

Top Ten Things to Know Treatment and Outcome of Hemorrhagic Transformation After Intravenous Alteplase in Acute Ischemic Stroke

1. Risk of symptomatic intracranial hemorrhage (sICH) after administration of IV alteplase in acute ischemic stroke varies depending on patient population and the definition of sICH and generally ranges between 2% and 7% in clinical trials.
2. This scientific statement focuses on the pathophysiology and treatment of sICH after administration of IV alteplase in acute ischemic stroke.
3. The definition of sICH is dependent on radiographic appearance of the hemorrhage and the presence of associated neurological deterioration. For proper comparisons to clinical trial benchmarks, stroke centers should:
 - classify the appearance of hemorrhagic transformation according to radiographic criteria (HI1, HI2, PH1, PH2 or remote ICH)
 - assess the degree of neurologic worsening by National Institutes of Health Stroke Scale (NIHSS) point change
 - provide an attribution of causality for the worsening (see section on definition in the paper or Table 5).
4. sICH involves several connected pathologic processes including: coagulopathy, ischemic injury, reperfusion injury and blood brain barrier disruption. These mechanisms are discussed in detail in this paper.
5. Diagnosing sICH includes monitoring after thrombolytic therapy, blood pressure measurement, and neurological examination (recommendations for monitoring are included in the Guideline for the Early Management of Patients with Acute Ischemic Stroke), monitoring for the timing of postthrombolytic ICH and then detecting sICH (consider a lower threshold to trigger emergent neuroimaging in patients with a high NIHSS >12 as an example).
6. Treatment of postthrombolytic hemorrhage includes indications for the reversal of alteplase-induced coagulopathy - risk of expansion, radiographic appearance, symptomatic versus asymptomatic hemorrhage infarction (HI), and assessment of potential benefit.
7. Agents for reversal of coagulopathy include: cryoprecipitate, platelet transfusion, prothrombin complex concentration (PCCs), fresh-frozen plasma, vitamin K, antifibrinolytic agents (ε-Aminocaproic acid and tranexamic acid), and activated factor VII.
8. Prevention of hematoma expansion and neurosurgical modalities postthrombolytic infusion is discussed in this scientific statement.
9. Further research is needed to establish treatments aimed at maintaining the integrity of the blood-brain barrier in acute ischemic stroke on the basis of inhibition of the underlying biochemical processes.
10. Treatment of sICH after IV thrombolysis requires early diagnosis/detection to prevent expansion of the hematoma with early administration of reversal agents quickly enough to take effect.

Yaghi S, Willey JZ, Cucchiara B, Goldstein JN, Gonzales NR, Khatri P, et al; on behalf of the American Heart Association Stroke Council; Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research. [Treatment and outcome of hemorrhagic transformation after intravenous alteplase in acute ischemic stroke: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association](#) [published online ahead of print November 2, 2017]. *Stroke*. doi:10.1161/STR.0000000000000152.