Mechanisms Underlying Estrogens' Rapid Facilitative Effects on Social Recognition in the Medial Amygdala of Female Mice

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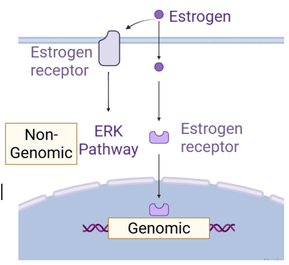
Introduction

Social recognition is essential to survival[4,7,16]

Estrogens facilitate social recognition in the medial amygdala (MeA)[19]

Estrogens have genomic and nongenomic effects [4,7,16]

Rapid facilitation of social recognition in dorsal hippocampus requires ERK activation[6, 20, 21]



The Medial Amygdala

Research Questions

First Research Question: Is ERK pathway activation in the MeA necessary for short-term social recognition?

Second Research Question: Does the rapid facilitation of social recognition by E2 in the MeA require ERK activation?

Methods

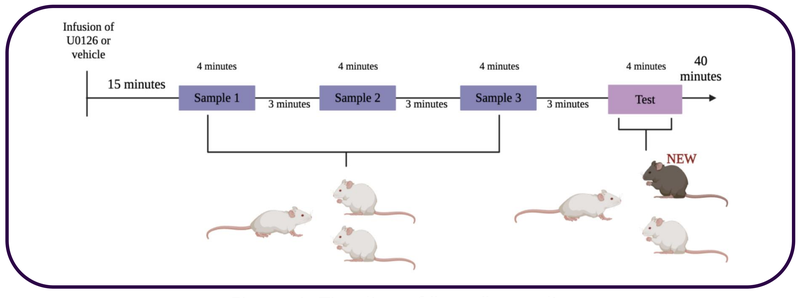


Figure 1. Timeline of "easy" paradigm

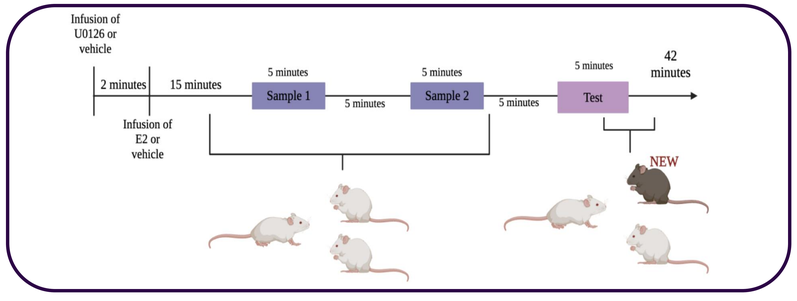


Figure 2. Timeline of "difficult" paradigm

Investigation Ratio

$$IR = \frac{\text{Novel}}{\text{(Novel + Familiar)}}$$

Results

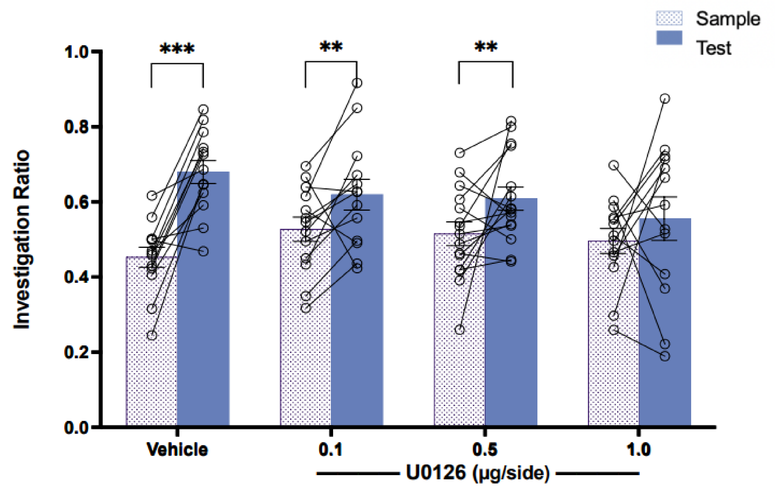


Figure 3. Rapid effects of U0126 in the medial amygdala on the "easy" social recognition paradigm.

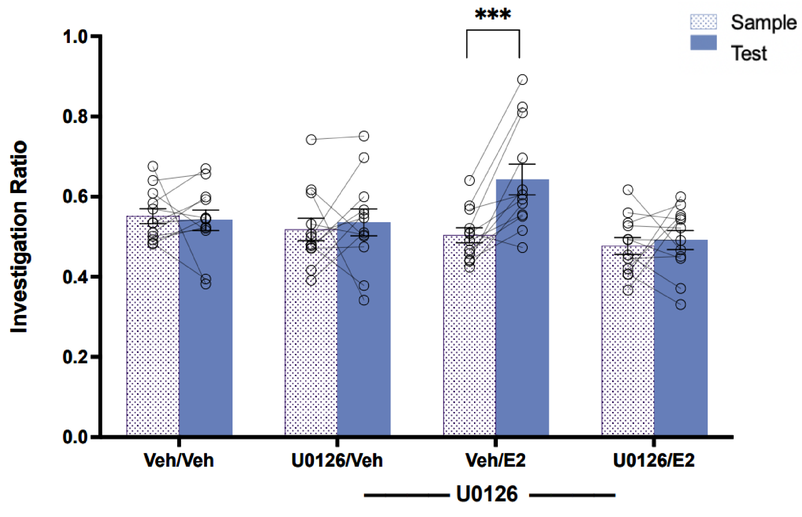


Figure 4. Rapid effects of U0126 and E2 in the medial amygdala on the "difficult" social recognition paradigm.

Main Findings

ERK activity → **Short-term social recognition memory**

ERK activity → **E2 Facilitation**

Discussion

1. These results are consistent with findings in non-social memory domains, including fear conditioning in the extended Amygdala[24]
3. Further supporting the role of the MeA as a central region for estrogenic facilitation + a part of the "social brain" network[2, 19]
3. Further support the role of the ERK pathway in social recognition across other brain regions, including the dorsal hippocampus[20, 21]

Limitations:

ERK pathway inhibition may have affected preference for novelty

Generalizability across lifespan and in gonadally intact females[11, 17, 23]

Future Direction

The downstream cellular changes induced by estrogen are unknown

Investigate the estrogen receptors involved (ERa, ERb or GPER)

Investigate E2-dependent intracellular cascades downstream of ERK phosphorylation[6, 20, 21]

Investigate in male mice[10,13]

References and Acknowledgements

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HOLERIS LAB

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