CWD: Research and Outreach Update

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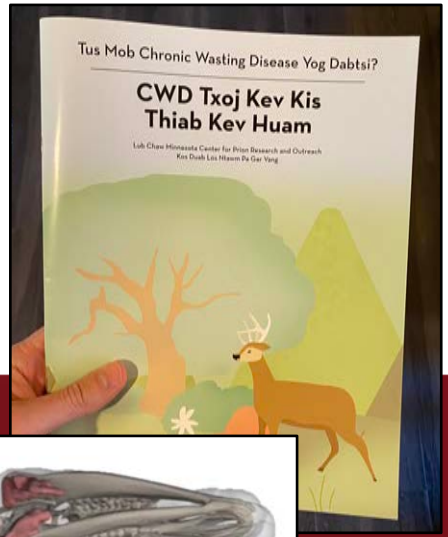

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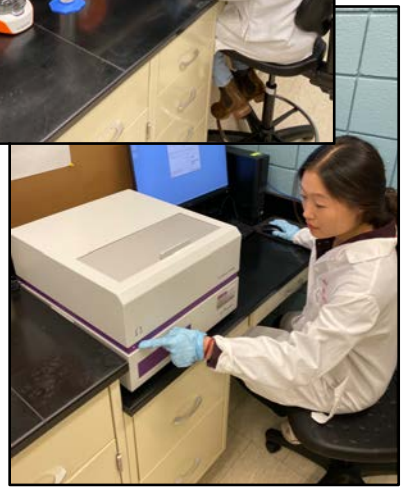
CWD Diagnostic R&D Update

CWD Diagnostic Test R&D

- Goal: develop advanced CWD diagnostics that are faster, more sensitive, easier to use
- Functional prototype(s) in 2 years (~Fall 2021)
- Can be used with hunter harvested deer, live deer, and environmental samples

CWD Diagnostic Test R&D

- January 2020: The new Minnesota Center for Prion Research and Outreach (MNPRO) molecular lab becomes fully operational
- March 2020: All non-essential UMN labs shutdown due to COVID-19
  - 1 year hiring freeze implemented
- June/July 2020: MNPRO lab re-opens at 50% capacity
- Currently running at 50% following UMN COVID-19 safety measures



