The Emerging Environmental Threat of Chronic Wasting Disease

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Outline

What is Chronic Wasting Disease and how does it relate to water?
CWD is a progressive and fatal neurodegenerative disease of cervids

- Impacts all cervids (caribou, elk, mule deer, white-tailed deer, moose, etc.)
- Not caused by a virus or a bacteria. Caused by misfolded prion protein
- First identified in Colorado in 1960's
What is a prion?

- All mammals have prion proteins
- Normal cellular function
  - Copper and metal processing
  - Important functional roles in nerve cells

Normal Prion
CWD Prions

- CWD prions are misfolded
- Stick together to form tangles
- Misfolded form is almost indestructible and can remain infectious in the environment
The Chaos Engine of CWD

CWD-prions cause normal prions to misfold. The reaction spreads through the animal, colonizes the brain, and begins to kill neurons.
How is CWD Transmitted?

- Misfolded prions in saliva, semen, blood, urine, feces, carcass
- Remain infectious in soil for years. Transported by water runoff from CWD positive areas.
- Plants can uptake the CWD prions and deposit them in their leaves
Where is CWD in Minnesota?

- Spread of CWD
- Flow along riparian zones and where deer congregate
- CWD+ areas are potential point sources for new infections
- Must conduct research on the ecology of CWD in MN
Hydrology of CWD

- CWD prions detected in snowpack melt runoff and at a water treatment facility downstream of CWD endemic area

- The more organic material in water the longer the prions remain infectious
Hydrology of CWD in Minnesota?

- Zero data exist on the hydrology of CWD in Minnesota
- Distance that prions are transported from CWD+ regions?
- Are water-transported prions infectious?
- Are prions ending up in wells or water treatment facilities?
Environmental Contamination Concerns and the Hydrology of CWD in Minnesota

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Elizabeth Boyer PhD
Marc Schwabenlander MPH
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Eric Seabloom PhD
Minnesota Center for Prion Research and Outreach (MNPRO)

- How to detect prions in environmental samples?
- New MNPRO prion research lab with advanced CWD diagnostics (RT-QuIC technology)
- Facilitates environmental research and infectivity studies
Hydrology of CWD in Minnesota
5 Year Research Project (HF 3591)

Key Research Areas

• Identify mechanisms for environmental spread of CWD
• Quantify prion abundance on and downstream of CWD point sources
• Forecast CWD contamination and spread
• Develop remediation strategies
Hydrology of CWD in Minnesota
5 Year Research Project (HF 3591)

Budget

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Thank you!