

# Evaluation of Viability and Cell Attachment of Human Endometrial Stem Cells on Electrospun Silk Scaffolds Prepared Under Different Degumming Conditions and Solvents

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## Abstract

**Purpose:** This study aims to evaluate the attachment and viability of human endometrial stem cells (hEnSCs) on the silk scaffolds which were spun under different degumming conditions and solvents to use for tissue engineering applications.

**Methods:** Silk was degummed at different times and temperatures, and then, weight loss was determined. Electrospinning of the silk fibroin (SF) was done by hexafluoroisopropanol (HFIP) and formic acid (FA) solvents, and finally, nanofibers were treated with methanol. Scanning electron microscopy (SEM), Fourier transform infrared (FTIR), tensile test and MTT assay were employed to study the structure of fibers and the viability and attachment of hEnSCs on the scaffolds.

**Results:** The diameter of nanofibers was affected by the weight loss and solvent. FTIR showed that silk degummed at  $87 \pm 1$  °C (2 times) had bands of sericin while at  $99 \pm 1$  °C (2 and 3 times) had little or no sericin. The tensile test revealed that by increasing in sericin, elongation at break increase and with methanol treatment, Young's modulus and UTS increase and the elongation at break decrease significantly. The electrospinnability of nanofibers was improved with sericin or HFIP. Besides, all scaffolds prepared with different degrees of degumming conditions and solvents exhibit good hEnSCs attachment and viability.

**Conclusion:** These results showed that degumming conditions and solvents can impact the electrospinnability, morphology and properties of the silk fibers. Although all scaffolds showed good biocompatibility for hEnSCs, sericin-containing scaffolds appear to be a better choice for tissue engineering applications due to their better electrospinnability and ductile properties.