

Editorial

Acupuncture's Effects on Intracranial Pressure: From Early Observations to Modern Insights

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Abstract

Understanding whether acupuncture can influence intracranial pressure (ICP) and cerebral hemodynamics remains a relevant and insufficiently explored question in contemporary neurovascular research. This editorial synthesizes early experimental observations with recent clinical and technological advances to reassess the cerebral effects of acupuncture from a modern perspective. Evidence from clinical studies indicates that acupuncture can alter cerebral blood flow velocity and regional perfusion, suggesting an interaction with cerebrovascular regulation beyond placebo-related mechanisms. Experimental models further support these findings by demonstrating improved cerebral perfusion, neuroprotection, and preservation of blood–brain barrier integrity following manual needle acupuncture or electroacupuncture stimulation. Recent advancements in non-invasive ICP monitoring, multimodal neurovascular assessment, and computational modelling enable a more precise evaluation of subtle changes in pressure and flow than was previously possible.



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Although definitive clinical data on sustained or therapeutic ICP modulation remain limited, the reproducibility of cerebral physiological responses highlights the importance of careful monitoring, particularly in patients with altered autoregulation or reduced intracranial compliance. Revisiting early acupuncture research with contemporary methodologies may enhance safety assessments and help define the role of acupuncture as a neuromodulatory intervention with effects on cerebral physiology.

Keywords

Acupuncture; intracranial pressure; cerebral blood flow; non-invasive ICP monitoring; neuromodulation; cerebral hemodynamics

1. Introduction

More than twenty years ago, pioneering experimental work by Litscher G. et al. [1] provided one of the first objective demonstrations that acupuncture can influence central cerebral parameters [1]. Utilizing transcranial Doppler sonography alongside complementary monitoring techniques, we revealed that stimulation of specific acupuncture points — through acupressure, manual needle acupuncture, electroacupuncture, and laser needle acupuncture — can induce measurable changes in cerebral blood flow velocity and reversible increases in intracranial pressure (ICP) in selected clinical contexts. At the time, these findings challenged the prevailing view that acupuncture effects were largely peripheral or subjective.

With modern neuroimaging, non-invasive ICP monitoring, and computational modeling of cerebral hemodynamics, these early observations can now be revisited under far more robust methodological conditions. What was once considered exploratory is increasingly recognized as physiologically plausible: acupuncture appears capable of modulating neurovascular coupling, cerebral perfusion, and ICP-related dynamics (Figure 1) [2-6].

