

RESISTING RESISTANCE

THE EFFECT OF THIOL-BASED SUPPLEMENTS ON E. COLI GROWTH

STUDY DESIGN & METHODOLOGY



**Incubation Receptacle pictured above

1-week, static-group quantitative study

Incubation Constants:

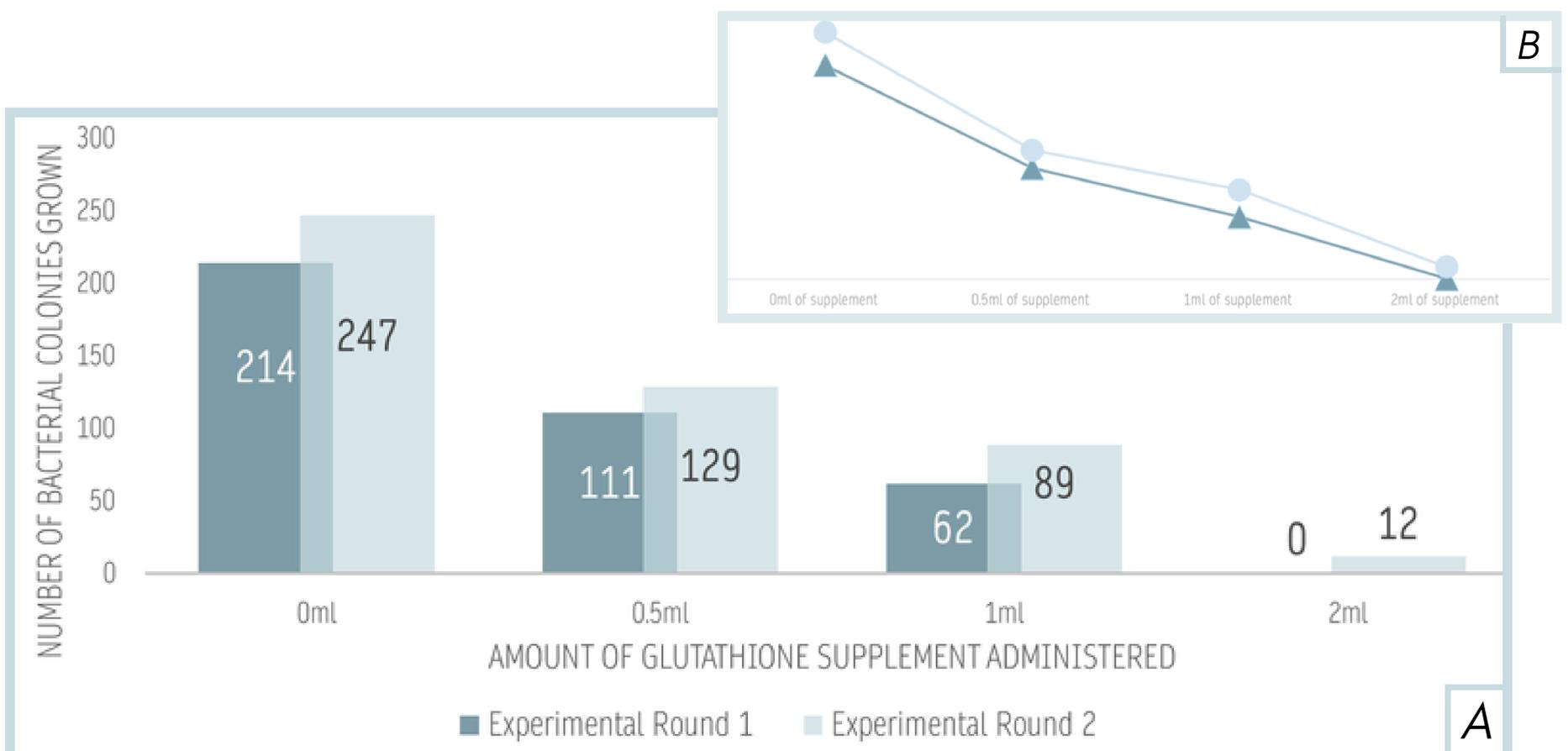
- Temperature: 34°Celsius (93°F)
- Heat Source: 9-Watt Lamp (540-720 lumens)
- 48hrs of Incubation

Round 1(a) Incubation [10/25/23-10/27/23]:

- 1a: 0ml of GL supplement
- 2a: 0.5ml of GL supplement
- 3a: 1ml of GL supplement
- 4a: 2ml of GL supplement

*Round 2 (b) Incubation [10/28/23-10/31/23]- conducted exactly as Round 1

GRAPHS

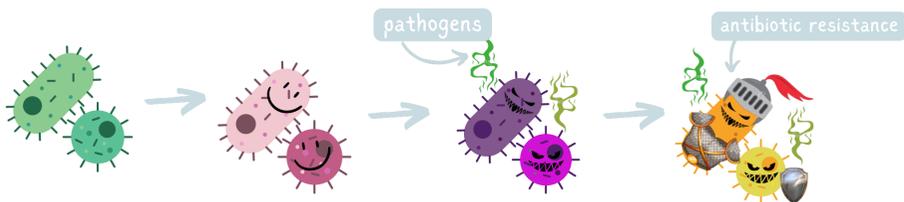


**E. coli K-12 Growth v. Glutathione Supplement Administration Graph (A)

**Correlation Line Graph below (B)

ABSTRACT

Pathogenic *E. coli* poses a great threat to the health of millions of individuals around the world, as these bacteria are gaining resistance against antibiotics and other medications. One idea for developing a clinically applicable method of inhibiting bacterial resistance is to utilize a human-safe reducing agent to chemically alter bacterial proteins. To answer the question of whether utilizing a reducing agent supplement can inhibit bacterial growth, I conducted a correlational study and tested the chemical effect of thiol-based supplements when in contact with *E. coli* K-12 bacteria. After using the direct count method to collect the data, I utilized a Kruskal-Wallis statistical test at the 5% significance level, yielding a p-value of 0.0069, and I rejected the null hypothesis. From these conclusions, further study into the use of chemical reducing agents for inhibiting pathogenic bacterial growth would be beneficial for finding other possible solutions to the increasingly concerning issue.



RESEARCH QUESTIONS

Q1 How can utilizing a reducing agent supplement, such as glutathione, help inhibit bacterial growth?

Q1.1 Does the amount of reducing agent administered to the bacteria have a relationship with the number of bacterial colonies present after the incubation period?

Q1.2 What effect can glutathione supplement have on the growth of *E. coli* bacterial colonies?

HYPOTHESES

H₀ No correlation between the amount of administered Glutathione supplement and the number of K-12 bacterial colonies that grew during the incubation period.

H_A Negative correlation between the amount of administered Glutathione supplement and the number of K-12 bacterial colonies that grew during the incubation period.

RESULTS & ANALYSIS



Using Kruskal-Wallis Statistics Test...

Based on the direct count method analysis, **I have evidence to reject the null hypothesis** that there is no correlation between the amount of glutathione administered to the *E. coli* K-12 bacteria and the change in number of discernable colonies.

 *P-Value*

$$0.0069 < 0.05$$

 *T-Value*

$$6.667 > 6.176$$

CONCLUSIONS

-The data provided evidence in **support of the alternative hypothesis** (H_A). ✓

-The data provided evidence of a **strong negative correlation** between the amount of glutathione administered and the number of bacterial colonies grown. ⊖

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REFERENCES

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