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Lab 2 Report

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**Significant Difference in Tetracycline and Mouthwash Effects on Bacterial Growth in High Temperature Setting**

**Abstract**

We hypothesize that Penicillin, mouthwash, and Tetracycline will inhibit bacterial growth when grown in agar solution at 42°C. The purpose of this study is to determine what and how environmental conditions effect bacterial growth in a high temperature situation because this can apply to better understand antibiotic treatment in humans with fever temperatures. The approach taken to address the hypothesis was that we conducted five different trials where we cultured bacteria on agar plates at 42°C with the plates separated into four different sections and a different disk was placed in each sector. The disks represented each treatment and included Penicillin, mouthwash, Tetracycline, and water (control). The statistical analysis we used was a ANOVA and Tukey-Kramer test and the results were found to be significant (p **≈** 7.47E-8, α = 0.05) and this indicated that there was a statistical difference between the means of the different treatment groups. The Tukey Kramer test found that there was a significant difference in Tetracycline vs Penicillin, Tetracycline vs Water, Penicillin vs Mouthwash, and Water vs Mouthwash. In conclusion, Tetracycline and mouthwash confirmed our initial hypothesis and did inhibit bacterial growth while Penicillin failed to reject the null hypothesis. These results matter because if a human with a fever were to take an antibiotic for a bacterial infection it would be more effective to take Tetracycline and if there was an bacterial growth in a mouth, mouthwash would prove to be effective.

**Methods**

The experiment conducted was testing the effect of different environmental treatments on bacterial growth and the purpose was what and how environmental conditions effect bacterial growth in a high temperature situation in order to understand antibiotic response on bacteria. The first step was spreading 100μl of *E. Coli* using sterilized beads on an agar plate. Then each plate was separated into four equal sectors. Each sector of the plate represented a treatment group and the treatment groups were Tetracycline, Penicillin, water, and Listerine. An antibiotic disks or sterile disks of its respective treatment is placed in the middle of its respective sector. Then we pipette 50μl of mouthwash or water (control) and saturate the sterile disks. This process was repeated five times and all agar plates were incubated at 42°C. After one week of incubation the areas of inhibition were measured using digital calipers and the distance measured was the largest diameter between two sides of the circle. Then an ANOVA test was conducted on all groups and a threshold of α = 0.05. In addition, the Tukey-Kramer test was also ran to find significant differences between pairs of treatment groups and also had a similar threshold of α = 0.05.

**Figures**

***Figure 1. Size of Zone of Inhibition*** *Above is a bar graph of means of the three treatment groups (Tetracycline, Penicillin, & Listerine) and control (Water), and ANOVA found a statistical difference between the groups (p ≈ 1.0E-5, α = 0.05). Data was collected by culturing E. Coli on agar plates with with different treatment disks and measured the zone of inhibition after a week.*

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