

Effects of AGEs on the rat neuronal cells in the intrauterine hyperglycaemic environment.

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OBJECTIVE: The incidence of Alzheimer-type dementia has been reported to be higher in patients with diabetes. Recently, excessive glycation (Advanced glycation end-products; AGEs) of neuronal proteins by hyperglycemia is considered as risk factor for Alzheimer-type dementia. The intrauterine hyperglycaemia during pregnancy has various effects on foetal development. Therefore, we examined the effect of excessive glycation in the neuronal cells by the intrauterine hyperglycaemic environment during foetal brain development.

METHODS: We analysed the AGEs and Akt related signalling of neuronal cells of infant of diabetic mother rat (IDMs). In addition, we examined the effects of high glucose culture medium on the rat PC12 cells.

RESULTS: In the brains of IDMs, AGEs were 1.3 times higher than that in controls, and Akt phosphorylation was 0.78 times lower. The AGEs of PC-12 cells cultured in high-glucose medium was 3.3 times higher and Akt phosphorylation was 0.59 times lower than that in cells cultured in low-glucose medium. Furthermore, apoptosis was enhanced in the high glucose medium.

CONCLUSION: We have shown that a hyperglycemia promotes excessive protein glycation in neuronal cells and may be more likely to degenerate of neuronal protein, the possibility of linked to increased Alzheimer's risk in the long-term.