Impact of Mild Blast Traumatic Brain Injury on Tanycyte Function

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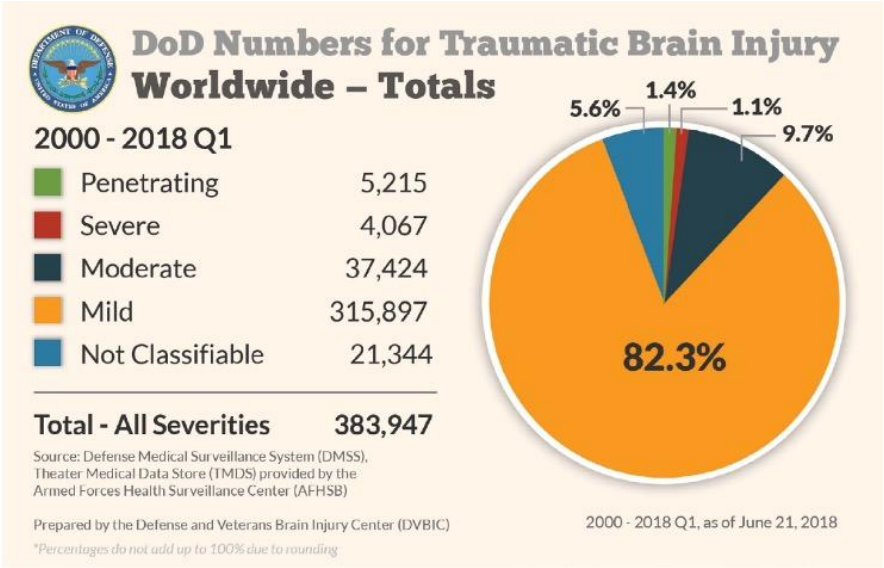
Summer Timeline

- Spring Break
  - Pipetting and BCA Assay
- June 9th
  - Rodent Handling Training
- June 27
  - Began learning immunohistochemistry (IHC)
- July 27
  - Began running IHC with male and female mice (blast and sham)
- August 11
  - Final run of IHC and beginning of analysis and imaging
- August 18
  - Poster presentation at USUHS

