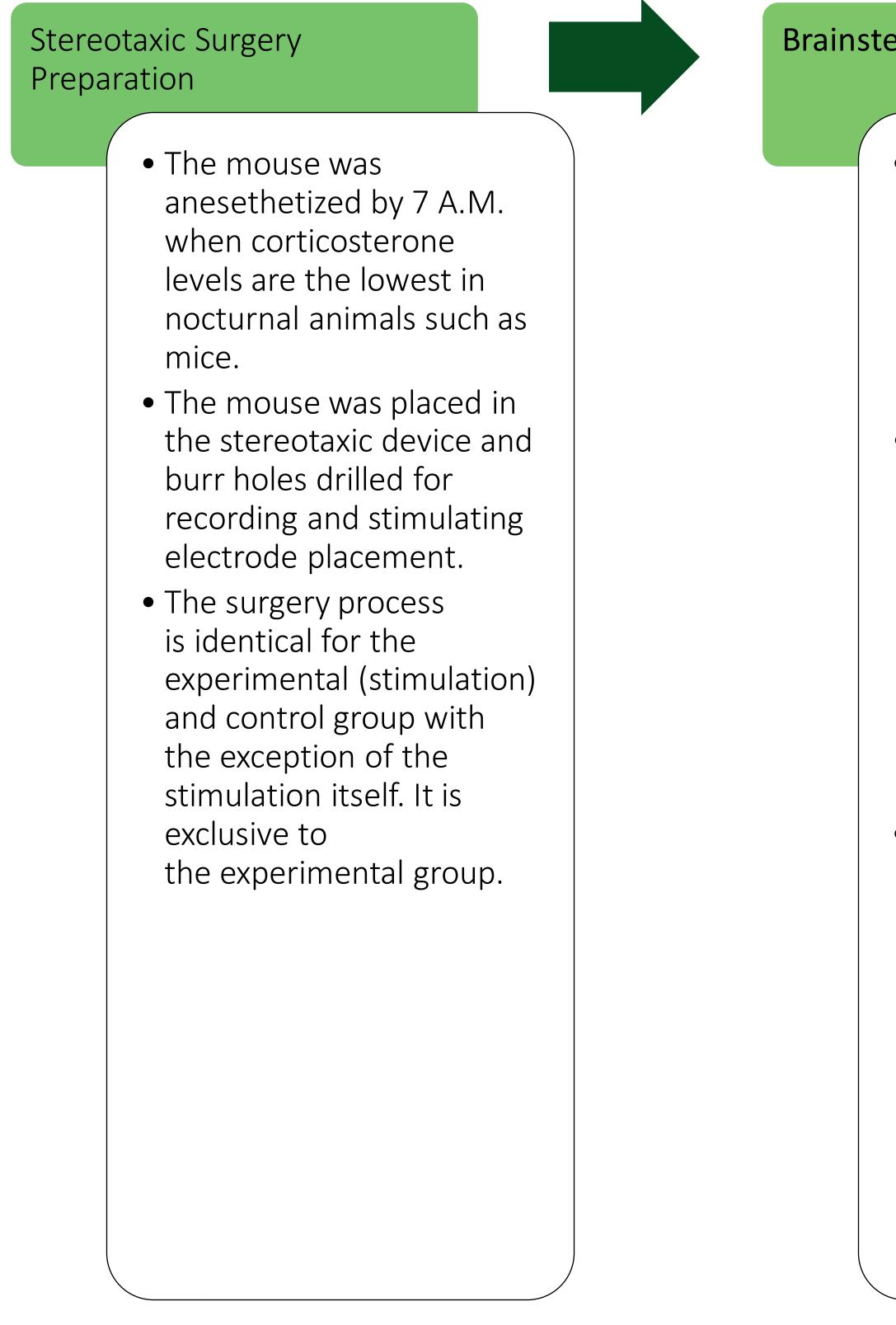
Identifying Stress Biomarkers in Mouse Serum and Cerebrospinal Fluid through Electrode-based **Brainstem Stimulation**

Abstract:

Stress is a physiological response that is unavoidable in life. Currently, the understanding of the brainstem interaction in the stress response and subsequent stress biomarker production are not clearly defined in recent literary works. This poster aims to connect the brainstem nucleus locus coeruleus to a stress response following electrode-based stimulation. We hypothesized that locus coeruleus stimulation would result in higher stress hormone production of corticosterone in mice. The cerebrospinal fluid (CSF) collected from the mice was analyzed using a mass spectrometer to detect other inflammatory compounds by Cleveland State's Analytical Chemistry Department. Samples of serum were collected and used in an enzyme-linked immunoassay (ELISA) kit to measure corticosterone levels; a product of stress responses released by the adrenal cortex. The fixed brain was later sliced via cryostat and stained on a frosted slide to confirm the accurate placement of the electrodes. The overall hypothesis for the experiment was that stimulated mice would have higher corticosterone serum levels when compared to controls (non-stimulated mice). Currently, additional cryostat slicing, staining, and ELISA assays are needed to optimize experimental results. After investigating the locus coeruleus in these stress hormone experiments, the long-term goal of the lab is to make a direct connection between the brainstem and inflammatory compounds that exacerbate cochlear auditory dysfunction.



