

# What can clinical neuropsychology offer type II diabetes mellitus treatment management?

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In Canada, more than 9 million people have diabetes or pre-diabetes, with Type II Diabetes Mellitus (T2DM) accounting for the vast majority of diabetes cases.<sup>1</sup> Individuals with diabetes have a 1.2 to 2.3 times greater risk for Alzheimer's disease and a 2.2 to 3.4 times greater risk for vascular dementia than non-diabetics.<sup>2</sup> Further, it has been estimated that 7 to 13% of all cases of dementia can be directly attributed to diabetes.<sup>3</sup> Proper diabetes treatment and management may, therefore, contribute to a reduction in risk of dementia in T2DM. For example, Cosway et al.<sup>4</sup> demonstrated that individuals with well-managed diabetes did not significantly differ from non-diabetic controls in their cognitive functioning.

Unfortunately, diabetes treatment and management regimens are often complex and cognitively demanding. As such, many individuals with T2DM cannot effectively manage their treatment regimens, leading to poor treatment adherence.<sup>3</sup> Incorporating neuropsychological assessment and intervention strategies into T2DM management could alleviate the burden of cognitively-demanding treatment regimens, potentially resulting in a decreased risk of cognitive deficits and dementia and improved quality of life in this population. Integrated neuropsychological assessments could also facilitate identification of individuals who may present with cognitive decline indicative of early dementia.<sup>2,5</sup> Incidence of dementia begins to increase in the sixth decade of life;<sup>2</sup> thus assessments of cognitive functioning in individuals with diabetes would ideally commence at age 60.

Within the context of the individual's psychological, interpersonal, and environmental milieu,<sup>6</sup> neuropsychological assessment involves testing cognitive functions to determine an individual's cognitive strengths and weaknesses (i.e., their cognitive profile). The most crucial cognitive functions needed for effective diabetes management are memory and executive functions, which

could be measured using the Wechsler Memory Scale IV and the Delis-Kaplan Executive Function System.<sup>6</sup> Yet these functions also represent the most common and severe cognitive impairments in individuals with T2DM.<sup>3,7</sup> A recent longitudinal study found significant differences between those with T2DM and non-diabetic controls on measures of processing speed, attention, and executive functions at baseline and at follow-up four years later.<sup>8</sup>

Individuals with low-average or borderline skills in these cognitive domains could benefit from specific strategies that could be implemented to make diabetes management more feasible. For example, for individuals with poor prospective memory who do not remember to take their medication or insulin, reminders could be implemented that would work best with their lifestyles, such as an alarm on a phone or a note in a day planner. For individuals with poor planning and time-management skills, structured strategies for meal planning could be implemented to ensure that they adhere to their dietary restrictions, which is often the most difficult aspect of diabetes management for those affected. Similar cognitive and behavioural memory-related strategies have been successfully implemented with individuals with amnesic mild cognitive impairment, resulting in increased independence in daily activities in these individuals.<sup>9</sup>

In addition to addressing specific weaknesses in cognitive functioning, psychological factors, such as perceptions of self-efficacy or anxiety and depression, could be addressed, along with implementing specific strategies that minimize the cognitive demands of treatment adherence. Social supports could be maximized and small changes in the environment could also be made to minimize the cognitive demands. It is well known that individuals with cognitive deficits benefit from structured environments.<sup>10</sup> Neuropsychologists have the necessary training and skills to implement these and similar strategies. They could work alongside diabetes program educators, families and, ideally,

in conjunction with the Canadian Diabetes Association to ensure this type of integrated care is systematically provided to all individuals with diabetes.

Incorporating neuropsychological assessment of cognitive functioning in the treatment regimens of individuals with T2DM, as has been advocated, will serve two goals. First, individuals with cognitive deficits who are at risk of developing dementia could be identified early before these deficits impact their diabetes management. Implementing the above strategies may also reduce the risk of further cognitive decline and dementia among persons with T2DM, thus minimizing the cost burden on the health care system. Second, it could also serve the broader goal of individually tailoring diabetes treatment regimens to the cognitive strengths and weaknesses of the individual, while taking into consideration psychological, interpersonal, and environmental factors that influence diabetes treatment adherence. Doing this would make diabetes treatment regimens more manageable and could improve treatment adherence and quality of life in individuals with T2DM.

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Michelle Monette is completing her PhD in Clinical Psychology in the Neuropsychology track at the University of Windsor. Her research focuses on improving diabetes management by simplifying and individually tailoring treatment regimens to improve glucose levels and quality of life in individuals with diabetes. She is also researching the risk factors for cognitive decline and development of dementia in individuals with diabetes and how best to lessen the risk for cognitive decline and dementia in these individuals.