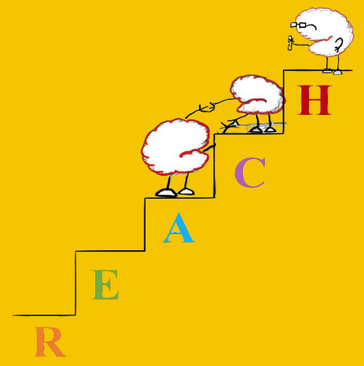

Characterization of Neuronal Connectivity in the Lupus Brain

Francis Jean-Paul, Jasmine Grant-Phillips, Marleen Orelien, Lizbeth Mendoza

Mentors: Dr. Juan Marcos Alarcon, Shokhrukh Abdulloev, and Sydney Eze

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1.Rationale

Neuroinflammation and ASD

- Autistic individuals often show signs of altered inflammatory responses and neuro-immune system abnormalities throughout life. (Lucchina and Depino, 2014)
- ASD brains show hyperconnectivity across short-range regions and hypoconnectivity across the long-range regions of the brain

Does neuroinflammation lead to hyperconnectivity within local areas of the brain and hypoconnectivity between distant regions of the brain?

Research Question

Target Areas

Nucleus Accumbens Shell (Nacc) & Dorsal Striatum (DS)

- Connection in the mesolimbic pathway (dopamine pathway)
- NAcc implicated in reward processing and learning (motivation & aversive stimuli)
- Dorsal striatum also implicated in motivational and emotional functioning

Anterior Commissure (AC)

- Long distance pathway that interconnect amygdalae across temporal lobes
- Implicated in social interaction

Goal of Research

To utilize the NZB animal model of neuroinflammation to investigate synaptic and axonal connectivity in the brain

Central Hypothesis

In the NZB mice, there will be increased levels of synaptic connectivity within the nucleus accumbens and dorsal striatum in the basal ganglia, and decreased levels of axonal connectivity across the anterior commissure.

Aims

Specific Aim 1

- To determine the level of connectivity in local circuits within the nucleus accumbens and dorsal striatum of NZB mice

Specific Aim 2

- To determine the level of connectivity across the anterior commissure of NZB mice

