

Elevated Neural Activity of Prelimbic Cortex During Threat Anticipation in California Mice

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Introduction

- 1 in 4 people tend to develop an anxiety disorder in early-life.
- Threat anticipation is a core symptom in those with anxiety and depressive disorders.
- Females are more susceptible to developing anxiety and depressive disorders than males.
- Brain regions involved like amygdala, bed nucleus of the stria terminalis, and the medial prefrontal cortex have been implicated in processing of fear memories.
- Behavior and neural activity of threat anticipation is not yet well understood.

Prelimbic Cortex Significance:

- The prelimbic cortex (PL) and infralimbic cortex (IL), regions within the medial prefrontal cortex, have shown to differentially respond to stressful events.
- Specifically, PL has shown to be more active while anticipating a threat and less active during an active threat.

Why California Mice?



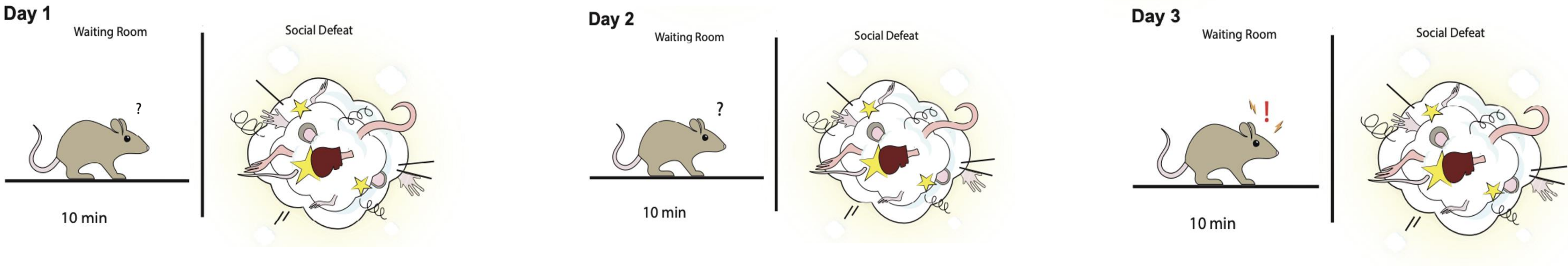
- Both male and female California mice show aggression when defending their territories allowing social defeat stress to be examined in both sexes.
- They are a pair-bonded species making them a good model for resident intruder tests (e.g. social defeat).
- They have an extended adolescent period making them suitable for examining the emergence of anxiety-like behaviors.
- Social defeat stress has shown to decrease social interactions in females but not males allowing us to examine sex differences of social stress.

Method:

