# The Impact of Developmental Serotonin (5-HT) on Prefrontal Parvalbumin Excitability

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## Introduction

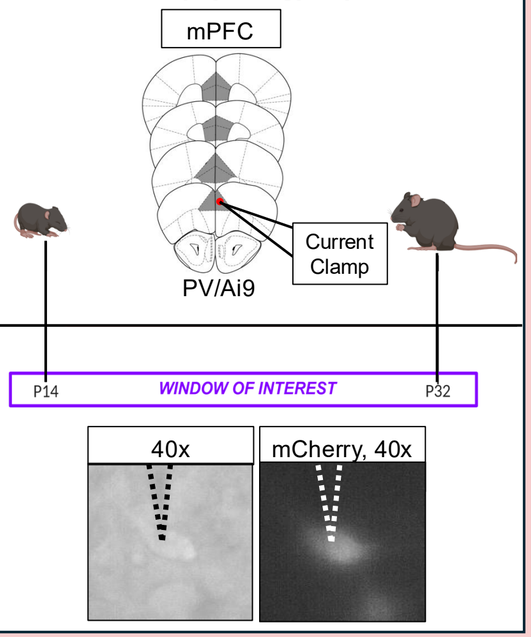
- Experiences or exposures occurring during windows of early life shape patterns of cortical connectivity impacting behavior later in life.[1]
- One way by which experiences can alter neural connectivity is by changing cellular activity.
- For example, in rodents, suppression of prefrontal parvalbumin-expressing (PV) interneuron activity during a postnatal window of development (P14-32) results in PFC-dependent cognitive flexibility impairments later in life.[2,3]

***What factors regulate the activity of developing prefrontal parvalbumin interneurons?***

- The neuromodulator serotonin (5-HT) may be one factor impacting developing PFC PV cell activity:
  - 5-HT produces effects on PFC PV cell activity in adulthood.[4,5]
  - 5-HT projections densely innervate the PFC from birth.[6]
  - 5-HT receptors are present in the PFC early in development.[7-9]

