SYNCHRONIZATION OF THALAMIC SPINDLE OSCILLATIONS IS ENHANCED BY CORTICAL FEEDBACK INPUT.

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Synchronization of spindle waves was studied in intact-cortex and decorticated cats under barbiturate anesthesia. Field potentials were recorded from the cortical suprasylvian gyrus (areas 5 and 7) with an array of 8 equidistant bipolar electrodes (surface-depth), with an interelectrode separation of 1 mm. Sequences of spindles at 7-12 Hz recurred every 5 to 10 seconds and they were simultaneous in all cortical leads. Interruption of corticocortical connections by a cut between recorded foci, in the middle suprasylvian gyrus, did not affect intracortical synchronization. In intact-cortex animals, recordings from the thalamus, with the same array of bipolar electrodes (1 mm apart), revealed that most spindle sequences occur simultaneously over a distance of about 7 mm. Massive unilateral decortication decreased intrathalamic synchrony; however, many spindles still occurred simultaneously among the 8 electrodes. In decorticated animals, thalamic recordings with an array of 8 equidistant tungsten microelectrodes, separated by smaller interelectrode distances (0.4 mm), revealed that, when spindling propagated sequentially, thalamic reticular neurons recorded from the rostral pole consistently discharged typical spike-bursts, with acceleration-deceleration patterns, before thalamocortical neurons recorded from more posterior dorsal thalamic nuclei. These results demonstrate the important role of the cortex in enhancing the intrathalamic synchrony within the frequency range of spindles and emphasize the role of rostral reticular neurons in initiating and synchronizing spindling in decorticated animals.

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