



USMEF Backgrounder Hepatitis E Virus

November 2007

Cause and Impact

Hepatitis E virus (HEV) is a spherical, non-enveloped, single stranded, positive-sense RNA (ribonucleic acid) virus. It induces a human viral hepatitis disease seen principally in developing countries. In HEV-endemic countries cases are generally due to the drinking of water contaminated with feces.

The “E” was chosen to illustrate its enteric, endemic and epidemic qualities, and made sense because hepatitis A, B, C and D viruses had already been identified as causing hepatitis (liver inflammation) in humans.

HEV is a major cause of outbreak and sporadic cases of human viral hepatitis occurring primarily in Africa, Central Asia and Mexico. When it has been found in developed countries, it's usually diagnosed in travelers returning from trips to HEV-endemic countries. Some researchers have estimated that as many as 20 percent of the world's population has been infected by HEV.

With hepatitis E, patients suffer jaundice similar to hepatitis A infections. Unlike hepatitis A, however, HEV is not found in young children, but in the 15-40 year old population. It is also not spread through close person-to-person contact. Jaundice is usually accompanied by malaise, anorexia, abdominal pain, liver enlargement, vomiting and fever.

The incubation period of the virus in humans ranges from three to nine weeks.

Like hepatitis A, there is no treatment for hepatitis E, only for its symptoms. No vaccine has been developed that prevents HEV infection. The only cure is prevention of initial contamination, which requires purification of drinking water in developing countries and the segregation of wastewater and raw sewage from drinking water sources.

The overall mortality rate of HEV infection is from 1-2 percent. However, mortality rates of up to 20 percent have been reported in infected pregnant women in developing countries of Asia and Africa.

The Swine/HEV Link

In 1997 an HEV strain was isolated in hogs that was closely related to – but not identical to – human HEV strains. From this and related research, it was found that the U.S. hog HEV had the greatest degree of similarity to the U.S. genotype of human HEV. (At the amino acid level, the hog and human strains are about 90 percent alike.)

Hogs injected with U.S. human HEV became infected with the virus. Additional research found that the U.S. hog HEV could be transmitted to primates, which further suggested that hog HEV is zoonotic (can infect humans), and that swine are a reservoir for HEV.

HEV is ubiquitous in hogs in the U.S., infecting hogs at 3-5 months of age through fecal-oral transmission. In the 1997 study, 100 percent of 15 herds were found with anti-HEV antibodies. Pigs naturally infected with the U.S. hog HEV appear clinically normal, with no symptoms, but they do show anti-HEV antibodies, viremia and virus excretion.



USMEF Backgrounder Hepatitis E Virus

November 2007

The strain of hog HEV is distinct from the strains known to cause disease in humans. It may be that either hog HEV is species specific or is circulating in the human population without causing disease.

One researcher has suggested that pork products may be a relatively low zoonotic risk to consumers because viremia appears to be rare in market-aged hogs. Another suggests that rodents would be a likely reservoir for HEV, given their wide distribution across a variety of human habitats.

Regardless, tests on healthy blood donors show that between 1 and 5 percent have HEV antibodies in their blood. While there is no evidence that the hog virus causes disease in either human or pigs, some have suggested that hogs are acting as reservoirs of HEV and passing a weakened form of the virus on to humans. Sub-clinical infections of humans with HEV from hogs may explain the relatively high prevalence of hepatitis E antibodies in healthy U.S. individuals.

This has also given rise to the suggestion that the hog HEV may prove useful in identifying and developing a vaccine for the human strains of HEV. Hogs may also be useful in providing an alternative animal model for studying the hepatitis E virus infection.

Other major animal reservoirs of HEV antibodies, depending on geographical areas, include lambs, cattle and chickens.

Spread, Prevention and Implications for the Pork Industry

Exposure to hog feces from HEV-infected hogs represents a risk for transmission of HEV. Those most at risk would be pork producers and hog handlers, veterinarians, and those handling, hauling or exposed to hog feces. Segregated early weaning provides a means to derive HEV-free hogs from infected herds.

The specific management practices for reducing risk factors for on-farm and farm-to-farm transmission of HEV are not known. But various practices could lead to the spread of HEV in the environment. Run-off waters from hog operations or from lands spread with untreated pig manure could pollute irrigation and surface waters and result in the eventual contamination of fruits and vegetables.

Also, run-off water from the hog farms could pollute water environments in which shellfish are growing, resulting in contamination of the shellfish with HEV. Therefore, hog production coupled with the increased globalization of the food marketplace has important implications in the spread of hepatitis E.

Because it was only discovered in 1997, hepatitis E is an emerging issue with wide-ranging ramifications. Until more is known about the animal reservoirs and modes of transmission of HEV among swine and other animal species – along with how HEV is transmitted to humans – it will be difficult to determine the most efficient and effective preventive measures for the virus.

For more information please visit the USMEF Hepatitis E Resource page at:

http://www.usmef.org/TradeLibrary/hepatitis_resources.asp