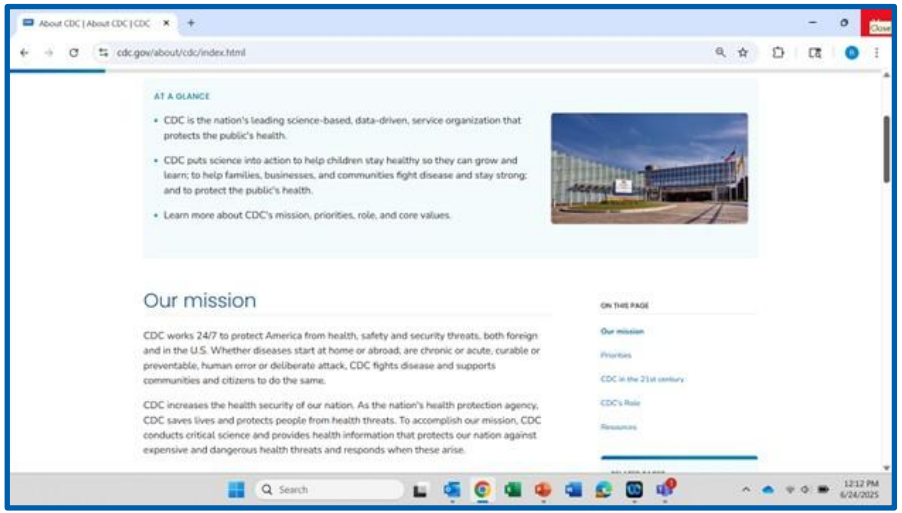
The 2025 Centers for Disease Control and Prevention (CDC) Report

Ryan Maddox, PhD

July 13, 2025

CJD Foundation Family Conference

U.S. Centers for Disease Control and Prevention



- **Nation's health protection agency**
- **Works to protect America from:**
  - Health threats
  - Safety threats
  - Security threats
- **Conducts critical science and provides health information**

CDC Organization (?)

- **Now: National Center for Emerging and Zoonotic Infectious Diseases → Division of High-Consequence Pathogens and Pathology → Prion and Public Health Office**
- **Pending: National Center for Emerging and Zoonotic Infectious Diseases → Division of High-Consequence Pathogens and Pathology → Infectious Disease Pathology Branch → Prion Team**
- **Future: ?**

Prion Team Mission

- **Surveillance (for <u>human</u> prion disease) = monitoring of disease in population**
  - Estimation of prion disease rates
  - Detection of changes in disease trends over time
  - Investigation of cases of interest




