OMICS Group Conferences
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International Conference on
Dental & Oral Health

August 19-21, 2013 Embassy Suites Las Vegas, USA

Bone marrow stromal cells and orofacial pain relief

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Abstract

Some of the most prevalent and debilitating orofacial pain conditions are associated with deep tissues such as muscle, joint, nerve and viscera. The most common persistent orofacial pain condition, temporomandibular joint disorders, affects the musculoskeletal and joint tissues, is heterogeneous in origin, and often not successfully treated.Bone marrow stromal cells (BMSC)have generated considerable interest as a candidate for cell-based therapy. In our rat models of orofacial pain, we observed that a single systemic infusion of rat BMSC reversed pain hypersensitivity after injury of the tendon of the masseter muscle or infraorbital nerve. The attenuation of pain lasted for at least 4-5 months. The pain hypersensitivity was rekindled by naloxone, an opioid receptor antagonist, suggesting the involvement of endogenous opioids. We next performed RT-PCR, immunohistochemical and Western blot analyses to examine the effect of the BMSC on opioid receptor expression in the rostral ventromedial medulla (RVM), the major structure in descending pain modulation. In the RVM, mu-opioid receptor (MOR) mRNA was significantly upregulated at 1 week with a further increase at 8 weeks after the BMSC treatment. Western blot and immunohistochemistry confirmed upregulation of MOR expression in RVMfollowing the BMSC treatment. Further analysis indicates that the pain-relieving effect of BMSC requires monocyte/macrophage population of immune cells and BMSC-immune cell interactions mediated by certain chemotactic factors such as CCL4 and CCR2are critical in BMSC-produced pain relief. Our findings prompt studies to elucidate the cellular mechanisms of the BMSC-induced pain relieving effect and translate these observations into clinical settings.

Biography

Ke Ren completed his Ph.D studies in the University of Iowa and postdoctoral studies at National Institute of Dental and Craniofacial Research, National Institutes of Health. He is Professor in the Department of Neural and Pain Sciences, University of Maryland School of Dentistry. He has published more than 150 papers in reputed journals and has been serving as an editorial board member of *Pain*, *Journal of Pain*, *Evidence-Based complementary and alternative Medicine*, *Pain Research and treatment*, *The Open Pain Journal*,and *Odontology*.