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Presence of hepatitis E virus (HEV) and markers for HEV infection in production swine, human patients with unexplained hepatitis, and veterinarians in Finland

Hepatitis E virus (HEV) infections are common in both humans and animals. HEV genotypes 1 and 2 (HEV-1 and HEV-2) only infect humans and are endemic to Asia, Africa, and Central America, where they cause large, usually waterborne hepatitis epidemics. HEV-3 and HEV-4 are zoonotic and in addition to humans, they also infect animals. Especially HEV-3 is common in swine globally. The porcine infection is usually asymptomatic. In humans, HEV-3 and HEV-4 infections are often asymptomatic or only cause mild symptoms, but they can also cause chronic hepatitis that can lead to liver fibrosis and cirrhosis and even death in immunocompromised patients. The aims of this work were to investigate occurrence of HEV and antibodies against HEV in human patients with unexplained acute hepatitis, in veterinarians, and in production pigs in Finland.

Antibodies against HEV were present in 27.6% of human patients diagnosed with acute non-A C hepatitis and as a marker for acute hepatitis E infection, anti-HEV IgM antibodies in 11.3% of the patients. All HEV isolates obtained from the patients belonged to HEV-1. Most of the patients with acute infections had recently visited HEV-1 endemic areas in Asia, Africa, or Mexico, indicating that their infections were obtained during travels. However, the possibility of infections acquired in Finland could not be excluded, since no traveling data were available for several HEV-positive patients.

Of all production pigs of different ages investigated, 15.5% were positive for HEV RNA and 86.3% for antibodies against HEV. Longitudinal follow-up studies on pigs revealed that the pigs were infected with HEV at the age of 2-3 months, when the prevalence of HEV RNA-positive pigs was at its peak, 34.6%. Thereafter, the prevalence of HEV RNA-positive pigs declined to 21.1% at 3-4 months of age and to 2.9% in slaughter-aged pigs. High HEV antibody seroprevalences of over 80% were detected in all age groups tested, from weaner-aged pigs to sows. All HEVs from pigs were of HEV-3, subtype e. Genetically separate clusters of HEV isolates were obtained from different swine farms, suggesting that genetic variations in viruses from different locations occur. In addition, two different isolates were obtained from the same farm, and also HEV-negative swine farms were seen. The pigs were commonly shedding HEV at the time they were transferred from farrowing farms to fattening farms, creating a possible risk of zoonotic infection for pig handlers. When pigs from HEV-negative and HEV-positive farms arrive at the same fattening farm, infection at a later age during the fattening stage must also be considered possible, which constitutes a risk for HEV entering the food chain in pork at the time of slaughter.

With apparent anti-HEV antibody prevalence of 10.2%, Finnish veterinarians commonly have antibodies against HEV. HEV seropositivity was unexpectedly associated with working as a small animal practitioner and negatively associated with having contacts with swine. However, contradictory to swine contacts, the seroprevalence appeared to be higher in those who had had needle stick by a needle that had previously been injected into a pig than in those who had not, suggesting that contact with blood or tissue fluid from swine might be a risk factor for HEV infection in veterinarians. In addition, those small animal practitioners who had traveled outside Europe during the previous five years appeared to be more often seropositive than those who had not, suggesting that some infections might have been travel-related. Although pigs seem to play a role in the hepatitis E infections of veterinarians, there are possibly multiple factors involved, including also other reservoirs of HEV than pigs.

Hepatitis E virus must be considered a possible cause of acute hepatitis in humans in Finland, especially in patients who have returned from areas endemic to HEV-1 and HEV-2. Although no cases of possibly zoonotic HEV-3 infections acquired in Finland were detected in humans in this study, their possibility should not be overlooked since HEV is widespread in production pigs in Finland and routes for zoonotic infection exist.