Sexual Dimorphism of SNB Neurons in Mice

Bennu Elbasioglu
Date: 07/18/2025
CAMP: Rosetta Institute, Molecular Neuroscience

INTRODUCTION

Sexual dimorphism is the difference between individuals of the opposite sex in the same species. These differences can be physical and behavioral. For example; male lions have a mane while female lions don't, male peacocks have much more colorful feathers than female peacocks and male songbirds sing complex songs.

But why does nature need a distinction between male and female? The purpose of sexual dimorphism is mainly natural selection and evolution. These differences lead to reproductive success or failure. As a result, these physical and behavioral differences go down to different evolutionary pathways to fit better in nature and increase the rate of reproductive success.

While sexual dimorphism is usually observed in external physical and behavioral traits, it's also connected with the structure and function of the central nervous system (CNS). The CNS includes the brain and the spinal cord and is identified as the body's processing center. The cellular components of the CNS are neurons and glial cells. Neurons send and receive neurotransmitters which are chemicals that carry information. Glial cells have many different functions that support the nervous system depending on their type.

In this virtual lab, we observed the sexual dimorphism of SNB neurons (spinal nucleus of the bulbocavernosus) in mice. SNB neurons are a group of motor neurons in the spinal cord and they contribute to sexual behavior in males. In female SNB neurons, the target muscles are mainly absent or not fully developed. Thus, the female SNB neurons do not contribute to reproductive motor behavior as much as male SNB neurons. The purpose of this study is to answer the question, "Are SNB neurons sexually dimorphic?". In this study, the number and the surface area of SNB neurons in male and female mice are collected as data to understand sexual dimorphism.

NULL HYPOTHESES

1. There's no significant difference in the surface area of SNB neurons between female and male mice.
2. There's no significant difference in the number of SNB neurons between female and male mice.

