

FAQ

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Hepatitis E virus: avoiding transmission via domestic pigs and wild boars and food derived from them

→ Changes compared to the version dated 9 February 2016: Comprehensive revision in accordance with new scientific findings in recent years.

Infection with the hepatitis E virus (HEV) can cause acute or chronic inflammation of the liver in humans. Hepatitis E can also be particularly severe in people with a severely weakened immune system, such as transplant patients, and in people with pre-existing liver disease. In Germany and Europe, HEV genotype 3, which is also widespread in domestic pigs and wild boars, is the most common type affecting humans. The animals do not show any symptoms of the disease when infected. However, the virus can be transmitted to humans through direct contact with infected animals or by consuming food derived from them. The German Federal Institute for Risk Assessment (BfR) has compiled questions and answers on HEV infection in humans and animals as well as on transmission routes of the virus and recommendations for preventing virus transmission via meat and meat products.

What is the hepatitis E virus?

The hepatitis E virus (HEV) is causative agent of an inflammation of the liver in humans. It is assigned to the *Hepeviridae* virus family and can be divided into different genotypes that are found in different regions around the world. Genotypes 1 and 2 only infect humans and are mainly found in Asia, Africa, and Central America. Genotypes 3 and 4 infect both humans and various animal species – especially domestic pigs and wild boars – and can be transmitted between animals and humans. While genotype 3 occurs worldwide and is the main genotype affecting humans in Europe, genotype 4 is mainly found in Southeast Asia. There are also certain other virus types that occur in dromedary camels, rabbits, and rats and which can also be transmitted to humans in rare cases. HEV is very stable in the environment and resistant to many physicochemical treatments. Studies by the BfR show that HEV is stable against acids and alkalis (pH 2 to 9) and high salt concentrations (20% table salt), and can remain infectious on various surfaces for weeks to months. However,

high temperatures destroy the virus and the pathogen is inactivated by sufficient heating of food during cooking or frying.

What is hepatitis E?

Hepatitis E is a human disease caused by infection with HEV and is usually characterised by acute inflammation of the liver. After an incubation period of two to six weeks, the disease often begins with fever and malaise before specific symptoms appear, such as upper abdominal pain and jaundice as well as an increase in liver-specific enzymes. In most cases, recovery occurs after days or weeks. People with pre-existing liver disease can suffer particularly severe courses of illness. In pregnant women, infections with genotype 1, which occurs predominantly in Asia and Africa, are particularly dangerous and can lead to severe illness with fatal outcomes. In immunocompromised people – especially transplant patients – genotype 3, which is prevalent in Europe, can trigger chronic infections that can lead to life-threatening liver cirrhosis. Disease symptoms that do not affect the liver (e.g. neuralgic amyotrophy, Guillain-Barré syndrome or kidney damage) have also been associated with HEV infections, although the specific significance is still unclear. In addition, studies of the German general population also indicate that the vast majority of HEV infections go unnoticed and without clinical symptoms.

How common is hepatitis E in Germany?

The number of reported cases of hepatitis E in Germany increased steeply between 2001 and 2019. The exact reasons for the increasing number of reports are not known, but could be due to improved detection of HEV and diagnosis of the disease. Between 2019 and 2024, approximately 3,000 to 4,500 cases of hepatitis E were reported in Germany each year.

Does infection with the hepatitis E virus always lead to liver inflammation?

HEV infection in humans often goes unnoticed and without clinical symptoms. A large-scale study (>12,000 samples) shows that more than 15% of the general population in Germany carry HEV-specific antibodies. This means that the test subjects had been infected with HEV at some point in their lives. However, the number of reported cases of hepatitis E is very low in comparison. Infections with HEV therefore appear to only rarely lead to hepatitis illness in humans in Germany.

What are the main sources of infection for humans?

