SUCKLING-ACTIVATED NEURONS AND THEIR NEUROCHEMICAL IDENTIFICATION IN THE BRAIN OF RAT PUPS

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A critically important activity of mammalian young is suckling especially in rodents where pups are born blind and undeveloped. To understand the neural mechanisms related to suckling we performed a mapping study using the c-fos technique. After reuniting the litters at postnatal day 13 (PND13) with the dams for 2h following 17h of separation, suckling started within 5 min. A significant increase in the number of Fos-immunoreactive (Fos-ir) neurons was found in the insular cortex, the central nucleus of the amygdala (CAm), the paraventricular (PVN) and supraoptic hypothalamic nuclei, the lateral parabrachial nucleus (LPB), the nucleus of the solitary tract (NTS), and the area postrema. Double labeling experiments demonstrated the activation of calcitonin gene-related peptide-ir (CGRP-ir) neurons in the LPB, corticotropin-releasing hormone-ir (CRH-ir) but not oxytocin-ir neurons in the PVN, and tyrosine hydroxylase labeled noradrenergic neurons in the NTS. In the CAm, Fos-ir neurons did not contain CRH but were apposed by CGRP-ir fiber terminals. For comparison, pups fasted for 17h were refed with dry food at PND19 without returning them to their mothers. At this age, all pups can consume dry food and drink water. Dry food induced Fos activation in all brain areas activated by suckling, too. The degree of activation was higher following dry food consumption than suckling in the insular cortex, and lower in the supraoptic nucleus and the NTS. Furthermore, some brain areas not activated by suckling showed increased activation by dry food, such as the accumbens, arcuate, and dorsomedial hypothalamic nuclei, and the lateral hypothalamic area. Thus, neurons activated by suckling may participate in homeostatic regulations with an activity pattern different from that after refeeding with dry food.

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