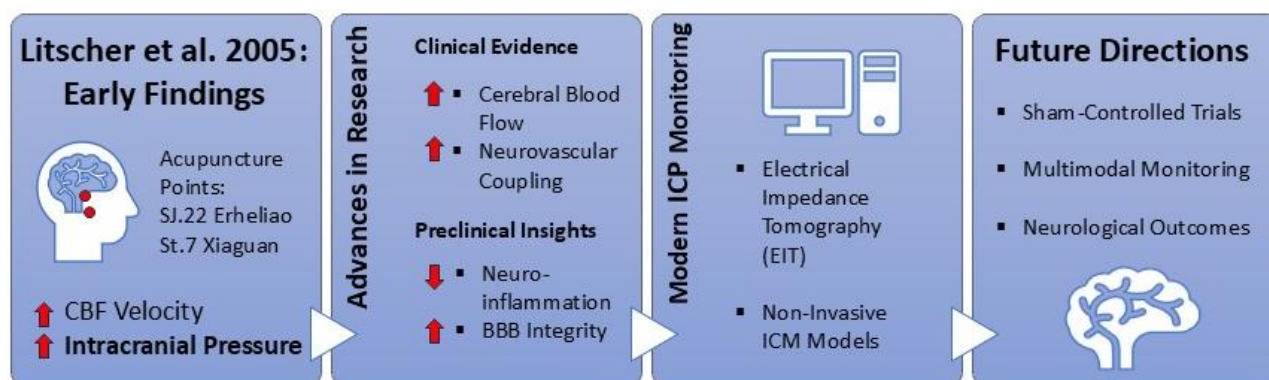


Figure 1 Summary of acupuncture-induced modulation of cerebral blood flow and intracranial pressure (ICP). Left panel: historical context (Litscher et al. 2005 [1]) showing stimulation of acupuncture points St.7 (Xiaguan) and SJ.22 (Erheliao), with Doppler-monitored changes in blood flow velocity and ICP. Right panels: modern 2026 clinical setting with advanced non-invasive ICP monitoring, transcranial Doppler, and neuroimaging. Arrows illustrate increases and decreases in cerebral blood flow and pressure, highlighting reproducible neurovascular responses over time (CBF Cerebral Blood Flow; BBB Blood–Brain Barrier).

2. Cerebral Blood Flow Modulation by Acupuncture

Clinical studies over the past two decades have consistently demonstrated that acupuncture can influence cerebral blood flow (CBF). Randomized controlled trials involving patients with cerebrovascular disease have increases in mean blood flow velocity in the middle cerebral artery and vertebrobasilar circulation following acupuncture compared with sham or standard therapy alone [2, 3]. These changes suggest a direct physiological effect on cerebrovascular tone, beyond placebo-related mechanisms.

Functional neuroimaging studies further support these findings, revealing region-specific perfusion changes after acupuncture [4]. These effects are consistent with targeted modulation of neural networks and autonomic regulation rather than global, non-specific changes in cerebral perfusion.

3. Mechanistic Insights from Experimental Research

Preclinical studies provide mechanistic explanations for these observations. Electroacupuncture in animal models of cerebral ischemia improves regional cerebral blood flow, enhances collateral circulation, and reduces neuronal damage via cholinergic and nitric oxide-dependent pathways [5]. Moreover, recent meta-analyses indicate that acupuncture can preserve blood–brain barrier integrity and reduce cerebral edema formation [6], suggesting a potential indirect influence on ICP.

4. Modern ICP Monitoring and Methodology

A significant limitation of early studies was the lack of sensitive, non-invasive ICP monitoring. Recent advances, including electrical impedance tomography and multimodal neurovascular monitoring, allow real-time assessment of cerebral perfusion and ICP surrogates without invasive probes [7]. Additionally, computational models integrating arterial pressure, cerebral blood flow,

and ICP dynamics now permit sophisticated simulations of subtle neuromodulatory effects [8]. These methodological innovations make it possible to revisit the early findings of Litscher et al. [1] with contemporary rigor.

5. Clinical Implications and Future Directions

The evidence accumulated until 2026 suggests that acupuncture induces reproducible functional changes in cerebral hemodynamics. While large-scale clinical data confirming clinically meaningful ICP modulation in humans are still limited, the physiological plausibility and safety considerations warrant renewed attention, particularly for patients with impaired autoregulation or reduced intracranial compliance, such as those with traumatic brain injury, hydrocephalus, or post-stroke edema.

Future studies should focus on:

- Prospective, sham-controlled designs incorporating multimodal cerebral monitoring, including non-invasive ICP surrogates.
- Standardized acupuncture protocols with clearly defined points and stimulation parameters.
- Translational approaches linking physiological endpoints to clinically meaningful outcomes.

Revisiting the pioneering work of Litscher et al. [1] with modern technology and neurovascular understanding may clarify both safety considerations and potential therapeutic implications, positioning acupuncture as a credible neuromodulatory intervention with measurable effects on cerebral physiology.

6. Conclusion

Accumulating evidence indicates that acupuncture can induce reproducible changes in cerebral blood flow and related intracranial dynamics. While definitive clinical proof of sustained intracranial pressure modulation is still limited, advances in non-invasive monitoring and neurovascular assessment now allow these effects to be evaluated with greater precision. Revisiting early experimental findings with contemporary methodologies is essential to refine safety considerations and clarify the potential role of acupuncture as a neuromodulatory approach that influences cerebral physiology.

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Competing Interests

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AI-Assisted Technologies Statement

An AI tool (ChatGPT-5, OpenAI, 2025) was used for the initial translation of this contribution from German into English. The author has carefully reviewed and edited the final version, which was also polished by a native speaker. The author takes full responsibility for the content of the manuscript.

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