

# The first non-invasive way for inducing migration in mesenchymal stem cells (MSC)

## **Author:**

Annette Schmidt, Yvonne Delhasse, Caroline Steingen, Helmut Neuland, Wilhelm Bloch

## **Institution:**

Department for Molecular and Cellular Sport Medicine, Department for Molecular and Cellular Sport Medicine, German Sport University, Germany and Center for Extracorporeal Shock Waves Kronberg, Germany

## **Device and producing company:**

German Sport University

## **Introduction:**

Stem cells have long been discussed as a useful tool for treating various dysfunctions. Different ways are described for placing stem cells into the area of need. Unfortunately, up to now there has been no non-invasive method which is able to attract stem cells to a targeted place. Here we demonstrate for the first time that it is possible to direct stem cells without invasion.

## **Methods:**

For this purpose MSC of human origin were obtained from bone marrow of patients undergoing hip joint surgery, isolated and cultured as described before (Schmidt A. et al.; Stem Cells 2006). Isolated MSC were treated with shock waves using the Piezoson 100 (Wolf Inc.). After treating MSC the migratory activity was analyzed using Boyden chambers.

## **Results:**

After shock wave treatment the migratory activity was increased significantly, up to three-fold as compared to the control. Also cell growth highly increased after shock wave treatment. During a wound and healing assay the MSC behave completely different after shock wave treatment compared to control. We also obtained interesting results by comparing the effect of two shock wave applicators (FP4 / F I OG4) on the migration behaviour of MSC.

## **Discussion:**

Taken together shock waves might be the first approach to mobilize stem cells without invasion and induce increased cell growth. The strong effects on the behaviour of MSC indicate that these cells can also be sensitized against mechanic influences like shock waves.

## **Conclusion:**

These mechanic sensitizers can therefore be used to induce a directed migration in MSC and might be a powerful tool for goal-orientated placement of stem cells.