Chronic Wasting Disease: Research and Outreach Update

Peter A. Larsen, Ph.D.
Dept. of Biomedical and Veterinary Sciences
Minnesota Center for Prion Research and Outreach
College of Veterinary Medicine

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Chronic Wasting Disease

- Direct threat to all aspects of cervid heritage
- Also poses a risk to multiple economic sectors in the state and across the USA
- Requires an immediate and sustained research and outreach effort

Research Update

CWD Research Update

- CWD Diagnostic Development Team


Dr. Schefers


Dr. Larsen


Dr. Skinner


Dr. Seelig


Dr. Oh

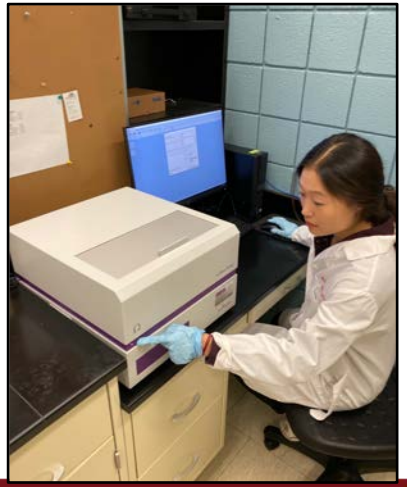
Collaborators: NIH Rocky Mtn Labs, Colorado State Univ Prion Research Center, Univ Of Maryland, Michigan State Univ, Public Health Agency of Canada, Alberta Centre for Prions and Protein Folding Diseases, Midwestern Univ Arizona

CWD Diagnostic Test R&D

- Goal: develop advanced CWD diagnostics that are faster, more sensitive, easier to use
- Prototype(s) in 2 years (~Fall 2021)
- Functional with hunter harvested deer, live deer, and environmental samples
- $2M in July 2019 ($259k Rapid Ag Response Fund, $1.8M MN Legislature LCCMR fund)

CWD Diagnostic Test R&D

- 2019 funds supported new prion research laboratory in the U of M College of Veterinary Medicine
- Space available in Aug 2019 (all essential equipment secured by December)

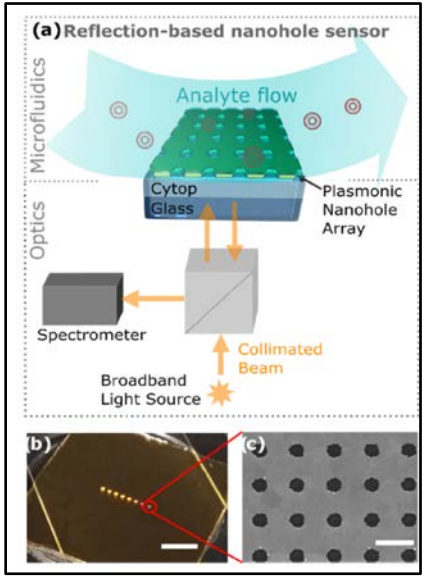


CWD Diagnostic Test R&D

- Established four independent lines of research aimed at advancing CWD diagnostic tools:
  - Antibody engineering
  - Detection of CWD biomarkers in blood (RNA expression)
  - **Light-based nanotechnologies**
  - **Protein-amplification methods**

CWD Diagnostic Test R&D

- **Light-based nanotechnology advancement**
  - First LCCMR acknowledged publication (Nov 2019)
  - Advanced plasmonic biosensor development
  - Helps provide foundation for next-gen CWD protein detection



Plasmonic Sensing on Symmetric Nanohole Arrays Supporting High-Q Hybrid Modes and Reflection Geometry

Milan Vala,[†,‡] Christopher T. Ertsgaard,[†] Nathan J. Wittenberg,[†,§] and Sang-Hyun Oh*[,†]

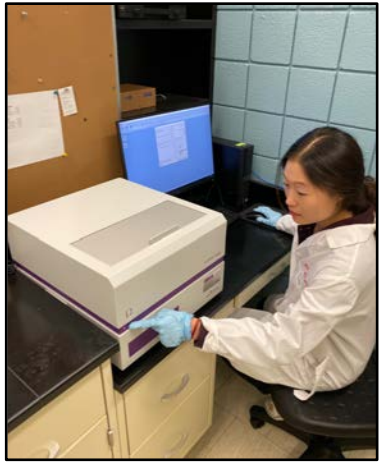
[†]Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, Minnesota 55455, United States

