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Sex differences in oxytocin producing neurons in the supraoptic nucleus

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Introduction

Oxytocin (OT) is a neuropeptide involved in sexual, maternal and pro-social behaviors such as orgasm, parturition, lactation, and mother-child bonding (Ross & Young, 2009; Tortora & Derrickson, 2006).

OT is produced by magnocellular neurons in the supraoptic and paraventricular nuclei of the hypothalamus and is secreted by the posterior pituitary gland (Ross & Young, 2009; Tortora & Derrickson, 2006).

Preliminary research of OT in mice has indicated a sex difference in the hindbrain of mice with female mice showing a denser innervation than male mice (Ismail et al, unpublished observation). However, the cause of this gender difference is unknown.

The present study examined the effects of sex hormones on the OT producing neurons in the supraoptic nucleus in the hindbrain by analyzing the brains of both gonadectomized and sham-operated female and male mice.

Hypothesis

1. Female mice are expected to have a greater percentage of the SON covered by OT cell bodies than males.
2. Gonadectomy is expected to have no effect on OT levels.

Methods

C57B1/6 mice were used (a genetically normal breed).

60 days of age:

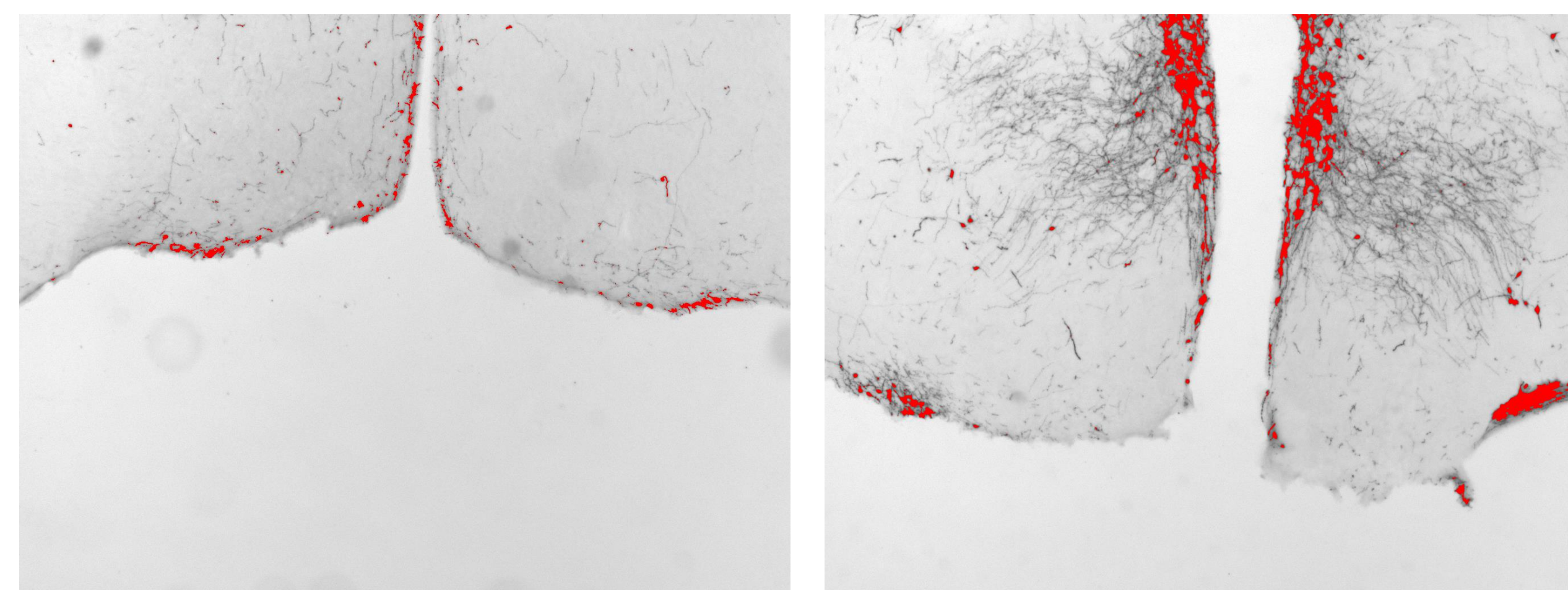
Half of the C57B1/6 mice sample underwent gonadectomy (ovaries or testes were removed). The mice that were not gonadectomized underwent sham surgery that simulated gonadectomy to control for possible procedural effects.

