

# Abstract

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## 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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