

Study links insulin resistance with language problems in women

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New research published in *Diabetologia* (the journal of the European Association for the Study of Diabetes) shows that insulin resistance—one of the hallmarks of type 2 diabetes—is associated with language problems (a lack of verbal fluency) in women, a sign of cognitive decline associated with dementia. The study, which included men and women of a range of ages, is by Dr Laura Ekblad, University of Turku and Turku University Hospital, Finland, and colleagues.

Type 2 diabetes and Alzheimer's disease are both common diseases. The number of patients suffering from these diseases continues to rise and type 2 diabetes is an [independent risk factor](#) for [cognitive decline](#) and Alzheimer's disease. Also, [insulin resistance](#) is linked to cognitive decline through different mechanisms. Insulin resistance occurring during midlife may increase the risk of cognitive decline later in life. Also, the apolipoprotein E $\epsilon 4$ allele (APOE $\epsilon 4$) is a well-known risk factor for Alzheimer's disease and for progression of impaired memory in patients with [mild cognitive impairment](#). The authors hypothesised that insulin resistance is associated with poorer cognitive performance and that gender and APOE $\epsilon 4$ may modulate this association, and tested their theory in a representative nationwide sample of the Finnish adult population with a wide age range (30-97 years).

It is common to test verbal fluency to help evaluate executive functions, language and also semantic memory. Verbal fluency is measured by a simple test; in this case, the participants were asked to name as many animals as they could during 60 seconds. The total score on the test is the

number of animals that were mentioned.

The authors found that higher insulin resistance was associated with poorer verbal fluency for women but not for men. Higher insulin resistance was also associated with poorer verbal fluency in APOEε4 negative individuals but not in APOEε4 carriers. Increased insulin resistance was also associated with a slower reaction time in the whole study group. The analysis adjusted for a wide range of previously reported [risk factors](#) for impaired cognition (such as age, years of education, metabolic risk factors).

The authors discuss that one possible reason for their findings applying to women but not men could be the gender difference previously demonstrated in lesions in the brain called white matter hyperintensities (WMH), that can be detected by brain imaging. These are more common in people with metabolic problems such as insulin resistance, and more common in women than men.

They add: "White matter lesions seem to play a role in Alzheimer's disease pathology. Therefore, the association between insulin resistance and cognitive functions could indicate that insulin resistance is a risk factor for Alzheimer's disease. This risk could be modulated by several mechanisms such as vascular damage, white matter lesions, direct mechanisms of insulin resistance on the accumulation of amyloid β-peptide, by functional changes in regional cerebral blood flow and glucose metabolism or by a combination of these processes."

The authors say: "To our knowledge, no previous studies have reported that female gender impacts the association of insulin resistance and verbal fluency in a comprehensive population-based study, which included young and middle-aged adults. Our study is cross-sectional, so causal effects of insulin resistance on cognition could not be evaluated. However, our results suggest that insulin resistance could be an early

marker for an increased risk for cognitive decline in women."

They conclude: "We show that insulin resistance is associated with poorer verbal fluency in women, which strengthens the previous findings showing that insulin has gender-specific effects on cognition. Although [verbal fluency](#) is not the most sensitive measure to identify early cognitive decline in adults, it associates well with insulin resistance for women and the brain regions that are negatively influenced by insulin resistance. Furthermore, the inclusion of young and middle-aged adults in our study suggests that the association of insulin resistance and poorer cognition is already present years before the onset of more severe cognitive defects. In the future, longitudinal studies should be conducted to explore the causal relations of insulin resistance and cognition."

Regarding the implications of the results, Dr Ekblad adds: "Our results suggest that women may be more vulnerable to the effects of insulin resistance on cognition than men. Insulin resistance can often already be detected years before the onset of type 2 diabetes. Therefore, it may be useful to draw special attention to the preventive treatment such as lifestyle interventions for women at risk for type 2 diabetes, such as those with obesity."

Provided by Diabetologia

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