Epidemiological role of cats in zoonotic disease transmission of Borna Disease Virus 1

Prof. Dr. Katrin Hartmann, Priv.-Doz. Dr. Karin Weber, Prof. Dr. Andrea Fischer
Clinic of Small Animal Medicine
Centre for Clinical Veterinary Medicine, Faculty of Veterinary Medicine, LMU Munich

Coinvestigators

Dr. Gesine Buhmann	Clinic of Small Animal Medicine, LMU Munich
Prof. Dr. Kaspar Matiasek	Institute of Animal Pathology at the Faculty of Veterinary Medicine, LMU Munich
Prof. Dr. Martin Beer	Institute for Virus Diagnostics, Friedrich-Loeffler-Institute, Greifswald - Insel Riems
Priv.-Doz. Dr. Dennis Rubbenstroth	Institute of Diagnostic Virology, Friedrich-Loeffler-Institute, Greifswald - Insel Riems
Priv.-Doz. Dr. Donata Hoffmann	Institute of Diagnostic Virology, Friedrich-Loeffler-Institute, Greifswald - Insel Riems
Prof. Dr. Rainer Ulrich	Institute of Novel and Emerging Infectious Diseases, Friedrich-Loeffler-Institute, Greifswald - Insel Riems
Prof. Dr. Hans Helmut Niller	Regensburg University Hospital, Institute of Clinical Microbiology and Hygiene, Regensburg
Prof. Dr. Barbara Schmidt	Regensburg University Hospital, Institute of Clinical Microbiology and Hygiene, Regensburg
Prof. Dr. Susanne Modrow	Regensburg University Hospital, Institute of Clinical Microbiology and Hygiene, Regensburg
Dr. Ralf Dürrwald	Robert Koch Institute, Department for Infectious Diseases, Berlin
Prof. Dr. Christina Herden	Institute of Veterinary Pathology, Justus-Liebig-University, Giessen
Dr. Jens Jacob	Julius Kühn-Institute, Federal Research Centre for Cultivated Plants, Institute for Plant Protection in Horticulture and Forests, Vertebrate Research, Münster
Dr. Christian Imhold	Julius Kühn-Institute, Federal Research Centre for Cultivated Plants, Institute for Plant Protection in Horticulture and Forests, Vertebrate Research, Münster

Summary

Borna disease virus 1 (BoDV-1) is the causative agent of Borna disease, a deadly encephalomyelitis in horses, sheep and other animals. The bicolored white-toothed shrew is the reservoir host for the virus. Recently, BoDV-1 could be detected in archived brain tissues from deceased patients that had suffered from severe encephalitis. Molecular sequencing shows that regional clusters of BoDV-1 in animals overlap with human cases. BoDV-1 has also been isolated from cats with neurologic diseases, but little is known about the prevalence of BoDV-1 infection in cats and its importance as feline pathogen, and the potential role of cats in the zoonotic disease transmission from shrews to humans is still undefined.

Research Objectives

This is a very new project that recently evolved out of ongoing co-operations. Our current research goals are to define the regional antibody prevalence of BoDV-1 in cats, to investigate whether antibody-positive cats originate from regional clusters of BoDV-1 in shrews, and to evaluate whether BoDV-1 RNA can be found in cats with encephalomyelitis. In addition, the carcasses of shrews that have been captured and killed by cats are investigated for the presence of BoDV-1. Furthermore, the antibody prevalence in humans that live in close contact to cats in regions with BoVD-1-infected shrews is investigated by our cooperation partners. BoDV-1 was detected in archived brain tissues from deceased patients that had suffered from severe encephalitis, particularly in the region of Munich, and molecular sequencing shows that regional clusters of BoDV-1 in animals overlap with human cases. Considering the close contact between cats and humans it is of utmost importance to examine the potential role of cats as reservoir or intermittent hosts.

Key Findings

By molecular investigation of carcasses of shrews that were either found without context or that were verifiably killed by cats, a regional cluster of BoDV-1 infection in white-toothed shrews was identified close to Munich. The participating research teams collects and analyses samples from cats, shrews and humans to elucidate the implications of BoDV-1 for human and feline health and possible virus transmission paths.

Selected Publications

1. Haring, VC, Schlottau, K, Schulze, V, Nobach, D, Ebinger, A, Hoffman, B, Hoffmann, D, Bauswein, M, Niller, HH., Schmidt, B, Modrow, S, Buhmann, G, Hartmann, K, Dürrwald, R, Höper, D, Koch ,P, Imholt, C, Jacob, J, Herden, C, Beer, M, Rubbenstroth, D, Ulrich, R.G. Large-scale screening of Rodentia and Eulipotyphla species for exploring the *BoDV-1* reservoir. Junior Scientist Zoonoses Meeting, Nationale Forschungsplattform für Zoonosen, 2021.