Surveillance: Prion Diseases

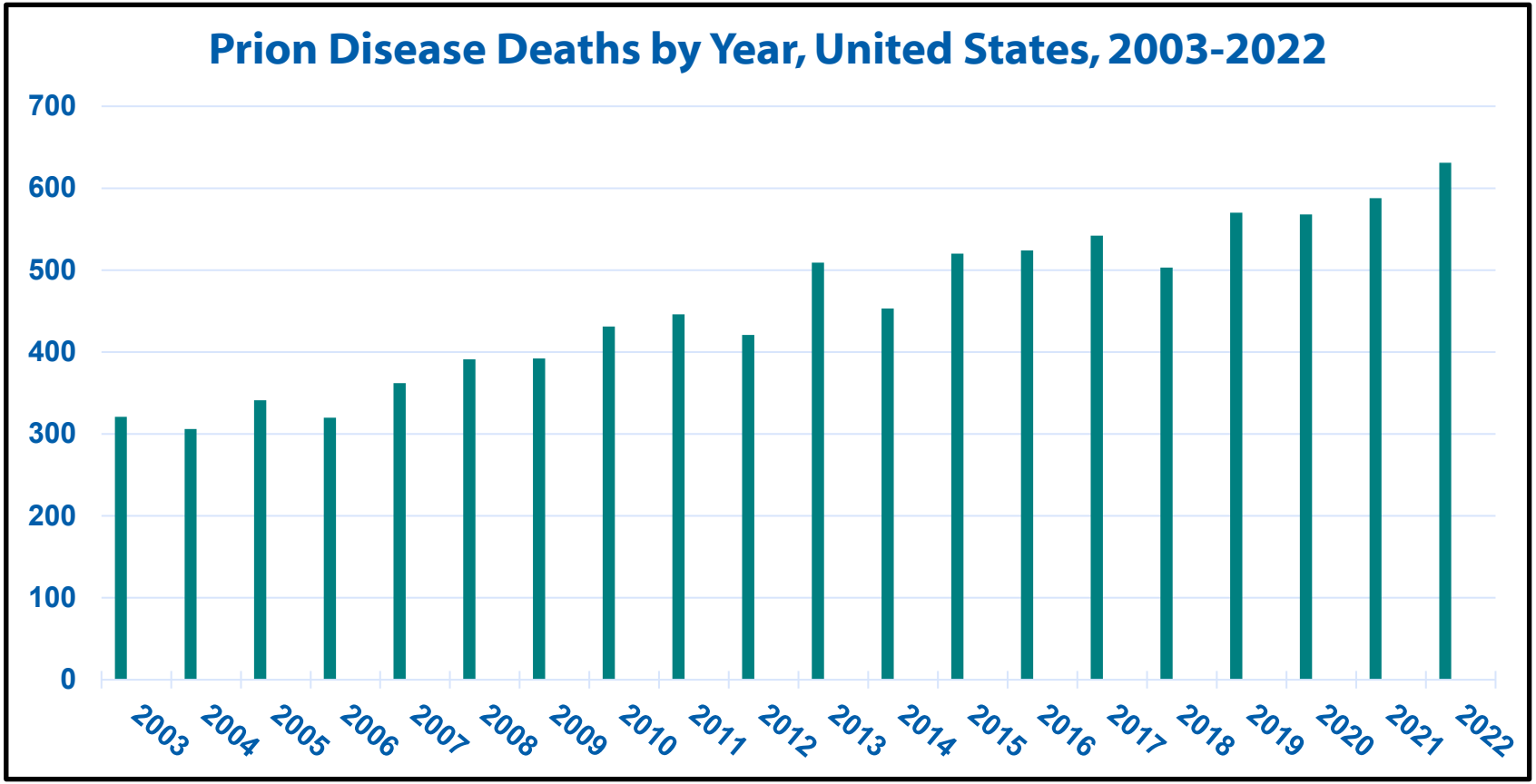
- To estimate prion disease incidence in the US, we match death certificate data with data from the National Prion Disease Pathology Surveillance Center (NPDPSC).
  - **National multiple cause-of-death data (death certificate data) is compiled by CDC's National Center for Health Statistics (NCHS).**
    - Routinely obtained and cost-effective
    - Good source of information because of disease fatality rate (100%); diagnosis more accurate at late stages of disease
    - If CJD, prion disease, GSS, etc. is listed anywhere on the death certificate, it is included in the NCHS data (misspellings, too).
  - **Results of specimen testing by NPDPSC may confirm or rule out suspected prion disease cases**
    - Cases are added to or subtracted from death certificate data based on NPDPSC information

Surveillance: Prion Diseases

- 9140 decedents were identified as having prion disease during 2003-2022 for an average annual age-adjusted incidence of **1.2 cases per million** population.
  - The incidence among males was 1.3 per million, and among females, 1.2 per million.
  - Incidence among those ≥65: 6.2 cases per million per year
- 2022 data:
  - 631 cases identified*
  - Average age-adjusted incidence: 1.4 per million population
  - 1 CJD death for approximately every 6000 deaths overall in the US

Surveillance: Prion Diseases (2022 Data)

- Definite or highly probable matches for >83% of cases in the national death certificate data when compared to diagnostic testing data from NPDPSC
  - **This high percentage is a testament to NPDPSC's expertise and the increased awareness of its services.**
- 8 cases in the death certificate data were found to have negative NPDPSC autopsy results and were removed from the total; 46 autopsy-confirmed cases were identified in the NPDPSC data with a death in 2022 that did not match with a case in the death certificate data and were added.

