

Chronic Wasting Disease

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Background

In the late 1960s, mule deer in a Colorado research facility, and later elk and mule deer in Wyoming, were the first to be identified exhibiting signs of what is now called chronic wasting disease (CWD). The animals progressively lost weight, stopped eating, had variable neurological deficiencies and eventually wasted away over a prolonged period. Ultimately, the disease was recognized in wild animals in Northern Colorado and Southern Wyoming. In the 1980s the disease agent was identified as a prion. Since that time, the disease has slowly progressed across western states and now has been detected in 26 states, three Canadian provinces, Norway, Finland, Sweden and South Korea.

Definition

CWD is the transmissible spongiform encephalopathy (TSE) of cervids.

Causative Agent

CWD is caused by a prion. A prion is essentially a misfolded protein that exhibits infectious properties. However, as compared to other infectious agents including viruses, bacteria, fungi and parasites, prions lack DNA or RNA. These misfolded proteins are extremely environmentally resistant and can persist in soil and other substrates for decades.

Species Affected

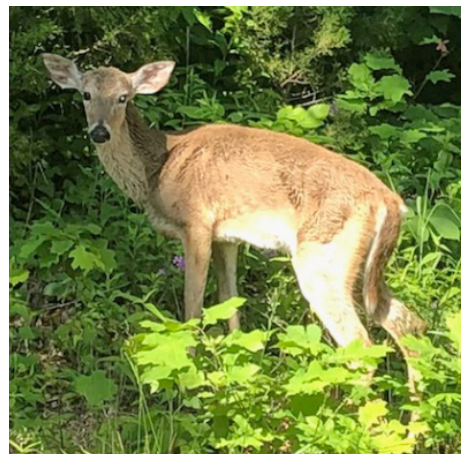
CWD is known to infect members of the Cervidae family. The disease has been found in wild white-tailed deer, mule deer, elk, moose and caribou populations. Captive populations of white-tailed deer, mule deer, black-tailed deer and elk have also been documented with the disease. Additionally, muntjac have been experimentally infected. Fallow deer are not known to be naturally infected with CWD. CWD is **not** known to be naturally transmissible to cattle, sheep, goats or horses. Pigs have been infected in experimental studies.

Transmission

The most likely route of infection is via ingestion of prions. Exposure may be from prions that have been deposited in the environment. Other behaviors such as mutual grooming amongst social groups or interactions during rutting behavior may facilitate transmission. In utero transmission (mother to offspring during gestation) has been experimentally documented in muntjac deer, mule deer and elk. Transmission also may occur during parturition (at birth) or shortly thereafter during the initial maternal interactions with the fawn.

Clinical Signs

Most of the clinical signs seen with CWD are the result of damage to the neurologic system (brain, spinal cord). Often animals will first appear as thin with poor hair coats. As the disease progresses ataxia (stumbling), incoordination and hypersalivation (drooling) can be seen. Unfortunately the signs of CWD are not specific to just CWD. Confirmation of CWD infection can be done only by laboratory testing of the animal's brain or lymph nodes. It is important to note that



Deer infected with chronic wasting disease. Note poor hair coat, drooping ears and thin body condition.

Photo provided by Arkansas Game and Fish Commission.

clinically normal animals that are infected can be CWD positive and shedding the prions into the environment which warrants confirmatory testing on both sick and healthy looking animals. The clinical signs of CWD can be indications of other diseases also. The only way to know that it is CWD is by taking a sample from the animal and testing it for CWD.



Deer infected with chronic wasting disease. Note thin body condition.

