Opposite effects of dexamethasone and retinoic acid on neuronal actin cytoskeleton

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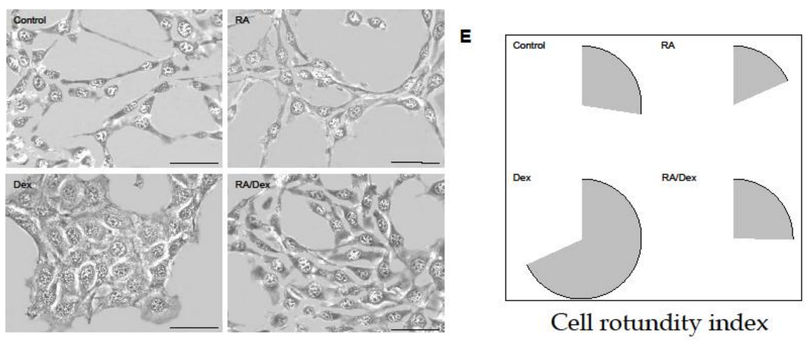
Introduction and objectives

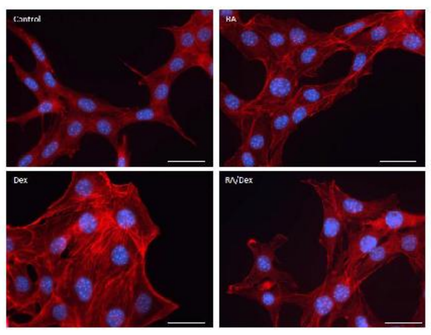
Retinoic acid (RA) implication is crucial in adult brain through its involvement in cellular and synaptic plasticity process [1]. By contrast, glucocorticoids (GC) impair synaptic plasticity [2]. **We questioned the influence of RA and Dex on hippocampal HT-22 cell line morphology** *via* the modulation of F-actin cytoskeleton organization and the implication of calpain system.

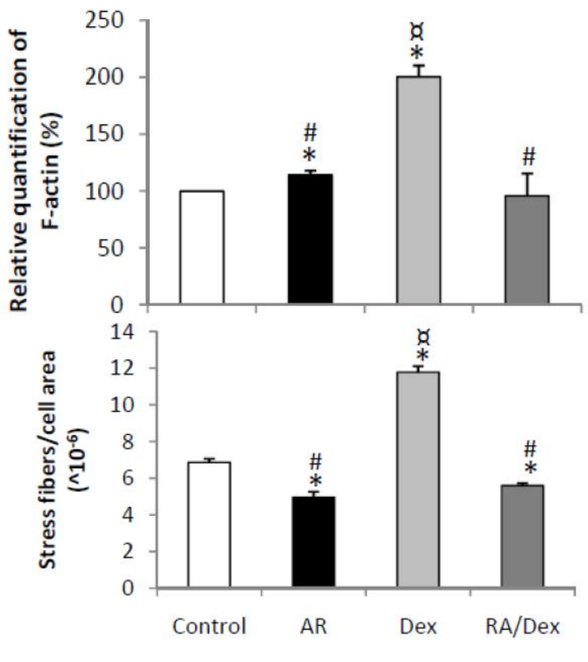
Methods: HT22 hippocampal murine cells were grown 4d with vehicule, RA, Dex or RA/Dex at 10^{-6} M. After treatment with or without calpeptin, the cells were fixed and their morphologies were observed in phase contrast. F-actin was stained with phalloidin-FITC (0.5 µM) and nucleus with DAPI (1.5 µg/ml) for 40 min. The cells were observed using an epifluorescence microscope. Calpain activity was quantified *in vitro* with the Abcam kit. p44/42 MAPK (ERK1/2) antibody were provided by Cell Signaling Biotechnology

Results

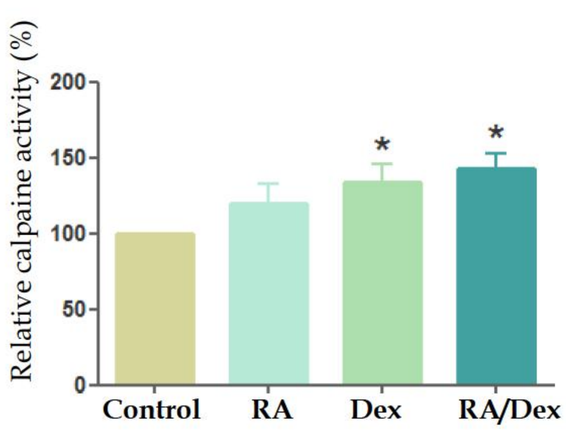
1 RA and Dex have opposite effect on cell morphology modifying F-actin and stress fibres of the cytoskeleton