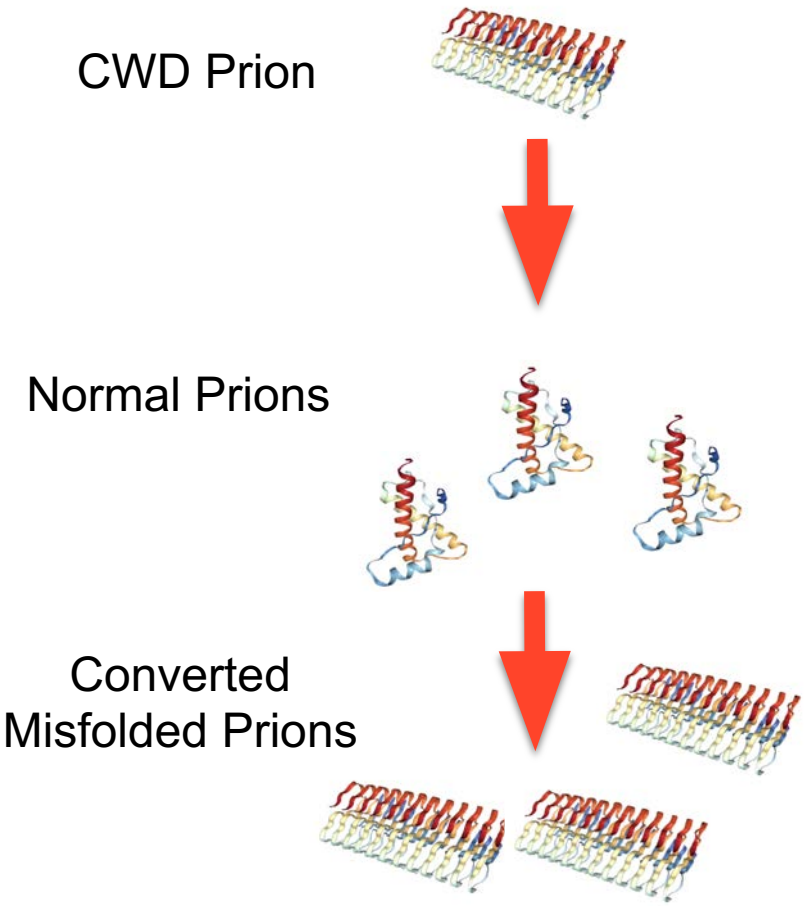
CWD Diagnostic Test R&D

- Three independent lines of research have emerged with exciting preliminary data:
  - Antibody engineering
    - New binding solutions to prion proteins
  - Light-based nanotechnologies
    - Detection of unique light scattering across CWD + vs. - samples
  - **Protein-amplification methods**
    - **RT-QuIC, microfluidic RT-QuIC**

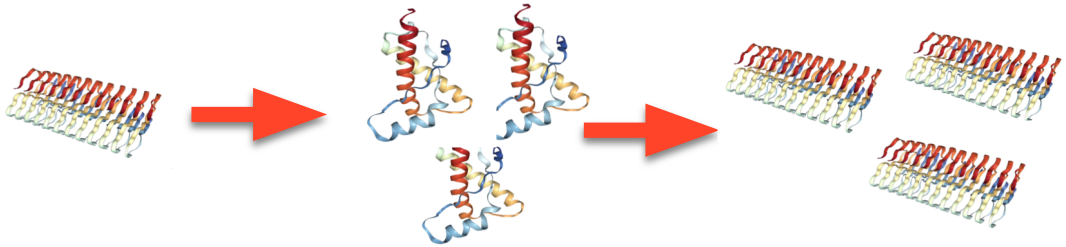
RT-QuIC
(Real-time Quaking-Induced Conversion)

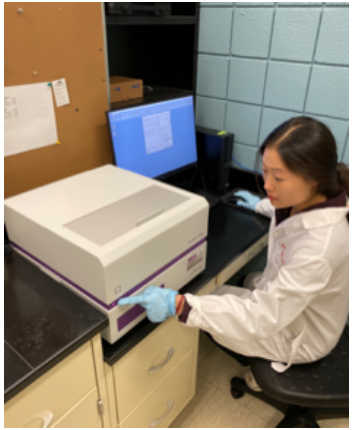
RT-QuIC

- CWD-prions cause normal prions to change their shape (misfold)
  - This is how the disease spreads
- RT-QuIC leverages this misfolding
- Detects the prion shape change using a fluorescent dye