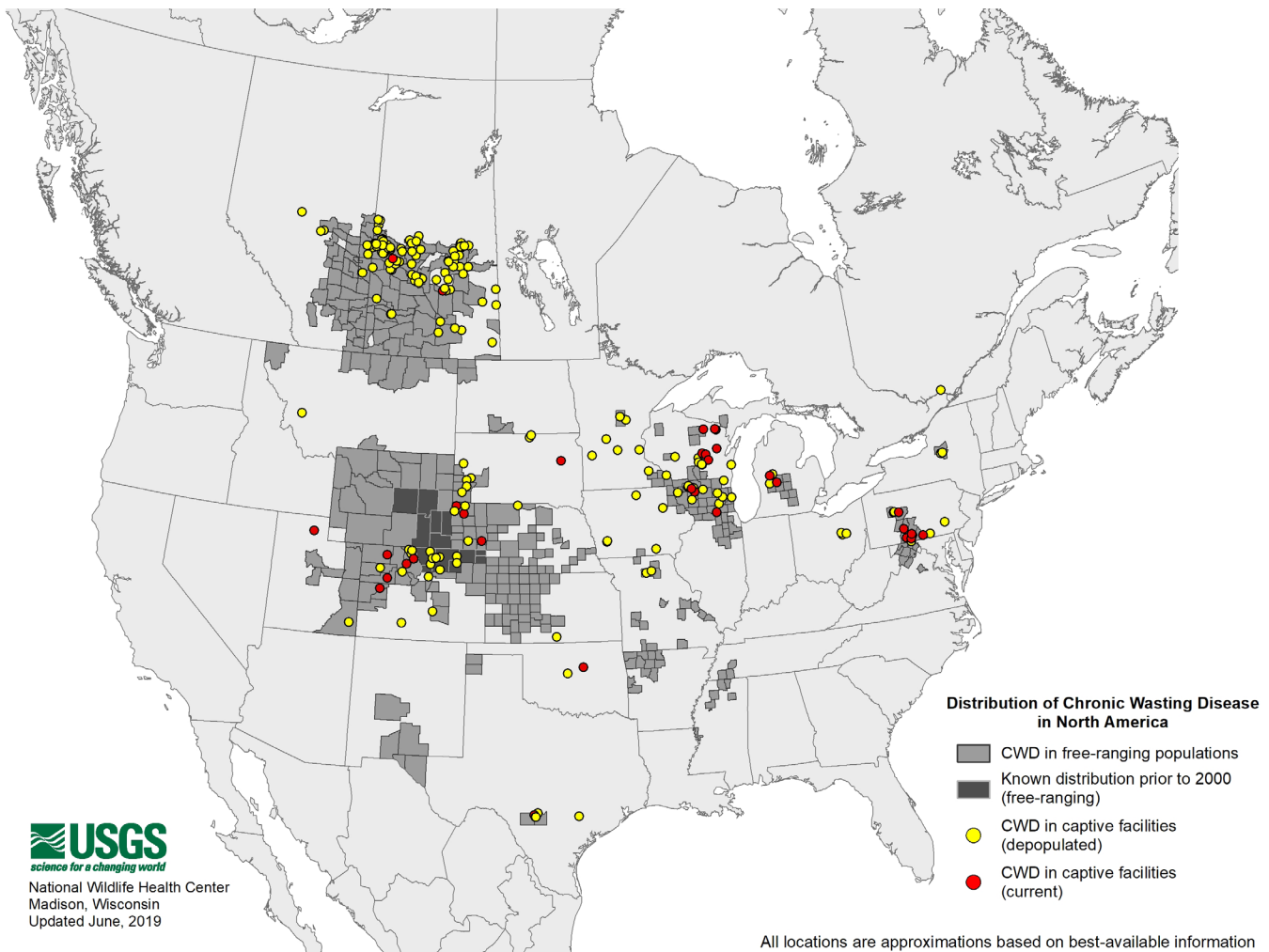
Photo by Donald Savoy and provided by the Wisconsin Department of Natural Resources

Disease Progression

CWD is a slowly progressive disease. It is 100 percent fatal. Once they are infected with prions, animals will succumb to the disease. On average, post-infection, it takes 10-18 months before clinical signs appear. Death usually occurs within months of the appearance of clinical signs.



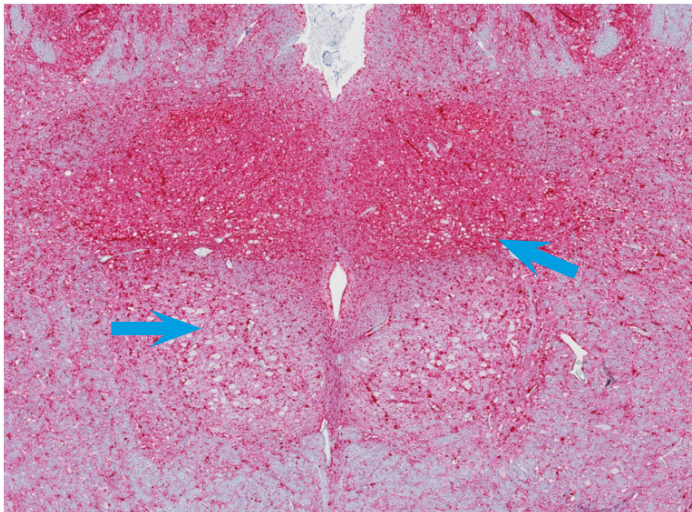
Despite appearing healthy, this 3.5-year-old buck harvested in southwest Tennessee tested positive for chronic wasting disease.



North American Chronic Wasting Disease Distribution Map

Where are the prions found in the body? The prions are found in highest concentrations in the nervous system (brain, spinal cord) and lymphatic system (lymph nodes and gastrointestinal associated lymphatic tissue). It has been detected in the liver, spleen, kidney, muscle, heart and antler velvet. Additionally prions have been found in bodily excretions and fluids such as saliva, urine, feces and blood.