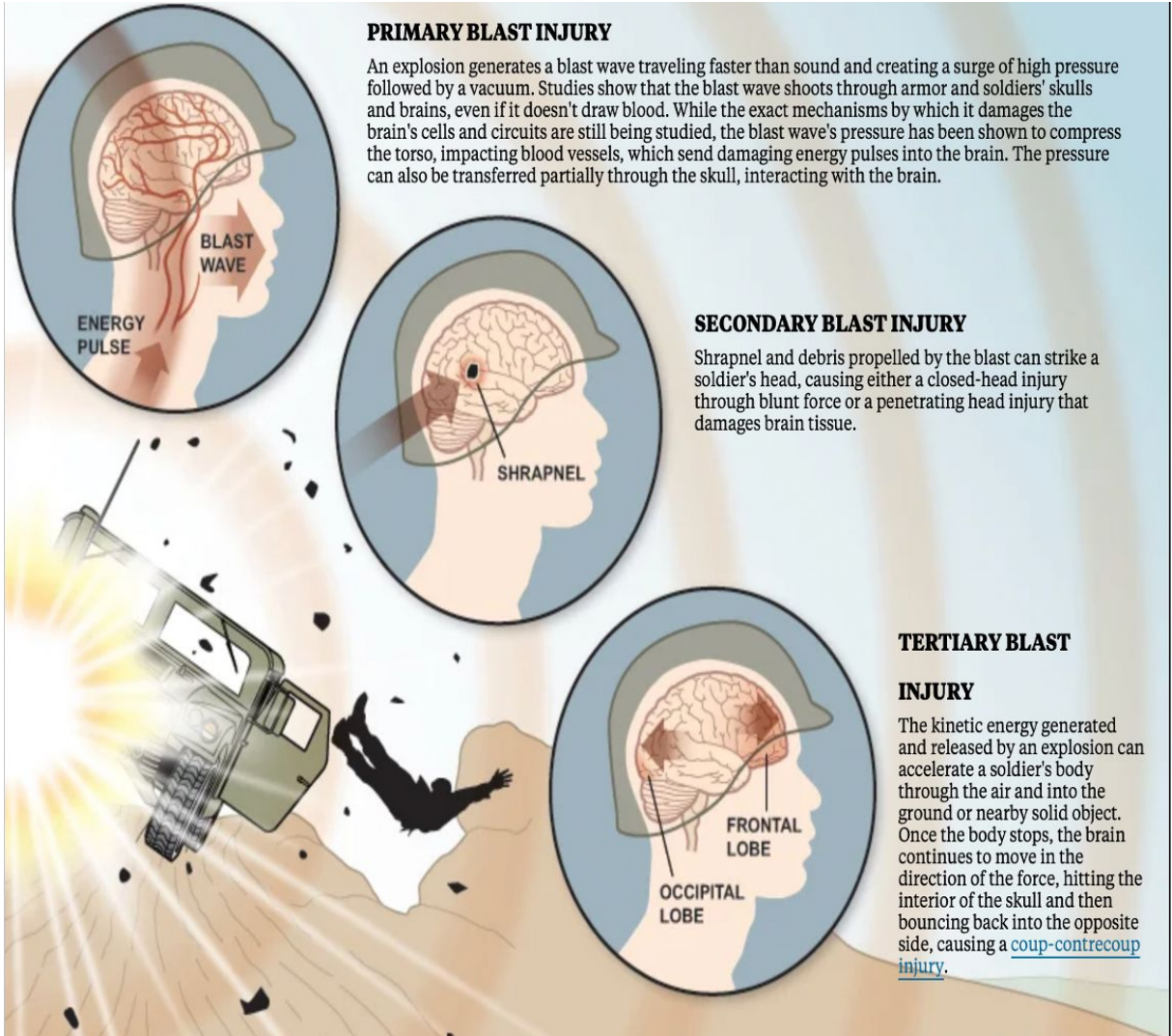
Introduction



Injury severity	Loss of consciousness	Post-traumatic amnesia	Glasgow Coma Scale
Mild	< 30 min	< 24 hr	13 - 15
Moderate	30 min – 1 day	1 – 7 days	9 – 12
Severe	> 1 day	> 7 days	3 - 8

What is Traumatic Brain Injury (TBI)?

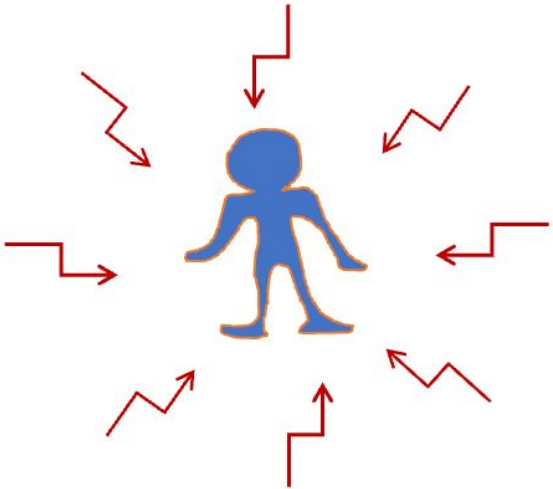
- TBI ”results from a violent blow or jolt to the head or body”
- Mild TBI may have temporary effects on brain cells, whereas more severe TBI results in severe bruising, torn tissues, bleeding and other complications that can lead to long-term complications



Blast Traumatic Brain Injury

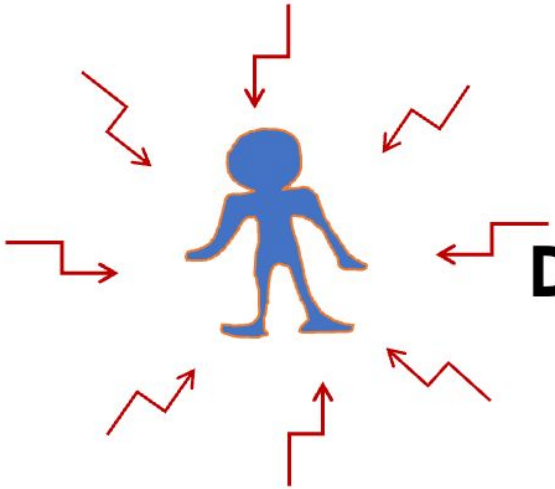
- TBIs result in neuroendocrine deficits in about 1/3 of people.
- Approximately a third of all combat injuries treated at the Walter Reed Army Medical Center (WRAMC) in early 2008 involved TBI
- In instances of mbTBI the prevalence of psychiatric disorders increases, including anxiety, depression, and post-traumatic stress disorder (PTSD)

