

Short Communication

The use of transient receptor potential (TRP) channel agonist in promoting bone regeneration and anti-osteoporosis

Zhao-Gui Zhang, Wan-Chun Wang*, Zhi-Hong Li and Xin-Zhan Mao

Department of Orthopaedics, The Second Xiangya Hospital of Central South University, Middle-Ren-Min Road No. 139, Changsha, Hunan 410011, China.

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The hypothesis is that the use of transient receptor potential (TRP) channel agonist could be helpful in promoting bone regeneration and anti-osteoporosis.

Key words: Transient receptor potential channel, bone repair, bone regeneration, osteoporosis, pharmacology.

INTRODUCTION

Transient Receptor Potential (TRP) channel is a family of non-selectively cation-permeable channels. Previous studies showed that TRP channels are multifunctional, performing as various sensors of light, mechanical force and heat, for example (Minke and Cook, 2002). One important signaling transduction pathway mediated by TRP channel is that the Calcium ion influx into the soma following channel opening, leading to diverse cellular events. These include the bone development and metabolism as well. For instance, TRPV4 plays an important role in mechanosensation of the bone (Mizuno, 2008), activating osteoblasts and leads the bone remodeling. Additionally, TRPV5 null mice showed reduced bone thickness and weakened bone resorption (Hoenderop et al., 2003; van der Eerden et al., 2005). All these evidences suggest that TRP channels are critical gates for bone development and remodeling.

MATERIALS AND METHODS

The authors summarized the current advances in TRP channel agonists by literature review from Pub Med Search and relevant experiences in the field. The authors then investigated their potential applications in the field of bone regeneration as the bases for the hypothesis.

Currently many TRP channel agonists are available. For

instance, Capsaicin was found to be an effective TRPV1 agonist. Previous studies have tried topical, intravenous, intranasal, and oral routes of administration of capsaicin, and in the future localized delivery of capsaicin would be of clinical interest. Additionally, there were many molecules with agonist action on TRPV4 and TRPV5, respectively, including 4-phorbol 12, 13-didecanoate (4-PDD), GSK1016790A, etc (Tsushima and Mori, 2006; Vriens et al., 2007; Watanabe et al., 2002).

HYPOTHESIS AND CONCLUSION

Taken together, we hypothesize that enhancing the calcium transients through activating the TRP channel would provide a very helpful therapy for patients with bone fracture and osteoporosis by activating the osteoblasts. It will also be interesting to examine if currently available drugs exert their effects on TRP channels, and if so, how much the TRP channel contribute. We expect to put TRP channel agonists in slow releasing gel-scaffolds seeded with osteoblasts in biomaterial transplantation for bone repair.

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*Corresponding author. E-mail: wanchun_wang@yeah.net. Tel: 86-731-85295128.

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