# Functionalised spider silk
# – a new biomaterial designed to contain specific cell signals

**Background:**
Tissue engineering is emerging as a multidisciplinary approach to create new biologically functional tissues that can replace or restore damaged ones. Appropriate scaffolds, which can function as a temporary extra cellular matrix for cultured cells, are a key element in developing effective tissue engineering products. All currently available materials are suboptimal for this purpose. Spider silk appear to exhibit all desired properties: strength and elasticity combined with biocompatibility. Recently, we developed a method for production of a soluble recombinant miniature spider protein, Spiber, that spontaneously forms fibres resembling native spider silk.

Figure 1. Spiber –a recombinant spider fibre.

Of critical importance in advanced tissue engineering is guidance of cells to help them create the new tissue. A three dimensional scaffold with inbuilt cell signals would be able to direct cell migration, proliferation and differentiation and trigger specific tissue regeneration. A major advantage of protein-based scaffolds, such as Spiber, is the option to genetically tailor the properties of the material according to the needs in a specific tissue.

**Aims:**
Within this project two differently engineered fibres, imitating fibronectin and laminin respectively, will be created and characterised in terms of fibre formation and cell interaction.

**Methods:**
During the travel from gene to protein fibre several important biotechnology methods will be utilised e.g: PCR, molecular cloning, recombinant protein expression and purification, fibre formation and cell analysis.

**Significance:**
The availability of engineered tissues would provide improved clinical options to cure several common diseases, e.g. bone and tendon defects and chronic wounds.

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