90 days of age:

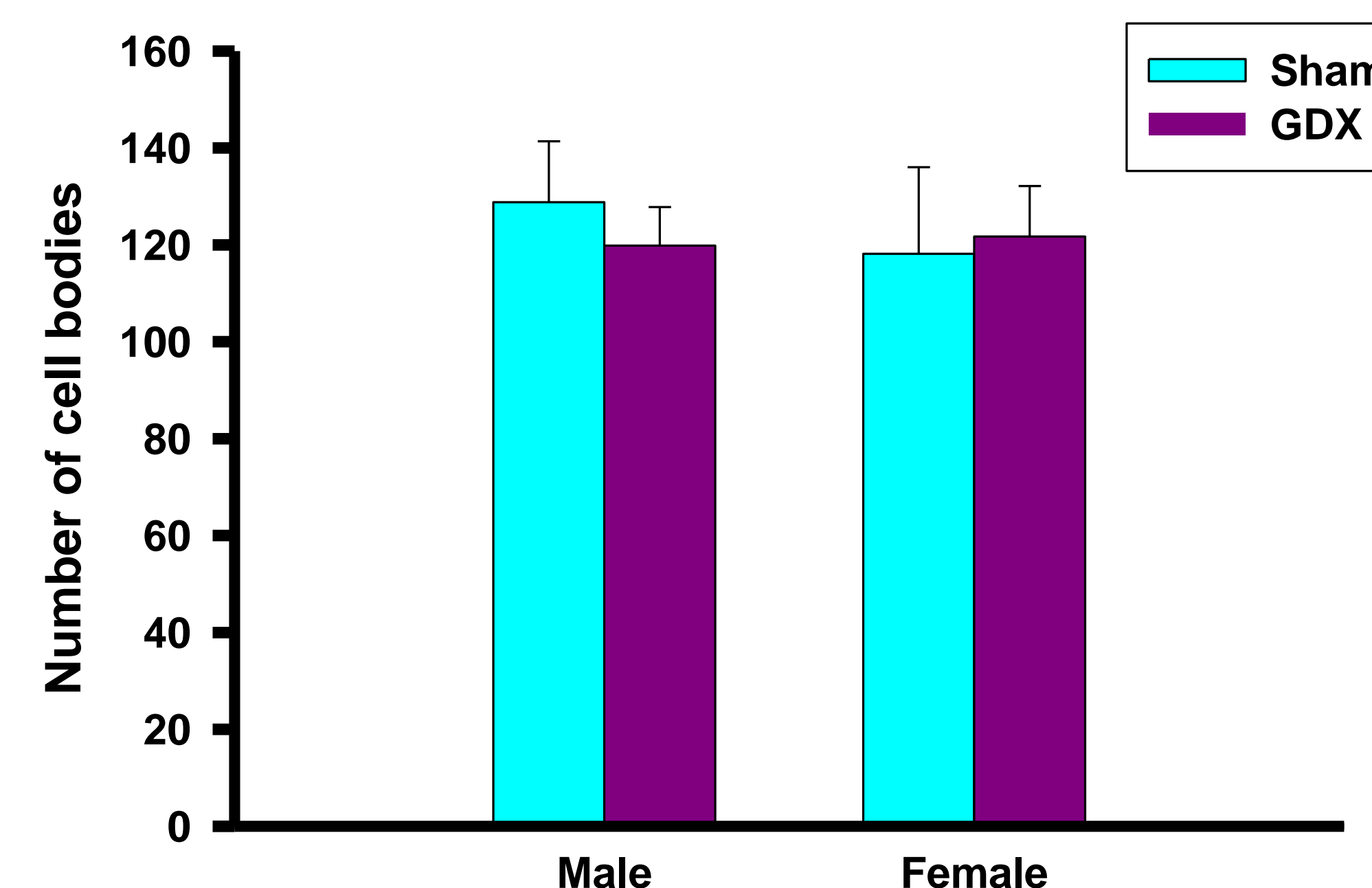
The mice were euthanized and their brains were extracted, sliced and stained for OT content using immunocytochemistry.

The OT cell body count and density was analyzed using the computer software Image J.

