The Centers for Disease Control and Prevention Report: A CDC CJD Q&A

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Division of High-Consequence Pathogens and Pathology

What is CDC, and how is it involved with prion diseases?

CDC Fast Facts

- CDC is one of the major operating components of the Department of Health and Human Services (DHHS) and is the nation's leading public health agency.
- Attempts to keep America secure by controlling disease outbreaks; making sure food and water are safe; helping people to avoid leading causes of death such as heart disease and cancer; and working globally to reduce threats to the nation's health.
- Headquartered in Atlanta with facilities in 10 additional U.S. locations
- More than 14,000 employees in nearly 170 occupations
- Field staff works in all 50 states and more than 50 countries

http://www.cdc.gov/about/facts/cdcfastfacts/cdcfacts.html

CDC's Responsibility

- **The DHHS BSE/TSE Action Plan has four major components:**
  - **Oversight:** primarily the responsibility of the Office of the Secretary of DHHS
  - **Protection:** primarily the responsibility of the Food and Drug Administration (FDA)
  - **Research:** primarily the responsibility of the National Institutes of Health (NIH)
  - **Surveillance (for human disease):** primarily the responsibility of CDC
    - Monitoring of disease in population (e.g., estimation of prion disease rates, detection of changes in epidemiology of disease over time, monitoring of possible occurrence of variant CJD (vCJD) or novel prion diseases, gaining of knowledge about prion diseases)

How rare is this disease *really*?

Death Certificate Data

- **The National Center for Health Statistics (NCHS) compiles national multiple cause-of-death data.**
- **Death certificate data review is effective as a surveillance tool for CJD:**
  - 100% fatality rate
  - Diagnosis more accurate at late stages of disease
  - Active review has shown high ascertainment rate
  - Mortality data are routinely obtained by NCHS on an ongoing basis; use for CJD surveillance cost-effective

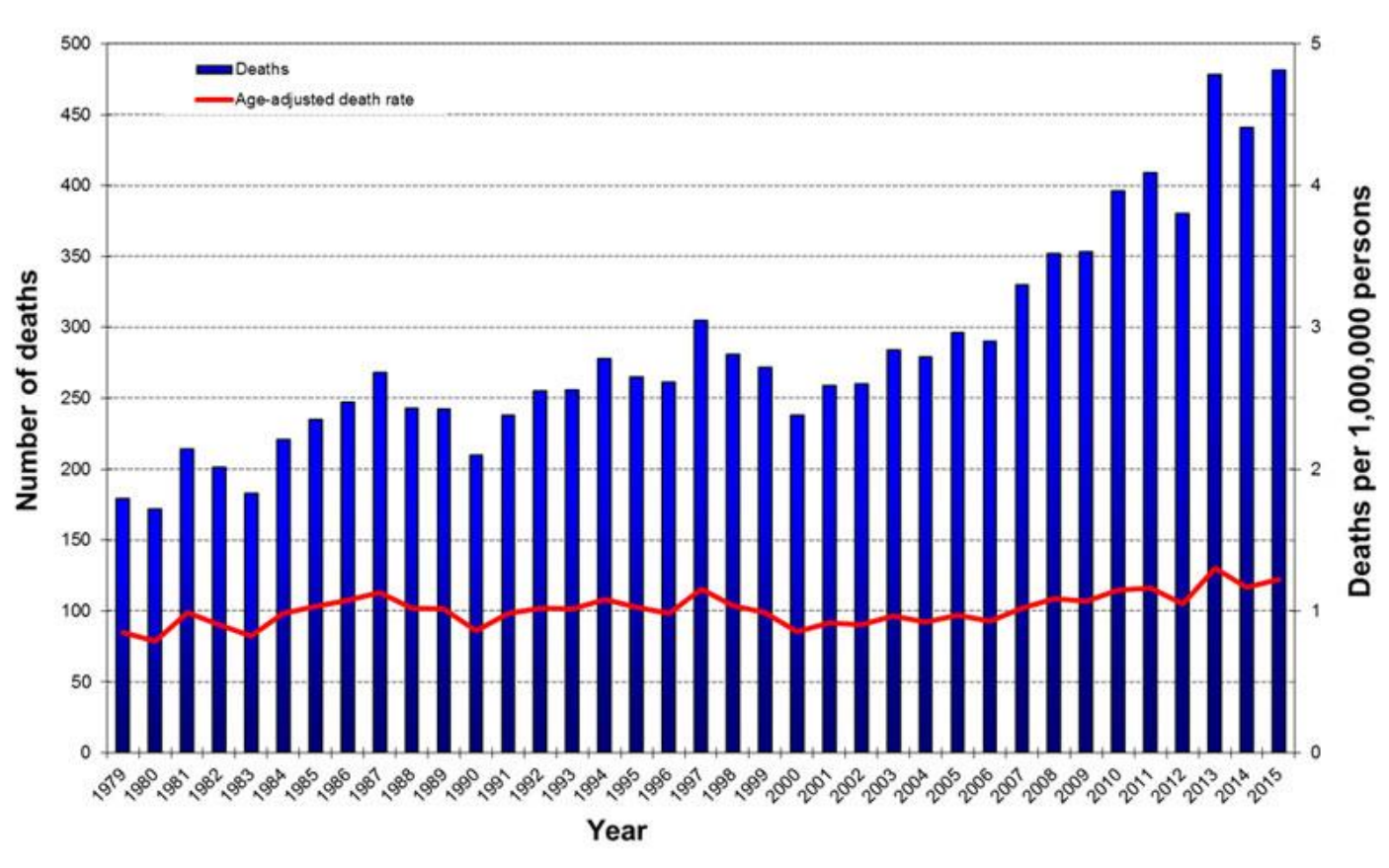
One in a million?