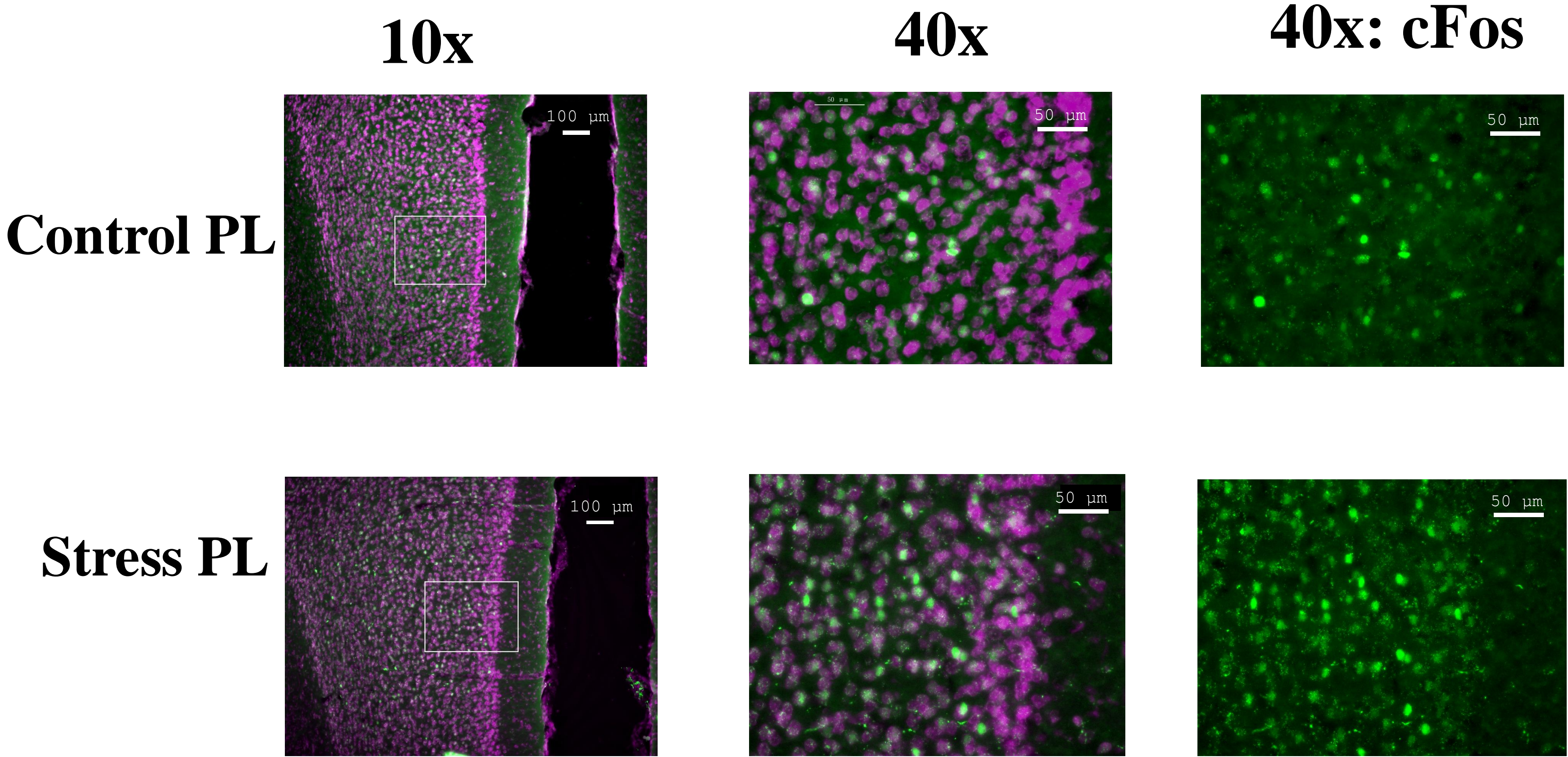
Animals

- Total of 16 male *Peromyscus californicus* mice were used in this study.
- There were 6 control animals (n = 6) and 10 experimental animals (n = 10).
- Animals are maintained on a 16:8 hr light-dark cycle where food and water was not restricted.
- All procedures were reviewed and approved by the Institutional Animal Care and Use Committee (IACUC) at University of California, Davis.

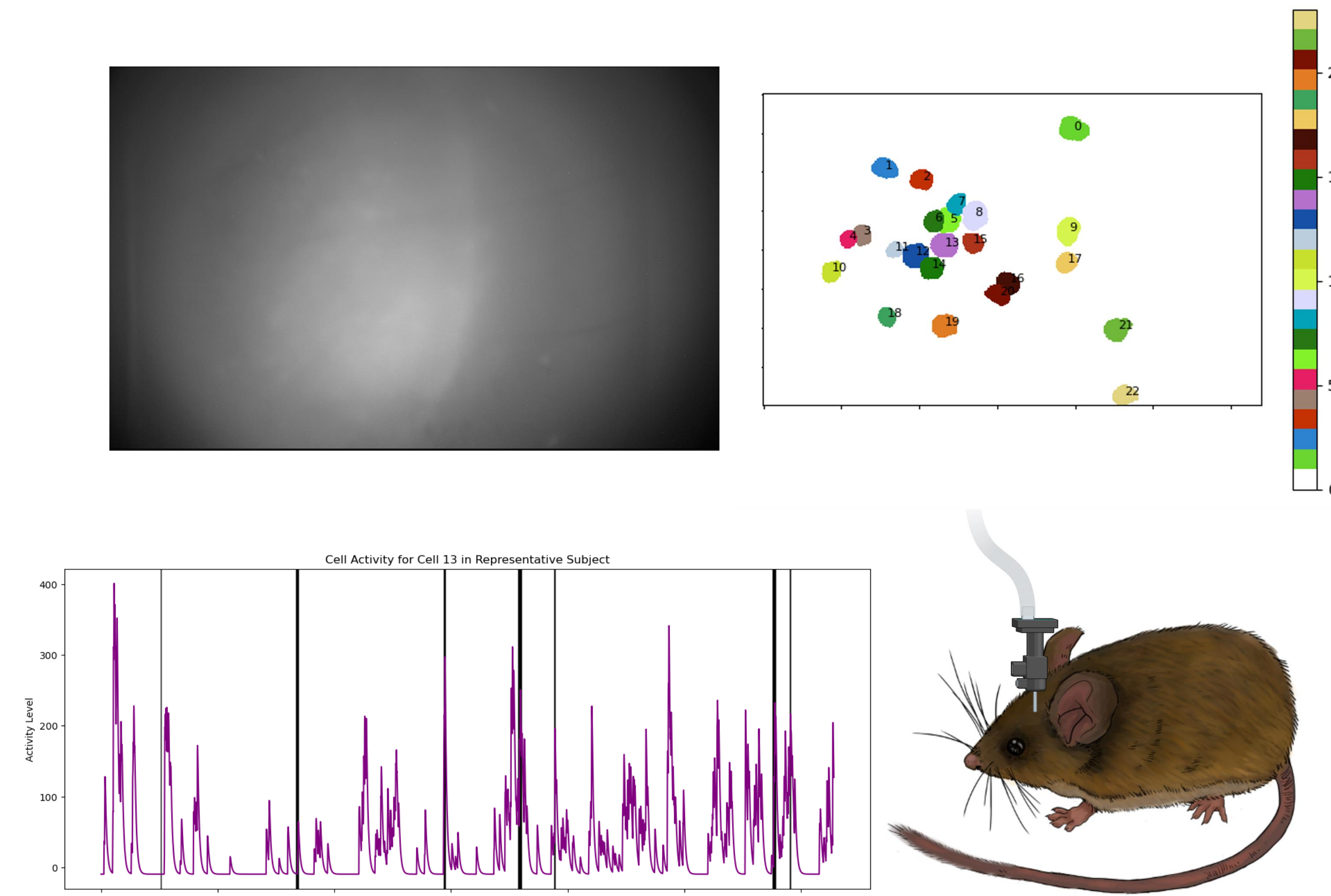
Threat Anticipation Task: The Waiting Room



