

COMBATting FUTURE BIOLOGICAL THREATS – HOST-DIRECTED INTERVENTIONS TO EMERGING THREATS FOR RAPID RESPONSE

Vaccine Ranking Analysis Framework

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Computational tools that can assess the state of vaccine research and predict the likelihood of success for a pathogen will help make informed experimental decisions based on the available platform research and avoid potential failures from previous investigations. Vaccine development for a given pathogen can be characterized by different levels of success. Identifying what should be ruled out as a viable approach can be challenging since negative data is generally unpublished. Having a ranking tool will provide the context and supporting evidence for positive indicators for success. We have created a vaccine analysis framework that has surveyed available bacterial and viral pathogen data to provide a ranking summary of the state of the research from the Vaccine Investigation and Online Information Network (VIOLIN) <https://violinet.org> and vaccine ontology data resource. Results from this ranking analysis can be used to inform and prioritize areas where literature mining and experimental data generation could fill in data to support computational modeling. Initial results show that there is coverage for a variety of pathogen types and ranking can be performed based on research phases. Our computational framework provides a summary context of the target pathogen versus neighbors. There are vaccine platforms that have been successful for specific pathogen taxonomic groupings, such as bacteria versus virus. Machine learning modeling and prediction of whether a pathogen and platform pairing will be successful requires both positive and negative data. Improving modeling performance beyond the existing datasets will require a larger-scale effort to collect and curate a wide range of data outcomes. Potential impact to the JSTO mission include having more efficient platform development of vaccines given a pathogen of interest. This will highlight evidence to support further development for existing vaccines and rank the best approaches for new vaccines.

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