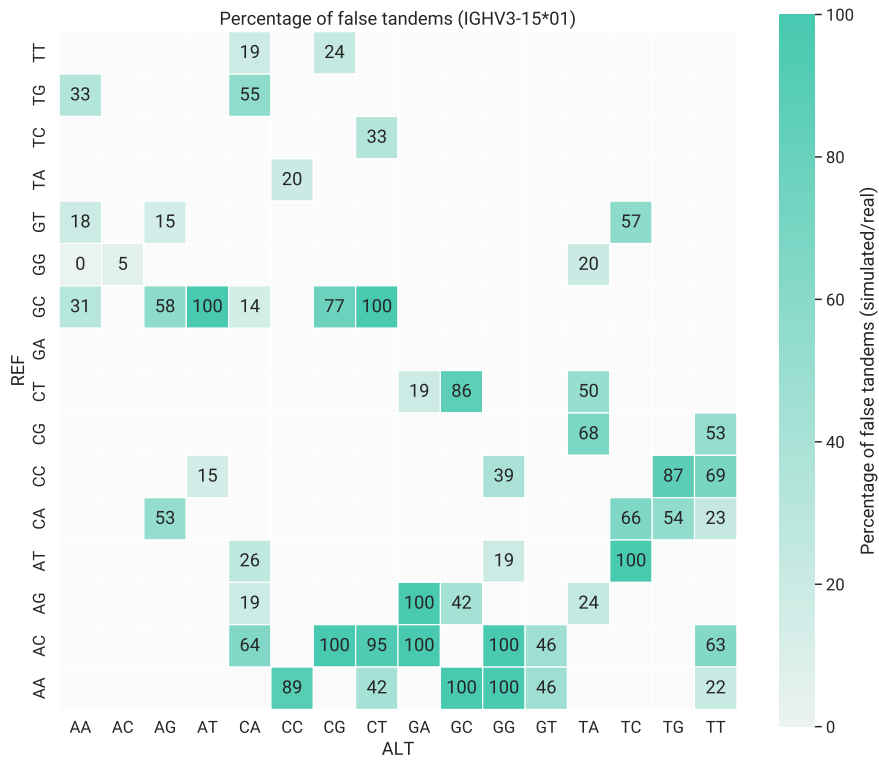
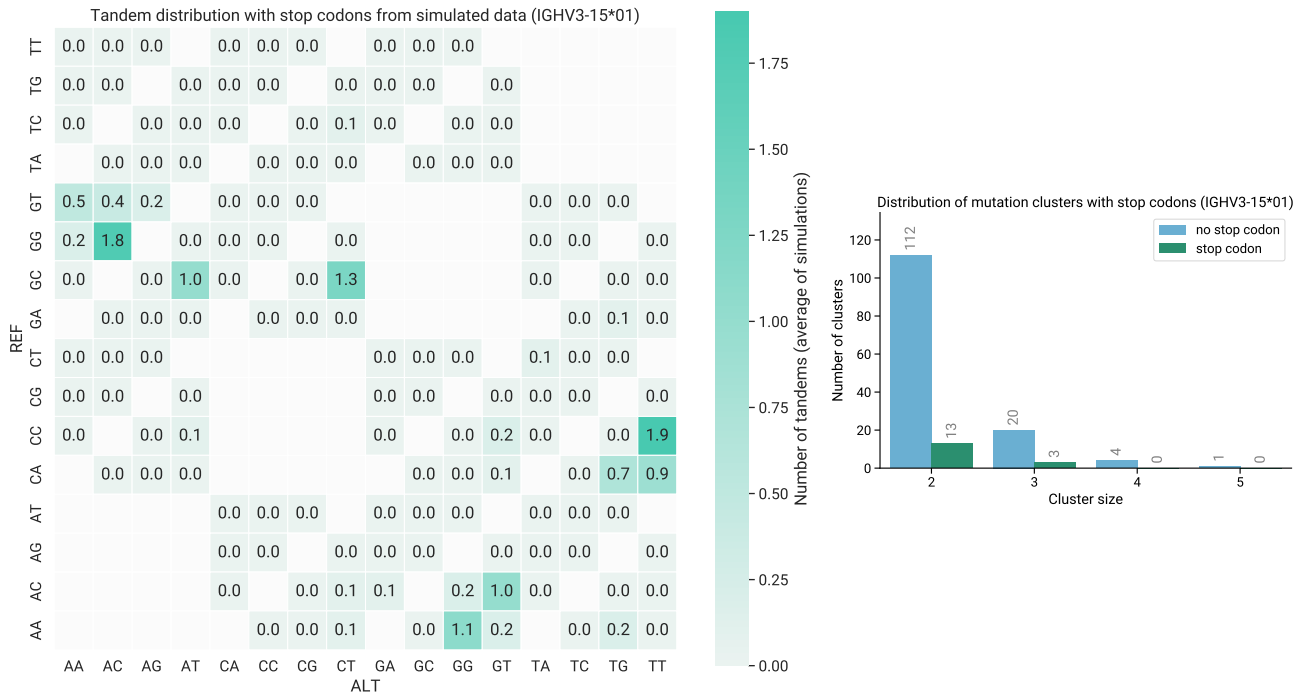


Tandem distribution from real data (IGHV3-15\*01)



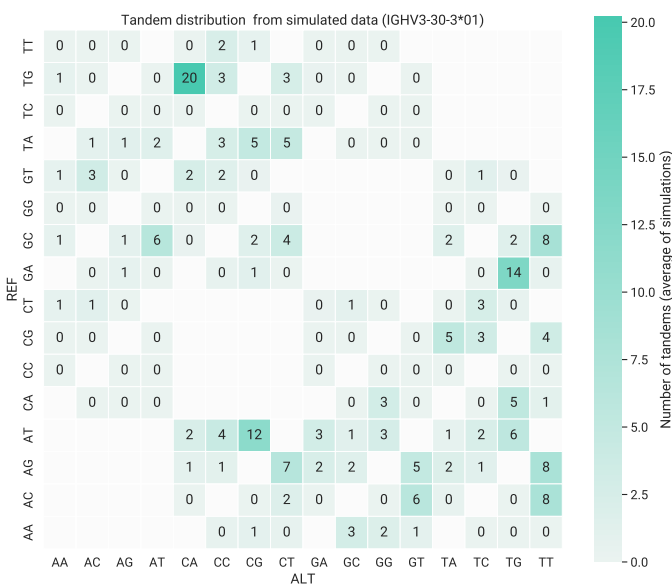
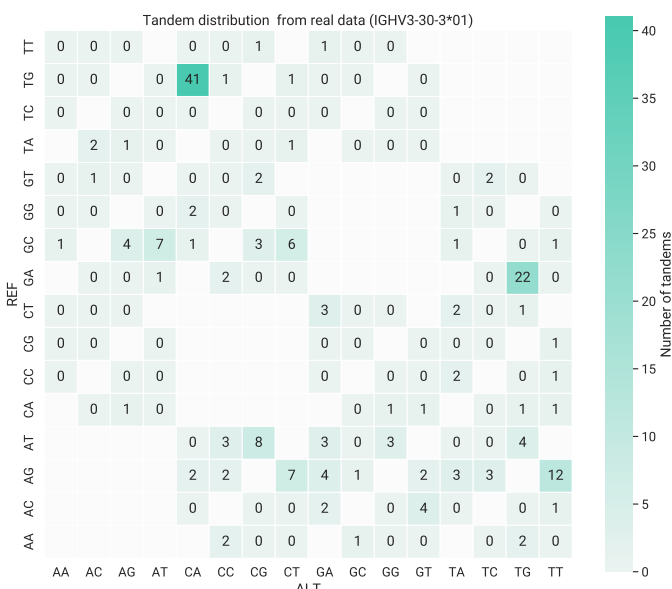
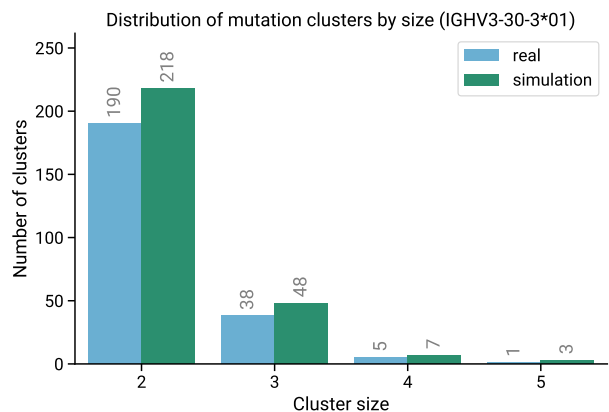
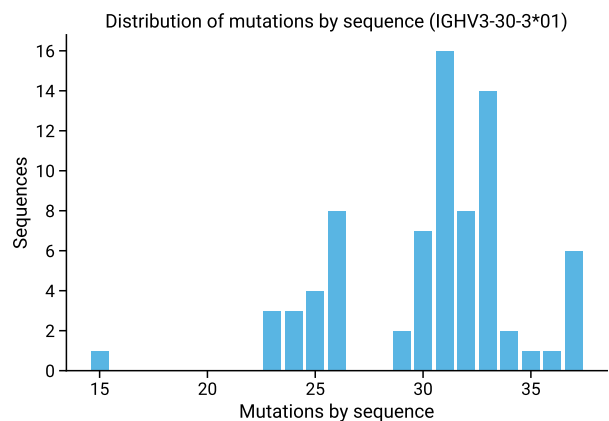
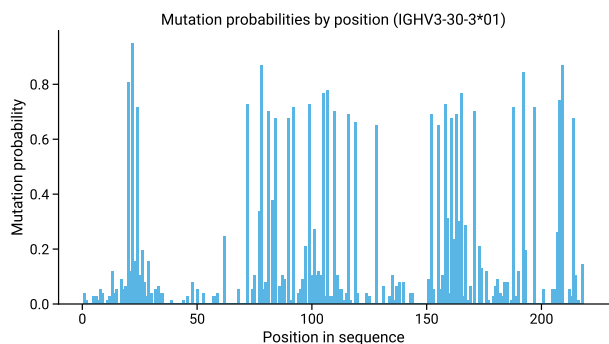
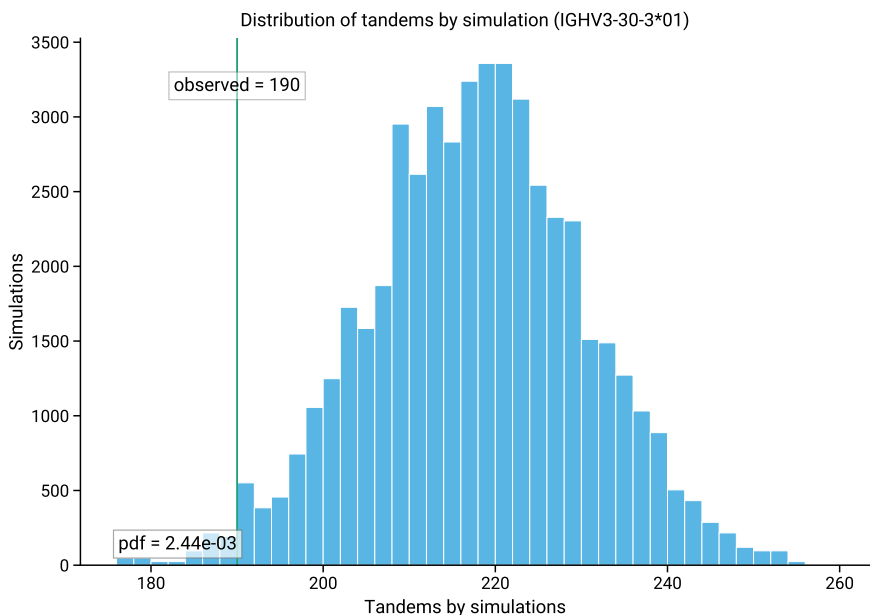
Tandem distribution from simulated data (IGHV3-15\*01)

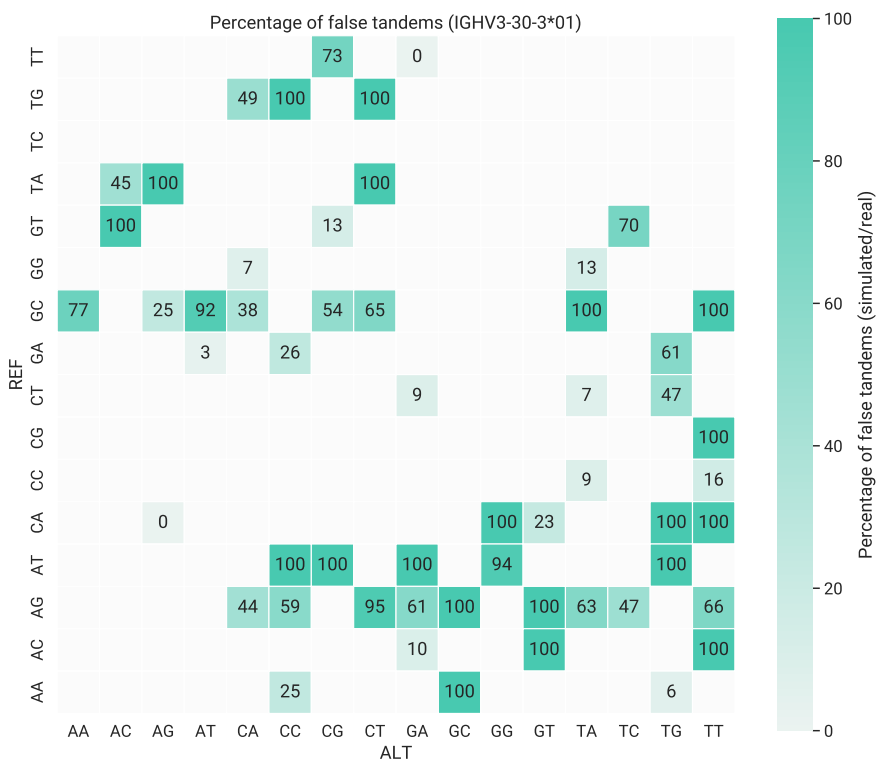
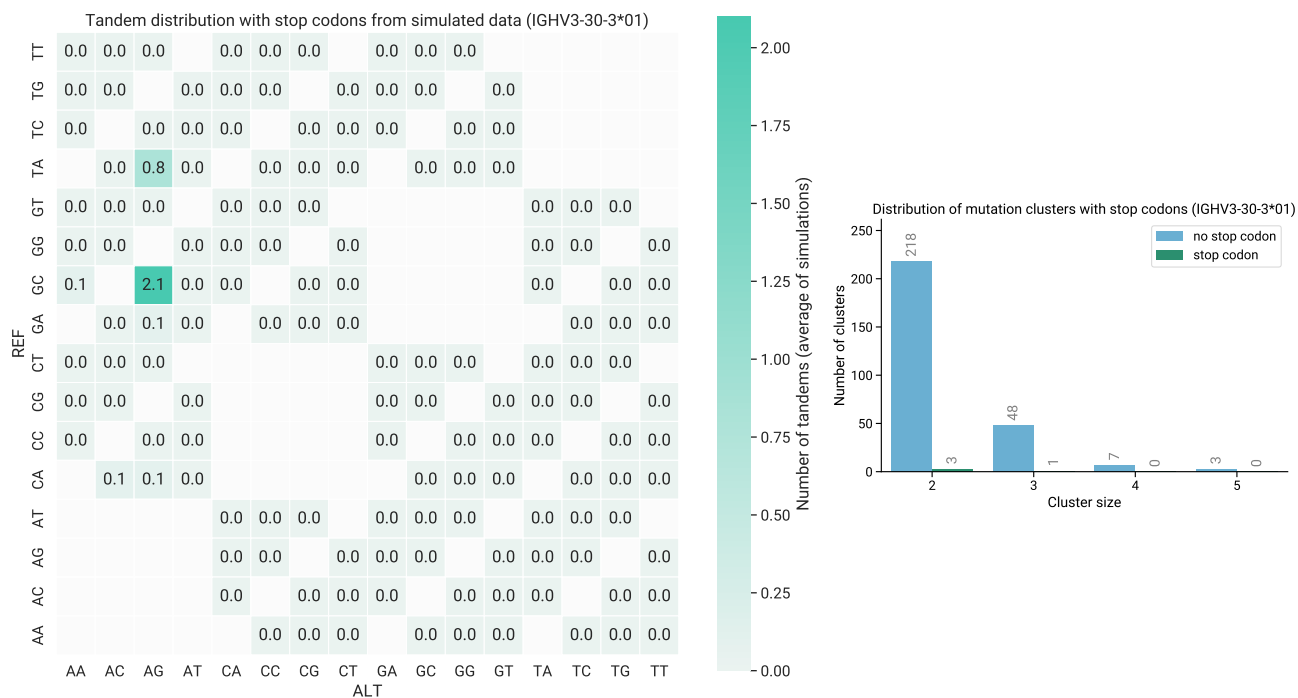






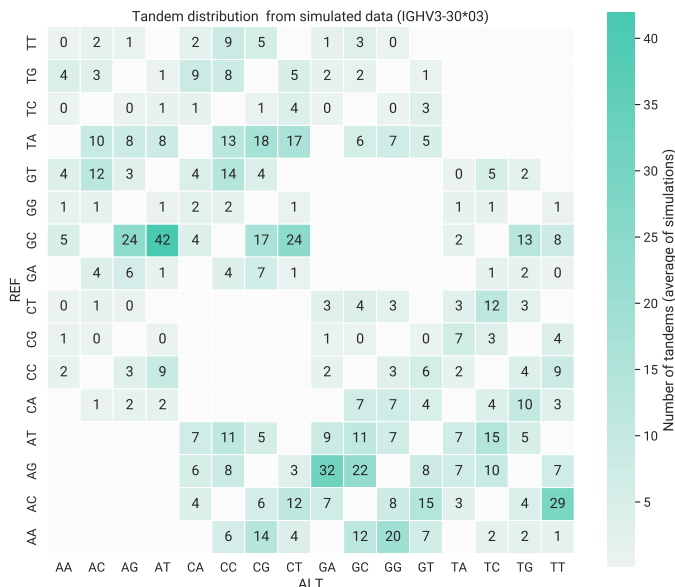
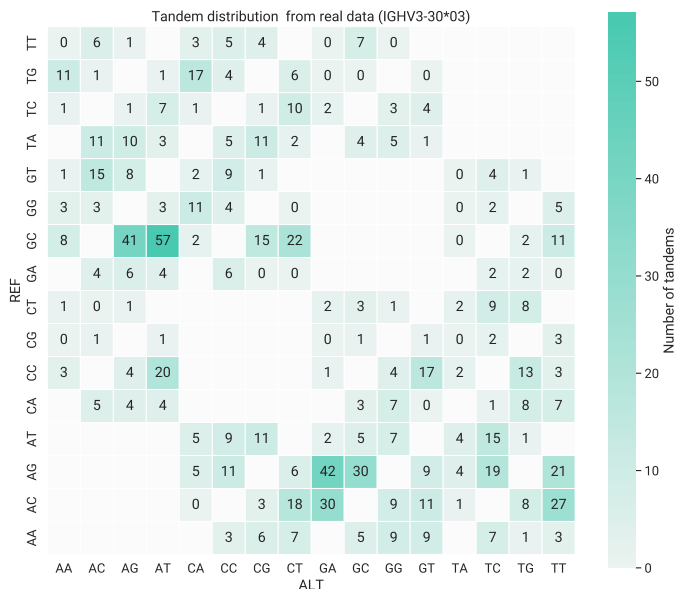
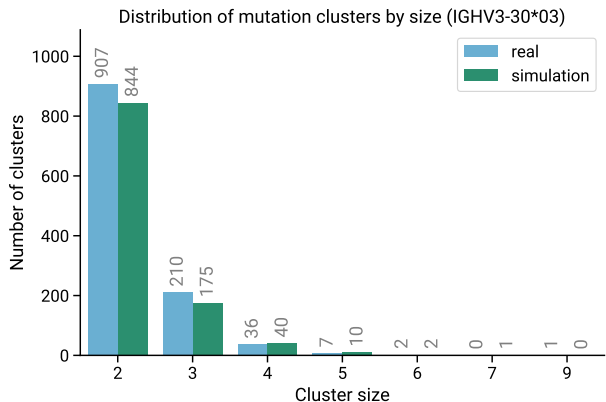
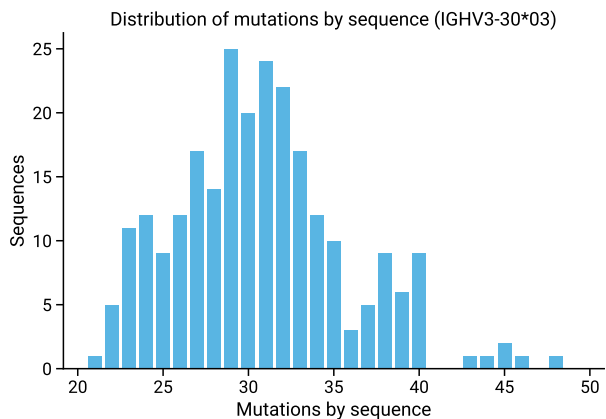
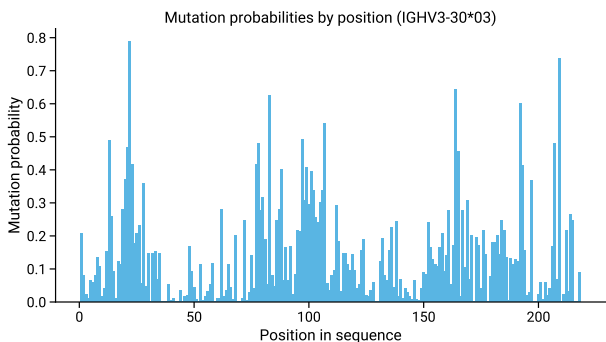
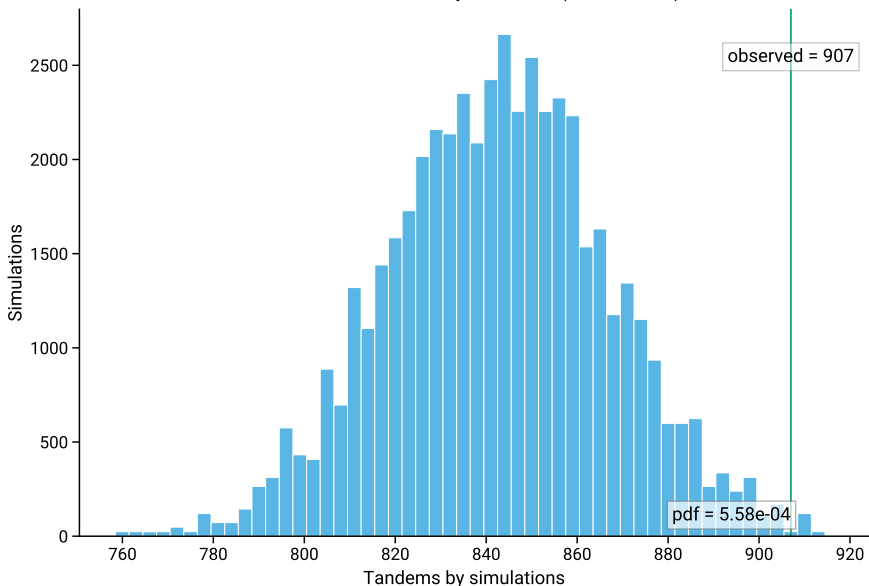
### 6.9 IGHV3-30-3\*01

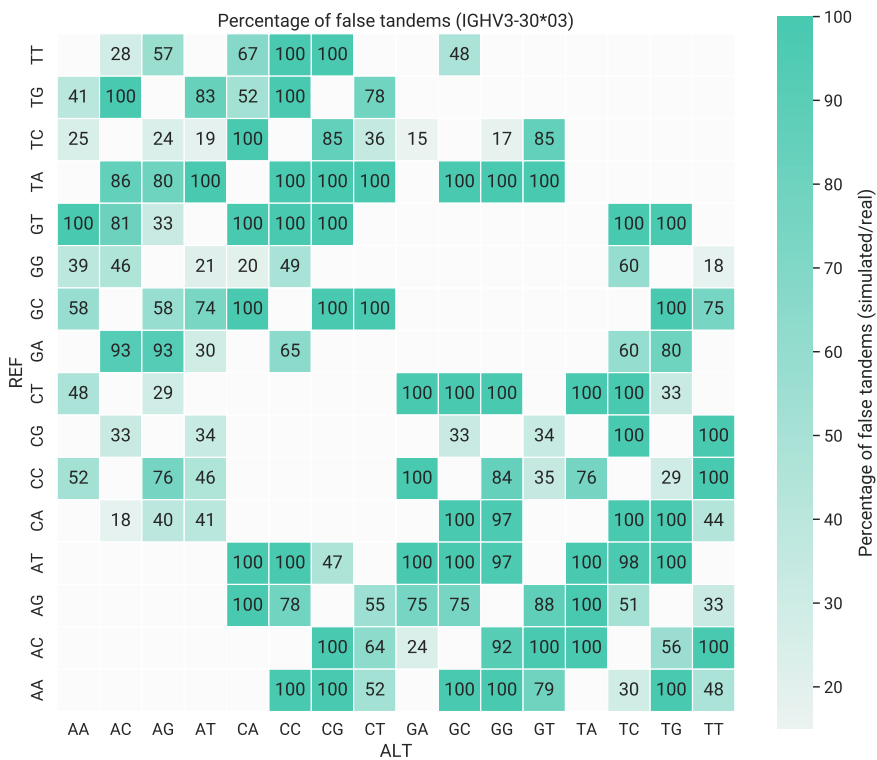
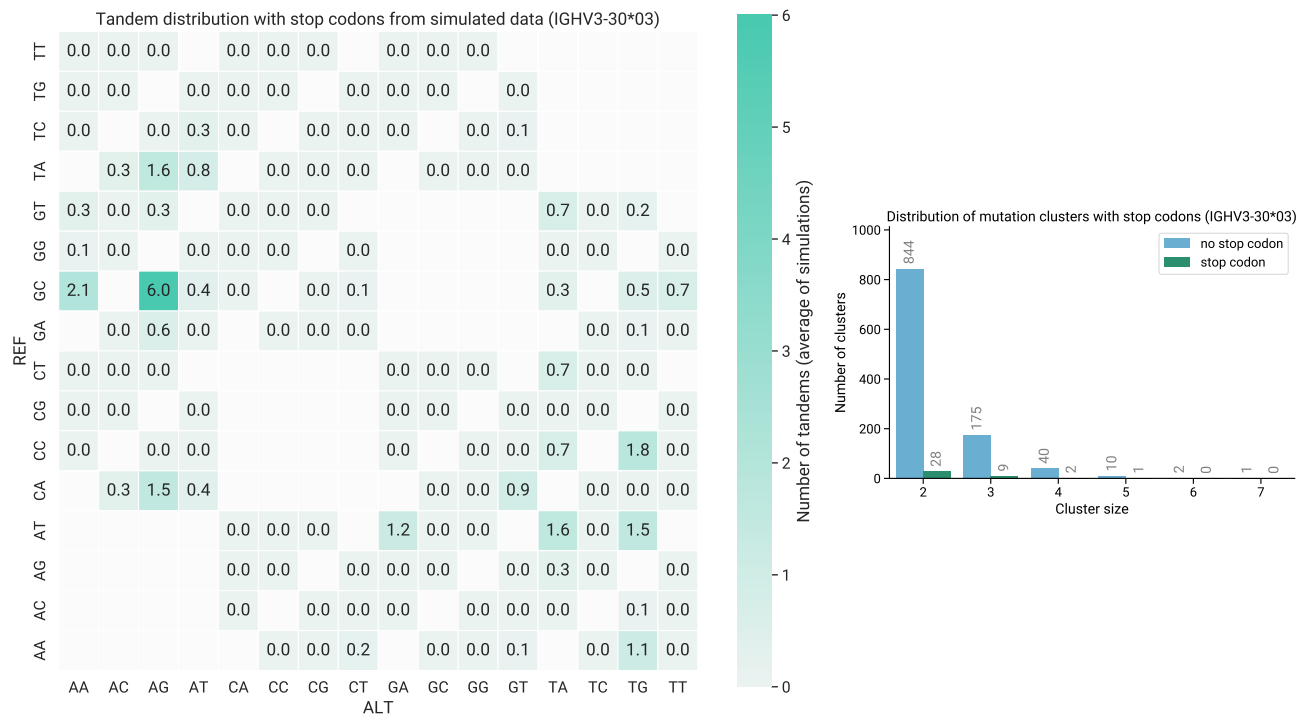




### 6.10 IGHV3-30\*03

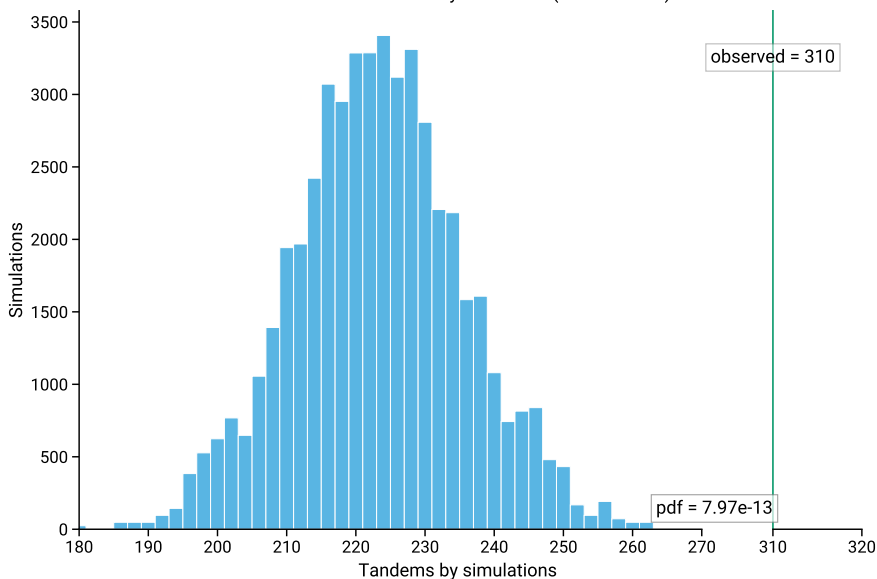
Distribution of tandems by simulation (IGHV3-30\*03)



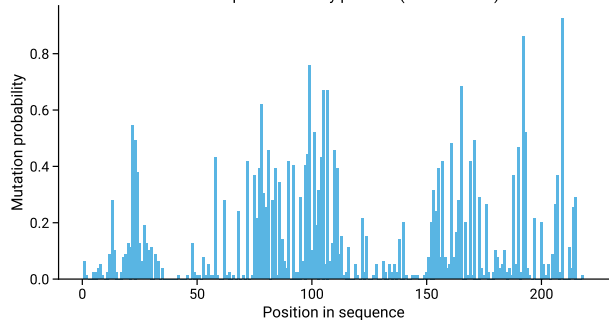


### 6.11 IGHV3-30\*04

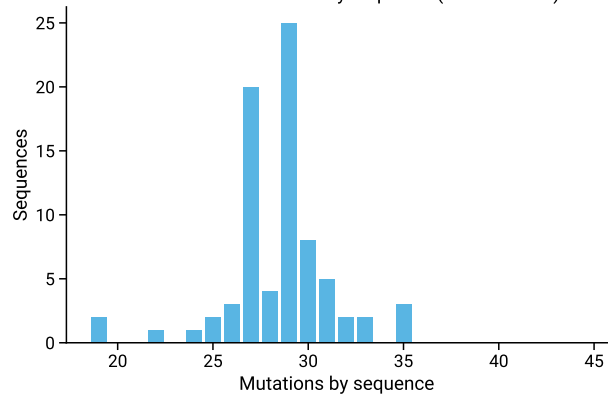
Distribution of tandems by simulation (IGHV3-30\*04)



