Veterinary researchers discover first US strains of hepatitis E virus from rabbits

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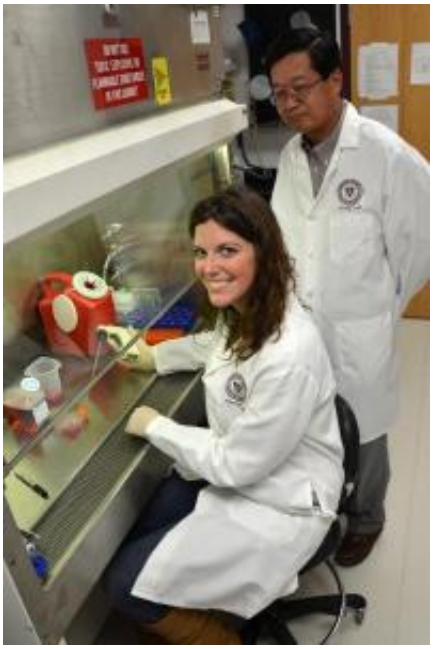

Caitlin Cossaboom (left), a combined D.V.M. and Ph.D. student in the Virginia-Maryland Regional College of Veterinary Medicine, and Dr. X.J. Meng (right), a professor of biomedical sciences and pathobiology, conduct research on hepatitis E virus in the US rabbit population. Credit: Image courtesy of Virginia Tech

Researchers in the Virginia-Maryland Regional College of Veterinary Medicine at Virginia Tech have identified the first strains of hepatitis E virus from farmed rabbits in the United States. It is unknown whether the virus can spread from rabbits to humans.

Caitlin Cossaboom of Salisbury, Md., a second-year student in the combined Doctor of Veterinary Medicine and Ph.D. program in the Department of Biomedical Sciences and Pathobiology, is the first author of a publication entitled "Hepatitis E Virus in Rabbits, Virginia, USA" in the November issue of Emerging Infectious Diseases, published by the U.S. Centers for Disease Control and Prevention.

"Although researchers found hepatitis E virus in rabbits in China in 2009, this is the first time the virus has been identified in rabbits in the United States or anywhere outside of China," Cossaboom said.

Dr. X.J. Meng, professor of biomedical sciences and pathobiology in the veterinary college, Cossaboom's graduate advisor, and senior author of the study, identified the first animal strains of hepatitis E virus — swine hepatitis E virus from pigs — in 1997. Following the landmark study on swine hepatitis E virus by Meng and his colleagues at the National Institutes of Health's National Institute of Allergy and Infectious Diseases, researchers began to consider hepatitis E virus a zoonotic virus.

"Since 1997, researchers have found hepatitis E virus in pigs essentially in every swine-producing country and shown that the virus from pigs can infect humans," said Meng, who added that his lab also identified avian hepatitis E virus from chickens in the United States and that other researchers later discovered strains of the virus in other animal species, including rats, mongoose, deer, and wild boars.

Hepatitis E is an acute hepatic disease caused by infection with an RNA virus that has a fecal-oral transmission route. The disease is mainly prevalent in developing countries, though sporadic cases have been reported in industrialized countries such as the United States. The mortality rate associated with hepatitis E virus infection in humans is generally less than 1 percent, but it can reach up to 28 percent in

infected pregnant women.

The virus has at least four distinct genotypes. Genotypes 1 and 2 infect only humans and typically occur in developing countries with poor sanitation conditions. Meanwhile, genotypes 3 and 4 are zoonotic, can spread from animals to humans, and are found in both industrialized and developing countries.

"It is worth noting that the strains of the virus found in rabbits in the U.S. and China closely relate to genotype 3, a genotype that has been shown to transfer from animals to humans," Meng said. "The question is, 'Do the strains of hepatitis E virus in rabbits infect humans?' We don't know, but the possibility is there and more research is needed to address this potential concern."

Cossaboom and her colleagues collected fecal and serum samples from 85 rabbits from two farms in Virginia — one in Southwest Virginia and one in Eastern Virginia — and found that approximately 50 percent of the rabbits were exposed to the hepatitis E virus. Researchers were able to genetically identify four isolates of the virus from the two rabbit farms.

"For future research, we are particularly interested in the potential zoonotic infection of humans and food safety concerns," Cossaboom said.

She added that pigs can serve as "animal reservoirs" for genotypes 3 and 4 hepatitis E virus. In other words, the pigs can carry and shed the virus, and occasionally the virus may transmit to humans. "However, it is unknown if the virus from rabbits can infect across species or serve as a reservoir," Cossaboom said.

There are five known types of viral hepatitis: Hepatitis A transmits from

person to person from ingesting contaminated food and water. Hepatitis B and C spread by blood-to-blood contact; the hepatitis C virus can also cause chronic infection and, in some cases, liver cancer. Hepatitis D occurs in individuals who already have hepatitis B. Although all of these viruses, including hepatitis E virus, target the liver, none of them are genetically related.

Provided by Virginia Tech