

Zebrafish offspring weaken when parents are given antibiotics

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Antibiotics were once proclaimed the salvation of the world. Today, researchers fear that antibiotics could become a threat to public health and the natural environment.

Since their invention, we have used [antibiotics](#) in such large doses and so

often that more and more of us become resistant, and thus otherwise common and harmless infections can become life-threatening for us.

In recent years, research has also shown that just being exposed to antibiotics can have a negative effect; both on the organism being exposed and on the offspring of the organism.

Always in our water

Both humans and animals are exposed to antibiotics. Antibiotics are often found in wastewater, groundwater, [surface water](#), and even bottled water and are thus difficult not to come into contact with.

"The half-life of antibiotics is quite short—it is out of the water again after hours or days—but since large amounts are continuously released into our water, we consider antibiotics as pseudo persistent water pollution," says Elvis Genbo Xu, who is an expert in ecotoxicology and assistant professor at the Department of Biology, University of Southern Denmark.

He is the co-corresponding author of a new study on the undesirable effects of antibiotics, published in *Environmental Science & Technology*. The background for the study is that in recent years, researchers have discovered that antibiotics can have a [detrimental effect](#) on the descendants of the individuals exposed to the drugs.

"In this study, we examined the offspring of zebrafish that were exposed to CTC, which is a common antibiotic. The CTC concentrations of the experiment corresponded to the concentrations that wild organisms may encounter in nature. We can see that the young generations, i.e. the offspring, are less effective at fighting bacteria and in general have a weaker immune system than the parent generation," explains Elvis Genbo Xu.

More specifically, the study shows that the first generation of zebrafish, born to CTC-exposed parents, had weakened antibacterial defenses and that the number of their immune cells decreased. The latter also applied to the third generation. When an organism's immune system is weakened, the organism becomes less able to fight viruses and bacteria and thus more prone to diseases.

Previous research published in *Scientific Reports* has also shown that males among so-called false scorpions (*Cordylochernes scorpioides*) have poorer sperm quality when their fathers have been exposed to the antibiotic tetracycline: the number of viable sperm cells fell by 25%.

From 2000 to 2015, world consumption of antibiotics increased by 65% from 21.1 billion daily doses to 34.8 billion. Every year, more than 700,000 people die as a result of antibiotic resistance; a number expected to rise to 10 million in 2050.

More information: Wenhui Qiu et al, Antibiotic Chlortetracycline Causes Transgenerational Immunosuppression via NF- κ B, *Environmental Science & Technology* (2022). [DOI: 10.1021/acs.est.1c07343](https://doi.org/10.1021/acs.est.1c07343)

Jeanne A. Zeh et al, From father to son: transgenerational effect of tetracycline on sperm viability, *Scientific Reports* (2012). [DOI: 10.1038/srep00375](https://doi.org/10.1038/srep00375)

Provided by University of Southern Denmark

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