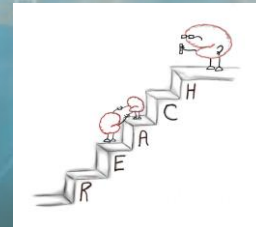


Evaluation of Synaptic Function in the Hippocampal Circuit of an ASD Mouse Model

REACH Program

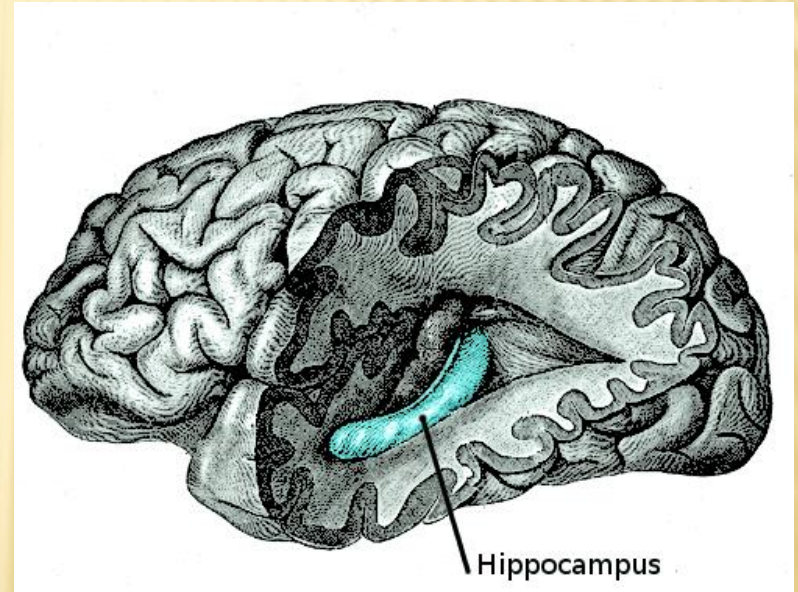
Marie Ceant
Ashley Jackman
Kwame Tannis



Mentors
Ifeoma Ezeoke
Rudolf Abdelmessih

Outline

- Background
- Hypothesis
- Experimental Design
- Data and Results
- Conclusion



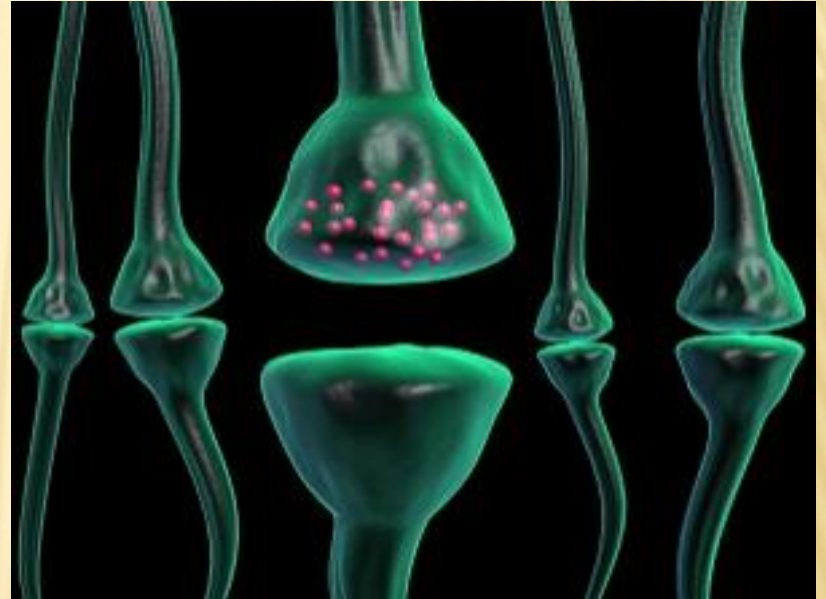
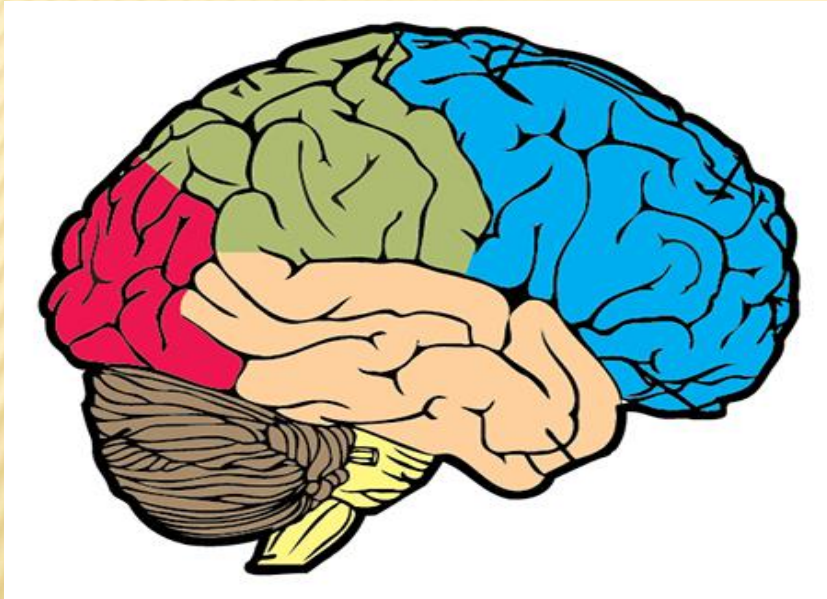
What is autism spectrum disorder?