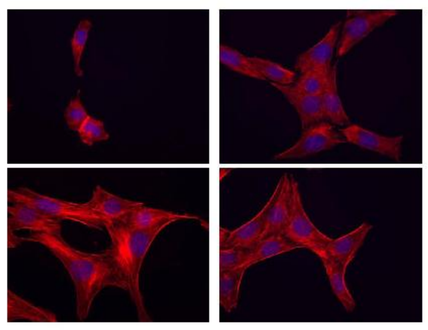


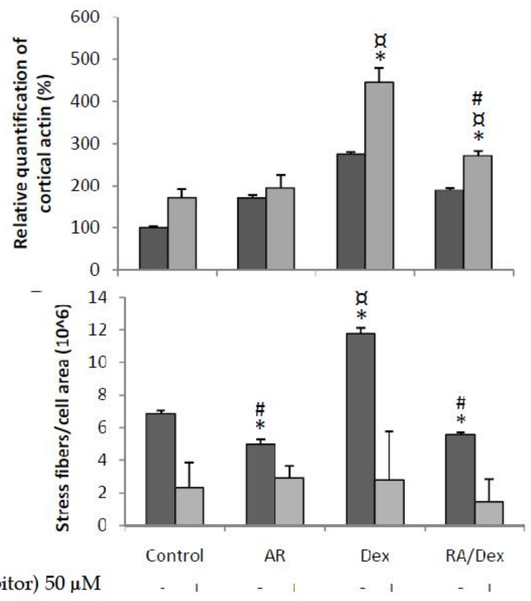




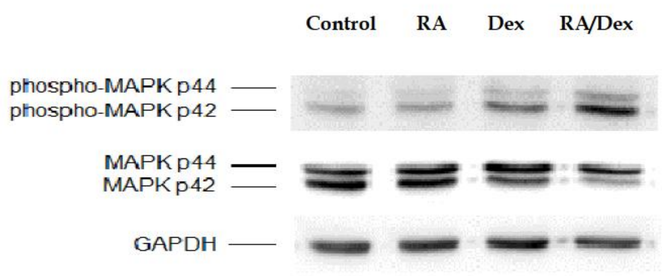
2 RA and Dex effects on stress fibres but not F-actin is linked with the modification of calpain activity

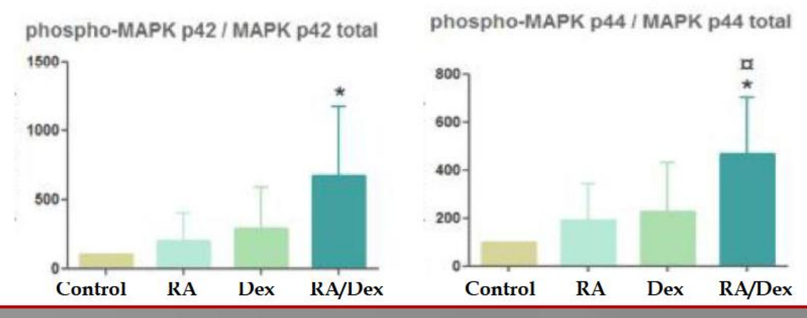






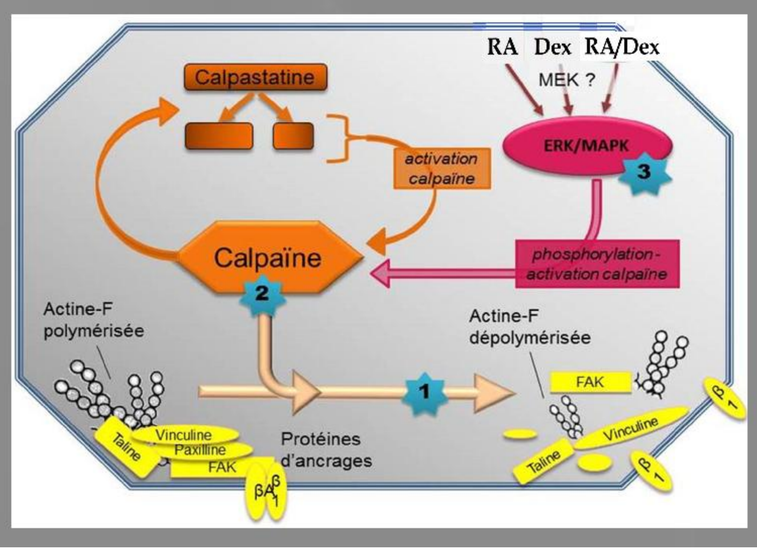
3 RA and Dex interact on phospho- and total- MAPK p42/44





Conclusion

From these data, we propose the following mechanism:
RA and Dex modify calpain activity *via* a modification of the ERK/MAPK pathway. This could explain RA and Dex effects on stress fibres because of the implication of calpain activity in the polymerisation of the cytoskeleton



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1-Lane, M.A. and S.J. Bailey, *Role of retinoid signalling in the adult brain.* Prog Neurobiol, 2005

2-Alfarez, D.N., et al., *Corticosterone and stress reduce synaptic potentiation in mouse hippocampal slices with mild stimulation.* Neuroscience, 2002

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