In the past, it was assumed that HEV was predominantly contracted when travelling to certain countries in Asia, Africa, and Central America. There, drinking water and food can be contaminated with the virus due to inadequate hygiene. This pertains to HEV genotypes 1 and 2, which only infect humans and are rarely found in Germany. In contrast, it has been shown in recent years that the majority of hepatitis E cases reported in Germany can be assigned to HEV genotype 3 and were acquired within Germany. This genotype is zoonotic and also widespread in animals, especially in domestic pigs and wild boars. The main transmission routes of HEV in Germany are therefore direct contact with HEV-infected animals or the consumption of food derived from infected animals. Indirect transmission through contamination of the environment and direct transmission of the virus through contact with infected persons are also possible. Transmission through blood transfusions occurred in the past, but are no longer to be expected due to the now mandatory testing for HEV.

Which animal species can be infected with HEV?

HEV has now been detected in numerous animal species worldwide, albeit with varying detection rates. Domestic pigs and wild boars, which are frequently infected with HEV, are of particular importance. Studies by the BfR and other research institutions show that between 40% and 50% of German domestic pigs have antibodies against HEV, meaning they have been infected with HEV at some point during their lifetime. Depending on the hunting area and region in Germany, between 2% and 68% of the wild boars shot had antibodies against the virus. There have also been isolated reports of HEV detection in roe deer and red deer from Germany. Rabbits and rats can be infected with specific types of HEV, but these are rarely detected in humans. Animals infected with HEV generally show no clinical symptoms and cannot be identified as HEV-infected without laboratory testing.

Are there any occupational groups that are particularly at risk?

Studies show that people occupationally working in the fields of hunting, forestry work, slaughtering, official meat inspection, and veterinary services have significantly more antibodies against HEV in their blood than the average population. This means that these carriers of HEV antibodies were infected with HEV at some point in their professional lives. These studies suggest that HEV can be transmitted to humans through direct contact with domestic pigs and wild boars or their faeces.

How can certain occupational groups reduce their risk of contracting HEV from pigs and wild boars?

By wearing the prescribed protective clothing, employees in slaughterhouses can reduce their risk of infection.

Hunters should wear protective gloves when disembowelling and cutting up the animal carcasses. This can significantly reduce the risk of infection, including that from other zoonotic pathogens.

Can food derived from domestic pigs and wild boars become a source of infection?

HEV has been detected in around 5% of raw liver samples from pigs and wild boar. Muscle meat from these animals can also contain HEV, although the virus is found less frequently and in smaller quantities there than in liver samples. HEV can therefore be transmitted to humans through the consumption of raw or undercooked meat or liver from pigs and wild boar. However, if these foods are sufficiently heated by cooking or frying, the virus is inactivated (destroyed), making human infection via this route unlikely.

Certain regionally produced sausages containing raw pork liver have led to hepatitis E infections in France and Switzerland in the past. Such sausages should be cooked thoroughly before consumption. Other types of liver sausage are usually heated during the production process. A study by the BfR has shown that the heating process commonly used in the production of spreadable liver sausages in Germany sufficiently inactivates HEV.

Raw sausages that do not contain raw pork liver and are not heated thoroughly before consumption may also contain infectious HEV. An investigation by the BfR has shown that during the production and curing of salami-like raw sausages, HEV is only inactivated to a limited degree. The BfR therefore recommends that people with a high risk of severe illness (people with a severely weakened immune system, e.g. transplant patients, and people with

pre-existing liver disease) avoid eating raw sausage, even if sausages without liver content are likely to contain only small amounts of HEV.

How can consumers protect themselves against HEV infection?

The risk of HEV infection can be greatly reduced by heating food evenly and completely through by cooking or frying. Brief heating or short microwaving is insufficient, as HEV is relatively heat-stable. Freezing the food does not kill the virus either.

Furthermore, consumers who want to minimise the risk of HEV infection should refrain from eating raw meat products from pigs or wild boar (including raw sausages) unless they have been sufficiently heated before consumption. This recommendation applies in particular to especially sensitive groups of people such as those with severely weakened immune systems (e.g. transplant patients) and people with pre-existing liver disease. Further recommendations for protection against foodborne infections can be found in the BfR information sheets "[Protection against viral foodborne infections](#)" (in German) and "[Safe Food: Protecting against foodborne infections in communal facilities](#)".

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the States ('Laender') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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