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Modification of the bovine genome for large-scale production of human serum albumin

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Abstract

There is a vast clinical need for human serum albumin (HSA) with nearly 500 metric tons used worldwide every year. Currently, HSA is isolated from donated human blood/plasma, a source that fluctuates unpredictably and can potentially spread pathogens from donor to recipient. One solution to the problem is the use of transgenic cattle as living bioreactors, enabling large-scale production of recombinant HSA (rHSA) in a cost-effective manner. Previous simple bovine transgenics which express rHSA in the milk have not proved commercially viable due to the presence of endogenous bovine serum albumin (BSA), resulting in a prohibitively expensive and tedious purification process. Ultimately, this project intends to provide proof-of-principle for production of an inexpensive, reliable, and quality-controlled therapeutic source of rHSA through proposal of the following: 1) Replace endogenous BSA expression with rHSA expression using transcription activator-like effector nuclease (TALEN)-stimulated homologous recombination 2) Direct rHSA expression into the milk using a milk-specific alpha-lactalbumin promoter 3) Produce transgenic bovine embryos from modified fibroblasts using somatic cell nuclear transfer (SCNT).

Biography

Shaida Moghaddassi is a Ph.D. Candidate in the Molecular Genetics program at Wake Forest University and is completing her dissertation under direction of Dr. Colin E. Bishop. She graduated with a B.S. in Biological Sciences from Clemson University in 2008.