



Sex-specific parenting and depression evoked by preoptic inhibitory neurons

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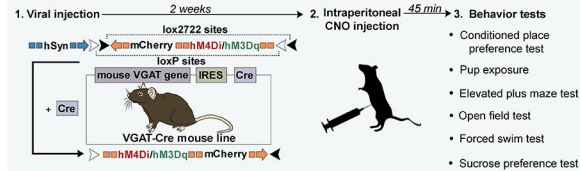
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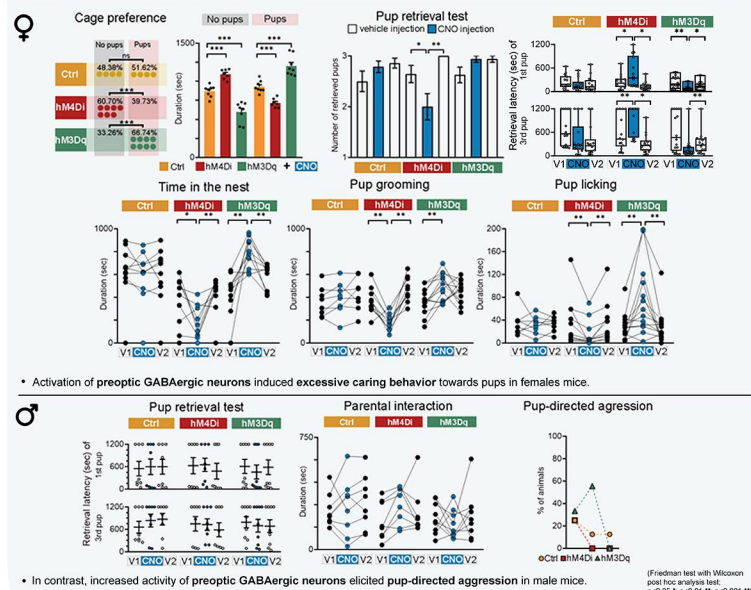
Introduction

- The evolutionary conserved and sexually dimorphic medial preoptic area (MPOA) has been shown to be essential for the display of parental behavior in all mammals.
- However, through which neurotransmitters the preoptic area exerts its main effect remains an open question.
- MPOA efferents form two major functional routes:
 - 1) excites a prosocial approach and acceptance neural circuit
 - 2) inhibits the defensive circuit
- If something were to go wrong with hypothalamic circuits that underpin maternal motivation in mammals, then there would be a devastating disruption of maternal behavior in both humans and rats.
- Aim of the study:**
 - Provide direct evidence for the essential role of MPOA in parenting through the inhibition of defensive circuits.
 - Reveal the involvement of maternal circuits in depression-like behavior.

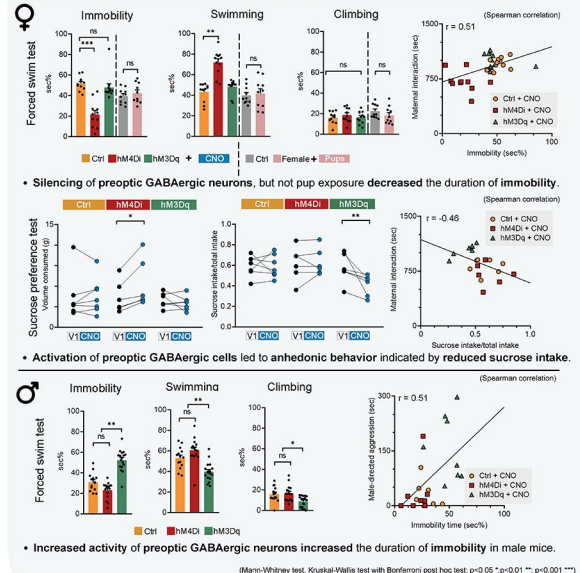
2. Behavioral changes after the manipulation of preoptic GABAergic neurons



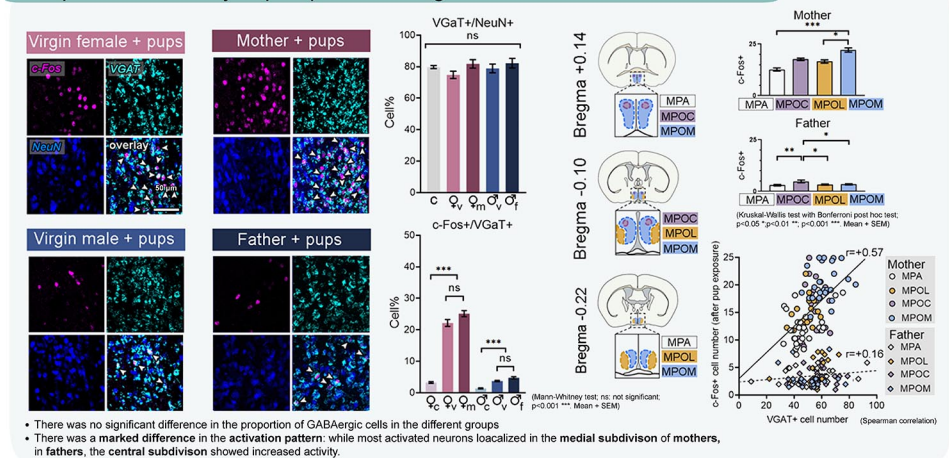
2.1 Preoptic GABAergic cells control parenting behavior in a sex-dependent manner