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S.R. Dager, L. Wang, S.D. Friedman, D.W. Shaw, J.N. Constantino, A.A. Artru, G. Dawson, J.G. Csernansky (Apr 2007). **Shape mapping of the hippocampus in young children with autism spectrum disorder.** American Journal of Neuroradiology, 28 (4) 672-677.

Where is the problem?



<https://www.google.com/url?sa=i&rct=j&q=&escr=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKewiY1NOqvpjVAhXCbj4KHXdzBXsQjRwIBw&url=http%3A%2F%2Fwww.petaluma-california.com%2F8720819%2Fbrain-unlabeled-of-the-brain-and-describe.html&psig=AFQjCNFjqGnNv7NXCCd44oPy2pjel-2Rq&ust=1500661625461518>

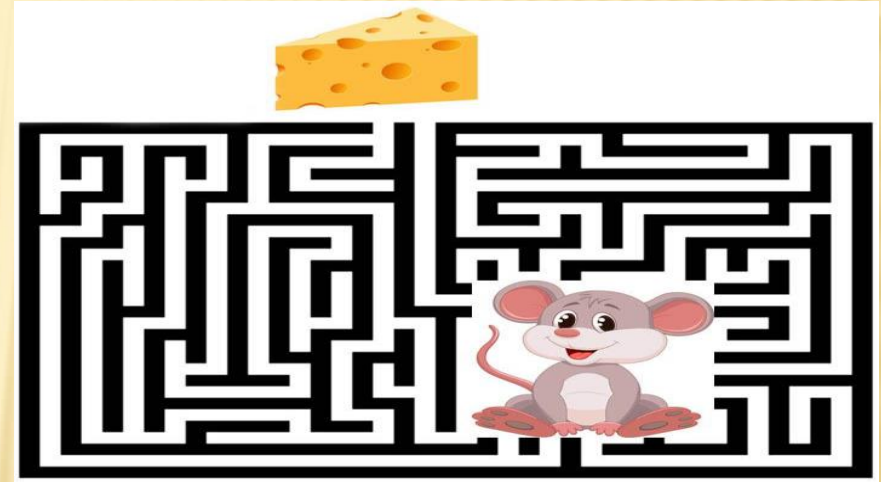
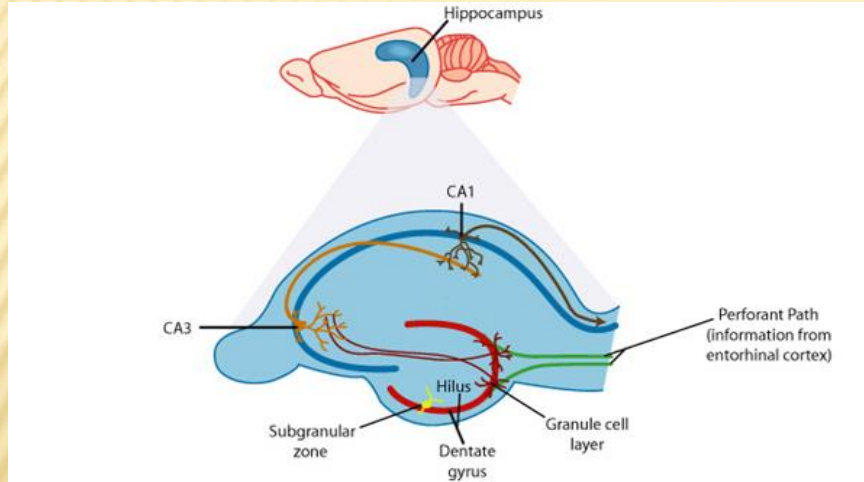
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An animal model for ASD

The FMR1 Knockout mouse



Why the hippocampus?