- **CJD occurs worldwide at a rate of about 1 – 1.5 per million population per year, although rates of up to 2 cases per million are not unusual.**
- **To more accurately determine incidence in the United States, we attempt to match death certificate data with National Prion Disease Pathology Surveillance Center (NPDPSC) data.**
  - Based on NPDPSC neuropathology results, cases are added to or subtracted from death certificate data.
- **For 2003-2011, the matching process yielded an incidence rate of 1.15 cases per million.**

But…

- The average annual CJD incidence rate among decedents ≥65 years of age (2008-2010): 6.3 cases per million.
- Incidence of sporadic prion disease among decedents <30 years of age (1979-2014):1.6 per *billion*.
- 1 CJD death for approximately every 6,000 deaths overall in the US each year

Creutzfeldt-Jakob disease deaths and age-adjusted death rate, United States, 1979-2015*



* Deaths obtained from the multiple cause-of-death data for 1979-1998 are based on ICD-9 codes, and those beginning in 1999 are based on ICD-10 codes with available computerized literal death certificate data. Death information was also obtained from other surveillance mechanisms; data include familial prion diseases. Rates are adjusted to the US standard 2000 projected population.

Spotlight on Washington

- Washington is the only state in the U.S. where a case of classic BSE has been identified; the disease was found in a dairy cow that died in 2003.
- Because a presumptive diagnosis of BSE was not made until two weeks after this animal was slaughtered, the carcass was released for use in food after routine removal of tissues considered to be at high-risk of transmission of the BSE agent (e.g., brain, spinal cord, small intestine).
- Although beef from cattle slaughtered in the same plant on the same day as the BSE-positive cow was recalled, some meat products were distributed to locations in Washington and several other states.

Washington (continued)

- **A state-wide prion disease surveillance system consisting of 35 local health jurisdictions has been in place in Washington since 2004.**
- **During 2006-2015, 115 human prion disease cases among Washington state residents were reported and investigated.**
  - None of the reported decedents was found to meet the criteria for a vCJD diagnosis.
  - Most decedents (90.4%) were classified as having a sporadic prion disease, and most sporadic cases (71.2%) were neuropathology-confirmed.
- **The average annual age-adjusted prion disease incidence in Washington was 1.5 cases per million population per year.**

Sánchez-González L, Maddox RA, Blevins JE, et al. Human prion disease surveillance in Washington state, 2006-2015. Presented at Prion 2017, Edinburgh, Scotland, May 25, 2017.

How many variant CJD cases have there been in the United States? How do you know they weren't exposed here?

