National Prion Disease Pathology Surveillance Center

2019 Update

SCHOOL OF MEDICINE
CASE WESTERN RESERVE UNIVERSITY

NPDPSC

- Started in 1997 at CWRU
- Funded by CDC to support prion disease surveillance
- Assist in determining incidence of prion disease
- Assist in determining etiology of prion disease
- Support clinicians and state health departments
- Staff of 21 individuals
- Provides critical resources for researchers
- Provides information for education

NPDPSC Faculty and Staff

Faculty

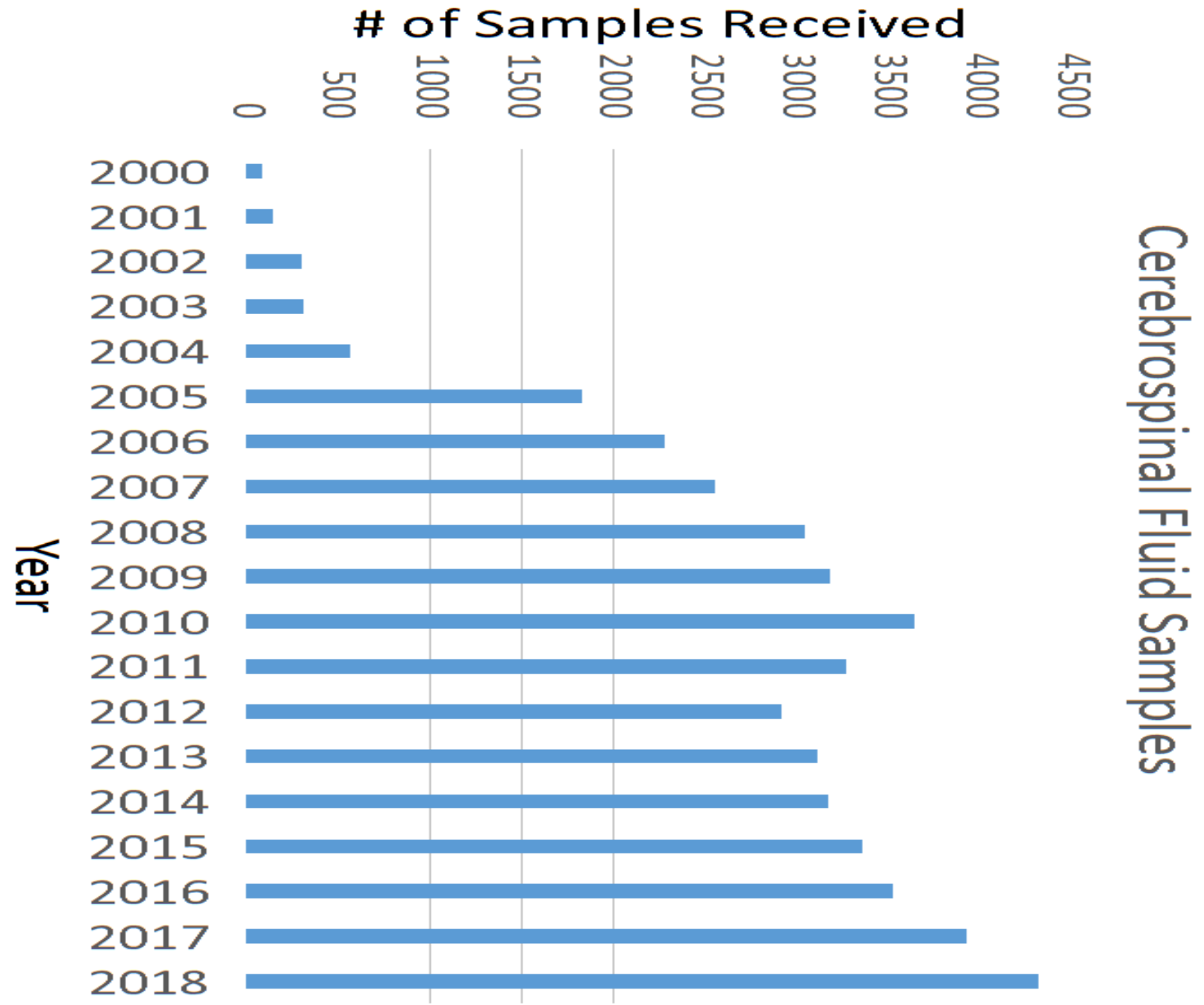
- Mark Cohen (Co-Director, neuropathology)
- Dan Rhoads (Co-Director, clinical lab)
- Wenquan Zou (Associate Director, Western blots)
- Qingzhong Kong (Associate Director, CWD work)