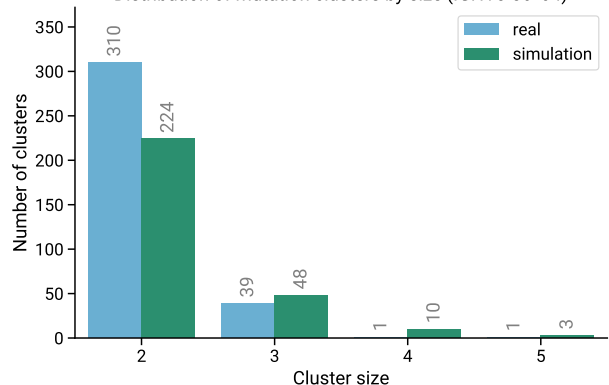
Mutation probabilities by position (IGHV3-30\*04)



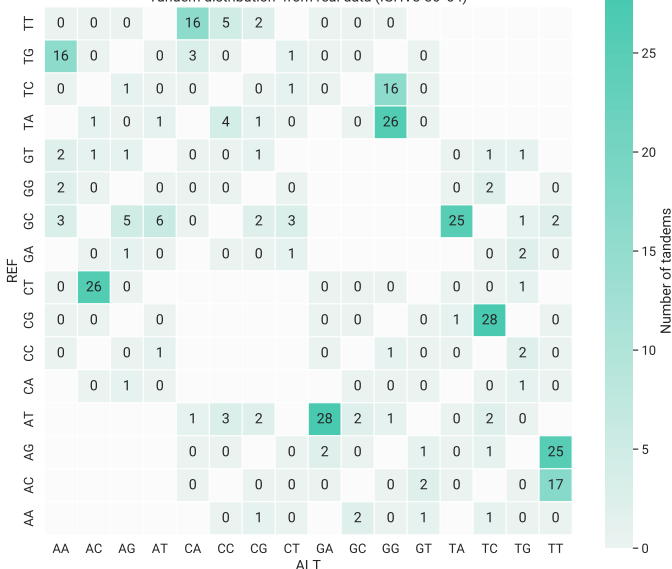
Distribution of mutations by sequence (IGHV3-30\*04)



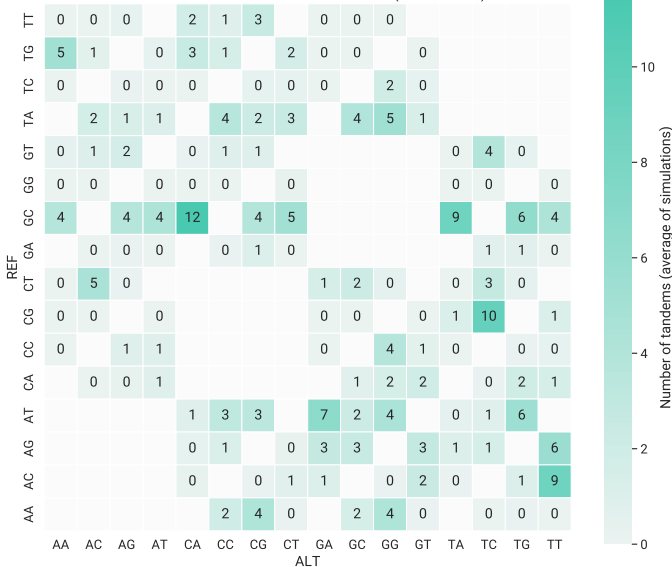
Distribution of mutation clusters by size (IGHV3-30\*04)

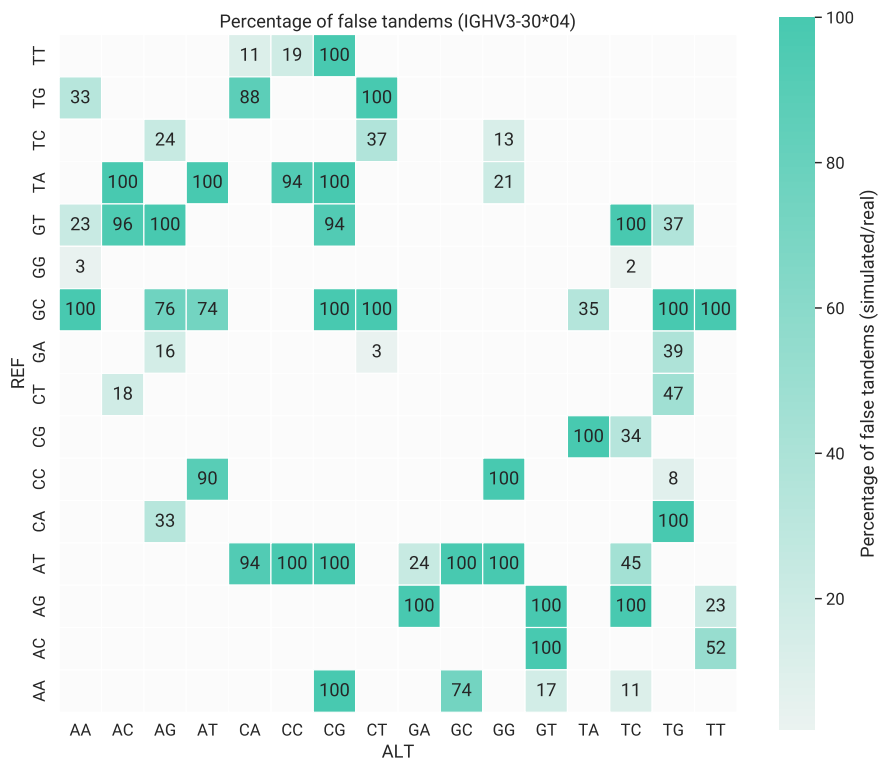
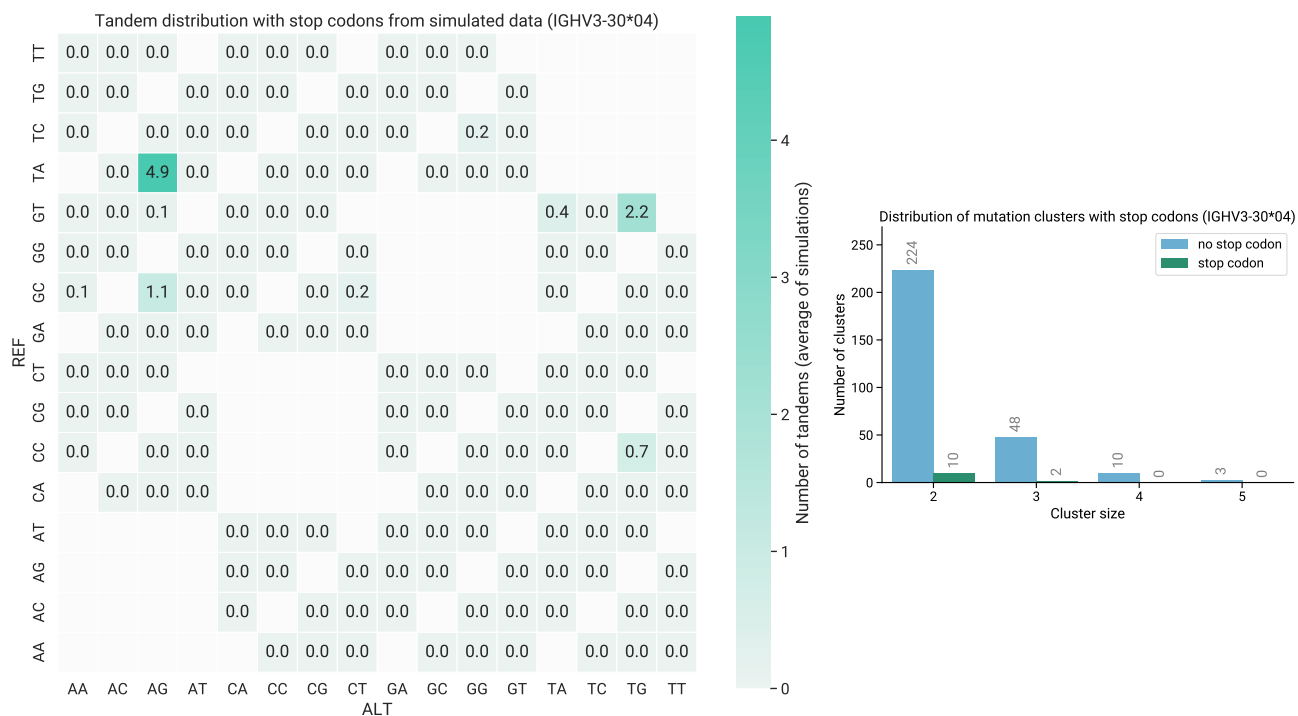


Tandem distribution from real data (IGHV3-30\*04)

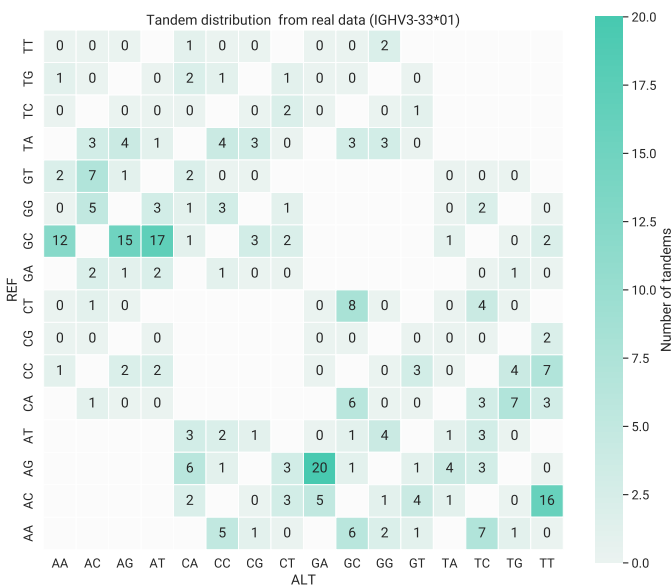
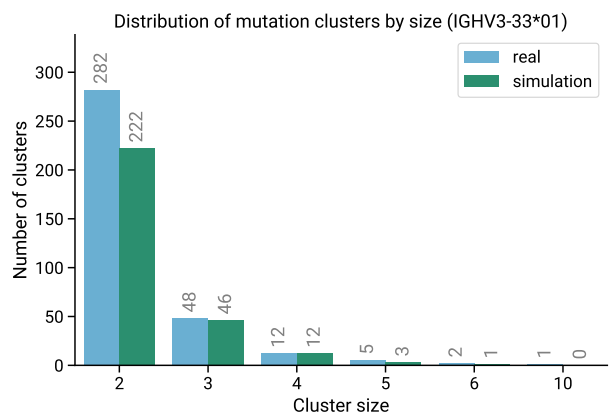
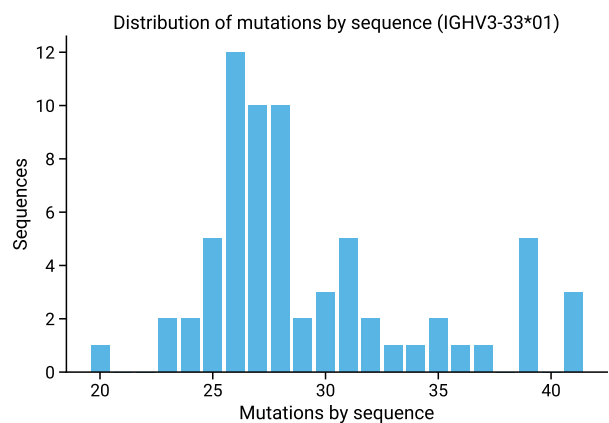
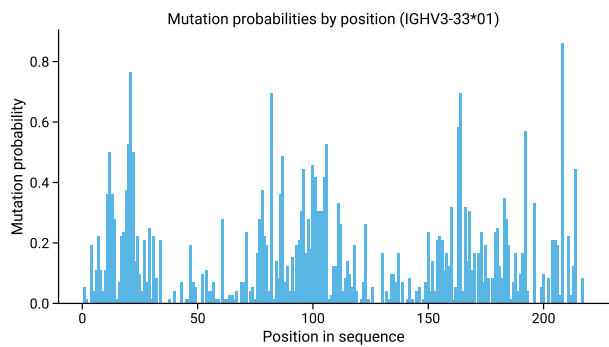
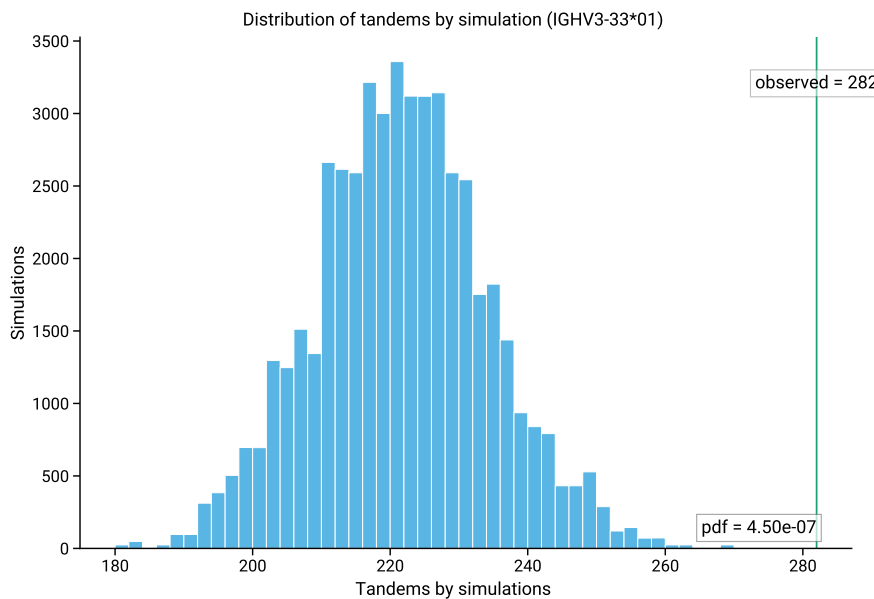


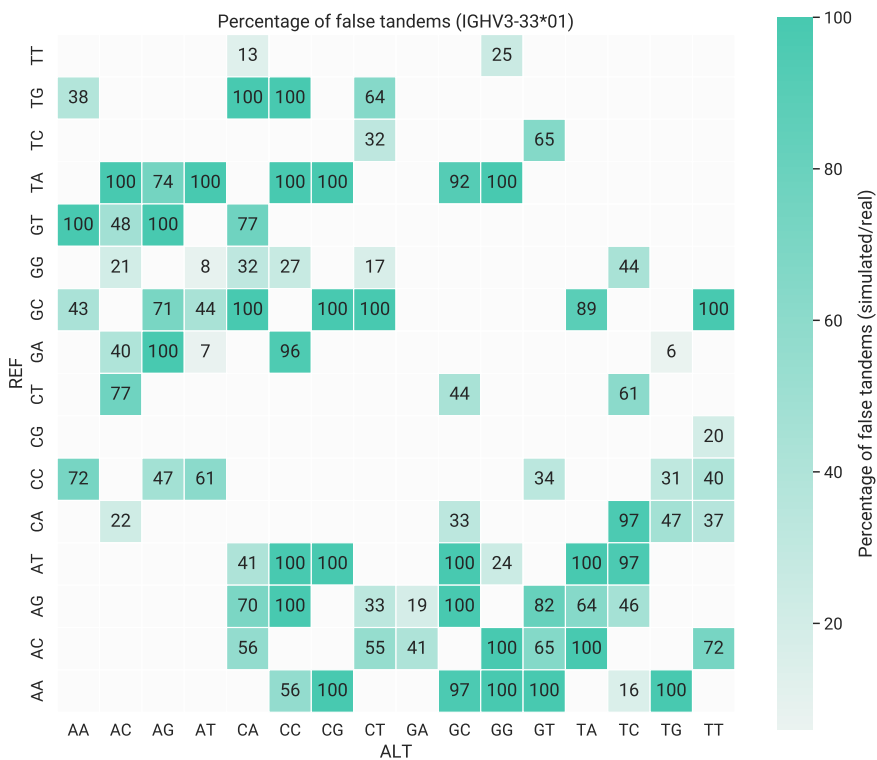
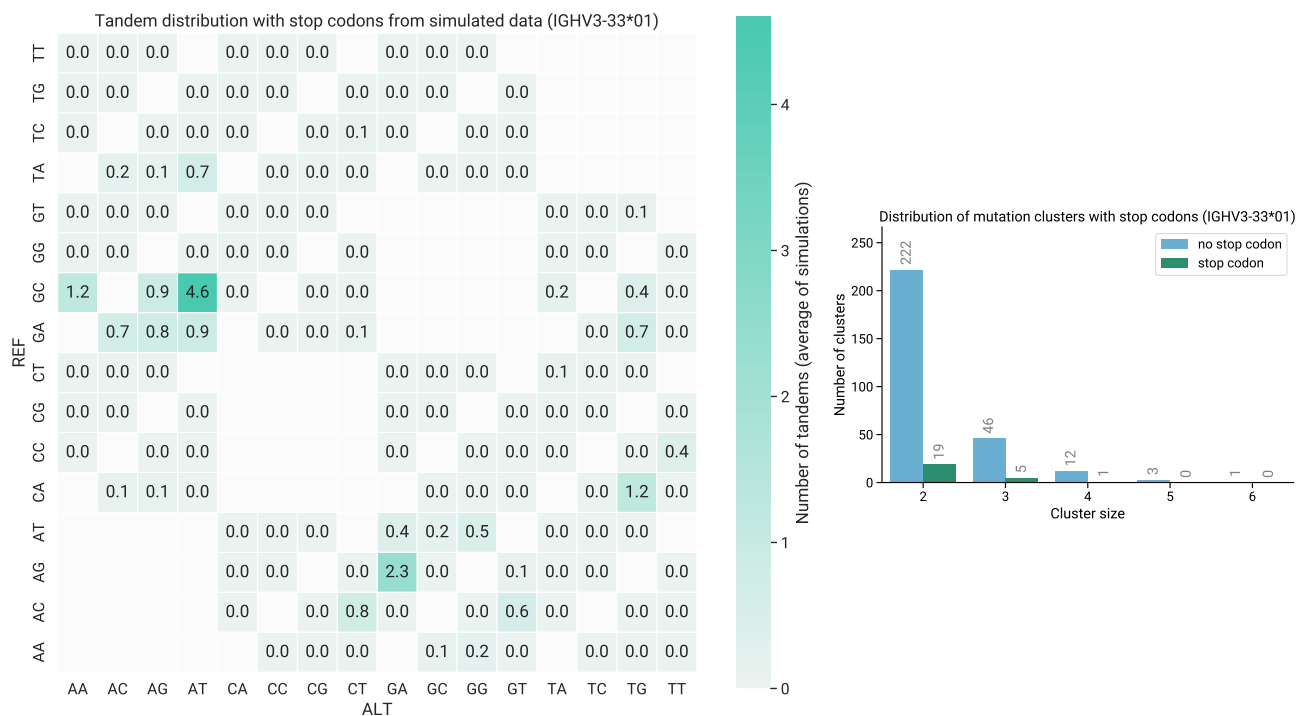
Tandem distribution from simulated data (IGHV3-30\*04)





### 6.12 IGHV3-33\*01

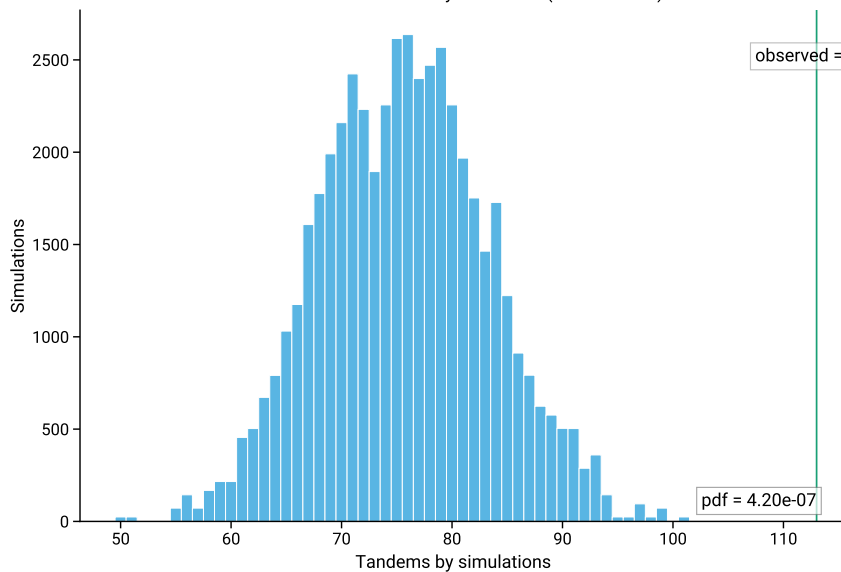




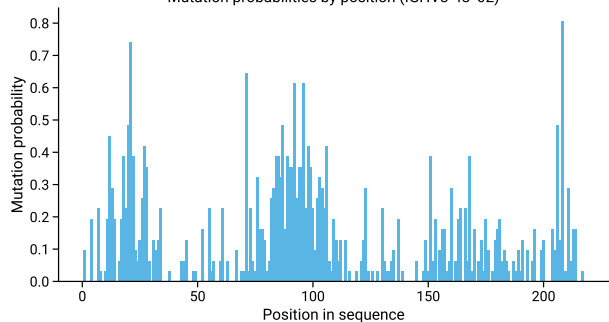


### 6.13 IGHV3-48\*02

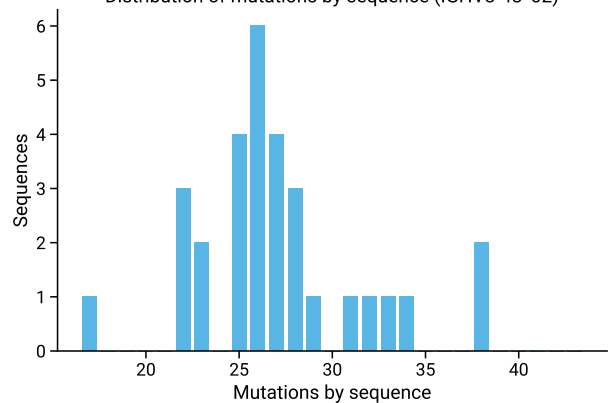
Distribution of tandems by simulation (IGHV3-48\*02)



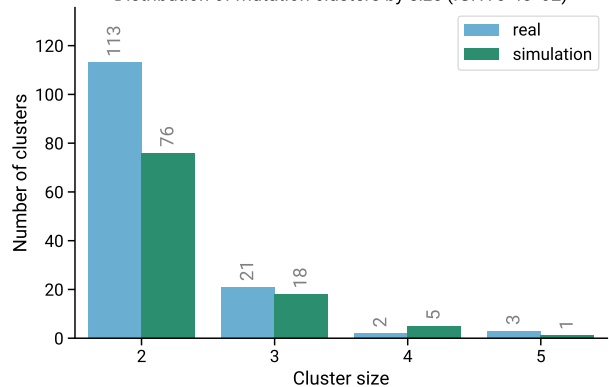
Mutation probabilities by position (IGHV3-48\*02)



Distribution of mutations by sequence (IGHV3-48\*02)



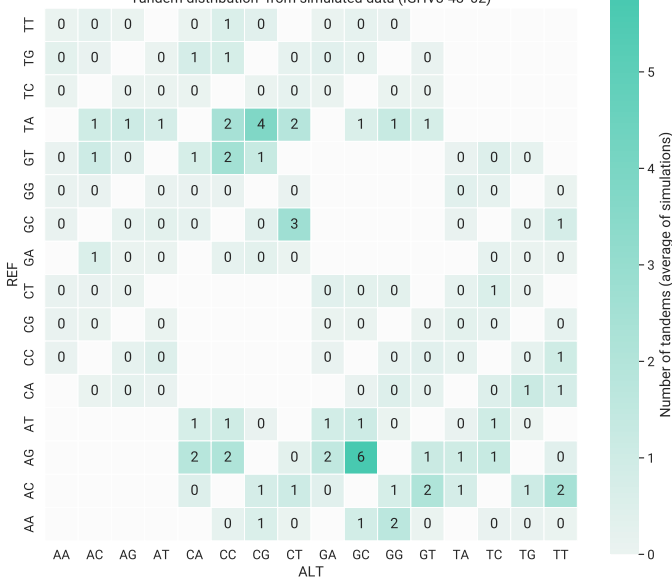
Distribution of mutation clusters by size (IGHV3-48\*02)

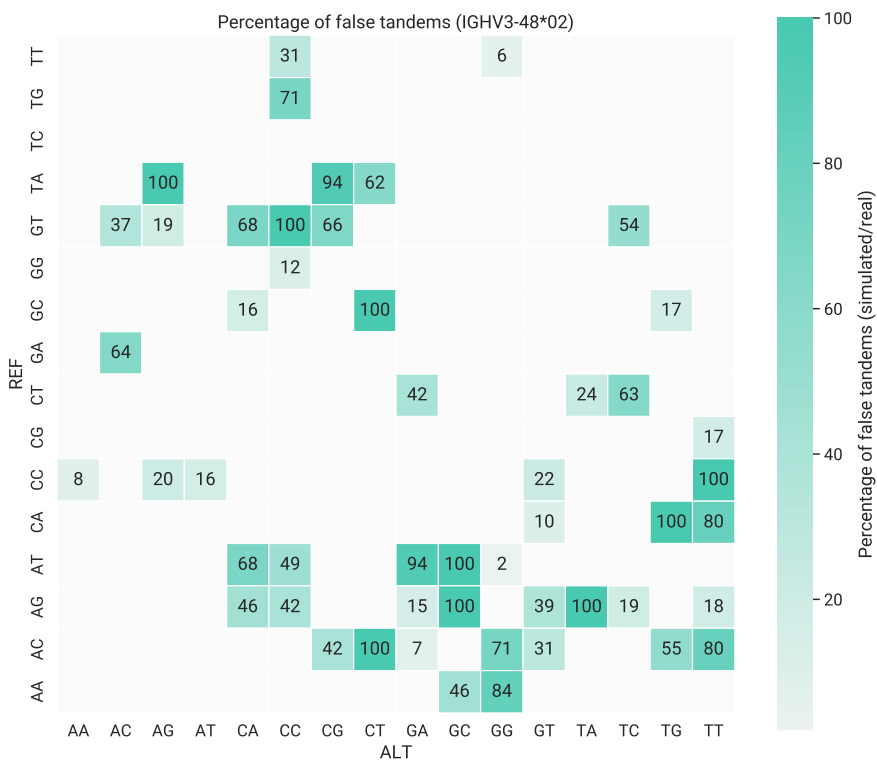
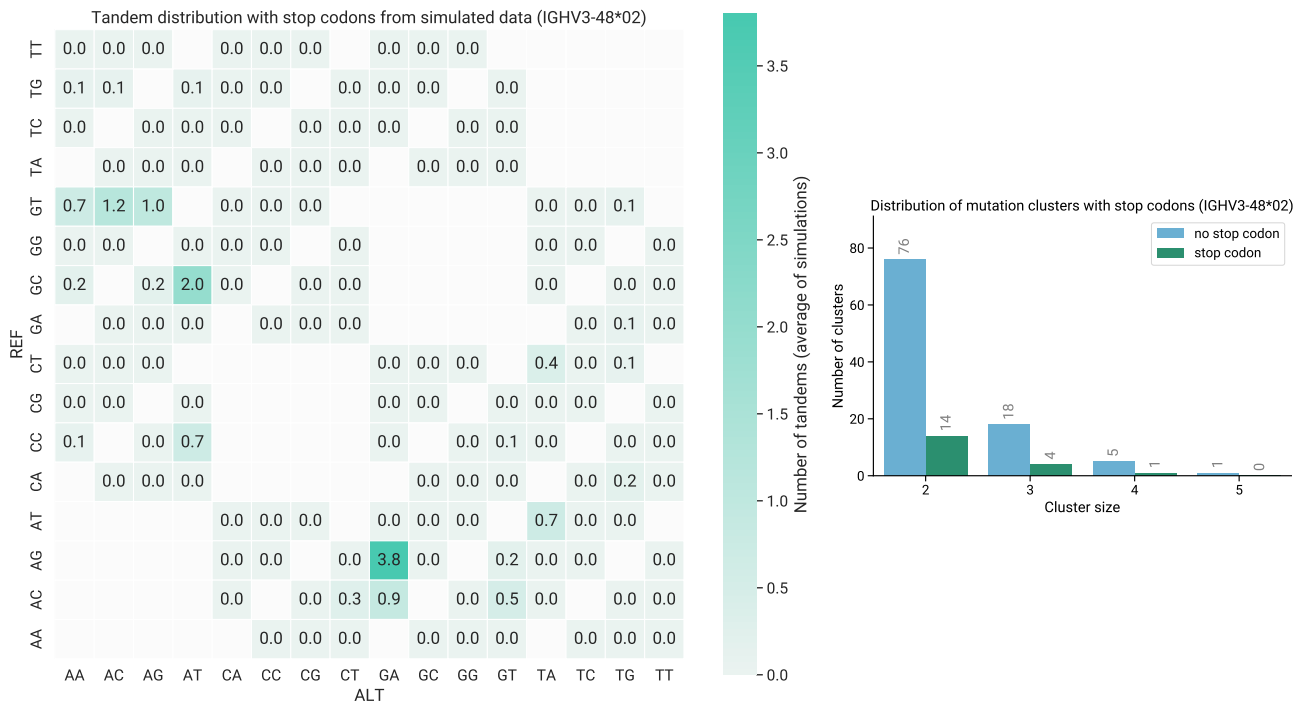


Tandem distribution from real data (IGHV3-48\*02)



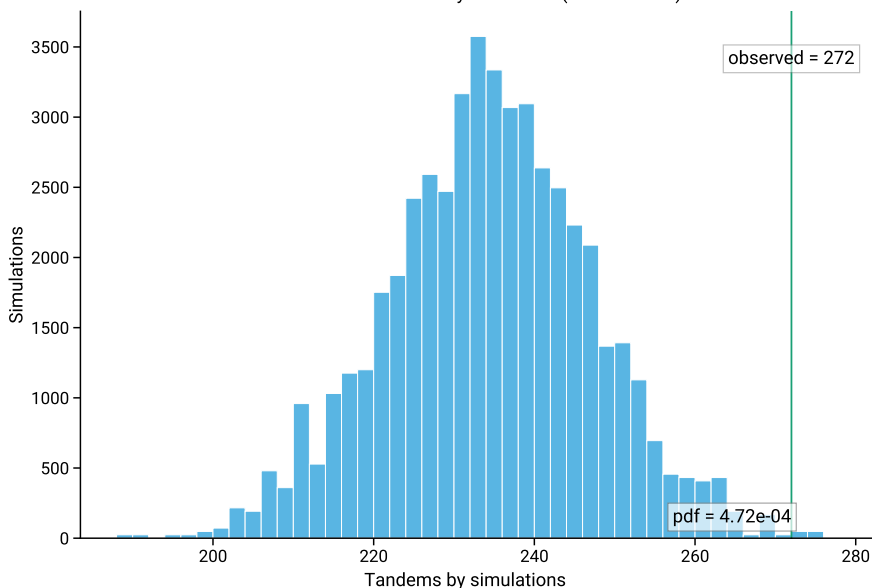
Tandem distribution from simulated data (IGHV3-48\*02)



