

Targeted Neuronal Injury for the Non-Invasive Disconnection of Brain Circuitry

Wilson Wang^{*1}, Yanrong Zhang^{*2}, Matthew J. Anzivino¹, Edward H. Bertram³, James Woznak^{1,4}, Alexander Klibanov⁵, Erik Dumont⁶, Max Wintermark^{*2}, Kevin S. Lee^{*1,7,8}

¹Department of Neuroscience, University of Virginia ²Department of Radiology, Stanford University ³Department of Neurology, University of Virginia

⁴Global Internship Program, Focused Ultrasound Foundation ⁵Department of Medicine, University of Virginia ⁶Image Guided Therapy ⁷Department of Neurosurgery, University of Virginia ⁸Center for Brain, Immunology, and Glia, University of Virginia

* These authors contributed equally

Corresponding Author

Kevin S. Lee
ksl3h@virginia.edu

Citation

Wang, W., Zhang, Y., Anzivino, M.J., Bertram, E.H., Woznak, J., Klibanov, A., Dumont, E., Wintermark, M., Lee, K.S. Targeted Neuronal Injury for the Non-Invasive Disconnection of Brain Circuitry. *J. Vis. Exp.* (), e61271, doi:10.3791/61271 (2020).

Date Published

September 27, 2020

DOI

10.3791/61271

URL

jove.com/video/61271

Materials

Name	Company	Catalog Number	Comments
7T-ClinScan MRI System	Bruker Biospin, Ettinglen, Germany		MR Image Acquisition
Acoustic Gel	Litho CLEAR	11-601	High Viscosity Acoustic Transmission Gel
DPX Mounting Medium	Electron Microscopy Sciences	13512	Resin Based Cover Glass Mountant
Fluoro-Jade B	EDM Millipore	AG310	High Affinity Stain For Degenerating Neurons
Fluovac anesthetic adsorber	Harvard Apparatus	34-0388	Organic Anaesthesia Scavenger
FUS System	Image Guided Therapy, Pessac, France	LabFUS	MR Compatible Small Animal Focused Ultrasound System
Gadodiamide	GE Healthcare AS, Oslo, Norway	Omniscan	MR Contrast Agent
Heparin	SAGENT	NDC2502140010	Anti-Coagulant
Hypodermic needle 30G x 1/2	Becton-Dickinson	26027	Tail Vein Catheterization
Insulin syringe 28G1/2 (1ml)	EXEL	26027	Administration of Injectables to Tail Vein Catheter
Isoflurane atomizer	SurgiVet	VCT302	Anaesthesia Administration
Isoflurane	Henry Schein	NDC1169567762	Anaesthesia
KMnO ₄	Sigma	223468	Reagent Used in Fluoro-Jade B Staining
Microbubbles	Produced internally: A. Klibanov	305106	Blood Brain Barrier Disrupting Agent
Microbubbles (commercial source)	Lantheus Medical Imaging, North Billerica, MA	Definity microbubbles	Blood Brain Barrier Disrupting Agent
Monitoring & Gating System	Small Animal Instruments	Model 1030	Respiration Monitoring
Multisizer 3 Coulter counter	Beckman-Coulter, Hialeah, FL	Multisizer 3	Used to Determine Average Size of Microbubbles
Optixcare EYE LUBE	CLC MEDICA, Ontario, Canada	11611	Corneal Protectant-Eye Lube
PE10 tubing	Becton-Dickinson	427401	Tail Vein Catheter Component

Quinolinic Acid	Santa Cruz Biotechnology, Dallas, TX	CAS 89-00-9	Neurotoxin
Sprague-Dawley Rats	Taconic Biosciences	SD-M	Rat Model
Syringe Pump	Carnegie Medicin	CMA 100	Controlled Delivery of Quinolinic Acid
Thermoguide Software	Image Guided Therapy, Pessac, France	Thermoguide	Drives Lab FUS System
Tish Rats	In-house colony		Rat Model
Veet depilatory cream	Reckitt Benckiser		Removal of Scalp Hair