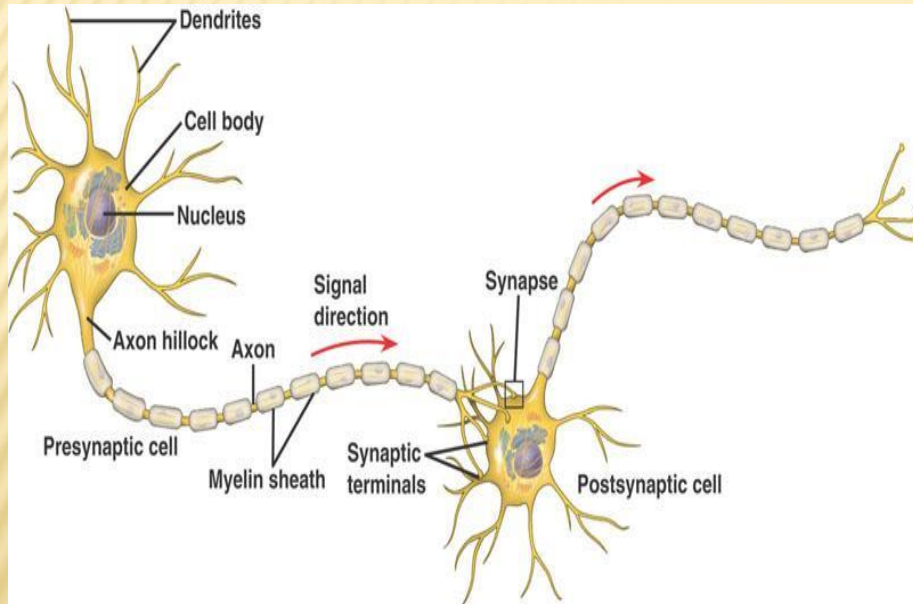


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Ito, R; Lee, AC (15 October 2016). "The role of the hippocampus in approach-avoidance conflict decision-making: Evidence from rodent and human studies.". Behavioural Brain Research. 313: 345–57

Goal of the Research



- We think that cognitive disabilities, manifested by the FMR1 knockout mice, are due to problems in the communication between neurons.
- So we will focus our research on evaluating the synaptic function in the hippocampal circuit.

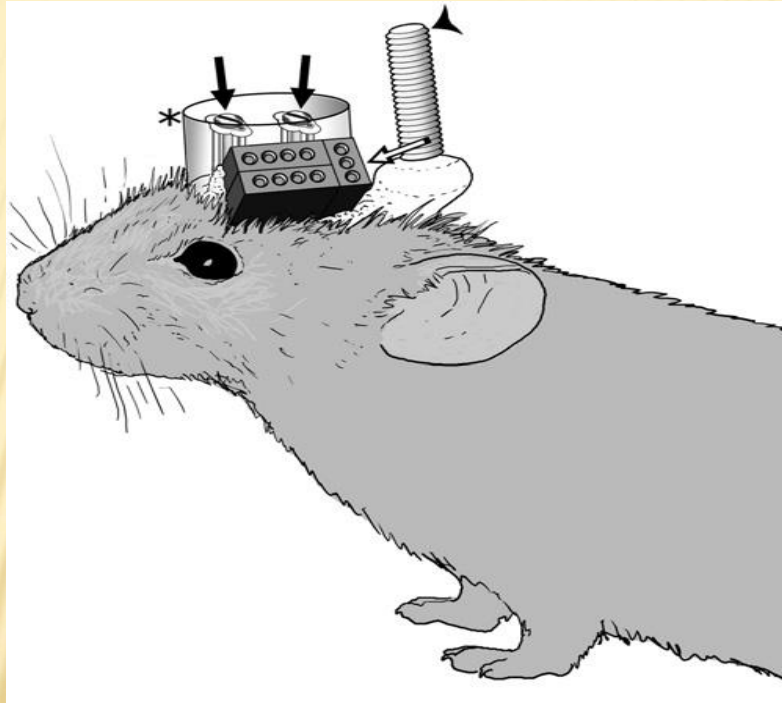
Hypothesis

We hypothesized that the deregulation of synaptic proteins, due to FMRP deficiency, will cause a change in synaptic function in the hippocampal circuit.