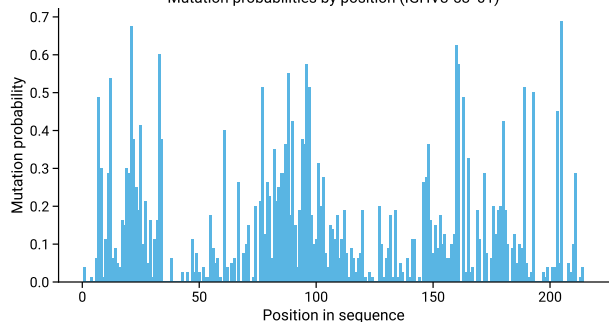


### 6.14 IGHV3-53\*01

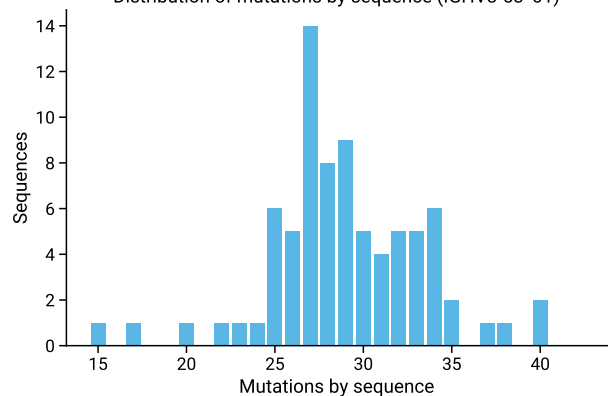
Distribution of tandems by simulation (IGHV3-53\*01)



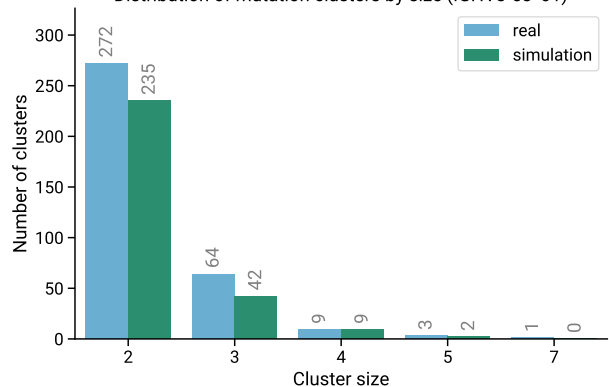
Mutation probabilities by position (IGHV3-53\*01)



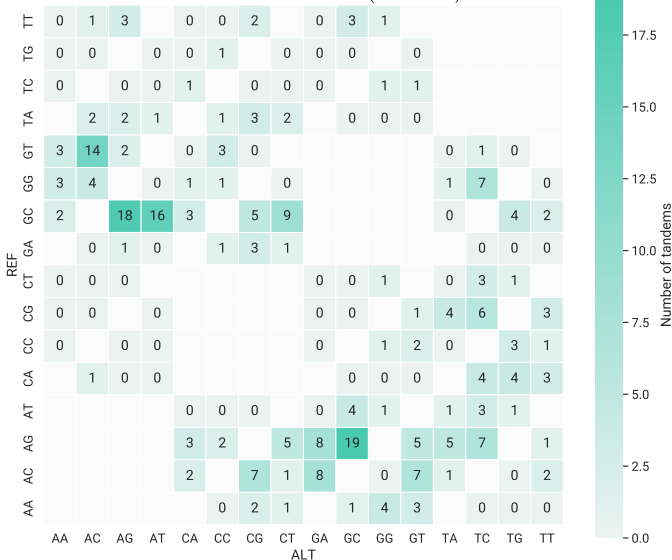
Distribution of mutations by sequence (IGHV3-53\*01)



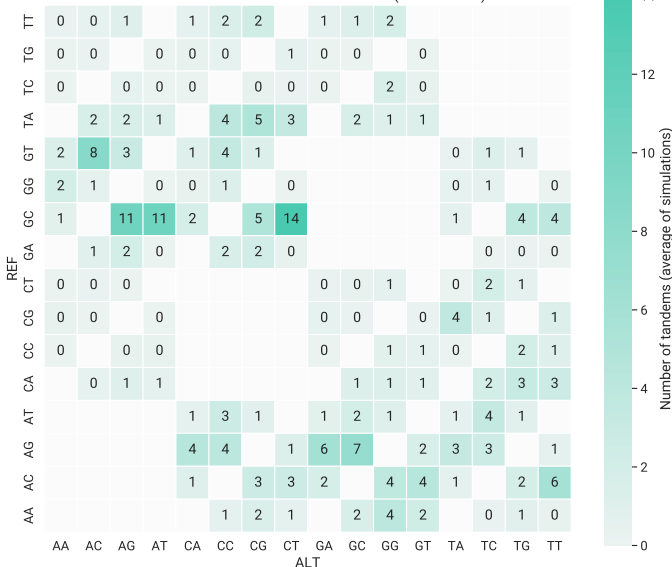
Distribution of mutation clusters by size (IGHV3-53\*01)

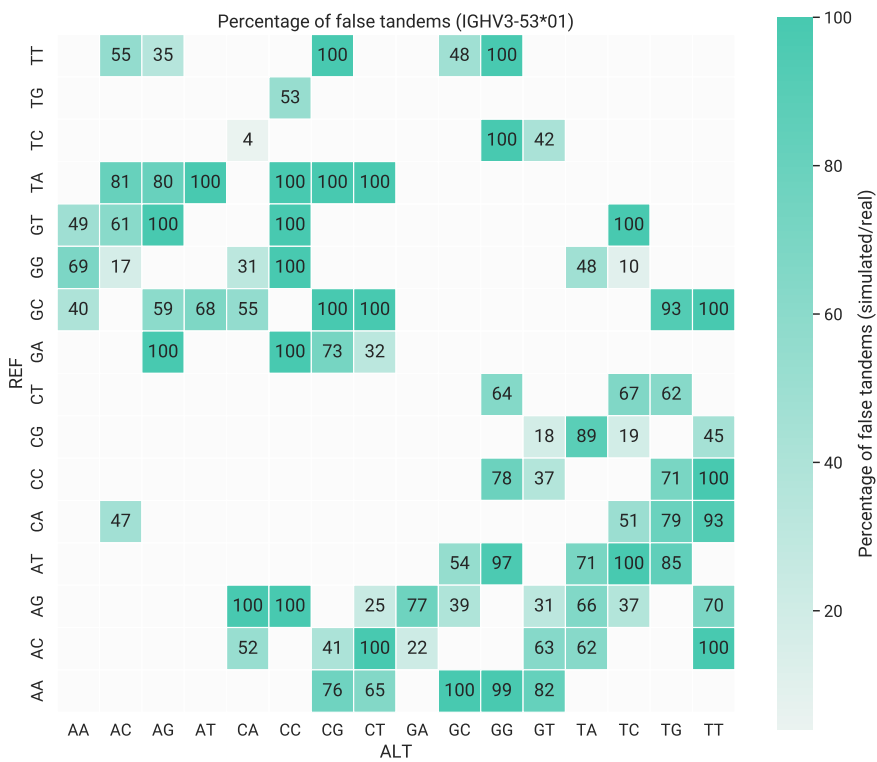
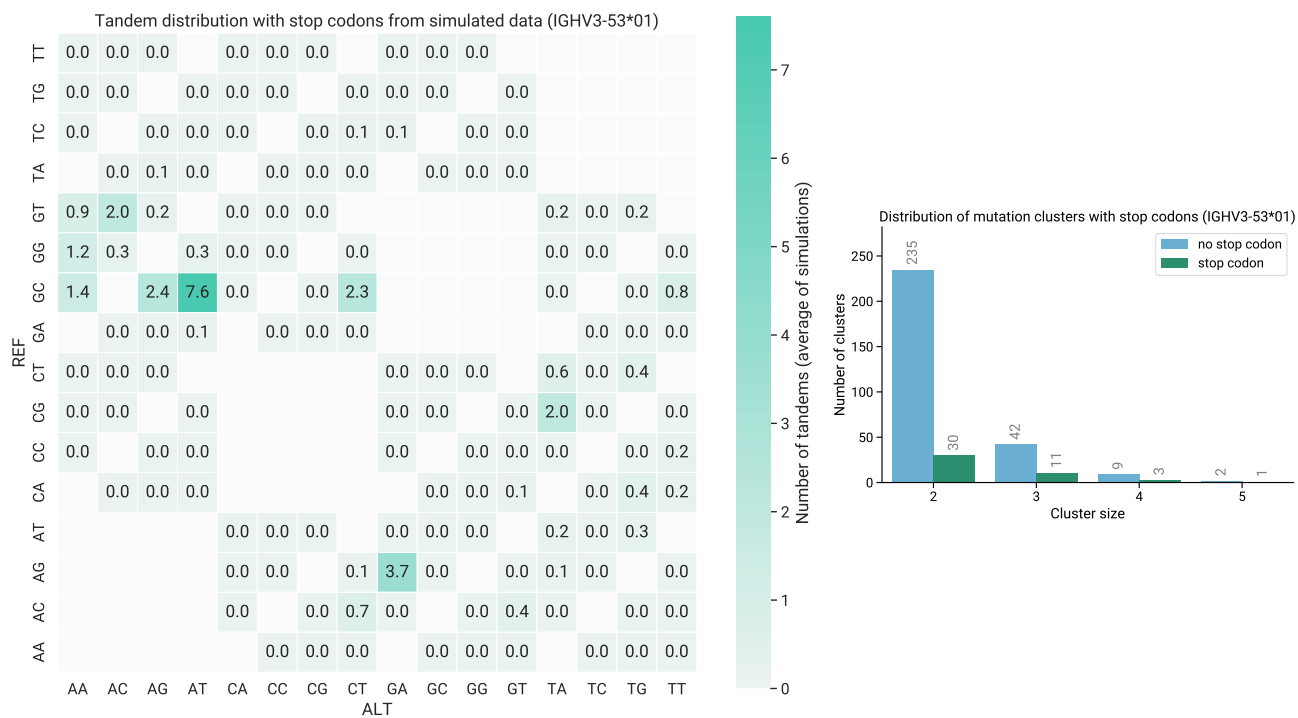


Tandem distribution from real data (IGHV3-53\*01)



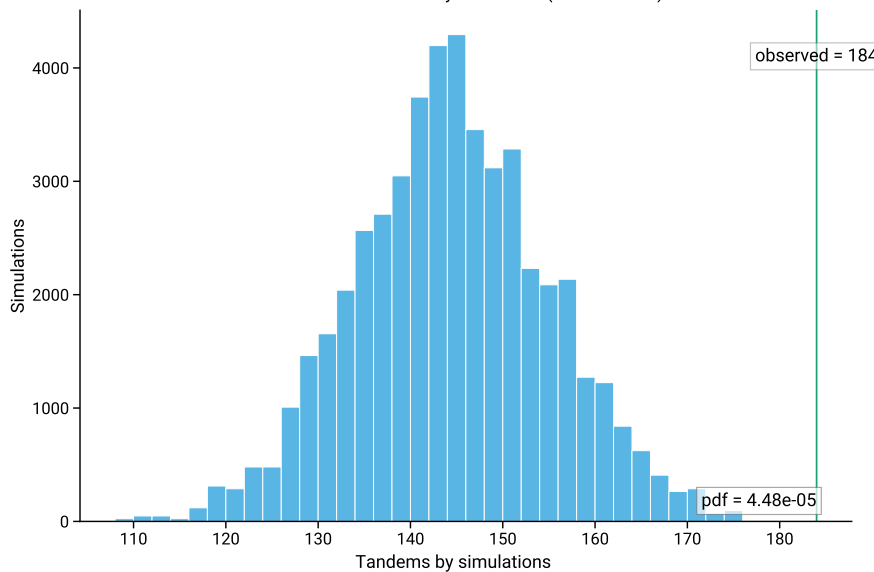
Tandem distribution from simulated data (IGHV3-53\*01)



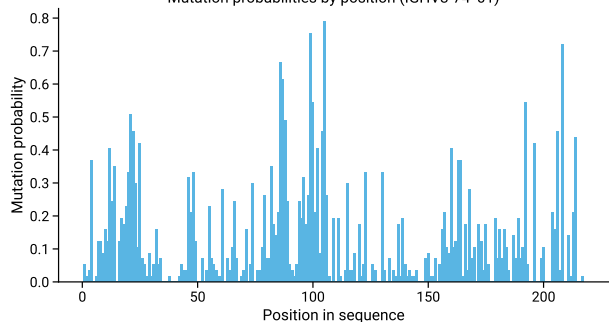


### 6.15 IGHV3-74\*01

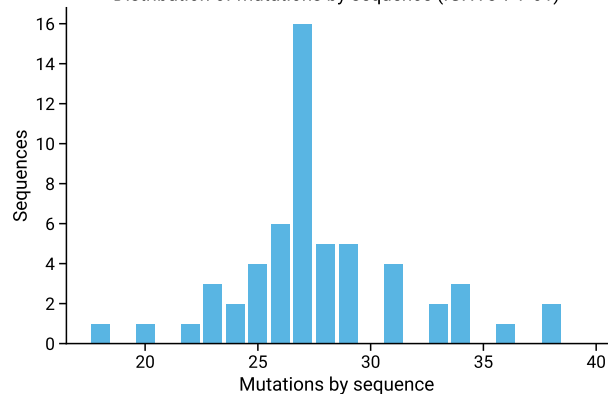
Distribution of tandems by simulation (IGHV3-74\*01)



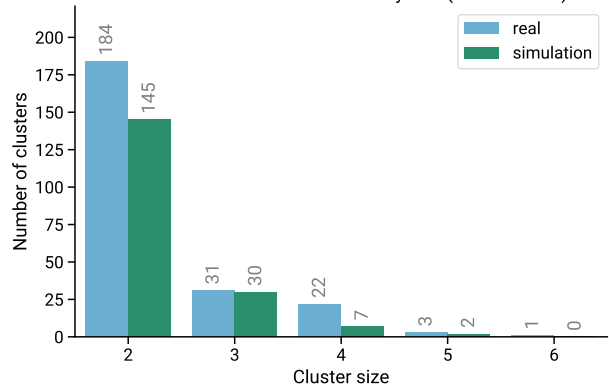
Mutation probabilities by position (IGHV3-74\*01)



Distribution of mutations by sequence (IGHV3-74\*01)



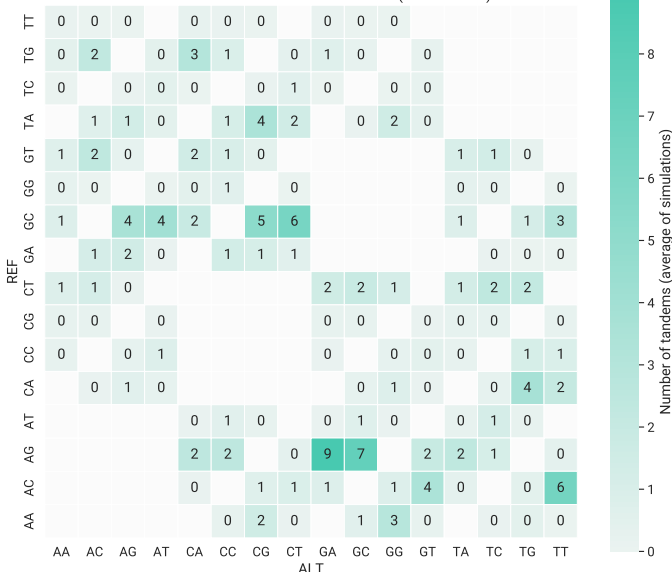
Distribution of mutation clusters by size (IGHV3-74\*01)

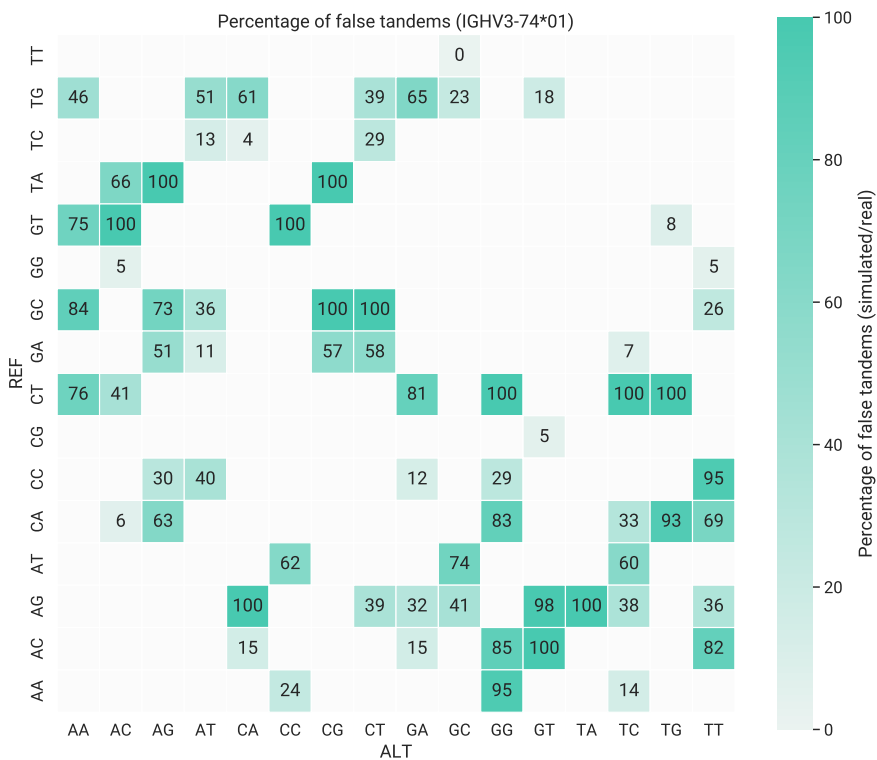
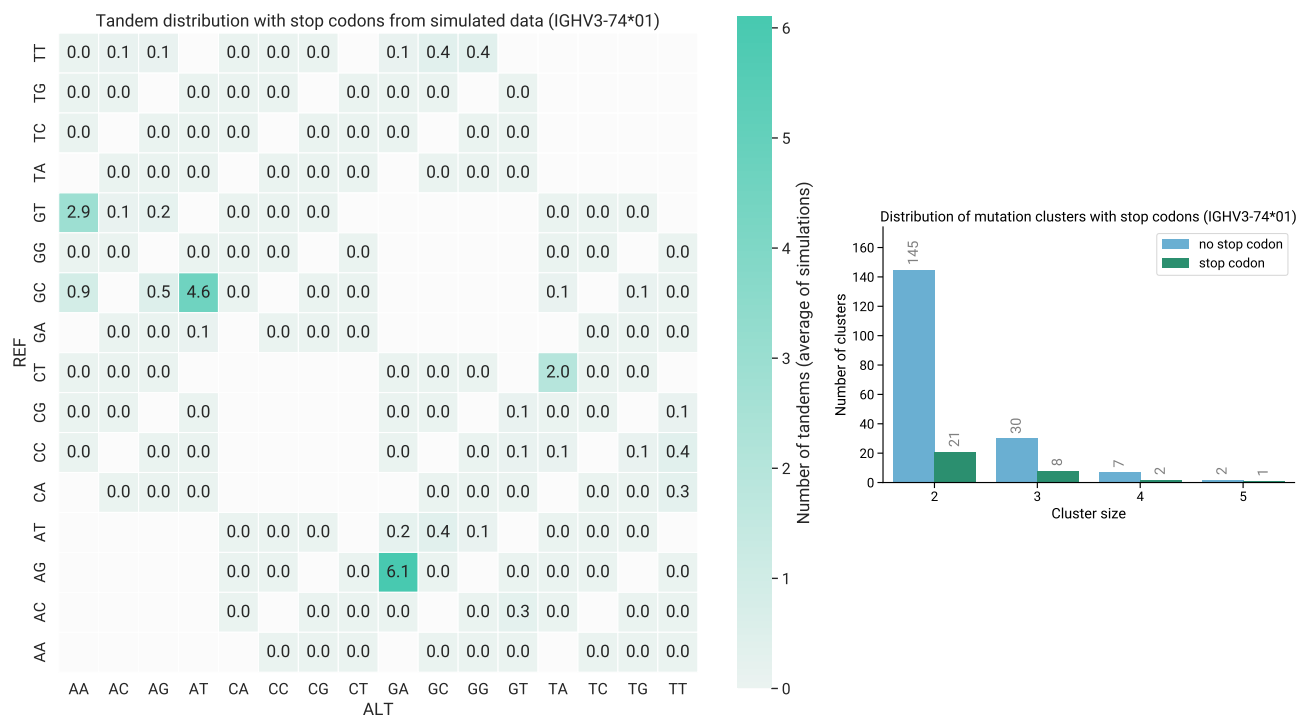


Tandem distribution from real data (IGHV3-74\*01)



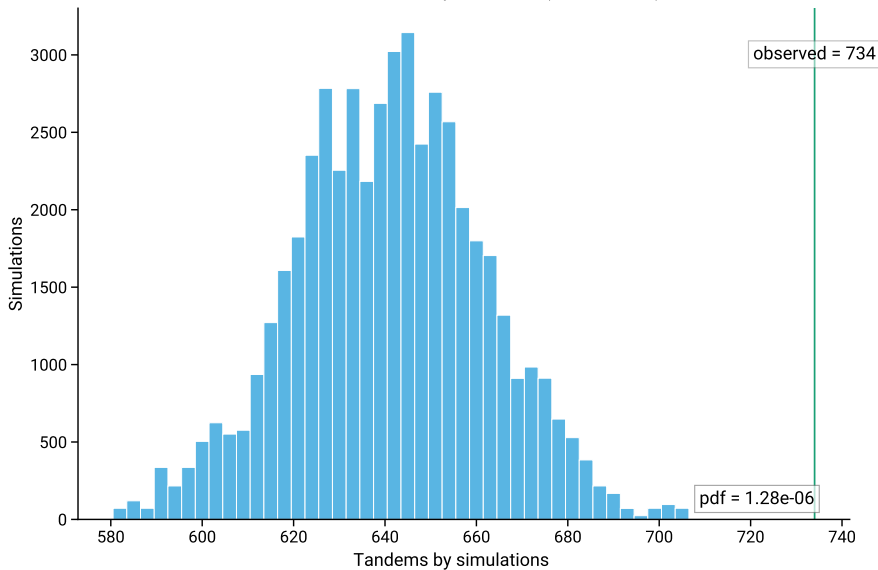
Tandem distribution from simulated data (IGHV3-74\*01)



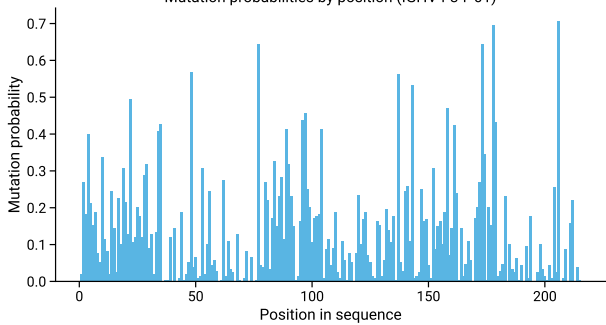


### 6.16 IGHV4-34\*01

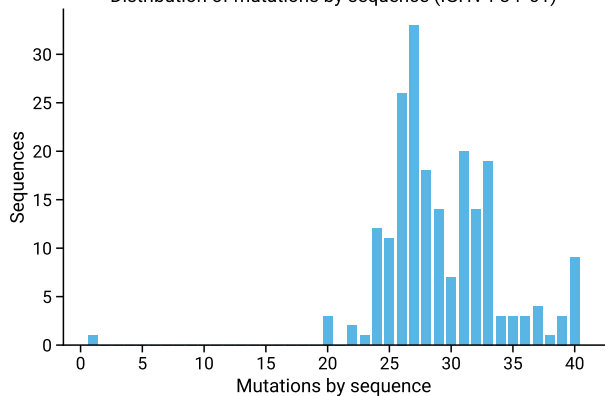
Distribution of tandems by simulation (IGHV4-34\*01)



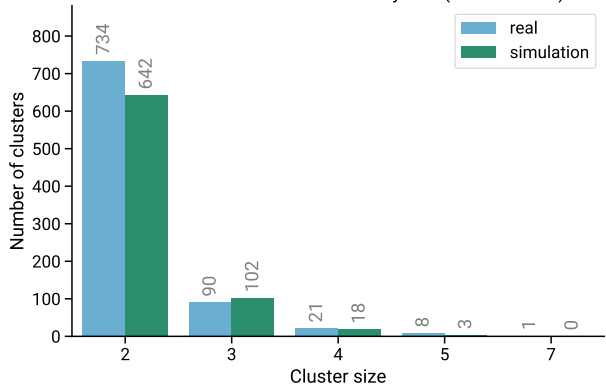
Mutation probabilities by position (IGHV4-34\*01)



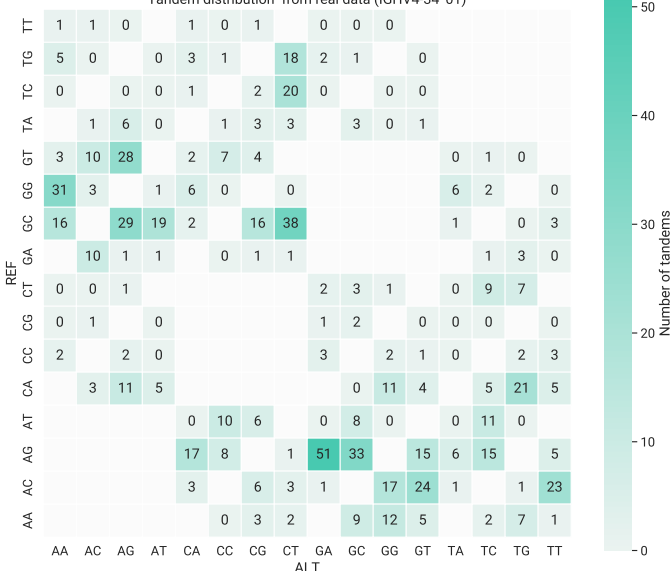
Distribution of mutations by sequence (IGHV4-34\*01)



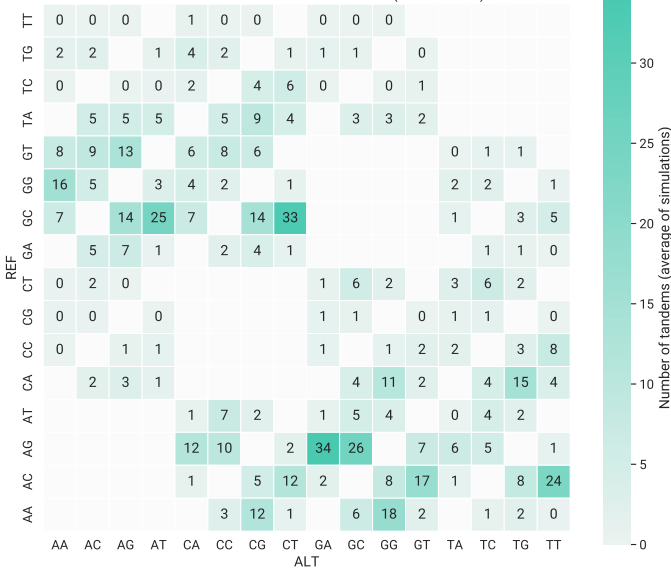
Distribution of mutation clusters by size (IGHV4-34\*01)

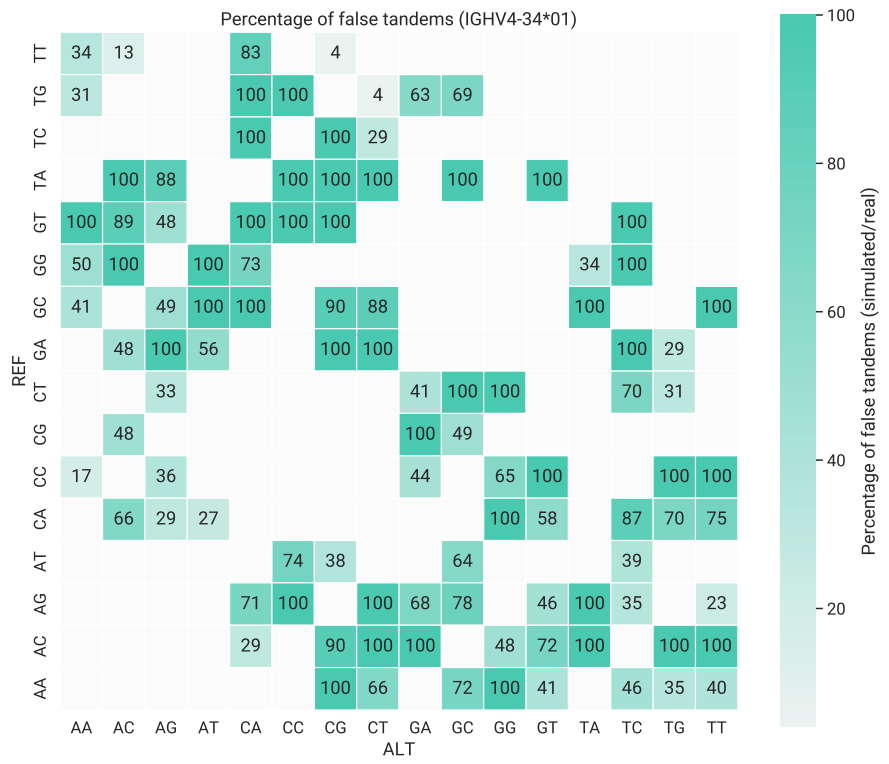
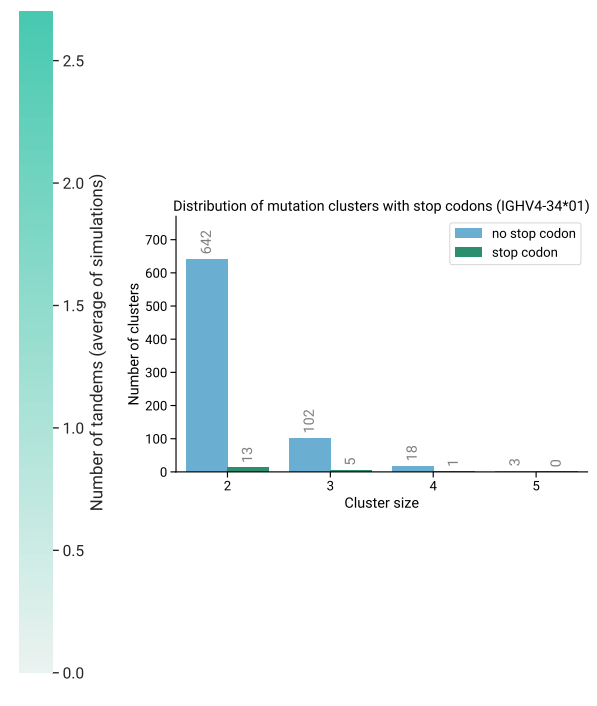
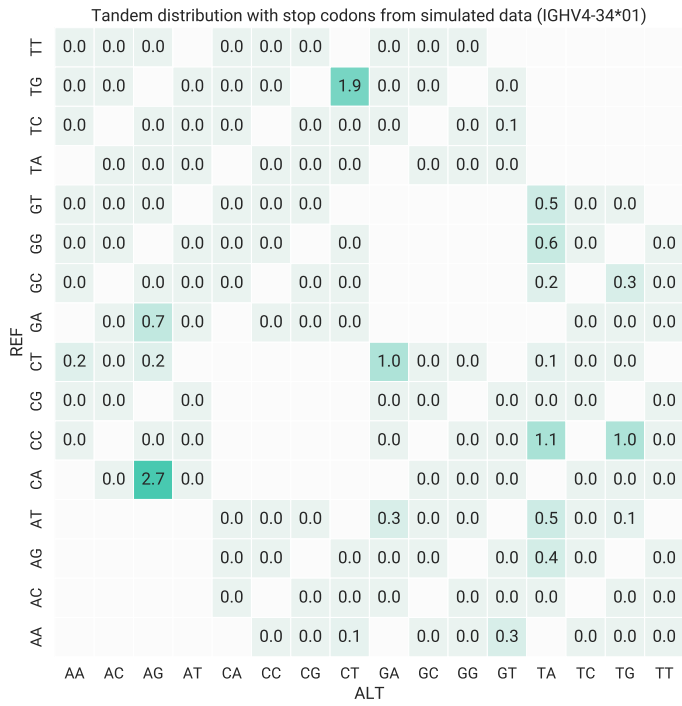


