

Abstract View

SPONTANEOUS FIRING IN VIBRISSAL TYPE II SLOWLY ADAPTING MECHANORECEPTORS DEPENDS ON POTASSIUM CHANNEL ACTIVITY

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Vibrissa have two types of slowly adapting mechanoreceptors - type I (St I) and type II (St II). The St II receptor is characterized by a regular discharge pattern on mechanical stimulation and a greater tendency for spontaneous firing, compared to St I receptors. While the evoked responses are the result of mechano-electric transduction, the basis of the spontaneous firing in St II is unclear. We therefore studied the effect of K channel blockers on both evoked and spontaneous firing in St II. Single unit recordings were made from isolated rat vibrissa using extracellular electrodes. Evoked firing was induced using feedback controlled displacement of the hair shaft for 5 s every 30 s. Spontaneous firing was continuously recorded during the 30 s intervals between stimuli. The calcium-dependent K channel blocker tetraethyl ammonium (TEA, 1 - 5mM) as well as the putative K channel blockers quinacrine (10-100uM) and chloroquine (50-300uM) all induced or significantly increased pre-existing spontaneous firing in all St II receptors. TEA also caused a reversible decrease in evoked responses while quinacrine and chloroquine had no effect or slightly increased evoked responses. Spontaneous firing induced by the K channel blockers remained high over 1 hour after washing out the drugs. These results suggest that the spontaneous spikes in St II mechanoreceptors arise from modulation of K channel activity rather than mechanical perturbation, as is the case for evoked spikes.

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