

# Activation of protein kinase B (Akt1/PKBa) in porcine cartilage after application of radial extracorporeal shock waves

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## Device and producing company:

Swiss Dolorclast, EMS, Switzerland

## Introduction:

Mechanotransduction is a biological process of converting mechanical stimuli into biochemical signals which are further assimilated into specific cellular responses.

Protein Kinase B (Act/PKB) is a Ser/Thr protein kinase which is known to be a typical downstream signaling protein regulating cell growth, apoptosis and metabolism. The aim of this study was the investigation of initial adaptation processes in signaling pathways of porcine cartilage after mechanical stimulation via radial extracorporeal shockwaves (rESW).

## Methods:

The shoulder joints of two groups of 5 and 6 animals, respectively, were treated with rESW at a different pressure initially post mortem (2000 impulses, 8Hz, 250kPa (group 1) and 400kPa (group 2); Swiss Dolorclast, EMS). The left foreleg served as intervention side, the right one as control. Six specimens were harvested on each side at specific points in time after the application (0, 2, 5, 10, 20 and 40 minutes). Protein Kinase B was detected using immunohistochemical stainings with Anti-phospho-Akt1/PKBa (Thr308). The staining of each cartilage zone was graded microscopically by a score of 0-3.

## Results:

The analysis revealed an activation of Akt1/PKBa in chondrocytes with different intensity depending upon the cartilage zone and, to some extent, with regard to the point in time of harvest and the application of shock waves.

## Discussion:

There is reason to believe that mechanotransduction is one of the mechanisms of action explaining the effects of (r)ESW. Yet in order to ascertain these first observations and to detect further specific changes in signaling pathways the number of subjects needs to be increased.