

# Low Cost Clot-dissolving Protein from Transgenic Plants for Stroke Treatment

## Background:

- Every year in the United States, more than 795,000 people suffer from stroke with 150,000 deaths from stroke. With more than 4 million stroke survivors in the United States, it is the major cause of serious, long-term disability. Recombinant human tissue-type plasminogen activator (t-PA) is the only clot-busting drug approved by the U.S. Food and Drug Administration for the acute (urgent) treatment of ischemic stroke. There is evidence that t-PA may increase risk of bleeding in the brain and lead to damage to neurons.
- The Vampire bat (*Desmodus rotundus*) salivary plasminogen activators (DSPAs) have been found to be both more active than t-PA and to have fewer side effects. DSPA $\alpha$ 1 produced in Chinese Hamster Ovary (CHO) cells, desmoteplase, is currently in two large clinical Phase III trials (DIAS-3 and DIAS-4) for the treatment of acute ischemic stroke. No safety issues have been revealed from the clinical studies. Filing with health authorities is expected in the second quarter of 2014. Desmoteplase could become the only thrombolytic agent in late stage development for acute ischemic stroke. However, the yields of protein produced from CHO cells are relatively low while the expense of operation is high.

## Advance:

- Transgenic plants can be used to produce active, safe, and inexpensive therapeutic proteins.
- An alternative plant seed-based platform for large scale and low cost production of functional DSPAs for the treatment of acute stroke patients is being developed at the Oklahoma INBRE

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