Skysong Innovations

A unit of the Arizona State University Knowledge Enterprise

Vaccine for Preventing Necrotic Enteritis in Poultry

SI Case # M17-174L

Inventors

Kenneth Roland
Associate Research Professor
Center for Immunotherapy, Vaccines and Virotherapy
The Biodesign Institute
Arizona State University

Hugh Mason
Associate Professor
Center for Immunotherapy, Vaccines and Virotherapy
The Biodesign Institute
Arizona State University

Andrew Diamos
Graduate Teaching Associate
Center for Immunotherapy, Vaccines and Virotherapy
The Biodesign Institute
Arizona State University

Intellectual Property Status:

Patent Pending

Contact

Thomas Goodman

Vice President of Life Sciences
Skysong Innovations LLC (SI)
P: 480.884.1648
C: 480.622.5630

Tom.Goodman@skysonginnovations.com

Invention Description

Necrotic enteritis (NE), caused by type A strains of the bacterium *Clostridium perfringens*, results in a global economic loss of over 2 billion dollars, annually, to the poultry industry. *C. perfringens* causes chronic sub-clinical intestinal mucosal damage, leading to a reduction in the ability of birds to benefit from nutrients in food and reduced feed intake and growth performance. The routine application of antibiotics at sub-therapeutic levels in feed is the most commonly used method to control NE. With recent moves to phase out the use of antibiotics in poultry feed, NE is a re-emerging disease and a threat to the objectives of 'antimicrobial-free' poultry farming.

Researchers at the Biodesign Institute of Arizona State University have developed a novel fusion protein vaccine, which fuses two toxoids that elicit immune responses protective against necrotic enteritis. The fusion protein is produced in plants which can be purified and used for *in ovo* vaccination, as an injectable preparation or fed directly to poultry for use as an oral vaccine to elicit a protective immune response. A preliminary chicken immunization experiment was performed and birds were vaccinated with the fusion protein and then subjected to an in-feed challenge. Results demonstrate that the fusion protein is highly immunogenic and protective against an in-feed challenge with a highly virulent *C. perfringens* strain.

This highly immunogenic and protective fusion protein provides an excellent vaccine platform for protecting poultry against NE while still accomplishing antimicrobial free farming.

Potential Applications

- Prevents bacterial outbreaks from *Clostridium perfringens*
  - Immunizing hens can protect offspring
  - *In ovo* vaccination – to protect eggs before they hatch

Benefits and Advantages

- High expression levels in plants
- Can be produced in a plant food for potentially low cost, oral vaccines
- Robust protection against NE
- Protection against NE from hatch when applied *in ovo*
- Versatile and easy administration routes
- Immunizing hens will protect their offspring in the first two weeks of life
- Avoids antibiotic administration
- Prevents disease outbreaks