

Antibiotic Resistance Dissemination Increased by High Frequency of Conjugating Bacteria in Escherichia coli Populations

Wu, Jennifer (School: Newcastle High School)

According to the World Health Organization, the total societal cost of antibiotic resistance amounts to over \$35 billion dollars per year in the United States alone when accounting for lost lives, wages, and extended hospital stays. Bacterial conjugation, a type of horizontal gene transfer, is one of the processes by which antibiotic resistance is disseminated throughout a bacterial population. In the search for methods to inhibit the spread of antibiotic resistance, preventing bacterial conjugation is considered a promising target. However, the degree to which conjugation affects the rise of antibiotic resistance is unclear. This study investigated the effect of different ratios of conjugatory donors to recipients of *Escherichia coli* on the population's resistance to tetracycline. Strains BB4 and DH5 α served as the donor and recipient cultures respectively and were allowed to conjugate before being plated in tetracycline containing agar; resistance was quantified by colony density. Results showed that the presence of conjugating bacteria had a greater relative effect on colony density at higher tetracycline concentration. A donor percentage of 5% (1:19) more than doubled the minimum inhibitory concentration of tetracycline required. At a donor percentage of 20% (1:4), colony density approached levels of an entirely resistant population. This experiment has revealed that even at low levels, bacterial conjugation has the potential to rapidly increase the resistance of a bacterial population and presents conjugation as a crucial target for slowing the spread of antibiotic resistance.