

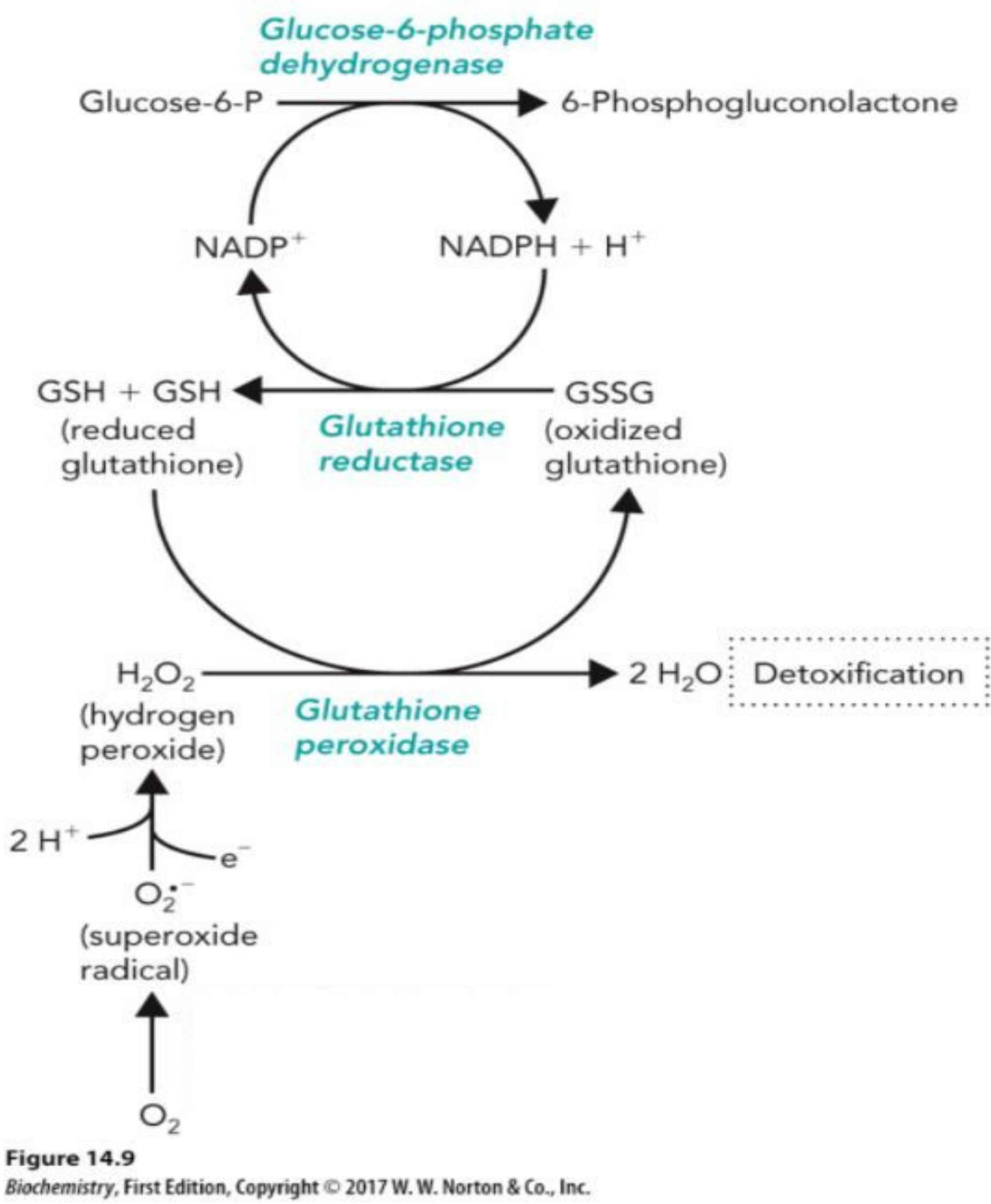
The Effects of High Glucose and Pterostilbene on the Oxidant Status of the Red Blood Cell

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Introduction

Hyperglycemia causes an increase in reactive oxygen species (ROS), leading to oxidative stress, which can lead to cell damage.¹ The pentose phosphate pathway is a way to regulate the amount of ROS in the body. Glucose-6-phosphate dehydrogenase (G6PD) is the rate-limiting enzyme in the pentose phosphate pathway, however it has been shown to have reduced activity in high-glucose conditions. Glutathione (GSH) is an antioxidant in the pentose phosphate pathway that is directly tied to G6PD activity. Previously, we have shown that addition of pterostilbene increases G6PD activity through an unknown mechanism.²



Aim

Create a reproducible procedure for determining the effect of pterostilbene on G6PD activity and GSH levels under high glucose conditions.

