SESSION I: NERVE

SPIDER SILK IN PERIPHERAL NERVE REGENERATION: UNRAVELLING THE MATERIAL'S BIOCHEMICAL PROPERTIES RESPONSIBLE FOR ITS SUCCESS

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Introduction: Spider silk (SPSI) has attracted avid interest for medical purposes due to its remarkable performance as a filament for nerve guidance conduits in tissue regenerative applications by supporting nerve growth and nerve regeneration. However, there are major limitations in translating the fiber into clinical practice, particularly the material's variability. For this reason, the search for possible SPSI analogues for applicability in human medicine is of tremendous interest. To pave the way toward this, an investigation of biochemical properties of different SPSIs together with an assessment of their nerve regenerative potentials is necessary.

Materials and Methods: In this study in vitro performances of different SPSI and their material properties are investigated. Live cell imaging was performed to study the migratory potential of primary rat Schwann cells (rSCs) on SPSI. After 14 days of cultivation the extent of culture's purity and proliferation was examined by multicolor immunofluorescence stainings. Liquid chromatography - mass spectrometry and atomic force microscopy were employed to elucidate SPSI's primary protein structure and its morphology, respectively.

Results: The results showed that rSCs can adhere and migrate along SPSI, with deviating velocity depending on SPSI type. Multicolor images of rSCs stained for Sox10 and S100 in combination with DAPI indicated a rSC culture purity over 95%. Furthermore, the proliferation of rSCs on SPSI was evaluated with an EdU staining. These differences in the cell behavior on SPSI were correlated to the silk's morphology and primary protein structure.

Conclusion: To date, only a limited knowledge about the interactions between SCs and SPSI exists, rendering the targeted improvements of natural silk and replacement with artificial fibers challenging. Our results demonstrated variations in the regenerative potentials of SPSI and showed that it is possible to use the natural differences between the native silks of diverse spider species to better understand the interactions between silk and cells.

RECONSTRUCTION OF PERIPHERAL NERVES AFTER NEUROMA, AND TUMOR RESECTION WITH PROCESSED ALLOGENIC NERVE GRAFT (AVANCE® NERVE GRAFT)

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Introduction: Autologous nerve grafts are accompanied by morbidity of the donor site, leading to loss of sensation and possible complications such as end neuroma formation or persistent pain. Moreover, the indications are narrow mostly limited to defects in larger motor nerves with good prognosis. One alternative to autografts might be the commercially available allograft (Avance® Nerve Graft). The aim of this study was to assess the safety and outcome of the Avance® Nerve Graft for the reconstruction of peripheral nerves after neuromas, and tumor resection.

Materials and Methods: For this purpose, ten patients with eleven implanted grafts were recruited for the prospective study. Five patients suffered from a neuroma-in-continuity, four from an terminal neuroma formation and two from Schwannomas. Seven patients were symptomatic for pain. After the resection, the peripheral