Insights into the biochemical features and immunogenic epitopes of common bradyzoite markers of the ubiquitous Toxoplasma gondii

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Abstract:

The widespread distribution of Toxoplasma gondii (T. gondii) infection and its harsh outcomes in pregnant women and immunocompromised patients lead researchers towards vaccination strategies. The present in silico investigation was done to reveal biophysical properties and immunogenic epitopes of six bradyzoite markers for rational vaccine design in future. For this purpose, different web servers were used to predict antigenicity, allergenicity, solubility, physicochemical properties, post-translational modification sites (PTMs), the presence of signal peptide and transmembrane domains. Moreover, the secondary and tertiary structures of the proteins were revealed followed by refinement and validation. Finally, NetCTL server was used to predict cytotoxic T-lymphocyte (CTL) epitopes, with subsequent immunogenicity analysis. Also, IEDB server was utilized to predict helper T-lymphocyte (HTL) epitopes, followed by IFN-γ and IL-4 induction, antigenicity and population coverage analysis. As well, several linear antigenic B-cell epitopes were found, with good water solubility and without allergenicity. Totally, these proteins showed appropriate antigenicity, abundant PTMs as well as many CTL, HTL and B-cell epitopes, which could be directed for future vaccination studies in the context of multi-epitope vaccine design.

Keywords: Toxoplasma gondii, Bradyzoite markers, Immunoinformatics, Immunogenic epitopes