Mammals regulate homeostasis through numerous biochemical pathways\textsuperscript{1}. When homeostasis cannot be maintained, diseases such as diabetes can develop. Diabetes is the leading cause of kidney disease in the western world and can be presented as either Type 1 or Type 2 Diabetes Mellitus. \textit{Drosophila melanogaster} is an animal that struggles to achieve homeostatic nutrient levels during larval development\textsuperscript{2}. Previous research has shown that a key hormonal pathway responsible for regulating nutrient levels is insulin signaling\textsuperscript{4}. Research has also shown that both mammals and \textit{D. melanogaster} are able to regulate nutrient levels not only during periods of starvation, but also during periods of excess feeding\textsuperscript{5}. We hypothesize that matrix-metalloproteinase (\textit{MMP2}) is the gene responsible for inhibiting insulin-signaling in the fat body of \textit{D. melanogaster}. To test this hypothesis, we compared the expression of the \textit{MMP2} gene in \textit{D. melanogaster} larvae in starved and fed groups. Fat body tissue samples were harvested from each group of animals. mRNA was isolated and converted to cDNA. RT-PCR was used to analyze the expression of the \textit{MMP2} gene. Quantitative PCR (qPCR) was then used to quantify the expression of \textit{MMP2}. This work will allow us to determine the impact of starvation on insulin-signaling during larval development, and the role that \textit{MMP2} plays in this process. The data will serve as a reference for understanding the genetic pathways that may lead to diabetes in humans.