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2. Title
   Analysis of glial mechanisms for the nicotine action with focus on astrocytic spatial potassium buffering

3. Period
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4. Summary
   Nicotine exhibits a variety of pharmacological effects, including cognitive enhancement, antidepressant effects, anti-Parkinsonian effects, behavioral addiction, and motor excitement (e.g., tremors and convulsions), but its mechanisms of action are still unknown. In this study, therefore, we investigated the role of astrocytes in the expression of nicotine's motor excitement and obtained the following results. (1) Nicotine dose-dependently increased the number of GFAP-positive astrocytes in the hippocampus, illustrating nicotine-induced activation of astrocytes. On the other hand, the expression of astrocytic Kir4.1 channels was not affected by nicotine. (2) Nicotine showed no effect until 4 hours after its administration and the nicotine-induced activation of astrocytes was prominent at 24 hr. In addition, activation of astrocytes by nicotine was unaffected by dihydro-β-erythroidine, but was specifically antagonized by methyllycaconitine, indicating that this reaction was mediated by α7nACh receptors. (3) In the astrocyte inactivation model, in which the specific astrocyte inactivator FC was intracerebroventricularly injected, seizure induction and excitation of hippocampal neurons by nicotine were significantly suppressed, implying that the nicotine-induced activation of astrocytes may be involved in potentiation of convulsive seizures during repeated administration (e.g., kindling). Our results suggest that the activation of hippocampal astrocytes by nicotine is partially involved in its motor excitement actions. Further studies are expected to elucidate the glial mechanisms responsible for various pharmacological effects of nicotine such as antidepressant effects and cognitive enhancement.