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Dermal Wound Fibroblasts and Matrix Metaloproteinases (MMPs): Their Possible Role in Allergic Contact Dermatitis

Mohammad Reza Khorramizadeh, Reza Falak, Mohammad Pezeshki, Farnaz Safavifar, Parvin Mansouri, Aziz Ghahary, Farshid Saadat, Kamran Varshokar

Abstract:

This study was conducted to examine if allergic contact dermatitis (ACD) alters the expression of MMPs in human dermal fibroblasts. Fibroblasts are the primary source for MMP and matrix production in skin. MMPs are known to involve in a number of physiological and pathological processes. Some published data indicated a gelatinase-like activity in acute and chronic phases of allergic contact dermatitis. However, no exact source of gelatinase activity was demonstrated. Moreover, little is known about the role of MMPs in immune responses.

To study and predict the pathophysiological effects of (MMP-2) in allergic contact dermatitic (ACD) patients, we established an in vitro tissue culture survey based on fibroblast explanted from ACD wounds and normal tissues respectively. We also employed a precise proliferation assay [i.e. MTT; 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] to analyze and compare three ACD vs. three normal cell strains. Parallel to MTT assay, we assessed the activity as well as the kinetics of gelatinase (MMP-2) in conditioned media using a zymogeraphy analysis.

There was a significant difference in proliferation capacity between mean ACD fibroblast strains vs. mean normal cells, particularly in days 6 to 8 post explantation, 492.5±6.6 vs. 361.75±8.25 respectively. Zymoanalyses indicated significant differences between ACD cells and normal fibroblasts both in time-course and MMP-2 activity per cell fashions, 163.7±16.21 for mean ACD fibroblasts vs. 130±9.09 for normal cells respectively.

These data suggest that fibroblasts overproliferated in the process of ACD. Moreover, simultaneous overexpression of MMPs observed in ACD fibroblasts vs. normal strains, is indicative of altered fibroblast functionality in the process of allergic contactdermatitis. The activity per cell analysis showed that MMP-2 expression in ACD fibroblasts is independent of cell number, suggesting that either intra- or inter-cellular control signals are also altered and that ACD fibroblasts exhibit hyper-responsiveness to mitogenic or fibrogenic stimulants. Altogether, these data address the chronocity and non-healing tendency of ACD wounds. However, more studies are required to examine possible MMPs inhibition and differential expression of mytogenic, fibrogenic and antifibrogenic cytokines in ACD wound beds. In particular, MMP-2 is postulated to be an aim for further gene therapy protocols.

Keywords:

Allergic Contact Dermatitis ، Matrix metalloproteinase 2 ، Zymoanalysis

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