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Zoonotic risk of chronic wasting disease prions in cervids: From animal models to human studies

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Chronic wasting disease (CWD) is the prion disease found in several cervid species (mule deer, white-tailed deer, American elk, moose, and reindeer). CWD prions are among the most infectious and highly transmissible between cervids. It has reached epidemic levels in many regions of USA and parts of Canada. Recent detection of CWD in wild moose and reindeer in Norway confirmed its spread to the European continent. The continued spread of CWD and popular hunting and consumption of cervid meat and other products raise serious public health concerns. The discovery of novel CWD strains further complicates the issue since prion strains are known to influence prion transmission barrier between species. However, human susceptibility to CWD prions is still unclear, especially on the difference in zoonotic potential among various CWD prion strains. We have been working to address the CWD zoonosis question for well over a decade. We used CWD samples from multiple cervid species collected at various geographic locations to inoculate transgenic mice expressing human or elk prion protein (PrP). We found infectious prions in the spleen or brain in a small fraction of CWD-inoculated transgenic mice expressing human prion protein, which is consistent with a recent report of CWD transmission in macaques (a non-human primate model) and indicates that humans are not completely resistant to CWD prions. This finding has significant ramifications on the public health impact of CWD prions. The influence of key cervid prion protein polymorphisms, the prion strain dependence of CWD-to-human transmission barrier, and the characterization of experimental human CWD prions will be discussed. Preliminary examination of human prion cases with a history of cervid hunting and/or consumption will be presented.

Biography

Qingzhong Kong has completed his PhD at the University of Massachusetts at Amherst and postdoctoral studies at Yale University. He is currently an Associate Professor of Pathology, Neurology and Regenerative Medicine, Associate Director, National Prion Disease Pathology Surveillance Center, Case Western Reserve University School of Medicine. He has published over 50 original research papers in reputable journals (including Science Translational Medicine, Journal of Clinical Investigations, PNAS, Cell Reports, and Plant Cells) and has been serving as an Editorial Board Member on multiple scientific journals.

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