Tandem distribution from real data (IGHV4-34\*01)



Tandem distribution from simulated data (IGHV4-34\*01)

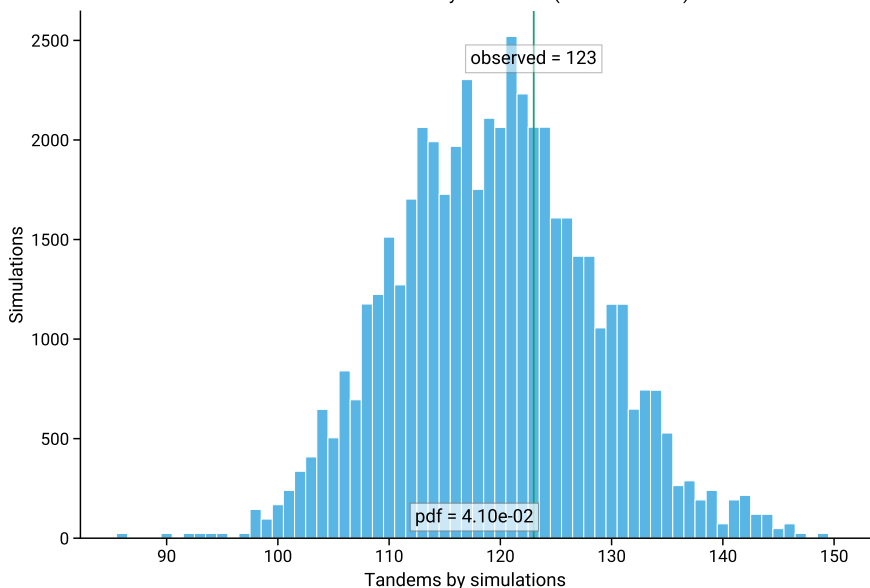




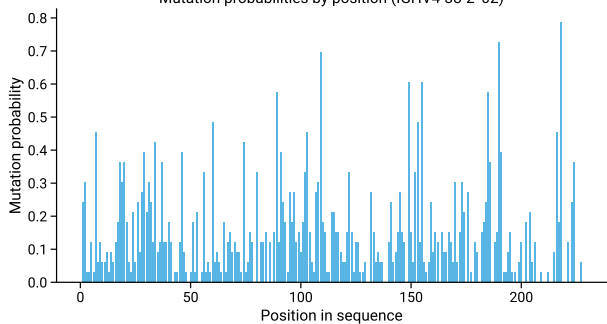


### 6.17 IGHV4-38-2\*02

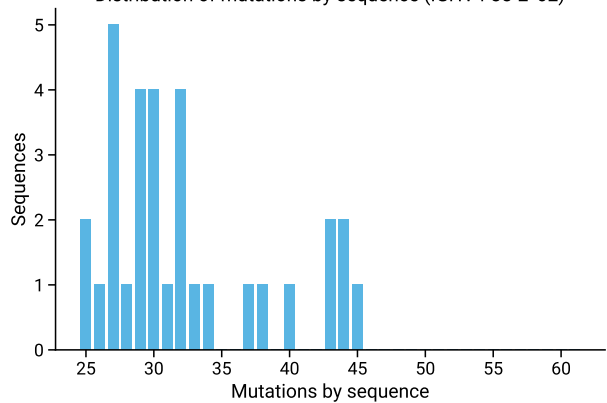
Distribution of tandems by simulation (IGHV4-38-2\*02)



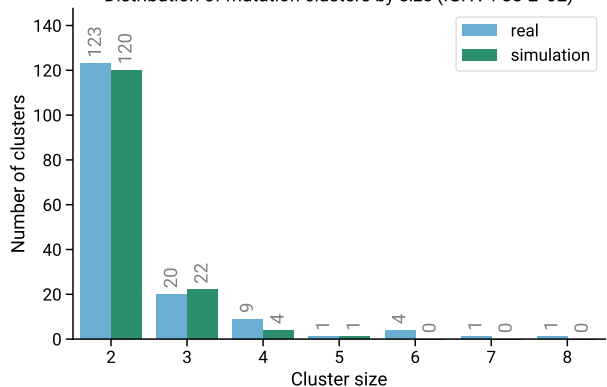
Mutation probabilities by position (IGHV4-38-2\*02)



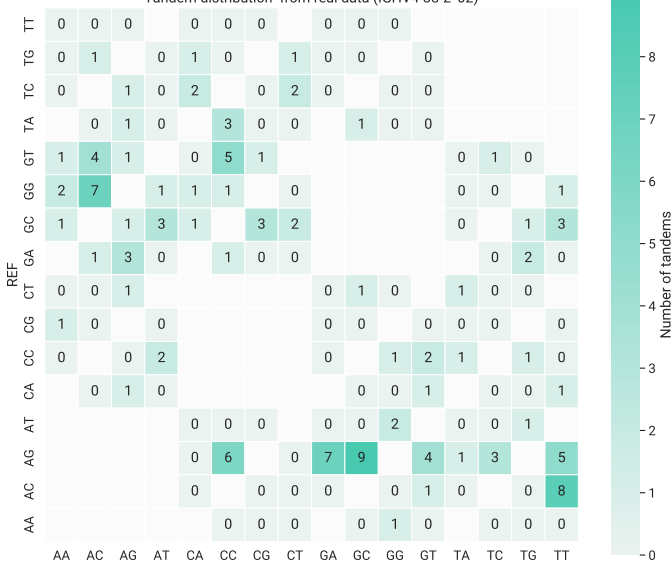
Distribution of mutations by sequence (IGHV4-38-2\*02)



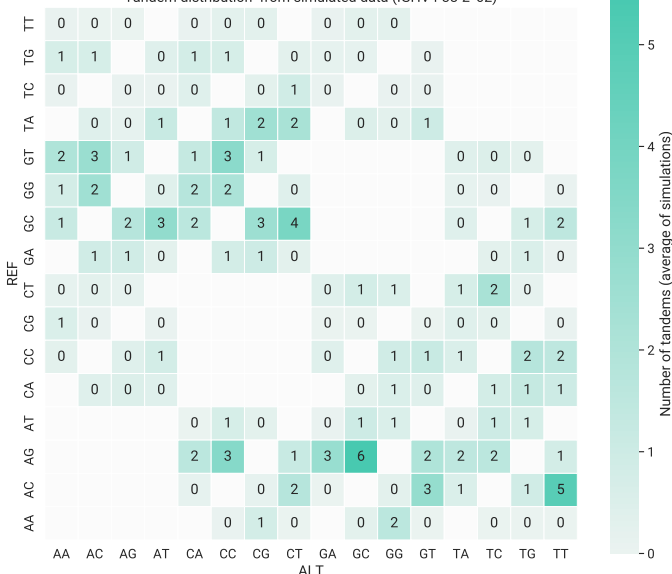
Distribution of mutation clusters by size (IGHV4-38-2\*02)

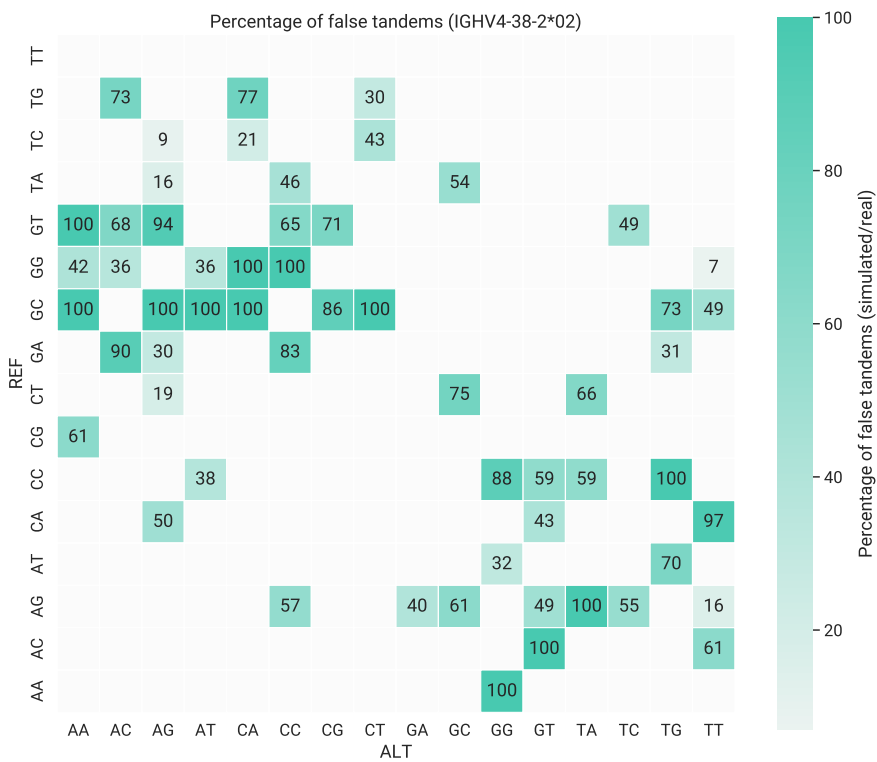
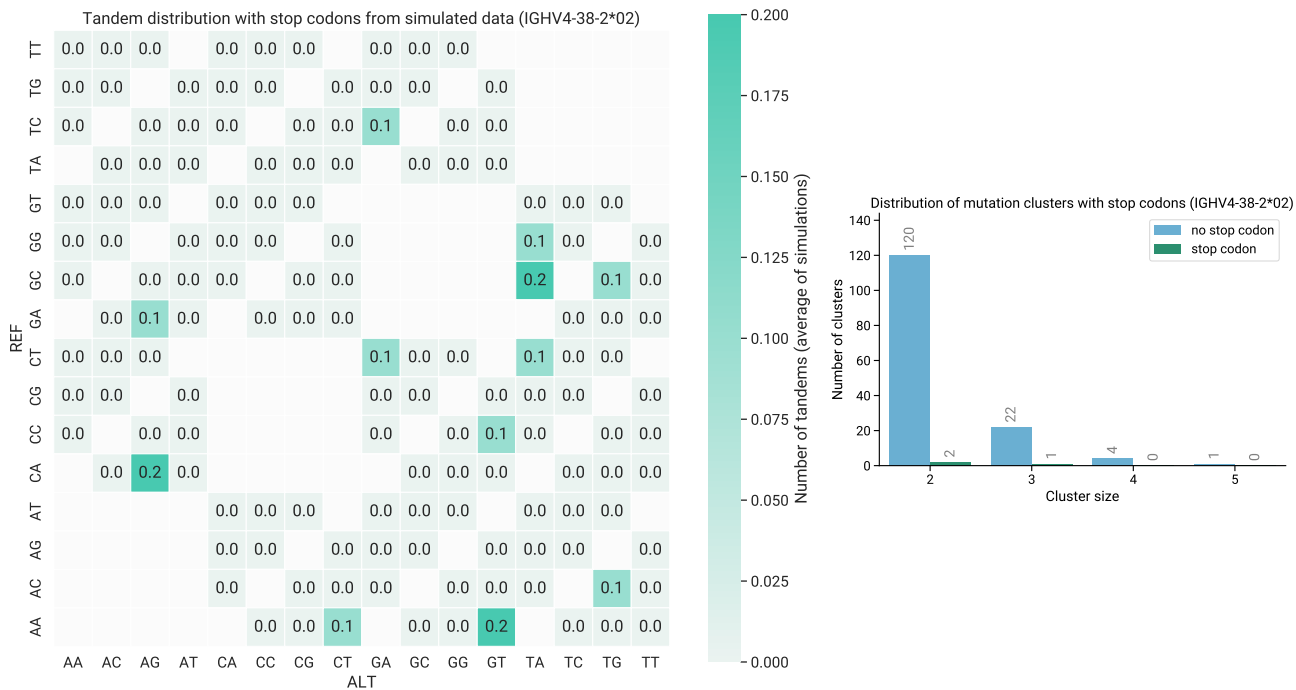


Tandem distribution from real data (IGHV4-38-2\*02)



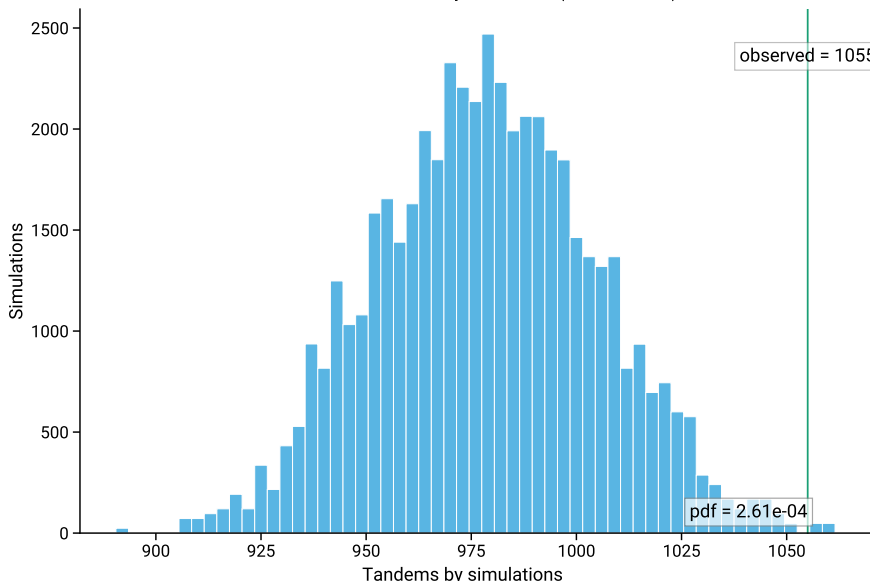
Tandem distribution from simulated data (IGHV4-38-2\*02)



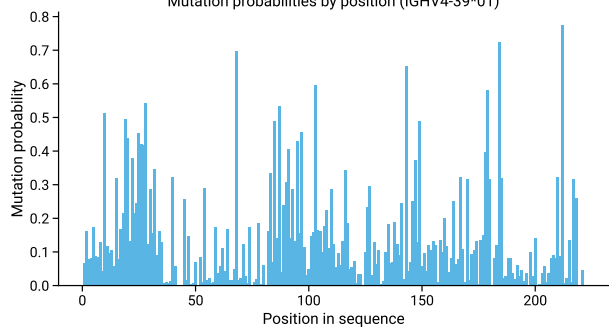


### 6.18 IGHV4-39\*01

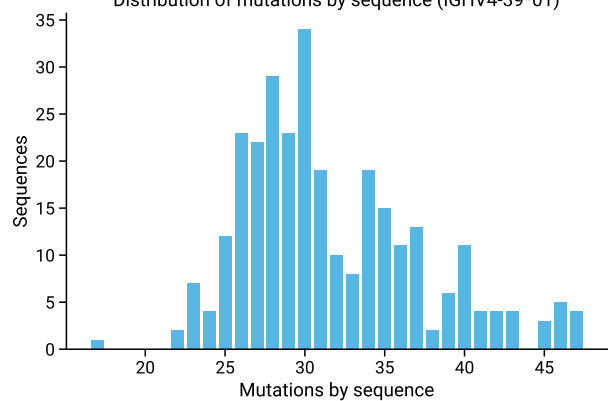
Distribution of tandems by simulation (IGHV4-39\*01)



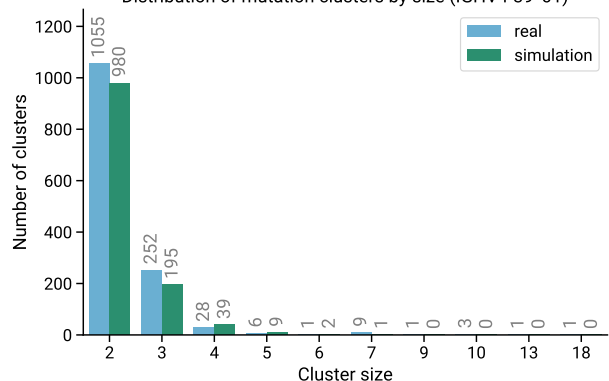
Mutation probabilities by position (IGHV4-39\*01)



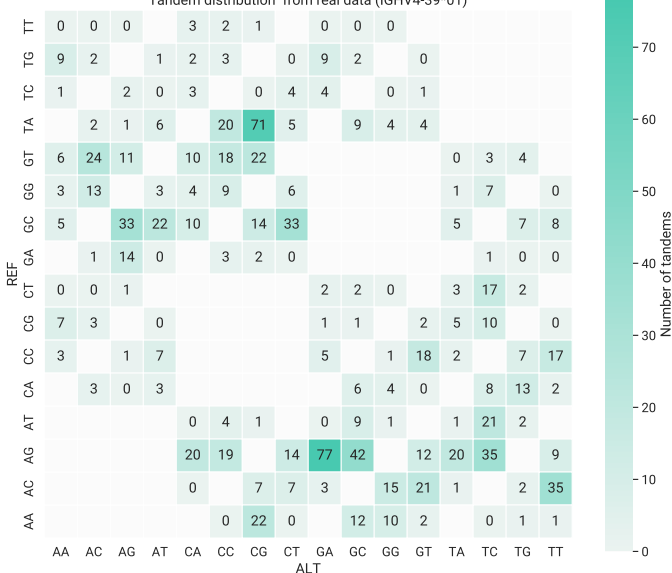
Distribution of mutations by sequence (IGHV4-39\*01)



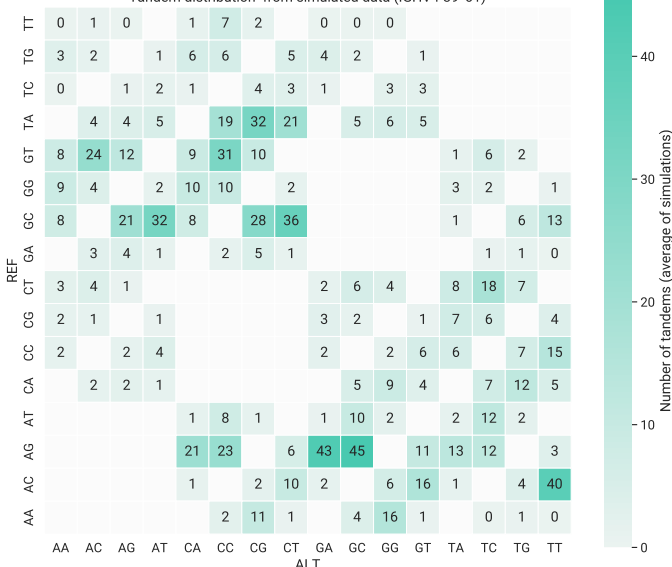
Distribution of mutation clusters by size (IGHV4-39\*01)

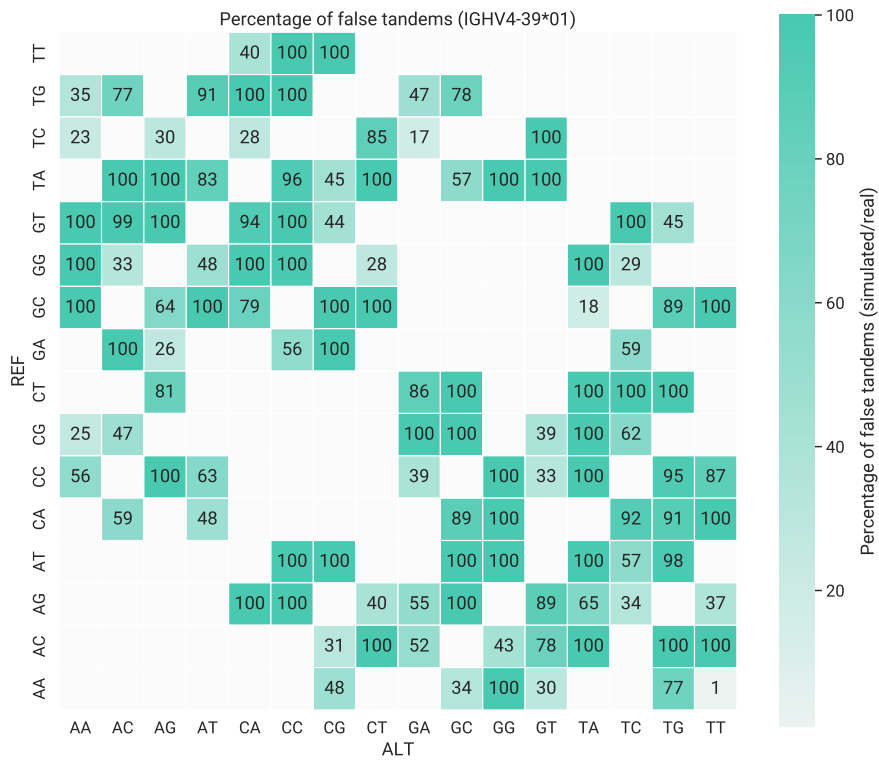
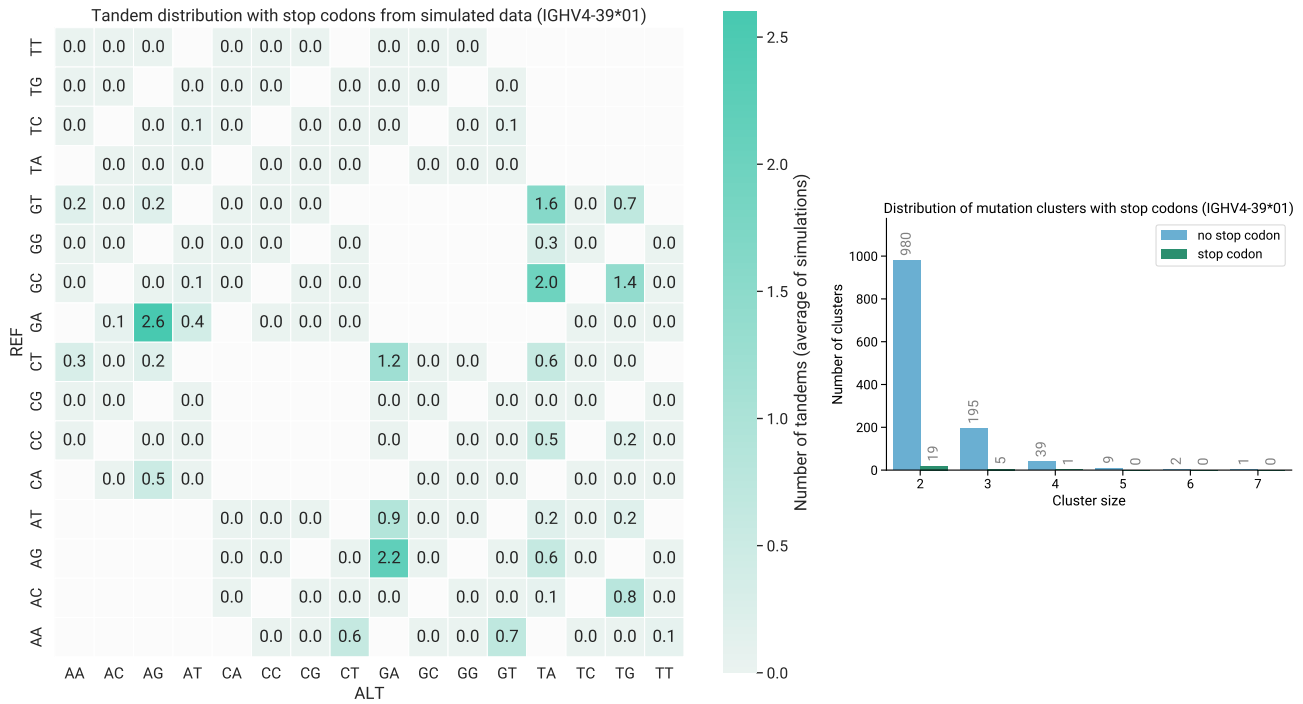


Tandem distribution from real data (IGHV4-39\*01)



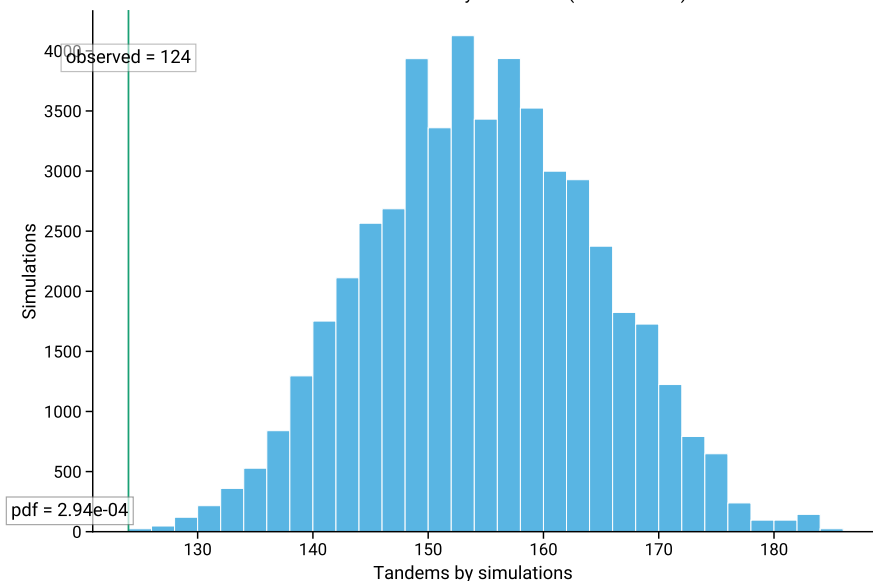
Tandem distribution from simulated data (IGHV4-39\*01)



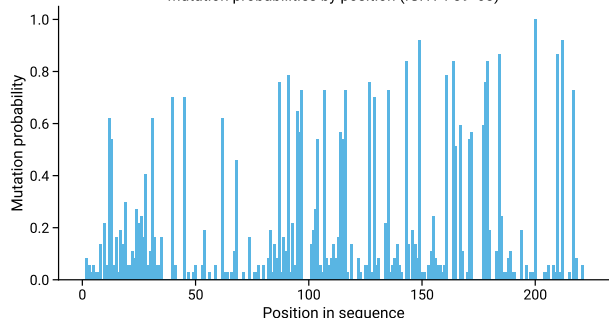


### 6.19 IGHV4-39\*03

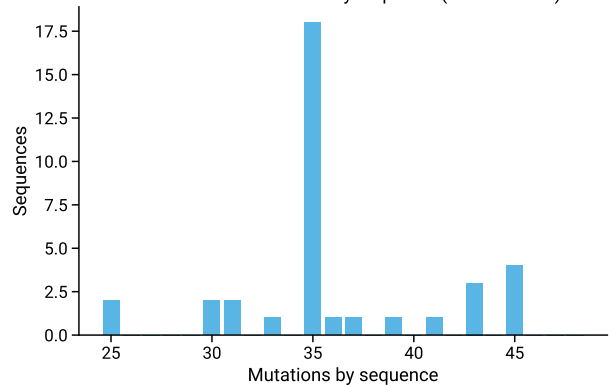
Distribution of tandems by simulation (IGHV4-39\*03)



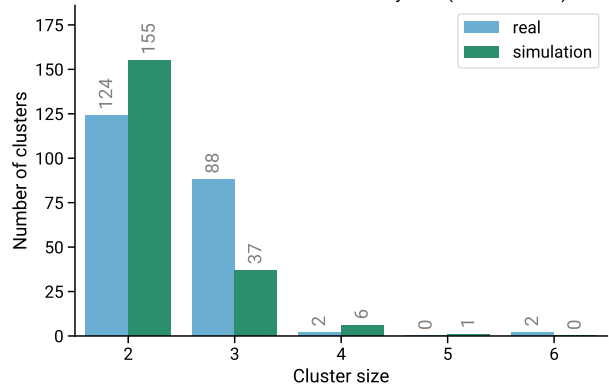
Mutation probabilities by position (IGHV4-39\*03)



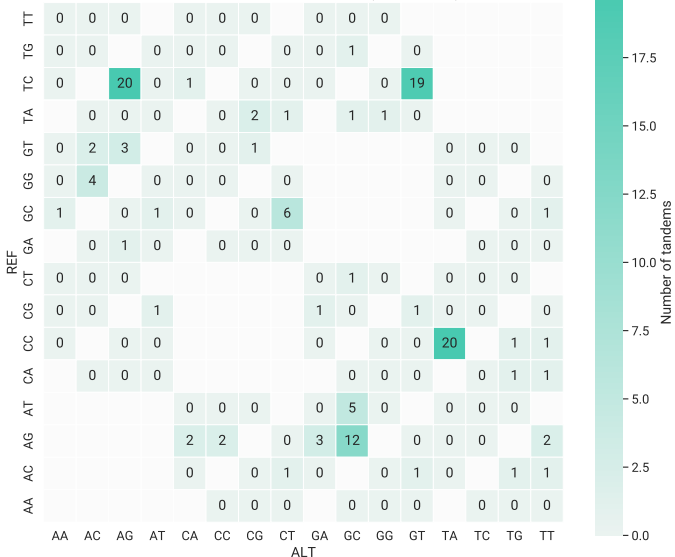
Distribution of mutations by sequence (IGHV4-39\*03)



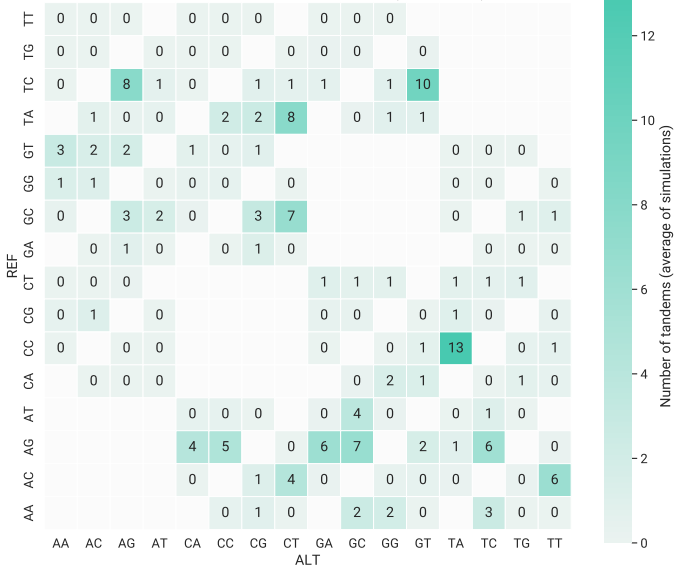
Distribution of mutation clusters by size (IGHV4-39\*03)

