

The Effects of a Low or High Fat Diet That Determines the Outcome of Diabetes

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Abstract

About 1 in 10 Americans have diabetes and about 90–95% of those with diabetes have Type II diabetes (CDC). We wanted to look at the effects of diet, sex, and genes to determine if they play a significant role in Type II diabetes. We performed a glucose tolerance test injected the F34 LG,SM advanced intercross line. We found that determined that these factors play a role in having Type II diabetes.

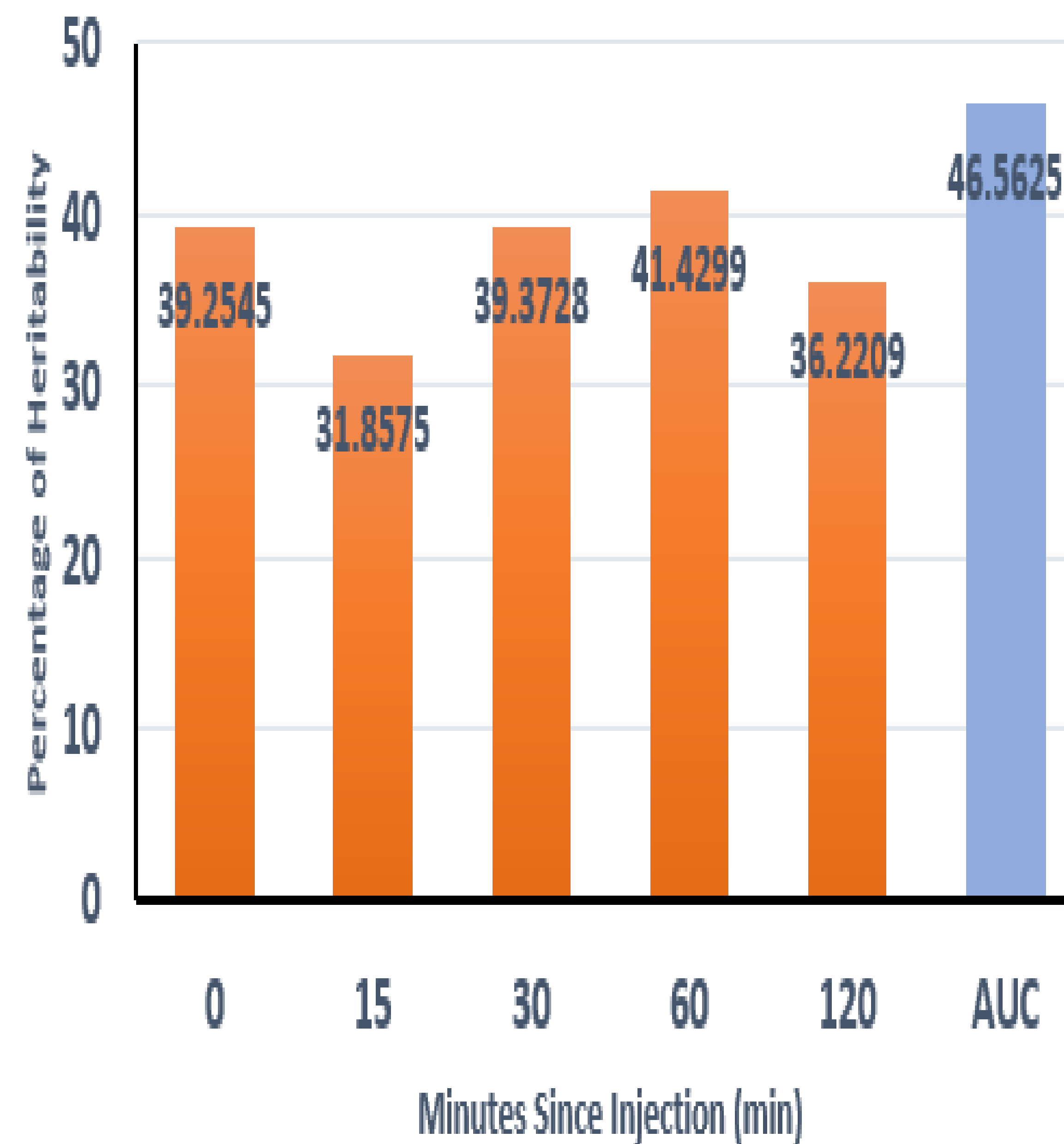
Methodology

We used mouse models because we can reliably manipulate their diets, the offspring are abundant in number, and the genetics of the mouse is similar in some respects to humans. We injected mice with glucose at 17 weeks of age after recording a baseline glucose level for each of 835 animals. Glucose readings were taken at 15, 30, 60, and 120 minutes after injection. Data was analyzed using MANOVA with glucose readings as the dependent variable and sex, diet, and family as independent variables. Twice the between family variance is a measure of the genetic variation among individuals.

