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Neuroprotective effect of aloesin in a rat model of permanent focal cerebral ischemia

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The purpose of the present study was to investigate whether treatments with aloesin could protect brain injury induced by permanent focal cerebral ischemia in rats. Permanent focal cerebral ischemia was induced by occlusion of middle cerebral artery for 24 hr with a silicone-coated 4-0 nylon monofilament without reperfusion in male Sprague-Dawley rats. Aloesin (10 mg/kg/injection, i.v.) was administered into the femoral vein once or 3 times at 0.5, 2 and 4 hr after onset of ischemia. Neurological deficit scores were measured 24 hr after onset of ischemia immediately before sacrifice. Seven serial coronal slices of the brain were stained 2,3,5-triphenyltetrazolium chloride and infarct size was measured using a computerized image analyzer. Repeated administration of aloesin 3 times at 0.5, 2 and 4 hr after onset of ischemia significantly reduced both total infarct volume and edema by 63% and 56%, respectively, compared with the saline vehicle-treated control group. In addition, neurological deficit scores were significantly but slightly increased, indicating minor behavioral recovery effect of aloesin. Single administration of aloesin at 0.5 hr after onset of ischemia significantly reduced total infarct volume by 52% and edema by 54%. Moreover, single administration of aloesin at 2 hr after onset of ischemia also significantly reduced total infarct volume by 44% and edema by 25%. However, single administration of aloesin at 4 hr did not show any neuroprotective effect. The results suggest that aloesin can serve as a lead chemical for the development of neuroprotective agents by providing neuroprotection against permanent focal ischemic brain injury.