

An Overview of Porcine Astrovirus

Excerpted from the Swine Health Information Center Disease Sheet and edited
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Key Points

- Further research is needed in all areas of the virus in order to better understand, treat, and prevent it
- AstV is a public health concern in humans as it is implicated in foodborne and has zoonotic potential
- PoAstV may play a role in enteric disease, and has been associated with neurological disease

Introduction

Porcine astrovirus (PoAstV) is a non-enveloped RNA virus belonging to the family *Astroviridae*. There are five recognized lineages (PoAstV1 to PoAstV5), all of which are known to circulate in swine herds in the United States.

PoAstV is found worldwide with variable prevalence among herds. PoAstVs have been detected by PCR in both diseased and healthy pigs. The clinical implications of detection of PoAstV in feces or nasal swabs are not well characterized.

Morbidity and Mortality

Prevalence of PoAstV within and between farms varies considerably. Diagnostic testing of diarrheic feces from throughout North America found PoAstV in 61.7% of samples, 20% of which were positive for PoAstV alone while the remainder of positive samples contained PoAstV and one or more other potentially pathogenic viruses (i. e. rotavirus, transmissible gastroenteritis virus, porcine circovirus-2, or porcine hemagglutinating encephalitis virus). A report from Canada detected PoAstV by RT-PCR in 80% of healthy pigs at time of slaughter for market.

In the U.S., pigs with PoAstV-associated neurological disease were documented in a multistate swine production system in 2017. Samples from neurologic cases were submitted for testing on three occasions over a 9-month period. An affected sow farm reported a case-fatality rate of 100%, while two commercial grow-out facilities reported a case-fatality rate of 75%. In Hungary, the index farm had experienced episodes of neurological disease over a two-year period (2015-2017). About 30-40 weaned pigs (1.5-2% of the farm population) were affected each month. A spike in cases (about 80 cases/month, 4% of farm population) was seen during the autumn months.

Transmission

A majority of published reports support the fecal-oral route in PoAstV transmission. However, further research is needed in order to draw firm conclusions about how PoAstV spreads.

Clinical signs

All PoAstV lineages can be detected in the feces of pigs by PCR. The role, if any, that one or more lineages of PoAstV play in enteric disease is unsettled. Recently, PoAstV3 has been associated with neurologic disease in swine. The most commonly reported neurological signs in these cases include ataxia, paralysis, paresis, astasia, and/or knuckling over on the forelimbs, commonly with progression to lateral recumbency.

Immunity

Pigs experimentally infected with PoAstV shed infectious virus in their feces seven days post-infection and developed neutralizing antibody titers 14 days post-infection. There are no commercially available PoAstV vaccines. Antigenic diversity among PoAstV strains in a given location may provide a challenge for vaccine development and disease prevention.

Cleaning and Disinfection

PoAstV retained its infectivity in water at pH 4.0 for 3 hours, but when exposed to pH 3.0 for 3 hours infectivity decreased two-fold. Infectivity of AstV when exposed to chlorine displayed 2.5 LTR after 1 hour contact time.

Zoonotic Potential

AstV is a public health concern in humans as it is implicated in foodborne illnesses and can survive in ground water. The zoonotic potential of AstVs is unclear; porcine-human AstV recombinants have been documented and human-to-pig transmission is suspected. AstV causes diarrhea in human infants, but zoonotic transmission from pigs to humans has not been reported to date. The ability of the virus to rapidly mutate, and the potential for an animal to become co-infected with two different strains, sets the stage for a recombination event from which a zoonotic strain could emerge. Further research and investigation into the pathogenesis of AstV and vaccine development would benefit both veterinary and human medicine.

Gaps in Preparedness

More information is needed about PoAstV and its role as a swine pathogen. PoAstV3 has been strongly associated with neurological disease and one or more PoAstVs may cause gastrointestinal disease. Human zoonosis from pigs has not been reported, but the potential for cross-species transmission exists. Vaccine development may be beneficial to both the human and animal medical communities. Investigations to better understand the ecology, epidemiology, and clinical implications of PoAstVs in swine, along with improved diagnostic tools, are needed for more effective disease prevention and mitigation.

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