



# **Chronic Wasting Disease: An Urgent Need for Critical Preparedness**

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# Background

- CWD in cervids continues to expand geographically.
- Cases now confirmed in at least 30 US states, 4 Canadian provinces, Finland, Norway, Sweden, and South Korea.
- In many areas where it's been established, prevalence has increased:
  - Example: In parts of the core CWD area in SW Wisconsin, ~30% of adult does and 40-50% of adult bucks are positive.

# Implications

- Animal and human exposure to CWD prions is increasing.
- Distinct strains are continuing to emerge.
- Potential for CWD transmission from cervids to other species.
- Documented transmission to humans or production animals would result in a crisis.

# Implications (continued)

- Significant implications for public health, agriculture and trade, wildlife health and conservation.
- No state, federal, or international agency is preparing for a potential crisis of CWD prion transmission to humans or production animals.
- Urgent need for preparedness and response plan, so that—should a species crossover event occur—we will not be left unprepared.

# CWD Threats

- **Increasing frequency of exposure to CWD prions** among cervids, humans, and other animal species
- **Ongoing propagation of novel CWD strains**, each of which can have distinct host ranges

# Chronic Wasting Disease in Cervids: Implications for Prion Transmission to Humans and Other Animal Species

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**ABSTRACT** Chronic wasting disease (CWD) is a prion-related transmissible spongiform encephalopathy of cervids, including deer, elk, reindeer, sika deer, and moose. CWD has been confirmed in at least 26 U.S. states, three Canadian provinces, South Korea, Finland, Norway, and Sweden, with a notable increase in the past 5 years. The continued geographic spread of this disease increases the frequency of exposure to CWD prions among cervids, humans, and other animal species. Since CWD is now an established wildlife disease in North America, proactive steps, where possible, should be taken to limit transmission of CWD among animals and reduce the potential for human exposure.

REVIEW

# Emergence of CWD strains

Alicia Otero<sup>1</sup> · Camilo Duque Velasquez<sup>2,3</sup> · Debbie McKenzie<sup>2,3</sup>  · Judd Aiken<sup>3,4</sup>

## Abstract

Chronic wasting disease (CWD) strains present a novel challenge to defining and mitigating this contagious prion disease of deer, elk, moose, and reindeer. Similar to strains of other prion diseases (bovine spongiform encephalopathy, sheep scrapie), CWD strains can affect biochemical and neuropathological properties of the infectious agent, and importantly interspecies transmission. To date, ten CWD strains have been characterized. The expanding range of CWD in North America and its presence in South Korea as well as Scandinavian countries will potentially result in millions of cervids infected with CWD; thus, novel strains will continue to emerge. In this review, we will summarize the characteristics of known CWD strains and describe the impact of prion protein gene polymorphisms on the generation of strains. We will also discuss the evidence that individual cervids can harbor more than one CWD strain, complicating strain analysis, and affecting selection and adaptation of strains in new hosts.

REVIEW

## Emergence of CWD strains

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**Many of the studies used to assess CWD and its properties  
lack strain-specific data**

*“In early CWD studies, it was common for pooled isolates to be used ... This could result in loss or dilution of less common strains.”*

*“Early publications often did not identify the source of the infectious brain homogenates, the geographic location from which the samples were obtained, nor the PRNP genotype of the donor animal.”*

REVIEW

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**Because different CWD strains can have unique host ranges, the overall lack of strain-specific data complicates understanding of transmission potential**

*“One of the more important characteristics that can define a strain is interspecies transmission.”*

*“The species barrier effect and interspecies transmission have not been thoroughly investigated at the level of CWD strains. Although CWD has been successfully transmitted to several other species ... individual strains have not been extensively analyzed.”*

## REVIEW

## Emergence of CWD strains

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**As CWD spreads, novel strains are expected to emerge, which could reshape associated risks.**

*“The generation of new variants as a CWD strain is transmitted through a population is not uncommon and can result in variants with novel characteristics. **CWD is no exception.**”*

*“CWD strains represent a **changing dynamic**, potentially affecting interspecies transmission. The diversity of strains identified to date, and **the likelihood of novel strains emerging and being selected ...** means that the biological properties of CWD need to be constantly monitored and assessed.”*

# CWD Threats

## (Continued)

- **Detection of CWD prions in skeletal muscle** of cervids, unlike BSE.
- **Evidence of CWD transmission in animal models** demonstrating human adaptation and zoonotic potential.
- **Evidence that pigs may contract CWD, with** cases among feral swine living in a CWD-endemic region of Arkansas.

# CWD Threats

## (Continued)

- **Trade restrictions already imposed** on Norway's imports of hay and straw sourced from North America.
- **CWD spread can significantly affect hunting.** CWD has reduced hunter participation (Lyon 2010).
- **Wildlife health and conservation.** State wildlife agencies have identified CWD as the “most important existential challenge confronting agencies in the 21st century” (Thompson & Mason 2022).

# CIDRAP-Supported Preparedness

- No cross-disciplinary playbook exists to adequately address a CWD-related crisis.
- Current, comprehensive, authoritative information.
- Provide up-to-date, reputable material to stakeholders.
- Working groups:
  - Human and veterinary medicine and public health
  - Human, cervid, and production animal testing and surveillance
  - Agriculture and trade
  - Disposal issues (animal and human)
  - Wildlife health and conservation.