

The Effects of Sublethal Antibiotics on *Listeria monocytogenes* Virulence

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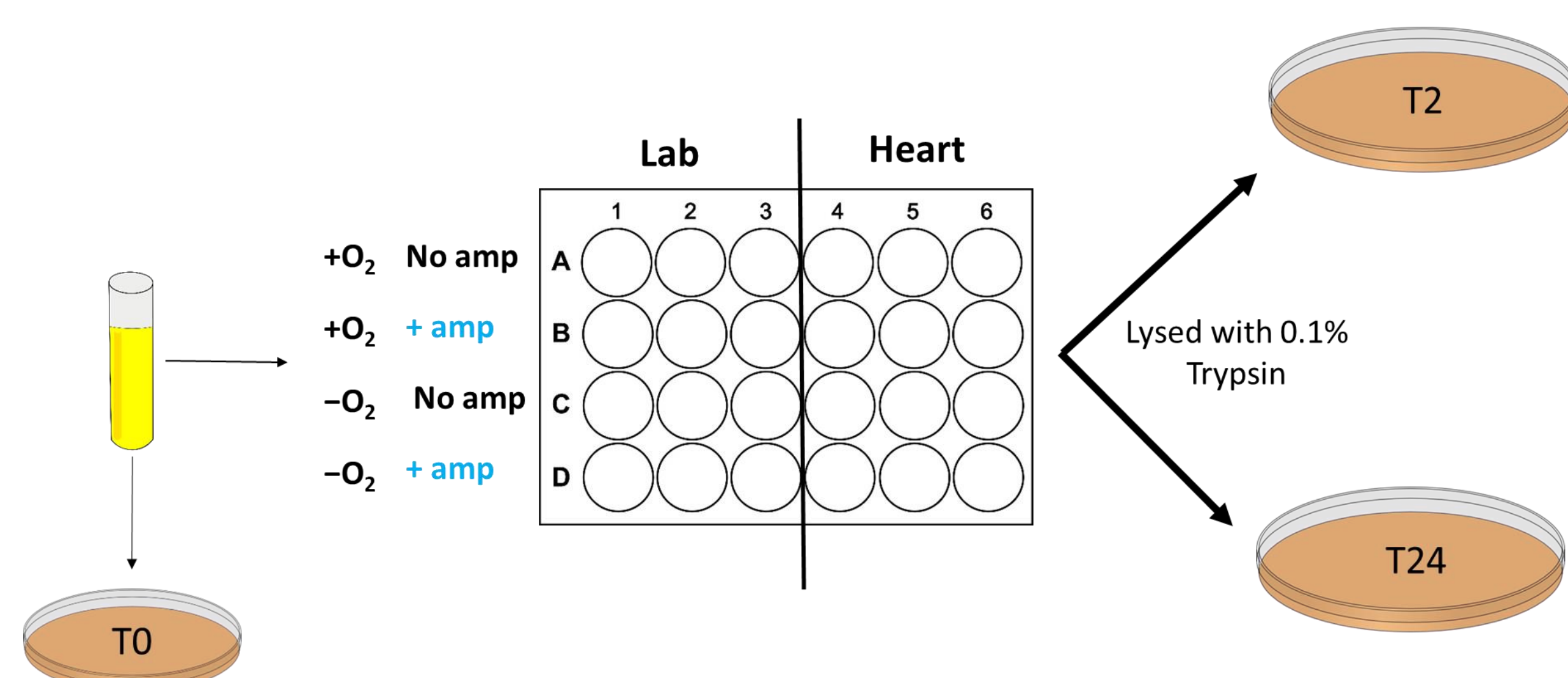
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Introduction

- Bacteria are constantly exposed to sublethal levels of antibiotics in the environment
- Sublethal levels of antibiotics has been shown to affect regulation of virulence genes in bacteria
- Listeria monocytogenes* is a dangerous foodborne pathogen that can cause potentially fatal infections
- The virulence of *Listeria monocytogenes* may be affected by pre-exposure to sublethal levels of antibiotics