Experimental Design

θ

10 Hz

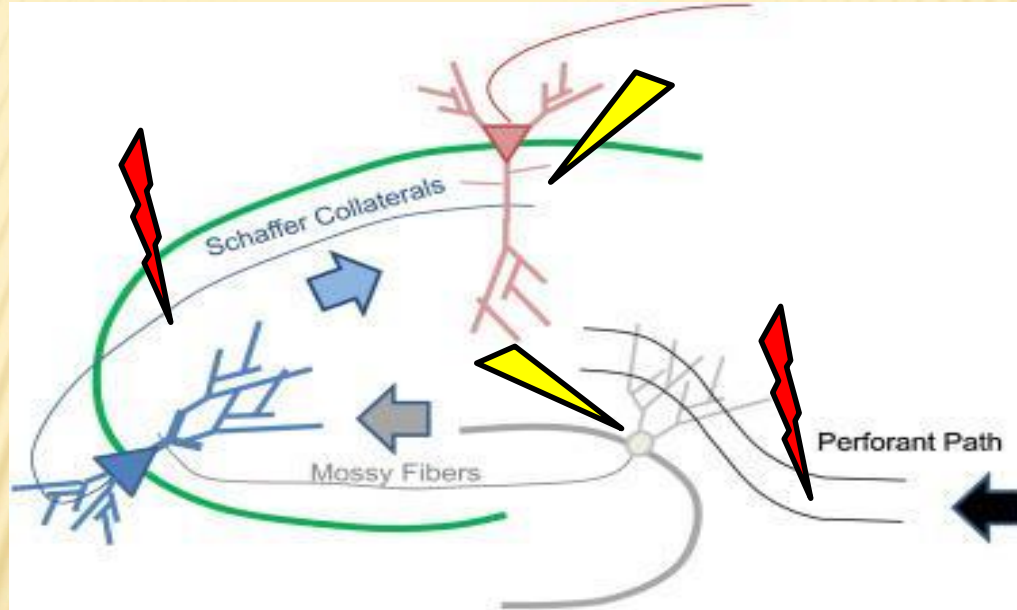


γ

40 Hz

The Hippocampal Circuit

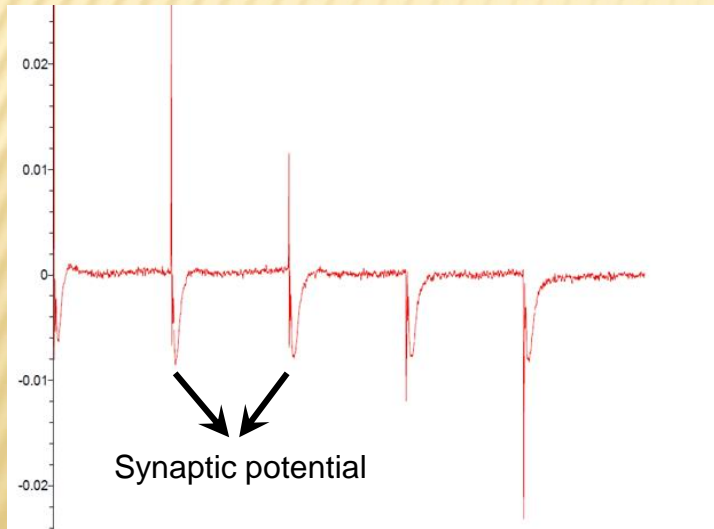
Where to investigate?



