EuroSciCon

June 17-18, 2019
London, UK

13th Edition of International Conference on

Advances in Tissue Engineering and Biomaterials Science

J Biomedical Sci 2019, Volume 08

Flexible electrical stimulation device with chitosan-based dressing accelerates angiogenesis in diabetic wounds

Xiao-Feng Wang, Qing-Qing Fang, Wan-Yi Zhao and **Wei-Qiang Tan**

Zhejiang University, China

Diabetic wounds are recalcitrant to treatment and still affect millions of people worldwide annually. Vascular lesions caused by hyperglycaemia are known to severely impair wound healing capabilities in diabetic patients, revealing the importance of vessel network establishment promotion for proper repair. Exogenous electrical stimulation (ES) is a promising physical treatment of diabetic chronic wounds, because it could provide a directional vector to stimulate charged cells involved in wound healing by enhancing cellular migration. However, uncertainty remains regarding the best electrical ES parameters for diabetic wounds and the molecular mechanisms involved in promoting wound healing. Moreover, the application of ES is also inconvenient for patients. Here, we show that high voltage monophasic pulse current stimulation is the optimal parameter to improve diabetic wound healing and that surface electrode is better than insertion electrode for this purpose. In vitro experiments showed that monophasic pulse current stimulation enhanced the proliferation and migration capacity of human umbilical vein endothelial cells and promoted growth factors released via the Pi3k/Akt and Erk1/2 pathways. In order to create a more convenient process for the patients and provide an optimal environment for cell migration, we used flexible materials and chitosan (good moisture and antibacterial effects) to create a preliminarily design of a flexible ES device with chitosan-based dressing, which was proven to promote the healing of diabetic wounds through accelerating angiogenesis in vivo. Thus, our work provides favourableness support for the development of a more advanced product that may have clinical application for diabetic chronic wounds in the future.

11818375@zju.edu.cn