Southern Illinois University System

Recombinant *Eimeria Maxima* Protein Delivered as Nanoparticles

Coccidiosis, a poultry disease caused by *Eimeria* pathogens, causes weight loss, poor weight gain, low feed-to-growth ratios, and mortality in poultry. Prevention of avian coccidiosis estimated to be a $3B global market. Current treatment options vary in effectiveness and side effects, and no available vaccines protect against all seven species of *Eimeria*.

Invention

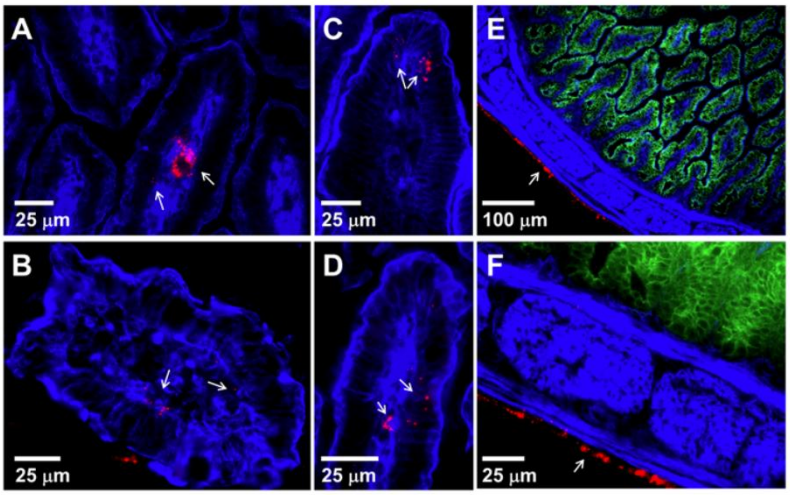
USDA and SIU researchers have developed a nanoparticle-based vaccine to protect poultry against *E. maxima*, one of the most common coccidiosis-inducing pathogens. The vaccine comprises ~20 nm polystyrene nanoparticles which are conjugated to *E. maxima* immune-mapped protein 1 (EmaxIMP1).

Key Advantages

- Complete protection against *E. maxima* in chickens observed in battery cage studies.
- Partial protection against *E. maxima* in chickens observed in floor pen studies.
- Platform technology can be adapted to deliver multiple *Eimeria* antigens (*E. maxima*, *E. tenella*, *E. acervulina*) simultaneously.
- Immunogenic compositions can be formulated for oral or nasal delivery.

Status

U.S. patent application #16/245,773 was filed January 11, 2019. The technology is available for license.



NP-EmaxIMP1 (B,D) and NP-NR (A,C) in epithelium and lamina propria of chickens' small intestinal villi 6 h after per os administration. Fluorescence signal from accumulated NPs in serosa 6 h post-inoculation (E,F) indicates NP crossing of mucosal-lumen interface to reach circulation.

This is a joint technology with USDA. Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available.

Applications

- Inducing active immunity to coccidiosis
- Controlling coccidiosis in poultry operations
- Reducing coccidiosis-related mortality and morbidity in poultry

Inventor(s)

Mark C. Jenkins, PhD

Dr. Jenkins is a microbiologist at the US Department of Agriculture's Animal Parasitic Diseases Laboratory. His research focuses on molecular biology, immunology, and biochemistry of coccidiosis, cryptosporidiosis, and neosporosis in domestic animals.

Vjollca Konjufca, PhD

Dr. Konjufca is an associate professor of microbiology at SIU Carbondale. Her research interests include immunology and host-pathogen interactions.

Contact

Kristy Owen

Assistant Director
kowen@siumed.edu
(217) 545-6397