ESWT affects Schwann cell phenotype *in vitro* and *in vivo* thereby accelerating nerve regeneration

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Introduction: Peripheral nerve injuries are common and a frequent cause of hospitalization displaying a major burden to patients and social health-care systems. ESWT has been shown to be one of very few treatment option which accelerates peripheral nerve regeneration. Despite recent advances in understanding the underlying mechanisms of ESWT, little is known of the effect on Schwann cells(SCs) and peripheral nerve regeneration. In this study we investigated these two aspects.

Methods
in vitro: Schwann cells have been isolated from motor, sensory and mixed nerves, respectively. Dissected nerves have been treated with ESWT prior to isolation. Cultured SCs were evaluated using FACS analysis and western blot.
in vivo: A femoral nerve defect model was established in the rat. The effects of ESWT on motor fibers regenerating through a sensory environment have been evaluated using automated gait analysis, electrophysiology, histology and qPCR.

Results: In vitro data indicate a strong influence of ESWT on the activation status of SCs of different phenotype. Motor SCs differ from sensory SCs regarding proliferation and expression of myelination associated proteins. ESWT is able to induce proliferation of motor and sensory SCs.
In vivo data indicate inferior regeneration of motor axons through a sensory nerve graft compared to a phenotypically matched graft. ESWT can ameliorate this effect and accelerate nerve regeneration.

Discussion: This study indicates that ESWT is able to accelerate peripheral nerve regeneration in a model which reflects the clinical reality after autologous nerve transplantation. Thereby providing support for the use of ESWT after peripheral nerve injury.

Device and producing company: Dermagold 100, MTS;

Setup: *in vitro:* waterbath, whole nerve
in vivo: 1x transcutaneously after wound closure