**INTRODUCTION**

Beyond the provision of a structural support for cells within tissues, the proteins of the extracellular matrix represent a dynamic network which plays a vital role in cell adhesion, migration and differentiation. Fibrous proteins such as collagen, fibrinectin and fibrin have already been used as scaffolds in tissue engineering applications. For this purpose, the proteins are usually obtained from animal sources. A recombinant production of these materials would offer clinical researchers numerous advantages including uniform quality, low immunogenicity and low risk of pathogenic transmission. In our group, we focus on the recombinant production of proteins carrying adhesion ligands, growth factor binding sites and providing inherent susceptibility to cell-derived proteases for regenerative medicine applications. Our special interest lies in fibrinogen-derived proteins or collagen-mimetic proteins. In addition, we are investigating the recombinant production of eLOX3, a lypoxygenase enzyme, which has been implicated in the maintenance of epidermal barrier function.

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**FGG - FIBRINOGEN GAMMA CHAIN**

- Fibrinogen network can actively bind cells and growth factors
- various active binding sites are located on the Fibrinogen gamma chain
- chemical modification of FGG to create a crosslinked biomimetic protein scaffold

**COLLAGEN-MIMETIC PEPTIDE**

- Collagen-derived peptide with synthetic ends
- synthetic ends consist of (Pro-Gly-Pro)\(_{9}\) domains that form fibrils similar to original collagen structure
- gel-like structure suitable for cell culture matrices
- no co-enzyme necessary (e.g. Prolyl-4-hydroxylase for Collagen Type I)

**EPIDERMAL LIP OXYGENASES (eLOXs)**

- eLOX from Homo sapiens and Ambystoma mexicanum (axolotl)
- both eLOXs display regeneration capacity in wound healing
- human cells also respond to eLOX from Mexican axolotl
- clinical applications in wound healing possible

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**OUTLOOK**

The positive clones have to be tested for production of the protein of interest. This includes screening for gene expression as well as cultivation optimization. The copy number of the gene of interest has to be determined for *Pichia pastoris* strains because it correlates directly with protein production. After confirming protein production the strain can be transferred to a bioreactor (2 L, 10 L) for higher protein yield. Higher protein yield is especially necessary for further investigation on the protein of interest e.g. characterization, functionality testing and activity determination. Consideration of this additional information can open the way to an even broader yet more specific clinical application of these products.

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