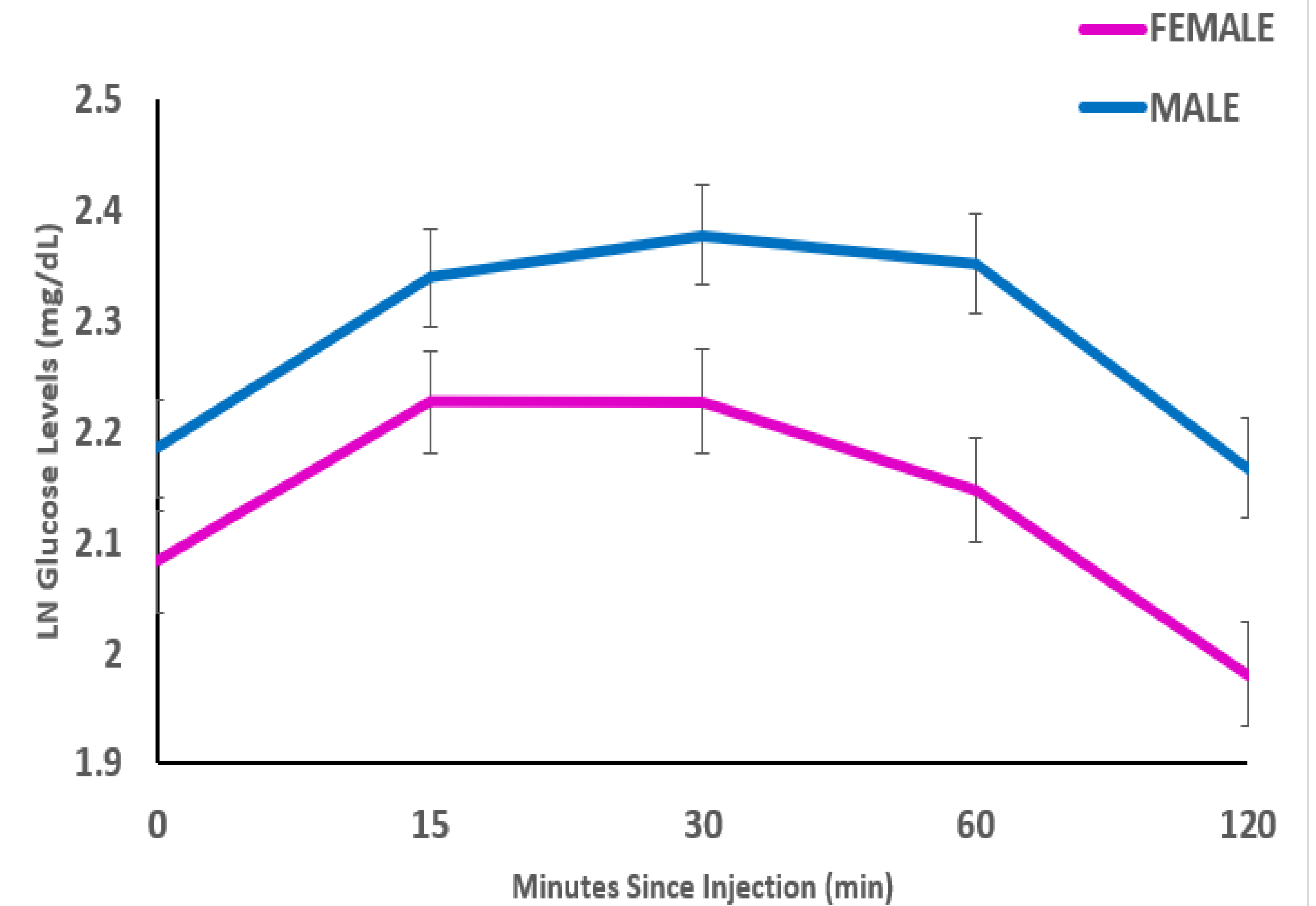
Conclusion

We found that sex, diet, and genes all have significant effects on the results of the glucose tolerance effects. Males had 42% larger glucose readings than females (see upper right) and high fat fed animals had 23% higher glucose levels than low fat fed animals (see lower right). For each trait, differences between the sexes and diets are strongest @ 15 and 30 minutes. The heritabilities of glucose levels vary around 40% so, with sexes and diets, 40% of the differences among individuals is due to genes. There are also high genetic correlations between the different time points of the test, averaging 0.79. Correlations between adjacent time points are higher (0.87), while those separated in time are lower (0.73).

