Linking Diabetes and Depression Through BDNF and Myeloperoxidase

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ABSTRACT

Diabetes-induced depression has become an important point of research as a difference between the rate of depression in diabetics and “healthy” people has become apparent. The point of concern is the idea that diabetics may have a physiological difference that makes them more susceptible to depression. Two biomarkers that have been found to be consistent with depression and diabetes in separate studies are Brain Derived Neurotrophic Factor (BDNF) and Myeloperoxidase (MPO). These will be tested for in participants through two groups, which will consist of a “non-depressed” group and a depressed group according to their responses to the questions of the Beck Depression Inventory Questionnaire (BDIQ), which scores the level of depression. Between both groups, diabetic participants (with an A1C >5.7%) will be dispersed into either group depending on their BDIQ answers. These two groups will be compared for any correlation between the values of BDNF, MPO, A1C, and BDIQ. BDNF and MPO will also be measured through participants’ blood samples to look for physiological signs of depression, which may or may not be correlated to the severity of diabetes. This research strives to find a correlation between these two diseases, which may lead to advances in treatment of both diabetics and those with depression.

INTRODUCTION

BDNF is a protein that acts on neurons, vital in the process of communication in the brain, within the central nervous system (CNS) and the peripheral nervous system (PNS). Its purpose is to support the survival of neurons and stimulate the growth and differentiation of new neurons and synapses in the brain. Depression has been shown to decrease the expression of BDNF, which can lead to atrophy of the hippocampus, a part of the brain thought to regulate emotion, memory, and other functions of the body that we do not voluntarily control. It has also been shown that those who have been diagnosed with diabetes have expressed lower amounts of BDNF and other studies have suggested that BDNF may play a role in insulin resistance, a common issue for those with Type 2 diabetes or adult onset Type 1 diabetes, where cells do not respond correctly to insulin, a hormone that plays a major role in the body’s process of blood sugar regulation.

The next biomarker, MPO is an enzyme that is found abundantly in white blood cells, a part of the immune system that is responsible for protecting the body against foreign invaders, and is found to be an important inflammatory enzyme in depression. In various studies it was found that those who were part of the depressed population had significantly higher levels of MPO. It has also been found that higher levels of activation of MPO in adipose tissue has played a part in obesity and insulin resistance, and thus diabetes.

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