



Investigating Norepinephrine and CGRP Co-expression in the Thalamus and Hypothalamus

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INTRODUCTION

Norepinephrine (NE) is a neurotransmitter that is found widely throughout the central nervous system (CNS) and peripheral nervous system (PNS) and has a diverse range of functions. NE neurons are responsible for modulating the stress response, the sleep/wake cycle, and cognitive arousal, as well as numerous other complex behaviors.

Calcitonin gene-related peptide (CGRP) is a molecule that is distributed widely throughout the CNS and PNS. CGRP expression has been linked to a number of dysregulations in the rodent and human body, including the most common neurological disorder: migraines.

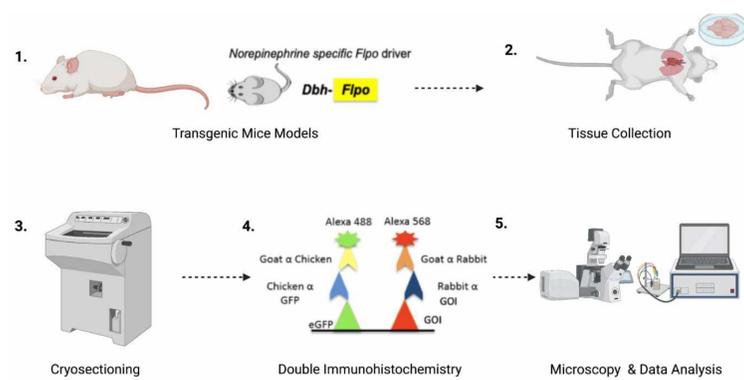
Our regions of interest are the **thalamus (TH)** and **hypothalamus (HY)**, as CGRP dysfunction in these areas is thought to be closely linked to migraine attacks. The concentration of CGRP has also been linked to sex-related differences, so we will also investigate this topic on male and female rodent models.

HYPOTHESIS

We hypothesize that we will see **colocalization** of **CGRP** with **NE** neurons in the thalamus because both operate through the trigeminovascular system to enact migraines.

In both areas, we anticipate sex differences in CGRP expression because estrogen, progesterone, and testosterone all regulate the action of CGRP in the thalamus and hypothalamus; female mice will have more CGRP co-expression than their male counterparts.

METHODS



Primary Antibody Dilutions

Antibody Name	ID, Manufacturer	Dilution
Chicken Anti-GFP	AB13970, Abcam	1:10000
Rabbit Anti-CGRP	AB15360, Millipore Sigma	1:2000

