

Effect of P2Y1 Receptor Knockout on Astrocyte Calcium Signalling



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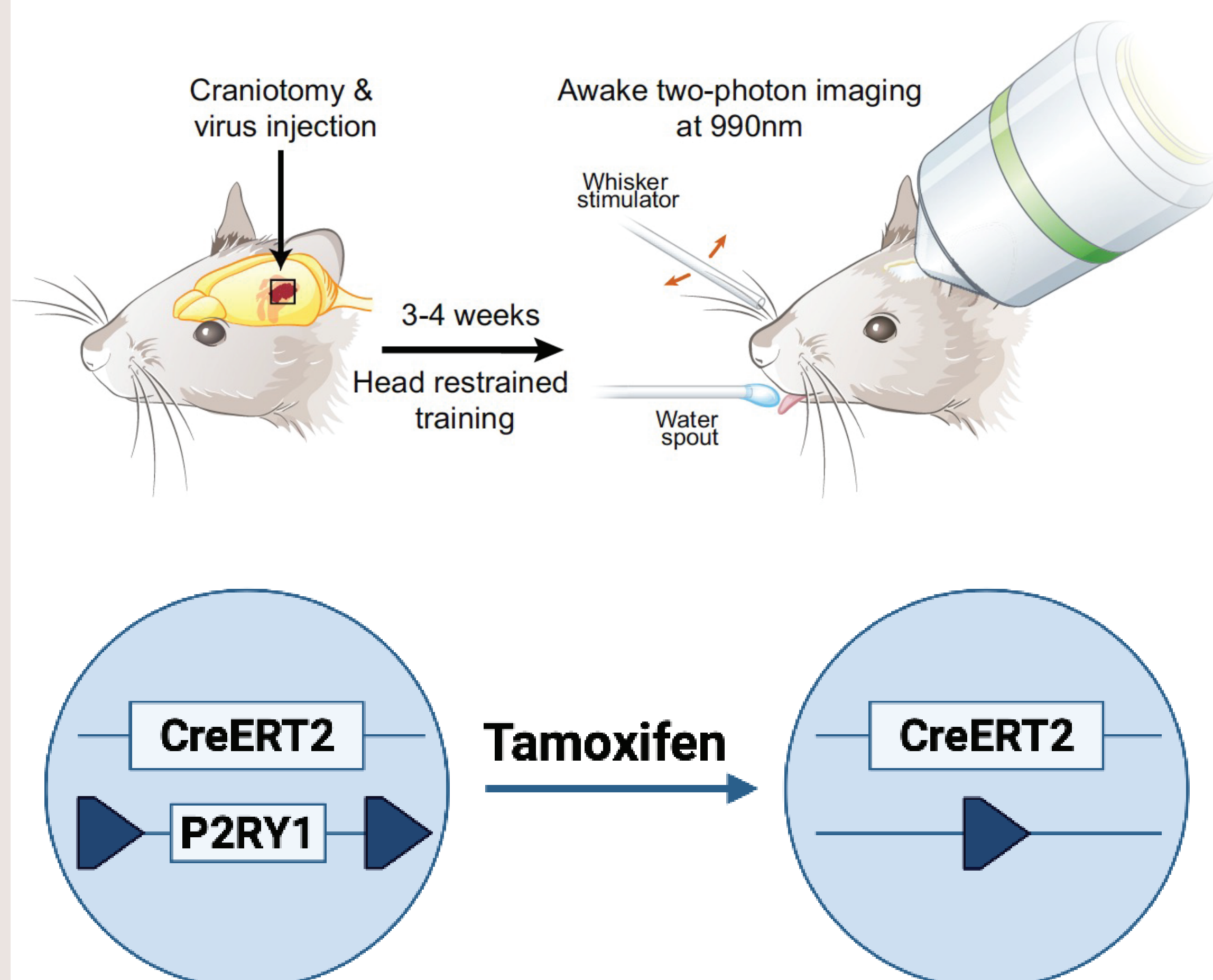
Introduction

- Astrocytes are the most abundant cell type in the brain¹.
- These cells have a diverse role within the normal functioning of the nervous system.
- Astrocytes help regulate the signaling of nearby neurons².
- Astrocyte signaling is largely dependant on Ca^{2+} .