Staff

- (Wet) Lab Staff
  - Brain tissue analyses
    - Histology
    - Western blots
  - Spinal fluid analyses
    - 14-3-3, tau, RT-QuIC
  - Genetics
    - Extraction
- (Dry) Research Staff
  - Autopsy coordination
  - Reports
  - Data collection/management
  - Support/customer service

NPDPSC Activities

- Neuropathology
  - Coordinate autopsies from around the country
  - Determine if a case is prion disease and the type
- Genetic testing
  - On brain tissue or blood
- Cerebrospinal fluid testing
  - 14-3-3, tau, RT-QuIC on suspected cases
- MRI consultations
- Collaboration with key organizations


# of Samples Received
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Year
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Cerebrospinal Fluid Samples

Cerebrospinal Fluid Tests

Markers of brain cell damage:

1. 14-3-3: positive, negative, or ambiguous
2. Tau: result is a number (0-tens of thousands)

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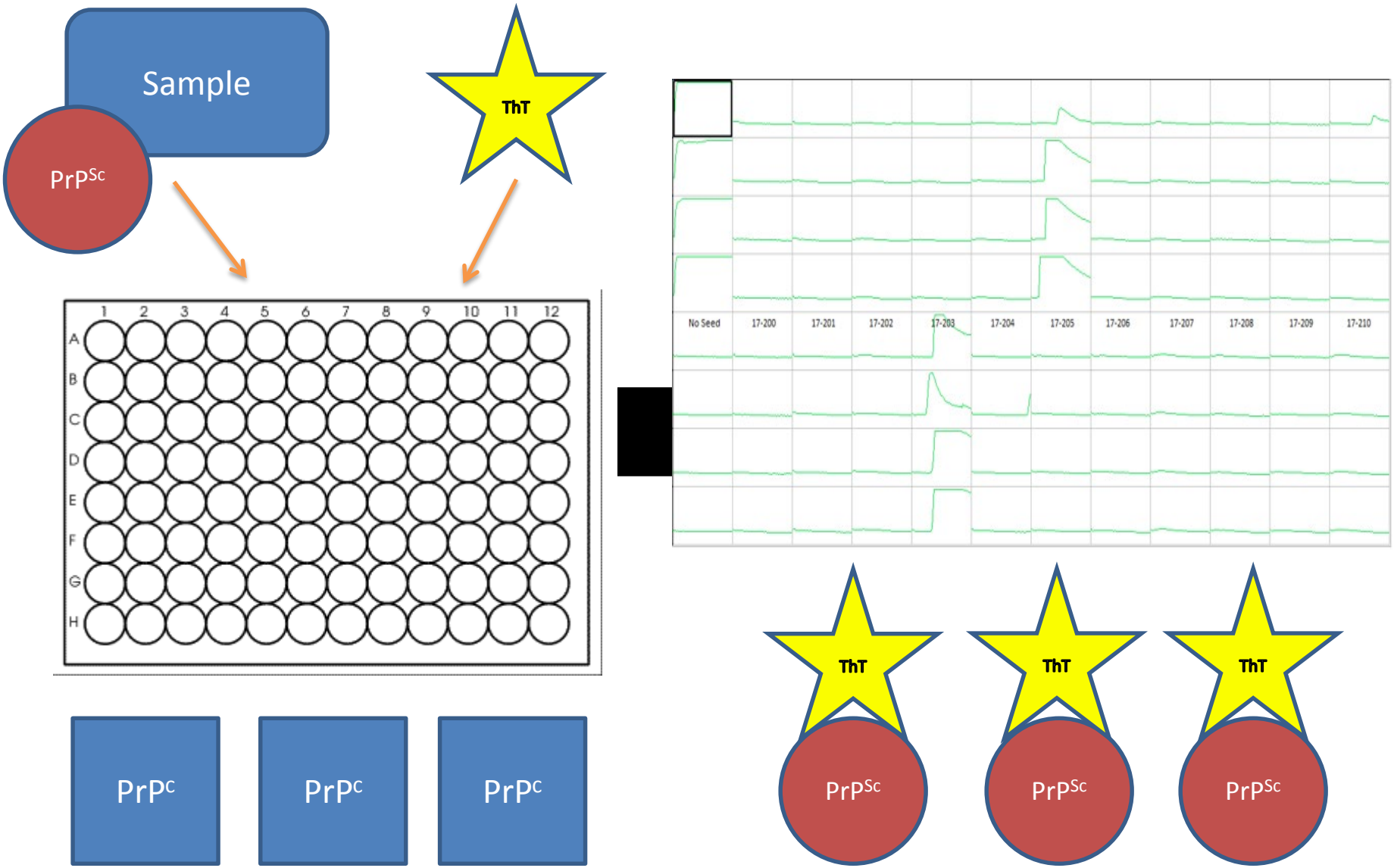
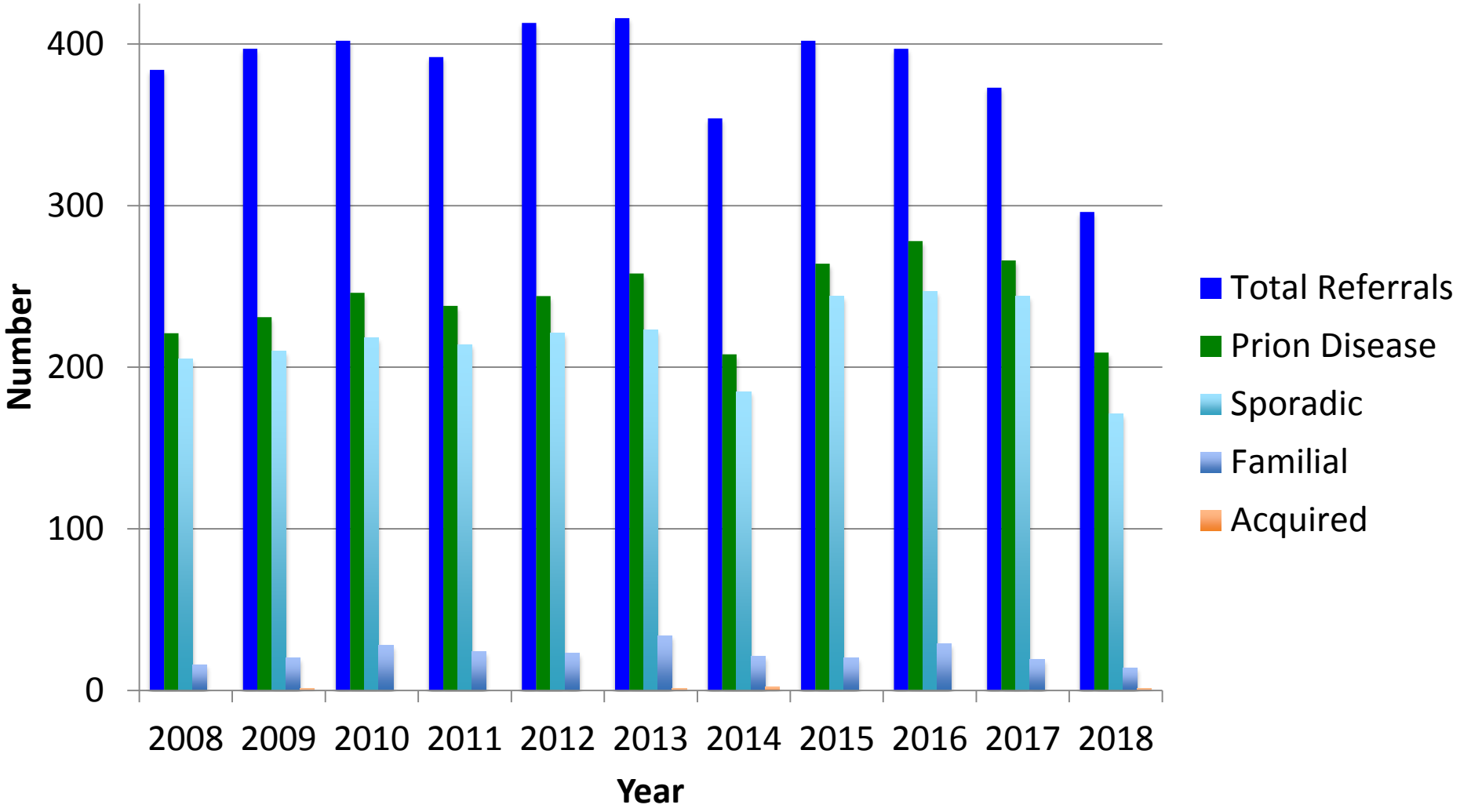
Disease specific test:

