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Relationship between large conductance calcium-activated potassium channel and bursting activity

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To elucidate the role of the large conductance calcium-activated potassium channel (BK<sub>Ca</sub> channel) in the production of bursting activity, which is characteristic of convulsions, effects of iberiotoxin (IbTX), a selective blocker of the BK<sub>Ca</sub> channel, on bursting activity, induced by various procedures were examined using primary cultured neurons from the cerebral cortex of mice. IbTX completely inhibited bursting activity induced by pentylenetetrazol (PTZ), caffeine, inositol 1,4,5,-triphosphate (IP3) and direct forced increase of intracellular calcium. Inherent spontaneous bursting activity in the cerebral cortical neurons of the El mouse, which shows a high susceptibility to convulsions was also completely inhibited by IbTX. Apamin, a specific blocker of the small conductance calcium-activated potassium channel (SK<sub>Ca</sub> channel) showed no inhibition of bursting activity. These findings suggest that the BK<sub>Ca</sub> channel is essential for the production of bursting activity, and also suggest the possibility of clinical use of blocking agents of the BK<sub>Ca</sub> channel against intractable epilepsy.