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Recording Synaptic Potential Series

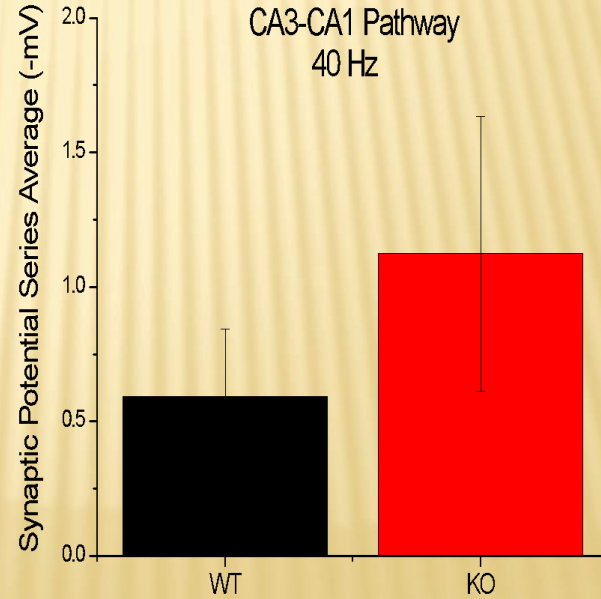
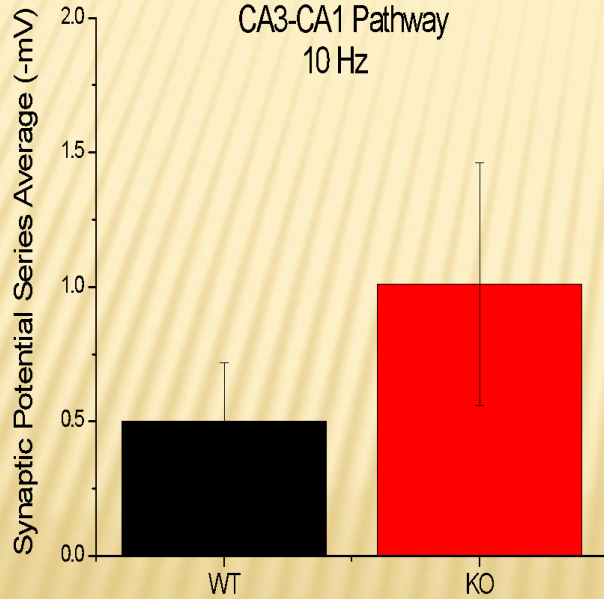
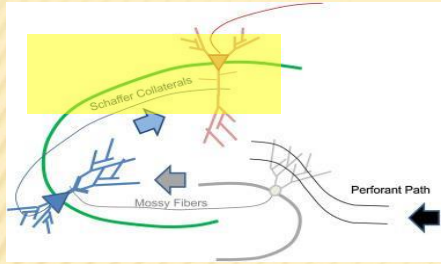
10 Hz Stimulation Pulses
(100 ms inter-pulse interval)



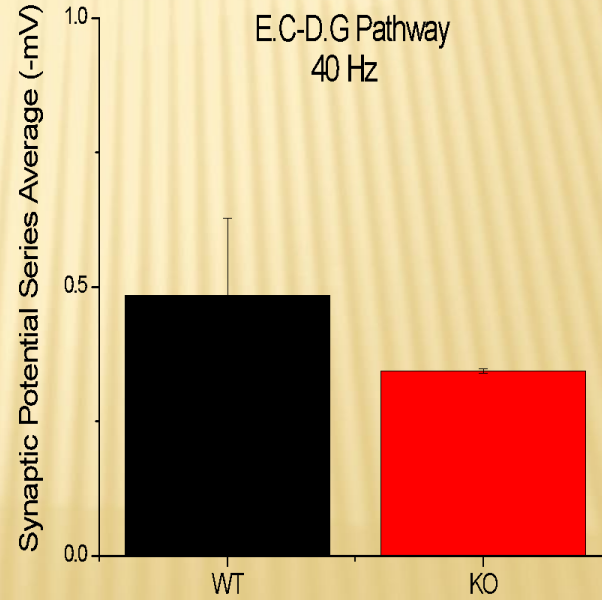
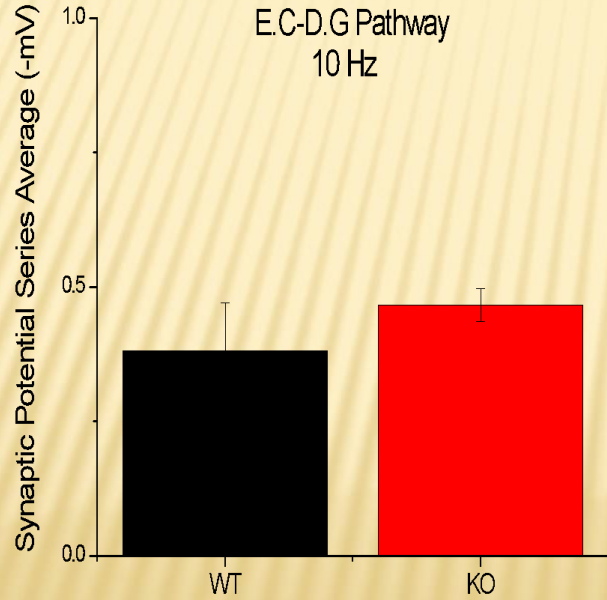
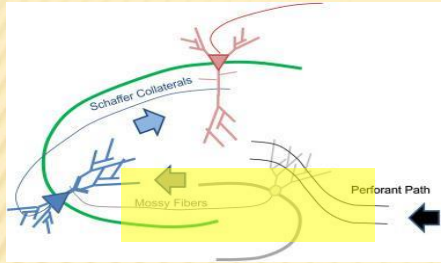
40 Hz Stimulation Pulses
(25 ms inter-pulse interval)



