



**Mount
Sinai**

NEURAL CIRCUIT MECHANISMS OF RISK VS. RESILIENCE TO SOCIAL TRAUMA

Scott J. Russo

Laboratory of Neural and Immune Mechanisms of Psychiatric Illness

Leon Levy Director of the Brain Body Research Center

Icahn School of Medicine at Mount Sinai

SOCIAL BEHAVIOR ACROSS THE ANIMAL KINGDOM



1. Social groups are better able to detect predators.
2. Cooperation can improve allocation and protection of resources.
3. Individuals in social groups have more reproductive opportunities
4. It has been proposed that social reward is a mechanism for the evolution of cooperative social behavior.

BUT WHAT HAPPENS WHEN WE HAVE TRAUMATIC SOCIAL EXPERIENCES?

Past-year relational victimization is associated with a blunted neural response to rewards in emerging adults

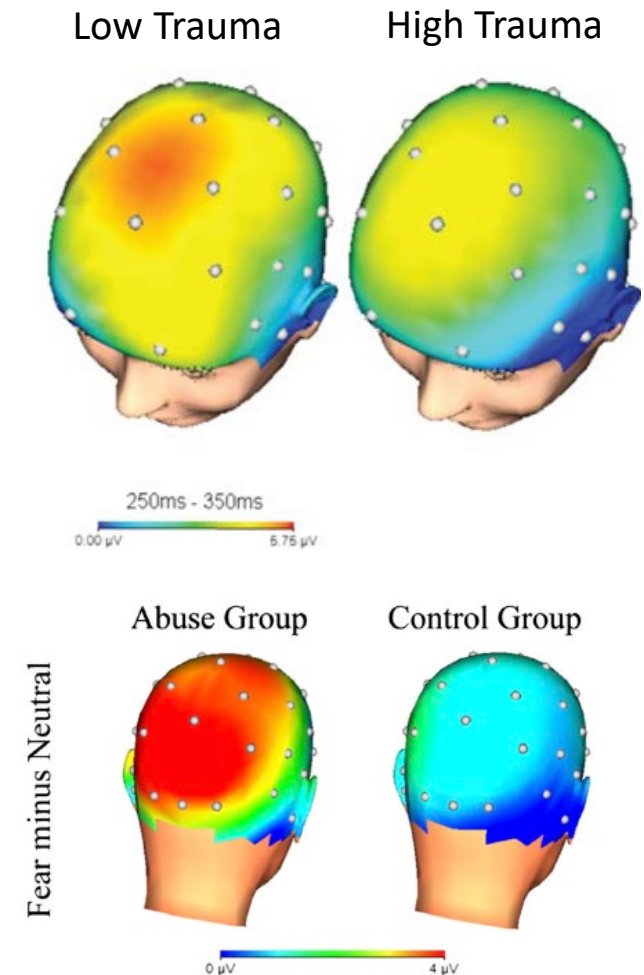
Paige Ethridge, Aislinn Sandre, Melanie A. Dirks, and Anna Weinberg

2018 Dec 4;13(12):1259-1267.

Childhood maltreatment is associated with increased neural response to ambiguous threatening facial expressions in adulthood: Evidence from the late positive potential

Aislinn Sandre¹ • Paige Ethridge¹ • Insub Kim^{2,3} • Anna Weinberg¹

2018 Feb;18(1):143-154.

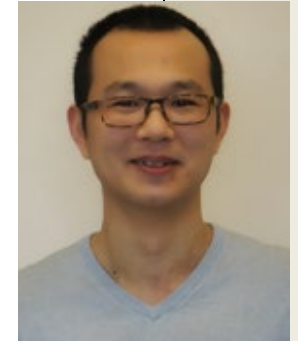
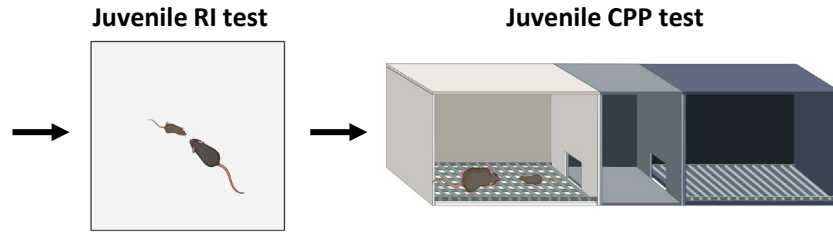
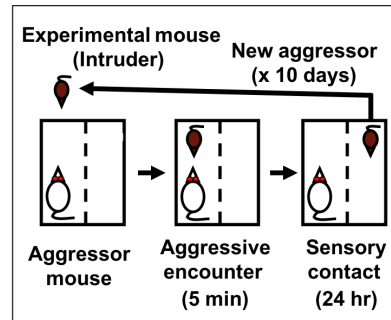