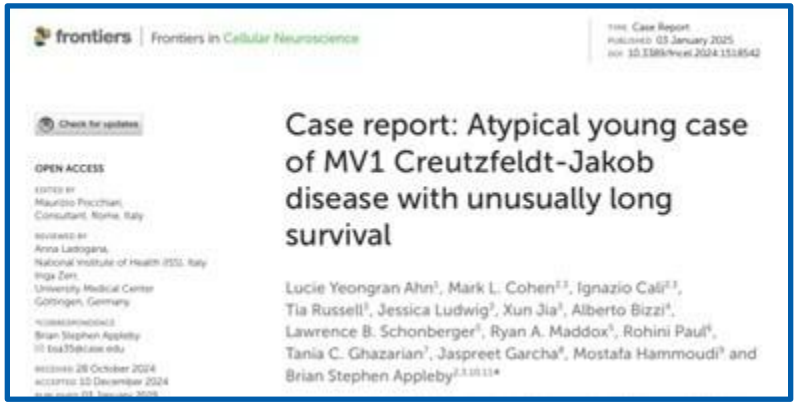

Prion Disease Deaths by Year, United States, 2003-2022
700
600
500
400
300
200
100
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

Surveillance: RT-QuIC

- An RT-QuIC-positive test result strongly indicates prion disease.
- If NPDPSC does not conduct autopsy analyses on an RT-QuIC-positive case, date of death data for the patient may not be available.
- A number of such cases were identified in the NPDPSC database; we estimate they could account for ~20% more cases per year based on the dates that NPDPSC received the samples for testing.

Surveillance: Young Cases (<30 Years)

- Most young cases have a genetic mutation or other risk factor (human growth hormone, vCJD)
- **20 young cases 2003-2023**
  - Only 8 were sporadic forms of prion disease.
  - The remaining 12 cases were familial (5 GSS, 2 FFI, 2 fCJD), variant CJD (2), and iatrogenic CJD (1, dura mater-associated).



frontiers | Frontiers in Cellular Neuroscience

Case Report

Check for updates

OPEN ACCESS

Case report: Atypical young case of MV1 Creutzfeldt-Jakob disease with unusually long survival

Lucie Yeongran Ahn, Mark L. Cohen, Ignazio Cali, Tia Russell, Jessica Ludwig, Xun Jia, Alberto Bizzi, Lawrence B. Schonberger, Ryan A. Maddox, Rohini Paul, Tania C. Ghazarian, Jaspreet Garcha, Mostafa Hammoudi and Brian Stephen Appleby

Surveillance: Disease Confirmation

- Prion disease diagnoses *still* confirmed only by neuropathology
  - **Neuropathology can be a sentinel for unique and possibly emerging prion disease cases.**
- RT-QuIC continues to be assessed through comparison of results with the "gold standard" of brain tissue analysis.
  - **BUT...a positive RT-QuIC in the context of a neuropsychiatric illness is <u>strongly</u> indicative of prion disease.**

Surveillance: Mechanisms

- CDC may learn of a CJD case through a variety of different sources:
  - **NCHS (national multiple cause-of-death data)**
  - **National Prion Disease Pathology Surveillance Center (NPDPSC)**
  - **Public health departments and medical personnel**
  - **Family members, the public, and the media**
- Cause of death on death certificates *can* be amended; the process varies from state to state.
- Verified cases are included as part of our national prion disease surveillance.
- Surveillance does *not* capture every CJD case.