2. Protocol

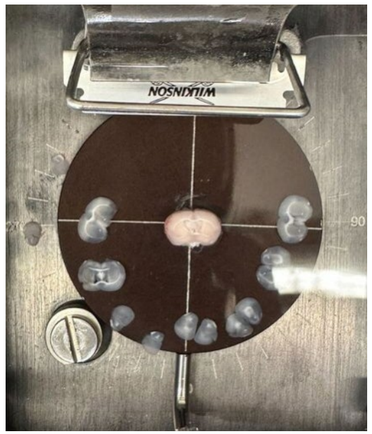
Experimental Approach

Dissection

1

Brain Slicing

2

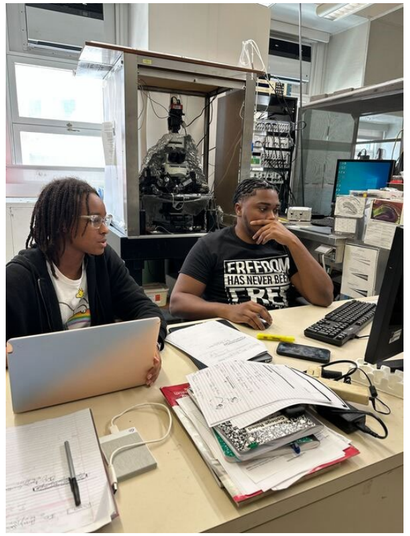


Data Acquisition

3

Analysis

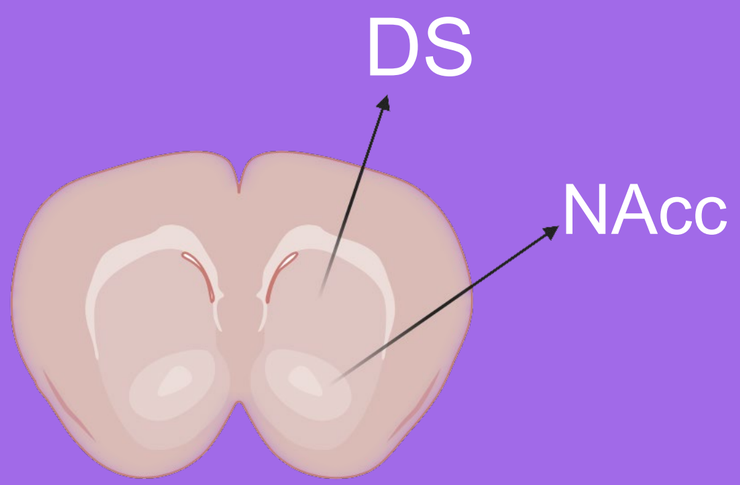
4

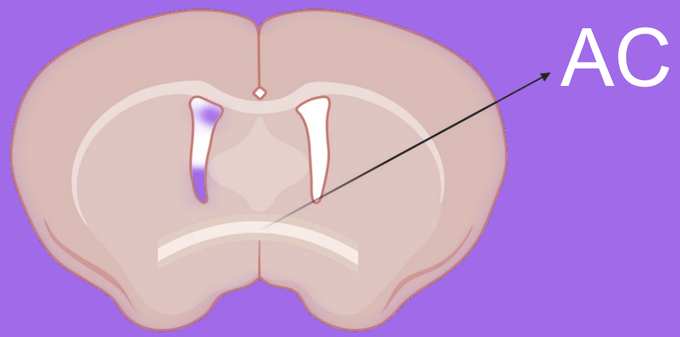


Experimental groups

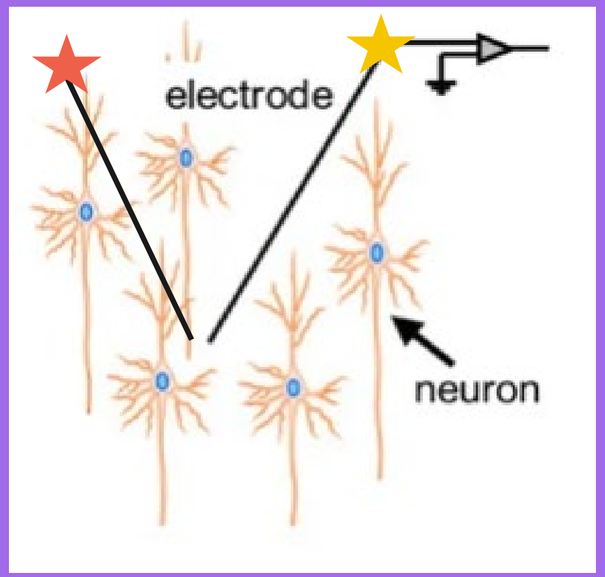
Control mice (C57BL/6): 5 female 12 week old

