TECHNOLOGY OFFER

Universität für Bodenkultur Wien
University of Natural Resources and Life Sciences, Vienna

Recombinant protein production in plants

BACKGROUND

Plants and plant cells are used to produce many different recombinant proteins, including vaccine subunits, antibodies and antibody fragments, and offer unique advantages in terms of production time, environmental impact, scalability and overall cost. Among the successfully produced target proteins were also some with high structural complexity, such as secretory IgAs, which pose a challenge for recombinant production in mammalian cells and often require additional technological solutions, such as reassociation in vitro. Overall, it thus appears that the plant cellular machinery is well suited for the expression and assembly of SIgAs and other complex multimeric proteins in functional form. However, the overall yield and in particular the proportion of fully assembled protein still varies depending on the protein.
It is therefore desirable to further optimize plants accordingly and develop production lines that are ideally suited to synthesize complex proteins and lead to a higher yield of fully assembled and functional proteins.

TECHNOLOGY

The endoplasmic reticulum (ER) is a central cell organelle for the synthesis of complex proteins, which are subsequently released into the lumen of the ER where they are folded with the help of chaperones and undergo some post-translational modifications. The ER is well developed in most cells specialized for protein synthesis, and there is evidence in the literature that expansion of the ER increases ER resilience, supports a high protein production rate and alleviates ER-stress. In the present invention, mutations were inserted in one to three *N. benthamiana* genes for CTP:phosphatidate cytidylyltransferase (CCT), so that a shortened version of the enzyme is produced, which is constantly present in an active conformation. CCT catalyzes a rate-limiting step for the synthesis of phosphatidylcholine (PC), which is an essential building block for ER membranes and causes the expansion of the ER. It has been shown that this expansion results in a higher yield of fully assembled and functional SIgA in the mutant plant lines, thus removing a major obstacle to realizing the full potential of SIgA for clinical use, both in humans and animals.

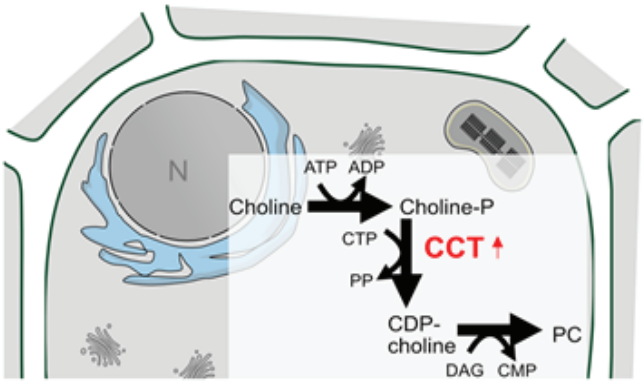

Figure: *Expansion of the ER using gene editing.*

ADVANTAGES

- Increased yield of functional (fully assembled) SIgA antibodies from plants
- Safe production of recombinant proteins on a large scale
- Optimized plant line for complex protein synthesis
- Cost-efficient manufacturing process

REFERENCE:
EM202310

AVAILABLE FOR:
- License agreement
- R&D cooperation
- Patent purchase

APPLICATION:
Production of pharmaceutical proteins

KEYWORDS:
N. benthamiana production lines, SIgA, recombinant antibodies/ proteins, endoplasmic reticulum

DEVELOPMENT STATUS:
Proof of concept

IPR:
EP prio

INVENTORS:
- Eva Stöger
BOKU, Vienna

- Julian Ma
St. George's University, London

CONTACT:

Verena Hönninger
Research Support, Innovation & Technology Transfer
Vienna, Austria
T: +43 1 47654 33035
verena.hoenninger@boku.ac.at