Thrombin in Intracerebral Hemorrhage

Previous studies demonstrated that thrombin is an important factor in brain injury after intracerebral hemorrhage and intraventricular hemorrhage.

Intraventricular injection of thrombin causes significant hydrocephalus and white matter damage.

Results suggest decreasing CSF production by acetazolamide attenuated thrombin-induced hydrocephalus in rats [1].

Intraventricular injection of thrombin caused more white matter damage and hydrocephalus in rats with low aerobic capacity. A differential effect of thrombin may contribute to differences in the effects of cerebral hemorrhage with aerobic capacity [2].

Thrombin is an essential component in the clotting cascade, and it is produced in the brain immediately after ICH induction [3]. However, thrombin can also participate in ICH-induced injury. The deleterious or protective effect of thrombin depends on its concentration [4].

The potential mechanism of early edema around the clot is considered to be a vasogenic reaction to pro-osmotic substances such as electrolytes and protein, which are released from the acute hematoma. This is followed by activation of the coagulation cascade and increased thrombin expression, which may propagate swelling. After the first week, any further edema is related to the cytotoxic effects of hemoglobin breakdown and the formation of reactive oxygen species [5].

Experimental investigations have indicated that thrombin formation, red blood cell lysis, and iron toxicity play a major role in ICH-induced injury and that these mechanisms may provide new therapeutic targets [6].

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