Lupus mice model (NZBWF1/J): 5 female 12 week old



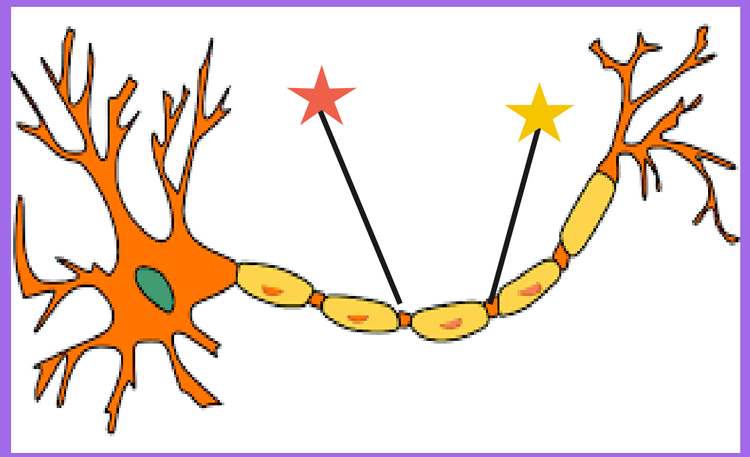


Stimulating and Recording Electrode setup



stimulating electrode

recording electrode



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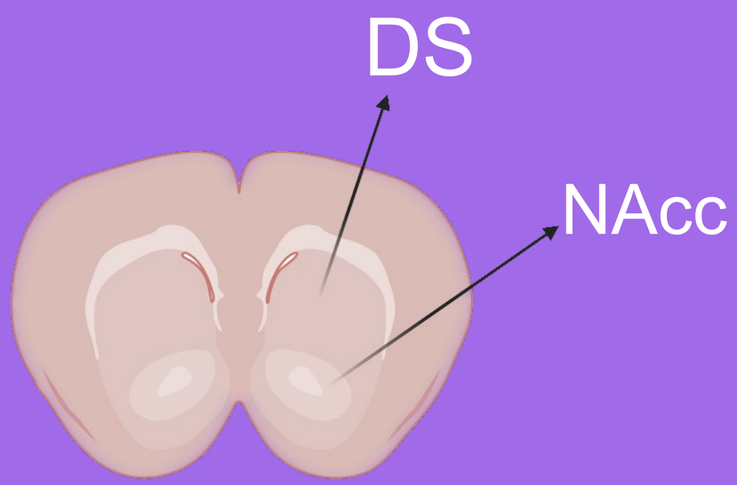
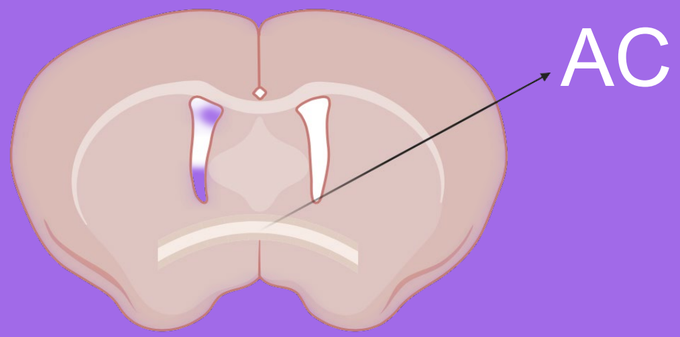
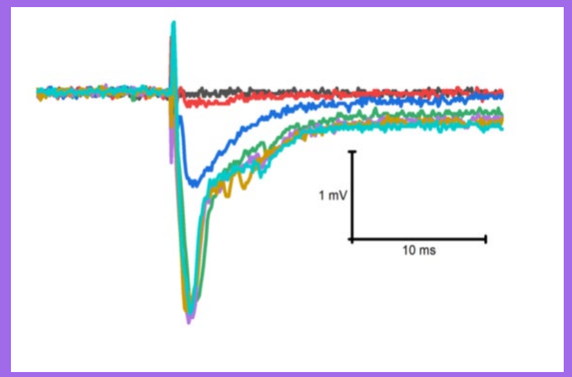


