



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Ann Kim	Project Number S0412
Project Title The Effects of Glucose on Insulin Receptor Protein Production	
Abstract Objectives/Goals The projects objective is to investigate the effects of increased glucose levels on the insulin receptor protein production in tilapia (<i>Oreochromis mossambicus</i>). Fish generally exhibit an impaired ability to up-take glucose, much like humans with type 2 diabetes. It has been shown that plasma insulin levels do increase in fish following a glucose injection. Fish possess many similar physiological characteristics to mammalian metabolism; therefore fish are an ideal model to study vertebrate glucose metabolism. For my project, seven fish were injected with glucose and seven fish were injected with saline (control). Liver tissues were collected four hours post injection to measure the amount of insulin receptor protein. Due to the observation that increased levels of glucose stimulates insulin release, I hypothesize that, in turn, glucose treatment will increase insulin-receptor protein production in tilapia liver cells. Methods/Materials SDS-PAGE was run, Western blot performed. Transfer proteins onto nitrocellulose membrane. After transfer, expose to primary antibodies (1:200). Leave overnight. Expose to secondary antibodies (1:20,000). Expose to ECL (enhanced chemiluminescence). Take picture Results Glucose treatment significantly elevated liver insulin receptor-b protein levels. Nevertheless, Glucose treatment significantly elevated plasma glucose. Insulin receptor-b antibody validation: Tissue homogenates were separated by SDS-PAGE and transferred to nitrocellulose membrane. Blot was probed with a human insulin receptor-b antibody at a 1:200 dilution. To validate the specificity of the antibody; the human insulin-b antibody was pre-absorbed with five-fold by weight excess of the insulin receptor-b blocking protein. Conclusions/Discussion After four hours, blood glucose levels remain high confirming the problem of glucose up-take. My hypothesis was supported. It can be seen that the insulin receptor protein concentration from glucose is 1.6X higher than the concentration from saline. Since there was an increase in IR proteins from the glucose injection, it should directly correlate with less plasma glucose. Nevertheless, four hours post injection plasma glucose levels remain significantly high. Thus, the amount of insulin receptor proteins present is not the contributing problem to glucose uptake in Tilapia liver cells.	
Summary Statement Increasing Insulin Receptor protein production by elevating glucose levels in Tilapia for therapeutic effects to treating type 2 diabetes.	
Help Received Used lab equipment and help with experimental design from Dr. Larry Riley, mother helped make project board.	