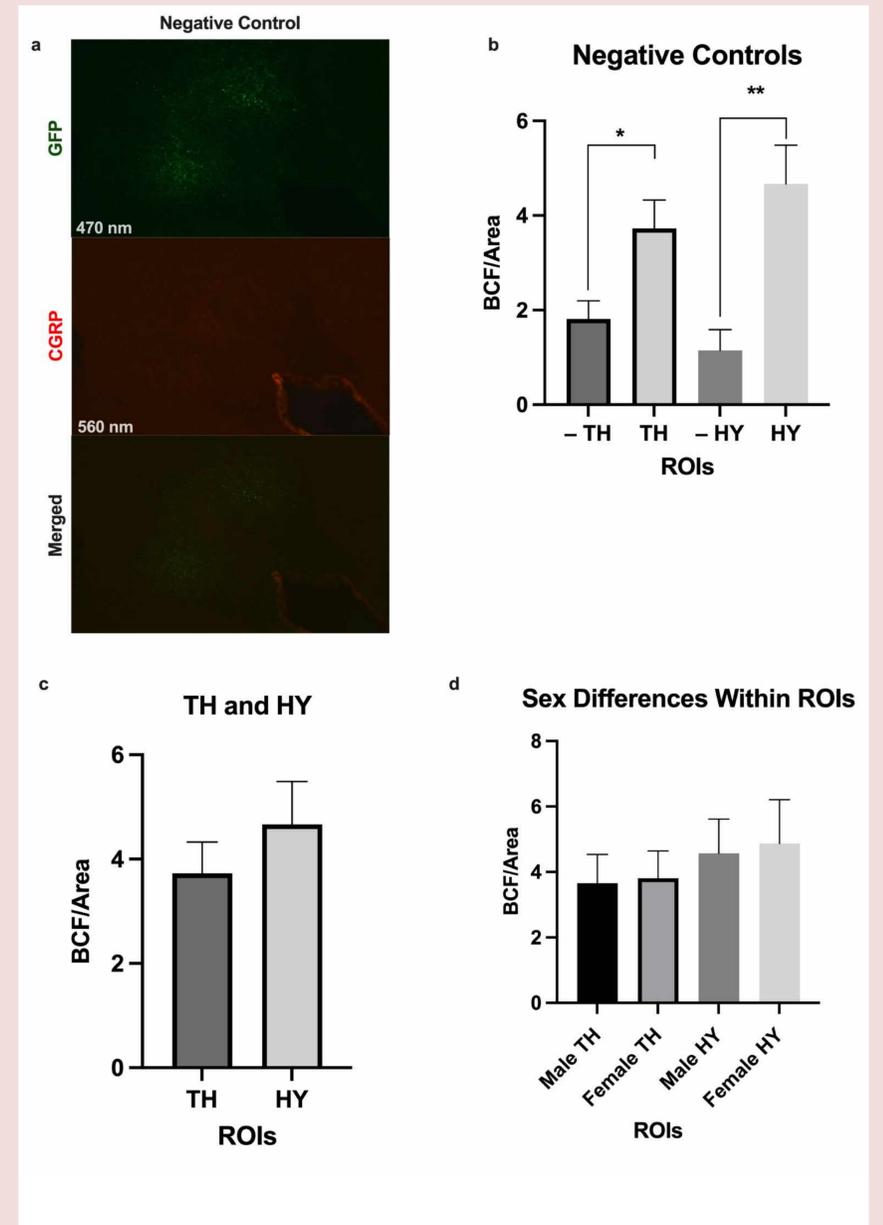
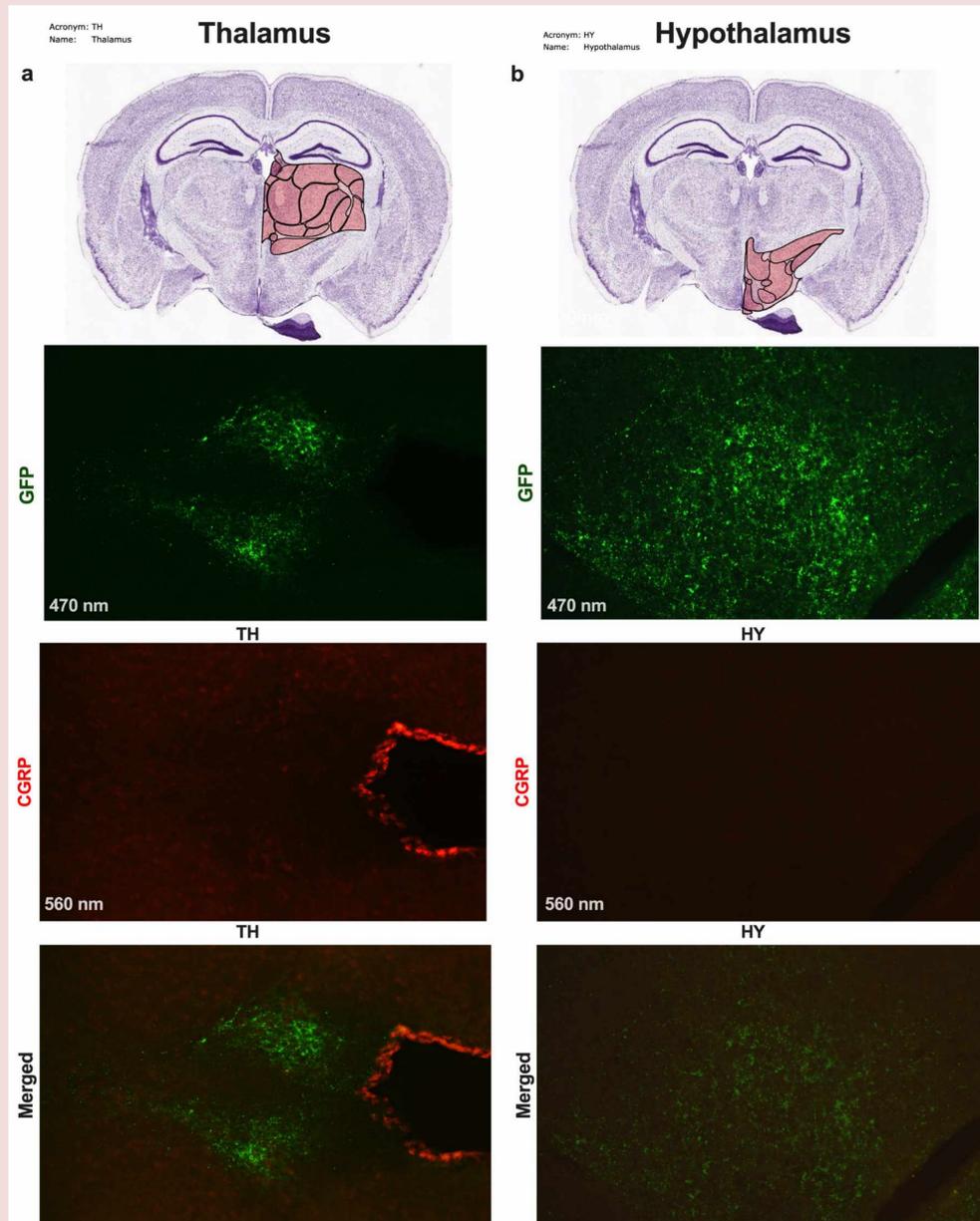
Table 1. Primary Antibody Information

Secondary Antibody Dilutions

Antibody Name	ID, Manufacturer	Dilution
Goat Anti-Chicken Alexa 488	AB11039, ThermoFischer Scientific	1:1000
Goat Anti-Rabbit Alexa 568	AB11036, ThermoFischer Scientific	1:1000

Table 2. Secondary Antibody Information

RESULTS



CONCLUSION

• Background corrected fluorescence per area (BCF/Area) **was significantly above** background in both the TH and HY when respectively compared with negative controls from each region ($p < 0.05$).

• **No significant differences** were found between sexes within the TH or HY.

• **No significant differences** were found between regions with regard to each regions' BCF/Area.

FUTURE DIRECTIONS

• Future investigations will alleviate our primary limitation: increasing the sample size of analyzed animal models with regard to NE/CGRP colocalization in the thalamus and hypothalamus sections.

• Our results suggest that the actions of CGRP in our regions of interest are not driven by expression within NE neurons, but more research into this topic will illuminate the relationship between CGRP and NE as well as aid in the understanding of sex differences for neurological pathologies like migraines.

ACKNOWLEDGEMENTS

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References: See QR Code at the top right of this poster.