



Acupoint catgut embedding attenuates cold stress-induced chronic pain through attenuation of TRPV1 signaling pathway in the mice brain



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Keywords : hyperalgesia, electroacupuncture, anti-nociception, inflammatory pain, voltage-gated sodium channels

Background & Aim :

Chronic pain is often defined as uncomfortable pain feeling that lasting for over 3 months in clinic. Chronic pain is an increasing international health problem that affects both individuals, insurance and society. Central sensitization is often found in chronic pain patients' brain, which is linked with increased neurotransmission in the central nervous system. Acupoint catgut embedding (ACE) is a novel type of Acupuncture that has been reported effective on pain management. ACE is a process to implant an absorbable catgut suture at local acupoint. Transient receptor potential vanilloid 1 (TRPV1) is a Ca²⁺ permeable cation channel that has been reported as inflammatory and pain detector in the brain. We aimed to explore the effects and mechanisms of ACE on cold stress-induced chronic pain via TRPV1 and related mechanisms in the murine model. Our data indicated a similar value among the all groups at basal condition. After cold stress, chronic mechanical and thermal hyperalgesia were induced (mechanical: 1.93 ± 0.14 g; thermal: 4.86 ± 0.23 s) and can be further reversed by ACE treatment (mechanical: 4.04 ± 0.15 g; thermal: 7.29 ± 0.3 s) and *Trpv1*^{-/-} (mechanical: 4.31 ± 0.16 g; thermal: 7.84 ± 0.23 s) mice. TRPV1 and related molecules were increased in the thalamus, medial prefrontal cortex (mPFC), anterior cingulate cortex (ACC) and somatosensory cortex (SSC) of chronic pain mice.

Materials & Methods :

We induced a mouse model of chronic pain by cold stress and observed related pain behaviors. ACE was performed at the Zusanli (ST36) acupoint. Mice mechanical hyperalgesia were evaluated using electronic von Frey filaments and thermal hyperalgesia were assessed using Hargraves' test. Furthermore, we observed TRPV1 and associated expression and quality in mPFC, SSC and ACC regions.

Results :