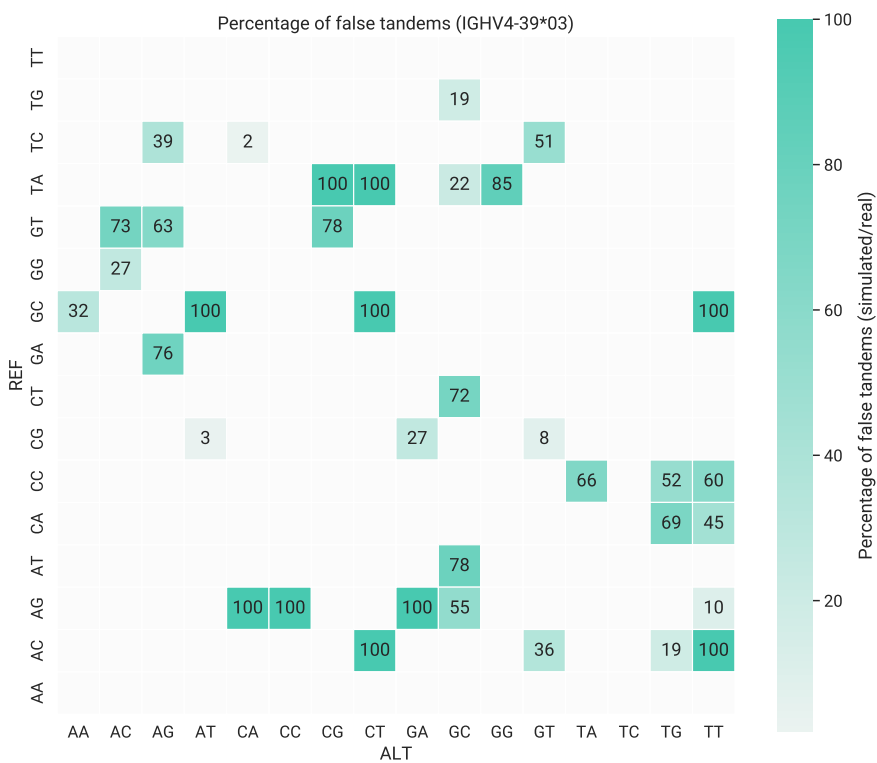
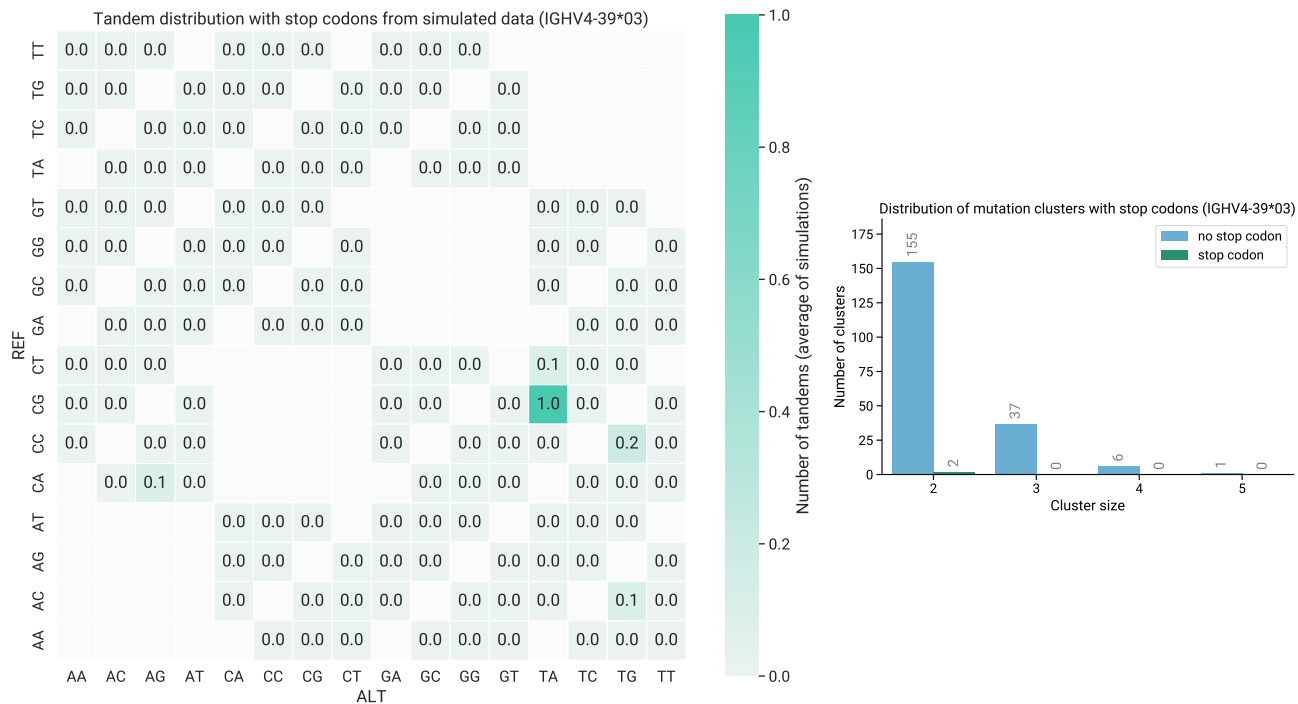


Tandem distribution from real data (IGHV4-39\*03)



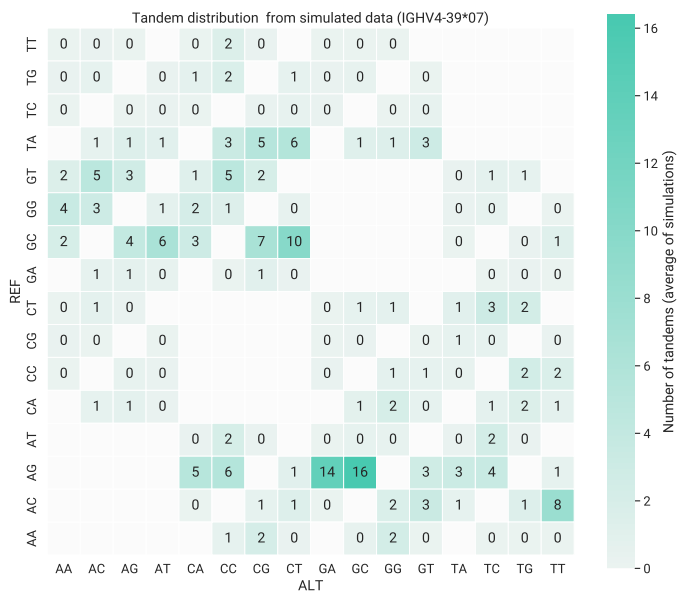
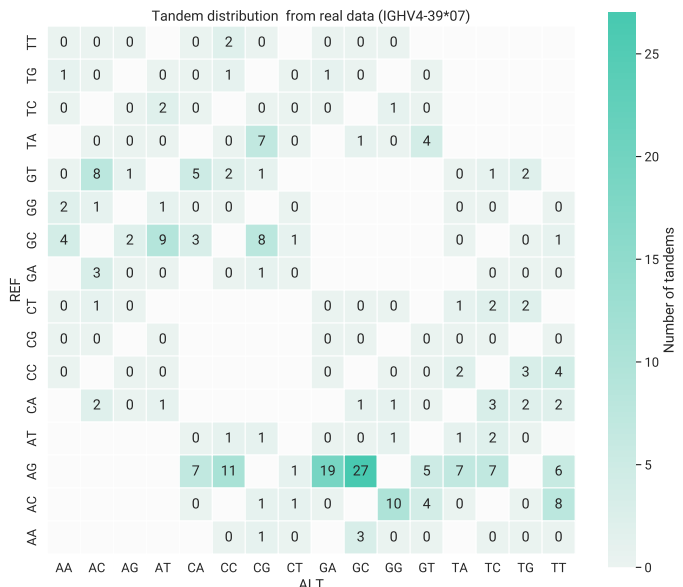
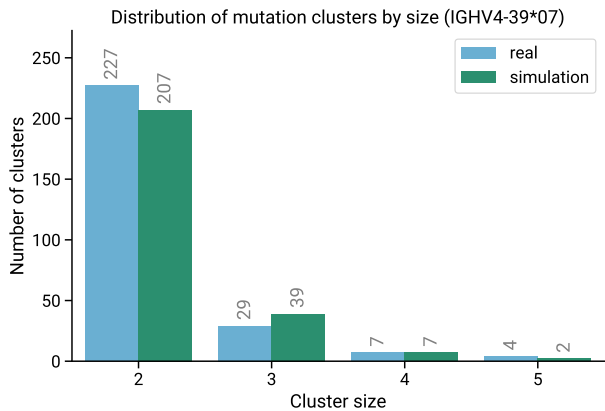
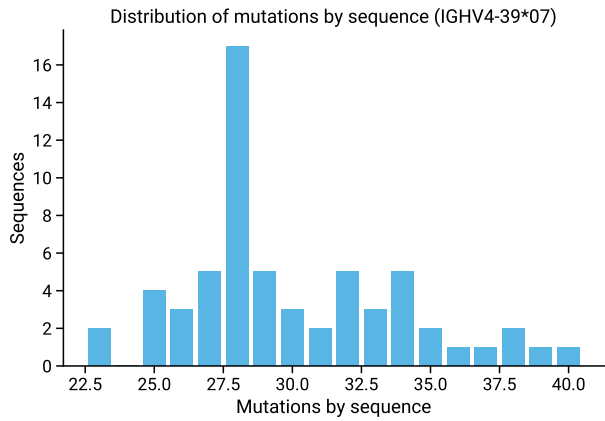
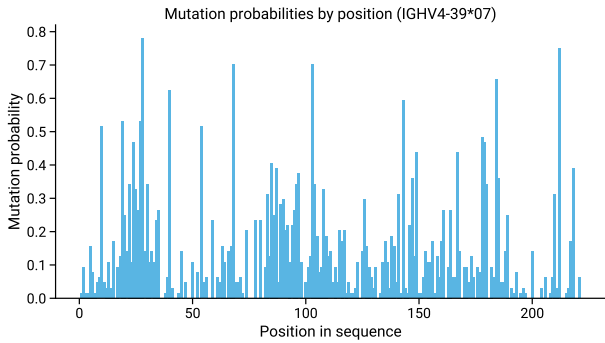
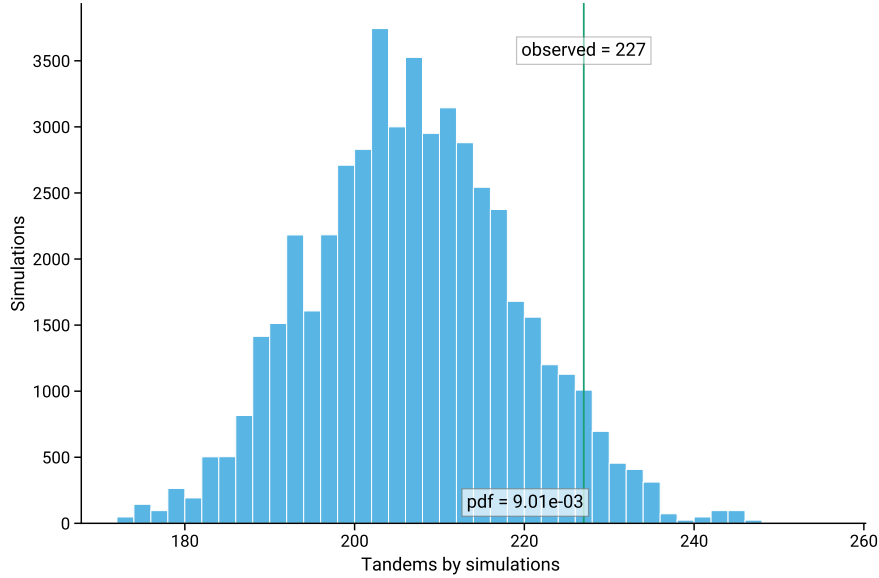
Tandem distribution from simulated data (IGHV4-39\*03)

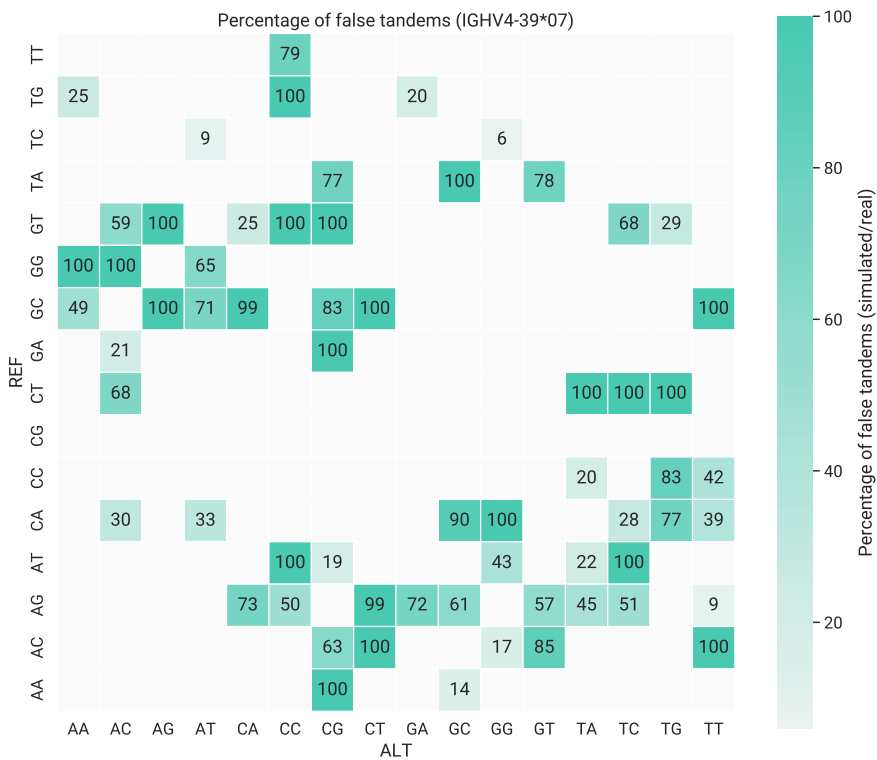
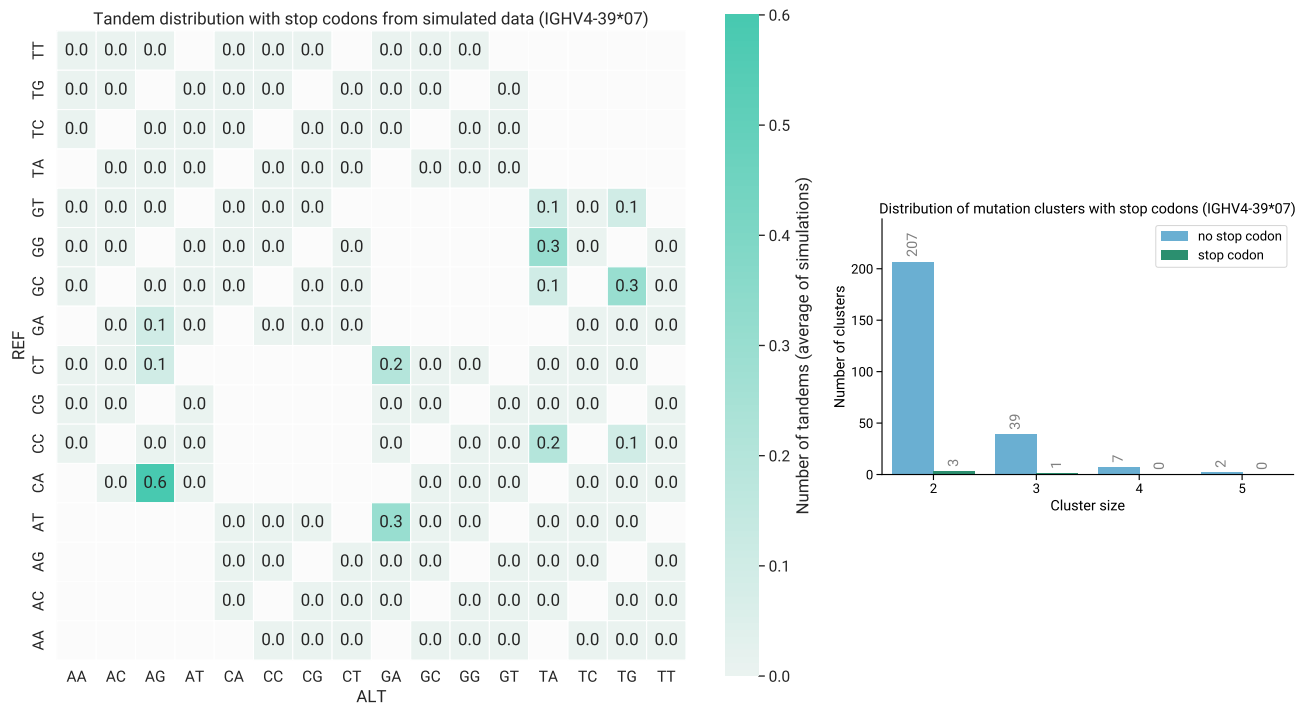




### 6.20 IGHV4-39\*07

Distribution of tandems by simulation (IGHV4-39\*07)

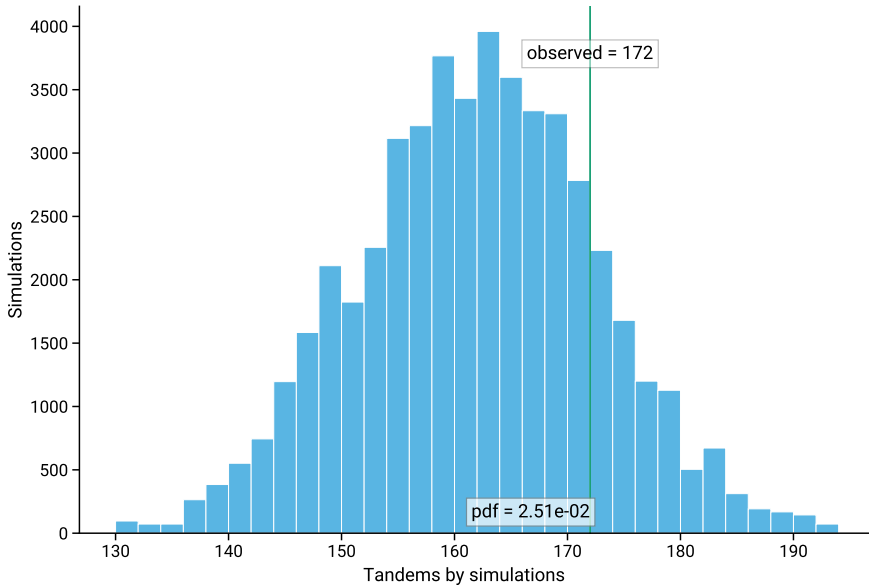




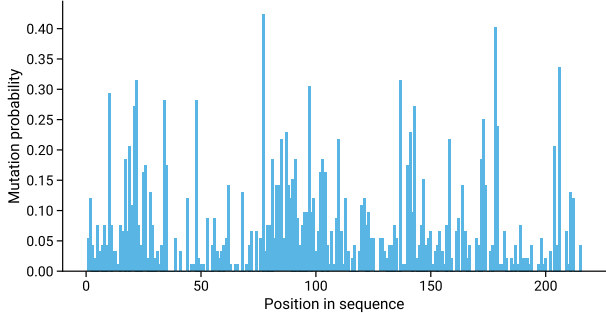


### 6.21 IGHV4-59\*01

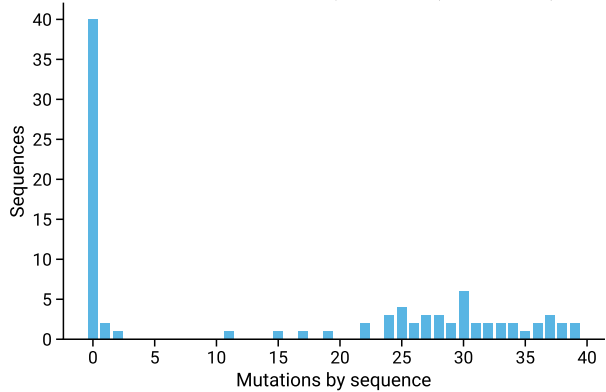
Distribution of tandems by simulation (IGHV4-59\*01)



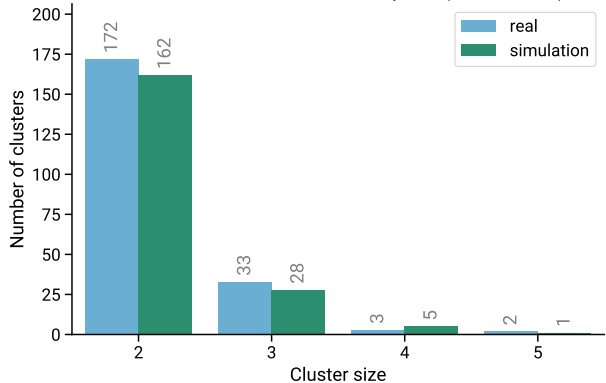
Mutation probabilities by position (IGHV4-59\*01)



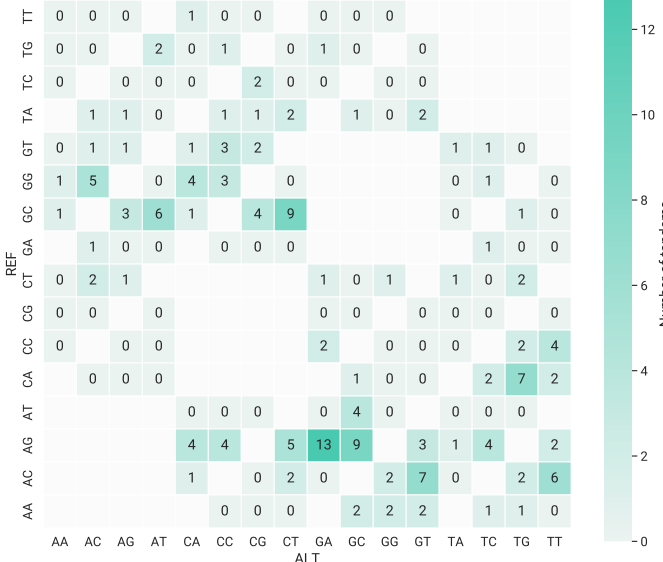
Distribution of mutations by sequence (IGHV4-59\*01)



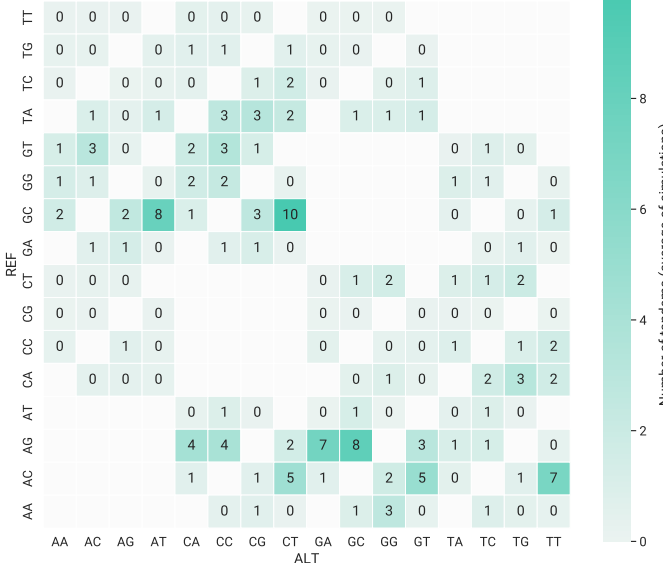
Distribution of mutation clusters by size (IGHV4-59\*01)

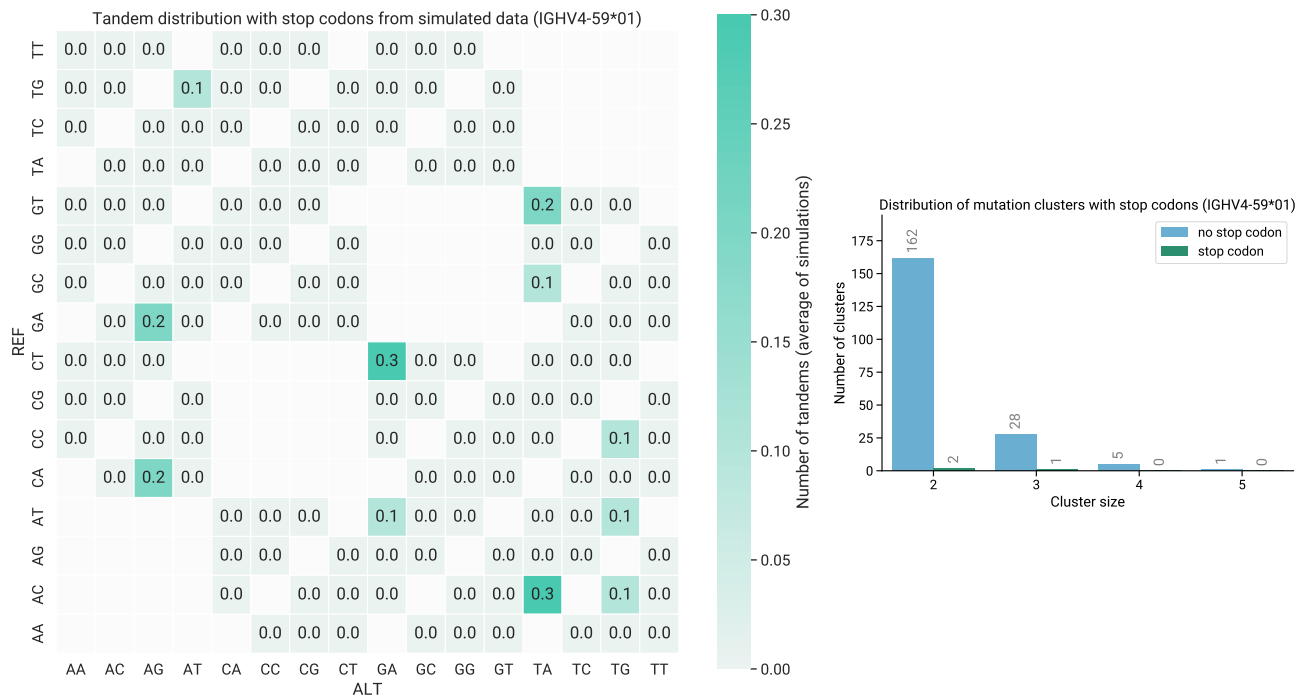


Tandem distribution from real data (IGHV4-59\*01)



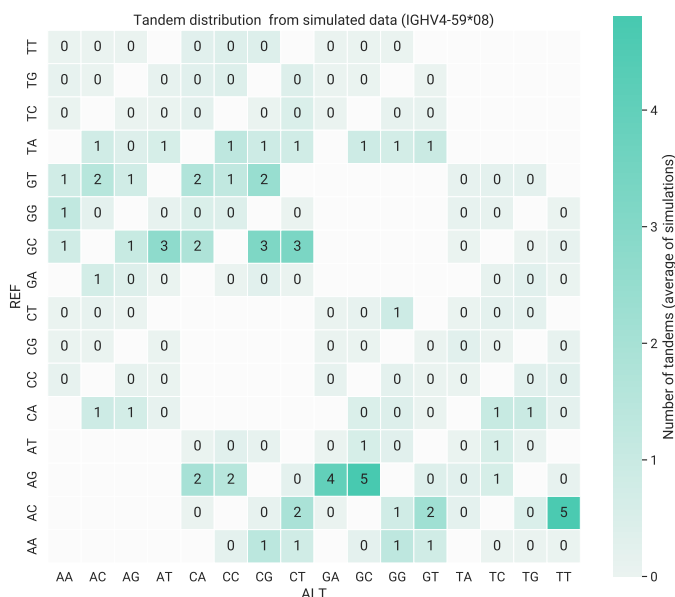
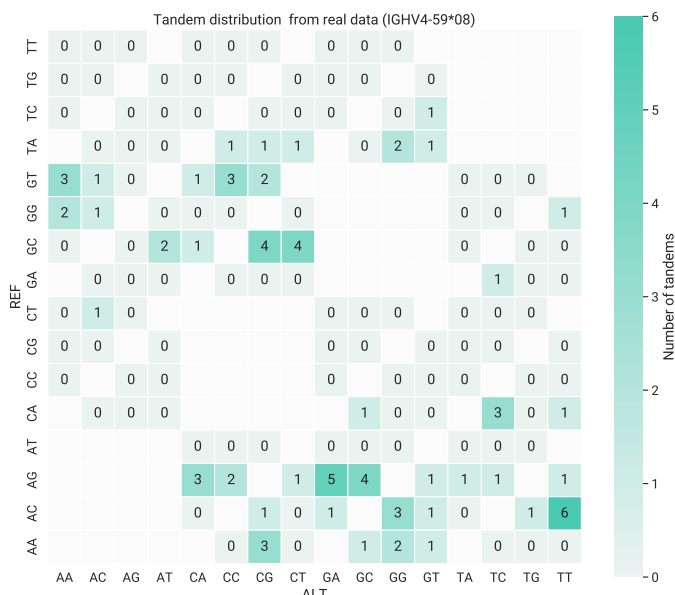
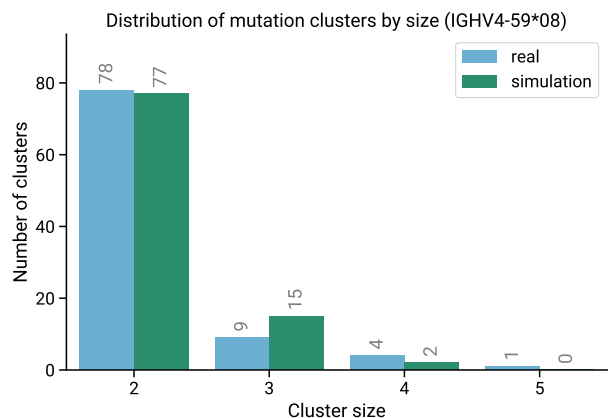
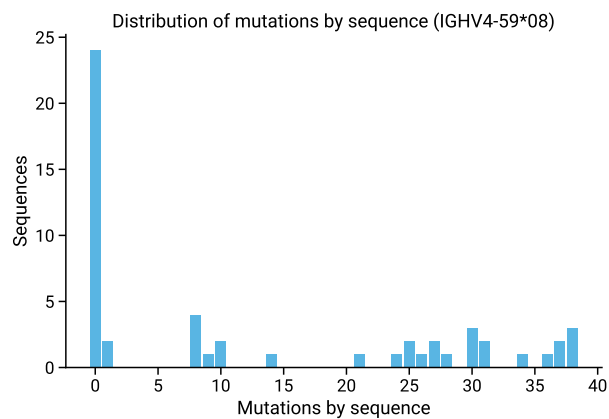
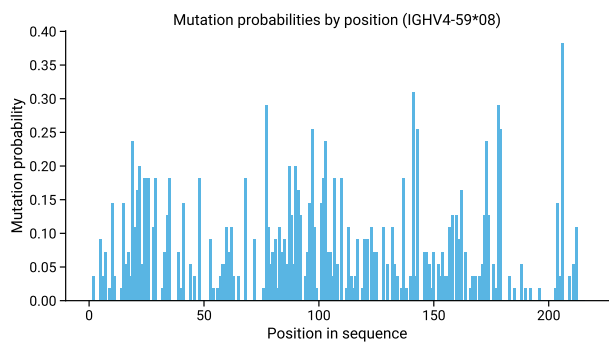
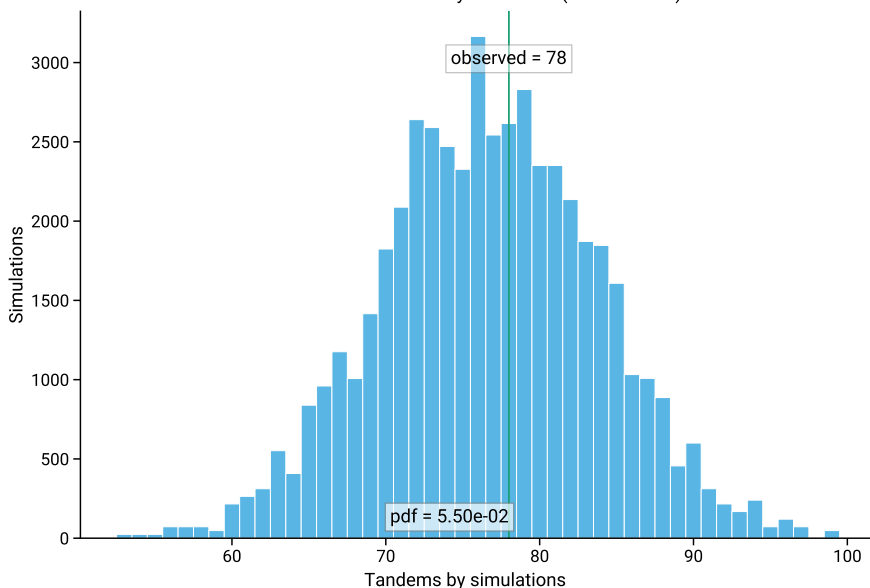
Tandem distribution from simulated data (IGHV4-59\*01)