1. RT-QuIC: detects abnormal prion protein (very specific)

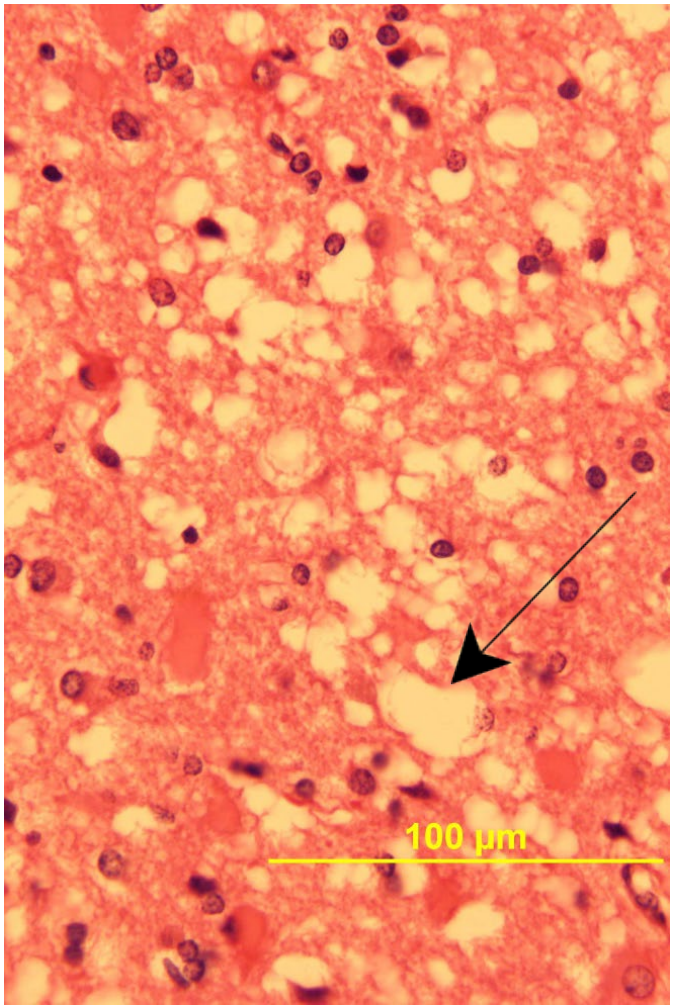
Real-Time Quaking-Induced Conversion (RT-QuIC)



