

The effects of mechanical stretch on keratinocytes

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Human skin is exposed to outer environment, which always suffers from outer stimuli. Mechanical stimulus is one of such stimuli, which could be the most frequent stimulus affecting skin, however, the effect of mechanical stimulus on human skin has not been adequately investigated. In order to clarify the effects of mechanical stimuli on human epidermis, we employed the equipment that utilized in the investigation of cardiac muscles, and stimulated keratinocytes by stretching cells. Mechanical stretch induced BrdU incorporation, which was inhibited by inhibitors for EGF receptor, MEK1/2, PI3K, and calcium channel. Mechanical stretch induced ERK phosphorylation, which was also inhibited by inhibitors for EGF receptor phosphorylation, MEK1/2 and PI3K. Mechanical stretch induced phosphorylation of Akt, which is known to inhibit cellular apoptosis, and it was also dependent on MEK1/2, PI3K, and EGF receptor. DNA microarray experiment revealed a set of genes regulated by mechanical stretch. These results indicate that mechanical stretch causes activation of signaling molecules, resulting in regulation of a variety of gene expression, some of which induce proliferative and anti-apoptotic phenotype in keratinocytes.