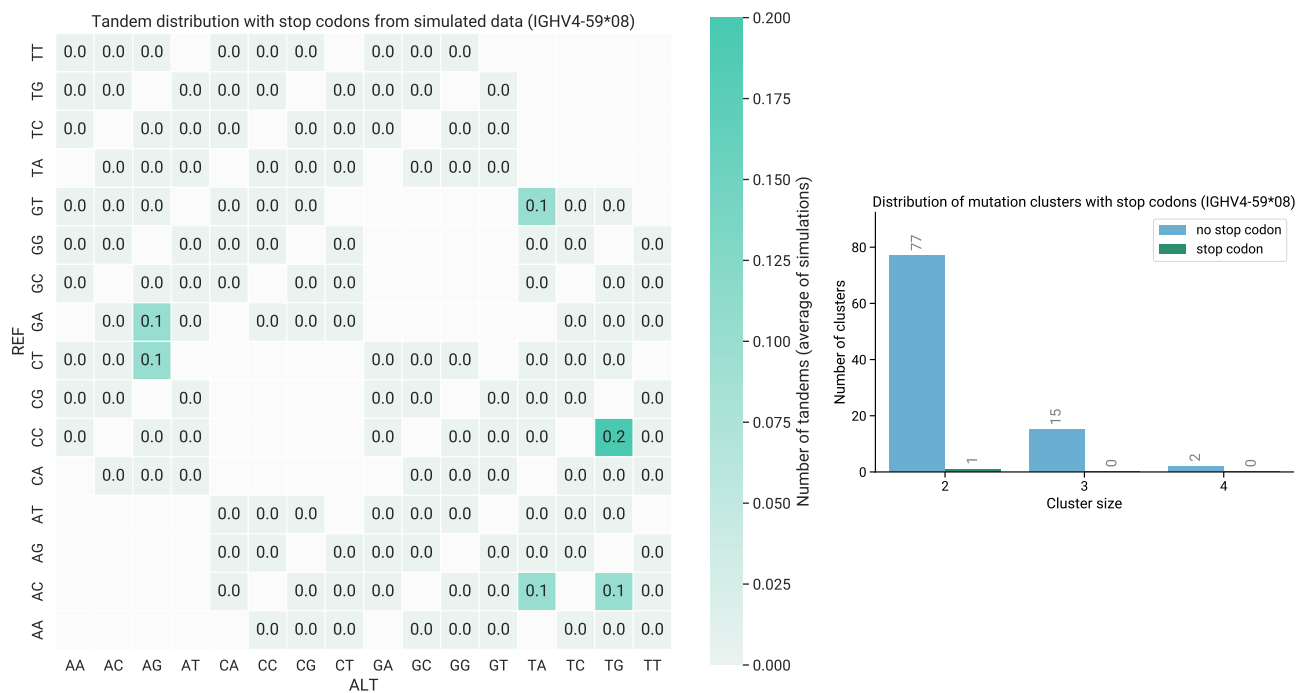




### 6.22 IGHV4-59\*08

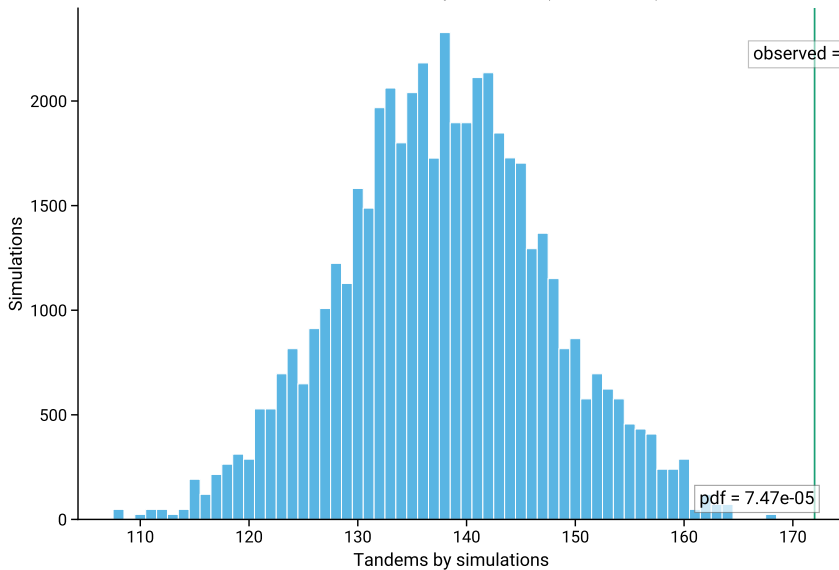
Distribution of tandems by simulation (IGHV4-59\*08)



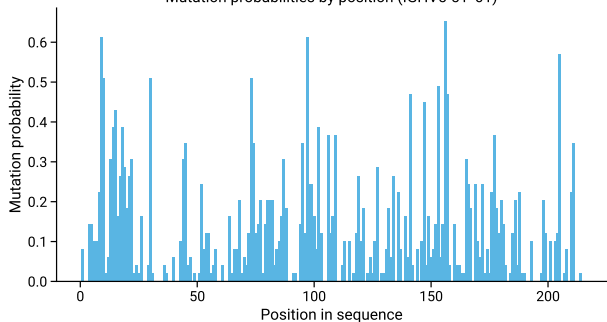


### 6.23 IGHV5-51\*01

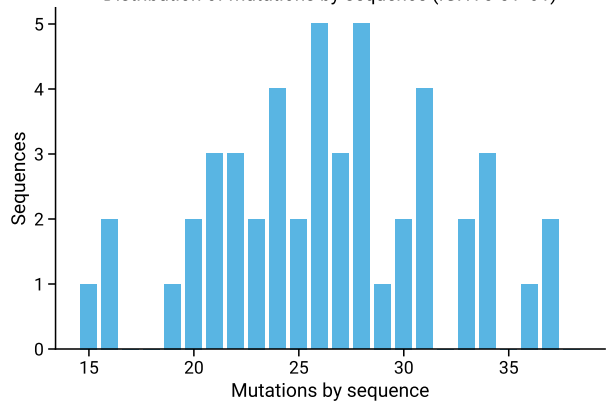
Distribution of tandems by simulation (IGHV5-51\*01)



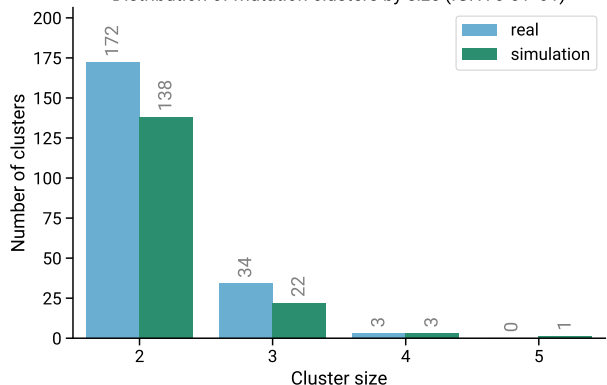
Mutation probabilities by position (IGHV5-51\*01)



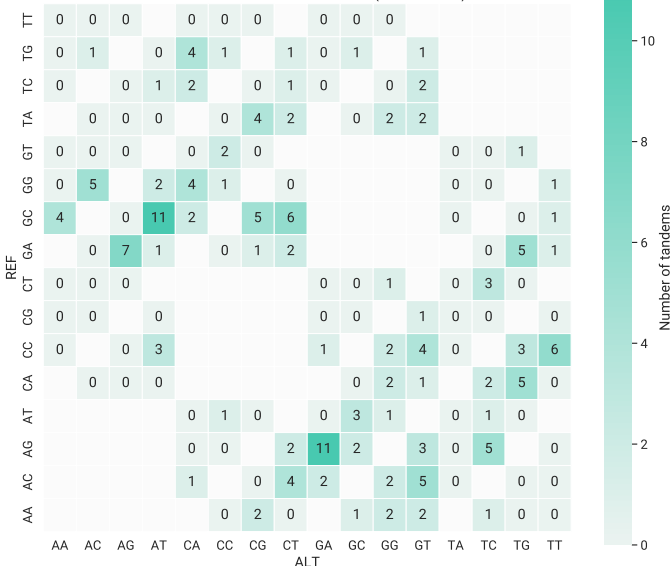
Distribution of mutations by sequence (IGHV5-51\*01)



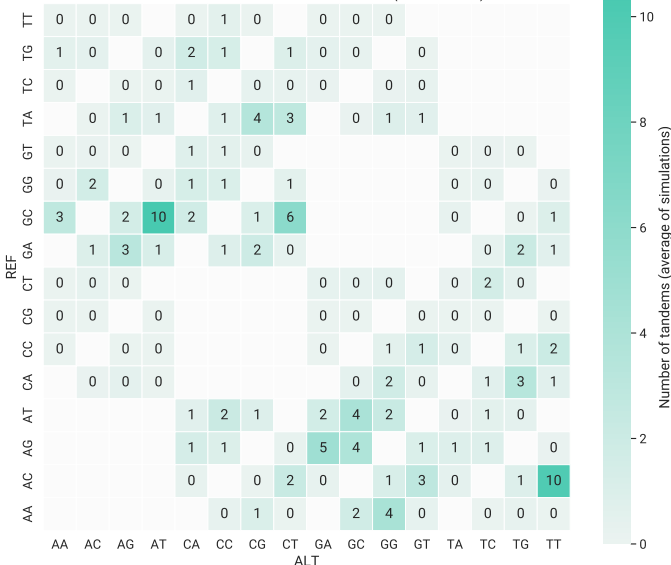
Distribution of mutation clusters by size (IGHV5-51\*01)

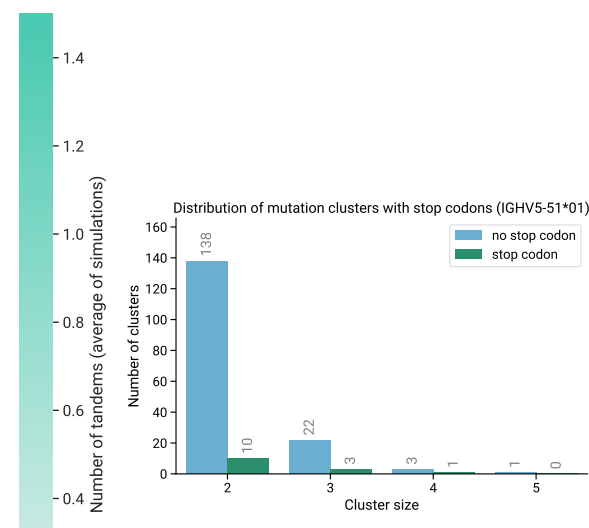
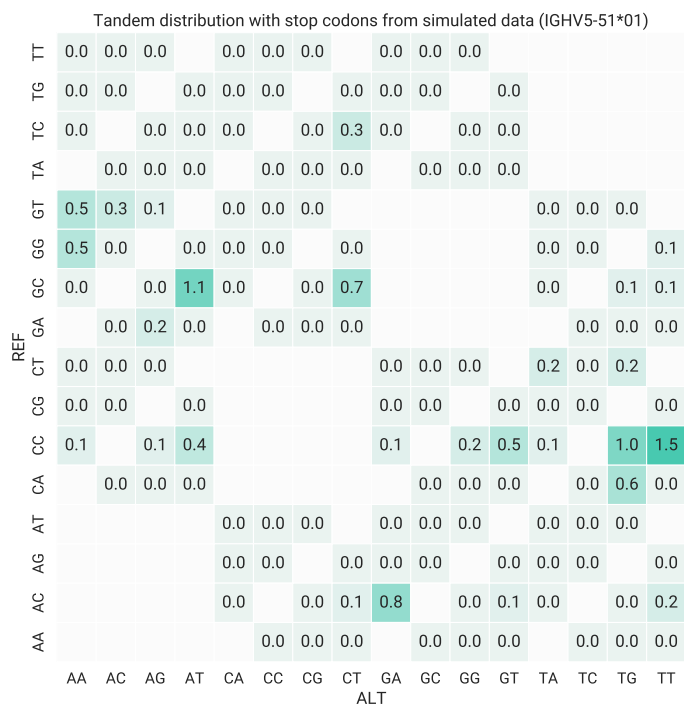


Tandem distribution from real data (IGHV5-51\*01)

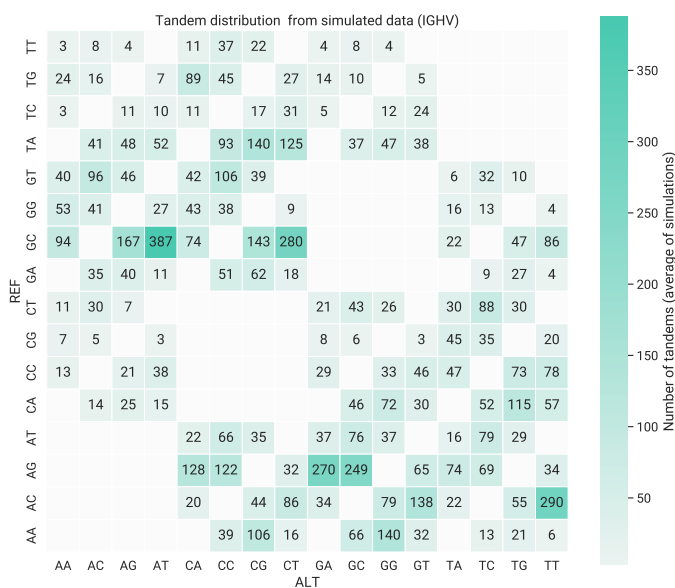
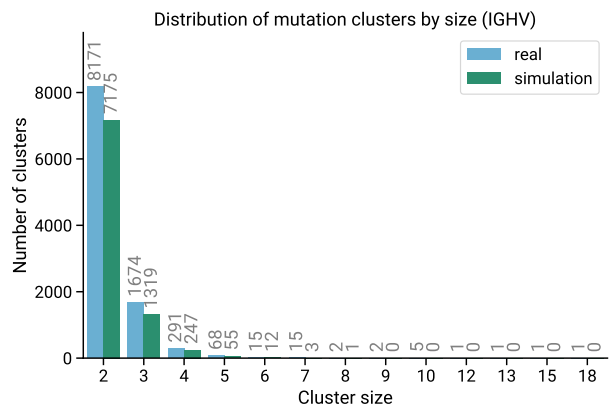
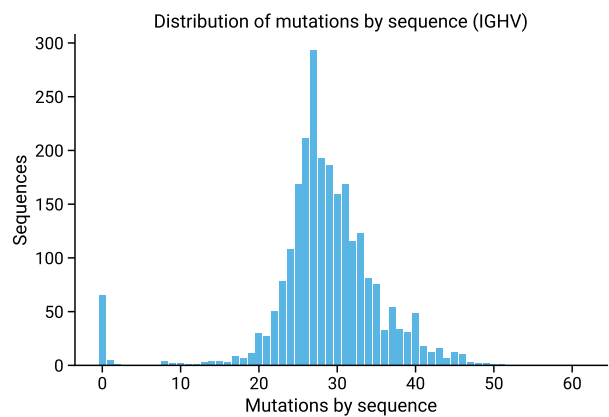
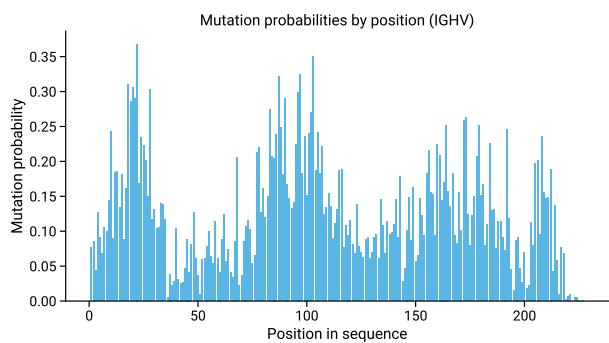
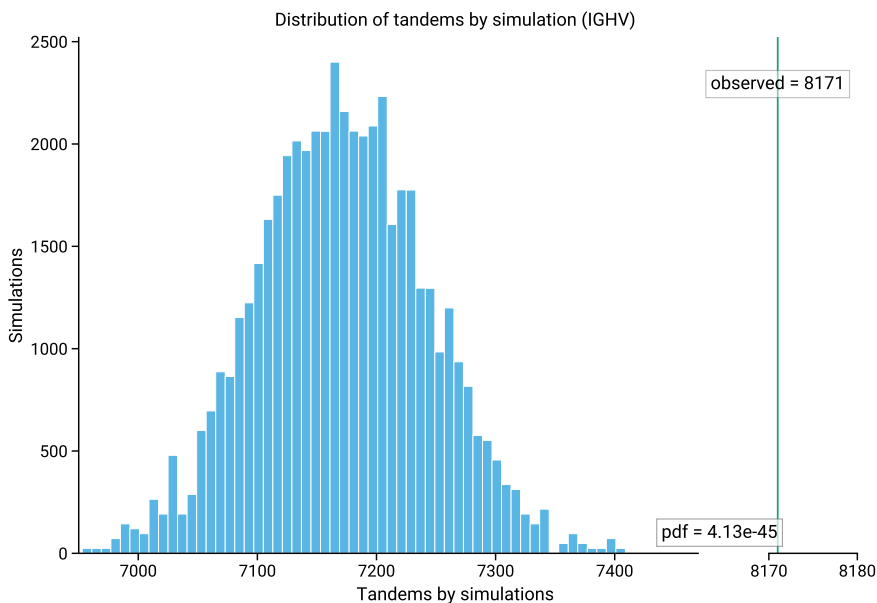


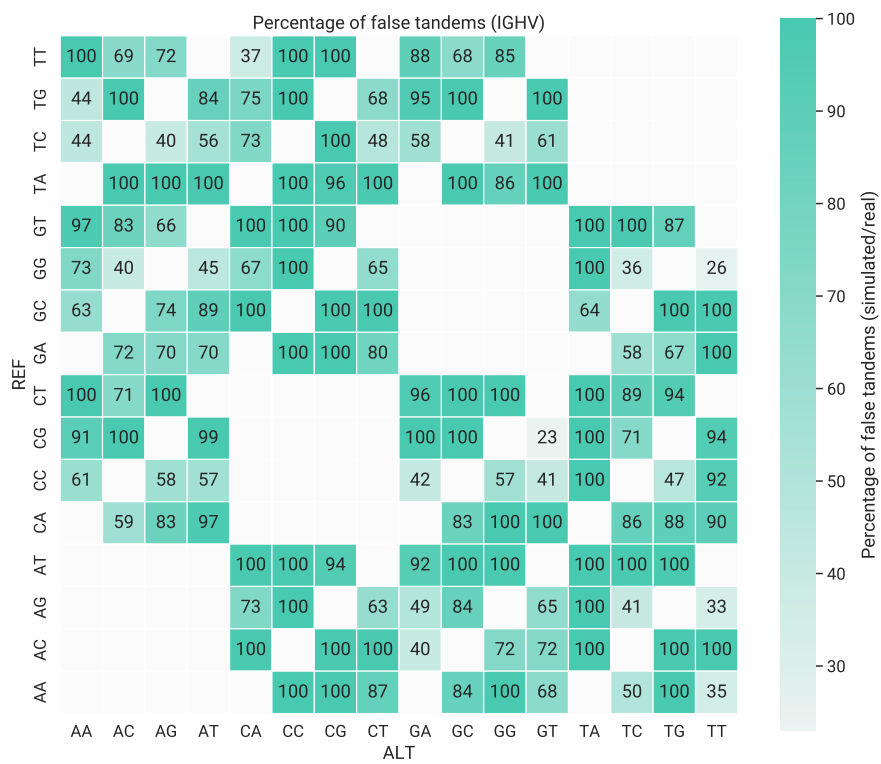
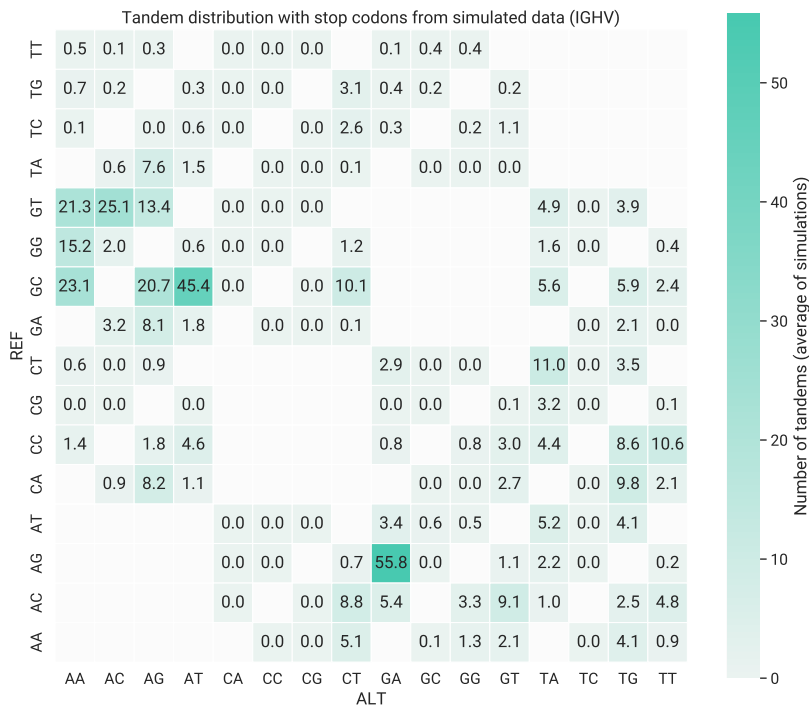
Tandem distribution from simulated data (IGHV5-51\*01)





### 6.24 IGHV

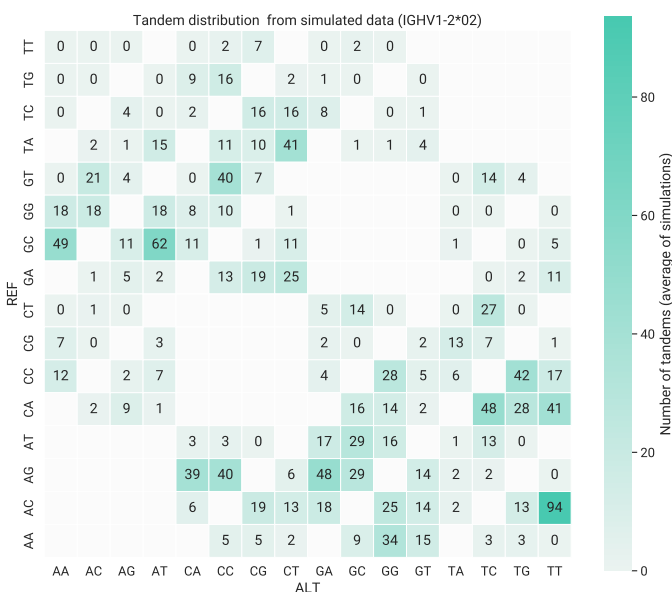
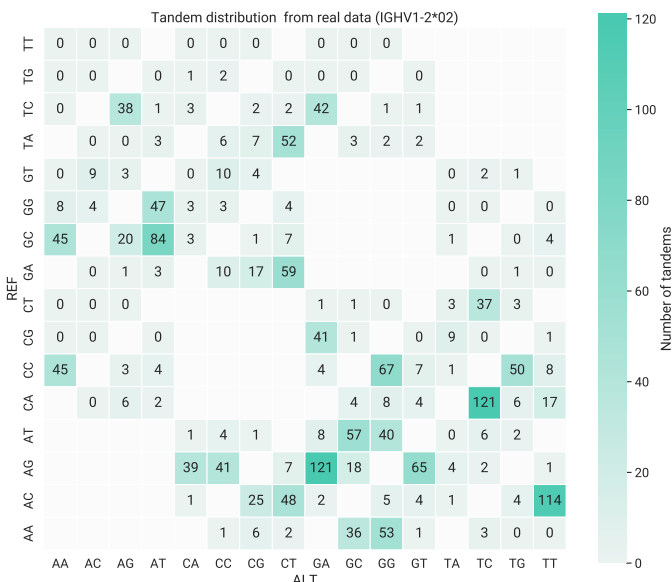
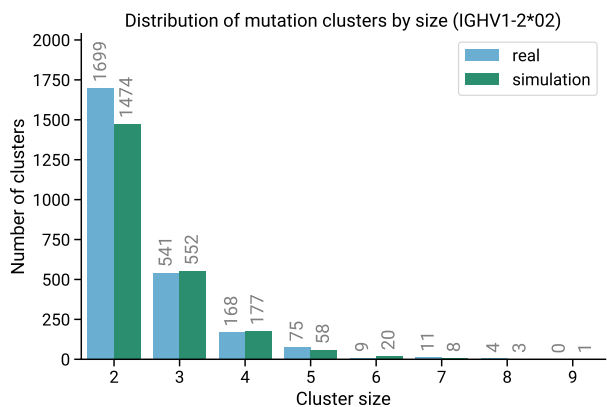
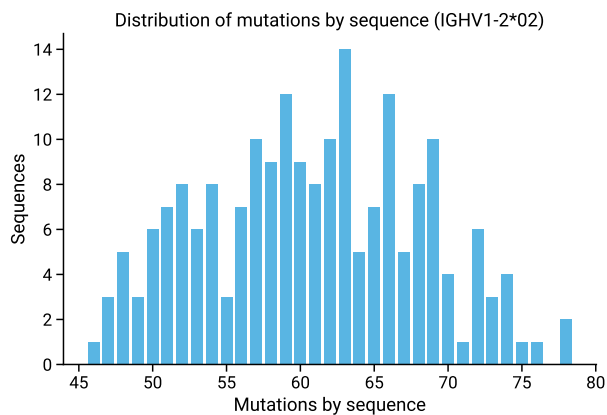
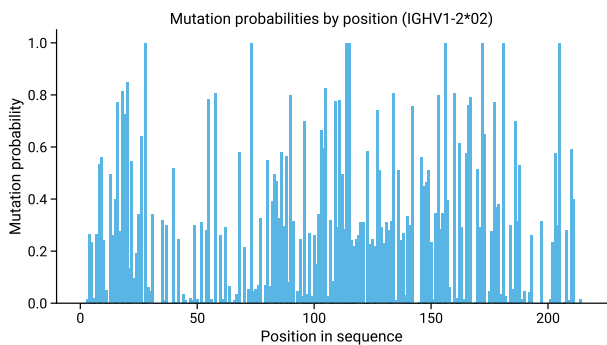
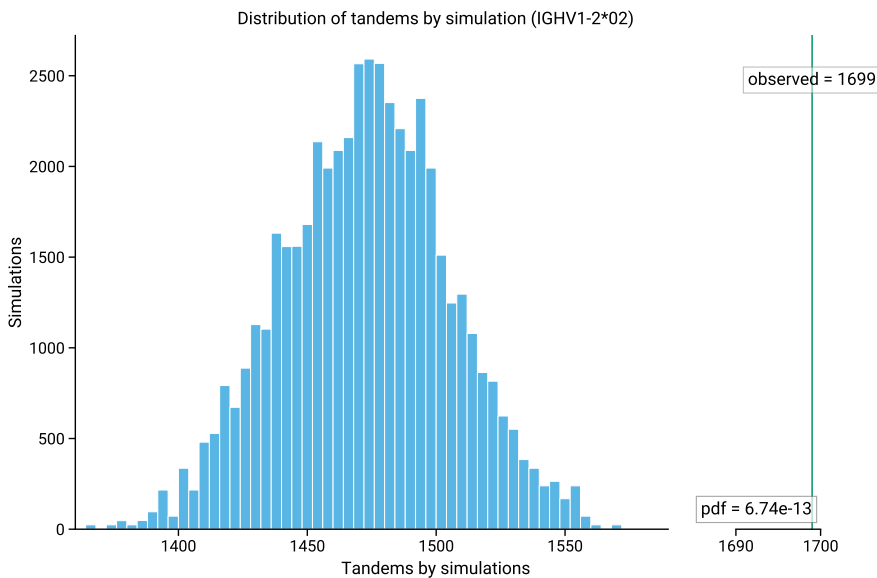