Surveillance: States

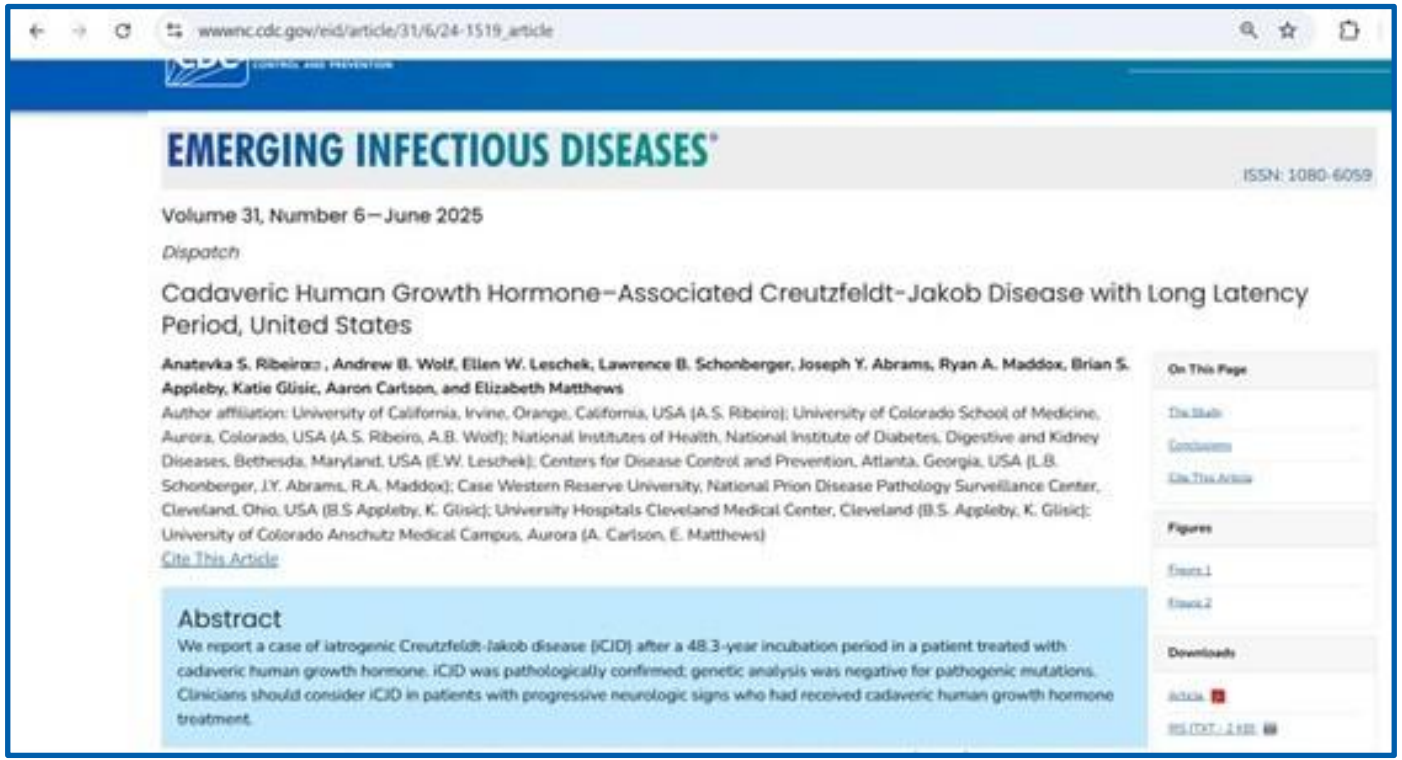
- CJD is reportable to some degree in most states.
- State reporting requirements do not necessarily translate into more accurate surveillance.
  - **Misdiagnosed case will still be a misdiagnosed case.**
- CDC helped co-author a Council of State and Territorial Epidemiologists (CSTE) position statement outlining specific CJD surveillance actions and goals.
  - **Making the disease reportable in a state may facilitate accomplishment of these goals.**
- CDC provides funding to strategic states for enhanced surveillance activities.

