OFFICIAL ABSTRACT and CERTIFICATION

The Effects of Chronic Insulin Exposure on Triglyceride Transfer Protein Activity and Expression in Adipocytes

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According to the CDC, 93.3 million US adults are living with obesity and are experiecing obesity-related conditions, including Type 2 Diabetes. More than 100 million US adults are now living with diabetes or prediabetes. Diabetes is a disease in which the body cannot produce a sufficient amount of the hormone insulin, resulting in elevated levels of glucose in the blood. Insulin resistance has become a major risk factor for type 2 diabetes. Glucose homeostasis is mainly regulated by liver, muscle and adipose tissue. Insulin resistance in adipose tissue alone is detrimental for the whole body. Since microsomal triglyceride transfer protein (MTP) is present in both white and brown adipocytes and is a lipid transfer protein, 3T3-L1 adipocytes were used to see the relationship between insulin resistant adipocytes and MTP. After a cell culture was done, the 3T3-L1 cells were differentiated into adipocytes. Subsequently, the adipocytes were subjected to chronic insulin exposure (CIE) and given 500 pM of insulin for 72 hours which resulted in increased lipid droplet size and accumulation. This increase in size of lipid droplets are common risk factors for insulin resistance. An MTP Assay was then done to identify MTP activity and MTP expression at an RNA level. The results indicated a decrease in MTP activity due to a decrease in MTP expression under chronic insulin conditions.
It is rational to suggest MTP expression and activity play a critical role in adipocyte insulin resistance. Further research is required to find out the mechanism by which insulin resistance regulates the expression of MTP. The experimental results suggest that MTP can be a potential therapeutic target for insulin resistance.

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