UMN veterinary scientists propose faster Chronic Wasting Disease diagnostic test

Current diagnostic tests for Chronic Wasting Disease (CWD), which is a growing threat to Minnesota's white-tailed deer population, can only confirm CWD's advance after an infected animal is dead. And the tests require days or weeks to deliver results. Thus, wildlife managers can only learn where CWD has been, not where it is currently circulating, which makes controlling the contagious, neurodegenerative disease challenging.

A team of University of Minnesota experts, led by scientists from the College of Veterinary Medicine, is seeking funds to develop a test that can rapidly screen live animals for the presence of CWD. The team is working closely with staff from the Minnesota Department of Natural Resources and the Minnesota Board of Animal Health to refine the proposal, which Minnesota legislators are considering.

CWD results from a malformed prion that kills neurons in the infected animal's brain—leading to disorientation, abnormal behavior and eventual death. Infected animals can live for at least 16 months before dying, and their blood, tissues and fecal material can remain a source of new infections for years after death. The prion behind CWD is closely related to the prion that causes mad cow disease, and also related to human prion diseases such as Alzheimer's and Parkinson's. The U.S. Centers for Disease Control recommends against eating meat from CWD-infected animals.

A difficult, but achievable goal

Recent advances in biomedical technology and the application of nanotechnology to DNA analysis have put a rapid, field-based test for the presence of CWD within reach. But developing a fast-acting test that reliably finds the CWD prions without delivering too many "false positive" results is a challenge. The team is requesting $1.8 million and two years to develop the test and a prototype device. The funding will allow staff to work full-time on the project purchase the specialized equipment they need.

"Our current tests," says Peter Larsen, PhD, "force wildlife managers to order the killing of deer without confirming their infection status. And the specialized hunts often occur long after infection has spread—possibly beyond the hunting boundaries." Larsen is leading the research team. He is a genomicist and bioinformatician with expertise in infectious disease, neurogenerative disease, and the application of nanotechnology for molecular diagnostics. He is a newly hired member of the University's Department of Veterinary and Biomedical Sciences.

The team's goal is to isolate and detect CWD prions within a microfluidic environment. To be really useful, the test needs to work with a variety of substances including blood, saliva and feces.

"We have the expertise and the necessary biocontainment facilities to safely handle the CWD prions," Larsen says. "It will be difficult to achieve, but we are confident of our future success."

A critical first step

CWD has spread across the central US over the past 50 years and is currently found in 26 states. It's also found in Canada, several Scandinavian countries and parts of Asia. It is circulating among animals in the cervidae family—i.e. white-tailed, deer, moose, elk, and reindeer.

"I have watched CWD move into Minnesota and I'm frustrated that we haven't found strategies to slow down or contain the disease," says Jeremy Scheffers, DVM, PhD. Scheffers is a pathologist with the Minnesota Veterinary Diagnostic Laboratory, and has spent over 10 years looking at thousands of tissue samples to confirm the presence of CWD. "Unfortunately, our lack of a rapid test that works on live animals, or our ability to test other things such as soil, meat processing equipment, and samples from other animals that might carry the prion, clouds our understanding of CWD transmission," Scheffers adds.

A rapid and reliable field-based test would help answer numerous CWD-related questions. How long does an infected animal shed the CWD prions that can infect other animals? How long do the prions survive in the environment? What techniques inactivate the CWD prions, either in animals or in the environment?

"We need to do something different to get ahead of this disease," Scheffers says, "and most of those different strategies won't be successful without the ability to quickly determine if CWD is present or not. A better test is the critical first step."

The research team also includes Davis Seelig, DVM, PhD, AVCP is a pathologist in the Department of Veterinary and Clinical Sciences; Pamela Skinner, PhD, a prion-disease researcher in the Department of Veterinary and Biomedical Sciences; and Sang-Hyun Oh, an expert in nanotechnology and biosensing in the Department of Electrical and Computer Engineering.

Newsletter version

New test proposed for Chronic Wasting Disease response

A team of University of Minnesota scientists propose to develop a diagnostic test that will help wildlife managers slow the spread of Chronic Wasting Disease (CWD) in elk and white-tailed deer. The new test would use samples from live animals. Current tests are conducted post-mortem, long after an infected animal has spread the disease to others. The improved test would give wildlife managers a better idea of where CWD is circulating.

The team, led by Peter Larsen, PhD, in the College of Veterinary Medicine's Department of Veterinary and Biomedical Sciences, plans to detect the CWD-causing prions in blood and then develop a miniaturized, field-based device to test a variety of substances including blood, saliva and feces. They are seeking $1.8 million in state funds for the two-year effort.

CWD results from a malformed prion that kills neurons in the infected animal's brain. The U.S. Centers for Disease Control recommends against eating meat from CWD-infected animals. CWD is circulating among wild deer populations in 26 states, including three counties in southeast Minnesota.

The research team also includes Jeremy Scheffers, DVM, PhD, a pathologist with the Veterinary Diagnostic Laboratory; Davis Seelig, DVM, PhD, AVCP is a pathologist in the Department of Veterinary and Clinical Sciences; Pamela Skinner, PhD, a prion-disease researcher in the Department of Veterinary and Biomedical Sciences; and Sang-Hyun Oh, an expert in nanotechnology and biosensing in the Department of Electrical and Computer Engineering.