

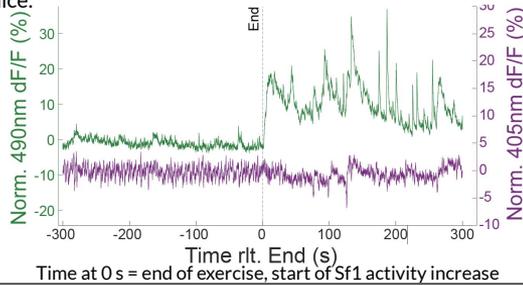
Steroidogenic Factor 1 (SF1) Neurons and Exercise

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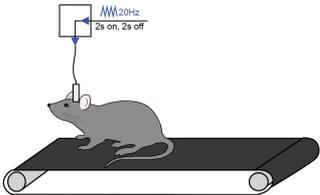
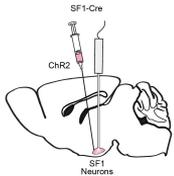
SF1 Neurons' Role in Exercise

Prior research in our lab found that SF1 activity in the ventromedial hypothalamus (VMH) increases after exercise. We hypothesize that increasing SF1 activity beyond normal levels following training will improve endurance capacity in mice.



Methods

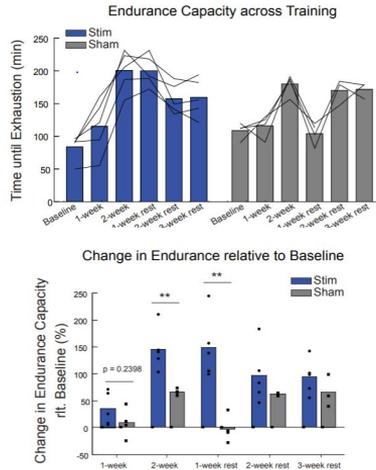
Cre-dependent channelrhodopsin virus (ChR2) is injected into the VMH of mice. It expresses ion channel proteins that open from light stimulation. A fiber is also inserted to allow light to shine through here, stimulating the SF1 neurons and heightening activity. After running a treadmill training protocol (Fujikawa et al, 2018), we stimulated SF1 neurons for an hour. The control group **did not** receive stimulation following exercise. Several behavioral tests were performed to assess progress.



Behavioral Tests

Endurance Test

Stimulation of SF1 neurons following training improves endurance in comparison with the unstimulated group.

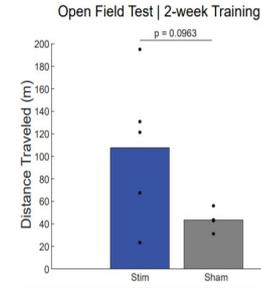


Discussion

SF1 neurons in the VMH play a role in producing the full metabolic effects of exercise including increased VO₂ max and more lean muscle mass (Fujikawa et al, 2018). Mice receiving SF1 stimulation following training ran longer compared to mice that did not receive stimulation. This endurance capability is sustained following rest. The OFT reveals an increase in hyperactivity among stimulated mice and the marble burying test reveals that stimulation may decrease anxiety-related behaviors in mice.

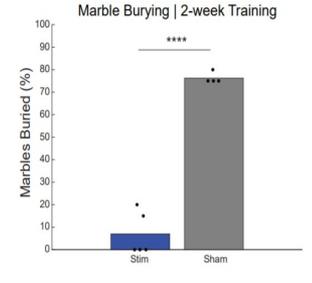
Open Field Test (OFT)

Using an OFT protocol, we observed more hyperactivity among the stimulated group. They traveled a longer distance compared with the sham group.



Marble Burying Test

The marble burying test is a measure of repetitive anxiety behaviors in mice. We observed significantly less marble burying in the stimulated group compared with the sham group.



Future Directions

Three next steps seem most plausible. This project used a small number of mice, so our findings could be more significant if we increased the sample size in the future. Since interpreting behavioral test data is complicated, adding to our current behavioral tests will help us better understand the implications of SF1 stimulation. Lastly, studying SF1 activity sedentary mice would aid our understanding of the role that these neurons play in metabolism not related to intentional exercise.