The influence of acute and chronic wound fluid on ADSC function

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Abstract

Introduction:

Chronic wounds represent a major problem in medicine today as their incidence is continuously increasing due to an aging population. Physiological wound healing is a complex biological process proceeding from the stage of inflammation through proliferation to maturation. It requires a well-orchestrated interaction of mediators, resident and infiltrating cells. In this context, mesenchymal stem cells play a crucial role as they are attracted to the wound site and influence wound healing processes via direct cell-cell interaction as well as paracrine secretion and transdifferentiation. In chronic wounds these finely tuned mechanisms are disturbed by mediators of the wound environment.

Methods:

We analysed the effect of acute and chronic wound fluid on adipose-derived stem cells (ADSCs). Therefore we successfully developed protocols to harvest wound fluid from acute and chronic wounds. We investigated the proliferation and migration capacity of ADSCs under the influence of acute and chronic wound fluid (AWF; CWF) using MTT test and transwell migration assay.

Results:

AWF and CWF positively influence ADSC migration. However, AWF has a significantly stronger chemotactic impact on ADSCs than CWF. Proliferation of ADSCs is inversely influenced by AWF and CWF, respectively. Whereas proliferation is stimulated by AWF, CWF has a negative effect on ADSC proliferation over time.

Conclusion:

These results give an insight into impaired ADSC function in chronic wounds. The less stimulating effect of CWF on ADSC proliferation and migration compared to AWF might be one reason for an insufficient wound healing process in chronic ulcers.