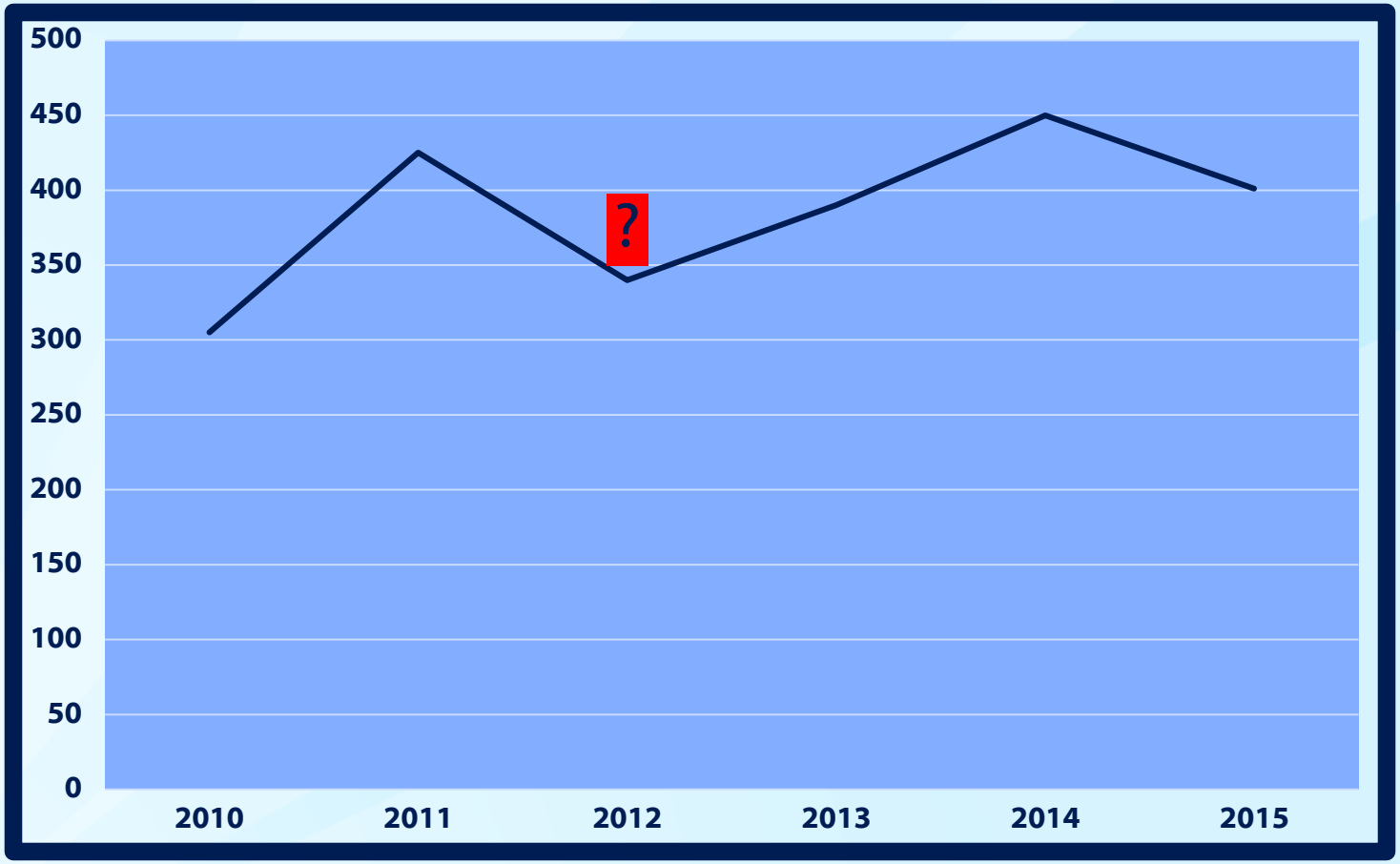
Recent US Case of Variant Creutzfeldt-Jakob Disease—Global Implications

Atul Maheshwari, Michael Fischer, Pierluigi Gambetti, Alicia Parker, Aarthi Ram, Claudio Soto, Luis Concha-Marambio, Yvonne Cohen, Ermias D. Belay, Ryan A. Maddox, Simon Mead, Clay Goodman, Joseph S. Kass, Lawrence B. Schonberger, Haitham M. Hussein

Variant CJD

- **Variant CJD is the human form of bovine spongiform encephalopathy (BSE, or "mad cow disease").**
- **Four cases in the United States, and two in Canada, have been identified.**
  - None are believed to have been exposed to the infectious agent in North America based on epidemiological evidence including the decedents' countries of origin, travel histories, and current knowledge about incubation periods and susceptibility factors associated with the disease.

