

Publication

Postnatal ontogeny of hippocampal expression of the mineralocorticoid and glucocorticoid receptors in the common marmoset monkey

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The mineralocorticoid receptor (MR) and glucocorticoid receptor (GR) are nuclear transcription factors that mediate many of the basal and stress functions and effects of the corticosteroid hormones, including those related to brain development. Despite this, relatively little is known about the postnatal ontogeny of MR and GR gene and protein expression in the central nervous system, and this is particularly true of the primates, including humans. Here we describe the postnatal ontogeny of central MR and GR gene and protein expression in the common marmoset monkey. By developing marmoset-specific riboprobes and using in situ hybridization, it was demonstrated that MR mRNA expression in the dentate gyrus and Ammon's horn was significantly greater in marmoset infants (aged 4-6 weeks) than in neonates (1-2 days), juveniles (4-5 months) and adults (3-6 years), with expression in the latter three ontogenetic stages being broadly similar. In the same subjects and ontogenetic stages, GR mRNA expression was developmentally consistent in the marmoset dentate gyrus and Ammon's horn, as well as in the paraventricular nucleus of the hypothalamus. Qualitative immunohistochemical comparison of infants and adults demonstrated that MR protein expression in the hippocampus was, as for mRNA, also greater in infants than adults, and that hippocampal GR protein was, as for mRNA, also similar in infants and adults. The increase in MR mRNA expression between the stages of neonate and infant co-occurred with a reduction in basal plasma ACTH and cortisol titres. The ontogenetic profiles of MR and GR gene expression in the marmoset monkey are therefore fundamentally different from those described for the rat and the mouse. This evidence for the postnatal ontogeny of central corticosteroid nuclear receptor expression in a primate is important for understanding both the developmental stage-specific significance of stress exposure and its potential long-term effects on health and disease.

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