Surveillance: Clusters

Surveillance: Clusters

- Possible clusters of prion disease are occasionally reported to CDC.
- Fortunately, investigations inevitably “dissolve” the reported clusters, due to:
  - **Case(s) misdiagnosed or misreported as prion disease**
  - **Case(s) residing outside of the cluster area**
  - **Case(s) having a genetic form of prion disease**
  - **Case number actually within expected range given the population/region served by a hospital/number of years included, etc.**
- State and local health departments are valuable partners in these investigations

Surveillance: Acquired Prion Disease



wwwnc.cdc.gov/eid/article/31/6/24-1519_article

EMERGING INFECTIOUS DISEASES®

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Dispatch

Cadaveric Human Growth Hormone–Associated Creutzfeldt-Jakob Disease with Long Latency Period, United States

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Cite This Article

Abstract

We report a case of iatrogenic Creutzfeldt-Jakob disease (iCJD) after a 48.3-year incubation period in a patient treated with cadaveric human growth hormone. iCJD was pathologically confirmed; genetic analysis was negative for pathogenic mutations. Clinicians should consider iCJD in patients with progressive neurologic signs who had received cadaveric human growth hormone treatment.

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Conclusions

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RIS (TXT - 2 kB)

Acquired Prion Disease: So far this year…

- **Decedent identified in death certificate data with codes indicating CJD *and* hemophilia.**
  - Concerning for possible transmission of CJD through blood
  - Investigation established that person **did not** have hemophilia but another blood disorder not treated with blood transfusions.
- **Probable CJD (positive RT-QuIC) in a person with history of cornea transplant.**
  - Concerning because CJD can be transmitted via cornea transplant
  - Investigation found that receipt of cornea likely coincidental (did not cause CJD)
- **Reported cluster of CJD cases in Oregon (discussed previously)**

Acquired Prion Disease: Variant CJD (vCJD)

- **Variant CJD is the human form of bovine spongiform encephalopathy (BSE, or “mad cow disease”).**
  - 233 cases worldwide (178 in U.K.)
  - 4 cases in the United States, 2 in Canada (none believed to have been exposed to the infectious agent in North America).
  - 3 of the 4 vCJD cases reported since 2016 have been attributed to occupational exposure rather than consumption of contaminated beef
    - **<u>NO</u> cases reported since 2021**

Tissue and Organ Donation

- FDA Guidance for Industry: Human cells, tissue, and cellular and tissue-based products (corneas, skin, bone, heart valves, etc.)

  Ineligible:

  - **Persons diagnosed with vCJD or any other form of CJD**
  - **Persons who have a history of CJD in a blood relative**
  - **Persons who spent ≥ 3 months cumulatively in the United Kingdom from 1980-1996; persons who spent ≥5 years cumulatively in Europe 1980-present**
- FDA does *not* regulate organ donation (liver, kidney, etc.)
  - **There are <u>no</u> absolute exclusions (i.e., organs from those with CJD *can* be donated, BUT organs may or may not be used depending on outcome of risk-benefit analysis by medical staff).**

Blood Donation

- **Variant CJD *has* been transmitted through blood.**
  - Reported in U.K. recipients of blood collected up to 3 years before vCJD onset in the donors; some concerns still exist about additional secondary spread
- **Updated guidance (5/2022):**
  - Removes donor deferral for geographic risk of BSE exposure
    - Donors previously deferred for time spent in the U.K., France, and Ireland, or for receipt of a blood transfusion in the U.K., France, or Ireland, may now be eligible if they meet all other eligibility requirements.

https://www.fda.gov/media/124156/download

Blood Donation

- **Still ineligible:**
  - Persons who have been diagnosed with vCJD, CJD, or any other transmissible spongiform encephalopathy or who have a blood relative diagnosed with familial prion disease (e.g., fCJD, GSS, or FFI)
  - Persons who received cadaveric pituitary hGH treatment
  - Persons who received a human cadaveric (allogeneic) dura mater transplant.

Blood Donation

- “The study suggests that [classic] CJD may not be transfusion-transmissible, a position in agreement with similar findings from two similar European reports…These studies have supported the conclusion that the risk, if any, of transmission of CJD by blood products is extremely small and remains theoretical.”

