

Project: Chronic Wasting Disease

Brief Description: Understand the source(s) and route(s) of transmission of chronic wasting disease (CWD) in deer and elk due to its importance to wildlife, livestock, and human health.

Executive Summary: Prion diseases are infectious and fatal neurodegenerative diseases of humans and domestic livestock, as well as wild and captive cervids. Generally, CWD is a prion disease of deer, elk, and moose in the Rocky Mountain states. However, its geographical distribution has expanded to the Midwestern and eastern U.S. CWD is a highly contagious disease, and the prevalence of infection in cervid game farms has been reported to be as high as 80%. In several game farms, CWD has subsequently spread into nearby free-ranging wildlife. Transmission of CWD is via direct contact between cervids, likely via infected bodily secretions or fluids, as well as by contamination of the environment from prions shed from infected hosts. A National Plan for chronic wasting disease management has been developed. A major concern is that the CWD agent may be able to spread to domestic livestock through grazing on common pastures. The recent discovery of CWD in muscle from infected deer also has a direct implication for food safety and prion transmission to humans through consumption of chronic wasting disease infected venison.

These outcomes would have a negative impact on animal and human health, as well as a devastating economic impact on domestic livestock industries. To minimize the threat of CWD to livestock and humans, an understanding of the source(s) and route(s) of prion transmission are necessary. This is a difficult area of investigation since definitive answers cannot be obtained by studying CWD in free-ranging cervids, and there are significant obstacles in housing large undomesticated cervids in an indoor biocontainment facility. Scientists at MSU, in collaboration with scientists at South Dakota State University, have developed a small deer model (~10 kg) for CWD in muntjac deer that can provide an opportunity to study chronic wasting disease in the new state-funded Johnson Family Livestock Facility at MSU. This containment facility will permit MSU scientists to study CWD in muntjac deer to investigate the pathways of CWD dissemination and neuroinvasion within a cervid and from a CWD infected deer to a susceptible deer. Since these events involve prion spread between neurons and along nerve fibers, these studies will also investigate the basic mechanism of prion transport. These studies can directly address the ability of the CWD agent to spread at the cellular level, within a deer, and between deer and ultimately, lead to improved surveillance of CWD and development of management approaches to contain disease spread.

Congressional Action Needed: An appropriation of \$500,000 is requested.

Importance to Montana: CWD is a fatal infectious disease that poses a threat to Montana hunting, tourism, and livestock industries. It is also a potential threat to human health through consumption of venison contaminated with CWD. While CWD has been limited in Montana, bordering states and Canada have reported an increase in the number of cases of CWD in both wild and captive cervids. It will be necessary to quickly diagnosis the disease in order to prevent disease transmission. This is important in order to protect both animal health and economic interests.

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Chronic Wasting Disease (CWD) Initiative – Talking Points

- CWD poses a threat to the hunting, tourism, and livestock industries in Montana and other Rocky Mountain States.
- Scientists have found the CWD agent in muscle from deer and elk, which is a potential source of CWD exposure to humans who consume venison.
- Research on CWD disease transmission can lead to national strategies to evaluate the zoonotic potential of CWD.
- An “International Symposium on Animal Prion Diseases and the Americas” was hosted by MSU.
- MSU scientist advised the World Health Organization on assessing the risk of prion infection in livestock food and tissue products.
- A USDA competitive grant was awarded to study prion disease in muscle and its implication for food safety. A USDA seed grant helped to establish a small deer model for CWD. Muntjac deer are susceptible to CWD and can be housed in biocontainment facilities for long-term studies accelerating promising CWD research.
- The new ABSL-2 facility at MSU is ideally suited for the investigation of infectious diseases that threaten domestic and free-ranging animals.
- Oral and nasal mucosa of deer and elk can represent potential sites of CWD agent shedding into bodily fluids. Using experimental models for CWD, infectious prions in nasal secretions have been demonstrated. Identifying sources of CWD that are shed from infected hosts is important to control or manage the spread of CWD.
- Additional funds have been secured to study strain diversity of the CWD agent and endocrine changes of CWD-infected deer and elk through a collaborative arrangement with scientists at the USGS National Wildlife Health Center.
- CWD was recently found near the elk feeding grounds south of Yellowstone National Park in Wyoming. The feeding grounds provide an opportune environment for the spread of infectious diseases. The entry and spread of CWD into Yellowstone National Park (YNP) would pose a direct threat to the health of the elk population and likely lead to potential deer infection. The YNP ecosystem could be disrupted by a significant loss of the cervid population or by interspecies transmission into other animal species.