Kansas State University Research Foundation
TECHNOLOGY LICENSING PROFILE

Novel Approach to Developing a Safer SIV Modified Live Vaccine

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REF. NO. (2014-39)

Description: Collaborative research between Kansas State University and the J. Craig Venter Institute in Rockville, Maryland has discovered a potentially safer approach to developing a modified live vaccine (MLV) to prevent swine influenza virus (SIV) infection. Previous research studies have shown that SIV MLV candidates can be more efficacious than the traditional inactivated vaccines. However, these candidates were not commercialized. A big concern is the safety issue, i.e., the MLV might reassort with the endemic influenza A viruses to generate more virulent virus in a host. To avoid this safety risk, the inventors of this patent pending technology showed that it is possible to use modified bat influenza viruses to create the desired immunogenic response in pigs without the reassortment potential. The modified bat viruses are attenuated in pigs when compared to the wild type swine virus and are immunogenic to produce hemagglutination inhibition antibodies.

Using synthetic genomics and reverse genetics, the researchers were able to produce two modified bat influenza - SIV vaccine candidates ("Bat-SIV") that had the bat influenza HA and NA coding regions replaced with those of a swine influenza virus (H3N2) and the remaining 6 internal genes from either the little yellow-shouldered bat or the flat-faced bat influenza virus. In an initial pig study, a group of four-week-old pigs were intratracheally infected with 5 x 10^5 $TCID_{50}$/pig of either Bat-SIV candidate #1, Bat-SIV candidate #2 or a wild-type SIV (TX98) virus. All pigs (9/9) infected with the TX98 virus showed fever that lasts for 3-4 days whereas both Bat-SIV candidate #1 & #2 only induced fever in 6 out of 9 infected pigs that lasted for 1-2 days. No fever was seen in the mock-infected group. All three viruses were able to cause lung lesions in all infected pigs. The TX98 virus induced more severe lung lesions than both modified bat viruses. This early pig study demonstrated that these Bat-SIV candidates can infect and replicate in pigs providing the basis for further research in the potential of this platform to provide heterologous protection against multiple swine influenza virus strains. Importantly, the researchers demonstrated no reassortment occurred when cells were co-infected with either Bat-SIV candidates and a canonical influenza A virus including a wild-type SIV stain.

Advantages:

- Potentially have all advantages of live attenuated virus vaccines
- Potentially more efficacious than killed vaccines
- Potentially providing heterologous protection against numerous SIV strains
- Demonstrated no reassortment in early studies

Applications:

- SIV vaccines
- Platform for potential vaccine development for other animal species and potentially humans

Patent Status: Patent pending

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