Blast TBI Exposure



→ Neuropsychiatric/ Psychological Disorders

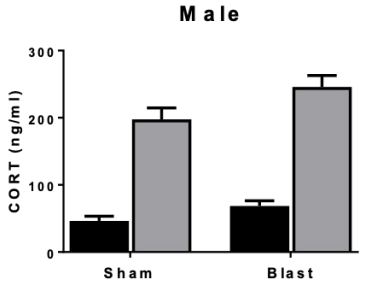
Blast TBI Exposure

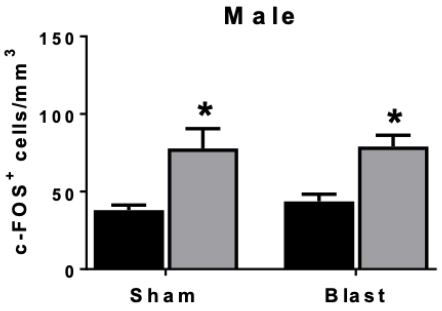


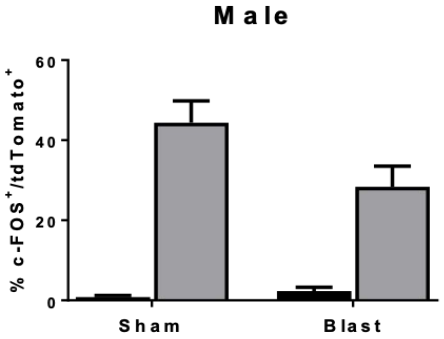
Stress Axis Dysregulation

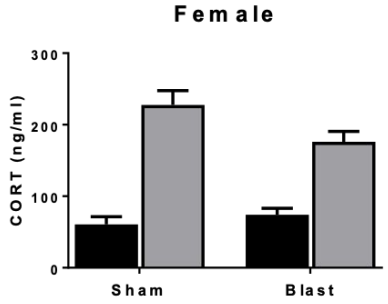
Neuropsychiatric/ Psychological Disorders