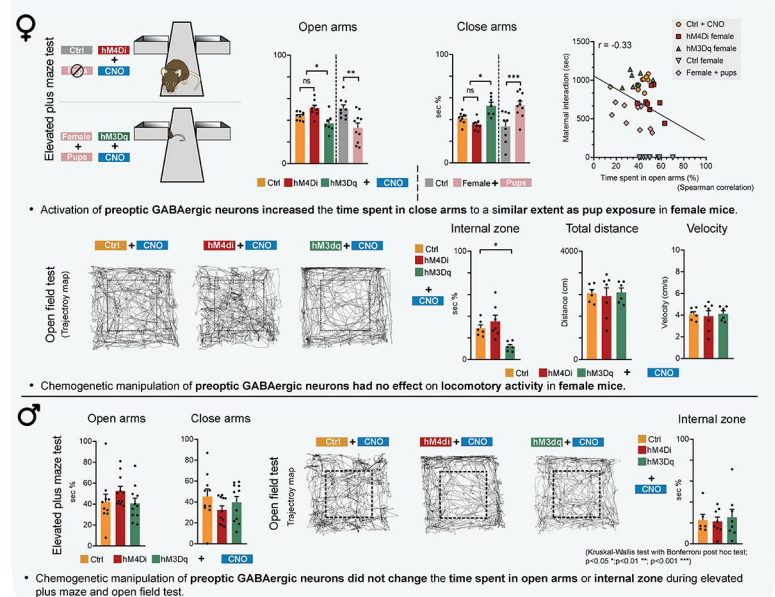
2.3 Depression-like behavior governed by preoptic GABAergic neurons in both sexes



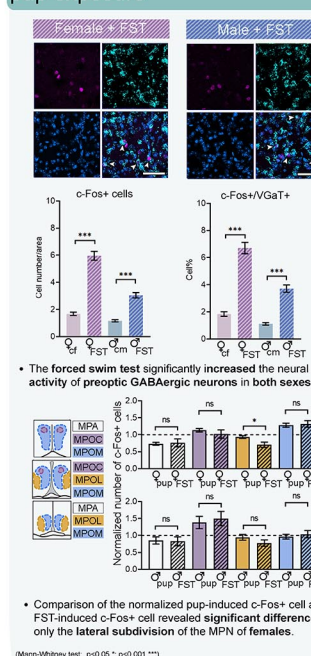
1. Pup induced activity of preoptic GABAergic neurons differs between sexes



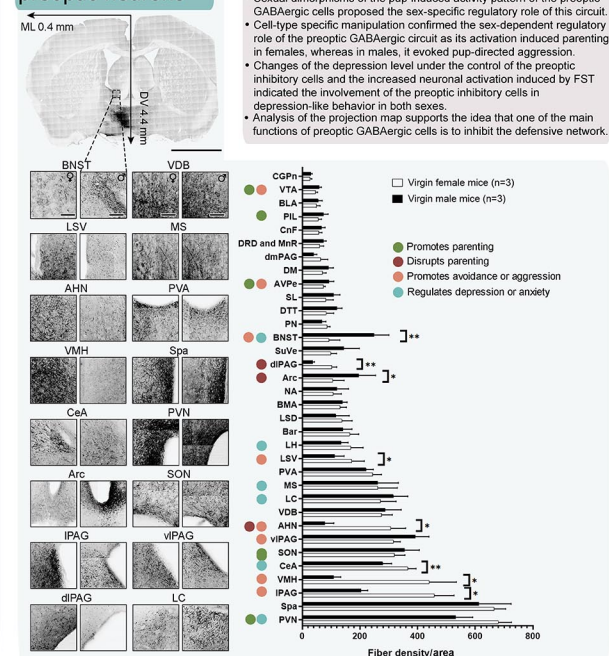
2.2 Preoptic GABAergic neurons evoked parenting linked anxiety-like behavior in female but not in male mice



3. Similarities between activity pattern evoked by stress and pup exposure



4. Inhibition of anti-social circuit by preoptic neurons



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International Neuroscience Meeting, Budapest 2022

IBRO Workshop



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27-28 January 2022
Budapest Hungary

Abstract book

General information

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IBRO Workshop organized by the Hungarian Neuroscience Society
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Poster session - Topic 7

Behaviour

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The role of preoptic GABAergic inhibitory neurons was addressed in parenting, anxiety and depression. Pup exposure and forced swimming resulted in similar *c-Fos* activation pattern in neurons expressing vesicular GABA transporter in the preoptic area with generally stronger labeling and different distributional pattern in females than in males. Chemogenetic stimulation of preoptic GABAergic cells resulted in elevated maternal motivation and caring behavior in females and mothers but aggression towards pups in males. Behavioral effects were the opposite following inhibition of preoptic GABAergic neurons suggesting their physiological relevance. In addition, increased anxiety- and depression-like behaviors were found following chemogenetic stimulation of the same neurons in females while previous pup exposure increased only anxiety-like behavior suggesting that not the pups, but overstimulation of the cells can lead to depression-like behavior. A sexually dimorphic projection pattern of preoptic GABAergic neurons was also identified, which could mediate sex-dependent parenting and associated emotional behaviors.

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