Results:

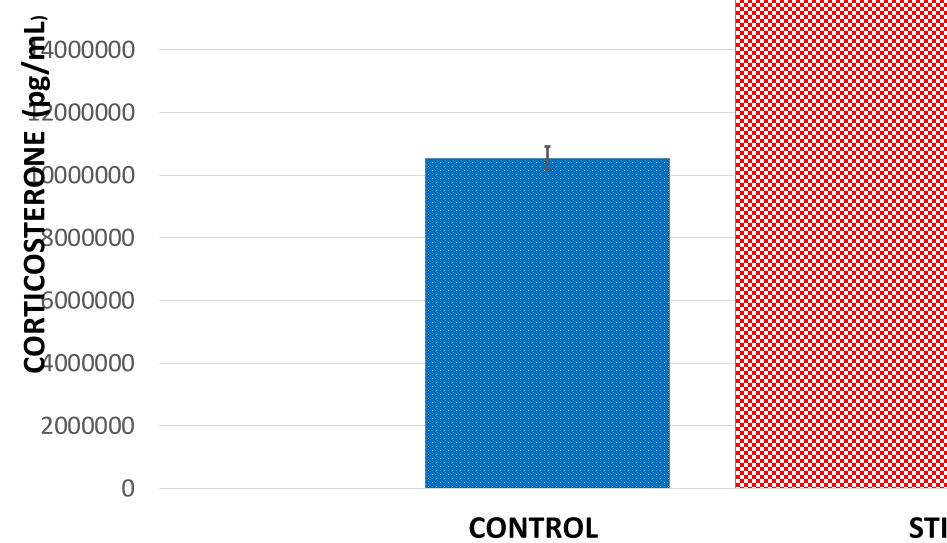
- 90% confidence interval used to analyze significance between control and stimulated mice
 - Significance confirmed by the rho value of ρ=.04 (significant ρ <.05)
- Top stained slide: Mouse #61
 - Stimulating electrode burn hole in proper location for locus coeruleus stimulation at -5.40 mm posterior location from bregma landmark.
 - Mouse atlas included to show the locus coeruleus in a coronal slice at -5.40 mm posterior from bregma.

Choose **ChioFirst**

McKenna Greene, Dr. Michael Hammonds Ph.D.