CONSEQUENCES OF SOCIAL TRAUMA



Hypothesis: Negative social experience (ie. aggression, bullying, or partner violence) may heighten activity of brain regions involved in threat/stress perception, which then inhibit brain regions involved in social reward, resulting in severe social avoidance.

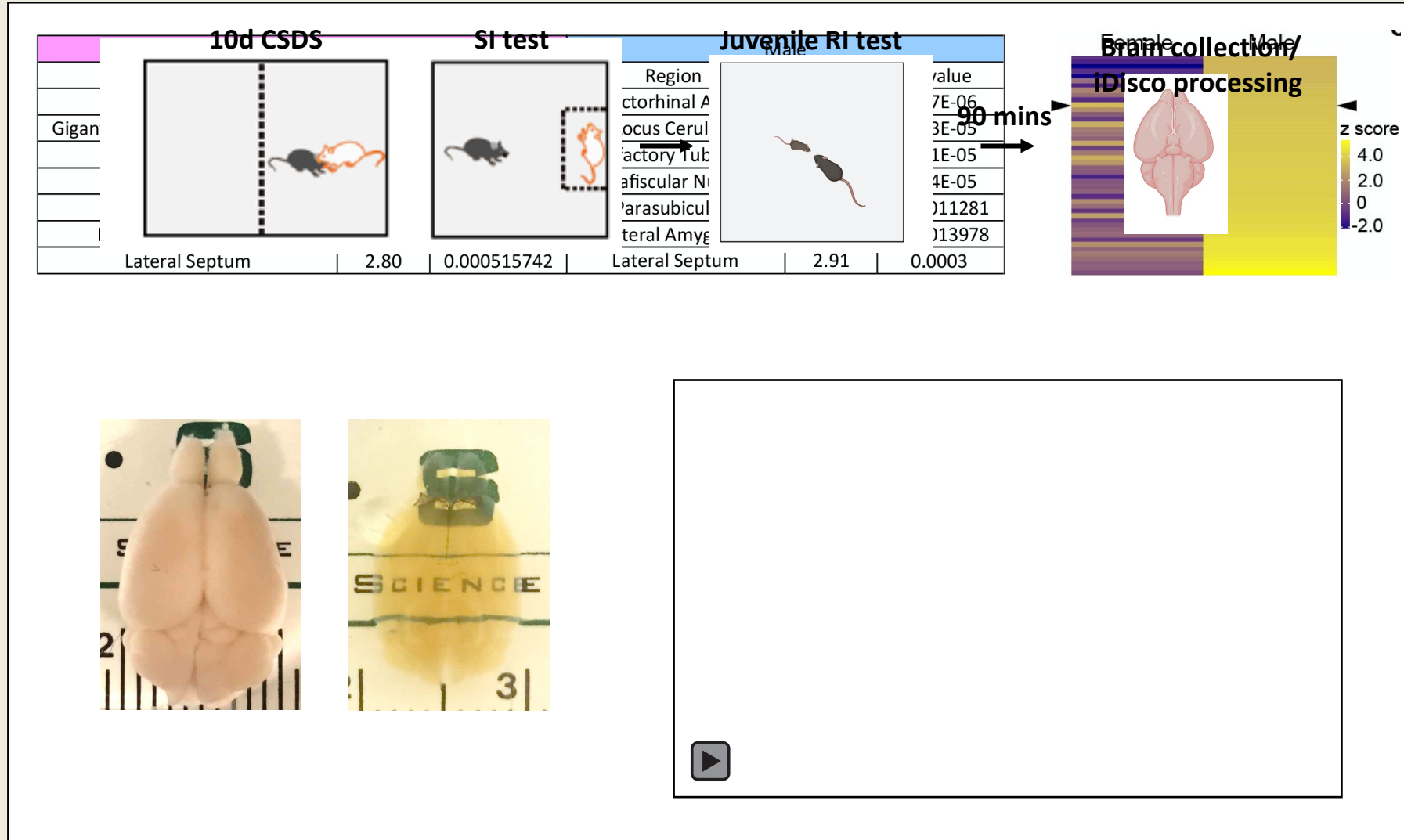
ASSESSING THE IMPACTS OF SOCIAL TRAUMA



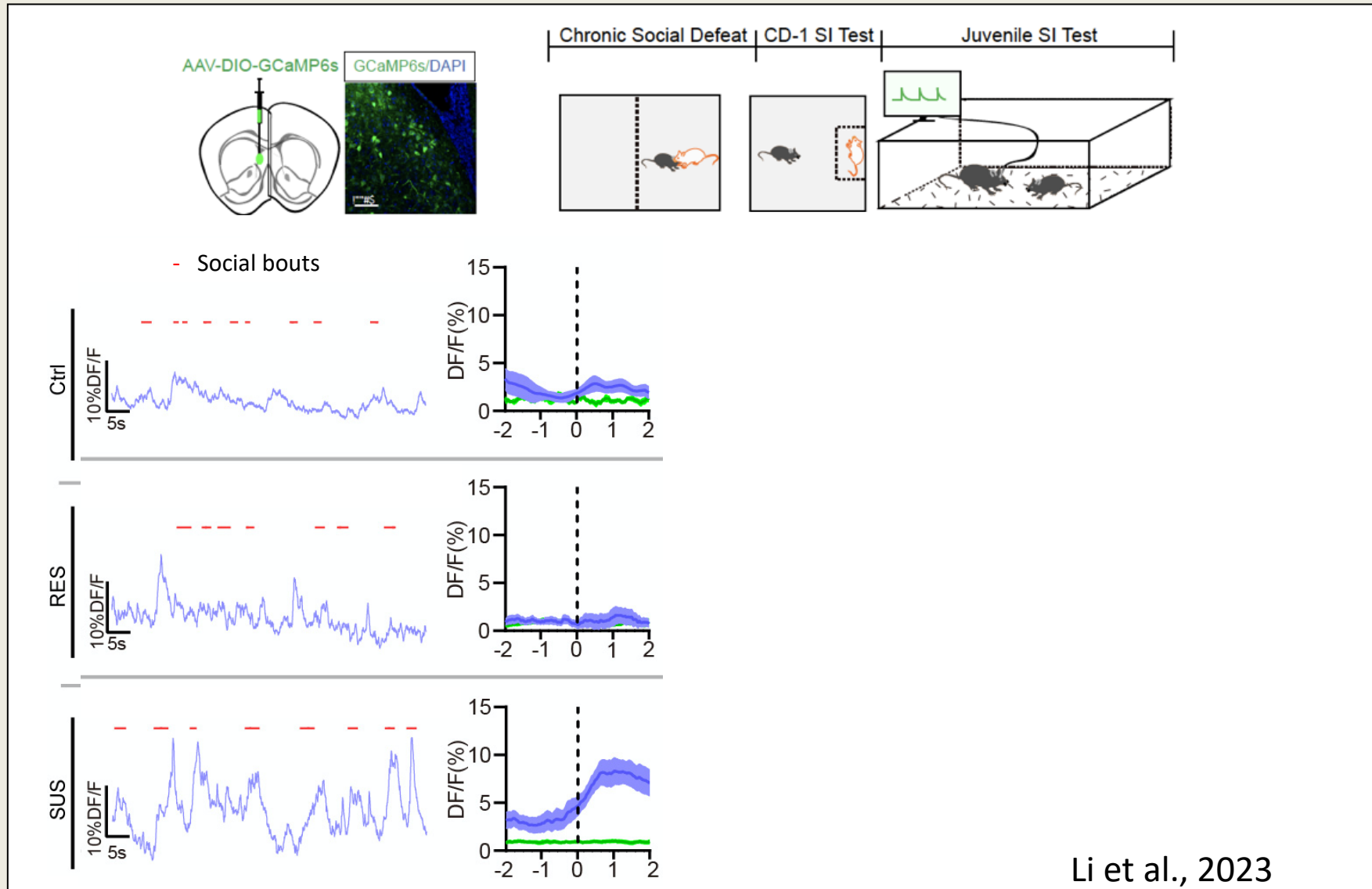
Krishnan et al., 2007; Li et al., 2023

Also see Navarrete et al., doi: <https://doi.org/10.1101/2022.11.08.515718> which shows social defeat reduces volitional social motivation.

