Role of Spinal G Protein-Coupled Kinase 2 in electroacupuncture analgesia on inflammatory pain

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Abstract: Objective Acupuncture or electroacupuncture (EA) has been demonstrated as a powerful anti-hypernociceptive effect on inflammatory pain. The attenuation of G protein-coupled-receptor kinase 2 (GRK2) in spinal cord and peripheral nociceptors have been widely acknowledged to promote the transition from acute to chronic pain and to facilitate the nociceptive progress. What is the role of GRK2 in EA analgesia has not been studied. This study was designed to investigate the possible role of spinal GRK2 in EA anti-allodynia in a rodent model with complete Freund’s adjuvant (CFA) induced inflammatory pain. Methods CFA was subcutaneously injected into the plantar surface of one hind paw of the mice to induce an inflammatory response. Normal saline in the same volume was set as control. EA was applied to ST36 (“Zusanli”) and BL60 (“Kunlun”) one day after CFA injection. 2/100Hz alternating frequencies were selected and the intensity was 1-3mA. Sham EA group animals received needle insertion subcutaneously into ST36 and BL60 in the same depth but without electrical stimulation. AAV mediated GRK2 shRNA was injected into the spinal cord four weeks before CFA injection. Mechanical allodynia were assessed by von Frey test. The expression of GRK2 were assessed by Western blot. Results CFA i.pl. decreased the expression of GRK2 in spinal cord. However, repeated EA treatments reversed the GRK2 expression. Down-regulation of spinal GRK2 by AAV mediated GRK2 shRNA completely eliminated the anti-allodynic effect by EA treatment. Conclusion The
attenuation of spinal GRK2 completely reversed the anti-allodynia effect by EA treatment on inflammatory pain. The results supported that the spinal GRK2 played an important role in EA anti-allodynia on inflammatory pain.

**Keywords:** G protein-coupled-receptor kinase 2; electroacupuncture; inflammatory pain; spinal cord