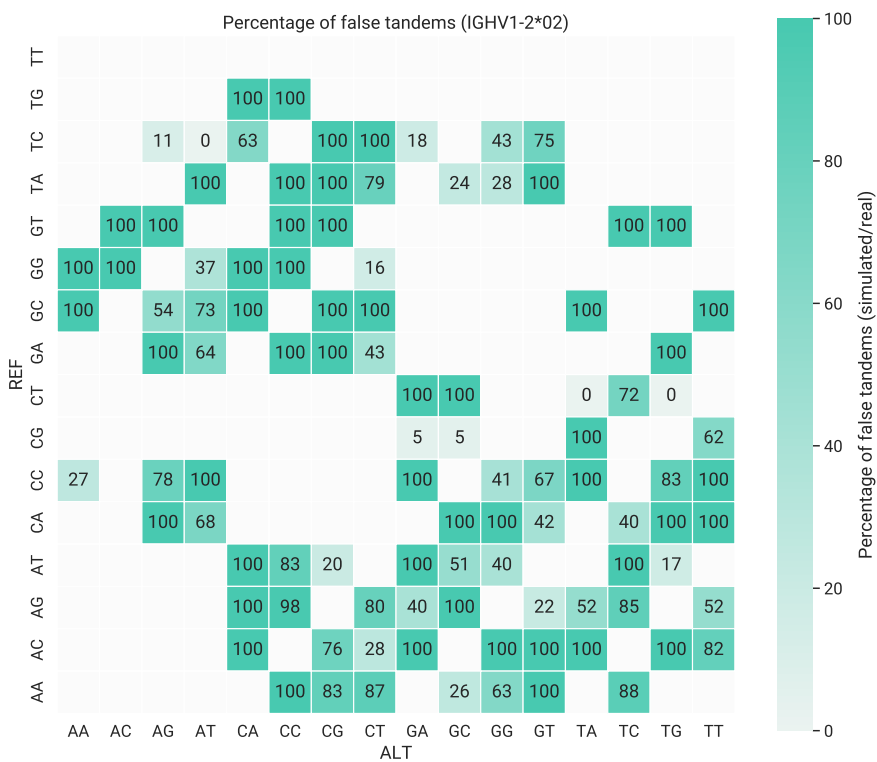
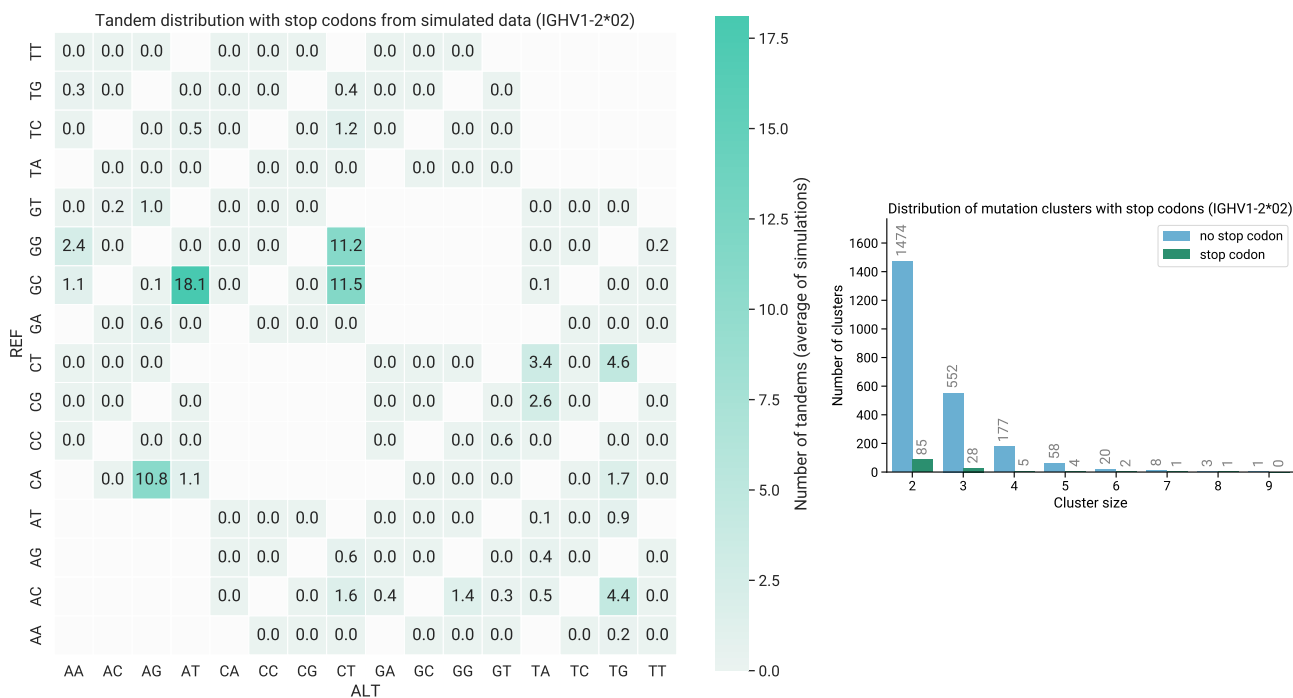




# LEIDEN HEALTHY DONOR COHORT (< 80% IGV IDENTITY)

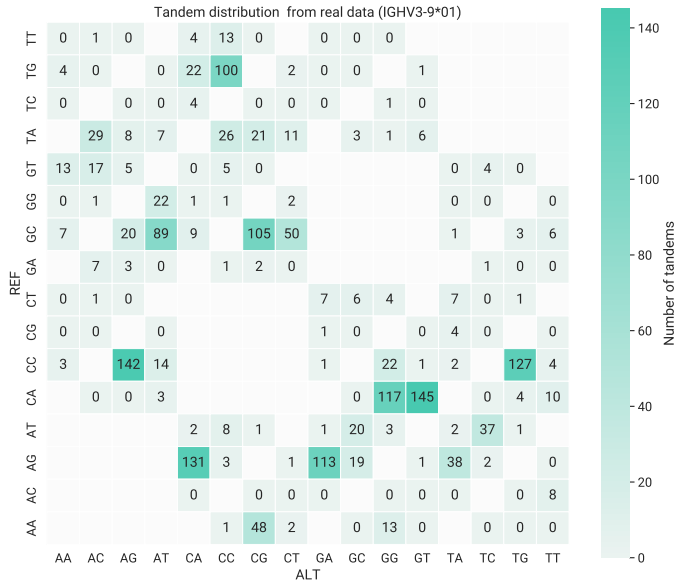
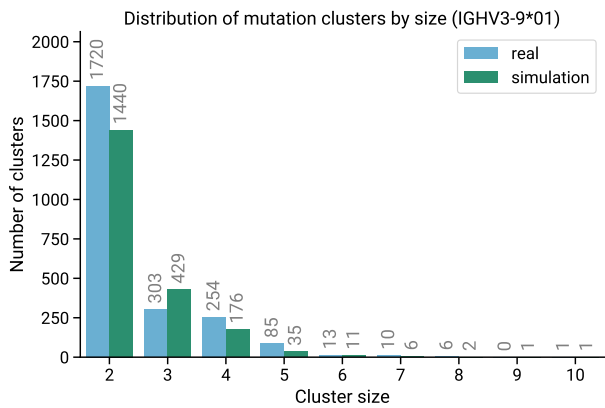
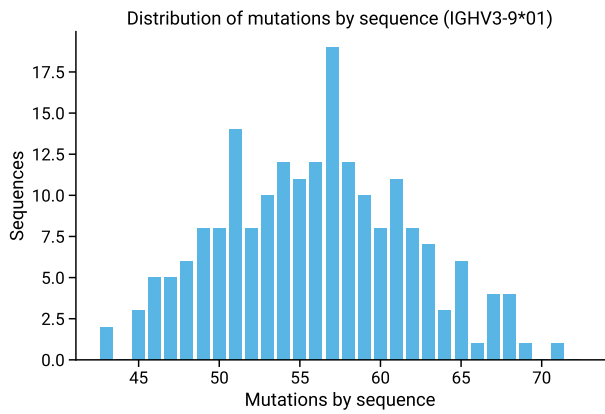
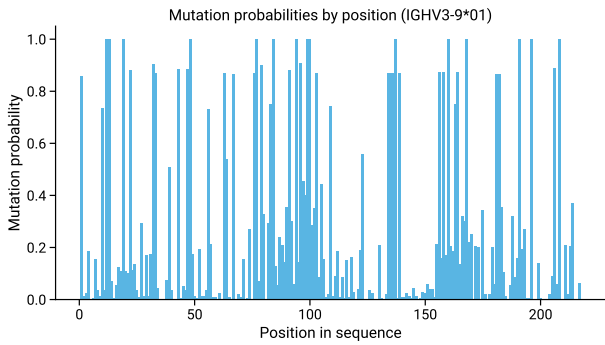
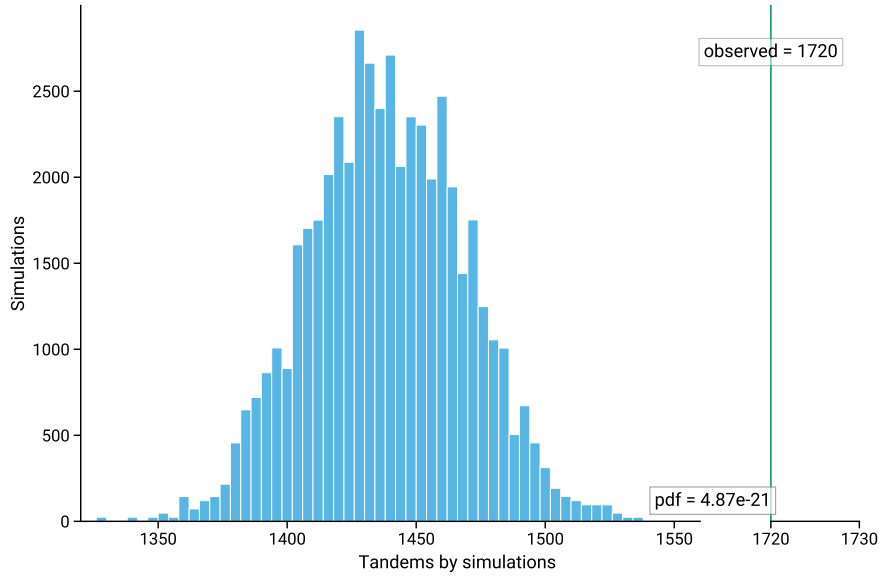
## 7.1 IGHV1-2\_02

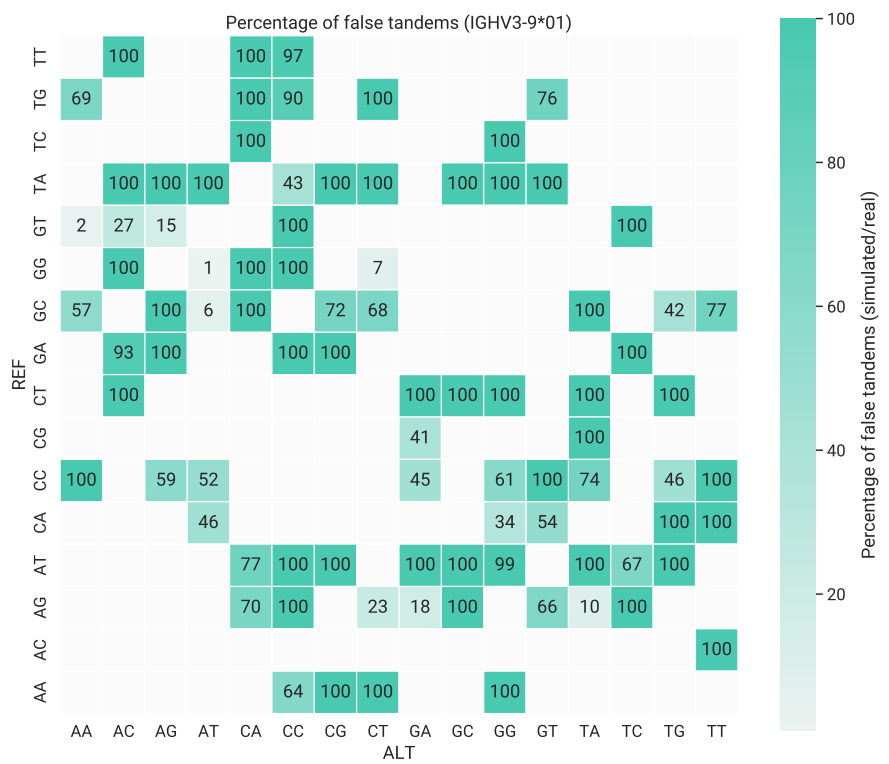
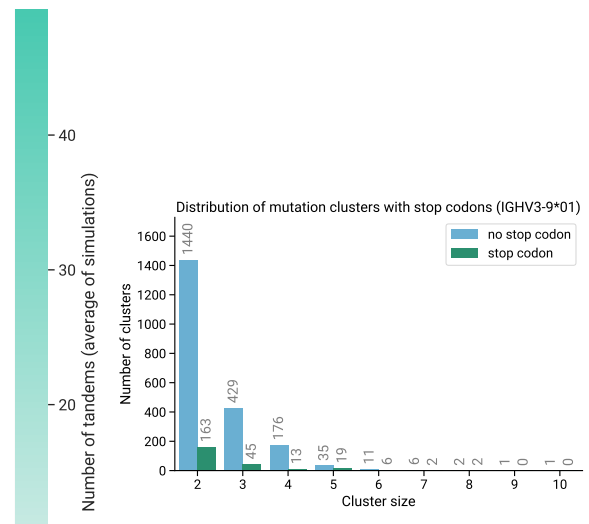
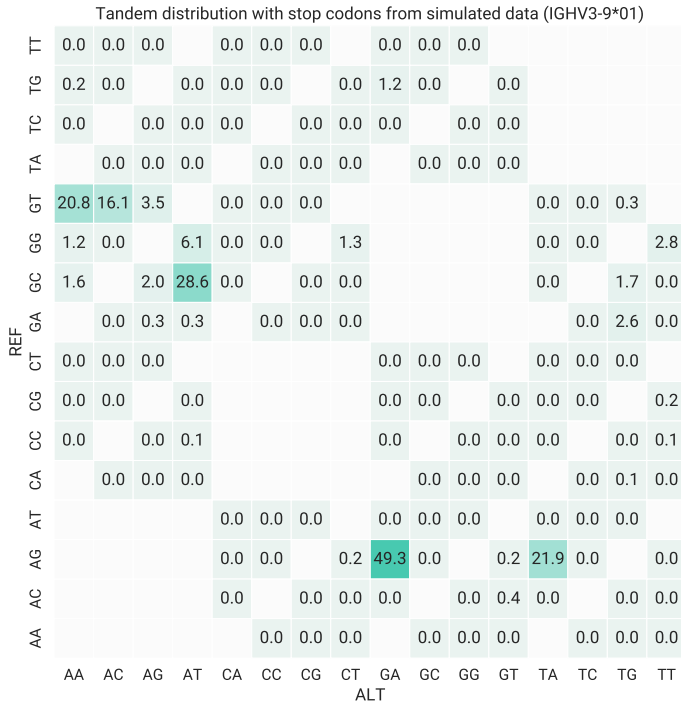




## 7.2 IGHV3-9\_01

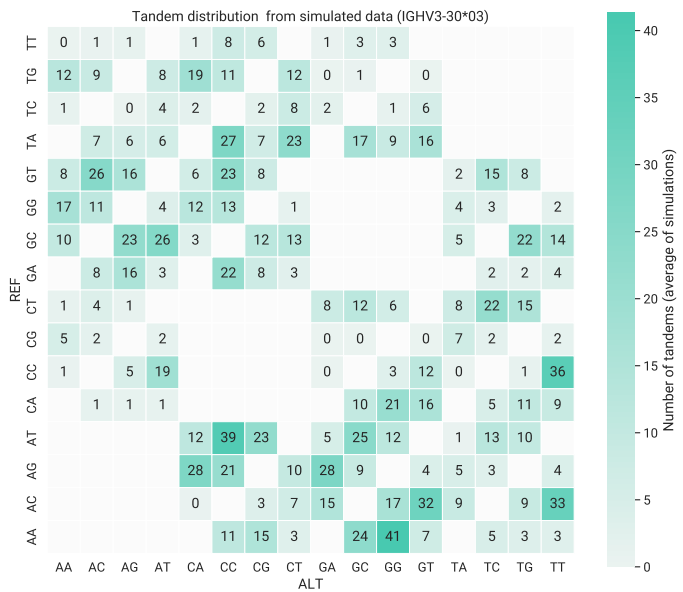
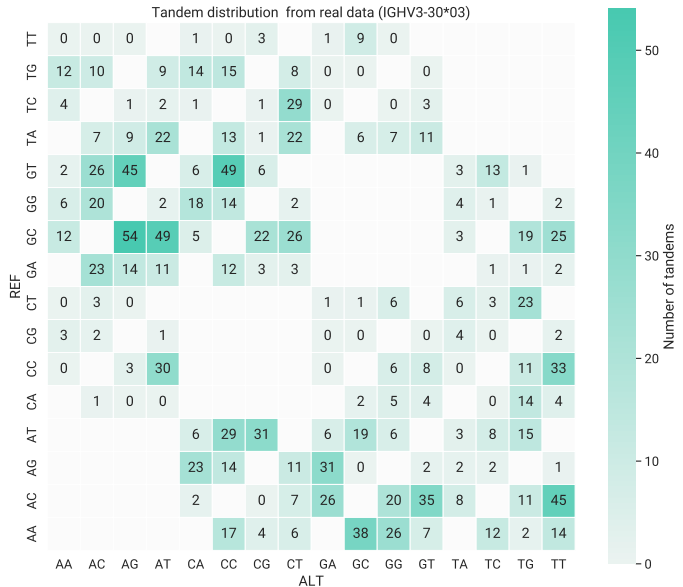
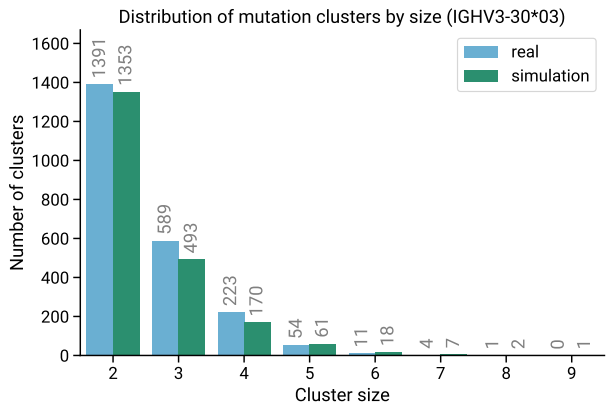
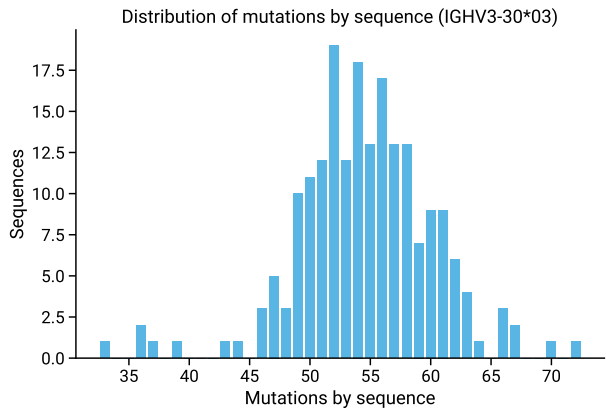
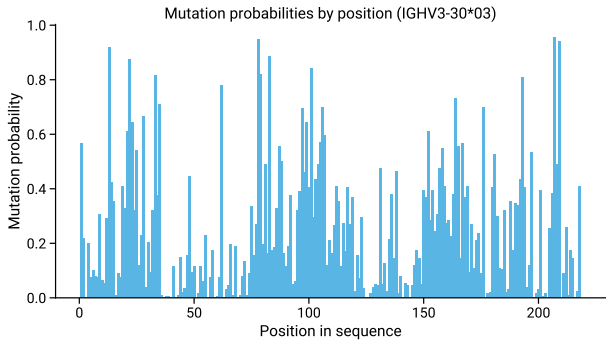
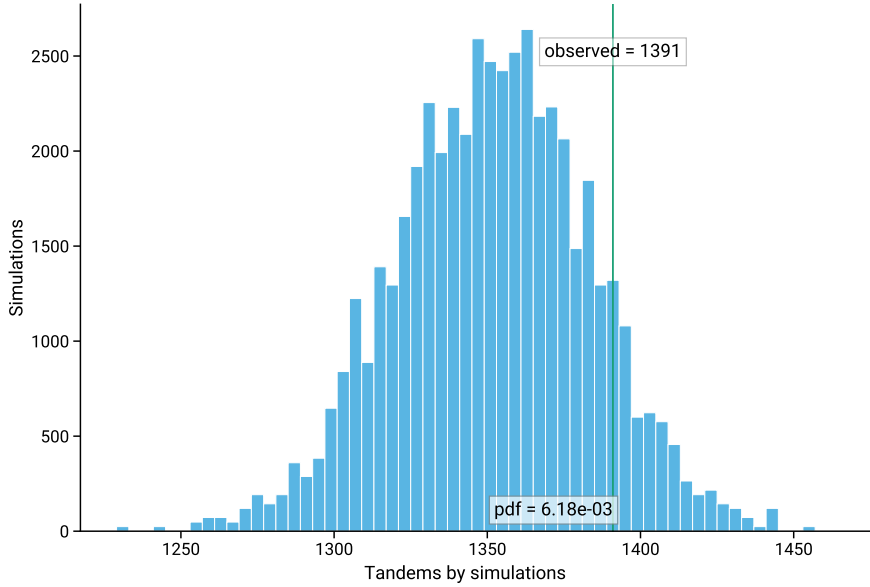
Distribution of tandems by simulation (IGHV3-9\*01)

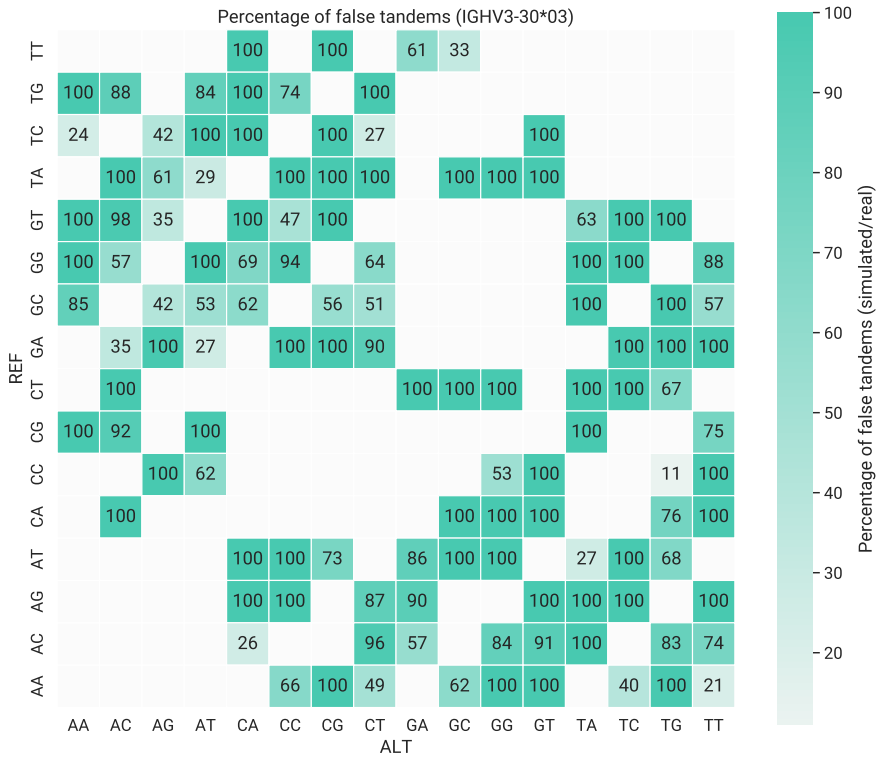
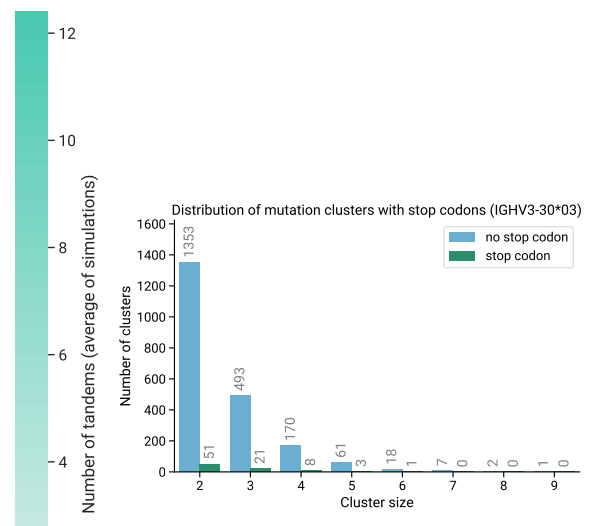
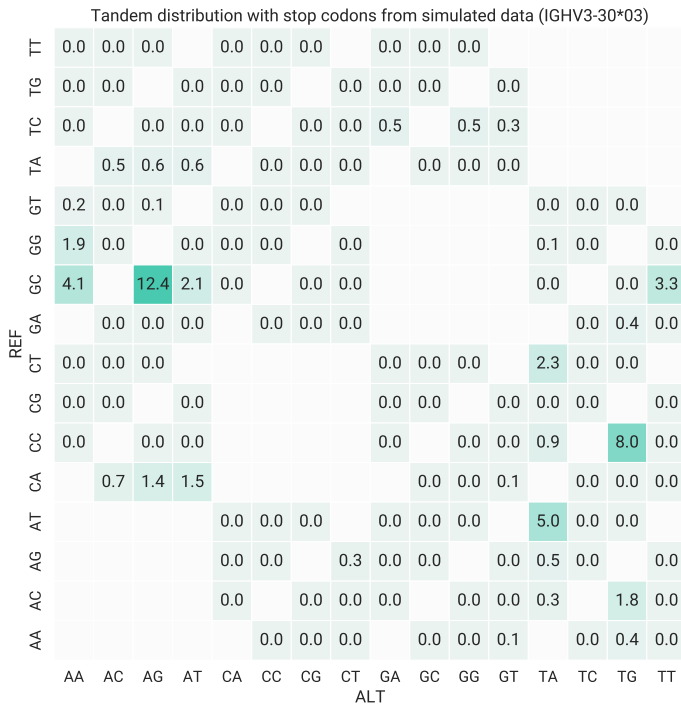




### 7.3 IGHV3-30\_03

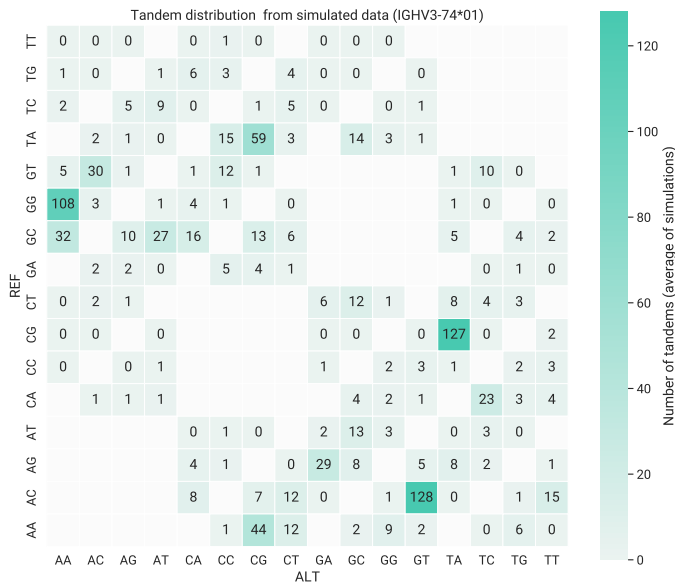
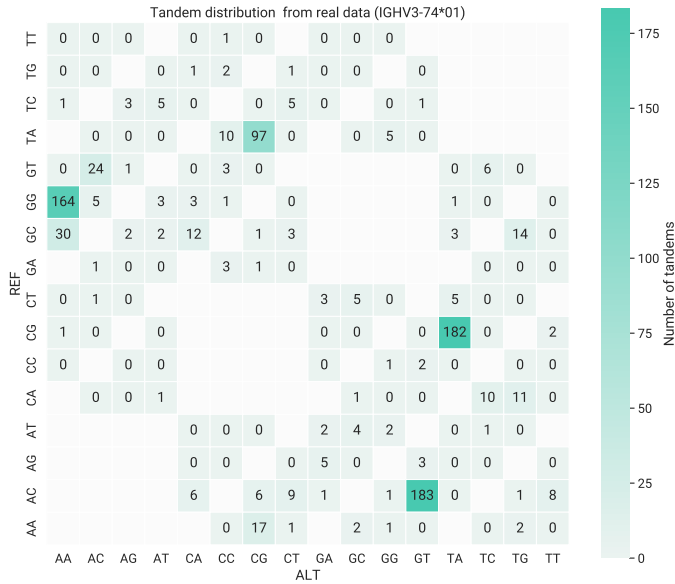
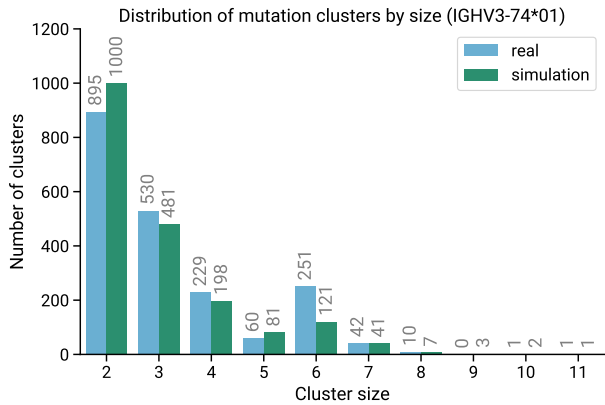
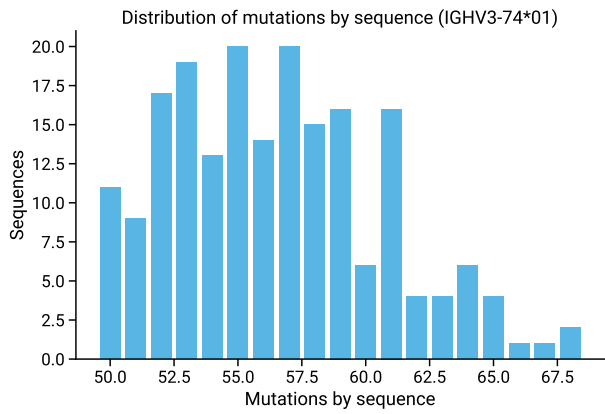
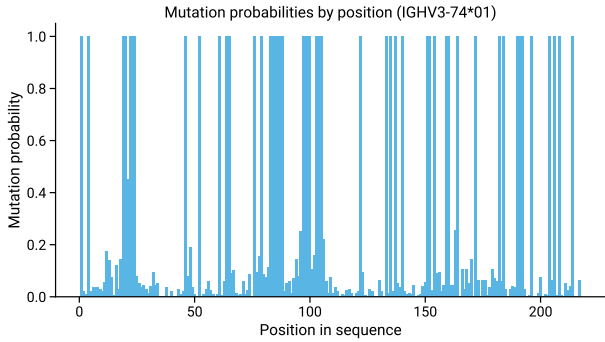
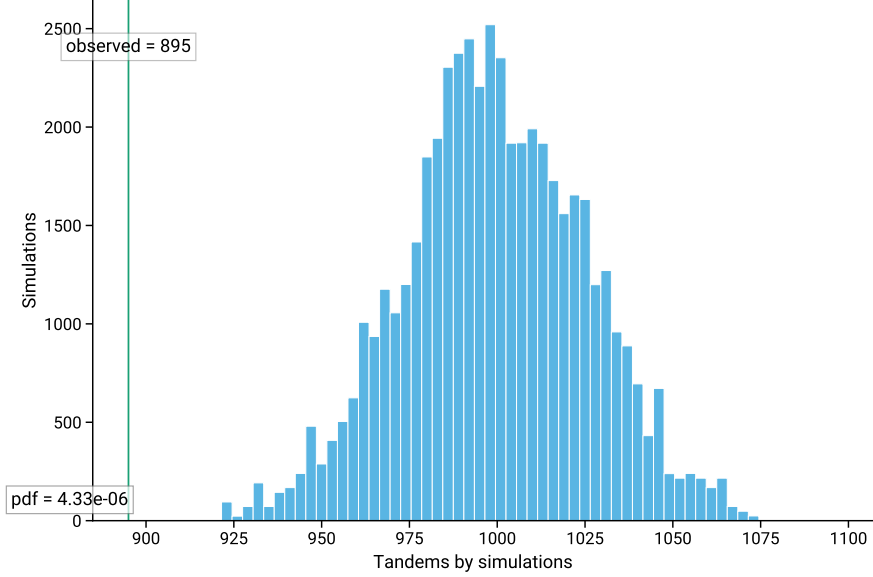
Distribution of tandems by simulation (IGHV3-30\*03)

