**Accelerated Vaccine Design for Emerging Infectious Diseases and Biodefense**

B. Biron1, F. Terry1, A. Gutierrez1, G. Richard1, M. Ardito1, L. Moise1,2, W. Martin1, A. S. De Groot1,2

1EpiVax, Inc., Providence, RI, USA

2iCubed, University of Rhode Island, Providence, RI, USA

Computational vaccinology includes epitope mapping, antigen selection, and immunogen design using computational tools. In silico prediction of immune response to biothreats, emerging infectious diseases and cancers can accelerate the design of novel and next generation vaccines.

iVAX is a cloud-based set of integrated immunoinformatic algorithms for triaging candidate antigens, selecting immunogenic and conserved T cell epitopes, eliminating regulatory T cell epitopes, and designing antigens to induce immunogenicity and protection against disease for humans and livestock.Commercial and academic applications of iVAX include identifying immunogenic T cell epitopes in the development of a T-cell based human multi-epitope Q fever vaccine, as well as identification of HLA-A2-restricted peptides conserved within F-TS and NFTS gene families of *T. cruzi*. In a ‘live-fire’ test for rapid response, an iVAX-designed Lassa virus vaccine stimulated epitope-specific cytokine-producing CD4 and CD8 T cell responses in HLA transgenic mice. An epitope-based encephalitic virus/Ebola virus combination vaccine was equally protective in HLA transgenic mice as whole antigen. In a malaria vaccine clinical trial, iVAX accurately predicted T cell responses according to individual HLA type and vaccine cross-reactivity with self-antigens. Low immunogenicity H7N9 influenza HA was replaced by an epitope highly cross-conserved in circulating influenza strains, resulting in an increase in post-vaccination antibody titers compared to wild type protein in humanized mice. iVAX has also advanced the safety impact of the “vaccines on demand” platform by successfully identifying the epitope cross-reactive between human titin and the MAGE A3 affinity-enhanced TCR cancer immunotherapeutic implicated in two fatalities among trial participants. As recent infectious disease outbreaks underscore the significance of bioterror preparedness, iVAX stands ready for accelerated and rational design of proteome-derived, epitope-driven vaccines.

Character Limit: 2,000

Current: 1,997