Hypothesis

Knocking out the P2Y1 receptor affects Ca^{2+} signaling within astrocytes and neighbouring neurons

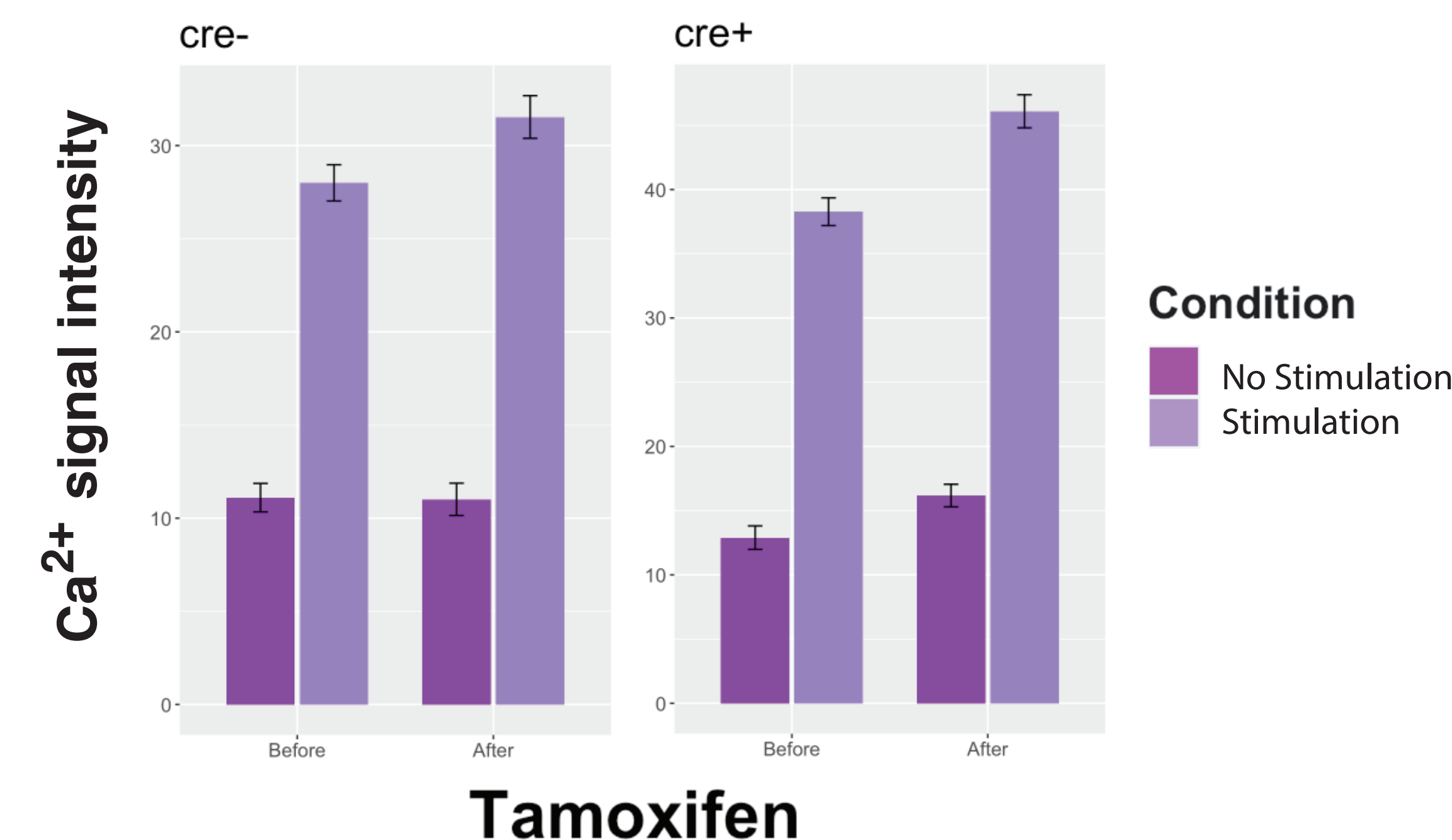
Methods



Results

Neurons

Figure 1. Neuronal calcium response to whisker stimulation before and after P2Y1 receptor knockout