Was my loved one's prion disease death *counted*?



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
- **Verified cases are included as part of our national prion disease surveillance.**
- **Surveillance does *not* capture every CJD case.**

Death Certificates

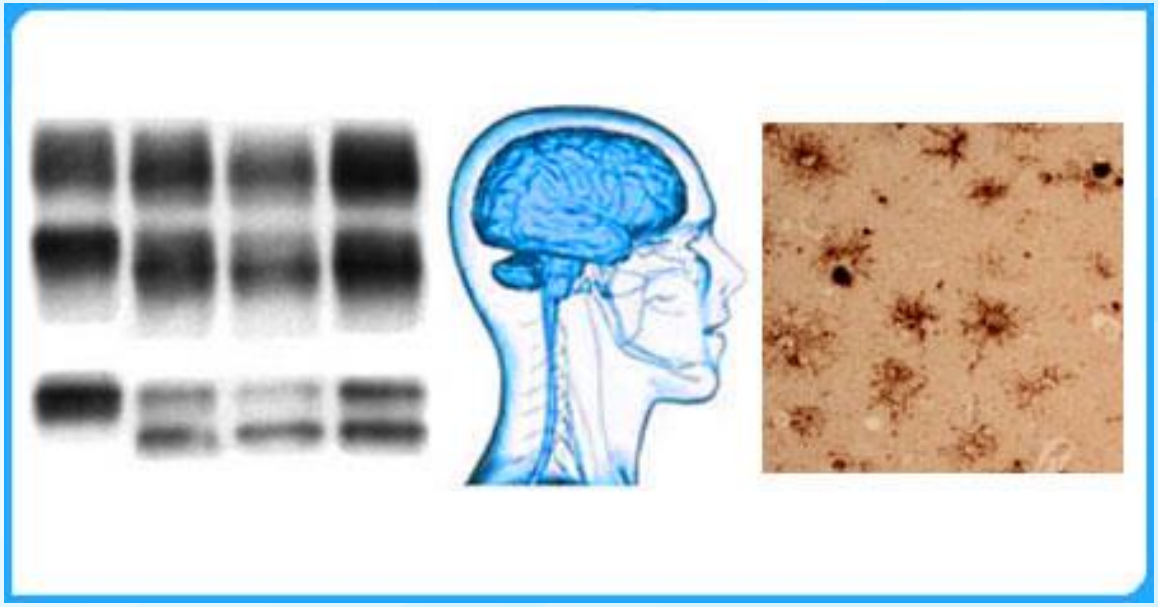
- **If CJD, prion disease, GSS, etc. is listed anywhere on the death certificate, it is included in the NCHS data.**
  - Misspellings, too!
- **Cause of death on death certificates *can* be amended.**
  - The process varies from state to state.
  - Some states require that the certifying physician or medical examiner make this amendment.
- **If there is no indication of prion disease anywhere on the death certificate, we still may be aware of the case through NPDPSC data or other sources mentioned previously.**

Is CJD reportable in my state? Should it be?

State Reporting

- **CJD is now reportable to some degree in almost all 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.

Is an autopsy still necessary? Can my loved one be a donor?



NPDPSC logo: www.cjdsurveillance.com

Autopsy

- **Prion disease diagnoses *still* confirmed only by neuropathology**
  - Neuropathology can be a sentinel for unique and possibly emerging prion disease cases.
- **New and improved premortem diagnostic tests such as RT-QuIC can be validated through comparison of results with the "gold standard" of brain tissue analysis.**
- **NPDPSC neuropathology results are used to adjust death certificate data, allowing for more accurate incidence calculations.**

Organ, Tissue, and Blood Donation

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

  Ineligible:

  - Persons who have been diagnosed with vCJD or any other form of CJD
  - Persons who have a history of CJD in a blood relative (unless no mutation is present)
  - Persons who spent three months or more cumulatively in the United Kingdom from the beginning of 1980 through the end of 1996
  - Persons who spent 5 years or more cumulatively in Europe from 1980 until the present

http://www.fda.gov/downloads/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/guidances/tissue/ucm091345.pdf
http://www.fda.gov/downloads/BiologicsBloodVaccines/GuidanceComplianceRegulatoryInformation/Guidances/Blood/UCM307137.pdf

