

Diabetes and cognitive decline

According to the American Diabetes Association, 27 percent of people age 65 and older in the United States have diabetes and about half have prediabetes. Numerous studies have found that individuals with diabetes, especially type 2 diabetes, have a lower level of cognitive function and are at higher risk for dementia than individuals without diabetes. The studies discussed below provide additional evidence supporting the recommendation that a healthy lifestyle to reduce risk from heart disease and diabetes may also help prevent Alzheimer's disease.

Study results presented at the Alzheimer's Association International Conference® 2015 (AAIC®) showed that people with type 1 diabetes were more likely to get dementia than people without diabetes. This study followed the health histories of nearly 500,000 people over age 60 with no prior dementia, tracking them over 12 years for new dementia diagnoses. The participants included 334 individuals who had type 1 diabetes. According to the study's results, type 1 diabetics were 93 percent more likely to get dementia (73 percent after adjustment for heart health risk factors) compared with people without diabetes.

In the October 2013 issue of the *Journal of Alzheimer's Disease*, researchers reported a strong correlation between Alzheimer's disease and high blood sugar levels. The study found that people with high blood sugar levels, such as those linked with type 2 diabetes, had a dramatic increase in beta-amyloid protein, a protein toxic to cells in the brain.

A study published in the July 2013 issue of *Alzheimer's & Dementia®: The Journal of the Alzheimer's Association* was the first to show that people in the early stages of type 2 diabetes have signs of brain dysfunction. Study participants showed high levels of insulin resistance in the brain and a reduced ability to use glucose to fuel normal brain function.

Research presented at AAIC 2013 showed that a diabetes drug may be associated with reduced risk of dementia. In a study of nearly 15,000 people with type 2 diabetes who were age 55 and older, those who took metformin, an insulin sensitizer, had a significantly reduced risk of developing dementia compared with people who took other standard diabetes therapies. Further research is being conducted to evaluate metformin as a potential therapy for dementia and mild cognitive impairment.

In another study reported in the June 2012 issue of the journal *Genetics*, researchers found that the amyloid precursor protein gene, known to be involved in some cases of Alzheimer's, affects the insulin pathway. Disruption of this pathway is a hallmark of diabetes. The finding could point to a therapeutic target for both diseases.

A study published in *Diabetologia* in 2007 reported that the early effects of diabetes on the brain were related to levels of a blood protein called hemoglobin A1C (HbA_{1C}). The HbA_{1C} blood test provides a snapshot of how well blood sugars have been managed in the past two to three months. The researchers tested memory, attention and other cognitive skills of people with diabetes and compared the results to healthy subjects without diabetes. They found that even people who had diabetes for less than 10 years had deficits in memory function typically associated with a brain region called the hippocampus. Using brain imaging techniques, they found that people with diabetes had smaller hippocampal sizes than people without diabetes. They also discovered that the decreases in hippocampal size were correlated to HbA_{1C} blood levels, suggesting that HbA_{1C} could be used to indicate hippocampal function and/or the onset of memory loss.

In a study published in the June 2013 edition of *Diabetes Care*, researchers examining the relationship between type 2 diabetes and cognitive function followed 1,290 people for 12 years, collecting cognitive measures at baseline, six years and 12 years. Even when correcting for factors such as age, gender and alcohol consumption, subjects who had diabetes at the start of the study performed worse on all cognitive measures and showed a decline in executive function four times greater than those without diabetes. Additional analyses using data from people who were healthy at the start but later developed diabetes by the either the six-year or 12-year follow-up found that these individuals showed a decrease in information processing speed. In sum, individuals with type 2 diabetes show accelerated cognitive decline, specifically in executive function and information-processing speed and executive function.

TS-0037 | Updated March 2017