Astrocytes

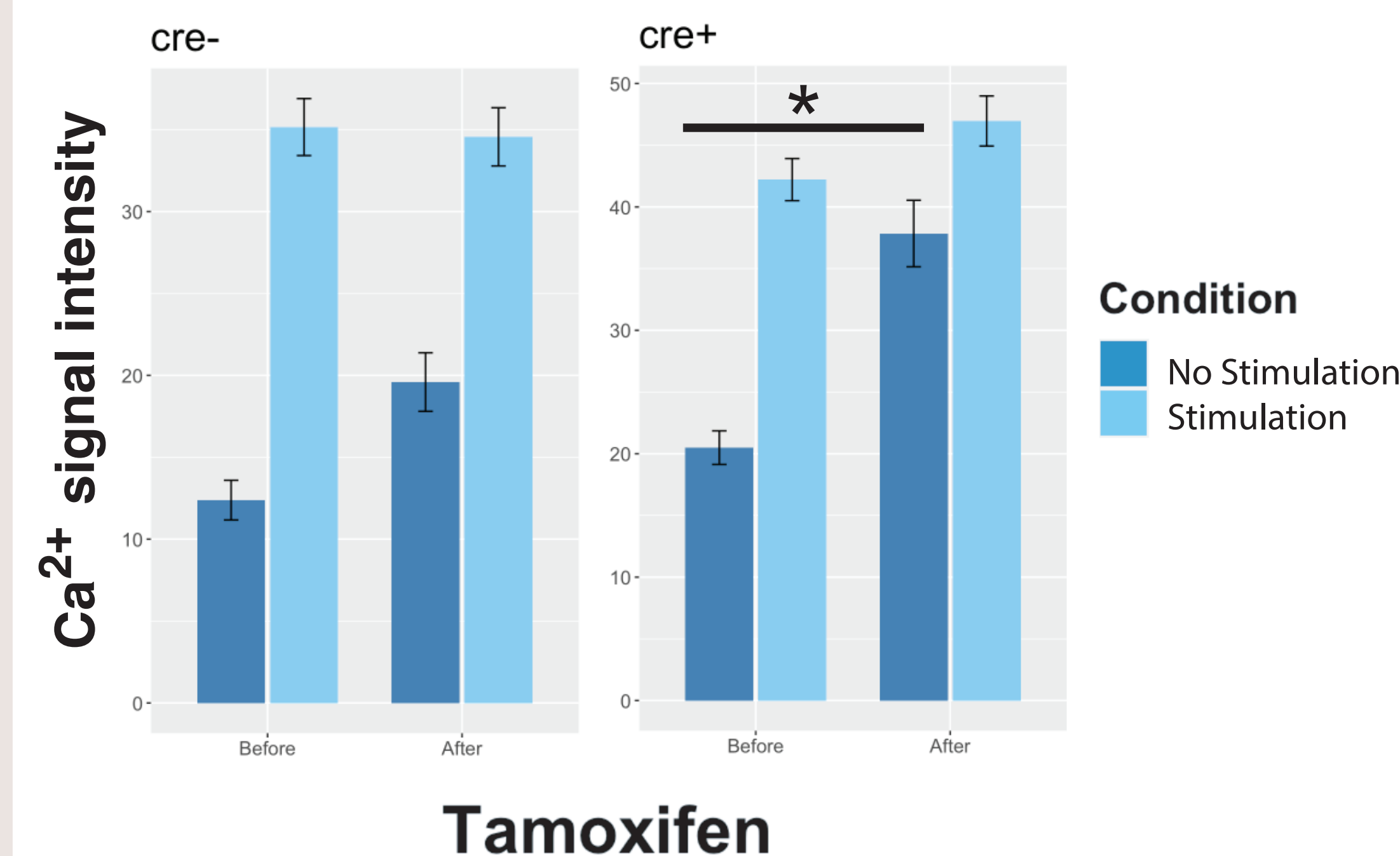
