— Note —

Incidence of Lordosis Behavior in the Female Rat Following Removal of the Vomeronasal Organ

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The lordosis behavior in female rats following removal of the vomeronasal organ (VNO) was observed for a period of 14 hrs by means of a video camera monitor. Although the VNO-ablated female rats received a large number of mounts (96 to 204 times) by sexually active males, they showed only low scores (8 to 22) of lordosis quotients (number of lordosis behavior displayed/number of mounts $\times 100$). In contrast, sham-operated females showed the highest lordosis quotients of 100 as was expected.

The vomeronasal organ (VNO) in most mammalian species consists of a bilaterally paired tubular structure lying on either side at the base of the nasal septum. Receptor neurons within the VNO project to the accessory olfactory bulbs (AOB). The AOB, in turn, gives rise to afferent pathways which project to the corticomedial amygdala, and from there to the medial preoptic area and the ventromedial nucleus of the hypothalamus [1]. Saito and Moltz [3] recently reported a role of the VNO in lordosis behavior of the female rat.

They removed the VNO and observed the depression in the incidence of lordosis behavior, although the ovarian cycle was not disrupted. These results, however, were based on a lordosis quotient: number of lordosis behavior displayed/10 mounts experienced $\times 100$, and the male was allowed to mount the female only 10 times.

The question addressed was whether the incidence of lordosis behavior in the female rat following removal of the VNO would be

accelerated when received a large number of mounts.

In the present experiment, the lordosis behavior in the VNO-ablated female paired with a male was recorded on video camera.

Animals: Adult female and male rats of the Wistar-Imamichi strain raised in our colony were used in this experiment. They were kept under controlled conditions of temperature (22–26°C) and lighting (light on 0600–1800).

They were allowed to take standard laboratory diet and tap water *ad libitum*.

Upon reaching 100–125 days of age, these females underwent either removal of the VNO (VOX, $n=6$) or a sham surgical procedure (SHAM, $n=6$), as detailed in Saito and Mennella [2].

Procedure: The estrous cycles of the rats were checked daily by vaginal smears from one week after operation, and proestrous females were used in the behavioral test after two consecutive 4-day cycles. They were individually placed with a single sexually active male in a semi-circular arena (radius 40, height 50 cm) faced

a); LQ during 14 hrs.
Fig. 1. Hourly lordosis quotient (LQ) in female rats following removal of the vomeronasal organ.

a); MLQ during 14 hrs.
Fig. 2. Hourly mean lordosis quotient (MLQ) in 6 sham-operated female rats.

with Plexiglas and low-level red-light illumination. The lordosis behavior of each pair was recorded on video camera for 14 hrs (1800–0800) to calculate lordosis quotient. The females were checked whether they would be pregnant and whether they would give birth to young.

Histology: At the end of the examination, each

female was sacrificed for histological observations. The animal was perfused with 10% formalin and the head was decalcified in a formic acid solution, embedded in paraffin, sectioned at 40 μ m and stained with hematoxylin and eosin.

Six VOX and 6 SHAM females showed a regular 4-day cycles after operation. Fig. 1 shows the incidence of lordosis behavior in 3

females of the VOX group. The sexual behavior of each pair was observed until 0100 or 0200 hr on estrus. The males showed active mounting behavior until 2100, 2200 and 2000 hr in pairs 1, 2 and 3, respectively. However, hourly lordosis quotients remain low in the range of 0 to 26 during these periods. When paired for 14 hrs, the females received 96 to 204 times of mounts and showed lordosis quotients of 16, 8 and 22, respectively. Despite these low lordosis quotients, each female was impregnated and gave birth to viable young.

For reference, the mean incidence of lordosis behavior of six SHAM females is shown in Fig. 2. As was expected, these animals showed the highest lordosis quotient of 100 through the behavioral test.

These results indicate that the VNO is the essential receptor of chemosensory information to induce the lordosis behavior in the rat.

Histological study revealed that the VNO had been removed from all VOX females used and was intact in all SHAM females.

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鋤鼻器剔出雌ラットにおけるロードシス行動 の発現割合について

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Wistar 今道系雌ラットの鋤鼻器を生後約4カ月齢で剔出した。術後、Smearの採取、観察を行い、発情前期像を示したラットと交尾能力を持った雄ラットとの同居を午後6時より翌朝の8時までの14時間行なった（照明条件：午後6時消灯，午前6時点灯）。性行動の観察にはビデオカメラを利用した。雌の性行動の発現率には、ロ

ードシス商（ロードシス行動の回数/マウント回数×100）を用いた。鋤鼻器剔出雌ラットのロードシス商は観察期間中、8～22であり、偽手術の発現率（100）と比較し、非常に低い値を示した。しかし、低いロードシス商にもかかわらず、鋤鼻器剔出雌ラットは数回の射精を受け、妊娠し、出産に至った。