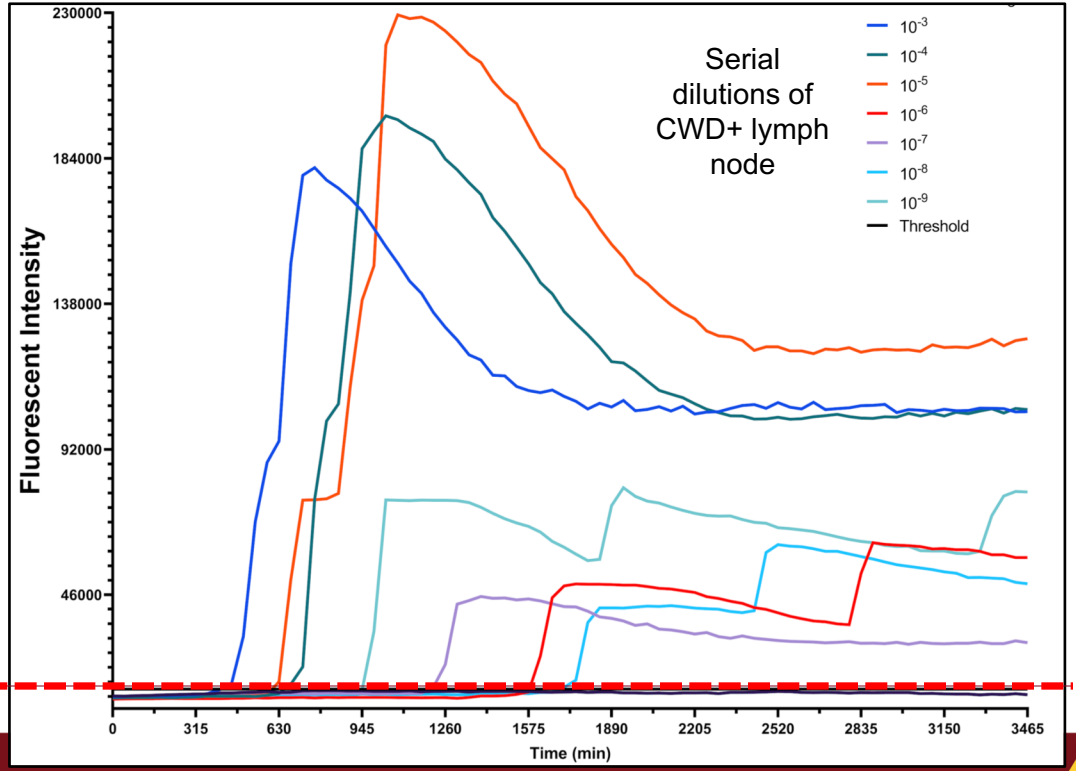
RT-QuIC





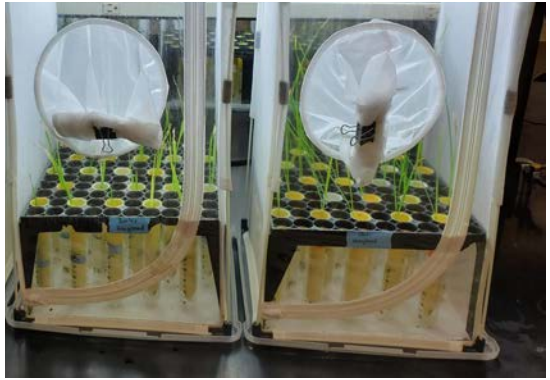
Can detect CWD+ in ~9hrs using tissues. Environmental samples take longer (~24 hrs)

Any curve above this red line is CWD +



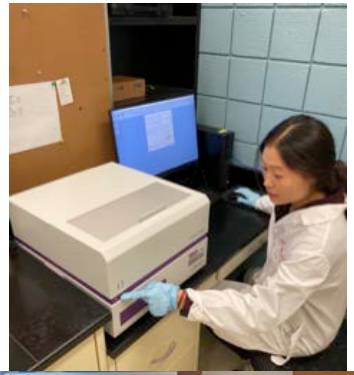
RT-QuIC

- Useful for **both live and harvested deer**
  - Blood, feces, tissue biopsies, muscle, lymph nodes, brain, etc.
- Useful for environmental detection of prions
  - Soil, plants, water
  - CWD-prion plant uptake experiments ongoing (barley, oats, alfalfa)



RT-QuIC

- Our MNPRO lab is only lab in the state with RT-QuIC functionality for CWD
- USDA is validating for farmed cervid industry
  - We will assist USDA in the validation of RT-QuIC
- **Current throughput:** 104 samples per 48 hrs. **Future upgrade:** 488 samples per 48 hrs.



RT-QuIC

- **The Good:** highly sensitive test that is much better than current diagnostic tools
- **The Bad:** requires special reagents that are costly and time consuming to produce
- **The Ugly:** highly technical, not “quick”, special equipment needed
- **Bottom Line:** RT-QuIC is major step forward. However, we still must develop a “deer-side” or field-deployable test.

Education and Outreach Update

Outreach resources

3D deer head

MNPRO has created a 3D printed model of a deer head. This novel tool, printed at the Earl E. Bakken Medical Devices Center, can be utilized to demonstrate the removal of lymph node samples for chronic wasting disease (CWD) testing. This model is highly useful to help educate hunters, cervid farmers, students, and professionals who may need to sample lymph node tissues for CWD testing.

