

Are multidrug-resistant bacteria spread through sewage water?

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Antibiotic-resistant intestinal bacteria enter the environment through toilets and sewage water treatment plants. Some multiply or survive there or transfer their genes to other microorganisms. People can be colonized with these bacteria, for example via contact with surface water. If the bacteria cause an infection – which in most cases happens in the hospital as urinary tract infection or sepsis – it gets difficult to combat the infection effectively with antibiotics. It is therefore in the interest of our society to quickly determine whether and how resistant bacteria spread via sewage water - and how this could be prevented. The new project HyReKA studies these aspects, while also looking for answers to the question: How relevant are these bacteria for our health?

The Federal Ministry of Education and Research (BMBF) is promoting the joint project "Biological and hygienic - medical relevance and control of antibiotic-resistant pathogens in clinical, agricultural and municipal waste [water](#) and their relevance in raw water (HyReKA)". Scientists from different research institutions as well as suppliers of water infrastructure, industry partners and authorities are involved. The Institute of Hygiene and Public Health of the University Hospital Bonn is leading the project. The project examines the spread of resistant pathogens through wastewater from hospitals, municipal areas, agricultural facilities and slaughterhouses as well as airports and considers the appropriate response strategies.

The worldwide increase in [antibiotic-resistant bacteria](#) is considered as a major challenge by the World Health Organization (WHO) and was a

topic at the G7 summit at Elmau Castle in 2015. To minimize the leaking of antibiotics or antibiotic-[resistant bacteria](#) into the environment the use of antibiotics in human and veterinary medicine needs to be reduced according to the German Antibiotic Resistance Strategy (DART).

A particular danger is represented by pathogens with a resistance against last resort antibiotics. It can be very difficult to cure patients that suffer from an infection with these resistant [bacteria](#). This was exemplified by an outbreak of different intestinal bacteria in 2014. Here, food from a hospital kitchen had been contaminated by contact with waste water. After the transmission path had been detected the outbreak could be brought under control within a very short time thanks to targeted hygiene measures.

The first indications of the importance of [sewage water](#) for the spread of antibiotic-resistant pathogens were already found in a previous project of the BMBF funding measure "Risk management of new pollutants and pathogens in the water cycle (RiSKWa)". With HyReKA the BMBF now starts a detailed new project for this research topic. It is focused on the hygienic - medical relevance of resistant pathogens in clinical, agricultural and municipal waste water and their importance for the production of drinking water.

Researchers test new wastewater treatment techniques

In the course of the project the spread of antibiotic-resistant pathogens from hospitals, agricultural facilities, slaughterhouses and airports via wastewater and sewage [water treatment plants](#) into surface waters will be tracked. Moreover, in a large sewage treatment plant new wastewater technologies are tested with which resistant bacteria can be retained. The

scientists also want to investigate the risk that multiresistant bacteria spread in waters or consumer goods (such as meat or drinking water) and resources (such as raw water) used by humans. Another question is whether the antibiotic concentrations in waste water and surface water are sufficient for [resistant pathogens](#) to gain an advantage - that would favor the spread of multiresistant bacteria.

The results will help to identify and to avoid the risk of spreading multiresistant bacteria through wastewater. This is also important in terms of sustainable risk regulation and the "Sustainable Development Goals" of the UN. The researchers also want to find technical solutions for example in [waste water](#) treatment and monitoring of medical and agricultural facilities and slaughterhouses to hold [harmful bacteria](#) at bay.

Provided by University of Bonn

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