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# NEUROPHARMACOLOGY

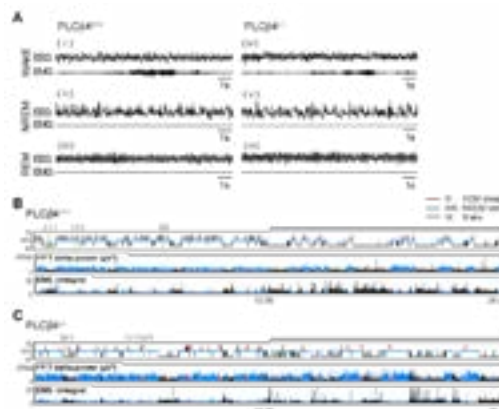
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## Thalamocortical circuit in sleep control: The thalamic mGluR1-PLC $\beta$ 4 pathway is critical in sleep architecture

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The transition from wakefulness to a nonrapid eye movement (NREM) sleep state at the onset of sleep involves a transition from low-voltage, high-frequency irregular electroencephalography (EEG) waveforms to large-amplitude, low-frequency EEG waveforms accompanying synchronized oscillatory activity in the thalamocortical circuit. The thalamocortical circuit consists of reciprocal connections between the thalamus and cortex. The cortex sends strong excitatory feedback to the thalamus, however the function of which is unclear. Here we investigated the role of the corticothalamic inputs onto thalamocortical (TC) neurons via metabotropic glutamate receptor 1 (mGluR1) pathway in sleep control. The mGluR1 in TC neurons is linked to phospholipase C  $\beta$ 4 (PLC $\beta$ 4) pathway. In PLC $\beta$ 4<sup>-/-</sup> mice, the transition from wakefulness to the NREM sleep state was stimulated, and the NREM sleep state was stabilized, which resulted in increased NREM sleep. The power density of delta ( $\delta$ ) waves increased in parallel with the increased NREM sleep. These sleep phenotypes in PLC $\beta$ 4<sup>-/-</sup> were consistent in TC-restricted PLC $\beta$ 4 knockdown mice. Moreover, *in vitro* intrathalamic oscillations were greatly enhanced in the PLC $\beta$ 4<sup>-/-</sup> slices. The results of our study showed that top-down control of thalamocortical circuit was critical in controlling sleep architecture.



### Biography

Eunji Cheong and her research group have expertise in studying electrophysiological properties of neurons from ion channel level to brain circuit level. Her lab has studied the thalamocortical circuit in controlling the vigilance state of brain such as sleep state control and pathological impairment of consciousness in mice model for many years. She also worked on studying the ion channels and synaptic transmission which control the excitability of thalamocortical neurons. She has published over 30 research papers in prestigious journals during the last 5 years.

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