



ORIGINAL ARTICLE

Effect of electrolytic lesion of the dorsomedial striatum on sexual behaviour and locomotor activity in rats[☆]



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KEYWORDS

Dorsomedial striatum;
Sexual behaviour;
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Locomotion;
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Abstract

Introduction: Cortical motor areas are influenced not only by peripheral sensory afferents and prefrontal association areas, but also by the basal ganglia, specifically the striatum. The dorsomedial striatum (DMS) and dorsolateral striatum are involved in both spatial and stimulus-response learning; however, each of these areas may mediate different components of learning. The aim of the study is to determine the effect of electrolytic lesion to the DMS on the learning and performance of sexual behaviour and locomotor activity in male rats.

Method: Once the subjects had learned to perform motor tests of balance, maze navigation, ramp ascent, and sexual behaviour, they underwent electrolytic lesion to the DMS. Five days later, the tests were repeated on 2 occasions and researchers compared performance latencies for each test.

Results: Average latency values for performance on the maze and balance tests were higher after the lesion. However, the average values for the ramp test and for sexual behaviour did not differ between groups.

Conclusions: Electrolytic lesion of the DMS modifies the performance of locomotor activity (maze test and balance), but not of sexual behaviour.

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PALABRAS CLAVE

Estriado dorsomedial;
Lesión electrolítica;
Conducta sexual;
Locomoción;
Aprendizaje

Efecto de la lesión electrolítica del estriado dorsomedial sobre la conducta sexual y actividad locomotora de la rata**Resumen**

Introducción: Las áreas motoras corticales no solo son influenciadas por aferencias sensitivas periféricas y áreas de asociación prefrontales, sino también por los ganglios basales, específicamente el estriado. El estriado dorsomedial (EDM) y el estriado dorsolateral están involucrados en el aprendizaje espacial y el aprendizaje estímulo-respuesta; sin embargo, cada una de estas zonas pudiera mediar distintos componentes del aprendizaje. El propósito del estudio es determinar el efecto de la lesión electrolítica del EDM sobre el aprendizaje y ejecución de la conducta locomotora y sexual en ratas macho.

Método: Una vez que los sujetos aprendieron a ejecutar las pruebas motoras de equilibrio, laberinto, rampa de ascenso y la conducta sexual, se realizó la lesión electrolítica del EDM. Cinco días después se realizaron las pruebas en 2 ocasiones más y se compararon las latencias de ejecución de cada prueba.

Resultados: Después de la lesión, los valores promedio de latencia, incrementaron durante la ejecución de las pruebas de laberinto y equilibrio. Sin embargo, los valores promedio en la prueba rampa y conducta sexual, no aportaron efectos contrastantes entre los grupos.

Conclusiones: La lesión electrolítica del EDM modifica la ejecución de la actividad locomotora (prueba de laberinto y equilibrio), pero no la ejecución de la conducta sexual.

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Introduction

Evidence suggests that the basal ganglia are involved in such non-motor functions as learning and memory.^{1,2} Findings from studies of animal models with electrolytic and pharmacological lesions support this hypothesis.^{3–9} In some mammals, the dorsal striatum, including the caudate nucleus and putamen, has traditionally been considered to be involved in motor control.¹⁰ However, it has also been associated with sensorimotor integration,¹¹ cognitive function,¹² learning,^{2,13} and some aspects of attentional performance.^{14,15}

According to several studies, the dorsal striatum may play a major role in associative learning (classical conditioning, that is, associating an unconditioned stimulus with a response).^{1,16,17} More specifically, manipulation of the dorsal striatum has been found to alter a wide range of learning tasks requiring spatial information processing in the Morris water maze¹⁸ and the four-arm cross-maze.¹⁹

However, the striatum is not a homogeneous structure: several areas may be distinguished by their biochemistry^{20,21} and connectivity (afferent and efferent projections).^{16,22}

Rats with dorsolateral striatum lesions have displayed impaired discriminant ability on conditional discrimination tasks and poor performance on simple discrimination tasks. These findings are consistent with the idea that the dorsolateral striatum is involved in stimulus-response (S-R) learning and conditioned place preference learning.^{23,24} Lesions to the dorsomedial striatum (DMS) have no effect on conditioned place preference learning.²³ However, evidence suggests that the poorer performance on discrimination

tasks in the post-lesion period (after having acquired the task) may affect S-R learning.^{16,23}

The striatum is a key structure in motor function; it has recently been linked to such functions as S-R learning, place preference learning, and spatial information processing, all of which are involved in sexual behaviour. Questions remain as to whether the DMS is responsible for the learning of locomotor patterns involved in sexual behaviour. The purpose of our study was to evaluate the effect of electrolytic lesions to the DMS on previously acquired sexual behaviour and locomotor activity.

Material and methods**Subjects and housing**

Our study included sexually experienced male Wistar rats (250–350 g) and ovariectomised female Wistar rats (200–250 g). The male rats selected for these experiments had ejaculated in at least 2 of 4 tests with ejaculation latencies of less than 15 minutes. Female receptivity was induced with exogenous steroids dissolved in canola oil: estradiol benzoate (10 µg) and progesterone (500 µg) injected subcutaneously 48 and 4 hours before each test, respectively. Animals were housed in transparent acrylic boxes (50 cm × 30 cm × 20 cm) containing sawdust bedding. They were kept with a 12 × 12 hour inverted light-dark cycle (lights were turned on at 20.00); food (LabDiet, ProLab RMH 2500) and water (Xallapan) were provided ad libitum. All experiments followed the official Mexican guidelines (NOM-062-ZOO-1999) and the ethical standards published by the Society for Neuroscience.

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