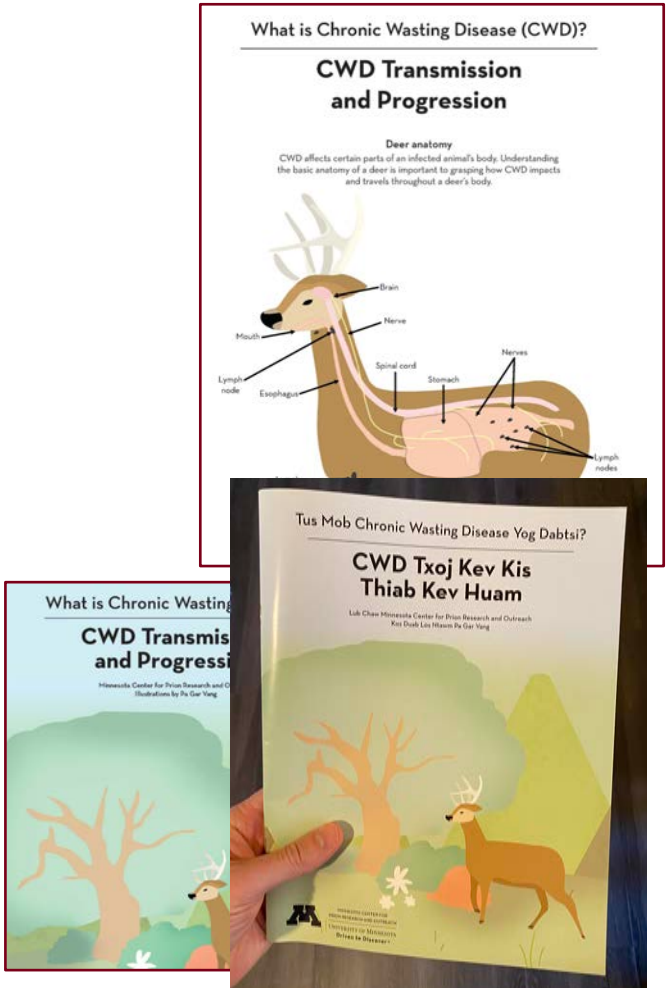
Dr. Tiffany Wolf

Marc Schwabenlander, MPH

Dr. Roxanne Larsen

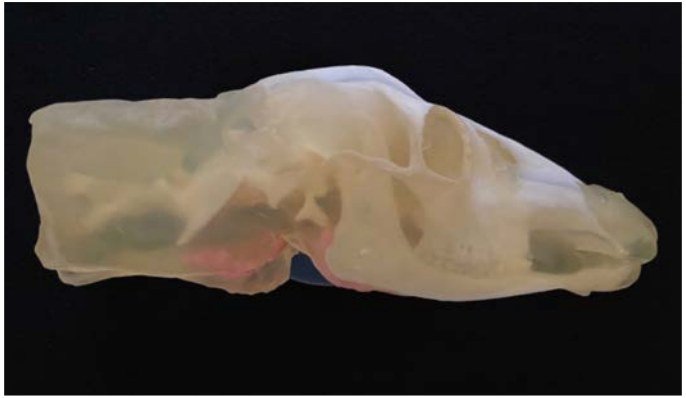
Education and Outreach

- Reached over 5,400 Minnesotans through in person and zoom outreach events over the past year
- Adapting outreach in response to COVID-19
  - What is CWD? Handout aimed at youth hunters, general public
    - Hmong translation available
    - Ojibwe translation pending
    - Will distribute hard copies mid-September, including to Amish communities in SE MN



Education and Outreach

- Produced full-sized 3D white-tailed deer head to assist with lymph-node sampling education:
  - DNR, BAH, USDA
- Can remove retropharyngeal lymph nodes from model. Same size and color as natural lymph nodes
- Video at: https://mnpro.umn.edu/outreach-resources



Education and Outreach

- Organizing CWD webinars in October (4 one hour sessions)
  - 1) The basics of CWD biology
  - 2) CWD ecology and diagnostic tools
  - 3) The human factor (human health and a hunters "toolkit"
  - 4) Minnesota CWD management (DNR)

Marc Schwabenlander, MPH

- Will announce final schedule soon

Scientific Literature Update

Very low oral exposure to prions of brain or saliva origin can transmit chronic wasting disease

Nathaniel D. Denkers, Clare E. Hoover, Kristen A. Davenport, Davin M. Henderson, Erin E. McNulty, Amy V. Nalls, Candace K. Mathiason, Edward A. Hoover

Minimum infectious dose to transmit CWD is ~300 nanograms of CWD+ brain material. This means:

2.5 grams of CWD+ brain
(weight of a penny)

Has potential to infect over 8 million deer

Thank you!

https://mnpro.umn.edu/

Funding Sources:

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