



Kansas State University Innovation Partners TECHNOLOGY LICENSING PROFILE

SARS-CoV 2 Vaccine Candidates

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Description: Researchers at Kansas State University have created two COVID-19 vaccine candidates that utilize a novel recombinant attenuated virus vector well suited for mucosal immunization.

Vaccine Candidate #1: The recombinant replicon encodes the 2019-nCoV receptor binding domain (RBD), which is designed for display on the surface of the infected cells. Surface display of the RBD is expected to mimic the actual virus and thereby avail the RBD for optimal B cell recognition. In addition, the construct is designed for co-expression and secretion of a tetrameric human CD40L functional domain as a potent B cell agonist and IgA switch factor.

Vaccine Candidate #2: A recombinant attenuated virus replicon was created that encodes the secreted tetrameric RBD-CD40L as a fusion. The secreted chimeric polypeptide is expected to be targeted to the CD40 receptor, serve as a B cell/Antigen Presenting Cell agonist, and in addition provide IgA isotype switching through the CD40L.

Preliminary Data:

- **Vaccine Candidate #1:** Preliminary data shows that the encoded protein is expressed on the surface of human embryonic kidney cells (HEK) 293 cells transfected with a plasmid construct encoding the surface-targeted RBD and concomitant secretion of the tetrameric human CD40L as judged by immunocytometric analysis using anti-His-tag monoclonal antibody [mAb] and more importantly by anti-corona virus S protein antibody. The rescued recombinant virus replicon encoding the surface displayed RBD and the secreted CD40L molecular adjuvant is expressing the proteins in a similar manner. Authenticity of the expressed RBD was validated using soluble human Angiotensin Converting Enzyme-2 [ACE2-IgG1 Fc fusion protein]
- **Vaccine Candidate #2:** Preliminary data shows that a plasmid construct and the rescued recombinant virus replicon encoding the secreted chimeric polypeptide are expressing the RBD-CD40L as expected.

Next Research Step: KSU now has capacity to evaluate immunogenicity and efficacy using ferrets at the Biosecurity Research Institute (BRI). We are seeking a commercial partner to enable us to fast track testing of the candidate immunogens in ferrets.

Advantages:

- KSU-owned attenuated live vector replicon for mucosal as well as parenteral immunization.
- Can be delivered as a nasal spray to induce mucosal IgA: vector can infect human mucosal epithelia cells.
- Surface display of RBD for optimal B cell recognition.
- Secreted RBD-CD40L is expected to be targeted to CD40 receptor on B cells and other antigen presenting cells.
- Replication-competent immunogen: scale up platform is available.

Applications: COVID-19 Vaccine Candidates

Patent Status: Patent Pending

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