

Development of lordosis-inhibiting system in the rat lateral septum

¹Tom Kouki, ²Shinji Tsukahara and ³Korehito Yamanouchi

¹Division of Histology and Cell Biology, Department of Anatomy, Jichi Medical School,

²Environmental Health Science Division, National Institute for Environmental Studies,

³Faculty of Human Sciences, Waseda University

It has been clarified that the reason of low level of lordosis in male rats even after treatments with large dose of estrogen is existence of inhibitory system in the lateral septum (LS)¹. The neurons in the intermediate part of the LS projecting axons directly to the midbrain central gray (MCG) is thought to exert a lordosis-inhibiting influence². The inhibition of LS is sexually dimorphic, because amounts of neurons projecting axons to the MCG in females were larger than those in males³. Neonatal treatment with estrogen decreased lordotic activity and caused male type LS-MCG connection in female rats⁴. Thus these suggest possibility that inhibitory system for lordosis in the LS-MCG connection is developed under sex steroids during neonatal period.

In this experiment, as some step to analyzing the LS-MCG function in female rats, postnatal development of LS projections to the MCG was analyzed by a tract-tracing methods with DiI and number of apoptosis neurons in the LS during postnatal periods were measured in rats⁵.

On birth day (D1 rat), 5, 10 or 15 days after birth (D5, D10 or D15 rat) or 8 weeks after birth (adult), brains were fixed and DiI was pasted on the coronally cut-surface of the right side of LS. After incubation for up to 3 months, frozen sections were made and observed by fluorescence microscope. As a result, numerous DiI positive fibers were found in the rostral MCG of right side (rMCG) in adult rats. In

D1 or D5 rats, the positive fibers in the rMCG was none or still a little. In the rat of D10, considerable number of positive fibers were seen in the rMCG but was lesser than that in the adult. In the rMCG of D15 rats amounts of positive fibers were comparable to those in adults. These results suggest that the neural projections from the LS to the rMCG develops acutely during 10 to 15 days after birth in rats.

The number of apoptotic cells in the dorsal, intermediate and ventral parts (LSd, LSi and Lsv) of the LS were counted using immunohistochemical methods with antibody against single-stranded DNA (ssDNA) or active caspase-3 on postnatal days in male and female rats⁶. In both sexes, a large number of ssDNA-immunoreactive cells were found in these 3 parts on postnatal day 8 and the number of active caspase-3-immunoreactive cells was significantly greater in the Lsv than in the LSd or LSi. Only in the LSi of males amounts of ssDNA-immunoreactive cells on postnatal day 16 was higher than that of females, but there is no sex difference in the number of active caspase-3 immunoreactive cells.

From results of DiI positive fibers and number of apoptotic cells during postnatal days, it can be thought that acute growth of LS projections to the MCG from day 10 after birth to the day 15 and sexual dimorphism of this projection occur by apoptosis after this periods.