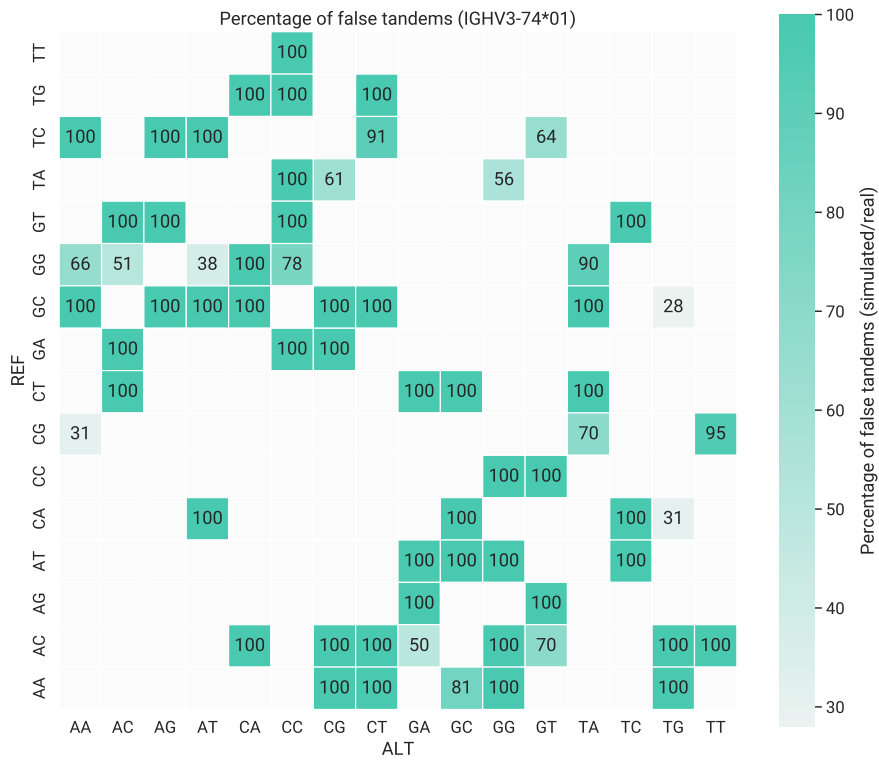
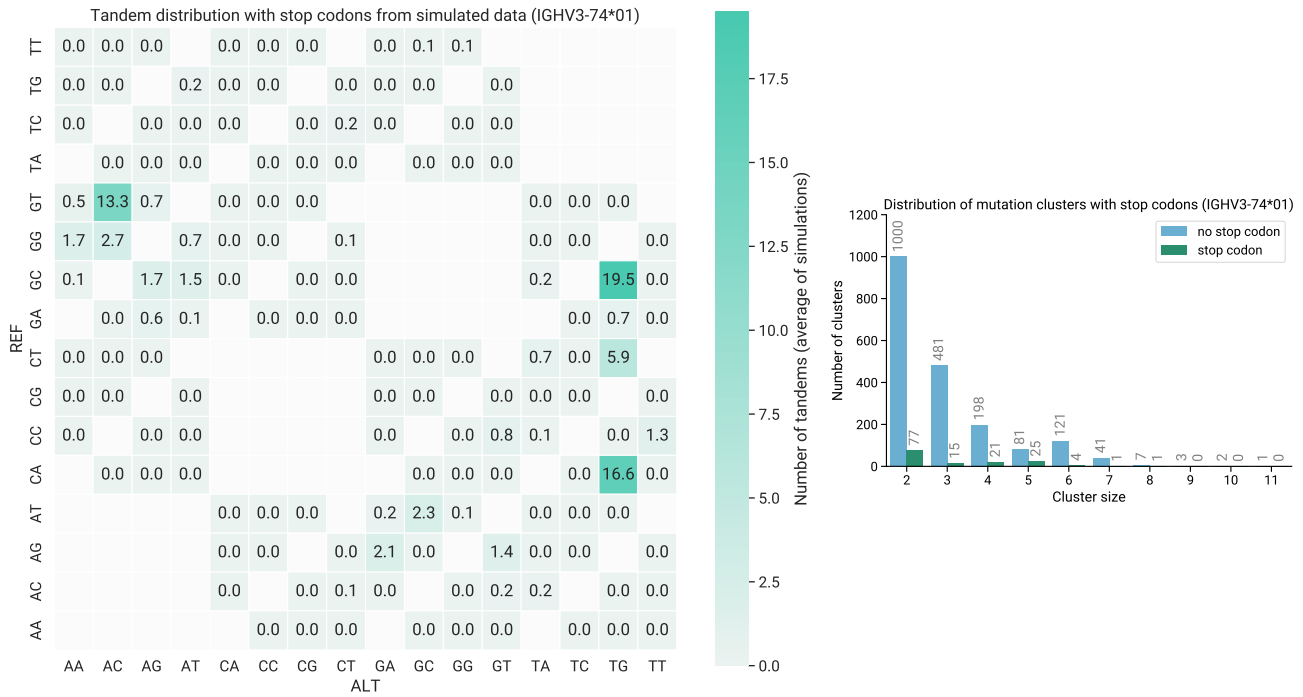




### 7.4 IGHV3-74\_01

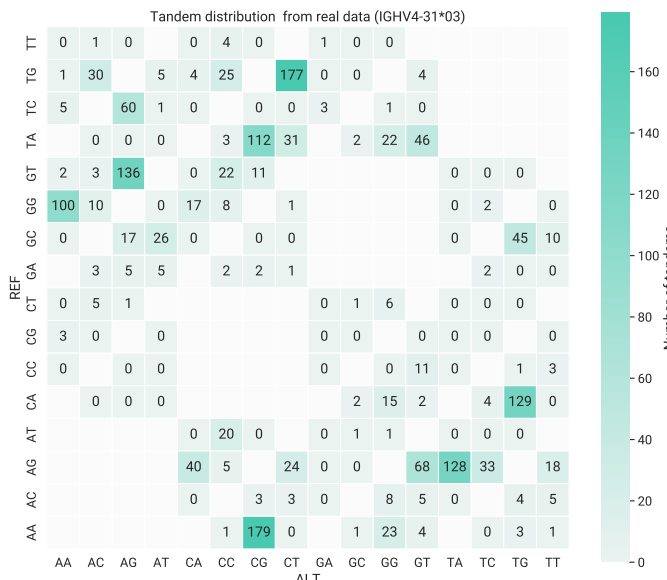
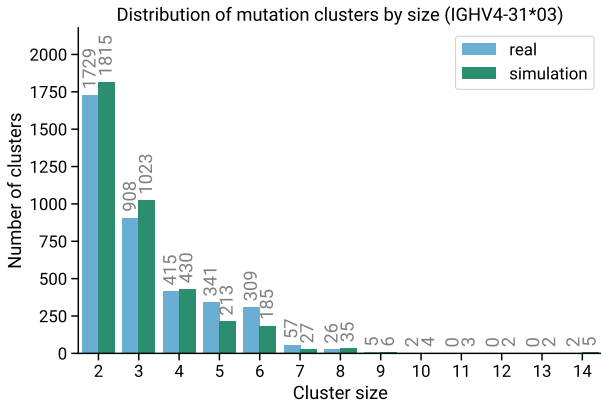
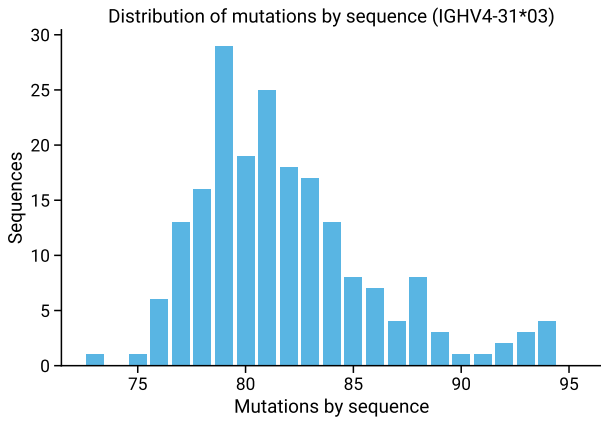
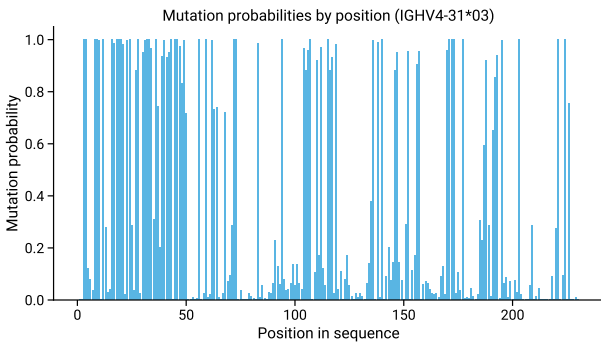
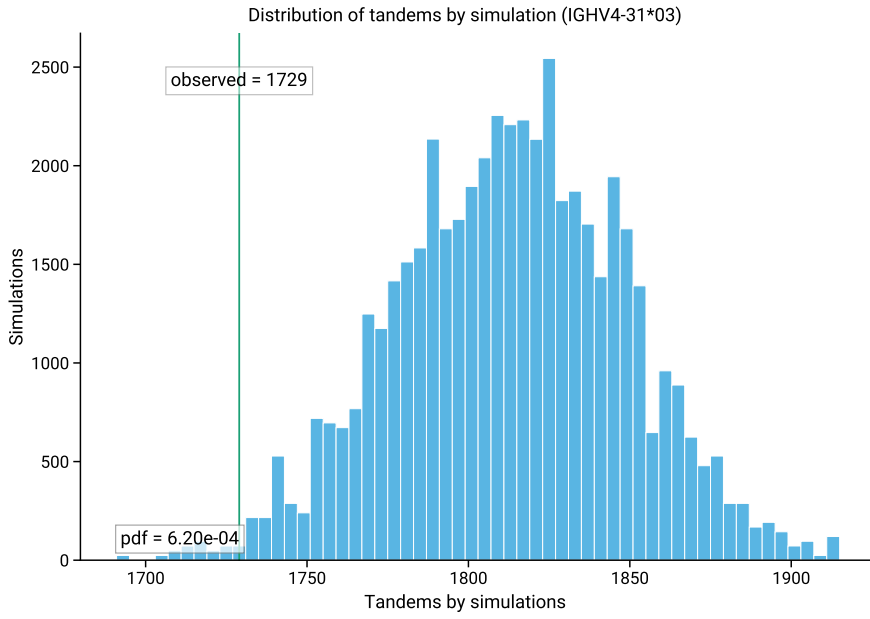
Distribution of tandems by simulation (IGHV3-74\*01)

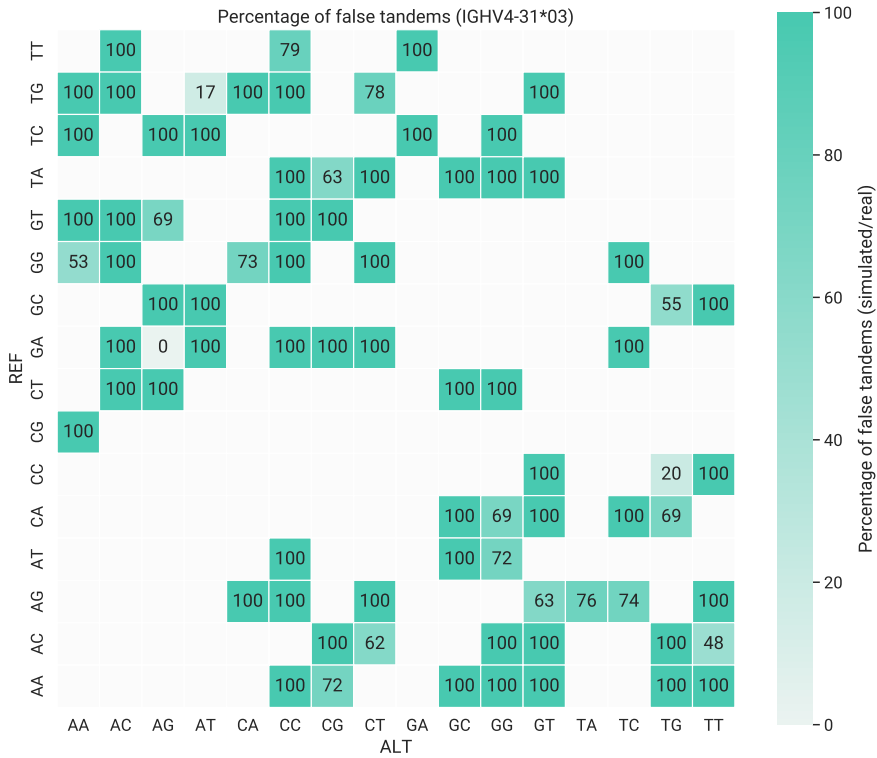
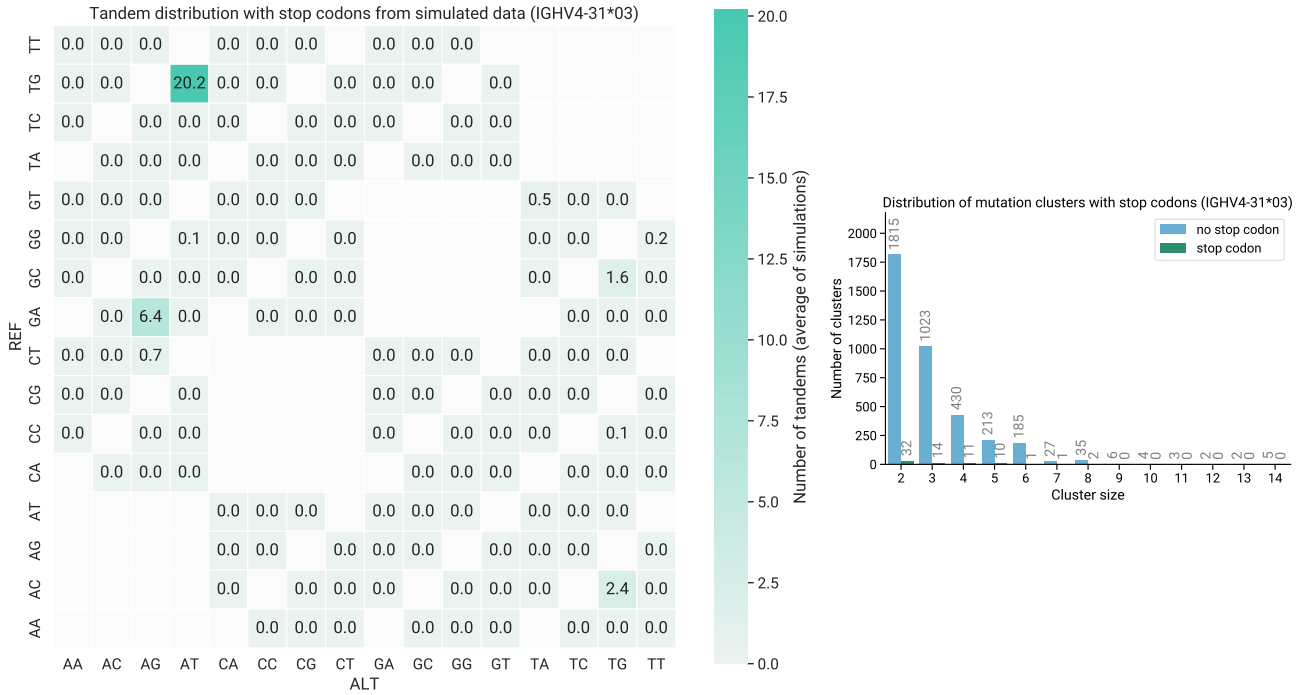






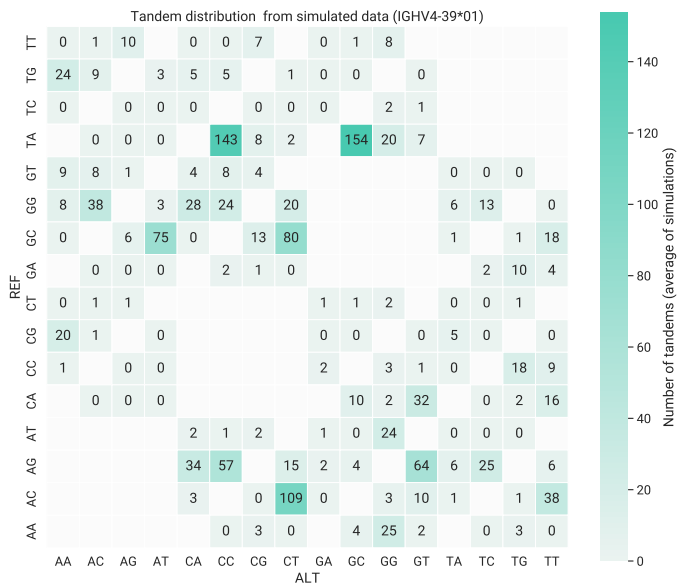
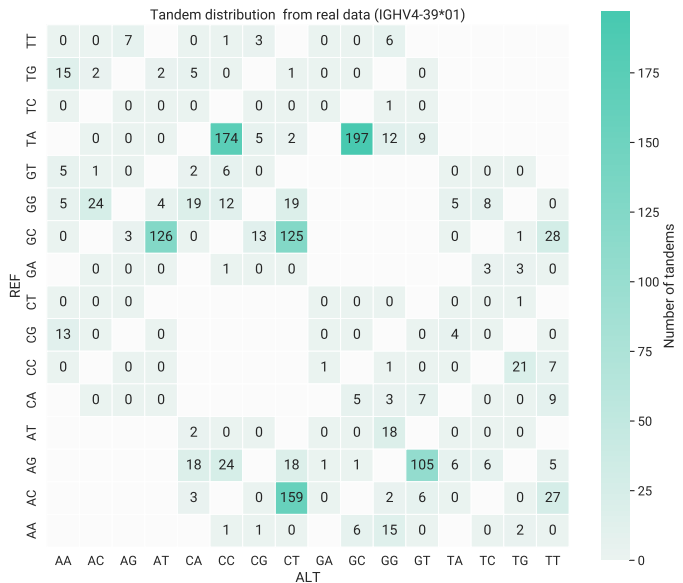
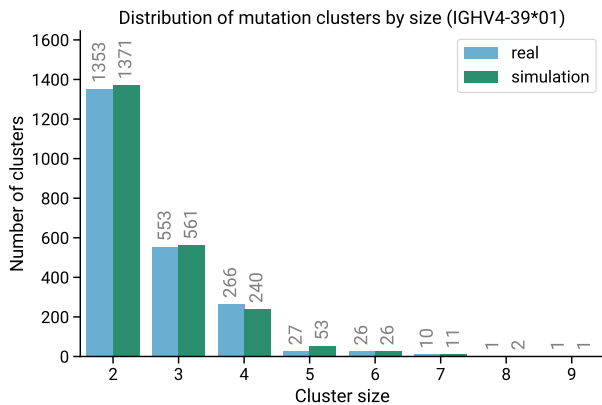
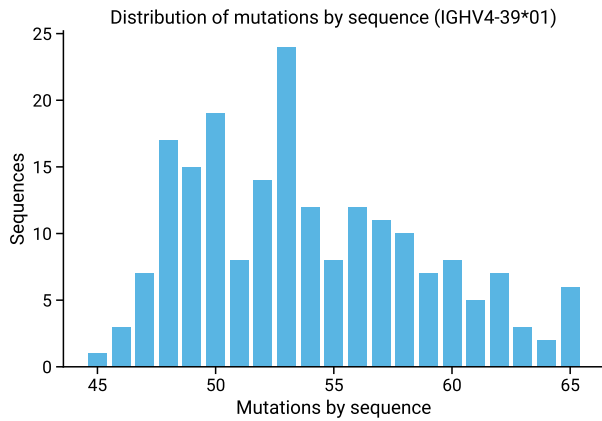
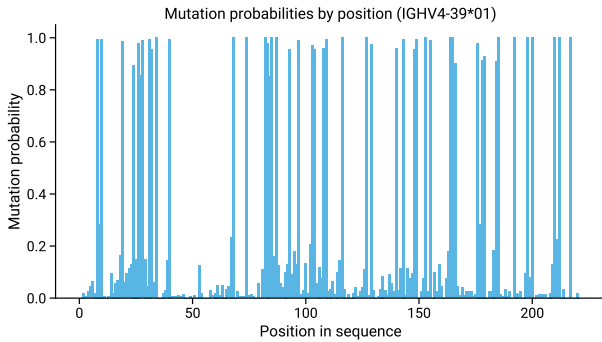
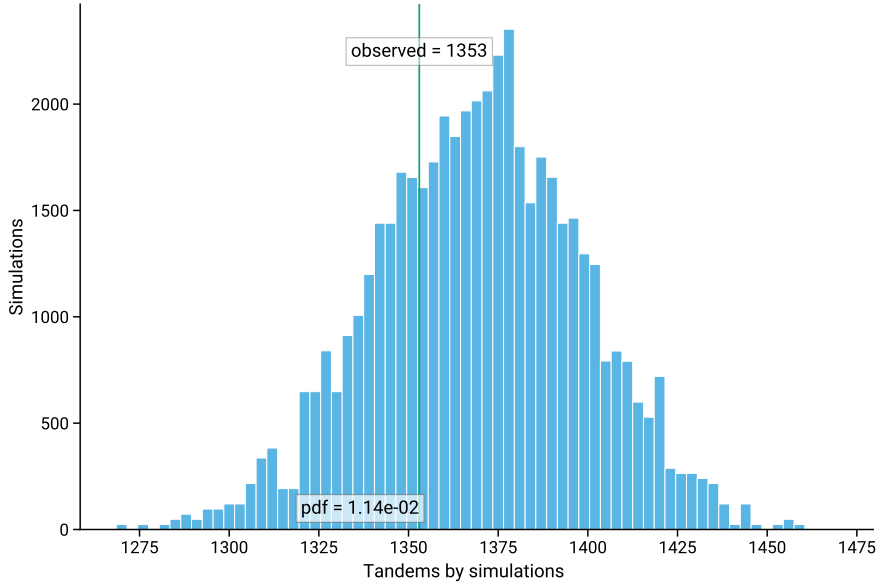
# 7.5 IGHV4-31\_03

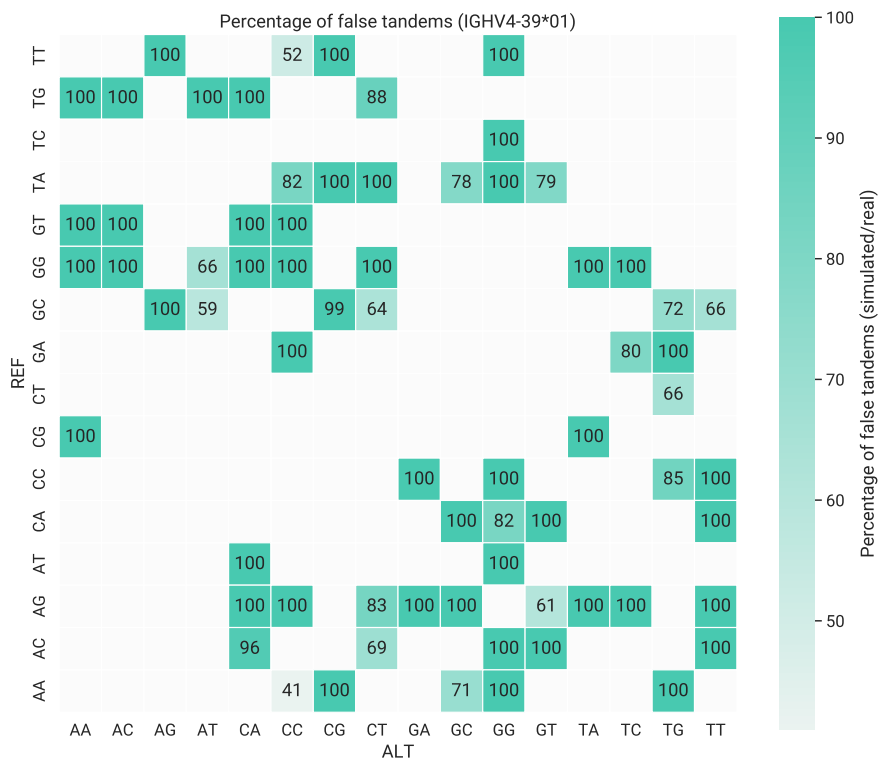
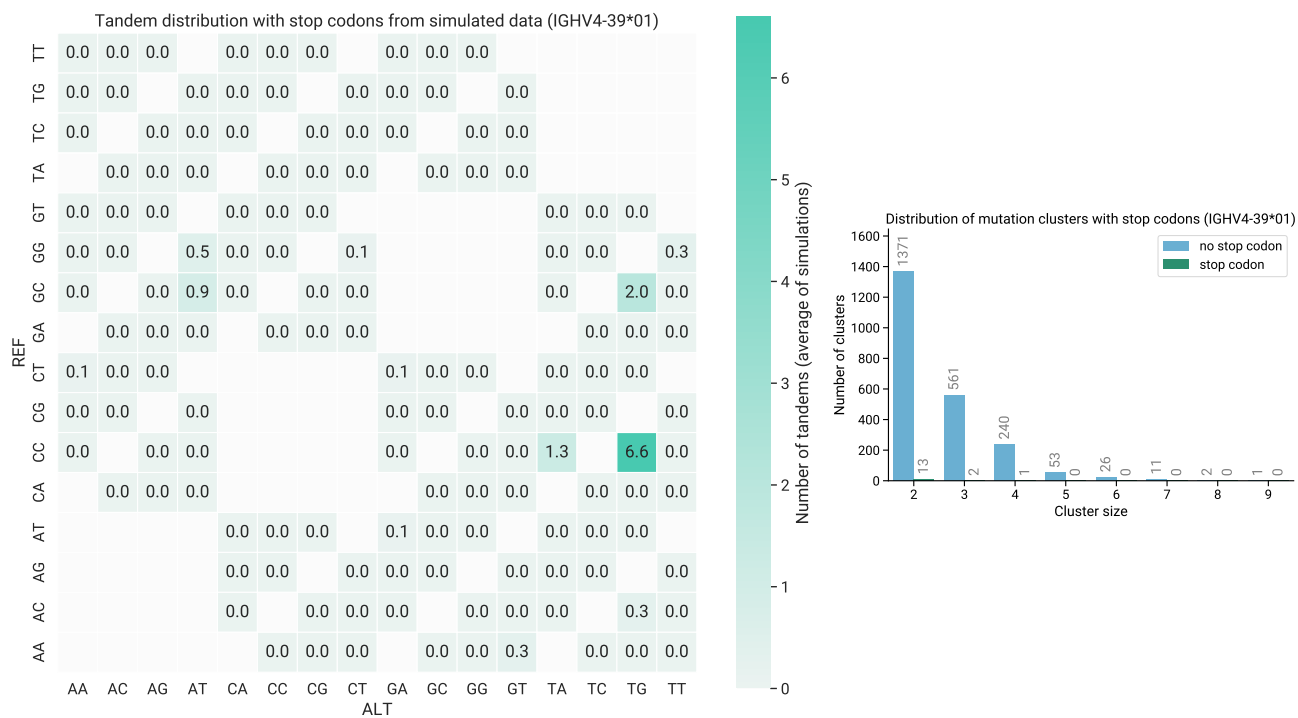




### 7.6 IGHV4-39\_01

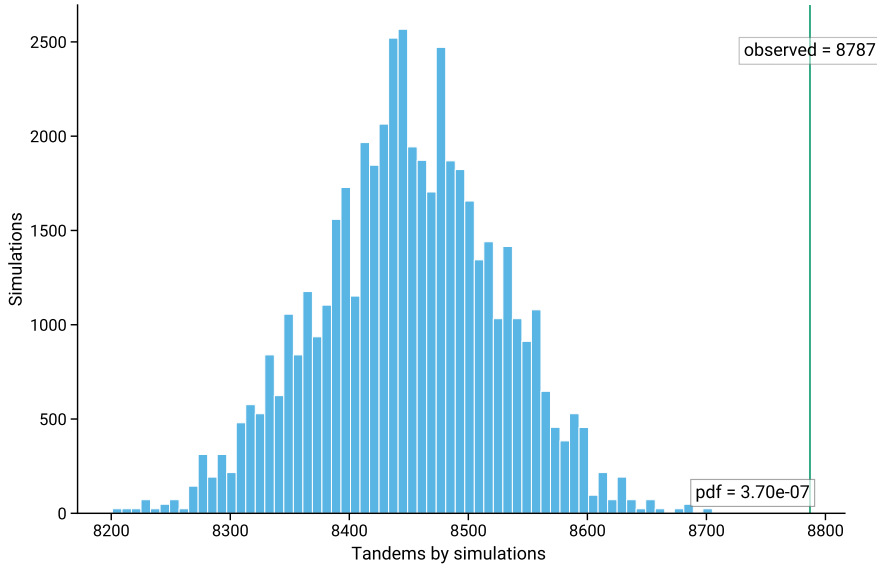
Distribution of tandems by simulation (IGHV4-39\*01)



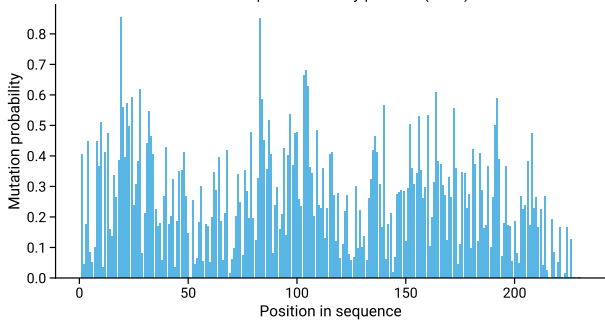


# 7.7 IGHV

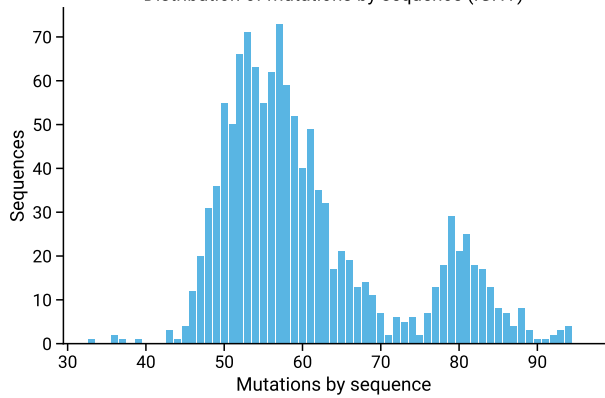
Distribution of tandems by simulation (IGHV)



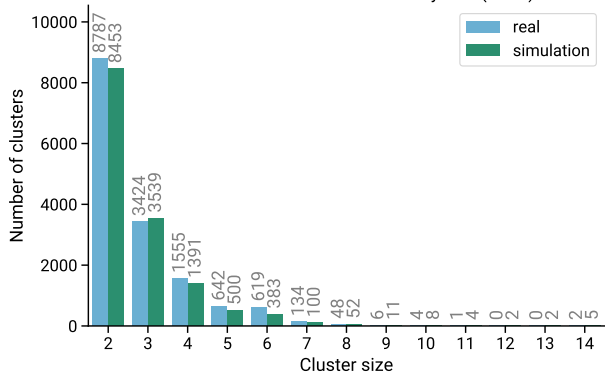
Mutation probabilities by position (IGHV)



Distribution of mutations by sequence (IGHV)



Distribution of mutation clusters by size (IGHV)



Tandem distribution from real data (IGHV)



Tandem distribution from simulated data (IGHV)

