P28. Elucidating the molecular mechanisms underlying cardiac shock wave therapy

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Introduction Despite the existence of established therapy strategies for coronary heart disease, the incidence of death is predicted to keep rising. Therefore, substitute methods are pursued.

Material and Method Cardiac SWT may offer a non-invasive alternative, yet the molecular mechanisms of its efficacy in the heart remain unknown. Murine embryonic stem cells (ESCs)- and cardiovascular progenitor cell (CVPCs)-3D models were subjected to SWT of 0.4-0.13 mJ/mm^2 using a Dermagold100 device (MTS). Intracellular signaling was assessed with Western blot and the differentiation into the cardiac lineage was determined with qPCR.

Results We observed a dose-dependent activation of ERK1/2 immediately after SWT in both cell types, consistent with previously shown results. No effect on the mTOR and PI3K pathways was visible up to 6 hours post SWT. A higher expression of the mesodermal marker Brachyury and the early cardiac marker Nkx2.5 was shown in mESCs following SWT, compared to controls. In contrast, no clear effect of SWT could be observed in CVPCs.

Discussion Our studies aim to justify the use of SWT in the therapy of patients who suffered from myocardial infarction. We could confirm the transduction of the mechanical signal triggered by SWT within the cell, which could potentially underlie the altered transcription of certain genes. Despite obvious trends visible in gene expression profile, the superiority of certain treatment regimes over others remains unclear. The lack of conclusive evidence that SWT affects differentiation of committed cells points to a different putative mechanisms affecting the heart cells and leading to their regeneration.

Conclusion All in all, SWT of the postischemic myocardium could contribute to its regeneration by improving differentiation of circulating stem cells, yet other mechanisms cannot be excluded.