Methods and Materials

- Purified bovine erythrocytes using 5.5mM and 25mM glucose Ringer's buffer representing normal and high glucose conditions respectively.
- A total of four sample sets were incubated in either normal (5.5 mM) or high (25 mM) glucose conditions with methanol or 12.5 μ M pterostilbene (added twice daily) for 48 hours.
- Assays were run to determine levels of G6PD and GSH.

Results

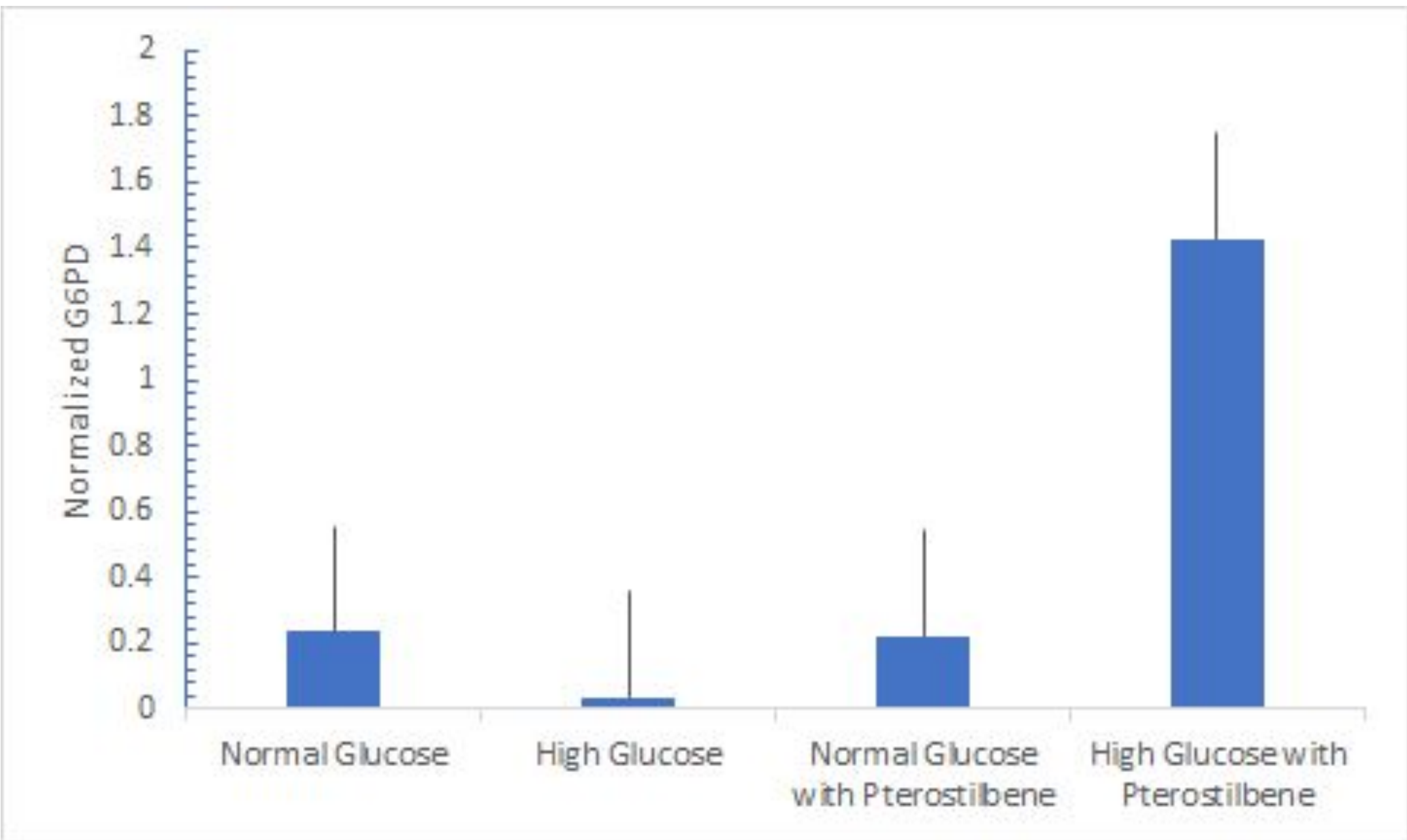


Figure 1: Normalized specific activity of G6PD after 48 hour incubation in 5.5 mM (low) 25 mM (high) glucose conditions (n=4, p<0.01)

