

# Evaluating the Effect of Electroacupuncture in Knee Osteoarthritis: Protocol for a Multicenter Randomized Controlled Trial [Letter]

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## Dear editor

We read with great interest the research paper titled “Evaluating the Effect of Electroacupuncture in Knee Osteoarthritis: Protocol for a Multicenter Randomized Controlled Trial” by Chen et al, published in *Journal of Pain Research*.<sup>1</sup> The protocol applies multimodal functional magnetic resonance imaging (fMRI) to explore the mechanisms of electroacupuncture (EA) for knee osteoarthritis (KOA). This fills a notable gap in acupuncture research—the over-reliance on subjective scales and the lack of objective efficacy measures. At the same time, it represents a pioneering effort to clarify the central nervous system mechanisms by which EA relieves chronic pain in KOA.

The protocol uses the traditional Chinese acupuncture technique of “shu-ci” (deep needling to the periosteum) to generate a strong stimulus. According to traditional acupuncture theory, this method unblocks meridians and collaterals, regulates Qi and blood, and resolves stasis. The authors also employ multimodal fMRI—including resting-state fMRI, diffusion-weighted imaging (DWI), and MEGA-PRESS magnetic resonance spectroscopy—to assess structural, functional, and neurochemical dimensions, thereby validating and exploring the central neural mechanisms of shu-ci for chronic KOA pain. This innovative approach holds promise for investigating the “skin-brain axis” in KOA.<sup>2</sup> Combining traditional acupuncture theory with advanced neuroimaging reflects a cutting-edge trend in the deep convergence of clinical acupuncture research and neuroscience.<sup>3</sup> We are very interested in the study's potential, and we would like to offer a few thoughts on several key aspects of the protocol.

## Considerations on Deqi Sensation and Electroacupuncture Stimulation

Guided by the shu-ci theory, the protocol specifies 0.35 mm × 50 mm needles inserted deeply to the periosteum at each acupoint, followed by EA after achieving deqi. The EA parameters are standardized: dense-and-sparse wave, frequency of 2/100 Hz, and intensity of 2 mA for 30 minutes. However, KOA patients are mostly middle-aged or elderly, and their tolerance to electrical stimulation varies. Also, the thickness of periarticular tissue differs between individuals. So it remains unclear whether a fixed current intensity can consistently produce the intended deqi effect or stay within tolerable limits for all participants. We therefore suggest adding quantitative scales to record each patient's tolerance to electrical stimulation and the intensity of deqi. This would help in subsequent dose-response analyses correlating stimulation intensity with brain network responses.

## Limitations of the Sham Electroacupuncture Control

The control group receives blunt-tip needle and an unpowered EA device. Participants are told that “the current intensity may be below the threshold of human perception”—a clever design for blinding. But from a neurophysiological perspective, even without skin penetration, the weight of the blunt-tip needle can still stimulate low-threshold



subcutaneous mechanoreceptors. Once triggered, these signals travel to the somatosensory cortex.<sup>4</sup> This tactile input could cause signal fluctuations in the sham group during fMRI scans, which might bias the results. To mitigate this, we suggest modifying the sham device: replace tape-based fixation with a plastic bracket. The bracket would hold the blunt-tip needle so that its tip lightly touches the skin without exerting gravitational pressure. This change could effectively reduce unintended activation of low-threshold mechanoreceptors caused by needle weight.

## Concerns About Unblinding and Its Psychological Contamination of the “Skin-Brain Axis”

Most participants in the sham EA group are aware that genuine EA produces cutaneous sensations or muscle twitching and that real manual acupuncture induces a deep deqisensation. The absence of these feelings during treatment can easily lead to unblinding. The authors have clearly anticipated this limitation and wisely included the Bang Blinding Index (BBI) to assess blinding success at the end of week 2, which will help control data bias. However, in neuroimaging studies, the psychological collapse of patient expectancy caused by unblinding is a powerful neurobiological confounder that alters brain function signals. When patients realize they are in an inactive control group, their therapeutic expectations can instantly shift toward negative emotions such as disappointment or anxiety.<sup>5</sup> This expectancy shift, mediated by unblinding, can directly interfere with measured cortical neurotransmitter concentrations. The observed neuroimaging differences might then reflect the psychological stress of unfulfilled expectations after unblinding, rather than genuine physiological regulatory effects transmitted via the “skin-brain axis”. Therefore, we suggest that the authors include the BBI scores and the changes in psychological expectancy as nuisance covariates in a general linear model (GLM) to statistically isolate and control for these psychological confounders.

Overall, this is a well-conceived protocol with a rigorous design. We look forward to seeing the clinical and neuroimaging results when they become available. We believe the findings will provide higher-level evidence for acupuncture in treating knee osteoarthritis and will validate its efficacy from a neuroscience perspective.

## Disclosure

The authors report no conflicts of interest in this communication.

## References

1. Chen Y, Xie H, Ye M, Zhang L, Yuan A. Evaluating the effect of electroacupuncture in knee osteoarthritis: protocol for a multicenter randomized controlled trial. *J Pain Res.* 2026;19:606479. PMID: 42017150; PMCID: PMC13094769. doi:10.2147/JPR.S606479
2. He T, Zheng Y, Yan J, et al. Skin-Brain Axis: neural pathways in acupuncture treatment. *Chin Med.* 2025;20(1):163. PMID: 41053779; PMCID: PMC12502229. doi:10.1186/s13020-025-01213-y
3. Qu Y, Peng Y, Xiong Y, Dong X, Ma P, Cheng S. Acupuncture-related therapy for knee osteoarthritis: a narrative review of neuroimaging studies. *J Pain Res.* 2024;17:773–784. doi:10.2147/JPR.S450515
4. Makary MM, Lee J, Lee E, et al. Phantom acupuncture induces placebo credibility and vicarious sensations: a parallel fMRI study of low back pain patients. *Sci Rep.* 2018;8(1):930. PMID: 29343693; PMCID: PMC5772373. doi:10.1038/s41598-017-18870-1
5. Huneke NTM, Fusetto Veronesi G, Garner M, Baldwin DS, Cortese S. Expectancy effects, failure of blinding integrity, and placebo response in trials of treatments for psychiatric disorders: a narrative review. *JAMA Psychiatry.* 2025;82(5):531–538. PMID: 40072447. doi:10.1001/jamapsychiatry.2025.0085

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