Effects of LHRH on Copulatory Behavior and Locomotor Activity in Sexually Inexperienced Male Rats

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To determine whether luteinizing hormone-releasing hormone (LHRH) contributes to the sexual behavior and locomotor activity of sexually inexperienced male rats, subcutaneous injections of LHRH (500 ng) were given to males. The males showed significant facilitation of a few aspects of sexual behavior 2h after LHRH injection, compared with saline-injected controls. However, the locomotor activity of males injected with LHRH showed no significant change. These results may indicate that LHRH mechanisms play a direct role in the normal regulation of sexual arousal of male behavior in rats.

It is well known that luteinizing hormone-releasing hormone (LHRH) is a single decapeptide which releases luteinizing hormone (LH) as well as follicle-stimulating hormone (FSH) in mammalian species. In addition, LHRH has been shown to facilitate male and female sexual behavior. Moss and McCann [5, 6] and Pfaff [8], for example, showed that LHRH induced lordosis in estrogen-primed female rats after systemic administration, and that the effects were not dependent on adrenal or pituitary hormone release. Moss et al. [7] demonstrated that this peptide reduces the latencies to intromission and ejaculation in intact male rats and in castrated, testosterone-treated males after systemic administration.

The present study was done to determine whether LHRH can modify the copulatory behavior of sexually inexperienced male rats as well as that of sexually experienced males, as reported by Moss et al. [7]. The relationship between the copulatory behavior and locomotor activity after administration of LHRH was also investigated.

Animals: Twenty-eight male and 14 female rats of the Wistar-Imamichi strain, obtained from the Imamichi Institute for Animal Reproduction (Omiya, Saitama 330, Japan), were used. The animals were maintained on a phase-shifted photoperiod of 12L:12D h (lights off at 18:30) and at a controlled temperature of 22 to 26°C. They were allowed to take a standard laboratory diet and tap water ad libitum.

Copulatory behavior testing: Upon reaching 90–120 days of age, behavioral testing of copulation in sexually inexperienced male rats was initiated at 19:00 and observation was continued according to a standard procedure described in detail by Heimer and Larsson [2]. The male was introduced into a semicircular observation cage (radius 40 cm, height 50 cm) faced with Plexiglass under low-level red-light illumination a few minutes before introduction of a receptive female. Receptive females were sexually experienced females that had been ovariecotomized and injected with 2 μg estradiol benzoate (EB, dissolved in 0.1 ml sesame oil) daily for 3 days and 0.5 mg progesterone (P, in 0.1 ml oil) 5–8 h before the test on the
evening of the fourth day. Each animal was allowed just one mating test.

The following behavior variables were measured:
1. Mounting frequency: Number of mounts without intromission preceding ejaculation.
2. Intromission frequency: Number of mounts with intromission preceding ejaculation.
3. Mount latency: Time from the presentation of female to the male’s first mount.
4. Intromission latency: Time from the presentation of female to the male’s first intromission.
5. Ejaculation latency: Latency from the first intromission until ejaculation.
6. Post-ejaculatory interval: Latency from ejaculation to the next intromission.

Locomotor activity testing: The other sexually inexperienced male rats, aged 90–120 days old, were used in behavioral testing of locomotor activity. Using a specially devised monitor [10], locomotor activity of the animals was measured between 19:00 and 19:30.

Drug procedure: LHRH was obtained commercially from Sigma Chemical Co. In both types of behavioral testing, the males received either subcutaneous injection of 500 ng LHRH (dissolved in 0.3 ml saline) or an injection of saline vehicle alone 2 h before the commencement of behavioral testing.

Statistical analysis: Behavioral frequencies and latencies were analyzed using the Mann–Whitney U test for independent comparisons between groups [4].

Copulatory behavior: As shown in Fig. 1, the latency to first intromission (p<0.05) and the latency to first ejaculation (p<0.05) were significantly shorter for the rats injected with LHRH, compared with the saline–injected controls. However, the mounting latency and post-ejaculatory interval did not decrease following the injection of LHRH. The number of mounts and intromissions showed no change between LHRH– and saline–injected animals (Fig. 2).

Locomotor activity: Injection of LHRH did not facilitate locomotor activity in male rats (Fig. 3).
In summary, the following can be said about LHRH and copulation in the male rat. First, LHRH contributes to sexual arousal in both sexually inexperienced males and sexually experienced males [7]. This is evident in the shorter intromission and ejaculation latencies of the LHRH-injected group. Second, there is no relation between the effects of LHRH on locomotor activity and the effects on sexual behavior. The same dose of LHRH (500 ng), that accelerated the male sexual behavior, did not contribute to the locomotor activity.

LHRH has been found in high concentrations in the vomeronasal system, which is the essential pathway of chemosensory information [1, 3, 9]. This peptide may function not only as a releasing hormone but also as a neurotransmitter or neuromodulator in certain kinds of nasal chemoreception [3]. Regardless of sexual experience, the possibility exists that LHRH mechanisms play a direct role in the normal regulation of sexual behavior.

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References
交尾未経験雄ラットの交尾行動および自発運動に対する黄体形成
ホルモン放出ホルモン（LHRH）の効果についての一考察

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交尾未経験の成熟雄ラットの皮下に黄体形成ホルモン
放出ホルモン（LHRH）500 ng を単一投与した。その
結果、ペニスの挿入および射精潜時の短縮が起った。し
かし、この投与量では自発運動量の亢進は見られなかっ
た。即ち、LHRH は交尾未経験雄ラットに対しても、
性的興奮の調節に直接関与していると推察された。