

# Identification of Compounds that Modulate Ependymal Cell Cilia Beat Frequency

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 STEP Project Category: Undergraduate Research  
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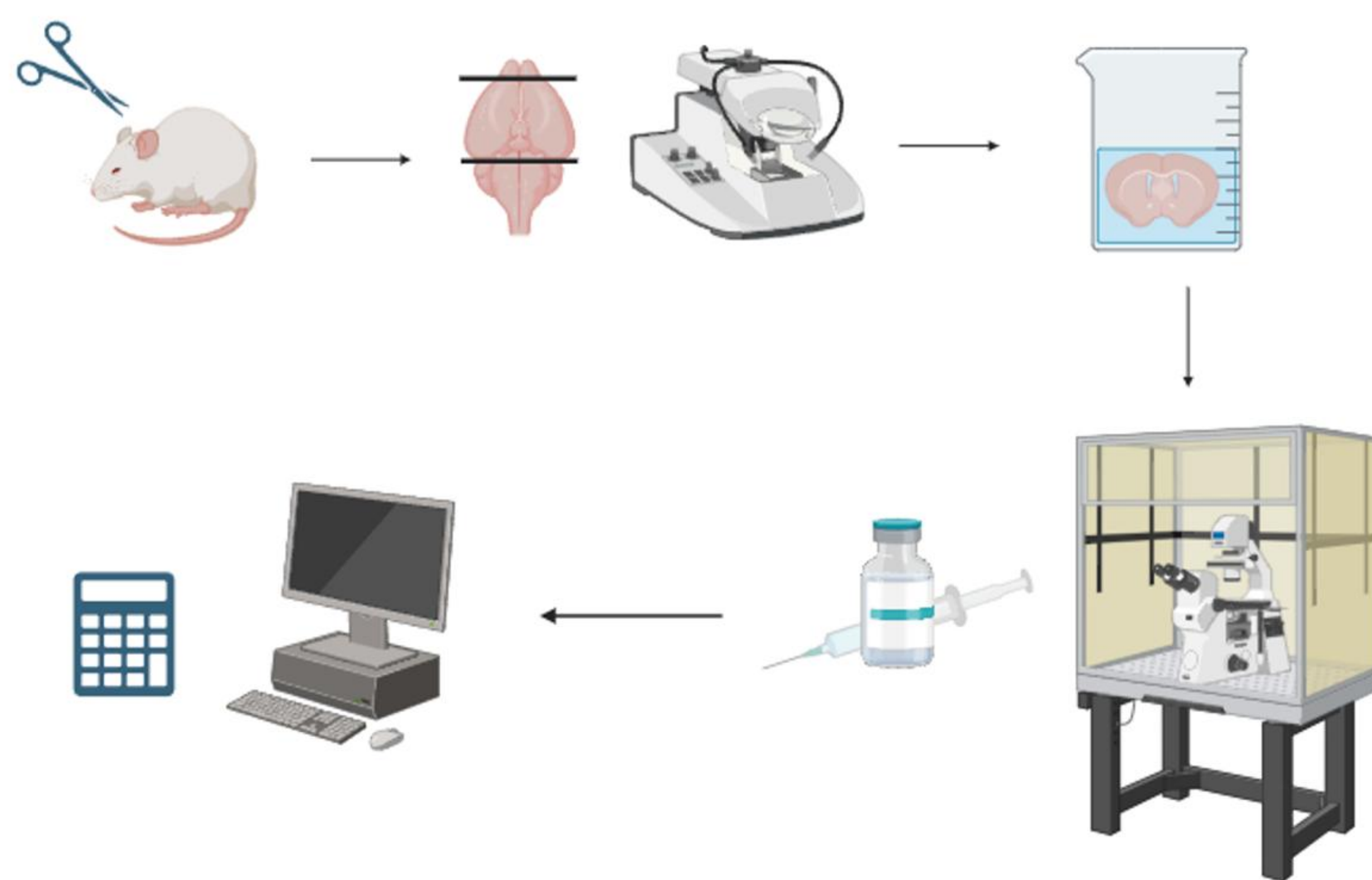
## Project Motivation

Wanting to get more involved in research, I used STEP to focus on undergraduate research. My project is a collaboration project between Dr. Candice Askwith's and Dr. Kirk Mykytyn's labs.

