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Why Do People Become Diabetic? – The link between Obesity and Diabetes

Relevance of Study: In 2004, 171 million people globally were living with diabetes and at the time it was estimated that this number would increase to 366 million by 2030 [1]. However, in 2014 the World Health Organization released a study that showed 422 million people were living with illness, far surpassing the 2004 prediction [2]. Considering the rapid increase in cases of diabetes, and that Type II Diabetes (T2D) accounts for 95% of all diagnoses, the development of models that can increase understanding of T2D is essential [2].

Introduction: T2D is characterized by reduced insulin sensitivity and increased circulating glucose, but the cause of T2D remains unclear [3]. We hypothesized that fat content influences the development of T2D. Gustatory receptors have recently been discovered to be present not only in the oral tissues where they provide the sense of taste, but also in the digestive and respiratory tracts where they have multiple tissue specific roles [4,5]. We discovered that gustatory receptor 47b (*Gr47b*) regulates body fat levels [6]. Reduced *Gr47b* expression decreased fat content while overexpression increases fat content. Thus, we will test whether varying body fat levels contribute to blood sugar levels using *Gr47b* fruit fly models.

Methods: Using mutant *Drosophila* flies generated by the UAS/Gal-4 system, *Gr47b* was overexpressed and knocked down in the adipose tissue. Using colorimetric assays, the sugar levels in the mutants were compared to control flies to determine their relative glucose levels. Further, we measured their expression of metabolically involved genes.

Results: The *Gr47b* KD flies exhibited both decreased fat content and decreased glucose levels. The *Gr47b* OE flies showed an increase in fat content. Expression of pdk was increased in OE flies and decreased in KD flies. PEPCK1 expression was increased in KD and OE flies.

Conclusion: Our findings suggest that low body fat is connected to low blood sugar levels. Further research on *Gr47b* should be conducted to uncover the mechanisms by which fat and glucose contents are regulated. We are currently analyzing the expression of genes in the biological pathways controlling fat and glucose metabolism using our Gr47b mutant flies.

References

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