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POSTER ABSTRACT
BOOK**

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POSTER ABSTRACTS

Neuropeptide mediated effects of thalamic neurons on the lateral septum in suckling rodents

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Parathyroid hormone 2 (PTH2) is a neuromodulator involved in the central control of maternal adaptations. PTH2 is maternally induced in the brain during the early postpartum period, most significantly in the posterior intralaminar thalamic nucleus (PIL). We aimed to determine the involvement of thalamic PTH2-positive projections in maternal activation of the lateral septum (LS). First, we mapped the inputs of the LS by retrograde neural tracer. The tracer injected animals were also mapped for c-Fos activation in response to pup exposure. We found activation in several brain regions already described in maternal care. However, only the neurons of the PIL showed c-Fos expression and sent projection to the LS, as well. PTH2-containing fibers projecting from the PIL to the LS was confirmed by using distinct pathway tracing methods combined with immunohistochemistry in suckling dams. PIL PTH2-expressing neurons especially project to the ventral subdivision of the LS (LSv). PTH2 action on septal neurons was suggested by the presence of PTH2 receptor (PTH2R) positive terminals in the area where PTH2-positive fibers are located. We also addressed whether suckling-related stimuli activate neurons in the LSv, too. We used pup-deprivation method in rat mothers and confirmed that the number of activated LSv neurons is significantly higher in suckling rat dams following pup exposure compared to control mothers with complete pup-deprivation. The level of activated neurons was significantly lower in those dams who received only pup-related vocal, visual and olfactory but not physical stimuli compared to suckling mothers, but still elevated when compared to totally pup-deprived mothers. We showed by both confocal and electron microscopies that PTH2-positive terminals closely apposed c-Fos activated septal neurons and form synaptic connection with them. In conclusion, lateral septal activation pattern of mother rats suggests that both non-physical and suckling-related stimuli from the pups contribute to neuronal activation. As PIL neurons are activated after pup exposure and PTH2-positive terminals innervate activated LS neurons, it is suggested that PIL PTH2 neurons take part in somatosensory input mediation to the LS.

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A konferencia linkje:

<https://mitt2023.mitt.hu/invitation>

Neuropeptide mediated effects of thalamic neurons on the lateral septum in suckling rodents

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Introduction

Regulating maternal behaviours requires a complex neural network. Our research group previously described that the neuromodulator, **parathyroid hormone 2 (PTH2)**, is involved in the central regulation of maternal behaviour. Its expression is induced in the **posterior intralaminar thalamic nucleus (PIL)** in rat mothers. We also found prominent amount of PTH2+ fibres in the **lateral septum (LS)**, a forebrain structure previously suggested to be involved in social interactions including maternal care. In the present study, we aimed to determine involvement of these PTH2+ inputs of thalamic origin in maternal activation of the LS neurons in rat dams.

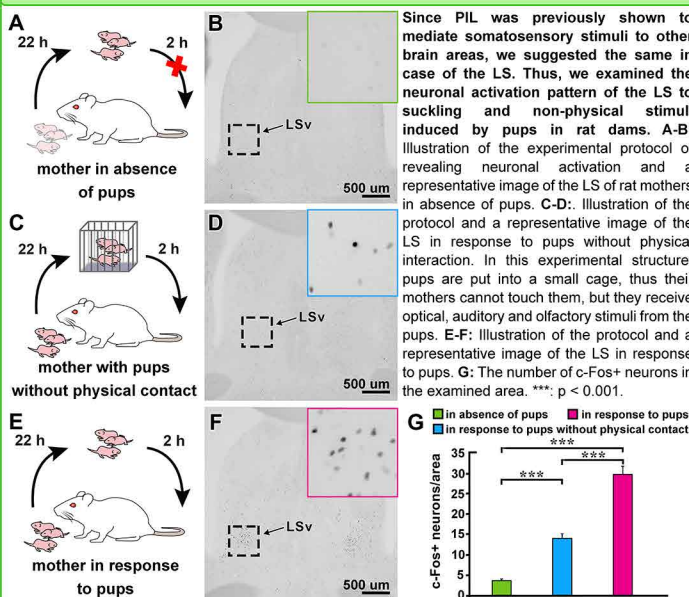
Objectives

- To examine the difference in the c-Fos activation pattern of lateral septal neurons of rat dams following suckling-related or non-physical stimuli from the pups.
- To determine which maternally activated brain areas send projection to the LS
- To establish the origin of the dense PTH2 fibre network found in the ventral part of the LS using anterograde and also retrograde neuronal tracers.
- To demonstrate synaptic connection between maternally activated c-Fos+ septal neurons and PTH2+ terminals.