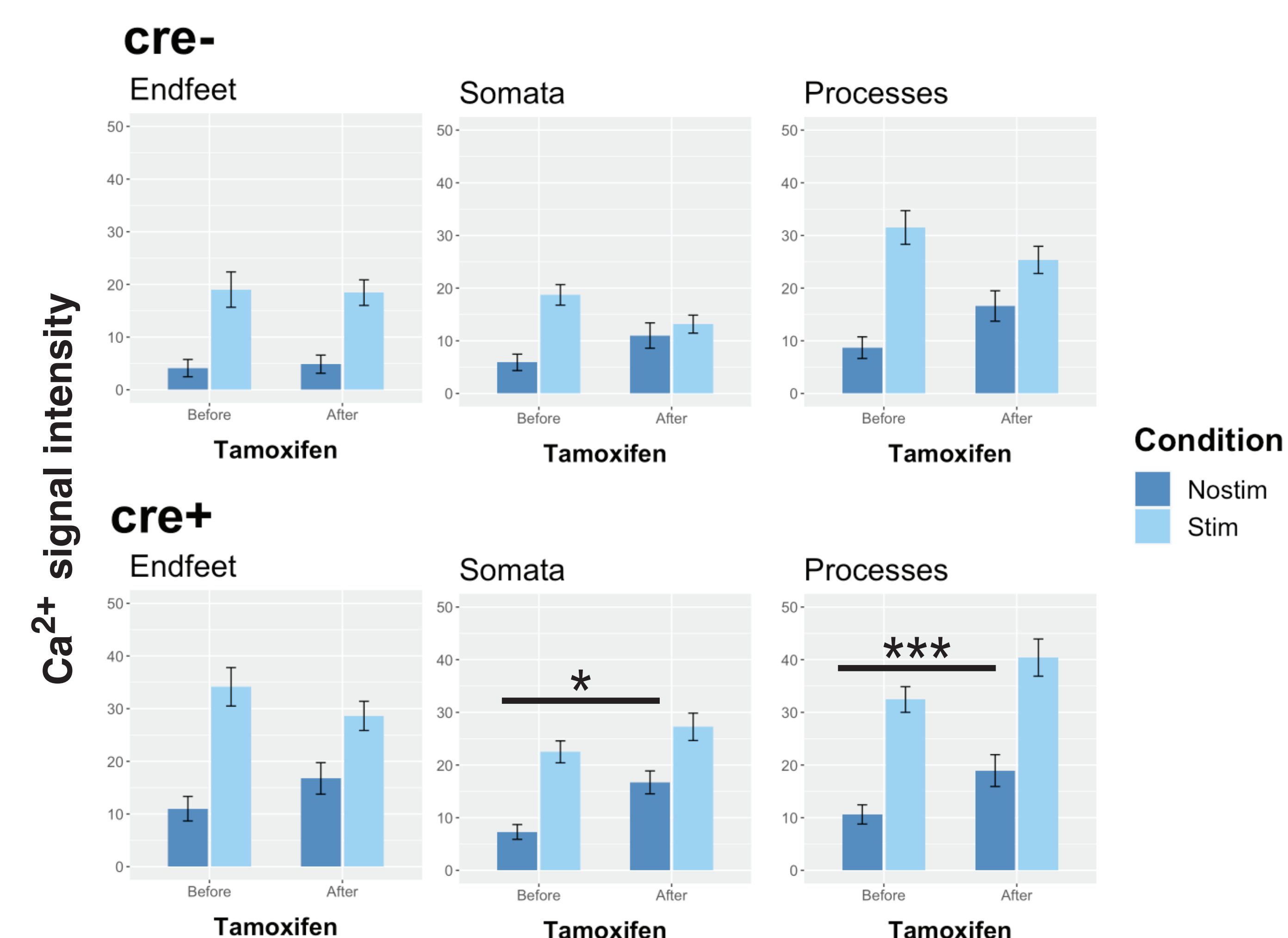


