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Titel des Beitrags: Calbindin in cerebellar Purkinje cells is a critical determinant of the precision of motor coordination.

Abstract: Long-term depression (LTD) of Purkinje cell-parallel fiber synaptic transmission is a critical determinant of normal cerebellar function. Impairment of LTD through, for example, disruption of the metabotropic glutamate receptor-IP3-calcium signaling cascade in mutant mice results in severe deficits of both synaptic transmission and cerebellar motor control. Here, we demonstrate that selective genetic deletion of the calcium-binding protein calbindin D-28k (calbindin) from cerebellar Purkinje cells results in distinctly different cellular and behavioral alterations. These mutants display marked permanent deficits of motor coordination and sensory processing. This occurs in the absence of alterations in a form of LTD implicated in the control of behavior. Analysis of synaptically evoked calcium transients in spines and dendrites of Purkinje cells demonstrated an alteration of time course and amplitude of fast calcium transients after parallel or climbing fiber stimulation. By contrast, the delayed metabotropic glutamate receptor-mediated calcium transients were normal. Our results reveal a unique role of Purkinje cell calbindin in a specific form of motor control and suggest that rapid calcium buffering may directly control behaviorally relevant neuronal signal integration.

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