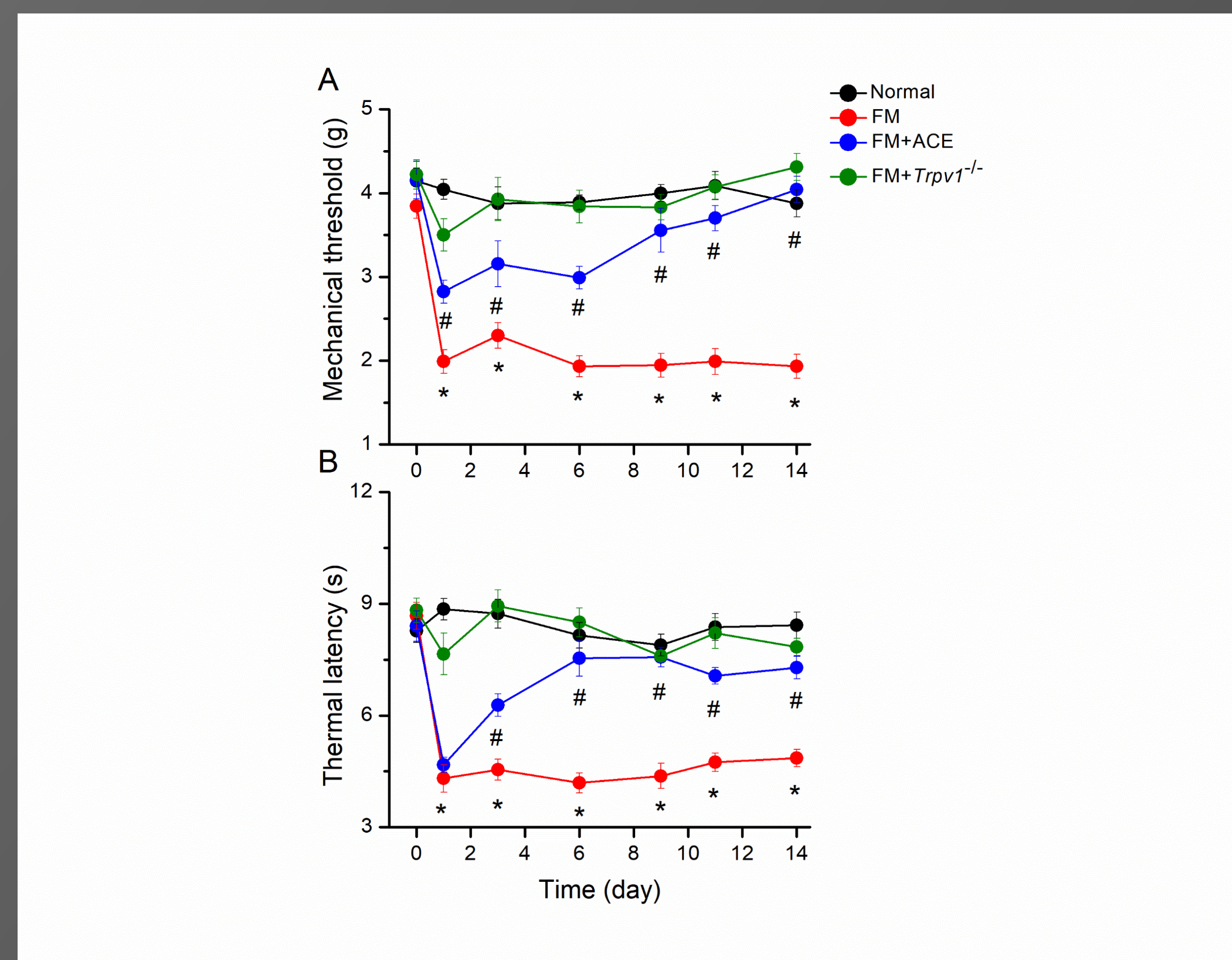


Figure 1. ACE or TRPV1 deletion attenuated FM-like pain in mice

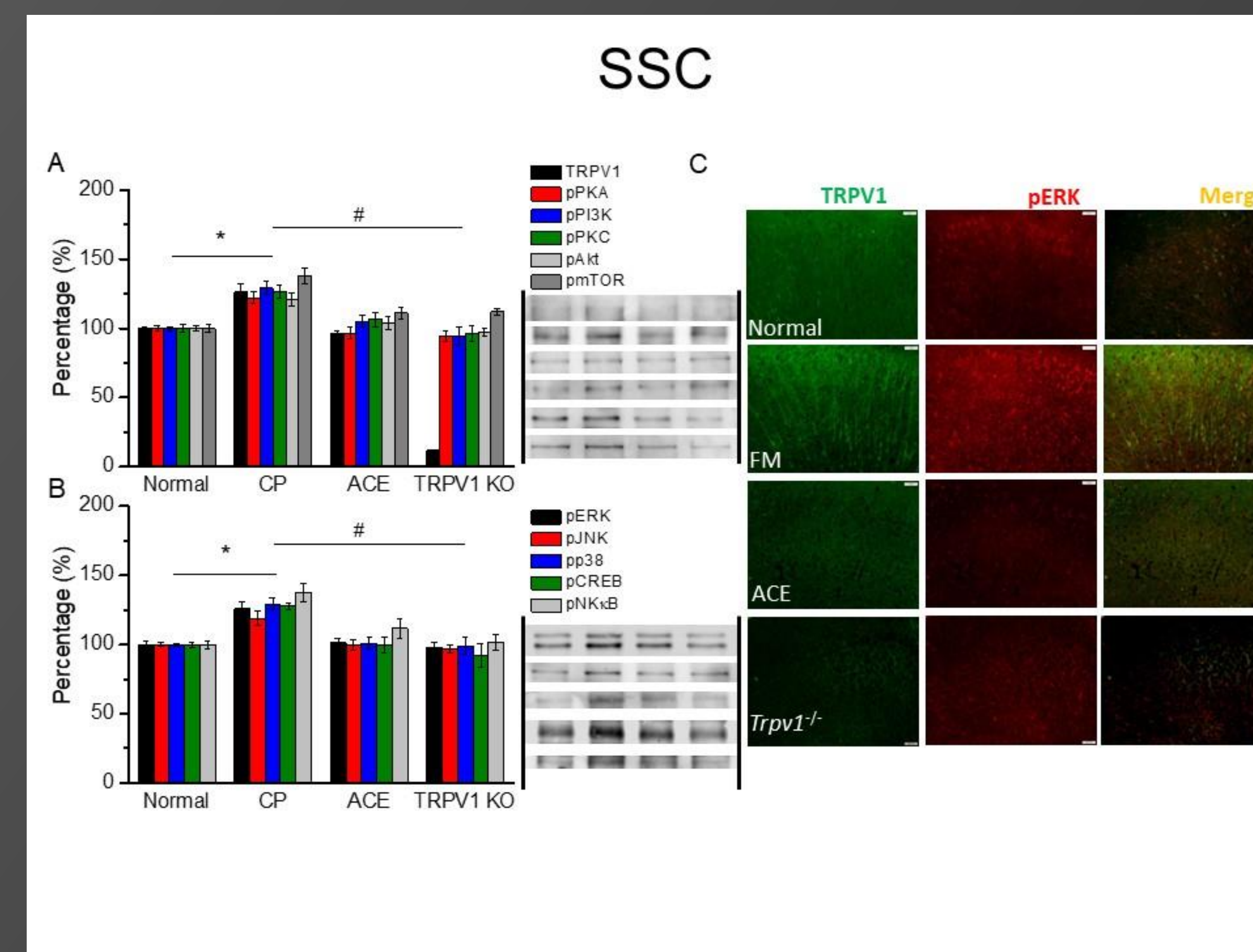


Figure 2 : ACE reduced FM through TRPV1 signaling pathways in the mice's somatosensory cortex