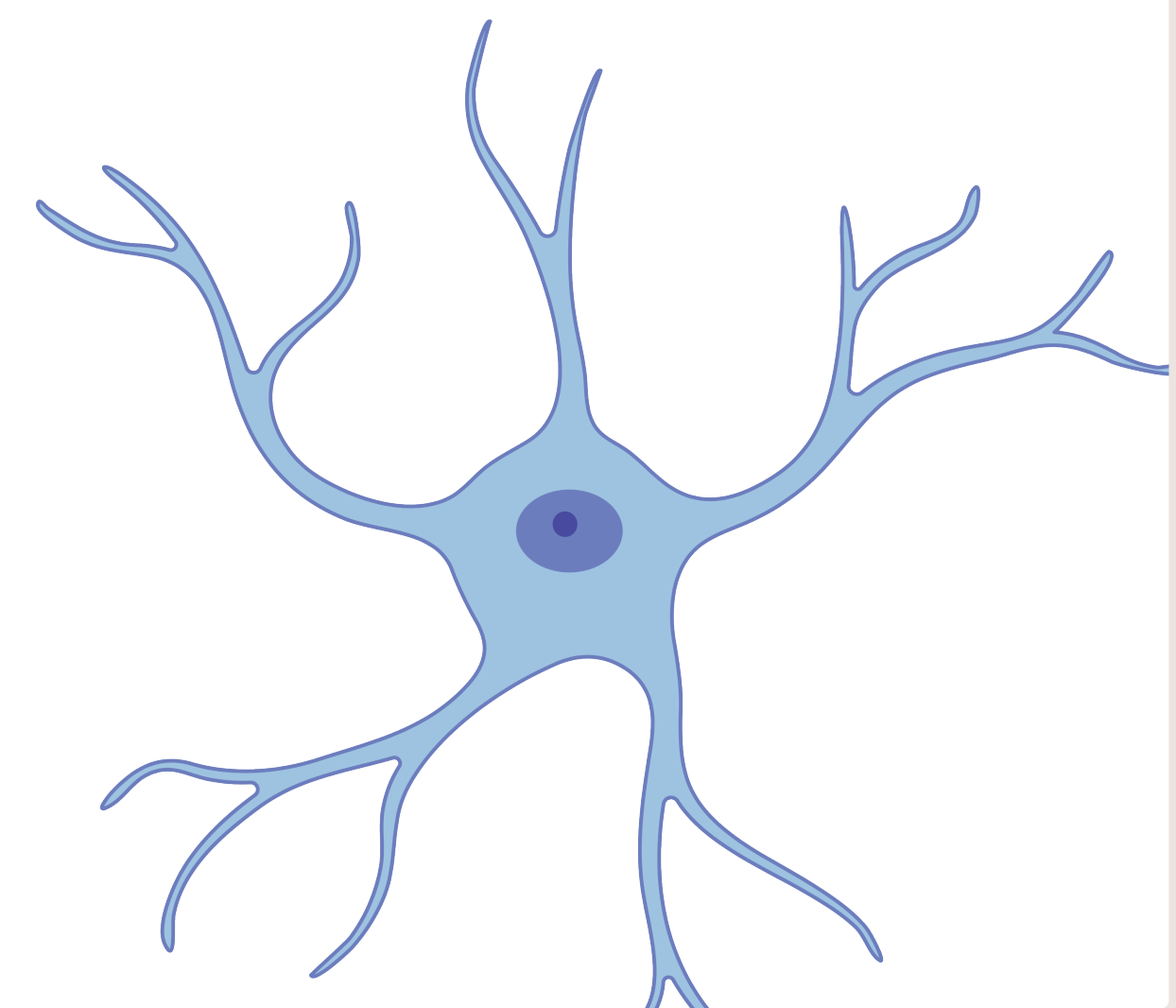
Figure 2. Astrocytic calcium response to whisker stimulation before and after P2Y1 receptor knockout
* = p-value < 0.05

Figure 3. Regional astrocytic calcium response to whisker stimulation before and after P2Y1 receptor knockout
* = p-value < 0.05
*** = p-value < 0.001



Conclusions

- Knockout of P2Y1 receptor had a significant effect on astrocyte Ca^{2+} signaling.
- Knockout of the P2Y1 receptor did not have a significant effect on neuronal Ca^{2+} signaling.
- Effect of knockout was greater in the somata and processes of astrocytes.
- P2Y1 receptor is likely localized to the processes and somata
- P2Y1 receptor is likely not a major component of the signaling pathway used to communicate with neurons



References

- 1 Jäkel S, Dimou L. Glial cells and their function in the adult brain: A journey through the history of their ablation. *Front. Cell. Neurosci.* 2017; 11: 1–17.
- 2 Stobart JL, Ferrari KD, Barrett MJP, Glück C, Stobart MJ, Zuend M, Weber B. Cortical Circuit Activity Evokes Rapid Astrocyte Calcium Signals on a Similar Timescale to Neurons. *Neuron* 2018; 98: 726-735.

All drawings (excluding mouse diagram) created using BioRender