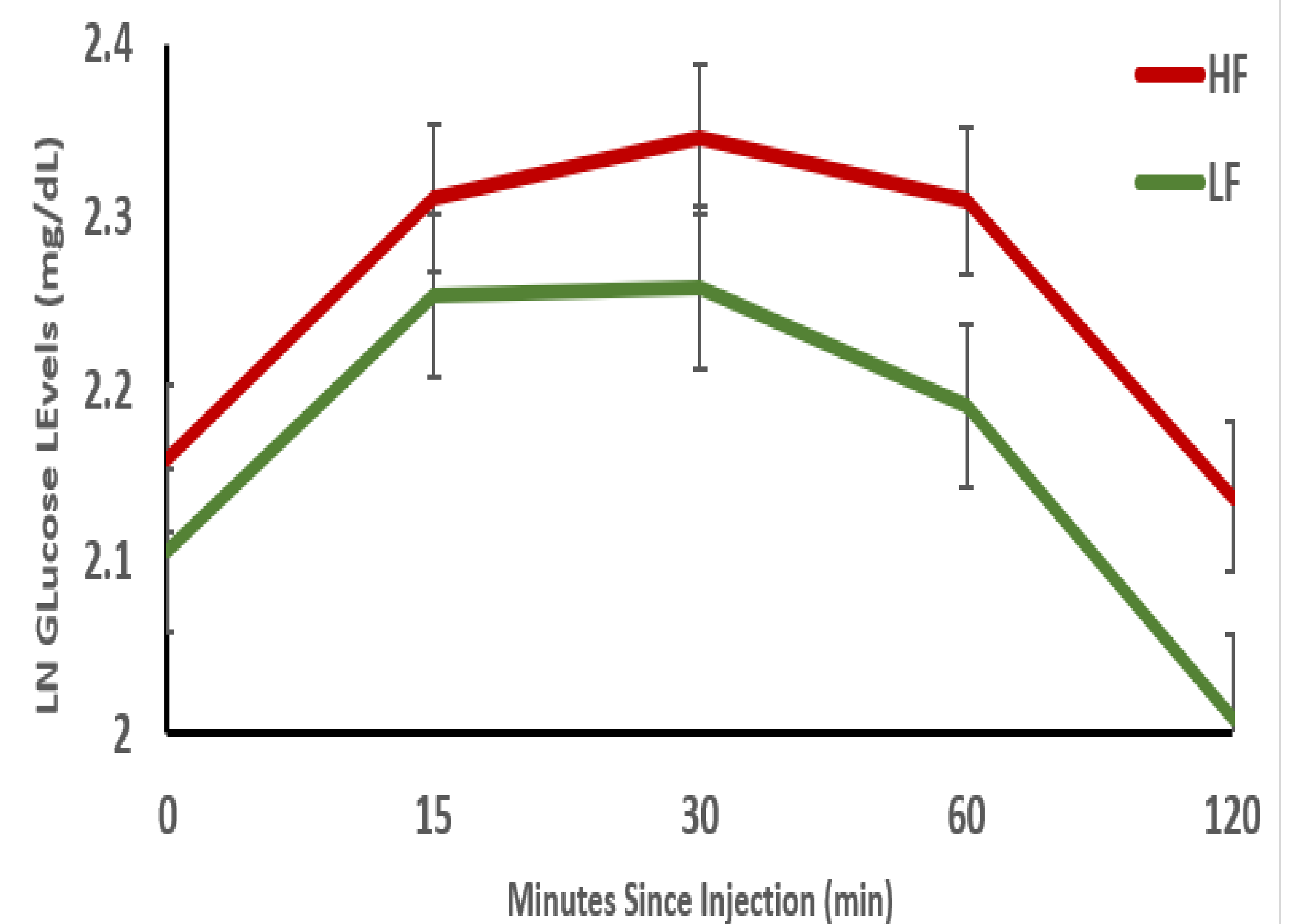
Percent Effect of Heritability on Glucose Levels



Glucose Levels Between Different Sexes



Glucose Levels Between Different Diets



| | G0 | G15 | G30 | G60 | G120 |
|------|----------|----------|----------|---------|------|
| G0 | 1 | | | | |
| G15 | 0.514346 | 1 | | | |
| G30 | 0.492381 | 0.714001 | 1 | | |
| G60 | 0.467079 | 0.644384 | 0.771711 | 1 | |
| G120 | 0.422389 | 0.47598 | 0.540954 | 0.67069 | 1 |

Bibliography

“Type 2 Diabetes.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 18 Apr. 2023, www.cdc.gov/diabetes/basics/type2.html#print.