

PUBLIC HEALTHWORKER SAFETY

Title: Relationship between Antibiotics in Water and Rates of Antimicrobial Resistance Gene Transfer
NPB #04-159

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Abstract:

There is growing concern about the fate of antibiotics and antibiotic residues in the environment. These compounds can potentially have selective effects on bacteria, thus amplifying the resistance gene pool. Although measured levels of these antibiotics in waterways associated with swine operations have been low, they may still be high enough to influence the persistence and dissemination of antibiotic resistance. The objective of this study was to correlate the effects of varied concentrations of tetracycline in water samples with the rate at which antibiotic resistance develops in the bacterial population in the water.

We designed a set of experiments for evaluating the biological effects of low levels of antibiotics in water. We established a system in the laboratory that uses chemostats, also known as bioreactors, to study microbial changes over time. Three different bioreactors were used, and each contained river water. One bioreactor served as the control to which no antibiotics were added. The other two bioreactors contained different levels of chlortetracycline (CTC). When followed over time, the total level of bacteria in the three bioreactors was about the same. Following 5 replicates of this experiment, the general trends are consistent: chlortetracycline at low levels does not appear to select for bacterial populations that are resistant to tetracycline. This experiment needs to be repeated for additional antibiotics, and then the findings from these studies need to be validated through a variety of field studies.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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