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Seed-derived plasminogen activators (t-PA and DSPAα1) dissolve fibrin and blood clot

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Stroke has remained the top major killer worldwide. It is also the leading cause of adult disability. Recombinant human tissue plasminogen (rt-PA) is the only FDA-approved treatment for acute ischemic stroke. The yields of rt-PA protein produced from CHO cells are relatively low while the cost of production is high. It often causes side effects which may lead to disability and death. Vampire bat (*Desmodus rotundus*) salivary plasminogen activators (DSPAα1) have been found to be both more active than t-PA and to have fewer side effects. In this study, both DSPAα1 and t-PA were targeted in tobacco seed under seed-specific promoter (*phas*) to minimize protein degradation. Both t-PA and DSPAα1 were codon-optimized for tobacco plant usage to increase foreign protein expression level. 6xHis tag was fused to C-terminal for recombinant protein purification. The ER signal peptide sequence, KDEL, will be used to accumulate recombinant proteins to the ER. The geminivirus-based single DNA replicon system pBY was used to rapidly produce t-PA and DSPAα1, respectively in tobacco leaf. Studies showed that recombinant proteins caused leaf tissue death. Seed-derived proteins can dissolve fibrin and human blood clots. Our study demonstrated that seed-based system can rapidly produce functional recombinant t-PA and DSPAα1 for stroke patient treatment.

Biography

Kevin Yueju Wang has completed his PhD in 2004 from at the Oregon State University, USA and Post-doctoral experiences from the University of California at Berkley and the University of Texas at Austin. He was appointed as an tenured Associate Professor in Molecular Biology at the Northeastern State University in August 2015. He has a broad background in Plant Molecular Biology and Biotechnology with specific training and expertise in “Expression of genes in plants to produce therapeutic proteins that are active, safe and inexpensive”.

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