



Engineering bone tissue with spider silk

Diploma work position available Fall 2017 at KTH Biotechnology, AlbaNova

Background

Bone Morphogenetic Proteins (BMPs) are bioactive growth factors that differentiate many cell types into bone. BMPs are routinely used by surgeons to help regenerate bone in large defects without having to rely on bone autografts. However BMPs have attracted criticisms, for as they are expensive treatments and are used with supraphysiological quantities, leading to undesirable side effects. Bone BMP mimicking peptides are fragments of BMPs and are currently explored as potential avenue for cheaper, and safer treatments.

Spider silk has an elegant way of combining strength and elasticity into a protein-based material. A miniature spider silk protein, 4RepCT, can be recombinantly produced in *E. coli* and still maintain the ability to spontaneously form silk-like fibers. Co-expressing the silk and BMP mimicking peptides could results in interesting bioactive materials for bone regeneration.

Aims

This project aims at designing and expressing and characterizing silk-bone morphogenetic peptide fusion protein.

Methods

You will be introduced to a range of techniques including the bioinformatics and cloning tools needed to design the new silk plasmids, the expression of the recombinant protein in bacterial system, and the formation of silk-based materials and initial bioactivity test using mammalian cell lines.



Figure: Fiber made of recombinant spider silk

Please do not hesitate to contact us for more information. The project will be co-supervised by:

Dr. Thomas Crouzier
KTH Biotechnology, AlbaNova University Center
crouzier@kth.se

Dr. My Hedhammar
KTH Biotechnology, AlbaNova University Center
myh@kth.se