Highly conserved epitopes of Zika envelope glycoprotein may act as a novel peptide vaccine with high coverage: Immunoinformatics approach

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Abstract

Zika virus (ZIKV) is positive sense single stranded RNA of *Flavivirus* genus belonging to the Flaviviridae family. It has neither drug nor protective vaccine and thought to be in relatedness to neurological diseases such as Guillain Barre Syndrome and microcephaly in neonates of infected mothers. The aim of this study is to analyze envelope glycoprotein-E of all Zika strains using *in silico* approaches looking for conservancy which is further studied to predict all potential epitopes that can be used after *in vitro* and *in vivo* confirmation as a therapeutic peptide vaccine. A total of 50 Zika virus variants' (include 12 from South America) polyproteins retrieved from NCBI database were aligned and the conserved regions of envelope glycoprotein-E were selected for epitopes prediction. We used IEDB analysis resource to predict B and T-cell epitopes and to calculate the population coverage. Epitopes with high scores in both B-cell and T-cell epitopes predicting tools were suggested. Three epitopes were proposed for international therapeutic peptide vaccine for B-cell (AQDKP, TPNSPRAE and TPHWNNK) and two other epitopes designed especially for South America strains (LDKQSDTQYV and EVQYAGTDGPCK). For T-cell epitopes, MMLELDPPF epitope was highly recommended as therapeutic peptide vaccine to interact with MHC class I along with three other epitopes (MAVLGDTAW, KEWFHDIPL and DTAWDFGSV) which showed very good population coverage against the whole world population. Three epitopes showed high affinity to interact with MHC class II alleles (FKSLFGGMS, LITANPVIT and VHTALAGAL) with excellent population coverage throughout the world and South America region. Herd immunity protocols can be achieved in countries with low population coverage percentage to minimize the active transmission of the virus, especially among pregnant women and other groups at risk. We recommend *in vitro* and *in vivo* proving the effectiveness of these proposed epitopes as a vaccine as well as to be used as a diagnostic screening test.

Biography

Marwan Mustafa Badawi Suluiman is currently a Master degree student of Medical Microbiology.

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