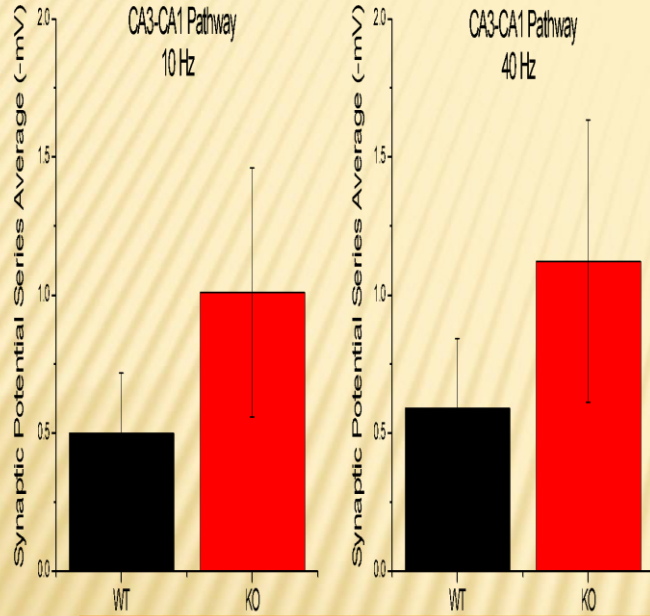
Results



Results



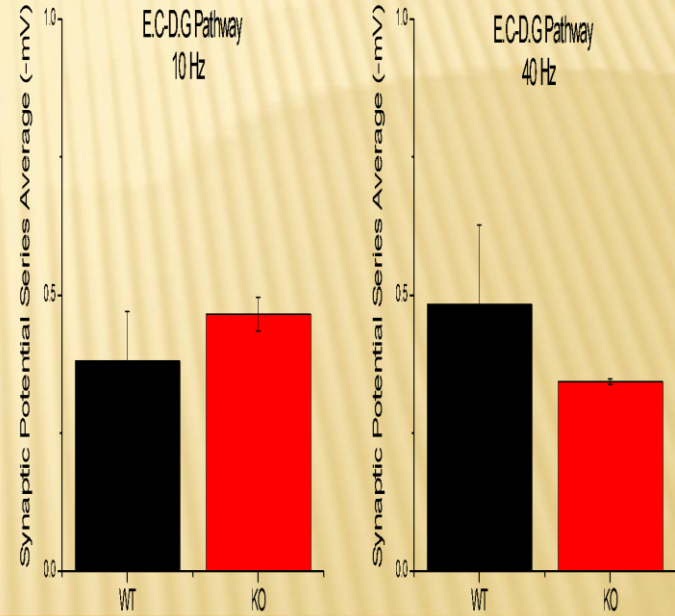
Conclusion



Hypotheses



Two predictions



Summary

- We have assessed the synaptic response to an increased functional demand by delivering multiple stimuli separated by short inter-pulse intervals.
- We measured synaptic potential at two different pathways in the hippocampal circuit.
- We used two different frequencies to deliver the stimuli.
- Results show difference in synaptic function between the wildtype and knockout mice in the two pathways examined in the experiment.

The link to Autism Spectrum Disorder



- Synaptic connectivity (hippocampus vs. brain)
- Spatial cognitive abilities and learning and memory (internal vs. external circuitry)

Future Experiments



Acknowledgments

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- Dr. Dow- Edwards
- Dr. T. Eom
- Dr. C. Boutin- Foster
- Dr. P. Bones.
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- K. McCormick
- Director D. Sheares
- P. Bones



