Abstract

# Immuno-informatics design of a multimeric epitope peptide based vaccine targeting SARS-CoV-2 spike glycoprotein

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## Abstract:

Developing an efficacious vaccine to SARS-CoV-2 infection is critical to stem COVID-19 fatalities and providing the global community with immune protection. We have used a bioinformatic approach to aid in the design of an epitope peptide-based vaccine against the spike protein of the virus. Five antigenic B cell epitopes with viable antigenicity and 27 discontinuous B cell epitopes were mapped out structurally in the spike protein for antibody recognition. We identified eight CD8+ T cell 9-mers along with 12 CD4+ T cell 14-15-mer as promising candidate epitopes putatively restricted by a large number of MHC-I and II alleles respectively. We used this information to construct an in silico chimeric peptide vaccine whose translational rate was highly expressed when cloned in pET28a (+) vector. The vaccine construct was predicted to elicit high antigenicity and cell-mediated immunity when given as a homologous prime-boost, with triggering of toll-like receptor 5 by the adjuvant linker. The vaccine was characterized by an increase in IgM and IgG and an array of Th1 and Th2 cytokines. Upon in silico challenge with SARS-CoV-2, there was a decrease in antigen levels using our immune simulations. We therefore propose that potential vaccine designs consider this approach.

## Biography:

Onyeka S Chukwudozie is a young researcher in the field of bioinformatics, computational biology, and immunology. He obtained a first-class degree in Cell Biology and Genetics, before his huge diversion into computational modeling of biomolecules for disease studies. He has published in several international reputable journals and won awards and fellowships. Given his expertise, he has vast experience in viral studies, where he has adequately studied the genomics, transcriptomics, and proteomics characterizations of viruses such as Ebola, Lassa, and the current coronavirus. At the age of 23, he had his first sole author publication, where he adopted and applied sophisticated computational pipelines in deciphering the Ebola virus host-pathogen relationships. He has won several international awards and travel fellowships to present his prestigious research works.

## Publication of speakers:

1.  Chukwudozie, O. S. (2020). The Function Annotations of ST3GAL4 in Human LAMP1 and Lassa Virus GP-C complex from the Perspective of Systems Virology. Access Microbiology. Volume 2

2.  Chukwudozie, O.S., Rebecca C. Chukwuanukwu, Iroanya O. Onyekachiet al. (2020). Attenuated Subcomponent Vaccine Design Targeting the SARS-CoV-2 Nucleocapsid-Phosphoprotein RNA Binding Domain: In silico analysis. Journal of Immunology Research.

3.  Chukwudozie, O. S., Clive M. Gray, Tawakalt A. Fagbayi et al. (2020). Immuno-informatics Design of a Multimeric Epitope Peptide Based Vaccine Targeting SARS-CoV-2 Spike Glycoprotein. BioRxiv. doi: https://doi.org/10.1101/2020.07.30.228221

4.  Otitoloju, I.P. Okafor, M., Fason, K.A., Bawa-Allahi, C. Isanbor, O.S., Chukwudozie, O.S et al., (2020). COVID-19 pandemic: examining the faces of spatial differences in morbidity and mortality in sub-Saharan Africa, Europe, and USA. medRxiv. doi: https://doi.org/10.1101/2020.04.20.20072322.

**Webinar on COVID-19 Vaccination | October 08, 2020 | Rome, Italy**

**Citation:** Onyeka S Chukwudozie; Immuno-informatics Design of a Multimeric Epitope Peptide Based Vaccine Targeting SARS-CoV-2 Spike Glycoprotein, COVID Vaccines 2020; October 08, 2020, Rome, Italy.