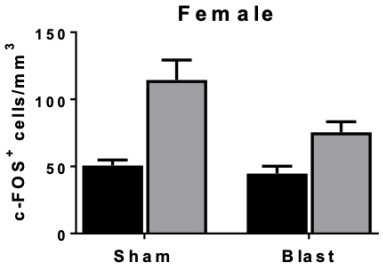
Stress

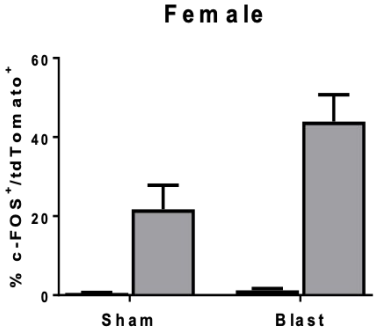






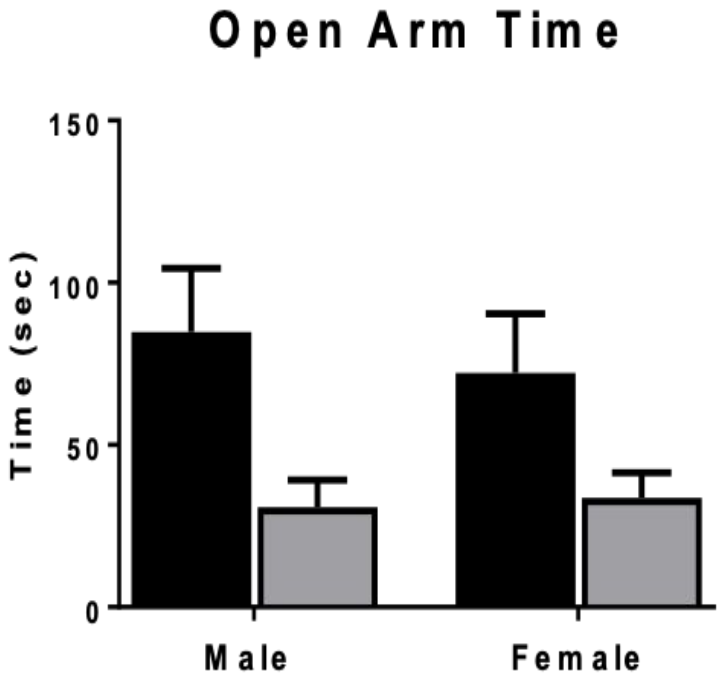


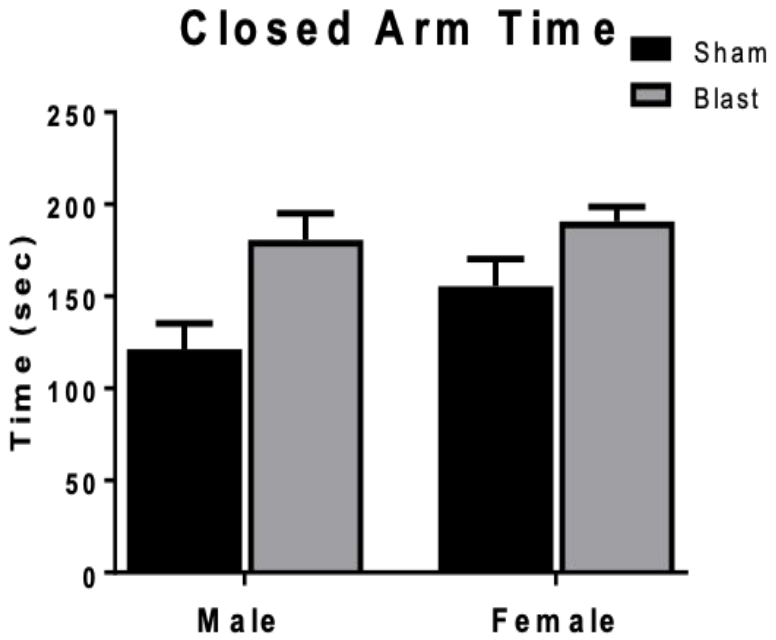




A, Russell *et al.* Differential Responses of the HPA axis to Mild Blast Traumatic Brain Injury in Male and Female Mice. Endocrinology, 2018