Methods

- RAW cells (macrophages) were grown in a 24 well plate for 24 hours
- The macrophages were infected by *Listeria monocytogenes* cultures grown overnight either aerobically or anaerobically and with or without ampicillin
- The number of intracellular colony forming units present inside the macrophages were counted at 2 and 24 hours post-infection



Results

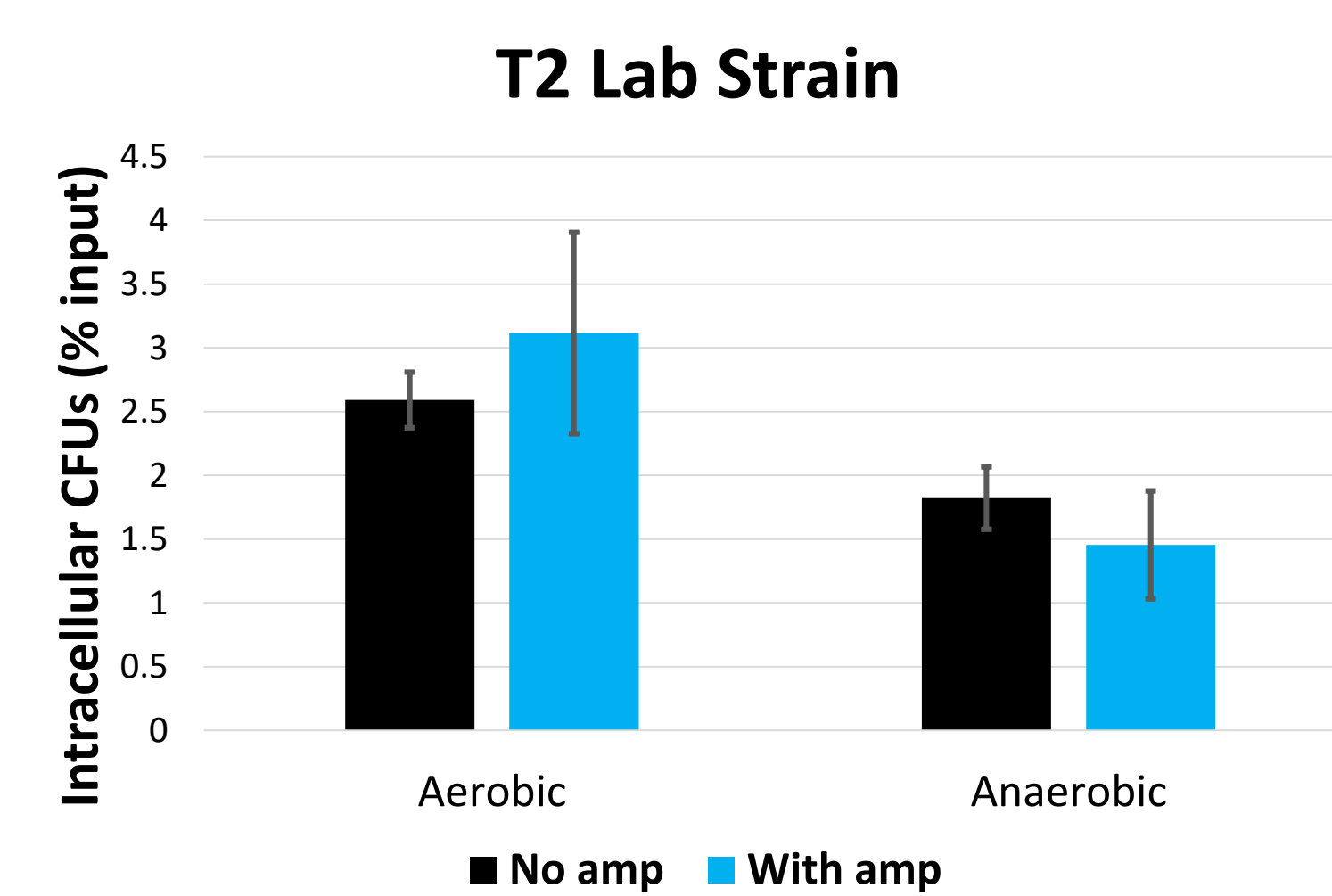


Figure 1

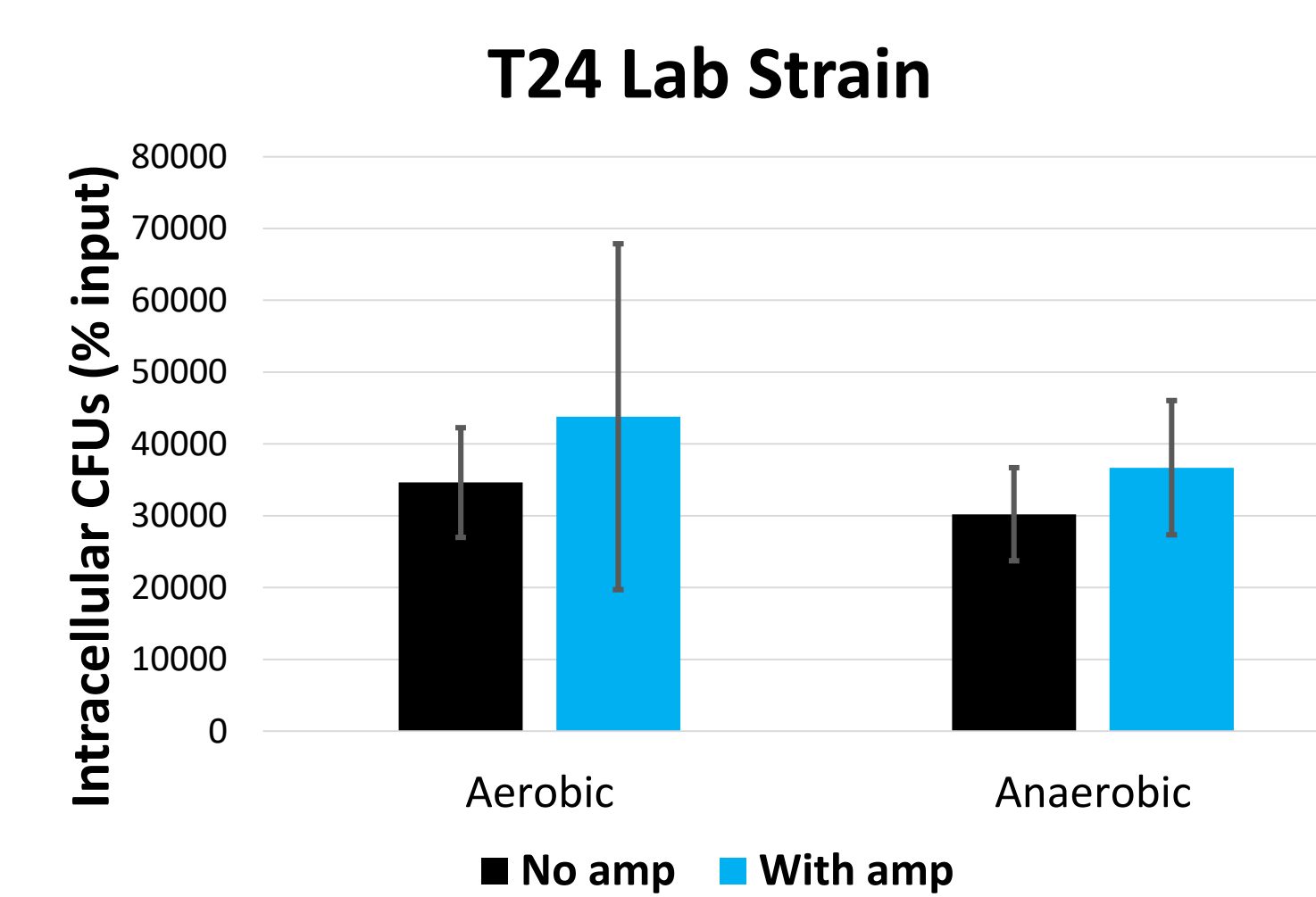


Figure 2

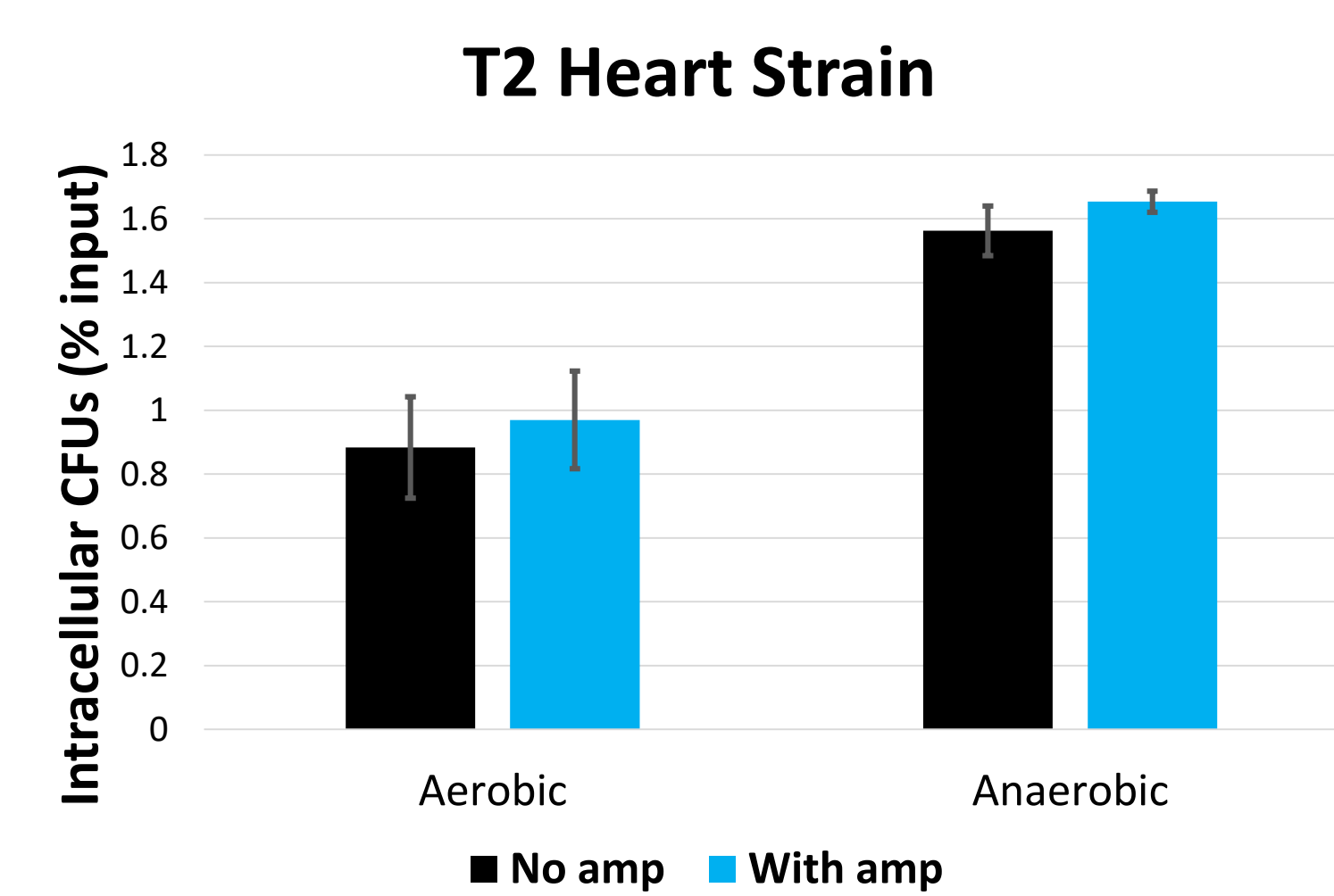


Figure 3

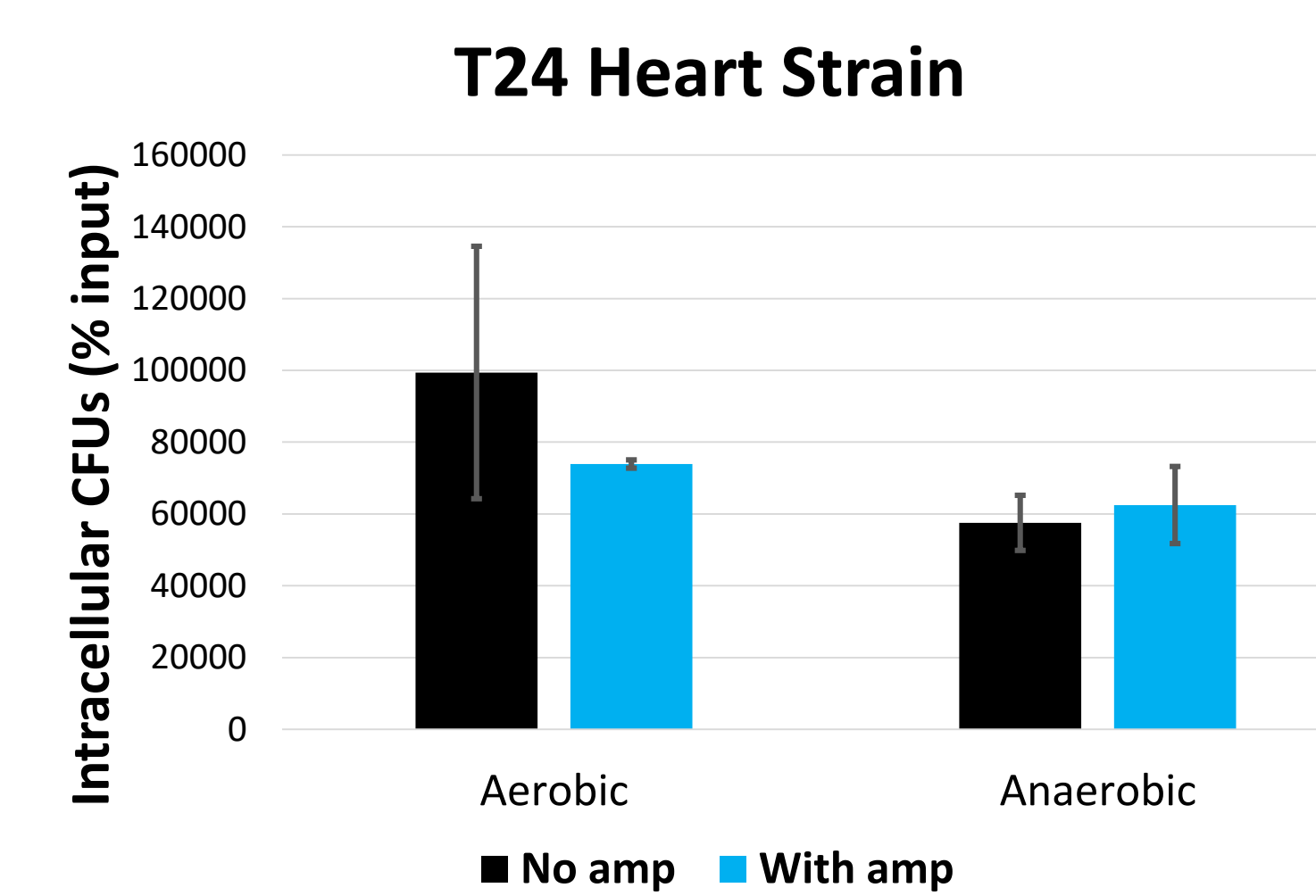


Figure 4

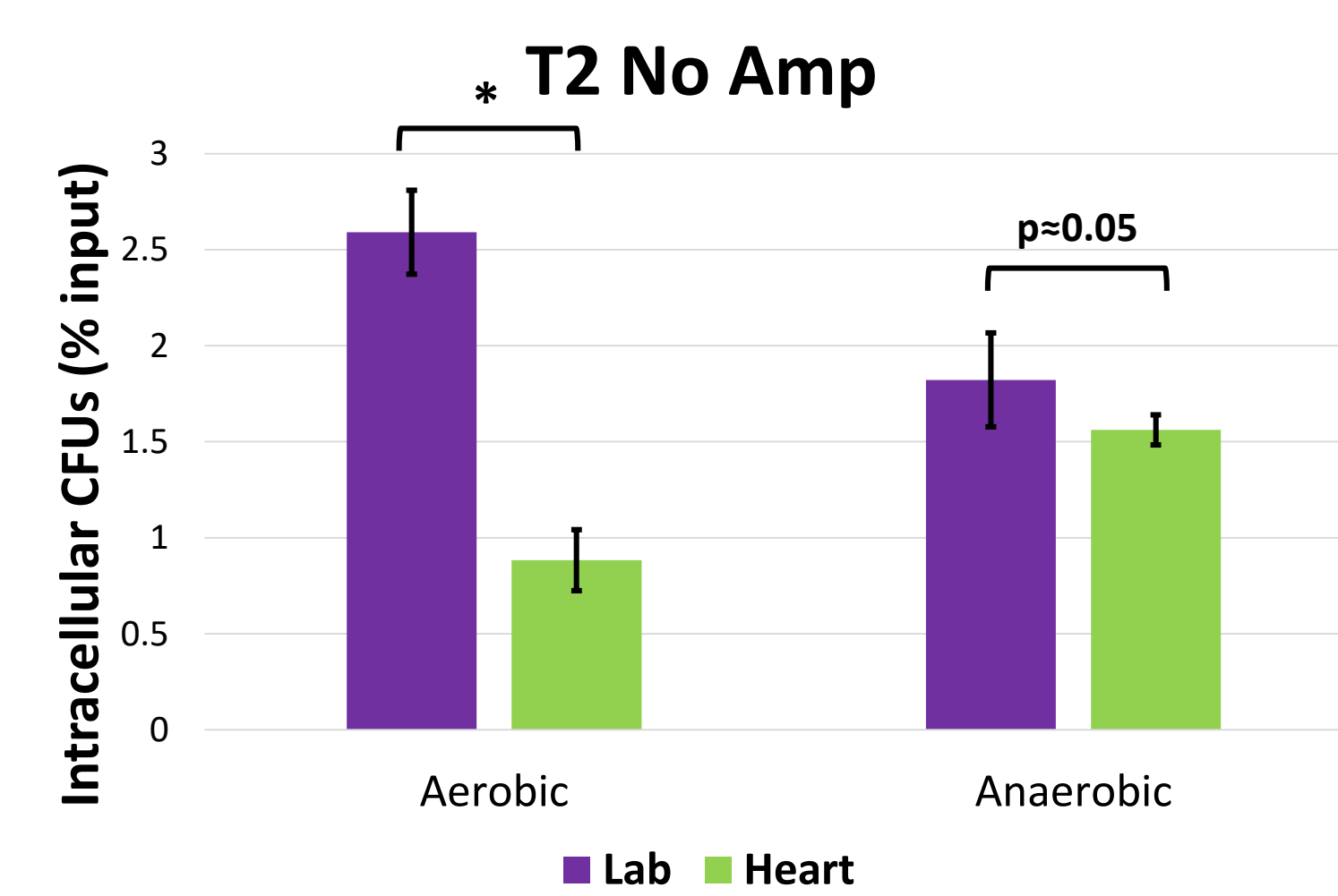


Figure 5

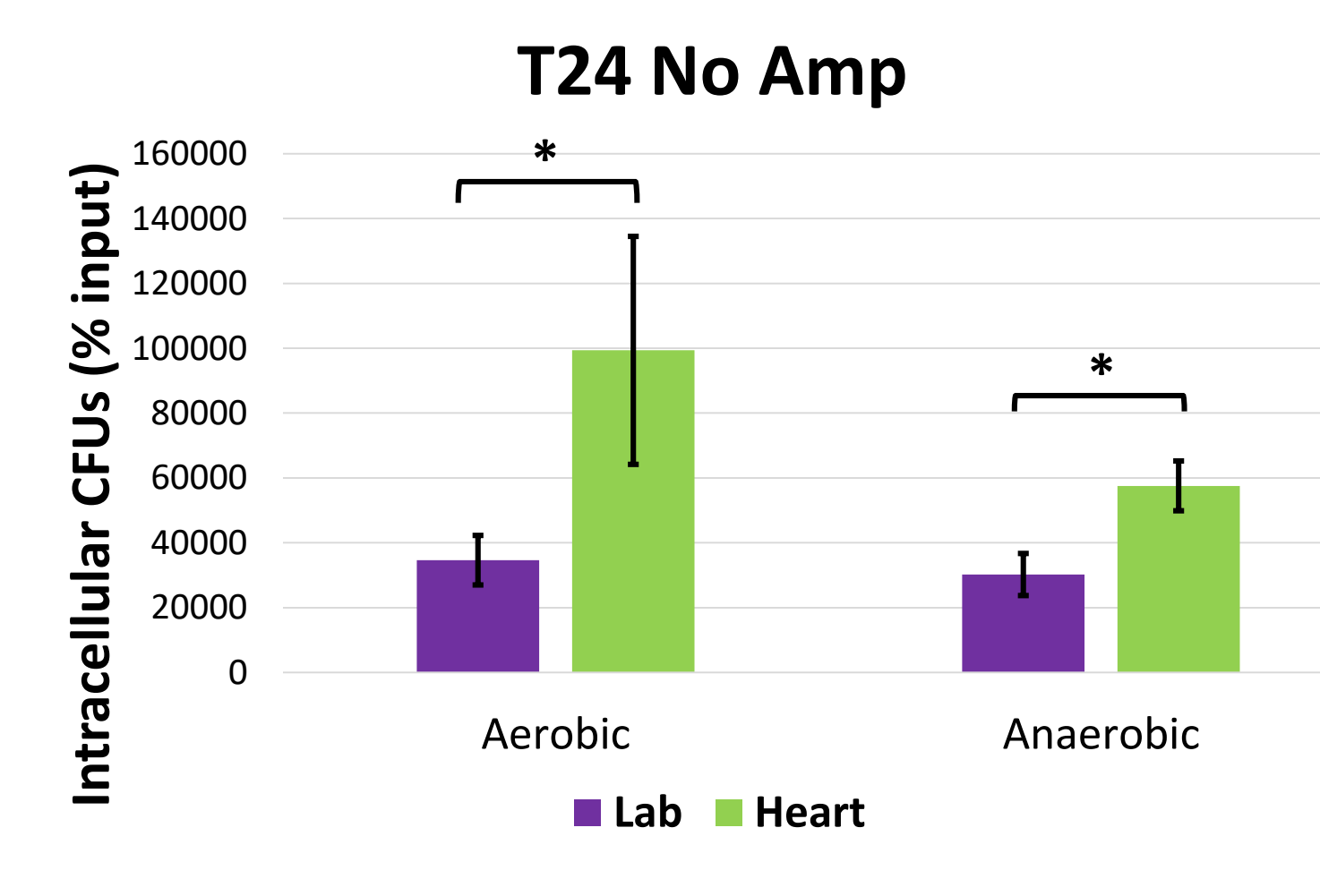


Figure 6

- Figures 1-4 show that pre-exposure to ampicillin does not cause