Organ, Tissue, and Blood Donation (continued)

- **CJD has not been shown to be transmissible through blood.**
  - Investigators recently reported sporadic CJD in two patients in the UK with bleeding disorders (von Willebrand disease, hemophilia B) who died in 2014. They had been treated with products including plasma-derived and recombinant factor VIII, plasma-derived and recombinant factor IX, and fresh frozen plasma.
  - This finding may be due to increased surveillance of all prion diseases combined with the higher incidence of CJD in general. According to the authors, "The balance of evidence indicates that, if sCJD is transmitted by blood transfusion, it must be a rare event, if it happens at all, and transfusion transmission is probably not the explanation for the two cases we describe."
- **Variant CJD *has* been transmitted through blood in a few cases.**

http://www.fda.gov/downloads/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/guidances/tissue/ucm091345.pdf
http://www.fda.gov/downloads/BiologicsBloodVaccines/GuidanceComplianceRegulatoryInformation/Guidances/Blood/UCM307137.pdf

Organ, Tissue, and Blood Donation (continued)

- **FDA does *not* regulate organ donation (liver, kidney, etc.)**
  - There are no absolute exclusions except a positive HIV test (even that is changing).
  - In other words, 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.

http://www.fda.gov/downloads/biologicsbloodvaccines/guidancecomplianceregulatoryinformation/guidances/tissue/ucm091345.pdf
http://www.fda.gov/downloads/BiologicsBloodVaccines/GuidanceComplianceRegulatoryInformation/Guidances/Blood/UCM307137.pdf

Funeral Homes

- Embalming bodies of CJD patients who have been autopsied can be safely performed. Unfortunately, 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."

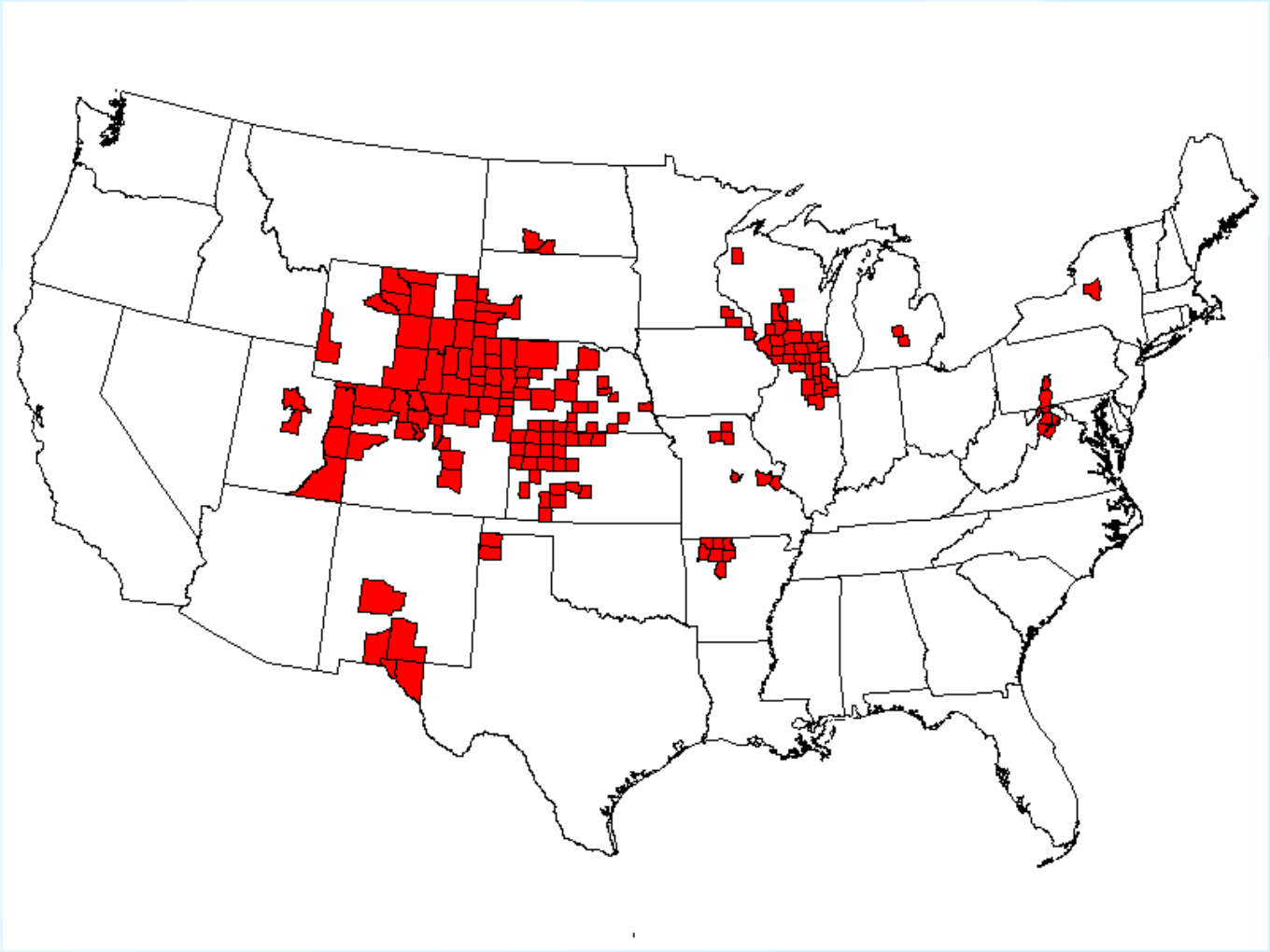
http://www.cdc.gov/prions/cjd/funeral-directors.html