## Background

Ependymal cells line the ventricles within the brain and contain motile cilia. The beating of these cilia contribute to near wall flow networks of the cerebrospinal fluid. The cerebrospinal flow networks have been shown to have altered flow patterns under different conditions. These flow networks could be involved in the pathology and physiology of conditions such as hydrocephalus, mood disorders, and traumatic brain injury. Which has led our lab to hypothesize that ependymal cell cilia are sensory organelles that respond to their environment. This project specifically looks at identifying compounds that modulate the beat frequency of the ependymal cilia.

## Methods

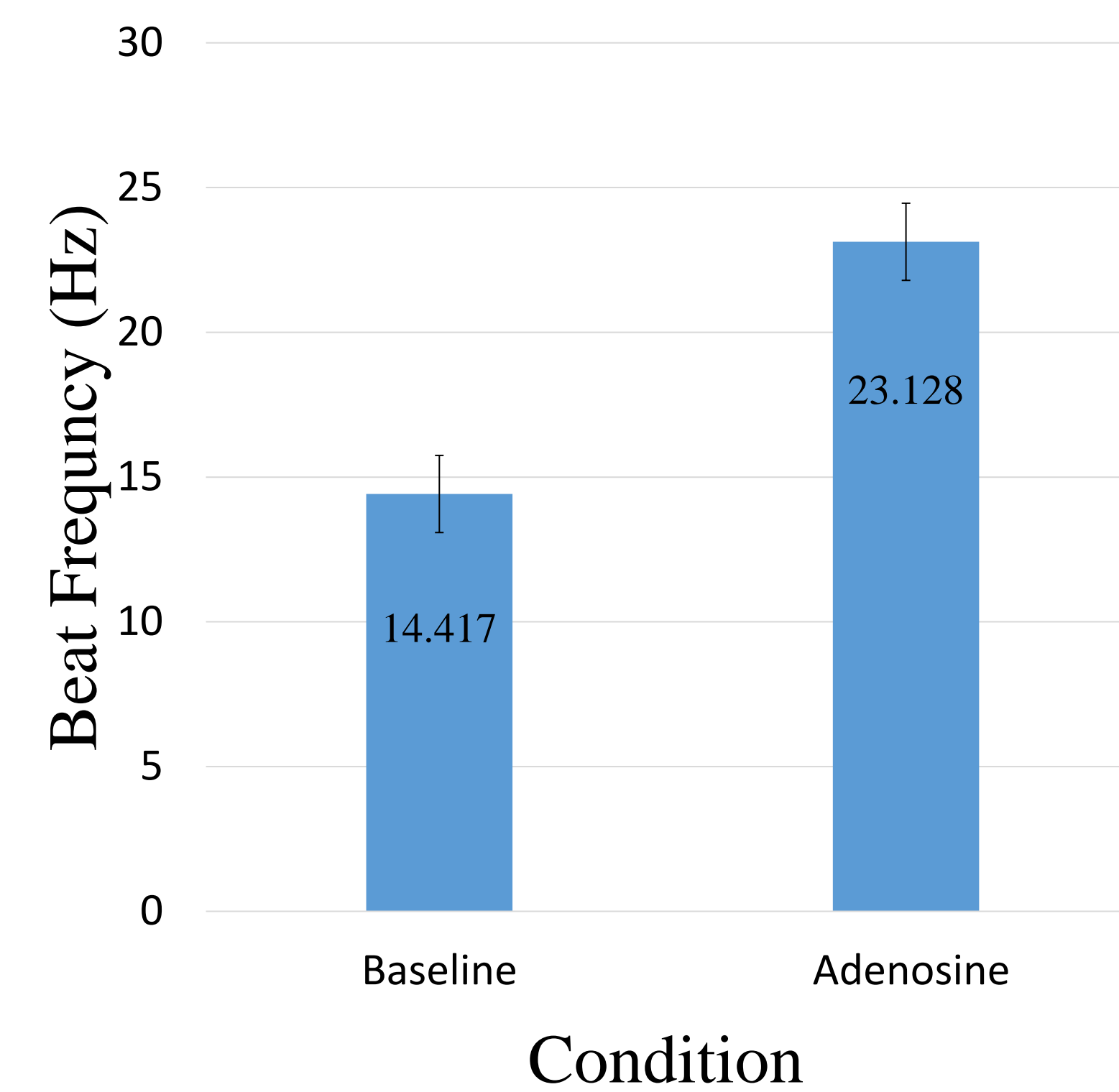


## Data Analysis

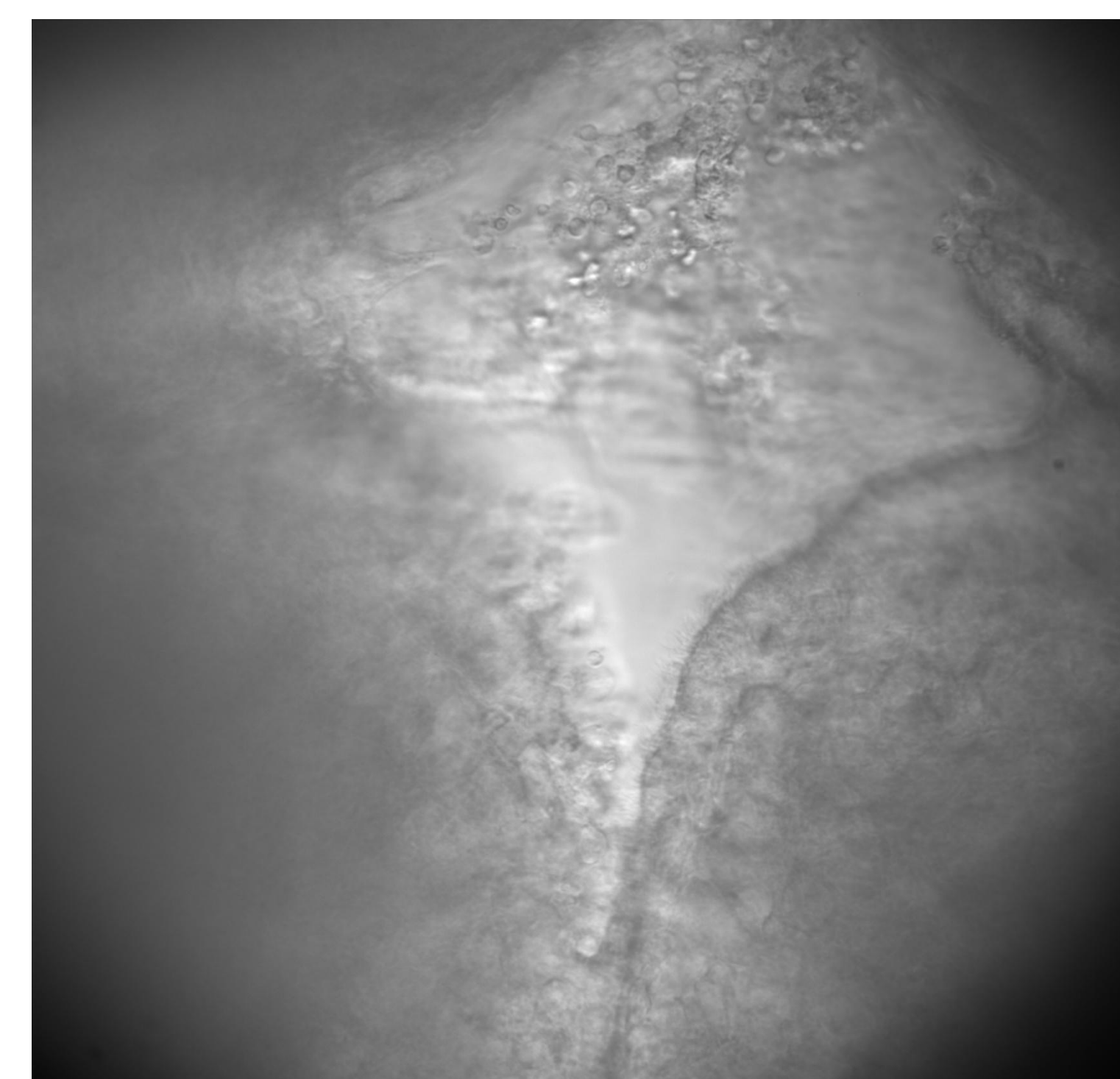
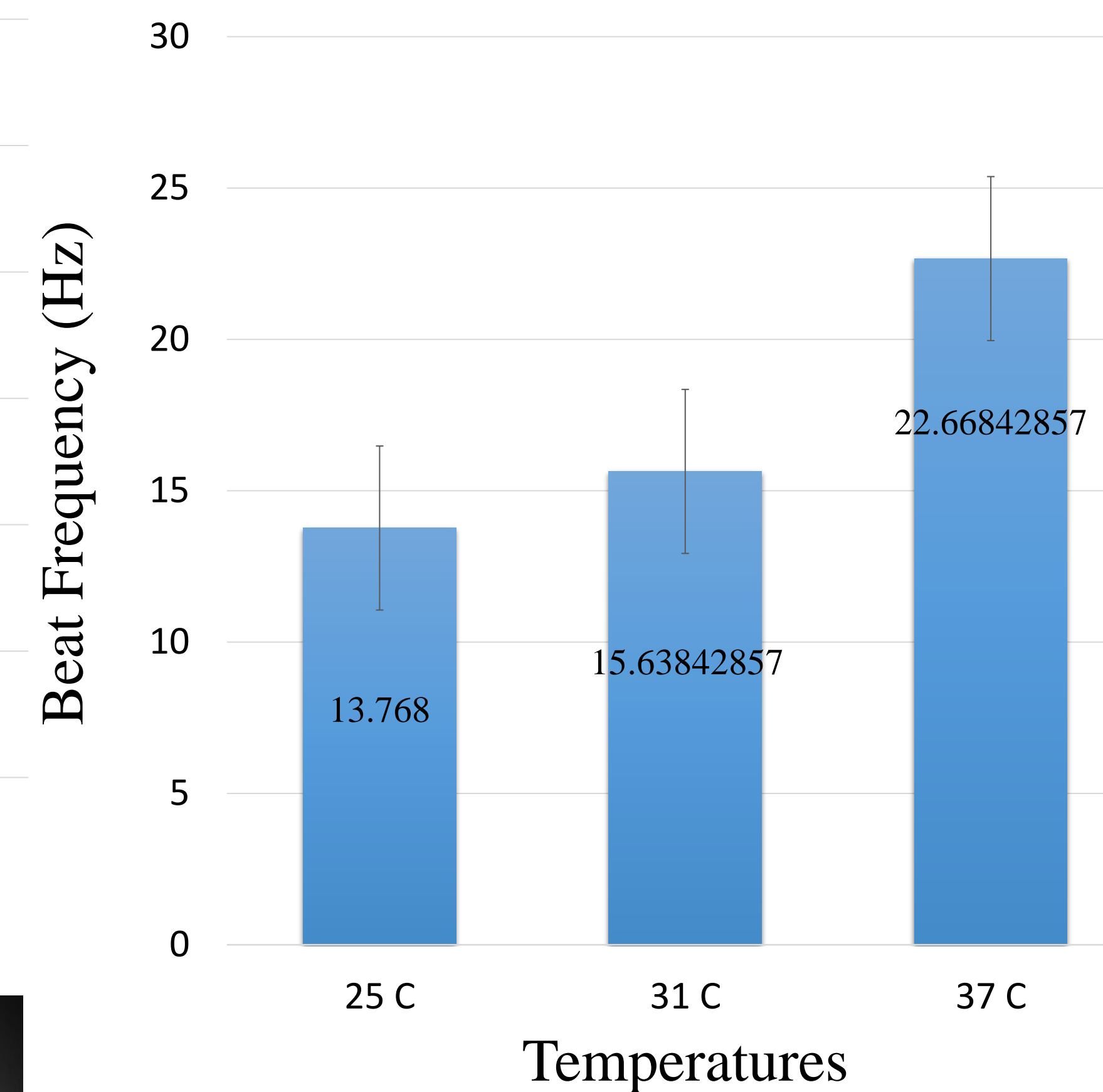
$$\frac{1000}{(XY)} = \text{Hz/sec}$$

