

Expression of 11 β -hydroxysteroid dehydrogenase type 1 in the human hypothalamus.

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Research question and background

The hypothalamus is a major target for glucocorticoids and a key structure for hypothalamic-pituitary-adrenal (HPA) axis setpoint regulation. The enzyme 11 β hydroxysteroid dehydrogenase type 1 (11 β HSD1) modulates glucocorticoid signalling in various tissues at the prereceptor level by converting biologically inactive cortisone to its active form cortisol. The present study aimed to assess 11 β HSD1 expression in the human hypothalamus.

Methods and tissues used

We studied 11 β HSD1 expression in five frozen and four formalin-fixed, paraffin-embedded human hypothalami (obtained from the Netherlands Brain Bank) by the polymerase chain reaction and immunocytochemistry, respectively. 11 β HSD1 mRNA was expressed in the area of the suprachiasmatic nucleus, which is the biological clock of the brain, in the supraoptic nucleus and paraventricular nucleus (PVN), and in the infundibular nucleus, which is the human homologue of the rodent arcuate nucleus. 11 β HSD1 was detected by immunocytochemistry in the same nuclei. In the PVN, neuronal 11 β HSD1 immunoreactivity colocalised with corticotrophin-releasing hormone (CRH), arginine vasopressin and oxytocin, as shown by dual fluorescence staining.

Results and conclusion

Our data demonstrate that 11 β HSD1 is widely expressed in the human hypothalamus. Its colocalisation with CRH in the PVN suggests a role in modulation of glucocorticoid feedback of the HPA axis, whereas the expression of 11 β HSD1 in additional and functionally diverse hypothalamic nuclei points to a role for the enzyme in the regulation of metabolism, appetite and circadian rhythms.