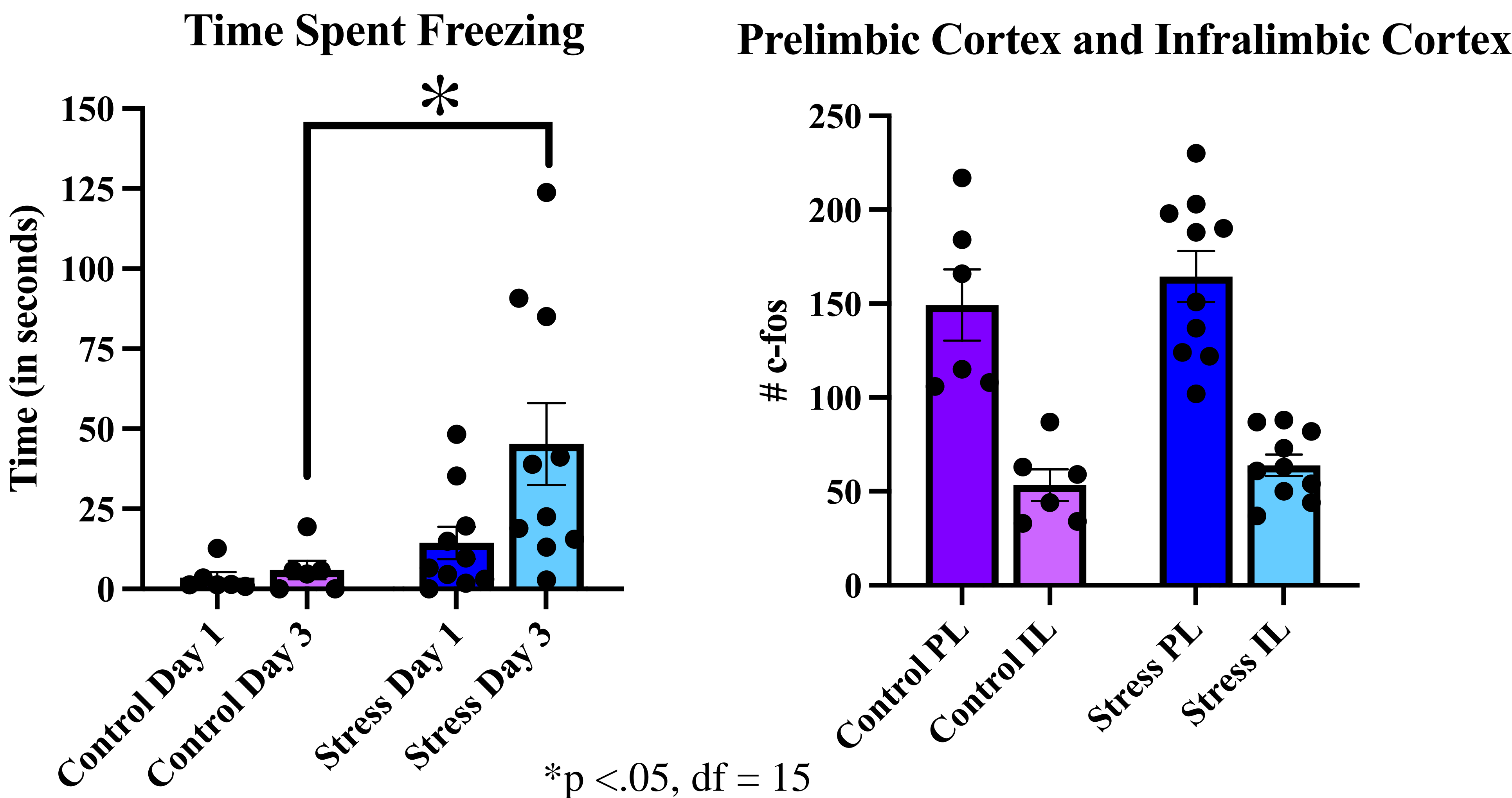
The Waiting Room: Prelimbic cFos Microscopy



Future Directions: Inscopix



Behavioral Analysis and cFos of Prelimbic Cortex:



Interpretation

- Freezing levels increased on day 3 of the waiting room compared to controls.
- The results of this study show no differences in PL cFos activity while anticipating threat.
- Although freezing levels are increased and there are no differences in cFos, this suggests that the temporal dynamics of PL may be better captured using devices with higher temporal resolution.