WHOLE BRAIN C-FOS MAPPING



ARE LS NEURONS THREAT DETECTORS?

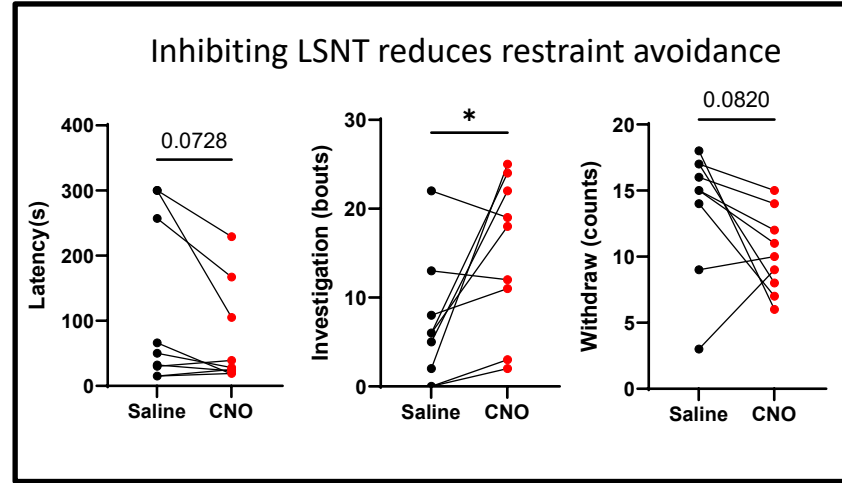
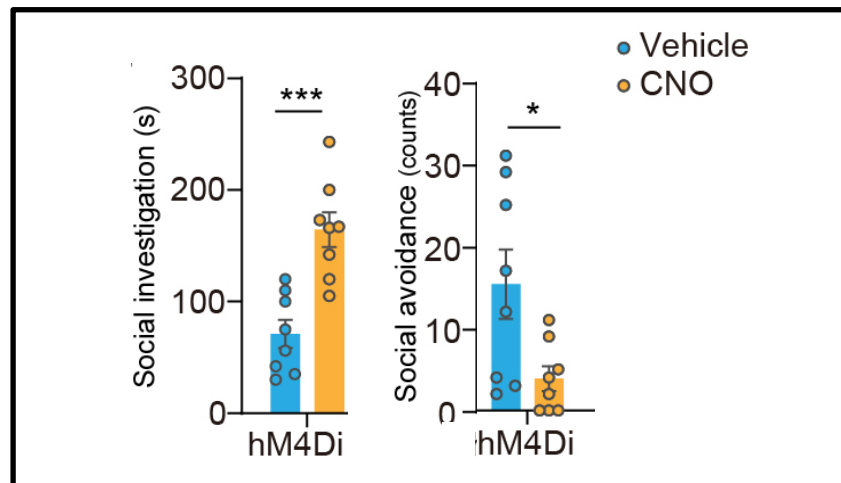
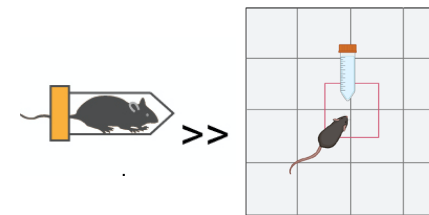


