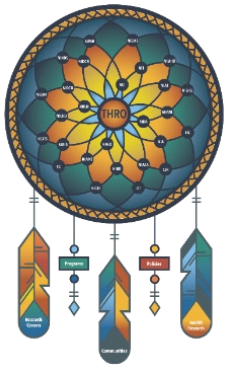

Tribal Health Research Office

Division of Program Coordination, Planning, & Strategic Initiatives
National Institutes of Health (NIH)

Chronic Wasting Disease (CWD) in the Deer Family

The Disease

- Chronic wasting disease (CWD) is a disease that affects deer, elk, reindeer, sika deer and moose, collectively referred to as Cervids or the deer family[1].
- CWD is a fatal disease of the central nervous system (neurodegenerative disease) which may infect animals for up to a year before the animal develops symptoms such as weight loss (wasting), stumbling, listlessness and other neurological symptoms. Some animals die without ever developing the disease[1].
- The disease results when naturally occurring proteins found in abundance in the brain, called prions, become misfolded or undergo structural change[2].
- Other examples of prion diseases include bovine spongiform encephalopathy (BSE) in cattle[3], (also known as 'mad cow disease'), scrapie in sheep and goats[4], and Creutzfeldt-Jakob disease (CJD) in humans[5].
- There are no available treatments or vaccines for CWD [1].

Disease Occurrence

- CWD was first recognized in captive deer in a Colorado facility in late 1960s and in wild deer in 1981[1].
- CWD has now been detected in 25 U.S. states as well as in Canada, South Korea, Norway, and Finland[6].

Transmission

- The disease spreads between members of the same species and transmitted through saliva, feces, and urine.
- The spread of CWD has been linked to both human transportation of infected animals to new locations and the natural movement of infected wild populations into new geographic areas[7].
- CWD infectivity can enter the environment through live animal feces and carcasses where it remains in the soil.
- Prions excreted into the environment by infected animals may persist for years and might facilitate transmission of the disease[1].

Risk of Transmission from Animals to People

- To date, there have been no reported cases of CWD infection in people. However, some animal studies suggest CWD can be transmitted to certain types of non-human primates, like squirrel monkeys. Infection by prions from multiple species has been demonstrated in this model, including sheep scrapie, which does not infect humans; thus, this animal may not demonstrate species restriction similar to humans.
- No human cases have been linked to CWD from infected animals[1].

Location of Reported CWD in Free-ranging Deer Family in the US

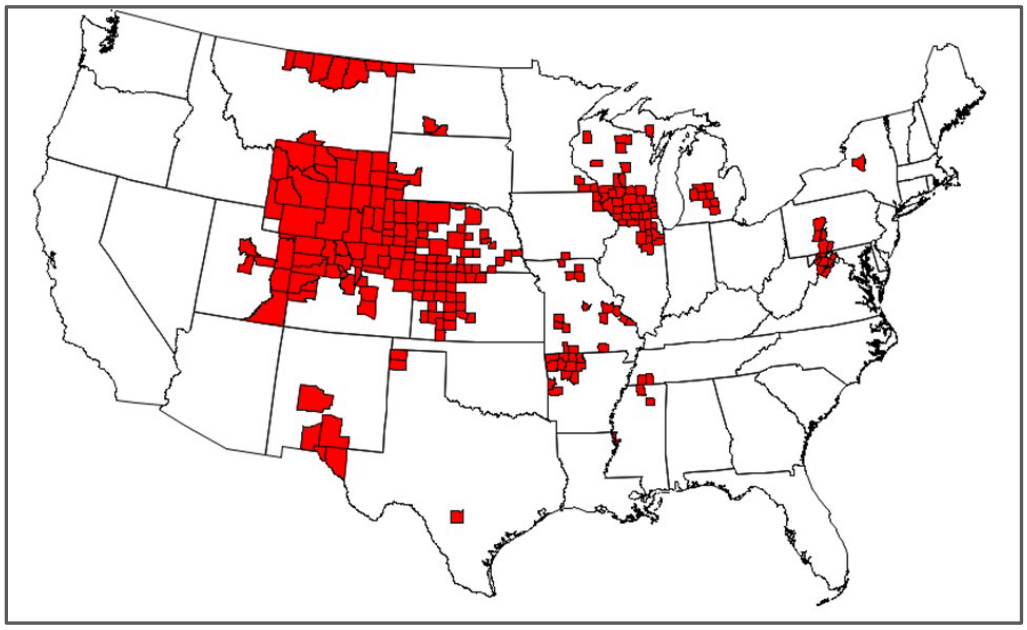

Fig. 1. CWD Among Free-ranging members of the deer family in 24 states based on the best available information from multiple sources, including wildlife agencies and the United States Geological Survey[1]

Prevention

- Since 1997, the World Health Organization (http://cwd-info.org/faq/)has recommended preventing agents of all known prion diseases from entering the human food chain[1].
- The CDC provides guidelines to decrease potential risk to exposure (https://www.cdc.gov/prions/cwd/prevention.html).

Current Research

- As of March 11, 2019a text search on active NIH projects on chronic wasting disease, deer and prion using NIH RePORTER, an online reporting tool (https://projectreporter.nih.gov/reporter.cfm), reveals that there are 13 active NIH research projects studying CWD, funded by National Institute of Allergy and Infectious Diseases (NIAID), Office of the Director (OD), or the National Institute of Neurological Disorders and Stroke (NINDS) at a total cost of $7.67 million (See Table 1).
- Eleven are projects awarded to academic institutions (extramural) while three are carried out by researchers at the NIH campus (intramural).

References

1. Chronic Wasting Disease (CWD). https://www.cdc.gov/prions/cwd/occurrence.html
2. Colby, DW, Prusiner, Stanley B. 2011. Prions. Cold Spring Harb Perspect Biol. 2011 Jan; 3(1): a006833. PMID: 21421910
3. Holt TA, Phillips J. 1988. Bovine spongiform encephalopathy. Br Med J 296:1581–1582. doi:10.1136/bmj.296.6636.1581.
4. Baeten LA, Powers BE, Jewell JE, Spraker TR, Miller MW. 2007. A natural case of chronic wasting disease in a free-ranging moose (Alces shirasi). J Wildl Dis 43:309–314. doi:10.7589/0090-3558-43.2.309.
5. Stengel E, Wilson WEJ. 1946. Jakob-Creutzfeldt disease. J Mental Sci 92:370–378
6. Davenport KA, Mosher BA, Brost BM, Henderson DM, Denkers ND, Nalls AV, McNulty E, Mathiason CK, Hoover EA. 2017. Assessment of Chronic Wasting Disease Prion Shedding in Deer Saliva with Occupancy Modeling.J Clin Microbiol. 2017 Dec 26;56(1). pii: e01243-17. doi: 10.1128/JCM.01243-17. Print 2018 Jan. PMID:29118163
7. Race B, Williams K, Orrú CD, Hughson AG, Lubke L, Chesebro B. 2018 Apr 25. Lack of Transmission of Chronic Wasting Disease to Cynomolgus Macaques. J Virol. pii: JVI.00550-18. doi: 10.1128/JVI.00550-18. [Epub ahead of print] PMID:29695429
8. Haley, NJ, Hoover, EA. 2015. Chronic Wasting Disease of Cervids: Current Knowledge and Future Perspectives. Annual Review of Animal Biosciences. 3:305-325