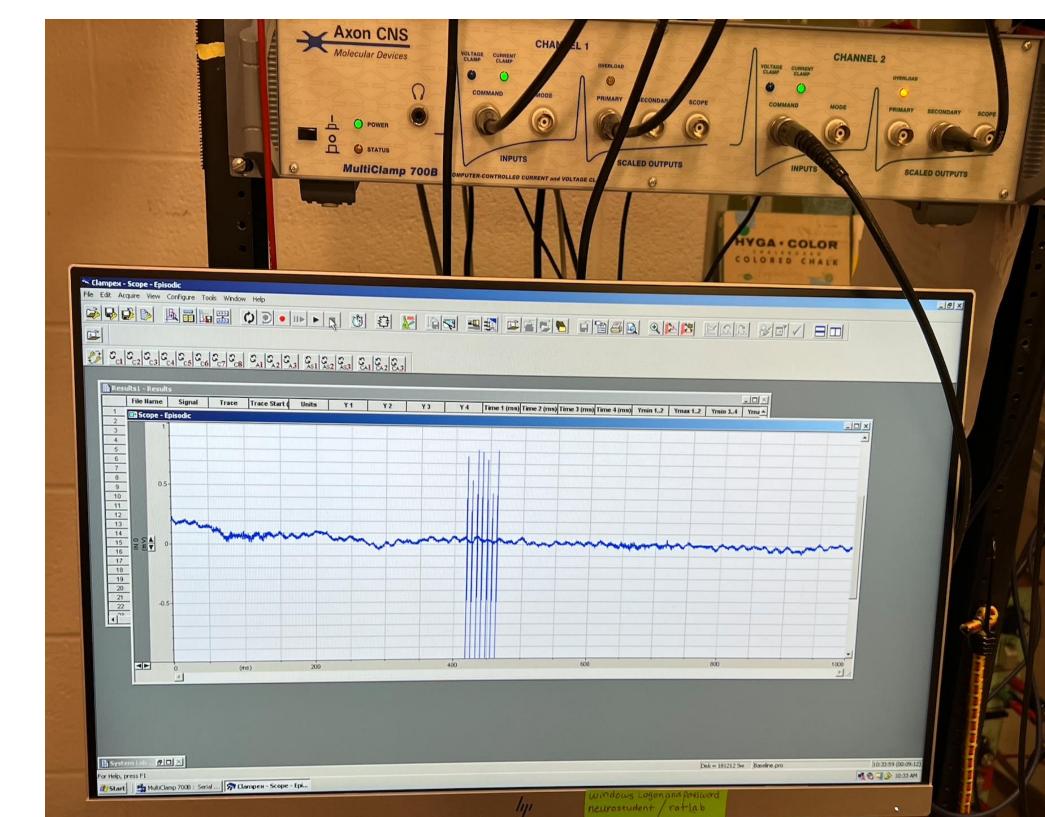


			iy dystati			
em Stin	nulation			CSF and seru	m collection	
recor elect to tar coer deter stere Brain data conn elect stimu ampl sent stimu depo the b	ttern of six .2 second biphasic es in a 50 millisec val was applied. T ern repeated ever nds at 10 volts fo	nce onds his ry 2		the A car ave 126 ext from • A si cre syri mic coll • CSF tare tub of a in a the pre	cision made t cisterna ma apillary pipe rage tip dian 5 µm was use ract cerebros m the cistern light vacuum ated with the inge and 5-10 croliters were ected. was transfe ed microcent e where a 1: acetic acid w accordance w CSF volume vent any enz gradation.	
		ELISA RESULTS: CONTROL VS STIMULATE SERUM CORTICOSTERONE				
4	20000000				I	
on for	16000000 (J 4000000 (J 6 (1600000)					



STIMULATED

Cleveland State University



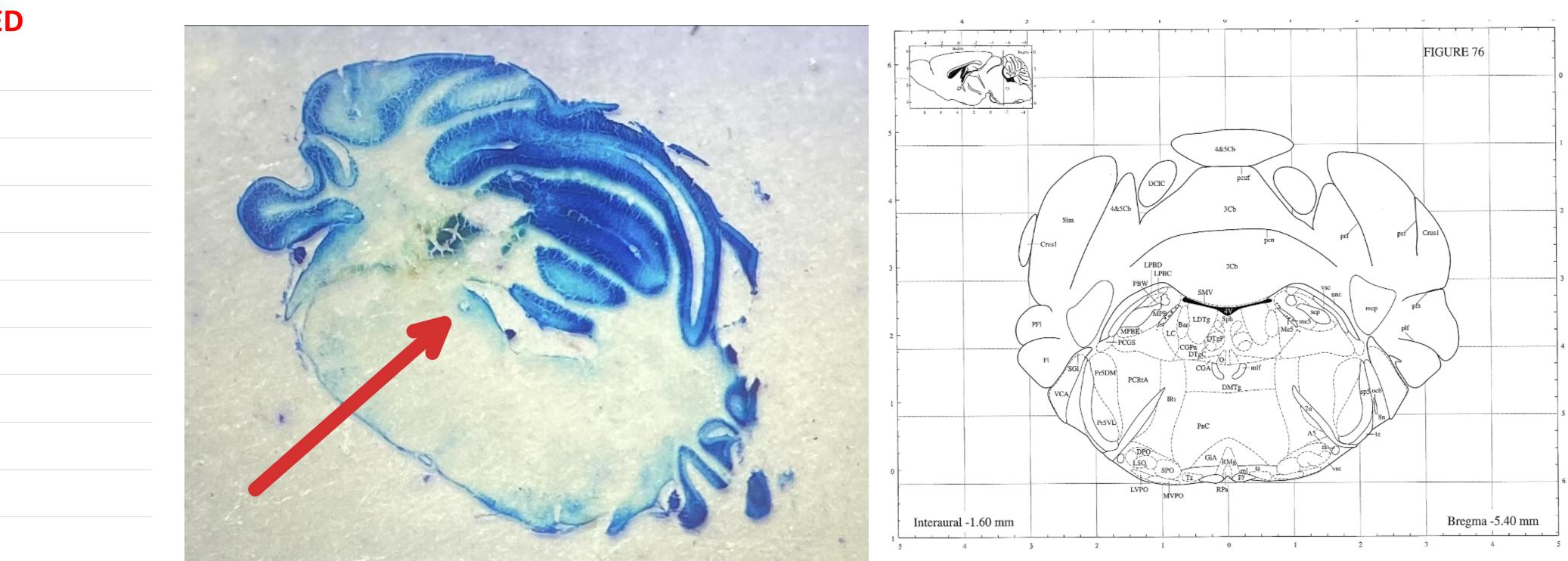
to expose agna. ette with an meter of sed to ospinal fluid na magna. n was re slowly

erred into a ntrifuge L:100 ratio vas added with 50% of e to nzymatic

Trans-cardial perfusion and brain removal

- The ventral surface of the mouse was exposed using a wax board and pins.
- Chest retractors were placed in exposed thoracic cavity and the right atrium was opened to allow blood serum collection. The blood is centrifuged and serum was used for ELISA analysis.
- A catheter was inserted into the left ventricle and isotonic saline was pushed through using a peristaltic pump.
- Peristaltic pump saline was exchanged for 10 percent buffered formalin to fix the tissues and organs.
- After fixation, the brain and brainstem were dissected from the cadaver and archived.

ED







 Confirmation of proper electrode stimulation is determined using stained slides containing brain slices. Electrolytic burn tracks of electrodes verify correct placement. Serum corticosterone levels were determined using an enzyme-linked immunoassay (ELISA) kit. The stimulated mice were compared to the control mice by serum corticosterone concentration levels (pg/ml). Mouse CSF was transferred to the Analytical Chemistry Department to determine if the CSF contained any stress biomarkers using ultrasenstive mass spectrometry. 	