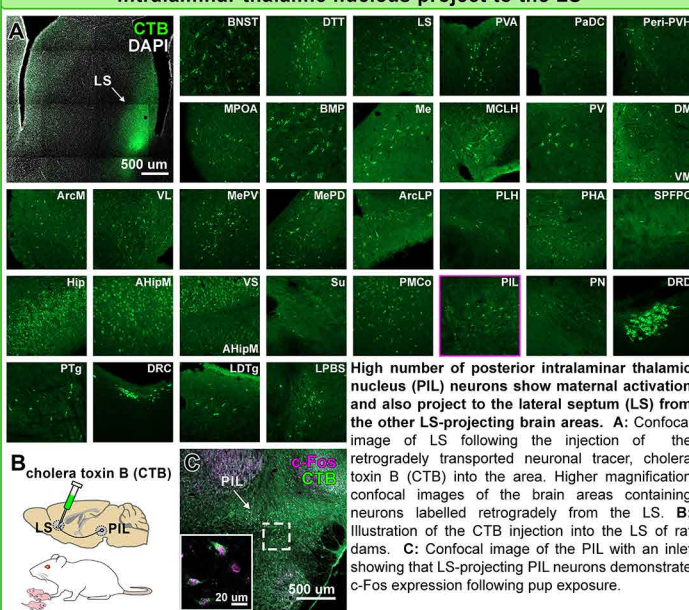
Results

- Significantly higher number of LS neurons show c-Fos activation in mothers in response to pups with physical contact as compared to dams in absence of pups or without physical interaction with them.
- PIL is a maternally activated brain region whose neurons project to the LS.
- PTH2 fibres in the LS originates from the PIL. PTH2+ fibres are abundant in the LS with topographical distribution similar to that of PTH2 receptors.
- PTH2+ terminals make synaptic connection with maternally activated c-Fos+ septal neurons.

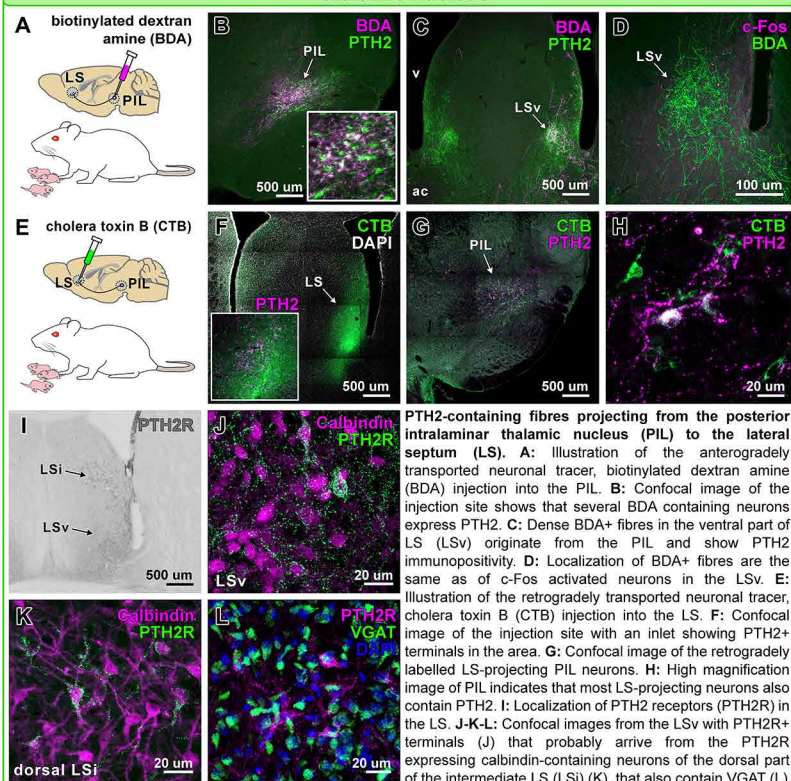
1. Pup-induced c-Fos activation in the lateral septum of rat dams



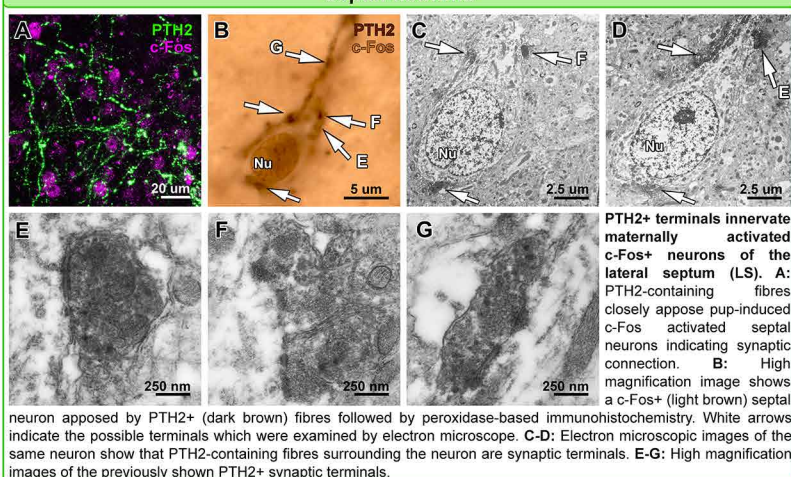
2. Prominent number of pup-activated neurons of the posterior intralaminar thalamic nucleus project to the LS



3. PTH2+ fibres in the lateral septum originate from the posterior intralaminar thalamic nucleus

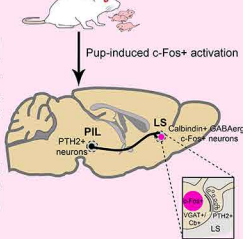


4. PTH2-expressing neurons innervate pup-induced c-Fos activated lateral septal neurons



Conclusion

Neurons of the lateral septum of rat mothers show c-Fos activation to both suckling-related and non-contact stimuli originated from the pups. The more intense activation in the former case suggest a role of somatosensory information processing in the activation. Since PIL neurons projecting to the LS are activated by suckling, it is likely that PIL neurons convey somatosensory input to the LS. Furthermore, PTH2+ fibres found in the lateral septum originate from the PIL and innervate the maternally activated septal neurons suggesting that PTH2-expressing PIL neurons mediate somatosensory input to the LS and PTH2 itself could be involved in the neurotransmission as a peptide neuromodulator.



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