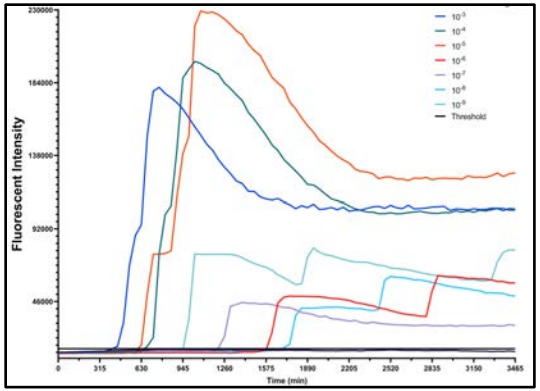
[‡]Institute of Photonics and Electronics, Czech Academy of Sciences, 18251 Prague, Czech Republic

[§]Department of Chemistry, Lehigh University, Bethlehem, Pennsylvania 18015, United States

CWD Diagnostic Test R&D

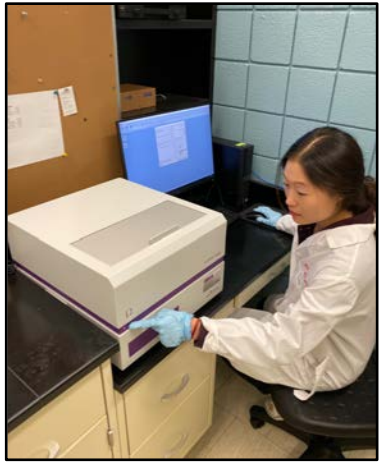
- **Protein-amplification R&D**
- **Major milestone reached on 24 January 2020**
- Prion research lab has RT-QuIC functionality:
  - Confirmation of CWD+ sample in ~9 hours of testing
  - Collaboration with NIH Rocky Mtn. Labs

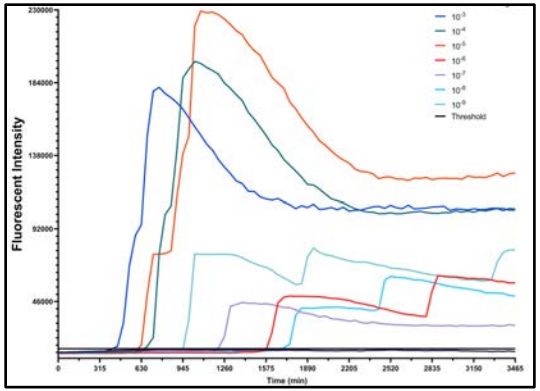




CWD Diagnostic Test R&D

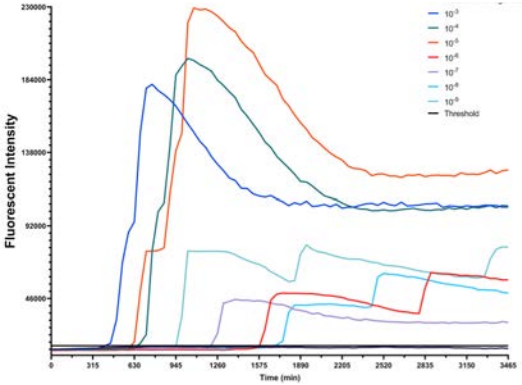
- RT-QuIC (Real-time quaking-induced conversion)
- CWD-prions cause normal prions to misfold, RT-QuIC can detect the misfolding as it happens
- Useful as both post-mortem and ante-mortem test (tissues, blood, saliva, feces, etc.)





CWD Diagnostic Test R&D

- RT-QuIC can be improved using advanced technologies (part of our R&D focus)
- Very useful for CWD research activities
  - Collaborations with both DNR and BAH
  - Screening 500 deer (provided by DNR); internal validation with epidemiologist Dr. Wolf
  - Environmental samples from CWD+ farms (BAH)
- Not validated by USDA yet (will likely be in the coming years)



