

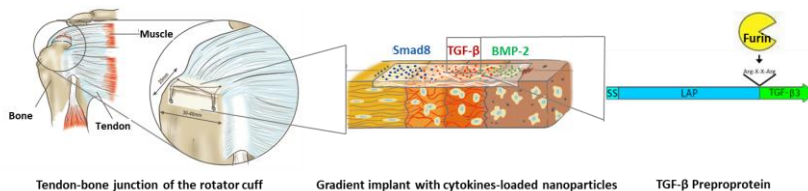


Enzymatic maturation of mammalian cell culture-derived TGF- β for implant research

Bachelor Thesis at the
Institute of Technical Chemistry (TCI)

Introduction

In recent years, interfacial tissue engineering has been a very active area of implant research, an important application of which is the tendon-bone junctions (enthesis). In our research project, we focus on the regenerative tendon-bone implants which are designed after the naturally occurring gradient junction between bone and tendon. For this 'graded implant', we use cytokines and growth factors, namely TGF- β , BMP-2 and Smad8. In cells, TGF- β is expressed as preproprotein, which has a secretory signal (SS), latency-associated peptide (LAP) and a C-terminal TGF- β domain. The mature domain is cleaved from the LAP via Furin protease. Furin protease is an important enzyme for several cytokines and plays an important role in the virulence of many viruses, such as HIV and SARS-Cov-2.



TGF- β preprotein for the tendon-bone gradient implants

We exploit mammalian cell culture techniques for recombinant expression of TGF- β preproprotein, which is later treated for Furin protease reaction. Since the protease reaction is very crucial for the maturation of TGF- β , more studies are needed to understand this step. To this end, we will optimize the conditions for the *in vitro* Furin protease reaction of TGF- β 3 (mammalian cell culture derived) and subsequent isolation of mature TGF- β 3 domain. To achieve this, we will employ analytical techniques such as SDS-PAGE, Western blot and affinity chromatography.

Requirements

Academic: General knowledge of cell biology and biochemical reactions as well as protein biochemistry.

Personal: Commitment, ability to work independently, scientific curiosity.

Field of Research

- Protein Biochemistry
- Biotechnology
- Downstream processing
- Hands on: FPLC, SDS-PAGE, Western blot

Beginning: Mid of February, 2022

Contact



Dr. Maria Zahid

Email: zahid@iftc.uni-hannover.de