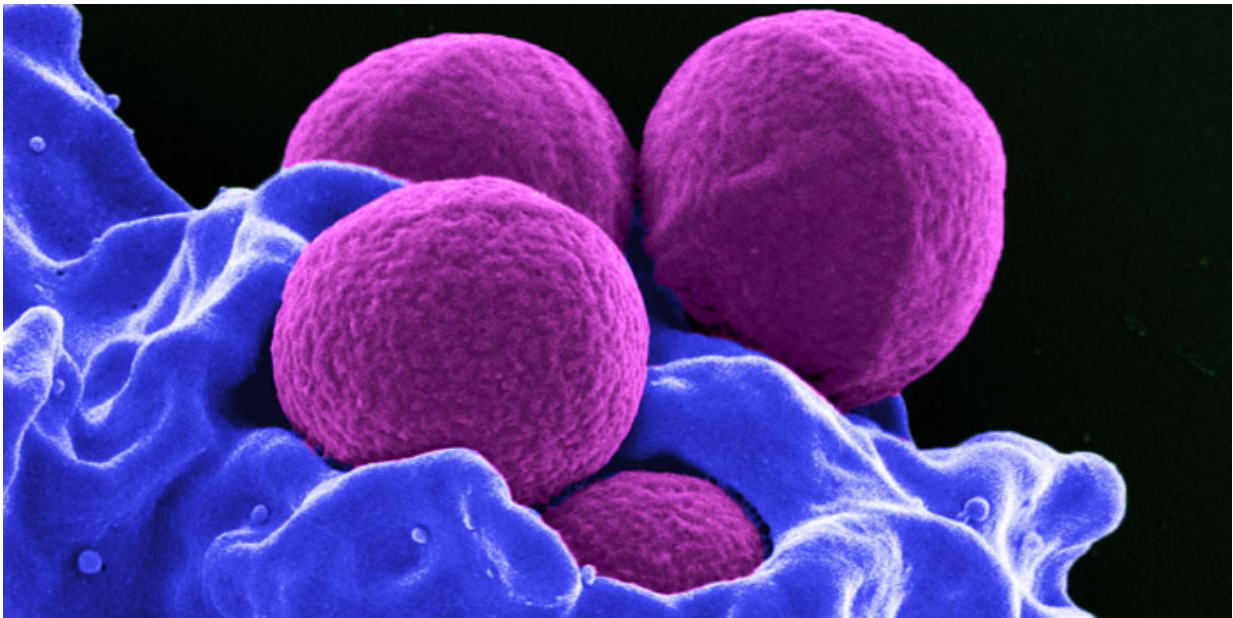


Wastewater treatment plants not responsible for spreading antimicrobial resistance

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New research challenges the common perception that bacteria develop antimicrobial resistance in wastewater treatment plants. The findings have recently been published in the recognized scientific journal *Nature Communications*.

In a collaboration with colleagues from Aalborg University, Technical University of Denmark (DTU) researchers have studied genes from

wastewater [treatment plants](#) that may help bacteria to develop antimicrobial resistance. Their findings demonstrate that the treatment plants contain a great many genes that may generate resistance to a wide variety of [antimicrobial agents](#). However, these genes are rarely found in bacteria outside the wastewater treatment plants, which suggests that—contrary to what was previously believed—the treatment plants do not pass on [resistance genes](#) to bacteria that are hazardous to people.

Every day, biological wastewater treatment plants all over Denmark receive millions of litres of water for processing from hospitals, private households, and other sources. This wastewater contains remnants of antimicrobial agents and a variety of pathogenic bacteria. It has therefore been generally assumed that wastewater treatment plants are the ideal location for pathogenic bacteria to develop new resistance genes. New Danish research has now revealed that the most common resistance genes in wastewater treatment plants are not to be found among bacteria outside these facilities—in people or animals, for example. The findings thus challenge the generally held perception that wastewater treatment plants are hotbeds for the spread of antimicrobial resistance genes.

"Wastewater contains a great many [intestinal bacteria](#) that have been described in detail, so we were surprised to find that the vast majority of the resistance genes we identified in the wastewater treatment plants were unknown," relates Christian Munck from DTU.

Christian is participating in a project led by Professor Morten Sommer in collaboration with Professor Per Halkjær Nielsen's team from the Center for Microbial Communities at Aalborg University.

"We've studied five large wastewater treatment plants, collecting samples over a period of two years. In all the samples, we found genes that provided resistance to the antimicrobial agents we tested. However,

when we looked into whether these genes had been described previously, we found that the vast majority were unknown," explains Christian Munck.

"This indicates that the majority of the resistance genes we identify in wastewater treatment plants are to be found in the special microorganisms that are able to survive in the extraordinary conditions of these treatment plants," continues Professor Per Halkær Nielsen.

Professor Morten Sommer adds:

"The findings from our research demonstrate that [wastewater treatment plants](#) contain a huge pool of genes with the capacity to provide bacteria with [antimicrobial resistance](#), but that these genes do not appear in pathogenic bacteria. It is difficult to say if, and to what extent, these genes may one day appear in pathogenic bacteria, but we are working to unravel the mechanisms that allow resistance genes to migrate from non-pathogenic to [pathogenic bacteria](#)."

More information: "Limited dissemination of the wastewater treatment plant core resistome." *Nature Communications* 6, Article number: 8452 [DOI: 10.1038/ncomms9452](https://doi.org/10.1038/ncomms9452)

Provided by Technical University of Denmark

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