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In silico development of a peptide based vaccine inducing multi-epitope T-cell responses against hepatitis C virus

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Background: Induction of a strong hepatitis C virus (HCV) specific T-helper 1 (Th1) T-cell response plays a pivotal role in control and clearance of the virus. A multi-epitope vaccine containing T-cell epitopes could be a promising vaccination strategy against HCV, but further computational evaluations are important before initiating the experimental study.

Method: In the present study, we have employed various approaches to design an efficient multi-epitope vaccine. First, CD8+ cytolytic T-lymphocytes (CTLs) epitopes, helper epitopes and adjuvant which are three essential components of peptide vaccine were determined. CTL epitopes were selected from HCV genotype 1a/1b, consensus regions of non structural protein 3 (NS3) and non structural protein 4A (NS4A) by various servers. NS3 derived sequences by various servers were used to induce $CD4^+$helper T-lymphocytes (HTLs) responses. Heparin-Binding Hemagglutinin (HBHA), a novel TLR4 agonist, was applied as an adjuvant to polarize $CD4^+$T cells toward T-helper 1 to induce strong CTL responses. Then obtained epitopes were linked together by appropriate linkers to enhance epitope presentation. 3D model of protein was generated and physicochemical properties, stability and allergenicity of the protein were predicted using bioinformatics tools and servers.

Results: Our results indicated that more than 90% residues locate in favorite or additional allowed region of Ramachandran Plot. Also, based on Ramachandran plot analysis this protein could be classified as a stable fusion protein. In addition, this multi-epitope protein had strong potential to induce specific T-cell response against HCV.

Conclusion: Our results supported that this multi-antigenic vaccine could be effectively considered as an efficient vaccine for prophylactic or therapeutic usages.

The comparison of the level of the IL-2, IL-6, IL-10, IFN-γ and serum cortisol hormone in young athlete and non athlete men report arising from your research

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It has been shown that two types of cells (Th1/Th2 cells) play critical roles in defensive immune responses and in immunopathological disorders such as allergic reactions and autoimmune diseases and the methods of detecting Th1 and Th2 cells have become more important. The purpose of this research is to compare the level of Th1 cells (IL-2, IFN-γ), Th2 cells (IL-6, IL-10) and serum cortisol hormone in young athlete and non athlete men. This is an applied research that its data is gathered by free method. So in order to carry out the research among healthy and volunteer people, 20 of them (weight: 78±4.1 Kg, height: 179±3.59 ms, age: 26±4.38 BMI: 24±1.51) are sorted in athletes group (scientific group) and 12 of them (weight: 79±4.62 Kg, height: 181±2.51 ms, age: 25±4.32 BMI: 24±1.63) in non athletes group (control group). The scientific group includes that athlete who has at least 6 months of regular aerobic exercise and the control group is the peoples who do not have any sport experience. Blood samples for evaluating the above factors in ELISA method are taken from both groups. Considering that the data were normal, with a T test, the independent student in the meaningful level of (P≤0/005) is examined. Comparing the average amount of IL-2, IL-6, IL-10, IFN-γ and serum Cortisol hormone in both groups, the amount of IL-6 and cortisol hormones in the scientific group has reduced considerably (p<0/05). The results of this research showed that aerobic exercise changed the balance of Th1/Th2 to TH1; this change is an effect of the reduction of TH1 anti-inflammatory cytokines and can be helpful in cure of rheumatic and allergic sickness.