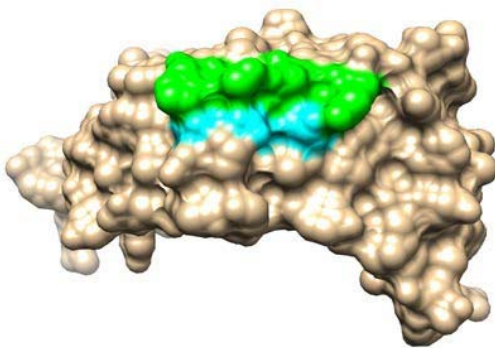


Structure-Based Chronic Wasting Disease Vaccines: Analyzing Their Mode of Action

Chronic Wasting Disease (CWD) is spreading uncontrollably in deer, elk, and moose throughout Alberta, Saskatchewan, Manitoba, and many US states. CWD is considered the most infectious prion disease and contaminates the environment long-term. This project will use our knowledge about the specific shape and surface properties of the CWD pathogen to develop structure-based vaccine candidates as potential disease prevention therapies. The team will analyze the molecular details of the immune responses in immunized rodent models with the aim to understand the immune system parameters that influence the effectiveness of the team's vaccine candidates. Improved vaccines candidates can then be tested in mouse models and white-tailed deer. The project aims to develop and validate an improved prion vaccine that can protect deer, elk, and moose from CWD infection.



Green and cyan areas represent the surface structures mimicked in the vaccine that will be tested for its ability to protect both mice and deer against CWD.

Beta-solenoid model for the structure of the infectious prion protein with a tan colored surface representation

APPLICATION

A first step towards a solution for preventing CWD infection is to develop and validate a vaccine that prevents infection with CWD prions under controlled conditions. A successful completion of this project would bring us closer to commercializing a CWD vaccine.



RECIPIENT:

University of Alberta, Dr. Holger Wille



PARTNERS:

National Institutes of Health Subgrant from Colorado State University



TOTAL BUDGET:

\$400,000



AI FUNDING:

\$250,000



PROJECT DATES:

**JAN 2022 –
DEC 2023**



PROJECT TRL:

**Start: N/A
End: N/A**



ALBERTA INNOVATES CLEAN RESOURCES

AGRI-FOOD INNOVATION

PRION RESEARCH

PROJECT GOALS

- Create and test prion based CWD vaccine candidates.
 - Test the efficacy of the existing CWD vaccine candidates in mouse models that contain elk DNA sequences.
 - Test improved vaccine candidates in genetically enhanced rodent models.
- Develop and validate a prophylactic vaccine under controlled conditions in captive cervids.
 - Produce CWD vaccine for testing and validation in deer at Colorado State University.
 - Analyze samples from immunized white-tailed deer.
- HQP will be trained in sample collection techniques and laboratory research for supporting a MSc thesis.

BENEFITS TO ALBERTA

- Development of a prophylactic prion vaccine capable of protecting cervids against infection with CWD prions would provide a great benefit to both free-ranging and captive cervids.
- A reduction of the risk of transmission will be a great benefit to deer and elk farmers whose livelihoods are threatened by CWD.
- Completion of the project would bring the prion vaccine closer to commercialization.
- Preventing CWD infection in free-ranging cervids may prevent the contamination of the environment with long-lived prions.



1-2 Publications



1 Student Trained



1 Patent



1 New
Product/Service



1 Project Job

CURRENT STATUS

APR 2023

In 2022, several new prion vaccine candidates were developed, the engineered proteins were produced in bacteria, and the purified vaccine antigens were tested in wild-type mice. The resulting immune responses were able to recognize the disease-causing form of the prion protein. We are now starting efficacy trials in a CWD mouse model. Similarly, our collaborators at Colorado State University have used our prion vaccine to immunize white-tailed deer that are housed in their facility.