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Chronic Wasting Disease

CWD has been documented in captive and/or free-ranging populations in 14 U.S. States and 2 Canadian Provinces.

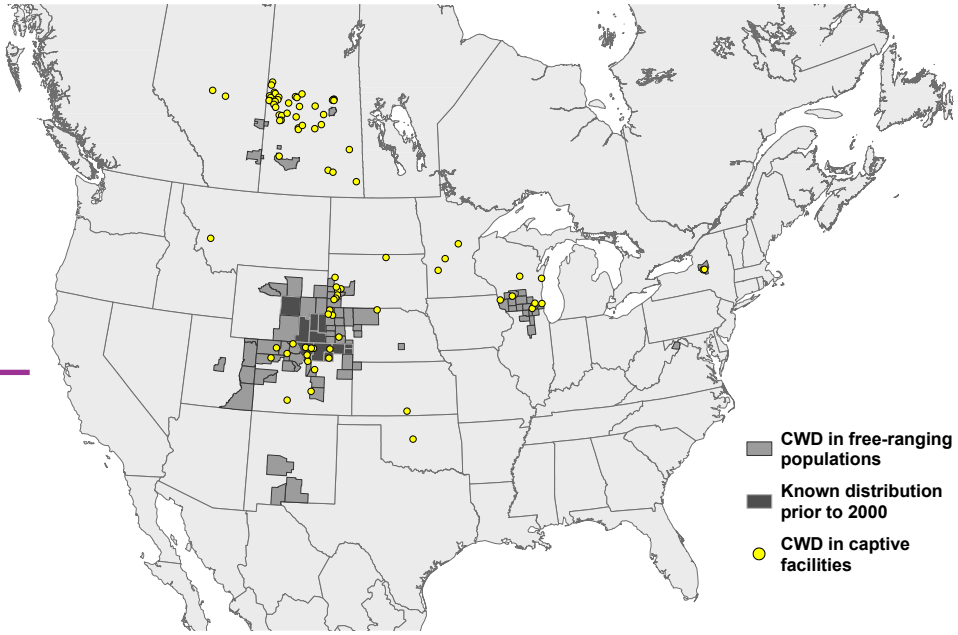

Figure 1. Distribution of chronic wasting disease in North America.

Introduction

Chronic wasting disease (CWD) is an always-fatal, neurological illness occurring in North American cervids (members of the deer family), including white-tailed deer, mule deer, elk and moose. Since its discovery in 1967, CWD has spread geographically and increased in prevalence locally. CWD is contagious; it can be transmitted freely within and among free-ranging populations. It is likely that diseased animals can transmit CWD to healthy animals long before they become clinically ill. Managing CWD in free-ranging populations is extremely difficult, therefore preventative measures designed to reduce the chance for disease spread are critically important.

History

Chronic wasting disease was first documented in a Colorado research facility in 1967. During the next decade, additional cases were documented in Colorado and Wyoming research facilities. In 1978, Dr. Elizabeth Williams determined that CWD was a transmissible spongiform encephalopathy (TSE), a family of diseases that includes scrapie in sheep, bovine spongiform encephalopathy (BSE, mad-cow disease) in cattle, and kuru and Creutzfeldt-Jakob disease (CJD) in humans. The first detection of CWD in a free-ranging population was in 1981 in an elk in Rocky Mountain National Park (Colorado). Prior to 2000, CWD had been documented in only a handful of counties in southeastern Wyoming and adjacent northeastern Colorado. Since 2000, CWD has been detected in many additional locations (Fig. 1).

Causative Agent

Although debate still occurs, the vast majority of research indicates that the causative agent of TSEs (including CWD) is a misfolded protein called a prion. All mammals produce normal prions (abbreviated PrP) that are used by cells, then degraded and eliminated, or recycled, within the body. When disease-associated prions (PrP^{CWD}) contact normal prions, they cause them to refold into the abnormal shape. These disease-associated prions are not readily broken down and tend to accumulate in lymphatic and neural tissues. Tissue damage associated with PrP^{CWD} accumulation in the brain results in a sponge-like appearance, microscopically.