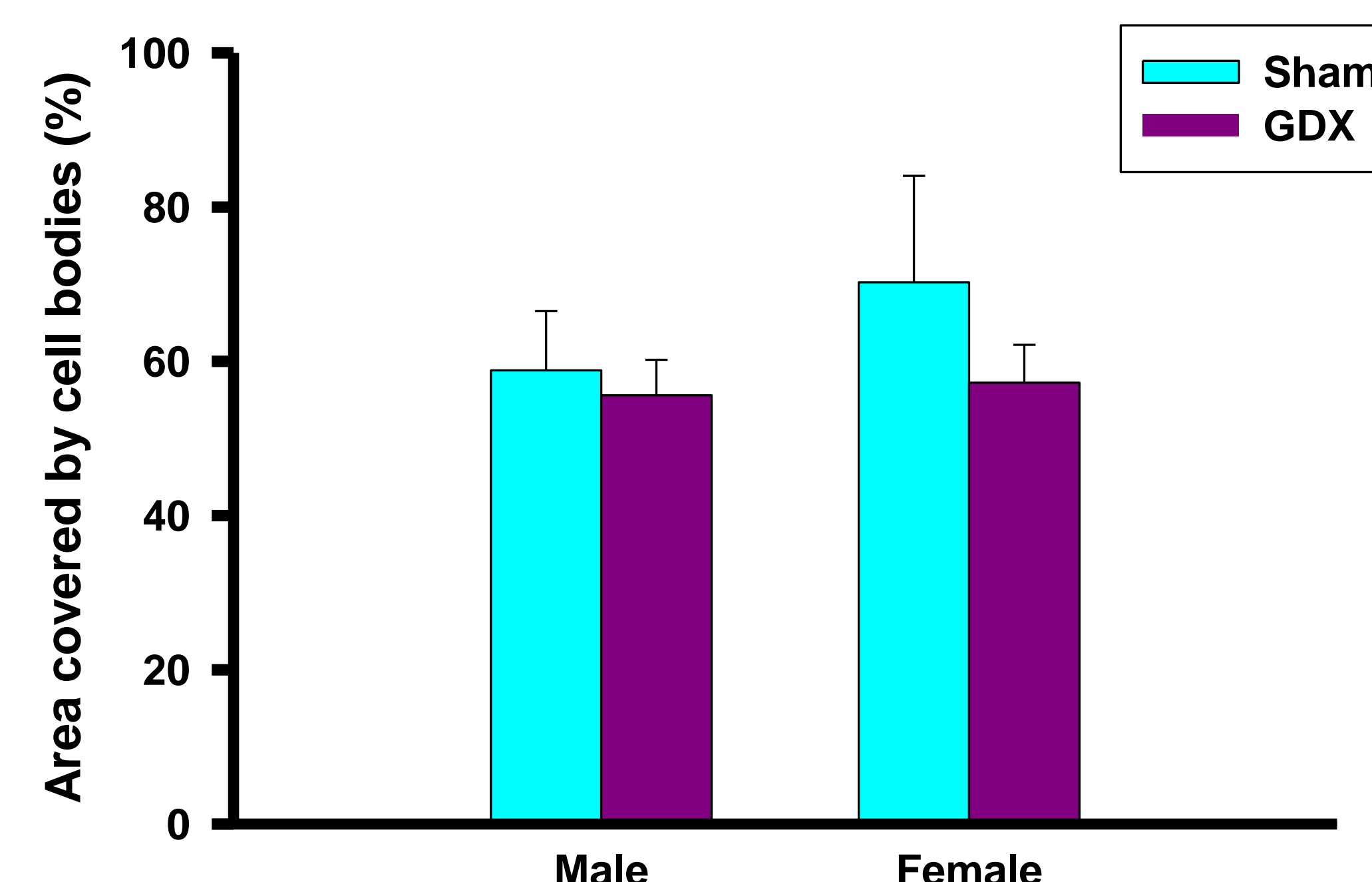
Results



Number of cell bodies in the Supraoptic Nucleus



Percentage of the Supraoptic Nucleus covered by Oxytocin cell bodies



Conclusion

No significant difference was found between the number of OT cell bodies in the SON or the percentage of OT cell bodies in the SON of sham operated and gonadectomized male and female mice. Therefore, the OT innervations originating in the SON are not responsible for the sex differences in OT innervations observed in the hindbrain in the preliminary study. Future studies should examine sex differences in the OT cell body counts in the paraventricular nucleus of the hypothalamus.

References

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- Tortora, G.J., & Derrickson, B. (2006). *Principles of anatomy and physiology* (11th ed). Hoboken, NJ: Wiley

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