Funeral Homes

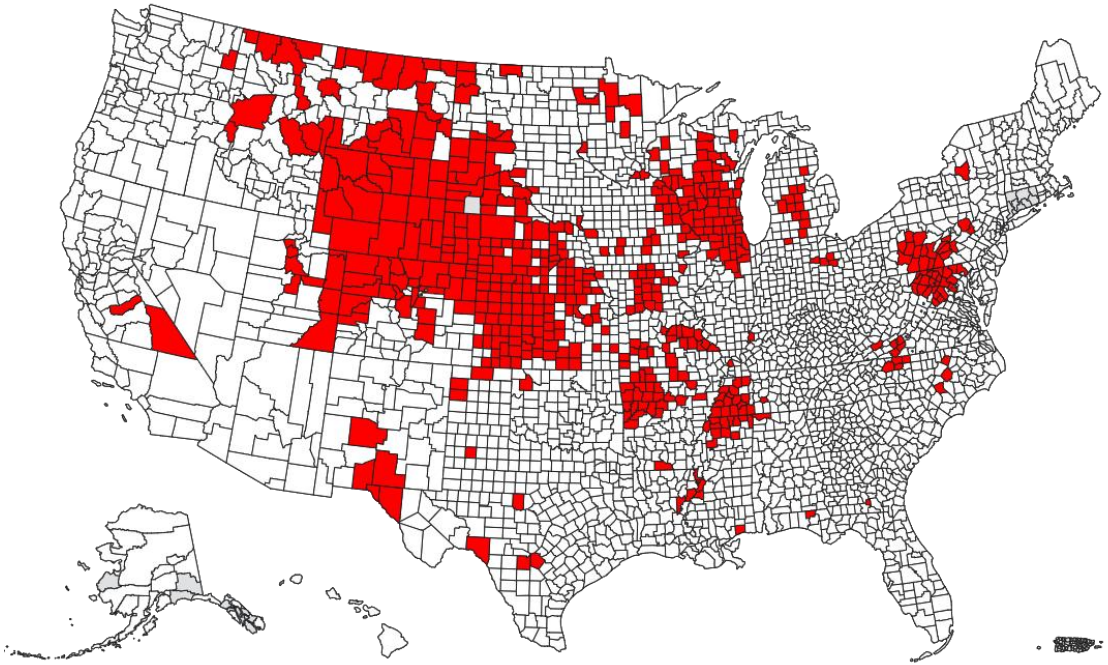
- Embalming bodies of CJD patients who have been autopsied can be safely performed, BUT a funeral home cannot be forced to accept a body.
- Education of funeral directors is important; however, some will be more open to revising policies than others.
- Information for funeral and crematory practitioners is available on the CDC website.
- “There are no special interment, entombment, inurnment, or cremation requirements for patients with CJD. Interment of bodies in closed caskets does not present a significant risk of environmental contamination and cremated remains can be considered sterile, as the infectious agent does not survive incineration-range temperatures.”

http://www.cdc.gov/prions/cjd/funeral-directors.html

Chronic Wasting Disease (CWD)

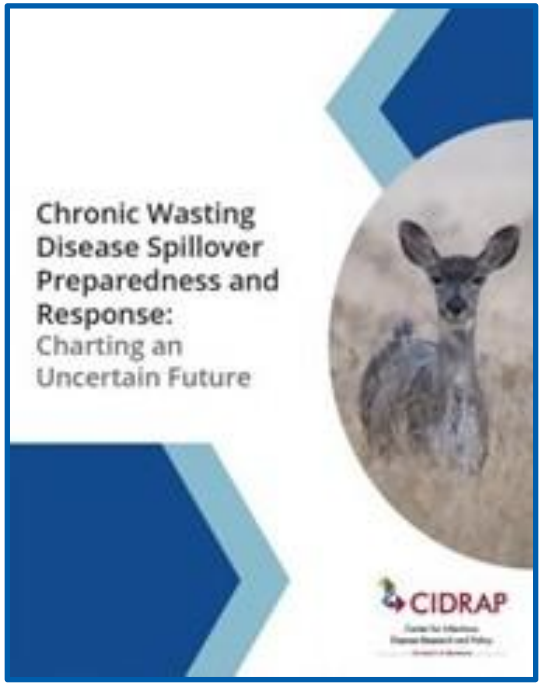
- Prion disease of cervids, including white-tailed deer, mule deer, elk, moose, and reindeer
- Clinical symptoms include weight loss, behavioral changes, excessive salivation, difficulty swallowing
- Can be highly transmissible within cervid populations
- **Found among free-ranging deer and elk in 36 states (most recently Georgia) and 4 Canadian provinces**
- Also reported among free-ranging moose and/or reindeer in Norway (2016), Finland (2018), and Sweden (2019)

