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Local spindling in thalamus during cortical slow oscillation

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Despite being the main input and output of the neocortex, the relationship of thalamus during cortical oscillations is not yet fully explored. To investigate this, we performed simultaneous multiple single-unit recordings in rats under urethane anesthesia in the ventral posteromedial nucleus (VPM) and the S1 cortex with four-shank silicon probes. In the VPM two types of spikes were recorded. Wide spikes showed the characteristic burst pattern of relay cells, while narrow spikes fired longer and slower bursts and displayed asymmetric cross-correlograms with wide spikes. During thalamic spindle episodes the two types of spikes fired at different phases, wide spikes preceding narrow spikes by ~25 ms. Most of the VPM multiunit activity was organized into spindle episodes, which only occasionally coincided with cortical spindles. These thalamic spindles were usually restricted to one or two electrode shanks. Both types of units were phase locked to spindles. Considering that VPM contains only relay cells, we propose that narrow spikes belong to axon terminals originating in the nRt. To prove this, we performed simultaneous juxtacell recording of the nRt soma, and axon terminal in VPM. Our data show that network activity in VPM is organized into spatially restricted spindle episodes, indicating that cortical control over VPM is not very, and VMP-nRt interaction dominates instead.