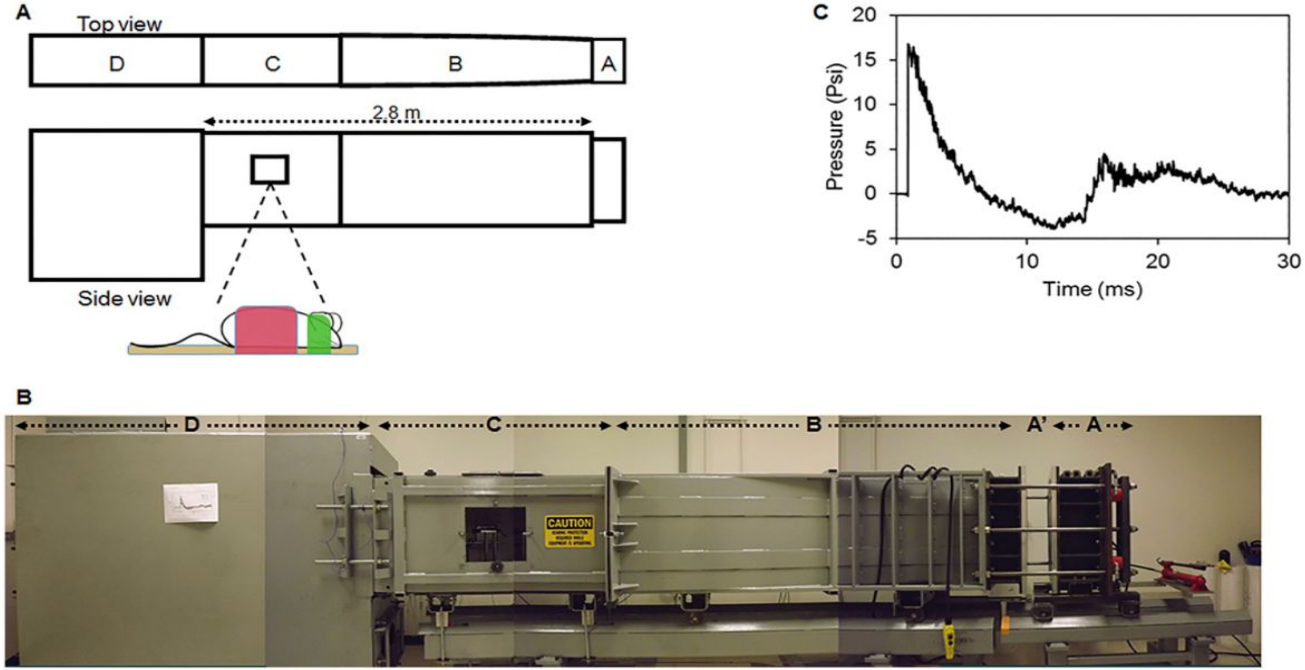
Anxiety





Traumatic Brain Injury in Male and Female Mice. Endocrinology,, Russell *et al.* Differential Responses of the HPA axis to Mild Blast . 2018A

Model of TBI

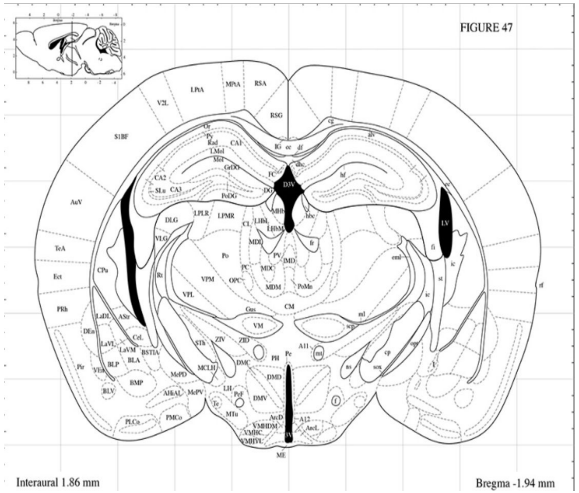


A, Russell *et al.* Differential Responses of the HPA axis to Mild Blast Traumatic Brain Injury in Male and Female Mice. Endocrinology, 2018

