

Detecting hepatitis viruses in wastewater

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The researchers obtained their water samples from the Emscher and from various sewage treatment plants. Credit: Fiona Rau

Hepatitis E is widespread among the population worldwide. The World Health Organization estimates that around 20 million people are infected with it every year.

"It's possible that there are many more—we don't know exactly, because there is no reliable screening," explains Fiona Rau from the Department of Molecular and Medical Virology at Ruhr University Bochum.

A possible solution would be to determine the levels of hepatitis E virus (HEV) in wastewater. This is shown by her dissertation, for which she and the team from the department detected viral RNA in samples from 21 sewage treatment plants, a canal and the Emscher river. The researchers [published](#) their findings in the journal *Liver International*.

Treatment in the purification plant reduces the load

In addition to collecting [water samples](#) from the Rhine-Herne canal and the Emscher river over the course of a year, Fiona Rau had access to further wastewater samples from 21 [sewage treatment plants](#) in NRW. The subsequent analysis focused on the search for viral RNA of the hepatitis E virus.

The results showed that HEV RNA was detectable in almost 73% of the 605 water samples taken. By comparing untreated wastewater and the water that left the treatment plants, the researchers found that the viral load was reduced by treatment. Nevertheless, some viral RNA was left in the water.

The high rate of HEV-positive water samples didn't surprise the researchers: For one thing, it's consistent with data from other regions. For another, North Rhine-Westphalia has many pig farms. Hepatitis E is common in pigs and can be transmitted to humans from infected [meat products](#).

Possible to detect genetic variants

High-throughput sequencing of the samples showed that it is also possible to identify different genetic variants of the virus in wastewater. "This approach could conceivably be used in the future to identify at an early stage whether variants that are resistant to certain drugs occur more frequently," says Dr. Daniel Todt from the Bochum research team.

In otherwise healthy people, hepatitis E usually clears up without any consequences. However, the virus can be life-threatening for immunocompromised people and pregnant women. There are no specific drugs to treat it.

"Even if we see that drugs with a general antiviral effect or drugs that have been developed against other hepatitis viruses are somewhat effective, treatment is often unsuccessful because the [virus](#) develops resistance," says Daniel Todt.

[In a recent study](#), the Bochum-based researchers identified several mutations that led to resistance against treatment with a number of different drugs.

"Given the fact that these variants hinder current and probably future antiviral treatment, it's important to examine how frequently they occur in the HEV-infected population and in the environment," says Todt.

More information: Fiona Rau et al, Monitoring of hepatitis E virus in wastewater can identify clinically relevant variants, *Liver International* (2024). [DOI: 10.1111/liv.15842](https://doi.org/10.1111/liv.15842)

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