

22nd January
2025

8th Hungarian Neuroscience Meeting for
Undergraduate Students, Graduate Students
and Young Postdocs

8th HuNDoc Meeting Debrecen 2025



hundoc2025.mitt.hu



University of Debrecen, Learning Center
(Debrecen, Egyetem tér 1., 4032)

Máté Egyed

Oxytocin receptor-expressing neurons in the medial preoptic area affect social behavior in rats

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Oxytocin is released during social interactions, acts through oxytocin receptors (OTRs) to regulate social behavior. The medial preoptic area (MPOA) of the hypothalamus, rich in OTR+ neurons, and is known for its role in reproductive behavior and is increasingly recognized for its involvement in affiliative social behavior. This study aimed to investigate the functional role of MPOA OTR+ neurons in social behavior. MPOA OTR+ neurons were selectively stimulated by chemogenetics in OTR-Cre female rats. Adeno-associated virus (AAV) expressing excitatory designer receptor (DREADD) in a Cre-dependent manner was injected into the MPOA. Following the stimulation of OTR+ neurons through the injection of the DREADDs ligand clozapine-N-oxide (CNO), a significant increase was observed in the number and duration of the following behavioral elements: allogrooming, body sniffing, mounting, and chasing as compared to the previous and subsequent control days. A significant reduction of non-social behaviors was observed. A control group of rats were injected with AAV expressing a construct without the DREADD, their behavior was not affected by CNO treatment. Furthermore, CNO treatment did not alter the animals' sociability, social preference, depression-, and anxiety-like behavior in both groups. Using fiber photometry, we found that MPOA OTR+ neurons are activated during anogenital sniffing. Finally, the projections of MPOA OTR+ neurons were mapped by viral tract tracing demonstrating projections to multiple brain regions, including the periaqueductal grey matter (PAG), and the lateral septum (LS), both are implicated in the control of social behavior. We also showed that OTR+ MPOA neurons are innervated by parathyroid hormone 2 containing terminals ascending from the thalamus, which relay touch-related signals during direct social interactions. These data suggest that MPOA OTR+ neurons may facilitate social interactions between adult females via projections to the PAG and the LS.

CERTIFICATE

Of Presentation

This Certificate is given to:

Máté Egyed

for holding a presentation at the
8th Hungarian Neuroscience Meeting for Undergraduate
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Debrecen, 2025. 01. 22.

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