What is the damage that prions cause in the body? The most life-threatening damage caused by prions replicating in an animal is the damage that happens in the brain. Over time, the abnormally shaped prions build up in the brain and lead to irreparable brain cell deterioration, which results in the clinical illness that we see (e.g., wasting, behavior changes). The most common clinical signs associated with the disease are a result of the decreased brain activity. A vacuolization (hole formation) occurs when the cells die, leading to the classic “spongelike” appearance to the brain on microscopic examination.



Photomicrograph of brain infected with chronic wasting disease. The clear areas are the vacuolization that occurs as a result of CWD (arrow). The red staining is highlighting the buildup of prion protein.

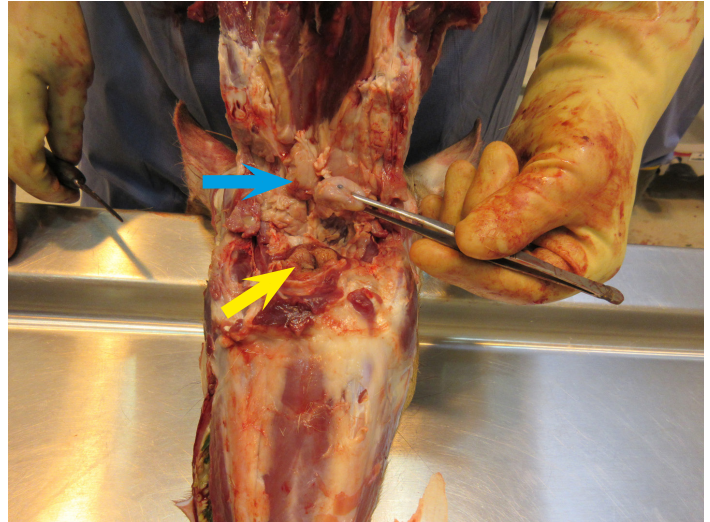
Photo courtesy Kevin Keel, Southeastern Cooperative Wildlife Disease Study.

CWD Surveillance

In general wildlife agencies utilize two methods of surveillance. Targeted surveillance is conducted year-round on sick acting, neurologic and roadkill animals. Hunter harvested surveillance is conducted during hunting season. If you are harvesting an animal in an area known to have CWD, contact your state’s wildlife agency for testing options. In Tennessee, contact the Tennessee Wildlife Resources Agency (TWRA) for sampling opportunities.

Testing

Typically retropharyngeal lymph nodes (behind the pharynx) or brainstem is collected and tested for routine surveillance by state agencies. To date, there is no accurate live animal test; testing must be conducted on samples collected from animals following death.



Collection and location of retropharyngeal lymph node. Blue Arrow = Lymph Node. Yellow Arrow = Pharynx (voice box). Photo is taken from the ventral (bottom side of the head).

Photo courtesy of the Michigan Department of Natural Resources.



Retropharyngeal lymph node. Blue Arrow = Lymph Node. Yellow Arrow = Pharynx (voice box).

Photo Courtesy of the Michigan Department of Natural Resources.

Treatment

There is no known treatment for CWD or any other prion disease.

Prevention

There currently is no effective vaccine. Research is ongoing in an attempt to develop a vaccine.

Resistance

About 5 percent of deer will have an apparent “resistance” to developing clinical disease. These deer still get infected, develop disease and die. The “resistance” basically means there is a prolonged period between infection and developing clinical disease. These animals are able to continue to shed prions into the environment but will do so for a longer period of time before succumbing to the disease. This prolonged shedding leads to a greater level of environmental contamination.

Immunity

There is no known level of immunity to CWD. Resistance does **not** equate to immunity.

Prions in the Environment

Prions are nearly indestructible. They are not destroyed by sunlight, heat, freezing or desiccation. The only known methods to destroy prions are through alkaline digestion or incineration at 1,000 C (1,838 F). Once shed into the environment, prions will remain infectious for over 15 years. For proper disposal of hunter harvested carcasses, check with your state’s wildlife resource agency for current recommendations.

Zoonotic Potential

The jury is still out as to whether CWD can cause disease in humans. To date there has been no conclusive link between human disease and consumption of CWD-infected animals. With that said, state wildlife agencies defer to public health officials for recommendations. If hunters are hunting in a known CWD endemic area it is recommended that they have their deer tested for CWD. If the animal tests positive for CWD, do not consume meat from that animal. For additional information regarding recommendations from the Centers for Disease Control and Prevention, visit CDC.gov.

If I see a sick deer or elk in Tennessee what should I do?

If you come across a sick animal, contact your local Tennessee Wildlife Resource Agency office to report the animal.

Additional CWD Resources

Tennessee Wildlife Resources Agency tn.gov/twra

USGS National Wildlife Health Center usgs.gov/centers/nwhc

CWD Alliance cwd-info.org

Centers for Disease Control and Prevention cdc.gov

Association of Fish and Wildlife Agencies CWD Best Management Practices fishwildlife.org/afwa-acts/afwa-committees/fish-wildlife-health-committee



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