

# Dietary-Induced Obesity and Gluconeogenic Gene Expression in Mice

Kelly Healey

Advisor: Dr. T.H. Reynolds

## Abstract

**INTRODUCTION:** More than two in five Americans are obese. Obesity increases the risk of developing several diseases such as diabetes, cancer, and cardiovascular disease. Obesity is highly associated with high levels of insulin and glucagon, indicating a resistance to both hormones. **Purpose:** to assess if gluconeogenesis and gluconeogenic gene expression is increased in obesity. It was hypothesized that gluconeogenesis and gluconeogenic gene expression would be increased in obesity. **Methods:** 18 C57BL/6 male mice were recruited and randomly assigned to a low- (n=8) or high-fat (n=10) diet for 20 weeks. The low-fat diet (LFD) mice were given a normal chow composed of 10% fat, and the high-fat diet (HFD) mice were given a Western diet composed of 40% fat. Body composition was assessed by magnetic resonance imaging and gluconeogenesis was assessed by pyruvate tolerance testing. Real-Time Quantitative PCR was performed to assess the gene expression for pyruvate carboxylase (PCX), phosphoenolpyruvate carboxykinase (PCK1, and glucose-6-phosphatase (G6Pase). **Results:** Body weight and body fat were significantly higher in the HFD ( $p < 0.0001$ ,  $p < 0.0001$ ). Lean body mass was significantly higher in the LFD ( $p = 0.0093$ ). Pyruvate tolerance testing was significantly higher in the HFD than the LFD at 60 minutes ( $p = 0.0368$ ). No significant differences in PCX and PCK1 gene expression were observed between HFD and LFD mice; however, G6Pase gene expression was found to be significantly higher in the mice fed a LFD ( $p = 0.05$ ). **Conclusion:** It was concluded that gluconeogenesis is increased in obesity and that the increase in gluconeogenesis is not associated with increases in gluconeogenic gene expression.