

Distribution and estrogen regulation of membrane progesterone receptor-? in the female rat brain. ^[1]

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Abstract Although several studies have reported the localization of membrane progesterone (P(4)) receptors (mPR) in various tissues, few have attempted to describe the distribution and regulation of these receptors in the brain. In the present study, we investigated expression of two mPR subtypes, mPR α and mPR β , within regions of the brain, known to express estradiol (E(2))-dependent [preoptic area (POA) and hypothalamus] and independent (cortex) classical progestin receptors. Saturation binding and Scatchard analyses on plasma membranes prepared from rat cortex, hypothalamus, and POA demonstrated high-affinity, specific P(4)-binding sites characteristic of mPR. Using quantitative RT-PCR, we found that mPR α mRNA was expressed at higher levels than mPR β , indicating that mPR α may be the primary mPR subtype in the rat brain. We also mapped the distribution of mPR α protein using immunohistochemistry. The mPR α -immunoreactive neurons were highly expressed in select nuclei of the hypothalamus (paraventricular nucleus, ventromedial hypothalamus, and arcuate nucleus), forebrain (medial septum and horizontal diagonal band), and midbrain (oculomotor and red nuclei) and throughout many areas of the cortex and thalamus. Treatment of ovariectomized female rats with E(2) benzoate increased mPR α immunoreactivity within the medial septum but not the medial POA, horizontal diagonal band, or oculomotor nucleus. Together, these findings demonstrate a wide distribution of mPR α in the rodent brain that may contribute to functions affecting behavioral, endocrine, motor, and sensory systems. Furthermore, E(2) regulation of mPR α indicates a mechanism through which estrogens can regulate P(4) function within discrete brain regions to potentially impact behavior.

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