Interrupting Cell-to-Cell Communication in Pathogenic Bacteria

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Antibiotic-resistant bacteria are a worldwide public health crisis with the potential of mass casualties due to the overuse of antibiotics. This experiment was conducted to investigate what effect, if any, negative signaling molecules had on pathogenic bacteria that used positive signaling molecules to communicate. The researcher hypothesized that N-Butanoyl-DL-homoserine lactone and N-Hexanoyl-L-homoserine lactone (used in agricultural production) would inhibit the growth of Streptococcus Pyogenes. This was done by swabbing the bacteria across eleven blood agar plates. Five plates had 1mg of N-Butanoyl-DL-Homoserine Lactone placed in the middle of the plate while the other five had 1mg of N-Hexanoyl-L-Homoserine Lactone, leaving one control plate. This procedure was repeated, yielding two distinct trials. After 24 hours, two different measurements were made on each plate in order to count the colonies (38.1mm and 14.3mm). Results from the experiment demonstrated that N-Butanoyl-DL-Homoserine Lactone was a catalyst while N-Hexanoyl-L-Homoserine Lactone was inhibiting growth. The mean of the Butanoyl data was 648 colonies per square while the mean of the Hexanoyl was 6 colonies. Another trial was run with the N-Hexanoyl-L-Homoserine Lactone with five plates, the same results were yielded. The researcher concluded through quantitative analysis that the hypothesis was proven to be correct for the Hexanoyl and was proven incorrect for the Butanoyl. This opens the doors for future researchers to investigate the way pathogenic bacteria communicate, interrupt that communication, and treat the bacteria, making people non-symptomatic. This, therefore, may provide a solution to the antibiotic-resistance crisis by treating pathogenic bacteria without antibiotics.

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