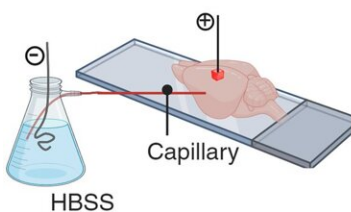


Study shows new, more precise way to deliver medicine to the brain

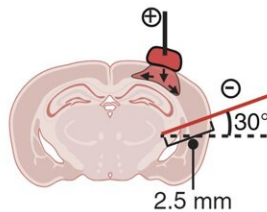
August 9 2024

Ex vivo

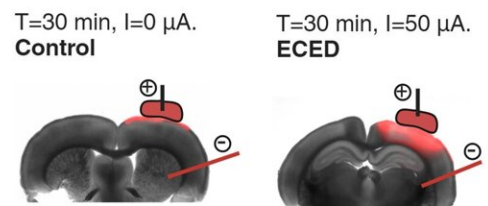
a Experimental setup



b ECED configuration

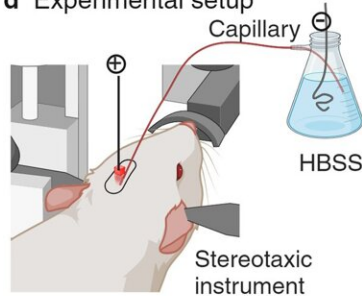


c Experimental conditions

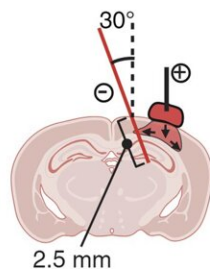


In vivo

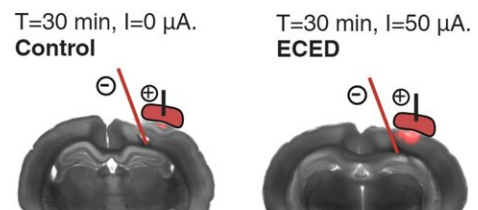
d Experimental setup



e ECED configuration



f Experimental conditions



Schematic of experimental setup for ECED transport. Credit: *Communications Biology* (2024). DOI: 10.1038/s42003-024-06404-1

Houston Methodist researchers have discovered a more accurate and timely way to deliver life-saving drug therapies to the brain, laying the groundwork for more effective treatment of brain tumors and other neurological diseases.

In a study, titled "Electrokinetic convection-enhanced delivery for infusion into the brain from a hydrogel reservoir," [published](#) in *Communications Biology*, investigators used an [electric field](#) to infuse medicine from a reservoir outside the brain to specific targets inside the brain.

This adds a new dimension to the 30-year-old process of injecting therapeutics into the brain through convection-enhanced delivery (CED), which uses continuous pressure over time to inject a fluid containing therapeutics into the brain. Because CED follows the path of least resistance, therapeutics don't always hit the target.

Introducing an electrical field to the process—called electrokinetic convection-enhanced delivery or ECED—gives surgeons the power to design the delivery path and potentially cover brain lesions and tumors better.

"Delivering therapeutics by way of ECED has many applications," explained Dr. Amir Faraji, principal investigator and Houston Methodist neurosurgeon.

"It has the potential to improve [gene therapy](#) and tumor treatment, as well as treatment for [traumatic brain injury](#) and [degenerative diseases](#)—any number of situations where we need to get vital treatments to the brain in a more targeted manner."

Delivering the correct dosage of drugs to the right place in the brain has long been a challenge. The same natural blood-brain barrier that protects our brains from toxins and pathogens can also block delivery of important medical treatments. Further research is needed before Faraji and team can bring this investigational therapy to humans.

A "Behind the Paper" [blog on the study](#)—by Houston Methodist

research scientist and co-author Jesus G. Cruz-Garza—explains how ECED can infuse macromolecules into the brain from a hydrogel reservoir placed at the brain's surface.

"The brain acts as a charged porous scaffold that, in the presence of an electric field, allows for electroosmosis: bulk fluid flow in a [porous media](#)." From the hydrogel reservoir, Cruz-Garza explains, this bulk flow of fluid enables the delivery of therapeutic agents.

More information: Jesus G. Cruz-Garza et al, Electrokinetic convection-enhanced delivery for infusion into the brain from a hydrogel reservoir, *Communications Biology* (2024). [DOI: 10.1038/s42003-024-06404-1](#)

Provided by Houston Methodist

Citation: Study shows new, more precise way to deliver medicine to the brain (2024, August 9) retrieved 9 August 2024 from <https://medicalxpress.com/news/2024-08-precise-medicine-brain.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--