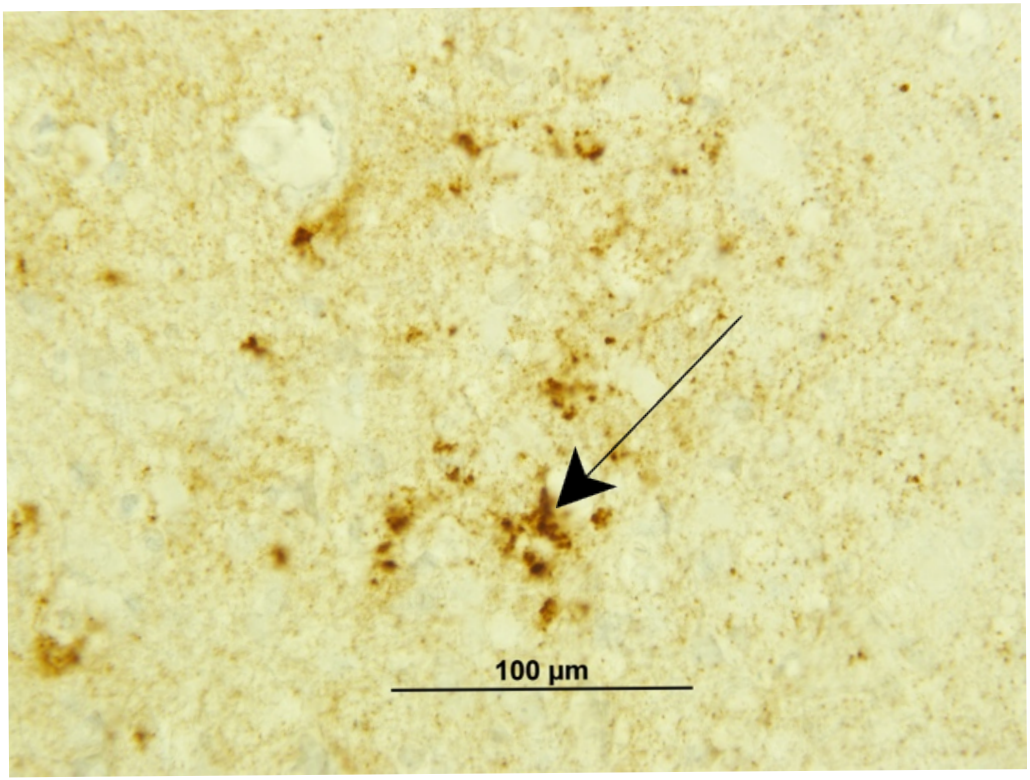
Neuropathology Referrals



Histology



H & E Staining
(spongiform changes)



Immunohistochemistry
(abnormal prion protein)

Recent Projects

- Large evaluation of CSF RT-QuIC results
- Large evaluation of brain MRIs sent to the NPDPSC
- Characterization of atypical subtypes
- Assessing whether or not CWD can be transmitted to humans

Continued Education/Outreach

BY MEGHAN LEWIS, KATIE GLISIC, DANIELLE JORDAN AND DR. BRIAN APPLEBY

Mortuary professionals have encountered many potentially fatal and infectious diseases and have successfully found ways to both serve families and protect the health of the community. Prion disease is no exception. Prion diseases, also referred to as transmissible spongiform encephalopathies (TSE), occur in humans and animals and primarily affect the central nervous system. The disease occurs when normal proteins spontaneously change to abnormal, disease-causing proteins.

There are three prion disease classifications: sporadic, genetic and acquired. The majority are of sporadic etiology (85%) and include sporadic Creutzfeldt-Jakob Disease, sporadic familial insomnia and variably protease-sensitive prionopathy. Genetic prion diseases account for 5% to 10% of cases and comprise familial Creutzfeldt-Jakob Disease, fatal familial insomnia and Gerstmann-Sträussler-Scheinker.

Finally, the remaining cases are acquired through either ritualistic cannibalism (kuru), ingestion of prions from cattle infected with bovine spongiform encephalopathy (variant CJD, sometimes referred to as the human equivalent to mad cow disease) or are secondary to receiving contaminated cadaver-derived growth hormone, dura mater graft, corneal transplants or through neurosurgical contamination. It is important to note that acquired prion diseases occur under very specific circumstances.

Prion disease is not transmissible from person to person through normal contact or through environmental contamination. It is not spread through airborne droplets, as is tuberculosis, nor by blood, as are hepatitis and human immunodeficiency virus.

The Director, 2019

Challenges

- CWD threat Must develop diagnostic test to distinguish possible CWD in humans from CJD
- Outreach required for more autopsies
- Requesting $8 million for FY20 for prion disease surveillance

Summary

- NPDPSC is funded by the CDC to assist in neuropathologic surveillance of prion disease
- NPDPSC serves as the reference laboratory and is a resource for clinicians (US and abroad)
- NPDPSC assists researchers from around the world
- NPDPSC works very closely with the CJD Foundation and views education and outreach as part of our mission

Thank you!

- We are sorry for your losses but are very appreciative of what you do
- Your loved ones continue to contribute to a legacy of helping others
- It is an honor and a privilege to work closely with families and the CJD Foundation

My Lab

Thank you for your support!