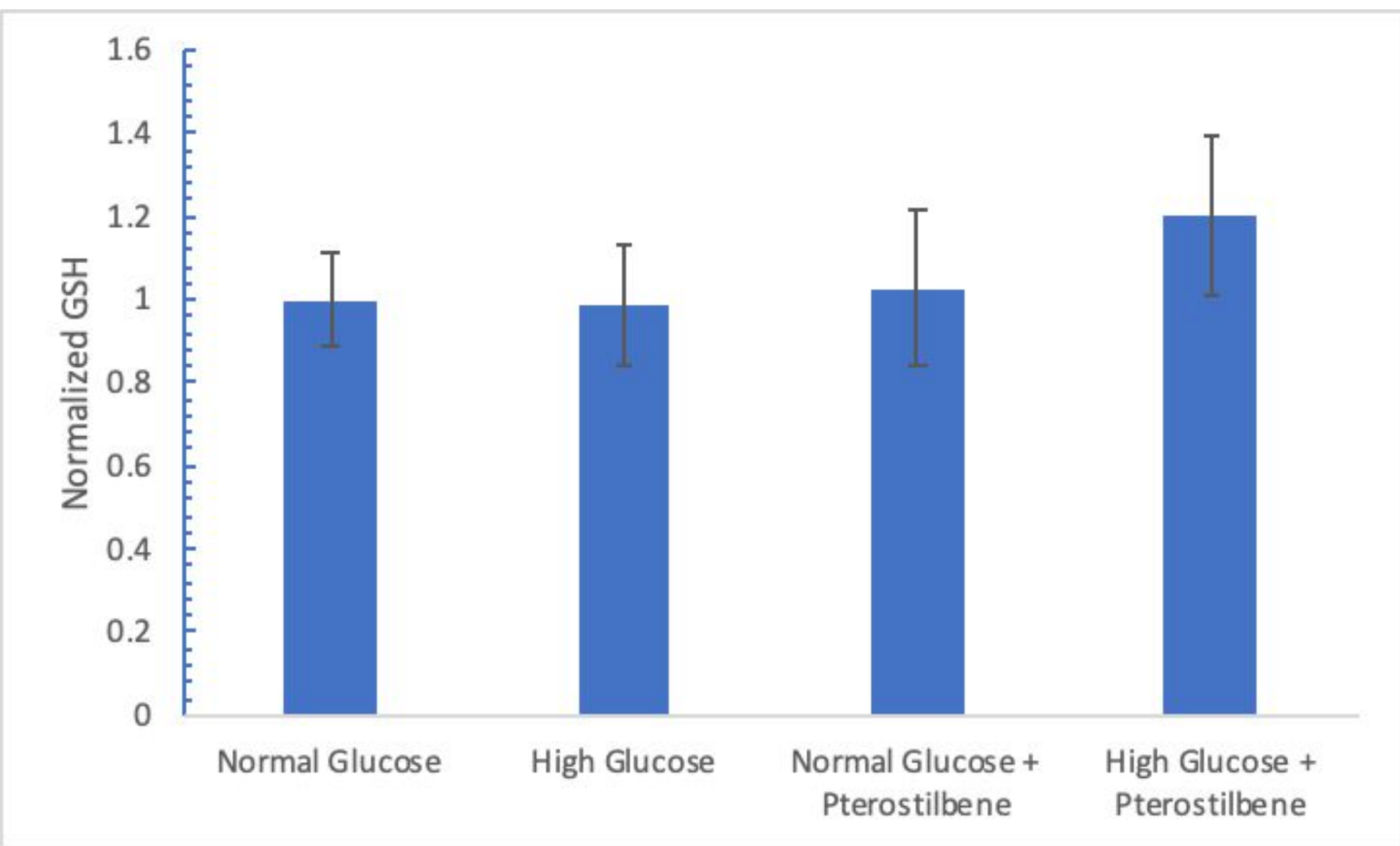


Figure 2: Normalized concentration of GSH after 48 hour incubation in 5.5 mM (low) 25 mM (high) glucose conditions (n=4, no p-value)

Conclusion

The results showed that activity of G6PD and levels of GSH increased upon addition of pterostilbene. This could indicate the potential use of pterostilbene as a therapeutic for diabetes.

Future Research

- Increase reproducibility
- Determine the molecular mechanism of pterostilbene effect on GSH and G6PD activity in erythrocytes
- Run trials with increasing amounts of pterostilbene
- Increase sample set size

References

1. Zang, Z., Apse, K., Pang, J., & Stanton, R. C. (2000). High glucose inhibits glucose-6-phosphate dehydrogenase via cAMP in aortic endothelial cells. *The Journal of Biological Chemistry*, 275(51), 40042-40047. Doi: 10.1074/jbc.M007505200
2. Richins, M., & Meyer, J. (2018). Pterostilbene Ameliorates Lipid Peroxidation and Increases Glucose-6-Phosphate Dehydrogenase Activity in Erythrocytes Subjected to High Glucose Conditions. *American Heart Association Journals*, 138.

Acknowledgements

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