Abstract


Cross-talk of vitamin D and glucocorticoids in hippocampal cells.

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BACKGROUND: There is growing evidence for a role of vitamin D3 signalling in the brain.

OBJECTIVE AND METHODS: In this study, we investigated the influence of vitamin D3, in combination with glucocorticoids, on differentiation of the hippocampal progenitor line HIB5, as well as survival of rat primary hippocampal cells.

RESULTS: In HIB5, pre-treatment with dexamethasone (Dex) alone inhibited neurite outgrowth and abolished activation of the mitogen-activated protein kinase (MAPK) pathway during platelet-derived growth factor (PDGF)-induced differentiation, consistent with previous findings. Interestingly, pre-treating HIB5 with vitamin D3 significantly reduced these effects of Dex and, in addition, lowered the transactivational function of the glucocorticoid receptor (GR) in transient reporter gene assays. A further impact of vitamin D3 on glucocorticoid effects was observed in a rat primary hippocampal culture known to be particularly sensitive to prolonged GR activation. In this model, Dex induced considerable cell death after 72 h of exposure in vitro. However, 24 h of pre-treatment with low doses of vitamin D3 substantially reduced the degree of Dex-induced apoptosis in primary hippocampal cells.

CONCLUSION: Taken together, our experiments demonstrate a cross-talk between vitamin D3 and glucocorticoids in two hippocampal models, a feature that may have important implications in disorders with dysregulated glucocorticoid signalling, including major depression.

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