Changes of peripheral-type benzodiazepine receptors in the penumbra area after cerebral ischemia-reperfusion injury and effects of astragaloside IV on rats

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ABSTRACT. This study investigated the changes in peripheral benzodiazepine receptors (PBRs) in the penumbra after cerebral ischemia-reperfusion injury, and examined the effects of astragaloside IV (AST) on PBRs in rats. Sixty Sprague-Dawley rats were divided into a sham operation group, a model group, and three AST treatment groups. Cerebral ischemic models were induced by the clue-blocked method. Neurological deficits were examined. The animals were sacrificed after
2 h of ischemia and 24 h of reperfusion, and mitochondria from the penumbra were purified. PBR density (B$_{max}$) and affinity were measured by radioligand assays. Mitochondrial [3H]PK11195 binding was correlated with neurological deficits in rats. Compared to the model group, the 10 mg/kg AST group, 40 mg/kg AST group, and 100 mg/kg AST group had fewer neurological deficits. The effects in the 40 mg/kg group did not significantly differ from the effects in the 100 mg/kg group. Compared to the model group, the 10 mg/kg AST group, 40 mg/kg group, and 100 mg/kg group had a decreased B$_{max}$ in the penumbra. The B$_{max}$ decreased in the 40 mg/kg AST group and in the 100 mg/kg AST group compared with the 10 mg/kg group. The B$_{max}$ and neurological deficits in the 40 mg/kg did not significantly differ from those in the 100 mg/kg group. By contrast, the AST-treated rats showed no significant changes in the binding parameter equilibrium dissociation constant compared with those in the sham operation group and the model group. AST protects ischemic brain tissue by inhibiting PBR expression after cerebral ischemia.

**Key words:** Cerebral ischemia-reperfusion; Penumbra; Mitochondria; Peripheral-type benzodiazepine receptors; Astragaloside IV