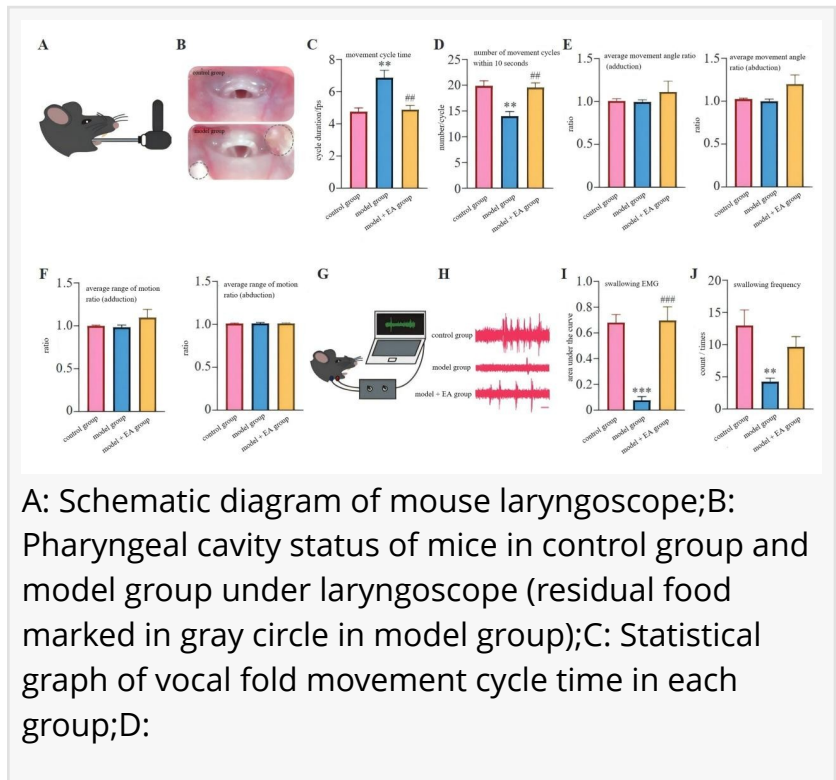


# How “Lianquan” helps stroke survivors swallow again: tracing the brain's hidden wiring

GA, UNITED STATES, June 30, 2026

[/EINPresswire.com/](https://EINPresswire.com/) -- After a stroke, nearly half of patients struggle to swallow – a dangerous condition called post-stroke dysphagia (PSD) that can lead to malnutrition, pneumonia, or even death. A new study in mice shows that electroacupuncture at a single acupoint, “[Lianquan](#)” (CV23), significantly improves swallowing-related function. Researchers discovered that this effect relies in part on the hypoglossal nucleus (12N) – a brainstem region that sends direct nerve projections to the tongue muscles involved in swallowing. The findings reveal a neural link between “Lianquan” (CV23) and brainstem motor control, offering a biological basis for a widely used clinical treatment. This study identified the hypoglossal nucleus (12N) as a key “output gate” for electroacupuncture’s effect on PSD.



Swallowing is a complex act requiring precise coordination of the mouth, throat, and voice box. After a stroke, damage to the brain's motor cortex can disrupt swallowing-related neural commands, leaving patients unable to clear food or liquid from their throat safely. Located on the anterior midline of the neck, above the hyoid bone, “Lianquan” (CV23) sits in a region closely related to tongue movement and swallowing. Acupuncture at “Lianquan” (CV23) has long been used in clinical practice to treat PSD, yet how signals from this region reach the brain to help restore swallowing-related movement has remained unclear. Previous studies suggested that the primary motor cortex and brainstem swallowing centers are involved, but a key downstream motor output pathway underlying these effects had not been directly confirmed. This gap motivated the research team to investigate the role of the hypoglossal nucleus (12N) in electroacupuncture’s effects on swallowing.

Researchers from Guangzhou University of Chinese Medicine have now identified a key brainstem motor node that helps explain how electroacupuncture at “Lianquan” (CV23) improves swallowing-related function after a stroke. Published in a recent issue of *Acupuncture Research* (published on August 25 2025), the study used viral tracing, chemogenetic inhibition, and laryngoscopy in a mouse model of PSD to show that the hypoglossal nucleus (12N) is both structurally connected to the acupoint and functionally important for the treatment’s effect. The team also traced upstream brain regions projecting to 12N, providing a broader view of how central swallowing networks connect with motor output.

The team showed that the hypoglossal nucleus (12N) sends direct, monosynaptic projections to tissues around “Lianquan” (CV23), providing structural evidence of a neural link between this acupoint and a brainstem motor center. In mice with stroke-induced swallowing deficits, a single 15-minute session of electroacupuncture (2 Hz, 1 mA) at “Lianquan” (CV23) improved vocal cord movement cycles and increased swallowing-related muscle electrical activity, as measured by laryngoscopy and electromyography (EMG). When researchers used a chemogenetic virus to silence the hypoglossal nucleus (12N) in healthy mice, swallowing muscle activity dropped significantly – suggesting that this nucleus normally supports swallowing. More importantly, in stroke mice, silencing the hypoglossal nucleus (12N) significantly attenuated the benefits of electroacupuncture: vocal cord movement slowed, and muscle activity returned to impaired levels.

Finally, by tracing the upstream inputs to the hypoglossal nucleus (12N) using a retrograde trans-monosynaptic virus, the team identified several brain regions known to control swallowing, including the nucleus tractus solitarii (NTS), the intermediate reticular nucleus (IRt), the spinal trigeminal nucleus caudalis (SP5C), and the lateral paragigantocellular nucleus (LPGi). Among these, the NTS is a core component of the brainstem’s swallowing central pattern generator. Together, the results position the hypoglossal nucleus (12N) as a critical “output gate” through which electroacupuncture at “Lianquan” (CV23) improves swallowing-related deficits in PSD.

“The findings revealed a direct structural connection between a brainstem motor nucleus and the acupoint,” the authors said. “This indicates that ‘Lianquan’ (CV23) is not just a local muscle point – it is anatomically linked to brainstem motor circuits involved in swallowing. When we chemically inhibited the hypoglossal nucleus (12N), the acupuncture effect was markedly reduced. That means 12N is a critical output node. Our next big question is: how does the needle signal travel back up to the brain in the first place?”

This study provides a mechanistic foundation for using electroacupuncture at “Lianquan” (CV23) in post-stroke dysphagia (PSD) rehabilitation. Beyond acupuncture, the findings highlight the hypoglossal nucleus (12N) as a potential target for future swallowing rehabilitation. Hypoglossal nerve stimulation is already used clinically for obstructive sleep apnea, but not yet established for swallowing disorders. Together, these findings point to new directions for future swallowing rehabilitation, including hypoglossal nerve-based neuromodulation and further study of 12N’s

upstream brainstem inputs – such as the nucleus tractus solitarii (NTS) and intermediate reticular nucleus (IRt). For now, the work strengthens the case for integrating electroacupuncture into early post-stroke care, not as a general reflex treatment but as a precisely targeted neural intervention.

#### References

DOI

[10.13702/j.1000-0607.20250444](https://doi.org/10.13702/j.1000-0607.20250444)

Original Source URL

<https://dx.doi.org/10.13702/j.1000-0607.20250444>

#### Funding Information

General Program of the National Natural Science Foundation of China (Nos. 82374573, 82474623).

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