LS ENCODES CONTEXT SPECIFIC STRESSFUL INFORMATION

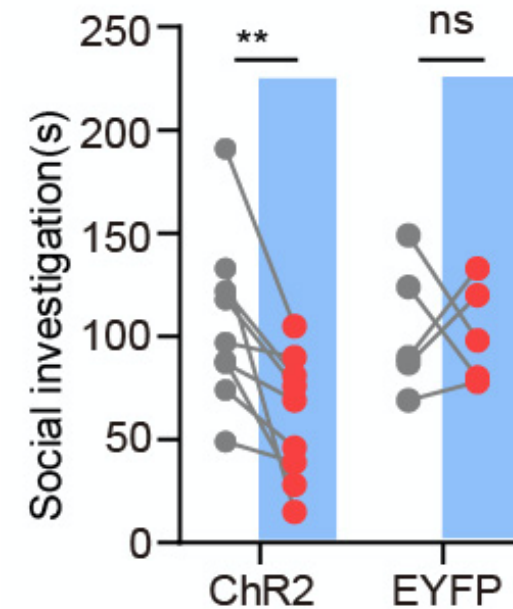
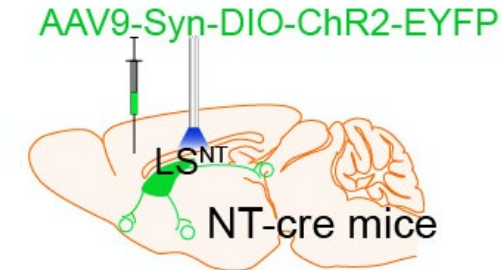
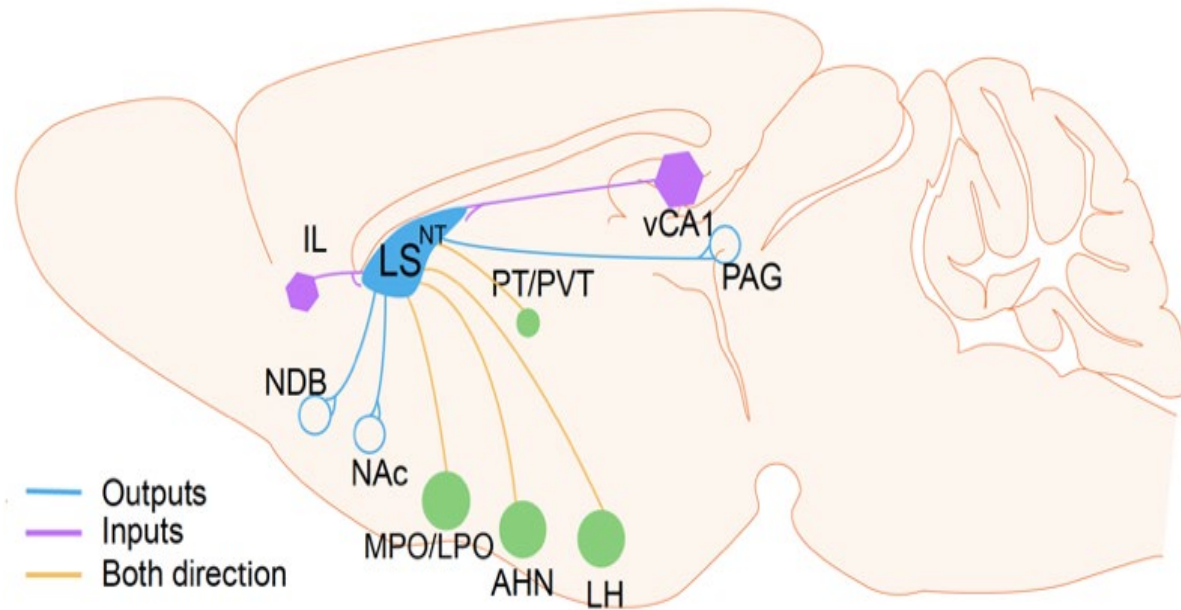
Social Defeat Stress



Chronic restraint stress



LS NEURONS INHIBIT DOWNSTREAM REWARD CENTERS?