a significant difference in intracellular CFUs of either the lab strain nor the heart strain.
- Figure 5 shows that macrophages infected with the heart strain had significantly fewer intracellular CFUs than those infected with the lab strain at T2. Figure 6 shows that macrophages infected with the heart strain had significantly more CFUs than those infected with the lab strain at T24.
- * indicates $p < 0.01$

Conclusions

- Ampicillin at $0.05 \mu\text{g/mL}$ does not affect *L. monocytogenes*' ability to infect macrophages
- The heart strain was unable to infect macrophages as well as the lab strain at T2, but had significantly more intracellular growth than the lab strain at T24

Future Work

- Testing if a higher concentration of ampicillin would affect virulence
- Repeating the experiment with a different type of antibiotic such as gentamicin
- Exploring the differences between the lab strain and the heart strain

References

Knudsen, G. M., Holch, A., & Gram, L. (2012). Subinhibitory concentrations of antibiotics affect stress and virulence gene expression in *Listeria monocytogenes* and cause enhanced stress sensitivity but do not affect Caco-2 cell invasion. *Journal of Applied Microbiology*, 113(5), 1273–1286. <https://doi.org/10.1111/j.1365-2672.2012.05435.x>

U.S. Department of Health & Human Services. (2017, August 2). *Listeria* (Listeriosis) | *Listeria* | CDC. Retrieved March 11, 2018, from *Listeria* (Listeriosis) website: <https://www.cdc.gov/listeria/index.html>