X= # of frames in one beat cycle  
 Y= # of ms between each frame

Beat Frequency in Adenosine



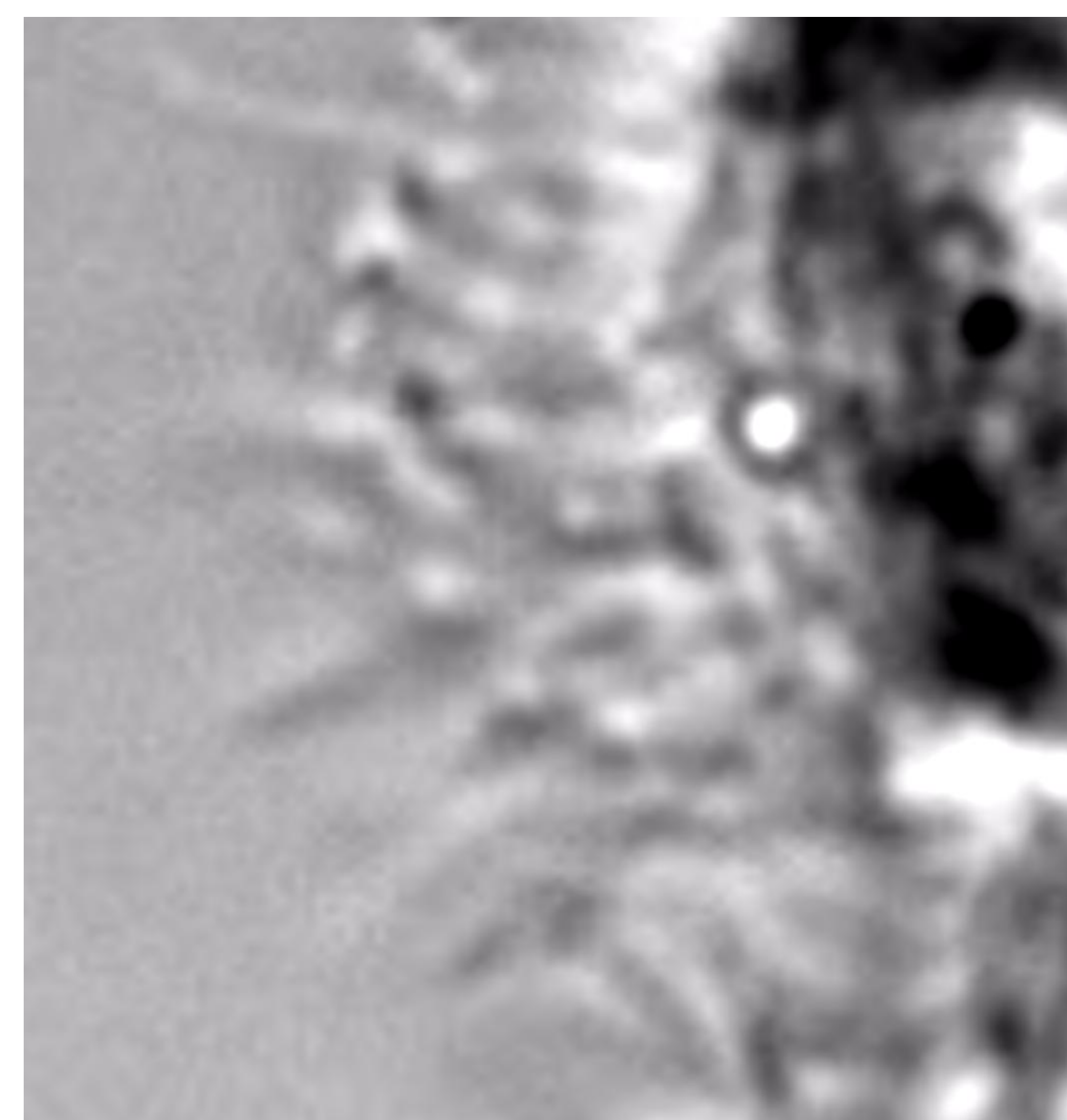
Beat Frequency in Varying Temperatures



Brightfield image of the dorsal 3rd ventricle at 40x



Brain slices recovering before imaging



Cilia on the wall of the lateral ventricle from a quantified video

## Next Steps

Now that the methods and techniques have been verified, the application of novel compounds can be quantified. Compounds and targets of interest are GABA, Prosaposin, pH gradients, and LPA.

## Reflection

Through this project, I was able to work independently and collaboratively on different aspects of the scientific method. This has allowed me to learn the determination, communication, and critical thinking skills associated with research. These skills are critical for careers in research, and learning these skills now is great preparation for when I attend graduate school.

## Acknowledgements

Special thanks to the following contributors: Dr. Candice Askwith and Dr. Kirk Mykytyn, Co-Principal Investigators who are overseeing the project. Cameron Ford, current PhD candidate, who is helping to test novel compounds on the project. Brandon Jones an undergrad who worked to help verify the methods and techniques.



Lab members on Halloween