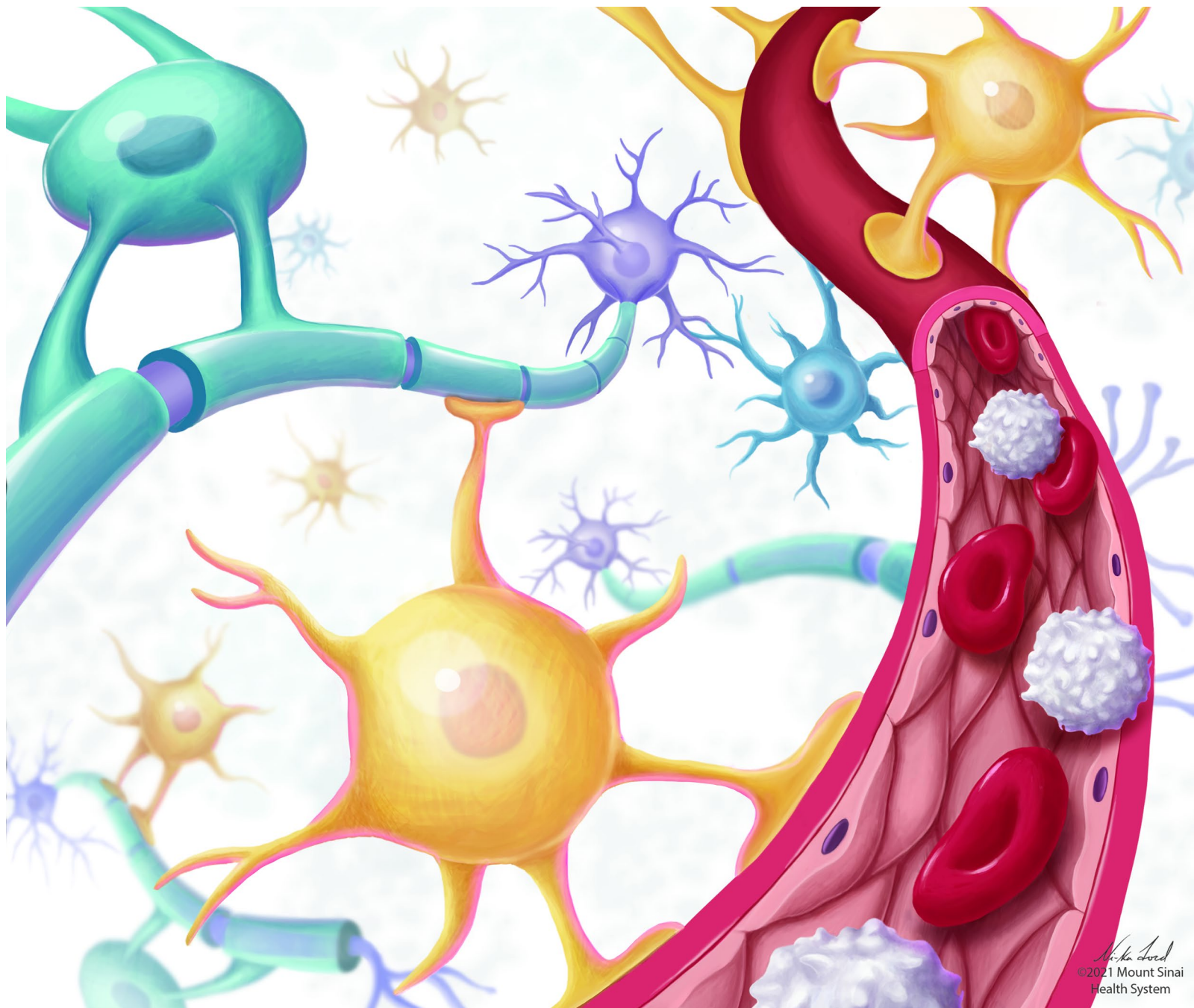


SUMMARY

Social trauma reduces social reward in a subset of individuals, leading to generalized social avoidance behavior.

Social trauma increases activity of lateral septum GABA neurons that project to downstream reward centers.

LS neurons can occlude social reward and promote generalized social avoidance by inhibitions of downstream reward centers.



Nika Lord
©2021 Mount Sinai
Health System

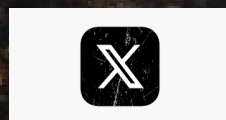


Russo Lab
(Current)
Hossein Aleyasin
Johana Alvarez
Antonio Aubry
Flurin Cathomas
Kenny Chan
Romain Durand-
de Cuttoli
Tory Drescher
Rachel Fisher
Ajani Gyashi
Hsiao-Yun Lin
Carol Morel
Hyoseon Oh
Lyonna Parise

(Past)
Ana Brancato
Joey Burnett
Daniel Christofell
Edith Chung
Carmen Ferrer
Meghan Flanigan
Sam Golden
Mitra Heshmati
Georgia Hodes
Lena Khibnik
Katherine LeClaire
Long Li
Caroline Menard
Madeline Pfau
Aki Takahashi
Kristina Deonaraine
Yusuke Shimo

Collaborators
Roger Clem
Beth Lucas
George Huntley
Bridgett Matikainen
Matt Shapiro
Kevin Guise
Eric Nestler
Erin Calipari
Akahiro Yamanaka
Ralph Dileone
Ming-Hu Han
Jessica Walsh
Dipesh Chaudhury
Robert Froemke

Follow us on twitter:



@ScottRussoPhD



Icahn
School of
Medicine at
Mount
Sinai

*Brain-Body
Research Center*



Icahn
School of
Medicine at
Mount
Sinai

*Center for Affective
Neuroscience*

Funding for these studies is from NIMH and the Leon Levy Foundation.