What is CWD? Should I be concerned about getting it?

Chronic Wasting Disease (CWD)

- **CWD is a prion disease of cervids, including white-tailed deer, mule deer, elk, and moose.**
- **Can be highly transmissible within cervid populations**
- **Found among free-ranging deer and elk in 21 states (19 identified within past two decades)**
  - First reported in reindeer and moose in Norway last year

Chronic Wasting Disease Among Free-Ranging Cervids by County, United States, June 2017



Hunter 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**
  - Results: Prion disease cases among these groups within expected range so far, but many years of follow-up necessary
- **Follow-up of hunters who consumed venison from CWD-positive deer in Wisconsin**

Recent CWD News

- A recent progress report of a scientific study indicated transmission of CWD to macaques, a kind of monkey genetically closer to humans than other animals infected with CWD to date.
- CWD was transmitted to one monkey that was fed CWD-infected brain tissue, and to two others that were fed muscle tissue from infected white-tailed deer that had not yet shown signs of CWD. CWD was also transmitted to two monkeys by direct surgical exposure of their brains to CWD.
- There is still no proof that humans can be infected with CWD, but we recommend that people be even more careful to reduce their risk of exposure.

Czub S, Schulz-Schaeffer W, Stahl-Hennig C, Beekes M, Schaetzl H, Motzkus D. First evidence of intracranial and peroral transmission of Chronic Wasting Disease (CWD) in cynomolgus macaques: a work in progress. Presented at PRION 2017, Edinburgh, Scotland, May 25, 2017

Final Thoughts

- CJD presents a unique diagnostic and public health challenge.
- CDC conducts surveillance for prion diseases through various methods to best capture the majority of cases.
- CDC investigates cases of interest in collaboration with affected states.
- CDC provides advice on prion disease-related issues.

Final Thoughts

- Collaboration with medical and public health personnel, NPDPSC, the CJD Foundation, and CDC is essential.
- Future surveillance will be helped by increased autopsy rates, improved pre-mortem diagnostic tests, and physician awareness of NPDPSC's services.

CJD Resources

- **CJD Foundation**
  - 1-800-659-1991
  - www.cjdfoundation.org
- **Centers for Disease Control and Prevention: Division of High-Consequence Pathogens and Pathology**
  - 404-639-3091
  - http://www.cdc.gov/prions/cjd/index.html
- **National Prion Disease Pathology Surveillance Center**
  - 216-368-0587
  - http://case.edu/med/pathology/centers/npdpsc/

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  - Dr. Larry Schonberger
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  - Ms. Marissa Person

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

Other questions?

For more information please contact Centers for Disease Control and Prevention

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