

Effects of unfocused shock waves stimulation on human microvascular endothelial cell line HMEC-1

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Device and producing company:

Dermagold, MTS - Europe

Introduction:

Unfocused Shock Waves (uSW) can induce soft tissue regeneration, mainly due to neoangiogenesis, the mechanisms of which are partly unknown. The aim of our study was to investigate the effects of uSW on human microvascular endothelial cell line HMEC-1.

Methods:

Cell cultures were stimulated with uSW (Dermagold, MTS) according to different protocols. Cell viability was assessed spectrophotometrically by XTT assay; for angiogenesis experiments, cells were grown in 24-well plates on Matrigel matrix, and vessels-like structures were quantified by counting the capillary connections under an inverted microscope.

Results:

Most relevant results were obtained at lower energies and 200 pulses. Results of 24h XTT assay showed enhanced metabolic activity in treated cultures, compared to controls (Treated/Controls Optical Density ratio was 1.8). Results from 24h-angiogenesis assay showed more capillary connections in uSW treated cultures than controls (31.40 ± 2.064 vs. 17.00 ± 3.286 ; $p < 0.05$).

Discussion:

In the literature, endothelial cell damage has been described after lithotripsy. Our data (enhanced metabolic activity and increased in vitro angiogenesis after uSW stimulation of HMEC-1 cell line), while encouraging a suitable use of this in vitro model, suggest some intriguing speculation about mechano-induced tissue healing and angiogenesis.

Conclusion:

A preliminary report on the potential metabolic enhancement and mitogenic effect on human microvascular endothelial cells, induced by unfocused Shock Wave (uSW) stimulation is presented. On this basis, the mechanism of neoangiogenesis in vivo and the role of endothelium as the main target of shock waves in living tissues may be postulated.