

# The 61st Frontier Brain Science Seminar

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## Neural Mechanisms of Behavioral Plasticity in a Paternal Life Stage Transition

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**場所:** 富山大学 附属病院2階 臨床講義室1

### Abstract

The transition into parenthood involves a significant shift in behavior towards infants, though the precise mechanisms driving this behavioral plasticity remain poorly understood. As an illustration, male mice experience a transition from infanticidal tendencies to nurturing behaviors in anticipation of their offspring. In this seminar, I explore two neural mechanisms that underlie this profound behavioral shift. Firstly, structural plasticity occurs, leading to an increase in neural connections to oxytocin neurons from specific hypothalamic cell types. This increase facilitates the release of oxytocin, a crucial regulator of paternal caregiving behaviors in father mice. Secondly, signaling through oxytocin receptors (OTR) within specific limbic circuits can trigger this transition in paternal behavior. Additionally, it's worth noting that a closely related neural hormone, vasopressin, also supports paternal behaviors through non-canonical vasopressin-to-OTR interactions. In summary, our study sheds light on the molecular and neural circuit mechanisms that elucidate how male caregiving towards offspring is elaborated.

### References

Inada K, Miyamichi K. Association between parental behaviors and structural plasticity in the brain of male rodents. *Neurosci Res* doi: 10.1016/j.neures.2023.06.007. (2023)

Inada K, Hagihara M, Tsujimoto K, Abe T, Konno A, Hirai H, Kiyonari H, Miyamichi K. Plasticity of neural connections underlying oxytocin-mediated parental behaviors of male mice. *Neuron* 110: 2009-2023, (2022)

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