## Methods

***Slice Electrophysiology Experiment***




## Results

***Figure 1: 5-HT promotes excitability of developing PFC PV interneurons.***

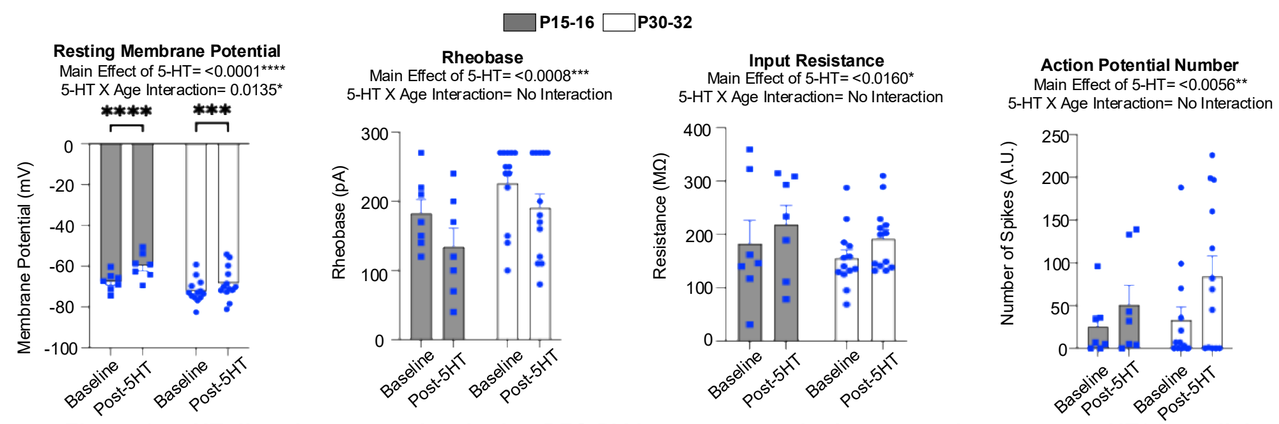
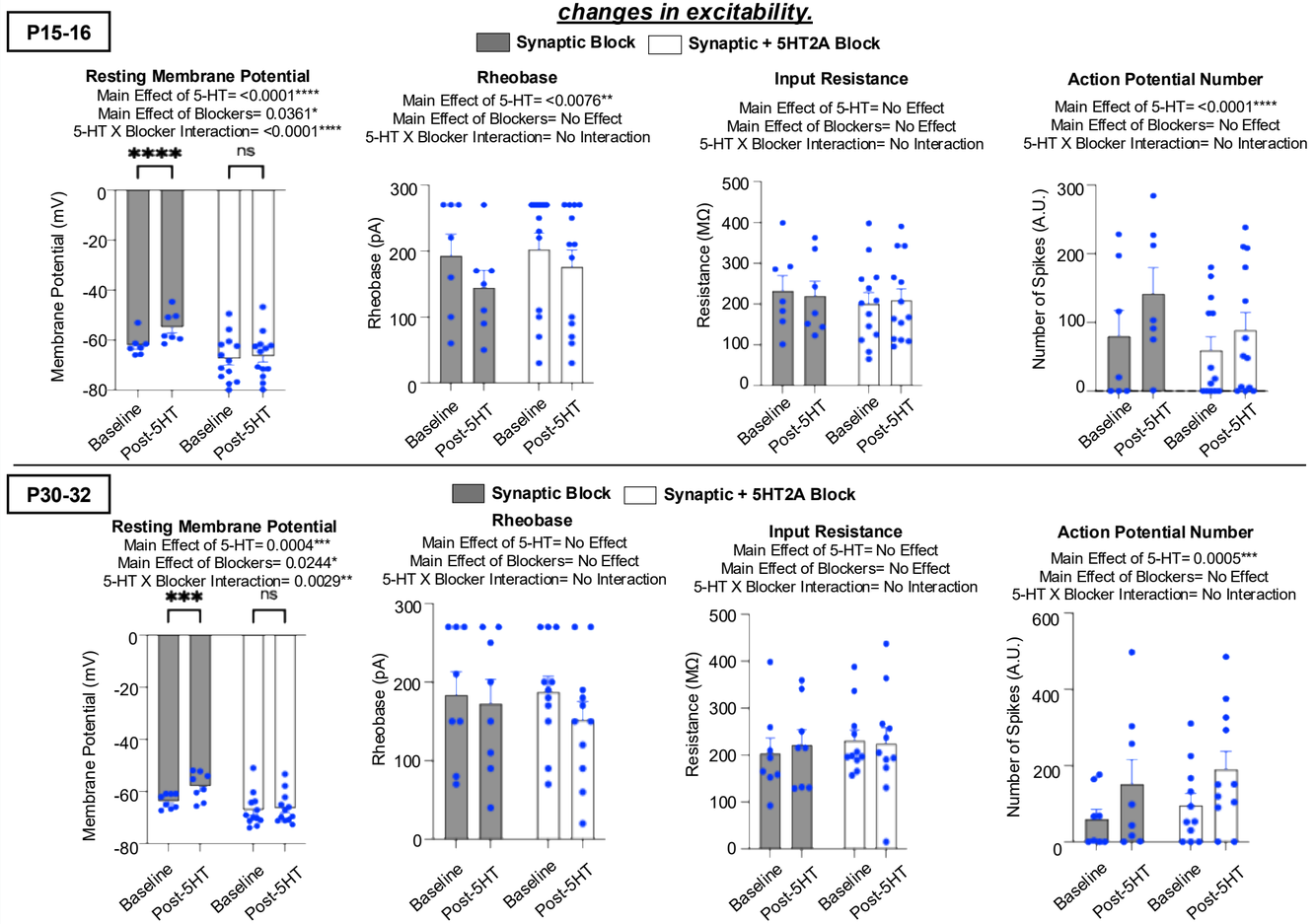



***Figure 2: 5-HT directly acts on developing PFC PV interneurons via the serotonin receptor 5-HT2A to elicit changes in excitability.***




## Results

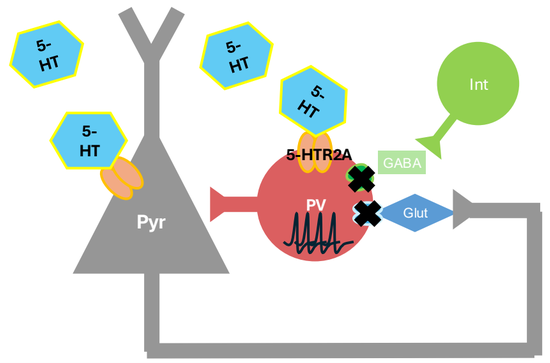
**Figure Legends:**

**Figure 1:** 5-HT promotes excitability of developing PFC PV interneurons. (A) Resting membrane potential is depolarized upon 5-HT bath application in both ages. 2-way ANOVA. (B) Rheobase is increased upon 5-HT bath application in both ages. 2-way ANOVA. (C) Input resistance is increased upon 5-HT bath application in both ages. 2-way ANOVA. (D) 5-HT increases the total number of action potentials in PFC PV interneurons. 2-way ANOVA.

**Figure 2:** 5-HT promotes excitability in the presence of synaptic blockers AP5, CNQX and Bicuculline and this effect is ablated upon blockage of receptor 5-HT2A using MDL100907. (A-D) Excitability measurements of PFC PV interneurons upon 5-HT bath application in the presence of blockers at P15-16. 2-way ANOVA. (F-H) Excitability measurements of PFC PV interneurons upon 5-HT bath application in the presence of blockers at P30-32. 2-way ANOVA.

## Summary

5-HT promotes 5-HT2A receptor-mediated excitability in developing PFC PV interneurons.

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Conflict of interest: The authors declare no conflict of interest.

## References