The Connecticut Agricultural Experiment Station

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LOCKWOOD LECTURE

"Prions: Environmental Contamination and Disease Transmission"

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Tea: 10:30 a.m., Lecture: 11:00 a.m.

Jones Auditorium, The Connecticut Agricultural Experiment Station
123 Huntington Street, New Haven, CT

Transmissible spongiform encephalopathies comprise a class of inevitably fatal neurodegenerative diseases and include Creutzfeldt-Jakob disease and kuru in humans, bovine spongiform encephalopathy ("mad cow" disease) in humans, scrapie in sheep and goats, and chronic wasting disease in members of the deer family. Environmental routes of transmission contribute to the spread of scrapie and chronic wasting disease. The infectious agent in these diseases is a misfolded form of a host-encoded protein referred to as a prion. Prions are notoriously difficult to inactivate, being resistant to sterilization methods that are effective against conventional pathogens. We have investigated mechanisms of prion interaction with the surfaces of important soil constituents and provided insight into the environmental transmission of prion disease by demonstrating that specific kinds of environmental and dietary microparticles can dramatically enhance oral disease transmission. Our work on the environmental transmission of prion diseases has demonstrated the plausibility of soil as an environmental reservoir for prions. The existence of an environmental reservoir of prion infectivity has profound implications for the maintenance of chronic wasting disease and scrapie epizootics. Furthermore, we have developed exquisitely sensitive methods to detect prions in environmental matrices, allowing us to study their release into and presence in the environment, their accumulation in plants, and their inactivation by chemical oxidants. Methods to sterilize prion-contaminated surfaces are needed to limit the environmental transmission of these diseases and to decontaminate sensitive medical equipment. We have developed new methods to inactivate notoriously persistent prions.