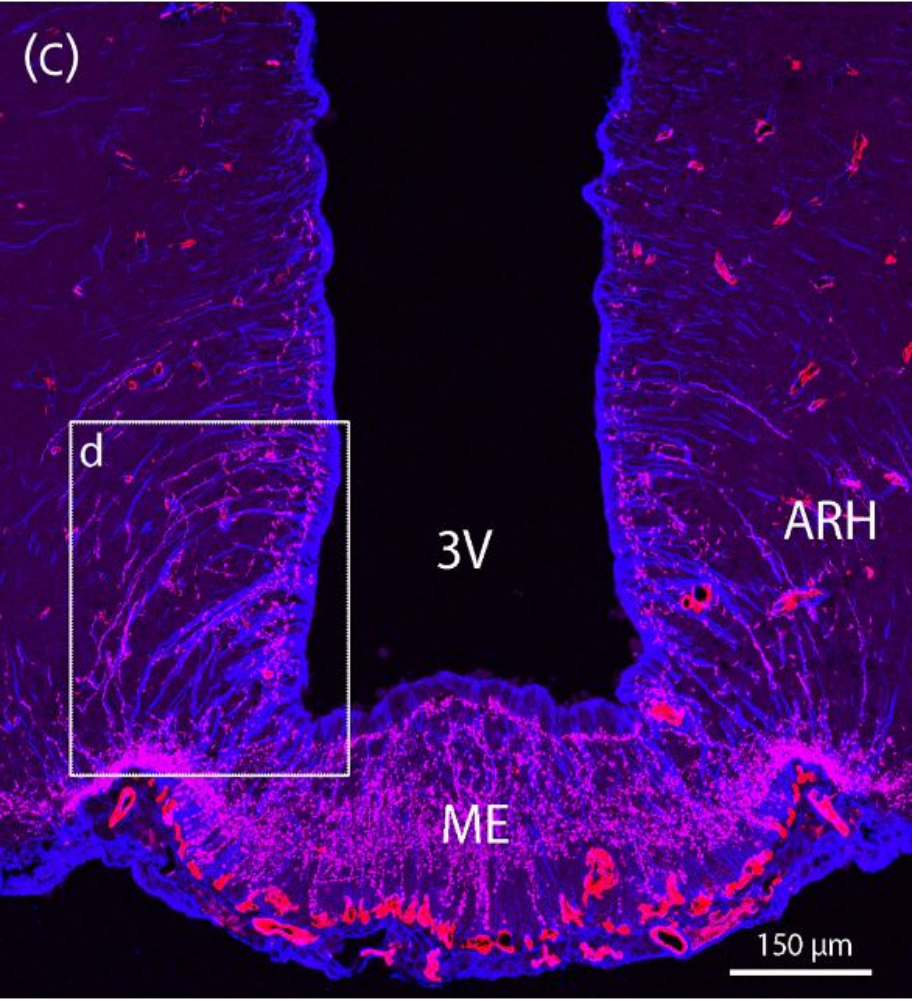
What are Tanycytes

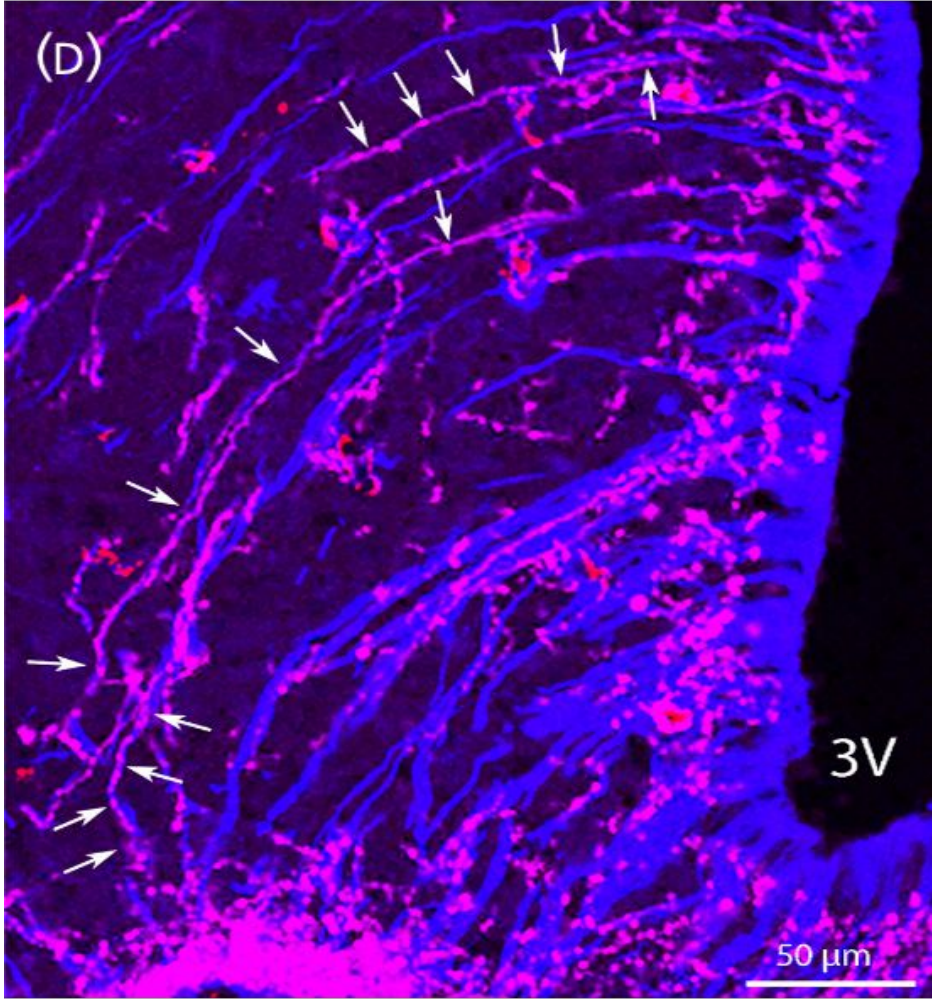
·Ependymal cells found within the third (and fourth) ventricles of the brain with processes reaching into the hypothalamus
·Link the central nervous system (CNS) to hypophyseal portal blood through cerebrospinal fluid (CSF)
·Connects CSF to neuroendocrine events
·Within the median eminence (ME), which links the hypothalamus to the pituitary gland, tanycytes aid in the regulation of hypothalamic functions including:

- Neuroendocrine output
- Energy balance
- Diffusion of blood-borne molecules
- Reproductive ageing