Clinical Signs

CWD has an extended incubation period averaging 18–24 months between infection and the onset of clinical signs. The most obvious clinical sign of CWD is progressive weight loss, thus, the name (Fig. 2). Numerous behavioral changes also have been reported, including decreased social interaction, loss of awareness, and loss of fear of humans. Clinically diseased animals also may exhibit increased drinking, urination, and excessive salivation.

Figure 2. White-tailed deer with chronic wasting disease. Photograph courtesy of the Wisconsin Department of Natural Resources.

Diagnosis

CWD is typically diagnosed by examination of brain or lymphoid tissue from a dead animal. A variety of assays (tests), including immunohistochemistry (IHC), immuno-blotting, and enzyme-linked immunosorbent assay (ELISA) techniques are currently in use. These same techniques have been successfully used to test surgical biopsies of tonsil tissue collected from live animals. Many researchers are working to develop additional live-animal tests. However, live-animal tests are difficult to apply in free-ranging populations due to the complexity of capturing live animals.

Transmission

It has long been hypothesized that CWD is transmitted via direct (nose-to-nose) contact between animals. It has now been demonstrated that CWD also can be transmitted indirectly. Diseased animals shed infectious prions into the environment where they persist and can be ingested by healthy animals at a later date. Saliva collected from clinically affected deer has been recently shown to be infectious, helping to elucidate a potential mechanism for both direct and indirect transmission. In areas where CWD has been established the longest, prevalence has continued to increase over time (greater than 30% prevalence has been reported in localized areas). Demographic data show higher rates of disease in adults than juveniles, and 2–4 times higher rates in adult males than adult females. It is theorized that adult male breeding behaviors result in higher disease exposure.

Preventative Measures

Because CWD is difficult to successfully manage in free-ranging populations, disease prevention is critical. Many states have restricted or banned importing live cervids and are requiring whole-herd disease monitoring within game farms. Some states have banned hunters from bringing whole carcasses into their home states. Others have banned feeding and baiting of cervids to reduce artificial congregations of animals that can increase chances for disease spread.

Surveillance

Disease surveillance can be simply defined as looking for disease. Nearly every state is currently conducting some level of surveillance for CWD. In areas where CWD has been detected, surveillance is used to monitor changes in disease distribution and severity. In areas where CWD has not been detected, surveillance is used to look for the disease and to determine the likelihood that CWD is not present. Surveillance efforts include examination of hunter-killed animals, animals killed in collisions with vehicles, and live animals displaying clinical signs compatible with this disease. In a few specialized situations, wildlife researchers capture and test live animals using tonsil biopsies.

Management

Disease management objectives include limiting geographic spread, reducing disease prevalence, and eliminating disease. Methods to manage CWD in free-ranging populations are extremely limited. Several states have attempted to greatly reduce deer populations, primarily through extended opportunities for hunters, in an effort to reduce disease transmission. Agency sharpshooters have also been used to cull deer in disease "hotspots." To be successful, CWD management efforts will likely need to be intensive and sustained over many years. Management efforts for CWD are difficult and expensive for states to undertake. However, the economic and social values associated with deer, elk, and moose in North America dictate that we continue efforts to detect and successfully manage CWD.

Human Risk

While the increasing volume of scientific research continues to suggest that the risk of CWD transmission to humans is remote, scientists cannot rule out the possibility. Simple precautionary measures may help reduce the risk even further. Do not consume meat from obviously sick animals. If you hunt in areas where CWD is known to occur, you may choose to have a CWD test run on your animal. Avoid consuming internal organs, spinal cord and lymph nodes from harvested animals. Wearing disposable gloves while field-dressing animals helps reduce exposure risk, not only for CWD, but for many other diseases as well.

Additional Information

For additional information on chronic wasting disease, please contact:

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