United States, April 2025



CIDRAP CWD report: Some conclusions

- Advocate for CWD spillover awareness and preparedness among medical providers, research institutions, and wildlife, agricultural, and public health agencies
- Expand and standardize CWD surveillance in wild cervids, other wildlife, and non-cervid production animals
- **Promote human prion disease surveillance among human healthcare providers to enhance capacities to detect CWD spillover to humans**
- Expand CWD research and development efforts



CWD Transmission to Humans

- To date, there is no strong epidemiologic evidence for the occurrence of CWD in people, BUT…
  - CWD in more areas = increased opportunities for human exposure
  - An animal prion disease has caused disease in humans before (BSE of cattle → vCJD of humans)
  - Some animal studies suggest potential for CWD transmission to humans
  - AND multiple CWD strains exist with different transmission properties

❖ **Continued vigilance regarding this animal prion disease is essential.**

CWD Studies

- Goal: To determine whether CWD can cause disease in humans
  - **Follow-up of persons who hunted in Wyoming and Colorado, where CWD has been present for years, and identifying those who died of prion disease**
    - To date, the number of identified human prion disease cases in these two states has been within the expected range
  - **Follow-up of individuals who consumed venison from CWD-positive deer in Wisconsin**
    - To date, no matches found among potentially exposed persons who were cross-checked with Wisconsin human prion disease surveillance data, NPDPSC data, and national multiple cause-of-death data
  - Analysis of highly CWD-endemic states compared to non-CWD states to assess whether differences in the rate of human prion disease mortality exist

COVID-19 and Prion Disease: Considerations

- The vast majority of US adults have received at least 1 vaccine shot. The percentage is even higher among older adults, so CJD **WILL** be diagnosed among vaccine recipients, sometimes in close proximity to the shot.
- Prion diseases are characterized by long incubation periods (typically years).
- No unusual neuropathological features have been observed at NPDPSC among cases reported as being possibly vaccine-related.
- The numbers of prion disease cases in the United States in 2019, 2020, and 2021 were very similar.

Final Thoughts

- Prion diseases present a unique diagnostic and public health challenge.
- CDC's prion disease-related activities include:
  - **conducting surveillance through various methods to best capture the majority of cases.**
  - **investigating cases of interest in collaboration with affected states.**
  - **providing advice on prion disease-related issues.**
- Collaboration with medical and public health personnel, NPDPSC, and the CJD Foundation is essential.
- Improvements in pre-mortem diagnostic testing (i.e., RT-QuIC) should benefit surveillance efforts; however, autopsy remains important.

Resources

- CJD Foundation
  - **1-800-659-1991**
  - **www.cjdfoundation.org**
- Centers for Disease Control and Prevention
  - **404-639-1170**
  - **Classic Creutzfeldt-Jakob Disease | Classic CJD | CDC**
- National Prion Disease Pathology Surveillance Center
  - **216-368-0587**
  - **www.cjdsurveillance.com**

Acknowledgements

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  - **Ms. Arshi Chowdhury**

- All the wonderful people at:
  - **CJD Foundation**
  - **NPDPSC**
  - **State and local public health departments**

Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.