Franklin and Paxinos, The mouse brain in stereotaxic coordinates, Third Edition. Academic Press, 2008. Coronal section taken at Bregma -1.90 to -2.18 mm

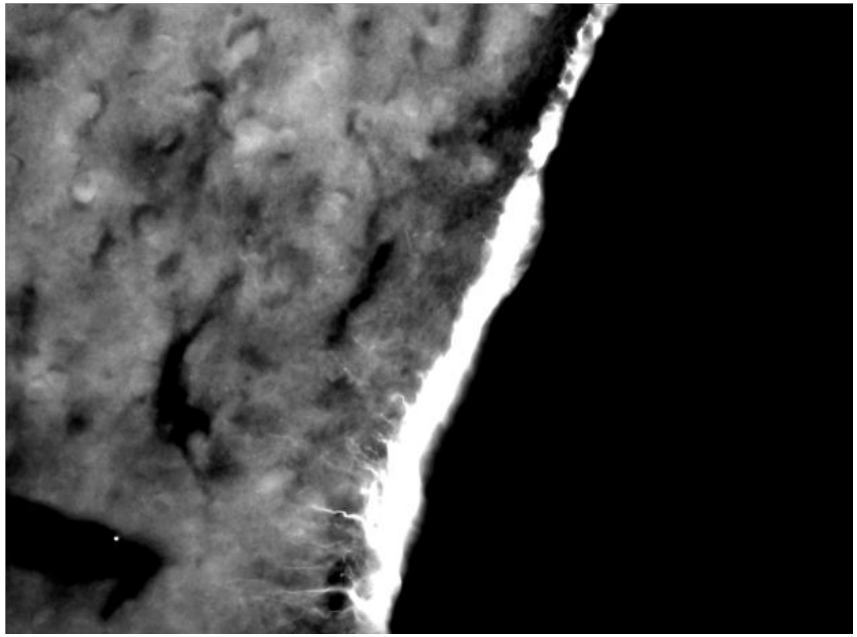




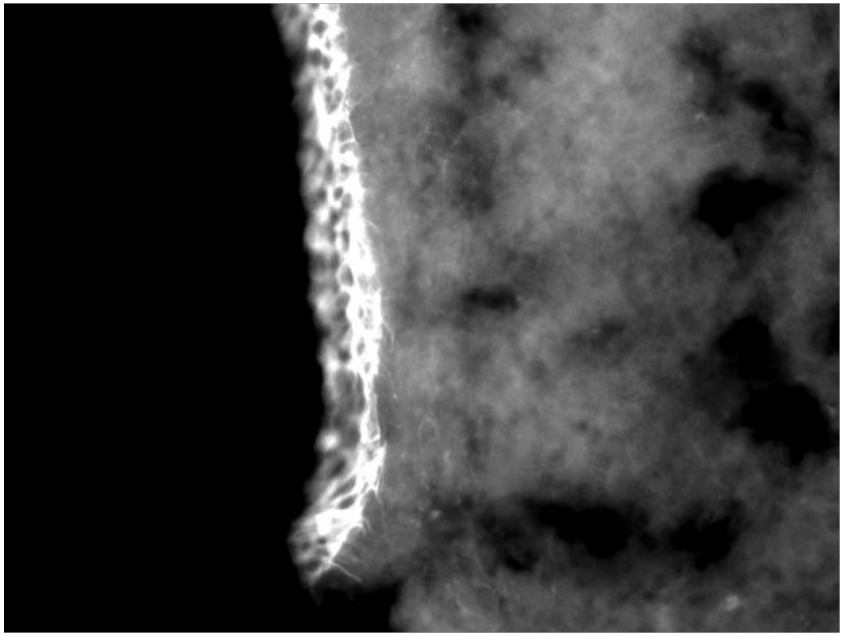
Prevot, V, Sharif, A. The polygamous GnRH neuron: Astrocytic and tanycytic communication with a neuroendocrine neuronal population. *J Neuroendocrinol*. 2022

Results

Male Sham



Male Blast



Takeaways

New Skills

- Working with fluorescent and confocal microscopes
- Developing and adapting experimental design
- Presenting complex findings to all ranges of comprehension
- Learning how to behave in a professional laboratory setting

Reflections

- Practice doesn’t always make perfect
- Asking questions is key
- Understanding past work is necessary to move forward
- Account for traffic on the beltway

Acknowledgements

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