Dr. Wolf

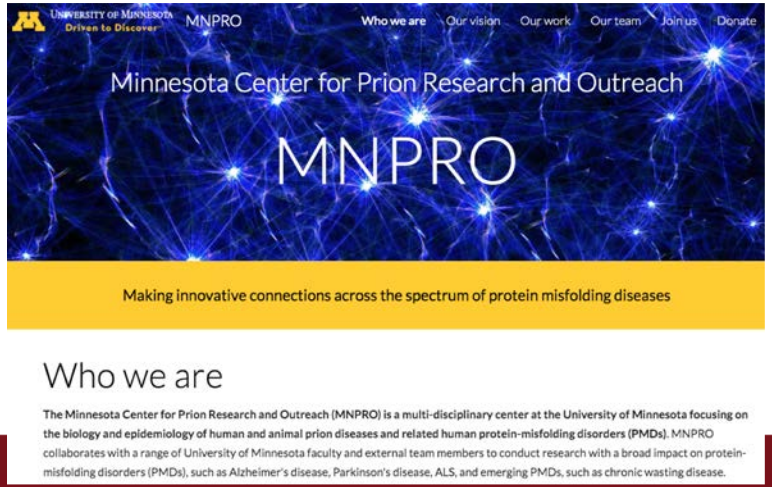
CWD Diagnostic Test R&D

- Summary:
  - Important progress forward on both nanotechnology and prion-amplification R&D
  - RT-QuIC method is major milestone for our diagnostic R&D effort. Would not have been possible without support from the legislature.
  - Ongoing collaborations with diverse team of scientists

Education and Outreach Update

Education and Outreach

- Combatting the spread of CWD in Minnesota requires intense research ***and*** education effort
- Forming the Minnesota Center for Prion Research and Outreach (MNPRO; mnpro.umn.edu)



Education and Outreach

- Core MNPRO team performing multiple outreach events and developing new educational tools

Marc Schwabenlander, MPH

Dr. Tiffany Wolf

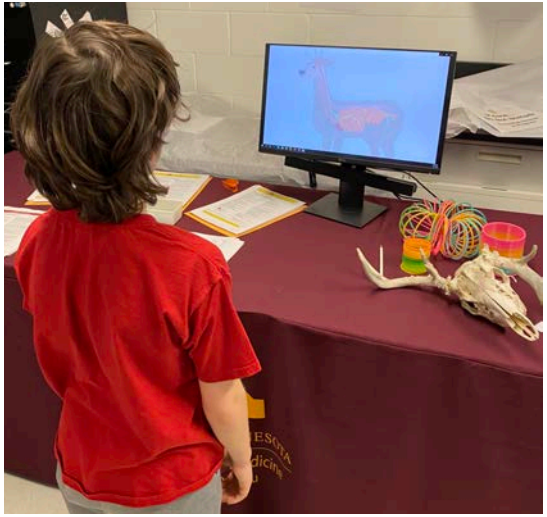
Dr. Roxanne Larsen

Ann Bateman and Center for Animal Health and Food Safety

Dr. Peter Larsen

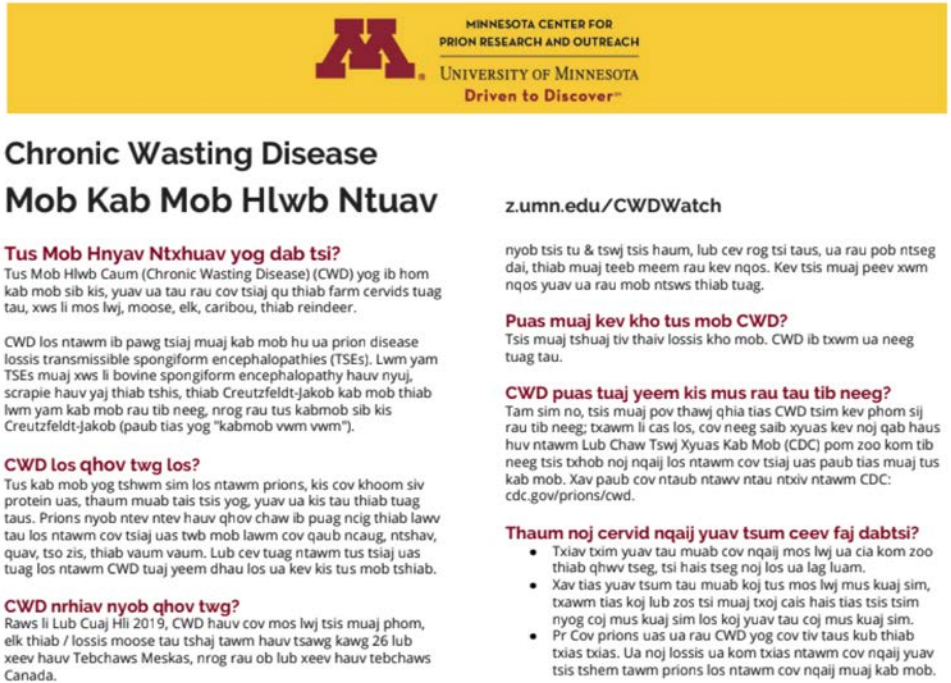
Education and Outreach

- Over ~2,500 Minnesotans reached through **direct, in-person,** outreach events over past 5 months



Education and Outreach

- Must reach Minnesota's diverse hunting communities
- We are translating fact sheets and CWD Watch website to connect with our SE Asian hunters



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Chronic Wasting Disease
Mob Kab Mob Hlwb Ntuav

z.umn.edu/CWDWatch

Tus Mob Hnyav Ntxhuav yog dab tsi?
Tus Mob Hlwb Caum (Chronic Wasting Disease) (CWD) yog ib hom kab mob sib kis, yuav ua tau rau cov tsiaj qu thiab farm cervids tuag tau, xws li mos lwj, moose, elk, caribou, thiab reindeer.