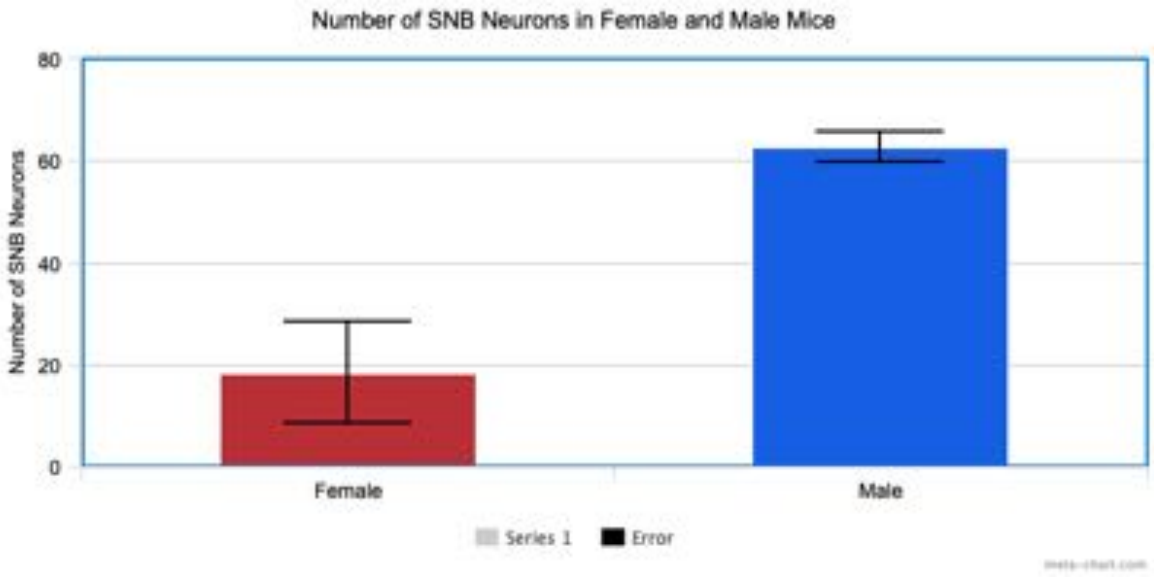
DATA

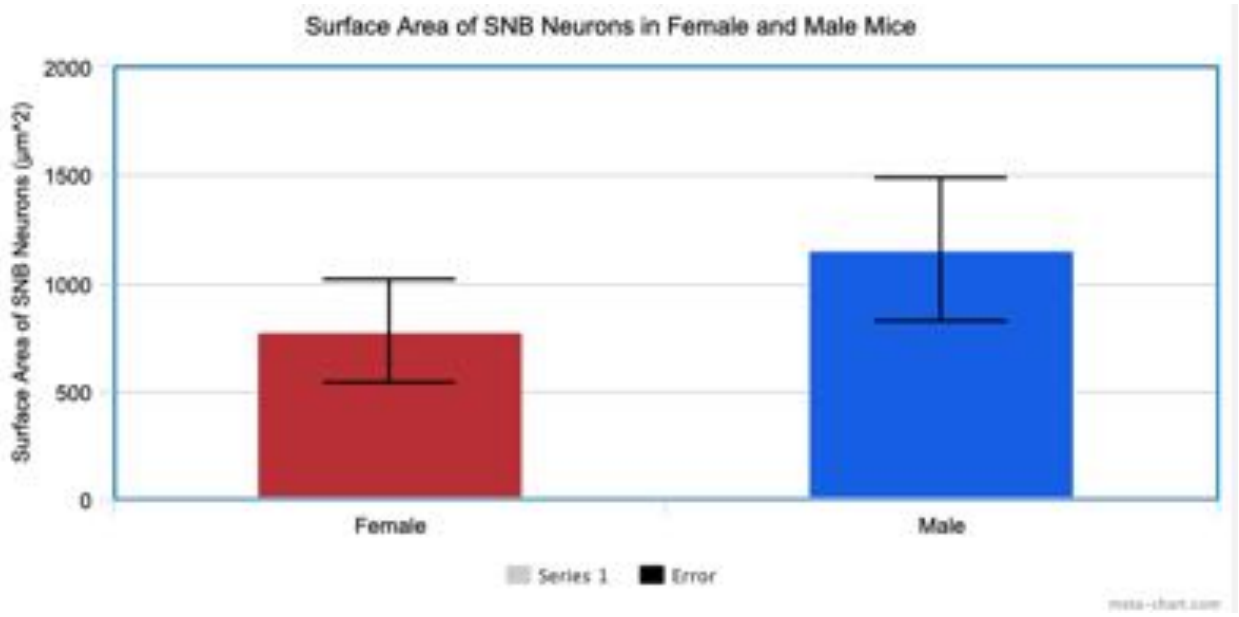
Female SNB Neurons Raw Data Sheet:
https://docs.google.com/spreadsheets/d/1Bn8e2CDqFbvDLZr35JuR59XQJLyVspwcUGpazDFImwY/edit?usp=sharing
Male SNB Neurons Raw Data Sheet:
https://docs.google.com/spreadsheets/d/1wyHGc_0IQHG-P2PmES-CCf0R2wmoj8T7OIyPjAWXR-I/edit?usp=sharing

	FEMALE	MALE	P VALUES
Avg. Neurons	18.333 ± 10.017	62.667 ± 3.055	0.001841
Avg. Surface Area	774.293μm² ± 237.825	1154.515μm² ± 330.120	0.00855

RESULTS

In this study, ImageJ was used to measure the surface area of SNB neurons and count them from the provided pictures of mice' spinal cord. Then, the data were transferred to excel sheets to calculate the average and the standard deviation. According to the data, male mice have approximately 3.5 times more SNB neurons than female mice. Additionally, the surface area of SNB neurons in male mice is approximately 1.5 times larger than female mice. This shows a clear sexual dimorphism of SNB neurons in mice.





CONCLUSION

The findings of this virtual lab supports that SNB Neurons show sexual dimorphism in mice. Both the number and surface area of SNB neurons are significantly greater in male mice than in female mice. The p-value for the number of neurons is 0.001841 and the p-value of the surface area of neurons is 0.00855. Both are below the critical value of 0.05. This means we can reject the null hypotheses and the differences are not due to random chance.

Moreover, these differences reflect the role of SNB neurons in male reproductive behavior in the aspect of function as the target muscles of SNB neurons are not present in female mice.

In conclusion, the structural differences between SNB neurons observed in this study, number and surface area, confirm that SNB neurons are sexually dimorphic and it reveals the influence of sex on neural development and function in the central nervous system.

REFERENCES

Ucr.edu, 2025, news.ucr.edu/sites/default/files/2019-08/Neurons_1.jpeg. Accessed 17 July 2025.

Birdfact.com, 2025, images.birdfact.com/production/male-and-female-peacock.jpg?w=1200&h=900&q=80&auto=format&fit=crop&dm=1652099619&s=d2d7082010424b4a10689165df407484. Accessed 17 July 2025.

4-Paws.org, 2025, media.4-paws.org/3/a/d/4/3ad462583b2d8e56694df29d42947488afac48d3/VIER%20PFOTEN_2012-05-15_002%20%281%29-1927x1333-1920x1328.jpg. Accessed 17 July 2025.

Healthdirect. “Central Nervous System (CNS).” *Healthdirect.gov.au*, Healthdirect Australia, Sept. 2019, www.healthdirect.gov.au/central-nervous-system.

National Institute of Neurological Disorders and Stroke. “Brain Basics: The Life and Death of a Neuron.” *Www.ninds.nih.gov*, NINDS, 2025, www.ninds.nih.gov/health-information/public-education/brain-basics/brain-basics-life-and-death-neuron.

“Sexual Dimorphism.” *Www2.Nau.edu*, Northern Arizona University, www2.nau.edu/~gaud/bio300b/sexdi.htm.

Watson, Neil V., et al. “Neuronal Size in the Spinal Nucleus of the Bulbocavernosus: Direct Modulation by Androgen in Rats with Mosaic Androgen Insensitivity.” *The Journal of Neuroscience*, vol. 21, no. 3, 1 Feb. 2001, pp. 1062–1066, https://doi.org/10.1523/jneurosci.21-03-01062.2001. Accessed 28 Apr. 2025.

Meta Chart. “Create, Customize and Download/Share - Pie, Bar, Double Bar, Spline, Area Charts and More with Our Free Suite! Meta-Chart.com.” *Meta-Chart.com*, 2019, www.meta-chart.com.