11 β-Hydroxysteroid-Deshydrogenase Activity in HT22 Neuronal and BV2 Glial Cell Lines

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Introduction and objectives

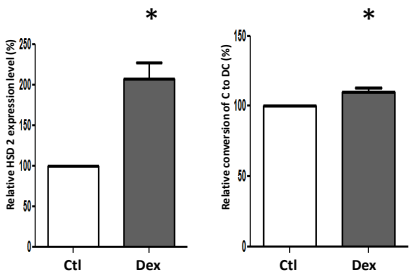
Glucocorticoids (GC) are hormones secreted by the adrenal glands in response to the perception of the homeostasis perturbation, also called stress. The bioavailability of GC is conditioned, at least in part, by the intra-cellular activity of 2 enzymes: 11β-hydroxysteroid-deshydrogenase type 1 and 2 (HSD 1 and 2) which convert active GC (cortisol or corticosterone) in inactive GC (cortisone or dehydrocorticosterone) for HSD1 and inversely for HSD2 (1).
The aim of the work is to develop a method to investigate the activities of the 2 enzymes in a hippocampal and in a glial cell line. We tested the effects of dexamethasone (Dex) known in literature to increase HSD1 and HSD2 expressions.

Methods: HT22 hippocampal and BV2 glial murine cells were grown 4d with vehicle or Dex at 10^{-6} M. qPCR was used to obtain mRNA expression of the enzymes. The enzymatic activities were obtained by quantifying the conversion of corticosterone (C) or dehydro-corticosterone (DC) in the supernatant of the cells by mass spectrometric assay.

Results

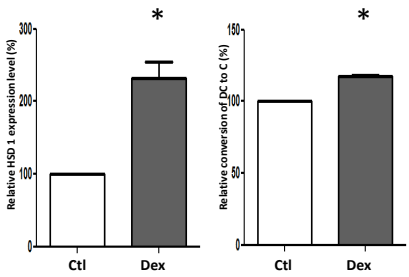
HT22

HSD 2 expression and activity

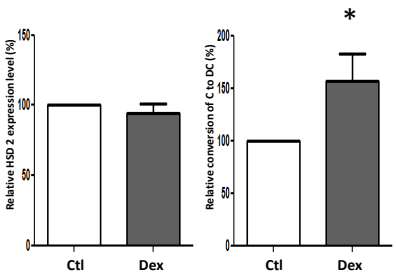


BV 2

HSD 1 expression and activity



HSD 2 expression and activity



There was no expression of HSD1 in the HT22 with or without Dex treatment. There was neither enzymatic conversion of DC to C.
Both mRNA and enzymatic activity of **HSD 1 were increased in BV 2 cells after Dex treatment**.

HSD 2 was expressed in both cell lines.
In HT22, there was a large **mRNA** increase with Dex but the **HSD 2 enzymatic activity was only moderately increased**.
Conversely, **in BV2, there was no significant increase of mRNA level with Dex although the HSD 2 enzymatic activity was clearly increased with Dex**.

Conclusion

The work underlines the utility to investigate enzymatic activity in living cells. Furthermore, it shows that mRNA expression and activity evaluation do not provide concordant resultd suggesting that these enzymes are subjed to different levels of regulation.

References:

1- Chapman, K., *et al.* (2013). "11beta-hydroxysteroid dehydrogenases: intracellular gate-keepers of tissue glucocorticoid action." Physiol Rev,