

Propping open the door to the blood brain barrier

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The treatment of central nervous system (CNS) diseases can be particularly challenging because many of the therapeutic agents such as recombinant proteins and gene medicines are not easily transported across the blood-brain barrier (BBB). Focused ultrasound can be used to "open the door" of the blood brain barrier. However, finding a way to "prop the door open" to allow therapeutics to reach diseased tissue without damaging normal brain tissue is the focus of a new study by a team of researchers at the Institute of Biomedical Engineering at National Taiwan University presenting at the 57th Annual Meeting of the Biophysical Society (BPS), held Feb. 2-6, 2013, in Philadelphia, Pa.

The group is investigating the feasibility of using heparin, a common anticoagulant, to enhance the delivery of therapeutic macromolecules using ultrasound into the brain. Heparin could be employed to increase treatment efficacy in patients with different types of CNS diseases under the guidance of medical imaging system providing new hope in these challenging cases. Initial results show that heparin does have the potential to optimize therapeutic delivery with ultrasound, acting as a "doorstop," allowing drugs to better permeate the BBB and enhancing treatment success.

"A higher acoustic pressure and longer sonication, and/or a higher dose of microbubbles may increase the delivery of drugs or tracers into the sonicated brain tissue," explains Kuo-Wei Lu, a member of the research team, "but side-effects, such as microhemorrhage, can also increase dramatically. The results of this study indicate that heparin may offer a

safer way can to enhance the delivery of therapeutics to patients with CNS diseases."

With these encouraging results, the next step for the team is to develop a focused [ultrasound system](#) with [Magnetic Resonance Imaging](#) (MRI) guidance to establish suitable parameters needed for patient clinical trials. "Focused ultrasound sonication is a [noninvasive technology](#) capable of localized and transient BBB opening for the delivery of CNS therapeutics," Lu states. "We hope by developing suitable parameters and using chemical enhancers like heparin, this can be a valuable tool in the treatment of patients with CNS diseases, opening the door to better patient outcomes."

More information: Presentation #3539-Pos, "Impact of initial vascular permeability and recovery speed of disrupted blood-brain barrier on nanodrug delivery into the brain tissue," will take place at 10:30 a.m. on Wednesday, Feb. 6, 2013, in the Pennsylvania Convention Center, Hall C. ABSTRACT: tinyurl.com/adycds6

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