



Immobilization of chronic wasting disease prions by pyrogenic carbonaceous geosorbents to reduce infectivity

Principle Investigators: Wei Zhang, Ph.D. MSU Associate Professor & Associate Chairperson, Department of Plant, Soil and Microbial Sciences and Jason Bartz, Ph.D, Associate Dean, Academic and Faculty Affairs, Creighton University

Prion diseases are neurodegenerative diseases that can affect a multitude of mammals. Some examples of prion diseases are scrapie in sheep, bovine spongiform encephalopathy (BSE) in cattle, chronic wasting disease (CWD) in cervids (e.g., deer, elk, and moose), and Kuru in humans. Prion diseases present significant health challenges as they are generally fatal. Currently, there is not a clear understanding of how prion exposure leads to infection.

Some prion diseases are more frightening than others. A human prion disease, variant Creutzfeldt-Jakob disease (vCJD), is linked to the consumption of beef products contaminated with BSE. The zoonotic potential, or ability to infect humans, of CWD is uncertain. However, there is a growing concern of CWD transmission to humans due to its increased prevalence. Prion diseases can spread through the ingestion of infectious animal tissue. CWD, however, is not only transmitted through consumption of tissue, but also through contact with feces, urine, or other bodily fluids. It can even be spread through exposure to contaminated soil and water, or perhaps foraging on plants grown in contaminated soil. These other routes of infection mean that CWD could have devastating impacts on the deer population.

No one knows how long prions that have been spread across the landscape remain infectious in soil, though evidence shows it may be years! Additionally, there is no known mechanism to deactivate infectious prion material in the environment.

Through funding from PA 207 of 2018, a team of interdisciplinary researchers have been able to study how to immobilize prions that are found in the environment through using pyrogenic carbonaceous geosorbents (PCGs), such as activated carbons and biochars. This project will provide evidence on whether adding commercially affordable PCGs to high activity areas, such as deer bedding, grazing, feeding or drinking areas, is an effective mitigation strategy in captive cervid farms or in areas where CWD occurs. This study will also provide insight on whether managed fire can have a lasting effect on reducing CWD prevalence by immobilizing prions with chars, addressing a highly significant area of CWD ecology.

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