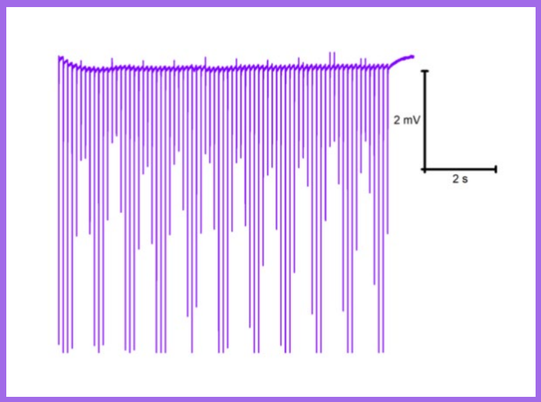


Stimulus Response Curve

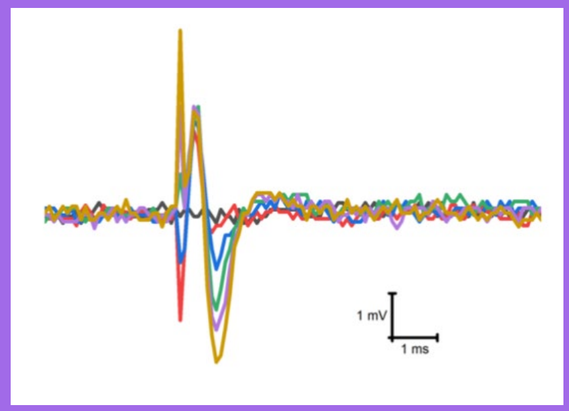


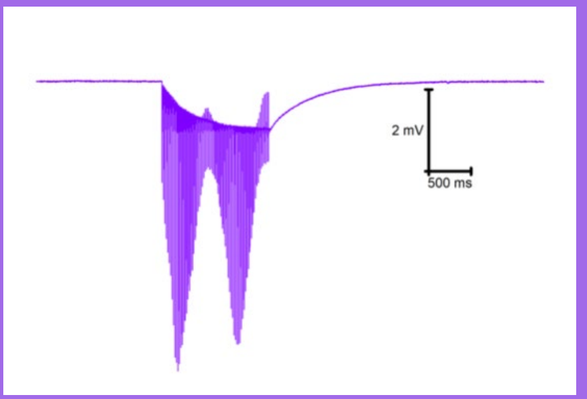
Frequency Response

8 Hz, 75 pulses



60 Hz, 75 pulses

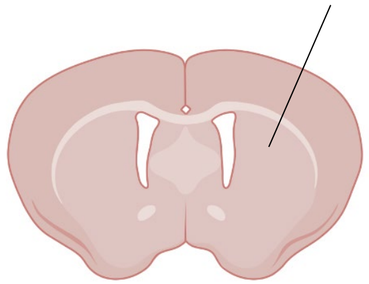


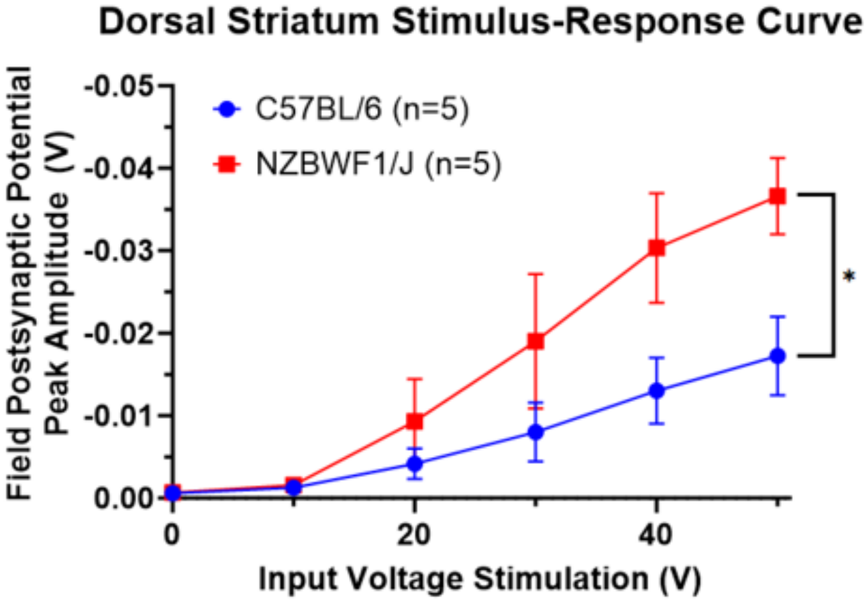


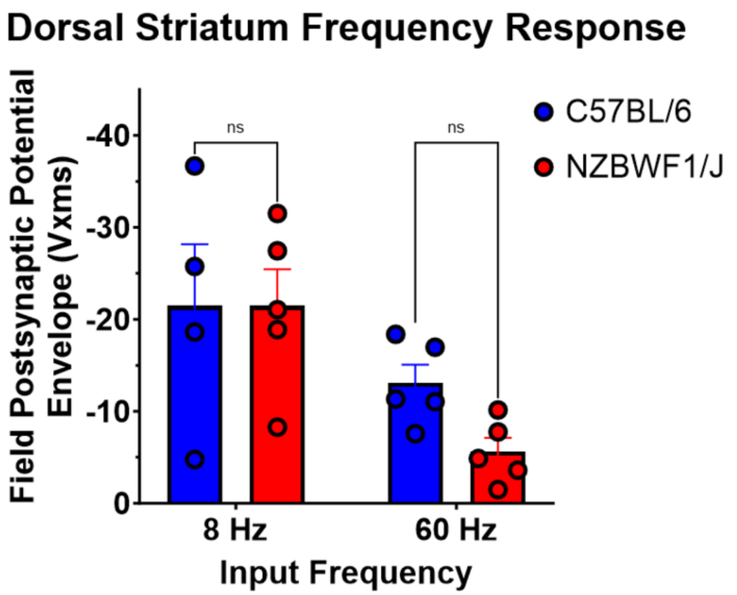
3. Findings

Hyperconnectivity in Dorsal Striatum but not Nucleus Accumbens