CWD los ntawm ib pawg tsiaj muaj kab mob hu ua prion disease lossis transmissible spongiform encephalopathies (TSEs). Lwm yam TSEs muaj xws li bovine spongiform encephalopathy hauv nyuj, scrapie hauv yaj thiab tshis, thiab Creutzfeldt-Jakob kab mob thiab lwm yam kab mob rau tib neeg, nrog rau tus kabmob sib kis Creutzfeldt-Jakob (paub tias yog "kabmob vwm vwm").

CWD los qhov twg los?
Tus kab mob yog tshwm sim los ntawm prions, kis cov khoom siv protein uas, thaum muab tais tsis yog, yuav ua kis tau thiab tuag taus. Prions nyob ntev ntev hauv qhov chaw ib puag ncig thiab lawv tau los ntawm cov tsiaj uas twb mob lawm cov qaub ncaug, ntshav, quav, tso zis, thiab vaum vaum. Lub cev tuag ntawm tus tsiaj uas tuag los ntawm CWD tuaj yeem dhau los ua kev kis tus mob tshiab.

CWD nrhiav nyob qhov twg?
Raws li Lub Cuaj Hli 2019, CWD hauv cov mos lwj tsis muaj phom, elk thiab / lossis moose tau tshaj tawm hauv tsawg kawg 26 lub xeev hauv Tebchaws Meskas, nrog rau ob lub xeev hauv tebchaws Canada.

nyob tsis tu & tswj tsis haum, lub cev rog tsi taus, ua rau pob ntseg dai, thiab muaj teeb meem rau kev nqos. Kev tsis muaj peev xwm nqos yuav ua rau mob ntsws thiab tuag.

Puas muaj kev kho tus mob CWD?
Tsis muaj tshuaj tiv thaiv lossis kho mob. CWD ib txwm ua neeg tuag tau.

CWD puas tuaj yeem kis mus rau tau tib neeg?
Tam sim no, tsis muaj pov thawj qhia tias CWD tsim kev phom sij rau tib neeg; txawm li cas los, cov neeg saib xyuas kev noj qab haus huv ntawm Lub Chaw Tswj Xyuas Kab Mob (CDC) pom zoo kom tib neeg tsis txhob noj nqaij los ntawm cov tsiaj uas paub tias muaj tus kab mob. Xav paub cov ntaub ntawv ntau ntxiv ntawm CDC: cdc.gov/prions/cwd.

Thaum noj cervid nqaij yuav tsum ceev faj dabtsi?
- Txiav txim yuav tau muab cov nqaij mos lwj ua cia kom zoo thiab qhwv tseg, tsi hais tseg noj los ua lag luam.
- Xav tias yuav tsum tau muab koj tus mos lwj mus kuaj sim, txawm tias koj lub zos tsi muaj txoj cais hais tias tsis tsim nyog coj mus kuaj sim los koj yuav tau coj mus kuaj sim.
- Pr Cov prions uas ua rau CWD yog cov tiv taus kub thiab txias txias. Ua noj lossis ua kom txias ntawm cov nqaij yuav tsis tshem tawm prions los ntawm cov nqaij muaj kab mob.

Education and Outreach

- Expanding our outreach efforts for Minnesota's Amish communities and Tribal Nations
  - Using CT scans of deer heads to develop 3D-printed models that will help ID lymph nodes used for CWD testing
  - Flip-book animations and educational tools to help explain CWD biology

Dr. Roxanne Larsen

Marc Schwabenlander, MPH

Dr. Tiffany Wolf

Education and Outreach

- U of M united on CWD outreach
- CIDRAP CWD Resource Center
- MNPRO and CIDRAP teams working together on CWD-related activities

Thank you!

- Minnesota Agricultural Experiment Station: Rapid Agricultural Response Fund
- Minnesota Legislature, LCCMR
- Grand Portage Band of Chippewa, USFWS
  - Seth Moore and Tiffany Wolf
- AGREETT (Agricultural Research, Education, Extension and Technology Transfer Program)
- U of M Office of the Vice President for Research (Dr. Chris Cramer)
- **DNR and BAH colleagues**

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