

# IMMUNE RECOGNITION BY T-CELLS: A TALE OF MACHINE LEARNING AND ITS LIMITATIONS

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Understanding the dynamics of the immune system and how it can potentially be used to fight cancer is one of the leading scientific challenges of our times. Underlying this question is the recognition by T-cells of foreign versus self, accomplished by binding of peptides (displayed on cell surfaces) to the T-cell receptor (TCR). It remains a challenge to predict the affinity of a specific TCR to a given displayed peptide and as a consequence to predict the probability that a given peptide (from e.g. the COVID-19 spike protein) will be highly immunogenic. This talk will focus on the question of how best to tackle this problem, especially considering all the hype concerning how machine learning is replacing traditional physics approaches to all types of classification problems. Our results indicate that a hybrid strategy which incorporates physical understanding into data science methods offers the best approach to this problem at present.