Intensive Treatment of Diabetes Does Not Impair Cognitive Functioning

During the landmark Diabetes Control and Complications Trial (DCCT), physicians were concerned that episodes of hypoglycemia could adversely affect the brain and impair cognitive function. In this trial, subjects with type 1 diabetes were randomized to either an intensive treatment group or a conventional treatment arm. The fear was that by aggressively treating hyperglycemia, additional episodes of hypoglycemia would occur and have adverse consequences. Indeed, subjects who kept their blood glucose in tight control during the study had three times the risk of experiencing hypoglycemia. At the end of the DCCT, there were no differences in cognition between intensive and conventionally treated patients, and no effects of recurrent hypoglycemic events on cognition (*Ann Int Med* 1996; 124(4):379-88).

However, since the DCCT trial was relatively short (6.5 years), a decision was made to follow the participants for a longer period of time. Cognitive testing was therefore repeated 18 years after study subjects entered the DCCT, in approximately 75% of the original DCCT participants. The test battery was identical to that of the DCCT and organized into the same 8 cognitive domains, allowing for a clean comparison to the earlier data. The 8 cognitive domains that were measured included problem solving, learning, immediate memory, delayed recall, spatial information processing, attention, psychomotor efficiency, and motor speed. Glucose was measured during the 4-5 hours of testing to make sure participants were not experiencing hypoglycemia. Severe hypoglycemic events were defined as ones leading to seizure or coma. Adjustments were made for age, gender, years of education, length of follow-up, and number of interval cognitive tests taken (to control for practice effects).

The study's principal investigator, Alan Jacobson, MD of Harvard University, gave an overview of the cognitive testing results from this cohort. A total of 1,136 subjects were tested, 583 from the intensive treatment group and 553 in the conventional treatment group. There were no differences between groups in duration of diabetes, HbA1c values, cholesterol levels, blood pressure, or IQ. The intensive treatment group had 880 episodes of hypoglycemia in 258 patients, and the conventional treatment group had 452 events in 187 patients. When analyzing the cognitive testing results, delayed recall, spatial information, and psychomotor efficiency displayed modest changes, less than 1/3 of a standard deviation. There were no differences between groups on any of the 8 domains.

"Neither prior treatment group assignment nor exposure to recurrent severe hypoglycemia led to decreases in cognitive functioning on any of the eight domains," said Dr. Jacobson. "While acute episodes of hypoglycemia can impair thinking and can even be life-threatening, patients with type 1 diabetes do not have to worry that such episodes will impair their long-term abilities to perceive, reason, and remember." He cautioned, however, that these patients were healthier than many patients with type 1 diabetes, and other patients may have worse cognitive outcomes from repeated hypoglycemia.

Highlights from the
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