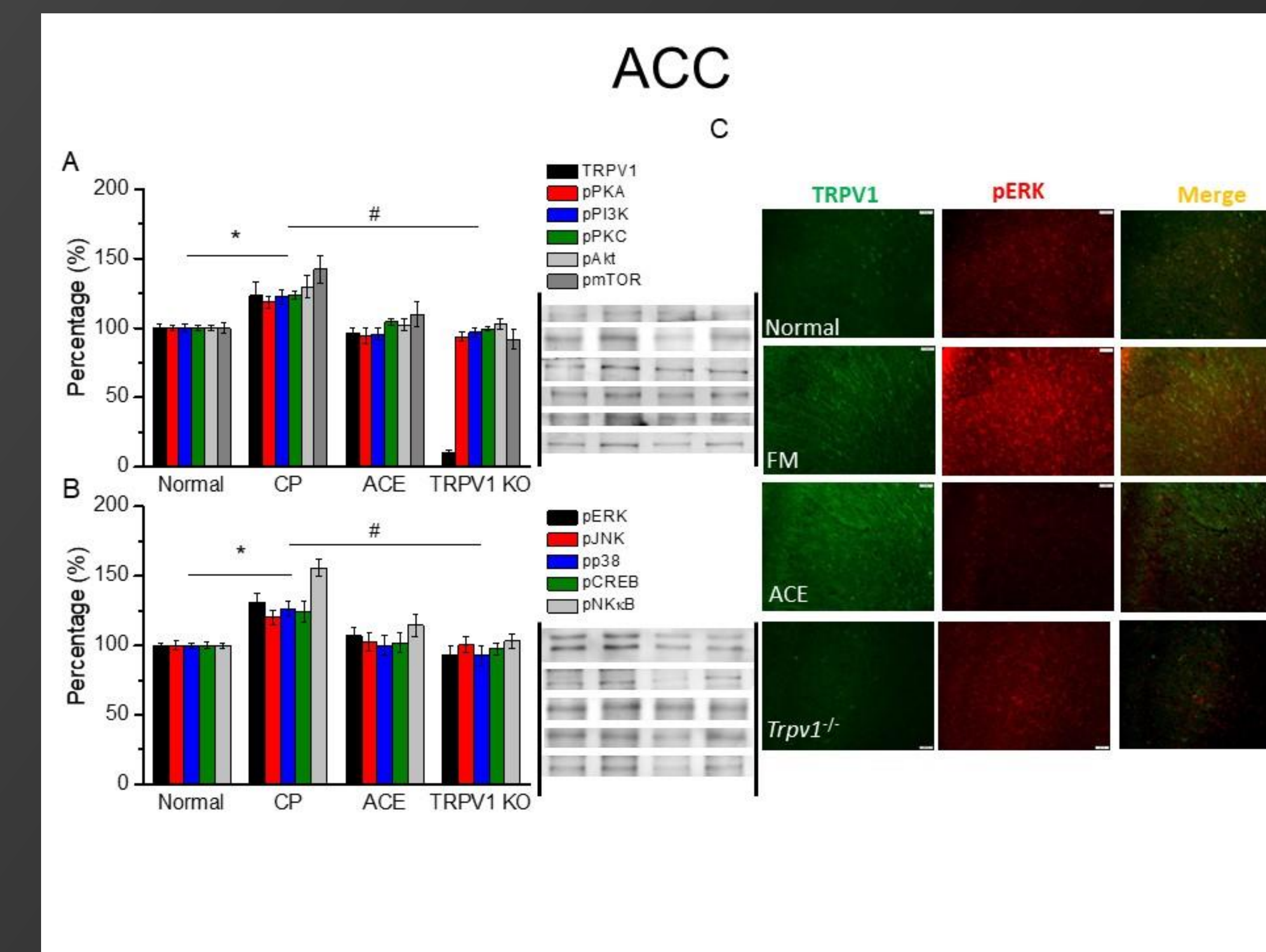


Figure 3: ACE reduced FM through TRPV1 signaling pathways in the mice's anterior cingulate cortex

DISCUSSION:

In the current study, our results cold stress significantly initiated mechanical the thermal hyperalgesia and ACE reliably reverse the nociception. In addition, chronic pain induction increased TRPV1 signaling pathway and related molecules in the nice thalamus, somatosensory cortex (SSC), and anterior cingulate cortex (ACC). Furthermore, ACE dramatically reduced these phenomena suggesting that TRPV1-induced central sensitization can be reversed. Our outcomes therefore specify that the analgesic effect of ACE is dependent on TRPV1 signaling in the mice brain. We provide novel evidence that ACE has therapeutic effect on cold stress-induced chronic pain through modulating the TRPV1 signaling pathway

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