Program Activity Report (PAR)

Bornavirus

Work continues on avian bornavirus, which appears to be endemic in some waterfowl in North America. Diagnostic work at Texas A&M University with samples collected by Wildlife Services, has established that 10-20% of some populations of ducks, geese and swans are infected. Most infected birds do not display any clinical signs of infection. But in some cases the disease can cause severe encephalitis. It has also been found in gulls and raptors.

Avian bornavirus is a negative strand RNA virus. The closely related Borna disease virus is endemic in parts of Germany and causes fatal encephalitis in horses, sheep, cats, chickens and ostriches. It is thought that there is a small mammal reservoir of Borna disease virus, and bicolored shrews (*Crocidura leucodon*) and bank voles (*Myodes glareolus*) have been identified as possible reservoirs in Europe. Free-ranging cats in the endemic zone in Europe are 7 times as likely to be infected with Bornavirus as household cats. Efforts to find a mammalian reservoir of Avian bornavirus in North American mammals have so far been fruitless. Texas A&M University diagnostic laboratory has examined blood samples or brain tissue from mink (*Neovison vison*), nutria, (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), and river otter (*Lontra canadensis)* from areas where avian bornavirus has been found in waterfowl.

An intriguing finding that complicates the situation is the discovery of highly conserved bornavirus sequences integrated into the genomes of many mammals, including humans. The 13-lined ground squirrel carries an intact bornavirus N gene in its genome. Species that carry endogenous bornavirus sequences are resistant to lethal infection with the disease agent, and perhaps more likely to be reservoirs.

Recently, Texas A&M and NWDP scientists published the complete genome sequence of the genotype infecting geese and swans in North America. Interestingly, the genotype found in geese and swans aligns more closely with the Borna disease virus that infects horses and sheep in Europe, than with the other avian bornavirus strains, which primarily afflict Psittacine birds (parrots and conures).

Future plans include continuing the search for a mammalian reservoir in North America and exploring the possibility that infected birds have a greater risk of mortality from airstrikes. For more information see:

Guo, J., L. Covaleda, J.J. Heatley, J.A. Baroch, I. Tizard and S.L. Payne. 2012. Widespread avian bornavirus infection in Mute swans in the Northeast United States. Veterinary Medicine: Research and Reports. 3: 49-52.

Guo, J, et al. 2013. Complete genome sequence of an avian bornavirus isolated from a healthy Canadian goose (Branta canadensis). doi: 10.1128/genomeA.00839-13

Payne et al. 2011 Detection and Characterization of a distinct Avian bornavirus lineage from healthy Canada geese (*Branta canadensis*). doi: 10.1128/JVI.05700-11

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