

Neuroanatomical distribution of the melanocortin-4 receptors in male and female rodent central nervous system.

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Objective :

To establish the detailed neuroanatomical distribution the melanocortin-4 receptor (MC4-R) MC4-Rs play a role in several physiological functions including neuroendocrine and sexual function in both males and females.

Methods :

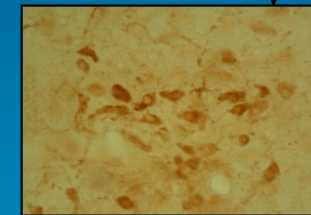
A specific antibody raised against rat MC4-R was visualized using immunocytochemistry. The detailed localization of MC4-R was examined from brain slices obtained from male and estrous female rats. The number of MC4-Rs was counted in every fourth 30µm coronal section.

Results

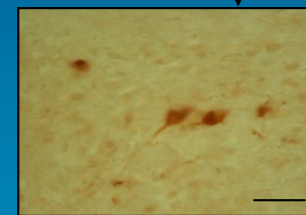
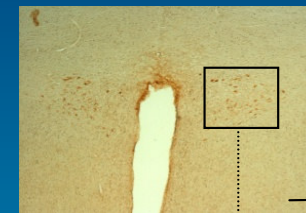
Brain areas	Estrous females	Males
SEPTAL REGION		
Lateral septum	154,2 ±37,9	154,6 ±19,6
BNST	4,3 ±1,2	3,7 ±1,4
HYPOTHALAMUS		
Medial preoptic area	12,5 ±2,3 *	6,4 ±1,1
Lateral hypothalamic area	10,9 ±0,8	14,7 ±0,5 *
Paraventricular nucleus	46,7 ±4,9	43,8 ±2,6
Supraoptic nucleus	39,1 ±4,2	36,5 ±2,4
Arcuate nucleus	42,1 ±11,1 *	8,5 ±2,3
BRAINSTEM		
Periaqueductal gray	5,1 ±1,1	4,6 ±0,7
LPGi	7,0 ±1,6	4,8 ±0,7
DPGi	4,5 ±0,6	3,3 ±0,6
Locus coeruleus	6,0 ±1,7	5,4 ±1,4

Number of MC4-R in estrous females and males brain regions

Estrous females



Males



MC4-R in the PVN of estrous females and males

In both male and female, MC4-R-positive neurons were widely distributed in numerous brain areas, including the septal region, hypothalamus and brainstem. In the medial preoptic area and arcuate nucleus, MC4-R were significantly more abundant in female than in males, whereas in the lateral hypothalamus the opposite was observed.

Conclusion :

This is the first time the neuroanatomical distribution, and sex differences, of brain MC4-R localisation has been described. The distribution of MC4-R is consistent with the proposed roles of central melanocortins in the regulation of autonomic, cardiovascular and neuroendocrine function. In particular, MC4-R localization in hypothalamic brain regions known to be involved in the control of sexual function supports targeting the central melanocortinergic system with specific MC4-R agonists for the treatment of sexual dysfunctions.