

Moderate hypoglycaemia affects cognitive function in people with diabetes, irrespective of diabetes type, level of glucose control or hypoglycaemic awareness

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Background: Hypoglycaemia is the most common adverse effect in people with type 1 or type 2 diabetes treated with insulin and creates an immediate threat for brain function. While it is evident that hypoglycaemia causes cognitive dysfunction, it is unclear how this is affected by factors like diabetes type, age, prior hypoglycaemic exposure or glycaemic control.

Methods: Adults with type 1 diabetes, type 2 diabetes treated with insulin, and non-diabetic individuals (matched on age, sex and BMI) were recruited to undergo a hyperinsulinaemic-hypoglycaemic glucose clamp (nadir 2.8mmol/l). During baseline and hypoglycaemia, cognitive function was measured with the Paced Auditory Serial Addition Test (PASAT) and the Test of Attentional Performance (TAP; Alertness, Working memory). Paired t-tests were used to compare data obtained during baseline and hypoglycaemia.

Results: An interim analysis was performed on the data of 29 participants with type 1 diabetes, 8 participants with type 2 diabetes and 23 controls (n=60 in total). For the total sample, with PASAT, the proportion of correct answers was 66±17% during baseline versus 62±17% during hypoglycaemia (p=0.001). On the TAP subtest Alertness, mean (±SD) reaction times increased from 291±77ms during baseline to 316±84ms during hypoglycaemia (p=0.010). On TAP working memory, a combination of the mean omissions and errors is increased from 4.9±5.1 to 6.7±7.7 (p=0.002) baseline and hypoglycaemia, respectively. Hypoglycaemia-induced cognitive declines were seen in all subgroups and were not modified by the level of hypoglycaemic awareness or glucose control.

Discussion/Conclusion: Based on these pre-liminary data, moderate hypoglycaemia results in a decline in auditory information processing speed, reaction time, and working memory that appears consistent in people with diabetes irrespective of diabetes type or glycaemic parameters, and people without diabetes.