Protective swine influenza T cell epitopes can be identified using PigMatrix and are conserved in field strains from 2013 to 2017

Quantifying the persistence of vaccine T cell epitopes in circulating swine influenza strains from 2013 - 2017

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Introduction
When swine influenza vaccine and circulating strains are poorly matched, vaccine-induced antibodies may not protect, but highly conserved T-cell epitopes may still have a disease-mitigating effect. This is a T-cell-mediated protection.

Challenge
Can I predict if my vaccine will induce T cell-mediated protection against a new flu strain?

Rationale
Higher conservation = higher protection.

Conservation of T cell epitopes between vaccine and novel swine influenza A virus (IAV) strains is variable and may explain variability in vaccine efficacy.

Approach
Analyze the degree of epitope cross-conservation between a T cell-directed DNA vaccine (class I and II) and 1272 swine influenza outbreak strains over five years (Figure 1) by immunoinformatics methods (Figure 2).

Results
Cross-conserved T cell epitopes are crucial to confer protection as viral sequence similarity changes from year to year (Figure 3). Whole proteome EpiCC score of all IAV field strains suggests that the epitope-based DNA vaccine is able to drive better CD4+ immune response by having cross-conserved T cell epitope content (Figure 4). Consistency of the area under the curve (AUC) relative to 2013 implies the T cell epitope in the prototype vaccine should be able to drive good immune response over time (Figure 5).

Conclusions
The higher the EpiCC score, the higher T cell epitope content relatedness to the vaccine of interest. This case study shows good coverage of flu strains by a single vaccine over many years.

References