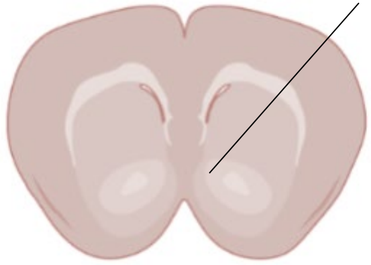
DS

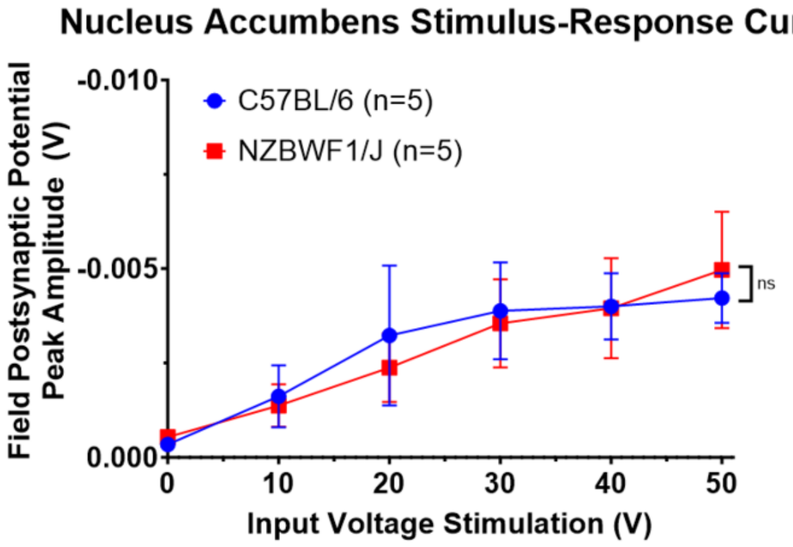


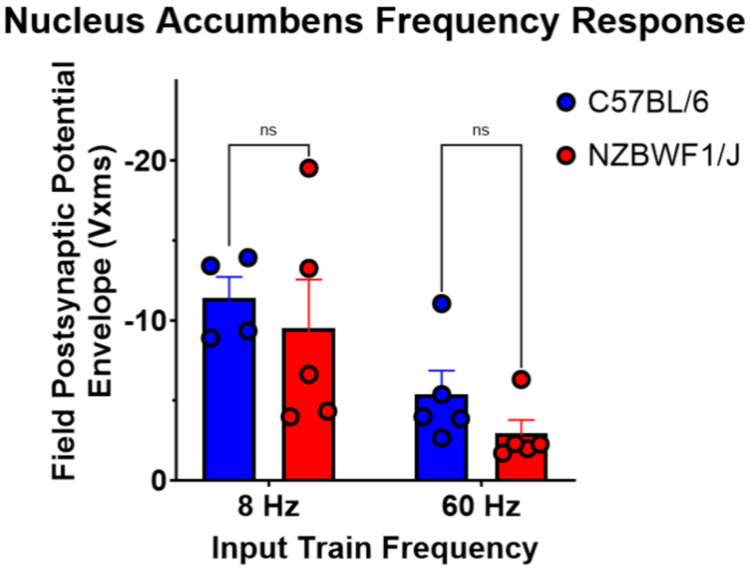




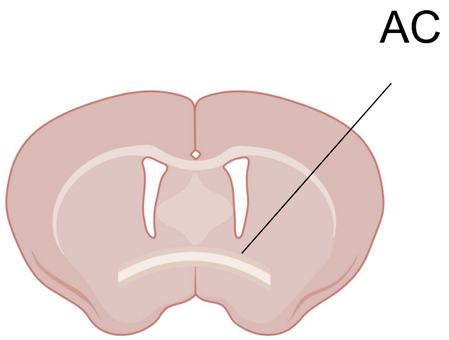
NAcc

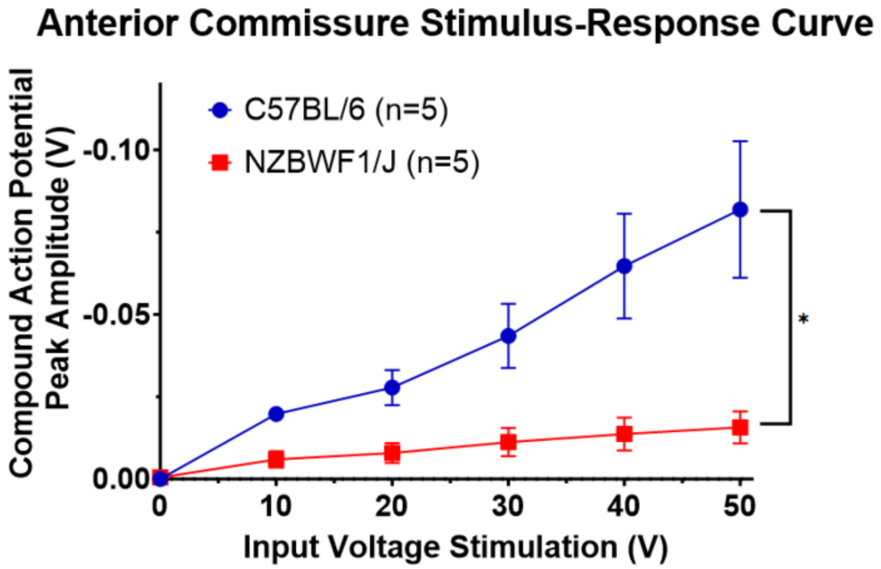


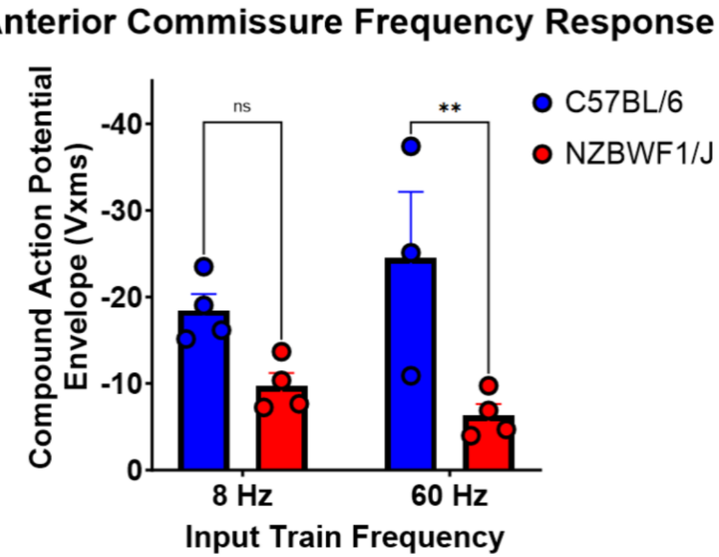




Hypoconnectivity in the Anterior Commissure







4. Interpretations

Interpretations

Findings support the hypothesis for hyperconnectivity in local circuits and hypoconnectivity in long range connections in the NZB animal model of neuroinflammation

Results suggest a connection between neuroinflammation and ASD at the functional level

Acknowledgements

Shokhrukh Abdulloev

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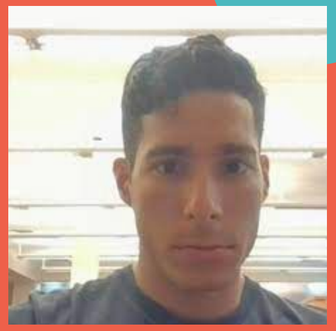
Mentor



Daniel Mishan

Program Coordinator

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Thank you!

ANY QUESTIONS?